Electrical Multimeter

MMW02

Installation & Operation Manual

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Serie: MMW02

Language: English

SUMMARY

1 INTRODUCTION

This manual describes how to install, configure and operate the MMW02 Electrical Multimeter. Screens show factory defaults (or data without measures). To ensure operator's safety, as well as equipment's integrity and its proper use, read this manual carefully.

1.1 CALIBRATION EXPIRY TERM

We suggest that the equipment returns to WEG for recalibration after 1 (one) year from the invoice issue date.

For calibration, WEG uses The International Standard Omicron CMC 256. Your equipment was calibrated by a direct comparison method. The results obtained can be supplied in a calibration report, which shows measurement values, given by the equipment under test, compared to standard values.

1.2 CONFORMITY DECLARATION

MMW02
Electrical Multimeter

Manufacturer:
WEG Equipamentos Elétricos - Automação
Av. Pref. Waldemar Grubba, 3000
89256-900 Jaraguá do Sul, SC - Brasil
www.weg.net

1.2.1 Reference Standards

- IEC 61557-12 : Electrical safety in low voltage distribution systems up to 1.000 V a.c. and 1.500 V d.c. Equipment for testing, measuring or monitoring protective measures Part 12: Performance Measuring and Monitoring Devices (PMD)
- IEC 61000-4-2 : Electrostatic Discharge (B)
- IEC 61000-4-3 : Radiated EM Field Immunity (A)
- IEC 61000-4-4 : Electric Fast Transient (B)
- IEC 61000-4-5 : Surge Immunity (B) - IEC61000-4-5
- IEC 61000-4-6 : Conducted Immunity
- IEC 61000-3-2 : Limits for harmonic current emissions
- IEC 62052-11 : Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
- IEEE 754-2008 : IEEE Standard for Floating-Point Arithmetic IEEE Computer Society (August 29, 2008)
- ABNT NBR 14519 - Electronic meters of electricity (static) - Specification
- ABNT NBR 14520 - Electronic meters of electricity - Test methods
- ABNT NBR 14521 - Acceptance of lots of electronic meters of electricity - Procedure

1.3 SAFETY INFORMATION

This equipment operates through high voltages; in addition, it was designed to operate in high power electrical systems. Therefore, it must be operated carefully to avoid fire or electrical shocks. For these reasons, read these instructions carefully and get familiar with the equipment before attempting to install and operate it.

DANGER!
It indicates an imminent risk.
If proper cares is not taken, it may result in death or cause serious damage.

ATTENTION!
It indicates a potentially dangerous situation.
If proper care is not taken, it may result in fainting or moderate injuries to the user. It may also compromise the equipment.

TIP!
It indicates a user suggestion, which can be used in several different contexts, helping the user with the equipment.

1.3.1 Dangers

- Only technically qualified people must install and operate this equipment
- You must have knowledge about the equipment before operating it
- Get to know the characteristics of the system where the equipment will be installed
- Never work alone
- Do not take measurements in any environments with risks of flammable gases. The use of the equipment can generate sparks, which can unleash an explosion
- Do not take measurements if your hands or the surfaces are wet
- Do not exceed the maximum allowable limits for any measurement range
- You must connect the voltage and current measurement cables on the equipment before connecting them on the circuit under test
- Never disconnect the voltage measurement cables or the current sensors cables while the instrument is in use
- Never take measurements if the equipment displays some abnormal condition, such as cable insulation failure or exposed metal parts

1.3.2 Attention

- Do not install extra components or make any modifications on the equipment
- If necessary, contact the technical assistance in case of operation failures, repairs, or calibration
- Do not pull, step on, or put heavy things on any equipment's cables
- Do not to place the cables on hot surfaces
- If the equipment starts producing smoke, overheating, or venting strange smells, unplug it immediately, and if it does not represents risk, remove the current's sensors and voltage measurement cables. When this occurs, contact technical assistance
- Always use appropriate EPIs when using this type of equipment
- Be careful with the conductors under test, they may be hot
- Do not place the equipment on strong vibrations or subject it to strong mechanical shocks
- Do not expose the equipment to high temperatures and humidity
- Do not use abrasives and solvents to clean the equipment
- Do not store the instrument if it is damp or wet

1.4 RECEIVING THE PRODUCT

The MMW02 leaves the factory packed in a box built to protect the equipment against any possible damage during transportation. Upon receipt, check its condition. If any item is visually damaged, contact the manufacturer immediately by the means indicated in Technical assistance section.

1.5 TECHNICAL SUPPORT AND ASSISTANCE

WEG has a technical team trained to clarify anything referring to the equipment and software's use.
To contact technical assistance, use the following means:

E-mail: astec@weg.net

If it turns out to be necessary, sending the equipment back to the factory for repairs, or calibration, use the following address:

WEG Equipamentos Elétricos - Automação
Assistência técnica
Av. Pref. Waldemar Grubba, 3000
89256-900 Jaraguá do Sul, SC
Brasil

The equipment must be sent along with the invoice Shipment to repair and the Technical's Assistance report fulfilled. In Brazil, use the following codes for fiscal classification of the operation (CFOP):

- 5915 for invoices issued in the state of Santa Catarina (SC)
- 6915 for invoices issued in other states.

To avoid possible damage that may happen during transportation, we recommend that the equipment should be carefully packed.

2 OVERVIEW

MMW02 is an electronic multimeter with extensive capacities to perform measurement of electrical quantities. Projected to be used in different applicability related to electric power generation and distribution enabling its users to monitor and to control it.

2.1 MEASURE OF BASIC QUANTITIES

Using methods based on international standards, the MMW02 measures basic electrical quantities such as voltage, current and frequency. In addition, it measures power, power demand and energy consumption in all four quadrants. One can use it in all stages of electricity's generation and distribution as well as electricity's consumption. The same equipment can be used to monitor instantaneous and statistical values providing accurate and reliable results. It is possible to read all quantities on its display or remotely through software.

2.2 THD CALCULATION

The equipment calculates the Total Harmonic Distortion (THD) according to IEC 61000-4-7, and one can view in the equipment the THD values for current and voltage.

2.3 DATALOG

It is possible to set up data groups (instantaneous, statistics, demand and energy) to be recorded. The product allows setting recording intervals according to ranges, from 1 second to 24 hours. It is possible to stop recording at a given date and time, by setting a number of records to be recorded, or stopping it manually. This is an optional functionality and it is featured in some models only.

2.4 COMMUNICATION

In order to fulfill the needs of integration with existing systems, the MMW02 provides a standard RS-485 serial communication interface using the Modbus RTU protocol. Hereby, it is possible to build a network of devices using global platforms.

2.5 CONNECTION MODES

Because there is a wide variation of connection modes, the MMW02 can be used in many different system configurations. The connection modes include basic systems such as single-phase and three-phase, 4-wires star or 3-wires delta and extend to more specific systems such as open delta, 4-wires delta (High leg) and varies in the number of elements for measuring voltage and current. As a whole, there are 21 available connection modes.

2.6 POWER MANAGER SOFTWARE

By Using WEG's Power Manager software, it is possible to analyze graphically (only available on specific versions) the performed measurements and generate specific reports for the selected quantities. In addition, it is possible to perform online readings on networked devices, enabling complete monitoration. It is also possible to download measurement data recorded on the mass memory. The WEG Power Manager also allows remote configuration of all parameters of MMW02, avoiding the necessity of going into the field to set up the meter, allowing more efficiency on maintenance services.

2.7 MODELS

The MMW02 is available in different models to attend specific applications according to its customers. Model variations are related to the inclusion, or not, of a mass memory.

A complete list of MMW02 series' models, as well as other information about this meter, is available at the WEG Automation's website (www.weg.net).

2.8 ACCESSORIES

Besides the different models that are available, WEG Automation also provides a series of accessories that can be used with MMW02. Some of these accessories can be used, e.g., to convert from RS-485 to USB 2.0 or Ethernet. The complete list of available accessories is presented at WEG Automation's website (www.weg.net).

ATTENTION!
WEG Automation recommends using only original accessories and cannot be hold responsible for the use of third-party accessories.

2.9 FRONT PANEL

The MMW02 has a user interface composed by a LCD display and a membrane keyboard. Figure 2.1 illustrates the front panel. Table 2.1 describes the parts that set the front panel.

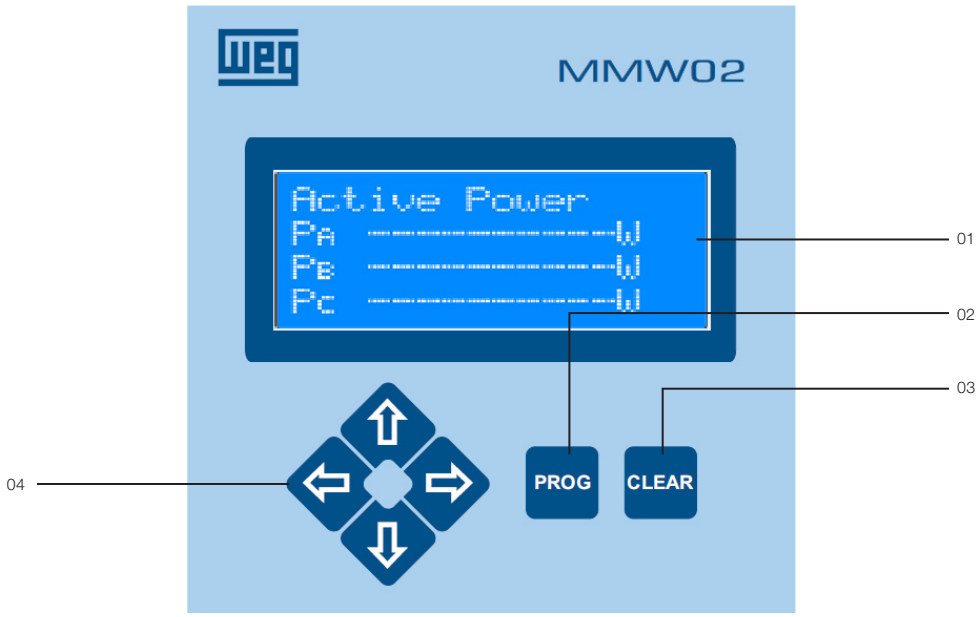


Figure 2.1: Front panel

Number	Description	
1	4 rows by 16 columns Cristal-liquid display with backlight. It shows measurement values and data configuration Rounding values on the display depend on the binary representation of numbers in IEEE 754 format	
2	PROG	Confirms choice or enters configuration mode
3	CLEAR	Cancels choice or exits configuration mode and returns one level up in the menu. Keep holding to return the equipment to factory standard during its initialization (this option will not delete the password protection)

Number	Description	
4		Moves menu up or increment variables
		Moves menu or cursor to the left
		Moves menu down or decrement variables
		Move menu or cursor to the right

Table 2.1: Front panel

2.10 REAR PANEL

On MMW02's rear panel it is possible to make connections to power supply, voltage and current, communication and relay. Figure 2.2 illustrates the eyebolt-type connector terminal and table 2.2 describes how to use it.

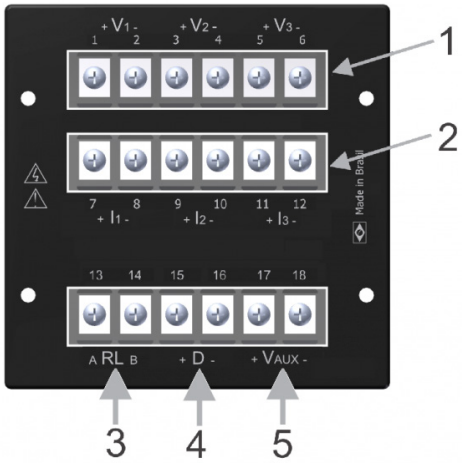
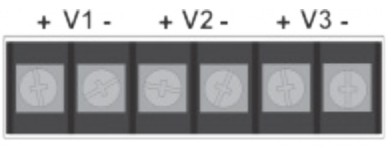


Figure 2.2: Rear panel

Number	Connector	Description
1	 Voltage inputs	In this connector, there are six terminals, which are used for connecting voltage inputs, one pair for each phase. If there is no PT, the connection must be made directly, respecting the maximum allowed voltage. The connection follows the convention: V1 - Voltage in phase 1 (aN phase) V2 - Voltage in phase 2 (bN phase) V3 - Voltage in phase 3 (cN phase) The maximum limits of applicable voltage must be observed in the Specifications section

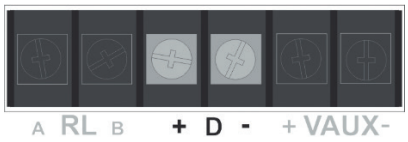
Number	Connector	Description
2	 Current inputs	There are six terminals that must be connected to the current inputs, a pair of terminals for each phase. Normally, this connection is made by means of Current Transformers (CTs). If there is no CT, the connection must be made directly, respecting the maximum allowed current. The connection follows the convention: I1 - Current in phase 1 I2 - Current in phase 2 I3 - Current in phase 3 The maximum limits of applicable current must be observed in the Specifications section
3	 Relay output	This connector has an output for relay, identified by RL, which is used as output for the programmed alarms.
4	 RS-485 serial connection	RS-485 Connection. This 2-pin connector is used to connect a network of meters to a computer in order to perform online readings, parameter adjustments and data from mass memory. It is coupled to a RS-485 port. The connection follows the convention: D+ RS-485 (+) D- RS-485 (-)
5	 Auxiliary power supply	This connector allows auxiliary power for energizing the MMW02. It is identified by Vaux. Vaux does not interferes with measurements. The limits of applicable voltage must be observed in the Specifications section

Table 2.2: Rear panel

3 INSTALLATION

3.1 ELECTRICAL SYSTEM

ATTENTION!
It is necessary to know the type of electrical system where the meter will be installed. Choosing the wrong type of connection or parameters may result in measurement errors. For details, see the Connection to electrical grid section.

3.1.1 Potential and Current Transformers

It is necessary to know the system voltage levels in order to operate the equipment. The MMW02 enables direct voltage measurements where the limits do not exceed the equipment's capacity, and indirect voltage measurements with the use of PTs. For this, it is important to have on hand the number of PTs necessary for the selected connection type. Furthermore, it is required to know the transformation relation and observe its polarity. To connect with current transformers, it is necessary to have the same information mentioned for PTs and always observe the chosen sensor's maximum current and voltage capacities. In case of measurements with CTs use the image below to execute the electrical connection and configure the equipment properly.

3.1.2 Phase Identification

Make sure that the phases are properly identified. Failure to identify the phases may cause measurement errors.

3.2 PANEL MOUNTING

For mounting the MMW02 on the panel, provide an opening of 91.00 x 91.00 mm. No tools are required for installation because the two fixing clips that come with the product allow proper fixation. Figure 3.1 illustrates the opening dimensions. Observe that the superior tolerance of the opening is up to 0.8 mm.

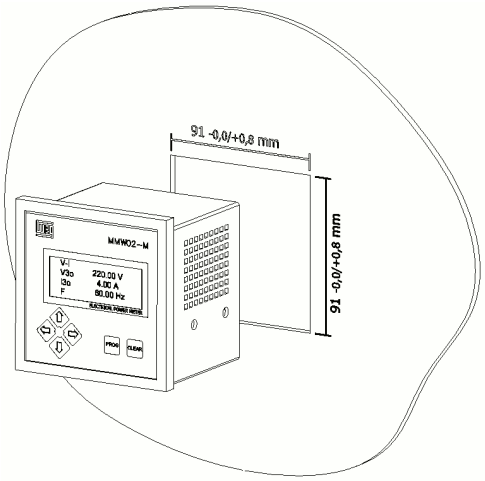


Figure 3.1: Dimension of the panel opening

3.3 POWER SUPPLY

For powering up the MMW02, use the connector identified by Vaux on the rear panel. To turn on the equipment, it must be connected to a minimum operating voltage as specified in the Specifications section. The MMW02 does not have an on/off button, so the equipment is turned on at the moment that it is fed. The connection to an uninterruptible power supply must be as the limits established for DC or AC voltage. To protect the meter, use a 0.5 A fuse.

Figure 3.2 illustrates the scheme for powering up the meter. If there is the need for feeding it by battery or UPS, contact Technical support to obtain more information.

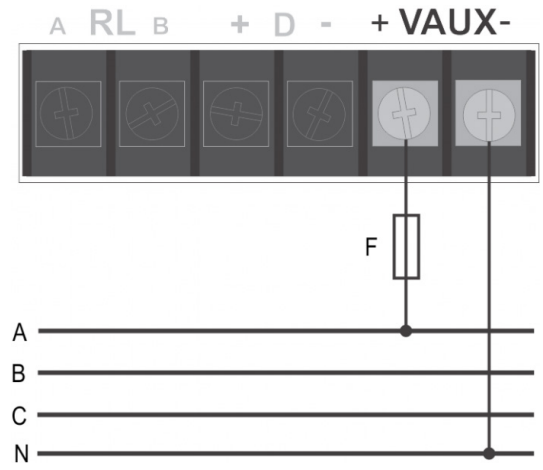


Figure 3.2: Power supply

3.3.1 Stabilization Time

The MMW02 is calibrated at the factory in a temperature and air humidity controlled environment. In addition, the calibration is performed with the meter under normal operation conditions; thereon it is energized previously for a time period that guarantees temperature stabilization of internal circuits. Under these conditions, the MMW02 reaches its maximum accuracy.

For this reason, when the equipment is turned on, considering that it was previously turned off for a long period, it is important to wait an approximate time of 15 minutes before taking measurements.

3.4 CONNECTION TO ELECTRICAL GRID

The MMW02 allows the selection of 21 topologies of connection. For identifying the connection, it is used coding informing a number of elements for current and voltage, and system configuration. Figure 3.3 shows how the connections are encoded. In the example, there is a Star connection with 3 elements for measuring voltage and 1 element for measuring current. In this case, as there is just one element for measuring current, the system must be balanced, indicated by the letter B.

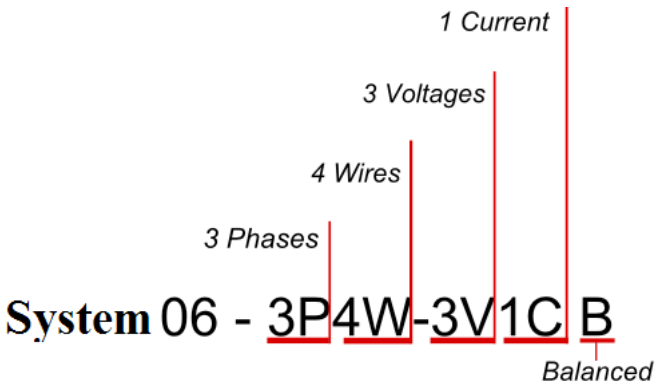


Figure 3.3: Connection Coding

The following are illustrations for all electrical systems supported by MMW02.

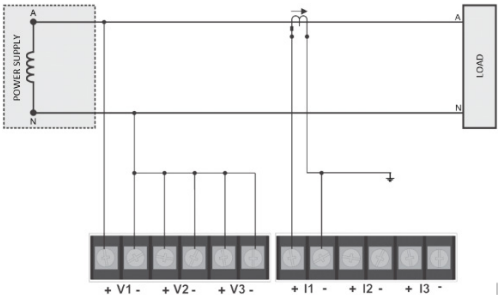


Figure 3.4: 1P2W-1V1C - Single-phase (LN).

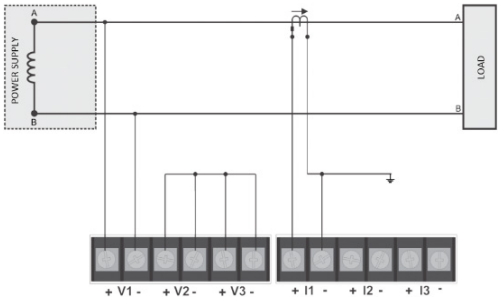


Figure 3.5: 2P2W-1V1C - Single-phase (LL).

