



Advanced User Guide

Eaton 5P Gen2 Lithium

1U Rack model

5P650IRG2-L

2U Rack/Tour models

5P1150IRT2UG2-L

5P1550IRT2UG2-L



Table of Content

1	Special symbols.....	5
2	Introduction	6
2.1	Environmental protection.....	6
2.2	Benefits	7
3	Presentation.....	8
3.1	Weights and dimensions	8
3.2	UPS Rear panel.....	8
3.3	Optional accessories.....	9
4	Installation	10
4.1	Inspecting the equipment.....	10
4.2	Recommended position	11
4.3	UPS connection.....	14
4.4	First startup wizard	15
4.5	Register warranty.....	15
5	Interfaces and communication.....	16
5.1	Control panel	16
5.2	LCD description.....	17
5.3	Display functions	18
5.4	User settings	21
5.5	Communication ports	25
5.6	UPS remote control functions.....	27
5.7	Eaton Intelligent Power Software suite.....	29
5.8	BMS	29
5.9	Cybersecurity.....	29
6	Operation	29
6.1	Start-up and normal operation	29
6.2	Starting the UPS on battery.....	31
6.3	UPS shutdown	31
6.4	Operating modes.....	31
6.5	Configuring battery settings.....	32

6.6	Return of AC input power	32
6.7	Transportation mode	32
7	UPS maintenance	32
7.1	Equipment care	32
7.2	Storing the equipment	32
7.3	Battery State Of Health (SOH)	33
7.4	When to replace Lithium batteries	33
7.5	Recycling the used equipment	35
8	Troubleshooting	36
8.1	Typical alarms and faults	36
8.2	Silencing the alarm	36
8.3	Service and support	37
9	Specification and technical characteristics	37
9.1	UPS Model list	37
9.2	Electrical input	38
9.3	Electrical input connections	38
9.4	Electrical output	38
9.5	Electrical output connections	39
9.6	Environmental and safety	39
10	Glossary	41

1 Special symbols

The following are examples of symbols used on the UPS or accessories to alert you to important information:



DANGER: Dangerous voltage levels are present within the UPS. The UPS has its own internal power source (the battery). Consequently, the power outlets may be energized even if the UPS is disconnected from the AC power source.



CAUTION: Batteries present a risk of energy or electrical shock or burn from high short circuit current. Observe proper precaution. Batteries may contain HIGH VOLTAGE and CORROSIVE, TOXIC and EXPLOSIVE substances.



Important instructions that must always be followed.



Information, advice, help.



Read the documentation provided.



Disconnect input plug.



Before maintenance, first shut down the UPS then disconnect the AC power source, internal and external batteries then discharge capacitors by pressing the ON button and wait 5 minutes.



This equipment should only be used in a dry indoor environment.



Operating range of temperature.



Operating range of humidity.



The UPS and their batteries must be kept in a ventilated place.



USB Communication Port



Alternating Current (AC)



Direct Current (DC)

2 Introduction

Thank you for selecting an Eaton 5P Gen2 product to protect your electrical equipment.

The Eaton 5P Gen2 range has been designed with the utmost care. We recommend that you take the time to read this advanced user guide to take full advantage of the many features of your UPS (Uninterruptible Power System).

Before installing your Eaton 5P Gen2, please read the information and safety instructions provided. Follow the instructions in the quick start guide and if necessary, refer to this advanced user guide.

To discover the entire range of Eaton products, we invite you to visit our web site at eaton.com or contact your Eaton local representative.

2.1 Environmental protection

Eaton has implemented an environmental-protection policy. Products are developed according to an eco-design approach.

Substances

This product contains no CFC, HCFC or asbestos. This product is compliant with regulations on the restriction of the use of substances in electrical and electronic equipment.

Packaging

To improve waste treatment and facilitate recycling, separate the various packing components. Follow local regulations for the disposal of packing materials.

- Packing materials are recyclable and bear the appropriate identification symbol .
- The cardboard we use comprises over 50% of recycled cardboard.
- Plastic bags are made of polyethylene.

Materials	Abbreviations	Number in the symbols 
Polyethylene terephthalate	PET	01
High-density polyethylene	HDPE	02
Polyvinyl chloride	PVC	03
Low-density polyethylene	LDPE	04
Polypropylene	PP	05
Polystyrene	PS	06
Corrugated fiberboard	PAP	20
Non-corrugated fiberboard	PAP	21
Wood	FOR	50
Plywood	FOR	51

End of life

Eaton will process products at the end of their service life in compliance with local regulations. Eaton works with companies in charge of collecting and eliminating our products at the end of their service life.

Product

The product is made from materials that can be recycled. Dismantling and destruction must take place in compliance with all local regulations concerning waste. At the end of its service life, the product must be transported to a processing center for electrical and electronic waste. eaton.com/recycling

Battery

The product contains lithium batteries that must be processed according to applicable local regulations concerning batteries. The battery may be removed to comply with regulations and in view of correct disposal.

2.2 Benefits

The Eaton 5P Gen2 uninterruptible power system (UPS) protects your sensitive electronic equipment from the most common power problems, including power outages, voltage sags, impulsive transients, line noise, and long-term under and over voltage conditions.

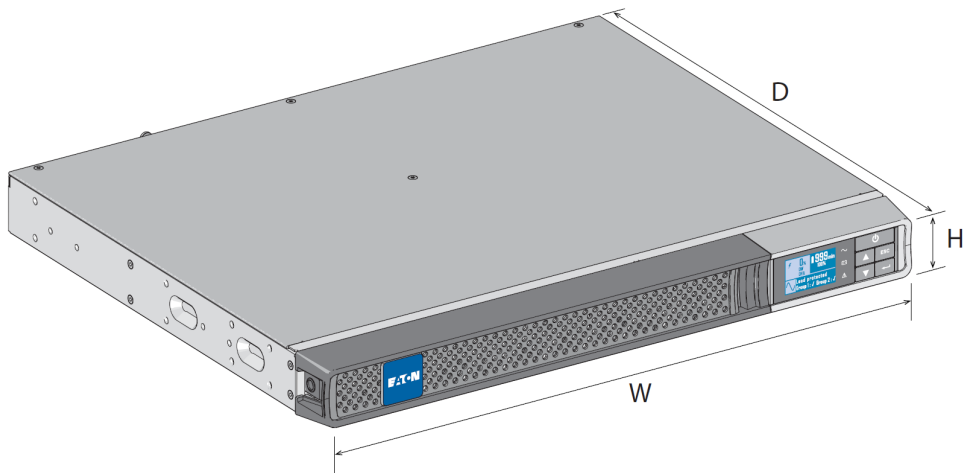
Power outages can occur when you least expect it, and power quality can be erratic. These power problems have the potential to corrupt critical data, destroy unsaved work sessions, and damage hardware - causing hours of lost productivity and expensive repairs.

With the Eaton 5P Gen2, you can safely eliminate the effects of power disturbances and guard the integrity of your equipment. Providing outstanding performance and reliability, Eaton 5P Gen2 's unique benefits include:

- Implementing Lithium battery to reduce maintenance cost.
- Constant mode battery charger with an integrated battery management system (BMS) for temperature regulation and life cycle monitoring.
- Optional connectivity cards with enhanced communication capabilities.
- Serial RS-232 communication by USB or DB9 port.
- Remote power off (RPO).
- Remote on/off (ROO).
- Remote firmware upgrade capability.
- Backed by worldwide agency approvals.

3 Presentation

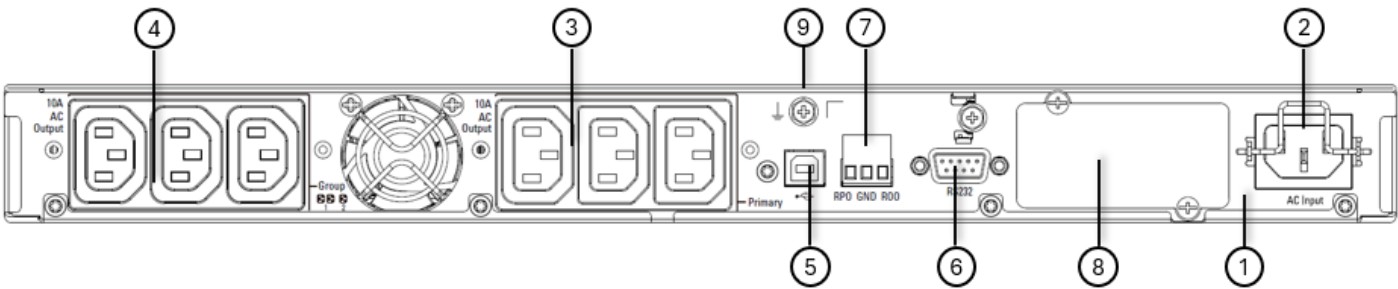
3.1 Weights and dimensions



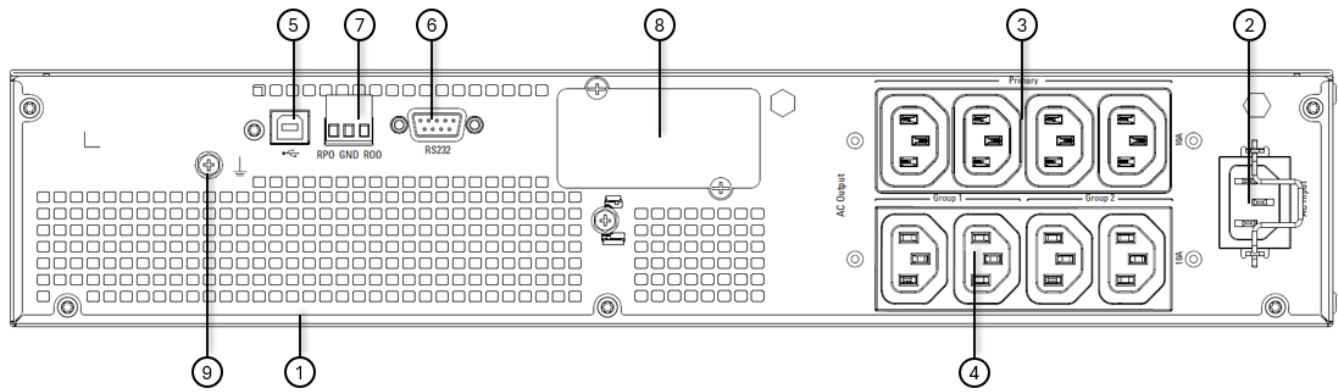
Description (UPS)	Weights (kg / lbs)	Dimensions (mm / inch) D x W x H
5P650IRG2-L	7.4/ 16.3	361 x 438 x 43.2 / 14.21 x 17.24 x 1.70
5P1150IRT2UG2-L	11.4 / 25.1	360 x 438 X 85.5 / 14.17 x 17.24 x 3.37
5P1550IRT2UG2-L	11.5/ 25.4	360 x 438 X 85.5 / 14.17 x 17.24 x 3.37

