MULTIPOWER VER.02

Electrical magnitude meter

USB

Graphic display

Monitoring System

Preset system

Modbus protocol

Alarms

Datalogger

Have this manual in the palm of your hand through the FG Finder app.

MULTIPOWERV02-01T-19971-2511

1. SUMMARY

1. SUMMARY

-

2. DESCRIPTION

Multifunctional monitor and controller that combines, in a single compact product, advanced features for electrical energy measurement, thermal monitoring, and refrigeration system protection. Equipped with two independent three-phase energy meters, it offers great flexibility, allowing the simultaneous monitoring of two balanced or unbalanced three-phase circuits or up to six single-phase circuits. This exclusive functionality enables the measurement of different points in the system using a single device — for example, in a compressor rack, it allows evaluating the energy consumption of the refrigerated and frozen systems individually.

The **MULTIPOWER** performs voltage measurement directly on the device. For current measurement, the use of external current transformers (CTs) is required (not included). In addition to electrical measurements (voltage, current, frequency, power factor, asymmetries, among others), the **MULTIPOWER** includes inputs for temperature sensors that can be used to configure alarms or to set up a versatile thermostat function with event scheduling. It also features configurable digital inputs and outputs that can be used for alarms and active circuit protection, triggering automatic shutdowns in case of anomalies. This ensures that compressors operate within the manufacturer's technical specifications, respecting voltage, current, and asymmetry parameters, thereby extending their service life.

With two integrated communication ports, the **MULTIPOWER** easily connects to supervisory software and thermal protection modules, consolidating electrical and thermal data on a single platform. This integration provides a complete and real-time analysis, helping reduce failures, extend equipment lifespan, and continuously improve energy efficiency. Ideal for compressor rack applications with medium and low temperature circuits, the **MULTIPOWER** delivers performance, protection, and savings — with the reliability of **Full Gauge Controls**.

3. APPLICATIONS

-Monitoring of electrical quantities and power consumption;

- Electric panels;

-Other three-phase equipment;

4. GLOSSARY

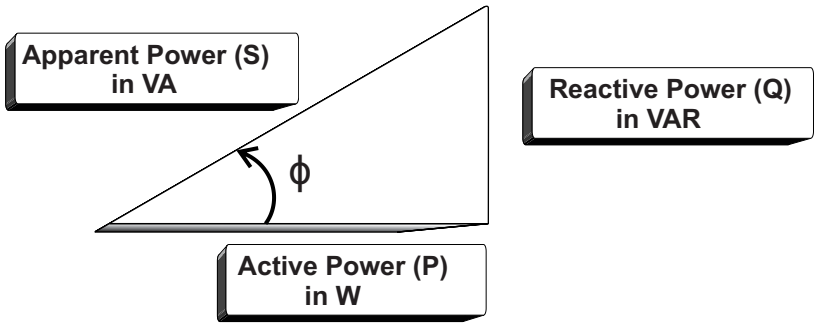
•**Active power (W):** Active power is that part of electrical power that is converted into useful work or other forms of power within an electrical circuit. It is the real power consumed or supplied by a device or system, responsible for carrying out mechanical, thermal, lighting work, among others.

•**Reactive Power (VAR):** Reactive power does not perform useful work directly but is necessary to maintain voltage and current in phase in alternating current circuits. It is associated with the storage and release of power in elements such as capacitors and inductors.

•**Apparent Power(VA)**: Apparent power is the vector combination of active power and reactive power. It represents the total amount of power being supplied to the circuit. It is the sum of active and reactive powers, indicating the total capacity of the system to transport power.

•**Power Factor (PF)**: Power factor is a measure of the efficiency with which electrical power is converted into useful work within an electrical system. In simple terms, it indicates the proportion of electrical power that is actually being used to perform work, compared to the power that is being wasted or temporarily stored in the system.

Power factor is a ratio between active power and apparent power in an alternating current circuit. It is calculated by dividing active power by apparent power.



•**Inductive Power Factor**: Inductive Power Factor occurs when there are components such as coils or inductors in an electrical circuit. These components accumulate magnetic power when current passes through them and release this power when the current decreases. As a result, current and voltage in inductive circuits can become out of phase, current lags behind voltage, which leads to positive reactive power. This reduces the power factor, leading to a less efficient conversion of power into useful work.

•**Capacitive Power Factor**: Capacitive Power Factor occurs when there are components such as capacitors in an electrical circuit. These components store electrical power when voltage increases and release this power when voltage decreases. This can cause an advance in the phase of the current in relation to the voltage, resulting in negative reactive power. As with inductive power factor, a low capacitive power factor indicates a lower efficiency in converting power into useful work.

•**Demand:** Average of the sum of powers within a defined time interval.

•**Current transformer (CT)**: Electric current measuring device that reproduces the current value measured in the circuit.

•**Setpoint:** Desirable value of the temperature control parameter.

•**Thermostat:** Temperature control based on a setpoint and hysteresis.

5. TECHNICAL SPECIFICATIONS

Power	**MULTIPOWER** 24V: 24Vac 50/60Hz ou 24Vdc ±10 **MULTIPOWER** 90-240 Vac: 3 Ø 90~240Vca 50/60Hz **Note: In three-phase power supply, the three phases and neutral are connected to the controller. The controller only needs one active phase to operate.*
Maximum consumption	500mA
Voltage reading range	50 a 500Vac F-N e F-F(50/60Hz)
Current reading range	5 a 3000 A. Always considering CT with 5A secondary. **Note: Current transformers (CT) are not included with the product and must be purchased separately.*
Control temperature	-50 to 200°C / -58 to 392°F
Operating Temperature	-20 to 60 ºC / -4 to 140°F
Operating humidity	10 a 90% UR (without condensation)
Product dimensions (WxHxD)	70,0 x 138,65 x 61,7 mm / 2,76" x 5,46" x 2,43"
Degree of Protection	IP20
Pollution Degree	II
Relays	O1, O2, O3 and O4: relay output (SPST) NA, 5(3)A/250Vac
Digital inputs	IN1 and IN2: dry contact type digital inputs
Analog inputs	S1 e S2: NTC temperature sensor (SB19, SB41, SB59, SB70)
USB Interface	Compatible with the USB 2.0 Full-Speed Module (USBFS) standard; Data format for flashdrives formatted in FAT32 / Maximum size 32GB
RS-485 communication interface	RS485-1: Not isolated *RS485-2*: Not isolated *Note:Both can be configured as Sitrad or Modbus*

Important!

The choice of the Current Transformer (CT) class has a direct impact on the accuracy of the values measured by the controller. Using an inappropriate CT class may result in inaccurate or distorted measurements.
Be sure to select the CT class appropriate to the expected result. The CT accuracy class nominally indicates the expected error, taking into account the transformation ratio error (the current value in amplitude), and the phase error (the insertion of a delay or advance of the signal) between the primary and secondary currents.

6.ELECTRICAL PRECAUTIONS

⚠ **BEFORE INSTALLING THE CONTROLLER, WE RECOMMEND THAT YOU READ THE ENTIRE INSTRUCTION MANUAL IN ORDER TO AVOID POSSIBLE DAMAGE TO THE PRODUCT.**

⚠ **CAUTION WHEN INSTALLING THE PRODUCT**:
-Before performing any procedure on this instrument, disconnect it from the power supply;
-Ensure that the instrument has proper ventilation, avoiding installing it on panels that contain other devices that can cause it to operate outside the specified temperature limits;
-Install the product away from sources that may generate electromagnetic disturbances, such as: motors, contactor, relays, electrovalves etc.

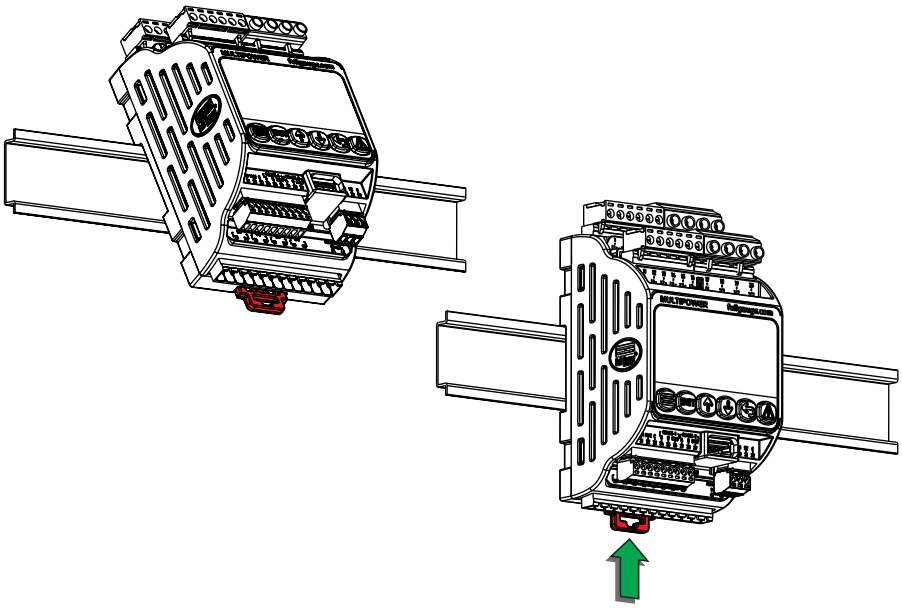
⚠ **AUTHORIZED SERVICE:**
-The installation or maintenance of the product must only be carried out by qualified professionals.

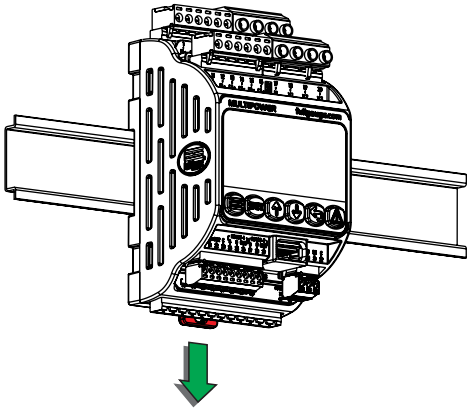
⚠ **ACCESSORIES:**
-Use only original Full Gauge Controls accessories.
-If in doubt, contact technical support.

AS IT IS CONSTANTLY EVOLVING, FULL GAUGE CONTROLS RESERVES THE RIGHT TO CHANGE THE INFORMATION CONTAINED IN THE MANUAL AT ANY TIME WITHOUT PRIOR NOTICE.

7. INSTALLING MULTIPOWER

To couple the **MULTIPOWER** onto the DIN rail, simply position the device according to the reference image and fit the upper part. Make sure it is secure for proper installation.

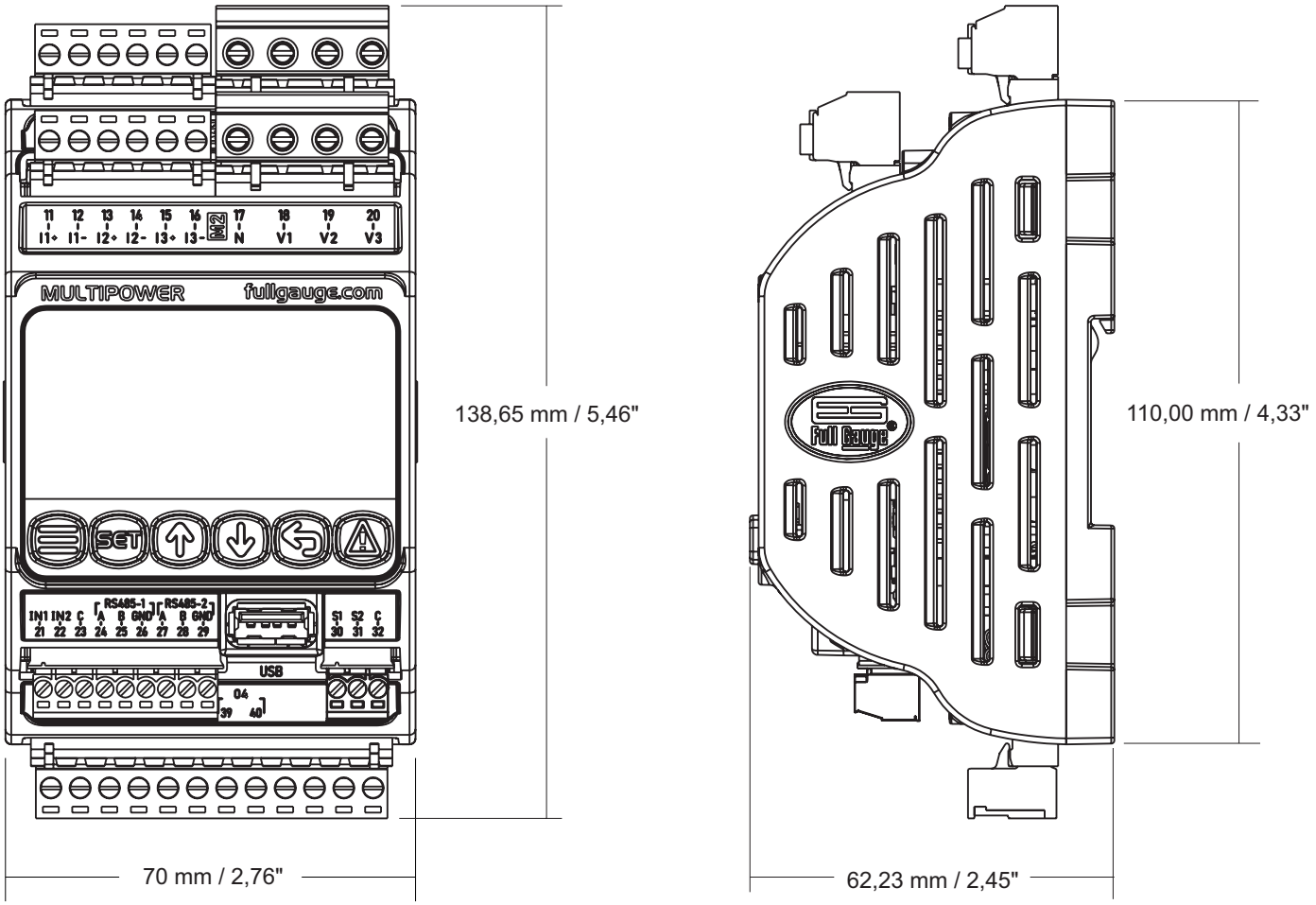




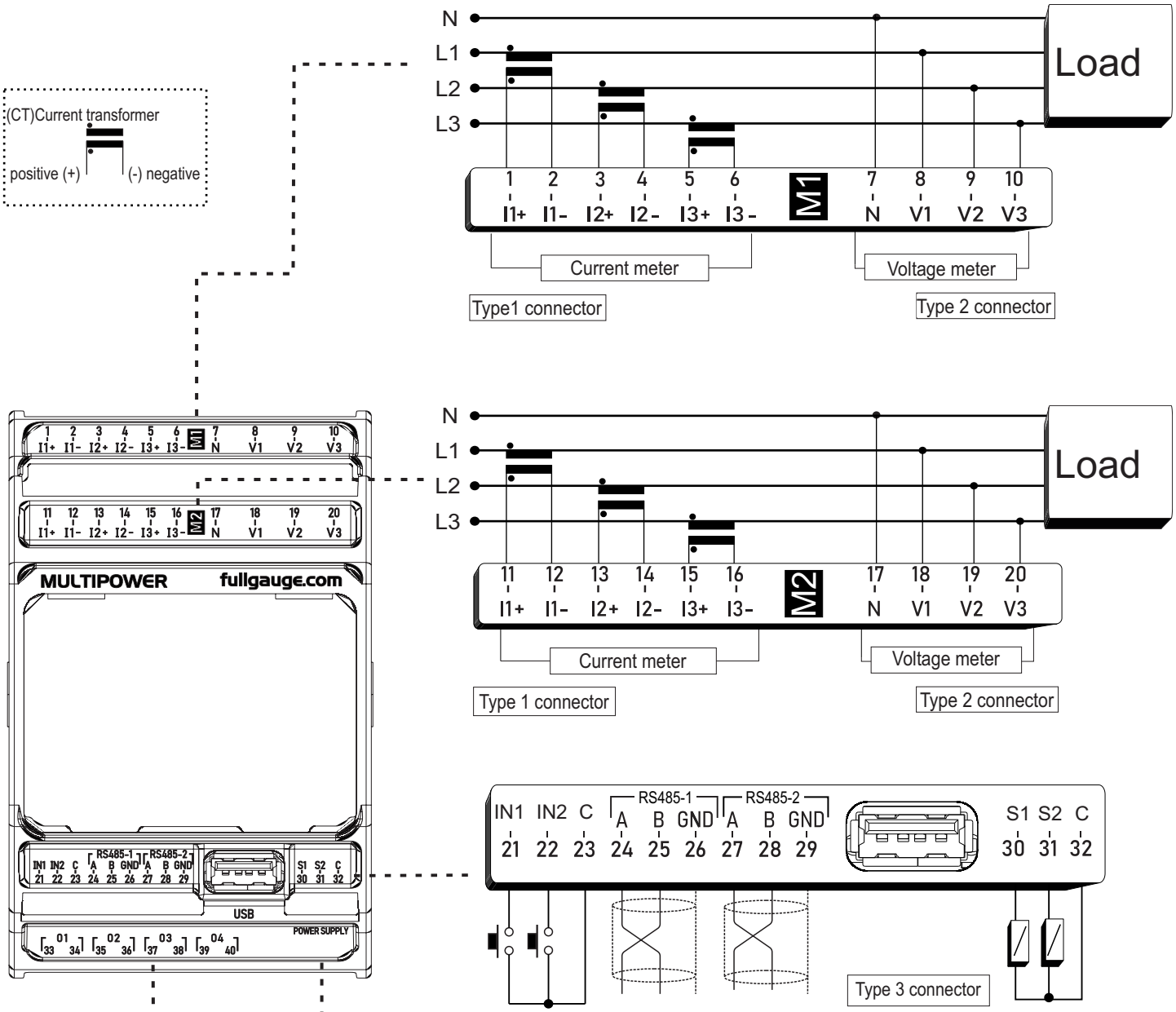
To remove the controller from the DIN rail, use a suitably sized screwdriver to open the catch.

8. DIMENSIONS

For more effective fixation of **MULTIPOWER**, it is important to pay attention to the product dimensions.



9. CONNECTION DIAGRAM



Type 1 connector: For Type 1 (5.0mm) connectors use a #1 Phillips screwdriver or 3.0mm Screwdriver. Do not exceed the maximum torque of 0.5 Nm.

Type 2 connector: For Type 2 connectors (7.62 mm) use a 3.0mm screwdriver. Do not exceed the maximum torque of 0.7 Nm.

Type 3 connector: For Type 2 (3.5mm) connectors use #0 Phillips screwdriver or 2.4mm Slit. Do not exceed a maximum torque of 0.2 Nm.

Note: Depending on the model purchased, check power supply

9. CONNECTION DIAGRAM

9.1 Modbus Master Network

In the Modbus Master Network functionality, the **MULTIPOWER** acts as a communication interface between the Sitrad® software and a network of Modbus devices.
The Sitrad® software is connected to one of the **MULTIPOWER**'s serial ports, while the Modbus network is connected to the other port. In this way, the **MULTIPOWER** intermediates the communication, allowing Sitrad® to recognize and manage the connected Modbus devices. Each Modbus device is presented in Sitrad® as an individual instrument. For this, it is necessary to configure two distinct addresses:

- **Sitrad® Address:** identifies the instrument within the Sitrad® network.
- **Modbus Address:** identifies the device on the physical Modbus network.

Thus, the **MULTIPOWER** ensures transparent integration between Sitrad® and the Modbus network, enabling centralized supervision and control of the equipment.

The devices supported for this functionality are the monitoring and control modules **CM-RC-01** and **CM-RC-02**, manufactured by **Bitzer**.

Example configuration for 2 control modules **CM-RC-01** and **CM-RC-02**:

Configuration of Multipower communication with Sitrad®:

3.1 RS485-1: Protocol = Sitrad®
3.2 RS485-1: Address = 1

Configuration of communication with the Modbus network:

3.6 RS485-2: Protocol = Modbus Master
3.7 RS485-2: Baud rate = 19200*
3.8 RS485-2: Parity = Even*
3.9 RS485-2: Stop bits = 1

*these are the default values of the **CM-RC-01** and **CM-RC-02** modules.

Configuration of devices on the network:

Device 1

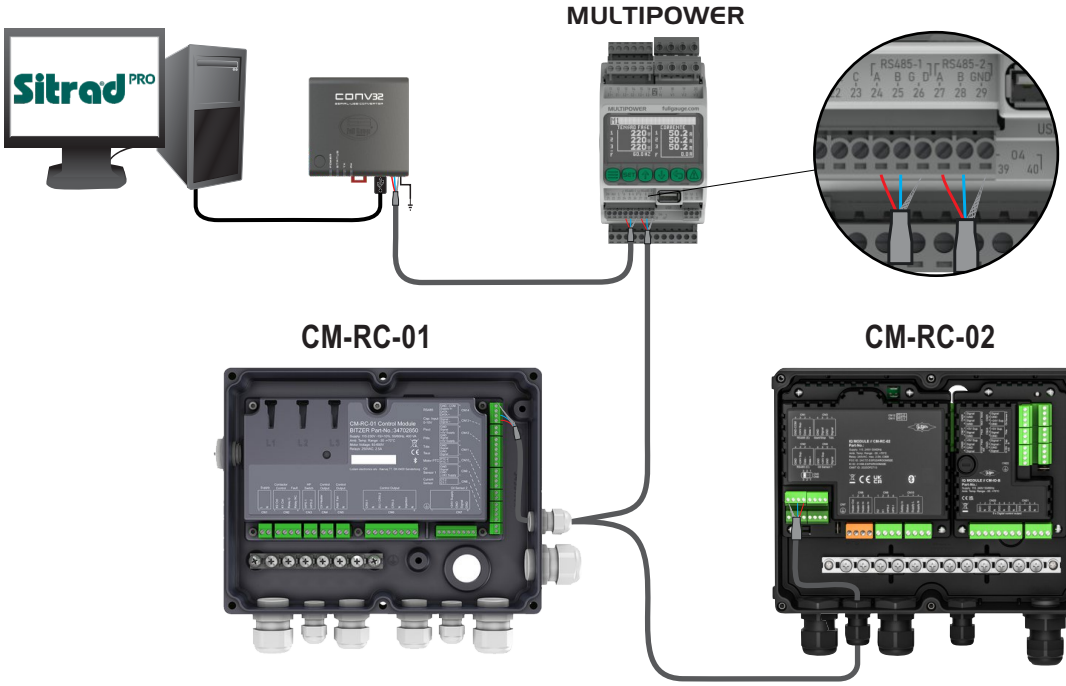
5.1 Dev1: Model = **CM-RC-02**
5.2 Dev1: Sitrad® Address = 33
5.3 Dev1: Modbus Address = 48**

Device 2

5.4 Dev2: Model = **CM-RC-02**
5.5 Dev2: Sitrad® Address = 34
5.6 Dev2: Modbus Address = 49**

** these addresses must be configured on the respective **CM-RC-01** and **CM-RC-02** modules.

In this way, the **MULTIPOWER** is recognized in Sitrad® with address 01, and the **CM-RC-01** and **CM-RC-02** modules with addresses 33 and 34. The configuration of the Modbus communication parameters of each device must be carried out beforehand, according to the manufacturer's instructions.



