www.eaton.com

Evolution

650/650 Rack 1U
850/850 Rack 1U
1150/1150 Rack 1U
1550/1550 Rack 1U

Pulsar Series

Installation and User Manual
Manuel d'installation et d'utilisation
Manual de instalación y uso
Instalação e manual do usuário

English

Français

Español

Portuguese

Powering Business Worldwide

Evolution

650/650 Rack 1U
850/850 Rack 1U
1150/1150 Rack 1U
1550/1550 Rack 1U

Installation and User Manual

Pulsar Series

Revision History

Evolution Installation and User Manual, 86-81700-00

For Technical Support, Customer Care Center, or Customer FAQ,
please call (800) 279-7776 or visit our website: www.eaton.com

Powering Business Worldwide

Contents

Introduction 5
IMPORTANT SAFETY INSTRUCTIONS 6
Symbol Usage 7

1. Presentation

1.1 Standard Positions 9
1.2 Rear Panels 10
1.3 Control Panel 10

2. Installation

2.1 Unpacking and Contents Check 11
2.2 Installation of Tower Model 12
2.3 Installation of Rack Model 12
2.4 Installation of the 650 Rack Model 13
2.5 Communication Ports 14
2.6 Equipment Connections 15

3.Operation

3.1 Start-Up and Normal Operation 17
3.2 Operation on Battery Power 17
3.3 Return of AC Input Power 17
3.4 UPS Shutdown 18
3.5 UPS Remote Control 18

4. Access to Measurements and Personalization Data

Main-Output Personalization 19
Voltage-Threshold Personalization 19
UPS-Sensitivity Personalization 19
UPS ON/OFF Personalization 20
Battery Personalization 20

Maintenance

5.1 Troubleshooting 21
5.2 Replacing the Battery Module in the Tower Model 21
5.3 Replacing the Battery Module in the Rack Model 22

Appendices

6.1 Technical Specifications 25
6.2 Programming the Programmable Outlets 26
6.3 Glossary 28

Thank you for selecting an EATON product to protect your electrical equipment.

The **Evolution** range has been designed with the utmost care.

We recommend that you take the time to read this manual to take full advantage of the many features of your **UPS** (**U**ninterruptible **P**ower **S**ystem).

Warning: This is a class A UPS product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.
If the device must be installed in overvoltage category III or IV environments, additional upstream overvoltage protection must be provided for.

Before installing **Evolution**, please read the booklet on the required safety instructions. Then follow the indications in this manual.

To discover the entire range of EATON products and the options available for the **Evolution** range, we invite you to visit our web site at www.eaton.com or contact your EATON representative.

Environmental protection

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

Substances

This product does not contain CFCs, HCFCs, or asbestos.

Packing

To improve waste treatment and facilitate recycling, separate the various packing components.
- The cardboard we use comprises over 50% of recycled cardboard.
- Sacks and bags are made of polyethylene.
- Packing materials are recyclable and bear the appropriate identification symbol.

Material	Abbreviation	Symbol number 
Polyethylene terephthalate	PET	01
High-density polyethylene	HDPE	02
Polyvinyl chloride	PVC	03
Low-density polyethylene	LDPE	04
Polypropylene	PP	05
Polystyrene	PS	06

Follow all local regulations for the disposal of packing materials.

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 up of recyclable materials.
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.

- **Battery**

The product contains lead-acid batteries that must be processed according to applicable local regulations concerning batteries.
The battery may be removed and disposed of in compliance with correct local disposal regulations.
The «Material Safety Data Sheets» (MSDS) for the batteries are available on our web site*.

(*) For more information or to contact the Product Environmental manager, please visit our website: www.eaton.com.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries.

The **Evolution** models that are covered in this manual are intended for installation in an environment within 0 to 35° for 650-1150VA and 0 to 40° for 1550VA, free of conductive contaminant. The outlet socket shall be installed near the equipment and shall be easily accessible.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Certification Standards

- IEEE 587-1980/ANSI C62.41 1980 Standards for Surge Withstand Ability
- FCC rules and regulations of Part 15, Subpart B, Class A
- UL listed under 1778, Standards for Uninterruptible Power Supply Equipment
- IEC 61000-4-2 (ESD): level 4
- IEC 61000-4-3 (Radiated field): level 3
- IEC 61000-4-4 (EFT): level 4
- IEC 61000-4-5 (surge): level 4
- IEC 61000-4-6 (electromagnetic conducted field): level 3
- IEC 61000-4-8 (radiated magnetic field): level 4

Safety of Persons

- The system has its own power source (the battery). Consequently, the power outlets may be energized even if the systems is disconnected from the AC power source.
- Dangerous voltage levels are present within the system. It should be opened exclusively by qualified service personnel.
- The system must be properly grounded.
- The battery supplied with the system contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:
  - Never burn the battery (risk of explosion).
  - Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).
  - Comply with all applicable regulations for the disposal of the battery.
  - Batteries constitute a danger (electrical shock, burns). The short-circuit current may be very high. Precautions must be taken for all handling: remove watches, rings, bracelets and any other metal objects, use tools with insulated handles.
  - Do not lay tools or metal parts on top of batteries.

Product Safety

- The UPS connection instructions and operation described in the manual must be followed in the indicated order.
- A protection circuit breaker must be installed upstream and be easily accessible. The system can be disconnected from the AC power source by opening this circuit breaker.
- Check that the indications on the rating plate correspond to your AC powered system and to the actual electrical consumption of all the equipment to be connected to the system.
- Never install the system near liquids or in an excessively damp environment.
- Never let a foreign body penetrate inside the system.
- Never block the ventilation grates of the system.
- Never expose the system to direct sunlight or source of heat.
- If the system must be stored prior to installation, storage must be in a dry place.
- The admissible storage temperature range is -20°C to +50°C.

Special Precautions

- All handling operations will require at least two people (unpacking, installation in rack system).
- Before and after the installation, if the UPS remains de-energized for a long period, the UPS must be energized for a period of 24 hours, at least once every 6 months (for a normal storage temperature less than 25°C). This charges the battery, thus avoiding possible irreversible damage.
- During the replacement of the Battery Module, it is imperative to use the same type and number of element as the original Battery Module provided with the UPS to maintain an identical level of performance and safety. In case of doubt, don't hesitate to contact your EATON representative.

Environment

- **This product has been designed to respect the environment:**
  It does not contain any Chlorofluorocarbon (CFC) or Hydrochlorofluorocarbon (HCFC).
- **UPS recycling at the end of service life:**
  EATON undertakes to recycle, by certified companies and in compliance with all applicable regulations, all UPS products recovered at the end of their service life (contact your EATON branch office).
- **Packing: UPS packing materials must be recycled in compliance with all applicable regulations.**
  WARNING: This product contains lead-acid batteries. Lead is a dangerous substance for the environment if it is not properly recycled by specialized companies.

