User manual

MPX - 15/25kW UP TO 500kW

multipower

RIELLO ELETTRONICA

riello ups

INTRODUCTION

Thank you for choosing our product.
Our company is specialised in the design, development and manufacture of uninterruptible power supplies (UPS).

The UPS described in this manual is a high-quality product, carefully designed and manufactured to guarantee the best performance.

This manual provides detailed instructions for use and installation of the product.
For information about using and to get the maximum performance from your UPS, this manual should be carefully kept near the UPS and READ BEFORE ANY OPERATIONS ARE PERFORMED UPON IT.

NOTE: Some of the images in this document are provided as a guideline only, and they may not accurately reproduce the depicted product components.

SAFETY PRECAUTIONS

Read the safety manual provided before carrying out any operations on the Modular UPS System.

This manual describes how to use the product; for its installation and configuration please refer to the specific manuals.

ENVIRONMENTAL PROTECTION

While developing its products, the company spends great efforts in analysing environmental issues. All our products seek the objectives defined by the policies of the environmental management system, developed by the company according to the current legislation.

No harmful material such as CFC, HCFC or asbestos can be found in this product.

The packaging is made of recyclable material. Please dispose of the individual elements according to the current legislation in force in the country where the product is to be employed. Please refer to the following table for identifying the materials:

DESCRIPTION	MATERIAL	
Pallet	Wood (FOR)	
Packaging box	Corrugated cardboard (PAP)	
Protective bag	High Density Polyethylene (PE-HD)	
Adhesive buffers	Low Density Polyethylene (PE-LD)	
Bubble Cushioning Wrap		

DISPOSAL OF THE PRODUCT

The UPS contains materials which (in case of decommissioning/disposal) are considered TOXIC and DANGEROUS WASTE, for example circuit boards and batteries. Treat such material according to the current legislation by using licensed centres. Their correct disposal helps to protect the environment and human health.
If some of the components are to be stored before being disposed of, make sure to store them in secure areas protected from weather conditions, in order to avoid soil and groundwater contamination (especially with materials such as lead or the battery electrolyte).

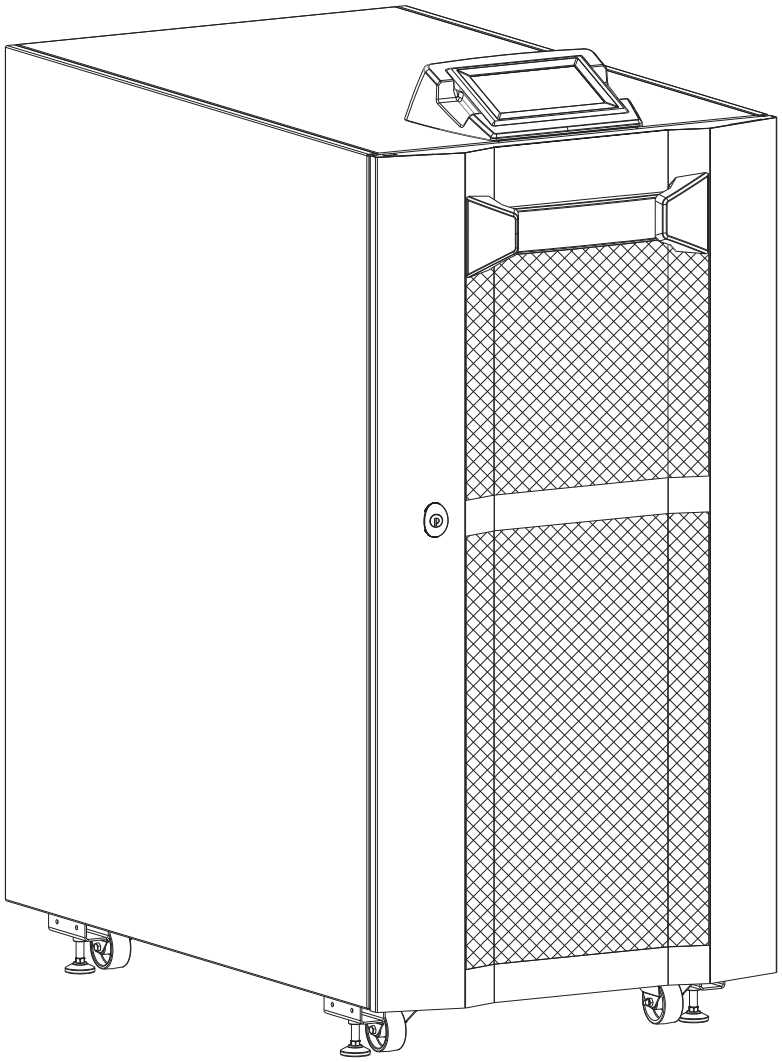
CONTENTS

PRESENTATION

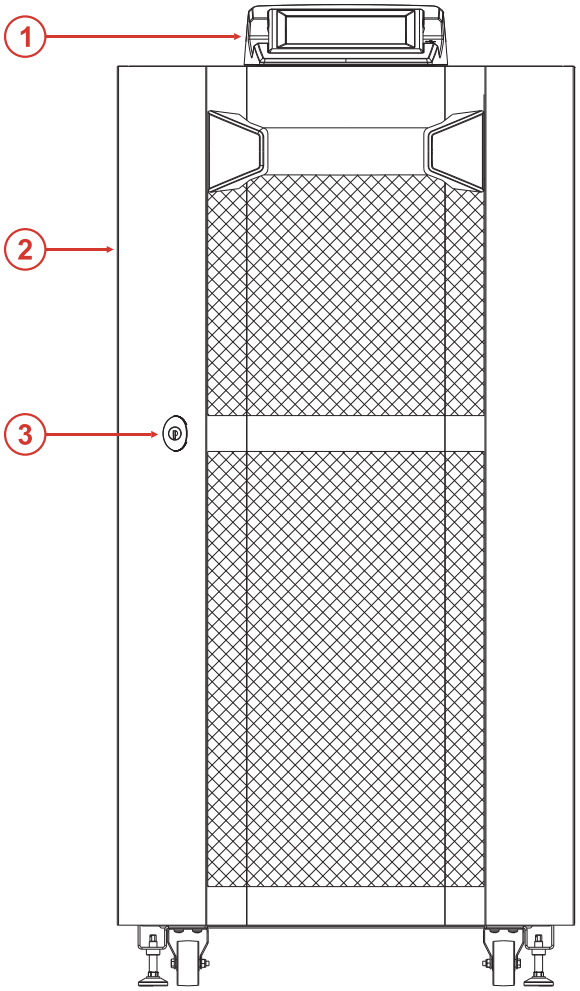
MULTI POWER MPX 15/25kW UP TO 500kW

The MPX modular UPS has been designed using the latest state of the art technology to ensure maximum resilience and performance; additionally, the use of three level Neutral Point Clamped (NPC) inverter and Power Factor Corrected (PFC) input control ensures the highest levels of performance such as:

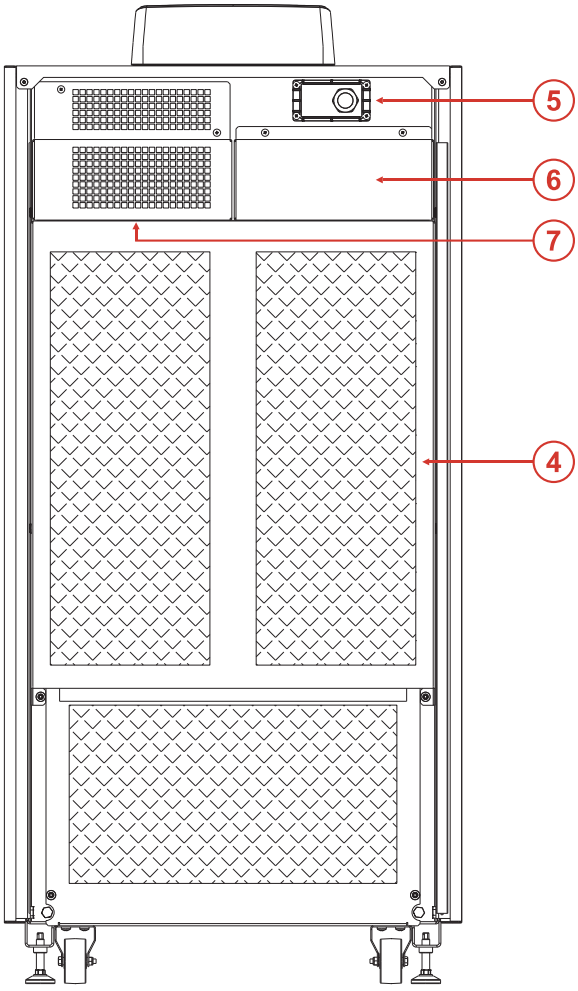
- OUTSTANDING EFFICIENCY; High system efficiency whilst operating in on-line double-conversion mode.
- ULTIMATE SCALABILITY; with 15/25kVA unity power factor (PF) power modules ensures the highest power density with ultimate scalability.
- UTMOST AVAILABILITY; designed to have a redundant power module in each power rack to provide reliability in terms of resilience and the availability of the UPS system.
- EASY CONTROL; using the latest colour touch screen technology the connectivity module provides easily navigable menus using icons to see the full status of the MPX UPS without having a single point of failure.



MODULAR UPS POWER CABINET (MPX 130 PWC)



Front view



Rear view

① Display

② Door

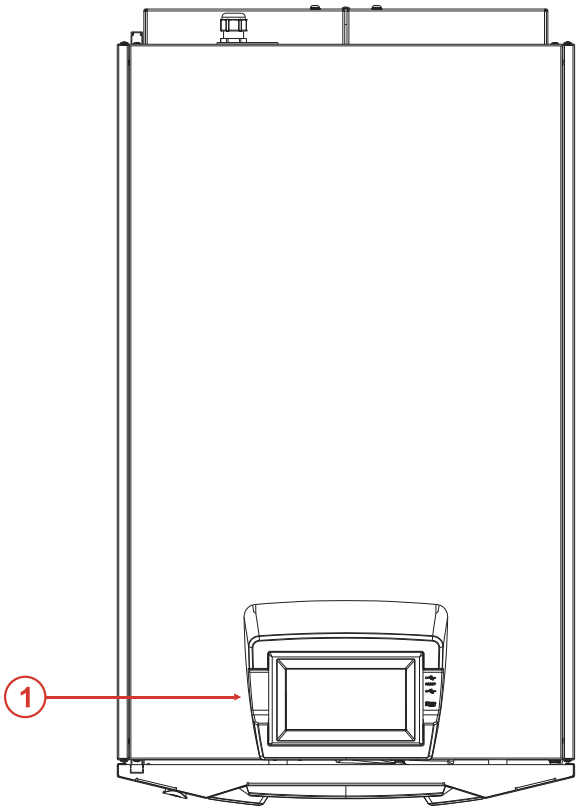
③ Lock

④ Back Panel

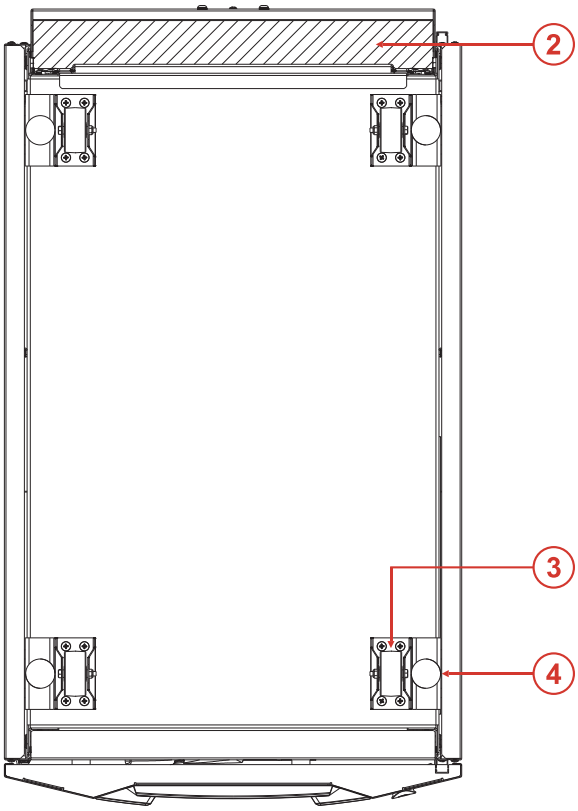
⑤ Relay Slot

⑥ ASB Panel

⑦ CIB Panel



Top view



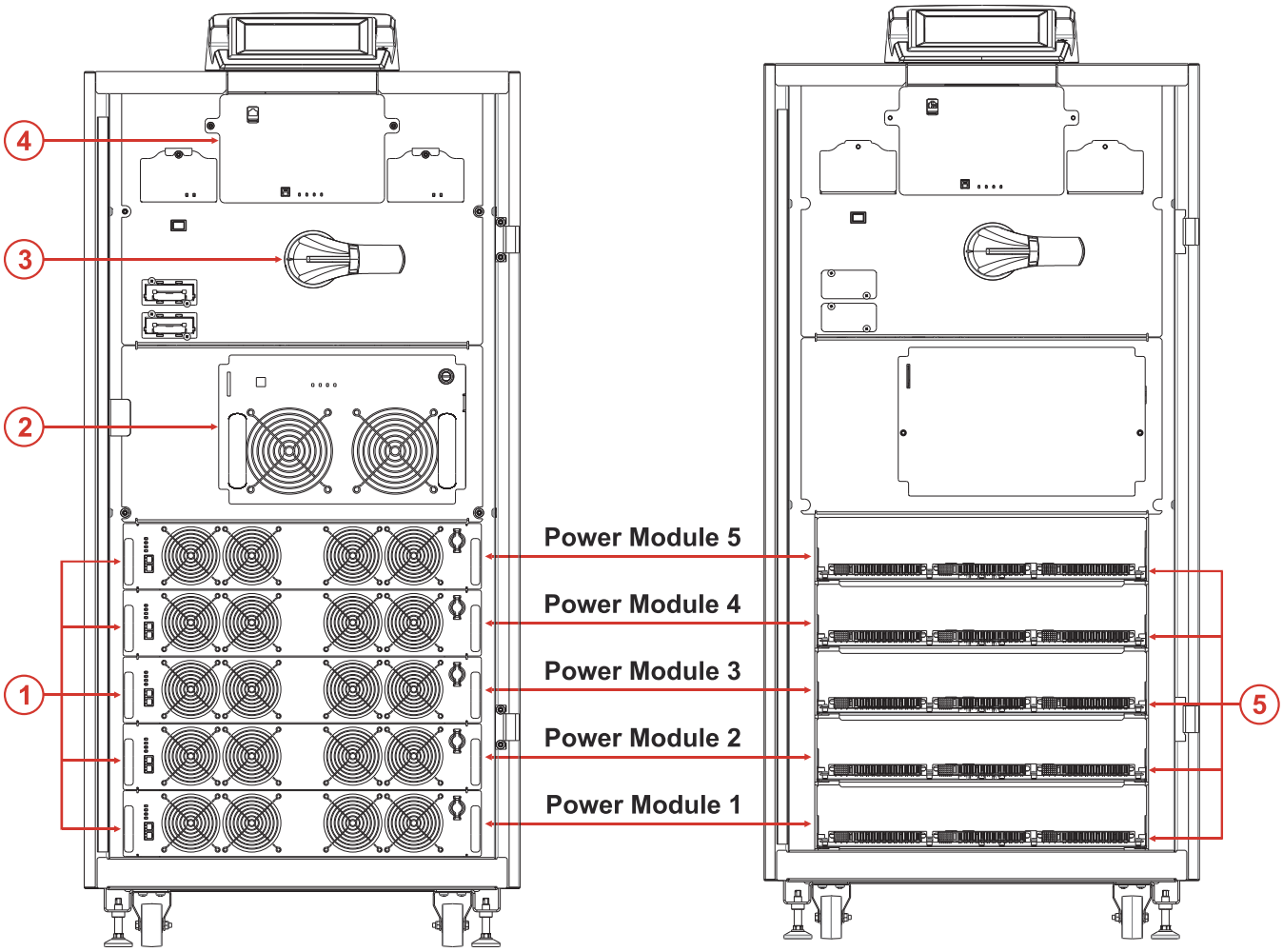
Bottom view

① Display

② Bottom cable entry

③ Wheels

④ Fastening stands



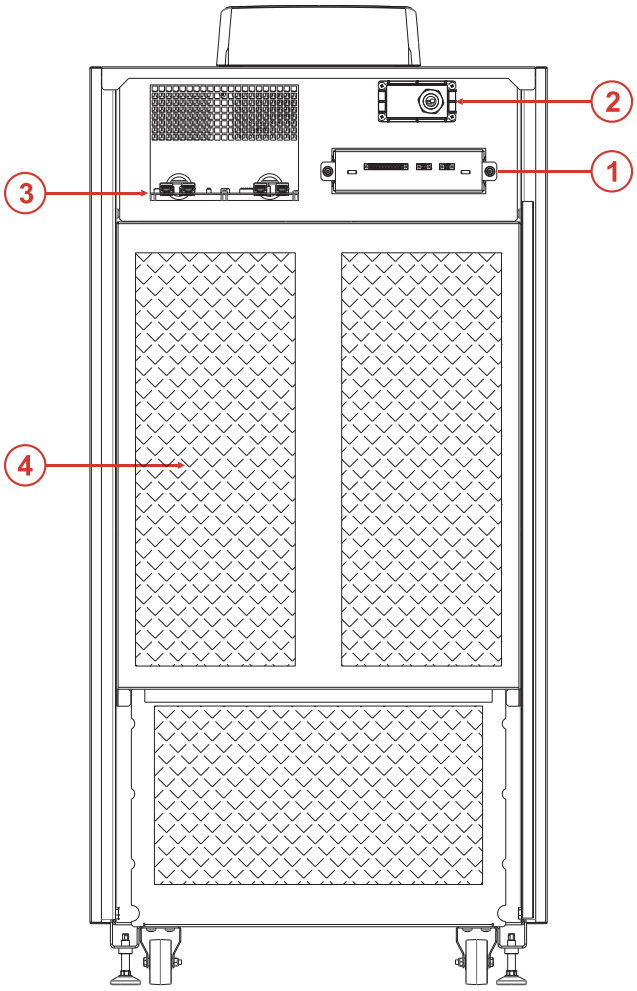
Front view – door open

Power Modules inserted

Front view – door open

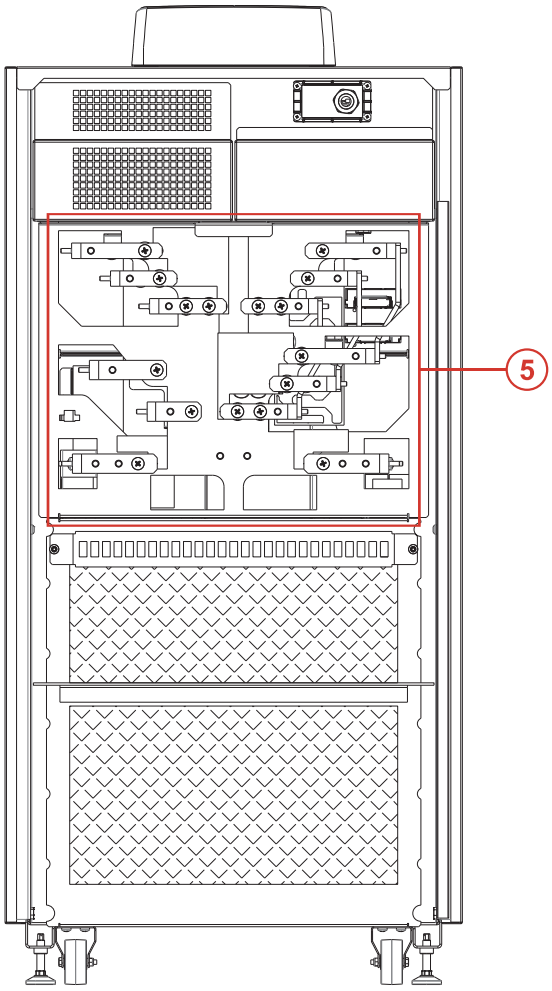
Power Modules extracted and respective blanking plates removed

1. Power Module 15/25kW (MPX 15 PM/MPX 25 PM)
2. Bypass Module (BM)
3. Manual Bypass switch (SWMB)
4. Connectivity Panel (CP)
5. Backplane: Power and communications interface connections between the PM and the cabinet



Rear view

Without the signal board panels

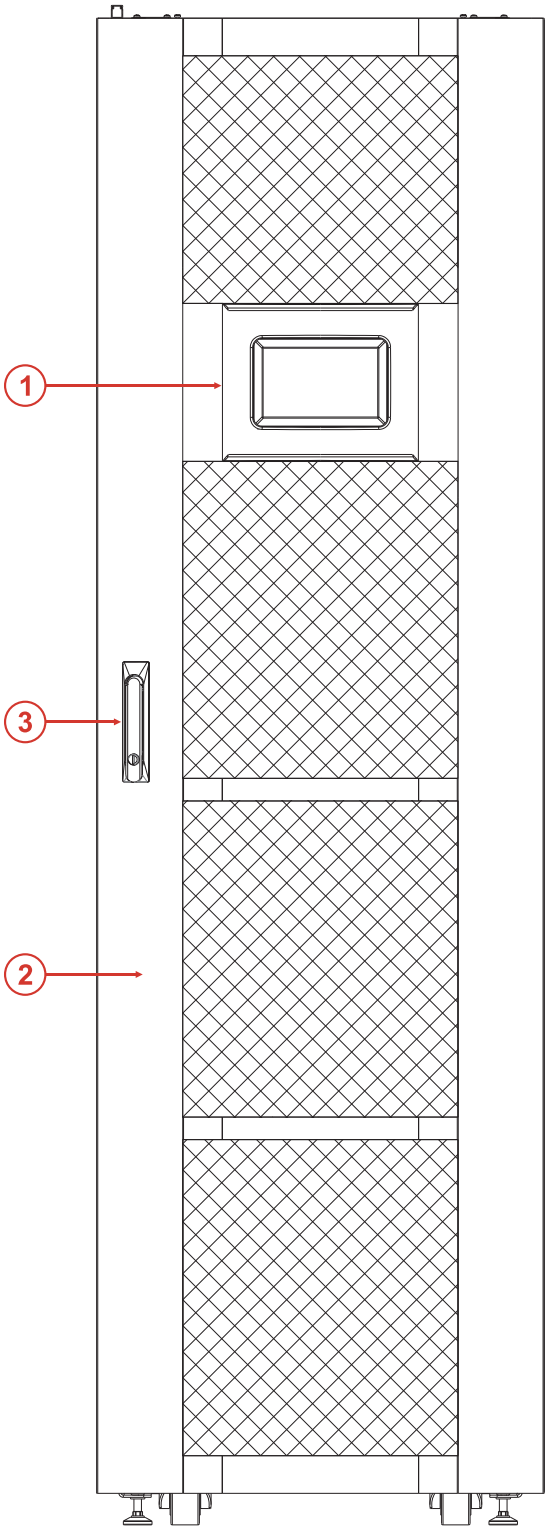


Rear view

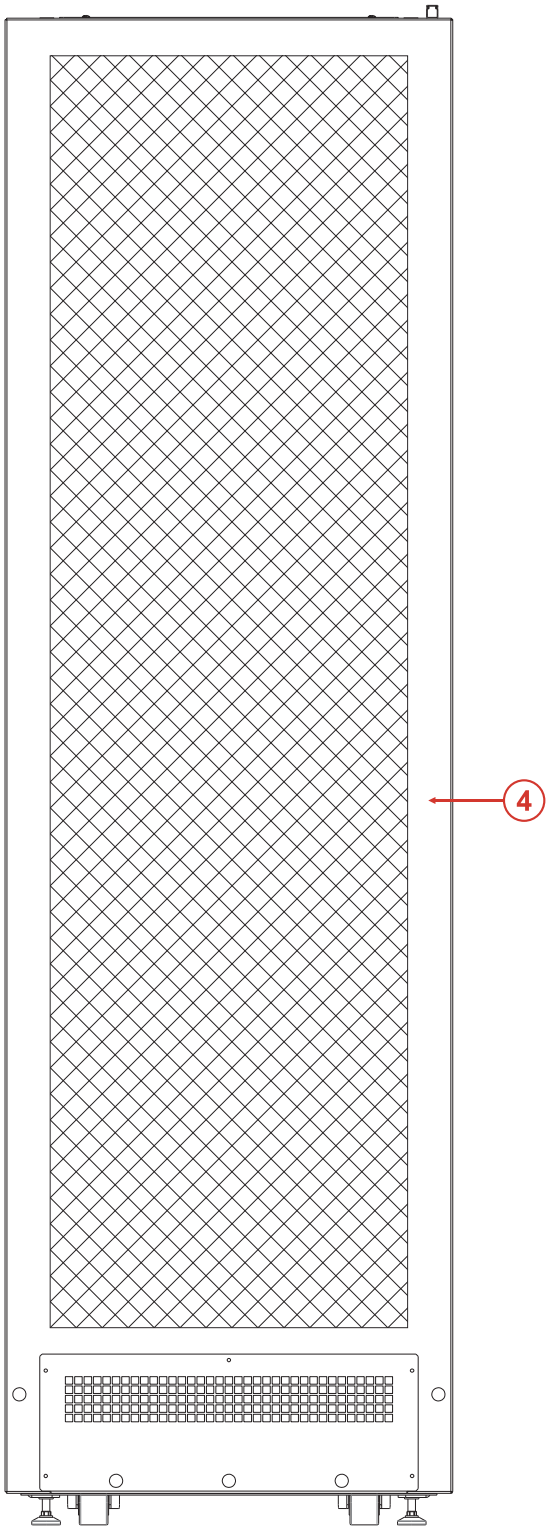
without the connections cover

1. Auxiliary Signal Board (ASB)
2. Relay Slot
3. Cabinet interface Board (CIB) (Option)
4. Connections cover
5. Power connections area

MODULAR COMBO CABINET (MPX 100 CBC)