MULTIPOWER	CM-RC-01
RS485-2 A	CN14 pin 1
RS485-2 B	CN14 pin 2
RS485-2 GND	CN14 pin 4

MULTIPOWER	CM-RC-02
RS485-2 A	CN1 pin 1
RS485-2 B	CN1 pin 2
RS485-2 GND	CN1 pin 4

NOTE: *The trademarks 'BITZER', 'CM-RC-01', and 'CM-RC-02' are the property of BITZER Kühlmaschinenbau GmbH. The use of these terms is solely for the purpose of identifying the product's technical compatibility.*

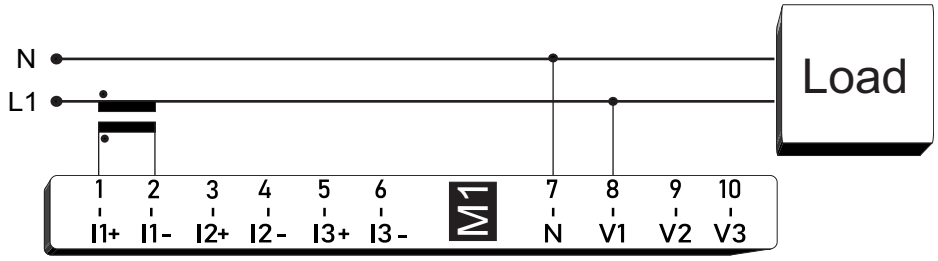
9. CONNECTION DIAGRAM

9.2Connection types:

Meters M1 and M2 operate independently, their operating modes are defined by parameters `1.1.1` M1: operating mode, and `1.1.22` M2: operating mode, the available modes are: single-phase, two-phase, three-phase and three-phase balanced.

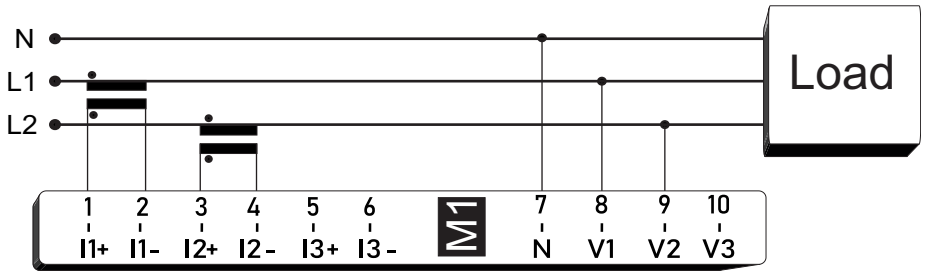
9.2.1 1F+N Single-phase:

Reads one phase, the reading of the other phases is disabled.



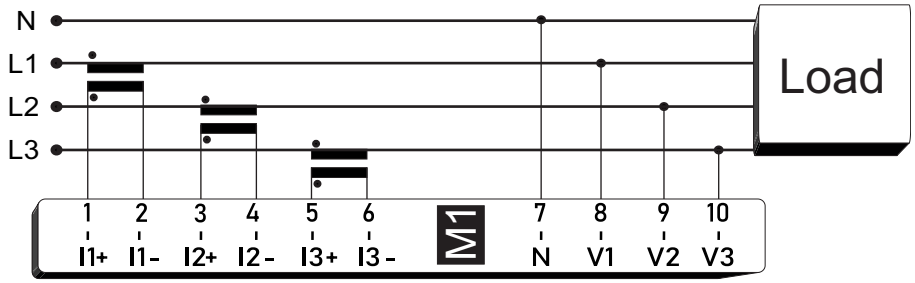
9.2.2 2F + N Two-phase:

Performs the reading of two phases, while the readings of the other phases are disabled.



9.2.3 3F+N Three-phase:

Performs three-phase reading.



9. CONNECTION DIAGRAM

9.2.4 3F+N Balanced Three-Phase:

In a balanced three-phase system, the loads are equally distributed among the three phases. Due to this symmetry, the current is the same in all of them.

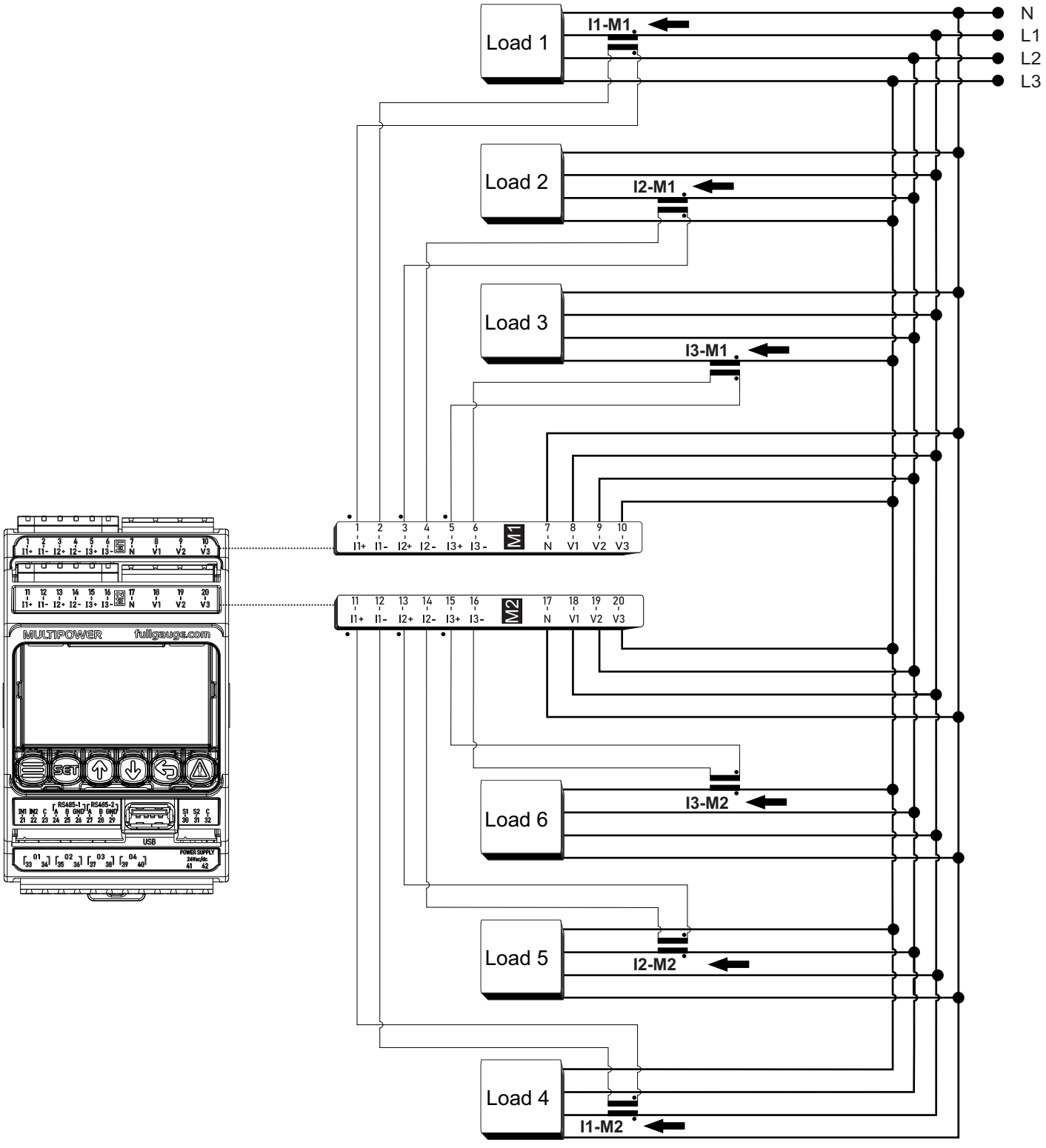
Therefore, it is possible to measure the current of only one phase and use this value to calculate the total quantities of the system. In this approach, the measurement of each phase (Phase 1, Phase 2, Phase 3) can be associated with an individual monitoring circuit (Circuit 1, Circuit 2, Circuit 3).

To determine the total power, demand, or energy, the calculation is done in two steps: first, the value for the measured phase is calculated (voltage × current); then, the result is multiplied by 3 to represent the entire system. This method is based on the premise that the currents of the other two phases are identical to the measured phase.

For example, the total apparent power of the system, when measured from Phase 1, is calculated as:

Total Apparent Power = (Phase 1 Voltage × Phase 1 Current) × 3

See more in item 12.5.



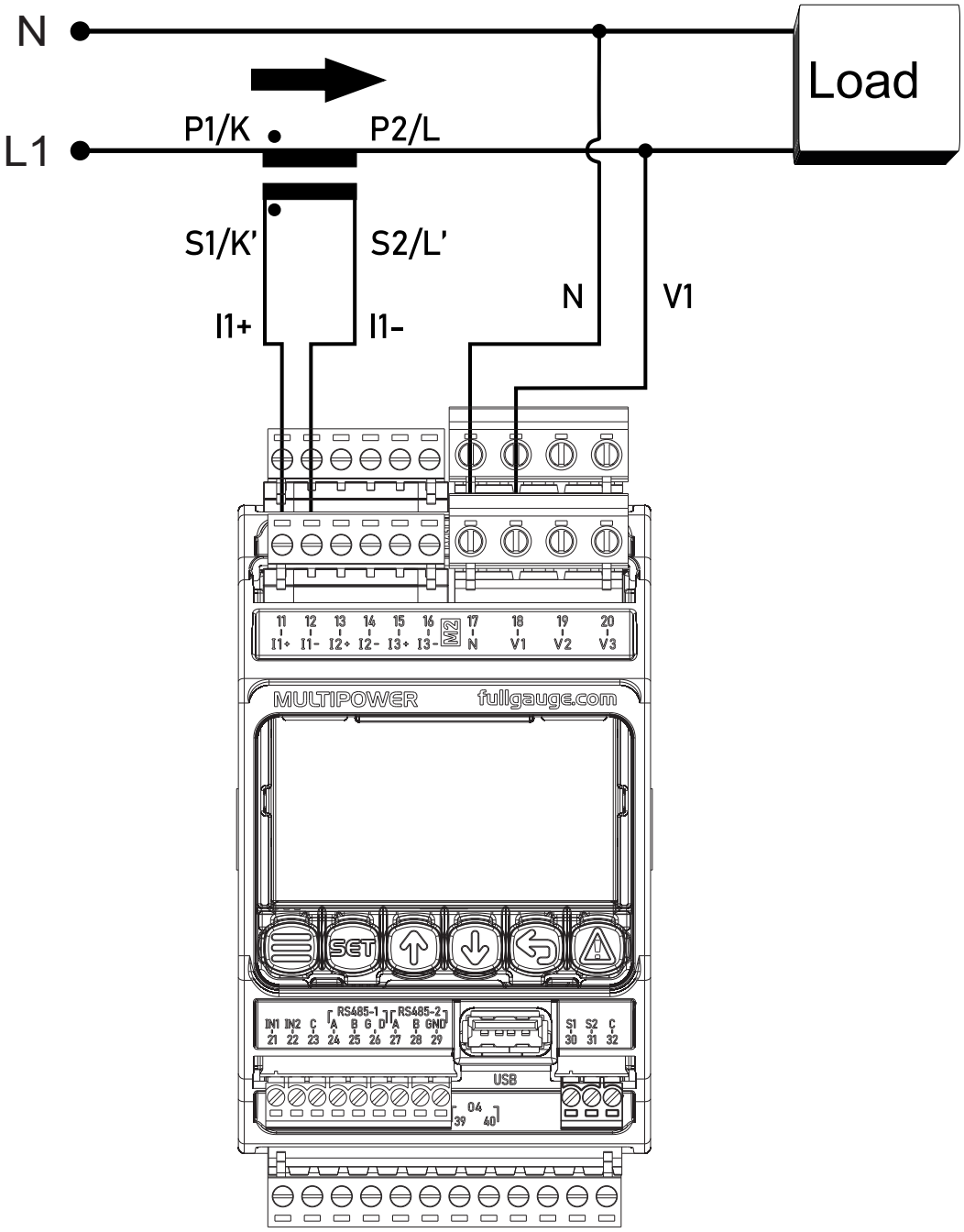
9. CONNECTION DIAGRAM

9.3 Installation instructions:

To ensure proper operation, it is extremely important that the connections are made according to the provided wiring diagram. It is crucial to pay attention to the polarity of the current transformers and to make the correct connections of the phases and the current transformers themselves. Any deviation from these guidelines may result in incorrect readings in the system.

Always connect the secondary of the Current Transformer (CT) to the current measurement terminals with the same index used to connect the voltage of the respective phase.

For example, if Phase **L1** is connected to terminal **V1** of the meter, the secondary of the **L1** phase CT must be connected to terminals **I1+** and **I1-**.



Caption:

P1/K = Primary 1 (Input from the network cable)
P2/L = Primary 2 (Output to the load)
S1/K' = Secondary 1 (terminal corresponding to P1)
S2/L' = Secondary 2 (terminal corresponding to P2)

For instance, if Phase **L1** is connected to **V1** and the **L2** phase CT is connected to terminals **I1**, it will result in incorrect power and energy measurements.

For the **MULTIPOWER** to correctly recognize the consumed and supplied energy data, attention must be paid to the installation of the primary and the polarity of the CT secondary. If the CT connection is made with reversed polarity, the **MULTIPOWER** will record the consumed energy in the supplied energy registers, and vice versa.

9. CONNECTION DIAGRAM

Note: Never remove the current measurement connectors from the **MULTIPOWER** with the circuit energized.
Current Transformers (CT) cannot, under any circumstances, be energized with the secondary open, as this can pose several risks, such as electric arcs, electric shock, protection failures and damage to the CT itself and the measurement circuits. Therefore, it is essential that the electrical network is de-energized during installation and maintenance of **MULTIPOWER**. To avoid this behavior, before disconnecting the current measurement connectors, the circuit must be turned off, de-energizing the phases, or the + and – terminals of the Current Transformers must be short-circuited externally.

9.4 Distance between the MULTIPOWER and the CTs

The length of the cable between the MULTIPOWER and the secondary of the current transformers (CTs) directly affects the accuracy of electrical measurements. Therefore, it is recommended that the installation be carried out with the shortest possible distance. If long distances are unavoidable, selecting a high-quality current transformer and a suitable cable is important. Use the following table as a guide for selection:

Class 1 current transformers with 5 VA rated power (most common on the market).

ELECTRICAL QUANTITY	CABLE WITH 1.5mm² CROSS-SECTION	CABLE WITH 2.5mm² CROSS-SECTION
Current Measurement Error	0,103% /meter	0,035% /meter
Active Power Measurement Error	0,055% /meter	0,013% /meter
Reactive Power Measurement Error	0,193% /meter	0,098% /meter

Class 0.6 current transformers with 12.5 VA rated power (higher accuracy).

ELECTRICAL QUANTITY	CABLE WITH 1.5mm² CROSS-SECTION	CABLE WITH 2.5mm² CROSS-SECTION
Current Measurement Error	0,005% /metro	0,006% /metro
Active Power Measurement Error	0,0003% /metro	0,0004% /metro
Reactive Power Measurement Error	0,013% /metro	0,018% /metro

In addition, the maximum secondary power must be respected.

The power that the **secondary of the current transformer (CT)** needs to handle can be roughly estimated using the formula:

$$P = R \times I^2$$

where:
P is the load power on the secondary (in VA);
R is the total circuit resistance (sum of the measurement equipment impedance and the cable resistance — round trip);
I is the rated secondary current of the CT (5 A).

This relationship only considers the resistive effects of the circuit, ignoring inductance, i.e., it treats the circuit as purely resistive. Thus, it provides a good practical approximation to check if the CT's rated power is sufficient to supply the measurement circuit without overloading.

Considering a 5 A current and that the measurement circuit impedance of the **MULTIPOWER** is 0.01 Ω, we have the following equation:

$$P = (Rc \times 2 \times C + 0{,}01) \times 5^2$$

where:
Rc = Cable resistance per meter (e.g., 0.0121 for 1.5 mm², 0.00741 for 2.5 mm²)
C = Length of the cable between the **MULTIPOWER** and the CT, one way, considering a 2-core cable.

This equation can be simplified for practical use as:

$$P = (50 \times Rc \times C) + 0{,}25$$

Example: 2-core cable, 20 meters, 2.5 mm²

$$\text{Power} = 50 \times 20 \times 0{,}00741 + 0{,}25 = 7{,}66\text{VA}$$

Therefore, in this scenario, a CT with a rated power higher than 7.66 VA should be selected.

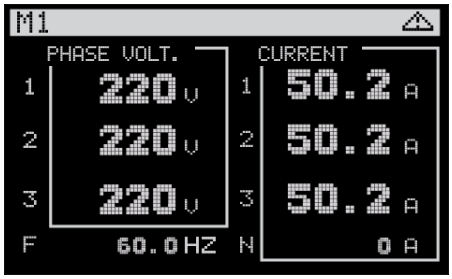
10. NAVIGATION KEYS

To switch between screens, edit parameters, view advanced functions, and perform other tasks, the **MULTIPOWER** has 6 navigation keys on its front panel:

SYMBOL	KEY	DESCRIPTION
	**MENU**	Accesses the Main Menu and Control Menu. Control Menu: Press the key . Main Menu: Keep the key pressed for 2 seconds .
	**SET**	Confirms the editing of parameters and values.
	**UP**	Increases values and navigates “up” the menu.
	**DOWN**	Decreases values and navigates “down” the menu.
	**BACK**	Returns to the previous screen without confirming parameter changes.
	**ALARM**	Access the view of active alarms and alarm history, press once to change the view. To clear the alarm history, view the alarm history and press and hold the key for 4 seconds. ***Note***: requires **Advanced** access level.

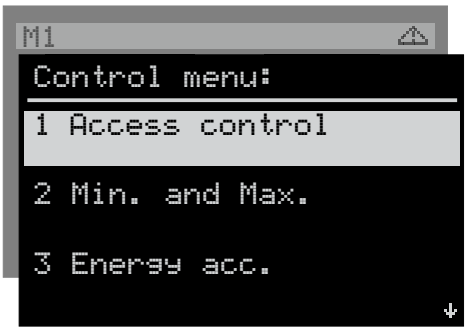
Note: To change the controller language, simply press the MENU and DOWN keys simultaneously for 5 seconds.

11. NAVIGATION TUTORIAL

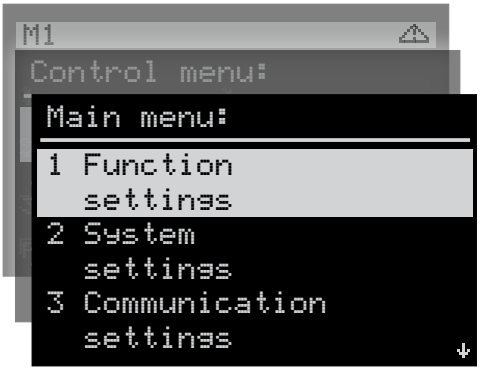


The first summary screen displays the voltages and currents per phase, measured by the first enabled meter, Meter 1 or Meter 2.

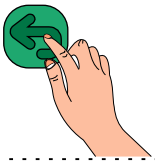
Using the **UP** or **DOWN** keys, navigate through the other summary screens.



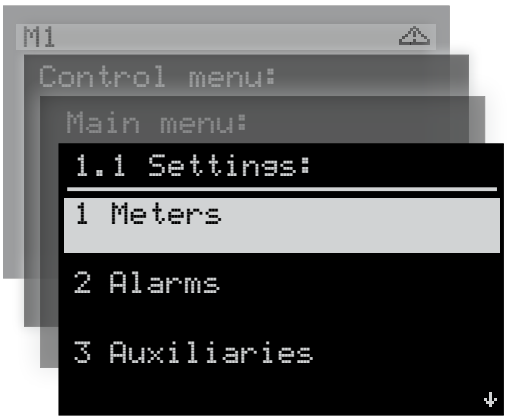
A short press on the **MENU** key leads to **Control Menu.**



Pressing the **MENU** key for 2 seconds opens the Main Menu, where it is possible to parameterize the meter's functions.



The **BACK key** is used to return to the configuration menus, and with a short press you can return to the previous level.



The **SET** key is used to access the selected item.

12. SUMMARY SCREEN

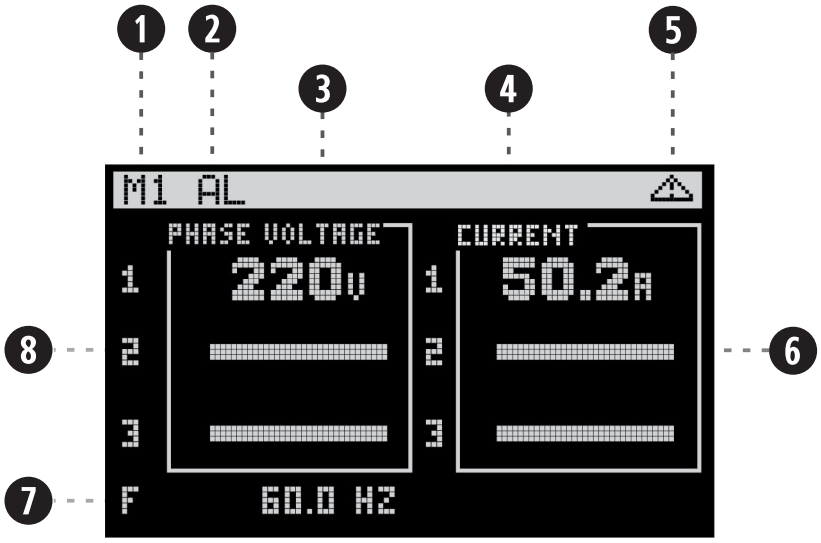
12.1 Navigating summary screens:

The summary screens display the main electrical measurements and power accumulators. Pressing the ⇧ or ⇩ keys, you can navigate between them. The display mode is linked to the operating mode configured on the meters. By default, **MULTIPOWER** uses the disabled operating mode. The operating mode may be changed by accessing the **Main Menu** → **Settings** → **Gauges**. For mode informatio, see menu section 15.1.1, Parameter 1.1.1 and 1.1.22.

> ***Notes: You must enter the advanced access code*** (123)***, in access control.***

12.2 1F + N operating mode Single-phase:

This mode performs measurement only between a phase and neutral. The summary screen displays quantities such as voltage, current, frequency, alarm signaling and meter identification. On the other screens, it is possible to view power and demand quantities, as well as the calculation of the power factor and the accumulators of consumed and supplied power.



1 — Identification of the quantity meter to be displayed:
M1
M2

2 — Alarm output activation indication:
AL = Alarm output in automatic reset.
AL flashing = Alarm output waiting for manual reset.

3 — Table that displays voltage values.

4 — Table that displays current values.