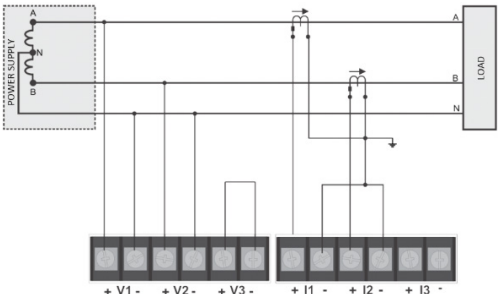


Figure 3.6: 2P3W-2V2C - Single-phase (LL+N).

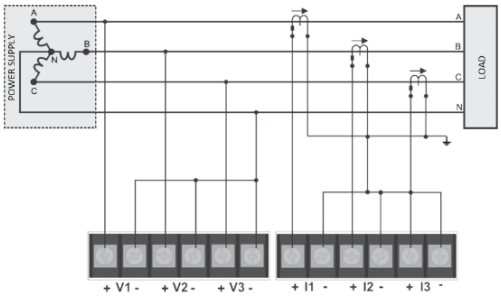


Figure 3.7: 3P4W-3V3C - Three-phase 4 Wires, Star, Direct Connection, 3 CT

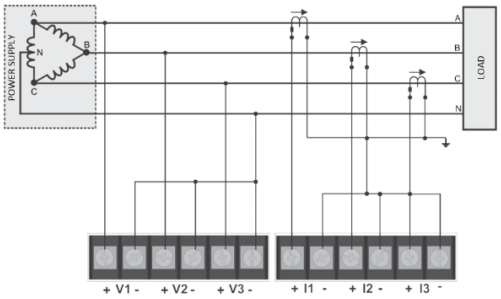


Figure 3.8: 3P4W-3V3C - Three-phase 4 Wires, Delta, Direct Connection, 3 CT (“High Leg”).

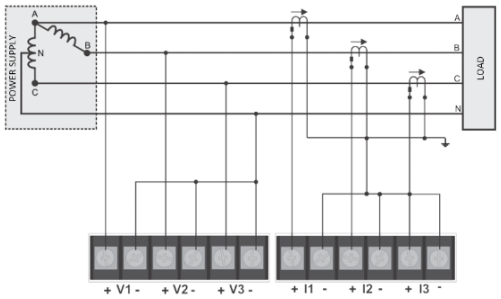


Figure 3.9: 3P4W-3V3C - Three-phase 4 Wires, Opened Delta, Direct Connection, 3 CT.

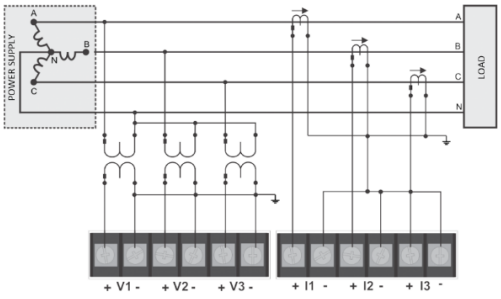


Figure 3.10: 3P4W-3V3C - Three-phase 4 Wires, Star, Connection 3 PT, 3 CT.

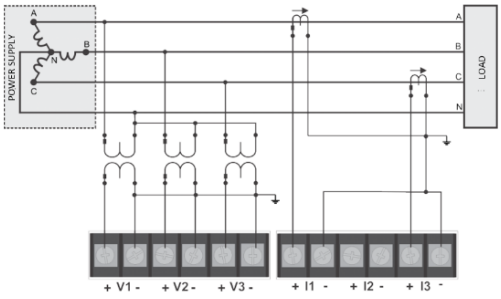


Figure 3.11: 3P4W-3V2C B - Three-phase 4 Wires, Balanced Star, Connection 3 PT, 2 CT.

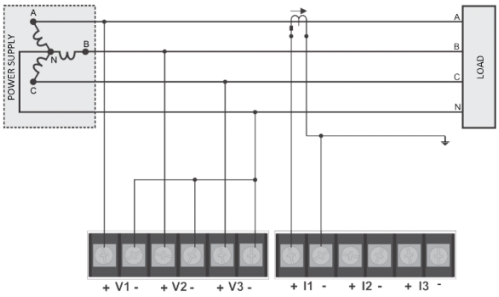


Figure 3.12: 3P4W-3V1C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 1 CT.

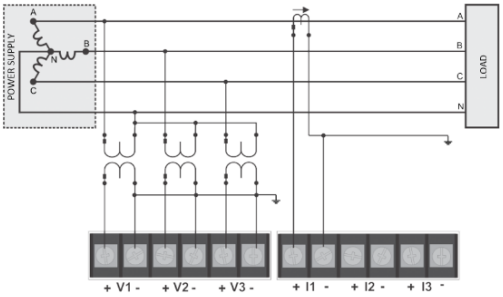


Figure 3.13: 3P4W-3V1C B - Three-phase 4 Wires, Balanced Star, Connection 3 PT, 1 CT.

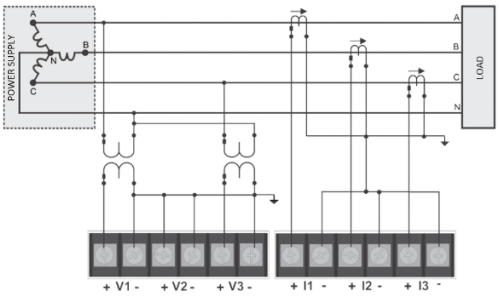


Figure 3.14: 3P4W-2V3C B - Three-phase 4 Wires, Balanced Star, Connection 2 PT, 3 CT.

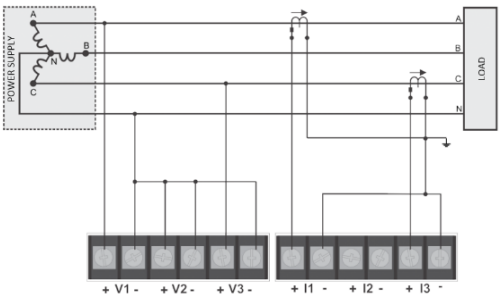


Figure 3.15: 3P4W-2V2C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 2 CT.

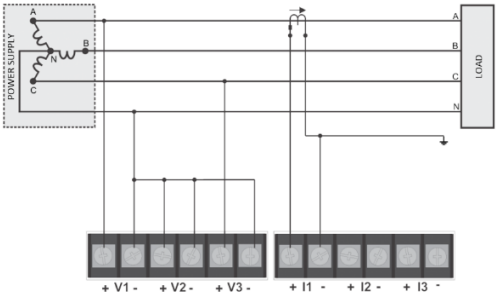


Figure 3.16: 3P4W-2V1C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 1 CT.

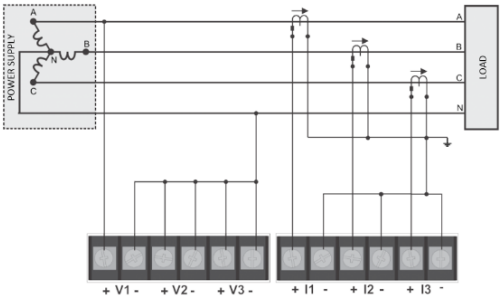


Figure 3.17: 3P4W-1V3C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 3 CT.

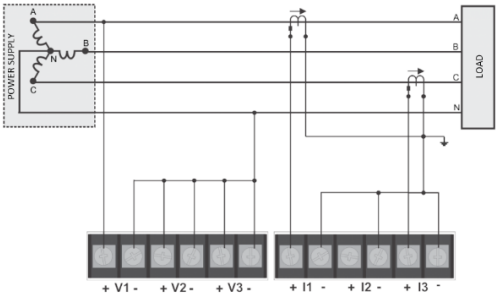


Figure 3.18: 3P4W-1V2C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 2 CT.

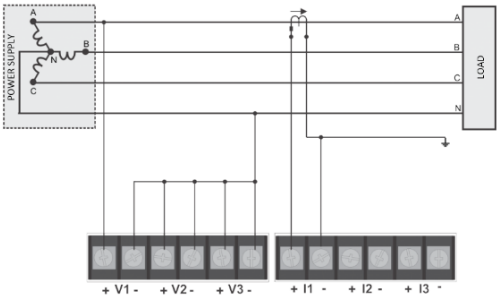


Figure 3.19: 3P4W-1V1C B - Three-phase 4 Wires, Balanced Star, Direct Connection, 1 CT.

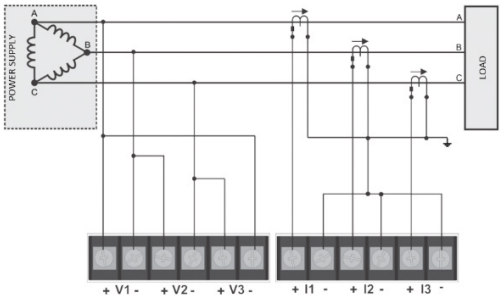


Figure 3.20: 3P3W-3V3C - Three-phase 3 Wires, Delta, Direct Connection, 3 CT

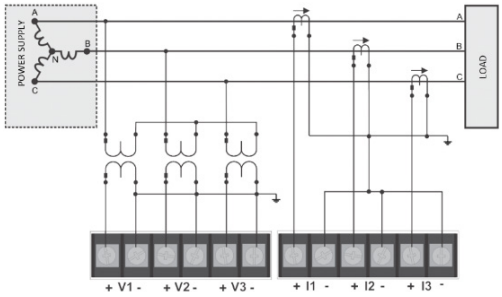


Figure 3.21: 3P3W-3V3C - Three-phase 3 Wires, Balanced Star, Connection 3 PT, 3 CT.

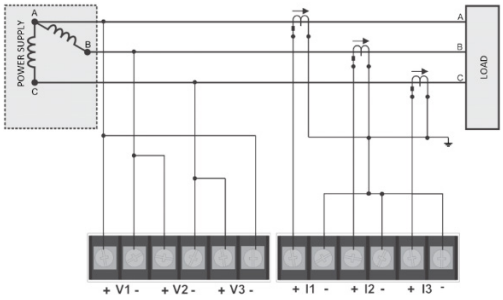


Figure 3.22: 3P3W-3V3C - Three-phase 3 Wires, Opened Delta, Direct Connection, 3 CT.

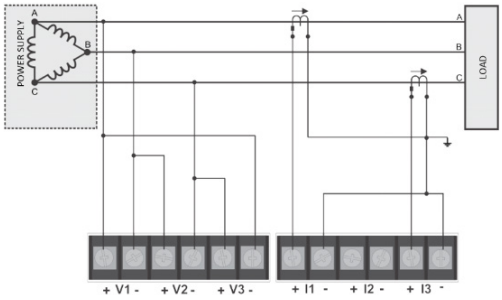


Figure 3.23: 3P3W-3V2C - Three-phase 3 Wires, Delta, Direct Connection, 2 CT.

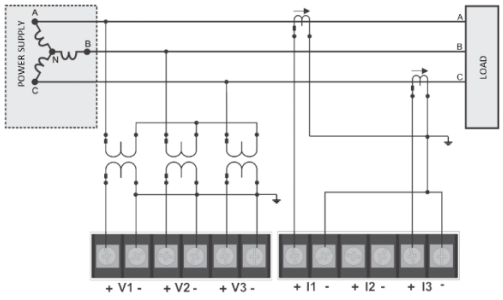


Figure 3.24: 3P3W-3V2C - Three-phase 3 Wires, Star, Connection 3 PT, 2 CT.

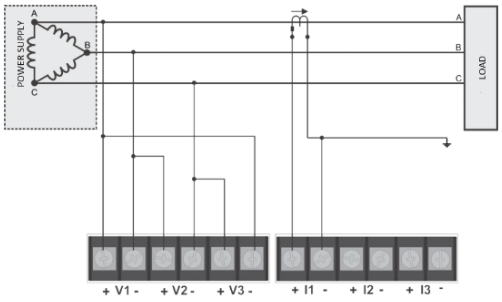


Figure 3.25: 3P3W-3V1C B - Three-phase 3 Wires, Balanced Delta, Direct Connection, 1 CT.

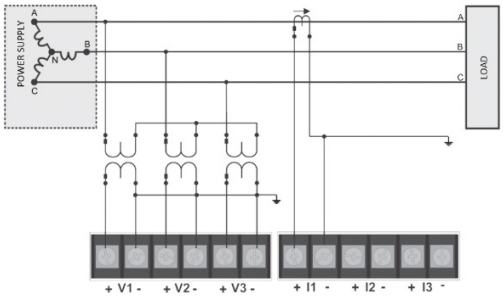


Figure 3.26: 3P3W-3V1C B - Three-phase 3 Wires, Balanced Star, Connection 3 PT, 1 CT.

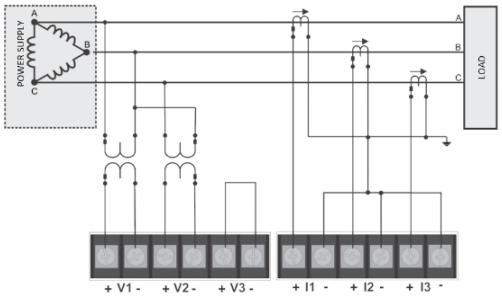


Figure 3.27: 3P3W-2V3C - Three-phase 3 Wires, Delta, Connection 2 PT, 3 CT.

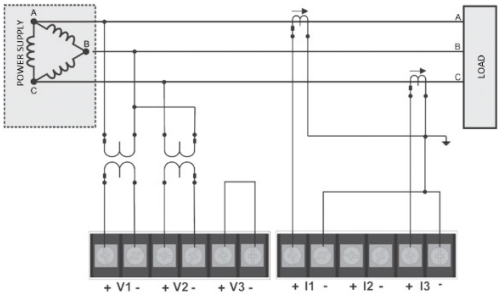


Figure 3.28: 3P3W-2V2C - Three-phase 3 Wires, Delta, Connection 2 PT, 2 CT.

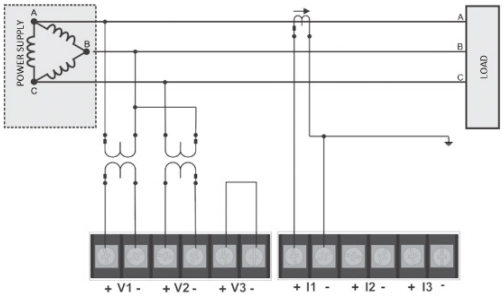


Figure 3.29: 3P3W-2V1C B - Three-phase 3 Wires, Balanced Delta, Connection 2 PT, 1 CT

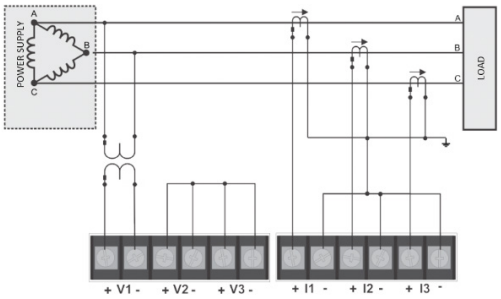


Figure 3.30: 3P3W-1V3C B - Three-phase 3 Wires, Balanced Delta, Connection 1 PT, 3 CT.

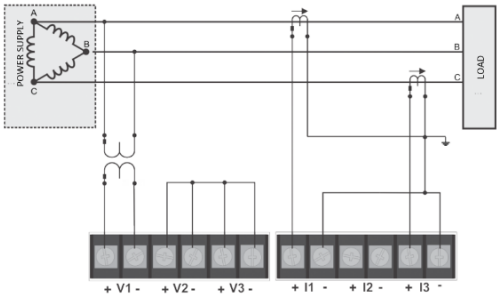


Figure 3.31: 3P3W-1V2C B - Three-phase 3 Wires, Balanced Delta, Connection 1 PT, 2 CT.

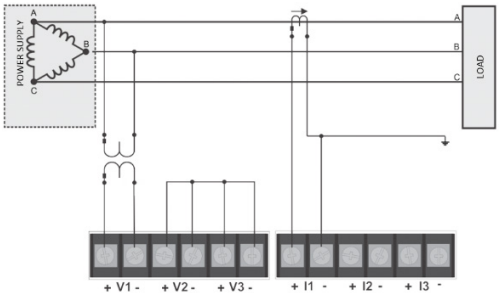


Figure 3.32: 3P3W-1V1C B - Three-phase 3 Wires, Balanced Delta, Connection 1 PT, 1 CT.

Note to the user:
Note that one must have knowledge about the phases of the system for the correct connection to measure voltage and current. Otherwise, if the phase sequence is inverted, the MMW02 may measure incorrectly.

TIP!
Connections that do not have the three elements for voltage or current (codes 3P3W-3V2C, 3P3W-3V1C, 3P3W-2V2C, 3P3W-2V1C), the error might be larger for the calculated phase. The error is acceptable, since what is displayed is the "sum of errors" of the phases that are effectively being measured.

3.5 CURRENT INPUT

When connecting the current inputs to the meter, some basic precautions must be taken.

3.5.1 Current Flow Direction

The current inputs have an indication of flow direction through + and - symbols located next to the terminals. Consider that the current flows from the negative terminal (-) into the positive terminal (+).

Always check the current flow direction before installing it. Inverting current flow direction may result in measurement's errors for power, energy, demand, etc.

TIP!
If the current sensor has been installed with the opposite direction, it is possible to use the adjustment option described in Adjusting the polarity of current sensors section to invert the sensor signal, thereby, allowing the measurements to be correct.

3.5.2 Measurement Phase

The current sensors need to be correctly positioned according to the type of connection. Verify the connection types in the Connection to electrical grid section.

3.5.3 Positioning of CTs

The CTs must be positioned on the electrical bus before loading the desired measurements of the electrical quantities. For this, observe carefully the electrical derivations from the principal bus and place the sensors properly. Make sure the conductor that has been chosen for the measurement is connected to the load under analysis.*

**For further details check the CT's fabricant appropriate indication.*

3.5.4 Thermal factor

The Current Transformers (CTs) have a parameter called Thermal Factor. The Thermal Factor (FT) of a CT is defined as the ratio between the highest level of primary current acceptable in a steady state and the primary rated current, without exceeding limited temperature elevation defined by the standard of its insulation class. Commonly used values for TF are 1,0; 1,2; 1,3; 1,5 e 2,0 (NBR 6856). *

The expression that define the Thermal Factor is as follows:

TF = Ipmax / Ipnominal (In a steady state)

The factory standard of MMW02 considers its use with external CTs (Indirect measurements) until nominal rated current of the CT, namely, considers TF = 1,0. With TF = 1,0 as its factory standard, the MMW02 guarantees measurement accuracy. Applicability example: an installation has a total load of 100 A, however as overload situations may occur, one could have installed CTs with relation 100/5 A and TF = 1,5. Thus, the CTs 100/5 A can support maximum continuous currents of 150 A in the primary CT without reducing its useful life or changing its features. For using the MMW02 in the installation as exemplified above, the CTs must be dimensioned for 150/5 A with TF = 1,0; therefore, ensuring the measurements up to 150 A. In practice, FT greater than 1,0 is used in conjunction with protective relays, being necessary to interrupt the circuit if an overload condition occurs.

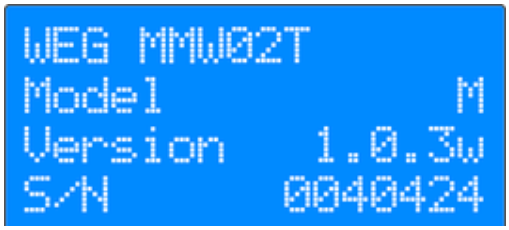
**For further details check the CT's fabricant appropriate indication.*

4 BASIC OPERATIONS

4.1 TURNING THE EQUIPMENT ON

The MMW02 does not have a turn on/off button; therefore, it will be turned on a few seconds after connecting the terminals to the electrical grid.

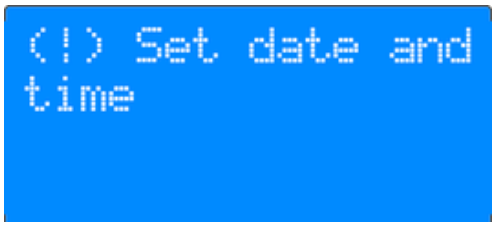
At this moment, the equipment beeps and, right after, it displays the product ID screen shown in Figure 4.1.



(1) Equipment name
(2) Equipment model
(3) Firmware version
(4) Serial number

Figure 4.1: Start screen

If date and time have not been adjusted yet, the following warning message will be displayed:



Screen informing that the clock must be adjusted

Figure 4.2: Adjust clock

To set date and time, follow the procedure described in Adjustment of date and time.