3.2 UPS Rear panel

5P650IRG2-L



5P1150IRT2UG2-L / 5P1550IRT2UG2-L



- ① UPS
- ② Input AC power source
- ③ Primary group (critical equipment)
- ④ Outlet groups (programmable outlets)
- ⑤ USB communication port
- ⑥ RS232 communication port
- ⑦ Connector for ROO (Remote On/Off) and RPO (Remote Power Off)
- ⑧ Slot for optional communication card
- ⑨ Ground screw

3.3 Optional accessories

Catalog Number	Description
Network-M3	Eaton Gigabit Network Card (SNMP v1/v3 and IP v4/v6 // Ethernet 10/100/1000BaseT)
INDGW-M3	Eaton Industrial Gateway Card (Modbus TCP / RTU)
Relay-MS	Eaton Relay card (1 x RS232 or 5 x Relay output)
INDRELAY-MS	Eaton Industrial relay card (5x relay outputs with dry contacts for remote alarm information)
EMPDT1H1C2	Environmental Monitoring Probe Gen2
MBP3KIF	HotSwap external maintenance bypass 4 FR
MBP3KID	HotSwap external maintenance bypass 4 DIN
MBP3KI	HotSwap external maintenance bypass 6 IEC
EFLX8F	FlexPDU 8 FR
EFLX8D	FlexPDU 8 DIN
EFLX12I	FlexPDU 8 IEC

4 Installation

4.1 Inspecting the equipment

If any equipment has been damaged during shipment, keep the shipping cartons and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage:

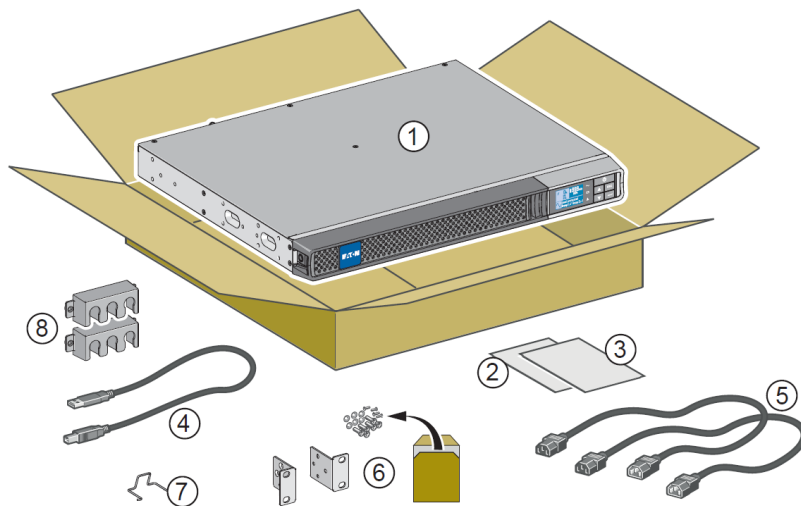
1. File with the carrier within 15 days of receipt of the equipment
2. Send a copy of the damage claim within 15 days to your service representative

i Check the battery recharge date on the shipping carton label. If the date has passed and the batteries were never recharged, do not use the UPS. Contact your local service representative.

UPS package content

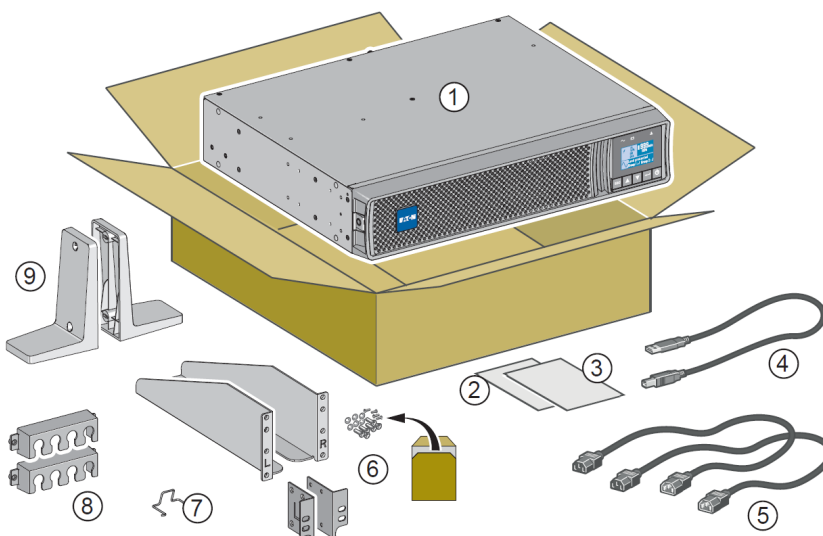
Verify that the following additional items are included with the UPS:

5P650IRG2-L



- ① UPS
- ② Quickstart
- ③ Instruction and Safety Information
- ④ USB, 1.8m
- ⑤ IEC 10A, 1,2m
- ⑥ Rack kit and screws
- ⑦ Output cable locking system
- ⑧ Input cable locking system
- ⑨ Two supports for tower position (tower feet)

5P1150IRT2UG2-L / 5P1550IRT2UG2-L



4.2 Recommended position

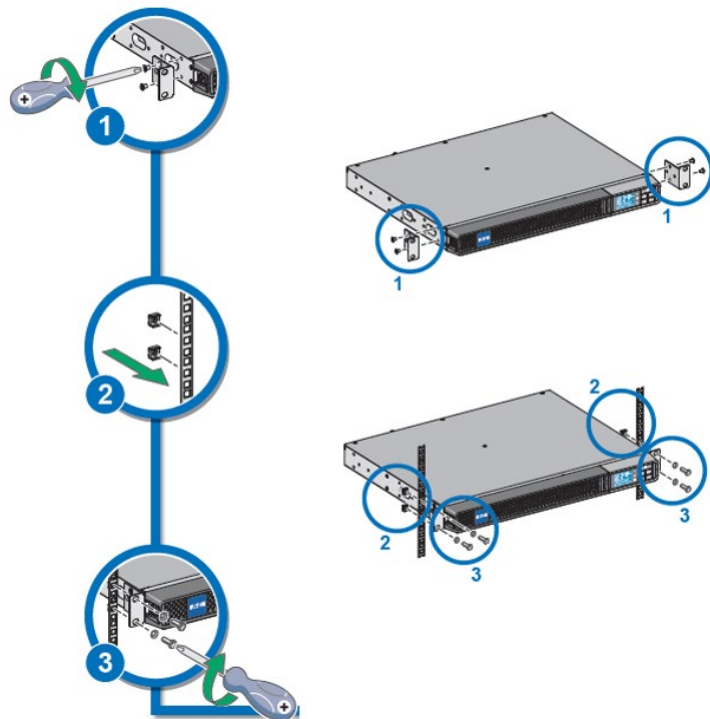
Installation in rack position

Follow steps below for module mounting on the rails.

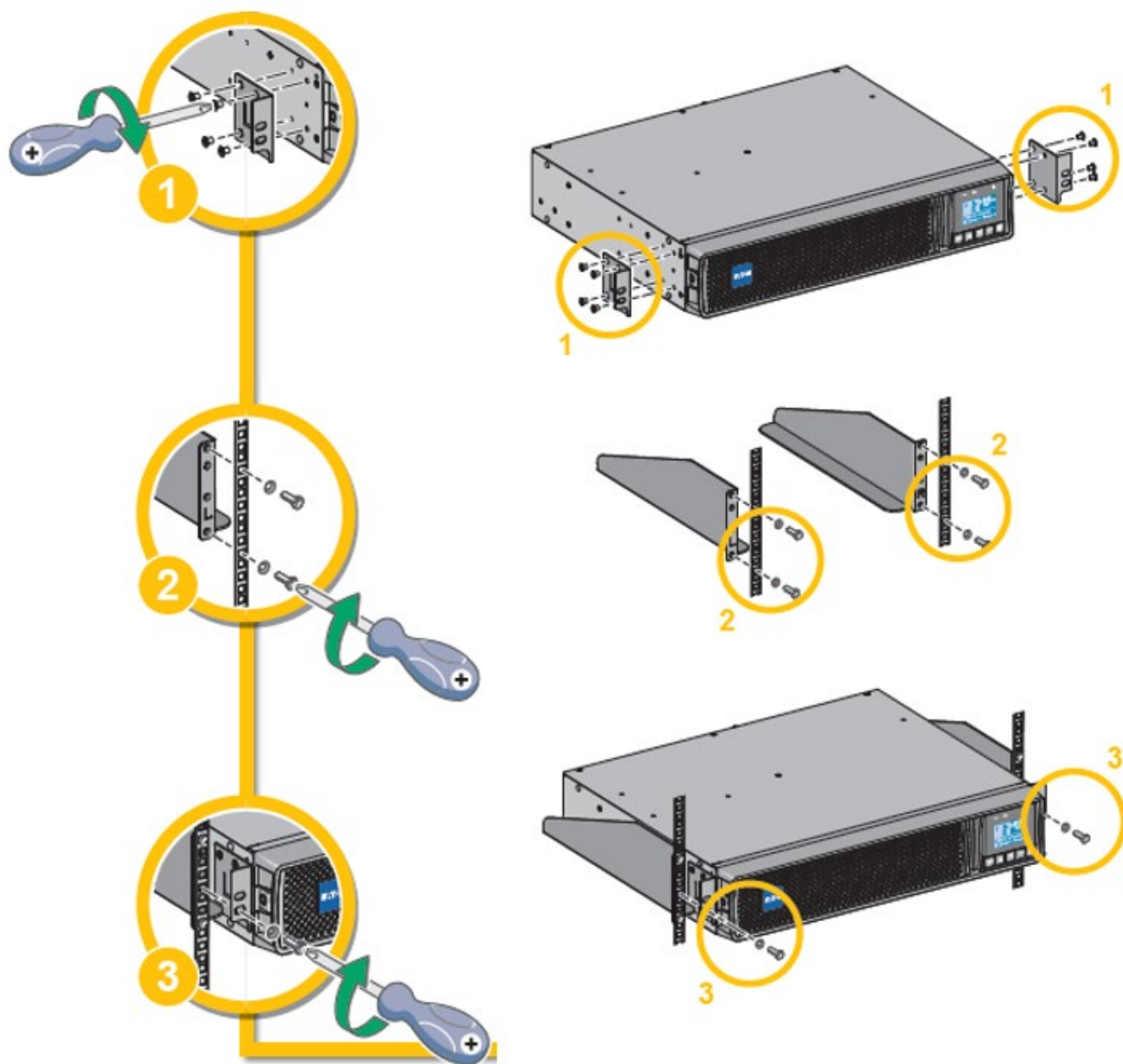
i The rails and necessary hardware are supplied by Eaton.