5 — Indication of active alarm or recording of an alarm occurrence:
⚠

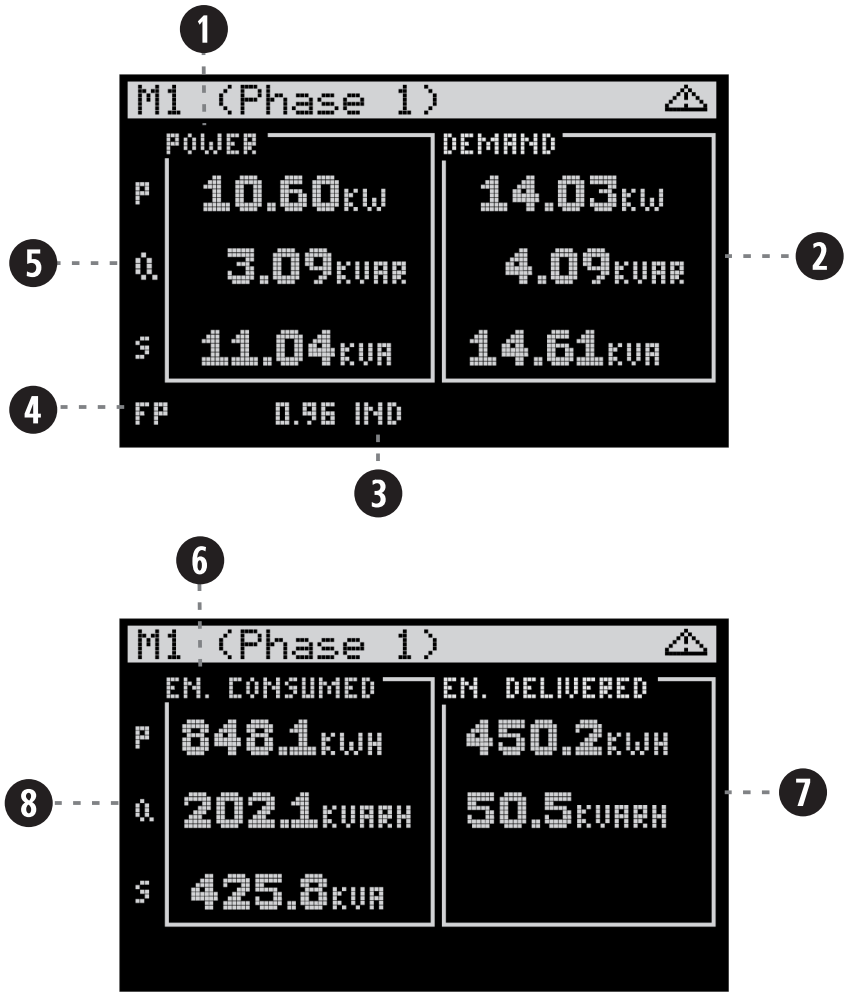
6 — Unmeasured phase indication.

7 — Phase indication displayed on each line:
1 - Phase 1

8 — Displays network frequency (F).

12. SUMMARY SCREEN

When pressing , it display others values.



1 — Power display table.

2 — Demand display table.

3 — Indicates whether the Power Factor is capacitive or inductive:
IND
CAP

4 — Displays the Power Factor value.

5 — Displays the three electrical powers, Active power, Reactive power, Apparent power.

6 — Consumed power display table.

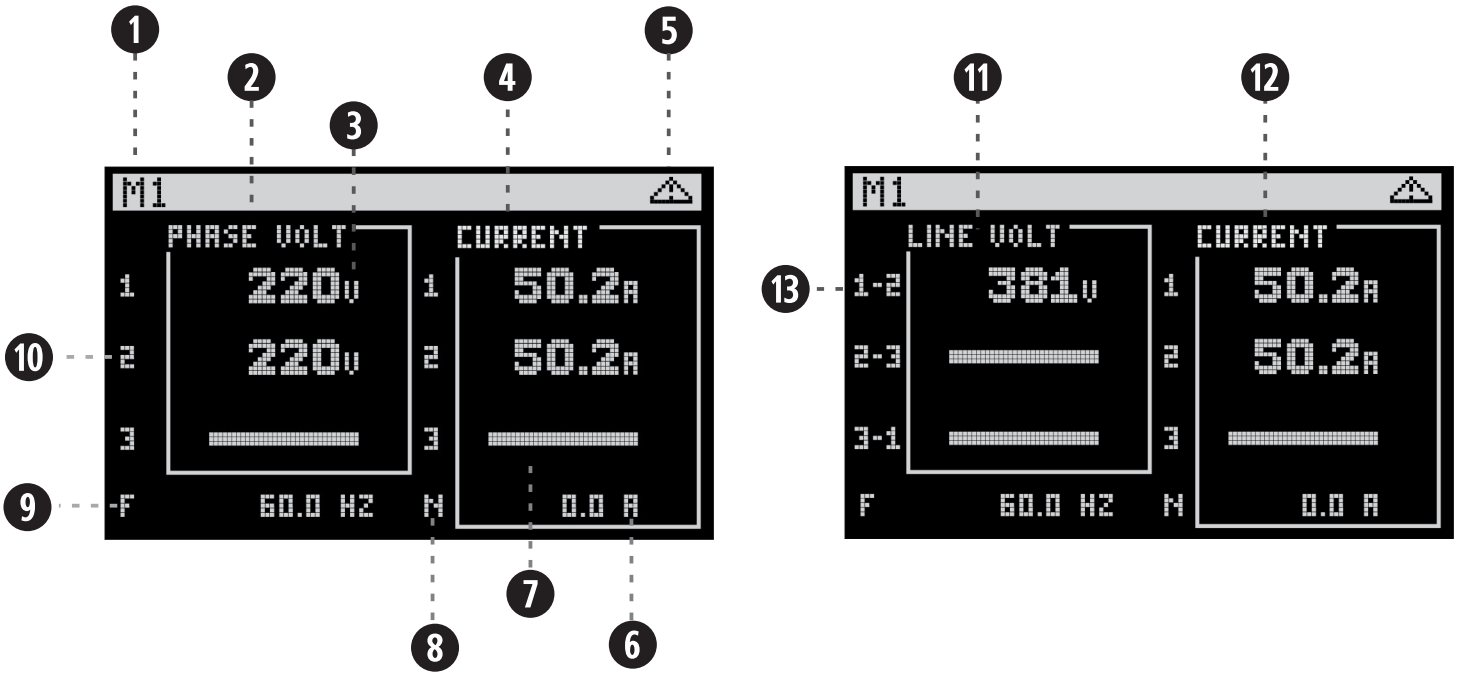
7 — Supplied power display table.

8 — IIndication of the type of power of each line, Active(P), Reactive(Q) and Apparent(S).

12. SUMMARY SCREEN

12.3 2F + N operating mode Two-Phase:

This mode of operation allows measurement in two phases, either between them or between each phase and the neutral. The summary screen displays quantities such as voltage, current, frequency, alarm signaling and meter identification. On the other screens, it is possible to view power and demand quantities, as well as the calculation of the power factor and the accumulators of consumed and supplied power.



1 — IIdentification of the meter whose magnitudes will be displayed:
M1
M2

2 — Table that displays voltage values.

3 — Voltage measurement unit in volts (V).

4 — Table that displays current values.

5 — Active alarm indication or alarm occurrence record:
⚠

6 — Unit of current measurement in amps (A).

7 — Unmeasured phase indication.

8 — Neutral current (N).

9 — Network frequency (F).

10 — Phase indication displayed on each line:
1 - Phase 1
2 - Phase 2

11 — Table that displays the voltage values measured between phases.

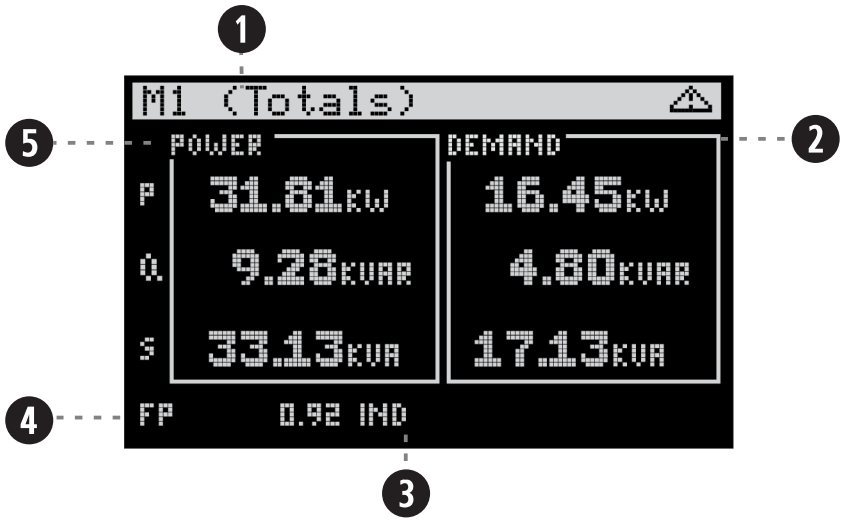
12 — Table that displays the current values measured between phase and neutral.

13 — Displays the list of phases to be measured:
1-2 Voltage between phases 1 and 2

12. SUMMARY SCREEN

In this mode of operation, power, demand, power consumed, and power supplied are displayed on screens separated by the total value and the value per measured phase.

Total Power and Demand



1 — Phase indication to be displayed:
M1 (Totals)
M1 (Phase 1)
M1 (Phase 2)

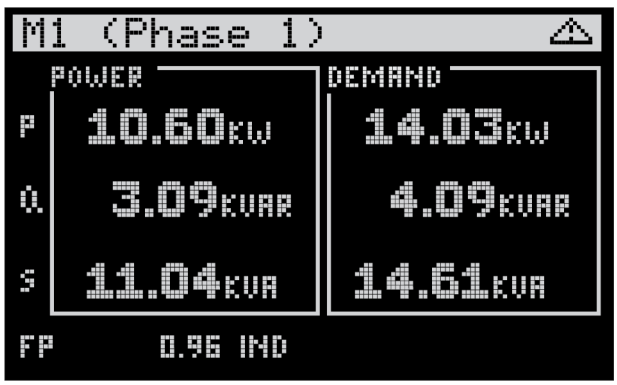
2 — Demand display table.

3 — Indicates whether Power Factor is capacitive or inductive:
IND
CAP

4 — Displays power factor value.

5 — Power display table.

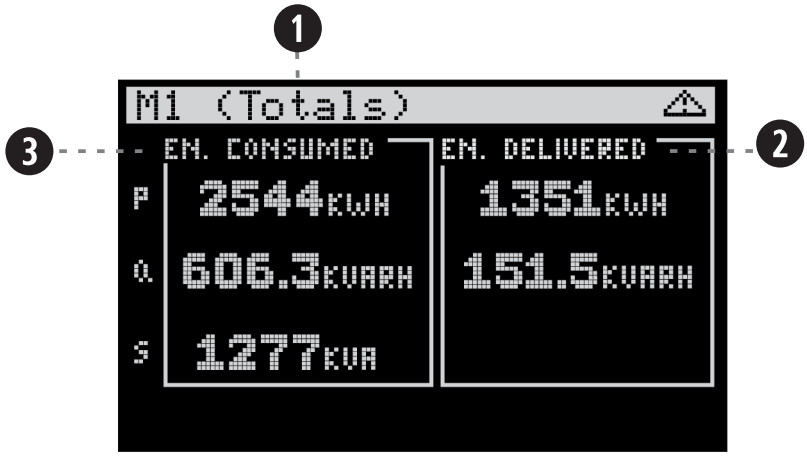
Power and Demand Phase 1



Power and Demand Phase 2

12. SUMMARY SCREEN

Consumed and supplied power

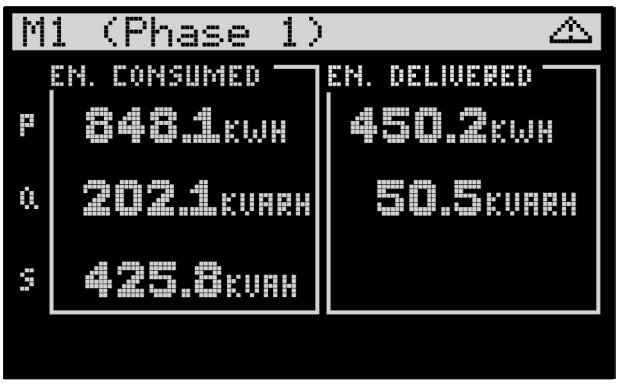


1 — Phase indication to be displayed:
M1 (Totals)
M1 (Phase 1)
M1 (Phase 2)

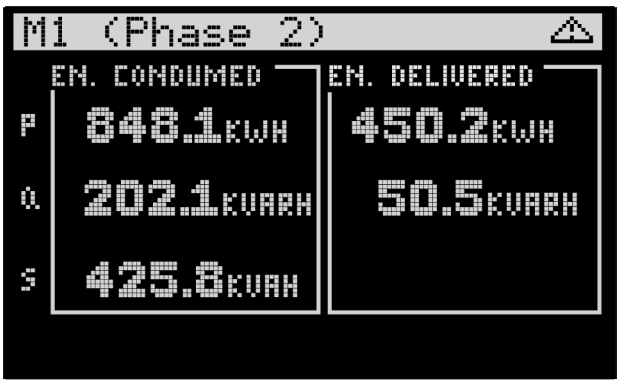
2 — Power supplied table.

3 — Power consumed table.

Consumed and supplied power Phase 1



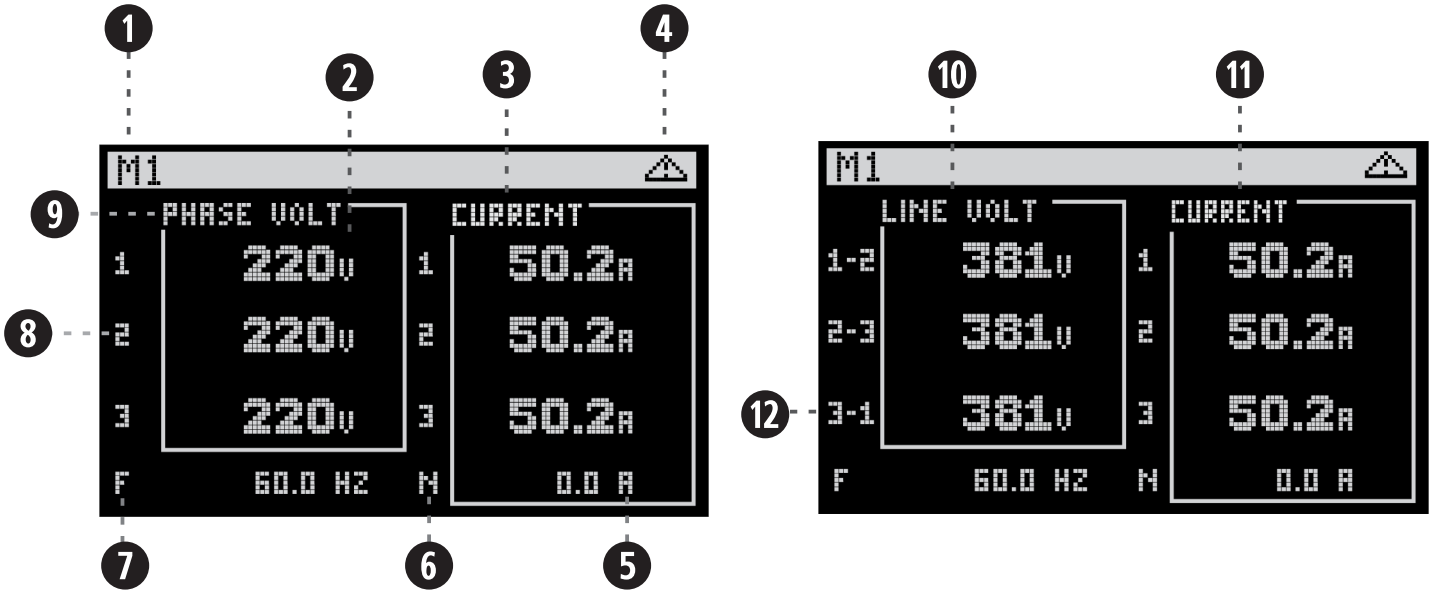
Consumed and supplied power Phase 2



12. SUMMARY SCREEN

12.4 3F + N Three-phase operating mode:

This mode performs the measurement using the three phases and the neutral. The summary screen displays quantities such as voltage, current, frequency, alarm signaling, and meter identification. On the other screens, it is possible to view power and demand quantities (active, reactive, and apparent), as well as the power factor and the consumed and supplied energies.



1 — Identification of the quantity meter to be displayed:
M1
M2

2 — Voltage measurement unit in volts (V).

3 — Current value table.

4 — Indication of active alarm or recording of an alarm occurrence:
⚠

5 — Unit of current measurement in amps (A).

6 — Neutral Indication (N)

7 — Network frequency statement (F).

8 — Indication of the phase in the network to be measured, also found to identify current values in the phases:
1 - Phase 1
2 - Phase 2
3 - Phase 3

9 — Table that displays voltage values.

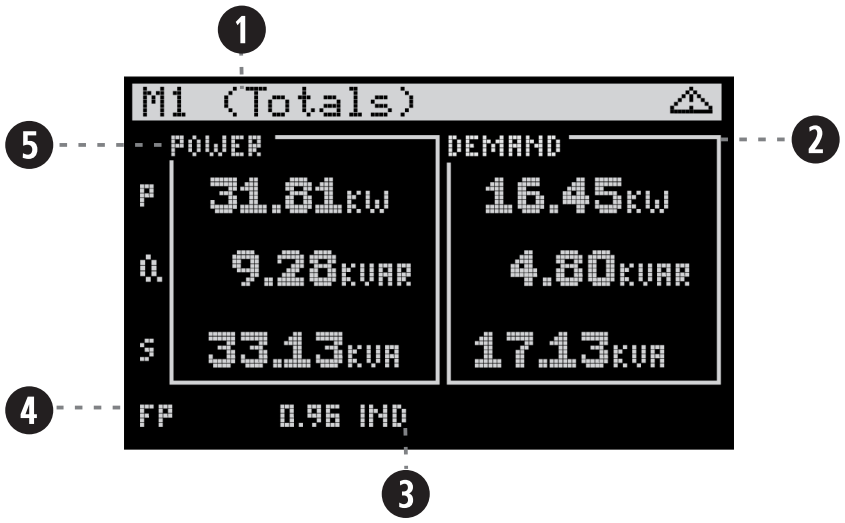
10 — Table that displays the current values measured between phase and neutral.

11 — Table that displays current values measured between phase and neutral.

12 — IIndication of line voltages:
1–2 Voltage between phases 1 and 2
2–3 Voltage between phases 2 and 3
3–1 Voltage between phases 3 and 1

12. SUMMARY SCREEN

Total Power and Demand



1 — Phase indication to be displayed:
- M1 (Totals)
- M1 (Phase 1)
- M1 (Phase 2)
- M1 (Phase 3)

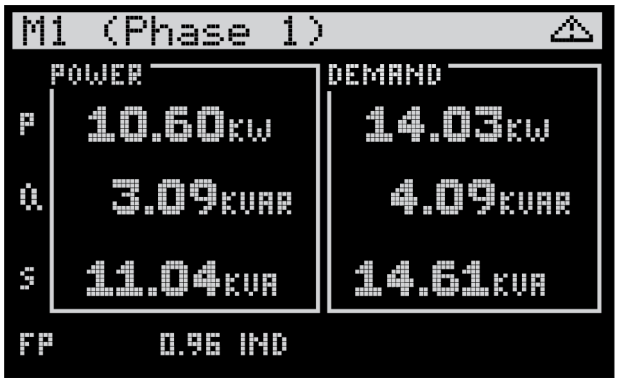
2 — Displays Demand in three units of measurement.

3 — Indicates whether Power Factor is capacitive or inductive:
- IND
- CAP

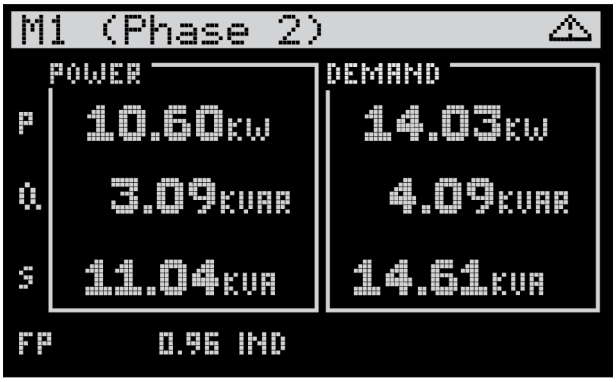
4 — Displays power factor value.

5 — Displays the three electrical powers, active power, reactive power, apparent power.

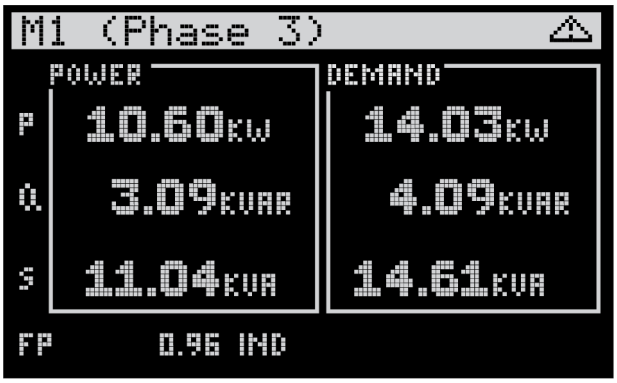
Power and Demand Phase 1



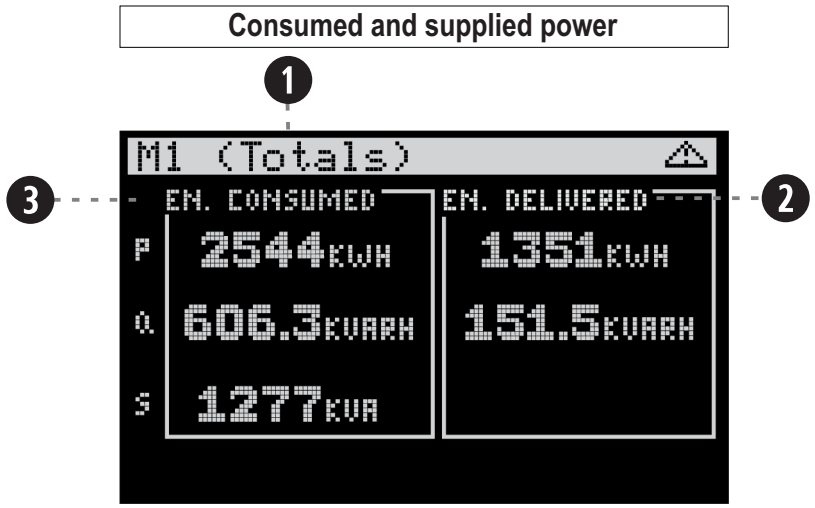
Power and Demand Phase 2



Power and Demand Phase 3



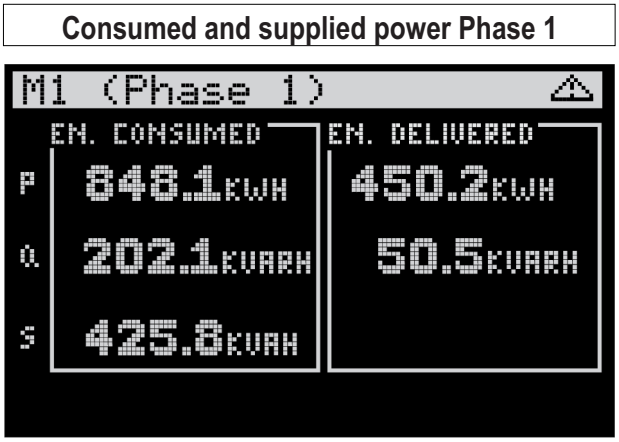
12. SUMMARY SCREEN

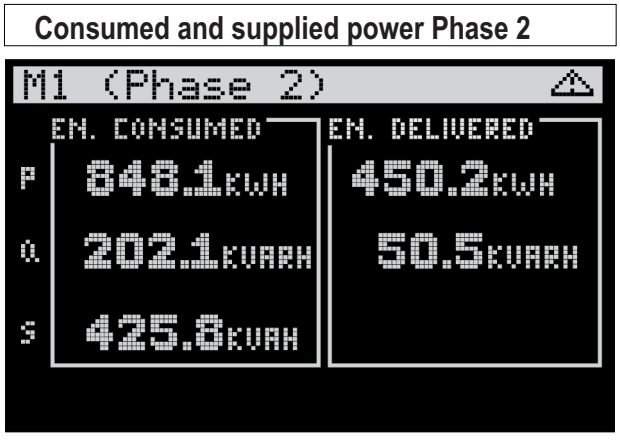


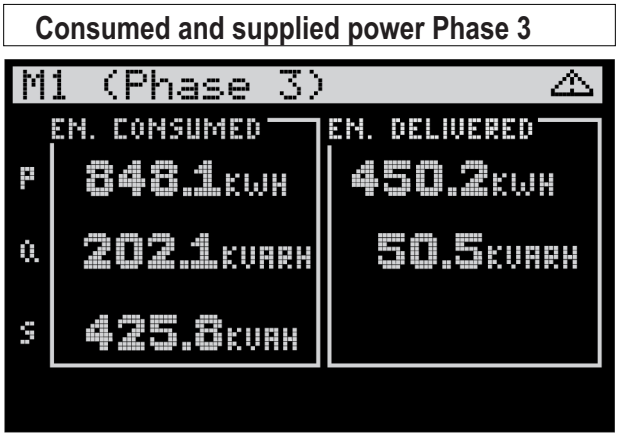
1 — Indication of the phase to be displayed:
M1 (Totals)
M1 (Phase 1)
M1 (Phase 2)
M1 (Phase 3)

2 — Shows the power supplied.