ATTENTION!
While powering up the equipment do not hold any button until its full initialization; otherwise, the equipment may go into diagnostic mode. If it enters into diagnostic mode, refer to the Diagnostic mode.

4.2 NAVIGATION MENU

4.2.1 Main Menu

In order to navigate through the screens of MMW02, menus at different levels are used. The MAIN MENU screen, which focuses on global functions of the equipment, can be accessed as follows:

In any screen, press the CLEAR button briefly (one level back) by the number of times that represent the level at which the screen is in at the moment.

Viewing measures options (MSR), datalog (LOG), date and time (CLK), configurations (CFG), erasing values accumulated measures (RST) and alarms (I/O)

Figure 4.3: Main menu

To navigate through the screens of this menu, simply use the navigation keys , , and and press the PROG to access the desired function.

Note 1: The LOG option is available for some of the MMW02 models.

4.2.2 Measures Menu

Through the MAIN MENU, it is possible to access the MEASURES MENU (Figure 4.4) with the measuring options for MMW02.

Voltage/Current/Frequency (V-I), Power/Power factor (PQS), Power demand (DMD), Energy consumption (E) and THD and voltage and current harmonics (THD) and custom views (CST).

Figure 4.4: Measures menu

Features associated with the MAIN MENU and the MEASURES MENU are presented in specific screens displaying measurement data or adjustable parameters.

4.3 SETTING

Parameter changes are initiated by pressing PROG key on the configuration screens. Depending on the kind of value to be adjusted, changes are performed by one of three different ways:

- Increment/decrement in a list of default options. For this, use the ⇧ and ⇩ keys;
- Increment/decrement of unit, tens, hundreds, etc, for numerical values. To do this, use ⇦, ⇨, ⇧ and ⇩ keys;
- Increment/decrement per unit, for small numerical values. For this, use the ⇧ and ⇩ keys;

Programming strings (sentences). To do this, use the key combination ⇦ + PROG to select among groups: numbers, symbols, uppercase and lowercase letters. Use PROG or ⇨ keys to move forward and backward, and ⇧ or ⇩ keys to select the characters.

To finish editing a parameter, press PROG key. To cancel the edition, press CLEAR key. On screens with more than one parameter, the edition of the parameters is performed sequentially, and the change will only occur when the last parameter is confirmed.

4.4 HOTKEYS

Some features of the MMW02 can be accessed through the combination of keys.

The combination of ⇦ + ⇨, keys, when pressed briefly displays a help screen on the selected screen. To scroll down through text, use ⇧ and ⇩ keys. To return to the home screen, press CLEAR key. Figure 4.5 exemplifies a help screen of MMW02.

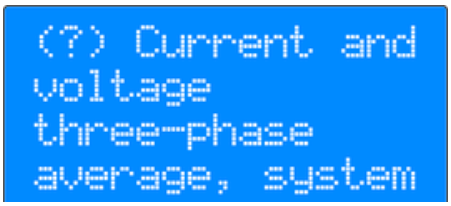


Figure 4.5: Help screen

Holding down the key combination ⇧ + ⇩ allows locking or unlocking the keypad functions, as shown in Figure 4.6.

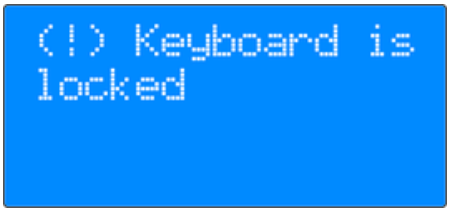


Figure 4.6: Locked keyboard

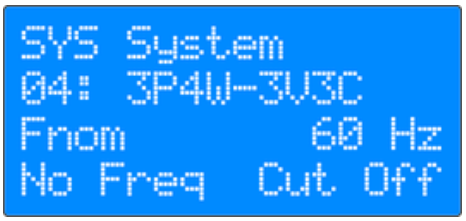
4.5 INITIAL SETTINGS

After finishing the installation of the MMW02, some basic settings must be performed.

4.5.1 Electrical system

For the MMW02 to measure correctly, it is necessary to set the parameters of the electrical system where it has been installed. To adjust these parameters, proceed as follows:

1. Access the >**MAIN MENU**< screen
2. Select the menu >**CFG**< menu
3. Select the screen >**SYS System**<



(1) Connection: Topology selection
(2) Fnom: Indication of nominal frequency
(3) No Freq: Operation mode without frequency

Figure 4.7: Connection configuration

4.5.1.1 Connection selection

As described in the Connection to electrical grid section, the MMW02 allows connection to up to 21 types of systems. Therefore, after the meter is installed, set the chosen connection for proper operation. For example, if the meter is connected to a three-phase star connection directly using three CTs, as shown in Figure 4.8, the selected option must be 04: 3P4W-3V3C. Details of connection topologies are illustrated in the Installation section.

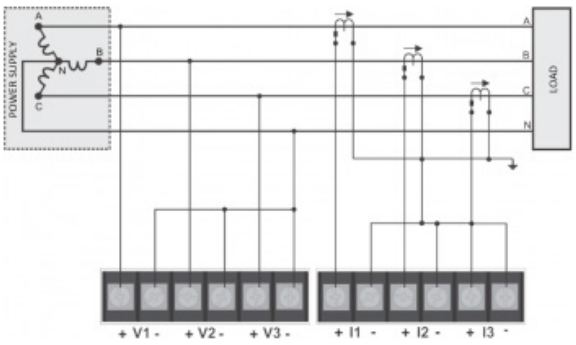


Figure 4.8: Example of system's connection.

In this screen, by pressing the PROG key, it is possible to select among 21 available systems.

ATTENTION!
Depending on the connection type, some of the current and voltage values can be hidden at the displayed measures.

4.5.1.2 Nominal Frequency

The nominal frequency of the electrical grid must be configured on the equipment and can be 50 or 60 Hz. This setting is the basis for all other measurement calculation.

The equipment continuously monitors the period (frequency) of the signal for high measurement accuracy. Period acquisition is performed at the V1 channel. In its absence, the period is acquired from the V2 channel, and in its absence, at V3 channel. If all three voltages fail, it is possible to use the nominal frequency as a reference. It is recommended to connect the voltage channels whenever possible.

4.5.1.3 Voltage Absence

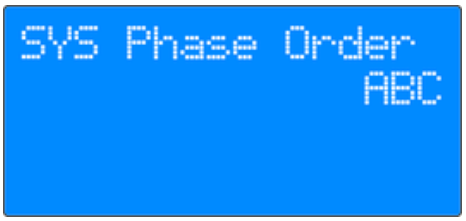
Equipment's operation mode, in case it cannot measure the frequency in the voltage channels, it can be programmed as **Cut off**, **Nominal** and **Last**.

- **Cut off:** measurement values will be shown with horizontal bars on the screen
- **Nominal:** a frequency equal to the nominal frequency programmed in the equipment will be internally simulated
- **Last:** a frequency equal to the last valid frequency measured by the equipment will be internally simulated

4.5.2 Phase Sequence

To measure the phase sequence correctly, it is necessary to set the grid sequence, ABC or ACB. To adjust this setting, do as following:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the screen >**SYS Phase Order**< screen
4. Press PROG key to start the setting



(1) Phase order: Phase sequence ABC or ACB

Figure 4.9: Phase sequence configuration

4.5.3 PT and CT Relations' Adjustment

The MMW02 allows to perform voltage measures directly on the electrical grid or using potential transformers (PT) and current transformers (CT), where voltages of the primary network are larger than 500 VAC between phases and the currents are larger than 5A. Independently of the connection option (direct/indirect), you must adjust the PT and CT settings, because the value informed for voltage and secondary current will serve as basis for the Measures. The primary voltage must always be greater than or equal to the secondary voltage. In case of CT, the value of secondary is always 5A. If the connection is direct both values of primary and values of secondary must be set as the same. Figure 4.10 shows the diagram of a potential transformer, and the nomenclature used in potentials' transformation.

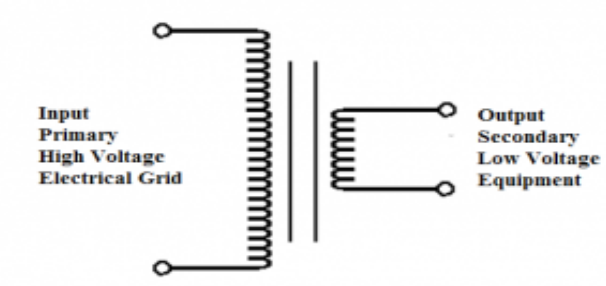
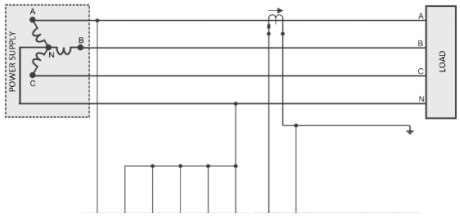


Figure 4.10: Primary-secondary relation

To adjust PT and CT settings, do as shown below:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the >**SYS PT/CT Mode**< screen

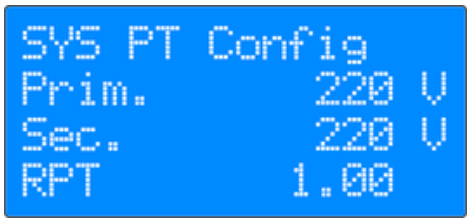


(1) Primary/secondary mode or PT relation.
(2) Primary/secondary mode or CT relation.

Figure 4.11: PT/CT Configuration

In this screen, by pressing the PROG key, it is possible to adjust the setup mode, by assigning the number of spires of the primary and secondary, or the relation between them.

Select mode and press the ⇩, key. The screens shown in Figure 4.12 and Figure 4.13, depending on the setup mode, are for PT values' adjustment. Similar screens for adjusting the CT values are displayed by pressing the ⇩ key again.



(1) Primary: Value of primary
(2) Secondary: Value of secondary
(3) RPT: Relation of spires calculated

Figure 4.12: Primary/secondary mode

(1) RPT: Relation of spires

Figure 4.13: Relation mode

Press the PROG key to edit the values. When selecting the "**Prim/Sec**" mode, the relation value displayed in the last row will be calculated automatically.

4.5.4 Adjustment of Current Sensors' Polarity

In order to facilitate installation, the MMW02 allows changing the polarity of current sensors, if necessary. In order to change the polarity, perform as following:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the >**SYS Polarization**< screen by pressing the ⇩ key
4. Press PROG key to start adjusting the polarities

Adjusting the polarity of current sensor (+ indicates direct direction (according to arrow of the sensor), while (-) indicates reverse direction

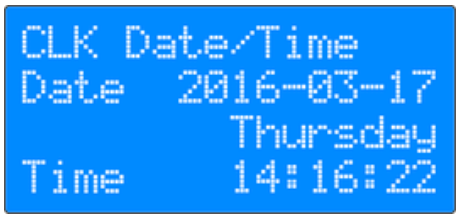
Figure 4.14: Polarity

4.6 CLOCK AND CALENDAR

4.6.1 Date and Time Adjustment

To adjust the meter's Date and Time, follow these steps:

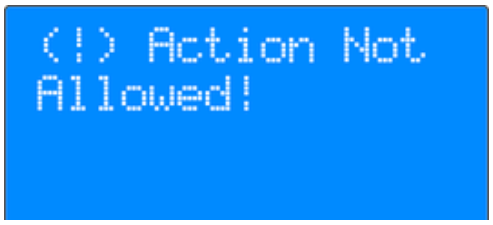
1. Access the >**MAIN MENU**< screen
2. Select the >**CLK**< menu
3. Select the >**CLK Date/Time**< screen
4. Press PROG key to start adjusting Date and Time



Screen for date and time adjustment

Figure 4.15: Date/Time

ATTENTION!
The date and time adjustment will only be possible when the Datalog status is “stopped”, otherwise the message shown in Figure 4.16 will be displayed.



Message informing that the configuration is not possible, because Datalog is active. In this case, see section related to the features of the Datalog to change its status.

Figure 4.16: Datalog warning

The date format is defined as follows: YYYY-MM-DD, with YYYY being the year between 2000 and 2099 with four digits, MM being the month between 1 and 12 with two digits, and DD being day between 1 and 31 with two digits. All dates used in the meter follow this format. The day of the week is adjusted automatically.

The time format is hh: mm: ss being hh the hour between 0 and 23, mm the minutes between 0 and 59 and ss the seconds between 0 and 59, all with two digits.

4.6.2 Time Zone and Daylight Saving Time

Time adjustment on the first screen refers to local time, namely, it is the universal time (UTC - Coordinated Universal Time) referenced by the Greenwich meridian plus the local time zone (GMT - Greenwich Mean Time). Furthermore, local time can be adjusted taking into account daylight saving time (DST - Daylight Saving Time), which must be informed by the user.

To set GMT and DST parameters, a second screen is available by pressing the ⇩ key in the screen of Date and Time. The adjustment of these two parameters must be performed according to the time region where the meter is installed, taking into consideration whether is normal or daylight saving time.

(1) Zone: Adjustment of time zone
(2) DST: Adjustment of daylight saving time

Figure 4.17: GMT and DST

4.7 USER INTERFACE

To adjust the interface settings with the user, such as language, sound signaling and upgrade rate of the display, proceed as follows:

1. To access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the >**UI Interface**< screen
4. Press PROG key to start the adjustment

Figure 4.18: User interface

(1) Language: MMW02 has three available languages for user interface: Portuguese, English and Spanish.
(2) Beep: This option allows you to enable / disable the keyboard beeps and alerts.
(3) Refresh: Defines the rate at which the display updates its values, ranging from 50 milliseconds to 5 seconds.

4.8 COMMUNICATION

The MMW02 has an RS485 serial communication interface. The connection details are described in the Rear panel section. This communication interface enables monitoring the meter through WEG's Power Manager software which facilitates meter's configuration and parameterization and enables the equipment's connection to WEG's energy monitoring systems or to third party applications.

The communication protocol used for data transfer is Modbus RTU, which allows access to the reading and programming variables through specific addresses. A Modbus table of MMW02's variables can be obtained once requested through formal inquire to Technical support. With this mean of communication and the protocol, it is possible to create a network of meters and access them individually to set them up or perform online reading. To access the communication settings menu, proceed as follows:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the >**COM Modbus**< screen
4. Press PROG key and adjust the parameters as necessary

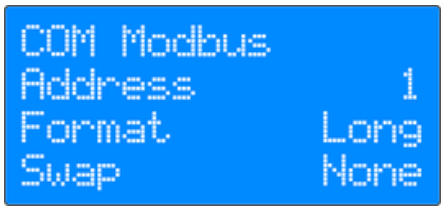


Figure 4.19: Modbus parameters

1. Adress: 1 to 247
2. Format: Short (16 bit) or Long (32 bit)
3. Byte/Word Swap: None/Byte/Word/Both

In this screen, in addition to the network address, it is possible to define the number of bytes for the address, which may be Short (16 bits) or Long (32 bits). The last parameter is used in specific situations where it is necessary to switch the order of the bytes or words in communication. For this option, it can be selected **None/Byte/Word/Both**. Table 4.1 below presents four possible configuration modes.

Byte order	Configuration
A B C D	None (Default)
B A D C	Byte
C D A B	Word
D C B A	Both

Table 4.1: None/Byte/Word/Both.

By pressing ⇧ and ⇩ keys, it is possible to parameterize the communication serial.

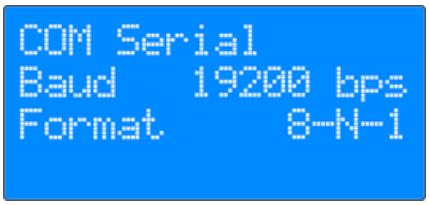


Figure 4.20: Serial parameters

1. Baud Rate: It defines the communication speed in bits per second.
2. Format: It defines the parameters for the serial port in according to the topology of the network to be used, in the options (8-N-1, 8-N-2, 8-E-1, 8-E-2, 8-O-1, 8-O-2); The first element correspond to the number of data bits; the second, to the parity (None, Even or Odd); the third, to the number of stop bits.

4.9 FACTORY STANDARDS

To return the MMW02 to standard factory values, follow:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Select the >**CFG Fact Default**< screen
4. Press PROG key
5. Confirm the operation by pressing PROG key again

Figure 4.21: Factory default

ATTENTION!
Remember that the current equipment's programming, including the programed password, will be entirely lost.

TIP!
To redefine the parameters use WEG's Power Manager software. Its use makes setup faster, besides allowing to save specific configuration profiles that can be used to set more than one meter.

5 MEASUREMENTS

5.1 INITIAL CONSIDERATIONS

Measurements are identified according to the following conventions. Because the MMW02 was designed based on international standards, it uses the nomenclature for magnitudes, phases and indices based on these standards, except in specific cases, due to limitations on the interface or on the standards.

The three-phase values are represented by 3Φ index, while values per phase are represented by indices AN, BN, CN for line to neutral voltages and AB, BC and CA for line to line voltages. The indices A, B, C are used for currents.

5.2 VOLTAGE, CURRENT AND FREQUENCY

Line to neutral voltage V [V], line to line voltage U [V], current I [A] and frequency F [Hz] measurements are shown on the screens linked to >**V-I**< menu, accessed through >**MSR**< menu.

Measures menu for voltage, current and frequency

Figure 5.1: Measures menu

ATTENTION!
Measuring ranges for voltages and currents are described in the Specifications chapter on this manual. Measured values outside the specified range may not have its accuracy guaranteed. For voltage, measured values above 550 Vca are saturated in 550 V. Values below 5 Vca are shown as dashes (---) and interpreted as null values in the Datalog and Modbus. The same occurs with the current: in direct connection, values above 6.5 A are saturated while values below 0.02 A are interpreted as null.

5.2.1 Measuring Method

The calculation method for electrical quantities is according to the definitions of IEC 61557-12 and 61000-4-30 standards. MMW02 records and displays measurements at a 1s interval. Sampling is sequentially performed on the six input channels (three for voltage and three for current) with 128 samples per cycle and 12 bits per sample. Frequency is calculated by counting zero-crossings and it is initially referenced to Phase A. If there is an interruption in Phase A, frequency will be calculated on Phase B, and, in the absence thereof, on Phase C.

Figure 5.2 shows the measuring method for 60 Hz systems. Frequency is calculated counting zero crossings, referring initially to Phase A. Upon an interruption in Phase A, frequency is calculated in Phase B, and upon its failure, in Phase C.

In case of complete tension loss, it is possible to choose not to measure (default) or measure using the value of the nominal frequency or the value of the last measured frequency. To edit this setting, see chapter Connection selection.

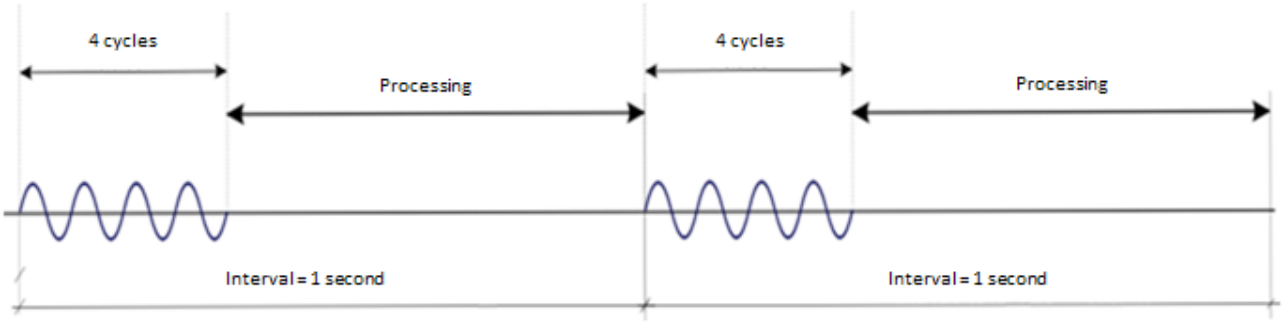


Figure 5.2: Measuring method for 60 Hz systems

Based on these parameters, True RMS values are calculated and then shown on display, available at communication interfaces and recorded in the memory if Datalog is active.

