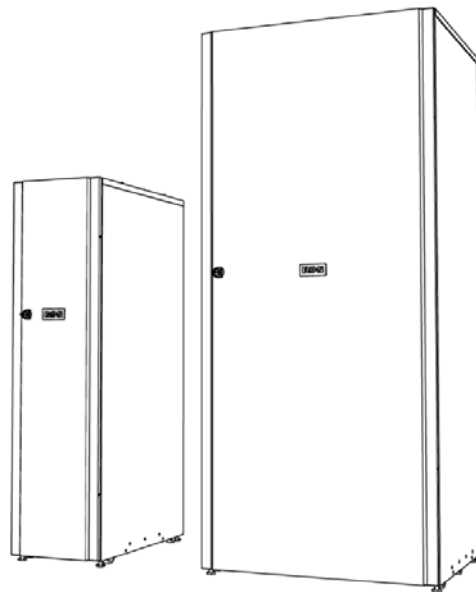


USER'S AND INSTALLATION GUIDE

Eaton Small External Battery Cabinet (EBC-S) and Large External Battery Cabinet (EBC-L)

P-164000504



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This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

This is a product for commercial and industrial application in the second environment. Installation restrictions or additional measures may be needed to prevent disturbances.

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Approvals and version history

REVISION	DATE	DESCRIPTION OF CHANGE	APPROVED BY
001	04.06.2015	First issue	Otto Asunmaa

Original instructions X / Translation of the original instructions




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1 How to read this manual

1.1 Safety-related signs

The following table explains the safety-related signs used in this document.

 DANGER	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in serious injury or death.
 WARNING	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in serious injury or death, or damage to your machine.
 CAUTION	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury, or damage to your machine.








NOTE: Notes are used to indicate important information and useful tips.

1.2 Safety symbols

1.2.1 Hazard symbols

These symbols indicate a hazardous situation or action. Symbols are used to warn of situations, which may cause environmental damage and personal injury.

	General warning symbol		Explosion and fire hazard
	Electrical hazard		Corrosive hazard
	Battery hazard		

1.2.2 Prohibited action symbols

These symbols are used to indicate an action that should not be taken.



General symbol for prohibited action



No smoking



Limited or restricted access

1.2.3 Mandatory action symbols

These symbols are used to indicate an action that must be taken.



General symbol for mandatory action



Disconnect from power source



Read the manual or instructions

1.3 Conventions used in this document

This document uses the following type conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures and menu options, or represents a command or option that you type or enter at a prompt.
- *Italic type* highlights notes and new terms when they are defined.

2 Safety instructions

DANGER



Important safety instructions!

Save these instructions!

This document contains important instructions that must be followed during the installation, operation and maintenance of the external battery cabinet and the batteries. Read all of the instructions before operating the equipment. Keep this manual for future reference.

The battery cabinet contains components that carry high currents and voltage. A properly installed enclosure is earthed and IP20 rated against electrical shock and foreign objects. However, the battery cabinet is a sophisticated power system and only qualified personnel are allowed to install and service it.

DANGER



This battery cabinet carries lethal voltages. All repairs and service must be performed by authorized personnel only. There are no user-serviceable parts inside the battery cabinet.

DANGER



Operations inside the battery cabinet must be performed by a service engineer from the manufacturer or from an agent authorized by the manufacturer.

 WARNING

To reduce the risk of fire or electric shock, install this battery cabinet in a temperature and humidity controlled, indoor environment that is free of conductive contaminants.

The ambient temperature must not exceed 40 °C (104 °F). Do not operate the battery cabinet near water or excessive humidity (95% maximum). The system is not intended for outdoor use.

Before you start any installation or service work, make sure that all AC and DC power sources are disconnected. Power may come from multiple sources. Also ensure system grounding / PE continuity.

In a parallel system, the output terminals may be energized even when the cabinet is turned off.

Batteries can present a risk of electrical shock or burn from high short-circuit current.

Electric energy hazard. Do not attempt to alter any battery wiring or connectors. Attempting to alter wiring can cause injury.

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

IMPORTANT: The battery may consist of multiple parallel strings. Make sure that you disconnect all strings before installation.

 CAUTION

Only qualified service personnel knowledgeable of batteries and the required precautions are allowed to perform installation or service work on batteries. Keep unauthorized personnel away from the batteries. Before you install or replace batteries, consider all the warnings, cautions, and notes concerning appropriate handling. Do not disconnect the batteries when the UPS is in the Battery mode.