3 — Shows the power consumed.



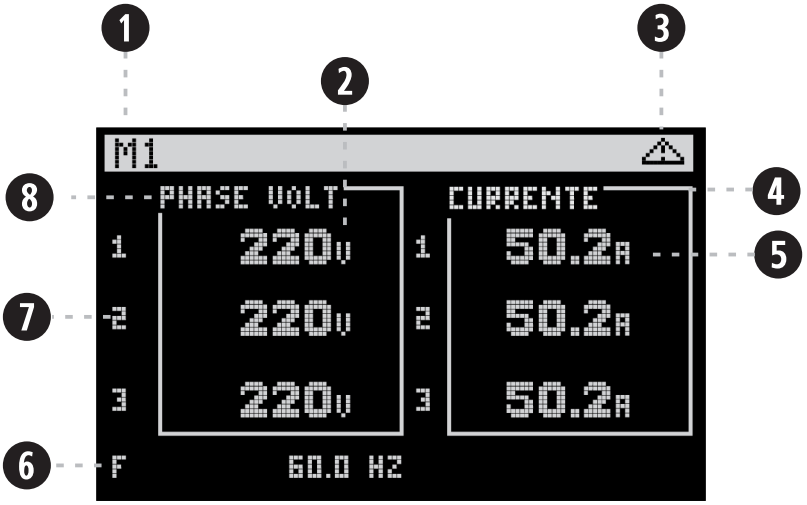


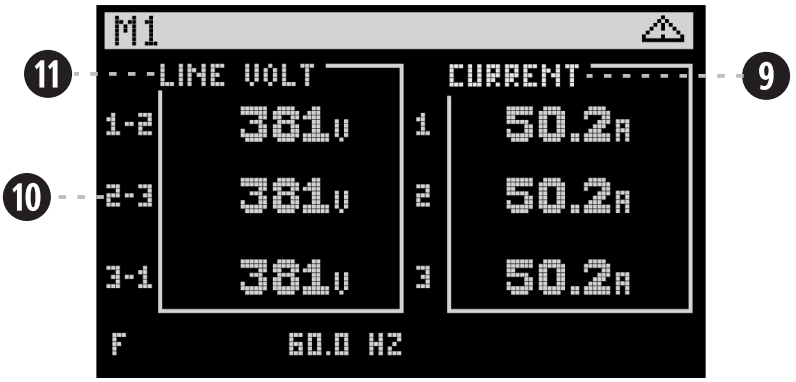


12.5 3F+N Balanced operating mode:

As previously described, in item 9.1.4, in **3F + N Three-Phase Balanced mode, MULTIPOWER** performs all power, demand and power calculations using values from just one phase of each load in a balanced three-phase circuit. However, the resulting values are presented on the summary screens multiplied by 3, and the summary screens do not display total values.

The measured values of phase and line voltage, current and frequency are presented in the same way as the other operating modes.





1 — Identification of the meter whose magnitudes will be displayed.

2 — Measurement unit - Volts.

3 — Indication of an active alarm or record of an alarm occurrence.

4 — Current values.

5 — Measurement unit - amps.

6 — Displays network frequency.

7 — Indication of the phase in the network to be measured, also available to identify the current values in the phases.

8 — Displays voltage values.

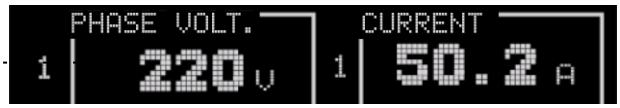
9 — Displays phase-by-phase current values.

10 — Indication of the ratio of the phases to be demonstrated.

11 — Table that displays the measured voltage values.

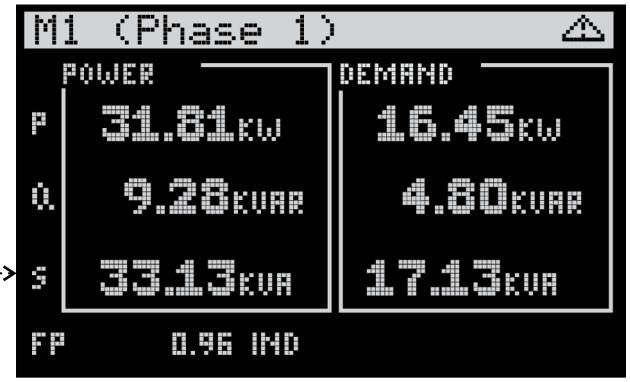
12. SUMMARY SCREEN

Here is an example of the calculation used to demonstrate the representation of powers in mode **3F + N Three-Phase Balanced:**



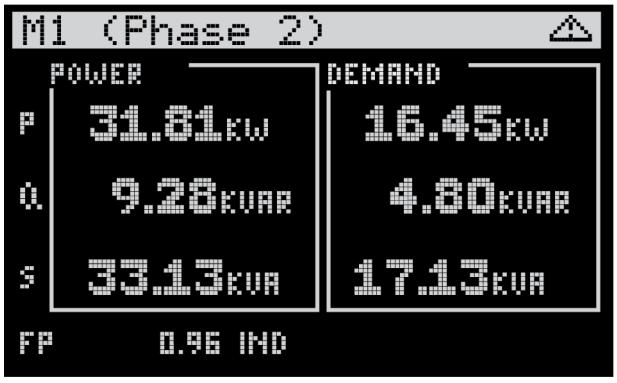
(S) = Voltage x Current x 3
(S) = 220 x 50.2 x 3
(S) = 11.04 KVA x 3
(S) = 33.13 KVA

Power and Demand Phase 1

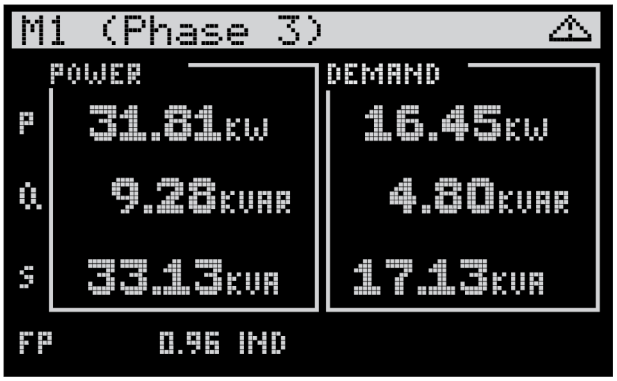


* For other values of active power, reactive power, demand values, consumed and supplied power, the same process is carried out. Taking into account the power factor when necessary.

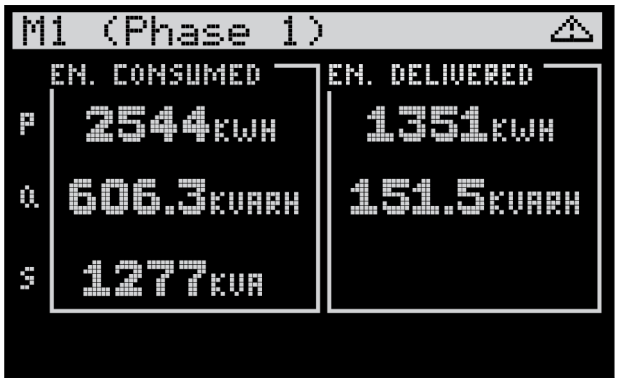
Power and Demand Phase 2



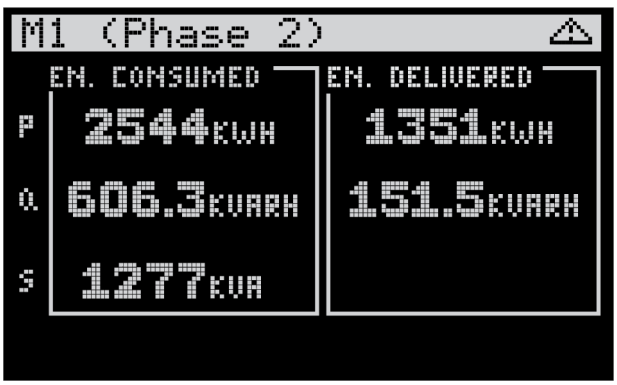
Power and Demand Phase 3



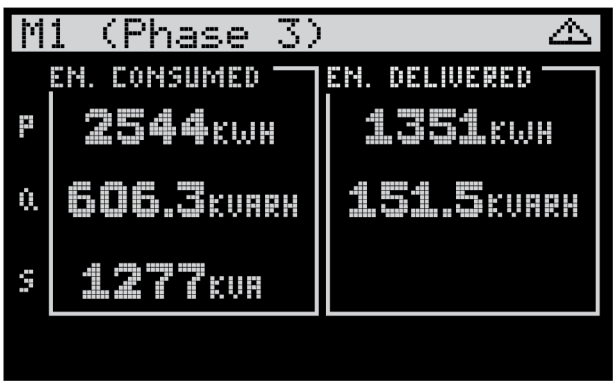
Consumed and supplied power Phase 1



Consumed and supplied power Phase 2



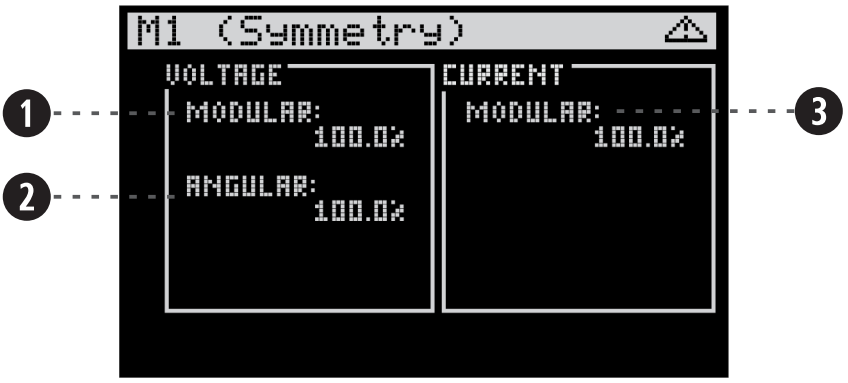
Consumed and supplied power Phase 3



12. SUMMARY SCREEN

12.6 Symmetry Percentage

The Symmetry screen displays the balance indices of the monitored electrical parameters, such as voltage and current, in percentages, allowing evaluation of the modular and angular uniformity of the system phases.



1 — Modular Voltage Asymmetry:
Indicates the percentage of symmetry among the phase voltage values.

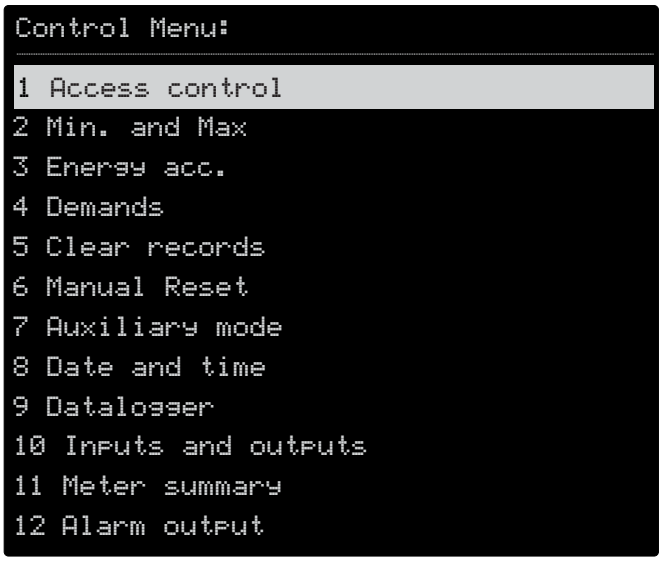
2 — Angular Voltage Asymmetry:
Indicates the percentage of symmetry among the phase angles.

3 — Modular Current Asymmetry:
Indicates the percentage of symmetry among the phase current values.

13. CONTROL MENU

13.1 Control Menu List:

The Control Menu is accessible by pressing the and has settings and commands for easy access to operations.



1 Access control

Depending on the access level, the user is allowed to take different actions on **MULTIPOWER**. You can adjust two different access levels:

- **Viewer**:
  Standard mode, no need to enter code.
- **Advanced**:
  Allows you to make changes to some system parameters.

**Advanced level is activated by entering code (123).*

2 Min. and Max.

Recording minimum and maximum values of all instrument measurements, to reset the records, first enter the code in the access control option.

3 Energy acc.

Allows viewing of the power accumulators of meters M1 and M2. Displays total consumed and supplied power records separated by phase.

4 Demands

Option to view active, reactive, and apparent demands in phases 1, 2, 3 and total, on meters M1 and M2.

5 Clear records

Allows you to reset all records in **MULTIPOWER** or reset records per interest groups, per meter or per phase. Records include minimums and maximums, power accumulators and demands.

6 Manual Reset

Performs the reset of the alarm outputs.

7 Auxiliary mode

Allows you to individually select the operating state of the auxiliary outputs, using the options off, manual, and automatic.

8 Date and time

Allows you to adjust the date by selecting Day/Month/Year, and time by selecting Time: Minutes: Seconds.

9 Datalogger

Access to the status of the internal memory (datalogger), also allows you to export, activate/deactivate your records and erase memory.

10 Inputs and outputs

Displays a summary of the inputs and outputs of **MULTIPOWER**, indicating the reading value of the sensors and the current state of the digital inputs and outputs.

11 Meter summary

Displays a summary of the electrical installation containing the direction of active and reactive power flow, as well as the power factor of the three phases. The coherence between the values of the 3 phases is an indication that the connection of the phases and current transformers is correct.

12 Alarm output

Displays the status of the alarm outputs.

13. CONTROL MENU

13.2 Screens in the Control Menu:
The following is a description of the screens displayed in the control menu options.

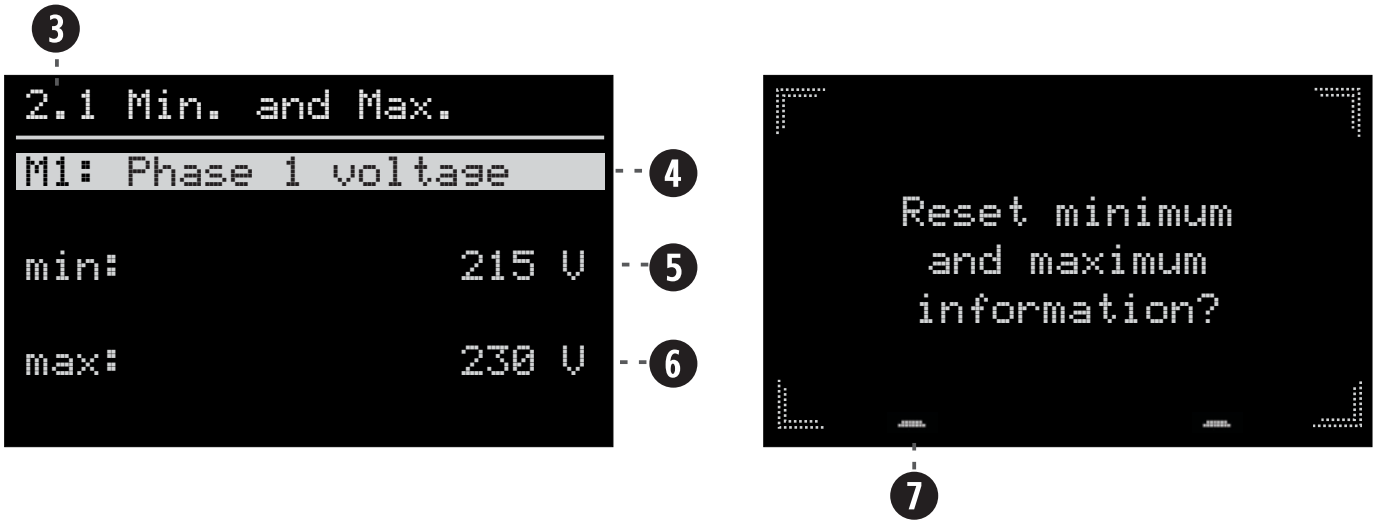
13.2.1 Access Control:
Displays a screen where the advanced access code must be entered.

1 — This field displays the access code for insertion.

2 — Indicates the available keys:

13.2.2 Min. and Max:
This screen displays minimum and maximum values of electrical quantities, as well as the temperature of the sensors. To restart the detection of the minimum and maximum values of a given record, you must press SET .

> ***Notes: You must enter the advanced access code*** (123)***, in access control.***



3 — Indication of the index of the item to be displayed:
2.1...64

4 — Description of the displayed item:
M1
M2

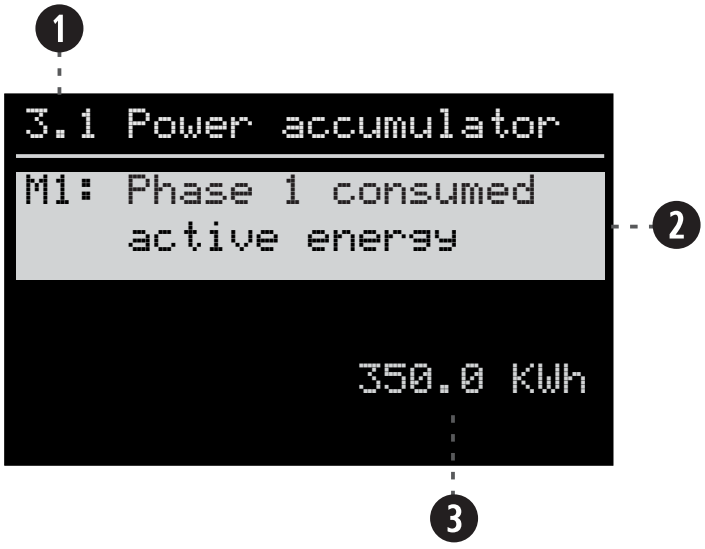
5 — Minimum recorded value.

6 — Maximum recorded value.

7 — Indication of available keys:

13.2.3 Power accumulators:

Displays the power accumulators of meters M1 and M2, per phase and total. Pressing key toggles the meter to be displayed.



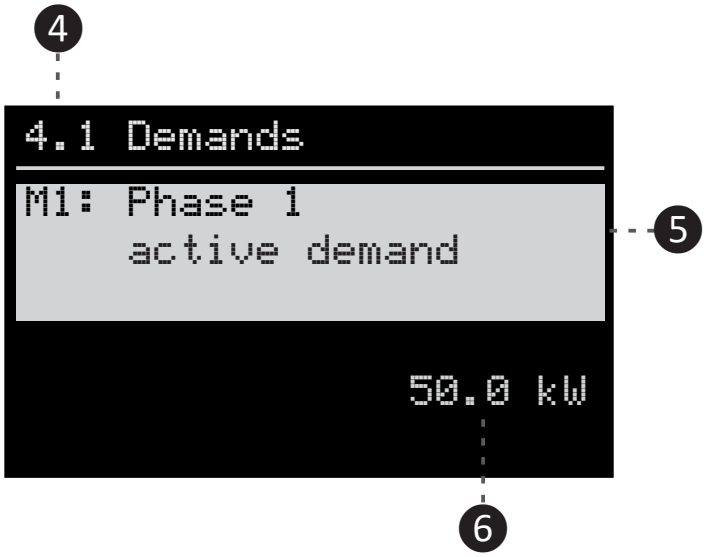
1 — Indicates the item and its description:
3.1 ...40

2 — Description of the record to be viewed.

3 — Accumulated power record.

13.2.4 Demands:

This screen displays the active, reactive, and apparent demands for each phase and total. The key toggles which meter is displayed.



4 — Indicates the selected item:
4.1...24

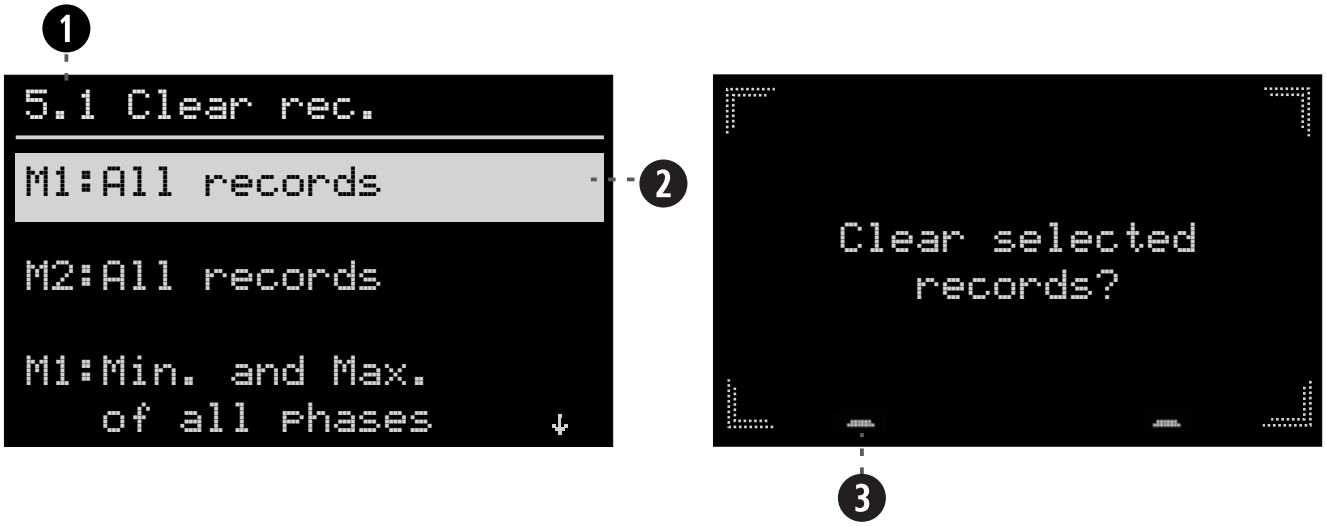
5 — Description of the value to be displayed

6 — Demand value of the selected item.

13.2.5 Clear records:

On this screen it is possible to reset the minimum and maximum records, power accumulators and demand of the two meters. Through the ↑ or ↓ keys, you can select the group of records to be reset by pressing the SET key.

Notes: You must enter the advanced access code (123), in access control.



1 — Indicates the item index:
5.1 ...26

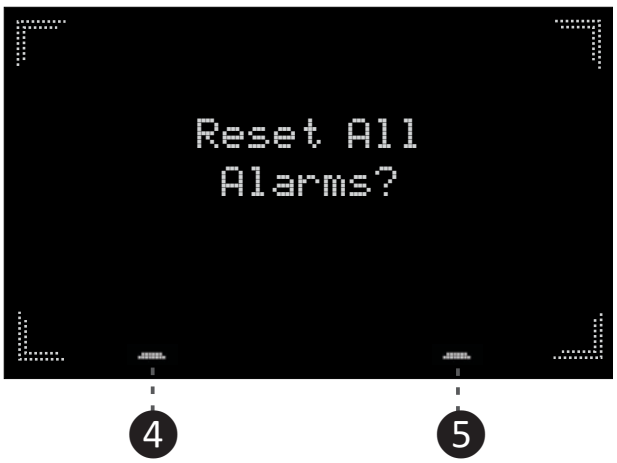
2 — Description of the selected item.