Front view



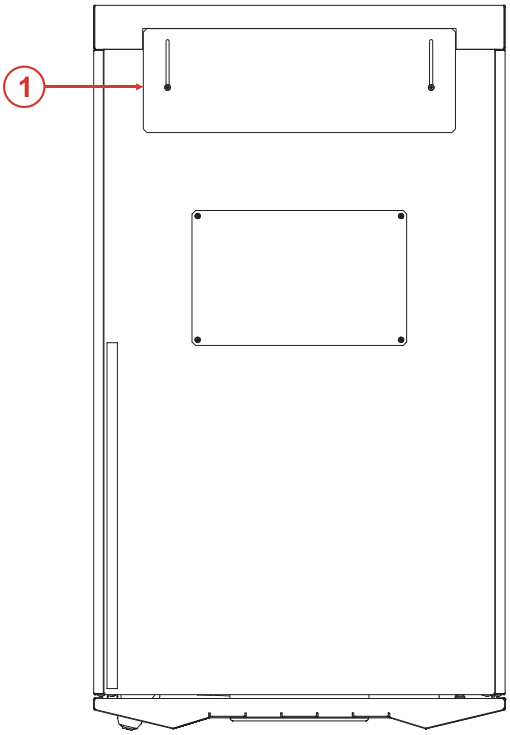
Rear view

① Display

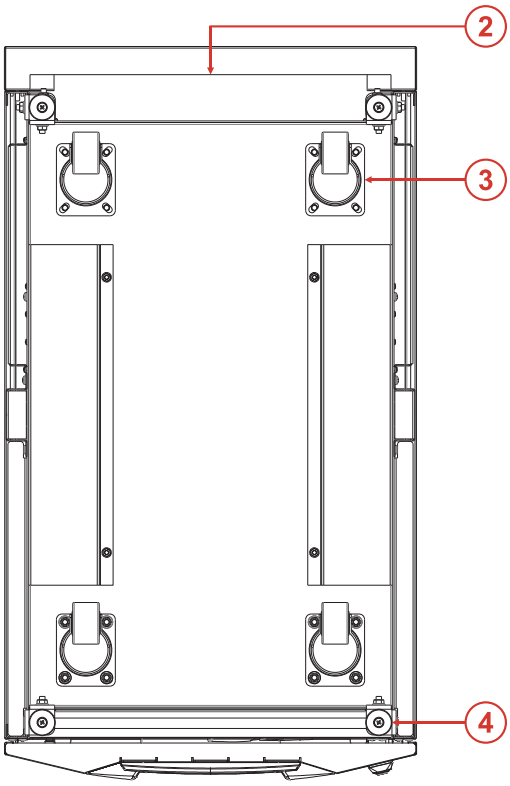
② Door

③ Handle with lock

④ Back Panel



Top view



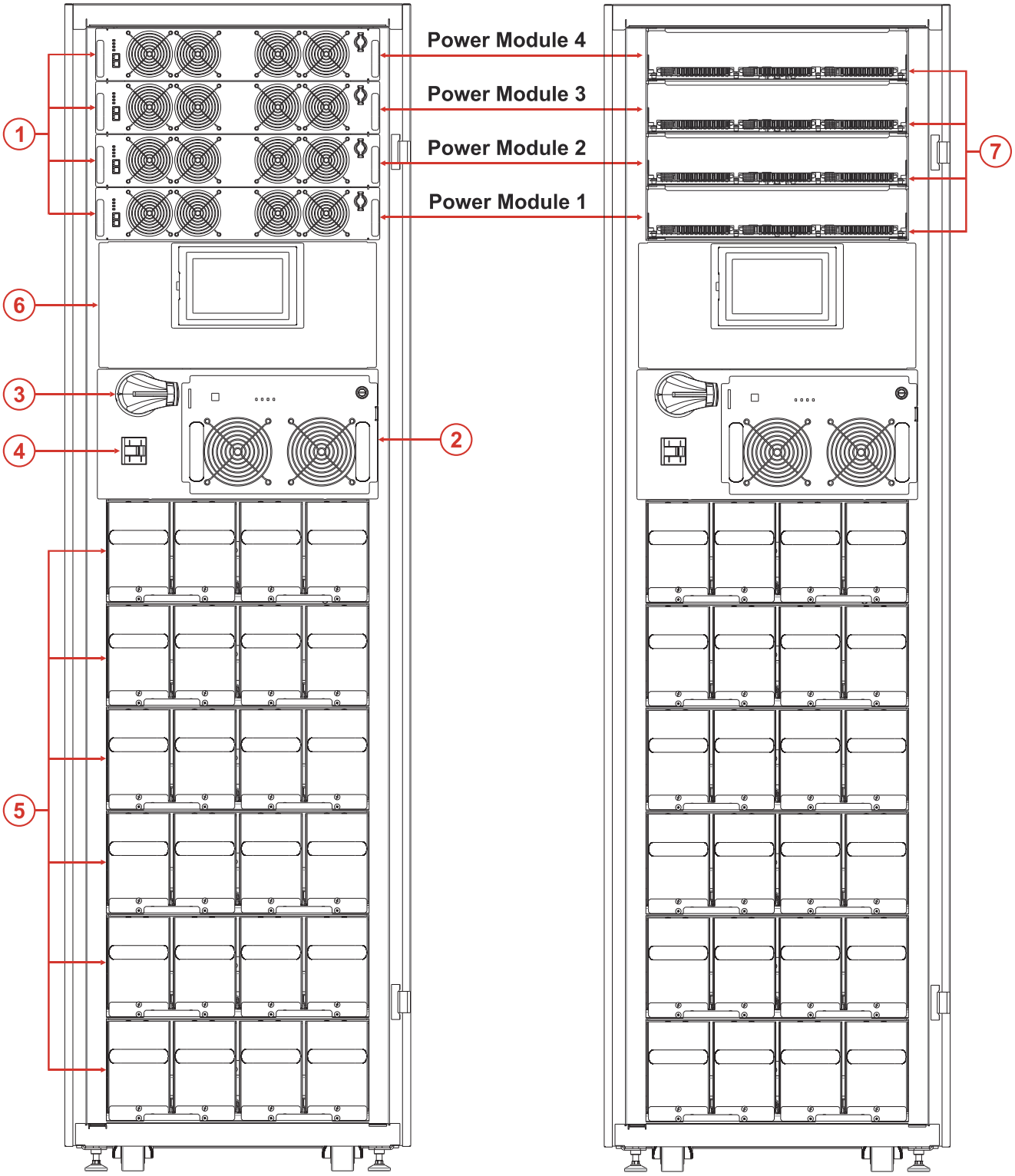
Bottom view

① Top cable entry

② Bottom cable entry

③ Swivel castors for positioning

④ Fastening stands



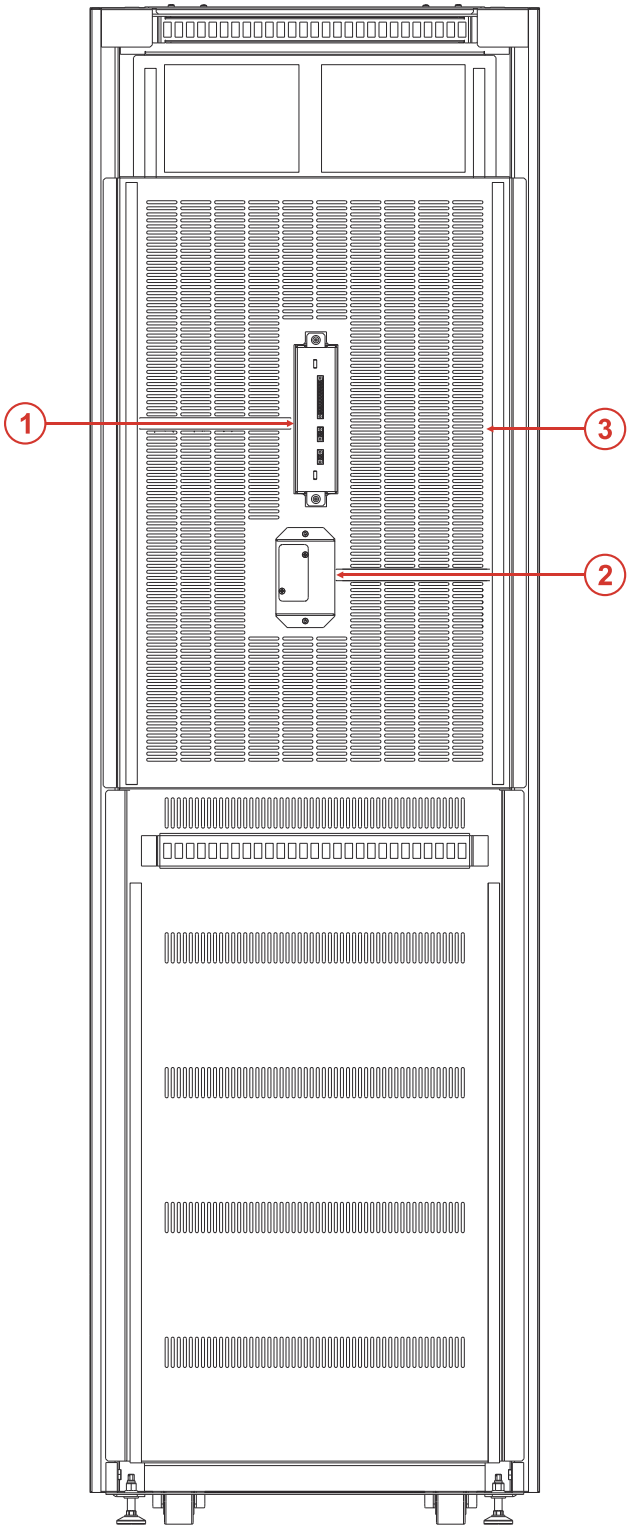
Front view - open door

Power Modules inserted

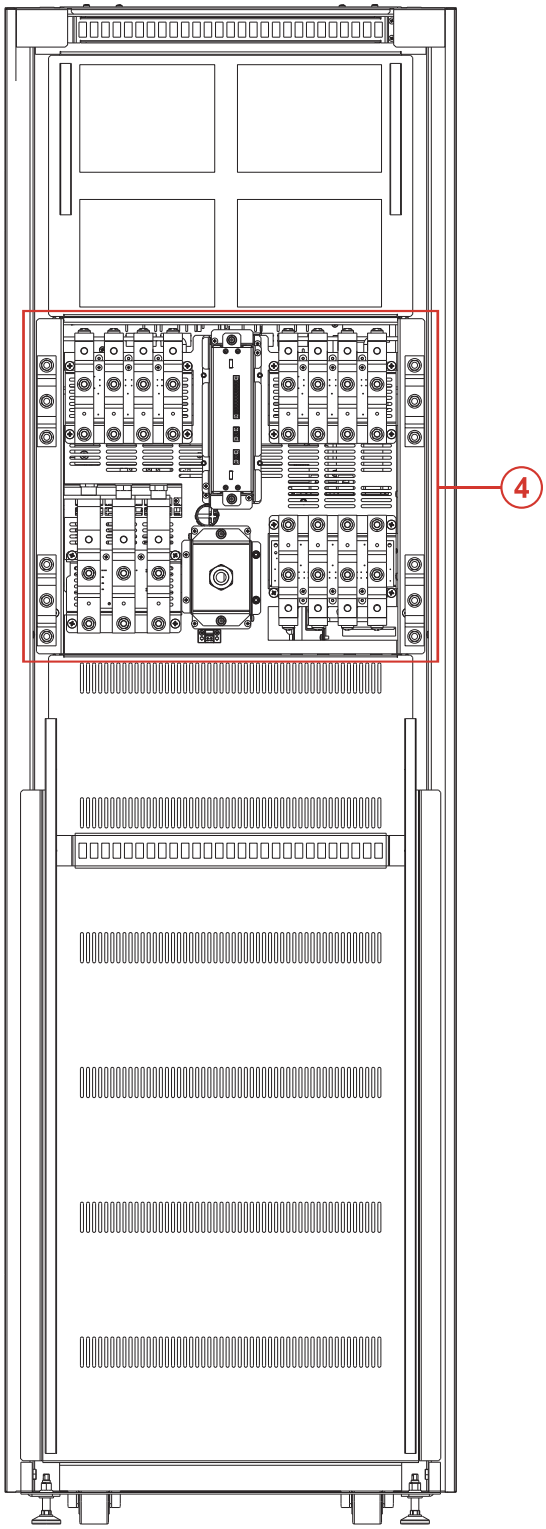
Front view - open door

Power Modules extracted and respective blanking plates removed

1	Power Module (PM)	5	Battery Unit
2	Bypass Module (BM)	6	Connectivity Panel (CP)
3	Manual Bypass switch (SWMB)	7	Backplane: power and communications interface connections for the PM
4	Battery Switch (SWBATT)		



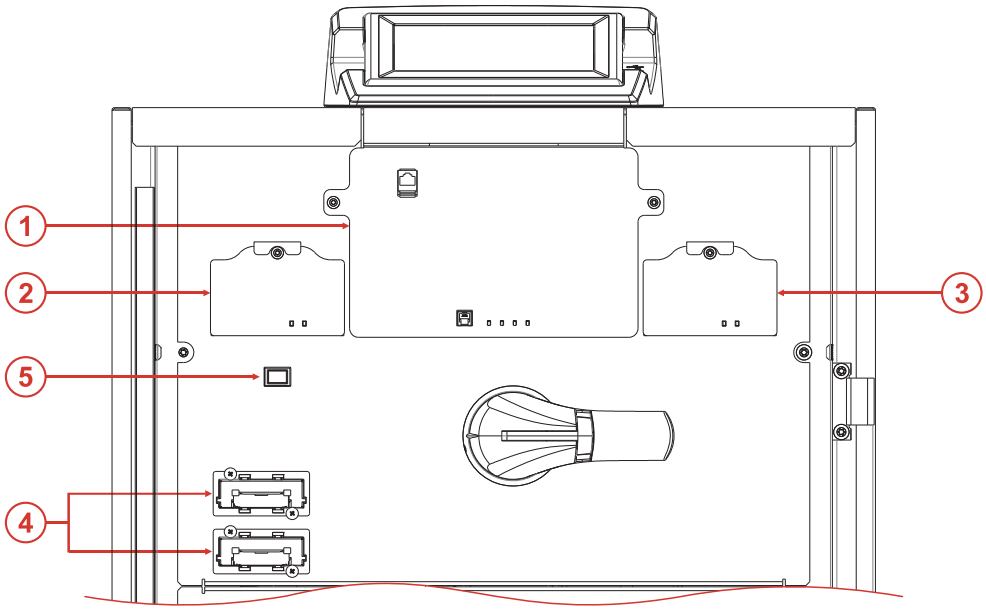
Rear view
without rear panel



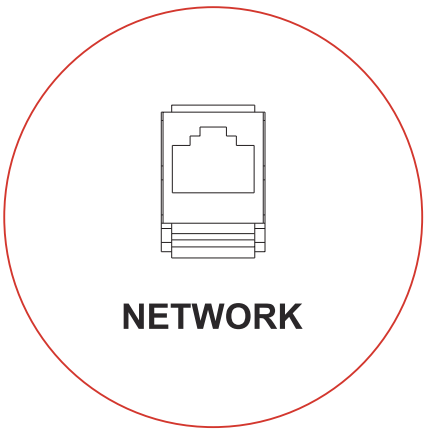
Rear view
without connections cover

1. Auxiliary Signal Board (ASB)
2. Relay Slot
3. Connections cover
4. Power connections area

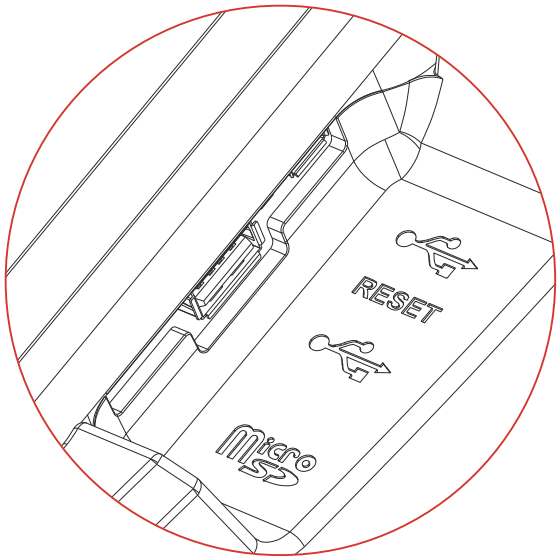
MPX 130 PWC USER INTERFACE



1. Connectivity Panel (CP)
2. Power Supply Unit 1 (PSU 1)
3. Power Supply Unit 2 (PSU 2) [optional]
4. Communication Slots for housing the expansion cards
5. Cold Start [optional]



The Connectivity Panel is provided with a network connection to enable the remote operation of the system.

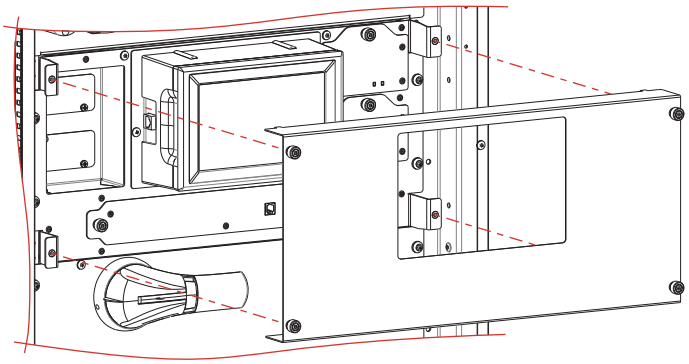


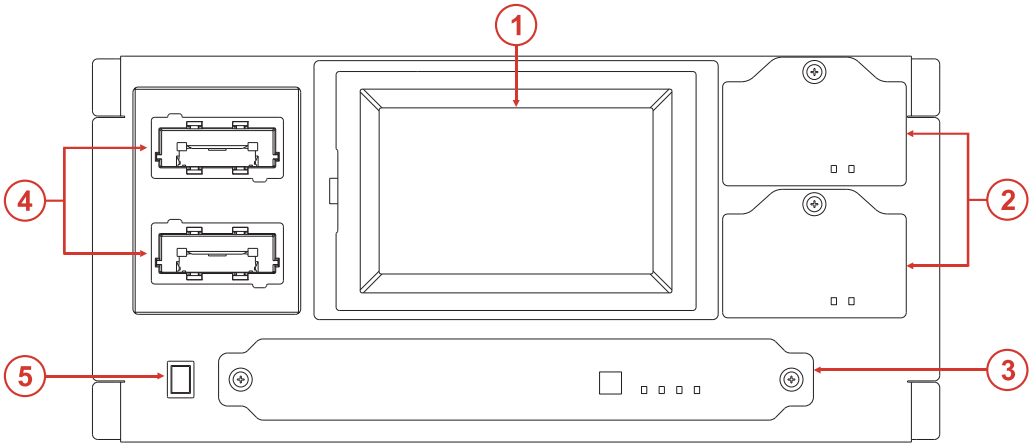
The right side of the display is equipped with connection ports (SA ports) that are reserved for trained service personnel only. Do not connect to the SA ports without specific instructions.

NOTE: For further information refer to the chapter “Remote Communication and accessories”

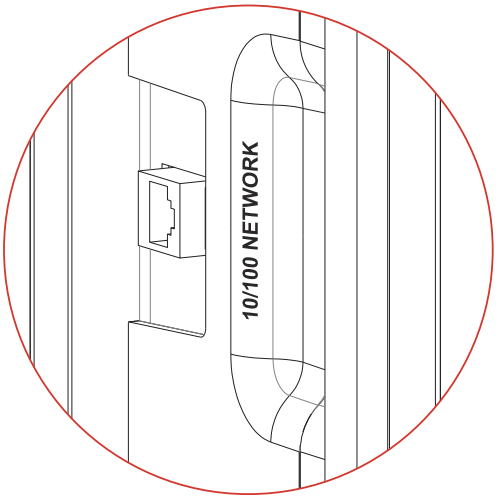
MPX 100 CBC USER INTERFACE

Unscrew the fastening knobs and remove the protection cover to access the components within the Connectivity Panel (CP).

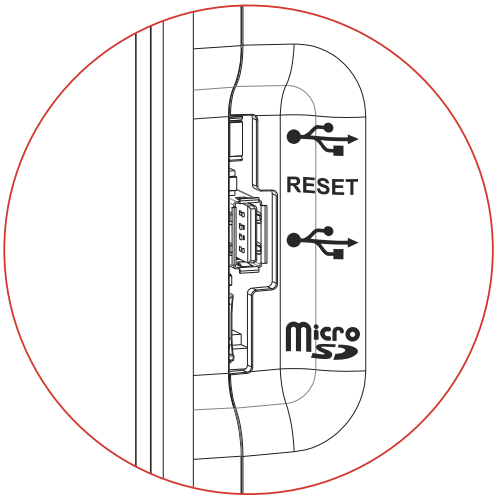




1. Main Communication Unit (MCU)
2. Power Supply Units (PSU 1 & 2)
3. Monitoring Unit (MU)
4. Communication Slots for housing the expansion cards
5. Cold Start [optional]



A network connection port is located on one side of the display to enable the remote operation of the system.



The right side of the display is equipped with connection ports (SA ports) that are reserved for trained service personnel only. Do not connect to the SA ports without specific instructions.

NOTE: For further information refer to the chapter “Remote Communication and accessories”

OPERATING MODE

MODULAR UPS SYSTEM

A Modular UPS System is intended to ensure a perfect supply voltage for the equipment connected to it, both with and without a power supply network. Once connected and powered, the system generates an alternating sinusoidal voltage, with stable amplitude and frequency, regardless of surges and/or variations affecting the electrical supply.
With no mains power, the system will power the load by taking energy from the batteries. When the batteries run out, the system will switch off. When the mains power is restored, the load will be automatically powered according to the AUTORESTART setting.

The Modular UPS System features three types of cabinets: Modular UPS Power Cabinet, Modular UPS Combo Cabinet and Modular Battery Cabinet, whose main functions and features will be highlighted within this manual.

The Modular UPS System can operate with different modes:

NORMAL MODE

During the NORMAL MODE, the system operates in On Line double conversion. This mode provides the maximum protection level for the load, the energy coming from the supply network (AC), is converted in order to provide a clean and stable output. The voltage supplied to the load is a perfect sine wave, with the frequency and voltage independent of the incoming mains supply (VFI technology). During this mode, the batteries are constantly maintained in a charged condition.

BATTERY MODE

When the AC power network falls outside the pre-set tolerances, for example, in case of a blackout or voltage or frequency fluctuation, the system automatically switches to the BATTERY MODE and takes power from the batteries to support the load.
When the AC network is again clean and stable, the system returns back to the NORMAL MODE operation.
The Power Walk-In function can be activated through the configuration software. This function allows, upon reconnection to the network (following a supply failure), a progressive absorption of power from the incoming supply, in order to avoid stressing (due to the inrush current) a generator which is installed upstream (if fitted). The duration of the transition mode can be set between 1 to 125 seconds. The default value is 10 seconds (when the function is enabled). During the transition mode the required power is partially collected from the batteries and partially from the network whilst maintaining a sinusoidal take-up. The battery charger is switched on again when the transition mode ends.

AUTOMATIC STATIC BYPASS MODE

During this operation mode, the load is directly powered by the AC supply, therefore, any input disturbances will directly affect the connected load.

ECO MODE

In order to optimise efficiency, in ECO [(1)] mode, the load is normally powered via bypass (any disturbances that occur within the supply network can affect the connected load). In the event of a mains power supply failure or if the power supply is not within the pre-set tolerances, the UPS will switch to normal ON LINE operation with double conversion. Approximately five minutes after the power supply returns within tolerance, the load is switched back to bypass.

FREQUENCY CONVERTER MODE

The system can be configured in this mode to generate a fixed output frequency different from the input frequency. In this configuration the bypass line will be automatically disabled.

EFFICIENCY CONTROL MODE

The EFFICIENCY CONTROL mode[(1)] improves the system overall efficiency, particularly at low loads, while preserving the ON LINE mode and the configured redundancy level. The PMs that are not required to support the applied load are placed in a low consumption state. In the event of a mains power supply failure or if the power supply is not within the specified conditions, all of the PMs switch to normal ON LINE operation with double conversion. If there are any sudden and/or high load increases, the system continuity is guaranteed with a possible temporary transfer to bypass.

NOTE: The Home Page always displays the active operating mode.

[(1)] These operating modes can only be selected via the “Expert” user profile (see “Access level selection”)

MANUAL BYPASS MODE

WARNING: <u>The SWMB disconnection switch installed within the Modular UPS Cabinet is not a maintenance bypass switch</u>, <u>therefore, there are dangerous voltages within the Cabinet, even if this disconnection switch is closed</u>.

CAUTION: Contact a service centre should any malfunctions be detected. Maintenance can be carried out only by skilled staff authorised by the manufacturer.

CAUTION: dangerous voltages can be present inside the device, even if the input, bypass, output and battery switches are open.
The removal of any panels from the Modular UPS Cabinet by non-skilled personnel is a source of danger and may cause damage to the operator, to the equipment and to the load connected to it.

Transferring the Modular UPS system into the MANUAL BYPASS MODE must be performed as follows to ensure that power to the connected load is not lost.

Caution: if the system is in battery mode, operation of the Manual Bypass may disrupt the power to the connected load.

1. Close the Manual Bypass SWMB disconnection switch located behind the door: at this point the input is directly connected to the output.
2. During this mode of operation, any disturbances or blackouts within the power supply line will impact the connected load (the Modular UPS Cabinet is no longer active, and the load is directly connected to the mains supply network).
3. The display will show that the system has now been transferred to Manual Bypass.

Transferring the Modular UPS Cabinet from the MANUAL BYPASS MODE to NORMAL MODE must be performed as follows to ensure that power to the connected load is not lost (<u>perform this only if no anomalies or malfunctions are present and if the system is operational</u>):

1. Ensure that the Bypass Module (see the “Modules and Units” chapter) is present and switched on.
2. Open the SWMB disconnection switch by rotating the handle anti-clockwise.
3. The Bypass Module will activate and then the entire Modular UPS Cabinet will be switched on.

MODULAR UPS POWER CABINET (MPX 130 PWC)

The Modular UPS Power Cabinet MPX 130 PWC may contain up to 5 Power Modules (MPX 15 PM or MPX 25 PM) and one Bypass Module MPX 130 BM (BM126X).

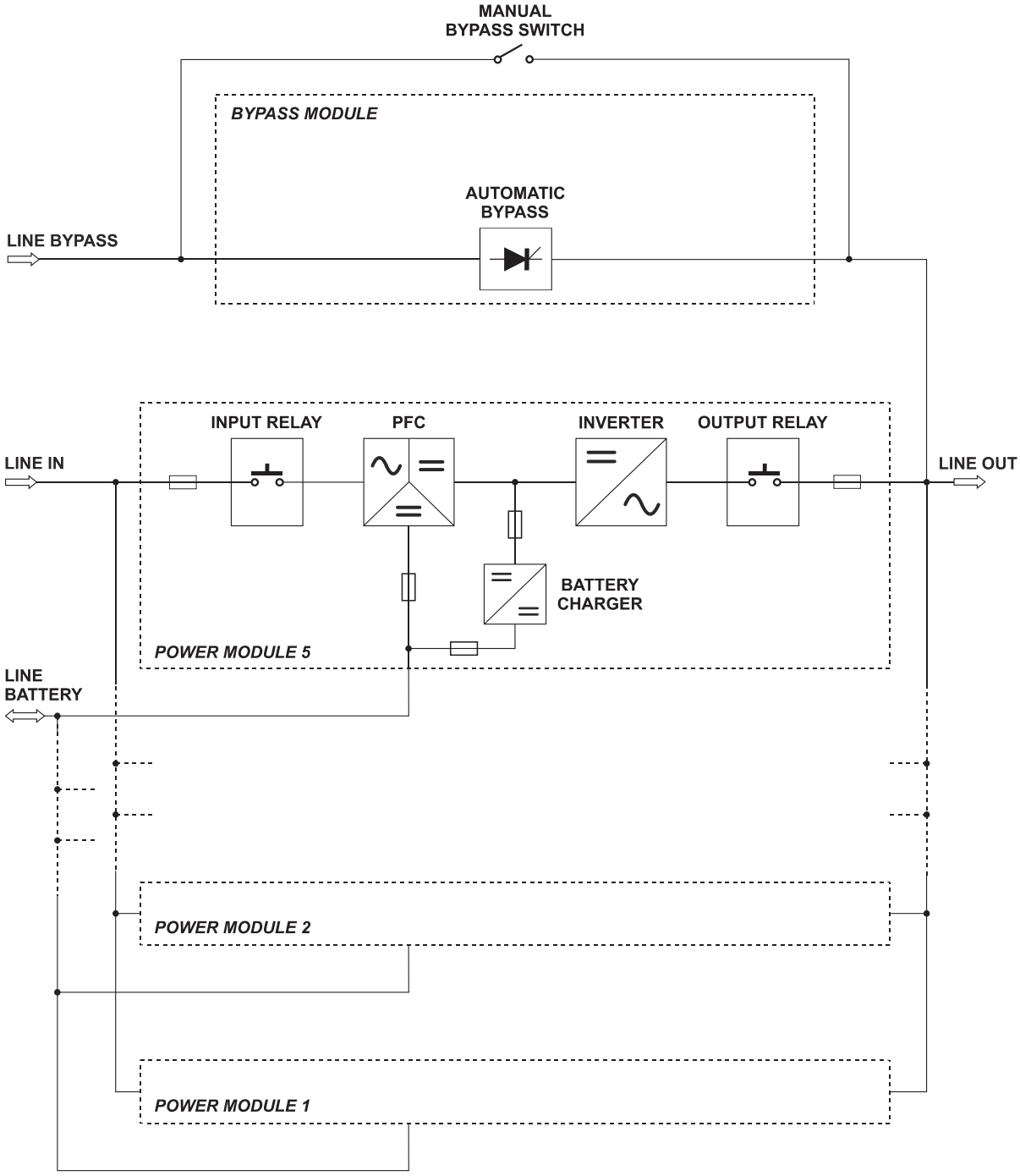
PMs are UPSs connected in parallel in order to increase reliability in the supply of power to the connected load and to increase the power available at the output (ref. to the "Modules and Units" chapters)
The load that can be applied to a Modular UPS Cabinet can be higher than the load that can be sustained by each unit thanks to automatic power-sharing. Increased reliability is only achieved on condition that the total system power, with one or more PMs deactivated, remains higher than the demand. This condition is always achieved by adding at least one redundant PM to the minimum number of elements required to power the load, so that after the automatic exclusion of a faulty PM, the power supply can continue as required.
Each PM is equipped with a smart control unit, connected through a data bus with the other PMs within the system, achieving a high reliability distributed logic.

<u>Note:</u> the redundancy level required by the PMs may be set-up during the initial configuration.

The Bypass Module (BM) operates as the central AUTOMATIC BYPASS for the whole Modular UPS Cabinet (ref. to chapter “Modules and Units”).

In order to further increase the power of the system, multiple Modular UPS Power Cabinets can be connected in parallel, up to 4. The maximum configuration will therefore be 20 PMs connected in parallel.

A wring diagram of the Modular UPS Power Cabinet is provided below.



MODULAR BATTERY CABINET (MPW 170 BTC)

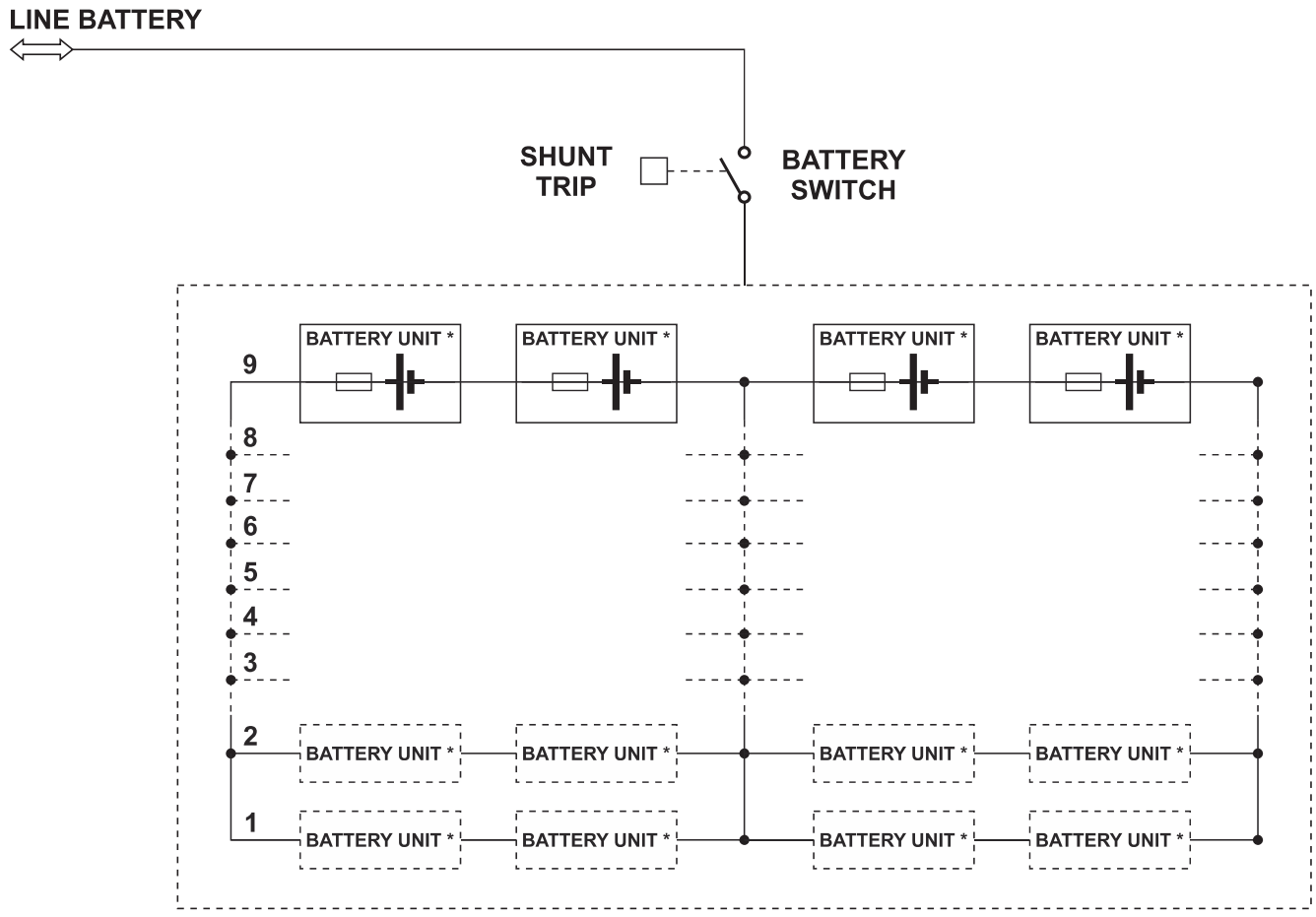
The Modular Battery Cabinet consists of 9 shelves, each of which may contain 4 Battery Units (BU). The BU contains 10 x 12V batteries (refer to “Modules and Units” chapter).
The Modular Battery Cabinet has an electronic supervision system which, through voltage and current sampling, is able to measure the condition and any anomaly within each of the Battery Units. The collected data is sent to the system through a data bus and shown on the display of the Modular UPS Cabinet.
In addition, within the Modular Battery Cabinet there is an SWBATT disconnection switch which enables the BUs to be disconnected from the Modular UPS Cabinet. The cabinet also features an opto-isolated input which enables the SWBATT switch to be opened remotely.

CAUTION: each shelf of the Modular Battery Cabinet can be filled (with the 4 BUs) based on the autonomy requirements of the system (up to a maximum of 9 shelves). <u>The minimum number of fully populated battery shelves must follow the rules set out in the table below:</u>

Number of non redundant PMs	MPX 15 PM Minimum number of battery shelves	MPX 25 PM Minimum number of battery shelves
1	1	2
2	2	3
3	3	5
4	4	8
..	…	…
N	Nx1	Nx2

Multiple Modular Battery Cabinets, up to 10, can be present within the Modular UPS System.

The wiring diagram of the Modular Battery Cabinet is provided below.



**** BATTERY UNIT: N.10 BLOCKS 12V 9Ah***

MODULAR UPS COMBO CABINET (MPX 100 CBC)

The Modular Combo Cabinet may contain up to 4 Power Modules (PM), 1 Bypass Module (BM) and 6 battery shelves. Each shelf may contain 4 Battery Units (BU). The BU contains 10 x 12V batteries (refer to “Modules and Units” chapter).

PMs are UPSs connected in parallel in order to increase reliability in the supply of power to the connected load and to increase the power available at the output.
The load that can be applied to a Modular UPS Cabinet can be higher than the load that can be sustained by each unit thanks to automatic power-sharing. Increased reliability is only achieved on condition that the total system power, with one or more PMs deactivated, remains higher than the demand. This condition is always achieved by adding at least one redundant PM to the minimum number of elements required to power the load, so that after the automatic exclusion of a faulty PM, the power supply can continue as required.
Each PM is equipped with a smart control unit, connected through a data bus with the other PMs within the system, achieving a high reliability distributed logic.

Note: the redundancy level required by the PMs may be set-up during the initial configuration.

The Bypass Module (BM) operates as the central AUTOMATIC BYPASS for the whole Modular UPS Cabinet (ref. to chapter “Modules and Units”).

In order to further increase the power of the system, multiple Modular UPS Combo Cabinets can be connected in parallel, up to 4.

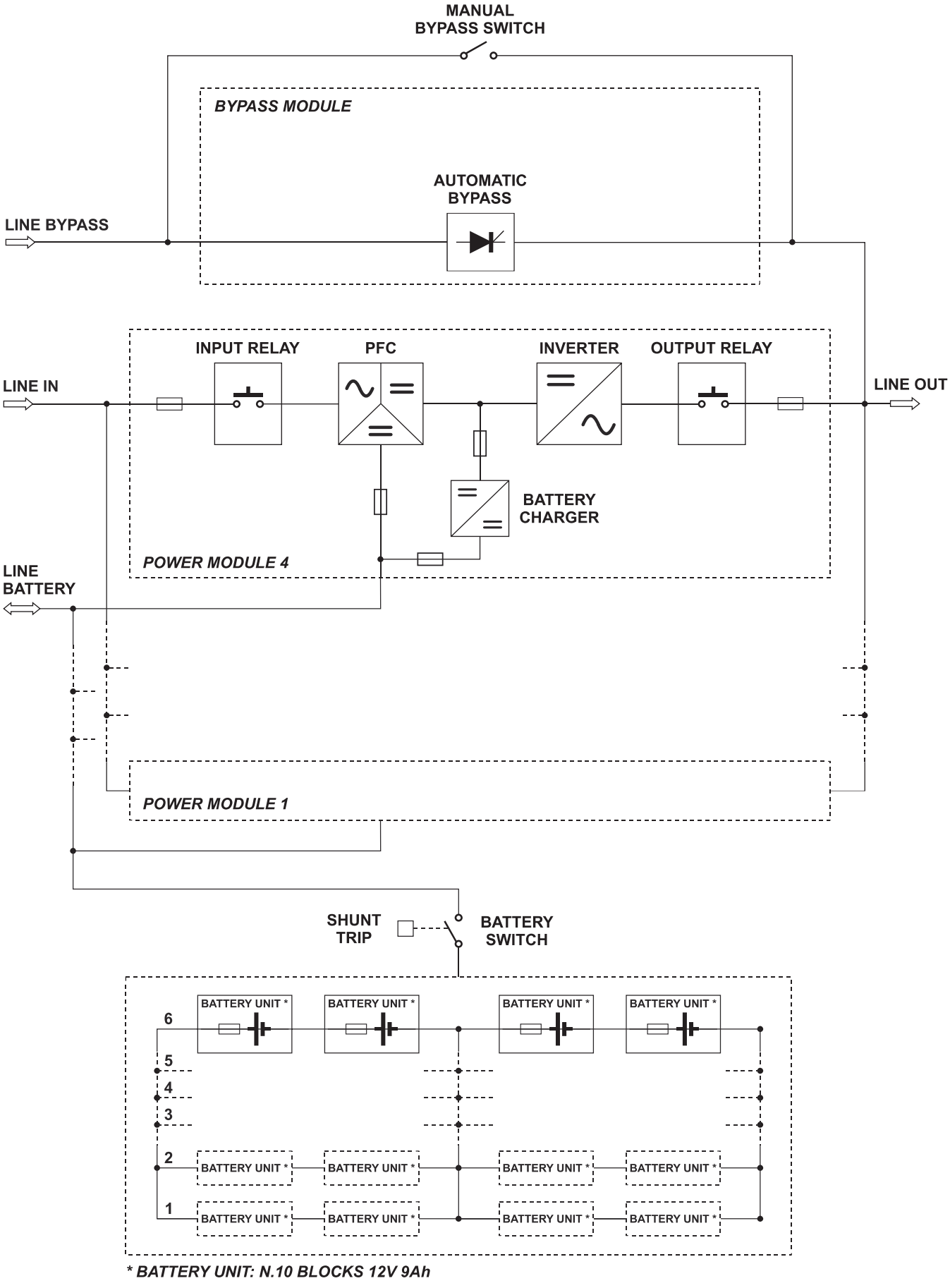
CAUTION: the Modular UPS Combo Cabinet can use both internal batteries and external batteries. It’s mandatory to use only modular “MPW Battery Cabinets” as the external battery source if the modular internal Battery Units are installed.

