MULTIPOWER

Electrical magnitude meter

USB

Graphic display

Monitoring System

Recipe system

Modbus protocol

Alarms

Datalogger

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

MULTIPOWERV01-02T-19455

1. SUMMARY

1. SUMMARY

2. DESCRIPTION

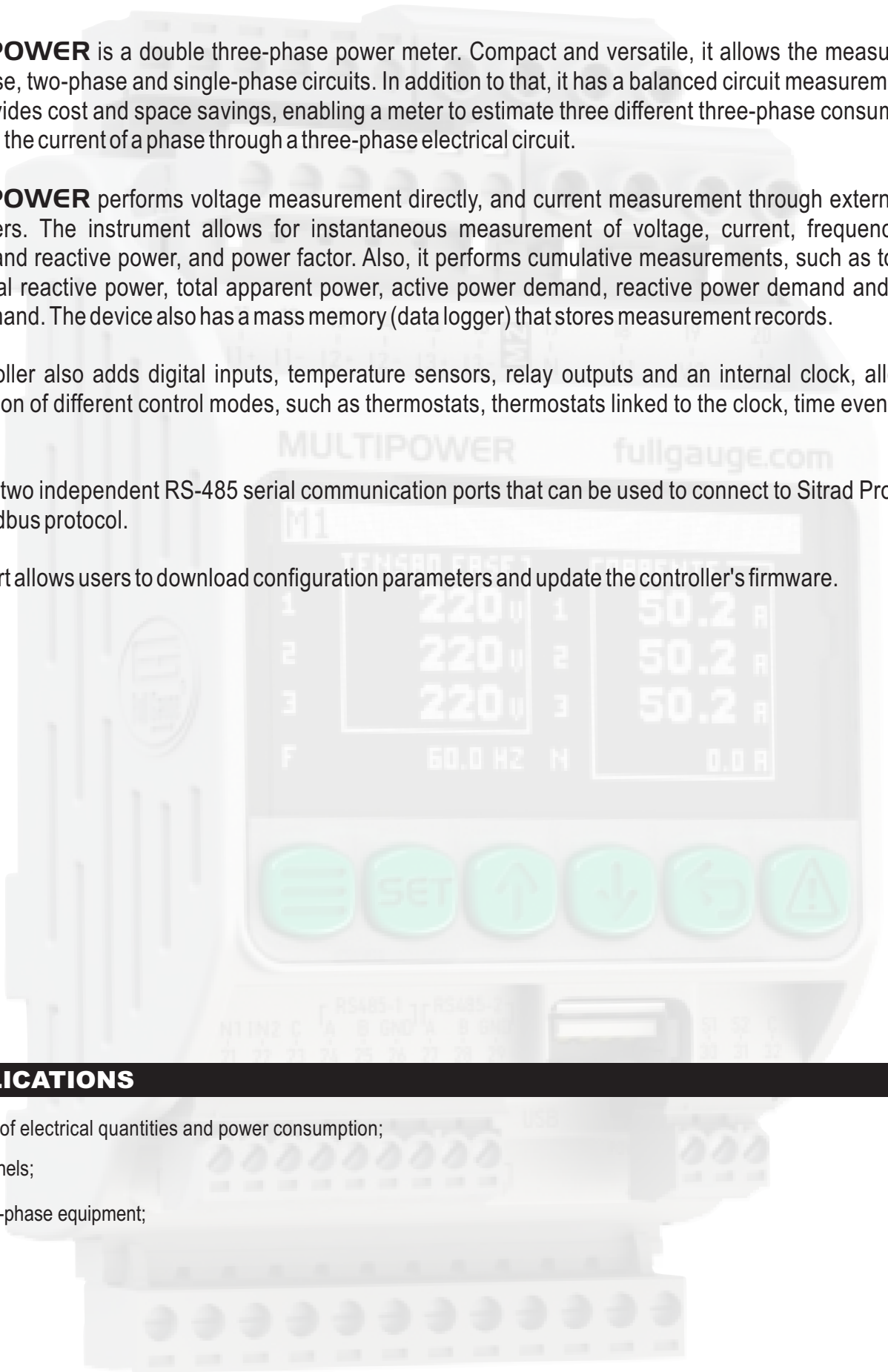
MULTIPOWER is a double three-phase power meter. Compact and versatile, it allows the measurement of three-phase, two-phase and single-phase circuits. In addition to that, it has a balanced circuit measurement mode, which provides cost and space savings, enabling a meter to estimate three different three-phase consumptions by measuring the current of a phase through a three-phase electrical circuit.

MULTIPOWER performs voltage measurement directly, and current measurement through external current transformers. The instrument allows for instantaneous measurement of voltage, current, frequency, active, apparent and reactive power, and power factor. Also, it performs cumulative measurements, such as total active power, total reactive power, total apparent power, active power demand, reactive power demand and apparent power demand. The device also has a mass memory (data logger) that stores measurement records.

The controller also adds digital inputs, temperature sensors, relay outputs and an internal clock, allowing the configuration of different control modes, such as thermostats, thermostats linked to the clock, time events, among others.

It features two independent RS-485 serial communication ports that can be used to connect to Sitrad Pro or others via the Modbus protocol.

Its USB port allows users to download configuration parameters and update the controller's firmware.



3. APPLICATIONS

-Monitoring of electrical quantities and power consumption;

- Electric panels;

-Other three-phase equipment;

4. GLOSSARY

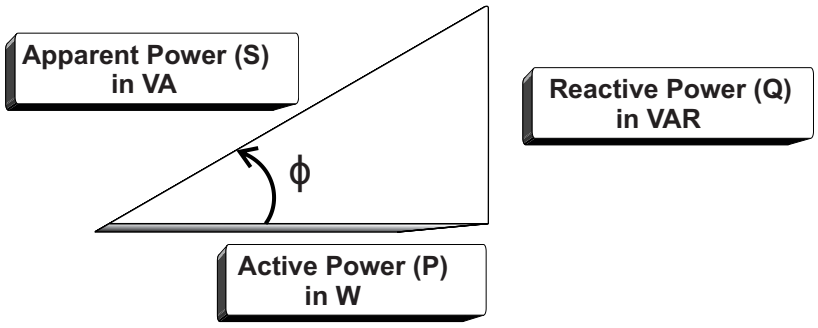
•**Active power (W):** Active power is that part of electrical power that is converted into useful work or other forms of power within an electrical circuit. It is the real power consumed or supplied by a device or system, responsible for carrying out mechanical, thermal, lighting work, among others.

•**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. ESPECIFICAÇÕES TÉCNICAS

Power	**MULTIPOWER** 24V: 24Vca 50/60Hz ou 24Vdc ±10 **MULTIPOWER** 90-240 Vca: 3 Ø 90~240Vca 50/60Hz **Notes: 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.*
Product dimensions (WxHxD)	70,0 x 138,65 x 61,7 mm / 2,76" x 5,46" x 2,43"
Operating Temperature	-20 a 60 ºC / -4 to 140°F
Operating humidity	10 a 90% UR (without condensation)
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 *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.

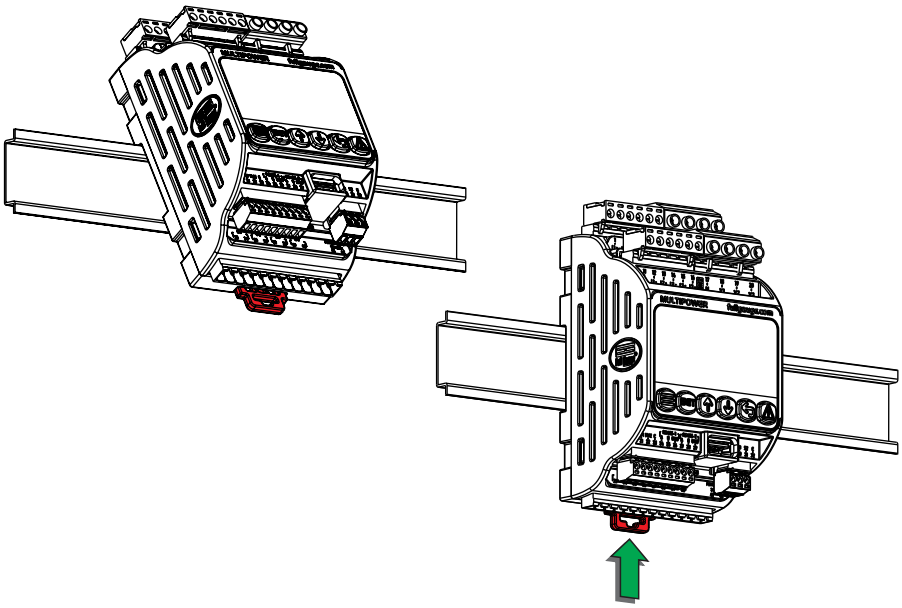
⚠ AUTHORIZED SERVICE:
-The installation or maintenance of the product must only be carried out by qualified professionals.

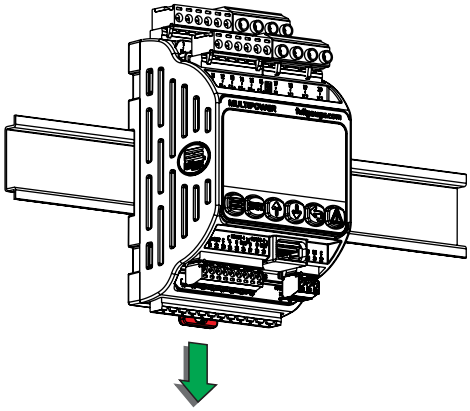
⚠ ACCESSORIES:
-Use only original Full Gauge Controls accessories.
-If in doubt, contact technical support.

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.

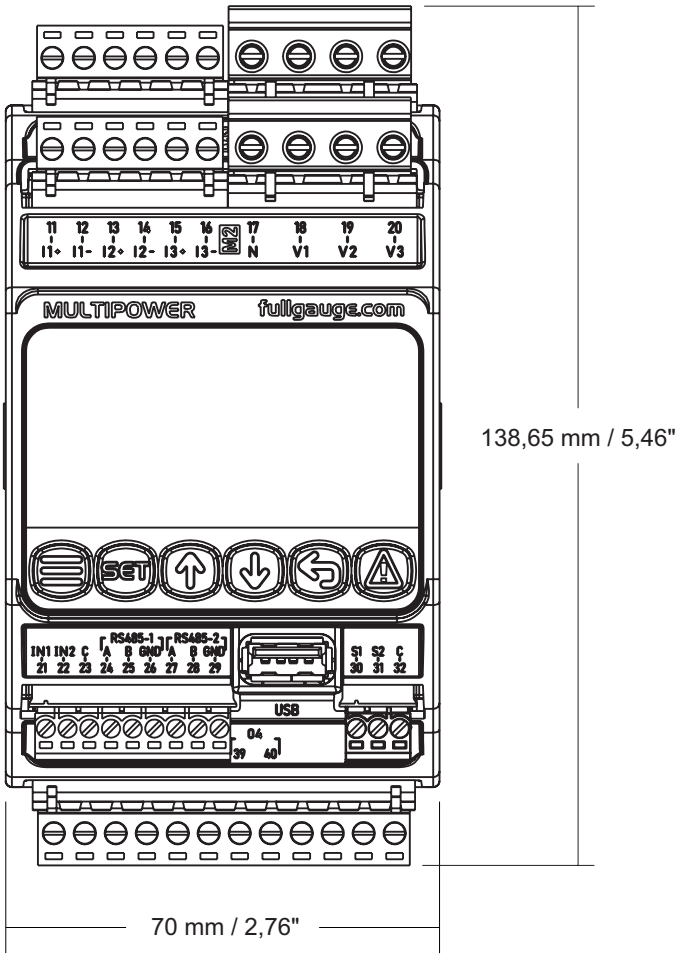


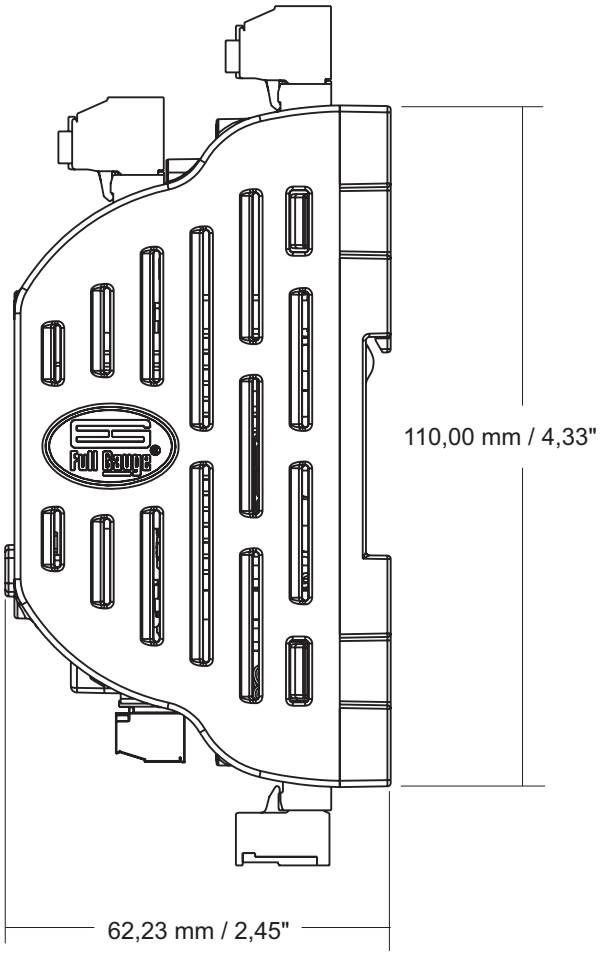


To remove the controller from the DIN rail, use a suitably sized screwdriver to open the catch.