3 — Indication of available keys:
SET ↩

13.2.6 Manual Reset:

On this screen, it is possible to select the reset of all alarm outputs.

Notes: You must enter the advanced access code (123), in access control.



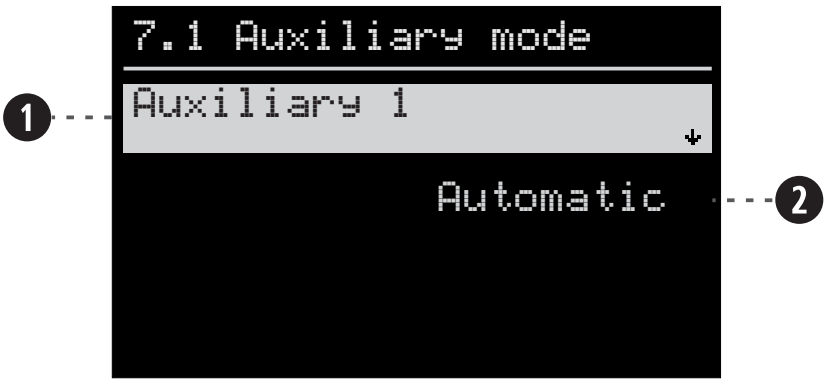
4 — The SET key indication, when pressed, resets all alarms.

5 — The ↩, when pressed, it cancels the reset of all alarms and returns to the previous menu.

13.2.7 Auxiliar Mode:

In this menu you can change the operating mode of the auxiliary controls.
- In automatic mode, the control operates according to the programming configured in menu 1.3.
- When the Manual option is selected, the auxiliary operates for the time established in the Manual activation time function.

> ***Notes: You must enter the advanced access code*** (123)***, in access control.***

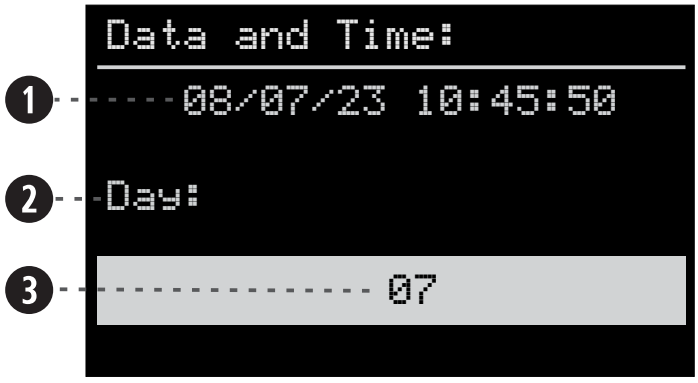


1 — Identifies the Auxiliary to be selected:
- Auxiliary 1
- Auxiliary 2
- Auxiliary 3
- Auxiliary 4

2 — Identifies the mode to be selected:
- Off
- Manual
- Automatic

13.2.8 Date and time:

This screen displays the current system date and time and allows you to adjust it.



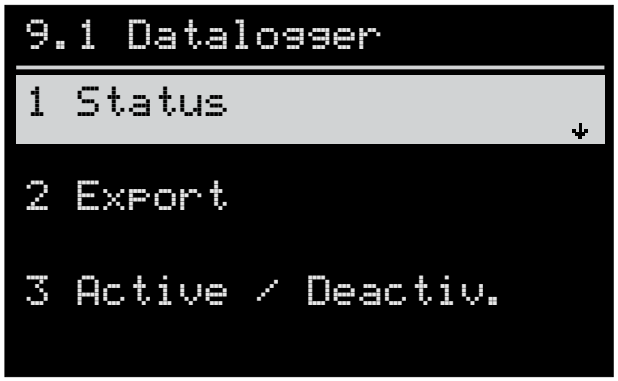
1 — Date in day/month/year, and Time in hour: minutes: second

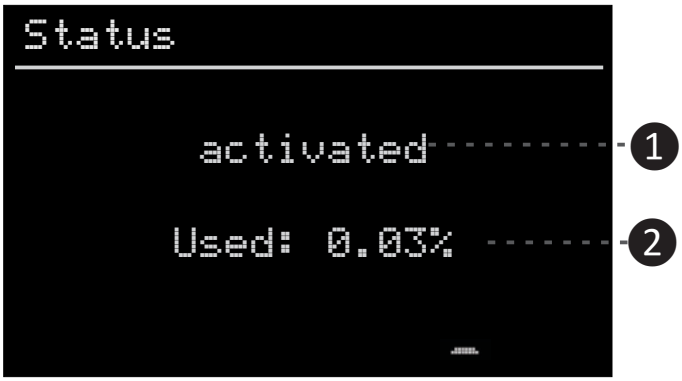
2 — Option to be changed:
- Day:
- Month:
- Year:
- Hour:
- Minute:
- Second:

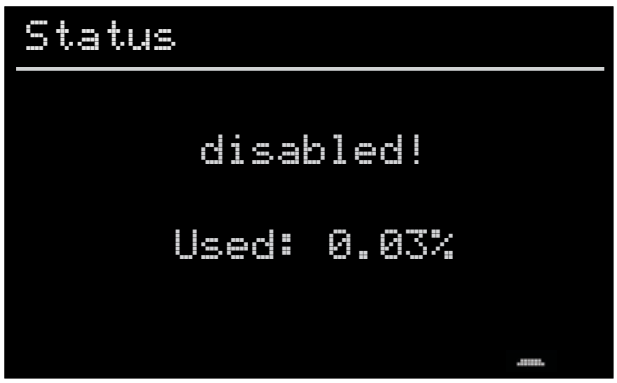
3 — Demonstration of value to be changed

13.2.9 Datalogger:
This screen displays the datalogger status, in addition to the Export to flash drive, Enable / Disable and Erase memory options.

> ***Notes: You must enter the advanced access code*** (123)***, in access control.***







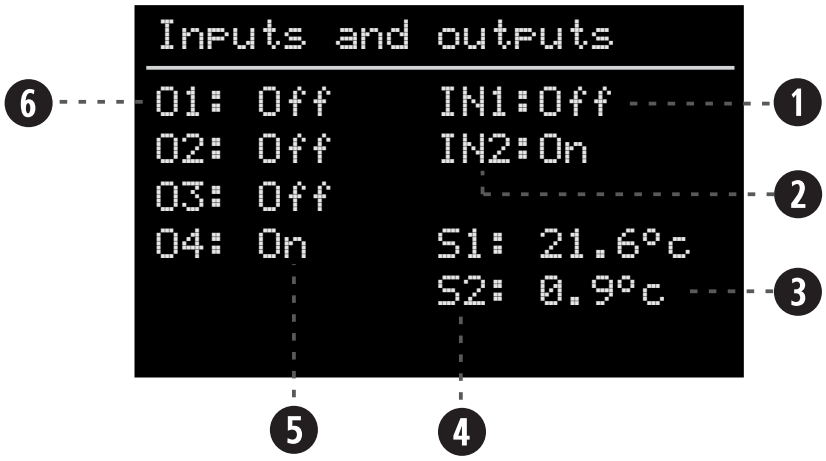
1 — Indicates in which mode the Datalogger is operating.

2 — Memory usage percentage.

3 — Indication of available keys:

13.2.10 Inputs and outputs:

This screen displays the status of all digital outputs, digital inputs, and sensor temperatures.



1 — Status of digital inputs:
On
Off

2 — Digital input identification:
IN1
IN2

3 — Temperature value measured by temperature sensors.

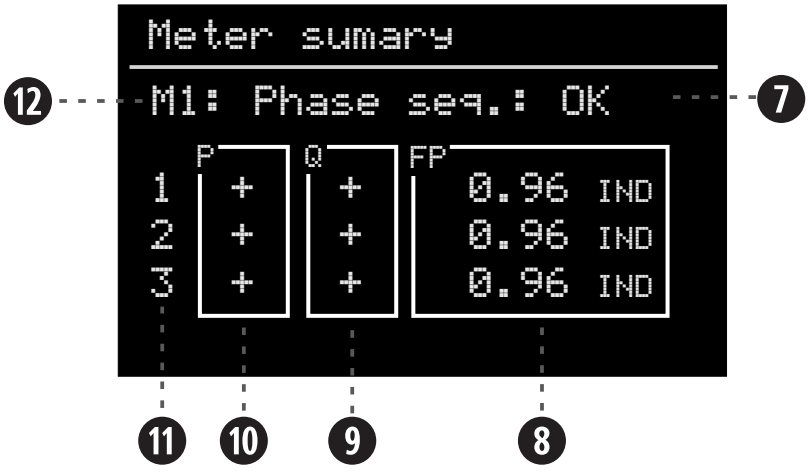
4 — Sensor identification:
S1
S2

5 — Status of digital outputs:
On
Off

6 — Auxiliary output identification:
O1
O2
O3
O4

13.2.11 Meter Summary:

This screen shows the power factor values and the direction of active and reactive power.



7 — Checking the phase sequence between V1, V2 and V3. (Only in three-phase modes).

8 — Indication of the power factor of each phase

9 — Reactive power flow indication:
+ = Reactive power consumed.
– = Reactive power supplied.
0 = Reactive power equal to zero.

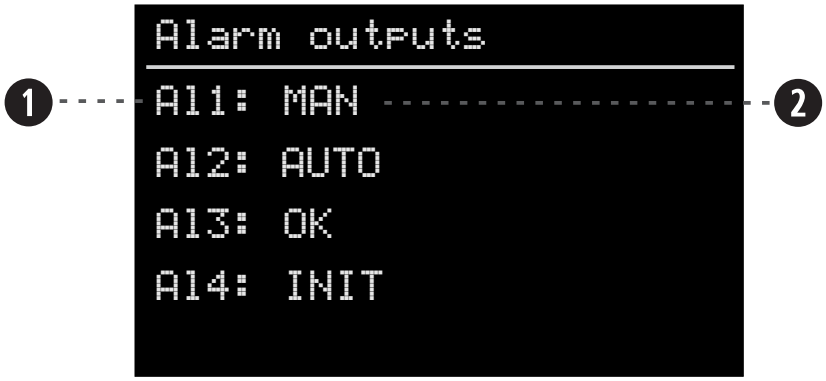
10 — Active power flow indication:
+ = Active power consumed.
– = Active power supplied.
0 = Active power equal to zero.

11 — Phase indication 1, 2 and 3.

12 — Meter indication on display.To toggle between meters, use the ↑ or ↓.

13.2.12 Alarm outputs:

Displays the current status of each alarm output, indicating the mode and operational status.



1 — Indicates alarm output activated.

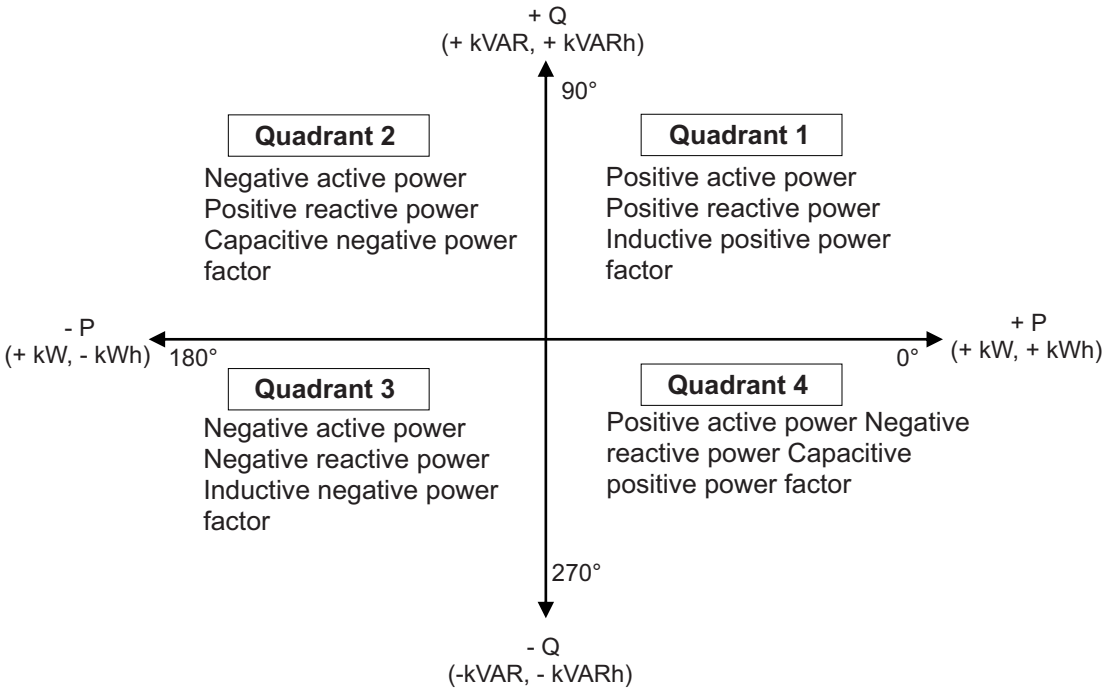
2 — Alarm status:
OK = Operating normally, no alarm
INIT = Waiting for initialization time
ALARM = In alarm condition
AUTO = In automatic reset
MAN = Waiting for manual reset

14. POWER CONSUMED AND SUPPLIED

Power consumed and supplied:

MULTIPOWER is a meter that operates in 4 quadrants, that is, it is capable of separately measuring and recording the power that is consumed or supplied to the electrical grid, also identifying whether the power factor is inductive or capacitive in both cases.

The following table illustrates the possible operating states and the indication of the signs of the electrical quantities displayed by the meter.



Quadrant 2

Quadrant 1

Quadrant 3

Quadrant 4

*Values for demonstration purposes only.

The operation of the **MULTIPOWER** is designed so that when the active power values are positive, the controller stores the corresponding energy in the consumption registers.Conversely, when the active power values are negative, the controller accumulates this energy in the supply registers.In this way, the **MULTIPOWER** is able to track and record both the consumed and supplied energy, depending on the direction of the active power.

15. MODULAR AND ANGULAR ASYMMETRY

15. 1 Detection of modular/angular asymmetry alarms:

Modular Voltage Asymmetry is quantified by analyzing the voltage amplitudes of each phase in relation to the nominal value (standard line of the electrical network). When the phase voltage amplitudes are not equal, modular asymmetry occurs. This is expressed in terms of the percentage of imbalance and is calculated using the following formula:

S = Sensitivity (0 to 100%)

Modular Asymmetry:

$$\text{Tolerance} = \frac{(100 - S) \times (\text{Average of Measured Voltages})}{100}$$

In an ideal and balanced three-phase electrical system, the three phases are displaced by 120 degrees from each other. This means there is perfect angular symmetry among the phases. When angular asymmetry occurs, the phase shift angles between the phase voltages are not equal to 120 degrees, which can lead to an uneven distribution of electrical power across system components. The Angular Voltage Asymmetry is obtained from the difference between the phase shift angles and the ideal situation (120 degrees).

Angular Asymmetry:

$$\text{Tolerance} = \frac{(100 - S) \times (\text{Average of Measured Phase Shifts})}{100}$$

15.1.1 Alarm Activation Condition

The alarm (in both cases) is triggered when:

Measured value greater than Average + Tolerance
OR
Measured value lower than Average − Tolerance

Important: The limits for indicating an asymmetry error (angular or modular) are given by “average of phase shifts/voltages + tolerance” or “average of phase shifts/voltages − tolerance.” Therefore, the alarm detection threshold depends on the current values of each measured phase.

15.2 Examples

15.2.1 Angular Asymmetry

To illustrate angular asymmetry, considering that the phase shift between two phase voltages in a three-phase system is ±120° and the total phase shift sum equals 360°, if the function is set to a value of 80:

Upper limit: The alarm will be triggered when the angular phase shift is greater than 96°.
Lower limit: The alarm will be triggered when the angular phase shift is lower than 84°.

15.2.2 Modular Asymmetry

To illustrate modular asymmetry, considering that the function is set to a value of 80 and that the voltages of phases 1 and 2 are equal to 220 VRMS:

- **Upper limit:** The alarm will be triggered when the voltage of phase T exceeds 293 VRMS, as it will be higher than the average of the measured values (244 VRMS) plus the calculated tolerance (48 VRMS).
- **Lower limit:** The alarm will be triggered when the voltage of phase T is below 159 VRMS, as it will be lower than the average of the measured values (199 VRMS) minus the calculated tolerance (39 VRMS).

15.3 Sensitivity Configuration

Sensitivity (S) allows configuring the margin at which the meter detects phase modular asymmetry.

If the maximum allowable asymmetry specification of the circuit is 2%, the sensitivity value should be set to 98. In other words, a sensitivity of 98 corresponds to 2% asymmetry.

The higher the value of this parameter, the more easily the controller detects the error.

16. ALARM OUTPUTS

Alarm Outputs:
The **MULTIPOWER** allows the use of up to four outputs triggered by alarms related to the electrical quantities measured by the meters. Each output has an independent set of functions, enabling greater flexibility in use.
For each output, it is possible to select which meters and which electrical quantities will be monitored for activation.

By default, the output starts in the ON state and is turned OFF when an alarm occurs. The default state can be changed using the function “ALX: Contact type NO – NC.”

Example:
(1.1.6) M1: Minimum phase voltage limit = 204V

(1.1.7) M1: Maximum phase voltage limit = 240V

(1.1.8) M1: Voltage alarm validation time = 10 seconds

(1.1.20) M1: Alarm inhibition time = 60 seconds

(1.8.1) AL1: Meter = Meter 1 only

(1.8.3) AL1: Activation by voltage alarms = Yes

(1.8.13) AL1: Digital output = O1

(1.8.14) AL1: Contact type NO – NC = NC

In this example, output O1 is activated when the controller is powered on and is turned OFF whenever a minimum or maximum phase voltage alarm occurs, as well as in cases of phase loss.

It is important to note that these alarms are only triggered after the configured validation and inhibition times have elapsed.

Each output also includes settings for automatic resets, which can be programmed to reset always or only a limited number of times.

Example continuation:
(1.8.10) AL1: Reset time = 180 seconds

(1.8.11) AL1: Number of attempts = 2

(1.8.12) AL1: Reset period = 1 hour

In this case, two reset attempts are made within a one-hour window. The attempts occur 180 seconds after the end of the alarm—that is, as soon as all phases return to the acceptable range between 204V and 240V.If a third occurrence happens within that period, the output must be reset manually. Manual reset can be performed through the control menu or remotely.

17. AUXILIARY LOGIC

17.1 Temperature Alarms:

MULTIPOWER allows the configuration of up to two independent temperature alarm logics, where it is possible to assign an alarm output to each sensor or up to two alarm outputs in different ranges for the same sensor. It also allows linking with Auxiliaries in order to turn off their output in the event of an alarm.

Example:
Low and high alarm output linked to Auxiliary 1.

(1.2.1) AL1: Low temperature = 5.0°C

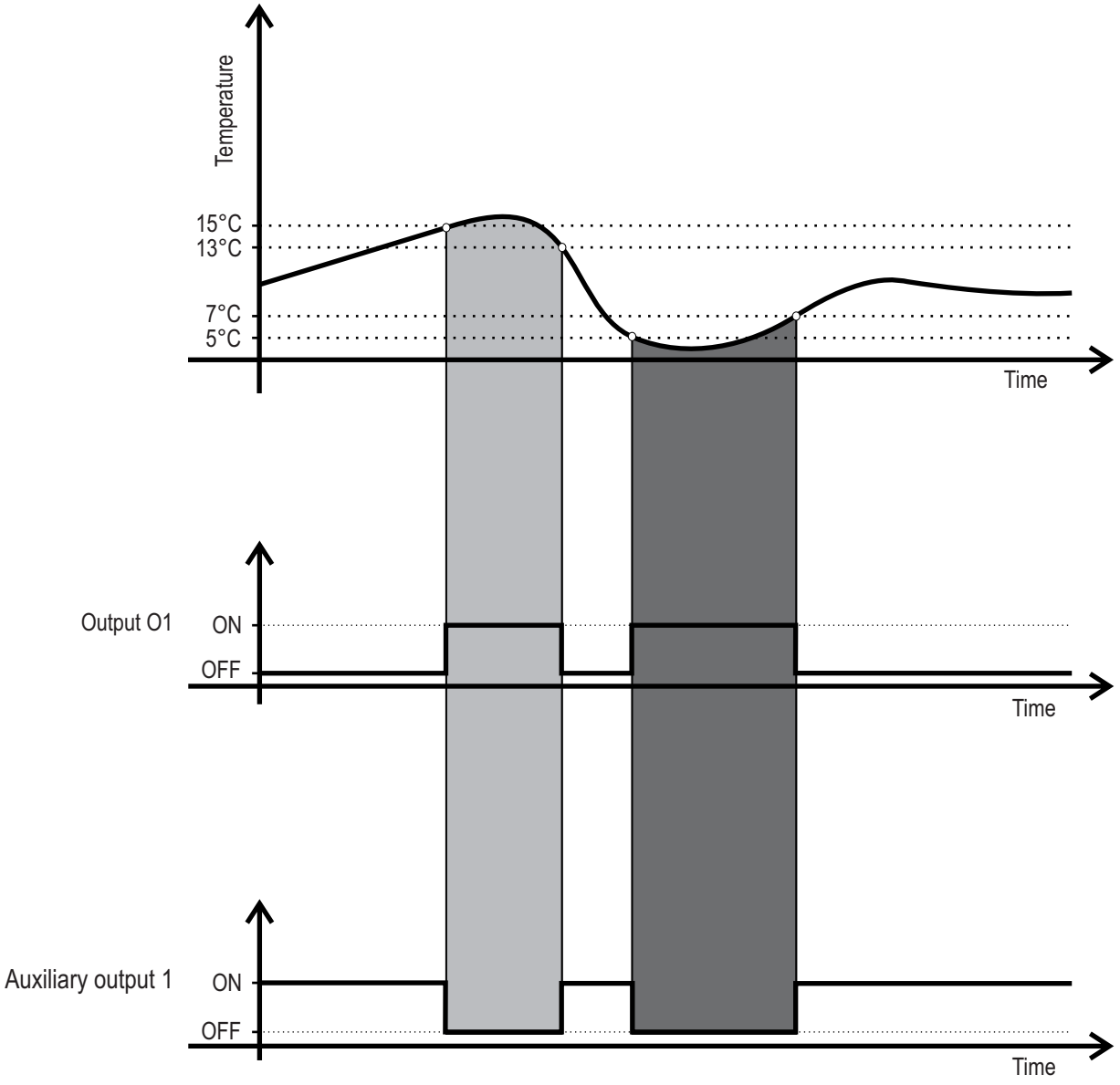
(1.2.2) AL1: High temperature = 15.0°C

(1.2.3) AL1: Hysteresis = 2.0°C

(1.2.6) AL1: Link = Auxiliaries: 1.0.0.0

(1.2.7) AL1: Reference sensor = S1

(1.2.8) AL1: Associated output = O1



Captions:

High temperature alarm

Low temperature alarm

In this example, the low temperature alarm occurs whenever the temperature recorded by sensor 1 drops below 5.0°C and is deactivated when the temperature rises above 7.0°C. On the other hand, the high temperature alarm occurs when the temperature detected by sensor 1 exceeds 15.0°C and is deactivated when the temperature drops below 13.0°C. Output O1 is activated when any of the alarms is active, while auxiliary output 1 remains off in this case.