The Modular Combo Cabinet has an electronic supervision system which, through voltage and current sampling, is able to measure the condition and any anomaly within each of the Battery Units. The collected data is sent to the system through a data bus and shown on the display of the Cabinet.
In addition, within the Modular Combo Cabinet there is an SWBATT disconnection switch which enables the BUs to be completely disconnected from the Modular UPS Cabinet. The cabinet also features an opto-isolated input which enables the SWBATT switch to be opened remotely.

CAUTION: each shelf of the Modular Combo Cabinet can be filled (with the 4 BUs) based on the autonomy requirements of the system (up to a maximum of 6 internal shelves). The minimum number of fully populated battery shelves must follow the rules set out in the table below:

Number of non redundant PMs	MPX 15 PM Minimum number of battery shelves	MPX 25 PM Minimum number of battery shelves
1	1	2
2	2	3
3	3	5
4	4	8
..	…	…
N	Nx1	Nx2

The wiring diagram of the Modular UPS Combo Cabinet is provided below.



INSTALLING THE CABINET

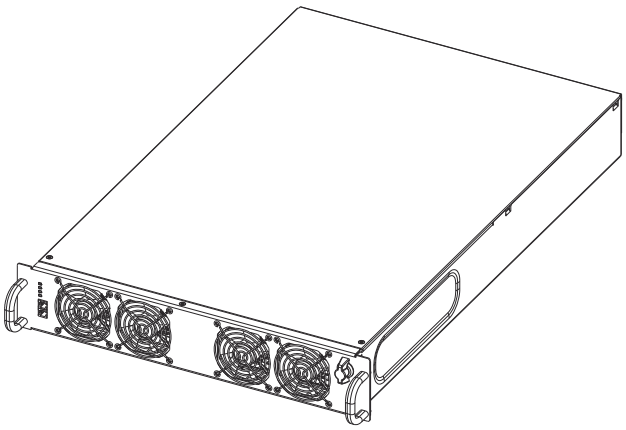
For the installation of the Modular UPS Power Cabinet and the Modular Battery Cabinet please refer to the "MPX Installation manual".

MODULES AND UNITS INSTALLATION

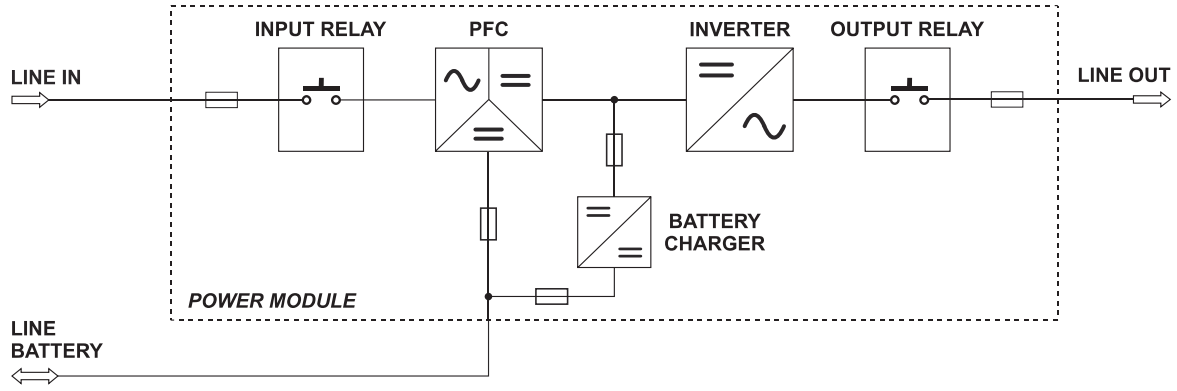
The cabinet consists of hot-swap modules and units which allow quick maintenance and expandability of the system. The hot-swap parts are:

- Power Module (PM)
- Bypass Module (BM)
- Monitoring Unit (MU) [MPX 100 CBC; MPW 170 BTC]
- Power Supply Unit (PSU)
- Main Communication Unit (MCU) [MPX 100 CBC]
- Connectivity Panel (CP) [MPX 130 PWC]
- Battery Unit (BU) [MPX 100 CBC; MPW 170 BTC]

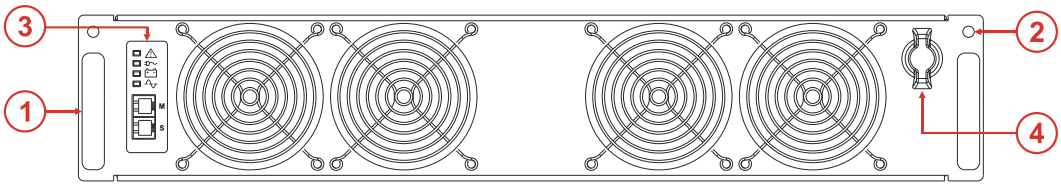
POWER MODULE (PM)



The Power Module (PM) is a three-phase double-conversion UPS module available in two sizes: 15kW (MPX 15 PM) and 25kW (MPX 25 PM). The wiring diagram of the PM, which shows its individual components, is provided below:

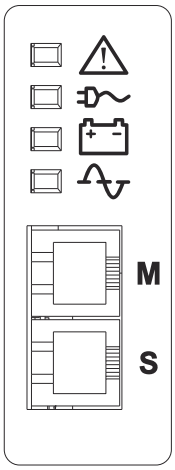


Power Module wiring diagram



1	Handles for inserting and extracting the cabinet	3	Interface panel
2	Holes for fastening the PM to the cabinet using the specific screws	4	Switch Lock: rotating switch and mechanical lock for the PM into the cabinet

INTERFACE PANEL



Green

Mains operation LED

- *On steady*: mains operation with a good bypass line and synchronised inverter
- *Slow blinking:*
  - 500 ms ON - 800 ms OFF: mains operation with bad or disabled bypass line and/or non-synchronised inverter.
  - 130 ms ON - 2.5 s OFF: module in EFFICIENCY CONTROL mode

Yellow

Battery operation LED

- *On steady:* battery operating mode
- *Slow blinking:* battery operation with early low battery or imminent shutdown warning

Green

Load on bypass LED

- *On steady*: load powered from bypass line
- *Slow flashing:* load fed by inverter while waiting to return to bypass (Eco mode)

Red

Standby/alarm LED

- *On steady:* alarm present
- *Slow blinking:* Stand-by mode
- *Fast blinking*: awaiting address from MCU of CP

\+ + *Slow blinking:* Start-up

M
S

Communication ports reserved for service personnel only

INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.

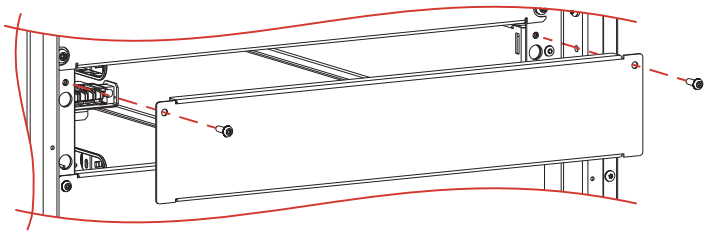
When the PM is not inserted, uncovered parts with dangerous voltage are present within the corresponding backplane.

The PM, due to its weight, must be handled by at least two persons.

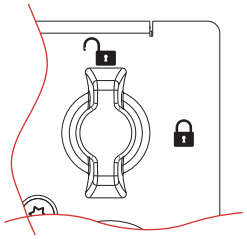
Strictly comply with the instructions as listed below.

INSERTION

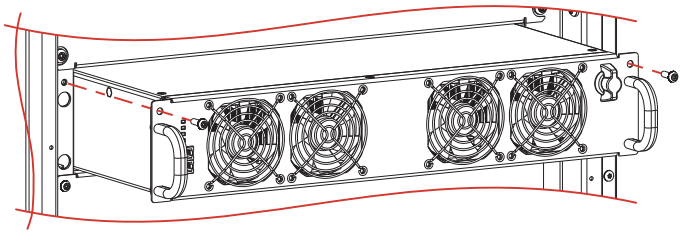
1. **Note: the PM must be inserted in the slot of a previously removed one or, <u>in case of first installation, in the first free dedicated slot of the cabinet, starting from the bottom slot.</u>**
   If present, remove the protection cover and store it together with the fastening screws.



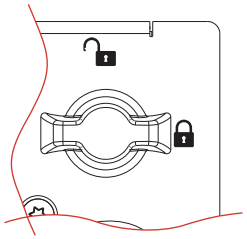
2. Check that the Switch Lock is in open position (see the picture on the right).



3. Carefully insert the PM into the cabinet (requires two persons) and fasten it using the supplied screws, as shown in the picture.



4. Turn the Switch Lock 90 Degrees clockwise to the closed position (see the picture on the right).



5. Switch on the PM using the display (ref. to “Operative procedures” chapter).

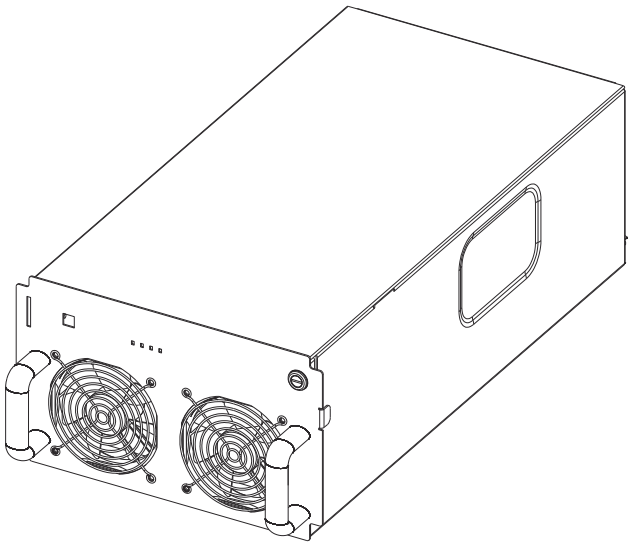
EXTRACTION

Note: before extracting any PM, please ensure that the remaining PMs are capable of supporting the full load.

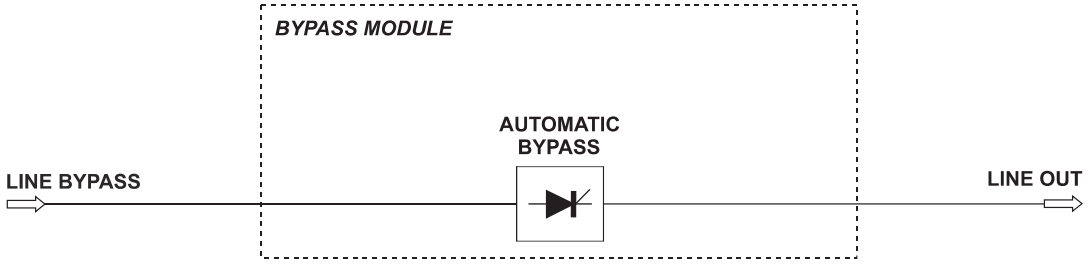
To extract the PM from the cabinet, reverse the procedure described above. In brief:

1. Switch off the PM using the display (ref. to “Operative procedures” chapter).
2. Turn the Switch Lock 90 degrees anticlockwise to the open position .
3. Wait until the front LEDs switch off.
4. Remove the two side fastening screws and store them.
5. Carefully extract the PM from its housing. This operation requires two persons.
6. **<u>Caution</u>**: when the PM is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane. Therefore, in the case where a new PM is not immediately inserted, install the supplied protection cover using the dedicated screws.

BYPASS MODULE (BM)



The Bypass Module (BM) allows the direct connection, electronically governed, between the input and the output of the Modular UPS Cabinet. The wiring diagram of the BM, which shows its individual components, is provided below:



Bypass Module wiring diagram

BACKFEED PROTECTION

The BM continuously monitors the bypass line for backfeed protection, and if required, the system will remove any dangerous voltage from the input terminals.
The type of action depends on the BM model installed within the system:

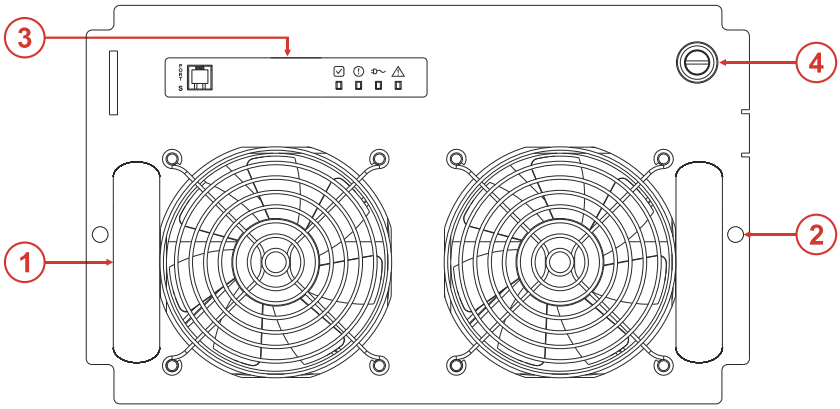
- MPX 130 BM (BM126X)

If a BACKFEED is detected, the system transfers the output onto the automatic bypass and disconnects the inverter line (via relays). The load is powered from the bypass line. If the protective action is triggered whilst on battery operating mode, the load will be disconnected for safety reasons.

- MPW 130 BM

If the BACKFEED is detected, the system disconnects the automatic bypass line (via contactor). The load remains powered by the inverter even during battery operating mode.

Warning: to avoid any safety and/or malfunctioning issues, all the BMs within the same system must be of the same model.



1	Handles for inserting and extracting the cabinet	3	Interface panel
2	Holes for fastening the BM into the cabinet using the specific screws	4	Switch Lock: rotating switch and mechanical lock for the BM into the cabinet

INTERFACE PANEL

Green	*On steady:* Bypass ready	Green	*On steady:* Bypass operating *Slow flashing*: active call with bypass unavailable
Yellow	*On steady:* Anomaly	Red	*On steady:* Alarm *Slow blinking:* Initialisation

PORT S Communication port reserved for service personnel only

INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.

When the BM is not inserted, uncovered parts with dangerous voltage are present within the corresponding backplane.

The BM, due to its weight, must be handled by two people.

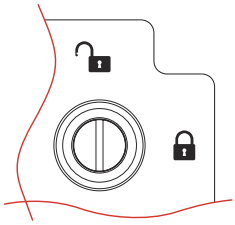
The BM is pre-installed by the manufacturer, extract it only in case of maintenance or replacement.

Strictly comply with the instructions as listed below.

EXTRACTION

WARNING: Before performing the operations below, ensure that the shutting of the BM does not lead to the loss of the connected load.

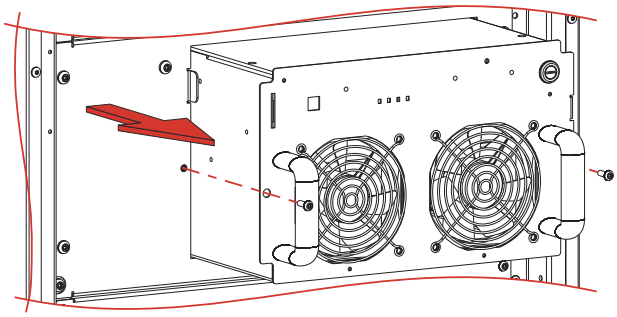
1. Turn the Switch Lock 90 degrees anticlockwise to the open position (see the picture on the right).



2. Wait until the front LEDs switch off.

3. Remove the two side fastening screws and store them.

4. Carefully extract the BM from its housing. This operation requires two persons.

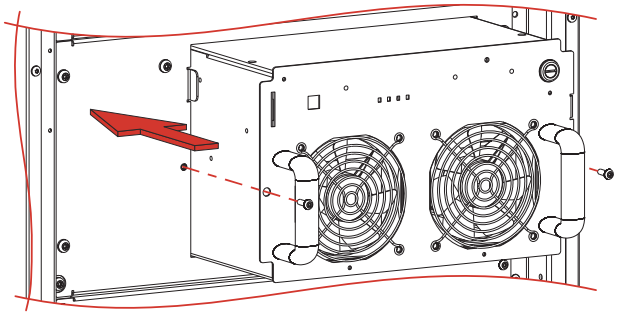


5. **Caution**: when the BM is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane. Therefore, in the case where a new BM is not immediately inserted, install the supplied protection cover using the dedicated screws.

INSERTION

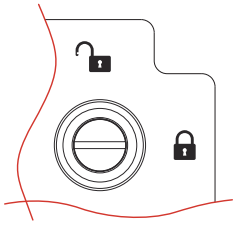
1. If present, remove the protection cover and store it together with the fastening screws.
2. Check that the Switch Lock is in open position (see the picture on the right).

3. Carefully insert the BM into the cabinet (requires two persons) and fasten it using the supplied screws, as shown in the picture.



4. Turn the Switch Lock 90 degrees clockwise to the closed position (see the picture on the right).

   During the first start-up, the red alarm LED will blink for 10 s, after which, if the start-up was successful, the green normal operation LED will change to on .

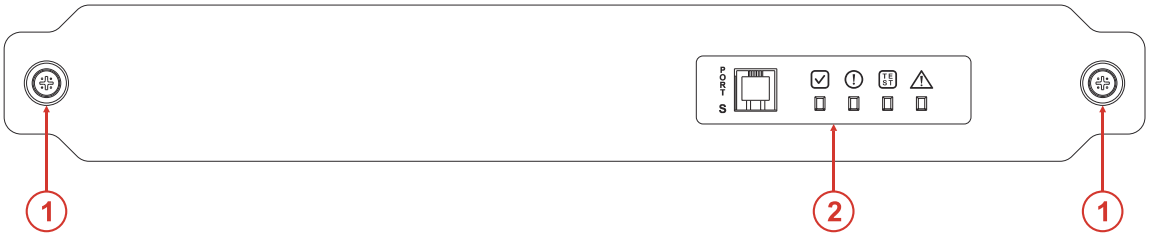


MONITORING UNIT (MU) [MPX 100 CBC; MPW 170 BTC]

Within the Modular UPS Power Cabinet [MPX 100 CBC], the Monitoring Unit (MU) monitors the status of the internal and external disconnection switches, the status of the Power Supply Unit and the internal and external temperatures.

Within the Battery Cabinet [MPW 170 BTC], the MU monitors the Power Supply Unit, the internal temperature values and supervises the status of each Battery Unit.

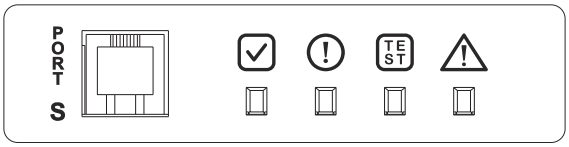
During the first installation of a single Cabinet, via a specific set up made within the MU, the address and the type of cabinet must be configured (ref. to “MPW-MPX Advanced Configuration Manual”)



① Fastening knobs

② Interface panel

INTERFACE PANEL



Green — *On steady:* MU ready

Green — *Slow blinking:* Test in progress

Yellow — *On steady:* Anomaly

Red — *On steady:* Alarm

PORT S Communication port reserved for service personnel only

INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.

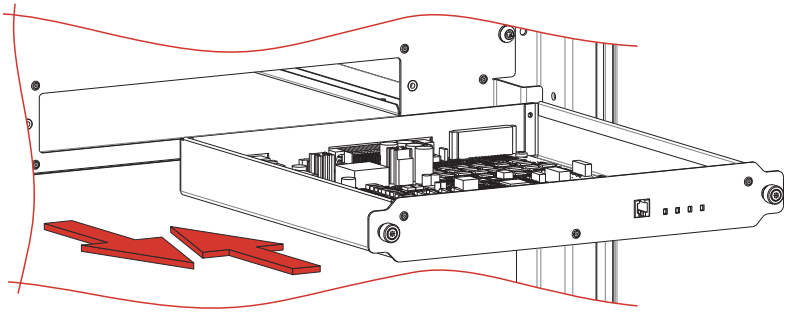
When the MU is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane.

The MU is pre-installed by the manufacturer. Remove the MU only in case of maintenance or replacement.

Strictly comply with the instructions as listed below.

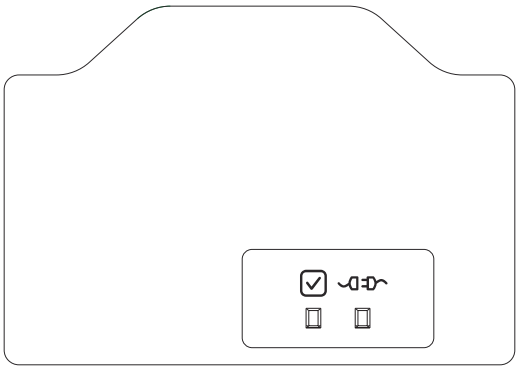
EXTRACTION
Unscrew the two side fastening knobs.
Using the knobs, carefully pull and remove the MU.

INSERTION
Carefully insert the MU into the dedicated slot.
Fasten the MU by tightening the side knobs.

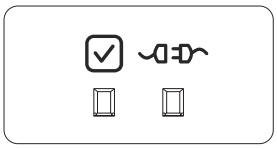


POWER SUPPLY UNIT (PSU)

The Power Supply Unit (PSU) is a low voltage power supply, required for the operation of the electronics assigned to the monitoring of the Cabinet.
Cabinets can contain up to two PSUs that are monitored by the MU or CP. The second PSU is redundant.



INTERFACE PANEL



Green — *On steady:* PSU ready

Green — *On steady:* PSU is supplying the load

INSERTION/EXTRACTION PROCEDURE

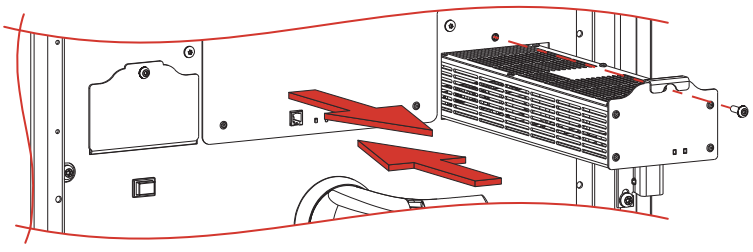
The following operations must only be performed by skilled and specifically trained personnel.

When the PSU is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane.

The PSU is pre-installed by the manufacturer. Remove the PSU only in case of maintenance or replacement.

Strictly comply with the instructions as listed below.

EXTRACTION
Undo the fixing screw.
Using the handle, carefully pull and remove the PSU.



INSERTION
Carefully insert the PSU in the dedicated slot.
Fasten the PSU using the screw removed earlier

MAIN COMMUNICATION UNIT (MCU) [MPX 100 CBC]

The Main Communication Unit (MCU) monitors the modules and units inserted within the Modular UPS Power Cabinet and also all the other Cabinets within the system. The MCU is equipped with a 7" colour touch screen display which shows in an easy an intuitive way all of the electrical values and the system status. It also enables the user to control and configure the system as required. The MCU also houses the communication ports for remote monitoring by the user and authorised personnel. For more information please refer to the chapter on the display and the chapter "Remote Communication and accessories".

INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.

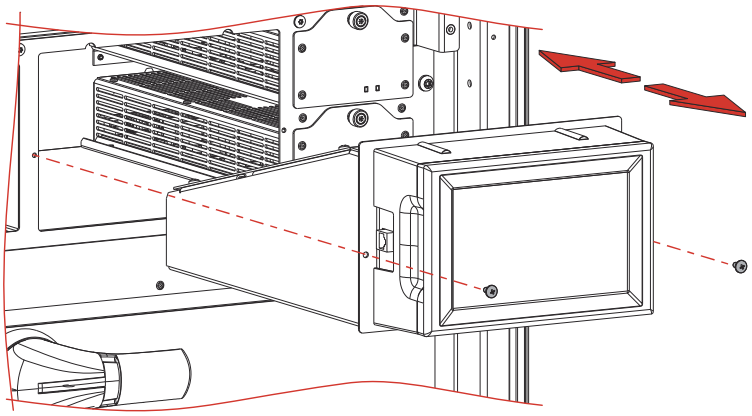
When the MCU is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane.

The MCU is pre-installed by the manufacturer. Remove the MCU only in case of maintenance or replacement.

Strictly comply with the instructions as listed below.

EXTRACTION
Undo the two side screws.
Using the dedicated handles on the sides of the display, carefully pull and remove the MCU.

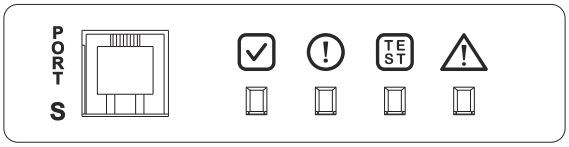
INSERTION
Carefully insert the MCU in the dedicated slot.
Fasten the MCU by fastening the two side screws removed previously.



CONNECTIVITY PANEL (CP) [MPX 130 PWC]

The Connectivity Panel (CP) integrates the logic functions of the MCUs and MUs (that are contained within other types of Cabinets). Therefore, it carries out the monitoring of the units and modules contained within the Modular UPS Power Cabinet and of all other Cabinets within the system. It monitors the status of the internal and external disconnection switches, the status of the Power Supply Units and the internal and external temperatures. The CP is equipped with a 7" colour touch screen display which shows in an easy an intuitive way all the electrical values, the system status and enables the main commands, settings and configurations. The CP also houses the communication ports for remote monitoring by the user and authorised personnel. For more information please refer to the chapter on the display and the chapter "Remote Communication and accessories".

INTERFACE PANEL



Green — *On steady:* MU ready

Green — *Slow blinking:* Test in progress

Yellow — *On steady:* Anomaly

Red — *On steady:* Alarm

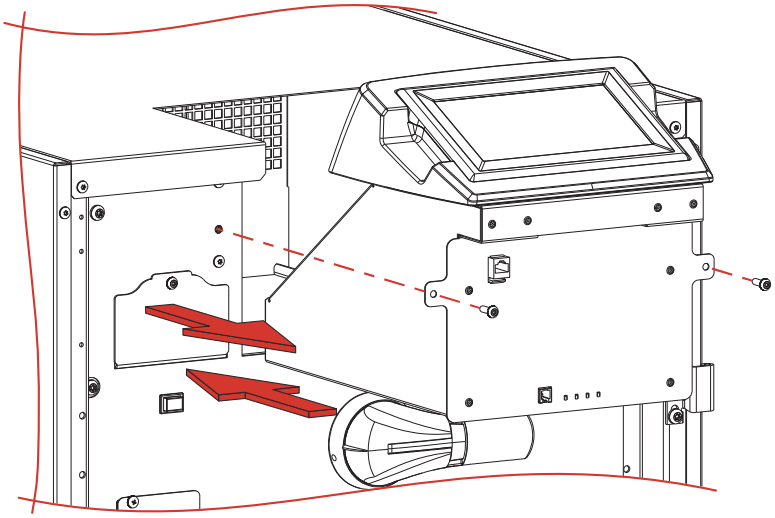
PORT S Communication port reserved for service personnel only

INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.
When the CP is not inserted, parts with voltage are present on the corresponding backplane.
Insert or remove the CP only during first installation or in the case of maintenance operations.
Strictly comply with the instructions as listed below.

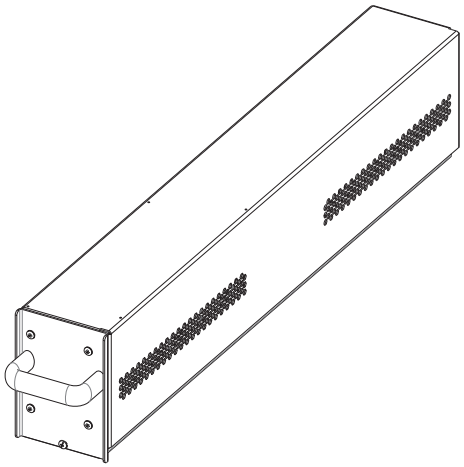
EXTRACTION
Undo the two side screws.
Using the handle provided under the display, carefully pull and remove the CP.

INSERTION
Carefully insert the CP in the dedicated slot.
Fasten the CP by fastening the two side screws removed previously.



BATTERY UNIT (BU)

The Battery Unit (BU) contains 10 off 12V batteries (120Vdc) which can be replaced during maintenance if required.



INSERTION/EXTRACTION PROCEDURE

The following operations must only be performed by skilled and specifically trained personnel.
When the BU is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane.
Never touch the base of the BU near the connector: a dangerous voltage is present.
The BU, due to its weight, must be handled by at least two persons.
Strictly comply with the instructions as listed below.

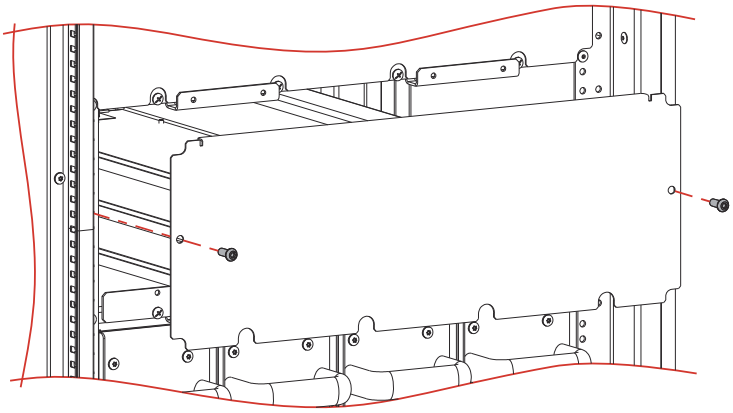
INSERTION

<u>PRIOR TO THE INSERTION OF A BU ENSURE THAT THE SYSTEM IS NOT OPERATING ON BATTERY MODE!</u>

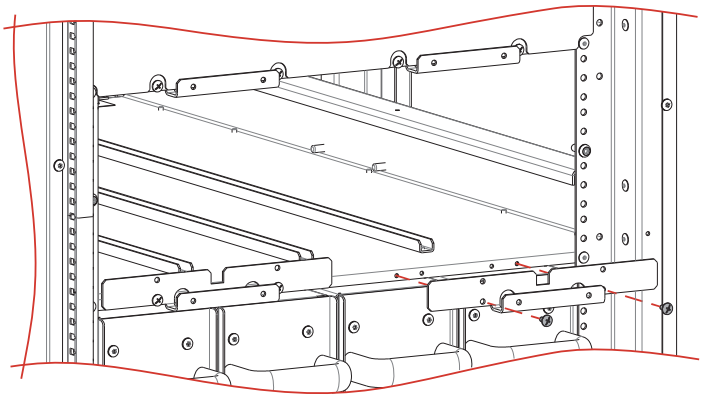
<u>ONLY INSERT THE BUs WITH CHARGED BATTERIES</u>

NOTE: the BU must be inserted in the place of a previously removed one or, in case of first installation, in the first free dedicated slot within the Battery Cabinet <u>starting from the bottom slot.</u>

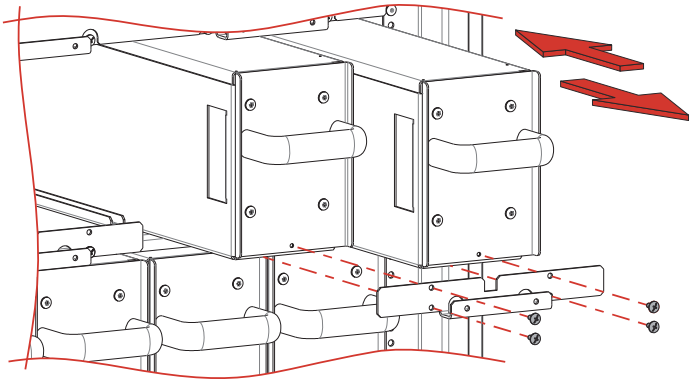
1. If present, remove the protection cover and store it together with the fastening screws.