Follow steps 1 to 3 for rack installation of **5P650IRG2-L** model:

- ① Screw the ears plate on the front of the UPS.
- ② / ③ Screw the ears plate into the rack.



Follow steps 1 to 3 for the rack installation of **5P1150IRT2UG2-L / 5P1550IRT2UG2-L** models:



- ① Screw the ears plate on the front of the UPS.
- ② Screw the ears plate on the back of the UPS.
- ③ Screw the ears plate into the rack.

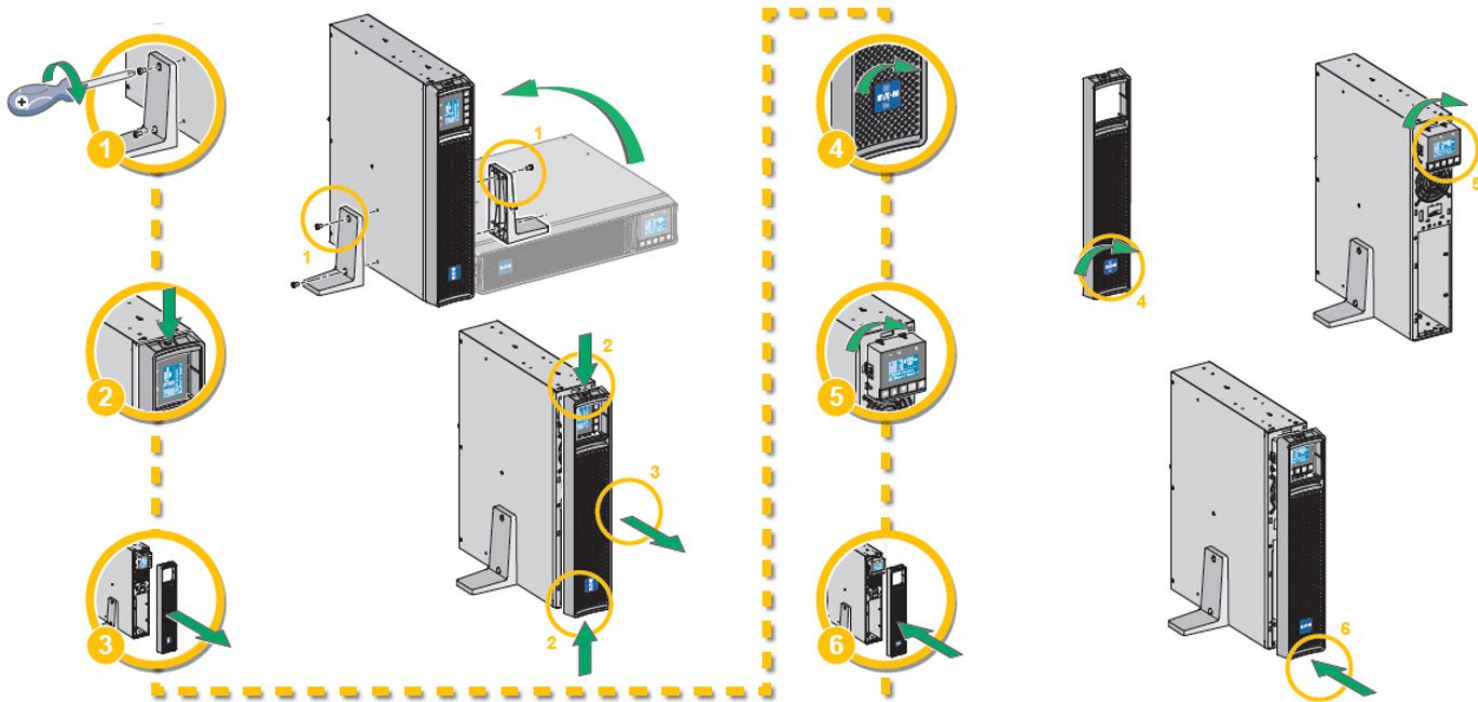
Installation in tower position (for 2U models only)

 If you ordered other UPS accessories, refer to specific user manuals to check the tower installation with the UPS.

To install the UPS:

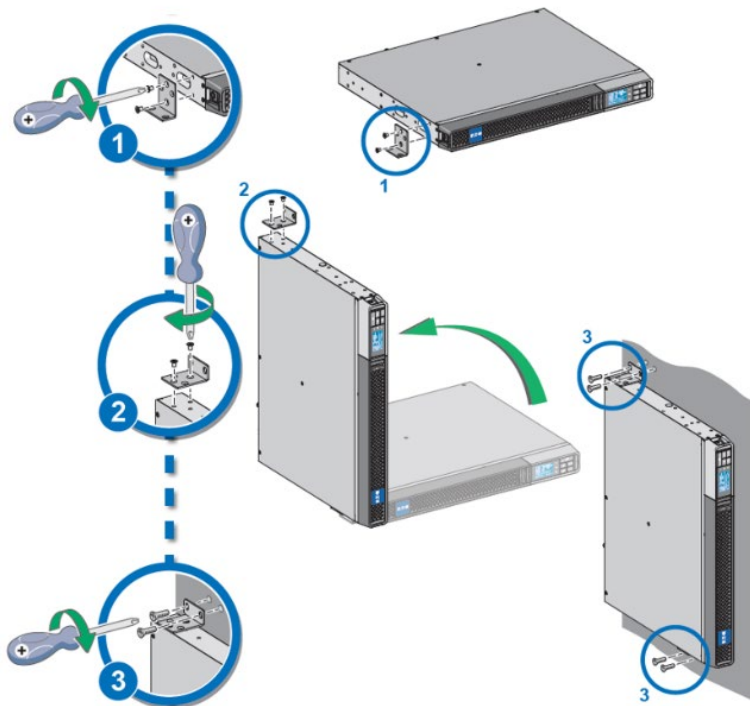
- Place the UPS on a flat, stable surface in its final location.
- Always keep 6" or 150 mm of free space behind the UPS rear panel for ventilation.
- If installing additional cabinets, place them next to the UPS in their final location.

When installing the UPS in tower position, you can rotate the LCD. Follow steps to adjust the orientation of the LCD panel and of the logo.



Wall mounted installation

The Eaton 5P Gen2 can be wall-mounted, horizontal or vertical position. For 2U models, wall mount kit is not provided and can be purchased separately (WMNTKIT reference).

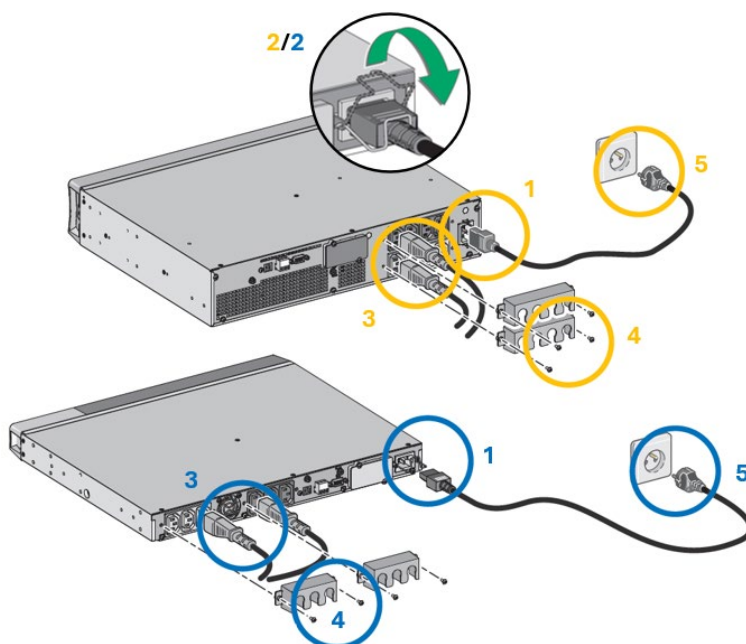


- ① Screw the ears plate on the front of the UPS.
- ② Screw the ears plate on the back of the UPS
- ③ Screw the ears plate into the wall

4.3 UPS connection

Power supply connection

⚠ Check that the indications on the name plate located on the back of the UPS correspond to the AC-power source and the true electrical consumption of the total load.

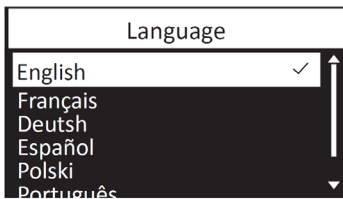


- 1 / 5. Connect the UPS input socket to the AC power source using the cable of the protected equipment.
 2. Fit the connection securing system that prevents the plug from being pulled out accidentally.
 3. Connect the loads to the UPS using the cables provided.
- It is preferable to connect the priority loads to the outlets primary group and the non-priority loads to the outlets group that can be programmed (see UPS rear panels section).
- To program shutdown and startup of the outlets to extend battery runtime and perform scheduled shutdown, please see the User settings / "In/Out settings" section.
4. Fit the connection securing system that prevents the plugs from being pulled out accidentally.

4.4 First startup wizard

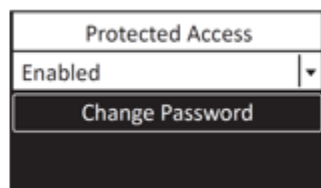
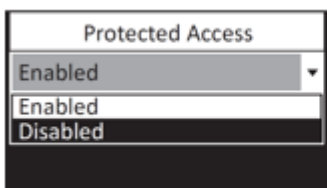
When used for the first time, the battery will provide its maximum autonomy after it has been charged for 3 hours.

On the first startup of the UPS, you will be guided to set up the following:



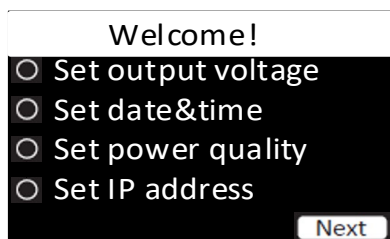
- **Language:**

- Choose from: [English] [Français] [Deutsch] [Español] [Português] [Italiano] [Polski] [Simplified Chinese] [Japanese]. By default, the UPS is set up in English.
- Menus, status, notices and alarms, UPS fault, Event Log data and settings are in all supported languages.
- Click on Enter or Escape to go to the next screen.