5.2.2 Phase Sequence

Las letras ABC o ACB indican la secuencia de fases establecida en el medidor. ABC se refiere a la secuencia The letter groups ABC and ACB indicate the phase sequence set in the meter. ABC refers to the direct sequence (positive) and ACB refers to the reverse sequence (negative). When there is no symbol to the left of letter A, it means the phase sequence is according to expectation. When the symbol "!" is shown, it means the measured phase sequence is the opposite to the expected one. When the symbol "?" is shown, it means the phase sequence cannot be determined, either due to low voltage level or absence of voltage at one phase.

The phase sequence is updated when:

- The equipment is restarted
- The configuration or connection is replaced
- The voltage signal measured is switched off and on again
- Another expected phase sequence is set (see chapter Basic operations)

ATTENTION!
Depending on system configuration, the phase sequence becomes meaningless and will be omitted, e.g., for a single-phase system.

The number of polarity' symbols for the current sensors depends on the number of sensors for the chosen connection. Only symbols corresponding to the connected sensors will be shown.

5.2.3 Measuring Data

The map of screens related to voltage, current and frequency measurements is shown in Figure 5.3, which illustrates representative values for each quantity. To navigate these screens, use ⇧, ⇩, ⇦ and ⇨ navigation keys.

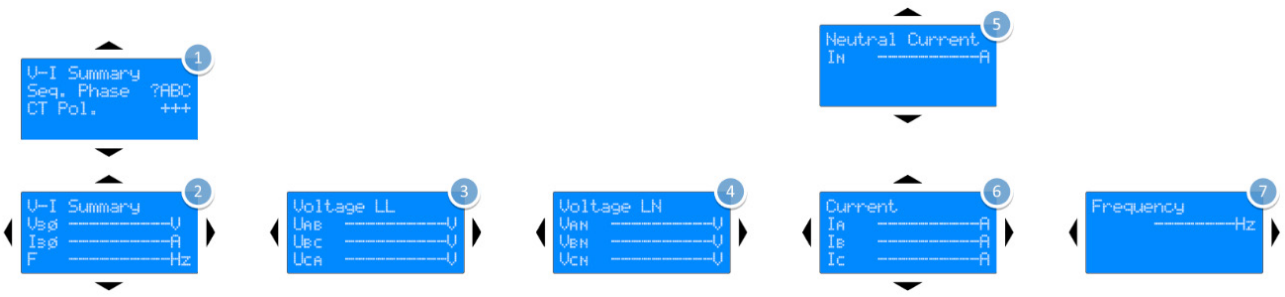
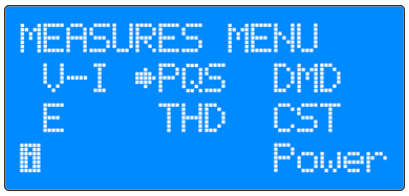


Figure 5.3: Map of screens for voltage, current and frequency

Note 1: To reset the statistical values, see Values' Reset section.

5.3 POWER AND POWER FACTOR

Power and power factor measurements are shown on the screens linked to the >**PQS**< menu, accessed through >**MSR**< menu.



Measures menu for active, reactive and apparent power and power factor

Figure 5.4: Power

5.3.1 Measuring Method

The MMW02 performs calculation of power and power factor based on the methods defined by IEC 61557-12 standard. Measurements are performed in the four quadrants, allowing handling energy flows for generation or consumption. According to the angle of lag between voltages and currents for each phase, the active and reactive powers can assume positive or negative values, according to the diagram illustrated in Figure 5.5. The diagram follows the convention used by the IEC 61557-12 standard.

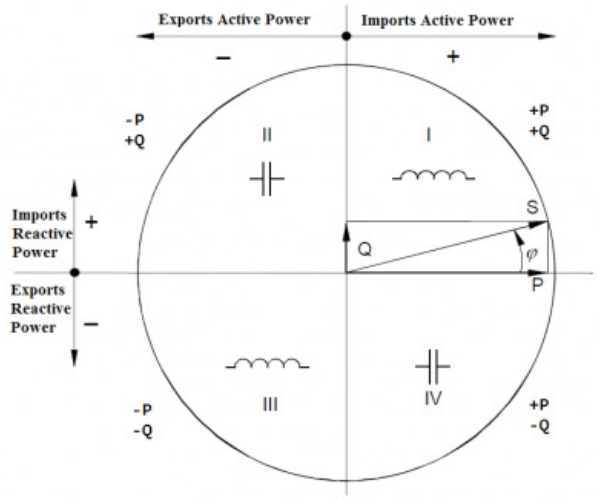


Figure 5.5: Power flow

In the diagram, the current is the reference. It remains fixed at the angle 0° and the voltage revolves the quadrants. Table 5.1 shows the power's sign and its nature.

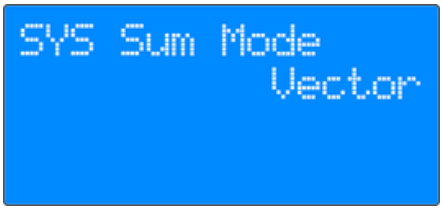
Quadrant	Active power [W]		Reactive power [VAr]	
	Signal	Classification	Signal	Classification
I	Positive	Imported	Positive	Inductive imported
II	Negative	Exported	Positive	Capacitive imported
III	Negative	Exported	Negative	Inductive exported
IV	Positive	Imported	Negative	Capacitive exported

Table 5.1: Power flow

5.3.2 Configuration

To calculate the total active and reactive power and total power factor, one can choose between two modes: Vector or Arithmetic sum, where the vector calculation is the default mode. To change the power's sum mode, follow these steps:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Using ⇦ and ⇨ keys, select the >**SYS System**< screen
4. Using ⇧ and ⇩ keys, select the >SYS Sum Mode< screen
5. Press PROG key to change the power calculation



1. Sum Mode: Configuration of power's sum mode. The options are: Vector Sum or Arithmetic Sum

Figure 5.6: Power calculation

Another way to access this setting is pressing the PROG key in any screen of power or power factor quantities.

The arithmetic mode calculates the reactive power based on the value of the apparent power disregarding the phase angle between voltage and current. The vector mode (factory default) calculates the apparent power based on the value of the reactive power considering the angle between voltage and current on each phase.

Table 5.2 shows the formula for power calculation. In arithmetic mode, the powers per phase are not shown.

Active Power	Reactive Power	Apparent Power
$P_p = \frac{1}{N} \cdot \sum_{k=0}^{N-1} (v_{pN_k} \times i_{p_k})$	$Q_p = SignQ(\varphi_p) \times \sqrt{S_p^2 - P_p^2}$	$S_p = V_{pN} \times I_p$

Table 5.2: Power Calculation Formula

Table 5.3 shows the formula for calculating total powers in the vector mode and arithmetic mode.

	Active Power	Reactive Power	Apparent Power
Vector Mode	$P = P_1 + P_2 + P_3$	$Q_V = Q_1 + Q_2 + Q_3$	$S_V = \sqrt{P^2 + Q_V^2}$
Arithmetical Mode	$P = P_1 + P_2 + P_3$	$Q_A = \sqrt{S_A^2 - P^2}$	$S_A = S_1 + S_2 + S_3$

Table 5.3: Total Power in Vector and Arithmetic Mode.

5.3.3 Measuring Data

The map of screens referring to Power and Power Factor measurements shows, with representative values for each quantity. Data measuring have units of W, VAr e VA. For navigating the screens use ⇧, ⇩, ⇦ and ⇨ keys.

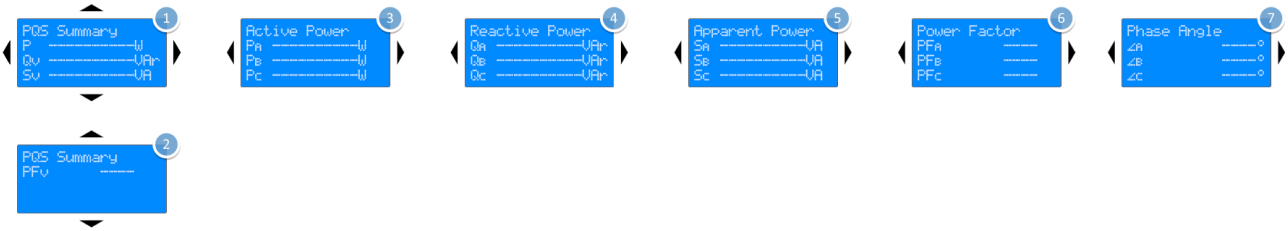


Figure 5.7: Map of screens for power and power factor

Note 1: For connections that do not have neutral, e.g., delta, the screens of power per phase are omitted.

5.4 POWER DEMAND

Power demand measurements are shown on the screens linked to the >**DMD**< menu, accessed through the screen of >**MSR**< menu.

Figure 5.8: Power Demand

Demanded quantities are identified by the following symbols:

- **Pd:** Demand of active power
- **Qd:** Reactive Power's Demand
- **Sd:** Apparent Power's Demand

5.4.1 Measuring Method

Power demand is calculated in fixed blocks, i.e., the power is integrated over a fixed interval and at the end divided by the interval duration. The result refers to the last calculated block. Measuring data refers to total demands, not per phase.

Figure 5.9 illustrates the method used for calculation using e.g., an interval of 15 minutes.

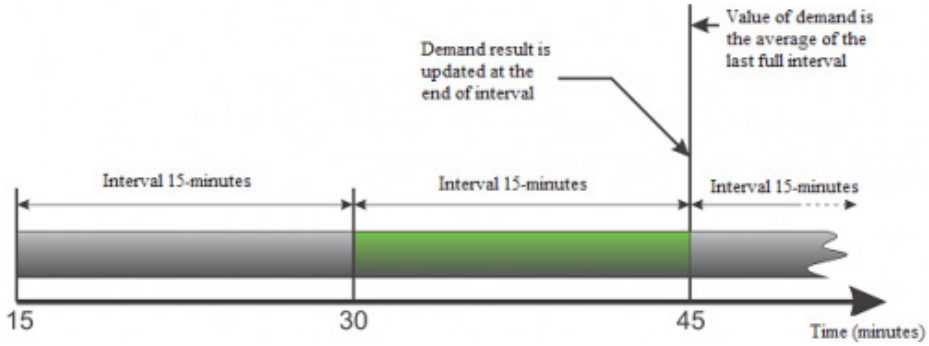


Figure 5.9: Power Demand calculation for fixed block

The demand's measures are separated by groups identified by the following indices:

- **peak:** Peak demand
- **pred:** Previous demand
- **c:** Capacitive demand
- **i:** Inductive demand

Note: When there is no index, the demand refers to the last calculated block.

5.4.2 Configuration

To adjust the demand interval follow these steps:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Using ◄ and ► keys, select the >**DMD Config**< screen
4. Press the PROG key to change the interval of demand

1. Demand interval: Possible values: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 e 60 minutes

Figure 5.10: Demand interval

Another way to access this configuration is pressing the PROG key in any screen for demand measurements.

5.4.3 Measuring Data

The map of screens relating to Power demand quantities is shown in Figure 5.11, with representative values for each quantity. Measurement results are expressed in units of W, VAr and VA. For navigating the screens, use ▲, ▼, ◄ and ► keys.

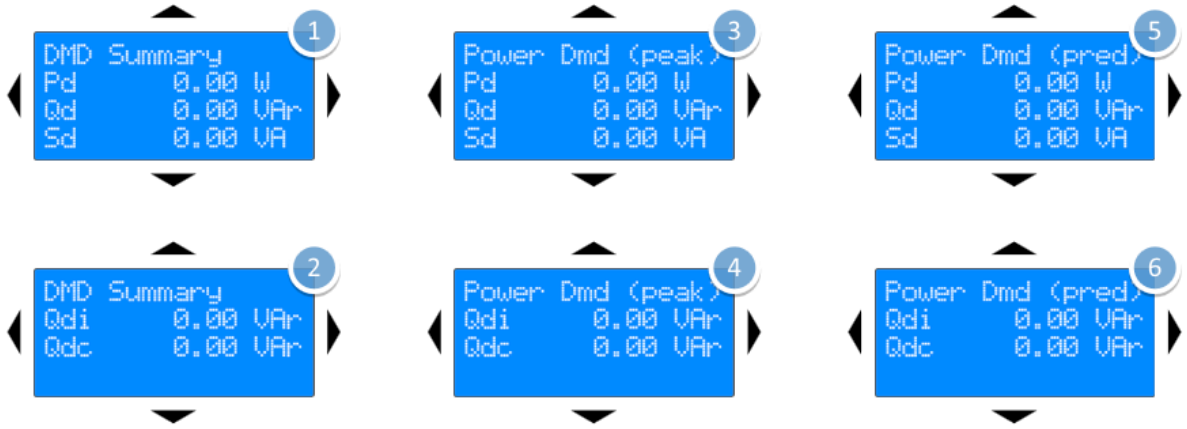


Figure 5.11: Map of screens for Power demand

Note: To reset demands, see Values' reset section.

5.5 ENERGY CONSUMPTION

Energy consumption measurements are shown on the screens linked to the >E< menu, accessed through the >**MSR**< menu screen.

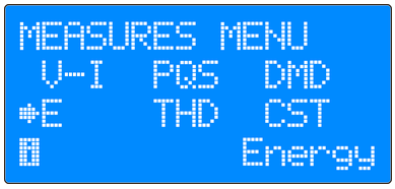


Figure 5.12: Energy

Energy consumption measurements are represented by the following letters:

- **Ph:** Active energy [Wh]
- **Qh:** Reactive energy [VArh]
- **Sh:** Apparent energy [VAh]

5.5.1 Measuring Method

MMW02 performs the energy measures on standard IEC 61557-12. The time-base for power integration is obtained through the meter's real time clock. Results are separated into groups according to the energy flow direction, for the active and reactive energy. In addition to the reactive power, the results with characteristic system's reference are separated in inductive or capacitive characteristics.

In addition to calculating energy in all four quadrants, MMW02 performs the calculation of gross energy, i.e., among active and reactive energy quantities it is possible to measure the energy corresponding to the sum of the direct and reverse energy in absolute value.

The indexes used to identify the energies are:

- **sum:** Gross energy
- **fwd:** Direct energy (Imported)
- **rev:** Reverse energy (Exported)
- **c:** Capacitive energy
- **i:** Inductive energy

The accuracy of energy's values is automatically adjusted according to the measured value. For energy values between 1 and 1G (W, VAr or VA) the accuracy will be 1 (W, VAr or VA). For values between 1G and 39T (W,VAr or VA) the accuracy will be 1k (W, VAr or VA).

5.5.2 Measuring Data

The map of screens relating to Energy consumption is shown in Figure 5.13, with representative values for each quantity. The results of the measurements are expressed in units of Wh, VAr and VA. For navigating the screens use the ⇧, ⇩, ⇦ and ⇨ keys.

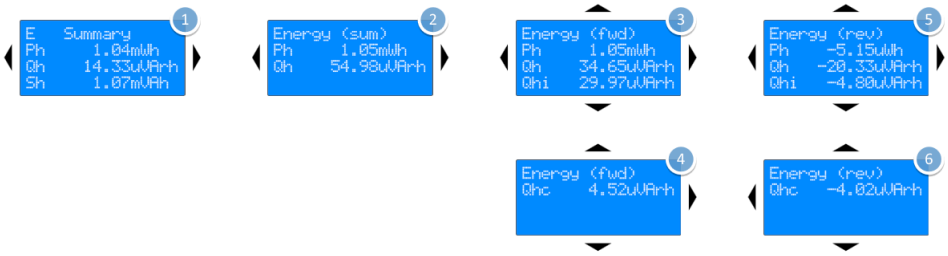
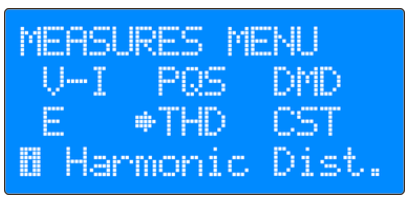


Figure 5.13: Map of screens for Energy consumption

Note: To reset the values of accumulated energy, see the Values' Reset section.

5.6 THD

Total harmonic distortion - THD measurements are shown on the screens linked to the menu >**THD**<, accessed through the >**MSR**< menu screen.



Measures menu for total harmonic distortion

Figure 5.14: Harmonic distortion

Harmonic distortions can be defined as sine wave's deformations caused by components of a periodic wave in which frequency is an integer multiple of the electrical system fundamental's frequency. The MMW02 measures harmonic voltage and current distortions taking into account individual components up to the 31st order for each phase. It shows the THD values expressed in percentage with reference to the True RMS value of fundamental component, both for current and for voltage.

5.6.1 Measuring Data

The map of screens relating to THD is shown in Figure 5.15, with representative values for each quantity. For navigating the screens use ⇧, ⇩, ⇦ and ⇨ keys.

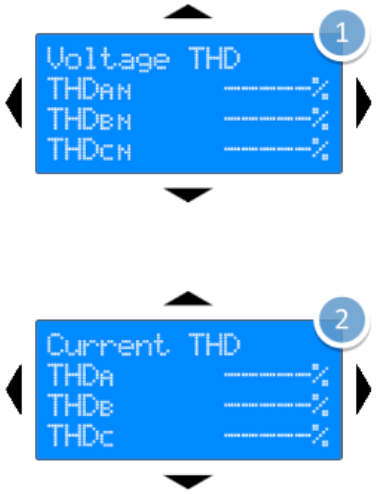
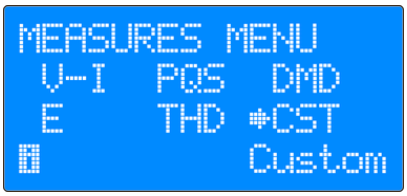


Figure 5.15: Map of screens for voltage and current total harmonic distortion

5.7 CUSTOM MENU

By means of attending specific demands, the MMW02 has an additional menu, which allows visualizing user-defined quantities relevant to the user.

These pre-selected quantities are shown on the screens linked to the >**CST**< menu, accessed through the >**MSR**< menu screen.



Custom menu screens

Figure 5.16: Custom

Figure 5.17 and Figure 5.18 are examples of screens found on this menu.

1. Three-phase voltage
2. Three-phase current
3. Total power factor

Figure 5.17: Three-phase custom resume

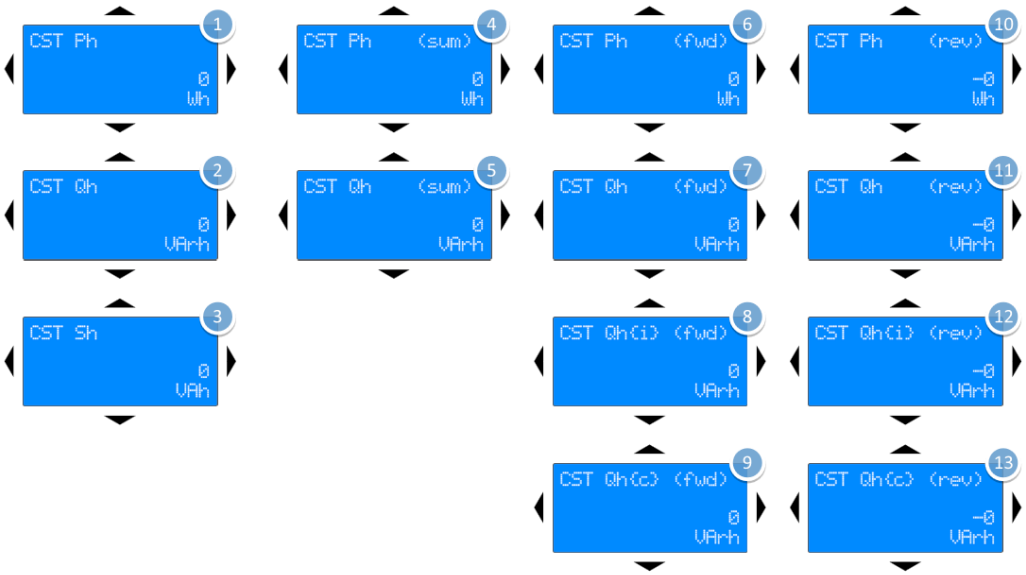


Figure 5.18: Map of screens for Energy consumption in high resolution

5.8 VALUES' RESET

The MMW02 performs Energy consumption and Power demand calculation on a non-volatile memory, i.e., even when the equipment is restarted, the value of certain quantities or even auxiliary variables used in the calculation have their values retained.