Make sure that your replacement batteries are of the same number and type as the battery that was originally installed.

Before you connect or disconnect battery terminals, disconnect the charging source by opening the corresponding battery circuit breaker.

Check if the battery is inadvertently grounded. If it is, remove the source of the ground. Contacting any part of a grounded battery can cause a risk of electric shock. If you disconnect the grounding connection before you work on the batteries, the risk of an electric shock is less likely.

Dispose of batteries according to your local disposal requirements.

Do not dispose of batteries in a fire. When exposed to flame, batteries may explode.

To ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit, keep the cabinet door closed and the front panels installed.

Do not install or operate the UPS system close to gas or electric heat sources.

Keep the operating environment within the parameters stated in this document.

Keep the surroundings of the battery cabinet uncluttered, clean, and free from excess moisture.

Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.

2.1 Audience

The intended audience of this document is as follows:

- People who plan and perform the installation of the UPS system
- People who use the UPS system

This document provides guidelines for how to check the external battery cabinet delivery and how to install and operate the cabinet.

The reader is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols. This document is written for a global reader.

⚠ CAUTION



Read this document before you start to operate or perform work on the UPS system.

2.2 CE marking

The product has a CE marking in compliance with the following European directives:

- LV Directive (Safety) 2006/95/EC

Declarations of conformity with UPS harmonized standards and directives EN 62040-1 (Safety) is available at www.eaton.eu or by contacting your nearest Eaton office or authorized partner.

2.3 User precautions

The only permitted user operation is to turn the battery circuit breaker on or off.

Follow the precautions and only perform the described operations. Any deviation from the instructions can be dangerous to the user or cause accidental load loss.

⚠ DANGER



Do not open any screws in the unit. Failure to recognize the electrical hazards can prove fatal.

2.4 Environment

The external battery cabinet must be installed and operated according to the recommendations in this document. Never install the battery cabinet in an airtight room, in the presence of flammable gases, or in an environment exceeding the specifications.

Excessive amount of dust in the operating environment of the battery cabinet may cause damage or lead to malfunction. Always protect the battery cabinet from the outside weather and sunshine. In order to maximize internal battery service life time, the recommended operating temperature range is from +20 °C to +25 °C.

⚠ WARNING



During charge, float charge, heavy discharge, and overcharge, hydrogen and oxygen gases are emitted from lead-acid and NiCd batteries into the surrounding atmosphere. Explosive gas mixture may be created if the hydrogen concentration exceeds 4% by volume in air. Ensure the necessary air flow rate for the ventilation of the battery cabinet location.

Ensure adequate air ventilation to locations where batteries or battery cabinets are. For the EBC-S, the minimum ventilation air flow is 6.2 m³/hour and the minimum free area of opening for inlet and outlet is 174 cm² when natural ventilation is used. For the EBC-L, the minimum air flow is 3.8 m³/hour and the minimum free area of opening for inlet and outlet is 108 cm² when natural ventilation is used.

2.5 Symbols on the UPS and accessories

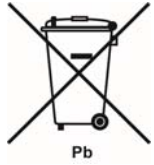
The following are examples of symbols used on the UPS or its accessories. The symbols are used to alert you of important information.



RISK OF ELECTRIC SHOCK
Indicates that a risk of electric shock is present and the associated warning should be observed.



CAUTION: REFER TO OPERATOR'S MANUAL
Refer to your operator's manual for additional information, such as important operating and maintenance instructions.



This symbol indicates that you may not discard the UPS or the UPS batteries in the trash. This product involves sealed, lead-acid batteries and they must be disposed of properly. For more information, contact your local recycling / reuse or hazardous waste center.



This symbol indicates that you must not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling / reuse or hazardous waste center.

2.6 For more information

Address any inquiries about the UPS and the battery cabinet to the local office or an agent authorized by the manufacturer. Quote the type code and the serial number of the equipment.