Symbol Usage

Important instructions that must always be followed

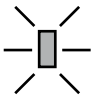
Information, advice, help

Visual indication

Action

Audible signal

LED off



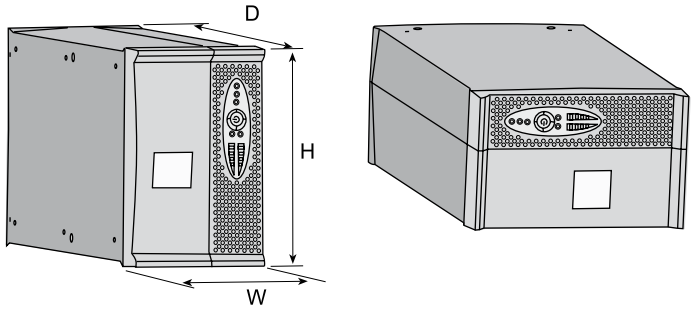
LED on

LED flashing

(This page left blank intentionally)

1.1 Standard Positions

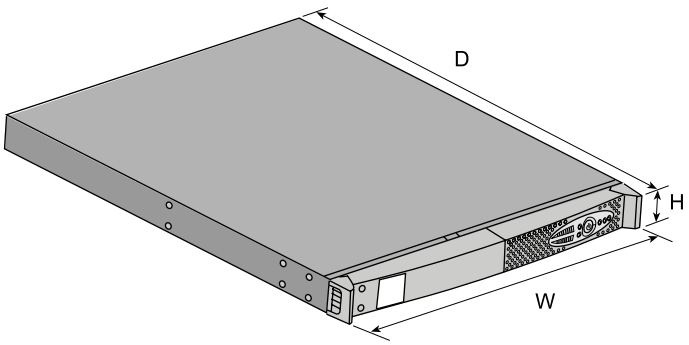
Tower Models



Dimensions (W x H x D) in inches	
Evolution 650	5.8 x 9.2 x 16.5
Evolution 850	5.8 x 9.2 x 16.5
Evolution 1150	5.8 x 9.2 x 16.5
Evolution 1550	5.8 x 9.2 x 19.4

Weights in lbs	
Evolution 650	18.8
Evolution 850	24.5
Evolution 1150	27.2
Evolution 1550	36

Rack Models



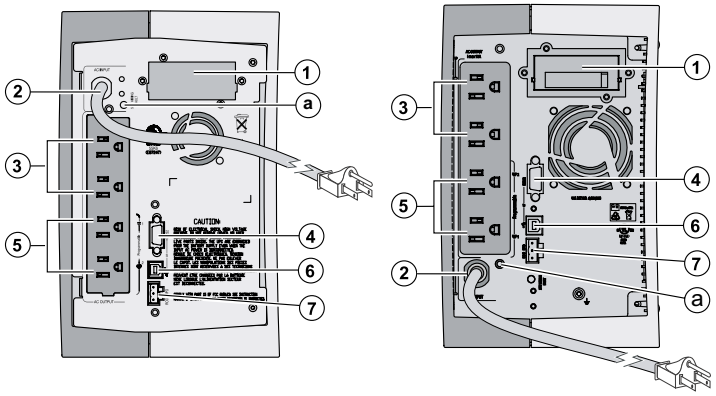
Dimensions (W x H x D) in inches	
Evolution 650 Rack	17.2 x 1.7 x 14.4
Evolution 850 Rack	17.2 x 1.7 x 20.2
Evolution 1150 Rack	17.2 x 1.7 x 20.2
Evolution 1550 Rack	17.2 x 1.7 x 21.9

Weights in lbs	
Evolution 650 Rack	22.7
Evolution 850 Rack	36
Evolution 1150 Rack	37
Evolution 1550 Rack	44.3

1. Presentation

1.2 Rear Panels

Evolution 650/850/1150/1550



(1) Slot for optional communication card

(2) Attached 6 ft. input power cord with 5-15P plug, 15A

(3) 2 NEMA 5-15R for connection of equipment

(4) RS232 communication port

(5) 2 NEMA 5-15R programmable outlets

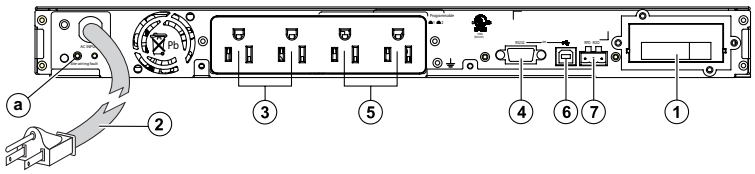
(6) USB communication port

(7) Connector for remote RPO/ROO (Remote Power OFF / Remote ON/OFF)

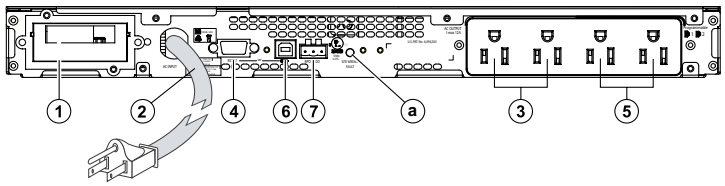
(a) LED indicating site wiring fault alarm with reset button