Non-volatile memory holds stored values indefinitely until they are reset by the user, or else, Datalog completes a sampling interval. However, in certain situations, you may need to reset the measurements. To clear these values, follow these steps:

1. Access the >**MAIN MENU**< screen
2. Select the >**RST**< menu
3. Select the desired group of values to be reset and confirm the operation pressing the PROG key

Figure 5.19: Reset energies

6 DATALOG

Datalog is the functionality related to recording data measurement in mass memory (non volatile memory). This chapter describes how to use the Datalog for storing values in the internal memory of the MMW02.

For greater flexibility when using the mass memory, MMW02 allows selecting blocks of specific data grouped by the measurement type. Thus, the user can optimize the use of memory by selecting only relevant data.

MMW02 records data measurements using the concept of observation areas, with each area holding one or more data blocks. At a given time, only one area can be active for recording. An area is created automatically when starting Datalog and holds identification and equipment configuration for that specific observation. The name of each area starts with AREA and ends with a sequential four-digit number, e.g., AREA0001.

6.1 ACCESSING DATALOG

Datalog can be accessed through **MAIN MENU** by selecting the **LOG** option.

Figure 6.1: Datalog selection

The Datalog status screen shown in Figure 6.2 displays the status and allows control of the data recording.

Figure 6.2: Datalog status

The following paragraphs describe the procedure for Datalog setup and operation.

6.2 CONFIGURATION

Before starting Datalog operation, it is necessary to set some basic parameters, such as starting mode, ending mode, interval between records and data blocks selection. To set these parameters, access the Datalog Setup menu and perform the following steps:

1. Access the >**MAIN MENU**< screen
2. Select the >**CFG**< menu
3. Using ⇦ and ⇨ keys, select the >**LOG Interval**< screen
4. Press the PROG key to start editing the parameters

6.2.1 Interval Recording

The first screen allows setting up the interval between records. This interval can be set to values ranging from 1 s to 24 hours. Recording intervals are always integer dividers of 60 for minutes and seconds, and integer dividers of 24 for hours. This allows performing the aggregation of a complete number of records within hours and minutes synchronized at 24:00:00 (midnight).

Figure 6.3: Interval Adjustment

To access the next setup screen press key.

6.2.2 Operating Modes

This screen allows to set Datalog start and stop mode. The following modes are possible:

- Start mode: manual or by date and time
- Stop mode: manual, by date and time, by timer or by counter

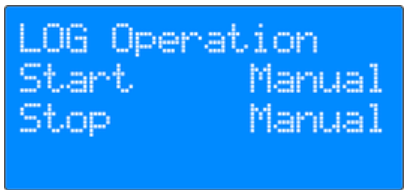


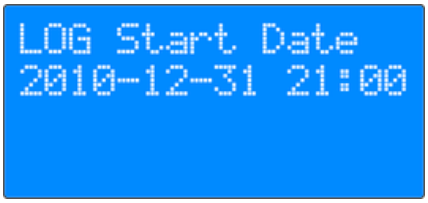
Figure 6.4: Start and stop

Manual mode is the one in which Datalog starts either by using the keyboard or the remote control, independently of any other scheduled event. When the selected start mode is date/time, the manual mode is linked to this, i.e., it is necessary to press the keypad or send remote control to activate the Datalog. Thus, when starting the Datalog, the status will be as Waiting until the scheduled time and date is reached. This process ensures that the Datalog is properly configured and allows the records' intervals to remain synchronized.

When start and stop modes are set different from manual, the following configuration screens, accessed by pressing key, will show the date/time adjustments, timer and counter, depending on the choice that were made.

6.2.2.1 Start Mode

The screen below show the possible configurations according to the start mode selected.



In this mode, Datalog will be started after date and time setting.

Figure 6.5: Start by Date/Time

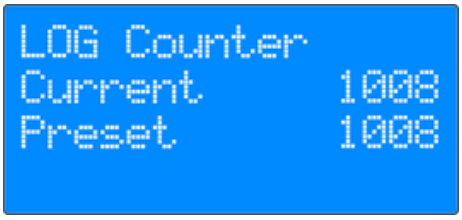
6.2.2.2 Stop Mode

The screens below show the possible configurations according to the stop mode selected.

In this mode, Datalog will be finalized after the date and time set.

In this mode, Datalog will be finalized after the time set.

Figure 6.6: Stop by timer



In this mode, Datalog will be finalized after the number of records exceed the value of counter set.

Figure 6.7: Stop by counter

6.2.3 Data Blocks

The following screens, accessed by pressing the PROG key to start, are used to select the measurement data blocks that the user wishes to record in the memory.

(1) Instantaneous
(2) Statistics
(3) Demand

Figure 6.8: Data blocks (1)

(1) Energy
(2) Harmonics

Figure 6.9: Data blocks (2)

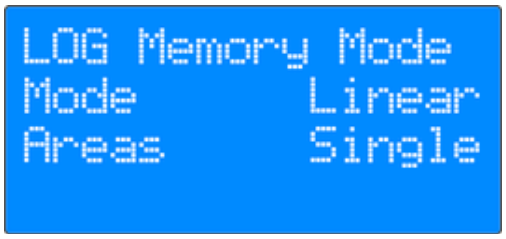
Below, it is described each data block:

- **Instantaneous:** data related to measurements with minimal aggregation. For example, voltage and current True RMS aggregated at intervals of 1 s
- **Statistics:** data related to the measurement statistical values (minimum, maximum and average) for all quantities, except for harmonics. Statistical values recorded on this block represent data of the selected sample interval
- **Demand:** data blocks related to Power demand
- **Energy:** data blocks related to Energy consumption
- **Harmonics:** data blocks related to the current and voltage total harmonic distortion values

6.2.4 Memory Usage

MMW02 allows two recording modes: linear or circular.

Both modes allow separating data into multiple areas. When this option is enabled, every time Datalog starts, a new area will be created while preserving the data of the areas previously recorded.



(1) Mode: Linear or Circular
(2) Areas: Multiple or Single

Figure 6.10: Memory use

6.2.4.1 Linear Mode

Linear mode sequentially fills the equipment's memory. The oldest data is at the beginning of the memory record while the most recent data is at the end.

6.2.4.2 Circular Mode

The circular mode allows that the oldest memory data to be overwritten by the most recent data. In this mode, the recording's autonomy is reduced to one third of that of the linear mode.

For example: in a 12 hours' autonomy calculation, from the moment it starts reading the equipment's log, recorded data, in the last 12 hours, are available for download. This process can be done while the equipment is recording without losing information in the Datalog. For more information, see item 6.2.4.3.

6.2.4.3 Autonomy

The MMW02 equipment autonomy is listed below.

Equipment	Aggregation interval	Voltage and current	Power, Energy consumption and Power demand	Harmonics of voltage and current	All quantities
MMW02	15 s	7.3 days	23.3 days	3.4 days	2.1 days
	5 min	145.,5 days	1.3 years	68 days	42.3 days
	15 min	1.2 year	3.8 years	204 days	126.9 days

ATTENTION!
Autonomy will always depend on settings such as quantities being recorded, interval aggregation and available memory.

6.2.5 Bindings

The bindings screen allows the user to select some particularities related to statistical data and energy recording.

Mode for recording of statistical and energy data

Figure 6.11: Bindings

These settings allow the choice of the following recording modes:

- **Statistcs:** When selecting Yes, at the beginning of each recording interval, statistical data of all measurements will be reset. Thus, statistics (average, minimum and maximum) will be only referring to that record. If No is selected, the statistical values will be calculated from the moment it was reset by >RST< menu. Thus, for each record, the statistical values related to that instant of time will be stored in memory, which is calculated from the last reset of statistical values
- **Energy:** When selecting Yes, at the beginning of each recording interval, the energies will be reset. Thus, the energy values (active, reactive and apparent) will be only referring to that interval. If No is selected, the energy values will be calculated from the moment it was reset by >RST< menu. Thus, for each record, it will be stored in memory the statistical values related to that instant of time, which is calculated from the last reset energies
- **1st Record:** When selecting **Yes**, the value of measured aggregations during the period of time in which Datalog is in **Synchronizing** state, will be stored in memory. When **No** is selected, only full integration intervals will be considered.

6.3 OPERATION

This section describes how to use Datalog to record data measurements. Before starting Datalog, adjustments must be set according to the company's needs.

6.3.1 Memory format

To format the memory, follow these steps:

1. Access the >**MAIN MENU**< screen
2. Select the >**LOG**< menu
3. Using ⇧ and ⇩ keys, select the >**LOG Free memory**< screen

(1) Available memory
(2) Autonomy
(3) Formatting

Figure 6.12: Datalog information

This screen informs the number of free bytes in the internal memory, the autonomy, according to the performed settings, and at last the option for formatting it. The quantity of free memory is represented in units of bytes GibiByte (GiB), MebiByte (MiB) e KibiByte (KiB), standard defined by the IEEE 1541-2002. The autonomy is represented in years [y], days [d], hours [h] and minutes [min].

To start the process of formatting, press the PROG key and confirm the operation. After confirming the operation, a message that the memory is being formatted is displayed. At the end, a formatting conclusion message will be displayed on the screen.

ATTENTION!
Make sure that the data in the memory are no longer needed or have been saved, because after formatting, data cannot be recovered.

6.3.2 Starting Datalog

To start recording measurements in the memory, go to Datalog home screen and, with Datalog in Stop mode, hold the PROG key for more than 1 second.

TIP!
Another way to start Datalog is by commanding through communication interface. For further information, contact technical support.

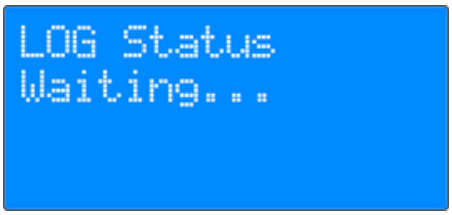
ATTENTION!
Independently of the startup mode option, the PROG key must always be pressed to begin the process of Datalog.

If Datalog is scheduled to start by **Date/Time**, the state will be changed to **Waiting**. It will remain in this state until the scheduled date and time are achieved based on the meter clock.

When the start condition is reached, Datalog state will change to **Preparing**, this means it will be preparing the file systems and writing the information related to the area being created into memory.

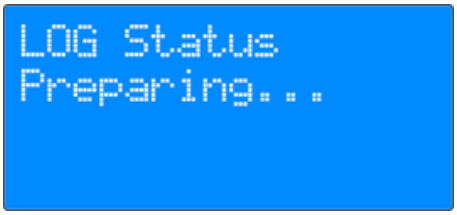
Thereafter, the Datalog state will be as **Synchronizing** until the clock of the meter reaches one synchronizable hour with the selected interval. For example: if the current time is 12:07:30, and the sampling interval is set to 00:10:00, Datalog will only start recording from 12:10:00, staying for 2 minutes and 30 seconds in **Synchronizing** state.

The different states are illustrated in the following images.



Datalog waiting date and time to start to record memory data

Figure 6.13: Status waiting



Datalog preparing area's files

Figure 6.14: Status preparing

Datalog waiting synchronizable time to start to record data memory

Figure 6.15: Status synchronizing

As soon as Datalog synchronizes, it will start recording on memory the data blocks at the selected intervals.

Datalog recording

Figure 6.16: Status recording

In this screen (Fig. 61), by pressing the tecla key briefly, Datalog will be in Pause mode. When keeping the PROG key pressed, Datalog will be finalized.

6.3.3 Area Information

To view the screen with information from the current area, press key while on the >**LOG Info**< screen.

(1) Area: Area identification
(2) Records: Number of records in the area.
(3) Blocks: Selected blocks of measures.

Figure 6.17: Area information

In this screen, it is informed the area identification, and the number of records and the measurement blocks recorded in it. The letters that compose the Blocks field relate to following measurement blocks:

- **I:** Instantaneous
- **S:** Statistics
- **D:** Demands
- **E:** Energies
- **H:** Harmonics

Unselected blocks will be shown with a lower trace. To change this setting, see the Configuration section.

6.3.4 Error Status

If the memory is defective or there is any other problem in the process of data recording, including configuration errors, Datalog will be with an Error status. To view the error, press the key. To put Datalog in Stopped state again, hold PROG key.

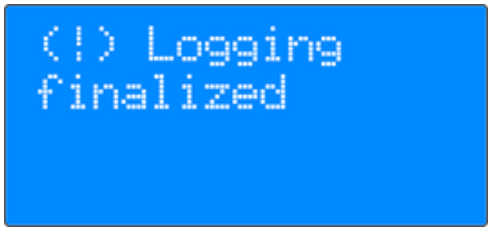
Figure 6.18: Error status

Figure 6.19: Error description

6.3.5 Stop Recording Datalog

From the moment the Datalog starts the recording process, it is possible to stop the operation at any time by pressing and holding the PROG key, independently if it is scheduled to stop by any other option. If Datalog is scheduled to stop by Date/Time, Timer, or Counter, it will go to Stop state automatically when the programmed condition is achieved, without the need of manual intervention.

When Datalog is finished, a message informing the end of the process is presented in the screen.



Message informing that data record has been finalized

Figure 6.20: Datalog finalized

At this moment, the area will be closed, and it becomes available for reading in the WEG Power Manager software.

ATTENTION!
Since MMW02 use flash memory type with the FAT file system, when there is any kind of power failure during the writing of a record in memory, it can happen that a record in particular becomes corrupted. The others are not affected.

7 ALARMS

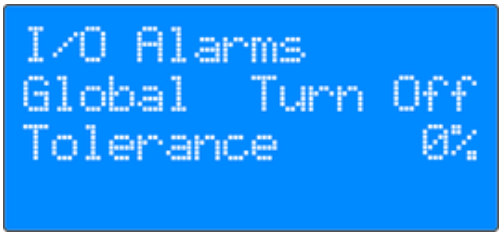
Alarms are a way to alert the user when the levels of certain quantities exceed preset limits. The MMW02 allows configuration of up to 20 different alarm events that operate simultaneously and independently. You can also schedule a tolerance (hysteresis) to the limits of quantities control range. The triggering of the alarms may activate audible beeps or close off a particular relay.

Alarms can be accessed via **MAIN MENU** by selecting the **I/O** option.

Figure 7.1: Alarm selection

7.1 CONFIGURATION AND REGISTRATION

The first screen allows you to set the alarms global functioning and hysteresis applied to the verification of the triggering limits programmed in the alarms.



(1) Global: Enable or disable all alarms simultaneously
(2) Tolerance: Apply a hysteresis to the programmed limits while alarm actuation

Figure 7.2: Global configuration of alarms

Then the alarm registration screen appears, as shown in Figure 7.4. When an alarm is registered, it is added to the alarm list. Upon reaching the upper limit of registered alarms, the registration screen for new alarms will be suppressed, reappearing again when any of the other alarms is deleted.

(1) Shows the alarm state and the monitored quantities
(2) The action taken by the alarm when it is acting
(3) Minimum performance limit
(4) Maximum performance limit

Figure 7.3: Register new alarm

To register a new alarm, follow the steps shown in Figure 7.4:

1. Access the screen for registering alarms pressing ⇧ and ⇩ keys
2. Press the PROG key
3. Select the supervised quantity ant the action to take (beep or relay)
4. Select the maximum and minimum limits for actuation
5. If power factor is supervised, select limits' characteristic (inductive, capacitive or resistive)

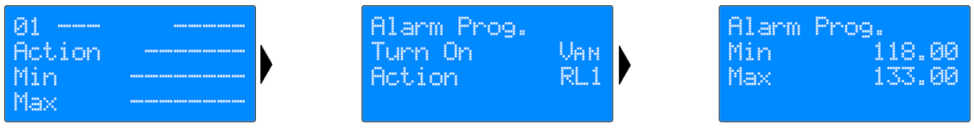


Figure 7.4: Flow for registering alarms

At the end, the alarm has been registered and it is available at the alarm list.

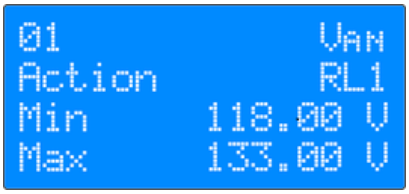


Figure 7.5: Alarm registered

To edit the alarm, press PROG key again.

7.2 EXCLUSION

To delete a programmed alarm, just hold down CLEAR key. Then, a message asking for a confirmation will be displayed.

7.3 ENABLING

The alarm is enabled whenever the monitored parameter surpasses the limited range by its maximum and minimum values. When this happens, an icon will appear on the alarm screen. Depending on the scheduled action for the alarm, an audible warning may be emitted, or the available relay on the meter can be closed.

Figure 7.6: Alarm enabled

7.4 DISABLING

To disable a particular alarm without affecting the others, hold down PROG key. An X appears in the status display, and alarm actions will be turned off, i.e., the beep will stop, or the meter's available relay will open.

Figure 7.7: Alarm disabled

8 SPECIFICATIONS

8.1 BASIC CHARACTERISTICS

Item	Specification
Nominal frequency	50 and 60 Hz
Sampling	128 samples per cycle
	4 cycles/s at 60 Hz = 66.67ms/s or 3 cycles/s at 50 Hz = 60ms/s
	12 bits with sequential conversion of all current and voltage channels
Display language	Portuguese, Spanish and English
Supervisory software	WEG Power Manager
Impedance of the voltage inputs	2MO
Maximum allowable measure	500 Vca Line to Line
	289 Vca Line to Neutral

8.2 ELECTRICAL QUANTITIES

8.2.1 Frequency

Item	Specification
Measuring method	Count of zero-crossings of the fundamental component of the reference phase
Measuring range	42.5 to 57.5 Hz and 51.0 to 69.0 Hz
Resolution	0.01 Hz
Accuracy	±0.02 Hz
Available values	Instantaneous frequency F [Hz]

8.2.2 Voltage

Item	Specification
Measuring method	According to IEC 61557-12
	Measuring range
	50 to 289 Vca Line to Neutral
	Indirect using PT
Resolution	0.01 V
Accuracy	Typical: ±0.20 %RV ±0.05 %FS (*)
	Guaranteed: ±0.25 %RV ±0.10 %FS (*)
Range selection	Single measurement range
Available values	Line to Neutral voltage per phase Van, Vbn, Vcn [V]
	Three-phase Line to Neutral voltage V3Φ [V]
	Line to Line voltage per phase Uab, Ubc, Uca [V]
	Three-phase Line to Line voltage U3Φ [V]

(*) Read value (RV), Full scale (FS)

8.2.3 Current

Item	Specification
Measuring method	According to IEC 61557-12
Measuring range	Direct connection: 0.02 to 5 A
	Indirect connection with use of CT, TF = 1.0 (**)
Resolution	0.01 A
Accuracy	Typical: ±0.20 %RV ±0.05 %FS (*)
	Guaranteed: ±0.25 %RV ±0.10 %FS (*)
Track selection	Single measurement range
Available values	Current per phase Ia, Ib, Ic [A]
	Three-phase current I3Φ [A]

(*) Read value (RV), Full scale (FS) (**) Thermal factor (TF)

8.2.4 Power

8.2.4.1 Active Power

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	1kW to 260MW
Resolution	1 W, 1 VAr, 1 VA
Accuracy (excluding current sensor)	Typical: ±0.40 %RV ±0.10 %FS (*)
	Guaranteed: ±0.50 %RV ±0.20 %FS (*)
Available values	Total active power P [W]
	Active power per phase Pa, Pb, Pc [W]

(*) Read value (RV), Full scale (FS)

8.2.4.2 Reactive Power

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	1kVAr to 260MVAr
Resolution	1 VAr
Accuracy	Typical: ±0.4 %RV ±0.1 %FS (*)
	Guaranteed: ±0.5 %RV ±0.2 %FS (*)
Available values	Total reactive power Q [VAr]
	Reactive power per phase Qa, Qb, Qc [VAr]

(*) Read value (RV), Full scale (FS)