2. If present, remove the locking bracket and store it together with the fastening screws.

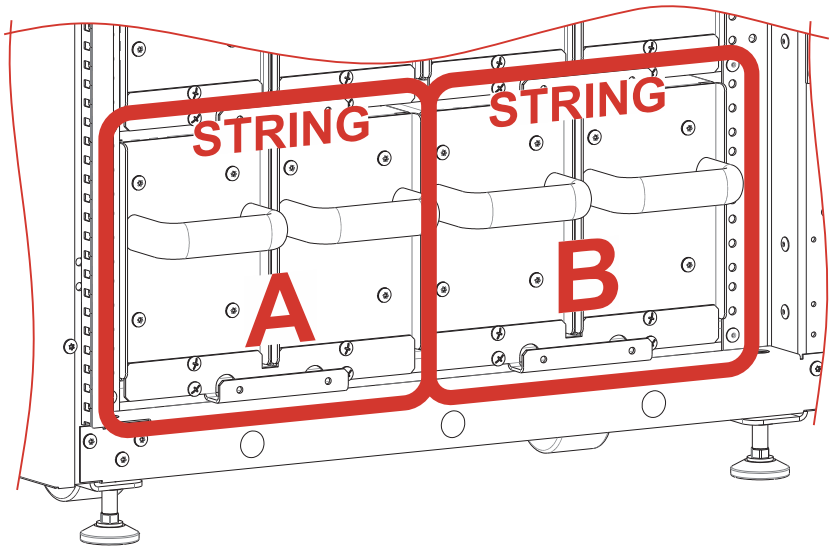


3. Insert the BU into the cabinet.
   Remove the screw located in the front part of the BU in the low/front part.
   Fasten the BU to the cabinet using the dedicated bracket and all the screws removed previously.



EXTRACTION

PRIOR TO THE INSERTION OF A BU ENSURE THAT THE SYSTEM IS NOT OPERATING ON BATTERY MODE!
NOTE: when a BU is replaced, you must replace the other BU within the same A or B string.



To extract the BU from the cabinet, reverse the procedure described above. In brief:

1. **Ensure that the SYSTEM IS NOT OPERATING ON BATTERY MODE**
2. If present, remove the locking bracket and store it together with the fastening screws.
3. Carefully extract the BU from its housing. This operation requires two persons.
4. **Caution:** when the BU is not inserted, uncovered parts with dangerous voltage are present on the corresponding backplane. Therefore, in the case where a new BU is not immediately inserted, install the supplied protection cover using the dedicated screws.

BATTERY MAINTENANCE

WARNING: DANGEROUS VOLTAGE INSIDE
Never open the BU for any reason, if any anomaly is noted, contact your local service agent.

Batteries, in order to maintain a high efficiency and durability must be regularly charged using the Modular UPS System itself.

Batteries are subject to self-discharge. In the case where a BU or Battery Box are stored and not immediately installed, an appropriate recharge must be planned.
To recharge the batteries, just connect the Battery Cabinet/Battery Box to a Modular UPS System in “NORMAL OPERATION” for at least 24 hours.
For long storage periods, contact your local service agent.

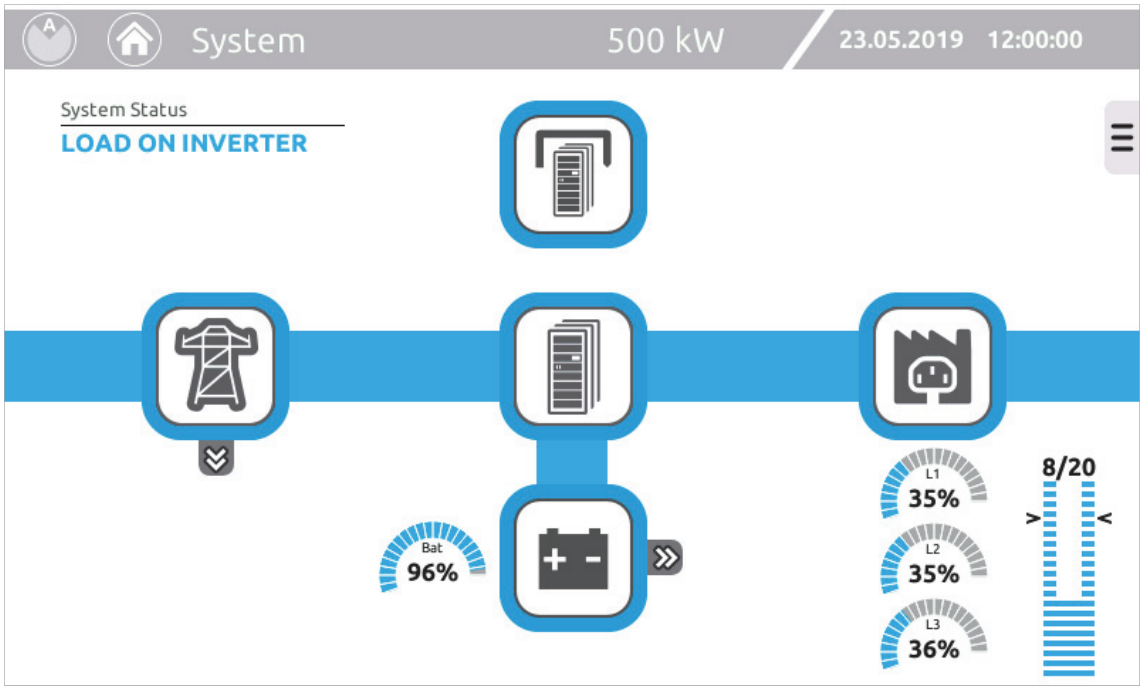
DISPLAY

OVERVIEW

Each Power Cabinet is equipped with a touch screen display, through which it is possible to:

- view the status of the system, the cabinets and all configured modules;
- activate switch on / switch off / battery test / bypass operation commands;
- configure the system, access levels and the network services (e-mail sending, anomaly reporting, etc.).

The “Home” page shows a diagram of the general operation status of the system. It is possible to interact with the system and see the details through the icons.



STATUS BAR

The status bar at the top shows the title of the current page and the rated power of the system. The system date and time are displayed on the right. The name of the cabinet (A, B, C or D) is displayed on the left.

ICONS AND SYMBOLS

System input mains status

Output

Automatic static bypass

Battery

System status

% Battery charge gauge

% Load gauge phase 1

% Load gauge phase 2

% Load gauge phase 3

Redundancy bar (see paragraph “Load level and redundancy system status”)

In general, the colour and the shape of the icons provide instant information to the status of the system.

Grey colour: communication lost (Com-Lost).

Light blue colour: normal status.

Blue colour: bypass operation.

Orange colour: anomaly.

Red colour: alarm.

PM STATUS	NORMAL OPERATION	ANOMALY-WARNING	FAULT	LOCK	COMM LOST
STAND-BY					
PRECHARGE					
STARTING - CALIBRATION					
WAIT BATTERY RECHARGE					
LOAD ON INVERTER					
FROM BATTERY					
LOAD ON BYPASS					
EFFICIENCY CONTROL					
LOCKED					
COMM LOST					

MU STATUS	NORMAL OPERATION	ANOMALY-WARNING	FAULT	COMM LOST
PRESENT				
COMM LOST				

BM STATUS	NORMAL OPERATION	ANOMALY-WARNING	FAULT	LOCK	COMM LOST
READY					
LOAD ON BYPASS					
LOCKED					
COMM LOST					

CABINET ALARMS	NORMAL OPERATION	ANY ANOMALY-WARNING	ANY FAULT	ANY LOCK	ANY COMM LOST
PRESENT					
COMM LOST					

LOAD LEVEL AND REDUNDANCY SYSTEM STATUS

The “Home” page provides a graphic bar showing the current load level and the system redundancy.

Load level: the bar is a representation of the number of PMs configured and their use as a function of the applied load level:

PM configured and necessary to supply the load

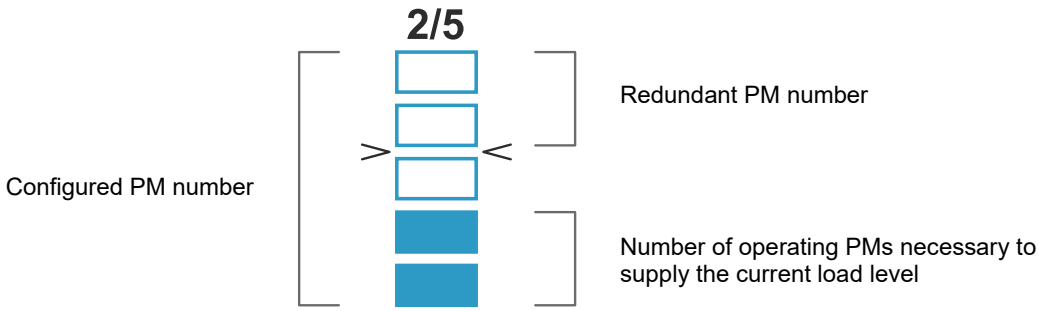
PM configured but not necessary to supply the load

PM configured but not available to supply the load

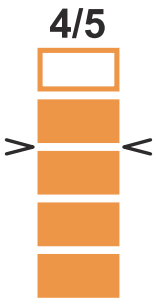
NOTE:
Whenever the installation includes one or more Power cabinets in parallel, the bar will show the system load level and not the single cabinet load level.

Redundancy: To increase system reliability, the user can add one or more redundant PMs rather than just install the number strictly required to supply the load.
The diagrams below show the possible “Load level” bar status according to the system conditions with respect to the load level, redundancy and PM availability. The example shows a system with 5 PMs in operation, 2 of which are configured as redundant.

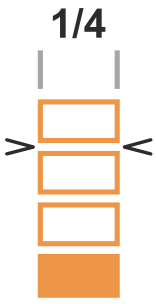
Case 1: Normal operation (light blue colour)



Case 2: Redundancy level reduction caused by excessive load level (orange colour)

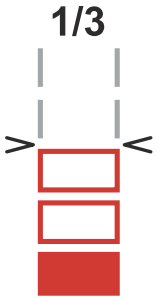


Case 3: Redundancy level reduction caused by a PM unavailability (orange colour)



Case 4: Redundancy lost due to load level (red colour)

Case 5: Redundancy lost due to complete PM unavailability (red colour)



NOTE: All PMs, including the redundant units operate together sharing the load.
Thanks to this reliable feature, we strongly suggest that the user configures one or more redundant PM according to the power required and the installation type.

ACTIVE TEXT AREAS

System Status: area of the display reserved for the description of the system status.

Cabinet Status: area of the display reserved for the description of the cabinet status.

Power Module Status: area of the display reserved for the description of the module status.

Alarm list: area of the display reserved for the description of the alarm list. The error code is shown between square brackets.

Mains Input: area of the display reserved for the displaying of the main electrical values related to the input to the system.

Battery: Area of the display reserved for displaying the main electrical values related to the battery.

Bypass input: Area of the display reserved for displaying the main electrical values related to the bypass line.

Output: Area of the display reserved for displaying the main electrical values related to the output of the system.

NAVIGATION

HOME Key for closing the currently selected page and returning to Home.

PREVIOUS Key for returning to the previously displayed screen.

SEND E-MAIL Key for sending to the pre-set addresses an e-mail containing the current screen shot.

Menu expansion / reduction Tab keys (the menu reduces automatically after a few seconds). The menu may change depending on the pre-set access level.

Expansion / reduction keys of the mains and battery detail sections.

SLIDING SWITCH STATUS

OFF

UNAVAILABLE

ON

TEMPORARILY UNAVAILABLE

PARTIALLY ON
(SOME ARE "OFF" – SOME ARE "ON")

TEMPORARILY UNAVAILABLE

OFF - LOCK STATUS

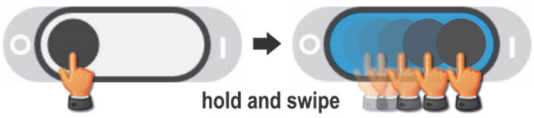
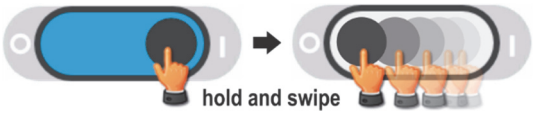
TEMPORARILY UNAVAILABLE

ON - LOCK STATUS

TEMPORARILY UNAVAILABLE

SYSTEM STATUS DISPLAY

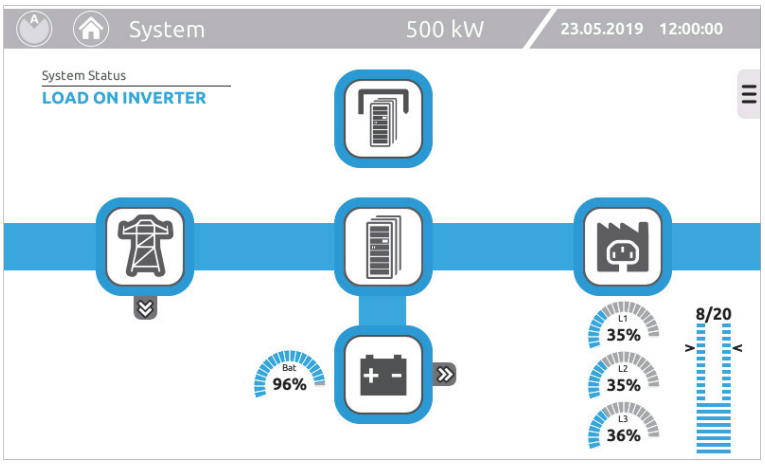
LEGEND OF THE USED SYMBOLS

	**TOUCH**	If present, it highlights the main elements which can be selected from the screen.
	**SWIPE LEFT-RIGHT**	Movement for the sliding graphical elements for the status switch from O to I.
	**SWIPE RIGHT-LEFT**	Movement for the sliding graphical elements for the status switch from I to O.

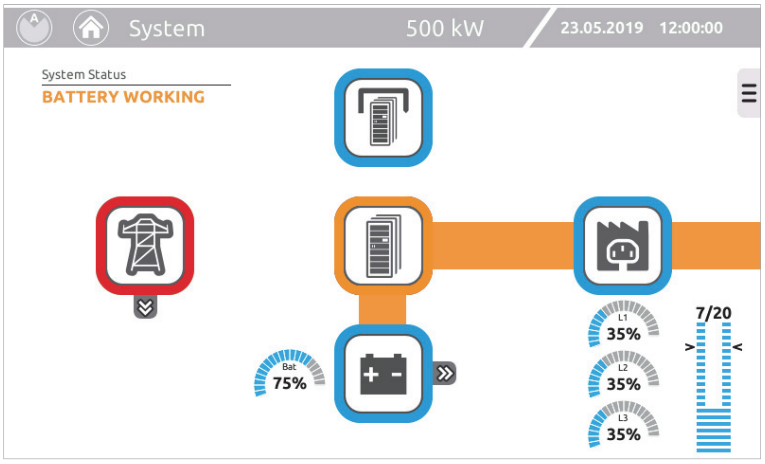
"SYSTEM" HOME PAGE

The home page provides a schematic view of the overall operating condition of the system. It is possible to interact with the system and see the details through the icons.

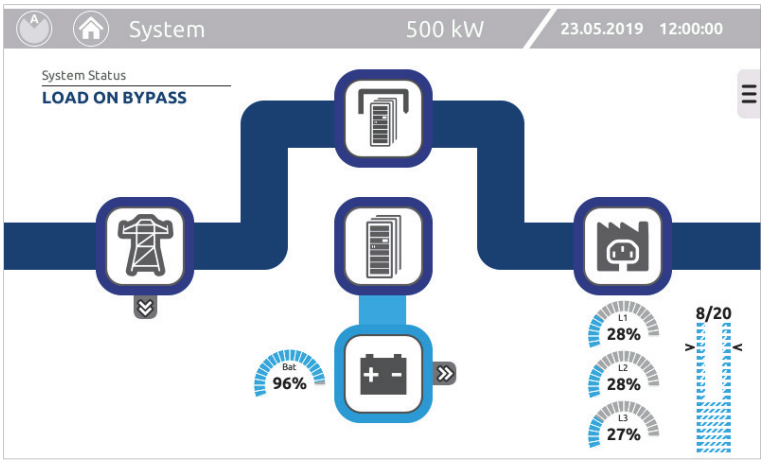
Depending on the current state of the system this page may assume different appearances as shown in the examples below.



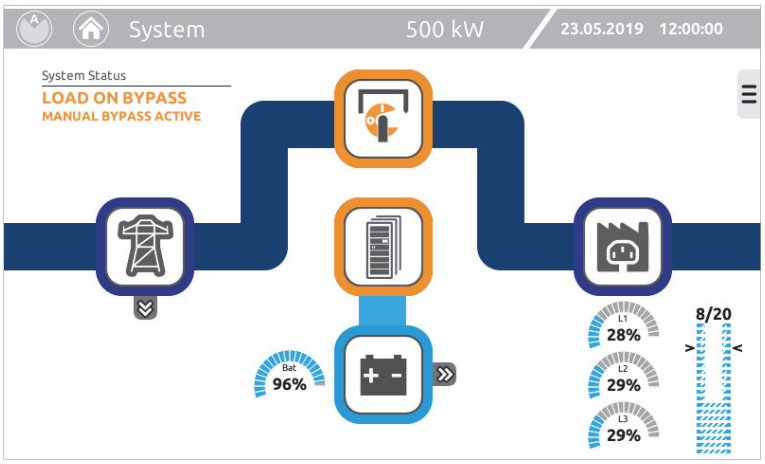
Load on INVERTER (normal operation)



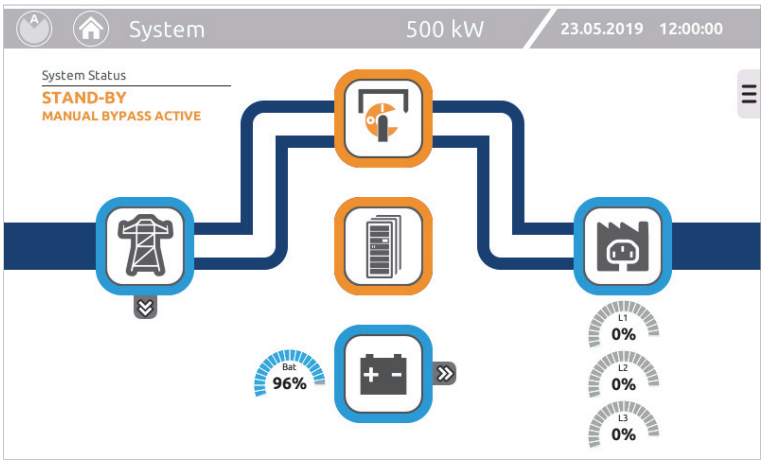
BATTERY operating mode



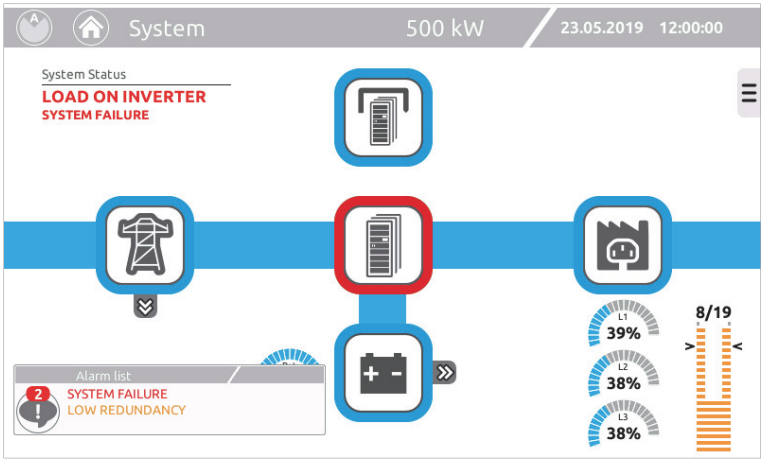
LOAD ON STATIC BYPASS



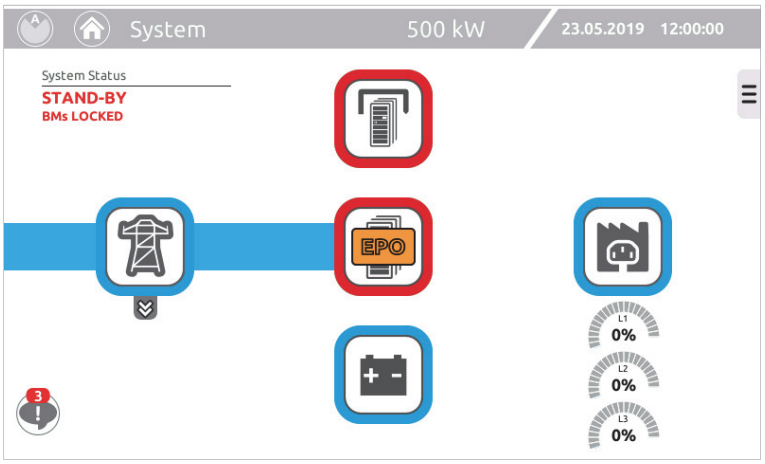
Load on the STATIC BYPASS with the MANUAL BYPASS SWITCH CLOSED



Load supplied solely via the MANUAL BYPASS SWITCH



System with an alarm signal



System with the EPO (Emergency Power Off) active

KEY ICONS:

When the load is powered by the bypass line, the bar graph has a dashed appearance. In this condition the bar indicates the load level and the system redundancy when the operation of the inverter is restored.

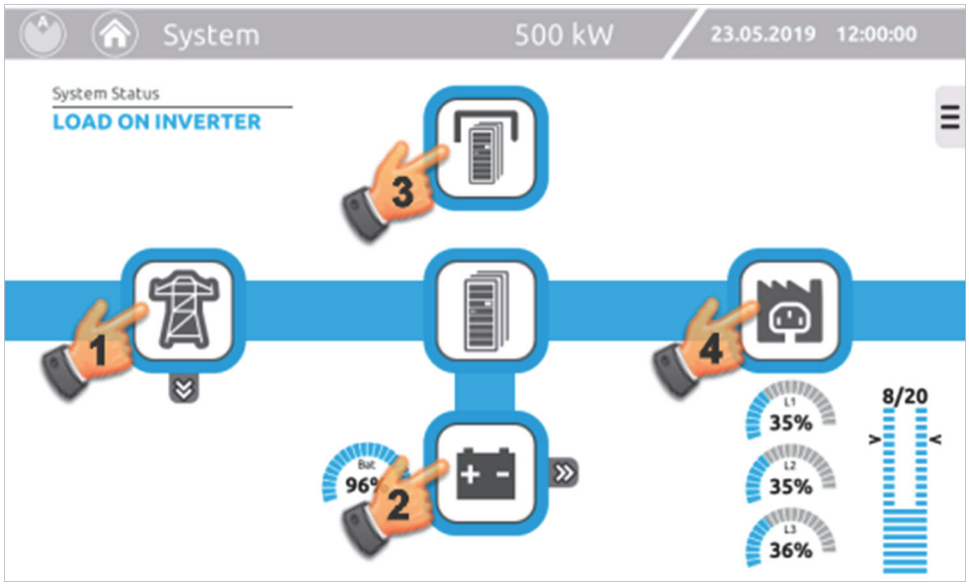
Icon indicating the existence and number of alarms that are active at that time. If you click on the icon, a window will open up that shows the individual alarms in detail.

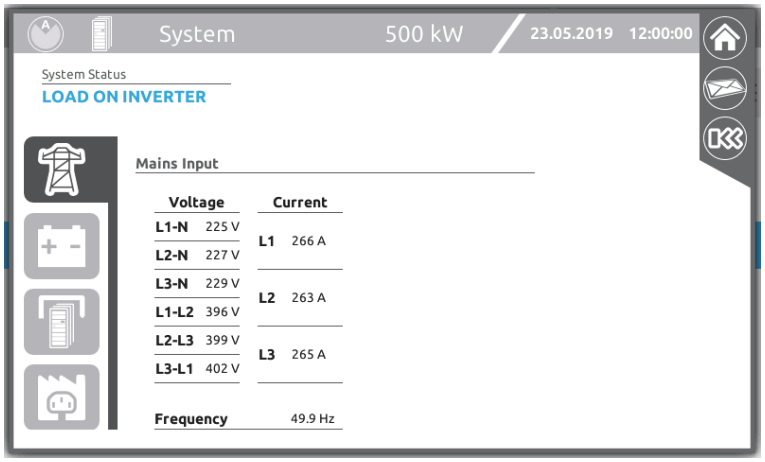
Icon that may appear on the status bar. Indicates that a data processing task on the mass storage is in progress; in this condition the system may work at a slower pace.

Icon that may appear on the status bar. Indicates “Power Off Active”.

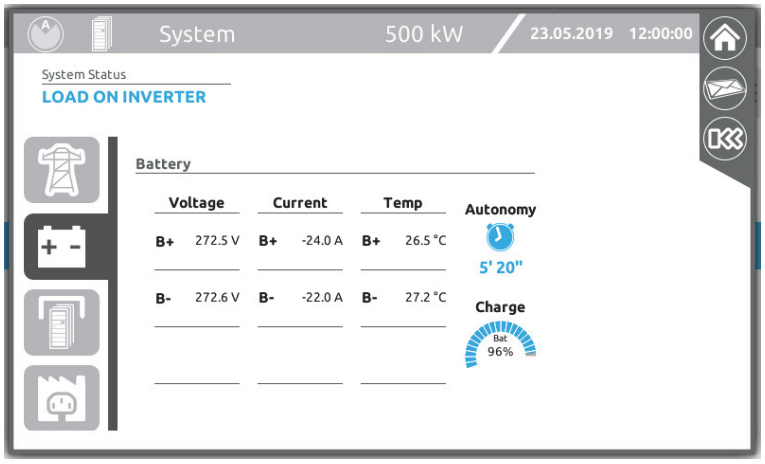
SYSTEM MEASUREMENTS

The pages that display the main electrical values of the system can be accessed through the icons on the Home page.



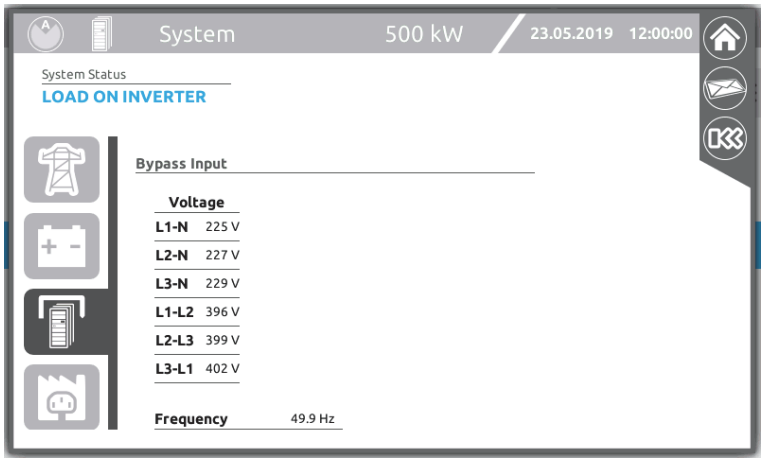


***1** - This displays the status and the electrical parameters relating to the system input*

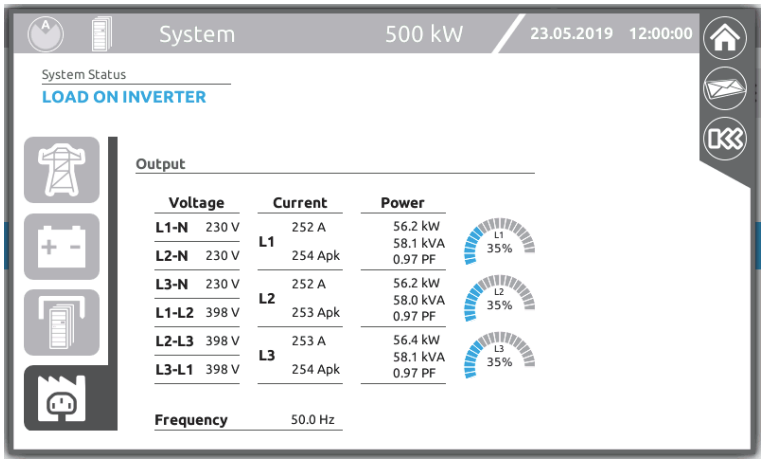


***2** - This displays the status and the electrical parameters relating to the system batteries*

If there is an anomaly related to the configured batteries (due to a BUA removal or the opening of the battery disconnectors), a bar will be displayed that shows the amount of residual Ah compared to the total configured Ah.

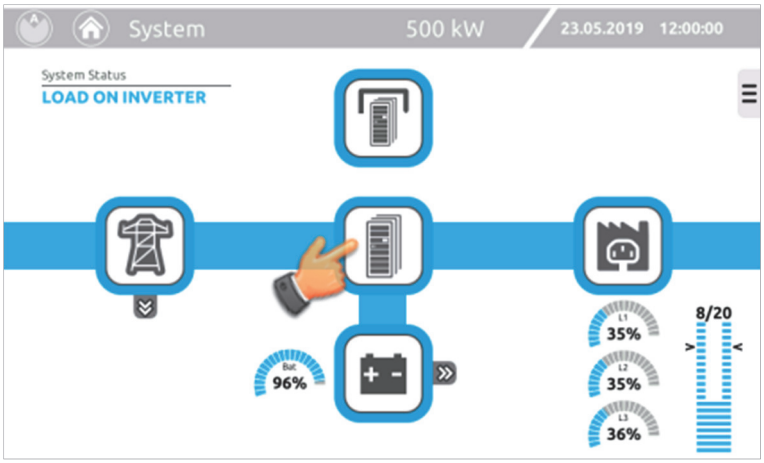


***3** - This displays the status and the parameters relating to the system bypass line*

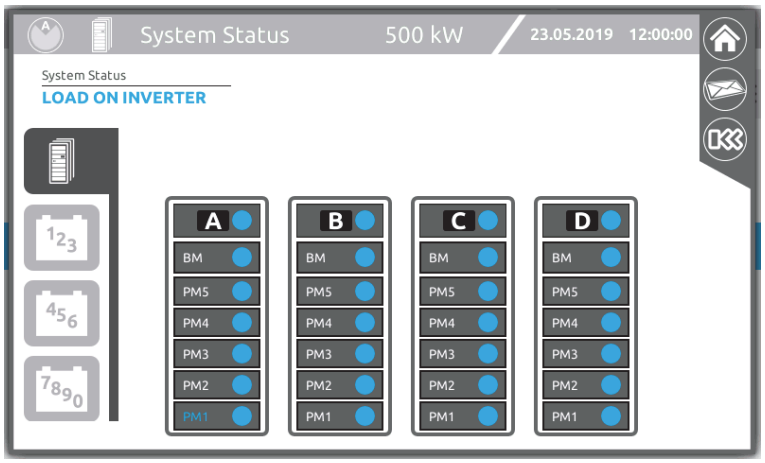


***4** - This displays the status and the electrical parameters relating to the system output*

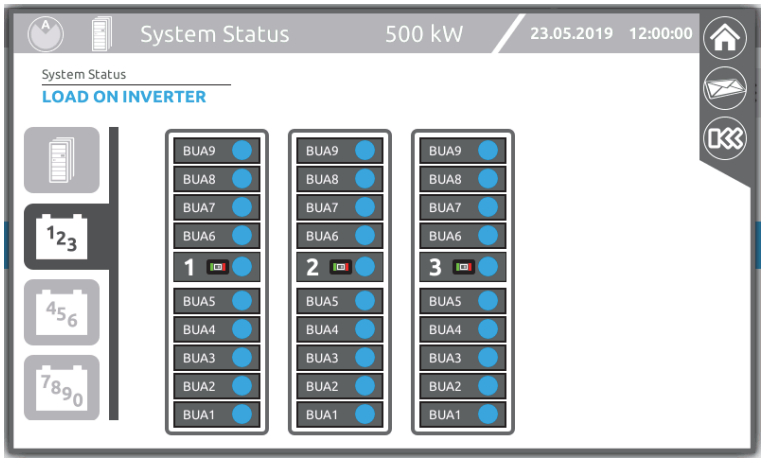
"SYSTEM STATUS" PAGE

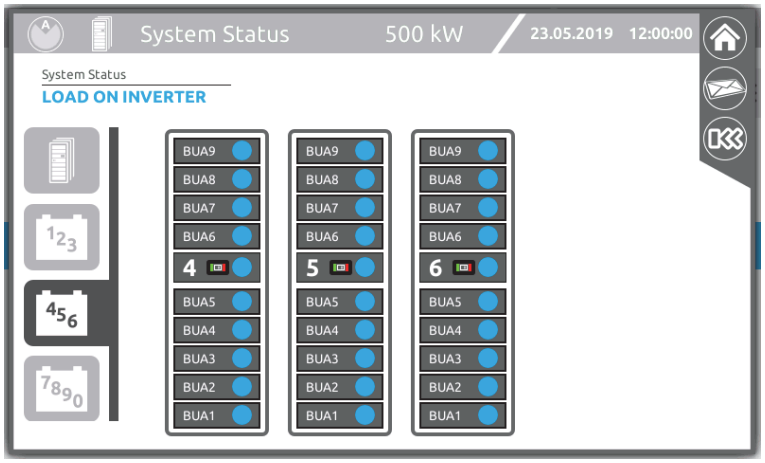


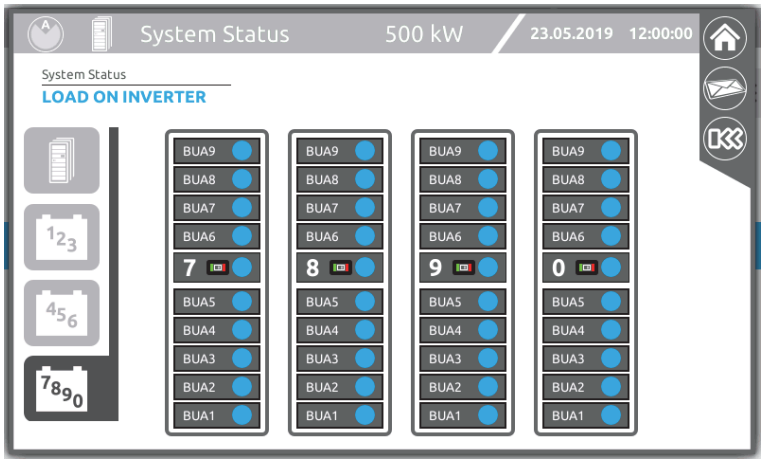
The page shown below may contain up to four TABs depending on the configuration of the system.
The first TAB refers to the cabinets containing the PMs (Power or Combo): the status of each configured element in the individual cabinets is represented. By pressing each of the related icons (A, B, C, D) all details in relation to each of the cabinets can be monitored ("Cabinet" page)



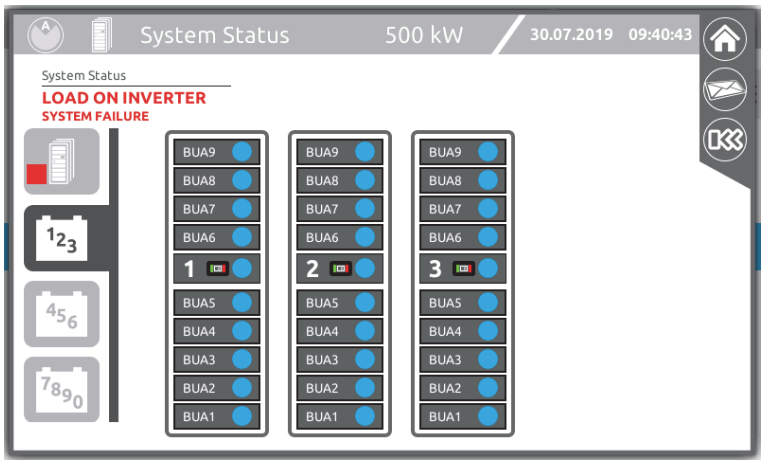
The following TABs represent the total number of connected Battery Cabinets (these are shown in groups of 3 or 4).
By pressing each of the related icons (1, 2, 3, …, 0) all details in relation to each of the cabinets can be monitored ("Battery Cabinet" page)

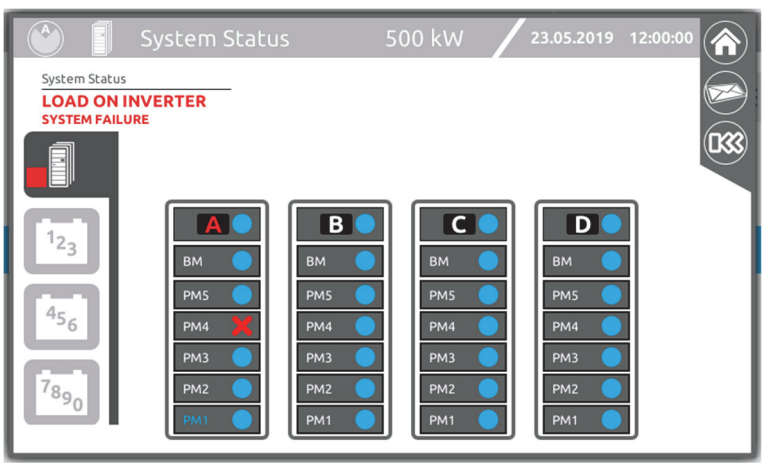






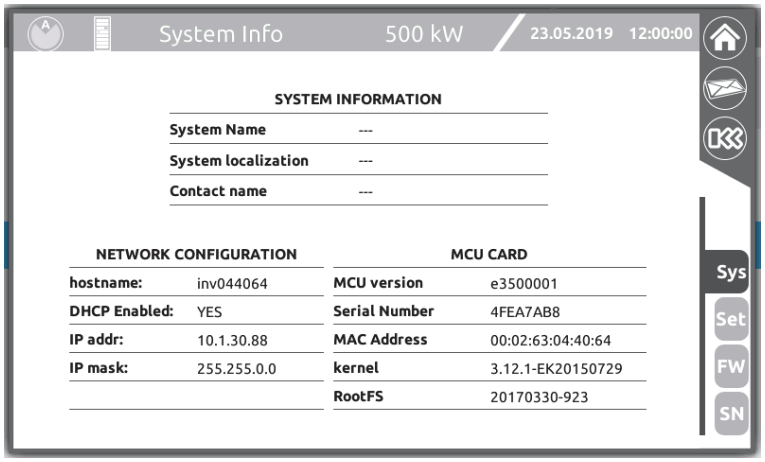
If for any reason an anomaly occurs within any of the cabinets, the related TAB will highlight the failure. For example, if a PM fails, the icon representing it will change as shown below.