Evolution 650/850/1150/1550 Rack

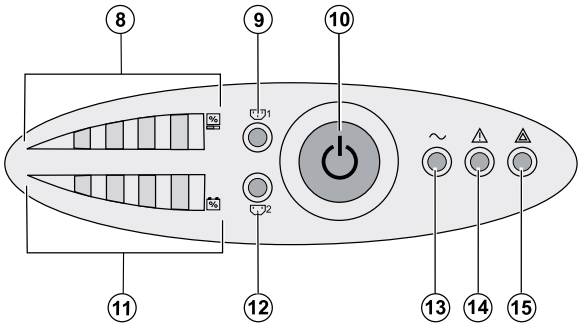
Evolution 650/850/1150 Rack



Evolution 1550 Rack



1.3 Control Panel



(8) Bargraph indicating the percent load

(9) Programmable outlet 1 is supplied

(10) ON/OFF button for UPS and outlets

(11) Bargraph indicating battery-charge level

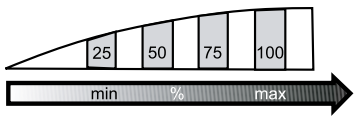
(12) Programmable outlet 2 is supplied

(13) Load protected LED

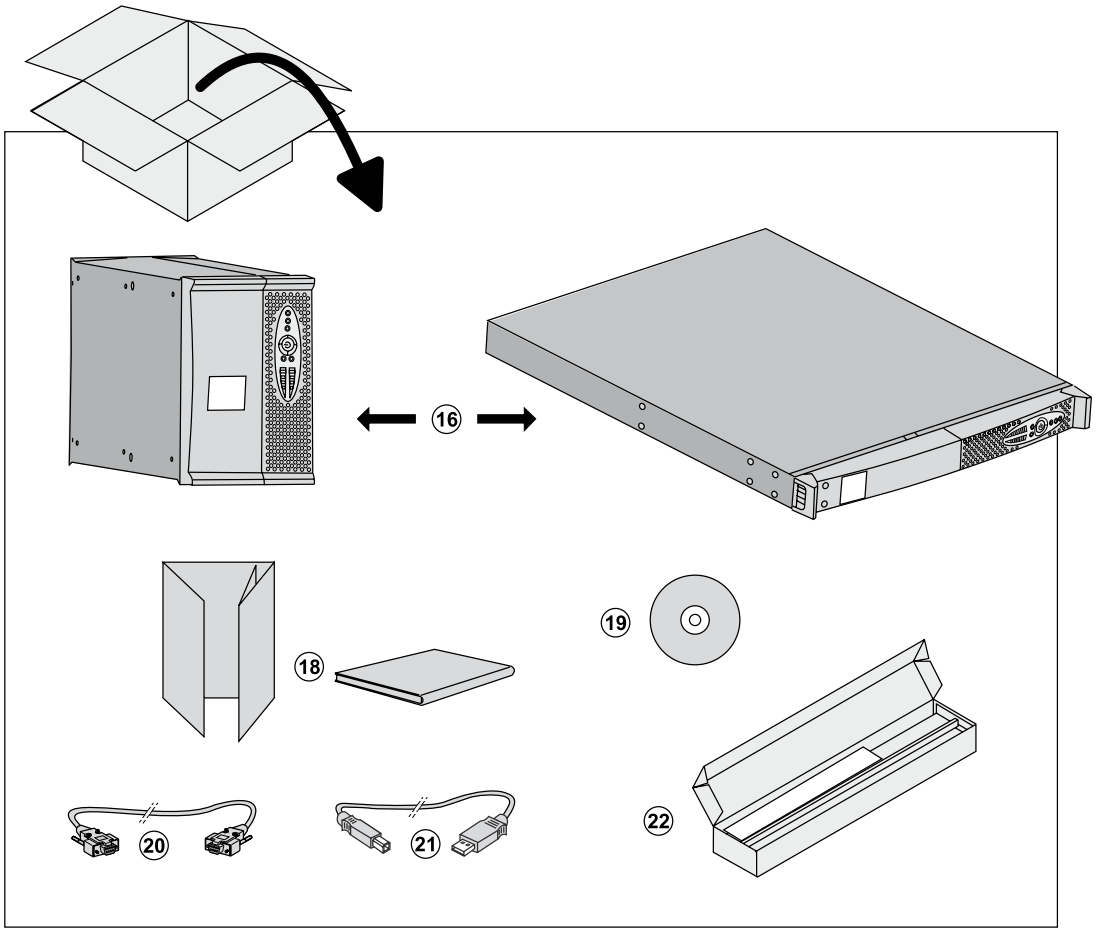
(14) Downgraded operation LED

(15) Load not protected LED

Bargraphs (8) and (11)



2.1 Unpacking and Contents Check



(16) Evolution UPS, tower or rack model with input cable attached

(18) Documentation

(19) **Solution-Pac** CD-ROM

(20) RS232 communication cable

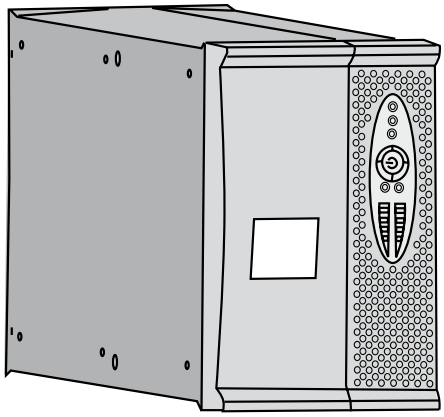
(21) USB communication cable

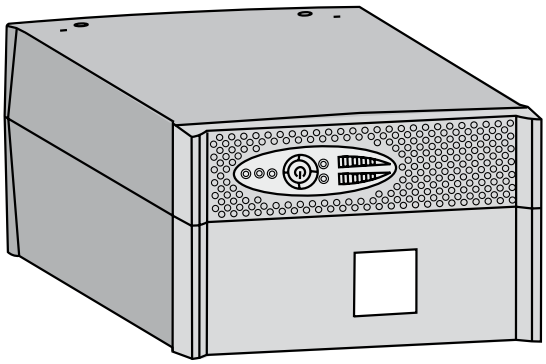
(22) Mounting kit for 19-inch bays (rack model only)

Packing materials must be disposed of in compliance with all local regulations concerning waste. Recycling symbols are printed on the packing materials to facilitate sorting.

2. Installation

2.2 Installation of Tower Model

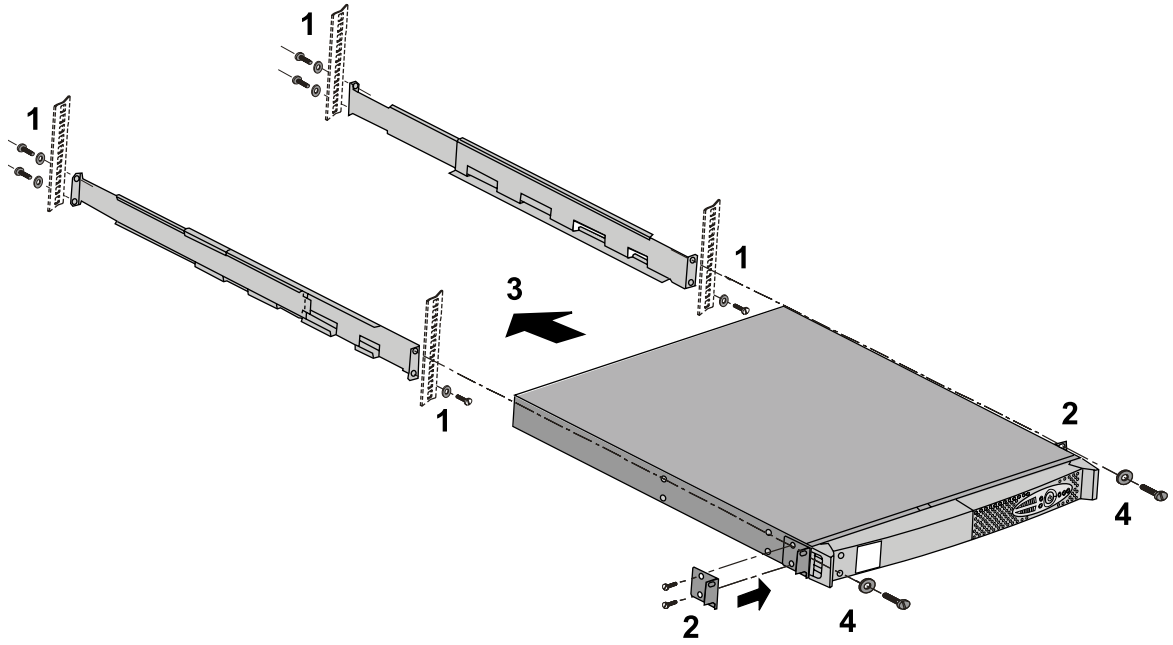




2.3

Installation of Rack Model

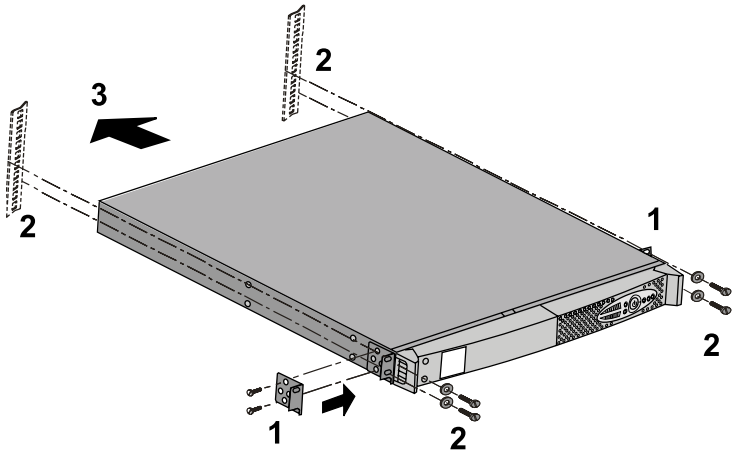
Follow steps 1 to 4 for module mounting on the rails.