8.2.4.3 Apparent Power

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	1kVA to 260MVA
Resolution	1 VA
Accuracy	Typical: ±0.4 %RV ±0.1 %FS (*)
	Guaranteed: ±0.5 %RV ±0.2 %FS (*)
Available values	Total apparent power S [VA]
	Apparent power per phase Sa, Sb, Sc [VA]

(*) Read value (RV), Full scale (FS)

8.2.5 Power Factor

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	0 to 1 capacitive
	0 to 1 inductive
Resolution	0.01
Accuracy	±0.4 % (*)
Available values	Total power factor PF
	Power factor per phase PFa, PFb, PFc

(*) Accuracy relative to Full scale (FS)

8.2.6 Energy Consumption

8.2.6.1 Active Energy

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	20 Wh to 167GWh
Resolution	1 Wh for values up to 1GWh
	1kWh for values up to 39TWh
Accuracy	±0.4 %
Classification	Class B (ABNT NBR 14520) (*)
Available values	Total active energy Ph [Wh]
	Gross active energy Ph sum [Wh]
	Direct active energy Ph fwd [Wh]
	Reverse active energy Ph rev [Wh]

(*) Valid for variation of ambient temperature, current and influence quantities (voltage, frequency, harmonics, phase sequence and disruption of one or two phases)

8.2.6.2 Reactive Energy

Item	Specification
Measuring method	Measurement in four quadrants, according to IEC 61557-12
Measuring range	20 VArh to 167GVArh
Resolution	1 VArh for values up to 1GVArh
	1kVArh for values up to 39TVArh
Accuracy	±0.4 %
Classification	Class B (ABNT NBR 14520) (*)
Available values	Total reactive energy Qh [VArh]
	Gross reactive energy Qh sum [VArh]
	Direct reactive energy Qh fwd [VArh]
	Inductive direct reactive energy Qhi fwd [VArh]
	Capacitive direct reactive energy Qhc fwd [VArh]
	Reverse reactive energy Qh rev [VArh]
	Inductive reverse reactive energy Qhi rev [VArh]
	Capacitive reverse reactive energy Qhc rev [VArh]

(*) Valid for variation of ambient temperature, current and influence quantities (voltage, frequency, harmonics, phase sequence and disruption of one or two phases)

8.2.6.3 Apparent Energy

Item	Specification
Measuring method	Vector sum of active and reactive power
Measuring range	20 VAh to 167GVAh
Resolution	1 VAh for values up to 1GVAh
	1kVAh for values up to 39TVAh
Accuracy	±0.4 %
Available values	Total apparent energy Sh [VA]

8.2.7 Power Demand

Item	Specification
Measuring method	Power integration over time in fixed blocks
Measuring range	1kW/VAr/VA to 260MW/VAr/VA
Resolution	1 W/VAr/VA
Accuracy	±0.4 %
Available values	Demand of active, reactive and apparent power
	Demand of active, reactive and apparent peak power
	Demand of active, reactive and apparent expected power

8.2.8 Voltage and Current THD

Item	Specification
Harmonics used	2 to 31st
Measuring range	0 to 100 %
Resolution	0.1 %
Accuracy	±5 %
Available values	THD of voltage per channel THDVa, THDVb, THDVc [%]
	THD of current per phase THDIa, THDIb, THDIc [%]

8.3 DIGITAL OUTPUT

Item	Specification
Type	Relay dry contact
Number of outputs	1 (RL1)
Maximum allowable voltage	250 Vca or 30 Vcc
Maximum allowable voltage (fuse)	3 A

8.4 ALARMS

Item	Specification
Number of alarms	Up to 20 configurable alarms with direct outputs for beep or RL1.
Variables monitored	VaN, VbN, VcN, Uab, Ubc, Uca, Ia, Ib, Ic, FPa, FPb e FPc, THDVaN, THDVbN, THDVcN, THDUab, THDUbc, THDUca, THDIa, THDIb, THDIc
Tolerance	0 to 10 %

8.5 DATALOG

Item	Specification
Type	Flash, 16MB
Data format	FAT32
Memory usage modes	Circular or linear
	Single area or multiple areas
Maximum number of areas	12
Start modes	Manual or date/time
Stop modes	Manual, timer, counter or date/time
Selectable data blocks	Instantaneous, statistics, demands and energy
Autonomy	Minimum: 1 hour and 40 minutes for all blocks with recording interval of 1 s, with linear memory
	Typical: 41 days, 20 hours and 50 minutes for all blocks with recording interval of 10 minutes, with linear memory
	Maximum: 6029 days for all blocks with recording interval of 24 hours, with linear memory
	With circular memory: 51 days for recording of the instantaneous blocks, demands and energy

8.6 COMMUNICATION INTERFACE

Item	Specification
Interface	RS-485
Baud rate	600 to 115200 bps
Stop bits	1 or 2
Data bits	8
Parity	None, odd or even
Protocol	MODBUS-RTU

8.7 POWER SUPPLY

Item	Specification
Power supply AC	85 to 265 Vca
Power supply DC	100 to 300 Vcc
Consumption	< 10 VA
External protection fuse (not included)	1 A

8.8 CLOCK AND CALENDAR

Item	Specification
Type	Supercap
Autonomy	120 hours (typical) considering energized meter for at least 10 hours

8.9 USER INTERFACE

8.9.1 Keyboard

Item	Specification
Type	Membrane keyboard with 6 multifunctional keys in relief and metal cap
Keys	Navigation (right, left, up, down), Prog and Clear

8.9.2 Display

Item	Specification
Type	Matrix of liquid crystal 4 lines x 16 columns (64 characters) with backlight
Visible area (width x height)	14.0 x 64.5mm
Format characters	5 x 8 Pixel
Update rate	50ms to 5 s

8.10 MECHANICAL CHARACTERISTICS

Item	Specification
Box	Heat-resistant plastic (ABS).
Dimensions (height x width x depth)	98 x 98 x 101mm
Panel Cut	91.0 x 91.0 -0.0/+0,8mm
Weight	425 g
Degree of protection	Frontal: IP-40
	Rear: IP-00

8.11 ENVIRONMENTAL CONDITIONS

Item	Specification
Temperature of storage	-25 to 75°C
Temperature of operation	0 to 60°C
Relative humidity of the air	40 to 70 %

8.12 RANGES AND DEFAULT VALUES

Submenu	Variable	Tracks	Standard
System (SYS)	Config	21 connections; See Connection to electrical grid section	04: 3P4W-3V3C
	Fnom [Hz]	{ 50 | 60 }	60
	S/ Freq	{ Cut | Nominal | Last }	Cut
	Phase sequence	{ ABC | ACB }	ABC
	PT configuration	{ Prim/Sec | Relation }	Prim/Sec
	Primary PT [V]	[50, 999999]	220
	Secundary PT [V]	[50, 500]	220
	PT relation	0.00 – 20000.00	1.00
	CT configuration	{ Prim/Sec | Relation }	Prim/Sec
	Primary CT [A]	5 – 99999	5
	Secundary CT [A]	5 (Fixo)	5
	CT relation	0.01 – 20000.00	1.00
	Polarization of the CTs	{ + | - }	I1:+
			I2:+
			I3:+
	Sum mode	{ Vector | Arithmetic }	Vector
Demands (DMD)	Interval [min]	{ 1 | 2 | 3 | 4 | 5 | 6 | 10 | 12 | 15 | 20 | 30 | 60 }	15
Serial communication (COM)	Velocity [bps]	{ 600 | 1200 | 1800 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 }	19200
	Format	{ 8-N-1 | 8-N-2 | 8-E-1 | 8-E-2 | 8-O-1 | 8-O-2 }	8-N-1
Protocol Modbus	Adress	1 – 247	1
	Format	{ Long (32bits) | Short (16 bits) }	Long
	B/W Swap	{ None | Byte | Word | Both }	None
Interface (UI)	Language (LNG)	{ PT-BR (Portuguese) | EN-US (English) | ES (Spanish) }	PT-BR
	Beep (SND)	{ On | Off }	On
	LCD rate [ms]	{ 50 | 100 | 200 | 500 | 1000 | 2000 | 5000 }	1000
Alarms (ALR)	Global	{ On | Off }	Off
	Hysteresis [%]	0 to 10	0
Date/Time (CLK)	Time	00:00:00 a 23:59:59	Current Time
	Data	2000-01-01 a 2099-12-31	Current Date
	Day of the week (calculated)	Monday to Sunday	Current day
Datalog (LOG)	Interval	00:00:00 to 24:00:00	00:10:00
	Start mode operation	{ Manual | Date/Time }	Manual
	Stop mode operation	{ Manual | Counter | Time | Date/Time }	Manual
	Blocks	Instantaneous (I), Statistics (S), Demands (D), Energies (E), Harmonics (H) { Yes | No }	Yes, Yes, Yes, Yes, No (ISDE_)
	Recording mode	{ Linear | Circular }	Linear
	Recording areas	{ Single | Multiple }	Single
	Linkages	Statistics, energies, 1st record { Yes | No }	Yes, No, No

9 MAINTENANCE

9.1 CLEANING

In order to clean the MMW02 use a wet cloth with neutral soap. Never use alcohol or any other solvent since its use causes panel deterioration, and erases text written on the meter.

9.2 PROBLEMS' SOLUTION

9.2.1 Equipment does not turn on

- Verify that the auxiliary power, identified by + VAUX -, is connected;
- Check the installation protection fuse;
- Also check if the voltage available on the system meets the minimum requirements for powering up the meter;
- More information in Power Supply section.

9.2.2 Results of the measurements with traces

The resulting value of the measurement is out of range or the measurement is not applicable for the selected connection.

- Verify that measuring cables for voltage and current inputs are properly installed;
- Verify that the voltage and current levels present in the system attend the established minimum limits for measurement;
- More information in Electrical system section.

9.2.3 Voltage and current measures with irregular values

Voltage and current values will be higher or lower depending on the actual configuration. To solve this issue, go to measurements menu setting and adjust the input ratio according to meter connection. If the meter connection is direct, make sure that the primary and secondary values are equal.

9.2.4 Active and reactive power with inverted signal

It might be a reversed direction problem of the current's sensors or an incorrect connection of the voltage measuring cables.

- Check the connection's direction of CTs, observing the indicative signal in the rear meter connector
- Verify if the voltage measuring cables are connected according to its phase sequence

9.2.5 The meter does not communicate with the software

- Verify if the communication cable is properly connected to the meter serial communication port. This port is identified as + D - on the rear panel;
- Check if the correct COM port has been selected in the software. For that, identify the virtual serial port created using the Windows Device Manager;
- Make sure that the settings of software's serial communication are the same as the meter's;
  - Check the rate of data transfer (baud rate), e.g., 19200 bps;
  - Data format, e.g., 8-N-1;
  - Network address, e.g., 79, preventing that multiple devices use the same address;
  - Addressing format, including byte order, e.g., Long ABCD.

9.2.6 Datalog starts, but it does not increment records

It might be that the meter's clock (date and time) has not been adjusted. In this situation, Datalog starts, indicated by the status Registering, but does not record. To solve this issue, go to Date/Time menu. Also observe GMT and DST adjustments, located in the screen under Date/Time.

9.3 CALIBRATION MANAGEMENT

The MMW02 provides the management and control of last and next calibration, according to a given periodicity. The first date filled, is the last calibration date filled when calibration was performed at the factory. The time between calibrations is suggested by the manufacturer (24 months), and the next calibration's date is automatically filled based on the last calibration and periodicity. WEG's software is able to update these values every time a calibration is performed, but it is also possible to set these values manually. If the date on the equipment is later than the next calibration date, a warning screen appears when initializing the device, reminding the user that the equipment's calibration should be performed.

For users that have their own calibration management, this facility, provided by MMW02, can be disabled (factory default).

To access the calibration screens, proceed as follows:

1. Access the >**PRINCIPAL MENU**< screen
2. Select the >**CFG**< menu
3. Use ⇦ or ⇨ keys to select the option **INF Calibration**
4. Press PROG key to enable the option
5. Use ⇧ and ⇩ keys to view the date values for the last and next calibration, and recommended periodicity
6. Press PROG key to edit any value

9.4 DIAGNOSTIC MODE

The MMW02 has a diagnostic mode for internal tests performed at the factory and for supervised field tests. To enter the diagnostic mode, power up the equipment while pressing PROG and CLEAR keys. In case of any mistake, while in diagnostic mode, press CLEAR until the equipment restarts in operating mode.

ATTENTION!
Remember that diagnostic mode should be supervised by WEG's technical personnel, otherwise the equipment may need repairing.

10 ANNEX A – REPORT TO TECHNICAL ASSISTANCE

COMPANY DATA
COMPANY NAME:
ADRESS FOR DELIVERYING THE EQUIPMENT:
CITY:
STATE:
PHONE:
FAX:
E-MAIL:
CONTACT:
HAULIER:
EQUIPMENT DATA
EQUIPMENT: MMW02
SERIAL NUMBER:
MALFUNCTIONS LISTED:
POSSIBLE CAUSES:

11 WARRANTY TERM

Limited Warranty for Drivers, Controls and Engineered Products of Weg Automation

WEG Automation offers limited warranty for defects in product's material and workmanship, as follows:

1. For the effectiveness of this warranty, it is essential that the user thoroughly inspect the product purchased immediately after its delivery, carefully observing all features and instructions for installation, adjustment, operation and maintenance. The product shall be considered accepted and automatically approved by the buyer when no written notice is made by the buyer regarding technical problems or purchase difficulties, when applicable, within seven working days after the delivery date;
2. The warranty period is twelve months from WEG's delivery date or authorized dealer's delivery date, proven by means of equipment's purchase invoice, and limited to twenty-four months from product's manufacturing date;
3. The paragraph above contains legal warranty periods, seeing that they are not cumulative;
4. If a warranty period is defined differently in the technical and commercial proposal of a particular sale, such period shall override the time limit described above;
5. In case the product under warranty does not work properly or does not work at all, the warranty services may be applied at WEG Automation's sole discretion, during the business hours in WEG's premises, at an Authorized Service Provider assigned by WEG or in the user's premises.
6. In case of a fault, the product must be available for the supplier by the period required to detect the cause, enabling the supplier to perform the corresponding repairs;
7. In order to be entitled to the warranty, the customer must comply with the specifications contained in WEG's technical documents, especially those established in the Installation and Operation Manual, as well as with local regulations in force, according to each country;
8. WEG Automation or an assigned Authorized Service Provider shall inspect the product sent, and, in case of any defect, covered by the warranty, it shall repair, modify or replace the defective component, at its sole discretion, free of charge, except for those items mentioned in item 10;
9. The liability of this warranty is solely limited to the repair, modification or replacement of the supplied product or component, and WEG takes no liability for damages to people, third parties, other equipment or installations, loss of profits or any other resulting or consequential damage;
10. Other expenses, such as product's freight, packaging, costs of removal/disassembly and replacement/reinstallation, adjustment/parameter setting services, when applicable, shall be borne exclusively by the buyer, including all the fees and expenses of transportation/lodging of the technical assistance personnel, when service is necessary and/or requested in the user's premises;
11. This warranty does not cover equipment's or product's normal wear and damages resulting from improper or negligent installation or operation. Noncompliance with the installation or operation instructions of the product's manual, incorrect parameterization (when applicable), improper maintenance or storage, poor installation or chemical, electrochemical, electrical, mechanical or atmospheric influences are not covered.
12. This warranty does not cover parts or components considered consumable items, such as plastic or rubber parts, air filters, incandescent light bulbs, fuses, surge protectors, etc.;
13. This warranty shall be automatically canceled, regardless of any notice if the buyer performs or authorizes third parties to perform any changes or repairs on the defective product or equipment without WEG's previous written authorization;
14. The right to the warranty shall be suspended in case the buyer defaults payment or does not meet the obligations towards WEG, seeing that the length of the suspension shall be considered as warranty time elapsed if the buyer subsequently meets its obligations towards WEG;
15. Any repairs, modifications, or replacements due to defects in material and workmanship will neither interrupt nor extend the period of this warranty under any hypothesis;
16. This product was not designed to be used as a safety element (except for dedicated products such as the Safety line). Additional measures must be taken to avoid material damages and personal injuries. The product was manufactured under strict quality control; however, if installed in systems where its failure may cause risks of material damages or personal injuries, additional safety devices must ensure safety condition in case of a product failure, thus preventing accidents;
17. WEG Automation does not authorize any person or company to take any liability on its behalf regarding the warranty of its products beyond those established herein;
18. WEG Automation reserves the right to change the characteristics of its products without previous notice.

12 ANEX B – PROTOCOL MODBUS RTU

12.1 MMW02: DOCUMENTATION/ MODBUS PROTOCOL/ 1.0.1/ MODBUS TABLE

ATTENTION!
The address with the written permissions do not have protection against invalid values.

The possible types to each value are:
- Bool: Logical value. 0 is false and any other value is true;
- Short: 16 bits unsigned integer;
- Long: 32 bits unsigned integer;
- Float: float formatted as IEEE754;
- DateTime: Timestamp in seconds starting at 00:00:00 UTC, January 1st, 1970;
- CaracFP: Power Factor Characteristics
  - - 1: Ningún;
  - 0: Resistive;
  - 1: Inductive;
  - 2: Capacitive;
- Phase: Equipment's phase at the time the measure was made
  - -1: None;
  - 0: AN, AB o A;
  - 1: BN, BC o B;
  - 2: CN, CA o C;

12.2 COIL

12.2.1 Digital Inputs/Outputs

Address		Format	Mode	Description
Short	Long			
0	0	Bool	R	Relay State 1

12.2.2 Coils Reset

Address		Format	Mode	Description
Short	Long			
50	50	Bool	W	Energy Reset
51	51	Bool	W	Demand Reset
52	52	Bool	W	Statistics Reset
53	53	Bool	W	Factory Default
54	54	Bool	W	IInternal / Not used
55	55	Bool	W	Counter Reset
56	56	Bool	W	Format memory
57	57	Bool	W	Internal / Not used
58	58	Bool	W	Internal / Not used
59	59	Bool	W	Internal / Not used
60	60	Bool	W	Internal / Not used
61	61	Bool	W	Internal / Not used
62	62	Bool	W	Internal / Not used
63	63	Bool	W	Internal / Not used
64	64	Bool	W	Internal / Not used
65	65	Bool	W	Internal / Not used
66	66	Bool	W	Internal / Not used
67	67	Bool	W	Internal / Not used
68	68	Bool	W	Internal / Not used
69	69	Bool	W	Internal / Not used
70	70	Bool	W	Last Active Demand Reset
71	71	Bool	W	Peak Active Demand Reset

Address		Format	Mode	Description
Short	Long			
72	72	Bool	W	Last Reactive Demand Reset
73	73	Bool	W	Peak Reactive Demand Reset
74	74	Bool	W	Last Apparent Demand Reset
75	75	Bool	W	Peak Apparent Demand Reset
76	76	Bool	W	Forward Active Energy Reset
77	77	Bool	W	Reverse Active Energy Reset
78	78	Bool	W	Forward Reactive Energy Reset
79	79	Bool	W	Reverse Reactive Energy Reset
80	80	Bool	W	Apparent Energy Reset

12.3 HOLDING

12.3.1 Parametrization (16 bits' value)

Address		Format	Mode	Description	
Short	Long				
0	0	Short	R/W	COM - Modbus address	1 till 247 interval
1	1	Short	R/W	COM - Modbus 32-bits mode	0-Short
					1-Long
2	2	Short	R/W	COM - Byte swap indication	
3	3	Short	R/W	COM - Word swap indication	
4	4	Short	R/W	COM - Baud rate [bps]	0-"600" 1-"1200" 2-"1800" 3-"2400" 4-"4800' 5-"9600" 6-"19200" 7-"38400" 8-"57600" 9 - "76800" 10 - "115200"
5	5	Short	R/W	SYS - Nominal frequency [Hz]	0 - "50" 1 - "60"
6	6	Short	R/W	LOG - Start mode	0 - "Manual" 1 - "Date/Time"
7	7	Short	R/W	LOG - Stop mode	0 - "Manual" 1 - "Date/Time" 2 - "Time" 3 - "Counter"
8	8	Short	R/W	LOG - Circular/Linear	0 - "Linear"
					1 - "Circular"
9	9	Short	R/W	Internal / Not used	