Call your local service representative if you need help with any of the following:

- scheduling initial startup
- regional locations and telephone numbers
- a question about any of the information in this manual
- a question that this manual does not answer

3 Installation

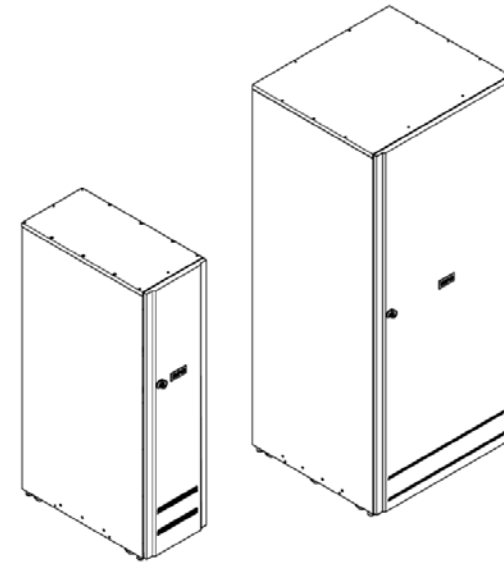


Figure 1. The small and the large external battery cabinet

The Eaton external battery cabinets provide emergency short-term backup power to safeguard operation during brownouts, blackouts, and other power interruptions. They match and line with the Eaton 93PS product line. There are two different battery cabinets: the small external battery cabinet, EBC-S and the large external battery cabinet, EBC-L.

The EBC-S is designed to be used with the uninterruptible power supply (UPS) rated up to 20kW output power and the EBC-L with up to 40kW output power. The maximum length of a battery string for both cabinets is 32 blocks per string. The maximum number of parallel strings in EBC-S is three. In EBC-L, it is possible to install one string.

The external battery cabinets are housed in single free-standing cabinets with safety shields behind the door for protection against hazardous voltage. Power and control wiring for EBC-S and EBC-L are supplied with

the cabinets. The battery cabinet can be located freely of the UPS cabinet. All the wiring goes through the back wall of the UPS cabinet.

By default, UPSs are configured to use valve-regulated lead-acid (VRLA) batteries. For the battery specification, see UPS User's and Installation Guide. Should there be a need to connect other type of batteries or other energy storage means, consult a certified and authorized service technician prior to proceeding with installation.

The battery block configuration in the chosen battery cabinet must always match the UPS requirement. Used battery configuration must be inserted into UPS settings during commissioning or start-up. Refer to UPS installation and operation manual for UPS configuration.

Battery cabinet internal power wiring, Battery-to-UPS power wiring and control wiring for integral line-up and match battery cabinets are supplied with both the small and large external battery cabinets.

There is one cable entry in the top-right corner of the back wall of the battery cabinet.

For more information on connecting external battery cabinets to UPS, refer to 93PS UPS 8-40 kW User's and Installation Guide.

3.1 Installation checklist

ACTION	YES/NO
All packing materials and restraints are removed from each cabinet.	
Each cabinet in the UPS system is placed in its installed location.	
A cabinet grounding kit / mounting kit is installed between any cabinets that are bolted together.	
All conduits and cables are properly routed to the UPS and any ancillary cabinets.	
All power cables are properly sized and terminated.	
Neutral conductors are installed according to the requirements.	
A ground conductor is properly installed.	
Battery cables are terminated and connected to battery connectors.	
Battery Shunt trip and Aux contact signal wiring is connected from the UPS to the battery breaker.	
Room ventilation and air conditioning equipment is installed and operating correctly.	
The area around the installed UPS system is clean and dust-free (it is	

ACTION	YES/NO
recommended that the UPS is installed on a level floor suitable for computer or electronic equipment).	
There is adequate workspace around the UPS and other cabinets.	
Adequate lighting is provided around all the UPS equipment.	
A 230 VAC service outlet is located within 7.5 meters of the UPS equipment.	
(OPTIONAL) Alarm relays and signal outputs are wired appropriately.	
(OPTIONAL) A remote battery disconnect control is mounted in its installed location and its wiring is terminated inside the UPS and battery cabinet.	
(OPTIONAL) Accessories are mounted in their installed locations and their wiring is terminated inside the UPS cabinet.	
Start-up and operational checks are performed by an authorized Eaton Customer Service Engineer.	

3.2 Installation considerations

The battery cabinet installation must meet the following guidelines.

- Install the system on a level floor suitable for computer or electronic equipment.
- Install the system in a temperature and humidity controlled indoor area free of conductive contaminants.

The battery cabinet dimensions are shown in Figure 2.