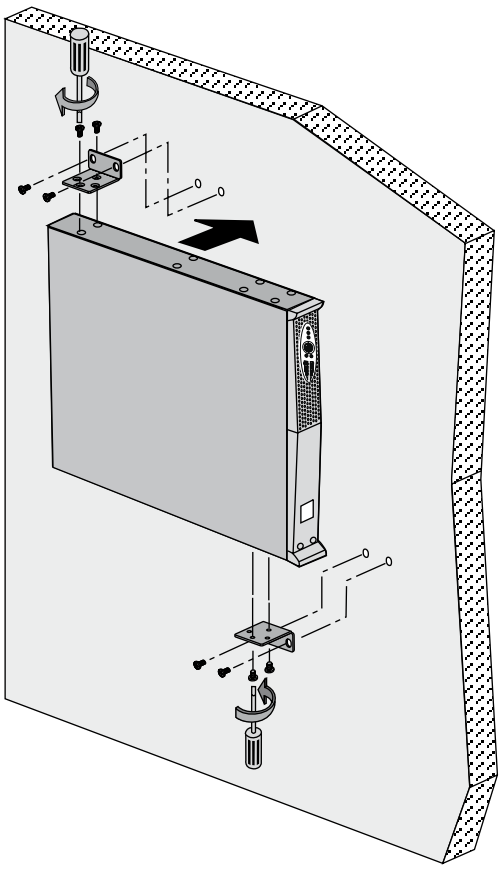
The rails and necessary hardware are supplied by EATON.

2.4 Installation of the 650 Rack Model

Follow steps 1 to 3 for rack mounting.



Wall mounting



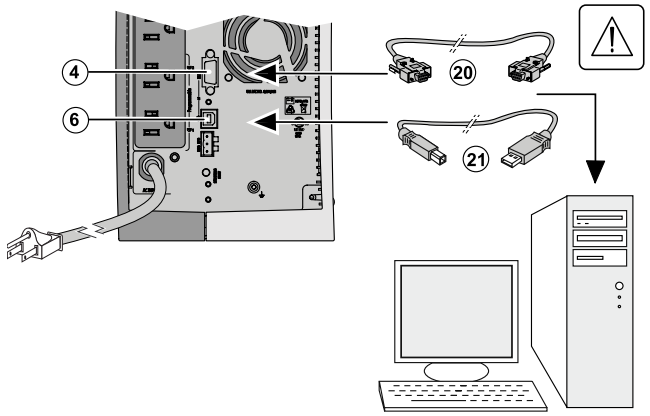
The necessary hardware is supplied by EATON.

2. Installation

2.5 Communication Ports

Connection of RS232 or USB communication port (optional)

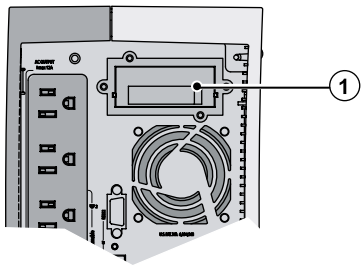
The RS232 and USB communication ports cannot operate simultaneously.



1. Connect the RS232 **(20)** or USB (21) communication cable to the serial or USB port on the computer equipment.
2. Connect the other end of the communication cable **(20)** or **(21)** to the USB **(6)** or RS232 **(4)** communication port on the UPS.

The UPS can now communicate with EATON power management software.

Installation of the communication cards (optional)

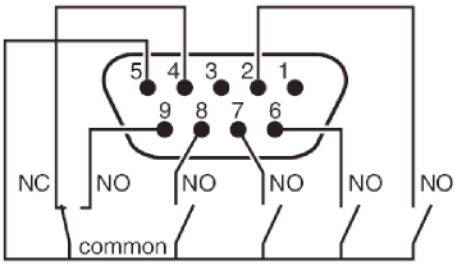


Limited-access slot for the communication card

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

1. Remove the slot cover **(1)** secured by screws.
2. Insert the communication card in the slot.
3. Secure the card cover with the two screws.

Characteristics of the contact communication port (optional)



- Pin 1: Not used
- Pin 2: Battery fault
- Pin 3: UPS power off
- Pin 4: Load on Utility
- Pin 5: COMMON
- Pin 6: Load on bypass, when available on UPS
- Pin 7: Low battery
- Pin 8: UPS on, load powered
- Pin 9: Load on battery

n.o.: normally open contact

When a signal is activated, the contact is closed between the common (pin 5) and the pin for the corresponding signal.

Please refer to the Network Management Card User Manual for the latest characteristics information.

Contact characteristics (optocoupler)

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

2.6 Equipment Connections

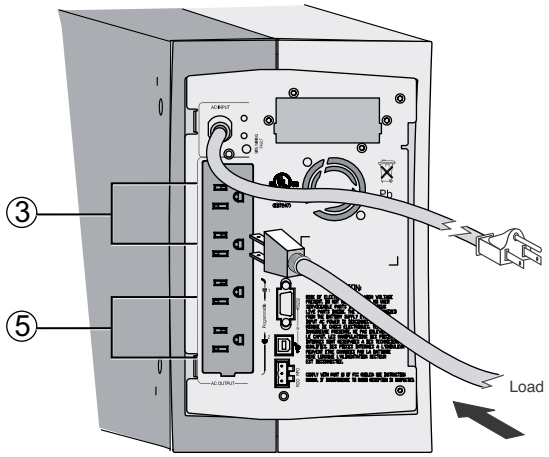
Check that the indications on the name plate located on the back of the UPS correspond to the AC-power source and the true electrical consumption of the total load.

1. Connect the input power cord to the AC outlet receptacle.

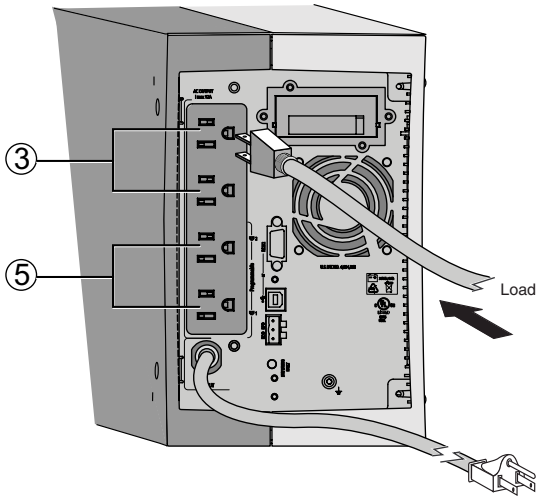
2. Connect the loads to the UPS outlets as shown. It is preferable to connect the priority loads to the two outlets marked **(3)** and the nonpriority loads to the two programmable outlets marked **(5)**.