- **Password:**

- Setting up a password allows the user to protect the access to Control / Settings / Event Log / Fault Log menus with a password. By default, the UPS is not password protected.
- To enable a password, enter the 6 requested digits (2 by 2, by pressing Enter).
- Click on Enter or Escape to go to the next screen



Click on Next:

- **Output voltage:** choose from the list [200 V] [208 V] [220 V] [230 V] [240 V], then click on Esc
- **Date/time:**
 - Setup date / time with server (NTS)? [Yes]/[No]
 - If [No]: Set up date and time manually then click on Esc
- **Power Quality:** set up power quality then click on Esc
 - This setting reflects the quality of the power that is applied to the application by defining the conditions before transferring to battery mode
 - More details on Power quality in chapter **6.1 Grid Power Quality**
- **IP address:** available if a card is inserted

Click on **FINISH** to start using your UPS.

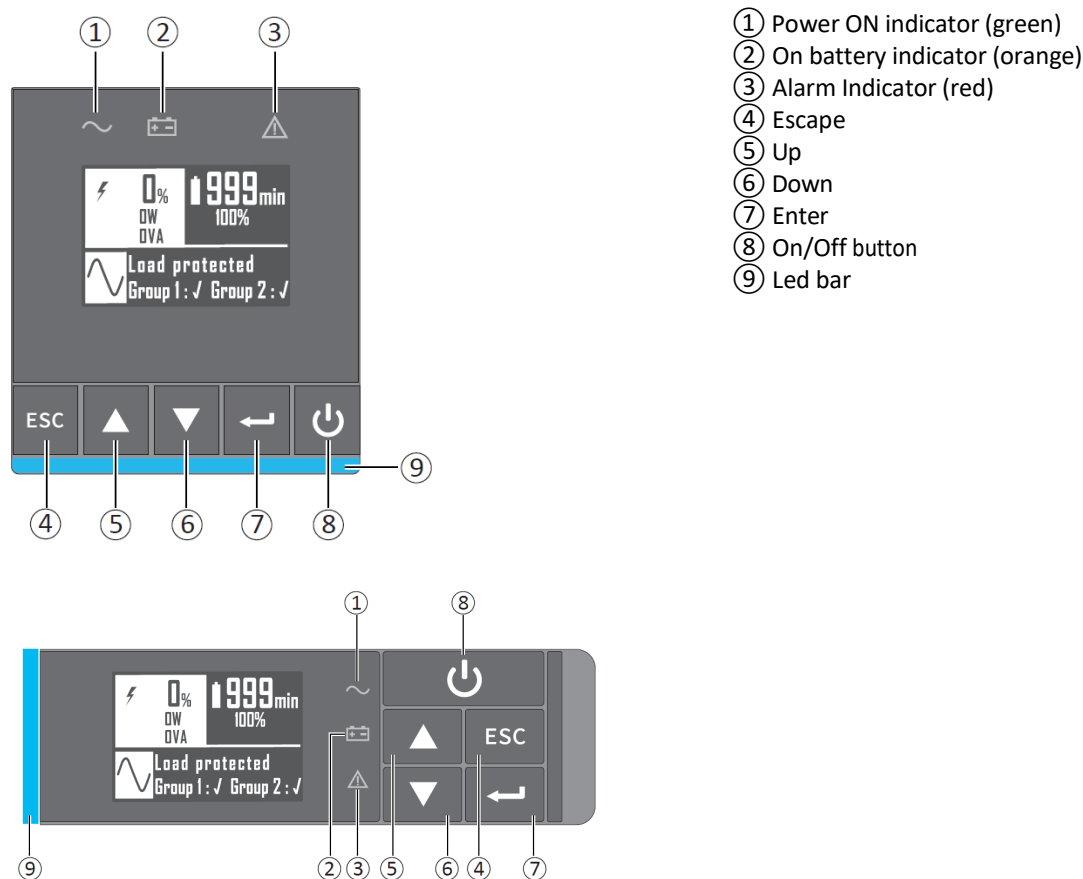
4.5 Register warranty

Register warranty at <https://www.pqproductregistration.eaton.com>

5 Interfaces and communication

5.1 Control panel

The screen provides useful information about the UPS itself, load status, events, measurements and settings.



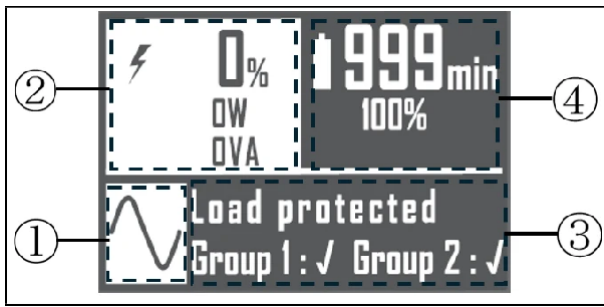
Led indicator

The following table shows the indicator status and description:

The LED bar has been implemented to provide a quick visual reference of UPS status "at-a-glance".

Indicator	Status	Description
 Green	On	The UPS is "ON" and the load is protected.
 Orange	On	The UPS is in battery mode and the load is protected.
	Flashing	The battery voltage is below the warning level.
 Red	On	The UPS has an active alarm or fault. See troubleshooting page for additional information.
Led bar	Static blue	The UPS is "ON" and the load is protected.
	Flashing blue	The UPS is on battery or the battery service age warning is reached.
	Static red	The UPS has an active alarm or fault.
	Flashing red	Flashing red The UPS output has stopped due to a fault.

5.2 LCD description



- ① Operation status
- ② Load/equipment status
- ③ Load group information
- ④ Battery status

By default, or after 5 minutes of inactivity, the LCD displays the screen saver.
The backlight LCD automatically dims after 5 minutes of inactivity. Press any button to restore the screen.

i Note: If other indicator appears, see troubleshooting page for additional information.

The following table describes the status information provided by the UPS:

Operation status	Possible cause	Action
Standby mode 	The UPS is OFF, waiting for start-up command from user	Equipment is not powered until  button is pressed during start up and the green "normal mode" LED indicator is illuminated.
Normal mode 	The UPS is operating normally.	The UPS is powering and protecting the equipment.
On Battery  One beep every 10 seconds	A utility failure has occurred and the UPS is operating in Battery mode.	The UPS is powering the equipment with battery power. Prepare your equipment for shutdown.
End of backup time  1 beep every 3 seconds Single beep	The UPS is in Battery mode and the battery is running low.	This warning is approximate, and the actual time to shutdown may vary significantly. Depending on the UPS Load, the "Battery Low" warning may occur before the battery reaches 20% capacity remaining.
In AVR mode No beep 	The UPS is operating normally but the utility voltage is outside Normal mode thresholds.	The UPS is powering the equipment through the Automatic Voltage Regulation device. The equipment is still normally protected.

5.3 Display functions

Press the Enter (↵) button to activate the menu options. Use the two middle buttons (▲ and ▼) to scroll through the menu structure. Press the Enter (↵) button to select an option. Press the (ESC) button to cancel or return to the previous menu.

Menu map for display functions

Measurements

Submenu	Display information or Menu function
Load	W, A, VA, pF
Input/Output	V, F
Efficiency	%
Battery	Battery info Battery: %, min, V Charger Statue: CC charging or CC floating or CC discharging or CC off Battery age: - In predictive mode: running age (in months) /age status (healthy / normal / warning) - In preventive mode: remaining life (in months) /age warning setting (set in months)
Average Power Usage	wh
Cumulative Power	Kwh since data

Control

Submenu	Display information or Menu function
Load Segments	Group 1: ON / OFF Group 2: ON / OFF These commands overrule user settings for load segments.
Start battery test	Starts a manual battery test (possible if battery >80%)
Connectivity test	Dry contacts test: DB9-1 [Open]/[Closed], DB9-7 [Open]/[Closed], DB9-8 [Open]/[Closed] Relay card test: Batt Fault [Open]/[Closed], Low Batt [Open]/[Closes], UPS ON [Open]/[Closed], On Batt [Open]/[Closed] Line failure test: starts a line failure test Battery low test; starts a battery low test
Functions reset	Reset fault state [Yes]/[No] <i>Clears active fault(s).</i>
	Reset power usage: Reset average power [Yes]/[No], Reset cumul. Power [Yes]/[No], Reset both [Yes]/[No] <i>Clears average power usage measurement.</i>
	BMS auto setup [Yes]/[No] <i>UPS will start detecting the BMS quantities only when the UPS is powered on for the first time. If the quantity of BMSs is reduced, UPS will report BMS comm. loss. If the quantity is increased, UPS cannot actively identify it. In that time, the user can select "BMS auto setup" to manually refresh the battery quantity.</i>
	Wake up BMS [Yes]/[No] <i>Sends signal to wake up Li-ion battery.</i>
	Set Transportation mode [Yes]/[No] <i>Sends a "go to transportation mode" command to Li-ion battery.</i> Once the "Set Transportation Mode" row has been validated([Yes]), a message box is displayed for user confirmation ([Yes]/[No]). Depending on the user choice, a new result message box is displayed with the following message: -> done (Transportation mode successfully activated) -> fail (Transportation mode command unsuccessful / UPS is not in transportation mode) -> canceled ([No] entered or [Yes] entered but current state does not allow setting) Once the "Transport mode" is activated and UPS is shut down, it takes 10 minutes for it to

	become fully effective. Transport mode is automatically exited when BMS communication is restored and continuous for more than 3mins.
	Reset battery life [Yes]/[No]
	NMC Card reset [Yes]/[No] <i>Manually resets the NMC card.</i>
	Restore factory settings [Yes]/[No] <i>Returns all settings to original values</i>

Settings

Submenu	Display information or Menu function
Local settings	Sets product general parameters, see User settings
In / Out settings	Sets input and output parameters
ON / OFF settings	Sets ON / OFF conditions
Battery settings	Sets battery configuration
Comm. settings	Sets communication parameters

BMS Information

Submenu	Display information or Menu function
Per battery	BMS Model: [BMS firmware], [Serial number Assembly date] BMS Meter: [BMS output], [SOC / SOH / Cycles / Capacity] BMS log: [BMS log1], [BMS log2], [BMS log3]

Event log

Submenu	Display information or Menu function
View Alarms	Displays the alarms stored
View Events	Displays the events stored
View All	Displays the faults, alarms and events stored
Reset All	[Yes] [No] Clears the faults, alarms and events stored

Fault log

Submenu	Display information or Menu function
Fault list	Displays the faults stored
Reset fault list	[Yes] [No] Clears faults

Identification

Submenu	Display information or Menu function
Product Type / Model	Type and Model
Part / Serial number	Part Number and Serial Number
UPS / NMC firmware	xx.xx.xxxx
IPv4 Address	xxx.xxx.xxx.xxx
IPv6 Address	xxx.xxx.xxx.xxx
COM card MAC	xx.xx.xx.xx.xx.xx

Registration

Submenu	Display information or Menu function
/	Links to Eaton registration website

5.4 User settings

The following table displays the options that can be changed by the user.