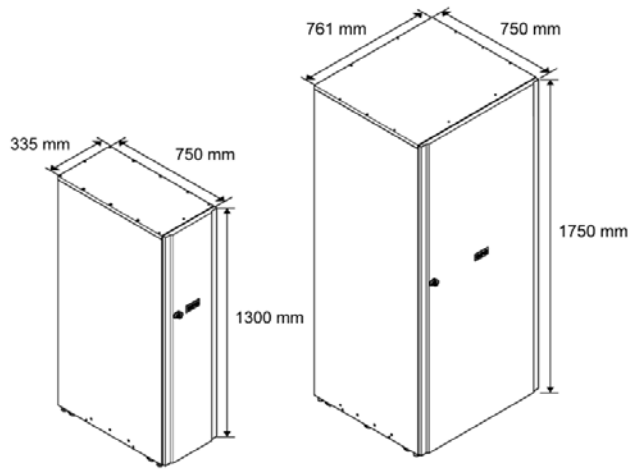


Figure 2. EBC-S and EBC-L dimensions

A DC-rated circuit breaker within each cabinet provides protection and service isolation.

The battery cabinets use convection cooling to regulate internal component temperature. Air inlets are at the bottom of the door and in the large battery cabinet also at the bottom of the back wall and outlets are on the rear of the cabinet. Allow clearance in front and rear of each cabinet for proper air circulation.

The clearance required around the battery cabinet is shown in Table 1.

Table 1. Battery cabinet minimum clearances

	EBC-S	EBC-L
From the top of the cabinet	0 mm	0 mm
From the front of the cabinet	500 mm	800 mm
From the back of the cabinet	150 mm	250 mm
From the side of the cabinet	0 mm	0 mm

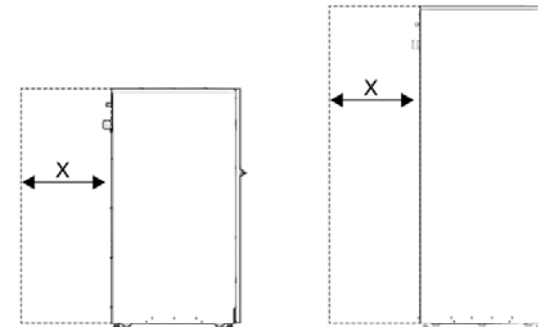


Figure 3. Battery cabinet clearances. See Table 1.

- X = clearance at the back of the EBC-S and EBC-L

The following molded case circuit breakers (MCCB's) are used in the external battery cabinets:

	TYPE	ARTICLE NO
With EBC-S	NZM1-A100	259085
With EBC-L	NZM1-A160	281234

The following 24V shunt-release with early-make auxiliary contact is used with the above circuit breakers:

TYPE	ARTICLE NO
NZM1-XAHIVL24AC/DC	259792

3.3 Unpacking and unloading the EBC

⚠ WARNING

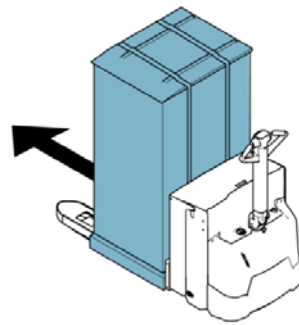


The external battery cabinet is heavy. If the unpacking instructions are not closely followed, the cabinet may tip over and cause serious injury.

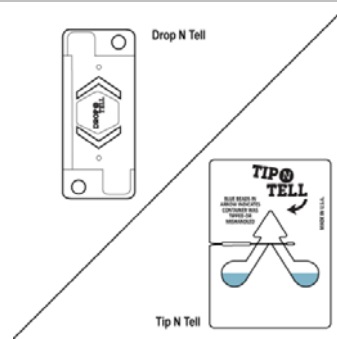
Do not tilt the cabinet more than 10 degrees from the vertical or the cabinet may tip over.

For transportation purposes, the battery cabinet is bolted onto a wooden pallet. To remove the pallet, perform the following procedure:

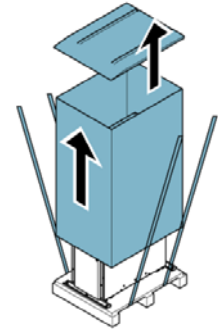
1. Before you unload the cabinet from the pallet, use a forklift or other material handling equipment to move the cabinet to the installation area. Insert the forks of the forklift between the skids on the bottom of the unit.