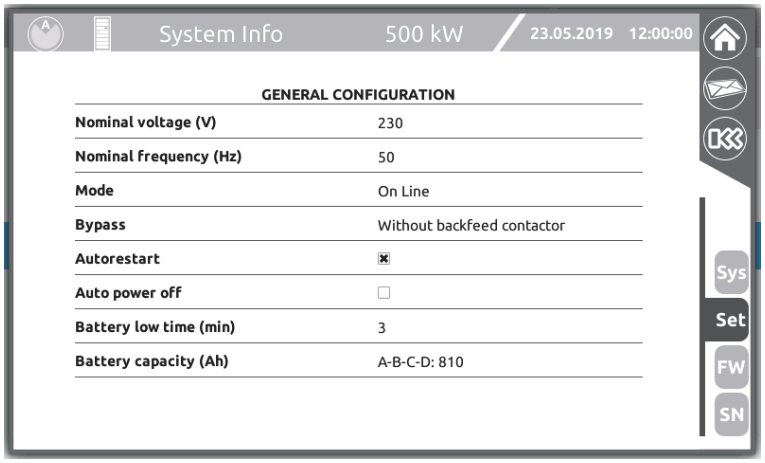


GLOBAL SYSTEM INFORMATION

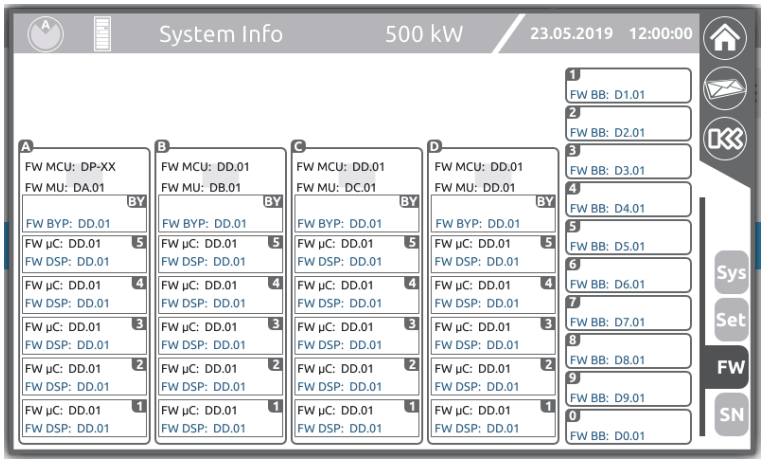
This page displays general information about the system.
Expand the drop-down menu on the Home page and touch the following icon:



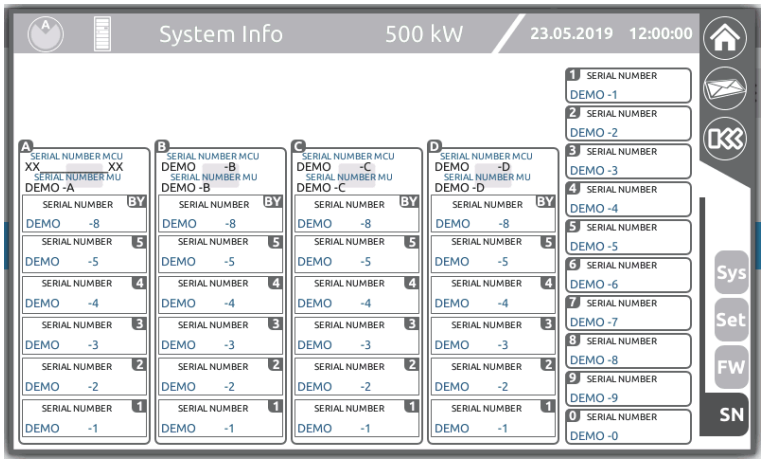
System name, firmware version and the network configuration of the cabinet [Sys]



Overall system parameters set by the user [Set]



Firmware versions of the individual MU and MCU modules or CP [FW]



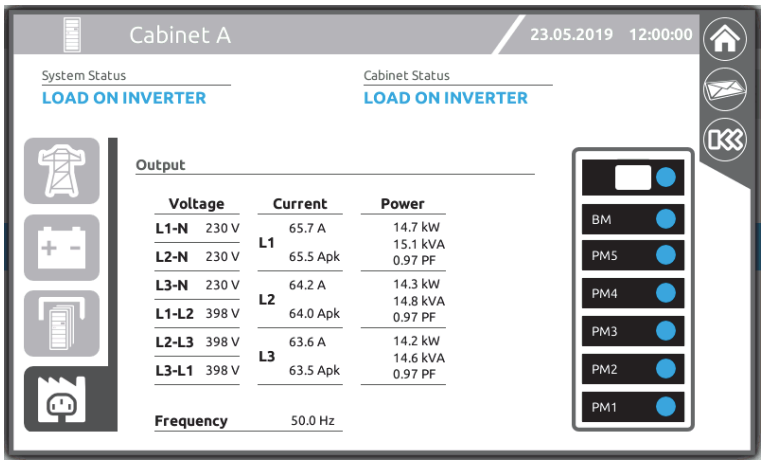
Serial numbers of the individual MU and MCU modules or CP [SN]

NOTE 1: the CP integrates in one unit the logic functions of the MCUs and MUs, therefore it features two types of FWs and two serial numbers.

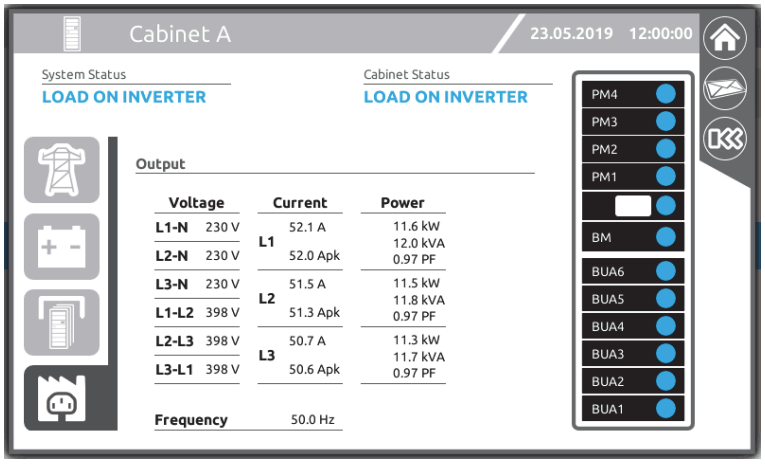
NOTE 2: The serial numbers and firmware versions of non-communicating elements are shown with an asterisk and in italics.

"CABINET" PAGE

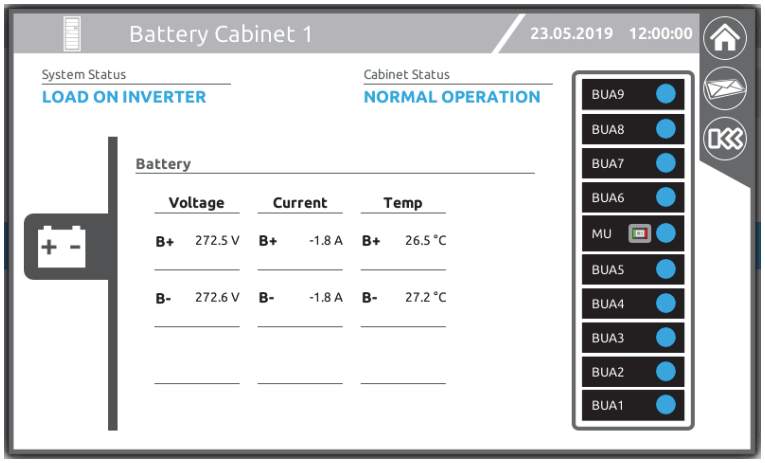
The "Cabinet" page displays the status of all of the modules and of the main electrical values of the cabinet indicated on the status bar.



Power Cabinet MPX 130 PWC



Combo Cabinet MPX 100 CBC

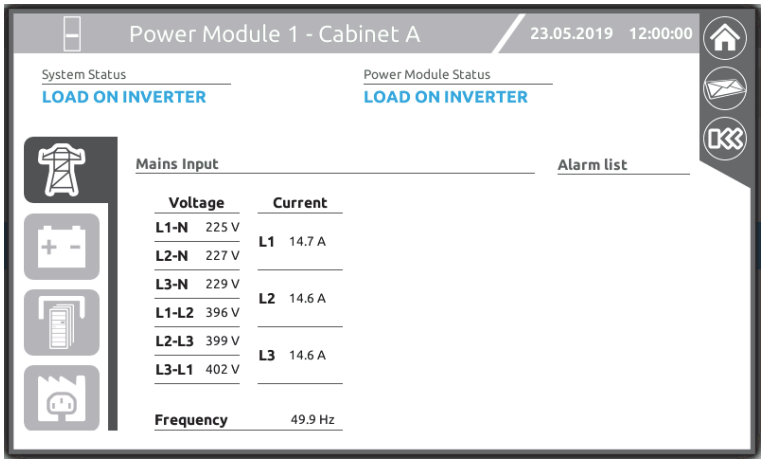


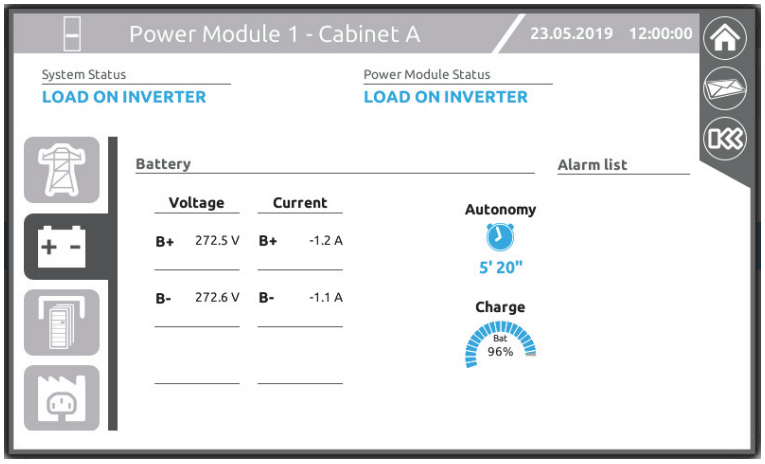
Battery Cabinet MPW 170 BTC

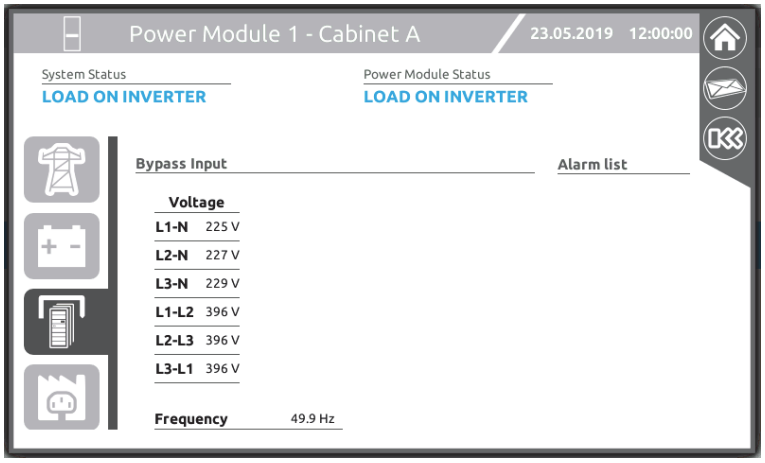
By pressing the left Tab menu, it is possible to display the electrical values of the cabinet related to the input, the batteries, the bypass line and the output.
Touching the relevant module (PM, BM or MU) brings up the associated detailed information page.

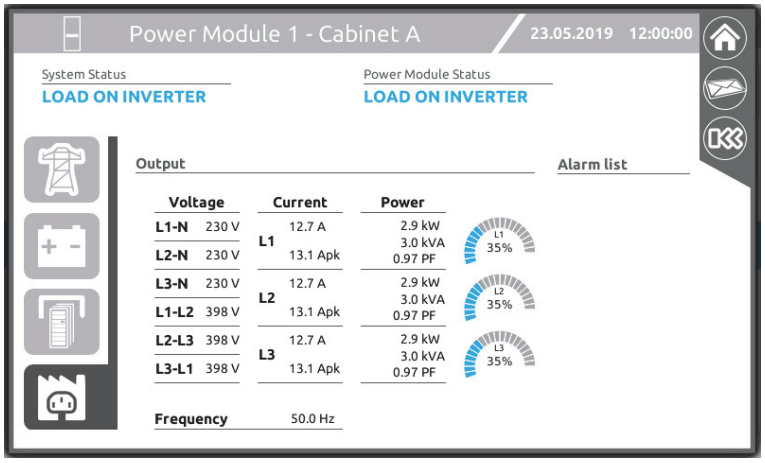
"POWER MODULE" PAGE

This page displays the main electrical values of the module indicated on the status bar. By pressing the left Tab menu, it is possible to display the input, battery, bypass line and output electric values measured in the module.
The alarm list on the right of the page shows details of any anomalous conditions/alarms currently present on the selected PM.



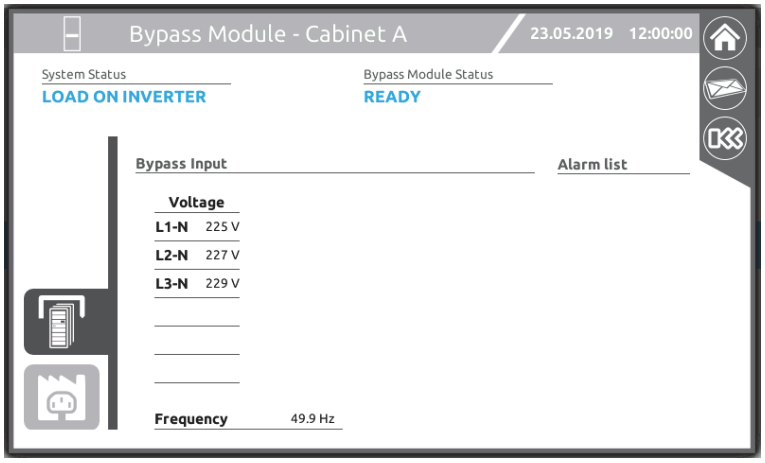


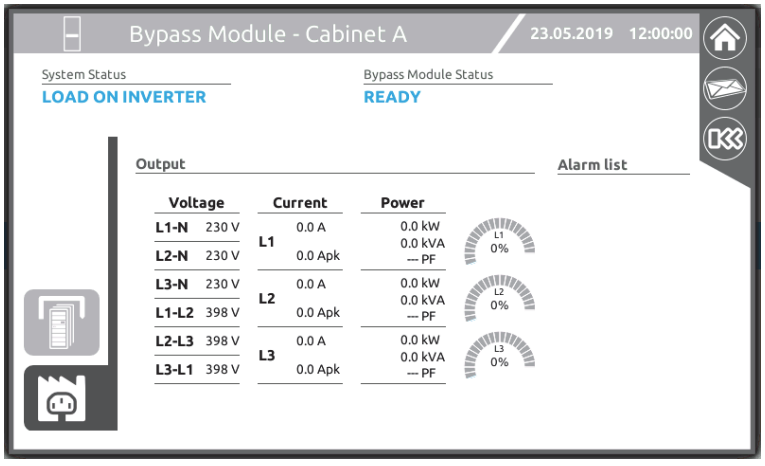




"BYPASS MODULE" PAGE

The frequency and voltage of each phase are displayed on the bypass input values page.
The bypass voltages and currents are displayed in the output values page. During inverter mode operation, bypass currents are always zero, while the voltages on the bypass output will be visible. Alternatively, during normal bypass operation and in presence of a load, the bypass current values will reflect the load levels applied.
The alarm list on the right of the page shows details of any anomalous conditions/alarms currently present on the selected BM.



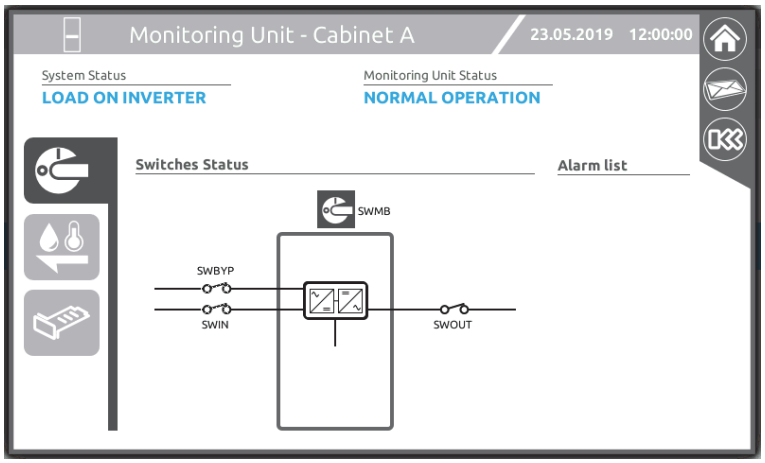


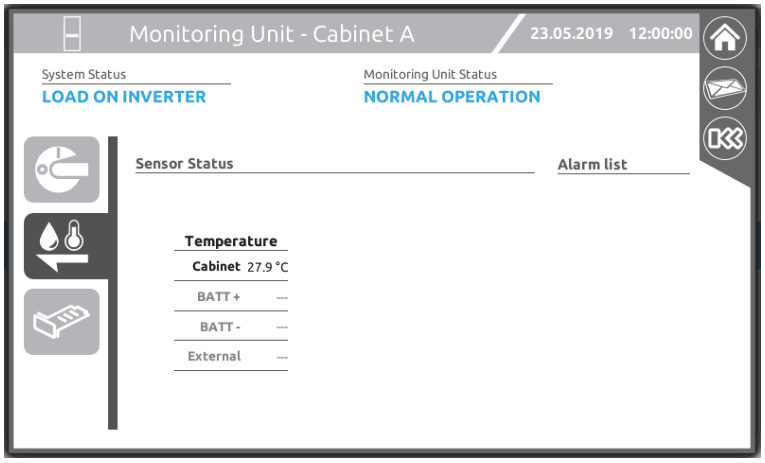
"MONITORING UNIT" PAGE

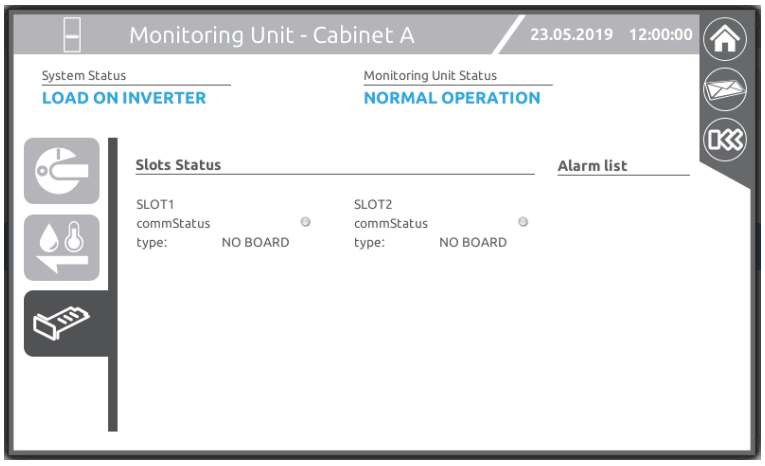
The Switches Status, the Sensor Status and the Battery Status (only for Combo Cabinet MPX 100 CBC or Battery Cabinet MPW 170 BTC) can be viewed in this page.
The alarm list on the right of the page shows details of any anomalous conditions/alarms currently detected by the selected MU.

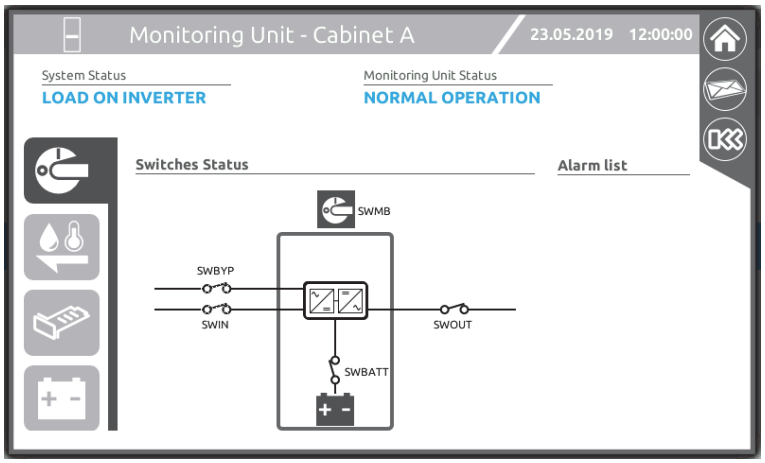
- SWBYP = Bypass Switch (external);
- SWIN = Input Switch (external);
- SWBATT_EXT = Battery Switch (external);
- SWOUT = Output Switch (external);
- SWMB = Manual Bypass Switch (external and internal).
- SWBATT = Battery Switch (internal);

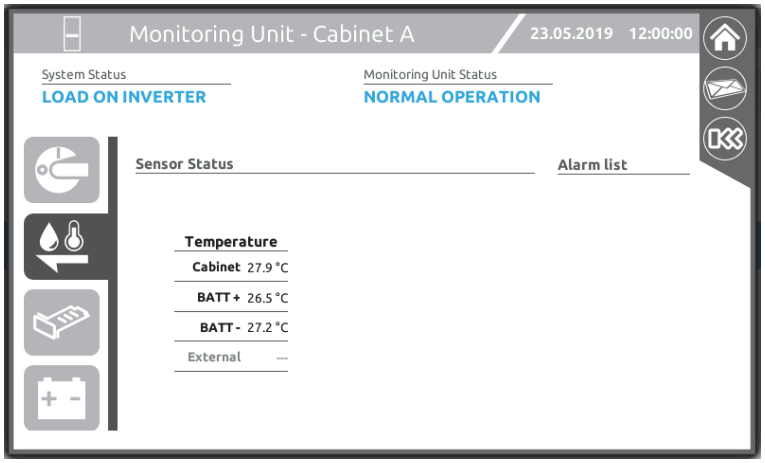
Power Cabinet MPX 130 PWC

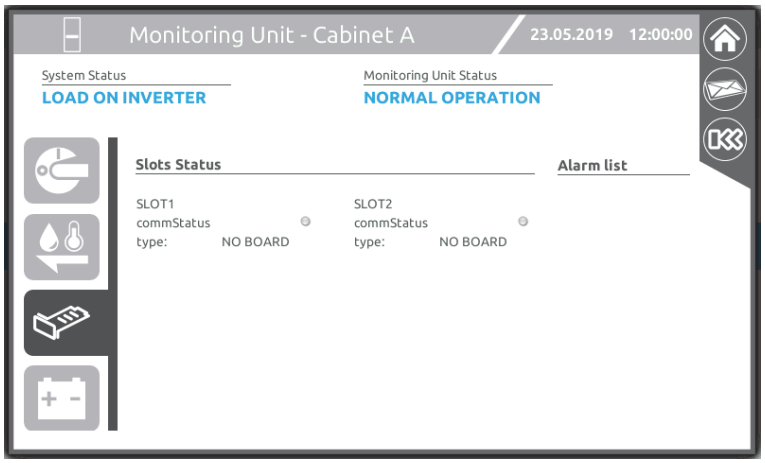


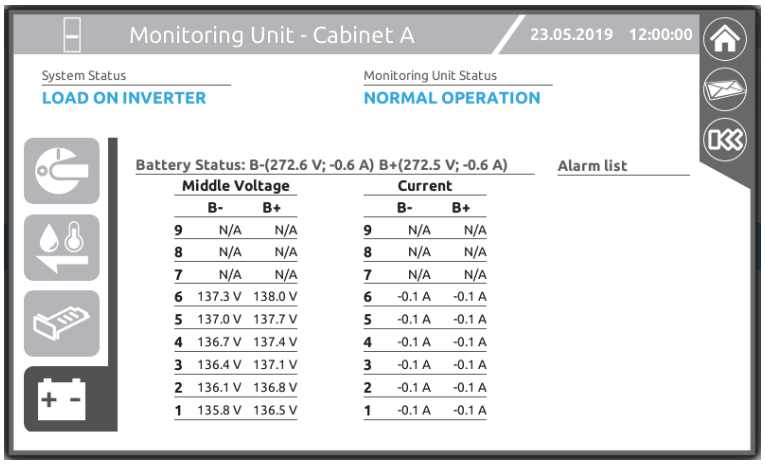


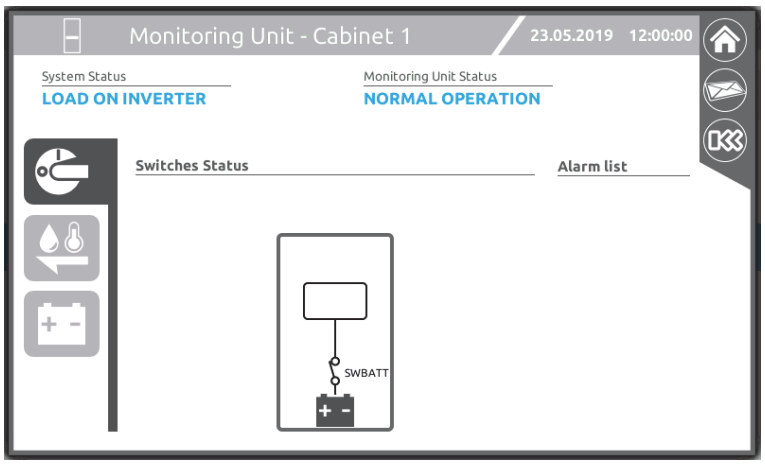


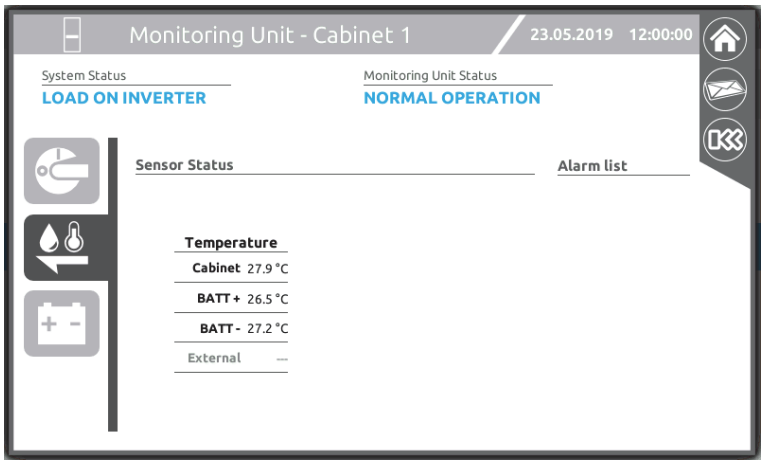

Monitoring Unit - Cabinet A
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Switches Status
Alarm list
SWMB
SWBYP
SWIN
SWOUT
SWBATT

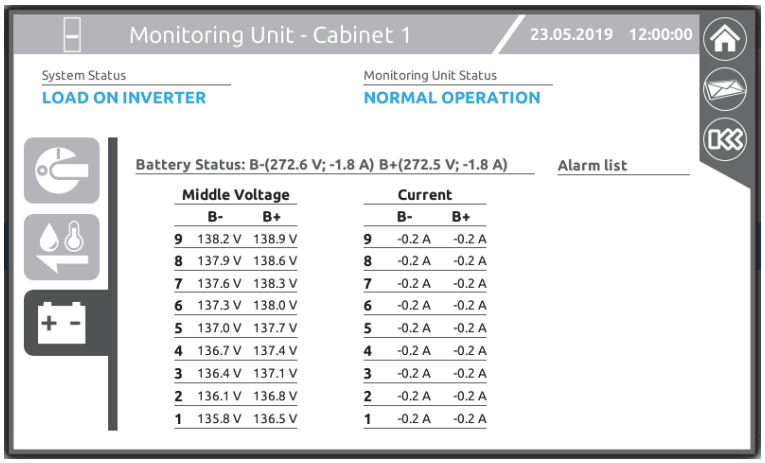

Monitoring Unit - Cabinet A
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Sensor Status
Alarm list
Temperature
Cabinet 27.9 °C
BATT + 26.5 °C
BATT - 27.2 °C
External ---


Monitoring Unit - Cabinet A
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Slots Status
Alarm list
SLOT1
commStatus
type: NO BOARD
SLOT2
commStatus
type: NO BOARD


Monitoring Unit - Cabinet A
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Battery Status: B-(272.6 V; -0.6 A) B+(272.5 V; -0.6 A)
Alarm list
Middle Voltage
B- B+
9 N/A N/A
8 N/A N/A
7 N/A N/A
6 137.3 V 138.0 V
5 137.0 V 137.7 V
4 136.7 V 137.4 V
3 136.4 V 137.1 V
2 136.1 V 136.8 V
1 135.8 V 136.5 V
Current
B- B+
9 N/A N/A
8 N/A N/A
7 N/A N/A
6 -0.1 A -0.1 A
5 -0.1 A -0.1 A
4 -0.1 A -0.1 A
3 -0.1 A -0.1 A
2 -0.1 A -0.1 A
1 -0.1 A -0.1 A

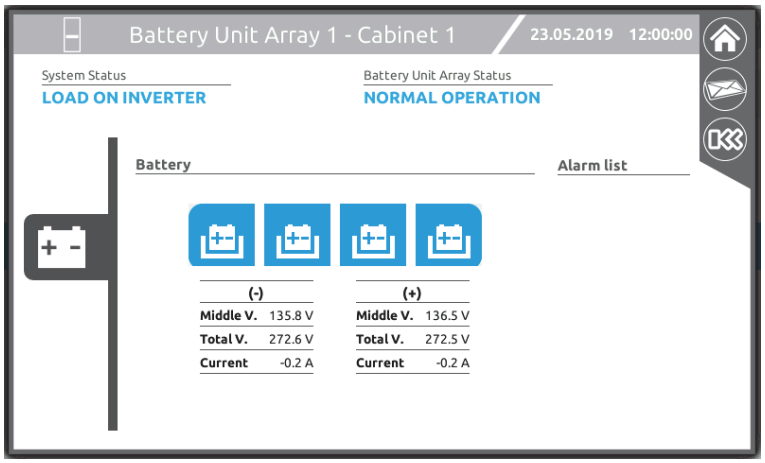

Monitoring Unit - Cabinet 1
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Switches Status
Alarm list
SWBATT


Monitoring Unit - Cabinet 1
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Sensor Status
Alarm list
Temperature
Cabinet 27.9 °C
BATT + 26.5 °C
BATT - 27.2 °C
External ---


Monitoring Unit - Cabinet 1
23.05.2019 12:00:00
System Status
LOAD ON INVERTER
Monitoring Unit Status
NORMAL OPERATION
Battery Status: B-(272.6 V; -1.8 A) B+(272.5 V; -1.8 A)
Alarm list
Middle Voltage
B- B+
9 138.2 V 138.9 V
8 137.9 V 138.6 V
7 137.6 V 138.3 V
6 137.3 V 138.0 V
5 137.0 V 137.7 V
4 136.7 V 137.4 V
3 136.4 V 137.1 V
2 136.1 V 136.8 V
1 135.8 V 136.5 V
Current
B- B+
9 -0.2 A -0.2 A
8 -0.2 A -0.2 A
7 -0.2 A -0.2 A
6 -0.2 A -0.2 A
5 -0.2 A -0.2 A
4 -0.2 A -0.2 A
3 -0.2 A -0.2 A
2 -0.2 A -0.2 A
1 -0.2 A -0.2 A

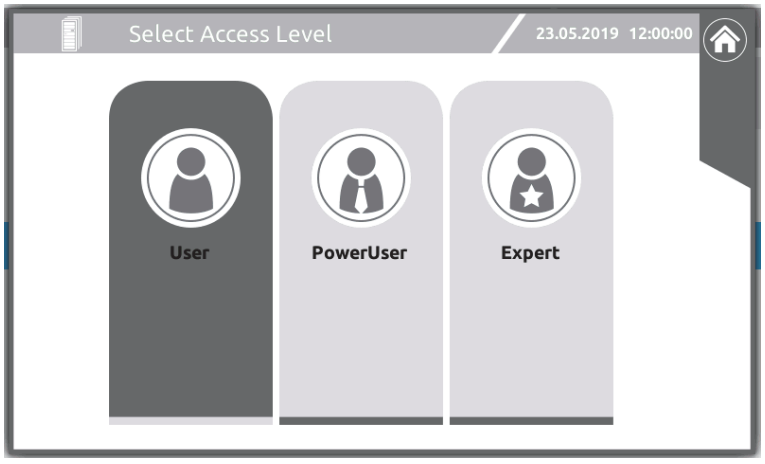
"BATTERY UNIT ARRAY" PAGE

This page displays the electrical values and any anomalous situations within the selected Battery Unit Array (BUA).