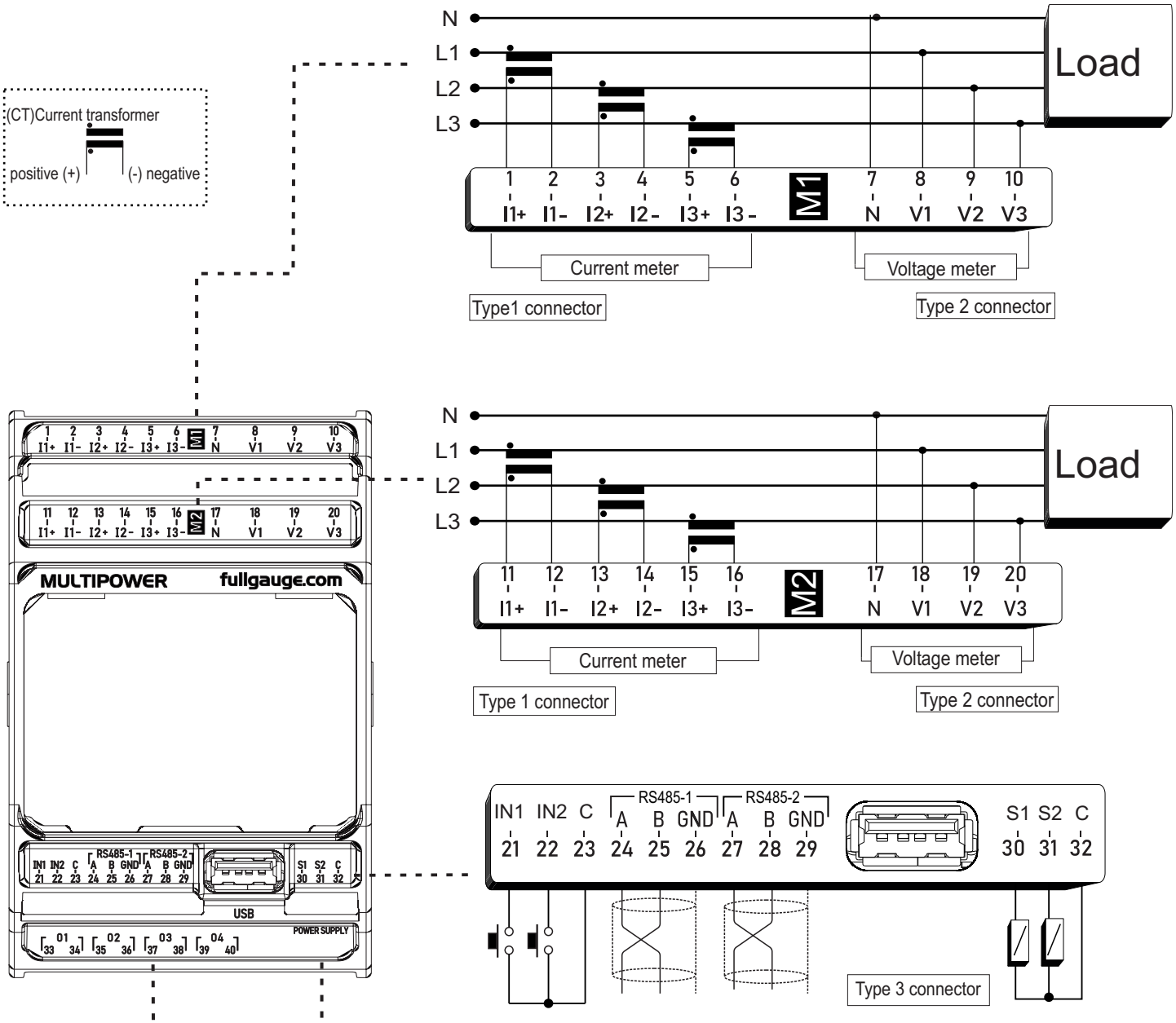
8. DIMENSIONS

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

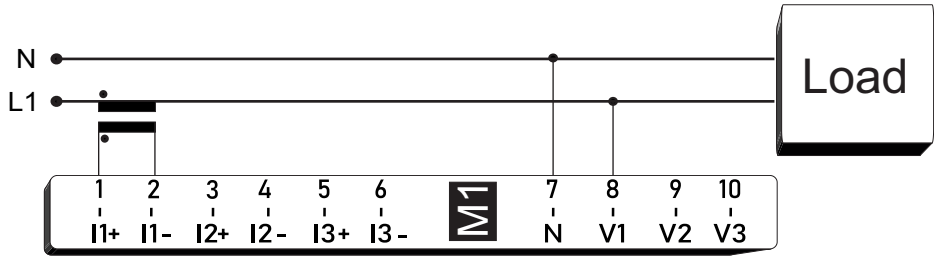
9. CONNECTION DIAGRAM

9.1Connection 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.

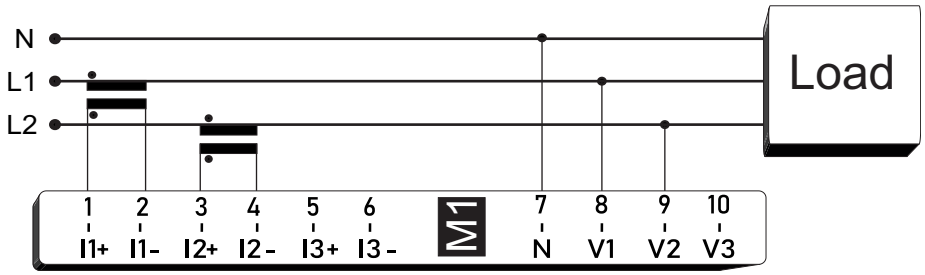
9.1.1 1F+N Single-phase:

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



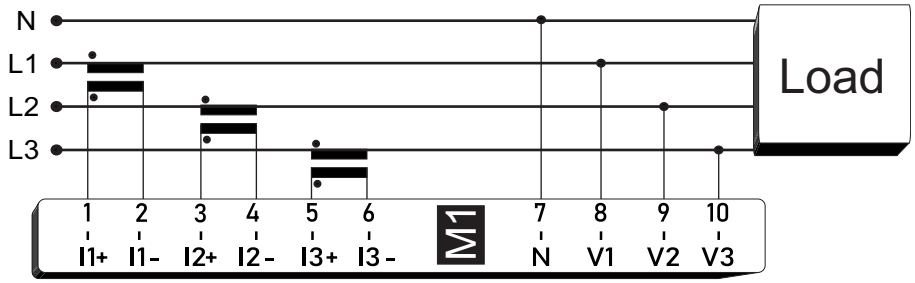
9.1.2 2F + N Two-phase:

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



9.1.3 3F+N Three-phase:

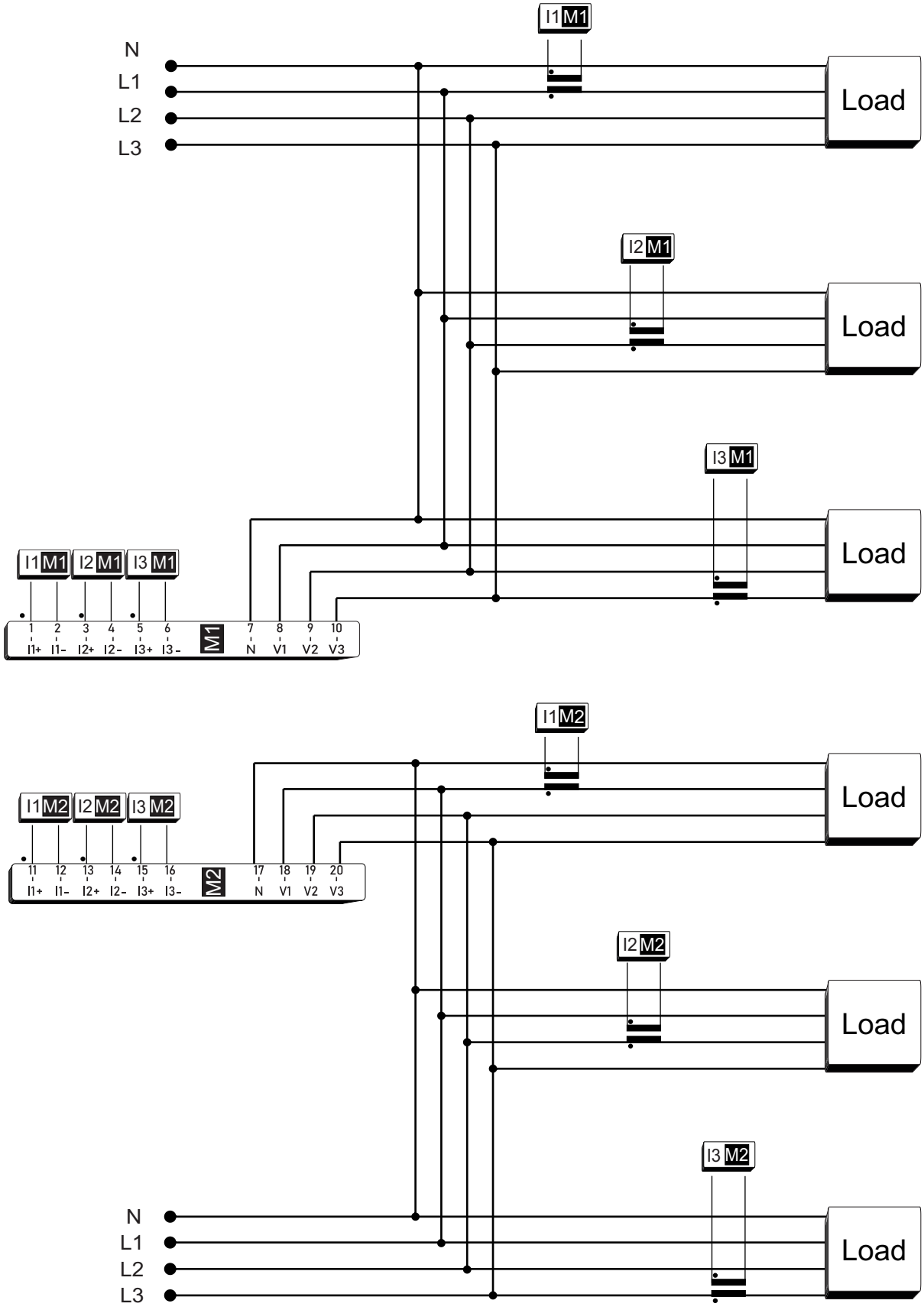
Performs three-phase reading.



9. CONNECTION DIAGRAM

9.1.4 3F+N Three-Phase Balanced:

In the context of a balanced three-phase system, current measurement is performed on only one of the phases, with each phase representing an independent three-phase circuit. That is, phase 1 corresponds to circuit 1, phase 2 to circuit 2 and phase 3 to circuit 3. Power, demand, and power values are calculated by multiplying the voltage by the current of each phase and then multiplying this result by 3. This approach is based on the assumption that the current in the other two phases is equal to the current measured in the reference phase. For example, the apparent power of circuit 1, that is, phase 1, is determined by the following formula: Phase voltage 1 x Phase current 1 x 3.

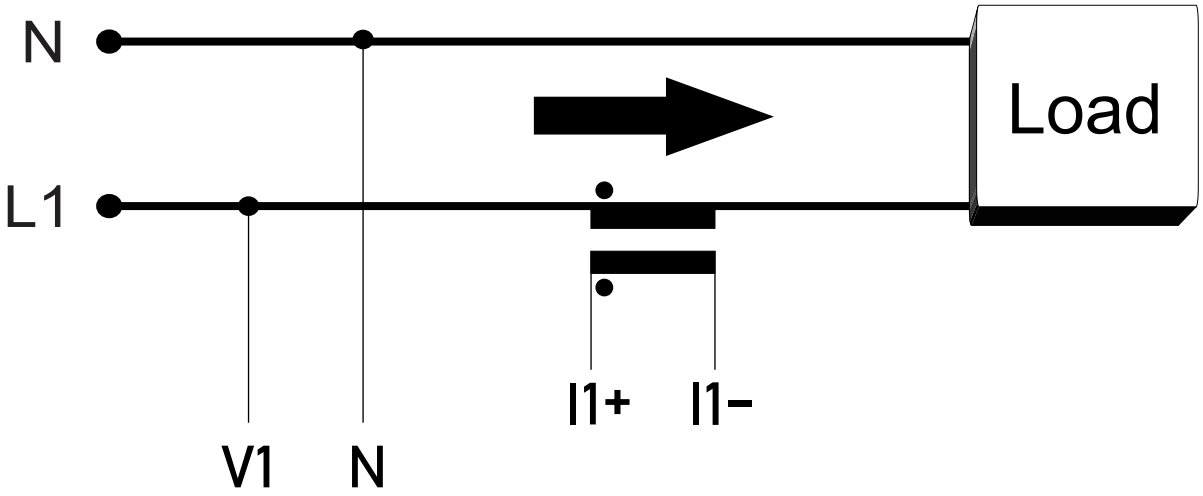


9. CONNECTION DIAGRAM

9.2 Installation instructions:

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

Always connect the Current Transformer (CT) secondary to the current measuring 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 CT secondary of phase L1 must be connected to terminals I1+ and I1-.



If, for example, phase L1 is connected to V1 and the CT of phase L2 is connected to the I1 terminals, this results in an incorrect measurement of power and energy.