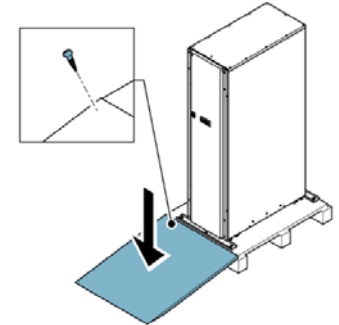
2. Make a visual inspection and check that there are no signs of shipping damages. Check the indicators. See the instructions next to the indicators on the package.



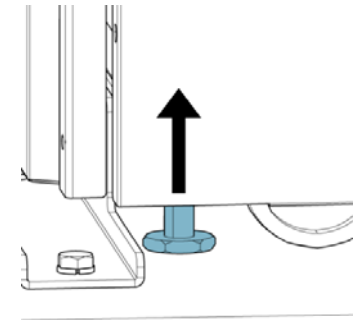
3. Open the package. The roof of the package is used as a ramp for moving the cabinet off the pallet.



4. Place the ramp on the floor and attach it to the pallet with nails or screws so that it can be safely used for wheeling the cabinet off the pallet.

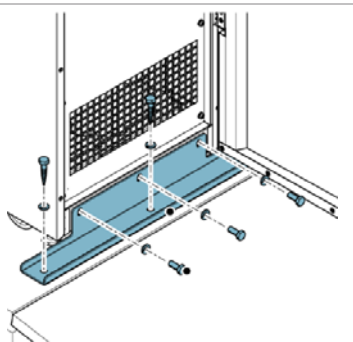


5. If the leveling feet are not fully retracted, turn them until they are retracted.

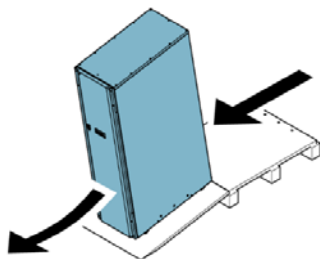


6. Open the cabinet door.

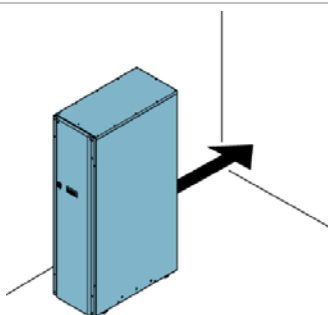
- 7. Remove the bolts that fasten the shipping brackets to the UPS cabinet and to the pallet.
- 8. Remove the shipping brackets.



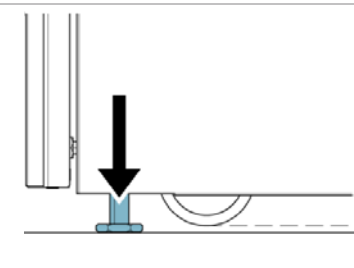
- 9. Slowly roll the cabinet toward the ramp edge. Be careful not to push the cabinet too much or too fast since it may cause the cabinet to tip over. Note that the cabinet is heavy. Make sure that you have enough manpower to handle and support the unit while rolling it off the pallet.



- 10. Roll the cabinet to its final installation location.



- 11. To secure the cabinet in position, lower the leveling feet until the cabinet is not resting on the casters and the cabinet is level.



NOTE: If you remove the cabinet from its original installation location and transfer it to a new location on a pallet, lower the leveling feet until the cabinet is not resting on the casters. In addition, attach the shipping brackets to the cabinet and the pallet.

3.4 Installing the EBC

DANGER



Do not connect battery strings with different battery quantity and voltage in parallel.

Make sure that the UPS with internal batteries uses 32 battery blocks per string. External battery strings must also contain 32 battery blocks per string.

WARNING



Make sure that all power sources are disconnected before installation.

CAUTION



Always use double insulated cables, because the cables are routed outside the cabinets. If you need to use other cables than the ones provided with the cabinet, make sure that their temperature class and the cross-sectional area match those of the original cables.

See Figure 4 for terminals and Figure 5 for power cable and battery

shunt trip cable terminations.