17. AUXILIARY LOGIC

17.2 Auxiliaries:

MULTIPOWER offers support for up to four auxiliary logic, which can be programmed to operate as thermostats or auxiliary outputs, depending on the auxiliary operating mode setting.

17.2.1 Always On Operating mode:

In this mode, the auxiliary output is activated according to the time schedule of the linked events.

Example:
(1.3.1) AUX1: Operating mode = Always on

(1.3.6) AUX1: Associated output = O1

(1.4.1) Event 1: Start time = 08:00

(1.4.2) Event 1: End time = 18:00

(1.4.3) Event 1: Days of the week = _TWTFS_

(1.4.4) Event 1: Link = Auxiliaries: 1,0,0,0

(1.4.5) Event 2: Start time = 10:00

(1.4.6) Event 2: End time = 14:00

(1.4.7) Event 2: Days of the week = S_____S

(1.4.8) Event 2: Link = Auxiliaries: 1,0,0,0

According to this schedule, output O1 is activated daily, from Monday to Friday from 08:00 to 18:00 and on Saturdays and Sundays from 10:00 to 14:00.

17.2.2 Heating Thermostat operating mode:

In this mode, the Auxiliary operates as a heating thermostat, where the output is activated for values lower than the setpoint minus hysteresis and is turned off for values greater than the setpoint. The operation of the thermostat does not depend on the schedule of events.

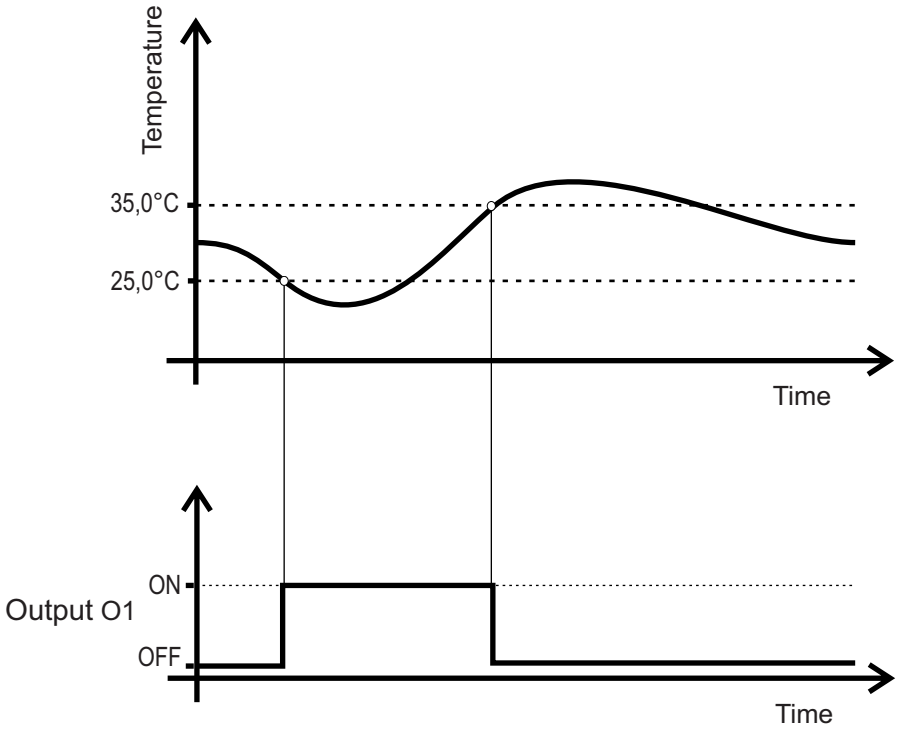
Example:
(1.3.1) AUX1: Operating mode = Heating thermostat

(1.3.2) AUX1: Setpoint of temperature = 35°C

(1.3.3) AUX1: Hysteresis = 10,0°C

(1.3.5) AUX1: Reference sensor = S1

(1.3.6) AUX1: Associated output = O1



In this example, output O1 is activated below 25.0°C and is turned off when it reaches 35.0°C.

17.2.3 Cooling Thermostat operating mode:

In this mode, the Auxiliary operates as a cooling thermostat, where the output is activated for values lower than the setpoint plus the hysteresis and is turned off for values lower than the setpoint. The operation of the thermostat does not depend on the schedule of events.

Example:

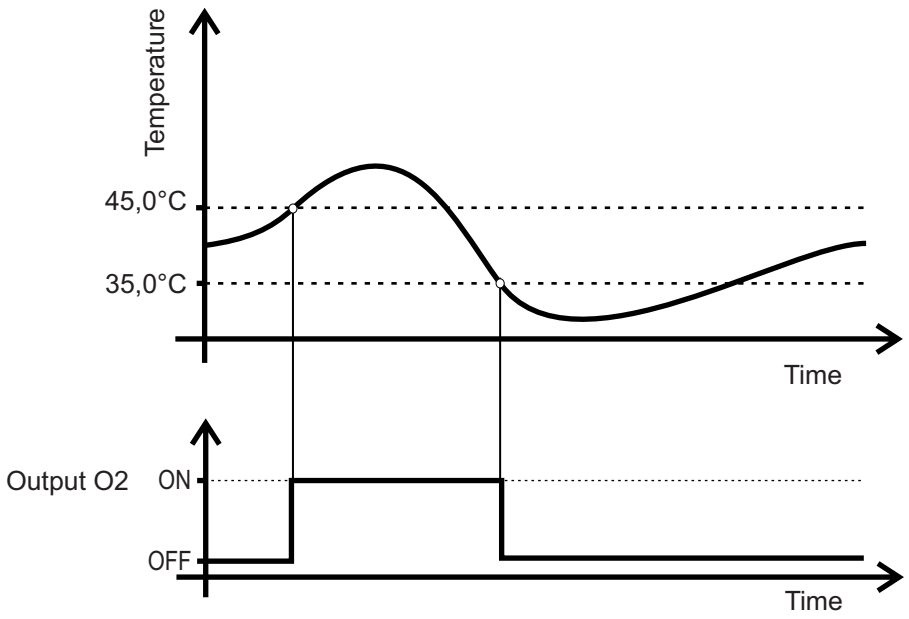
(1.3.6) AUX2: Operating mode = Cooling thermostat

(1.3.7) AUX2: Temperature Setpoint = 35°C

(1.3.8) AUX2: Hysteresis = 10,0°C

(1.3.11) AUX2: Reference sensor = S2

(1.3.12) AUX2: Associated output = O2



In this example, output O1 is activated above 45.0°C and is turned off when it reaches 35.0°C

17.2.4 Heating thermostat with scheduling and Cooling thermostat with scheduling operating modes:

In these two modes, the thermostat only operates within the times established in events linked to the Auxiliary.

Example:
(1.3.1) AUX1: Operating mode = Cooling thermostat

(1.3.2) AUX1: Setpoint of temperature = 25°C

(1.3.3) AUX1: Hysteresis = 10,0°C

(1.3.5) AUX1: Reference sensor = S1

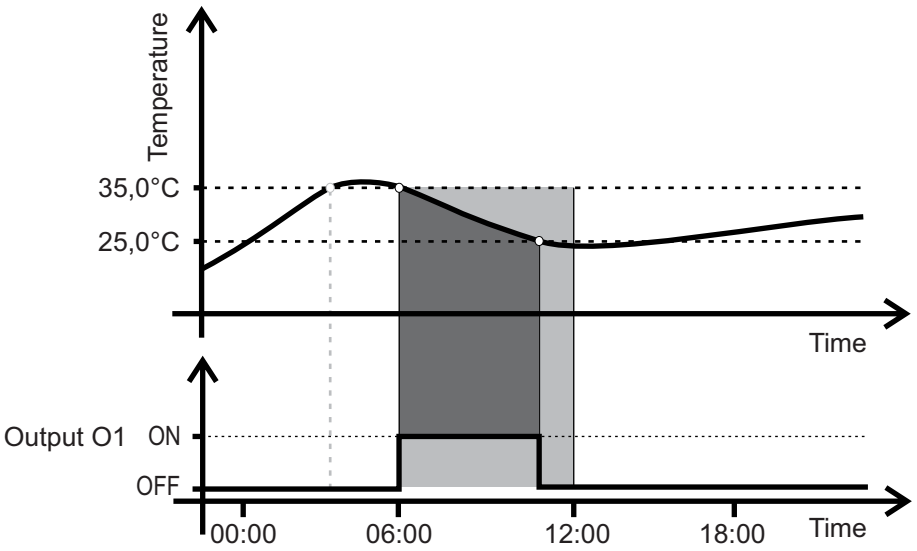
(1.3.6) AUX1: Associated output = O1

(1.4.1) Event 1: Start time = 06:00

(1.4.2) Event 1: End time = 12:00

(1.4.3) Event 1: Days of the week = _TWTFS_

(1.4.4) Event 1: Link = Auxiliaries: 1,0,0,0



Legend:
Output activated
Time at which the output can be activated

In this example, output O1 is activated only during the programmed time window, regardless of the temperature reaching 35.0°C.

17.2.5 Manual Only and Manual Only -NC Operation Mode:

The Manual Only mode allows the output to be activated only through the Manual option in the Auxiliary Mode Control. In this case, the output remains activated for the duration configured in the Manual Time function. In the Manual Only - NC mode, the normal state of the output is ON, and it is turned OFF when the Manual option is selected in the Auxiliary Mode Control. In this case, the output remains OFF for the duration configured in the Manual Time function.

17.2.6 Control of the Auxiliary mode:

Each Auxiliary can be turned on or off via the Control Menu or digital input.

In the Control Menu, item 6, it is possible to select the Auxiliary mode. When set to "Off", the Auxiliary Control Output remains inactive regardless of schedule or sensor temperature. On the other hand, in the "Automatic" option, the auxiliary operates according to the predefined configuration.

However, in Manual mode, the behavior varies depending on the operating mode. In **Always on mode**, the output is activated according to the time configured in **Manual activation time.**

In modes **Heating thermostat** and **Cooling thermostat**, with or without scheduling, during the period configured in **Activation by schedule**, the output is controlled by the sensor temperature.

After the time in manual mode has elapsed, the Auxiliary mode returns to the previous selection, off or automatic.

17.3 Events:

MULTIPOWER allows the use of up to 8 configurable events where it is possible to program the performance of one or more auxiliaries according to the time schedule.

Example:
(1.4.1) Event 1: Start time = 10:00

(1.4.2) Event 1: End time = 19:00

(1.4.3) Event 1: Days of the week = _TWTFS_

(1.4.4) Event 1: Link = Auxiliaries: 1,0,3,0

In this case, auxiliaries 1 and 3 are in operation from Monday to Friday from 10:00 at 19:00.

For hourly schedules that start on one day and end on the next, you must schedule 2 events, one for each day.

Example:
(1.4.1) Event 1: Start time = 20:00

(1.4.2) Event 1: End time = 23:59

(1.4.3) Event 1: Days of the week = _____S

(1.4.4) Event 1: Link = 0,2,0,0

(1.4.5) Event 2: Start time = 00:00

(1.4.6) Event 2: End time = 06:00

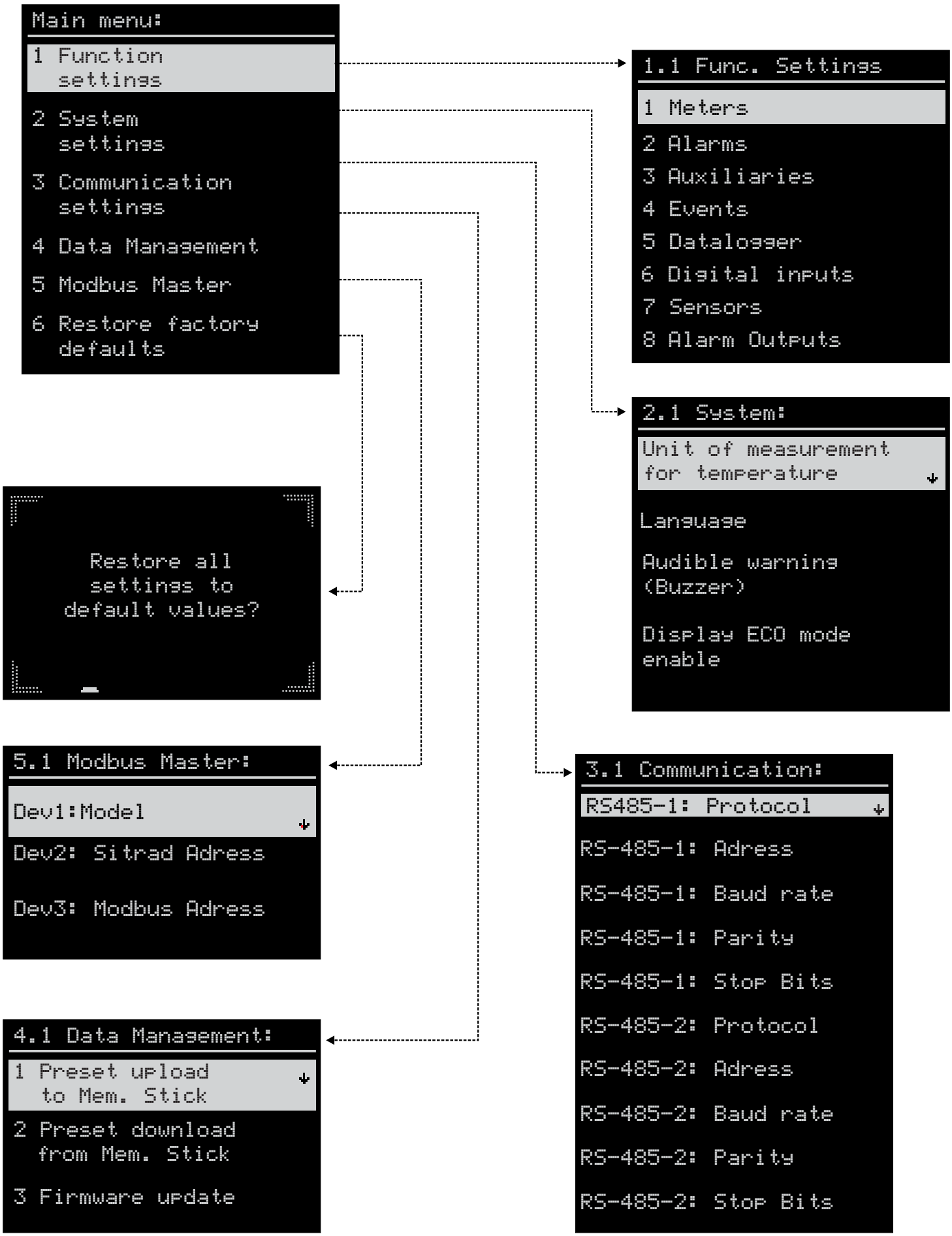
(1.4.7) Event 2: Days of the week = S_____

1.4.8 Event 2: Link = Auxiliaries: 0,2,0,0

In this case, auxiliary 2 goes into operation on Saturday at 20:00 until Sunday at 6:00.

18. MAIN MENU

To access the Main Menu, press the key and keep it pressed for at least 2 seconds.



19. PARAMETER TABLE

19.1 Settings :

In this option it is possible to change parameter values, according to the **MULTIPOWER** application.

19.1.1 Meters:

Parameters relating to the configuration of meters M1 and M2.

Function	Description	Minimun	Maximun	Standard	Unit
1.1.1	M1: Operation mode	0	4	0	-
1.1.2	M1: CT 1 primary	5	3000	200	A
1.1.3	M1: CT 2 primary	5	3000	200	A
1.1.4	M1: CT 3 primary	5	3000	200	A
1.1.5	M1: Range for demand calculation	0 [Off]	60	15	Minutes
1.1.6	M1: Minimum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.7	M1: Maximum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.8	M1: Voltage alarm validation time	0 [Off]	9999	5	seconds
1.1.9	M1: Maximum phase 1 current limit	0 [Off]	3000	0 [Off]	A
1.1.10	M1: Maximum phase 2 current limit	0 [Off]	3000	0 [Off]	A
1.1.11	M1: Maximum phase 3 current limit	0 [Off]	3000	0 [Off]	A
1.1.12	M1: Current alarm validation time	0 [Off]	9999	5	seconds
1.1.13	M1: Active power consumption demand limit	0 [Off]	4500	0 [Off]	kW
1.1.14	M1: Time to validate demand alarm	0 [Off]	9999	300	seconds
1.1.15	M1: Phase sequence error enable	No	Yes	Yes	-
1.1.16	M1: Lower limit for inductive power factor	0 [Off]	1,00	0 [Off]	-
1.1.17	M1: Maximum inductive power factor limit	0 [Off]	1,00	0 [Off]	-
1.1.18	M1: Minimum current to enable power factor alarms	0	3000	5	A
1.1.19	M1: Time to validate power factor alarms	0 [Off]	9999	5	seconds
1.1.20	M1: Alarm inhibition delay	0 [Off]	9999	60	secends
1.1.21	M1: Voltage angular asymmetry sensitivity	0 [Off]	100	80	-
1.1.22	M1: Voltage angular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.23	M1: Voltage modular asymmetry sensitivity	0 [Off]	100	80	-
1.1.24	M1: Voltage modular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.25	M1: Current modular asymmetry sensitivity	0 [Off]	100	0 [Off]	-
1.1.26	M1: Current modular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.27	M1: Minimum frequency limit	34 [Off]	100	34 [Off]	Hz
1.1.28	M1: Maximum frequency limit	34 [Off]	100	34 [Off]	Hz
1.1.29	M1: Frequency alarm validation time	0 [Off]	9999	5	seconds
1.1.30	M2: Operation mode	0	4	0	-
1.1.31	M2: CT 1 primary	5	3000	200	A
1.1.32	M2: CT 2 primary	5	3000	200	A
1.1.33	M2: CT 3 primary	5	3000	200	A
1.1.34	M2: Range for demand calculation	0 [Off]	60	15	Minutes
1.1.35	M2: Minimum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.36	M2: Maximum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.37	M2: Voltage alarm validation time	0 [Off]	9999	5	seconds
1.1.38	M2: Maximum phase 1 current limit	0 [Off]	3000	0 [Off]	A
1.1.39	M2: Maximum phase 2 current limit	0 [Off]	3000	0 [Off]	A
1.1.40	M2: Maximum phase 3 current limit	0 [Off]	3000	0 [Off]	A
1.1.41	M2: Current alarm validation time	0 [Off]	9999	5	seconds
1.1.42	M2: Active power demand limit	0 [Off]	4500	0 [Off]	kW
1.1.43	M3: Active power consumption demand limit	0 [Off]	1 [On]	0 [Off]	-
1.1.44	M2: Phase sequence error enable	No	Yes	Yes	-
1.1.45	M2: Minimum inductive power factor limit	0 [Off]	1,00	0 [Off]	-
1.1.46	M2: Maximum inductive power factor limit	0 [Off]	1,00	0 [Off]	-

19. PARAMETER TABLE

Function	Description	Minimun	Maximun	Standard	Unit
1.1.47	M2: Minimum current to enable power factor alarms	0	3000	5	A
1.1.48	M2: Power factor alarm validation time	0 [Off]	9999	5	seconds
1.1.49	M2: Alarm inhibition delay	0 [Off]	9999	60	seconds
1.1.50	M2: Voltage angular asymmetry sensitivity	0 [Off]	100	80	-
1.1.51	M2: Voltage angular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.52	M2: Voltage modular asymmetry sensitivity	0 [Off]	100	80	-
1.1.53	M2: Voltage modular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.54	M2: Current modular asymmetry sensitivity	0 [Off]	100	0 [Off]	-
1.1.55	M2: Current modular asymmetry validation time	0 [Off]	9999	5	seconds
1.1.56	M2: Minimum frequency limit	34 [Off]	100	34 [Off]	Hz
1.1.57	M2: Maximum frequency limit	34 [Off]	100	34 [Off]	Hz
1.1.58	M2: Frequency alarm validation time	0 [Off]	9999	5	seconds

1.1.1 and 1.1.30 M1 and M2: Operating mode:

Allows you to configure the meter for different operating modes. In single-phase mode, only phase 1 voltage and current are considered.
In two-phase mode, the voltages, and currents of phases 1 and 2 are taken into account. In three-phase mode, the voltages, and currents of the three phases are considered, forming a single three-phase circuit. In this mode, the powers, demands, and total consumption represent the total value of the three-phase circuit.
There is also balanced three-phase mode, where the voltages and currents of the three phases are considered, and each phase represents a distinct three-phase circuit. The power, demand and consumption quantities measured in each phase are multiplied by 3.

0 = Disabled
1 = 1F + N Single-phase
2 = 2F + N Two-phase
3 = 3F + N Unbalanced
4 = 3F + N Balanced

1.1.2 and 1.1.31 M1 and M2: CT 1 primary:

Allows you to configure the type of current transformer to be used. Select the current that in the primary of the current transformer will generate a 5A current in the secondary.

Note: In single-phase, two-phase and three-phase operating modes, TC1 must be configured.

1.1.3 and 1.1.32 M1 and M2: CT 2 primary:

Allows you to configure the type of current transformer to be used. Select the current that in the primary of the current transformer will generate a 5A current in the secondary

Note: TC2 must only be set in balanced three-phase mode.

1.1.4 and 1.1.33 M1 and M2: TC3 primary:

Allows you to configure the type of current transformer to be used. Select the current that in the primary of the current transformer will generate a 5A current in the secondary
.

Note: TC3 must only be set in balanced three-phase mode.

1.1.5 and 1.1.34 M1 and M2: Range for demand calculation:

Allows configuring the integration time of the demand accumulator.
The demand is calculated through the average of the sum of active powers during the specified time period, and the values are updated at the end of each period.

1.1.6 and 1.1.35 M1 and M2: Minimum phase voltage limit:

Voltage value below which the low voltage alarm is triggered. It must be configured based on the phase voltage (between phase and neutral).

Example:
In a 380V three-phase circuit (line-to-line voltage), a low voltage alarm is required when the voltage drops below 10% of the nominal value.
First, convert the line voltage to the phase voltage, then apply the desired limit:
380V / $\sqrt{3}$ = 220V. 220V * (1–0.10) = 198V

19. PARAMETER TABLE

1.1.7 and 1.1.36 M1 and M2: Maximum phase voltage limit:
Voltage value above which the high voltage alarm is triggered. It must be configured based on the phase voltage (between phase and neutral).

Example:
In a 380V three-phase circuit (line-to-line voltage), a high voltage alarm is required when the voltage exceeds 10% of the nominal value.
First, convert the line voltage to the phase voltage, then apply the desired limit:
380V / √3 = 220V. 220V * (1+0.10) = 242V

1.1.8 and 1.1.37 M1 and M2: Voltage alarm validation time:
Time elapsed between the moment the meter detects a voltage-related alarm condition and its indication.

1.1.9 and 1.1.38 M1 and M2:Maximum phase 1 current limit:
Current value above which the phase 1 high current alarm is triggered.

1.1.10 and 1.1.39 M1 and M2: Maximum phase 2 current limit:
Current value above which the phase 2 high current alarm is triggered.

1.1.11 and 1.1.40 M1 and M2:Maximum phase 3 current limit:
Current value above which the phase 3 high current alarm is triggered.

1.1.12 and 1.1.41 M1 and M2: Current alarm validation time:
Time elapsed between the moment the meter detects a current-related alarm condition and its indication.

1.1.13 and 1.1.42 M1 and M2: Active power consumption demand limit:
Total active demand value above which the high demand alarm is triggered.
Remarks: Module (both positive and negative)

1.1.14 and 1.1.43 M1 and M2: Demand alarm validation time:
Time elapsed between the moment the meter detects a demand-related alarm condition and its indication.