ACCESS LEVEL SELECTION

This page allows for the selection of the access level for the user operating the MCU or CP.
A safety password may be requested, based on the selected level.
Expand the drop-down menu in the Home page and touch the access level selection icon.



- The "User" level allows only basic display actions.
- The "Power User" level allows commands (on/off, bypass switch or battery test) and part of the settings. The preset access password: **power**
- The "Expert" level is reserved for the authorised service personnel only.

NOTES:

1) Access as "Expert" user to configure the system.
2) The drop-down menu in the Home page may change based on the current access level.

COMMANDS

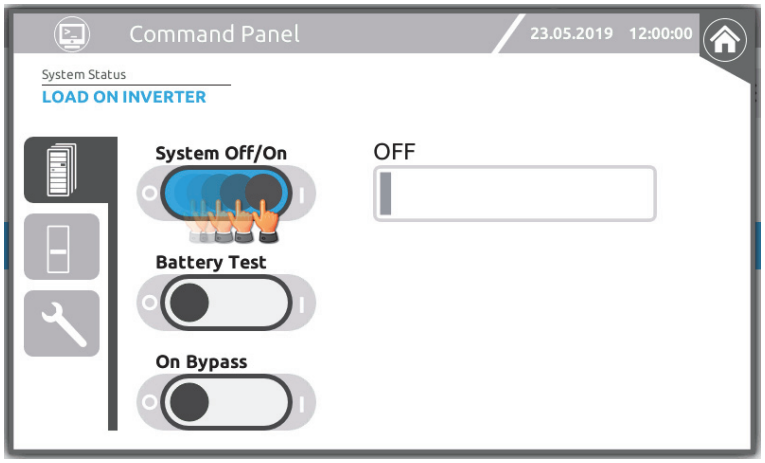
ACCESS TO THE COMMAND PANEL

The “Power User” access level is required for accessing the Command Panel.

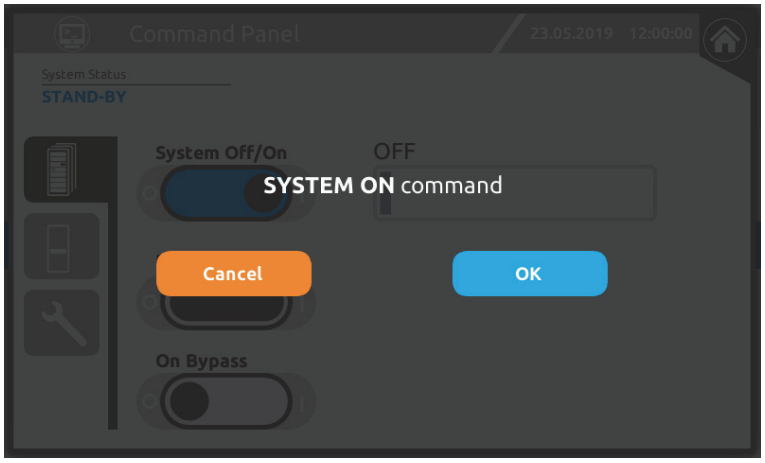
From this page it is possible to activate switch on/off commands for the system or for the individual module.
It is also possible to perform a battery test or force system operation from a static bypass.
Operate the sliding switch to execute a command. The progress bar shows the progress of the start-up/shut-down sequence.

SYSTEM OFF/ON COMMAND

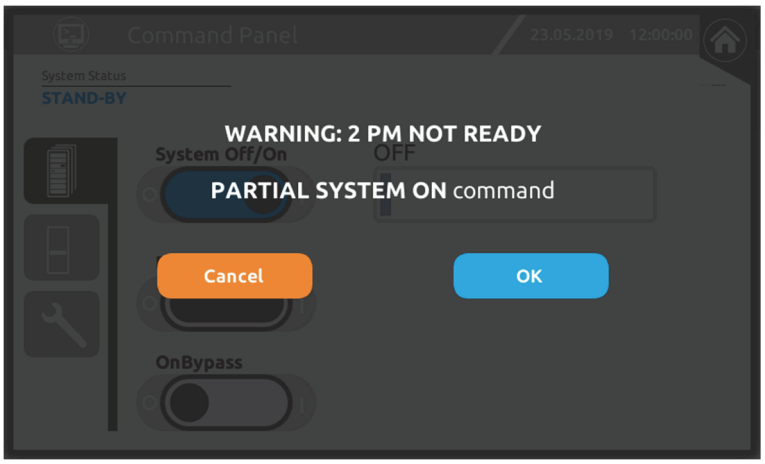
Operate the sliding switch from O to I to switch the system on.



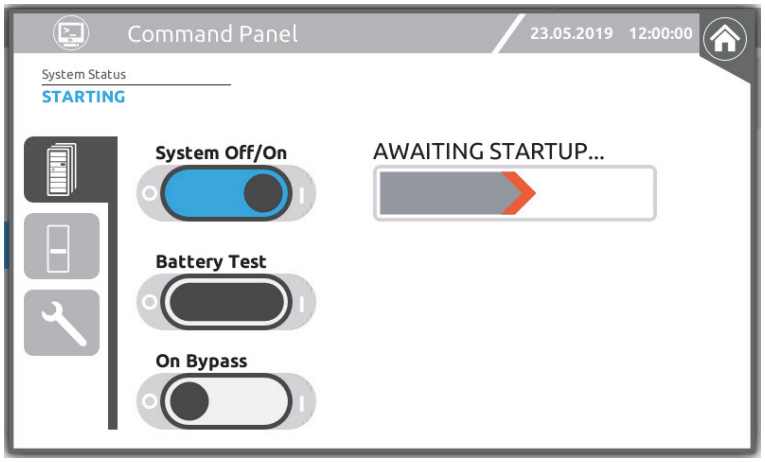
A confirmation of the action is requested for some of the commands.



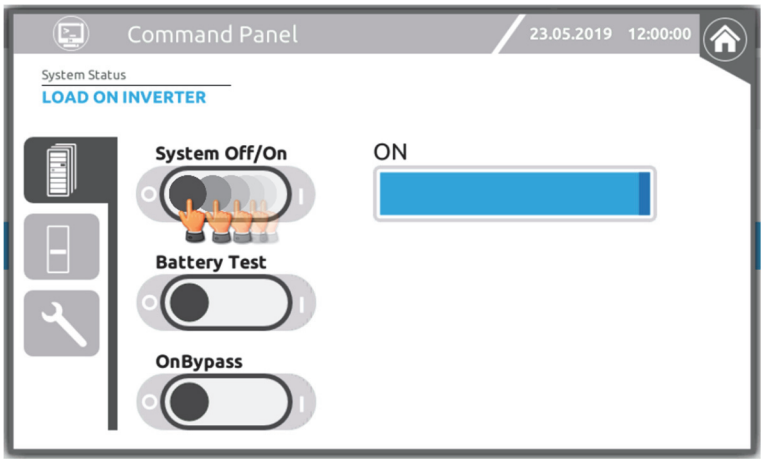
If one or more modules are not ready, a warning message will be shown.



Progress bar during a system start-up sequence.



Operate the sliding switch from I to O to switch the system off.



"COLD START" COMMAND

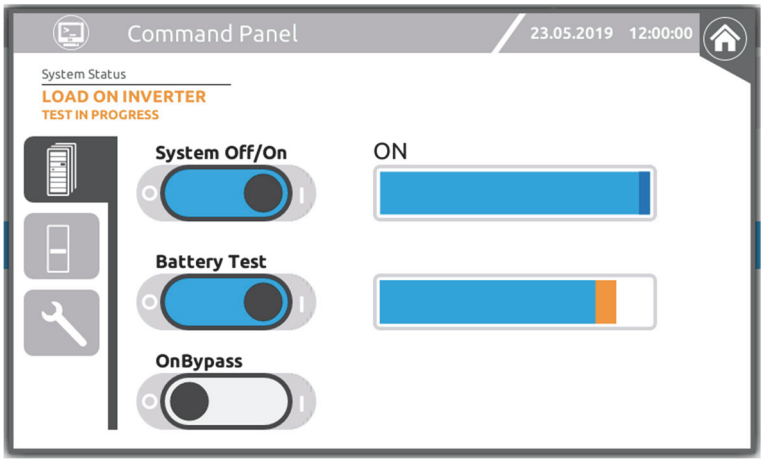
To switch on the system from the battery, press the "COLD START" button of the Cabinet for around 5 seconds (see the "User Interface" paragraph). The UPS modules will activate with their LEDs on.

Repeat this operation for all the Cabinets within the system.

Finally, switch on the system from the display using the ON/OFF COMMAND described in the previous paragraph.

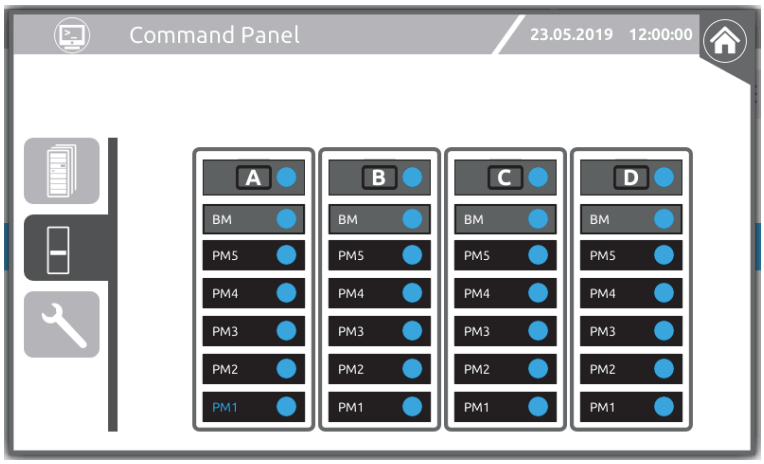
BATTERY TEST COMMANDS

Operate the sliding switch from O to I to execute the battery test.
The progress bar shows the progress of the battery test.

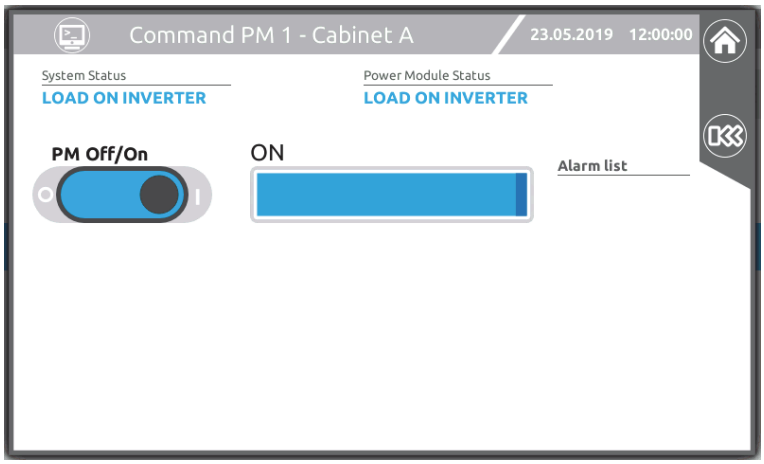


MODULE OFF/ON COMMAND

Select the Power Module on which you want to operate.

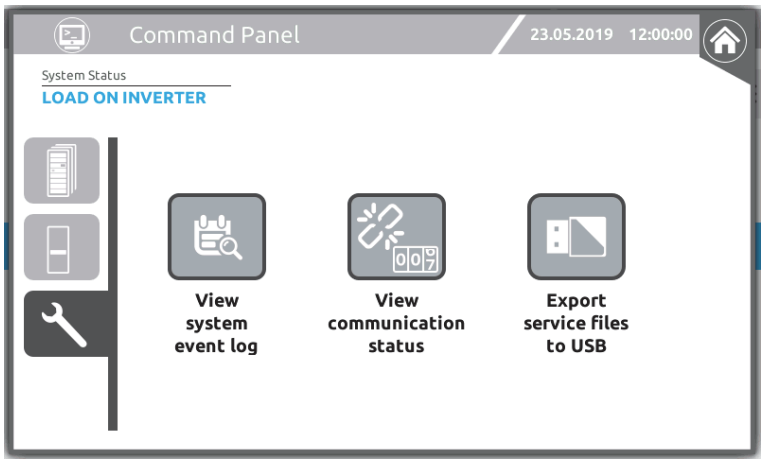


Operate the sliding switch from O to I or from I to O to switch the single Power Module on/off.

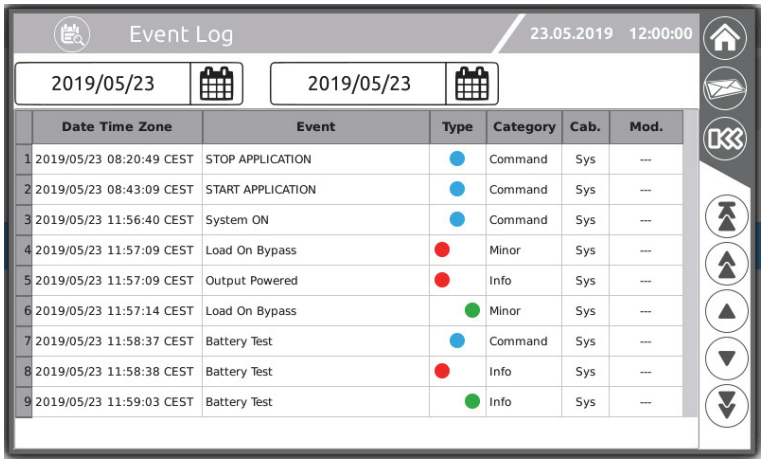


COMMANDS FOR DISPLAYING AND EXPORTING DATA

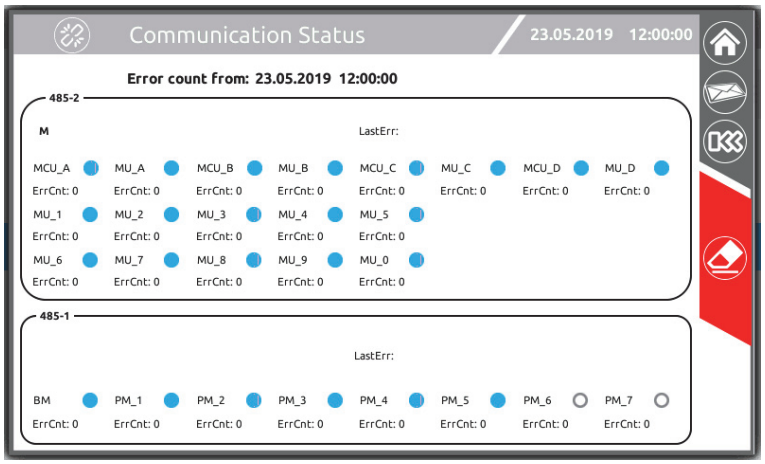
From this page, you can view the system event log file, view the communications status and export the complete log file onto a USB key for analysis by the authorised Service Personnel.



To view the event log file:
tap the “View system event log” icon. By setting the start and end dates you can view the events stored during a certain period.

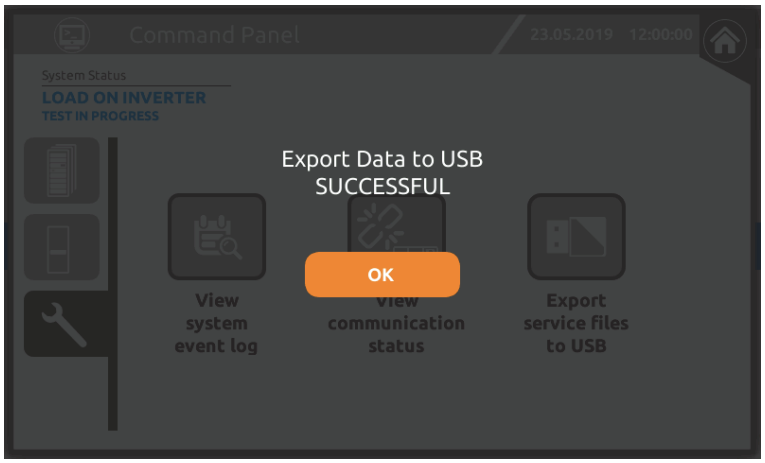


To view the communication status, tap the “View communication status” icon:



ErrCnt represents the number of errors accumulated by the MCU of CP you are operating from, as of the date given at the top of the page. Using the “eraser” icon, you can reset the counters and start the count again from the present date.
For further details refer to the “MPW-MPX Advanced Configuration Manual”.

To export the full log files (events, data, configuration) onto a USB:
Insert a USB memory key into the USB port on the side of the Main Communication Unit.
Touch the "Export service files to USB" icon to download the files. Please note that the operation could take several minutes.



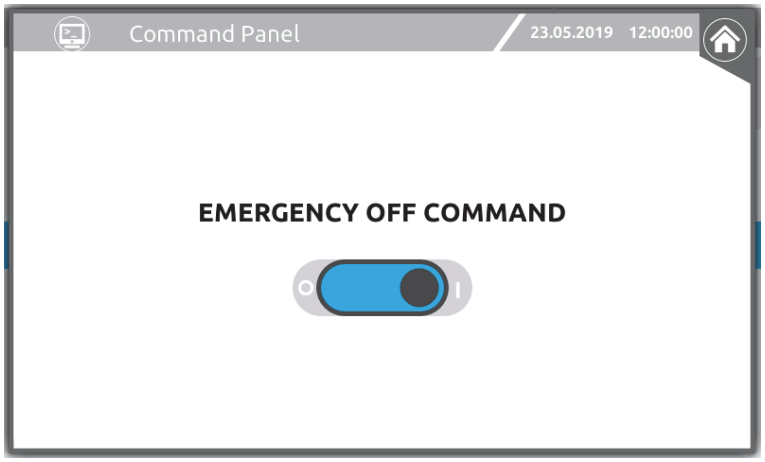
Wait until the download is complete before removing the USB key.

NOTE: the service files export icon will only become active once the USB key has been correctly recognised.

EMERGENCY OFF COMMAND

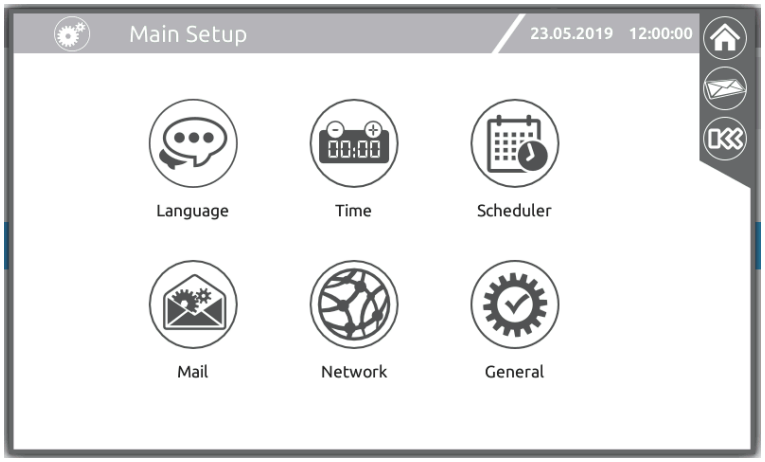
When there is an EPO condition, if you enter the Command Panel, a window will appear that displays the EPO condition.

WARNING: to restore the operation of the UPS, make sure that the conditions which led to the emergency shut-down are no longer present. After, remove the block by operating both the system EPO button and the slide.



MAIN SETUP PAGE

The “Power User” access level is required for accessing the Main Setup.



Language configuration.

Date/time, Country settings, system clock synchronisation with an NTP benchmark.

Planned operations configuration.

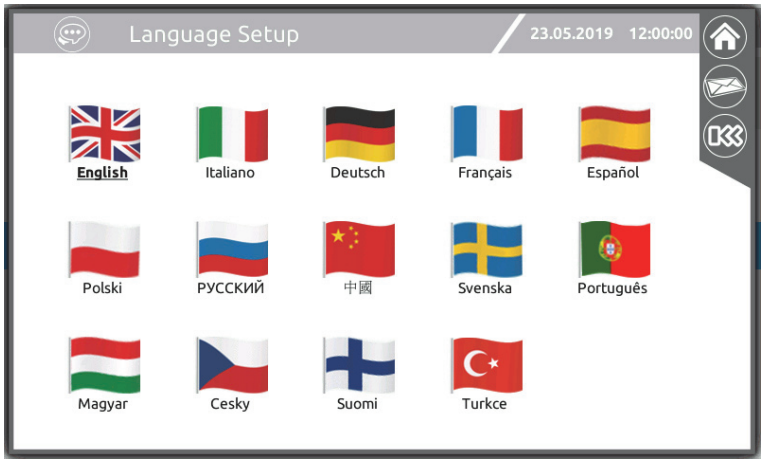
E-mail service configuration.

Network settings.

General system settings (system name, etc.)

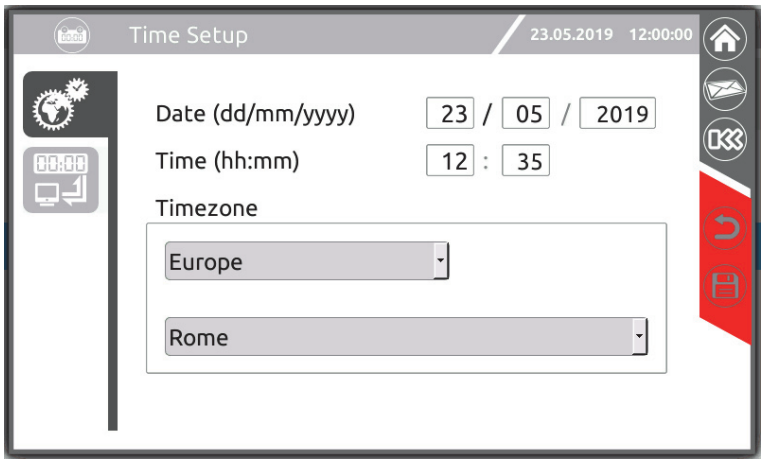
LANGUAGE CONFIGURATION

Enables the language configuration of the system menus.



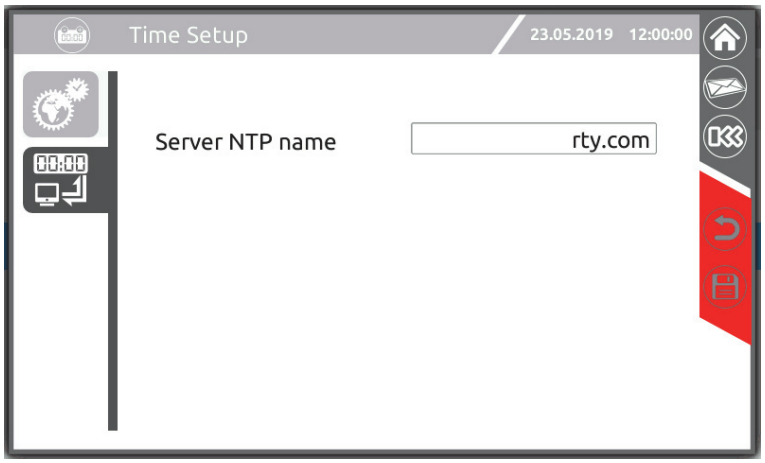
SYSTEM CLOCK SETTING

These pages enable the user to configure the date, the time and the time zone of the system.



CLOCK SYNCHRONIZATION SETTINGS

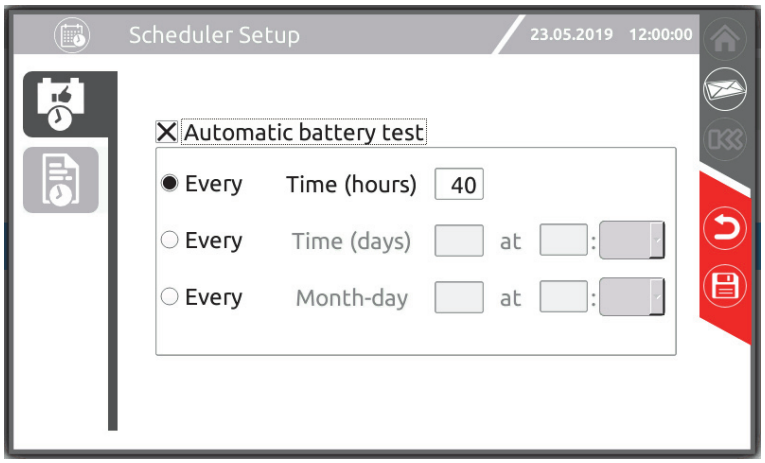
It is possible to make the system regularly synchronise its system clock with the clock of a local NTP server.



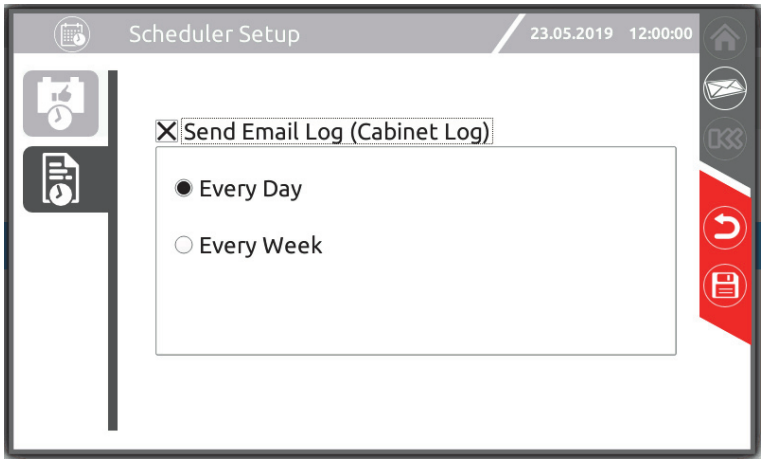
PLANNED OPERATIONS CONFIGURATION

BATTERY TEST SCHEDULING

This page enables the configuration of the scheduling for the automatic battery tests.



You can also program for logs to be sent via email. It will always be sent at 00:00 (every day or every week, depending on your choice).

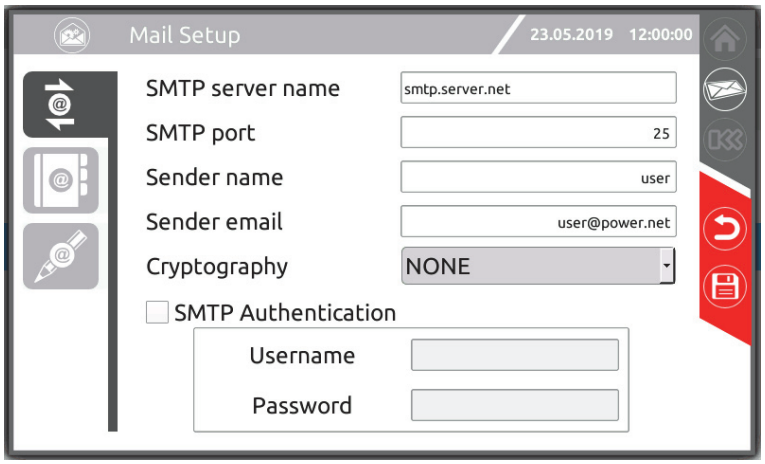


E-MAIL CONFIGURATION

The Tab menu on the left enables the user to move through the pages dedicated to the configuration of the e-mail service.

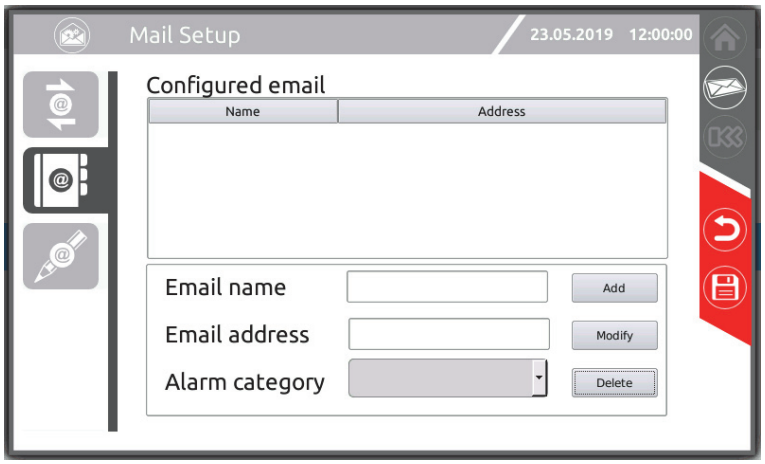
SMTP CLIENT CONFIGURATION

These pages enable the configuration of the SMTP client: server name, port, name and e-mail address of the sender, encryption type and authentication data.



E-MAIL ADDRESS CONFIGURATION

This page allows you to set a list of addresses to be sent a message in the event of a system event. Using the alarm category, messages can be filtered by importance.

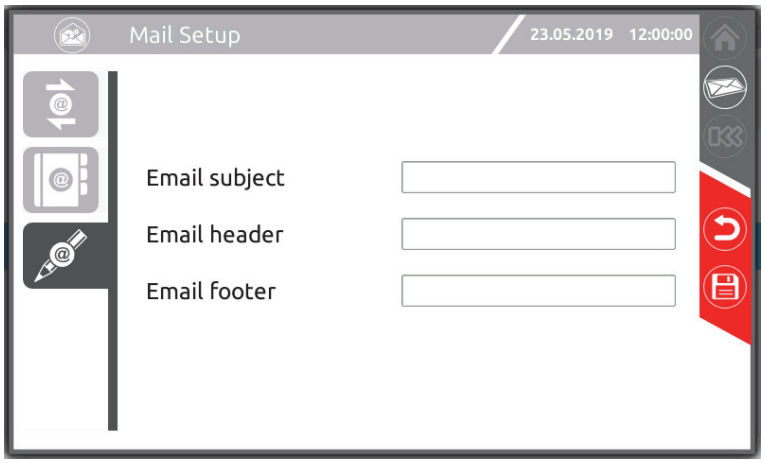


Alarm type: Informative, Minor, Major, Critical.