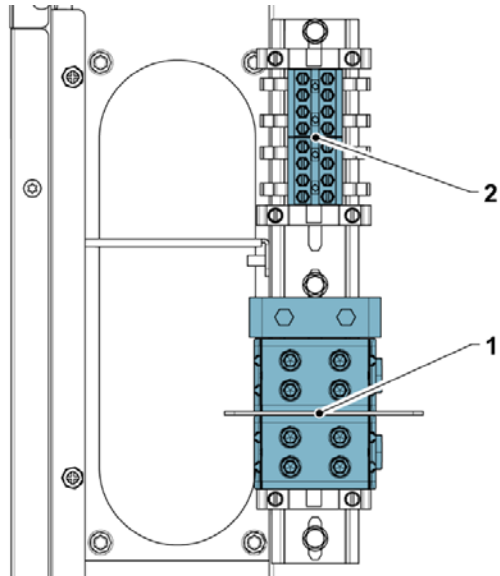


Figure 4. TB1 and TB2 terminals

- 1. Terminal TB1
- 2. Terminal TB2

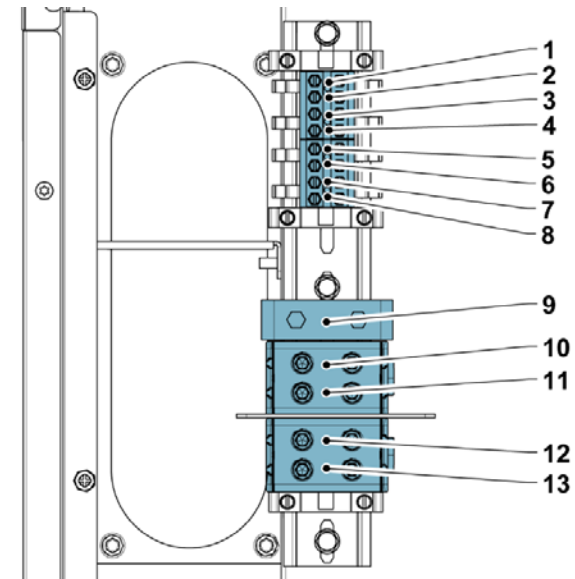


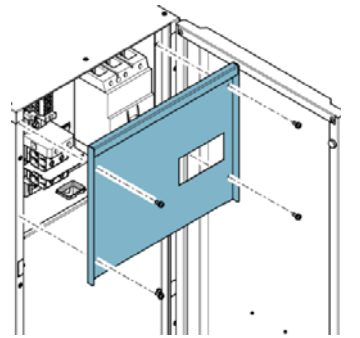
Figure 5. EBC power cable and battery shunt trip cable terminations

- | | |
|---|---|
| 1. +24V, battery shunt trip cable from UPS | 6. TRIP, battery shunt trip cable from another EBC if daisy-chained |
| 2. TRIP, battery shunt trip cable from UPS | 7. DET, from another EBC if daisy-chained |
| 3. DET, battery shunt trip cable from UPS | 8. GND, from another EBC if daisy-chained |
| 4. GND, battery shunt trip cable from UPS | 9. PE |
| 5. +24V, battery shunt trip cable from another EBC if daisy-chained | 10. Power cable + |
| | 11. Power cable + |
| | 12. Power cable - |
| | 13. Power cable - |

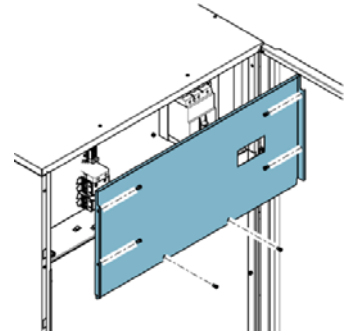
To connect the power cables and signal wires to the external battery cabinet:

- 1. Open the cabinet door.

- Open the screws and remove the front panel.

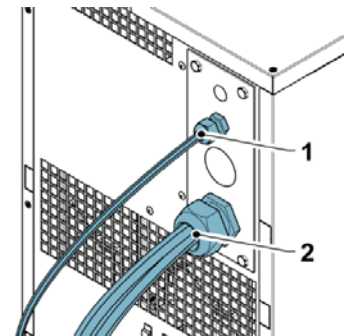


EBC-S



EBC-L

- Route the signal wires (1) and power cables (2) through the gland plate.



- Connect the signal wires and the power cables to the connectors according to Figure 5.

- Put the front plate back and fasten the screws.

If multiple cabinets are used, repeat the steps for the rest of the cabinets and make sure that the signal wire harnesses are daisy chained in the next cabinet.