For the **MULTIPOWER** to correctly recognize the data on power consumed and supplied, it is necessary to pay attention 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 accumulate the consumed power in the supplied power records, and vice versa.

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.

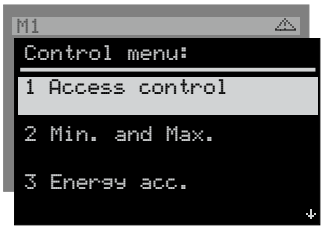
10. NAVIGATION KEYS

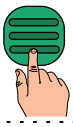
To switch between screens, edit parameters, view advanced functions, and perform other tasks, the **MULTIPOWER** has 6 navigation keys on its front panel:

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	**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.

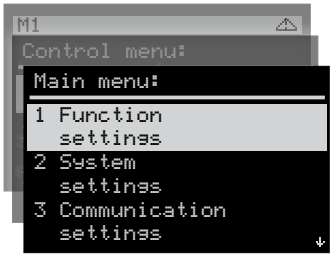
11. NAVIGATION TUTORIAL

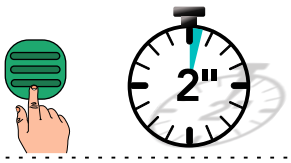
The first summary screen displays the voltages and currents per phase, measured by the first enabled meter, Meter 1 or Meter 2.



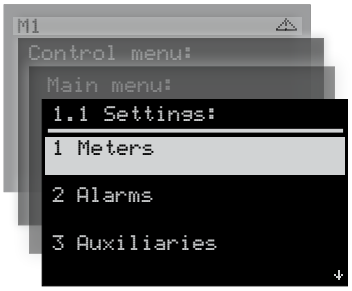


A short press on the **MENU** key leads to **Control Menu.**



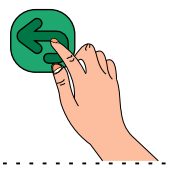


Pressing the **MENU** key for 2 seconds opens the Main Menu, where it is possible to parameterize the meter's functions.



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

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



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

12. SUMMARY SCREEN

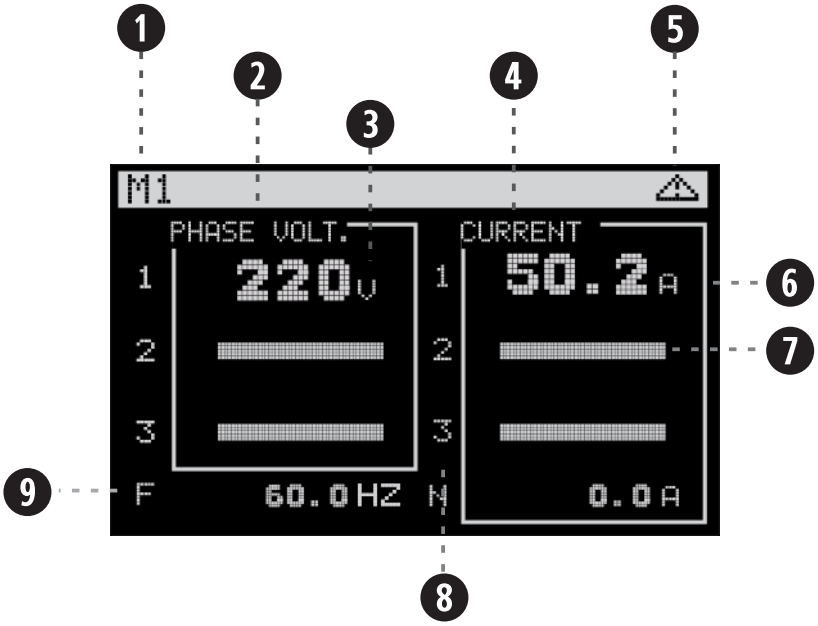
12.1 Navigating summary screens:

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 — Table that displays voltage values.

3 — Voltage measurement unit in volts (V).

4 — Table that displays current values.

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

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

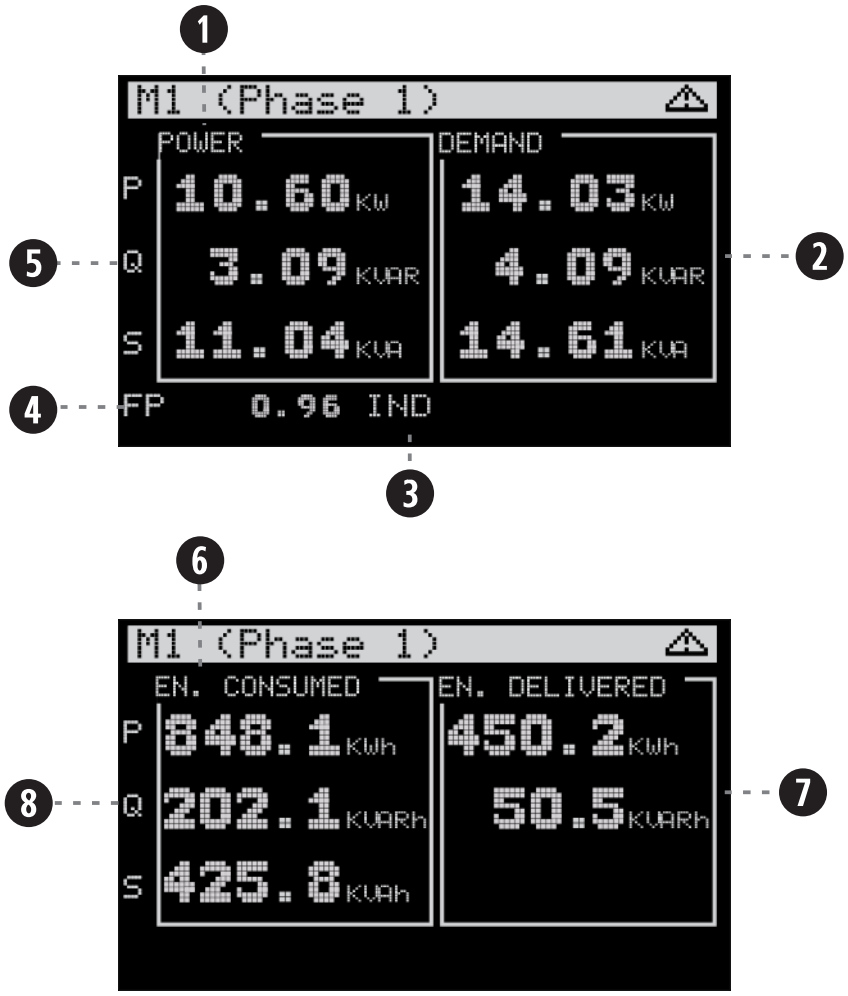
7 — Unmeasured phase indication.

8 — Phase indication displayed on each line.
1 - Phase 1

9 — 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.

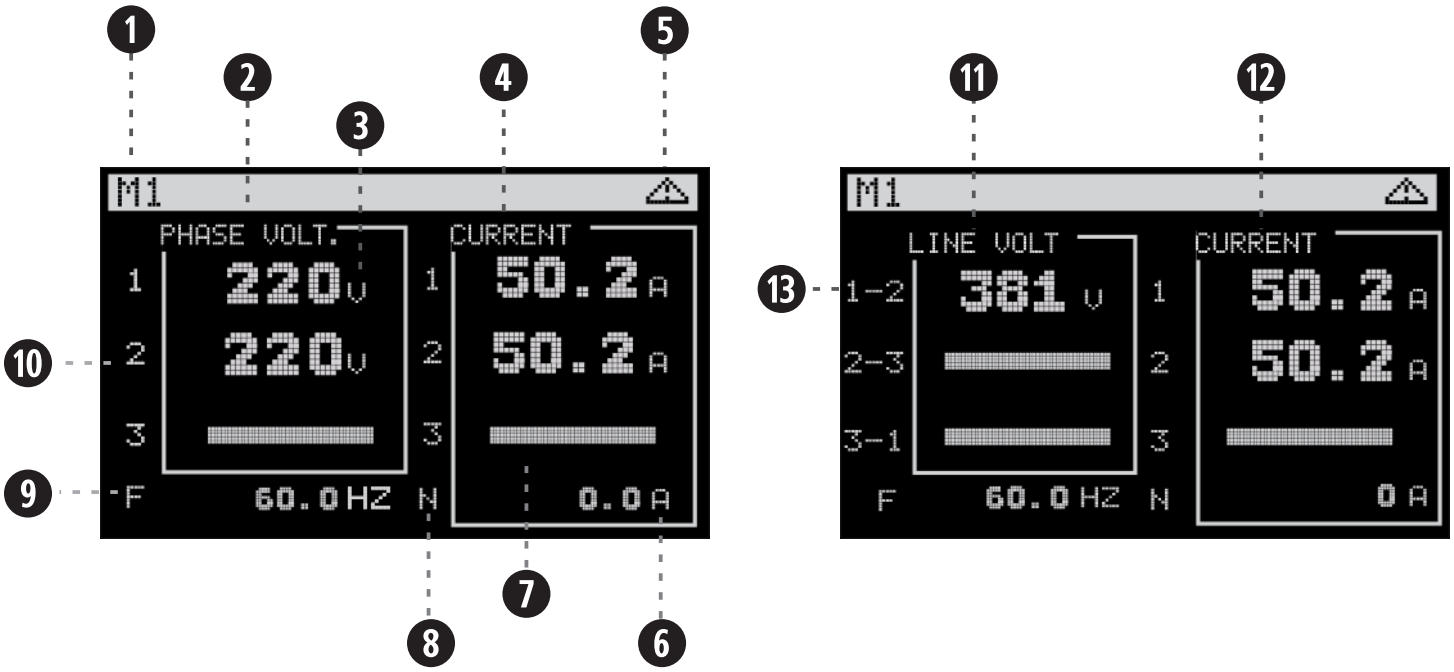
7 — Supplied power display table.

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 — Signaling that this phase is not measured.

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.

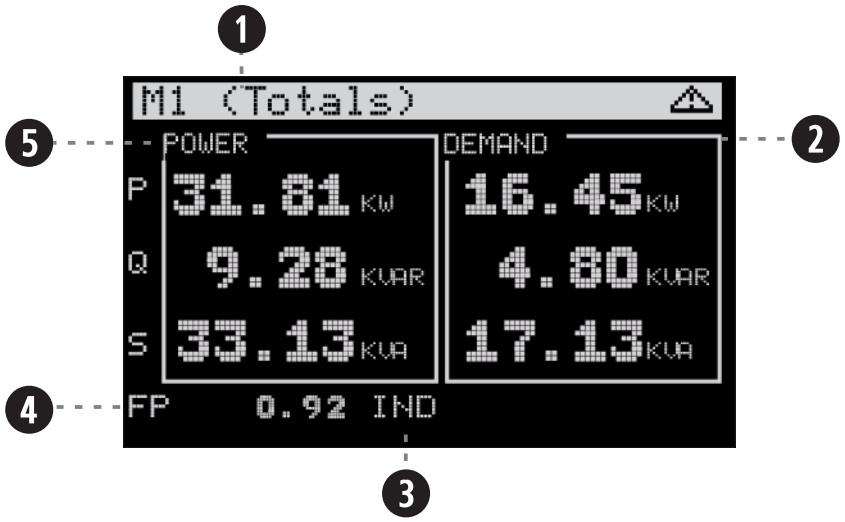
12 — Table that displays the current values measured between phase and neutral.

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.

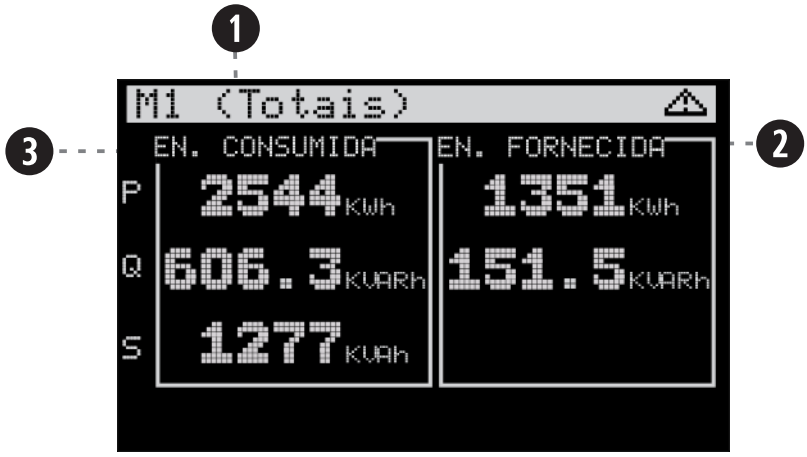
5 — Power display table.

Power and Demand Phase 1

Power and Demand Phase 2

12. SUMMARY SCREEN

Consumed and supplied power



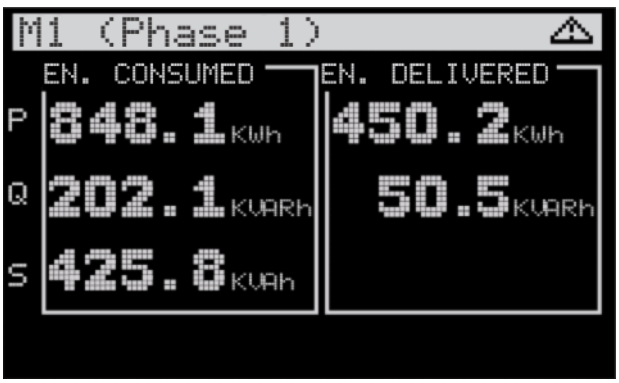
1 — Phase indication to be displayed:

```
M1 (Totals)
M1 (Phase 1)
M1 (Phase 2)
```

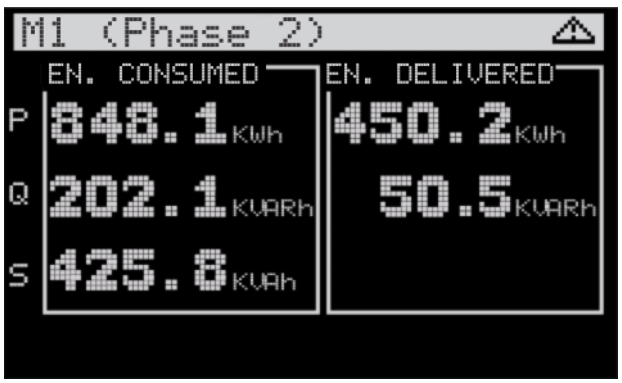
2 — Power supplied table.