NOTES: The selected alarm category includes all the other more serious categories (ref. to “Status messages / Alarm codes” chapter).

CONFIGURATION OF THE DETAILS OF THE E-MAIL MESSAGE

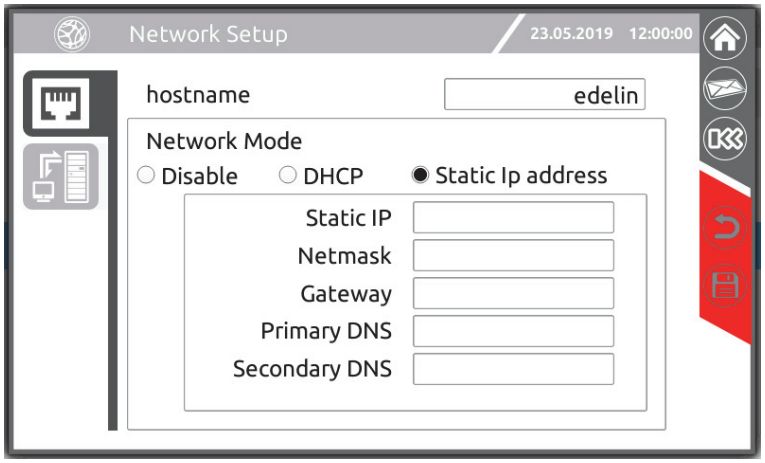
This page enables the configuration of the text which will be used as the subject of the e-mail, the header and footer of the message.

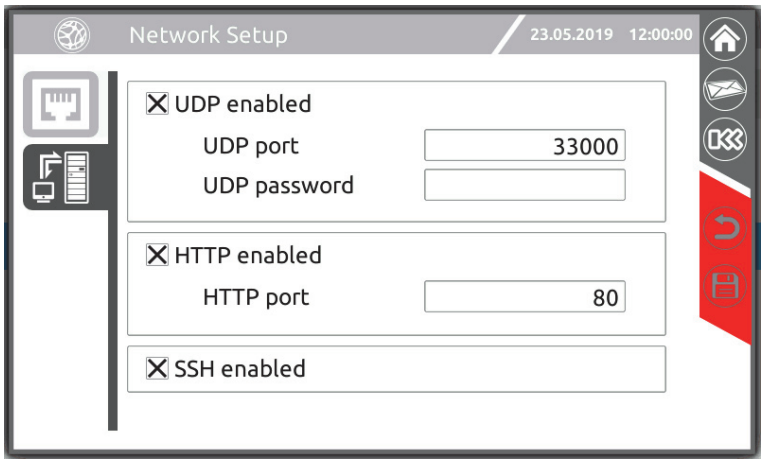


NETWORK SETTINGS

These pages enable the configuration of the network connection.

Hostname	This is the name identifying the MCU or CP on the network
Tcp/Ip protocol	Allows you to modify the network interface settings.
UDP, HTTP	Allows you to set the associated services with the key, the port and the password (see chapter on “Monitoring via Ethernet port”).

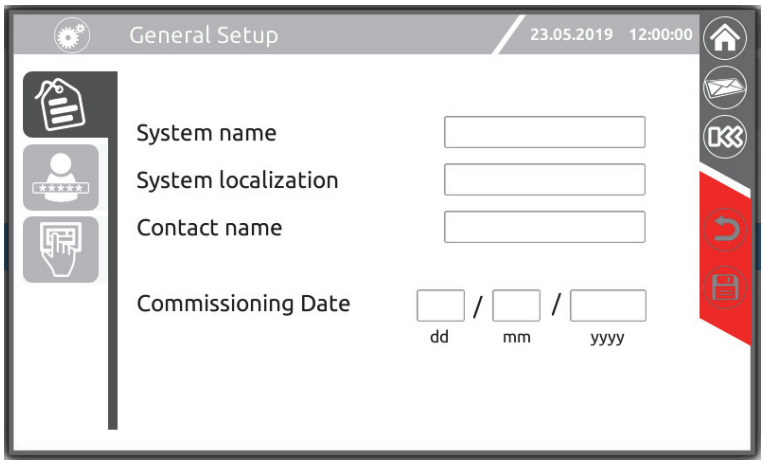




GENERAL SYSTEM SETTINGS

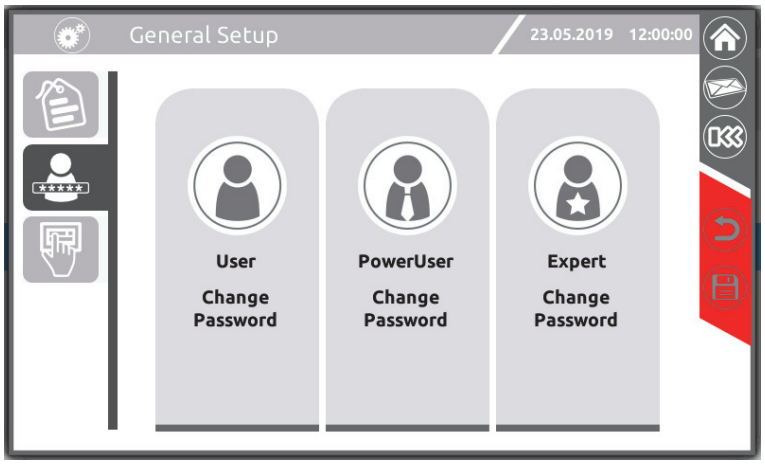
SYSTEM LABEL

This page enables the configuration of the system name, its location and the contact person.
The commissioning date can only be viewed by a Power User.



PASSWORD SETTING AND CHANGE

Touch the user icon matching the access level for which it is intended to set or change the password and type/change the password. The password will be required to be entered twice to ensure it is correct.

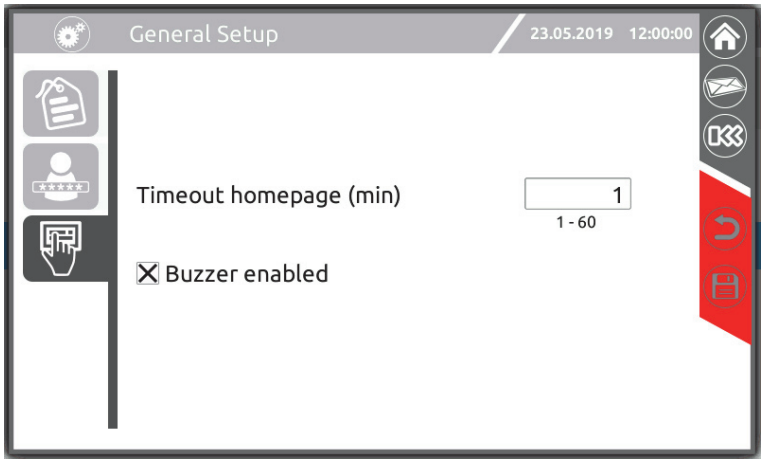


DISPLAY SETTINGS

This page enables:

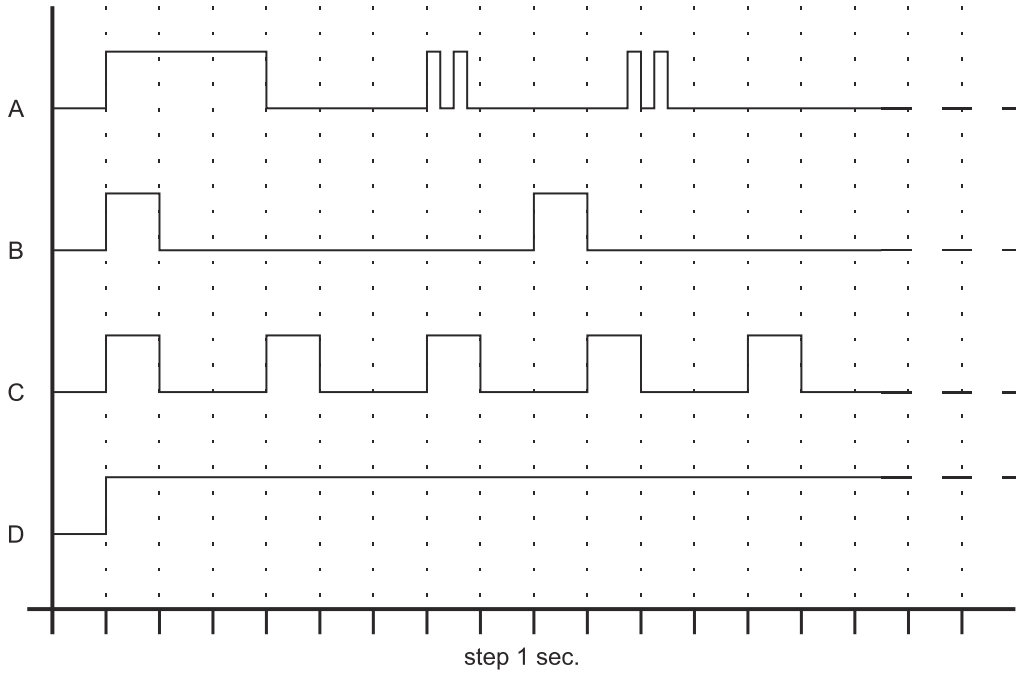
- define the inactivity period after which the Home page is displayed and the energy saving function is activated;
- activate the buzzer.

  Note: The touch screen keyboard beep is separate and it is not possible to enable/disable this.



BUZZER

The UPS status and any anomalies are reported by a buzzer, which emits a modulated sound according to the various UPS operating conditions.
The different types of sounds are described below:



Sound A: This sound is made when the UPS switches to bypass.

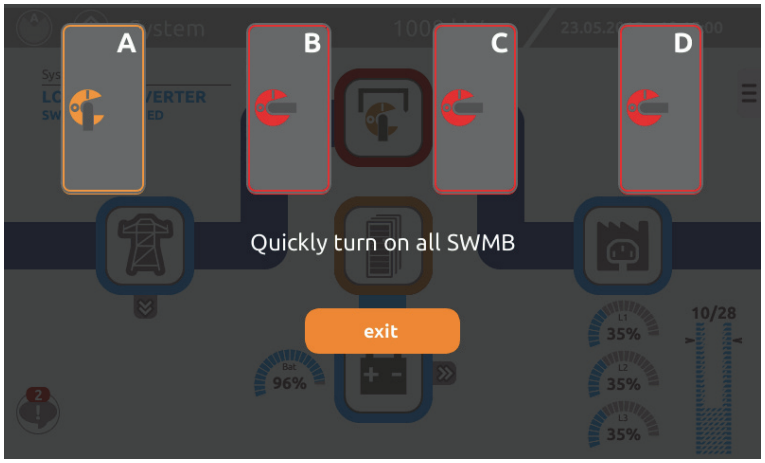
Sound B: The sound is made when the UPS switches to battery mode before the battery final discharge signal is given (sound C).

Sound C: The sound is made in battery mode when the battery final discharge alarm threshold is reached.

Sound D: This sound is made when there is an alarm or lock.

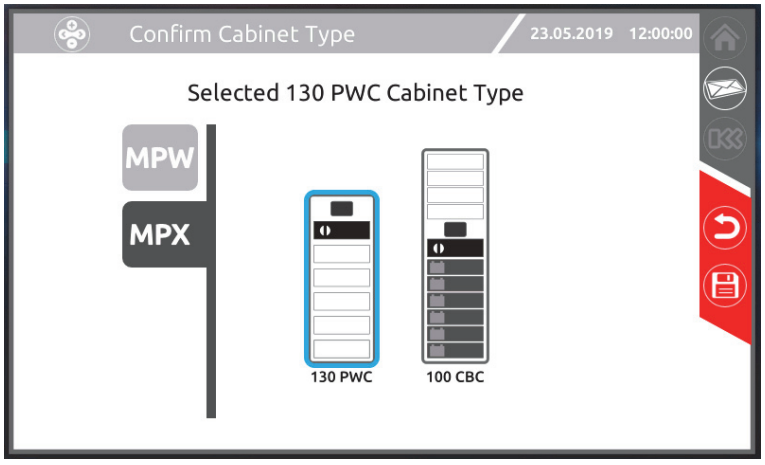
ANOMALOUS SITUATION SCREENS

Remember that the SWMBs should be closed as simultaneously as possible in order to avoid excess loads at parts of the Manual Bypass. During the Manual Bypass switch (SWMB) closing procedure, a message will appear reminding you to operate the switches quickly.

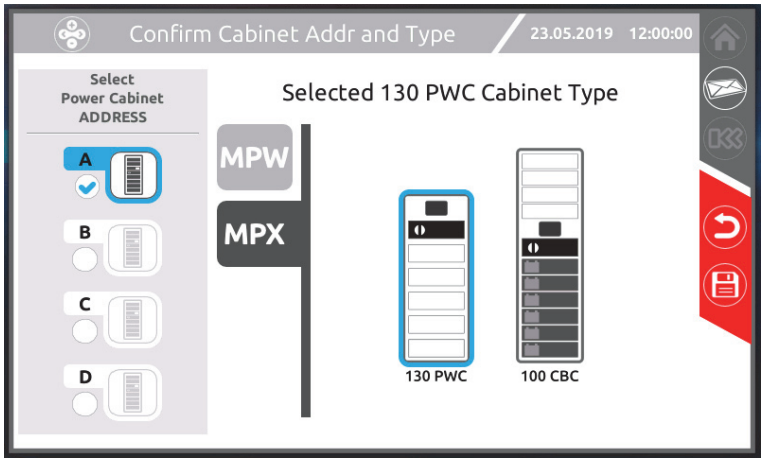


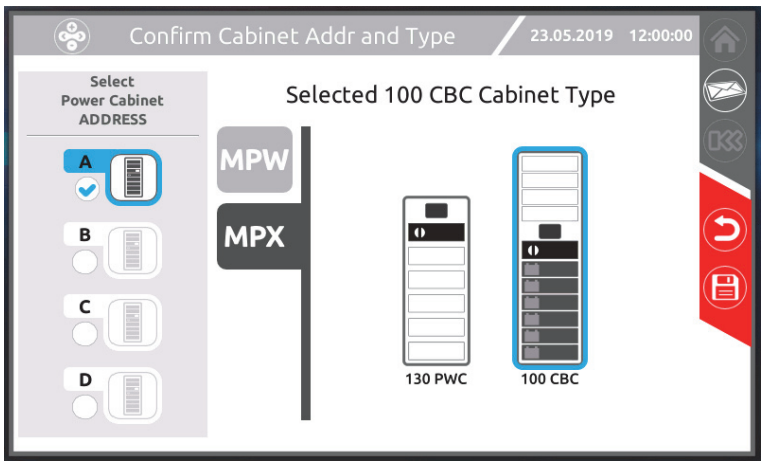
A similar message is shown during the SWMB opening procedure.

During the start-up phase, the MCU (or CP) must perform some consistency tests on the configuration of its own cabinet.
Under some circumstances this operation may not be successful at the first attempt. In this case, the display will show a screen that allows the test outcome to be forced by the operator.



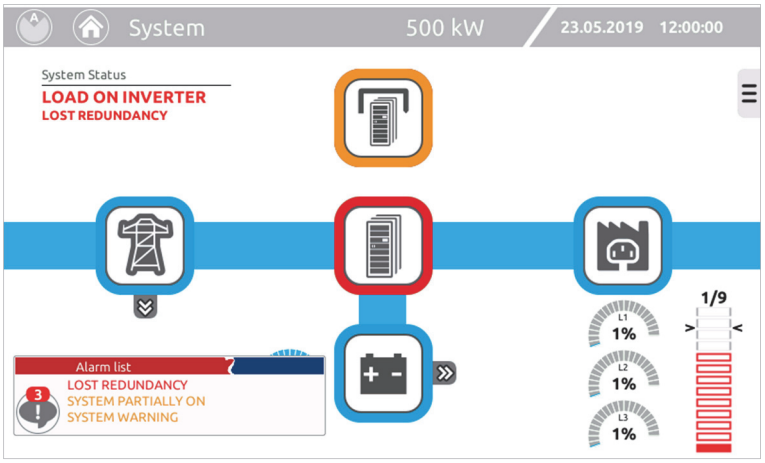
The test is in any case repeated autonomously every 60 seconds. Usually, the test is completed successfully at the second attempt and the MCU (or CP) can then start autonomously.
Only for the MPX 100 CBC, if the MCU starts up in complete absence of the MU, the test obviously cannot achieve a positive result and the operator must therefore confirm, before start-up, the address and type of cabinet the MCU is starting in.





NOTE: The screen for selecting the type of cabinet is also shown in the event of a discrepancy between the hardware and software settings. In this case, refer to the “MPW-MPX Advanced Configuration Manual”.

In the event that the EPO condition is detected by a sub-system of UPS Cabinets, the system will switch to a state of "partial switching on" with the BMs of the affected Cabinets locked.
To exit this situation, remove the EPO contact problem and switch the system on again.



OPTIONS

DOOR WITH DUST FILTER

This UPS series features a kit for the installation of a dust filter on the front door of the Cabinet, useful for dusty environments. The kit includes an air interchangeable filter and a seal to be mounted around the edge of the door.

If the maintenance operations are carried out correctly, the presence of the filter does not reduce the UPS performance (no power derating).

Clean the filter regularly according to the conditions of the environment in which the UPS is located.

EXTERNAL BATTERY TEMPERATURE SENSOR

The optional kit containing the temperature sensor, allows the Modular UPS System to monitor the temperature inside a separate battery room or Battery Cabinet, via the terminals provided on the ASB card identified as “TEMP”. This **isolated** input can also be used to compensate the battery voltage with the environment temperature (temperature compensation). This function must be enabled from the display and can be found in the “MONITORING UNIT” page.

It is essential that only the kit provided by the manufacturer is used. The use of a temperature sensor that does not comply with the specifications may cause faults or breakdowns of the equipment. Only authorised personnel can install and activate the temperature sensor.
The kit provides for the connection of the temperature sensor for a Battery Cabinet located next to the UPS or at a distance of 10 metres from the UPS. If such distance is not sufficient, the kit can be extended to a maximum distance of 25 metres.

Refer to the manual provided with the kit for the installation of the external temperature sensor on the Battery Cabinet.

PARALLEL AND COMMUNICATION WITH MODULAR BATTERY CABINETS

The Cabinet MPX 130 PWC features a kit for the installation of a parallel and communication card in the slot provided. This card allows for the parallel connection of a maximum of 4 Cabinets of the same type and for the monitoring of the batteries contained in the Modular Battery Cabinets.
For further information, please refer to the parallel kit manual provided and to the installation manual.
Note: this card is provided as standard in the Cabinet MPX 100 CBC.

REDUNDANT POWER SUPPLY UNIT (PSU2)

The Cabinet MPX 130 PWC features a kit for the installation of an additional power supply unit (PSU2), in the slot provided. This provides a redundant power supply also for the monitoring of the cabinet.
For further information, please refer to the kit manual provided.
Note: the redundant power supply is provided as standard in the Cabinet MPX 100 CBC.

ACCESSORY CARD SLOT

The UPS is equipped with three expansion slots for accessory communication cards or I/O expansion cards which enable the appliance to communicate using the main communication standards.
For example:

- Ethernet with TCP-IP, HTTP and SNMP protocols
- RS232 + RS485 ports with JBUS / MODBUS protocol
- Additional digital inputs
- Additional clean output contacts

For further information on the available accessories, please refer to the updated catalogue or visit the website.

KIT IPX1

The Cabinet MPX 100 CBC features a kit which provides the installation of an optional cover which protects the UPS from drops of water falling vertically. From the standard version, this kit provides the IP21 protection rating.

BACKFEED PROTECTION WITH MPW 130 BM TYPE BYPASS MODULE

In the MPX standard series, which includes the MPX 130 BM (BM126X) bypass module, the load is disconnected for safety reasons in case of intervention of the backfeed protection.
It is possible to order different Cabinet models which feature the MPW 130 BM bypass module. With this version, the load continues to be supplied by the inverter also during battery operating mode if the backfeed protection intervenes.
For further details, refer to the section regarding the BM in the “Modules and Units installation” chapter.

COLD START

If it is necessary to start the Modular UPS System from the battery, it is possible to order Cabinet models and the relevant UPS modules which provide such function (Cold Start).

REMOTE COMMUNICATION

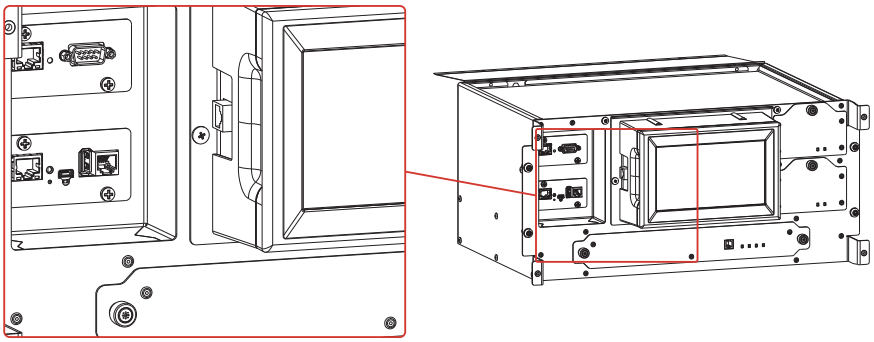
CONNECTIVITY PANEL OVERVIEW

The area of the Connectivity Panel includes the user interface and all the available connection services.
It includes a 7-inch graphic display (Monitor Control Unit) and two communication slots for the local or remote monitoring of the system using optional cards.

The MCU or CP is provided by standard with an Ethernet 10/100 network port (RJ45 connector) and with ports dedicated to assistance services.

Two independent communication slots to fit several communication cards including Netman 204 and Multicom 302. The two slots are fully independent; this means that two separate communications bus can be created.

The figure shows the Ethernet network port and the slots with the Multicom 302 and Netman 204 options.



MPX MONITORING WITH ETHERNET PORT (STANDARD)

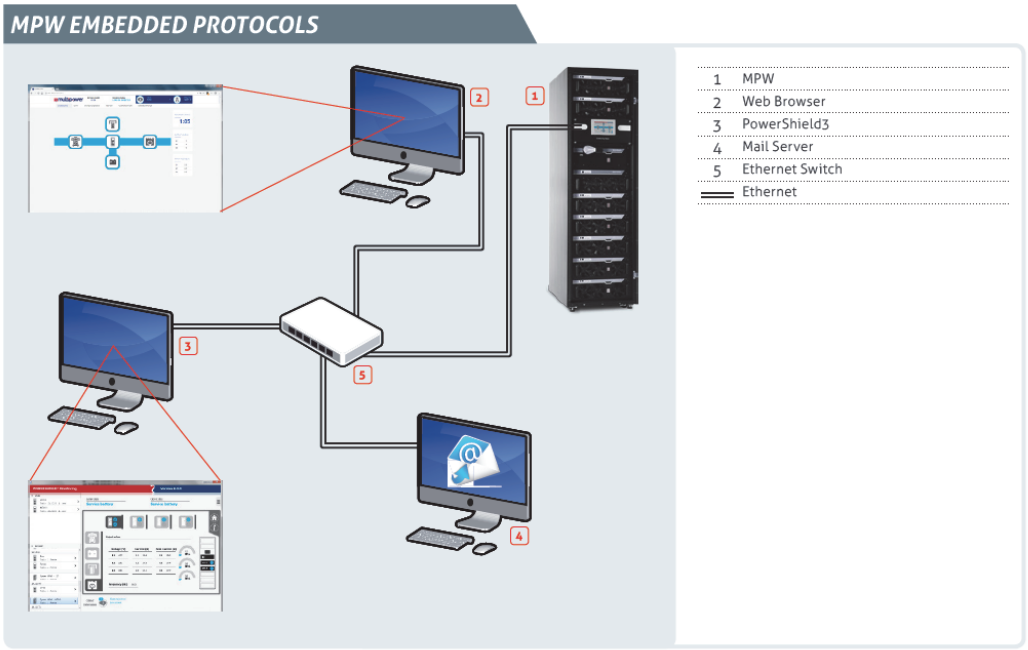
The network port supports standard UDP, HTTP and SMTP protocols to control and monitor the system.
In detail:

UDP protocol to operate with PowerShield3 propriety software, (available from www.riello-ups.com).

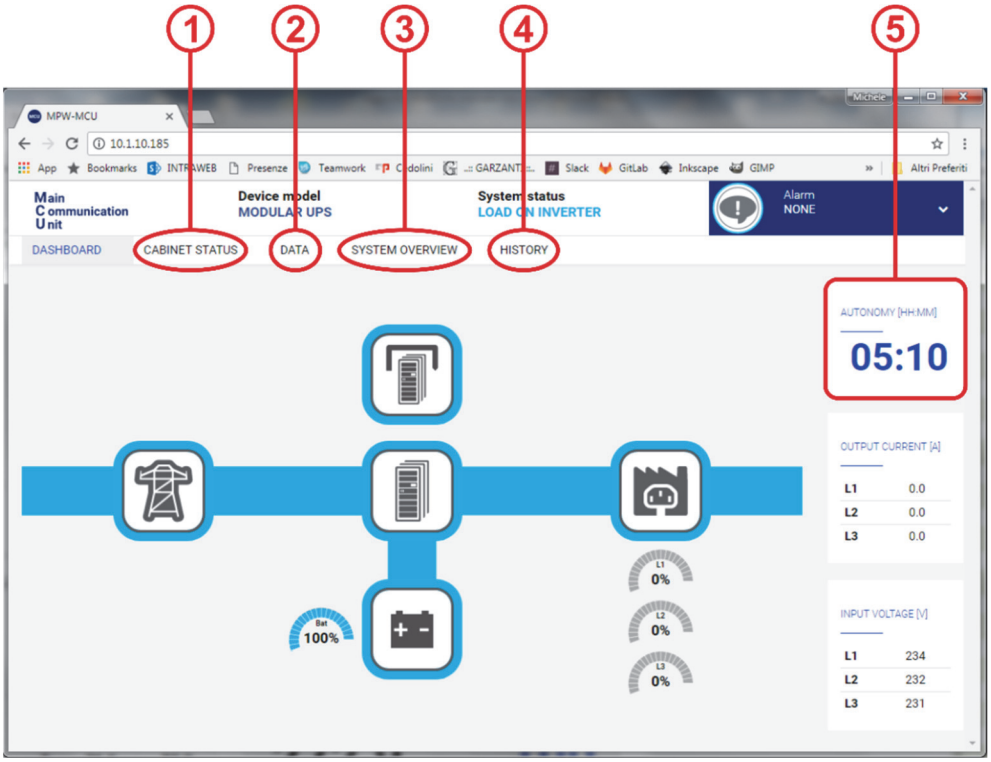
For further information, refer to the dedicated PowerShield3 user manual. Note: The term “System” refers to the overall installation, which might include from one to four complete cabinets. From the same Ethernet port, there are also two additional protocols available:

HTTP to monitor the entire UPS system (status and measurements) via a standard web browser.

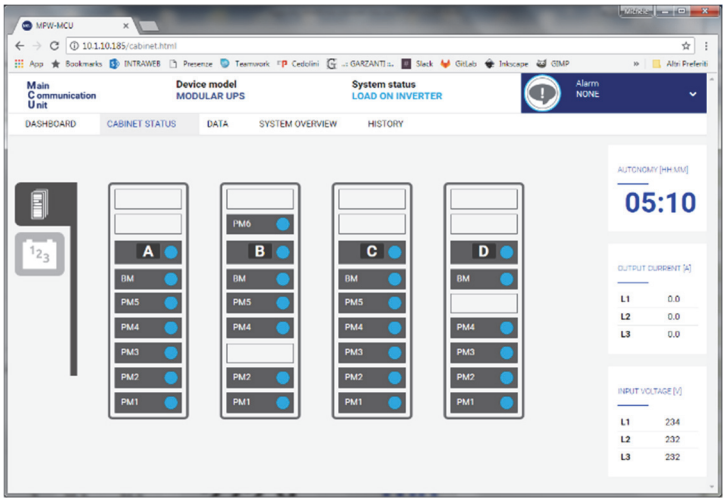
SMTP to send emails to a list of recipients with any alarms or reports content.



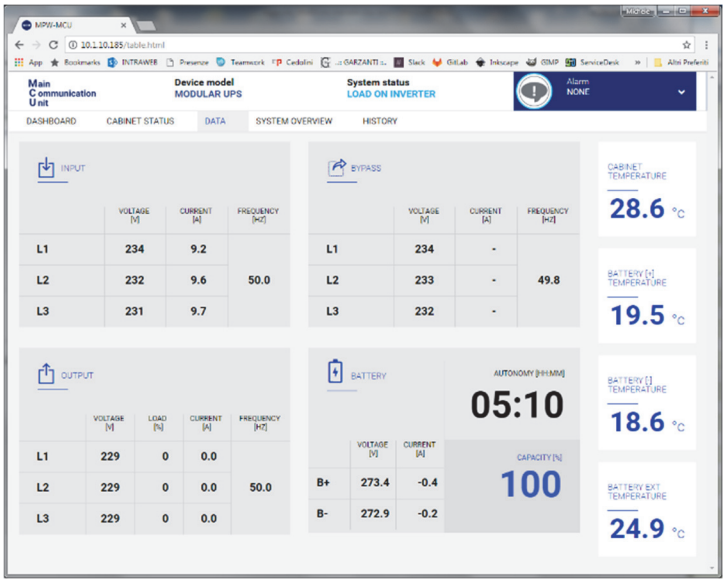
MONITORING VIA WEB BROWSER



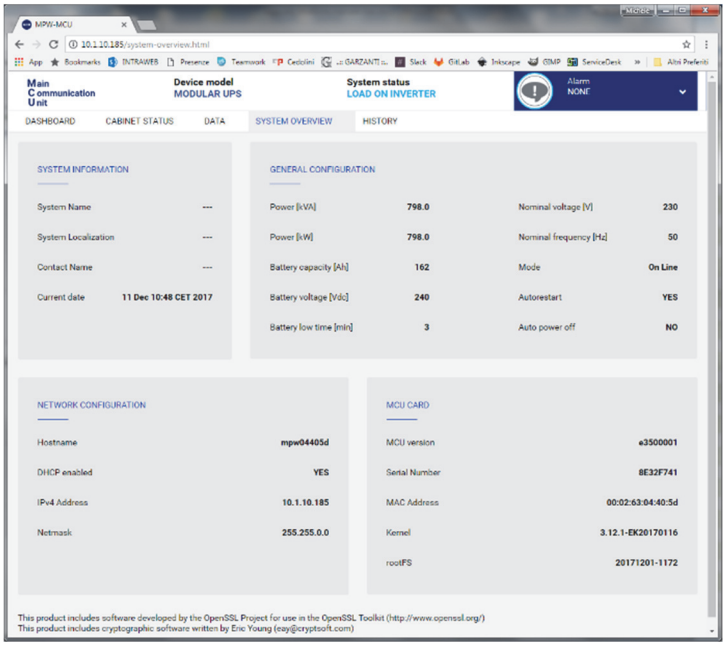
1



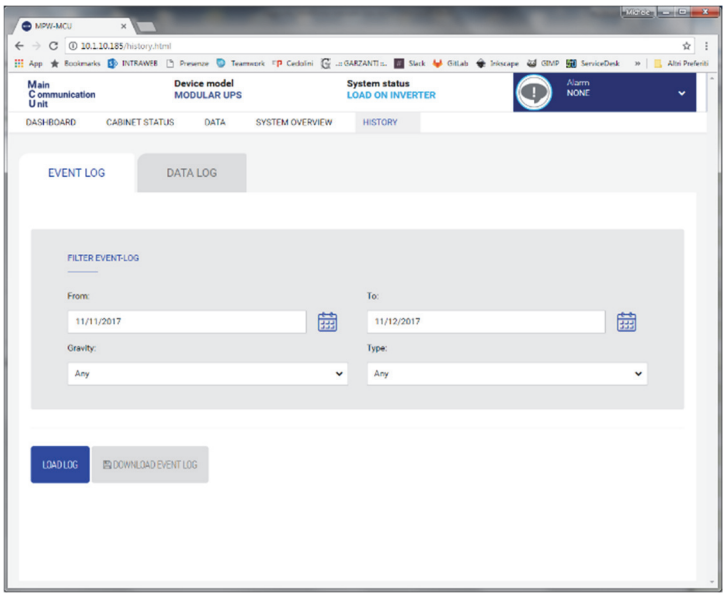
2



③

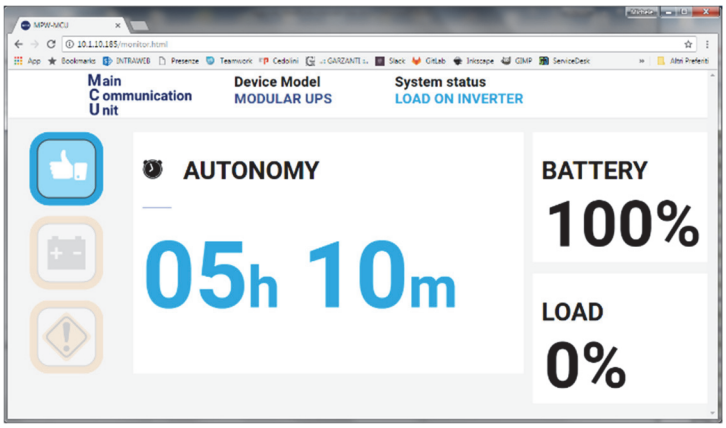


④



As an extension of the web interface, we have developed a special page for “Simplified Monitoring”.
The page can be accessed at http://addrMCU/monitor.html where addrMCU is the hostname of the MCU (or CP) or simply the selected IP address. You can view a preview by clicking in the AUTONOMY panel on the Home page.