Local settings

Submenu	Available settings	Default settings
Language	[English] [Français] [Deutsch] [Español] [Português] [Italiano] [Polski] [Simplified Chinese] [Japanese] Menus, status, notices and alarms, UPS fault, Event Log data and settings are in all supported languages.	[English] Automatic message for user configuration when UPS is powered for the first time.
Date / time	Format: [International] [US] Day, Month, Year, Hour, Minute, Time of Day	[International]
LCD	Modify LCD screen brightness and contrast to be adapted to room light conditions.	[0]
Audible alarm	[Enabled] [Disabled on batt.] [Always disabled] Enable or disable the buzzer if an alarm occurs.	[Enabled]
	Level: [0-8]	[6]
Protected access	[Enabled] [Disabled] Allow the user to lock the settings modification. To enable a password, enter the 6 requested digits (2 by 2, by pressing Enter) then exit all menus to activate it. Settings & Control menus will be password protected. To recover a lost password, contact the local country technical- support.	[Disabled]

In/Out settings

Submenu	Available settings	Default settings
Output voltage	[200 V] [208 V] [220 V] [230 V] [240 V]	[230 V]
Power Quality	Mode:[Good] [Fair] [Poor] [Custom] Threshold: [Normal] [Extended] Frequency: [Normal] [Extended] Sensitivity : [High] [Normal] [Low] [Disabled] This setting selects the quality of the Main AC Input that is supported by the output load by defining the conditions beyond which the UPS will transfer to battery mode	Mode :[Good] Threshold: [Normal] Frequency: [Normal] Sensitivity : [High]
Load segments	[Auto start delay]	UPS:[No delay]; Group1:[3s]; Group2:[6s]
	[Auto shutdown delay]	UPS:[Disabled]; Group1: [Disabled]; Group2: [Disabled]
Overload prealarm	Threshold: [10%] ... [105%] Load % when overload alarm occurs	[105%]

ON/OFF settings

Submenu	Available settings	Default settings
Start/Restart	[Cold start] [Auto restart] [Auto start]	[ON] [ON] [OFF]
Forced reboot	Enabled: [Yes] [No] [Timer] [10s] ... [180s] When mains recovers during a shutdown sequence: If set to Enabled, shutdown sequence will complete and wait 10 seconds prior to restart. If set to Disabled, shutdown sequence will not complete, UPS stays on.	[Yes] [10s]
Energy saving (W,%, delay)	Enabled: [Yes] [No] Timer: [0min] ... [15min] Level: [10W] ... [Nominal Power] If Enabled, UPS will shutdown after defined duration of backup time, if load is less than set value.	[No] [5min] [100W]
Sleep Mode	Enabled: [Yes] [No] Timer: [10min] ... [120min] If Disabled, LCD and communication will turn OFF immediately after UPS is OFF. If Enabled, LCD and communication stays ON for the set time period after UPS is OFF.	[Yes] [30min]
Site Wiring Fault	Enabled: [Yes] [No] Prevents the UPS from starting if the phase and neutral wires are swapped.	[No]
Power Off alert	Enabled: [Yes] [No] If enabled, activates a confirmation screen that requires user confirmation after pressing the power button, before UPS shutdown occurs. Remote shutdown, ROO, RPO, Input signals will never request user confirmation, even if the setting is enabled	[Yes]

Battery settings

Submenu	Available settings	Default settings
Auto battery test	Frequency: [No test] [Monthly]	[No test]
Battery age warning	Mode: [Disabled][Preventive][Predictive] If Preventive, the UPS displays a battery replacement reminder through the front LCD and any installed network communication card after the indicated timeframe has elapsed (default 96 months).	[Predictive] Refer to Battery State Of Health (SOH) section (chapters 7.3 and 7.4)
Low battery warning	Capacity: [10%] ... [100%] Runtime: [0min] ... [60min] The alarm triggers when the set percentage of battery capacity or remaining back-up time is reached.	[10%] [3min]
Restart batt. Level	Level: [0%] ... [100%] Automatic restart will occur only when the set percentage of battery charge is reached, and "Auto Restart" is enabled and set to ON. A setting of 0% allows immediate automatic restart when utility returns after a UPS shutdown due to an extended power outage.	[0%]

Comm settings

Submenu	Available settings	Default settings
Input signals [ROO] [RPO] [DB9-4] Sets Input signals parameters (function, delay, operation) through external contact connectors or RS232 port.	ROO port: [Function]: [No] [ROO] [RPO] [Building alarm] [Shutdown commands] [Delay]: [0s] ... [999s] [Active]: [Open] [Closed]	ROO port: [No] [0s] [Closed]
	RPO port: [Function]: [No] [ROO] [RPO] [Building alarm] [Shutdown commands] [Delay]: [0s] ... [999s] [Active]: [Open] [Closed]	RPO port: [No] [0s] [Open]
	DB9-4 port: [Function]: [No] [ROO] [RPO] [Building alarm] [Shutdown commands] [Delay]: [0s] ... [999s] [Active]: [Low] [High]	DB9-4 port: [No] [0s] [High]
Outputs signals [DB9-1] [DB9-7] [DB9-8] Sets events or fault that will actuate Output signal parameters through external contact connector or RS232 port	DB9-1: [On bat] [Low bat] [Bat fault][UPS OK] [Load protected] [Load powered] [General alarm] [Overload Prealarm] [Batt Disconn]	[Low bat]
	DB9-7: [On bat] [Low bat] [Bat fault][UPS OK] [Load protected] [Load powered] [General alarm] [Overload Prealarm] [Batt Disconn]	[UPS OK]
	DB9-8: [On bat] [Low bat] [Bat fault][UPS OK] [Load protected] [Load powered] [General alarm] [Overload Prealarm] [Batt Disconn]	[On bat]
Remote command	Enabled: [Yes] [No] If yes, shutdown or restart commands from software are authorized.	[Yes]
Shutdown commands [Send CMD] [Output OFF] [OFF delay] [Restart] Sets events or fault that will actuate Output signal parameters through external contact connector or RS232 port	Send CMD: [Yes] [No]	[No]
	Output OFF: [No] [UPS] [Group 1] [Group 2] [Group 1 + 2]	[No]
	OFF delay: [0s] ...[999s] For a proper server shutdown please make sure that the Output OFF delay is long enough	[0s]
	Restart: [Yes] [No]	[Yes]
On battery notice delay	Delay: [0s] ... [99s] Sets delay before providing an on battery notice to software.	[0s]
General alarm	On Bat [] [V] Battery fault [] [V] Overload Prealarm [] [V] Internal Fault [] [V] Ambient temp [] [V] Fan Lock [] [V] Current Limit [] [V] Short circ. [] [V]	On Bat [] Battery fault [] Overload Prealarm [] Internal Fault [V] Ambient temp[] Fan Lock [] Current Limit [] Short circ.[]

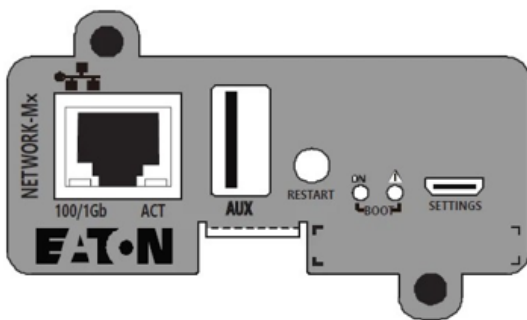
	Inverter overload [] [V] Power Overload [] [V] Low Bat [] [V] UPS OK [] [V] Load Protected [] [V] Load Powered [] [V] Defines which event or fault will generate a general alarm through Output signal screen.	Inverter overload [] Power Overload [] Low Bat [] UPS OK [] Load Protected [] Load Powered []
Set Comm Card IPv4	[DHCP] : [Yes] [No] [IP Adress] [Subnet mask] [Gateway] The UPS does not display the IPv4 settings menu by default, you can activate it by a communication command.	[Yes] XXX.XXX.XXX.XXX

5.5 Communication ports

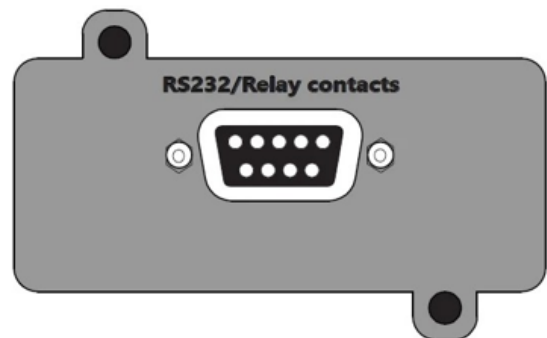
Communication cards

Communication cards allow the UPS to communicate in a variety of networking environments and with different types of devices. The Eaton 5P Gen2 models have one available communication bay for the following connectivity cards:

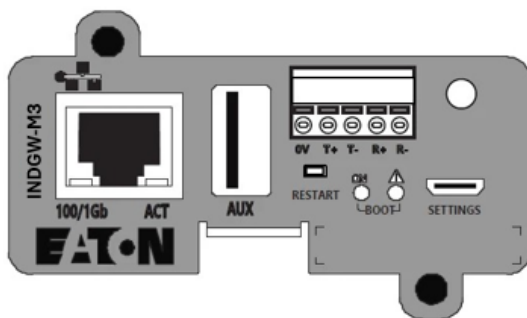
- **Gigabit Network card (Network-M3):** provides a Gigabit Ethernet connection and enables secure UPS monitoring over HTTPS web browser interface, SNMP v1/v3 protocol and email alarms. In addition, up to 3 Environmental Monitoring Probes can be attached to obtain humidity, temperature, smoke alarm, and security information.
- **Industrial Gateway card (INDGW-M3):** provides Modbus TCP/RTU and BacNet communication, in addition to the same secure UPS monitoring, management and sensor capabilities as the Gigabit Network card.
- **Relay-MS card:** provides isolated dry contact (Form-C) relay outputs for UPS status: Utility failure, Battery low, UPS alarm/OK, or on Bypass.
- **INDRELAY-MS card (Industrial relay Card-MS):** provides a simple way to remotely input UPS information to an alarm system, PLC or a computer system via dry contacts. It offers five isolated dry contact outputs and one isolated dry contact input.