To program shutdown of outlets **(5)** during operation on battery power and thus optimize the available backup time, the EATON communication software is required.

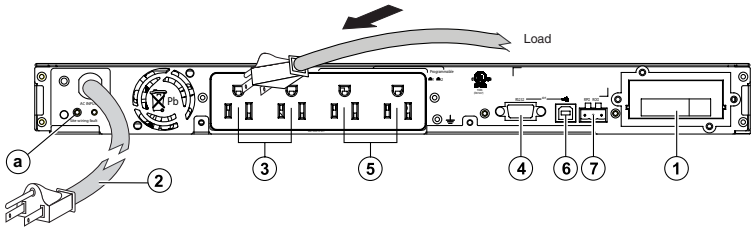
Evolution 650/850/1150



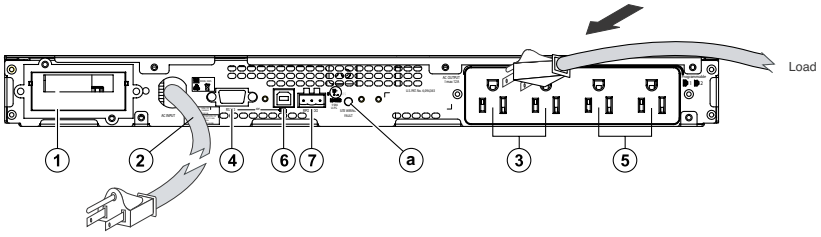
Evolution 1550



Evolution 650/850/1150 Rack

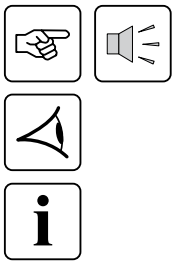


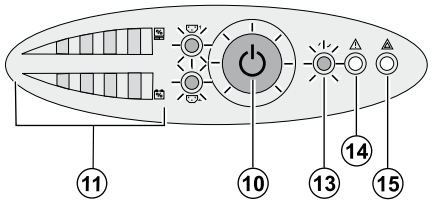
Evolution 1550 Rack



(This page left blank intentionally)

3.1 Start-Up and Normal Operation





Press button **(10)** for approximately 1 second.

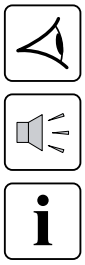
- The buzzer beeps once and all the LEDs go ON simultaneously.
- If AC input power is available, button **(10)** and LED **(13)** are ON. The load is supplied by the AC-power source. Conditions permitting, the UPS runs a battery test, indicated by LEDs **(11)** and the buzzer.
- If AC input power is not available, button **(10)** and LEDs **(13)** and **(14)** are ON. The load is supplied by the UPS on battery power.

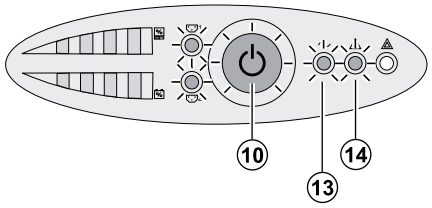
The connected devices are protected by the UPS.

If LED **(15)** is ON, a fault has occurred (see the "Troubleshooting" section).

3.2 Operation on Battery Power

Transfer to battery power

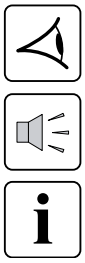


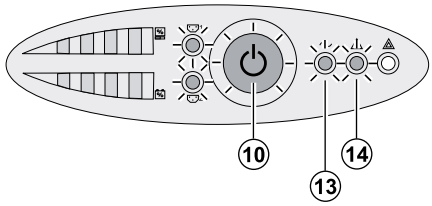


- The connected devices continue to be supplied by the UPS when AC input power is no longer available. The necessary energy is provided by the battery.
- Button **(10)** and LEDs **(13)** and **(14)** are ON.
- The audio alarm beeps every ten seconds.

The connected devices are supplied by the battery.

Low-battery warning





- Button **(10)** and LEDs **(13)** and **(14)** are ON.
- The audio alarm beeps every three seconds.

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

- All the LEDs go OFF.
- The audio alarms stops.

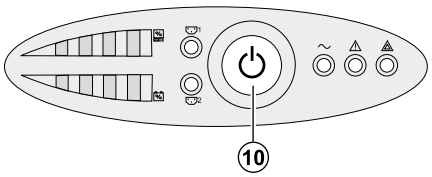
The UPS is completely shut down.

3.3 Return of AC Power

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

3. Operation

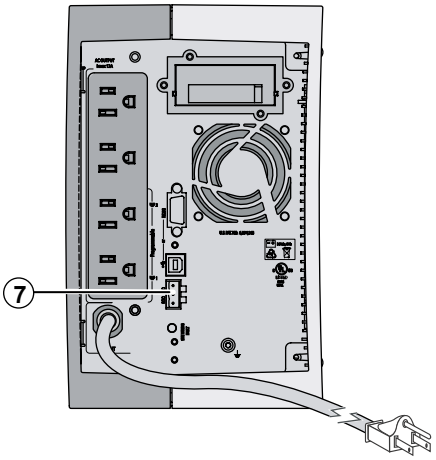
3.4 UPS Shutdown



Press button **(10)** for approximately 2 seconds.

The devices connected to the UPS are no longer supplied.

3.5 UPS Remote Control



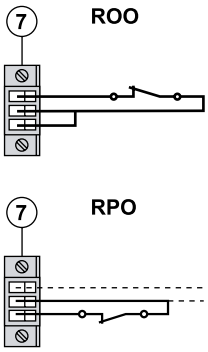
Evolution offers a choice between two remote control functions.

- **RPO**: Remote Power OFF allows a remote contact to be used to disconnect all the equipment connected to the UPS. Restarting the UPS requires manual intervention.
- **ROO**: Remote ON/OFF allows remote action of button **(10)** to shut down the UPS.

These functions are obtained by opening of the contact connected between the appropriate pins of connector **(7)** on the rear panel of the UPS (see figures below).

Remote control connection and test

1. Check that the UPS is **OFF** and disconnected from the AC input source.
2. Remove connector **(7)** after unscrewing the screws.
3. Connect a normally closed volt-free contact (60 V DC / 30 V AC max., 20 mA max., 0.75 mm² cable cross-section) between the two pins of connector **(7)** (see diagram).



Contact open: UPS shutdown

Contact closed: UPS start-up (UPS connected to AC power and AC power is available).

Note: The local ON/OFF control using button **(10)** overrides the remote-control function.

Contact open: UPS shutdown, LED **(14)** goes ON.

To return to normal operation, deactivate the remote external contact (LED (**14**) goes OFF) and restart the UPS by pressing button (**10**).

4. Plug connector **(7)** into the back of the UPS.
5. Connect and restart the UPS following the previously described procedures.
6. Activate the external remote shutdown contact to test the function.

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

4. Access to Maintenance and Personalization Data

Insert the **Solution-Pac** CD-ROM in the drive.

- On the first navigation screen, select "Point to Point solution" and follow the instructions on how to install the **Personal Solution-Pac** software.
- Then select "Settings", "Advanced settings" and "UPS settings".

Note that the Linux/Unix/MacOS versions of **Personal Solution-Pac** software do not offer this possibility.