1.1.15 and 1.1.44 M1 and M2: Phase sequence error enable:
Allows you to activate the phase sequence alarm indication. Available in Three-Phase and Three-Phase Balanced modes.

1.1.16 and 1.1.45 M1 and M2: Minimum inductive power factor limit:
Inductive power factor value below which the alarm is triggered.

1.1.17 and 1.1.46 M1 and M2: Maximum inductive power factor limit:
Inductive power factor value above which the alarm is triggered. This alarm is also triggered for any capacitive power factor value.

1.1.18 and 1.1.47 M1 and M2: Minimum current value to enable power factor alarms:
Measured current value above which inductive power factor alarms are enabled. Setting a current threshold ensures that alarms only occur under relevant load conditions. The low or high total power factor alarm only occurs if the current in all phases exceeds the configured limit.

1.1.19 and 1.1.48 M1 and M2: Power factor alarm validation time:
Time elapsed between the moment the meter detects a power factor alarm condition and its indication.

1.1.20 and 1.1.49 M1 and M2: Alarm inhibition delay:
Period of time after meter energization in which alarm events are taken into account.

1.1.21 and 1.1.50 M1 and M2: Voltage angular asymmetry sensitivity:
Defines how sensitively the meter detects angular asymmetry between phases. The higher the value of this parameter, the lower the tolerance for error.
The equation for determining the alarm detection limits is presented in Chapter 15 – Angular/Modular Asymmetry Alarm Detection. It is important to note that the limits for detecting angular asymmetry errors are given by “average of phase shifts + tolerance” and “average of phase shifts - tolerance”. Therefore, the alarm detection limit depends on the current values of each measured phase.

For example, considering the phase shift between two voltage phases in a three-phase system is ±120°, and the total sum of phase shifts is 360°, if this function is set to 80, we have:

-Upper limit: The alarm will be triggered when the angular phase shift exceeds 144°.
-Lower limit: The alarm will be triggered when the angular phase shift is less than 96°.

1.1.22 and 1.1.51 M1 and M2: Voltage angular asymmetry validation time:
Time elapsed between the moment the meter detects an angular asymmetry alarm condition and its indication.

1.1.23 and 1.1.52 M1 and M2: Voltage modular asymmetry sensitivity:
Defines how sensitively the meter detects modular asymmetry between phases. The higher the value of this parameter, the more easily the controller detects the error.
The equation for determining the alarm detection limits is presented in Chapter 15 – Angular/Modular Asymmetry Alarm Detection. It is important to note that the limits for detecting modular asymmetry errors are given by “average of voltages + tolerance” and “average of voltages - tolerance”. Thus, the alarm detection limit depends on the current values of each measured phase.

For example, if the function is set to 80 and the voltages of phases 1 and 2 are equal to 220 VRMS:
- Upper limit: The alarm will be triggered when the voltage of phase T exceeds 293 VRMS, as it will be higher than the average of the measured values (244 VRMS) plus the calculated tolerance (48 VRMS).
- Lower limit: The alarm will be triggered when the voltage of phase T is below 159 VRMS, as it will be lower than the average of the measured values (199 VRMS) minus the calculated tolerance (39 VRMS).

Example 1:
If the maximum allowed asymmetry specification of the circuit is 2%, the sensitivity value must be set to 98. That is, a sensitivity of 98 corresponds to 2% asymmetry.

1.1.24 and 1.1.53 M1 and M2: Time to validate voltage modular asymmetry:
Elapsed time between the moment the meter identified a voltage modular asymmetry alarm condition and its indication.

1.1.25 and 1.1.54 M1 and M2: Current modular asymmetry sensitivity:
Allows configuring the sensitivity with which the meter detects the asymmetry in current values between phases.

Example 1:
If the maximum allowable asymmetry specification of the circuit is 10%, set the sensitivity value to 90. In other words, a sensitivity of 90 corresponds to 10% asymmetry.

1.1.26 and 1.1.55 M1 and M2: Time to validate current modular asymmetry:
Elapsed time between the moment the meter identified a current modular asymmetry alarm condition and its indication.

1.1.27 and 1.1.56 M1 and M2: Minimum frequency limit:
Frequency value below which the low frequency alarm is triggered.

1.1.28 and 1.1.57 M1 and M2: Maximum frequency limit:
Frequency value above which the high frequency alarm is triggered.

1.1.29 and 1.1.58 M1 and M2: Frequency alarm validation time:
Time elapsed between the moment the meter identified an out-of-band frequency alarm condition and its indication.

19. PARAMETER TABLE

19.1.2 Alarms:

Parameters relating to alarm settings.

Function	Description	Minimum	Maximum	Standard	Unit
1.2.1	AL1: Low temperature	-50,1 [Off] (-58,2)	200,0 (392,0)	-50,1 [Off] (-58,2)	°C(°F)
1.2.2	AL1: High temperature	-50,1 [Off] (-58,2)	200,0 (392,0)	-50,1 [Off] (-58,2)	°C(°F)
1.2.3	AL1: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.2.4	AL1: Time to validate alarms	0 [Off]	9999	5	Seconds
1.2.5	AL1: Alarm inhibition time	0 [Off]	9999	60	Seconds
1.2.6	AL1: Link	-	-	0	-
1.2.7	AL1: Temperature sensor	NC	S2	NC	-
1.2.8	AL1: Digital output	NC	04	NC	-
1.2.9	AL2: Low temperature	-50,1 [Off] (-58,2)	200,0 (392,0)	-50,1 [Off] (-58,2)	°C(°F)
1.2.10	AL2: High temperature	-50,1 [Off] (-58,2)	200,0 (392,0)	-50,1 [Off] (-58,2)	°C(°F)
1.2.11	AL2: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.2.12	AL2: Time to validate alarms	0 [Off]	9999	5	Seconds
1.2.13	AL2: Alarm inhibition time	0 [Off]	9999	60	Seconds
1.2.14	AL2: Link	-	-	0	-
1.2.15	AL2: Temperature sensor	NC	S2	NC	
1.2.16	AL2: Digital output	NC	04	NC	-

1.2.1 and 1.2.9 AL1 and AL2: Low temperature:
Temperature value below which the low temperature alarm is triggered

1.2.2 and 1.2.10 AL1 and AL2: High temperature:
Temperature value above which the high temperature alarm is triggered.

1.2.3 and 1.2.11 AL1 and AL2: Hysteresis:
Allows you to configure the difference between the measured temperature and the alarm value to exit the alarm condition.

1.2.4 and 1.2.12 AL1 and AL2: Time to validate alarm:
Time elapsed between the moment the meter identified a temperature alarm condition and its indication.

1.2.5 and 1.2.13 AL1 and AL2: Alarm inhibition time:
Period of time after meter energization in which alarm events are taken into account.

1.2.6 and 1.2.14 AL1 and AL2: Link:
Allows you to select which Auxiliaries are associated with the event, that is, which auxiliary logics will have their output turned off in the event of a temperature alarm.
To configure this function, you must select in the same line which auxiliaries are linked to the Alarm. You must navigate using the or keys until the representation matches the desired configuration. The value "0" indicates that the auxiliary is not linked, while the values "1", "2", "3" and "4" indicate the link between the alarm and the respective auxiliary.

Ex1:
1.2.6 AL1: Link =Auxiliary: 1.2.3.4
In this case, Auxiliaries 1, 2, 3 and 4 are linked to the occurrence of Alarm 1.

Ex2:
1.2.14 AL2: Link =Auxiliary: 1.2.0.0
In this case, only Auxiliaries 1 and 2 are linked to the occurrence of Alarm 2.

1.2.7 and 1.2.15 AL1 and AL2: Temperature sensor:
Allows you to configure which temperature sensor is used as a reference for temperature alarms.

0 = Not configured
1 = S1
2 = S2

1.2.8 and 1.2.16 AL1 and AL2: Digital output:
Allows you to configure which output is activated during the alarm.

0 = Not configured
1 = O1
2 = O2
3 = O3
4 = O4

19.1.3 Auxiliaries:
Parameters relating to auxiliary output configurations.

Function	Description	Minimum	Maximum	Standard	Unit
1.3.1	AUX1: Operating mode	0	6	0	-
1.3.2	AUX1: Temperature setpoint	-50,0 (-58,0)	200,0 (392,2)	50,0 (122,0)	°C(°F)
1.3.3	AUX1: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.3.4	AUX1: Manual activation time	0	9999	180	minutes
1.3.5	AUX1: Temperature sensor	NC	S2	NC	-
1.3.6	AUX1: Digital output	NC	S2	NC	-
1.3.7	AUX2: Operating mode	0	6	0	-
1.3.8	AUX2: Temperature setpoint	-50,0 (-58,0)	200,0 (392,2)	50,0 (122,0)	°C(°F)
1.3.9	AUX2: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.3.10	AUX2: Manual activation time	0	9999	180	minutes
1.3.11	AUX2: Temperature sensor	NC	S2	NC	-
1.3.12	AUX2: Digital output	NC	S2	NC	-
1.3.13	AUX3: Operating mode	0	6	0	-
1.3.14	AUX3: Temperature setpoint	-50,0 (-58,0)	200,0 (392,2)	50,0 (122,0)	°C(°F)
1.3.15	AUX3: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.3.16	AUX3: Manual time	0	9999	180	minutes
1.3.17	AUX3: Temperature sensor	NC	S2	NC	-
1.3.18	AUX3: Digital output	NC	S2	NC	-
1.3.19	AUX4: Operating mode	0	6	0	-
1.3.20	AUX4: Temperature setpoint	-50,0 (-58,0)	200,0 (392,2)	50,0 (122,0)	°C(°F)
1.3.21	AUX4: Hysteresis	0,1 (0,2)	200,0 (360,0)	2,0 (3,6)	°C(°F)
1.3.22	AUX4: Manual time	0	9999	180	minutes
1.3.23	AUX4: Temperature sensor	NC	S2	NC	-
1.3.24	AUX4: Digital output	NC	S2	NC	-

1.3.1, 1.3.7, 1.3.13 and 1.3.19 AUX1, AUX2, AUX3 and AUX4: Operating mode:
Defines the auxiliary operating mode.

0 = Always off
1 = Always on
2 = Heating thermostat
3 = Cooling thermostat
4 = Heating thermostat with scheduling
5 = Cooling thermostat with scheduling
6 = Manual only -NC

1.3.2, 1.3.8, 1.3.14 and 1.3.20 AUX1, AUX2, AUX3 and AUX4: Temperature setpoint:
Sets the desired control temperature for the auxiliary.

1.3.3, 1.3.9 , 1.3.15 and 1.3.21 AUX1, AUX2, AUX3 and AUX4: Hysteresis:
Temperature difference to turn on the auxiliary output. Using this function, you can define a temperature range within which the output remains on or off. For example: if the auxiliary is configured for heating, the setpoint set at 45°C and a hysteresis of 1°C, the auxiliary output will be turned off when the temperature reaches 45°C and will turn on again when it drops below 44ºC.

1.3.4, 1.3.10, 1.3.16 and 1.3.22 AUX1, AUX2, AUX3 and AUX4: Manual activation time:
Used when the user wants to eventually activate the auxiliary output outside the scheduled times in the event schedule. During this time, the auxiliary output is controlled according to its operating mode, for example, linked to the temperature if the thermostat is configured as HOT (heating thermostat) or REF (cooling thermostat). From manual activation, after the time programmed in this parameter has elapsed, the auxiliary mode returns to AUT (automatic) mode.

1.3.5, 1.3.11, 1.3.17 and 1.3.23 AUX1, AUX2, AUX3 and AUX4: Temperature sensor:
Allows you to select the temperature sensor used in the auxiliary control.

0= Not configured
1= S1
2= S2

1.3.6, 1.3.12, 1.3.18 and 1.3.24 AUX1, AUX2, AUX3 and AUX4: Digital output:
Allows you to select the output used in auxiliary control.

0= Not configured
1= O1
2= O2
3= O3
4= O4

19.1.4 Events:
Parameters relating to event configuration:

Function	Description	Minimum	Maximum	Standard	Unit
1.4.1	Event 1: Init time	00:00	23:59	12:00	hh:mm
1.4.2	Event 1: End time	00:00	23:59	12:00	hh:mm
1.4.3	Event 1: Days of the week	-	-	0	-
1.4.4	Event 1: Link	-	-	0	-
1.4.5	Event 2: Init time	00:00	23:59	12:00	hh:mm
1.4.6	Event 2: End time	00:00	23:59	12:00	hh:mm
1.4.7	Event 2: Days of the week	-	-	0	-
1.4.8	Event 2: Link	-	-	0	-
1.4.9	Event 3: Init time	00:00	23:59	12:00	hh:mm
1.4.10	Event 3: End time	00:00	23:59	12:00	hh:mm
1.4.11	Event 3: Days of the week	-	-	0	-
1.4.12	Event 3: Link	-	-	0	-
1.4.13	Event 4: Init time	00:00	23:59	12:00	hh:mm
1.4.14	Event 4: End time	00:00	23:59	12:00	hh:mm
1.4.15	Event 4: Days of the week	-	-	0	-
1.4.16	Event 4: Link	-	-	0	-
1.4.17	Event 5: Init time	00:00	23:59	12:00	hh:mm
1.4.18	Event 5: End time	00:00	23:59	12:00	hh:mm
1.4.19	Event 5: Days of the week	-	-	0	-
1.4.20	Event 5: Link	-	-	0	-
1.4.21	Event 6: Init time	00:00	23:59	12:00	hh:mm
1.4.22	Event 6: End time	00:00	23:59	12:00	hh:mm
1.4.23	Event 6: Days of the week	-	-	0	-
1.4.24	Event 6: Link	-	-	0	-
1.4.25	Event 7: Init time	00:00	23:59	12:00	hh:mm
1.4.26	Event 7: End time	00:00	23:59	12:00	hh:mm
1.4.27	Event 7: Days of the week	-	-	0	-
1.4.28	Event 7: Link	-	-	0	-
1.4.29	Event 8: Init time	00:00	23:59	12:00	hh:mm
1.4.30	Event 8: End time	00:00	23:59	12:00	hh:mm
1.4.31	Event 8: Days of the week	-	-	0	-
1.4.32	Event 8: Link	-	-	0	-

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1.4.1, 1.4.5, 1.4.9, 1.4.13, 1.4.17, 1.4.21, 1.4.25 and 1.4.29 Event X: Init time:
Sets the start time for the event.

1.4.2, 1.4.6, 1.4.10, 1.4.14, 1.4.18, 1.4.22, 1.4.26 and 1.4.30 Event X: End time:
Defines the event end time.

1.4.3, 1.4.7, 1.4.11, 1.4.15, 1.4.19, 1.4.23, 1.4.27 and 1.4.31 Event X: Days of the week:
Allows you to select which days of the week are configured for the event to occur.

To configure this function, you must select on the same line which days of the week the event is repeated. You must navigate using the ↑ or ↓ keys until the representation matches the desired configuration. The days of the week are represented by their initials, starting with Sunday.

Example 1:
1.4.1 Event 1: Days of the week = STWTFSS
In this case, event 1 repeats every day

Example 2:
1.4.7 Event 2: Days of the week = _TW_FS_
In this case, event 2 is repeated on Mondays, Tuesdays, Thursdays, and Fridays.

1.4.4, 1.4.8, 1.4.12, 1.4.16, 1.4.20, 1.4.24, 1.4.28 and 1.4.32 Event X: Link:
Allows you to select which Auxiliaries are associated with the event.

To configure this function, you must select in the same line which auxiliaries are linked to the Event. You must navigate using the ↑ or ↓ keys until the representation matches the desired configuration. The value "0" indicates that the auxiliary is not linked, while the values "1", "2", "3" and "4" indicate the link between the Event and the respective auxiliary.

Example 1:
1.4.4 Event 1: Link = Auxiliary: 1.2.3.4
In this case, Auxiliaries 1, 2, 3 and 4 are linked to the time schedule of event 1.

Example 2:
1.4.8 Event 2: Link = Auxiliary: 1.0.3.0
In this case, only Auxiliaries 1 and 3 are linked to the time schedule for event 2.

19. PARAMETER TABLE

19.1.5 DATALOGGER:

Parameters relating to datalogger configurations.

Function	Description	Minimum	Maximum	Standard	Unit
1.5.1	Operating mode	0	2	1	-
1.5.2	Enables meter logging	0	2	0	-
1.5.3	Sampling period	10	9999	300	sec
1.5.4	Voltage variation to force data logging	3	201/Off	201/Off	Volt
1.5.5	Current variation to force data logging	1	1001/Off	1001/Off	Amperes
1.5.6	Force registration in case of alarm	0 [No]	1 [Yes]	1 [Yes]	-
1.5.7	Overwrite data when memory full?	0 [No]	1 [Yes]	1 [Yes]	-

1.5.1 Operating mode:

Allows you to choose between the following datalogger operating modes

0= Always off
1= Always on
2= Manual operation

1.5.2 Enables meter logging:

Allows you to select which meters will have their data recorded.

0= Meter 1 only
1= Meter 2 only
2= Meter 1 and 2

1.5.3 Sampling period:

Allows you to configure the time interval in which records are stored.

1.5.4 Voltage variation to force data logging:

Voltage difference in any of the monitored phases that causes the meter to force data logging in the datalogger, regardless of the sampling interval.

1.5.5 Current variation to force data logging:

Current difference in any of the monitored phases that causes the meter to force data logging in the datalogger, regardless of the sampling interval.

1.5.6 Force registration in case of alarm:

Allows you to force a data record in the event of an alarm, regardless of the configured sampling period.

1.5.7 Overwrite data when memory full?

Indicates whether the controller should start writing new data to the beginning of the datalogger memory when it is full. This avoids losing the last data outputted by the equipment. If set to zero, when memory is full, the **MULTIPOWER** indicates memory full.

19.1.6 Digital inputs:

Parameters relating to digital input configurations.

Function	Description	Minimum	Maximum	Standard	Unit
1.6.1	Input 1: Input function	0	6	0	0
1.6.2	Input 1: Type of contact	0	1	0	-
1.6.3	Input 2: Input function	0	6	0	0
1.6.4	Input 2: Type of contact	0	1	0	-

1.6.1 and 1.6.3 Input 1 and Input 2, Input function:

Allows you to configure the digital input function.

0= Disabled: Input function not configured.
1=External alarm 1: Activation of the input triggers an alarm.
2=External alarm 2: Activation of the input triggers an alarm.
3= Aux.1 manual : Activating the input activates the manual mode of auxiliary 1
4= Aux.2 manual : Activating the input activates the manual mode of auxiliary 2
5= Aux.3 manual : Activating the input activates the manual mode of auxiliary 3
6= Aux.4 manual : Activating the input activates the manual mode of auxiliary 4

1.6.2 and 1.6.4 Input 1 and Input 2, Type of contact:

Allows you to configure whether the input is activated with logic level 0 or 1. If the input is configured as "NO" (Normally Open), it will be activated by a contact that is normally open. On the other hand, if it is configured as "NC" (Normally Closed), it will be activated by a contact that is normally closed.

0= NO
1= NC

19.1.7 Sensors:

Parameters relating to sensor offset settings.

Function	Description	Minimum	Maximum	Standard	Unit
1.7.1	S1: Offset	-50,0 (-58,0)	50,0 (122,0)	0,0 (32,0)	°C (°F)
1.7.2	S2: Offset	-50,0 (-58,0)	50,0 (122,0)	0,0 (32,0)	°C (°F)

1.7.1 and 1.7.2 S1 and S2 Offset:

Allows you to compensate for deviations in the temperature reading.

19. PARAMETER TABLE

19.1.8 Alarms Output:

Function	Description	Minimum	Maximum	Standard	Unit
1.8.1	AL1: Meter	0	2	0	-
1.8.2	AL1: Actuation by phase sequence alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.3	AL1: Operation triggered by voltage alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.4	AL1: Operation triggered by current alarms	0 [no]	1 [yes]	0 [no]	-
1.8.5	AL1: Operation triggered by frequency alarms	0 [no]	1 [yes]	0 [no]	-
1.8.6	AL1: Operation triggered by demand alarms	0 [no]	1 [yes]	0 [no]	-
1.8.7	AL1: Operation triggered by power factor alarms	0 [no]	1 [yes]	0 [no]	-
1.8.8	AL1: Operation triggered by external alarm	0 [no]	3	0	-
1.8.9	AL1: Delay to energize the meter	0 [no]	9999	5	sec.
1.8.10	AL1: Reset time	0	9999	180	sec.
1.8.11	AL1: Number of attempts	0 /Off	11/Always	11	-
1.8.12	AL1: Reset period	1	24	1	h
1.8.13	AL1: Digital output	0	4	0	-
1.8.14	AL1: Contact type NO - NC	0	1	-1	-
1.8.15	AL2: Meter	0	2	0	-
1.8.16	AL2: Actuation by phase sequence alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.17	AL2: Operation triggered by voltage alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.18	AL2: Operation triggered by current alarms	0 [no]	1 [yes]	0 [no]	-
1.8.19	AL2: Operation triggered by frequency alarms	0 [no]	1 [yes]	0 [no]	-
1.8.20	AL2: Operation triggered by demand alarms	0 [no]	1 [yes]	0 [no]	-
1.8.21	AL2: Operation triggered by power factor alarms	0 [no]	1 [yes]	0 [no]	-
1.8.22	AL2: Operation triggered by external alarm	0 [no]	3	0	-
1.8.23	AL2: Delay to energize the meter	0 [no]	9999	5	sec.
1.8.24	AL2: Reset time	0	9999	180	sec.
1.8.25	AL2: Number of attempts	0 /Off	11/Always	11	-
1.8.26	AL2: Reset period	1	24	1	h
1.8.27	AL2: Digital output	0	4	0	-
1.8.28	AL2: Contact type NO - NC	0	1	-1	-
1.8.29	AL3: Meter	0	2	0	-
1.8.30	AL3: Actuation by phase sequence alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.31	AL3: Operation triggered by voltage alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.32	AL3: Operation triggered by current alarms	0 [no]	1 [yes]	0 [no]	-
1.8.33	AL3: Operation triggered by frequency alarms	0 [no]	1 [yes]	0 [no]	-
1.8.34	AL3: Operation triggered by demand alarms	0 [no]	1 [yes]	0 [no]	-
1.8.35	AL3: Operation triggered by power factor alarms	0 [no]	1 [yes]	0 [no]	-
1.8.36	AL3: Operation triggered by external alarm	0 [no]	3	0	-
1.8.37	AL3: Delay to energize the meter	0 [no]	9999	5	sec.
1.8.38	AL3: Reset time	0	9999	180	sec.
1.8.39	AL3: Number of attempts	0 /Off	11/Always	11	-
1.8.40	AL3: Reset period	1	24	1	h
1.8.41	AL3: Digital output	0	4	0	-
1.8.42	AL3: Contact type NO - NC	0	1	-1	-
1.8.43	AL4: Meter	0	2	0	-
1.8.44	AL4: Actuation by phase sequence alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.45	AL4: Operation triggered by voltage alarms	0 [no]	1 [yes]	1 [yes]	-
1.8.46	AL4: Operation triggered by current alarms	0 [no]	1 [yes]	0 [no]	-
1.8.47	AL4: Operation triggered by frequency alarms	0 [no]	1 [yes]	0 [no]	-
1.8.48	AL4: Operation triggered by demand alarms	0 [no]	1 [yes]	0 [no]	-
1.8.49	AL4: Operation triggered by power factor alarms	0 [no]	1 [yes]	0 [no]	-
1.8.50	AL4: Operation triggered by external alarm	0 [no]	3	0	-
1.8.51	AL4: Delay to energize the meter	0 [no]	9999	5	sec.
1.8.52	AL4: Reset time	0	9999	180	sec.