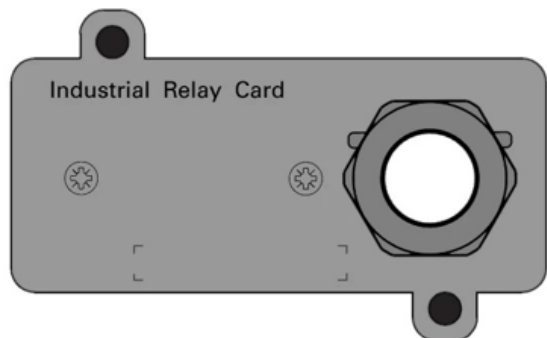
Network-M3



Relay-MS

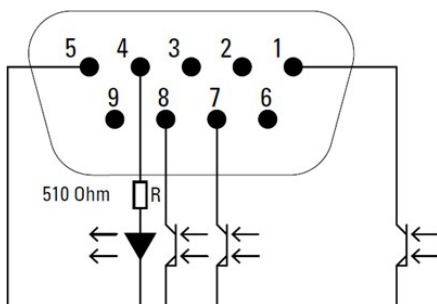


INDGW-M3



INDRELAY-MS

Characteristics of the contact RS232 communication port

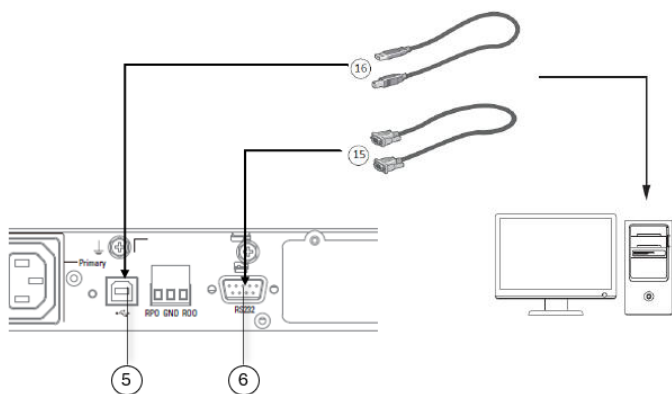


Contact characteristics (optocoupler):

- Voltage: 48 V DC max
- Current: 25 mA max
- Power: 1.2 W

Pin	Signal	Direction	Function
1	Bat low	Output	Low Battery Output
2	TxD	Output	Transmit to external device
3	RxD	Input	Receive from external device
4	I/P SIG	Input	-
5	GNDS	-	Signal common tied to chassis
6	NC		Not Connected
7	UPS OK	Output	UPS OK
8	BAT mode	Output	UPS on battery mode
9	+5V	Output	Power supply for external signal or options

Connection of RS232/USB communication port

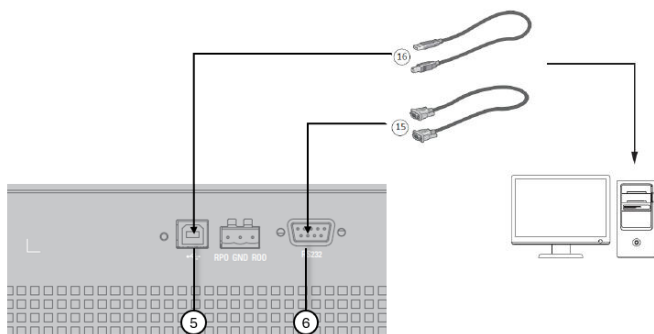


1. Connect the RS232 (DB9) or USB communication cable to the serial or USB port on the computer equipment.
2. Connect the other end of the communication cable to the USB or RS232 (DB9) communication port on the UPS

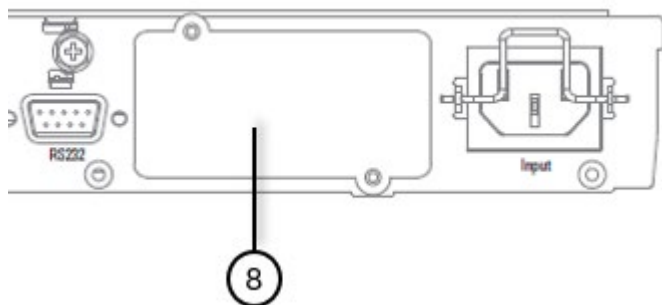


The UPS can now communicate with Eaton power management software.

You can improve the remote monitoring and power management of the UPS by adding a communication card compatible with the product.

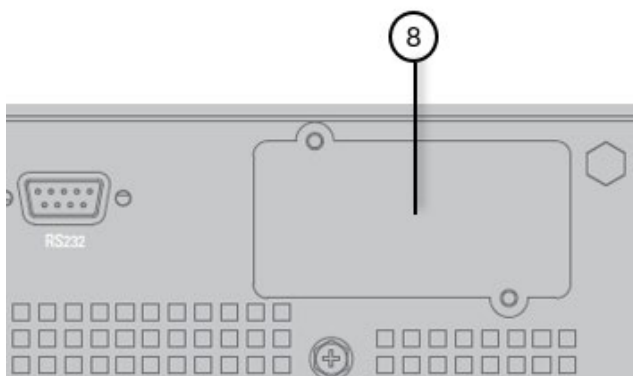


Installation of the communication cards



It is not necessary to shutdown the UPS before installing a communication card.

1. Remove the slot cover secured by screws.
2. Insert the communication card in the slot.
3. **Secure the card cover with the two screws to connect the comm card to the ground.**



5.6 UPS remote control functions

Programmable signal inputs

Remote firmware upgrade capability

The firmware upgrade feature allows you to update the UPS and Battery Management System (BMS) software to the latest version. This feature allows the UPS firmware to be updated remotely without requiring physical access to the unit.

This ensures:

- Improved performance and compatibility.
- Bug fixes and security enhancements.
- Support for new features, such as Li-ion battery integration and advanced diagnostics.

Conditions:

The upgrade can be performed while the UPS is in normal or standby mode, ensuring continuous output during the process. If the upgrade is interrupted, it can resume or restart safely once conditions are restored.

The UPS must not be in AVR (buck/boost) mode. If it is, the upgrade will be blocked for safety reasons.

A clear message will appear: "Device Not Ready for Upgrade – UPS in AVR mode".

Completion: Once finished, the UPS will restart automatically.

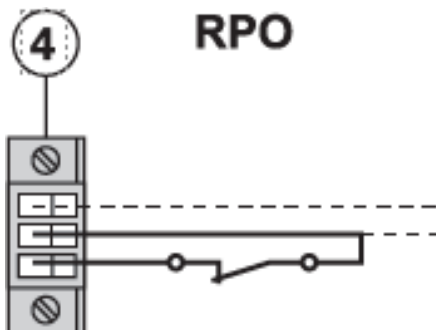
Remote Power Off (RPO)

RPO is used to shutdown the UPS remotely when the contact is open. This feature can be used for shutting down the load and the UPS by thermal relay, for example, in the event of room over temperature. When RPO is activated, the UPS turns off the output and shuts down all power converters immediately (except for logic power). The UPS remains "ON" to alarm the fault.

The RPO circuit is a safety extra low voltage (SELV) circuit. This circuit must be separated from any hazardous voltage circuits by reinforced insulation.

- The RPO must not be connected to any utility connected circuits. Reinforced insulation to the utility is required. The RPO switch must be a dedicated latching-type switch not tied into any other circuit. The RPO signal must remain active for at least 250 ms for proper operation.
- To ensure the UPS stops supplying power to the load during any mode of operation, the input power must be disconnected from the UPS when the Remote Power Off function is activated.

RPO connections:



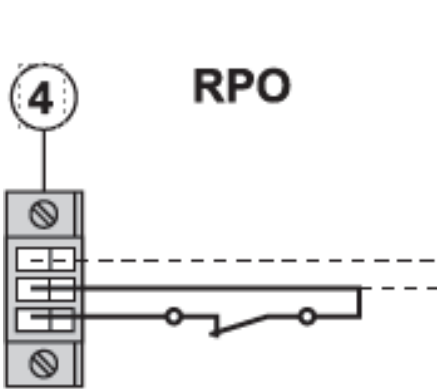
RPO	Comments
Connector type	Terminal, 14 AWG Maximum wires
Terminal rating	60 V DC/30 V AC 20 mA max

Remote control connection and test

 This connector must only be connected to SELV (Safety Extra-Low Voltage) circuits.

- 1. Check the UPS is shut down and the electrical supply network disconnected.
- 2. Remove RPO connector from the UPS by removing the screws.
- 3. Connect a normally closed volt-free contact between the two pins of connector.
- 4. Plug the RPO connector into the back of the UPS and fix the screws.
- 5. Connect and restart the UPS according to the previously described procedures.
- 6. Activate the external remote shut down contact to test the function.

 Always test the RPO function before applying your critical load to avoid accidental load loss.



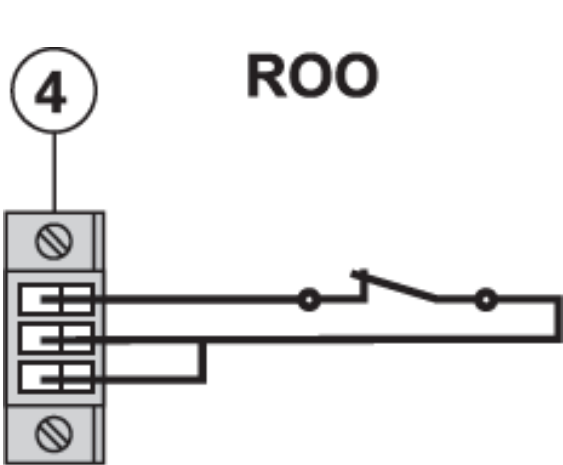
Contact open: shut down of UPS.

To return to normal operation, deactivate the external remote shut down contact and restart the UPS from the front panel.

Remote On/Off (ROO)

- Remote On/Off allows remote action of button to switch On/Off the UPS.
- When contact changes from open to closed, the UPS is switched-on (or stays On).
- When contact changes from closed to open, the UPS is switched-off (or stays Off).
- On/Off control via button has priority over the remote control.

 The ROO function is only active after the first use of the "Remote OFF" function.



ROO	Comments
Connector type	Terminal, 14 AWG Maximum wires
Terminal rating	60 V DC/30 V AC 20 mA max

5.7 Eaton Intelligent Power Software suite

Eaton Intelligent Power Software suite is available from eaton.com/downloads.

Eaton Software suite provides up-to-date graphics of UPS power and system data and power flow.

It also gives you a complete record of critical power events, and it notifies you of important UPS or power information. If there is a power outage and the UPS battery power becomes low, Eaton Software suite can automatically shut down your computer system to protect your data before the UPS shutdown occurs.

5.8 BMS

The BMS (Battery Management System) continuously monitors battery health, temperature, and charge/discharge cycles to ensure safe and efficient operation. It provides automatic addressing and communication with the UPS for predictive maintenance and life-cycle management, helping extend battery life and prevent faults.