It is possible to modify the settings listed below (detailed comments are available in the **Personal Solution-Pac** software).

Main-output personalization

Function	Factory setting	Other available settings
Output voltage on battery power	120 Volts AC	100/120/127 Volts AC
Overload alarm threshold	105%	30/50/70%

Voltage-threshold personalization

Function	Factory setting	Other available settings
High threshold for transfer to battery	151 Volts AC ±3%	141 to 153 Volts AC
Low threshold for transfer to battery	89 Volts AC ±3%	80 to 94 Volts AC
Fader activation threshold	132 Volts AC ±3%	127 to 138 Volts AC
Booster activation threshold	102 Volts AC ±3%	92 to 108 Volts AC
Maximum input-voltage range	Disabled	Enabled

UPS-sensitivity personalization

Function	Factory setting	Other available settings
UPS-sensitivity level	Normal	High or low

4. Access to Maintenance and Personalization Data

Voltage-threshold personalization

Function	Factory setting	Other available settings
Automatic start	Enabled	Disabled
Cold start	Enabled	Disabled
Forced shutdown	Enabled	Disabled
Energy-savings mode	Disabled	Enabled
UPS ON/OFF controlled by software	Enabled	Disabled
Battery level before restart	0%	0 to 100%

Battery personalization

Function	Factory setting	Other available settings
Battery-test intervals	Weekly	No test / daily test / monthly test
Low-battery warning	20%	0 to 100%
Battery protection against deep discharge	Enabled	Disabled
Audio alarm	Enabled	Disabled

5.1 Troubleshooting

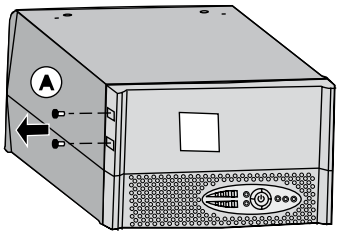
	Indication	Diagnostic	Correction
1	When the UPS is started using button **(10)**, all the LEDs go ON once and the buzzer beeps once, then LED **(14)** remains ON.	The remote power off (RPO) contact has been activated to shut down the UPS and now prevents restart.	Set the contact back to its normal position and press button **(24)** to restart.
2	Button **(10)** and LEDs **(13)** and **(14)** are ON and all the LEDs on bargraph **(8)** flash.	The percent load is greater than the set overload level or UPS capacity.	Check the power drawn by the connected devices and disconnect any non-priority devices. Check the overload level setting.
3	Button **(10)** and LED **(15)** are ON and all the LEDs on bargraph **(8)** are flashing.	A critical overload has occurred on the UPS output. If AC input power fails, the load will not be supplied in battery mode.	Check the power drawn by the connected devices and disconnect any non-priority devices.
4	LED **(15)** is ON and all the LEDs on bargraph **(11)** are flashing.	A battery fault has been detected during the automatic test.	Replace the battery module (See Section 5.2, Battery-module replacement).
5	LED **(15)** alone is ON and the buzzer sounds continuously.	A UPS internal fault has occurred and the load is not supplied.	Visit www.eaton.com for after-sales support or call (800) 279-7776.

5.2 Replacing the Battery Module in the Tower Model

Safety recommendations

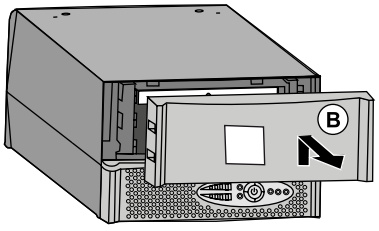
See Section 5.3 on Page 5—2 for safety recommendations.

Battery-module removal

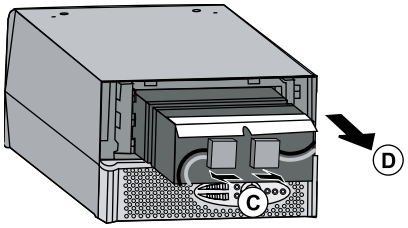


The UPS must be turned as shown in the figure opposite.

A. Remove the two screws on the left-hand side.



B. Lift and pull away the panel with the logo.



C. Pull on the two connectors to disconnect the battery (never pull on the wires).

D. Pull the plastic tab to remove the battery.

5. Maintenance

Mounting the new battery module

Carry out the above instructions in reverse order.

- To ensure safety and high performance, use only batteries supplied by EATON.
- Take care to firmly press together the two parts of the connector during remounting.

5.3 Replacing the Battery Module in the Rack Model

Safety recommendations

The battery can cause electrocution and high short-circuit currents. The following safety precautions are required before servicing the battery components:

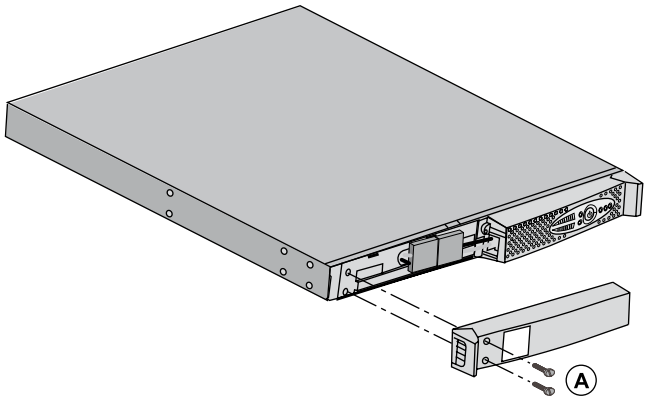
CAUTION: Do not dispose of batteries in a fire. The batteries may explode. Dispose of used batteries according to the instructions.

CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

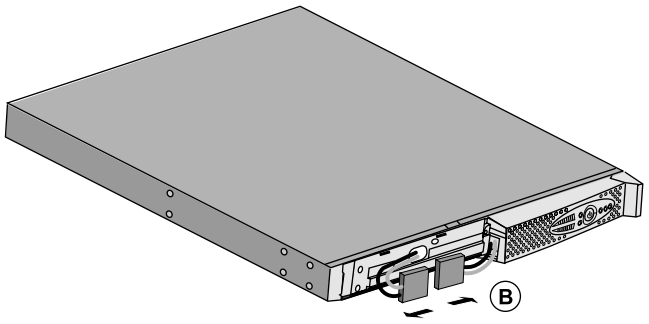
CAUTION: A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

a. Remove watches, rings, or other metal objects.
b. Use tools with insulated handles.
c. Wear rubber gloves and boots.
d. Do not lay tools or metal parts on top of batteries.
e. Disconnect charging source prior to connecting or disconnecting battery terminals.
f. Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.