Address		Format	Mode	Description	
Short	Long				
10	10	Short	R/W	UTC - timezone	0 - "UTC-12:00"; 1 - "UTC-11:00"; 2 - "UTC-10:00"; 3 - "UTC-09:30"; 4 - "UTC-09:00"; 5 - "UTC-08:00"; 6 - "UTC-07:00"; 7 - "UTC-06:00"; 8 - "UTC-05:00"; 9 - "UTC-04:30"; 10 - "UTC-04:00"; 11 - "UTC-03:30"; 12 - "UTC-03:00"; 13 - "UTC-02:00"; 14 - "UTC-01:00"; 15 - "UTC"; 16 - "UTC+01:00"; 17 - "UTC+02:00"; 18 - "UTC+03:00"; 19 - "UTC+03:30"; 20 - "UTC+04:00"; 21 - "UTC+04:30"; 22 - "UTC+05:00"; 23 - "UTC+05:30"; 24 - "UTC+05:45"; 25 - "UTC+06:00"; 26 - "UTC+06:30"; 27 - "UTC+07:00"; 28 - "UTC+08:00"; 29 - "UTC+09:00"; 30 - "UTC+09:30"; 31 - "UTC+10:00"; 32 - "UTC+10:30"; 33 - "UTC+11:00"; 34 - "UTC+11:30"; 35 - "UTC+12:00"; 36 - "UTC+12:45"; 37 - "UTC+13:00"; 38 - "UTC+14:00";
11	11	Short	R/W	DST - Daylight Saving Time	0 - "Standard" 1- "D. Savings"
12	12	Short	R/W	LOG - Creation Area Mode	0 - "Single" 1 - "Multiple"
13	13	Short	R/W	SYS - Phase order	0 - "ABC" 1 - "ACB"
14	14	Short	R/W	SYS - System Connection Type	0-"01:1P2W-1V1C"; 1-"02:2P2W-1V1C"; 2-"03:2P3W-2V2C"; 3-"04:3P4W-3V3C"; 4-"05:3P4W-3V2CB"; 5-"06:3P4W-3V1CB"; 6-"07:3P4W-2V3CB"; 7-"08:3P4W-2V2CB"; 8-"09:3P4W-2V1CB"; 9-"10:3P4W-1V3CB"; 10-"11:3P4W-1V2CB"; 11-"12:3P4W-1V1CB"; 12-"13:3P3W-3V3C"; 13-"14:3P3W-3V2C"; 14-"15:3P3W-3V1CB"; 15-"16:3P3W-2V3C"; 16-"17:3P3W-2V2C"; 17-"18:3P3W-2V1CB"; 18-"19:3P3W-1V3CB"; 19-"20:3P3W-1V2CB"; 20-"21:3P3W-1V1CB";
15	15	Short	R/W	SYS - PT Configuration Mode	0 - "Prim/Sec"; 1 - "Ratio";
16	16	Short	R/W	SYS - CT Configuration Mode	0 - "Prim/Sec"; 1 - "Ratio";

Address		Format	Mode	Description	
Short	Long				
17	17	Short	R/W	SYS - CT 01 Polarity	0 - "Forward (+)"; 1 - "Reverse (-)";
18	18	Short	R/W	SYS - CT 02 Polarity	0 - "Forward (+)"; 1 - "Reverse (-)";
19	19	Short	R/W	SYS - CT 03 Polarity	0 - "Forward (+)"; 1 - "Reverse (-)";
20	20	Short	R/W	SYS - Power Sum Mode	0 - "Vector"; 1 - "Arithmetic";
21	21	Short	R/W	COM - Transmission/Reception Format	0-"8-N-1"; 1-"8-N-2"; 2-"8-E-1"; 3-"8-E-2"; 4-"8-O-1"; 5-"8-O-2";
22	22	Short	R/W	UI - User's Language Interface	0 - "PT-BR"; 1 - "ES"; 2 - "EN-US";
23	23	Short	R/W	DMD - Demand Integration Interval [min]	0-"1"; 1-"2"; 2-"3"; 3-"4"; 4-"5"; 5-"6"; 6-"10"; 7-"12"; 8-"15"; 9-"20"; 10-"30"; 11-"60";
24	24	Short	R/W	Internal / Not used	
25	25	Short	R/W	Internal / Not used	
26	26	Short	R/W	Internal / Not used	
27	27	Short	R/W	Internal / Not used	
28	28	Short	R/W	I/O - Global State of the Alarms	0-"Off" 1-"On"
29	29	Short	R/W	I/O - Alarm Hysteresis [%]	0 till 10 Interval
30	30	Short	R/W	LOG - Selection of Instantaneous Measuring Block	0 - "No" 1 - "Yes"
31	31	Short	R/W	LOG - Selection of Statistical Measuring Block	0 - "No" 1 - "Yes"
32	32	Short	R/W	LOG - Selection of Demand Measuring Block	0 - "No" 1 - "Yes"
33	33	Short	R/W	LOG - Selection of Energy Measuring Block	0 - "No" 1 - "Yes"
34	34	Short	R/W	LOG - Selection of Harmonics Measuring Block	0 - "No" 1 - "Yes"
35	35	Short	R/W	LOG - Bind Statistic block to Log Interval	0 - "No" 1 - "Yes"
36	36	Short	R/W	LOG – Bind Energy block to Log Interval	0 - "No" 1 - "Yes"
37	37	Short	R/W	LOG - Record the first register after synchronization	0 - "No" 1 - "Yes"
38	38	Short	R/W	UI - Beep	0-"Off" 1-"On"

12.3.2 Parametrization (32 bits' value)

Address		Format	Mode	Description	
Short	Long				
200	100	Long	R/W	SYS - Primary PT [V]	50 till 999999 interval
202	101	Long	R/W	SYS - Secondary PT [V]	50 till 500
204	102	Float	R/W	SYS - PT Ratio	0 till 20000
206	103	Long	R/W	SYS - Primary CT [A]	5 till 99999
208	104	Long	R	SYS - Secondary CT [A]	Fixed Value in 5
210	105	Float	R/W	SYS - CT Ratio	0 till 20000
212	106	Long	R/W	LOG - Date/Time to stop recording data in the memory (Timestamp)	
214	107	Long	R/W	LOG - Interval between Records [s]	
216	108	Long	R/W	LOG - Time to stop recording data in the memory (Timestamp)	
218	109	Long	R/W	LOG - Regressive Counter to stop recording in the memory	0 till 999999
220	110	Long	R/W	LOG - Date/Time to start recording data in the memory (Timestamp)	

12.3.3 Datalog Autonomy

Address		Format	Mode	Description
Short	Long			
300	150	Long	R	Number of bytes recorded by records
302	151	Long	R	Free memory
304	152	Float	R	Memory autonomy to the Datalog. The whole part is in seconds, while the fractioned one is in milliseconds

12.3.4 Equipment's clock

Address		Format	Mode	Description
Short	Long			
600	300	DateTime	R/W	Clock - Unix Timestamp
602	301	Long	R/W	Clock - Year
604	302	Long	R/W	Clock - Month
606	303	Long	R/W	Clock - Day
608	304	Long	R/W	Clock - Time
610	305	Long	R/W	Clock - Minute
612	306	Long	R/W	Clock - Second

12.3.5 Informations

Address		Format	Mode	Description
Short	Long			
1040	520	Long	R	Relay Counter 1
1042	521	Long	R	Internal / Not used
1044	522	Long	R	Indicates that some of the energy's register has come to its limit

12.3.6 Datalog Control

Address		Format	Mode	Description	
Short	Long				
1060	530	Short	R/W	Actions (Written)	0 - Stop 1 - Record 2 - Pause 3 - Format
				State (Reading)	1 - Stopped 2 - Preparing 3 - Waiting 4 - Synchronizing 5 - Recording 6 - Finalyzing 7 - Paused 8 - Error

12.4 INPUT

12.4.1 Instantaneous

Address		Format	Mode	Description
Short	Long			
0	0	DateTime	R	Timestamp at measuring time
2	1	Float	R	Average Phase Voltage [V]
4	2	Float	R	Phase A Voltage [V]
6	3	Float	R	Phase B Voltage [V]
8	4	Float	R	Phase C Voltage [V]
10	5	Float	R	Average Current [A]
12	6	Float	R	Phase A Current [A]
14	7	Float	R	Phase B Current [A]
16	8	Float	R	Phase C Current [A]
18	9	Float	R	Average Line Voltage [V]
20	10	Float	R	Line AB Voltage [V]
22	11	Float	R	Line BC Voltage [V]
24	12	Float	R	Line CA Voltage [V]
26	13	Float	R	Total Power Factor
28	14	Float	R	Phase A Power Factor
30	15	Float	R	Phase B Power Factor
32	16	Float	R	Phase C Power Factor
34	17	CaracFP	R	Characteristic of total PF
36	18	CaracFP	R	Characteristic of PF phase A
38	19	CaracFP	R	Characteristic of PF phase B
40	20	CaracFP	R	Characteristic of PF phase C
42	21	Float	R	Total Active Power [W]
44	22	Float	R	Phase A Total Active Power [W]
46	23	Float	R	Phase B Total Active Power [W]
48	24	Float	R	Phase C Total Active Power [W]
50	25	Float	R	Total Reactive Power [VAr]
52	26	Float	R	Phase A Reactive Power [VAr]
54	27	Float	R	Phase B Reactive Power [VAr]
56	28	Float	R	Phase C Reactive Power [VAr]
58	29	Float	R	Total Apparent Power [VA]

Address		Format	Mode	Description
Short	Long			
60	30	Float	R	Phase A Apparent Power [VA]
62	31	Float	R	Phase B Apparent Power [VA]
64	32	Float	R	Phase C Apparent Power [VA]
66	33	Float	R	Instanteneous Frequency [Hz]
68	34	Float	R	Internal / Not used
70	35	Float	R	Internal / Not used
72	36	Float	R	Internal / Not used
74	37	Float	R	Neutral Current [A]
76	38	Long	R	Phase in which the frequency was obtained
78	39	Float	R	Phase A current angle [°]
80	40	Float	R	Phase B current angle [°]
82	41	Float	R	Phase C current angle [°]

12.4.2 Demand

Address		Format	Mode	Description
Short	Long			
200	100	Float	R	Predicted Apparent Demand [VA]
202	101	Float	R	Apparent Demand (last interval) [VA]
204	102	Float	R	Peak Apparent Demand [VA]
206	103	Float	R	Predicted Total Active Demand [W]
208	104	Float	R	Active Demand (last interval) [W]
210	105	Float	R	Peak of Total Active Demand [W]
212	106	Float	R	Predicted Total Reactive Demand [VAr]
214	107	Float	R	Total Reactive Demand (last interval) [VAr]
216	108	Float	R	Peak of Reactive Demand [VAr]
218	109	Float	R	Predicted Inductive Reactive Demand [VAr]
220	110	Float	R	Inductive Reactive Demand (last interval) [VAr]
222	111	Float	R	Peak of Inductive Reactive Demand [VAr]
224	112	Float	R	Predicted Capacitive Reactive Demand [VAr]
226	113	Float	R	Capacitive Reactive Demand (last interval) [VAr]
228	114	Float	R	Peak of Capacitive Reactive Demand [VAr]

12.4.3 Energy

Address		Format	Mode	Description
Short	Long			
300	150	Float	R	Total Net Active Energy [kWh]
302	151	Float	R	Total Sum Active Energy [kWh]
304	152	Float	R	Forward Active Energy [kWh]
306	153	Float	R	Reverse Active Energy [kWh]
308	154	Float	R	Total Net Reactive Energy [kVArh]
310	155	Float	R	Total Sum Reactive Energy [kVArh]
312	156	Float	R	Forward Reactive Energy [kVArh]
314	157	Float	R	Reverse Reactive Energy [kVArh]
316	158	Float	R	Inductive Reverse Reactive Energy [kVArh]
318	159	Float	R	Capacitive Reverse Reactive Energy [kVArh]
320	160	Float	R	Inductive Forward Reactive Energy [kVArh]
322	161	Float	R	Capacitive Forward Reactive Energy [kVArh]

Address		Format	Mode	Description
Short	Long			
324	162	Float	R	Total Apparent Energy [kVAh]
326	163	Long	R	Internal / Not used

12.4.4 Statistics

Address		Format	Mode	Description
Short	Long			
400	200	Float	R	Minimum Phase Voltage A [V]
402	201	Float	R	Minimum Phase Voltage B [V]
404	202	Float	R	Minimum Phase Voltage C [V]
406	203	Float	R	Minimum Line Voltage AB [V]
408	204	Float	R	Minimum Line Voltage BC [V]
410	205	Float	R	Minimum Line Voltage CA [V]
412	206	Float	R	Average Phase Voltage A [V]
414	207	Float	R	Average Phase Voltage B [V]
416	208	Float	R	Average Phase Voltage C [V]
418	209	Float	R	Average Line Voltage AB [V]
420	210	Float	R	Average Line Voltage BC [V]
422	211	Float	R	Average Line Voltage CA [V]
424	212	Float	R	Maximum Phase Voltage A [V]
426	213	Float	R	Maximum Phase Voltage B [V]
428	214	Float	R	Maximum Phase Voltage C [V]
430	215	Float	R	Maximum Line Voltage AB [V]
432	216	Float	R	Maximum Line Voltage BC [V]
434	217	Float	R	Maximum Line Voltage CA [V]
436	218	Float	R	Minimum Current A [A]
438	219	Float	R	Minimum Current B [A]
440	220	Float	R	Minimum Current C [A]
442	221	Float	R	Average Current A [A]
444	222	Float	R	Average Current B [A]
446	223	Float	R	Average Current C [A]
448	224	Float	R	Maximum Current A [A]
450	225	Float	R	Maximum Current B [A]
452	226	Float	R	Maximum Current C [A]
454	227	Float	R	Minimum Power Factor A
456	228	Float	R	Minimum Power Factor B
458	229	Float	R	Minimum Power Factor C
460	230	CaracFP	R	Minimum Characteristic of PF A
462	231	CaracFP	R	Minimum Characteristic of PF B
464	232	CaracFP	R	Minimum Characteristic of PF C
466	233	Float	R	Average Power Factor A
468	234	Float	R	Average Power Factor B
470	235	Float	R	Average Power Factor C
472	236	CaracFP	R	Average Characteristic of PF A
474	237	CaracFP	R	Average Characteristic of PF B
476	238	CaracFP	R	Average Characteristic of PF C
478	239	Float	R	Maximum Power Factor A
480	240	Float	R	Maximum Power Factor B
482	241	Float	R	Maximum Power Factor C

Address		Format	Mode	Description
Short	Long			
484	242	CaracFP	R	Maximum PF Characteristic A
486	243	CaracFP	R	Maximum PF Characteristic B
488	244	CaracFP	R	Maximum PF Characteristic C
490	245	Phase	R	Phase in which Minimum Phase Voltage occurred
492	246	DateTime	R	Minimum Phase Voltage Timestamp
494	247	Phase	R	Phase in which Maximum Phase Voltage occurred
496	248	DateTime	R	Maximum Phase Voltage Timestamp
498	249	Phase	R	Line in which Minimum Line Voltage occurred
500	250	DateTime	R	Minimum Line Voltage Timestamp
502	251	Phase	R	Line in which Maximum Line Voltage occurred
504	252	DateTime	R	Maximum Line Voltage Timestamp
506	253	Phase	R	Phase in which Minimum Current occurred
508	254	DateTime	R	Timestamp in which Minimum Current occurred
510	255	Phase	R	Phase in which Maximum Current occurred
512	256	DateTime	R	Timestamp in which Maximum Current occurred

12.4.5 Harmonics

Address		Format	Mode	Description
Short	Long			
600	300	Float	R	THD Voltage AN | AB [%]
602	301	Float	R	THD Voltage BN | BC [%]
604	302	Float	R	THD Voltage CN | CA [%]
606	303	Float	R	THD Current A [%]
608	304	Float	R	THD Current B [%]
610	305	Float	R	THD Current C [%]

12.4.6 64Bits Energy

Address		Format	Mode	Description
Short	Long			
12000	6000	Short	R	Active Energy NET [0]
12001	6001	Short	R	Active Energy NET [1]
12002	6002	Short	R	Active Energy NET [2]
12003	6003	Short	R	Active Energy NET [3]
12004	6004	Short	R	Active Energy SUM [0]
12005	6005	Short	R	Active Energy SUM [1]
12006	6006	Short	R	Active Energy SUM [2]
12007	6007	Short	R	Active Energy SUM [3]
12008	6008	Short	R	Active Energy IMPORT [0]
12009	6009	Short	R	Active Energy IMPORT [1]
12010	6010	Short	R	Active Energy IMPORT [2]
12011	6011	Short	R	Active Energy IMPORT [3]
12012	6012	Short	R	Active Energy EXPORT [0]
12013	6013	Short	R	Active Energy EXPORT [1]
12014	6014	Short	R	Active Energy EXPORT [2]
12015	6015	Short	R	Active Energy EXPORT [3]
12016	6016	Short	R	Reactive Energy NET [0]
12017	6017	Short	R	Reactive Energy NET [1]

Address		Format	Mode	Description
Short	Long			
12018	6018	Short	R	Reactive Energy NET [2]
12019	6019	Short	R	Reactive Energy NET [3]
12020	6020	Short	R	Reactive Energy SUM [0]
12021	6021	Short	R	Reactive Energy SUM [1]
12022	6022	Short	R	Reactive Energy SUM [2]
12023	6023	Short	R	Reactive Energy SUM [3]
12024	6024	Short	R	Reactive Energy IMPORT [0]
12025	6025	Short	R	Reactive Energy IMPORT [1]
12026	6026	Short	R	Reactive Energy IMPORT [2]
12027	6027	Short	R	Reactive Energy IMPORT [3]
12028	6028	Short	R	Reactive Energy EXPORT [0]
12029	6029	Short	R	Reactive Energy EXPORT [1]
12030	6030	Short	R	Reactive Energy EXPORT [2]
12031	6031	Short	R	Reactive Energy EXPORT [3]
12032	6032	Short	R	Inductive Reactive Energy EXPORT [0]
12033	6033	Short	R	Inductive Reactive Energy EXPORT [1]
12034	6034	Short	R	Inductive Reactive Energy EXPORT [2]
12035	6035	Short	R	Inductive Reactive Energy EXPORT [3]
12036	6036	Short	R	Inductive Reactive Energy EXPORT [0]
12037	6037	Short	R	Inductive Reactive Energy EXPORT [1]
12038	6038	Short	R	Inductive Reactive Energy EXPORT [2]
12039	6039	Short	R	Inductive Reactive Energy EXPORT [3]
12040	6040	Short	R	Inductive Reactive Energy IMPORT [0]
12041	6041	Short	R	Inductive Reactive Energy IMPORT [1]
12042	6042	Short	R	Inductive Reactive Energy IMPORT [2]
12043	6043	Short	R	Inductive Reactive Energy IMPORT [3]
12044	6044	Short	R	Capacitive Reactive Energy IMPORT [0]
12045	6045	Short	R	Capacitive Reactive Energy IMPORT [1]
12046	6046	Short	R	Capacitive Reactive Energy IMPORT [2]
12047	6047	Short	R	Capacitive Reactive Energy IMPORT [3]
12048	6048	Short	R	Apparent Energy [0]
12049	6049	Short	R	Apparent Energy [1]
12050	6050	Short	R	Apparent Energy [2]
12051	6051	Short	R	Apparent Energy [3]

13 MODBUS FUNCTIONS

13.1 17-REPORT SLAVE ID

This function allows reading the identification of MMW02. The requisition and the answer have the following formats:

13.1.1 Requisition

Description	Width	Value
Function Code	1 byte	0x11 (17)

13.1.2 Answer

Description	Width	Value
Function Code	1 byte	0x11 (17)
Byte Count	1 byte	0x17
Bytes Reserved	3 bytes	
Serial Number	4 bytes*	Specific of the equipment
Equipment's Type	2 bytes*	0x010A (266)
Equipment's Model	1 byte	3 - MMW02
		4 - MMW02 - M
Firmware Version	4 bytes*	Specific of the equipment
Modbus Table	1 byte	0X77 (w)
Bits Capacity	8 bytes	Specific of the equipment

(*) Values read in little-endian;

13.2 MASS MEMORY DOWNLOAD

To initiate reading procedures of MMW02 datalog memory, it is necessary to require the numbers of areas recorded on the equipment. Each area consists on registers' measured blocks (instantaneous, statistics, ...) selected by the user during a defined period.