⑤



MPX MONITORING WITH NETMAN 204 (OPTIONAL)

The optional network card supports the standard SNMP and Modbus TCP protocols.

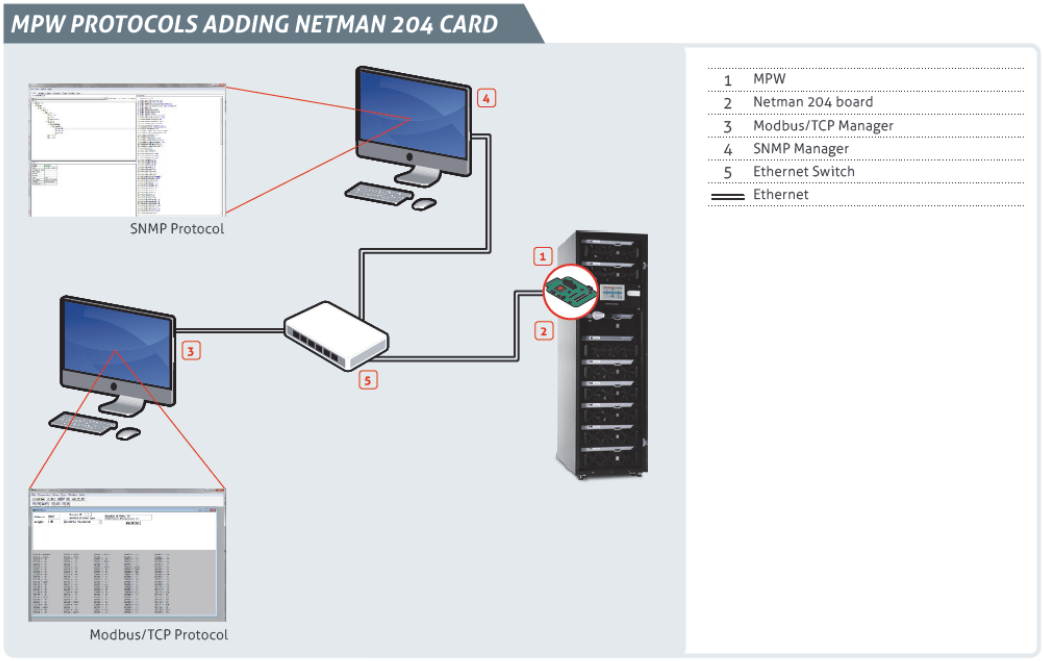
In detail:

- SNMP for control via SNMP Manager standard software (private MIB files available from www.riello-ups.com).

- Modbus/TCP to integrate the system into a Modbus network (log map available from www.riello-ups.com).

In the event of a system comprised of several cabinets, the Netman 204 provides alarm/status information and the main reading for the entire system. It also provides a detailed description of the cabinet it is inserted into.

Note: A Netman 204 installed within an MPX system does not make available the services already supplied by the standard Ethernet port (UDP, HTTP and SMTP).



MONITORING VIA OPTIONAL MULTICOM 302 CARD (MODBUS 485)

The optional network card supports the standard Modbus 485 protocol to integrate the system into a Modbus network (log map available from www.riello-ups.com).

In the event of a system comprised of several cabinets, the MultiCOM 302 provides alarm/status information and the main reading for the entire system. It also provides a detailed description of the cabinet it is inserted into.

OPERATIVE PROCEDURES

Before any attempt to put the system online it is mandatory to check the power supply and connections (PHASE, NEUTRAL, BATTERY).
Refer to "MPX Installation manual".

SYSTEM ON

Operations to be performed in order to Switch On the MPX.

The MPX can be switched to "Normal Operation" in two ways:

A. SYSTEM ON: DIRECT COMMAND

- Switch on the Mains and Bypass Input lines.
- The system will activate in "Stand-By" mode (The Leds on PSU1 and PSU2 - if present - will be lit).
- Verify the Mains and Bypass input voltages on the "System Status" page.
- Verify that no anomalies are present on the system status page (except the alarm "Batteries not present").
- Verify that all the configured PMs are ready (the red led "ALARM" blinks slowly).
- Verify that all the configured BM are ready (the green led "BYPASS READY" is lit fixed).
- From the "Command Panel" page, slide "System Off/On" from "O" to "I" to start the System.
- Confirm "System ON" command.
- This command will automatically Start Up the System with the following sequence:
    1. PMs Pre-charge
    2. PMs Inverters Synchronise
    3. Transfer the load onto the Static Bypass Line
    4. Transfer the load onto the Inverter Output

  The "Awaiting Start Up" process will take approximately one minute.
- Verify that no anomalies are present on the "System Status" page.
- Verify that the measurements of inverter voltages are correct, and that the system status is "Load on Inverter".
- Connect the batteries to the system.
- Check the battery status and verify the measurements.
- From the "Command Panel" page slide the "Battery Test" from "O" to "I" to execute the test.
- Verify that the Alarm "Batteries Not Present" is no longer present anymore.
- From this point the system is in normal operation.

B. SYSTEM ON: VIA STATIC BYPASS COMMAND

- Switch on the Mains and Bypass Input lines.
- The system will activate in “Stand-By” mode (The Leds on PSU1 and PSU2 - if present - will be lit).
- Verify the Mains and Bypass input voltages on the “System Status” page.
- Verify that no anomalies are present on the system status page (except the alarm “Batteries not present”).
- Verify that all the configured PMs are ready (the red led “ALARM” blinks slowly).
- Verify that all the configured BM are ready (the green led “BYPASS READY” is lit fixed).
- From the “Command Panel” page, slide “OnBypass” from “O” to “I” to start the system to static bypass.
- Confirm “Load On Bypass Command”.
- This will supply power to the load via the bypass line. The system PMs will remain in Stand-By.
- Verify the output Voltages on the “System Status” page.
- From the “Command Panel” page, slide “System Off/On” from “O” to “I” to start the PMs.
- Confirm “Inverter On Command”.
- The inverters will synchronise within all of the PMs ready to start, but the system will remain on bypass.
- The “Awaiting Start Up” process will take approximately one minute.
- Verify that no anomalies are present on the system status page (except the alarm “Batteries not present”).
- From the “Command Panel” page, slide “OnBypass” from “I” to “O”.
- Confirm “Load On Inverter Command”.
- The system will transfer the load from the bypass onto the inverter output.
- Verify that the output Voltages and the operational status are correct on the “System Status” page.
- Connect the batteries to the system.
- Check the battery status and verify the measurements.
- From the “Command Panel” page slide the “Battery Test” from “O” to “I” to execute the test.
- Verify that the Alarm “Batteries Not Present” is no longer present anymore.
- From this point the system is in normal operation.

SWITCHING THE SYSTEM TO MANUAL BYPASS

Operation to be performed in order to switch the MPX to "Manual Bypass" (in a system with only one cabinet):

NOTE: if the Bypass line is not present, the manual bypass operation may disconnect the power to the load.
With the SWMB switch closed the bypass input line supplies the load directly.

The switching of the System to manual bypass can be done in two ways:

A. VIA STATIC BYPASS (preferred):

- Verify that the bypass voltages are correct on the "System Status" page.
- Verify that the inverters are synchronised to the bypass line (no presence of the message " Bypass not available").
- Verify that the BM has no anomalies on the "System Status" page.
- From the "Command Panel" page, slide "OnBypass" from "O" to "I" to switch the system to static bypass.
- Confirm "Load On Bypass Command".
- Close the SWMB switch.

B. DIRECT MANUAL BYPASS (not suggested):

- Verify that the bypass voltages are correct on the "System Status" page.
- Verify that the inverters are synchronised to the bypass line (no presence of the message " Bypass not available").
- Directly close the SWMB manual bypass switch: the bypass line supplies the load directly.

NOTE: In the case of an installation with an external SWMB switch, verify first the proper connection of the relative Auxiliary Contact.

SWITCHING THE SYSTEM TO INVERTER AFTER MANUAL BYPASS

Operation to be performed in order to switch the MPX from "Manual Bypass" to normal operation:

- From the "Command Panel" page, slide "OnBypass" from "O" to "I" to close static bypass.
- Confirm "Load On Bypass Command".
- Verify the output Voltages on the "System Status" page.
- The PMs will remain in StandBy.
- Open the SWMB switch.
- From the "Command Panel" page, slide "System Off/On" from "O" to "I" to start the PMs (if not already on).
- Confirm "Inverter On Command".
- This command will synchronise all of the PMs ready to start, but the system will remain on bypass.
- Verify that no anomalies are present on the "System Status" page.
- Verify that all PMs are ready.
- Verify that all the measurements and the operational status are correct on the "System Status" page.
- From the "Command Panel" page, slide "OnBypass" from "I" to "O".
- Confirm "Load on Inverter Command".
- The system will transfer the load from the bypass to the inverter output.
- Verify the output Voltages on the "System Status" page.
- From this point the system is in normal operation.
- Verify that all the measurements and the operational status are correct on the "System Status" page.

PM REPLACEMENT

The following operations must only be performed by skilled and specifically trained service personnel.
Refer to the Insertion/Extraction procedure

Possible scenarios:

1. Replacement of a working PM when redundancy is available. Use procedure "**A**".
2. Replacement of a Switched off PM or of a faulty PM (i.e. not supplying the load). Use procedure "**A**" (where applicable)
3. Replacement of a working PM when redundancy is not available. Use procedure "**B**".

A. Operation to be performed in order to replace a PM (when redundancy is available):

- Verify that the load can be adequately supported by the remaining operational POWER MODULES.
- Switch off the selected PM using the "Module Off/On Command" from Command Panel/PM Page (if not already off or faulty).
- Open the associated switch lock.
- Extract the PM (Please note that the PM weighs 25 kg and 2-person handling is required).
- Insert the new PM, close the Switch Lock and wait for the Stand-by mode (slow flashing red LED) (1).
- Switch on the PM using the "Module Off/On Command" from Command Panel/PM Page.
- Confirm "Power Module ON Command".
- This command will activate the replaced PM.
- Check from the "Power Module" Page that the replaced module is operating correctly.
- Verify that all the measurements and the operational status are correct.

B. Operation to be performed in order to replace a PM (when redundancy is not available):

- When the number of available PMs cannot adequately support the connected load, it is necessary to put the system into static bypass.
- Using "OnBypass" command from Command Panel/System page, force the system into static bypass mode.
- Using "Module Off/On Command" from Command Panel/PM Page, switch off the PM to be replaced.
- Open the associated switch lock.
- Extract the PM (Please note that the PM weighs 25 kg and 2-person handling is required).
- Insert the new PM, close the Switch Lock and wait for the Stand-by mode (slow flashing red LED) (1).
- Using "Module Off/On Command" from Command Panel/PM page, switch on the module.
- Check from the "Power Module" Page that the replaced module is operating correctly.
- From the "Command Panel" page, slide the "OnBypass" command from "I" to "O". This will return the status to on line mode.
- Check from the "Power Module" Page that the replaced module is operating correctly.
- Verify that all the measurements and the operational status are correct.

(1) If the system is configured with an output frequency of 60 Hz, to activate the new PM frequency automatic detection, you must reopen the Switch Lock, wait for the LEDs to switch OFF and close the Switch Lock again.

BM REPLACEMENT

The following operations must only be performed by skilled and specifically trained service personnel.
Refer to the Insertion/Extraction procedure

Operation to be performed in order to replace a BM during "Online Mode" status without interrupting power to the load:

- Verify that the load is correctly supported by all of the PMs.
- Verify that the BM is not supplying the load.
- Open the associated switch lock.
- Extract the BM (Please note that the BM weighs 23 kg and 2-person handling is required).
- Insert a new BM and close its switch lock.
- Verify that all the measurements of the new BM are correct on the "System Status" page.
- Verify that the operational status of the new BM is "Ready" on the "System Status" page.

REPLACING MU, MCU, CP AND PSU

The following operations must only be performed by skilled and specifically trained service personnel.
Refer to the Insertion/Extraction procedure

This operation can be performed without interrupting power to the load:

- The replacement of these units will not affect the load.
- Simply extract the unit and insert the new one.
- Verify the status of the replaced unit.

NOTE: If the MCU or CP is removed the system will continue to operate correctly. During this time the user will only lose the system monitoring functions.

WARNING: The MU, MCU and CP must be configured accordingly to the system (refer to the "MPW-MPX Advanced Configuration Manual" for correct setting).

BU REPLACEMENT

The following operations must only be performed by skilled and specifically trained service personnel.
Refer to the Insertion/Extraction procedure

This operation must only be performed when the SYSTEM IS <u>NOT</u> OPERATING ON BATTERY MODE:

- Verify that the MPX is not working in battery mode.
- Remove the safety screws and bracket.
- Extract the BU (Please note that the BU weighs 32kg and 2-person handling is required).
- Reinsert the new BU.
- Verify that the SYSTEM is reporting the correct measurements and setup.
- Fasten the bracket and all the required screws.

STATUS MESSAGES / ALARM CODES

MPX SYSTEM

MPX STATUS MESSAGES		
Comm Lost	✉	Minor
PMs LOCKED	✉	Critical
BYPASS BACKFEED	✉	Critical
BMs LOCK - OUTPUT OVERLOAD		
BMs LOCK - BOARDS LINK FAIL		
BMs LOCKED		
PARALLEL LINK OPEN	✉	Major
OVERLOAD	✉	Major
BYPASS NOT AVAILABLE	✉	Major
BMs FAULT	✉	Major
LOST REDUNDANCY	✉	Major
POWER SUPPLY PSU1 FAIL	✉	Minor
POWER SUPPLY PSU2 FAIL	✉	Minor
SYSTEM FAILURE	✉	Major
MANUAL BYPASS ACTIVE	✉	Major
SWOUT OPEN	✉	Major
LOW REDUNDANCY	✉	Minor
SWBATT OPEN	✉	Major
SWEXTBATT OPEN	✉	Major
BATTERY NOT PRESENT	✉	Major
BATTERY UNIT ANOMALY		
REPLACE BATTERY	✉	Major
SYSTEM ANOMALY	✉	Minor
LOAD THRESHOLD EXCEEDED		
BATTERY LOW	✉	Major
IMMINENT SHUTDOWN	✉	Major
SCHEDULED SHUTDOWN	✉	Minor
TEST IN PROGRESS		
EPO COMMAND ACTIVE	✉	Critical
SWIN OPEN	✉	Major
SWBYP OPEN	✉	Major
PM NOT COMPATIBLE	✉	Warning
SYSTEM WARNING	✉	Warning
MAINS INPUT FAIL	✉	Major
SWMB MISALIGNED	✉	Major
PM NOT COMPATIBLE	✉	Warning
INPUT CONTACT DISABLED	✉	Warning
DIFFERENT MCU FIRMW. VERSION	✉	Warning
ERRONEOUS SWMB STATUS	✉	Warning

ERRONEOUS SWOUT STATUS	✉	Warning
INCONSISTENT BATTERY WORKING	✉	Warning
INCONSISTENT BYPASS STATUS	✉	Warning
ERRONEOUS SWBATT_EXT STATUS	✉	Warning
SYSTEM PARTIALLY ON	✉	Warning
ERRONEOUS SWIN STATUS	✉	Warning
ERRONEOUS SWBYP STATUS	✉	Warning
BYPASS DISABLED		
BYPASS COMMAND ACTIVE		
REMOTE BATT. CHARGER OFF		

POWER MODULE

PM STATUS MESSAGES		
PM NOT PRESENT	✉	Minor
PRECHARGE		
STAND-BY		
STARTING		
LOAD ON BYPASS	✉	Minor
LOAD ON INVERTER		
FROM BATTERY	✉	Major
WAIT BATTERY RECHARGE		
ECONOMY MODE (ENERGY SAV.)	✉	Warning
READY		
LOCK - LOAD OFF	✉	Critical
LOCK - LOAD ON BYPASS	✉	Critical
LOCK - STAND-BY	✉	Critical
FREQUENCY CONVERTER		
CALIBRATION		
POWER OFF ACTIVE		
WAIT CABINET ID		
EFFICIENCY CONTROL		

PM ALARM CODES	
COMMAND	
[C01]	REMOTE OFF COMMAND
[C02]	REMOTE BYPASS COMMAND
[C03]	REMOTE ON COMMAND
[C04]	BATTERY TEST ACTIVE
[C05]	MANUAL BYPASS ACTIVE
[C06]	EPO COMMAND ACTIVE
[C07]	REMOTE BATT. CHARGER OFF
[C08]	BYPASS COMMAND ACTIVE
WARNING	
[W01]	BATTERY LOW WARNING
[W02]	SCHEDULED SHUTDOWN
[W03]	IMMINENT SHUTDOWN
[W04]	BYPASS DISABLED
[W05]	SYNCHRONIZATION DISABLED
[W07]	SERVICE UPS
ANOMALY	
[A01]	CONFIG. DATA CORRUPTED
[A02]	PM NOT COMPATIBLE
[A03]	INVERTER ASYNCHRONOUS
[A04]	EXTERNAL SYNC. FAIL
[A05]	MAINS OVERVOLTAGE L1
[A06]	MAINS OVERVOLTAGE L2
[A07]	MAINS OVERVOLTAGE L3
[A08]	MAINS UNDERVOLTAGE L1
[A09]	MAINS UNDERVOLTAGE L2
[A10]	MAINS UNDERVOLTAGE L3
[A11]	MAINS FREQUENCY ABNORMAL
[A13]	BYPASS VOLT. ABNORMAL L1
[A14]	BYPASS VOLT. ABNORMAL L2
[A15]	BYPASS VOLT. ABNORMAL L3
[A16]	BYPASS FREQ. ABNORMAL
[A18]	BYPASS VOLTAGE FAIL
[A19]	OUT. PEAK OVERCURRENT L1
[A20]	OUT. PEAK OVERCURRENT L2
[A21]	OUT. PEAK OVERCURRENT L3
[A22]	LOAD L1> USER THRESHOLD
[A23]	LOAD L2> USER THRESHOLD
[A24]	LOAD L3> USER THRESHOLD
[A25]	SWOUT OPEN
[A26]	(+) BATTERY NOT PRESENT
[A27]	(-) BATTERY NOT PRESENT
[A29]	INT. TEMP. SENSOR FAULT
[A30]	INTERNAL UNDERTEMP
[A31]	INTERNAL OVERTEMP
[A32]	UNDERTEMP. POWER L1
[A33]	UNDERTEMP. POWER L2
[A34]	UNDERTEMP. POWER L3
[A39]	REPLACE (+) BATTERY
[A40]	REPLACE (-) BATTERY
[A47]	REV. PM FIRMW. VERSION

PM ALARM CODES	
FAULT	
[F01]	INTERNAL COMM. ERROR
[F02]	MAINS PHASE REVERSED
[F03]	INP.FUSE/CONTACT FAIL L1
[F04]	INP.FUSE/CONTACT FAIL L2
[F05]	INP.FUSE/CONTACT FAIL L3
[F06]	INPUT CONTACT LOCKED L1
[F07]	INPUT CONTACT LOCKED L2
[F08]	INPUT CONTACT LOCKED L3
[F09]	DC (+) BUS PRECHARGE FAIL
[F10]	DC (-) BUS PRECHARGE FAIL
[F11]	BOOSTER FAULT
[F12]	BYPASS PHASE REVERSED
[F13]	BOOSTER FAILURE
[F14]	INV.SINE WAVE ABNORMAL L1
[F15]	INV.SINE WAVE ABNORMAL L2
[F16]	INV.SINE WAVE ABNORMAL L3
[F17]	INVERTER FAULT
[F19]	(+) BATTERY OVERVOLTAGE
[F20]	(-) BATTERY OVERVOLTAGE
[F21]	(+) BATTERY UNDERVOLTAGE
[F22]	(-) BATTERY UNDERVOLTAGE
[F23]	OUTPUT OVERLOAD
[F24]	BYPASS MODULE FAULT
[F25]	POWER RETURN FROM OUTPUT
[F26]	OUTPUT CONTACT LOCKED L1
[F27]	OUTPUT CONTACT LOCKED L2
[F28]	OUTPUT CONTACT LOCKED L3
[F29]	OUT.FUSE/CONTACT FAIL L1
[F30]	OUT.FUSE/CONTACT FAIL L2
[F31]	OUT.FUSE/CONTACT FAIL L3
[F32]	BATTERY CHARGER FAULT
[F33]	BATTERY MEASURE ERROR
[F34]	POWER OVERTEMPERATURE
[F36]	FAN FAILURE
[F37]	BATTERY CHARGER OVERTEMP.
[F39]	VDC BUS MEASURE ERROR
[F40]	BATTERY FUSE (+) BROKEN
[F41]	BATTERY FUSE (-) BROKEN
[F42]	SCR1 BATTERY FAILURE
[F43]	SCR2 BATTERY FAILURE
[F44]	SCR3 BATTERY FAILURE
[F45]	PARALLEL LINK OPEN
[F46]	PARAL. R_BYP. LINE FAULT
[F47]	PARAL. SYNC. LINE FAULT

PM ALARM CODES	
LOCK	
[L01]	AUXILIARY POWER FAIL
[L02]	BOARDS LINK OPEN
[L03]	INP.FUSE/CONTACT FAIL L1
[L04]	INP.FUSE/CONTACT FAIL L2
[L05]	INP.FUSE/CONTACT FAIL L3
[L06]	(+) BOOSTER OVERVOLTAGE
[L07]	(-) BOOSTER OVERVOLTAGE
[L08]	(+) BOOSTER UNDERVOLTAGE
[L09]	(-) BOOSTER UNDERVOLTAGE
[L10]	BYPASS BACKFEED
[L11]	BYPASS OUTPUT LOCKED L1
[L12]	BYPASS OUTPUT LOCKED L2
[L13]	BYPASS OUTPUT LOCKED L3
[L14]	INVERTER OVERVOLTAGE L1
[L15]	INVERTER OVERVOLTAGE L2
[L16]	INVERTER OVERVOLTAGE L3
[L17]	INVERTER UNDERVOLTAGE L1
[L18]	INVERTER UNDERVOLTAGE L2
[L19]	INVERTER UNDERVOLTAGE L3
[L20]	INV.SINE WAVE ABNORMAL L1
[L21]	INV.SINE WAVE ABNORMAL L2
[L22]	INV.SINE WAVE ABNORMAL L3
[L23]	OUTPUT OVERLOAD L1
[L24]	OUTPUT OVERLOAD L2
[L25]	OUTPUT OVERLOAD L3
[L26]	OUTPUT SHORT-CIRCUIT L1
[L27]	OUTPUT SHORT-CIRCUIT L2
[L28]	OUTPUT SHORT-CIRCUIT L3
[L29]	OUT.FUSE/CONTACT FAIL L1
[L30]	OUT.FUSE/CONTACT FAIL L2
[L31]	OUT.FUSE/CONTACT FAIL L3
[L32]	PARAL. SYNCHRON. ERROR
[L33]	PARAL. SYNC. LINE FAULT
[L34]	BOOST L1 OVERTEMP/SENSOR
[L35]	BOOST L2 OVERTEMP/SENSOR
[L36]	BOOST L3 OVERTEMP/SENSOR
[L37]	OVERTEMP. BATTERY CHARGER
[L38]	INV. L1 OVERTEMP/SENSOR
[L39]	INV. L2 OVERTEMP/SENSOR
[L40]	INV. L3 OVERTEMP/SENSOR
[L41]	SCR BATT. OVERTEMPERATURE
[L42]	SCR1 BATTERY FAILURE
[L43]	SCR2 BATTERY FAILURE
[L44]	SCR3 BATTERY FAILURE
[L45]	PARALLEL BUS DIVISION
[L46]	PARAL. COMMUNICAT. FAULT
L47	PARALLEL BOARD FAULT

BYPASS MODULE

BM STATUS MESSAGES		
BM NOT PRESENT	✉	Minor
INITIALIZE		
READY		
LOAD ON BYPASS	✉	Minor
BACKFEED LOCK	✉	Critical
LOCKED		
BYPASS NOT AVAILABLE		

BM ALARM CODES	
COMMAND	
[C06]	EPO COMMAND ACTIVE
[C08]	BYPASS COMMAND ACTIVE
WARNING	
[W89]	BM WARNING
[W90]	BACKFEED NOT COMPATIBLE
ANOMALY	
[A86]	BYPASS UNDERVOLTAGE
[A89]	BM ANOMALY
FAULT	
[F81]	FAN 1 FAILURE
[F82]	FAN 2 FAILURE
[F83]	FAN 3 FAILURE
[F84]	HIGH TEMPERATURE
[F85]	BYPASS PHASE REVERSED
[F87]	OUTPUT UNDERVOLTAGE
[F89]	BM FAULT
[F91]	OUTPUT OVERLOAD
LOCK	
[L89]	BM LOCKED
[L91]	OUTPUT OVERLOAD
[L92]	BOARDS LINK FAIL
[L93]	BYPASS BACKFEED

MONITORING UNIT

MU STATUS MESSAGES		
MU NOT PRESENT	✉	Minor
FAULT	✉	Major
ANOMALY		
WARNING		
NORMAL OPERATION		

MU ALARM CODES			
COMMAND			
[C05]	MANUAL BYPASS ACTIVE		
[C06]	EPO COMMAND ACTIVE		
ANOMALY			
[A61]	BATTERY UNIT ANOMALY		
[A62]	BATTERY NOT PRESENT	✉	Major
[A63]	SWBATT OPEN	✉	Major
[A64]	SWEXTBATT OPEN	✉	Major
[A65]	SWIN OPEN	✉	Major
[A66]	SWBYP OPEN	✉	Major
[A67]	SWOUT OPEN	✉	Major
[A68]	BATTERY OVERTEMP	✉	Major
[A69]	CABINET OVERTEMP	✉	Major
FAULT			
[F61]	TEMP. SENSOR FAULT S1		
[F62]	TEMP. SENSOR FAULT S2		
[F63]	TEMP. SENSOR FAULT S3		
[F64]	TEMP. SENSOR FAULT S4		
[F65]	HUMIDITY SENSOR FAULT		
[F66]	HARDWARE FAULT		
[F67]	POWER SUPPLY PSU1 FAIL	✉	Minor
[F68]	POWER SUPPLY PSU2 FAIL	✉	Minor
[b+n] *	INTERNAL CODE		
[b-n] *	INTERNAL CODE		

BU ALARM CODES			
WARNING			
[W62]	DISCHARGE CURRENT		
[W63]	BATTERY CONFIG. ERR.		
ANOMALY			
[A62]	BATTERY NOT PRESENT	✉	Major
[A71]	CHARGE OVERCURRENT		
FAULT			
[F69]	ABNORMAL CURRENT		
[F70]	ABNORMAL VOLTAGE		
[F71]	DISCHARGE CURRENT		
[b+n] *	INTERNAL CODE		
[b-n] *	INTERNAL CODE		

* “n” denotes the shelf identification number with the anomaly (1 - 9)

PREVENTIVE MAINTENANCE

INTRODUCTION

Every Modular UPS System appliance was designed and manufactured to be durable even under the most demanding operating conditions. Nevertheless, please remember that they are electronic power equipment and, as such, they require regular checks. Furthermore, some of the components have a specific life limit and must be checked regularly; it may be necessary to replace them due to the operation conditions; in particular: batteries, fans, electrolytic capacitors and film capacitors.

It is significantly important to check the requirements and indications related to the installation environment which can be found in the “Installation Manual”.
In addition, it is advisable to create a preventive maintenance programme which must be carried out by assistance staff specifically trained to do so and authorised by the manufacturer.

During maintenance, all electronic and mechanic devices must be checked. This ensures the improvement of reliability, the best maintenance of the UPS efficiency and the extension of the product’s lifetime.

The duration in time of the safety of the product is guaranteed by a preventive and regular maintenance programme of the UPS

Maintenance operations on the UPS must be performed by specifically trained and authorised personnel only.

Our Assistance Service department is at your disposal to discuss about different custom preventive maintenance options.

BATTERIES

Thanks to a significant attention to batteries, our UPS preserves the health of the batteries both during charging and discharging. For example, an algorithm has been implemented to avoid deep discharges. Nevertheless, environmental conditions and usage affect the duration of the batteries. The environmental temperature, the number of blackouts or power supply interruptions, the number of deep discharges and the frequency of charge/discharge cycles are all key factors which affect the lifetime of the batteries.
In order to avoid unexpected behaviours during a blackout of the power supply line, the batteries must be regularly checked, and the authorised assistance personnel must carry out regular maintenance operations.

FANS

The fans installed within this UPS are provided with a speed control system. The environmental temperature and the output power with which the UPS operates, affect the operational speed. In addition, a dusty environment can worsen its conditions. A preventive maintenance operation will ensure the perfect operation of the cooling system.

CAPACITORS

The most critical capacitors inside the UPS are the electrolytic capacitors that are mounted on the DC BUS and the AC film capacitors used as input and output high-frequency filters. For our UPS, the best components available on the market have been used, they come from known manufacturers and are designed to ensure the product’s maximum reliability. The lifetime of the component, nevertheless, depends from the use and environmental conditions. A preventive maintenance carried out through a regular check of the capacitors ensures a better reliability of the system.

TECHNICAL DATA TABLE

MPX - from 15/25 to 125 kW[1]				
INPUT				
Voltage [V]	380-400-415V AC 3 phase plus neutral			
Voltage tolerance [V]	from 240 to 480[2]			
Frequency tolerance [Hz]	40-72			
Power factor	1			
THDI [%]	MPX 15 PM ≤ 4 MPX 25 PM ≤ 3			
BYPASS				
Nominal power [kW]	60/75/100/126 (depending on the type of Cabinet)			
Nominal voltage [V]	380-400-415V AC 3 phase plus neutral			
Voltage tolerance [V]	from 180 (adjustable 180-200) to 264 (adjustable 250-264) referring to neutral			
Nominal frequency [Hz]	50 or 60			
Overload	125% for 10 minutes; 150% for 1 minute			
BATTERIES	**Modular Type (MPW 170 BTC)**		**Traditional Type**	
Configuration	Battery units (BU[4]) 9 per battery shelf (36 x BU[4])		Battery shelf with standalone installation 1 x (20 + 20) batteries	
Battery characteristics	VRLA aligned batteries; continuous measurement of voltage and current; battery status monitoring via the MPX LCD display		Traditional VRLA type batteries	
Dimensions (WxDxH) (mm)	600x1050x2000		860x800x2000	
Weight [kg] (without PM[3]/BU[4])	280		250	
OUTPUT				
Nominal voltage [V]	380[2]/400/415V AC 3-phase plus neutral			
Nominal frequency [Hz]	50 or 60			
Voltage stability [%]	± 1			
Dynamic stability	EN62040-3 Performance Class 1 with non-linear load			
GENERAL SPECIFICATIONS				
Cabinet type	MPX 130 PWC	MPX 100 CBC	MPX 130 PWC	MPX 100 CBC
Power Module nominal power [kW]	15 (MPX 15 PM)	15 (MPX 15 PM)	25 (MPX 25 PM)	25 (MPX 25 PM)
Nominal power [kW]	75	60	125	100
Output power factor	1	1	1	1
Can be installed in parallel (up to)	4	4	4	4
Cabinet configuration	5 x MPX 15 PM	4 x MPX 15 PM 6 x batt. shelf (24 x BU[4])	5 x MPX 25 PM	4 x MPX 25 PM 6 x batt. shelf (24 x BU[4])
Dimensions (WxDxH) (mm)	600x1050x1200	600x1050x2000	600x1050x1200	600x1050x2000
Weight [kg] (without PM[3]/BU[4])	145	350	145	350
Level of system noise at 1 m [dBA ± 2]	≤ 65	≤ 64	≤ 65	≤ 64
Cabinet IP Class	IP20			
Operating temperature [°C]	0/40			

Storage temperature [°C]	-25/+60
Relative humidity [%]	5 - 95% (without condensation)
Installation maximum height	Up to 1000m above sea level (power reduction 1% for every 100m between 1000m and 4000m)
Pollution degree	PD2
Vibration resistance	1 m/s^2
Overvoltage category / Protection class	OVC II / class I
Power supply distribution system	TT, TN, IT (install a 4-pole circuit breaker on the power supply line)
Short circuit current	ICC=10kA at 415V maximum
Cable entry	Rear from the bottom MPX 130 PWC Rear from the bottom or top MPX 100 CBC
Colour	RAL 9005
Standards	Safety: IEC EN62040-1 EMC: IEC EN 62040-2 Category C2
Mobile Cabinet	Castors (all cabinet types are sent without PM[3] and BU[4])

[1] Including redundancy
[2] Applied conditions
[3] PM = Power Module (referring to the 15 kW [MPX 15 PM] or 25 kW [MPX 25 PM] module)
[4] BU = Battery Unit

NOTE: all performance quoted in a single row refer to any UPS system configuration from one to five modules operating in parallel unless specified differently.

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