5.9 Cybersecurity

Eaton is committed to minimizing the Cybersecurity risk in its products and employs cybersecurity best practices and the latest cybersecurity technologies in its products and solutions, making them more secure, reliable and competitive for our customers. Eaton also offers Cybersecurity Best Practices whitepapers to its customers, referenced at www.eaton.com/cybersecurity.

6 Operation

6.1 Start-up and normal operation

 Check that the indications on the name plate located on the back of the UPS meets to the AC power source and the true electrical consumption of the total load.

Battery charge

The UPS charges the battery as soon as it is connected to the AC outlet, whether the ON/OFF button is pressed or not. It is recommended that the UPS be permanently connected to the AC power supply to ensure the best possible autonomy. When used for the first time, the battery will provide its maximum autonomy after it has been charged for three hours.

To start the UPS

 On the first startup of the UPS, you will need to configure the output voltage and time of the UPS.

Verify that the UPS power cord is plugged in.

The UPS front panel display illuminates and shows Eaton logo.

1. Verify that the UPS status screen shows .
2. Press the  button on the UPS front panel for at least a few seconds.
3. Check the UPS front panel LED for active alarms or notices. Resolve any active alarms before continuing; if the  indicator is on, do not proceed until all alarms are clear (see "[Troubleshooting](#)" section). Check the UPS status from the front panel to view the active alarms. Correct the alarms and restart if necessary.
4. Verify that the  indicator illuminates solid, indicating that the UPS is operating normally and any loads are powered and protected. The UPS should be in Normal mode.

Grid power quality

This setting reflects the quality of the power that is applied to the application by defining the conditions before transferring to battery mode.

- **Good** means that the application needs a perfect power signal quality (voltage, frequency and waveform distortion) to be able to work correctly.
- **Fair** means that power signal may show some slight voltage and frequency variation without disturbing the application.
- **Poor** means that the application can withstand extended threshold of voltage and frequency as well as some distorted input waveforms without any risk.

Each of these settings will automatically adjust the UPS voltage and frequency thresholds in order to provide the best protection possible vs application need.

A custom mode permits to adjust each setting independently.

Power Quality	Good	Fair	Poor
Voltage	Normal	Normal	Extended
Frequency	Normal	Normal	Extended
Sensitivity	High	Normal	Low

To extend battery runtime for critical devices, it is possible to program sequenced shutdown (also known as load shedding) of less-critical loads connected to Group 1 or Group 2 outlets during extended power outages.

6.2 Starting the UPS on battery

 Before using this feature, the UPS must have been powered by utility power with output enabled at least once. Battery start can be disabled. See the "Cold start" setting in "ON/OFF Settings".

To start the UPS on battery:

7. When the UPS is disconnected from the AC power source, press the  button on the UPS front panel.
The UPS transfers from Standby mode to Battery mode.
The indicator  illuminates solid.
The indicator  blinks and the buzzer snoozes.
The UPS supplies power to your equipment
8. Check the UPS front panel display for active alarms or notices besides the "Battery mode" and related notifications that indicates missing utility power.
Resolve any active alarms before continuing. See "Troubleshooting".
Check the UPS status from the front panel to view the active alarms. Correct the alarms and restart if necessary.

6.3 UPS shutdown

To shut down the UPS:

Press the  button on the front panel for two seconds.

confirmation message will appear. When confirmed, the UPS starts to beep and shows a status of "UPS shutting OFF...".
The UPS then transfers to Standby mode, and the  indicator turns off.

6.4 Operating modes

The Eaton 5P Gen2 front panel indicates the UPS status through the UPS indicators located above the LCD screen.

Normal mode

When the symbol  is illuminated in green, the UPS is providing protected AC power output. The UPS charges the batteries and provides power protection to your equipment.

Battery mode

When the UPS is operating during a power outage, the alarm beeps once every five seconds and the indicator  illuminates blinking.

The necessary energy is provided by the battery.

When the utility power returns, the UPS transfers to Normal mode operation while the battery recharges.

If battery capacity becomes low while in Battery mode, the audible alarm beeps faster.

This warning is approximate, and the actual time to shutdown may vary significantly; shutdown all applications on connected equipment due to imminent UPS shutdown.

When utility power is restored after the UPS shuts down, the UPS automatically restarts.

Low-battery warning

- The  indicator illuminates solid.
- The audio alarm beeps every three seconds.
- The LED bar illuminates red

The remaining battery power is low. Shut down all applications on the connected equipment because automatic UPS shutdown is imminent.

End of battery backup time

- LCD displays "End of backup time".

- All the LEDs go OFF.
- The audible alarm stops.

6.5 Configuring battery settings

Automatic battery test

Automatic battery tests are disabled by default as battery is monitored by the BMS. The tests frequency can be modified to “Monthly”.

During the test, the UPS transfers to Battery mode and discharges the batteries for 10 seconds under load. Battery mode is not displayed, and battery low alarm is not activated during a battery test.

The battery test may be postponed due to bad conditions or failed if battery is not ok.

Low battery warning

During discharge, the low battery alarm is activated if the remaining runtime goes below 3 minutes or less than the setting capacity threshold (10% by default or set to 20% by default by the Network Management card NM3).

This threshold can be modified.

6.6 Return of AC input power

Following an outage, the UPS restarts automatically when AC input power returns (unless the restart function has been disabled) and the load is supplied again.

6.7 Transportation mode

This feature is designed to extend the battery storage time.

Batteries are shipped in transportation mode by default. The battery is in deep sleeping and cannot discharge externally. Once the UPS connects to the mains and establishes communication with the battery, it will exit transport mode after 3 minutes.

Users can set the battery to transport mode via the LCD menu.

After the UPS shuts down for a period, the BMS will enter transport Mode. The typical duration is approximately 12 minutes.

7 UPS maintenance

7.1 Equipment care

For the best preventive maintenance, keep the area around the equipment clean and dust free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner.

For full battery life, keep the equipment at an ambient temperature of 25 °C (77 °F).

The batteries are rated for a 8-10 years service life. The length of service life varies, depending on the frequency of usage and ambient temperature

If the UPS requires any type of transportation, verify that the UPS is turned off.

Batteries used beyond expected service life will often have severely reduced runtimes.

Batteries runtime will be reduced at low temperature (below 10 °C).

7.2 Storing the equipment

If you store the equipment for a long period, recharge the battery every 6 months by connecting the UPS to utility power. The internal batteries charge to 90% capacity in less than 3 hours. However, Eaton recommends that the batteries charge for 48 hours after long-term storage.

Check the battery recharge date on the shipping carton label. If the date has passed and the batteries were never recharged, do not use them. Contact your service representative.

7.3 Battery State Of Health (SOH)

Overview

The **State of Health (SOH)** is a key metric used to assess the condition of lithium batteries over time. It reflects the battery's ability to deliver performance and runtime compared to its original specifications. SOH is expressed as a percentage, where 100% represents a new battery operating at full nominal capacity.

As the battery ages or undergoes repeated charge/discharge cycles, its SOH decreases. This reduction impacts the **runtime** of the system. To assist users in monitoring battery health, the system displays one of three pop-up messages based on the current SOH level.

Pop-Up Message Logic

SOH Level	Status	Description
> 90%	Healthy	Battery is performing optimally. Full runtime and performance are available.
70% – 89%	Normal	Battery is functioning within acceptable limits. Runtime may be slightly reduced.
< 70% (low)	Warning	Battery performance and runtime are significantly lower than nominal. However, the UPS remains operational.

Important Notes

- **Even in the Warning state**, the UPS can still be used safely. The system will continue to operate, but users should expect **shorter runtimes** and **reduced peak performance**.
- The SOH status is monitored continuously by the **Battery Management System (BMS)**, which helps detect degradation early and supports proactive maintenance planning.
- Users are encouraged to schedule product replacement when SOH drops below 70%, especially in critical applications where full runtime is required.
- Pop up message is given for a single battery pack. To find out which battery pack is affected by the message, you need to check the BMS menu.

User Guidance

- **Healthy (SOH > 90%)**: No action needed. System is operating at full capacity.
- **Normal (SOH 70–89%)**: Monitor performance.
- **Warning (SOH < 70%)**: Continue using the UPS if needed, but prepare for replacement to avoid unexpected downtime.

7.4 When to replace Lithium batteries

Eaton 5P Gen2 Lithium batteries have an expected life span of 8-10 years.

 Contact your service representative before ordering new batteries.

Preventive Mode

After x years of operation (defined by the user, refer to “Battery settings” menu), the UPS will provide a battery replacement notification. You should take proactive steps to ensure you replace your batteries for optimal operation and reliability.

Predictive Mode

This is default mode for Lithium UPS. Based on real UPS usage condition, the battery health is monitored by the BMS.

When SOH is <70%, "Battery Status" will change from "Normal" to "Warning".

Note: You can refer to section "Battery State Of Health" for more information about SOH

Before ordering new batteries, you are advised to contact Eaton support to take appropriate action to help you keeping the UPS operating at its best performance.

Battery reference can be accessed through the LCD (Measurement > Battery).

7.5 Recycling the used equipment

Contact your local recycling or waste center for information on proper disposal of the used equipment. eaton.com/recycling.



Do not dispose of the battery or batteries in a fire, they may explode.

Proper disposal of batteries is required, refer to your local codes for disposal requirements.

Do not open or mutilate the battery or batteries, released electrolyte is harmful to the skin and eyes. It may be toxic.



This symbol indicates that you should not discard the batteries in the trash. This product contains Lithium-Ion batteries and must be disposed of properly. For more information, contact your local recycling/reuse or hazardous waste center.



Do not discard waste electrical or electronic equipment (WEEE) in the trash.

For proper disposal, contact your local recycling/reuse or hazardous waste center.

8 Troubleshooting

The Eaton 5P Gen2 is designed for reliable, autonomous operation while providing you with notifications and alerts whenever a potential operational or performance issue occurs.

Usually the alarms shown by the product do not mean that the output power is affected. Instead, they are preventive alarms intended to alert the user.

- Some alarms may be announced by a beep in a regular way. Example = "Battery low".
- Faults are announced by a continuous beep and red LED.

Use the following troubleshooting chart to determine the UPS alarm condition.

8.1 Typical alarms and faults

To check the Event log or Fault log:

9. Press any button on the front panel display to activate the menu options.
10. Press the down button to select Event log or Fault log.
11. Scroll through the listed events or faults.