3 — Power consumed table.

Consumed and supplied power Phase 1



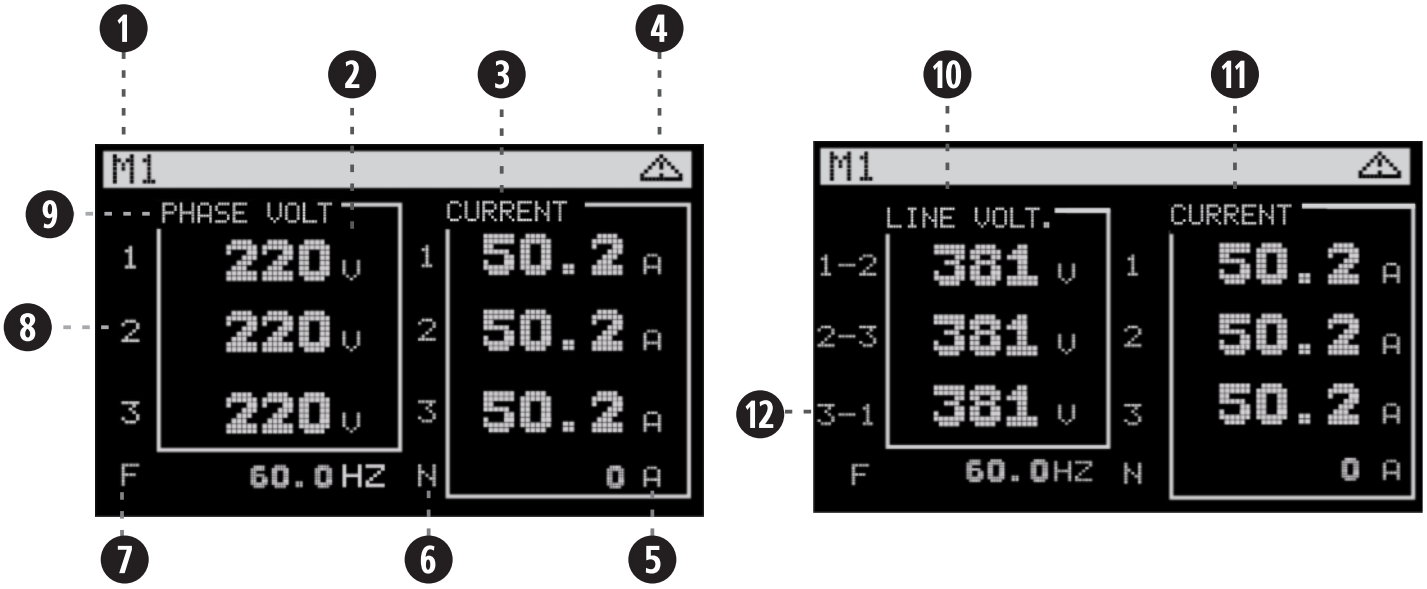
Consumed and supplied power Phase 2



12. SUMMARY SCREEN

12.4 3F + N Three-phase operating mode:

This mode performs 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 quantities and active, reactive, and apparent demand, as well as the power factor and consumed and supplied power.



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.

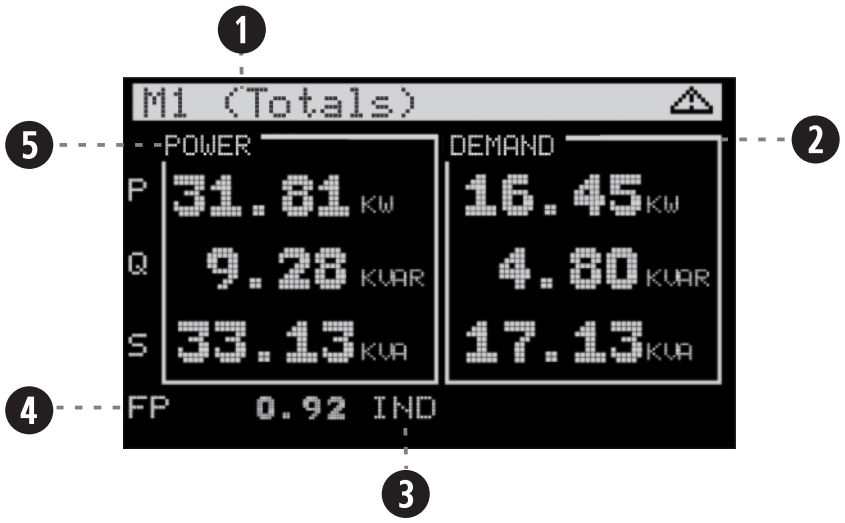
11 — Table that displays current values measured between phase and neutral.

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.

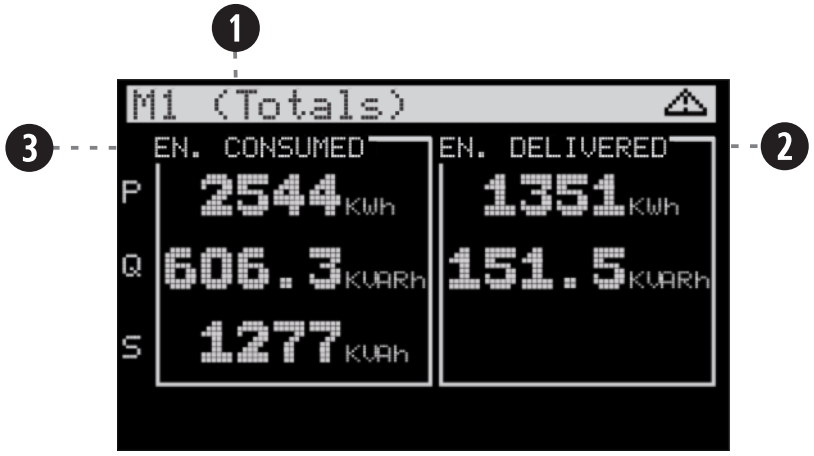
Power and Demand Phase 1

Power and Demand Phase 2

Power and Demand Phase 3

12. SUMMARY SCREEN

Consumed and supplied power



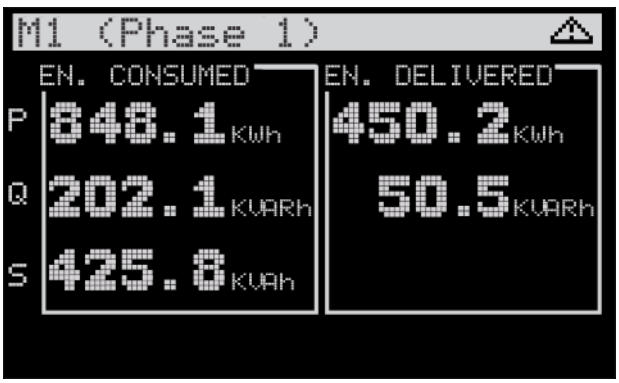
1 — Indication of the phase to be displayed:

M1 (Totals)
M1 (Phase 1)
M1 (Phase 2)
M1 (Phase 3)

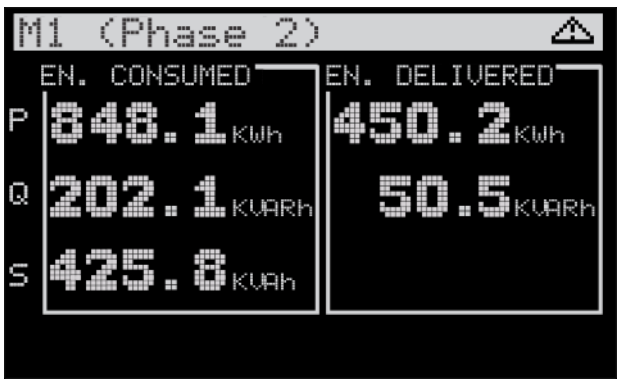
2 — Shows the power supplied.

3 — Shows the power consumed.

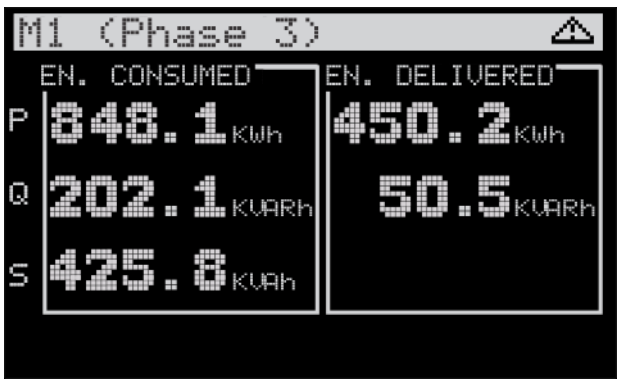
Consumed and supplied power Phase 1



Consumed and supplied power Phase 2



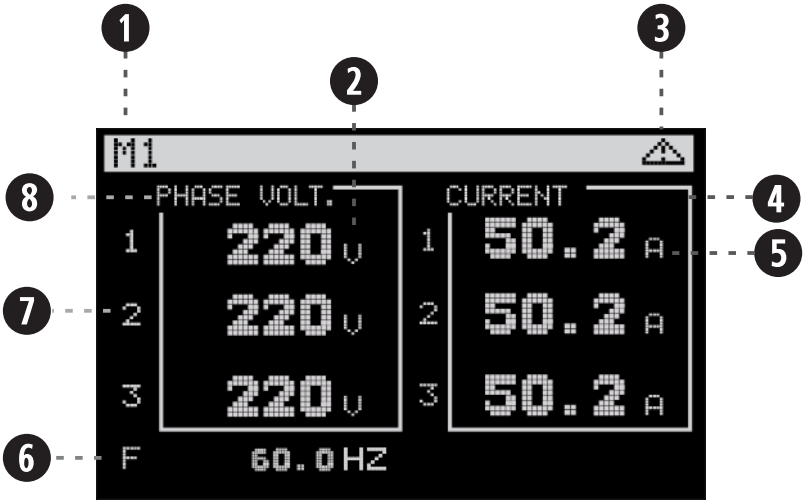
Consumed and supplied power Phase 3

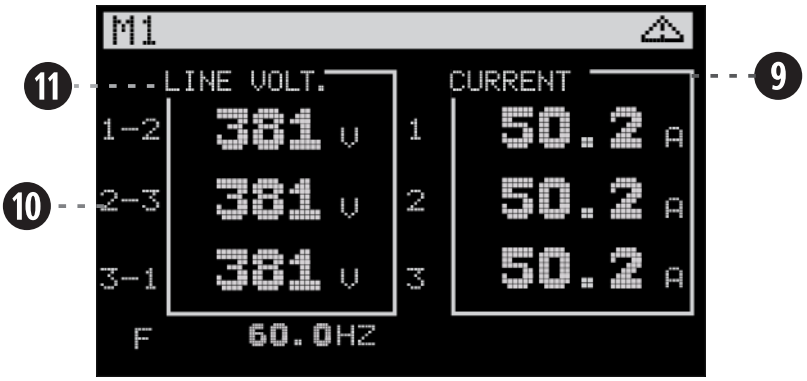


12.5 3F+N Balanced operating mode:

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.

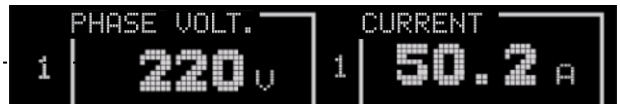
9 — Displays phase-by-phase current values.

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

11 — Table that displays the measured voltage values.