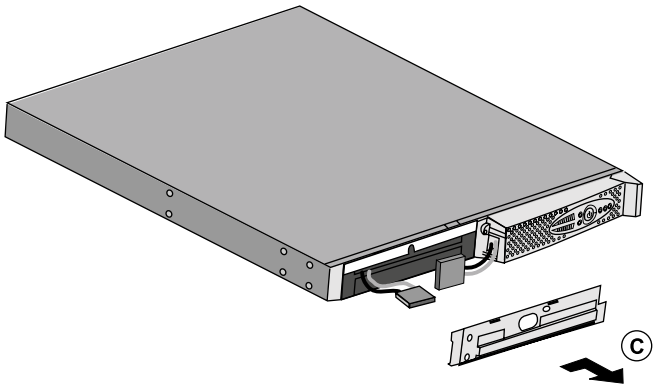
Battery-module removal



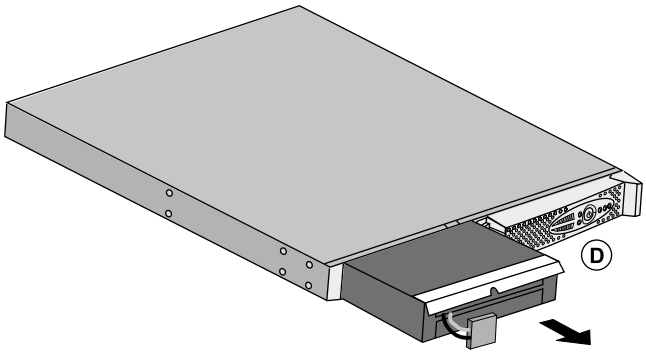
A. Remove the two screws on the left-hand side of the front panel.



B. Disconnect the battery block by separating the two connectors (never pull on the wires).



C. Remove the part.



D. Pull the plastic tab to remove the battery block and replace it.

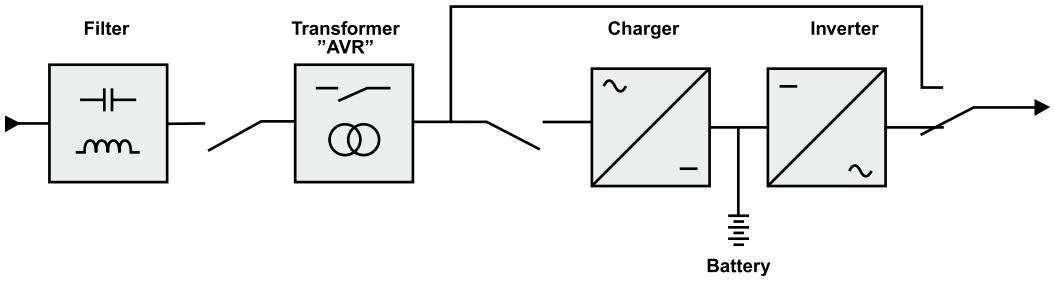
Mounting the new battery module

Carry out the above instructions in reverse order.

- To ensure safety and high performance, use only batteries supplied by EATON.
- Take care to firmly press together the two parts of the connector during remounting.

(This page left blank intentionally)

6.1 Technical Specifications



Evolution	650 / 650 Rack	850 / 850 Rack	1150 / 1150 Rack	1550 / 1550 Rack
Output power	650 VA / 420 W	850 VA / 600 W	1150 VA / 770 W	1550 VA / 1100 W
AC input power ◗ Rated input voltage ◗ Input-voltage range ◗ 50 Hz input-frequency range ◗ 60 Hz input-frequency range	Single phase 120 V 89 V to 151 V (1) 47 Hz to 70 Hz (2) 56.5 Hz to 70 Hz (2)			
Output on battery power ◗ Voltage ◗ Frequency	120 V (+6% / -10%)(3) 50/60 Hz ±0.1 Hz			
Battery (sealed lead acid, maintenance free) ◗ Tower model ◗ Rack model	1 x 12 V -9 Ah 2 x 6 V -9 Ah	2 x 12 V -7.2 Ah 4 x 6 V -7.2 Ah	2 x 12 V -9 Ah 4 x 6 V -9 Ah	3 x 12 V -9 Ah 6 x 6 V -9 Ah
Environment ◗ Operating temperature range	0 to 35°C			0 to 40°C
◗ Storaage temperature range ◗ Humidity ◗ Noise Level	-20°C to 50°C 20 to 90% (without condensation) < 40 dbA			

(1) The high and low thresholds can be adjusted using **Personal Solution-Pac** software.
(2) Up to 40 Hz in extended frequency mode (programmable using **Personal Solution-Pac** software).
(3) Adjustable to 100 V (10% derating of output power) 120 V / 127 V.

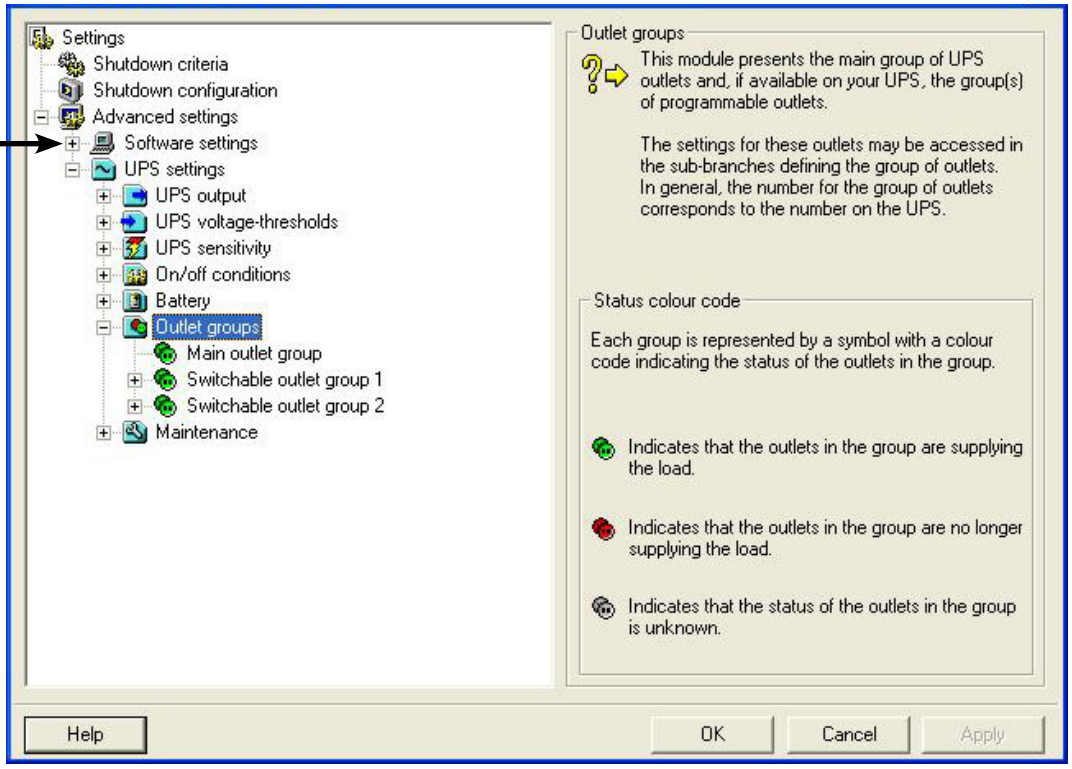
This product is designed for IT power distribution system.