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Function	Description	Minimum	Maximum	Standard	Unit
1.8.53	AL4: Number of attempts	0 /Off	11/Always	11	-
1.8.54	AL4: Reset period	1	24	1	h
1.8.55	AL4: Digital output	0	4	0	-
1.8.56	AL4: Contact type NO - NC	0	1	-1	-

1.8.1, 1.8.15, 1.8.29, and 1.8.43 AL1, AL2, AL3, and AL4: Meter:
Defines which meters activate the output in case of an alarm.

0 = Only Meter 1
1 = Only Meter 2
2 = Meter 1 and Meter 2

1.8.2, 1.8.16, 1.8.30, and 1.8.44 AL1, AL2, AL3, and AL4: Actuation by phase sequence alarms:
Determines whether the phase sequence alarm activates the output.

0 = No
1 = Yes

1.8.3, 1.8.17, 1.8.31, and 1.8.45 AL1, AL2, AL3, and AL4: Operation by voltage alarms:
Defines whether voltage-related alarms activate the output.
- Phase 1, 2, or 3 disconnected;
- Phase 1, 2, or 3 – Low voltage;
- Phase 1, 2, or 3 – High voltage;
- Voltage angular asymmetry;
- Voltage modular asymmetry.

0 = No
1 = Yes

1.8.4, 1.8.18, 1.8.32, and 1.8.46 AL1, AL2, AL3, and AL4: Operation by current alarms:
Defines whether current-related alarms activate the output.
- High current;
- Current modular asymmetry.

0 = No
1 = Yes

1.8.5, 1.8.19, 1.8.33 and 1.8.47 AL1, AL2, AL3, and AL4: Operation by frequency alarms:
Defines whether frequency-related alarms activate the output.
- Low frequency;
- High frequency.

0 = No
1 = Yes

1.8.6, 1.8.20, 1.8.34 and 1.8.48 AL1, AL2, AL3, and AL4: Operation by demand alarms:
Defines whether demand-related alarms activate the output.
Phase 1, 2, or 3 – High demand;
High total active demand.

0 = No
1 = Yes

1.8.7, 1.8.21, 1.8.35 and 1.8.49 AL1, AL2, AL3 e AL4: Operation by power factor alarms:
Defines whether power factor-related alarms activate the output.
- Phase 1, 2, or 3 – Low power factor;
- Phase 1, 2, or 3 – High power factor;
- Low total power factor;
- High total power factor.

0 = No
1 = Yes

1.8.8, 1.8.22, 1.8.36 and 1.8.50 AL1, AL2, AL3 and AL4: Operation by external alarm:
Defines whether external alarms via digital input activate the output.

0 = No
1 = External alarm 1
2 = External alarm 2
3 = External alarm 1 and 2

1.8.9, 1.8.23, 1.8.37 and 1.8.51 AL1, AL2, AL3 and AL4: Delay to energize the meter:
Time interval between the energizing of the meter and the switching of the output due to an alarm.

1.8.10, 1.8.24, 1.8.38 and 1.8.52 AL1, AL2, AL3 and AL4: Time to rearm:
Time interval between two consecutive automatic rearming attempts.

1.8.11, 1.8.25, 1.8.39 and 1.8.53 AL1, AL2, AL3 and AL4: Number of attempts:
Number of automatic rearming attempts performed within the Rearming Period (1.8.9).

1.8.12, 1.8.26, 1.8.40 and 1.8.54 AL1, AL2, AL3 and AL4: Rearming period:
This function allows setting the time period considered for the number of automatic rearming attempts (1.8.9). If all automatic rearming attempts have already been made within the time configured in this function and another failure occurs, the output will only return to operation with a manual rearming.

1.8.13, 1.8.27, 1.8.41 and 1.8.55 AL1, AL2, AL3 and AL4: Digital output:
Allows associating the digital output used as an alarm output.

1.8.14, 1.8.28, 1.8.42 and 1.8.56 AL1, AL2, AL3 and AL4: Contact type NO - NC:
Allows configuring whether the output remains ON or OFF during the alarm condition.

NO: The output remains OFF during normal operation and ON during an alarm condition.
NC: The output remains ON during normal operation and OFF during an alarm condition.

0 = NO
1 = NC

19. PARAMETER TABLE

19.2 System Settings:

Parameters relating to system configurations.

Function	Description	Minimum	Maximum	Standard	Unit
2.1	Unit of measurement for temperature	°C	°F	°C	-
2.2	Language	0 (Portuguese)	2 (Spanish)	0 (Portuguese)	-
2.3	Audible warning (Buzzer)	Yes	No	No	-
2.4	Display ECO mode enable	Yes	No	Yes	-

2.1 Unit of measurement for temperature:

Temperature measurement unit used by the controller: Celsius or Fahrenheit.

2.2 Language:

Controller Language:

0 = Portuguese
1 = English
2 = Spanish.

2.3 Audible warning (Buzzer):

Enables the audible warning function in case of alarm and controller feedback.

2.4 Display ECO mode enable:

Enable display sleep mode. After a period of 15 minutes, the display's brightness decreases, increasing its useful life and reducing power consumption.

Note: When ECO mode is active, a short press on any of the keys is enough to deactivate it.

19.3 Communication Setting:

MULTIPOWER has two independently configurable RS-485 communication ports for communication with Sitrad software or supervisors that use the Modbus protocol.

Function	Description	Minimum	Maximum	Standard	Unit
3.1	RS485 - 1: Protocol	Sitrad	Modbus Master	Modbus Master	-
3.2	RS485 - 1: Address	1	247	1	-
3.3	RS485 - 1: Baud rate	4800	115200	19200	-
3.4	RS485 - 1: Parity	0	2	0	-
3.5	RS485 - 1: Stop bits	1	2	1	-
3.6	RS485 - 2: Protocol	Sitrad	Modbus Master	Modbus Master	-
3.7	RS485 - 2: Address	1	247	1	-
3.8	RS485 - 2: Baud rate	4800	115200	19200	-
3.9	RS485 - 2: Parity	0	2	0	-
3.10	RS485 - 2: Stop bits	1	2	1	

3.1 and 3.6 RS-485-1 Protocol:

Allows configuring the communication protocol of the RS-485 port:

0 = Sitrad
1 = Modbus Slave
2 = Modbus Master

3.2 and 3.7 RS-485-1 Address:

Allows configuring the network address of the RS-485 port.

3.3 and 3.8 RS-485-1 Baud rate:

Communication data rates (Available only for the Modbus protocol).

0 = 4800
1 = 9600
2 = 19200
3 = 38400
4 = 57600
5 = 115200

3.4 and 3.9 RS-485-1 Parity:
Parity of the communication protocol. (Available only for the Modbus protocol).

0 = None
1 = Even
2 = Odd

3.5 and 3.10 RS-485-2 Stop Bits:
Number of stop bits. (Available only for the Modbus protocol).

19.4 Data management:
MULTIPOWER features a USB port for communication via USB flash drive, allowing preset management and controller firmware updates.
Access path: **Main Menu ⟶ Data management.**

4.1 Export preset to USB Flash Drive:
Copies the preset from the controller to the USB flash drive memory.
The file will be stored in the MULTIPOWER folder and will be named according to the following logic:

MODEL_AAMMDD_HHMMSS.rec, where:
MODEL = product model, AA = year, MM = month, DD = day, HH = hour, MM = minute, SS = second.

Example:
A preset exported on 08/02/2023 at 13:30:00 will be named MULTIPOWER_230802_133000.rec.

4.2 Import preset from USB Flash Drive:
Copies the preset from a USB flash drive to the controller memory.
MULTIPOWER searches for the preset inside the MULTIPOWER folder.
The preset name can have a maximum of 32 characters, including the extension (.rec).

4.3 Firmware update:
Allows updating the **MULTIPOWER** firmware. The file must be stored in the **MULTIPOWER** folder and its name may have a maximum of 42 characters, including the extension (.ffg).

19.5 Modbus Master Network:

After configuring the model, communication is carried out through the Sitrad Address of each device.

Function	Description	Minimum	Maximum	Standard	Unit
5.1	Dev 1: Model	0	2	0	-
5.2	Dev 1: Sitrad Address	33	247	33	-
5.3	Dev 1: Modbus Address	1	247	48	-
5.4	Dev 2: Model	0	2	0	-
5.5	Dev 2: Sitrad Address	33	247	33	-
5.6	Dev 2: Modbus Address	1	247	48	-
5.7	Dev 3: Model	0	2	0	-
5.8	Dev 3: Sitrad Address	33	247	33	-
5.9	Dev 3: Modbus Address	1	247	48	-
5.10	Dev 4: Model	0	2	0	-
5.11	Dev 4: Sitrad Address	33	247	33	-
5.12	Dev 4: Modbus Address	1	247	48	-
5.13	Dev 5: Model	0	2	0	-
5.14	Dev 5: Sitrad Address	33	247	33	-
5.15	Dev 5: Modbus Address	1	247	48	-
5.16	Dev 6: Model	0	2	0	-
5.17	Dev 6: Sitrad Address	33	247	33	-
5.18	Dev 6: Modbus Address	1	247	48	-
5.19	Dev 7: Model	0	2	0	-
5.20	Dev 7: Sitrad Address	33	247	33	-
5.21	Dev 7: Modbus Address	1	247	48	-
5.22	Dev 8: Model	0	2	0	-
5.23	Dev 8: Sitrad Address	33	247	33	-
5.24	Dev 8: Modbus Address	1	247	48	-
5.25	Dev 9: Model	0	2	0	-
5.26	Dev 9: Sitrad Address	33	247	33	-
5.27	Dev 9: Modbus Address	1	247	48	-
5.28	Dev 10: Model	0	2	0	-
5.29	Dev 10: Sitrad Address	33	247	33	-
5.30	Dev 10: Modbus Address	1	247	48	-

5.1, 5.4, 5.7, 5.10, 5.13, 5.16, 5.22, 5.25, 5.28, 5.19 **Model:**

0 = Not configured
1 = CMRC-01
2 = CMRC-02

5.2, 5.5, 5.8, 5.11, 5.14, 5.17, 5.20, 5.23, 5.26, 5.29 **Sitrad Adress:**
Instrument address on the network for communication with the Sitrad software.
Note: *In a network, there cannot be more than one instrument with the same address.*

5.3, 5.6, 5.9, 5.12, 5.15, 5.18, 5.21, 5.24, 5.27, 5.30 **Modbus Adress:**
Instrument address on the network for Modbus communication.
Note: *In a network, there cannot be more than one instrument with the same address.*

19.6 Restore factory settings:

Allows restoring all parameters to factory values.

20. ALARMS

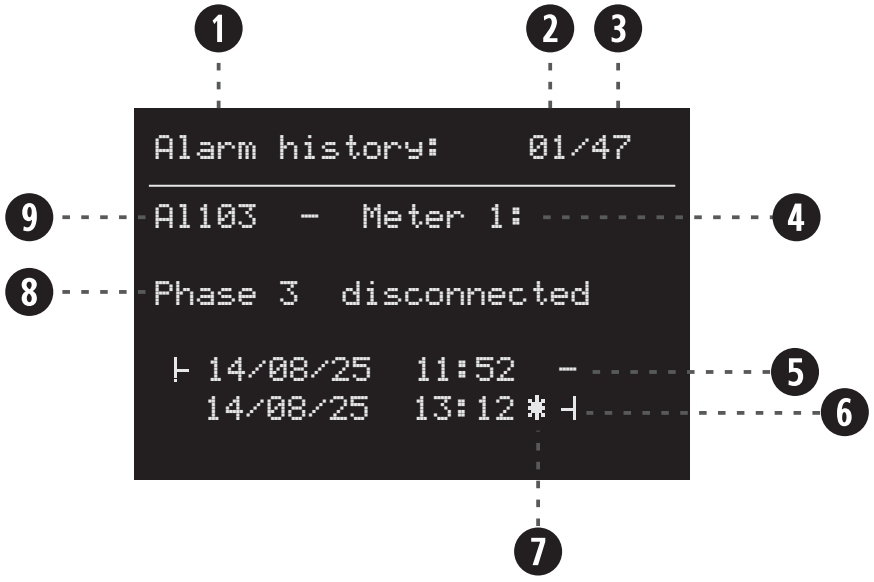
MULTIPOWER has an alarm management system. The alarm settings are linked to the electrical quantities of the meters and the values of the temperature sensors and digital inputs.
When an alarm occurs, an audible warning will be issued and will remain active until one of the following conditions occurs:

- The alarm condition no longer occurs, and the alarm is not in manual reset condition.
- The audible warning was inhibited (by pressing the key for 5 seconds)

If the audible warning function is not desired, it must be disabled in the **Main menu** → **System settings** → **Audible alarm (Buzzer)**.

20.1 Alarm views:

A touch of the key displays the active Alarms, a second touch displays the Alarm History screen. Up to 50 records are stored in each of these three lists, and you can navigate between the records using the or keys.
When the list is complete, new alarms overwrite older alarm records.
Each alarm record has information about the reason for the alarm, which Meter the event occurred in, the start time and the time the occurrence stopped.
To delete alarm records, you must be viewing the alarm history list and keep pressing the key for 3 seconds and confirm the request.



1 — Alarm list on display:
Active alarms: Alarms that are active, in alarm condition.
Alarm history: Records all alarms that are no longer active.

2 — Number of the list record being displayed.
Record 1 is always the most recent.

3 — In active alarms, indicates the number of alarms currently occurring.
In Alarm history, indicates the number of alarms recorded.

4 — Meter corresponding to the alarm.

5 — Date and time of the start of the alarm occurrence.

6 — Date and time of the end of the alarm occurrence.

7 — This marking indicates that the controller was de-energized while the alarm was active, and it is not possible to determine the exact time at which the alarm stopped occurring.
In this case, the time at which the controller was energized after this occurrence is displayed.

8 — Reason for the alarm.

9 — Alarm identifier code. See alarm table.

20. ALARMS

20.2 Alarm table:

Below are the alarm tables with the identified alarm code, the alarm description and the effect caused.

20.2.1 System alarms:

Alarm	Description	Effect
AL001	Clock not set	Indicative alarm
AL002	PPP	Blocking of control functions (Reset controller parameters)
AL003	ECAL	Blocking of control functions (Contact Full Gauge Controls)
AL004	Memory full	Indicative alarm
AL005	Registration paused due to settings change	Indicative alarm

20.2.2 Alarms Voltage and current corresponding to the meter M1:

Alarm	Description	Effect
AL101	M1 - Phase 1 disconnected	Indicative alarm
AL102	M1 - Phase 2 disconnected	Indicative alarm
AL103	M1 - Phase 3 disconnected	Indicative alarm
AL104	M1 - Phase 1 - Low voltage	Indicative alarm
AL105	M1 - Phase 2 - Low voltage	Indicative alarm
AL106	M1 - Phase 3 - Low voltage	Indicative alarm
AL107	M1 - Phase 1 - High voltage	Indicative alarm
AL108	M1 - Phase 2 - High voltage	Indicative alarm
AL109	M1 - Phase 3 - High voltage	Indicative alarm
AL110	M1 - Phase 1 - High current	Indicative alarm
AL111	M1 - Phase 2 - High current	Indicative alarm
AL112	M1 - Phase 3 - High current	Indicative alarm
AL113	M1 - Phase 1 - High active demand	Indicative alarm
AL114	M1 - Phase 2 - High active demand	Indicative alarm
AL115	M1 - Phase 3 - High active demand	Indicative alarm
AL116	M1 - High total active demand	Indicative alarm
AL117	M1 - Incorrect phase sequence	Indicative alarm
AL118	M1 - Angular asymmetry	Indicative alarm
AL119	M1 - Modular asymmetry	Indicative alarm
AL120	M1 - Low frequency	Indicative alarm
AL121	M1 - High frequency	Indicative alarm
AL122	M1 - Current angular asymmetry	Indicative alarm
AL123	M1 - Low power factor	Indicative alarm
AL124	M1 - High power factor	Indicative alarm

20.2.3 Alarms Voltage and current corresponding to the meter M2:

Alarm	Description	Effect
AL201	M2 - Phase 1 disconnected	Indicative alarm
AL202	M2 - Phase 2 disconnected	Indicative alarm
AL203	M2 - Phase 3 disconnected	Indicative alarm
AL204	M2 - Phase 1 - Low voltage	Indicative alarm
AL205	M2 - Phase 2 - Low voltage	Indicative alarm
AL206	M2 - Phase 3 - Low voltage	Indicative alarm
AL207	M2 - Phase 1 - High voltage	Indicative alarm
AL208	M2 - Phase 2 - High voltage	Indicative alarm
AL209	M2 - Phase 3 - High voltage	Indicative alarm
AL210	M2 - Phase 1 - High current	Indicative alarm
AL211	M2 - Phase 2 - High current	Indicative alarm

20. ALARMS

Alarm	Description	Effect
AL212	M2 - Phase 3 - High current	Indicative alarm
AL213	M2 - Phase 1 - High active demand alarm	Indicative alarm
AL214	M2 - Phase 2 - High active demand alarm	Indicative alarm
AL215	M2 - Phase 3 - High active demand alarm	Indicative alarm
AL216	M2 - High total active demand Indicative alarm	Indicative alarm
AL217	M2 - Incorrect phase sequence	Indicative alarm
AL218	M2 - Modular asymmetry	Indicative alarm
AL219	M2 - Modular asymmetry	Indicative alarm
AL220	M2 - Low frequency	Indicative alarm
AL221	M2 - High frequency	Indicative alarm
AL222	M2 - Current angular asymmetry	Indicative alarm
AL223	M2 - Low power factor	Indicative alarm
AL224	M2 - High power factor	Indicative alarm

20.2.4 Temperature alarms, when the temperature exceeds the pre-defined minimum and maximum values:

Alarm	Description	Effect
AL301	AL1: Low temperature	Turns on alarm output and turns off linked auxiliary output
AL302	AL1: High temperature	Turns on alarm output and turns off linked auxiliary output
AL303	AL2: Low temperature	Turns on alarm output and turns off linked auxiliary output
AL304	AL2: High temperature	Turns on alarm output and turns off linked auxiliary output

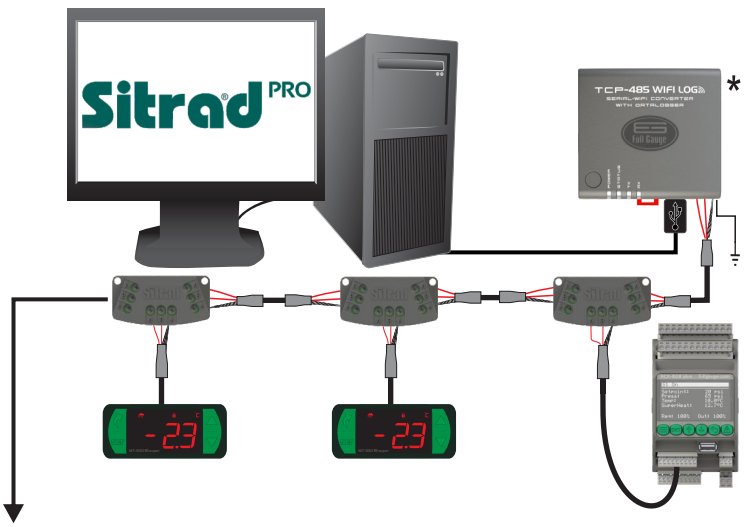
20.2.5 Sensor alarms:

Alarm	Description	Effect
AL401	Sensor S1: Failed temperature sensor	Turns off logic outputs that use this sensor as a reference
AL402	Sensor S2: Failed temperature sensor	Turns off logic outputs that use this sensor as a reference

20.2.6 External alarms:

Alarm	Description	Effect
AL501	External alarm 1	Indicative alarm
AL502	External alarm 2	Indicative alarm

21. INTERCONNECTING CONTROLLERS, RS-485 SERIAL INTERFACE, AND COMPUTER.



INTERFACE SERIAL RS-485
Device used to establish the connection of Full Gauge Controls instruments with Sitrad®.

Product NOT compatible with:
-TCP-485 versions lower than 4.01
-TCP-485 WiFi version 1
-TCP-485 WiFi Log version 1

Full Gauge offers different interface options, including technologies such as USB, Ethernet, Wifi, among others.
For more information, consult Full Gauge Controls.
Sold separately.

Modbus PROTOCOL
The controller allows you to configure the RS-485 communication port for the Modbus-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

Sitrad PRO — Keep Sitrad updated at site: http://www.sitrad.com

CONNECTION BLOCK
It is used to connect more than one controller to the Interface. The wire connections must be made as follows: Terminal **A** of the controller connect to terminal **A** of the connection block, which in turn, must be connected to terminal **A** of the Interface. Repeat the procedure for terminals **B** and ⏚, being ⏚ the cable screen.

22. IMPORTANT

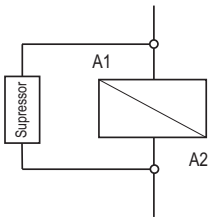
According to NBR 5410 standard chapters:

1. Install surge protectors on the power supply

2. Sensor cables and computer signals can run alongside, however not in the same conduit as the power supply and load cables.

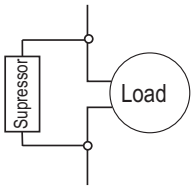
3. Install transient suppressors (RC filter) in parallel with the loads, in order to increase the life of the relays.

Connection diagram for suppressors in contactors



A1 and A2 are the contactor coil terminals.

Connection diagram for suppressors in direct activation loads



activation, take into account the specified maximum current.

Full Gauge Controls offers suppressors for sale

23.WARRANTY AGREEMENT

ENVIRONMENTAL INFORMATION

Package:
The materials used in the packaging of Full Gauge products are 100% recyclable. Try to dispose of it through specialized recycling agents.

Product:
The components used in Full Gauge controllers can be recycled and reused if disassembled by specialized companies.

Disposal:
Do not burn or dispose of household controllers that reach the end of their life. Obey existing legislation in your region regarding the disposal of electronic waste. If in doubt, contact Full Gauge Controls.

TERMO DE GARANTIA - FULL GAUGE CONTROLS

The products manufactured by Full Gauge Controls after May 2005, have a warranty period of 10 (ten) years directly with the factory and 01 (one) year with accredited resellers, counted from the date of sale included on the invoice. After this year with resellers, the guarantee will continue to be valid if the instrument is sent directly to Full Gauge Controls. This period is valid for the Brazilian market. Other countries have a 2 (two) year warranty. The products are guaranteed in case of manufacturing failure that makes them unsuitable or improper for the applications for which they are intended. The warranty is limited to the maintenance of devices manufactured by Full Gauge Controls, regardless of any other form of costs, such as any indemnity due to damage caused to other equipment.

WARRANTY EXCEPTIONS

The warranty does not cover transport and/or insurance costs for sending products with defects or malfunctions to Technical Assistance. The following events are also not covered: natural wear of parts, external damage caused by drops or improper packaging of products.

LOSS OF WARRANTY

The product will automatically lose its warranty if:
-The instructions for use and assembly contained in the technical description and the installation procedures present in Standard NBR5410 are not observed;
-It is subjected to conditions beyond the limits specified in its technical description;
-It is violated or repaired by a person who is not part of Full Gauge's technical team;
-The damage is caused by a fall, blow and/or impact, water infiltration, overload and/or atmospheric discharge.

USE OF WARRANTY

To take advantage of the warranty, the customer must send the product properly packed, together with the corresponding purchase invoice, to Full Gauge Controls. Shipping costs for products are borne by the customer. It is also necessary to send as much information as possible regarding the detected defect, allowing us to streamline the analysis, testing and execution of the service.
These procedures and the eventual maintenance of the product will only be carried out by Full Gauge Controls' Technical Assistance, at the Company's headquarters - Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul - Brazil.