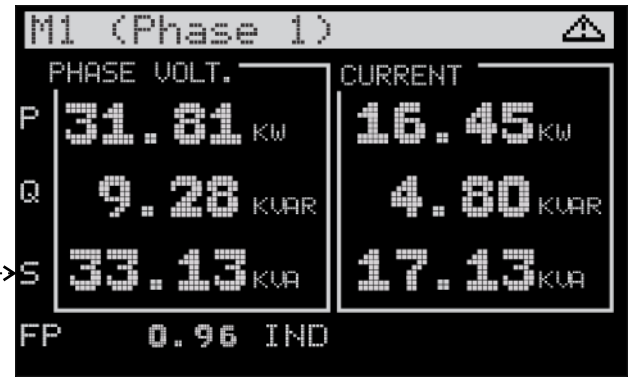
12. SUMMARY SCREEN

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



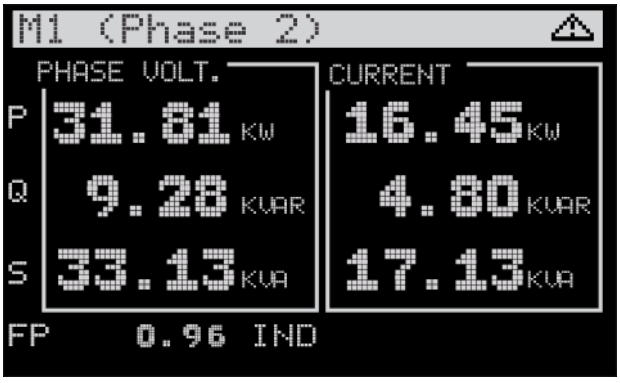
(S) = Voltage x Current x 3
(S) = 220 x 50.2 x 3
(S) = 11.04 KVA x 3
(S) = 33.13 KVA

Power and Demand Phase 1

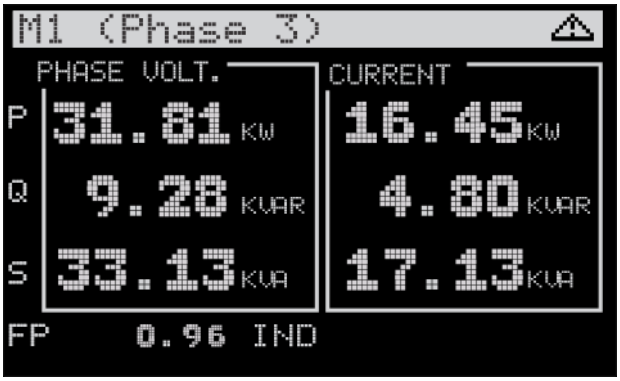


* For other values of active power, reactive power, demand values, consumed and supplied power, the same process is carried out. Taking into account the power factor when necessary.

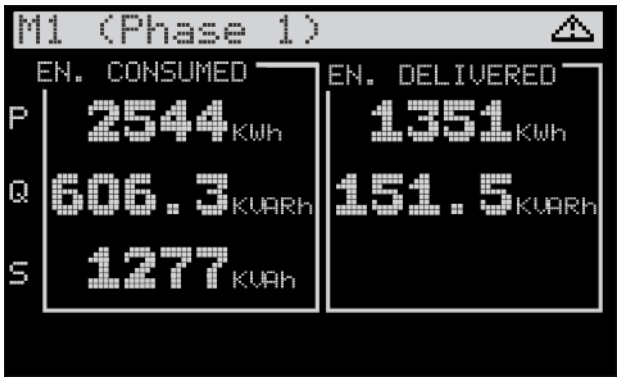
Power and Demand Phase 2



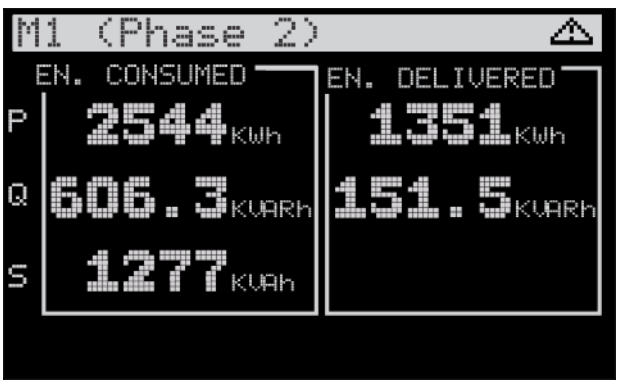
Power and Demand Phase 3



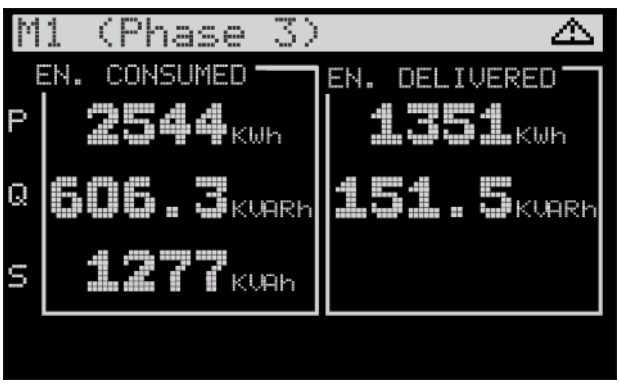
Consumed and supplied power Phase 1



Consumed and supplied power Phase 2



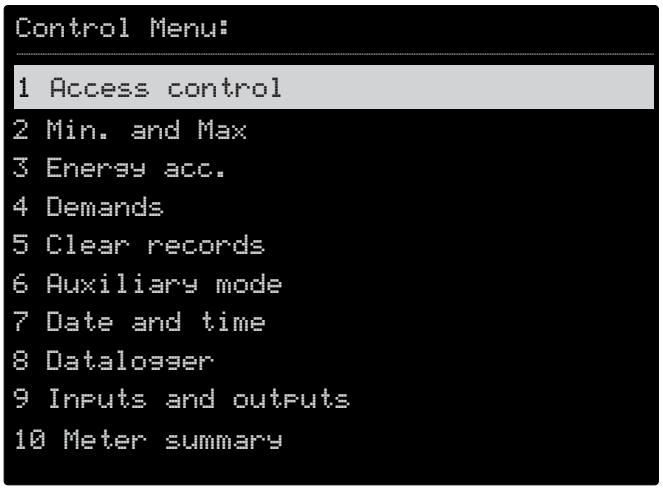
Consumed and supplied power Phase 3



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 Auxiliary mode

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

7 Date and time

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

8 Datalogger

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

9 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.

10 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.

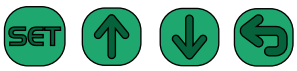
13. CONTROL MENU

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.

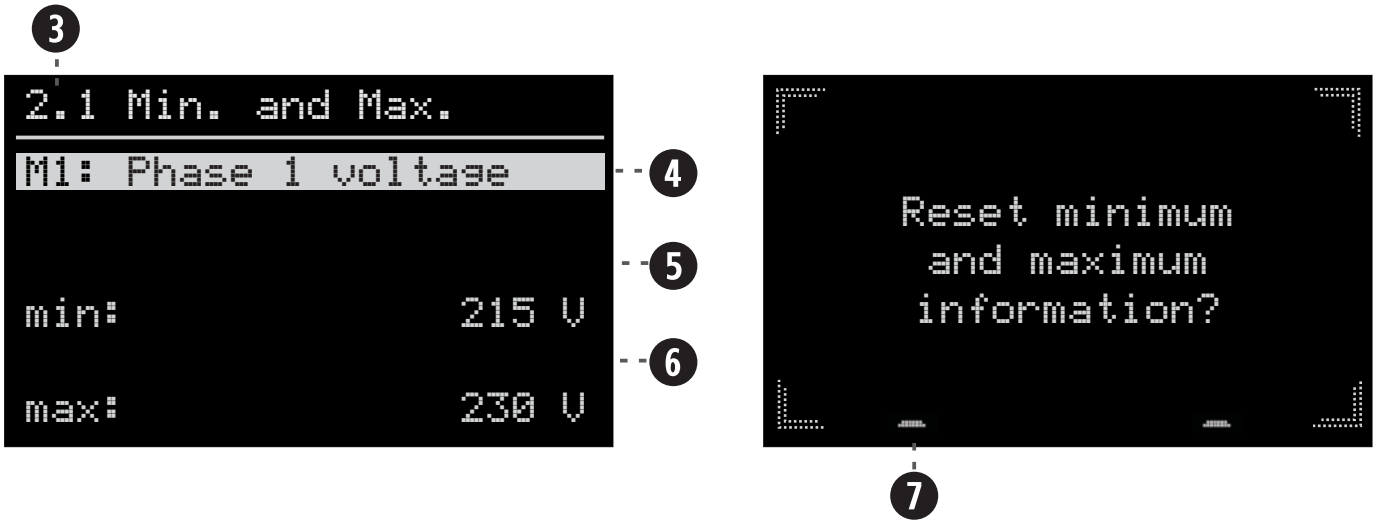
1 — This field displays the access code for insertion.

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

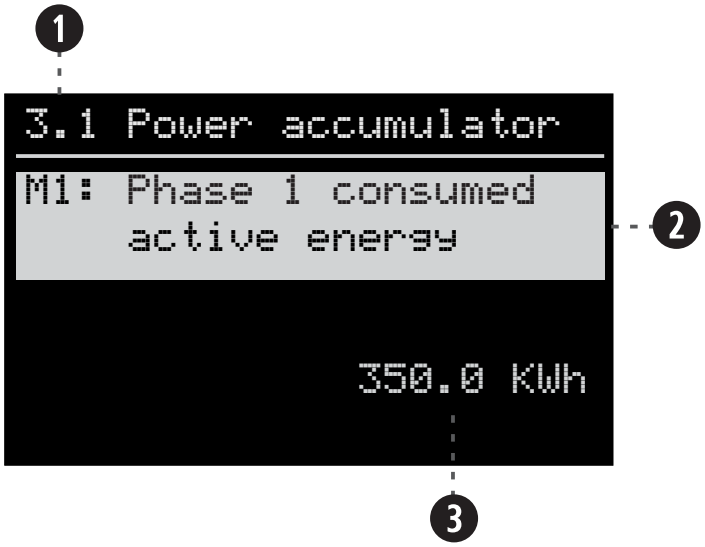
5 — Minimum recorded value.

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.



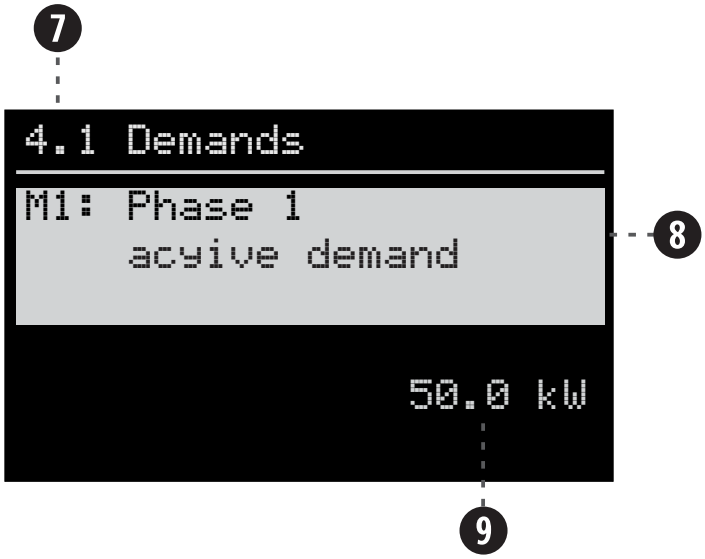
1 — Indicates the item and its description:
3.1 ...40

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.



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

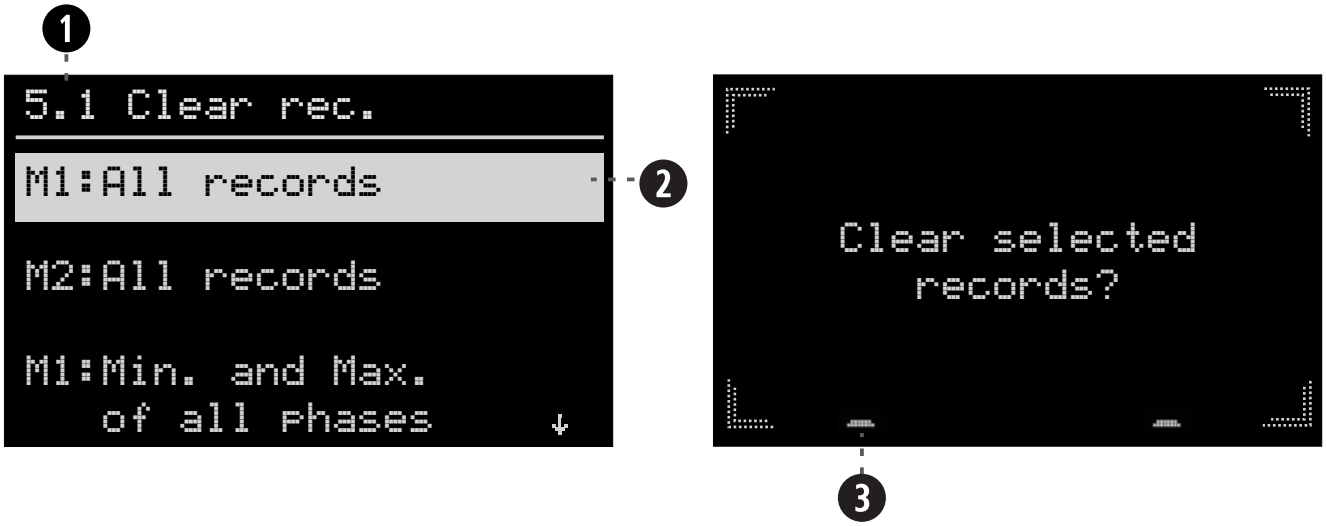
8 — Description of the value to be displayed

9 — 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

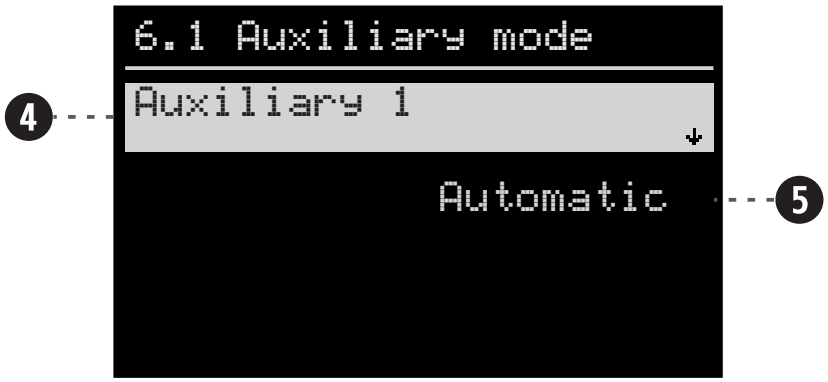
2 — Description of the selected item.