The following table describes typical conditions:

Conditions	Possible cause	Action
Battery mode LED is On. 1 beep every 10 seconds	A utility failure has occurred and the UPS is in battery mode.	The UPS is powering the equipment with battery power. Prepare your equipment for shutdown.
Battery low LED is On. 1 beep every 3 seconds	The UPS is in Battery mode and the battery is running low.	This warning is approximate, and the actual time to shutdown may vary significantly. Depending on the UPS load and number of Extended Battery Modules (EBMs), the "Battery Low" warning may occur before the batteries reach 10% capacity.
No battery  LED is On Beep continuous	The batteries are disconnected.	Verify that all batteries are properly connected. If the condition persists, contact your service representative.
Battery fault  LED is On. Beep continuous	The battery test is failed due to bad or disconnected batteries.	Verify that all batteries are properly connected. If the condition persists, contact your service representative.
The UPS does not provide the expected backup time.	The batteries need charging or service.	Apply utility power for 48 hours to charge the batteries. If the condition persists, contact your service representative.
Power Overload  LED is On	Power requirements exceed the UPS capacity (greater than 100% of nominal; see "User Settings" for specific output overload ranges).	Remove some of the equipment from the UPS. The UPS continues to operate, but may shut down if the load increases. The alarm resets when the condition becomes inactive.
UPS overtemperature  LED is On 1 beep every 3 seconds	The UPS internal temperature is too high or a fan has failed. At the warning level, the UPS generates the alarm but remains in the current operating state. If the temperature rises another 10°C, the UPS shuts down.	Clear vents and remove any heat sources. Allow the UPS to cool. Ensure the airflow around the UPS is not restricted. Restart the UPS. If the condition continues to persist, contact your service representative.
The UPS does not start	The input source is not connected correctly.	Check the input and battery connections.
	The Remote Power Off (RPO) switch is active or the RPO connector is missing.	If the UPS Status menu displays the "Remote Power Off" notice, deactivate the RPO input.

8.2 Silencing the alarm

Press the ESC (Escape) button on the front panel display to silence the alarm. Check the alarm condition and perform the applicable action to resolve the condition. If the alarm status changes, the alarm beeps again, overriding the previous alarm silencing.

8.3 Service and support

If you have any question or problem with the UPS, call Eaton or your local service representative in your country / region. Please have the following information ready when you call for service:

- Model number
- Serial number
- Firmware version number
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

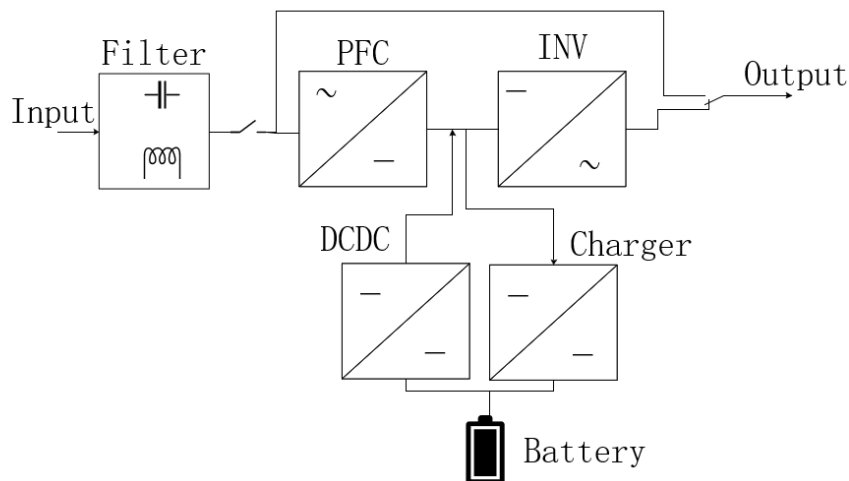
If repair is required, you will be given a Returned Material Authorization (RMA) number. This number must appear on the outside of the package and on the Bill Of Lading (if applicable). Use the original packaging or request packaging from the Help Desk or distributor. Units damaged in shipment as a result of improper packaging are not covered by warranty. A replacement or repair unit will be shipped freight prepaid for all warranted units.

i For critical applications, immediate replacement may be available. Call the Help Desk for the dealer or distributor nearest you.

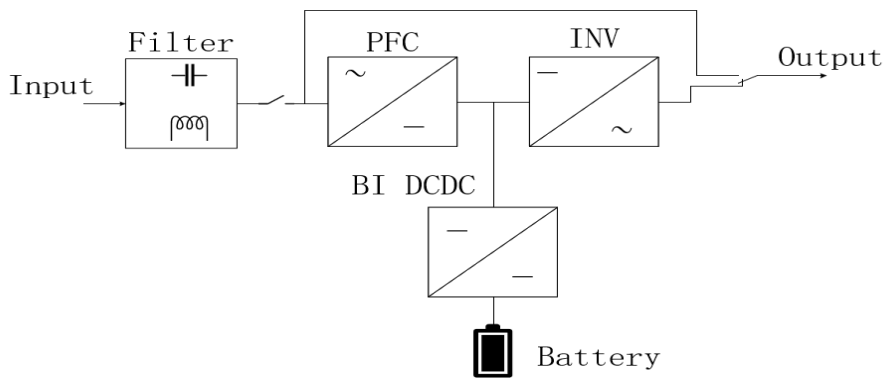
9 Specification and technical characteristics

9.1 UPS Model list

Description	Catalog Number	Power rating	Configuration
Eaton 5P650i Rack 1U Li-Ion G2	5P650IRG2-L	520W / 650VA	Rack
Eaton 5P650i Rack 1U Netpack Li-Ion G2	5P650IRNG2-L	520W / 650VA	Rack
Eaton 5P1150i RT 2U Li-Ion G2	5P1150IRT2UG2-L	920W / 1150VA	Rack and Tour
Eaton 5P1150i RT 2U Netpack Li-Ion G2	5P1150IRT2UNG2-L	920W / 1150VA	Rack and Tour
Eaton 5P1550i RT 2U Li-Ion G2	5P1550IRT2UG2-L	1350W / 1550VA	Rack and Tour
Eaton 5P1550i RT 2U Netpack Li-Ion G2	5P1550IRT2UNG2-L	1350W / 1550VA	Rack and Tour



For 5P650IRG2-L



For 5P1150IRG2-L and 5P1550IRG2-L

9.2 Electrical input

Default frequency	50Hz
Nominal frequency	50/60Hz
Frequency range	47-70Hz
Protective class	Protective class I

Rated Input Voltage	200-240V~
Input Voltage Range	135-300V~ adjustable to 110~300V~ derating 50%
Rated Input Current	10A
Nominal Input Current	5P650IRG2-L : 3.09A 5P1150IRG2-L : 5.44A 5P1550IRG2-L : 7.19A

9.3 Electrical input connections

Input connection	Input cable
IEC C14-10A	Not provided

9.4 Electrical output

All models	Normal mode	Battery mode
Voltage regulation (Tolerance)	+/-1%	+/- 3%
Efficiency (100% load)	> 97%	Between 85% and 89%
Nominal output	200/208/220/ 230 /240V~	
Frequency	Follows input frequency range	50/60Hz +/-0.1 Hz
Output overload	[105%,120%] 30min [120%,150%]5min [150%, 180%] 10S >180% 1S	[105% ~110%] 10s [110%~130%] 1s, >130% 0.15s

Short circuit current limitation in battery mode	Depends on the external fuse or breaker in the upstream of UPS	< 5 cycles 5P650IRG2-L : 6A 5P1150IRG2-L : 6A 5P1550IRG2-L : 8A
Transfer time Normal to Battery	High Sensitivity mode 10ms max Low Sensitivity mode 13ms max	High Sensitivity mode 10ms max Low Sensitivity mode 13ms max
Transfer time AVR mode to Normal mode	6ms typical, 10ms maxi	/

9.5 Electrical output connections

Catalog Number	Output connection	Output cable
5P650IRG2-L	(3) IEC10A Primary group (2) IEC10A Group 1 (1) IEC10A Group 2	(2) IEC10A 1.2m
5P1150IRG2-L 5P1550IRG2-L	(4) IEC10A Primary group (2) IEC10A Group 1 (2) IEC10A Group 2	(2) IEC10A 1.2m

9.6 Environmental and safety

Standards	IEC/EN 62040-1 Safety IEC/EN 62040-2 Electromagnetic Compatibility EMC IEC/EN 62040-3 Performance
EMC (Emissions)	CISPR32 Class B FCC part 15 Class B IEC/EN 62040-2 C1 IEC/EN 61000-3-2 Flickers IEC/EN 61000-3-3 Harmonics
EMC (Immunity)	IEC 61000-4-2, (ESD): 8 kV Contact Discharge / 15 kV Air Discharge IEC 61000-4-3, (Radiated field): 10 V/m IEC 61000-4-4, (EFT): 4 kV IEC 61000-4-5, (Surges): 2 kV Differential Mode / 4 kV Common Mode IEC 61000-4-6, (Electromagnetic field): 10 V IEC 61000-4-8, (Conducted magnetic field): 30 A/m
UPS enclosure IP rating	IP20
Earthing system	This UPS can be connected to TN, TT, IT electrical supply system, same system is supplied to the load.
Overvoltage Category	Category II
Pollution degree	PD2
Operating temperature	0 to 40 °C (32 to 104 °F) 100% load, 40~50 °C (104 to 131°F) can support load max to 50%.
Storage temperature	-0 to 50°C (3 to 122 °F) with battery -25 to 55°C (-13 to 131 °F) without battery
Relative humidity	0 to 90 % (without condensation)
Operating altitude	Up to 3,000 meters (9,843 ft) above sea level, no derating for 40°C (104°F) room temperature.
Transit altitude	Up to 10,000 meters (32,808 ft) above sea level

Audible noise	For 5P650IRG2-L: Line mode:<30dB Buck/boost mode:<40 dB Batt. Mode: <40dB For 5P1150IRG2-L and 5P1550IRG2-L : Line mode:<30dB Buck/boost mode:<45 dB Batt. Mode: <40dB
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10 Glossary

SOH	State Of Health. Overall condition of the battery compared to when it was new.
SOC	State Of Charge. Percentage of usable energy remaining in the lithium battery.
CC	Constant Current.
CV	Constant Voltage.
Backup time	Time during which the load can be supplied by the UPS operating on battery power.
Low-battery warning	This is a battery-voltage level indicating that battery power is low and that the user must take action before the UPS shuts down.
Load	Devices or equipment connected to the UPS output.
Normal mode	The normal UPS operating mode in which the AC source supplies the UPS which, in turn, provides AC power to the connected loads.
Normal AC source	Normal source of power for the UPS.
OVL	Overload. When the load exceeds 100% of the maximum load of the UPS.
UPS	Uninterruptible Power System.
Relay contacts	Contacts supplying information to the user in the form of signals.
AVR	The Automatic Voltage Regulation maintains a constant voltage level for electrical equipment loads when the voltage falls outside the voltage tolerance range.