Address		Format	Mode	Description	Value Expected
Short	Long				
20000	40000	Short	R	Total quantity of areas on the equipment's memory	Between 0 (no area recorded) and 12 (maximum number of areas recorded simultaneously)

13.2.1 Area Information

MMW02 stores information related to all areas recorded on the equipment's datalog memory. To acquire any information, it is necessary to select one of the areas recorded on the equipment.

Address		Format	Mode	Description	Value Expected
Short	Long				
20001	40001	Short	R/W	Selected Area	The written value, or read, reflects the number of areas recorded on the equipment's datalog memory. The values available are:
					0 - AREA0001 1 - AREA0002 n - AREAn, where "n" is lower than the total number of areas recorded

The following information could be read next:

Address		Format	Mode	Description	Value Expected
Short	Long				
20002	40002	Short	R	Area Name [1]	Two characters. Example “AR”
20003	40003	Short	R	Area Name [2]	Two characters. Example “EA”
20004	40004	Short	R	Area Name [3]	Two characters. Example “00”
20005	40005	Short	R	Area Name [4]	Two characters. Example “01”
20008	40008	Short	R	Observations recorded at the area	Each bit represents an observation. The observation was recorded if the bit is equal to 1, and 0 in the contrary, meaning: Bit 0: Observation 0 Bit 1: Observation 1 Bit n: Observation n Example: if the value in this register is 2, only the observation 1 will be present. On the other hand, if is read 3, the observations 0 and 1 would be present.

Data registers are organized in different archives, called observations. Each observation contain one or more measure blocks, depending on the parametrization of the area at the moment in which the datalog is initialized.

To MMW02, the present observations, along with the measure blocks that compose it are:
- Observation 0 – Instantaneous, Statistical, Energies or Demands;
- Observation 1 – THD

13.2.2 Observation’s Information

To acquire data of the areas of MMW02, it is necessary to select the observation of interest.

Address		Format	Mode	Description	Value Expected
Short	Long				
20009	40009	Short	R/W	Selected Observation	The written value, or read, reflects the number of observations that the equipment can record on datalog memory. Likewise, the possible values are: 0 - Observation 0 1 - Observation 1

Following, it is necessary to know the size and how many records were recorded on the observation. Each records equals to all measures belonging to the measure blocks selected from that observation, acquired at the same moment of time. Making an analogy to a table, the registers would be lines, while the measures, would be the column.

Address		Format	Mode	Description	Value Expected
Short	Long				
20010	40010	Short	R	Total of records	Total of records recorded on the selected observation
20011	40011	Short	R	Size of records	The size of each record, in bytes
20015	40015	Short	R	Total of measures	Quantity of measures at the record

13.2.3 Data Acquisition

Once the observation is selected, the next step is to alter the operation mode to 15 – Data Reading.

Address		Format	Mode	Description	Value Expected
Short	Long				
20014	40014	Short	R/W	Operation mode of the selected observation	From the operation mode, it is possible to open the observation to reading mode, or headers, or to close the observation. The possible values are: 15 - Reading data 240 - Reading headers 255 - Closed observation

Knowing the total of records and the total of measures in each record, it is possible to positioned the pointer of data on the observation in any point of the archive.

Address		Format	Mode	Description	Value Expected
Short	Long				
20013	40013	Short	R/W	Selected Record	The possible values start from 0 till the total number of records minus 1.
20016	40016	Short	R/W	Selected Measure	The possible values start from 0 till the total number of measures minus 1.

Positioning the pointer, the measure selected, along with the 149 measures following, will be available to be read through function 03. The pointer position will not be alter, being necessary to position the pointer manually.

Address		Format	Mode	Description	Value Expected
Short	Long				
20101	40202	Long	R	Datalog memory [0]	Position 0 from the observation pointer
20102	40204	Long	R	Datalog memory [1]	Position 1 from the observation pointer
20103	40206	Long	R	Datalog memory [2]	Position 2 from the observation pointer
20104	40208	Long	R	Datalog memory [3]	Position 3 from the observation pointer
20105	40210	Long	R	Datalog memory [4]	Position 4 from the observation pointer
20106	40212	Long	R	Datalog memory [5]	Position 5 from the observation pointer
20107	40214	Long	R	Datalog memory [6]	Position 6 from the observation pointer
20108	40216	Long	R	Datalog memory [7]	Position 7 from the observation pointer
20109	40218	Long	R	Datalog memory [8]	Position 8 from the observation pointer
20110	40220	Long	R	Datalog memory [9]	Position 9 from the observation pointer
20111	40222	Long	R	Datalog memory [10]	Position 10 from the observation pointer
20112	40224	Long	R	Datalog memory [11]	Position 11 from the observation pointer
20113	40226	Long	R	Datalog memory [12]	Position 12 from the observation pointer
20114	40228	Long	R	Datalog memory [13]	Position 13 from the observation pointer
20115	40230	Long	R	Datalog memory [14]	Position 14 from the observation pointer
20116	40232	Long	R	Datalog memory [15]	Position 15 from the observation pointer
20117	40234	Long	R	Datalog memory [16]	Position 16 from the observation pointer
20118	40236	Long	R	Datalog memory [17]	Position 17 from the observation pointer
20119	40238	Long	R	Datalog memory [18]	Position 18 from the observation pointer
20120	40240	Long	R	Datalog memory [19]	Position 19 from the observation pointer
20121	40242	Long	R	Datalog memory [20]	Position 20 from the observation pointer
20122	40244	Long	R	Datalog memory [21]	Position 21 from the observation pointer
20123	40246	Long	R	Datalog memory [22]	Position 22 from the observation pointer
20124	40248	Long	R	Datalog memory [23]	Position 23 from the observation pointer
20125	40250	Long	R	Datalog memory [24]	Position 24 from the observation pointer
20126	40252	Long	R	Datalog memory [25]	Position 25 from the observation pointer

Address		Format	Mode	Description	Value Expected
Short	Long				
20127	40254	Long	R	Datalog memory [26]	Position 26 from the observation pointer
20128	40256	Long	R	Datalog memory [27]	Position 27 from the observation pointer
20129	40258	Long	R	Datalog memory [28]	Position 28 from the observation pointer
20130	40260	Long	R	Datalog memory [29]	Position 29 from the observation pointer
20131	40262	Long	R	Datalog memory [30]	Position 30 from the observation pointer
20132	40264	Long	R	Datalog memory [31]	Position 31 from the observation pointer
20133	40266	Long	R	Datalog memory [32]	Position 32 from the observation pointer
20134	40268	Long	R	Datalog memory [33]	Position 33 from the observation pointer
20135	40270	Long	R	Datalog memory [34]	Position 34 from the observation pointer
20136	40272	Long	R	Datalog memory [35]	Position 35 from the observation pointer
20137	40274	Long	R	Datalog memory [36]	Position 36 from the observation pointer
20138	40276	Long	R	Datalog memory [37]	Position 37 from the observation pointer
20139	40278	Long	R	Datalog memory [38]	Position 38 from the observation pointer
20140	40280	Long	R	Datalog memory [39]	Position 39 from the observation pointer
20141	40282	Long	R	Datalog memory [40]	Position 40 from the observation pointer
20142	40284	Long	R	Datalog memory [41]	Position 41 from the observation pointer
20143	40286	Long	R	Datalog memory [42]	Position 42 from the observation pointer
20144	40288	Long	R	Datalog memory [43]	Position 43 from the observation pointer
20145	40290	Long	R	Datalog memory [44]	Position 44 from the observation pointer
20146	40292	Long	R	Datalog memory [45]	Position 45 from the observation pointer
20147	40294	Long	R	Datalog memory [46]	Position 46 from the observation pointer
20148	40296	Long	R	Datalog memory [47]	Position 47 from the observation pointer
20149	40298	Long	R	Datalog memory [48]	Position 48 from the observation pointer
20150	40300	Long	R	Datalog memory [49]	Position 49 from the observation pointer
20151	40302	Long	R	Datalog memory [50]	Position 50 from the observation pointer
20152	40304	Long	R	Datalog memory [51]	Position 51 from the observation pointer
20153	40306	Long	R	Datalog memory [52]	Position 52 from the observation pointer
20154	40308	Long	R	Datalog memory [53]	Position 53 from the observation pointer
20155	40310	Long	R	Datalog memory [54]	Position 54 from the observation pointer
20156	40312	Long	R	Datalog memory [55]	Position 55 from the observation pointer
20157	40314	Long	R	Datalog memory [56]	Position 56 from the observation pointer
20158	40316	Long	R	Datalog memory [57]	Position 57 from the observation pointer
20159	40318	Long	R	Datalog memory [58]	Position 58 from the observation pointer
20160	40320	Long	R	Datalog memory [59]	Position 59 from the observation pointer
20161	40322	Long	R	Datalog memory [60]	Position 60 from the observation pointer
20162	40324	Long	R	Datalog memory [61]	Position 61 from the observation pointer
20163	40326	Long	R	Datalog memory [62]	Position 62 from the observation pointer
20164	40328	Long	R	Datalog memory [63]	Position 63 from the observation pointer
20165	40330	Long	R	Datalog memory [64]	Position 64 from the observation pointer
20166	40332	Long	R	Datalog memory [65]	Position 65 from the observation pointer
20167	40334	Long	R	Datalog memory [66]	Position 66 from the observation pointer
20168	40336	Long	R	Datalog memory [67]	Position 67 from the observation pointer
20169	40338	Long	R	Datalog memory [68]	Position 68 from the observation pointer
20170	40340	Long	R	Datalog memory [69]	Position 69 from the observation pointer
20171	40342	Long	R	Datalog memory [70]	Position 70 from the observation pointer
20172	40344	Long	R	Datalog memory [71]	Position 71 from the observation pointer
20173	40346	Long	R	Datalog memory [72]	Position 72 from the observation pointer
20174	40348	Long	R	Datalog memory [73]	Position 73 from the observation pointer

Address		Format	Mode	Description	Value Expected
Short	Long				
20175	40350	Long	R	Datalog memory [74]	Position 74 from the observation pointer
20176	40352	Long	R	Datalog memory [75]	Position 75 from the observation pointer
20177	40354	Long	R	Datalog memory [76]	Position 76 from the observation pointer
20178	40356	Long	R	Datalog memory [77]	Position 77 from the observation pointer
20179	40358	Long	R	Datalog memory [78]	Position 78 from the observation pointer
20180	40360	Long	R	Datalog memory [79]	Position 79 from the observation pointer
20181	40362	Long	R	Datalog memory [80]	Position 80 from the observation pointer
20182	40364	Long	R	Datalog memory [81]	Position 81 from the observation pointer
20183	40366	Long	R	Datalog memory [82]	Position 82 from the observation pointer
20184	40368	Long	R	Datalog memory [83]	Position 83 from the observation pointer
20185	40370	Long	R	Datalog memory [84]	Position 84 from the observation pointer
20186	40372	Long	R	Datalog memory [85]	Position 85 from the observation pointer
20187	40374	Long	R	Datalog memory [86]	Position 86 from the observation pointer
20188	40376	Long	R	Datalog memory [87]	Position 87 from the observation pointer
20189	40378	Long	R	Datalog memory [88]	Position 88 from the observation pointer
20190	40380	Long	R	Datalog memory [89]	Position 89 from the observation pointer
20191	40382	Long	R	Datalog memory [90]	Position 90 from the observation pointer
20192	40384	Long	R	Datalog memory [91]	Position 91 from the observation pointer
20193	40386	Long	R	Datalog memory [92]	Position 92 from the observation pointer
20194	40388	Long	R	Datalog memory [93]	Position 93 from the observation pointer
20195	40390	Long	R	Datalog memory [94]	Position 94 from the observation pointer
20196	40392	Long	R	Datalog memory [95]	Position 95 from the observation pointer
20197	40394	Long	R	Datalog memory [96]	Position 96 from the observation pointer
20198	40396	Long	R	Datalog memory [97]	Position 97 from the observation pointer
20199	40398	Long	R	Datalog memory [98]	Position 98 from the observation pointer
20200	40400	Long	R	Datalog memory [99]	Position 99 from the observation pointer
20201	40402	Long	R	Datalog memory [100]	Position 100 from the observation pointer
20202	40404	Long	R	Datalog memory [101]	Position 101 from the observation pointer
20203	40406	Long	R	Datalog memory [102]	Position 102 from the observation pointer
20204	40408	Long	R	Datalog memory [103]	Position 103 from the observation pointer
20205	40410	Long	R	Datalog memory [104]	Position 104 from the observation pointer
20206	40412	Long	R	Datalog memory [105]	Position 105 from the observation pointer
20207	40414	Long	R	Datalog memory [106]	Position 106 from the observation pointer
20208	40416	Long	R	Datalog memory [106]	Position 106 from the observation pointer
20209	40418	Long	R	Datalog memory [107]	Position 107 from the observation pointer
20210	40420	Long	R	Datalog memory [108]	Position 108 from the observation pointer
20211	40422	Long	R	Datalog memory [109]	Position 109 from the observation pointer
20212	40424	Long	R	Datalog memory [110]	Position 110 from the observation pointer
20213	40426	Long	R	Datalog memory [111]	Position 111 from the observation pointer
20214	40428	Long	R	Datalog memory [112]	Position 112 from the observation pointer
20215	40430	Long	R	Datalog memory [113]	Position 113 from the observation pointer
20216	40432	Long	R	Datalog memory [114]	Position 114 from the observation pointer
20217	40434	Long	R	Datalog memory [115]	Position 115 from the observation pointer
20218	40436	Long	R	Datalog memory [116]	Position 116 from the observation pointer
20219	40438	Long	R	Datalog memory [117]	Position 117 from the observation pointer
20220	40440	Long	R	Datalog memory [118]	Position 118 from the observation pointer
20221	40442	Long	R	Datalog memory [119]	Position 119 from the observation pointer
20222	40444	Long	R	Datalog memory [120]	Position 120 from the observation pointer

Address		Format	Mode	Description	Value Expected
Short	Long				
20223	40446	Long	R	Datalog memory [121]	Position 121 from the observation pointer
20224	40448	Long	R	Datalog memory [122]	Position 122 from the observation pointer
20225	40450	Long	R	Datalog memory [123]	Position 123 from the observation pointer
20226	40452	Long	R	Datalog memory [124]	Position 124 from the observation pointer
20227	40454	Long	R	Datalog memory [125]	Position 125 from the observation pointer
20228	40456	Long	R	Datalog memory [126]	Position 126 from the observation pointer
20229	40458	Long	R	Datalog memory [127]	Position 127 from the observation pointer
20230	40460	Long	R	Datalog memory [128]	Position 128 from the observation pointer
20231	40462	Long	R	Datalog memory [129]	Position 129 from the observation pointer
20232	40464	Long	R	Datalog memory [130]	Position 130 from the observation pointer
20233	40466	Long	R	Datalog memory [131]	Position 131 from the observation pointer
20234	40468	Long	R	Datalog memory [132]	Position 132 from the observation pointer
20235	40470	Long	R	Datalog memory [133]	Position 133 from the observation pointer
20236	40472	Long	R	Datalog memory [134]	Position 134 from the observation pointer
20237	40474	Long	R	Datalog memory [135]	Position 135 from the observation pointer
20238	40476	Long	R	Datalog memory [136]	Position 136 from the observation pointer
20239	40478	Long	R	Datalog memory [137]	Position 137 from the observation pointer
20240	40480	Long	R	Datalog memory [138]	Position 138 from the observation pointer
20241	40482	Long	R	Datalog memory [139]	Position 139 from the observation pointer
20242	40484	Long	R	Datalog memory [140]	Position 140 from the observation pointer
20243	40486	Long	R	Datalog memory [141]	Position 141 from the observation pointer
20244	40488	Long	R	Datalog memory [142]	Position 142 from the observation pointer
20245	40490	Long	R	Datalog memory [143]	Position 143 from the observation pointer
20246	40492	Long	R	Datalog memory [144]	Position 144 from the observation pointer
20247	40494	Long	R	Datalog memory [145]	Position 145 from the observation pointer
20248	40496	Long	R	Datalog memory [146]	Position 146 from the observation pointer
20249	40498	Long	R	Datalog memory [147]	Position 147 from the observation pointer
20250	40500	Long	R	Datalog memory [148]	Position 148 from the observation pointer

In case the number of measures following the selected measure is smaller than 149, the addresses beyond necessary should be disregarded.

After reading the data, it is mandatory to close the observation.

13.2.4 Headers Acquisition

The headers acquisition is analog, with the exception that the mode of operation of the observation should be configured to 240 – Headers Reading. Each header is an 8 bytes unique identifier (occupying two or four Modbus addresses, respectively, Long and Short) that characterizes the way that a measurement should be interpreted. Without the header, the read measure does not have a physic sense, being only gross data.

After reading the headers, it is mandatory to close the observation.

14 PROGRAMMING THE ALARMS

The alarms are a way to alert the user when the levels of certain measures exceed the limits pre-established. The MMW02 allows the configuration of 20 events with different alarms that work simultaneously and independently. It is possible to program a tolerance (hysteresis) to the limits of measures' control range. The alarm's trigger can be in the format of sound (beeps) or close a predetermined relay, in case these are present in the equipment.

14.1 CREATING AND SELECTING AN ALARM

The alarms can be created through function 05. After the 20 alarms are created, to write on the address of the alarms' creation will be forbidden, being available again when one of the alarms is excluded.

Address		Format	Mode	Description	Value Expected
Short	Long				
10	10	Bool	W	Alarms Creation	Should be written 0xFF00 to create a new alarm. The address will return an error in case the maximum number of alarms has been reached

After being created, the alarm is added to the end of the list of the alarms, in a way that its index is the total quantities of alarms minus 1. To edit it, it is necessary to select it.

Address		Format	Mode	Description	Value Expected
Short	Long				
702	1404	Long	R/W	Monitored measure	The possible values are: 0 - No quantity; 1 - Phase voltage AN; 2 - Phase voltage BN; 3 - Phase voltage CN; 4 - Line Voltage AB; 5 - Line voltage BC; 6 - Line voltage CA; 7 -Current A; 8 - Current B; 9 - Current C; 10 - Power factor A; 11 - Power factor B; 12 - Power factor C; 13 - THD Phase voltage AN; 14 - THD Phase voltage BN; 15 - THD Phase voltage CN; 16 - THD Line voltage AB; 17 - THD Line voltage BC; 18 - THD Line voltage CA; 19 - Current A THD; 20 - Current B THD; 21 - Current C THD;
703	1406	Long	R/W	Action to be taken	The possible values are: 0 - No action; 1 - Warning sound; 2 - To close relay 1;
704	1408	Float	R/W	Minimum value	Interval from 0 to 1 to power factor, 0 to 100 to THD and 0 to 99999999 to other measures. The minimum value should be smaller than the maximum value.
705	1410	Float	R/W	Maximum value	Interval from 0 to 1 to power factor, 0 to 100 to THD and 0 to 99999999 to other measures. The maximum value should be greater than the minimum value.
706	1412	Long	R/W	Characteristic of minimum value	In case the measure monitored is Power Factor, it is necessary to attribute one characteristic to minimum value. On the contrary, this field should be ignored. The possible values are: 0 - capacitive 1 - inductive 2 - resistive

Address		Format	Mode	Description	Value Expected
Short	Long				
707	1414	Long	R/W	Characteristic of maximum value	In case the measure monitored is Power Factor, it is necessary to attribute one characteristic to minimum value. On the contrary, this field should be ignored. The possible values are: 0 - capacitive 1 - inductive 2 - resistive
708	1416	Long	R/W	Ignore alarm	To ignore, or not, the monitoring of the programmed measure at the alarm. The possible values are: 0 - Not ignore 1 - Ignore
709	1418	Long	R	State of alarm	Verify if the alarm was triggered or not. The possible values are: 0 - Normal 1 - Triggered
710	1420	Long	W	Erase alarm	Writing in this address makes the alarm selected to be erased. The parameter edition will point to the next alarm on the list. In case the alarm erased is the last on the list, it will be necessary to select a new alarm.

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