3 — Indication of available keys:
SET ↩

13.2.6 Modo Auxiliar:

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.

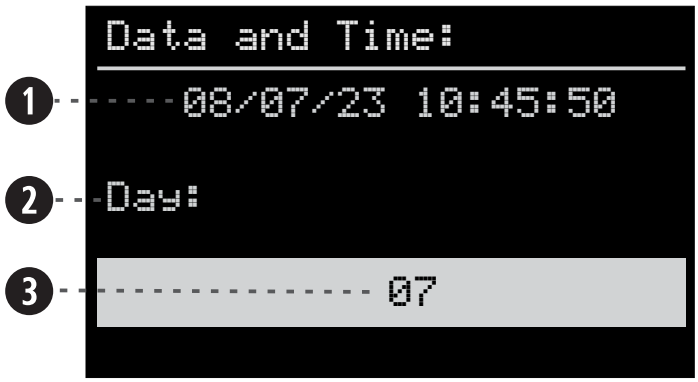


4 — Identifies the Auxiliary to be selected:
Auxiliary 1
Auxiliary 2
Auxiliary 3
Auxiliary 4

5 — Identifies the mode to be selected:
Off
Manual
Automatic

13.2.7 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

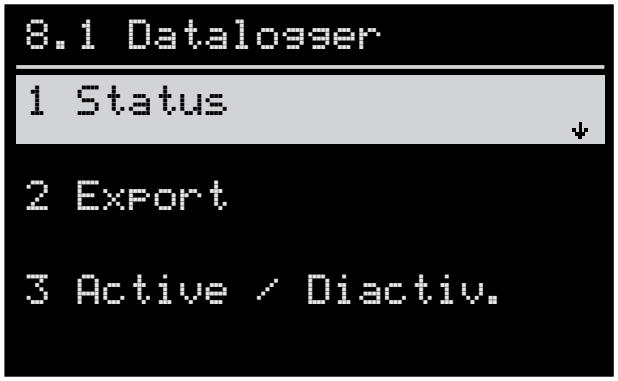
2 — Option to be changed:
Day:
Month:
Year:
Hour:
Minute:
Second:

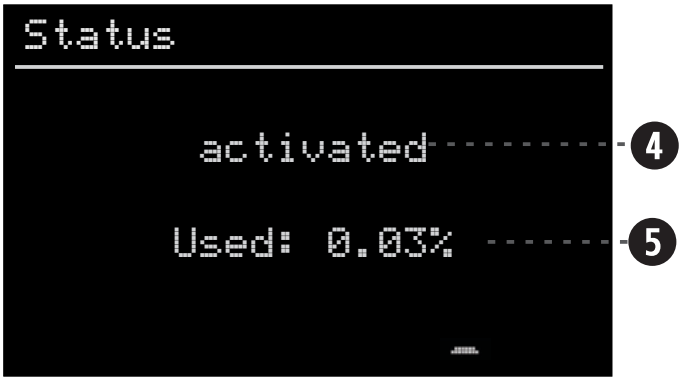
3 — Demonstration of value to be changed

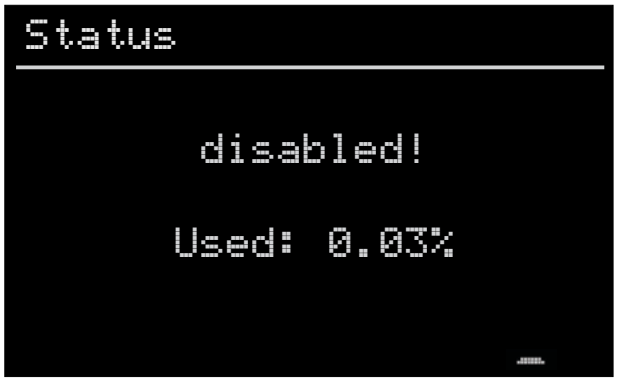
13.2.8 Datalogger:

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.***







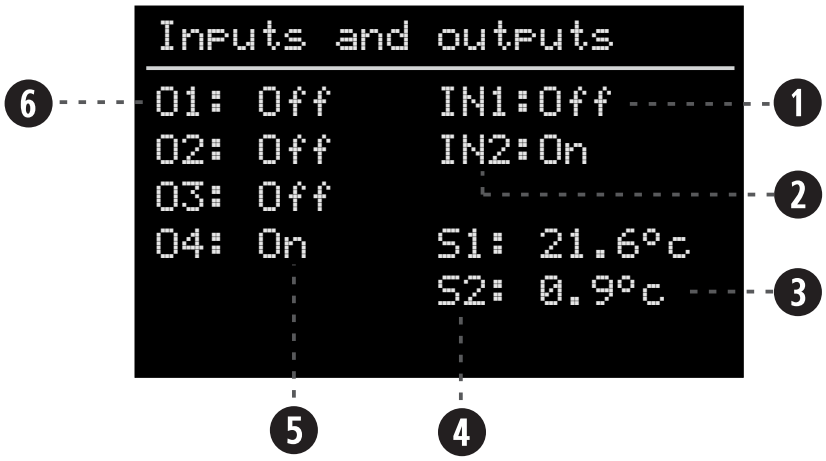
4 — Indicates in which mode the Datalogger is operating.

5 — Memory usage percentage.

6 — Indication of available keys:

13.2.9 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.

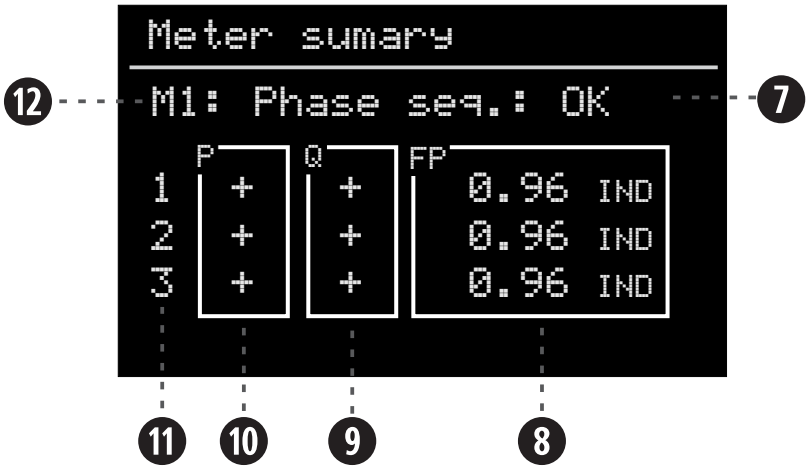
4 — Sensor identification:
S1
S2

5 — Status of digital outputs:
On
Off

6 — Auxiliary output identification:
O1
O2
O3
O4

13.2.10 Meter Summary:

This screen displays a summary of the power factor values, active and reactive powers for each meter.



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.

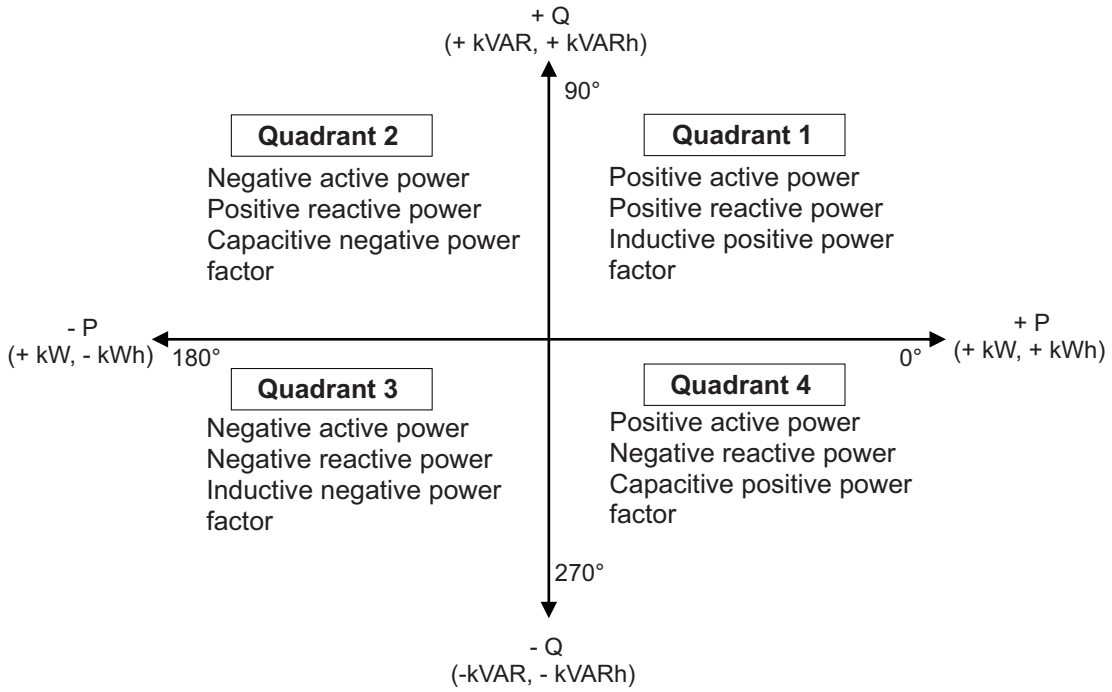
12 — Meter indication on display.To toggle between meters, use the ⇧ or ⇩.

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 **MULTIPOWER** operation is designed so that when active, power values are positive, the system stores the corresponding power in consumption records. On the other hand, when the active power values are negative, the system accumulates this power in the supply records. Therefore, **MULTIPOWER** is capable of tracking and recording both power consumed, and power supplied, depending on the direction of active power.

15. MODULAR AND ANGULAR ASYMMETRY

Detection of modular/angular asymmetry alarms:

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

S = Sensitivity (0 to 100%) Modular asymmetry:

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

In an ideal, balanced three-phase electrical system, the three phases are 120 degrees out of phase with each other. This means that there is perfect angular symmetry between the phases. When angular asymmetry occurs, the phase shift angles between phase voltages are not equal to 120 degrees, and this can lead to an uneven distribution of electrical power across system components. The voltage angular asymmetry is obtained from the difference between the phase shift angles in relation to the ideal situation (120 degrees).

Angular asymmetry

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

Condition for alarm activation (in both cases):
Measured value greater than the Average Tolerance or Measured value less than the Average - Tolerance.

16. AUXILIARY LOGIC

16.1 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

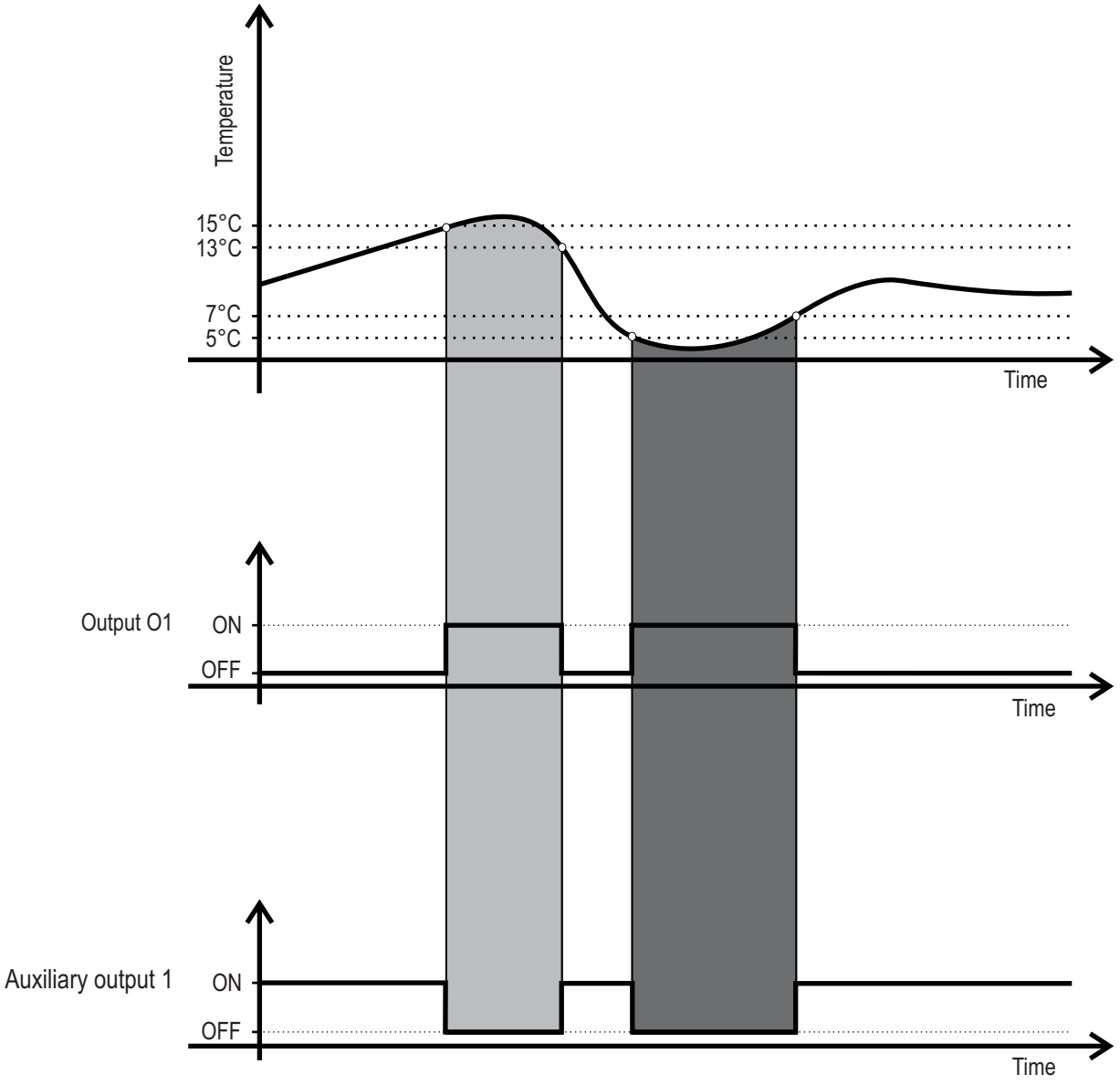
1.2.2 AL1: High temperature = 15.0°C

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.