6. Appendices

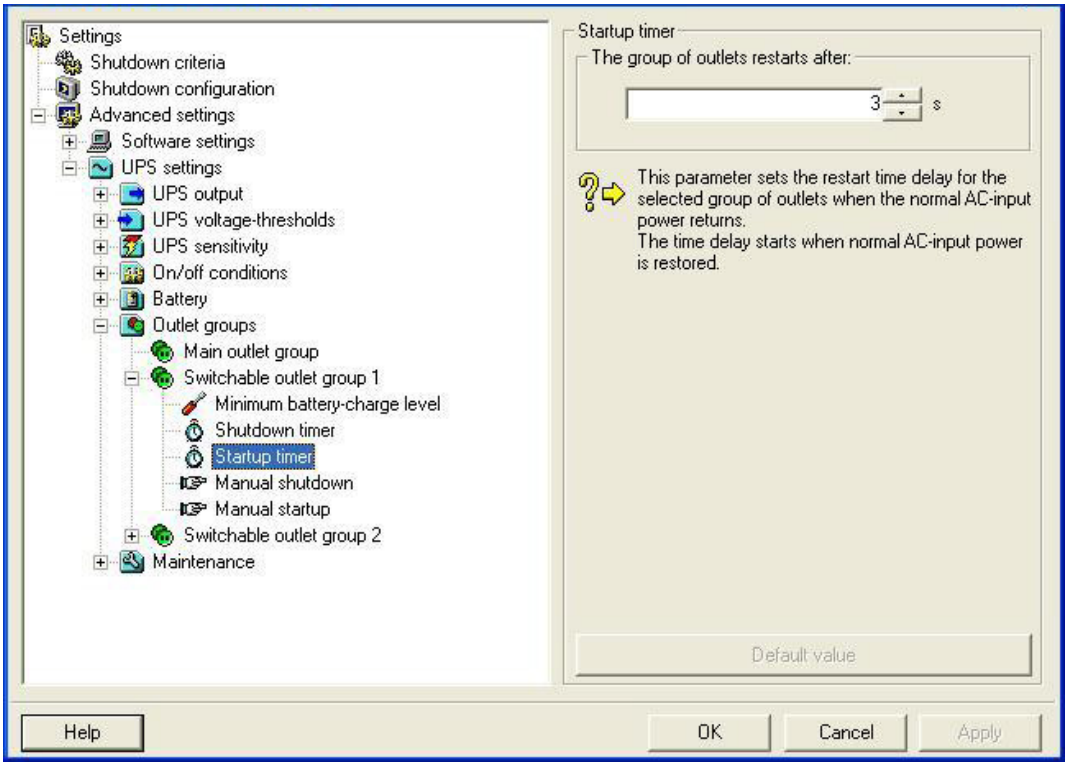
6.2 Programming the Programmable Outlets

1. To open the Setting window, left-click on Start Menu / Programs / EATON / Personal Solution Pac / Settings, or right-click on the PSP power plug located in the SYS Tray.

2. Click on the "+" symbol next to "UPS Settings" to expand the "UPS Settings" section.



3. Click on "Startup Timer" and change the "The group of outlets restarts after" to "0" to have powershare outlet provide power at the same time the as main outlets.

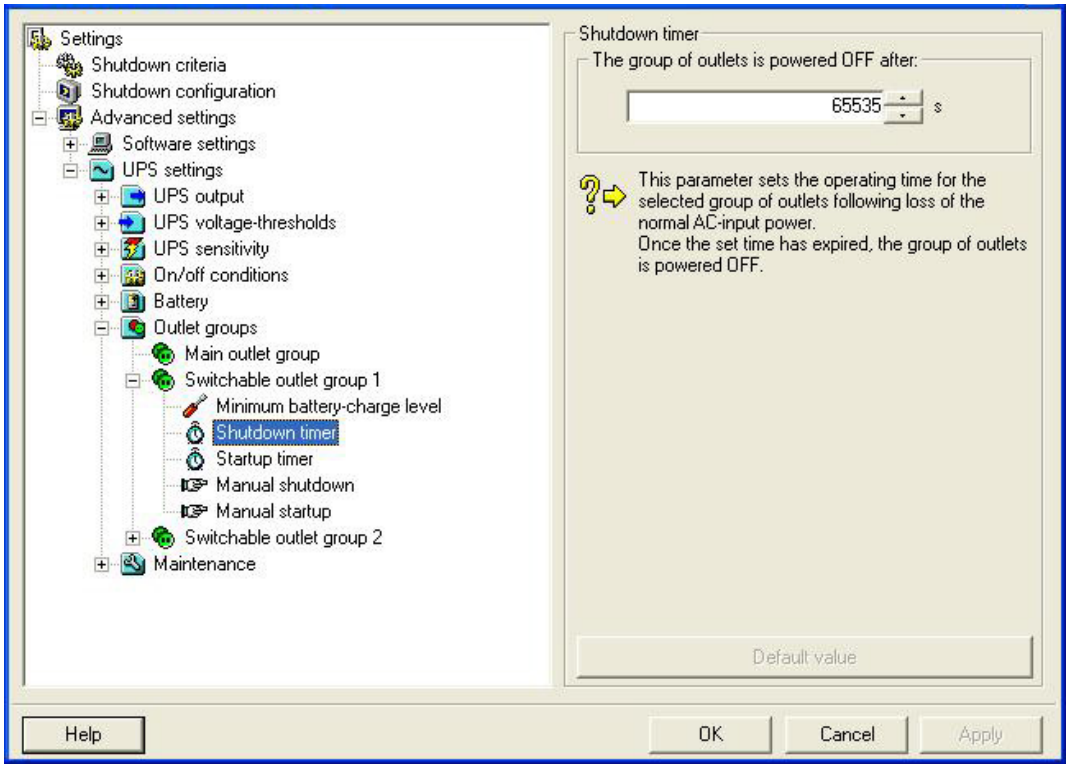


4. Repeat step 3 for each programmable outlet.

5. After making the changes,s click on the “Apply” button.

The section entitled “Shutdown timer” allows the user to define how long the powershare outlet should provide power after a power loss. To configure the powershare to power off at the same time as the main outlets:

6. Set the “The group of outlet is powered OFF after” to 65535.



6. Appendices

6.3 Glossary

Backup time	Time during which the load can be supplied by the UPS operating on battery power.
Battery test	Internal UPS test to check battery status.
Booster mode	Automatic UPS mode that steps up the AC voltage if it is too low, to a level above the personalised set-point, without discharging the battery.
Cold start	The devices connected to the UPS can be started even if AC input power is not available. The UPS operates on battery power alone.
Deep discharge	Battery discharge beyond the permissible limit, resulting in irreversible damage to the battery.
Fader mode	Automatic UPS mode that steps down the AC voltage if it is too high, to a level below the personalised set-point, without discharging the battery.
Load	Devices or equipment connected to the UPS output.
Low-battery warning	This is a battery-voltage level indicating that battery power is low and that the user must take action in light of the imminent break in the supply of power to the load.
Normal AC input	The AC-power line supplying the UPS under normal conditions.
Percent load	Ratio of the power effectively drawn by the load to the maximum output of the UPS.
Personalization	It is possible to modify certain UPS parameters set in the factory. Certain UPS functions can also be modified by the **Personal Solution-Pac** software to better suit user needs.
Programmable outlets	Controllable outlets for automatic load shedding, remote shutdown and sequential restart (personalised using **Personal Solution-Pac** software.
UPS	Uninterruptible Power Supply.
UPS ON/OFF controlled by software	This function enables or disables initiation of UPS ON/OFF control sequences by computer power management software.