16. AUXILIARY LOGIC

16.2 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.

16.2.1 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.

16.2.2 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:

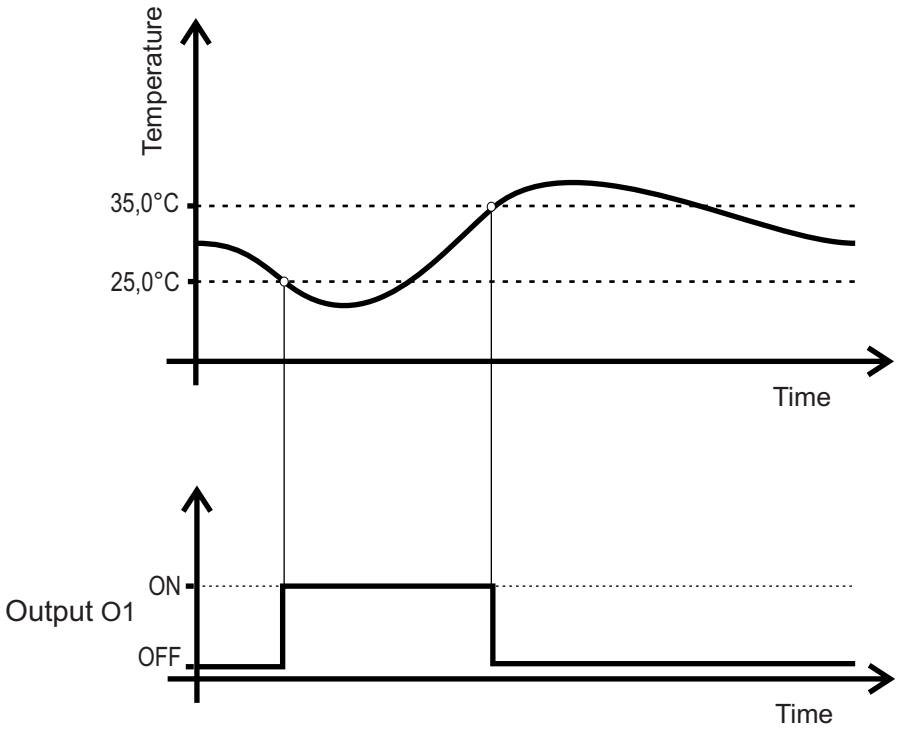
1.3.1 AUX1: Operating mode = Heating thermostat

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.

16.2.3 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:

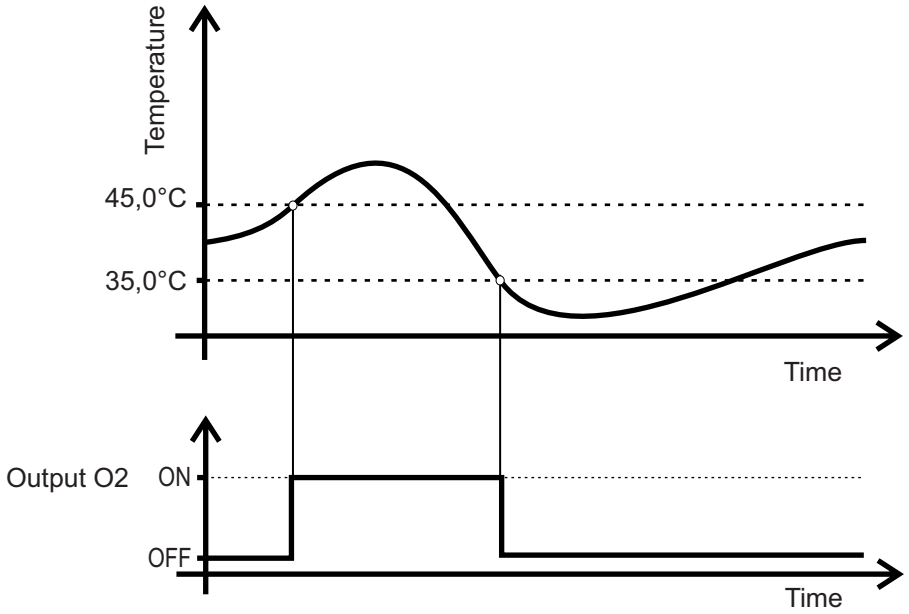
1.3.6 AUX2: Operating mode = Cooling thermostat

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

16.2.4 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:

1.4.1 Event 1: Start time = 06:00

1.4.2 Event 1: End time = 12:00

1.3.1 AUX1: Operating mode = Cooling thermostat

1.3.2 AUX1: Setpoint of temperature = 25°C

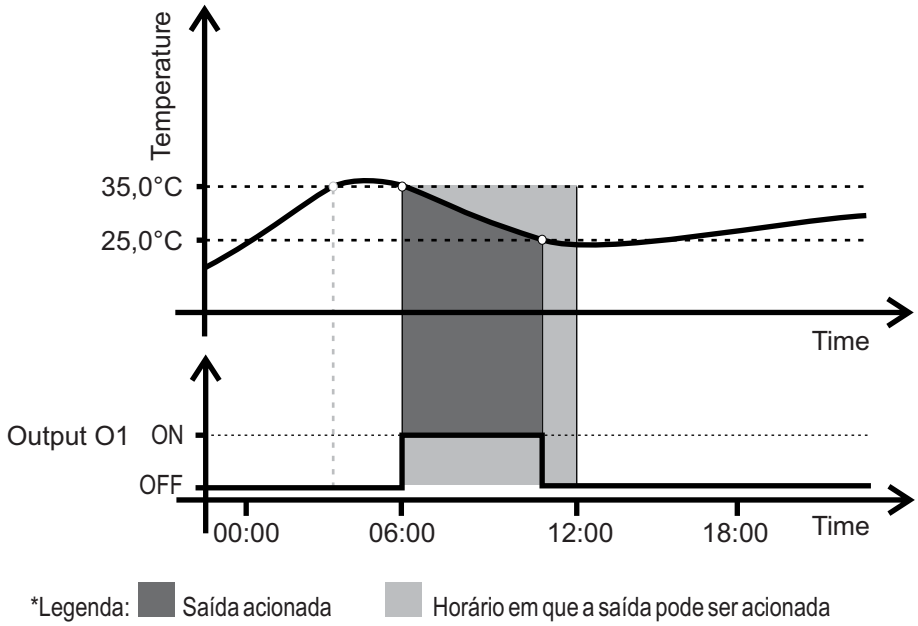
1.3.3 AUX1: Hysteresis = 10,0°C

1.4.3 Event 1: Days of the week = _TWTFS_

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

1.3.5 AUX1: Reference sensor = S1

1.3.6 AUX1: Associated output = O1



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

16.2.5 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.

16.3 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 to 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_____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

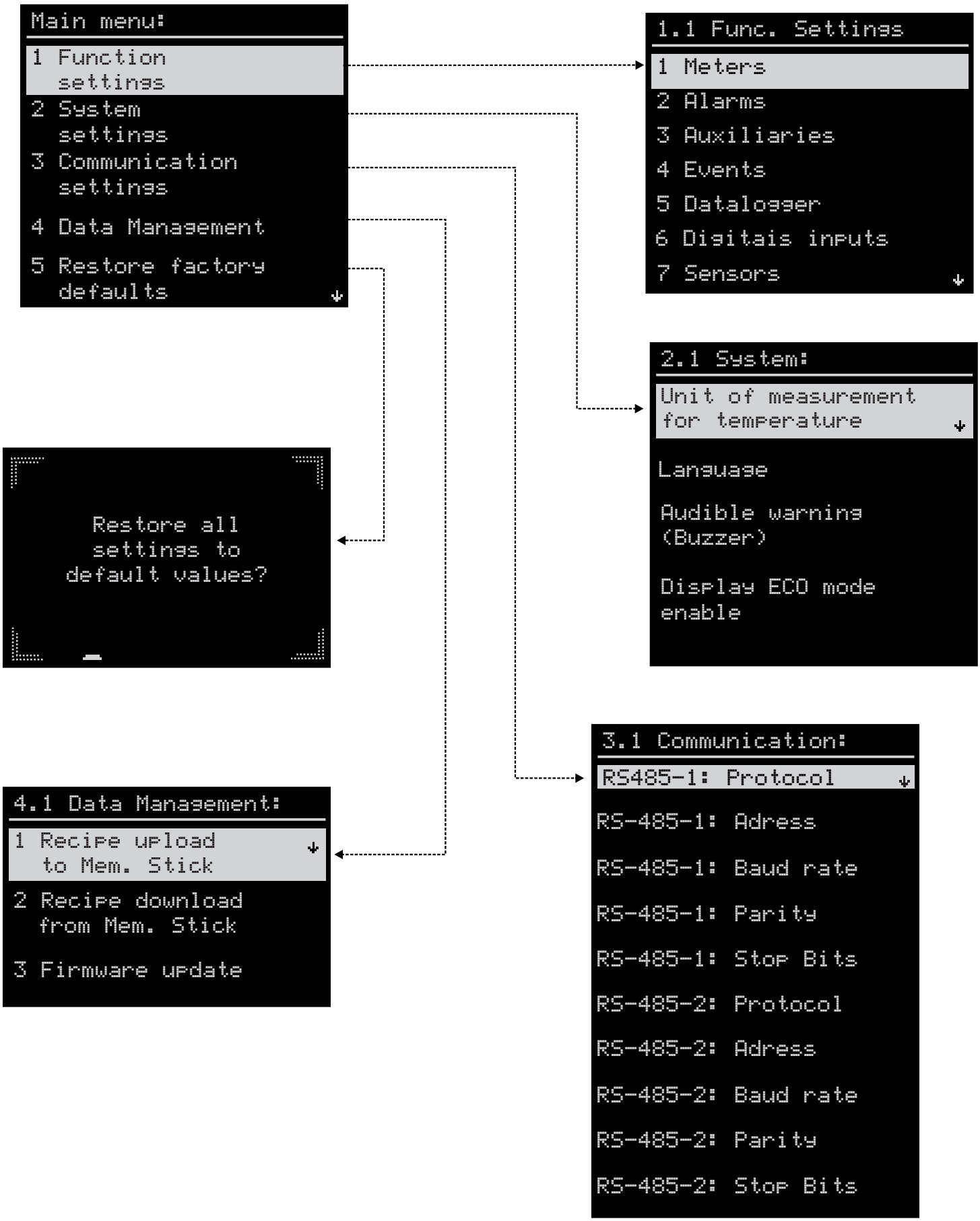
1.4.7 Event 2: Days of the week = S_____S

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

In this case, auxiliary 2 goes into operation on Saturday at 8:00 pm until Sunday at 6:00 am.

17. MAIN MENU

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



18. PARAMETER TABLE

18.1 Settings :

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

18.1.1 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: Maximum phase 1 current limit	0 [Off]	3000	0 [Off]	A
1.1.9	M1: Maximum phase 2 current limit	0 [Off]	3000	0 [Off]	A
1.1.10	M1: Maximum phase 3 current limit	0 [Off]	3000	0 [Off]	A
1.1.11	M1: Active power demand limit	0 [Off]	4500	0 [Off]	kW
1.1.12	M1: Phase sequence error enable	No	Yes	No	-
1.1.13	M1: Time to validate alarm	0 [Off]	9999	5	Seconds
1.1.14	M1: Alarm inhibition delay	0 [Off]	9999	60	Seconds
1.1.15	M1: Angular asymmetry sensitivity	0 [Off]	100	0	
1.1.16	M1: Angular asymmetry validation time	0 [Off]	9999	5	Seconds
1.1.17	M1: Modular asymmetry sensitivity	0 [Off]	100	0	
1.1.18	M1: Modular asymmetry validation time	0 [Off]	100	5	Seconds
1.1.19	M1: Minimum frequency limmit	34 [Off]	100	34 [Off]	Hz
1.1.20	M1: Maximum frequency limmit	34 [Off]	100	34 [Off]	Hz
1.1.21	M1: Frequency alarm validation time	0 [Off]	9999	5	Seconds
1.1.22	M2: Operation mode	0	4	0	-
1.1.23	M2: CT 1 primary	5	3000	200	A
1.1.24	M2: CT 2 primary	5	3000	200	A
1.1.25	M2: CT 3 primary	5	3000	200	A
1.1.26	M2: Range for demand calculation	0 [Off]	60	15	Minutes
1.1.27	M2: Minimum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.28	M2: Maximum phase voltage limit	0 [Off]	500	0 [Off]	V
1.1.29	M2: Maximum phase 1 current limit	0 [Off]	3000	0 [Off]	A
1.1.30	M2: Maximum phase 2 current limit	0 [Off]	3000	0 [Off]	A
1.1.31	M2: Maximum phase 3 current limit	0 [Off]	3000	0 [Off]	A
1.1.32	M2: Active power demand limit	0 [Off]	4500	0 [Off]	kW
1.1.33	M2: Phase sequence error enable	No	Yes	No	-
1.1.34	M2: Time to validate alarm	0 [Off]	9999	5	Seconds
1.1.35	M2: Alarm inhibition delay	0 [Off]	9999	60	Seconds
1.1.36	M2: Angular asymmetry sensitivity	0 [Off]	100	0	-
1.1.37	M2: Angular asymmetry validation time	0 [Off]	9999	5	Seconds
1.1.38	M2: Modular asymmetry sensitivity	0 [Off]	100	0	-
1.1.39	M2: Modular asymmetry validation time	0 [Off]	9999	5	Seconds
1.1.40	M2: Minimum frequency limmit	34 [Off]	100	34 [Off]	Hz
1.1.41	M2: Maximum frequency limmit	34 [Off]	100	34 [Off]	Hz
1.1.42	M2: Frequency alarm validation time	0 [Off]	9999	5	Seconds

18. PARAMETER TABLE

1.1.1 and 1.1.22 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 1.1.23 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 1.1.24 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 1.1.25 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 1.1.26 M1 and M2: Range for demand calculation:
Allows you to configure the demand accumulator integration time.
Demand is calculated by averaging the sum of voltages during the specified period of time and the values are updated at the end of each period.

1.1.6 and 1.1.27 M1 and M2: Minimum phase voltage limit:
Voltage value below which the low voltage alarm is triggered.

1.1.7 and 1.1.28 M1 and M2: Maximum phase voltage limit:
Voltage value above which the high voltage alarm is triggered.

1.1.8 and 1.1.29 M1 and M2: Maximum phase 1 current limit:
Current value above which the phase 1 high current alarm is triggered.

1.1.9 and 1.1.30 M1 and M2: Maximum phase 2 current limit:
Current value above which the phase 2 high current alarm is triggered.

1.1.10 and 1.1.31 M1 and M2: Maximum phase 3 current limit:
Current value above which the phase 3 high current alarm is triggered.

1.1.11 and 1.1.32 M1 and M2: Active power demand limit:
Total active demand value above which the high demand alarm is triggered.
Remarks: Module (both positive and negative)

1.1.12 and 1.1.33 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.

1.1.13 and 1.1.34 M1 and M2: Time to validate alarm:
Time elapsed between the moment the meter identified an alarm condition and its indication.

1.1.14 and 1.1.35 M1 and M2: Alarm inhibition delay:
Period of time after meter energization in which alarm events are taken into account.

1.1.15 and 1.1.36 M1 and M2: Angular asymmetry sensitivity:
Allows you to configure the sensitivity with which the meter detects angle asymmetry between. The higher the value of this parameter, the lower the error tolerance. The equation to determine the alarm detection limits is presented in item 15 – Detection of angular/modular asymmetry alarms.
it should be noted that the limits to indicate angular asymmetry error are given by "average of tolerance + shifts" and "average of shifts - tolerance". Therefore, it is important to note that the alarm detection limit depends on the current values of each measured phase.

To illustrate, knowing that the phase difference between two voltage phases in a three-phase system is ±120º and that the total sum of the phases is equal to 360º, if the function is configured with a value of 80, we will have:

- Upper limit: the alarm will be triggered when the angular offset is greater than 144º.
- Lower limit: the alarm will be triggered when the angular offset is less than 96º.

1.1.16 and 1.1.37 M1 and M2: Angular asymmetry validation time:
Time elapsed between the moment the meter identified an angular asymmetry alarm condition and its indication.

1.1.17 and 1.1.38 M1 and M2: Modular asymmetry sensitivity:
Allows you to configure the sensitivity with which the meter detects phase module asymmetry. The higher the value of this parameter, the easier the controller detects the error. The equation to determine the alarm detection limits is presented in item 14.3 – Detection of angular/modular asymmetry alarms. It is worth noting that the limits to indicate modular asymmetry error are given by "average voltage + tolerance" and "average voltage - tolerance". Therefore, it is important to note that the alarm detection limit depends on the current values of each measured phase.

To give an example, considering that the function is configured with a value = 80 and that the voltages of phases 1 and 2 are equal to 220VRMS:

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

1.1.18 and 1.1.39 M1 and M2: Modular asymmetry validation time:
Time elapsed between the moment the meter identified a modular asymmetry alarm condition and its indication.

1.1.19 and 1.1.40 M1 and M2: Minimum frequency limmit:
Frequency value below which the low frequency alarm is triggered.

1.1.20 and 1.1.41 M1 and M2: Maximum frequency limmit:
Frequency value above which the high frequency alarm is triggered.

1.1.21 and 1.1.42 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.

18.1.2 Alarms:
Parameters relating to alarm settings.

Function	Description	Minimum	Maximum	Standard	Unit
1.2.1	AL1: Low temperature	-50,1 [Off]	200,0	-50,1 [Off]	ºC
1.2.2	AL1: High temperature	-50,1 [Off]	200,0	-50,1 [Off]	°C
1.2.3	AL1: Hysteresis	0,1	200,0	2,0	°C
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]	200,0	-50,1 [Off]	ºC
1.2.10	AL2: High temperature	-50,1 [Off]	200,0	-50,1 [Off]	ºC
1.2.11	AL2: Hysteresis	0,1	200,0	2,0	ºC
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	-

18. PARAMETER TABLE

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 below 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

18.1.3 Auxiliaries:
Parameters relating to auxiliary output configurations.

Function	Description	Minimum	Maximum	Standard	Unit
1.3.1	AUX1: Operating mode	0	5	0	-
1.3.2	AUX1: Temperature setpoint	-50,0	200,0	-50,0	°C
1.3.3	AUX1: Hysteresis	0,1	200,0	2,0	°C
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	5	0	-
1.3.8	AUX2: Temperature setpoint	-50,0	200,0	50,0	°C
1.3.9	AUX2: Hysteresis	0,1	200,0	2,0	°C
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	5	0	-

18. PARAMETER TABLE

Function	Description	Minimum	Maximum	Standard	Unit
1.3.14	AUX3: Temperature setpoint	-50,0	200,0	50	°C
1.3.15	AUX3: Hysteresis	0,1	200,0	2,0	°C
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	5	0	-
1.3.20	AUX4: Temperature setpoint	-50,0	200,0	50,0	°C
1.3.21	AUX4: Hysteresis	0,1	200,0	2,0	°C
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

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

18.1.4 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

18. PARAMETER TABLE

Function	Description	Minimum	Maximum	Standard	Unit
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	-

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.

Ex1:
1.4.1 Event 1: Days of the week = STWTFSS
In this case, event 1 repeats every day

Ex2:
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.

Ex1:
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.

Ex2:
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.

18.1.5 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	Force registration in case of alarm	0 [No]	1 [Yes]	1 [Yes]	-
1.5.5	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 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.

1.5.5 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.

18.1.6 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

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18.1.7 Sensors:
Parameters relating to sensor offset settings.

Function	Description	Minimum	Maximum	Standard	Unit
1.7.1	S1: Offset	-50,0	50,0	0,0	°C
1.7.2	S2: Offset	-50,0	50,0	0,0	°C

1.7.1 and 1.7.2 S1 and S2 Offset:
Allows you to compensate for deviations in the temperature reading.

18.2 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	1 (Portuguese)	3 (Spanish)	1 (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:

1= Portuguese
2= English
3= 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.

18.3 Communication Setting:
MULTIPOWER has two independently configurable RS-485 communication ports for communication with Sitrad software or supervisors that use the MODBUS protocol.

Função	Description	Minimum	Maximum	Standard	Unit
3.1	RS485 - 1: Protocol	Sitrad	Modbus	Sitrad	-
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	Sitrad	-
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 you to configure the RS-485 port communication protocol:

0= Sitrad
1= MODBUS

3.2 and 3.7 RS-485-1 Address:
Allows you to configure the network address of the RS-485 port.

3.1 and 3.8 RS-485-1 Baud rate:
Communication data rates (Available only for MODBUS protocol).

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

3.2 and 3.9 RS-485-1 Parity:
Communication protocol parity. (Only available for the MODBUS protocol).

0= No parity
1= Even
2= Odd

3.3 and 3.10 RS-485-2: Stop Bits:
Number of stop bits. (Only available for the MODBUS protocol).

18.4 Data Management:
MULTIPOWER has a USB port for communication via flash drive, where it is possible to manage recipes and update the controller's firmware. Access path: **Main Menu → Data management.**

4.1 Recipe upload to Mem. Stick:
Copies the controller recipe to the flash drive memory.
The file will be stored in the **MULTIPOWER** folder and will have the name respecting the following logic:

MODELO_AAMMDD_HHMMSS.rec, in which:
MODEL = product model, AA= year, MM = month, DD = day, HH = hour, MM = minute, SS = second.

Example: A recipe exported on August 02, 2023 at 13:30:00 will have the name MULTIPOWER_230802_133000.rec.

4.2 Recipe download from Mem. Stick:
Copies the recipe from a Flash drive to the controller's memory.
MULTIPOWER searches for the recipe inside the **MULTIPOWER** folder. The recipe name can have a maximum of 32 characters, including the extension (.rec).

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

18.5 Restore factory defaults :
Allows you to restore all parameters to factory values.

19. ALARMS

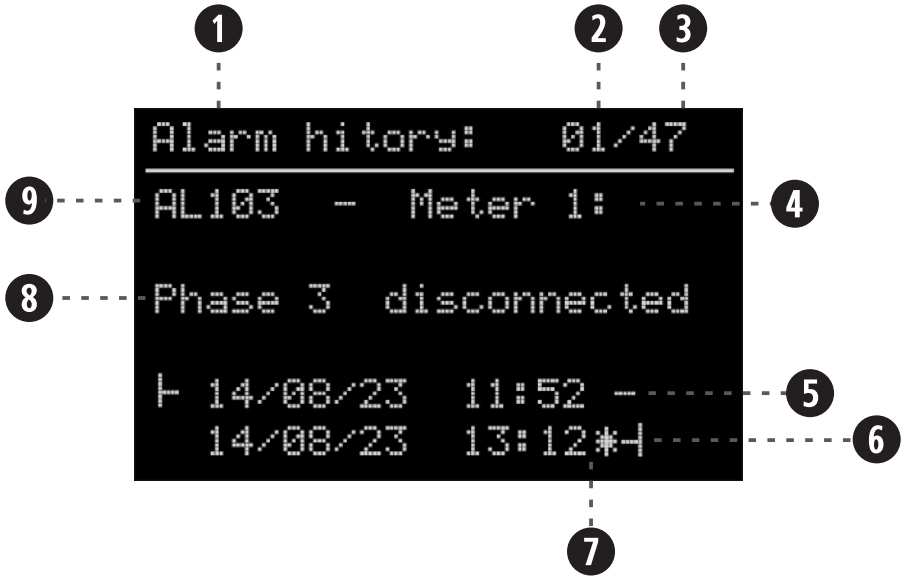
MULTIPOWER has an alarm management system. The alarm settings are linked to the electrical quantities of the meters and the values of the temperature sensors and digital inputs.
When an alarm occurs, an audible warning will be issued and will remain active until one of the following conditions occurs:

- 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)**.

19.1 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.

19. ALARMS

19.2 Alarm table:

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

19.2.1 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

19.2.2 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

19.2.3 M2 meter voltage and current alarms:

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 - Hihj voltage	Indicative alarm
AL210	M2 - Phase 1 - High current	Indicative alarm
AL211	M2 - Phase 2 - High current	Indicative alarm
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

19. ALARMS

Alarm	Description	Effect
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

19.2.4 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 temprature	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 temperatura	Turns on alarm output and turns off linked auxiliary output

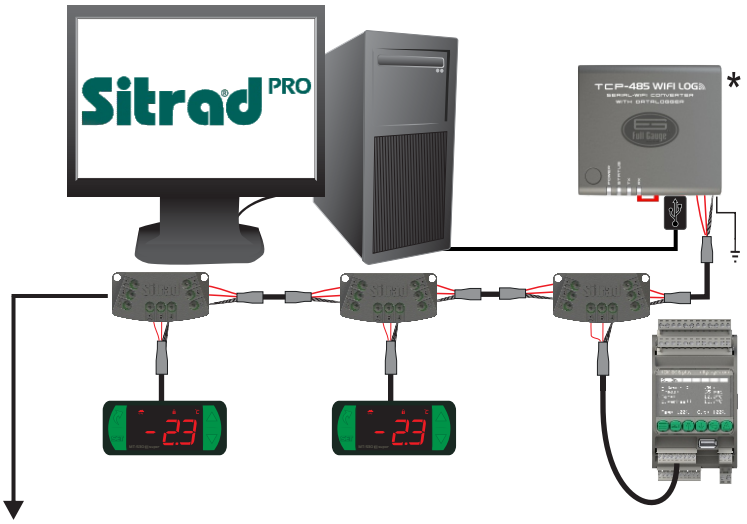
19.2.5 Sensor alarms, when the sensors have some type of defect, sensors are disconnected or the sensor itself is defective:

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

19.2.6 Alarmes externos:

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

20. 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®.

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.

21. IMPORTANT

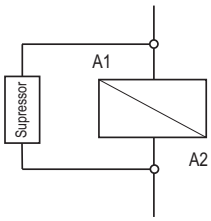
According to NBR 5410 standard chapters:

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.

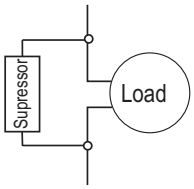
3. Install transient suppressors (RC filter) in parallel with the loads, in order to increase the life of the relays.

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

22.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.