To daisy chain signal wires, cut the multiple connector and extra length of the cables and connect the cables to TB2 terminals.

3.5 Installation compatibility of the EBCs

EBC-S and EBC-L are fully compatible with the Eaton 93PS UPS product line. Other UPSs may not be fully compatible with the external battery cabinets. Refer to the UPS for the requirements for the external battery supply.

3.6 Operation

To set the cabinet on or off, open the cabinet door and flip the power switch down or up. See Figure 6 for the power switch.

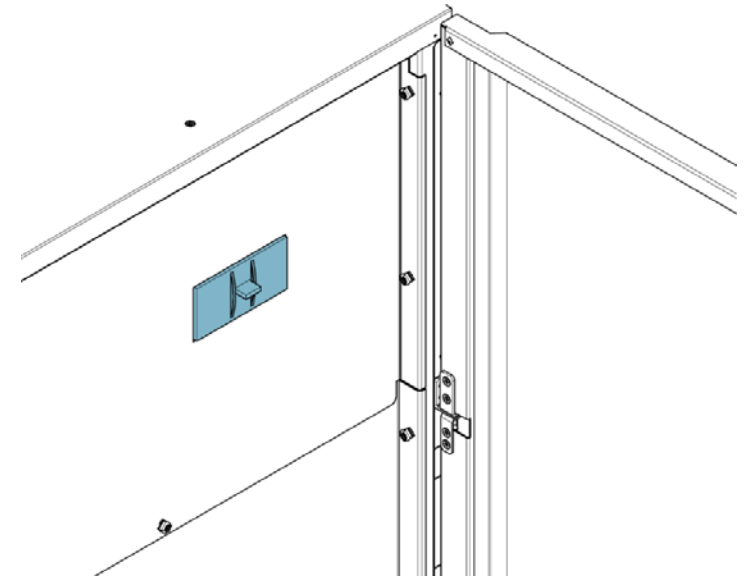


Figure 6. The power switch

4 Maintenance

The components inside the cabinet are secured to a sturdy metal frame. All repairable parts and assemblies are located for easy removal with very little disassembly. This design allows authorized service personnel to perform routine maintenance and servicing quickly. Schedule periodic performance checks of your UPS system to keep it running properly. Regular routine checks of the operation and system parameters enable your system to function efficiently for many trouble-free years.

4.1 Important safety instructions

Remember that your UPS system is designed to supply power **EVEN WHEN IT IS DISCONNECTED FROM THE UTILITY POWER**. The UPS module interiors are unsafe until the DC power source is disconnected and the electrolytic capacitors are discharged.

After disconnecting the utility power and the DC power, authorized service personnel must wait at least 5 minutes for capacitor bleed-off before attempting internal access to the UPS module.

DANGER



LETHAL VOLTAGE. Do not operate the UPS system without the cabinet doors or protective panels secured. Do not make any assumptions about the electrical state of any cabinet in the UPS system.

WARNING



All service and maintenance work must be performed only by service personnel qualified and authorized by Eaton.

Since each battery string is an energy source in itself, opening the battery circuit breaker does not de-energize the voltage within the battery string.

DANGER



Do not attempt to access any internal area of the battery string yourself. Voltages are always present in the battery strings. If you suspect that a battery string needs service, contact your service representative.

Observe these precautions when working on or around batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Prior to connecting or disconnecting terminal, disconnect the charging source.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contact with any part of a grounded battery can result in an electrical shock. The likelihood of such a shock is reduced if such grounds are removed during installation and maintenance.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Dispose of batteries according to your local codes for disposal requirements.

4.2 Performing preventive maintenance

The battery cabinets require very little preventive maintenance. However, inspect the system periodically to verify that the units are operating normally and that the batteries are in good condition.

4.2.1 Periodic maintenance

Inspect the UPS periodically to determine if components, wiring, and connections exhibit evidence of overheating. Pay particular attention to bolted connections.

4.2.2 Annual maintenance

 CAUTION



Only authorized personnel that are familiar with the maintenance and servicing of the UPS system are allowed to perform annual preventive maintenance. Contact your service representative for more information about service offerings.

4.2.3 Battery maintenance

 WARNING



Only authorized personnel are allowed to perform battery replacement and maintenance. Contact your service representative for battery maintenance.

4.3 Recycling the used UPS or batteries

Remove the battery bank before disposing of the UPS or its battery cabinet. Follow the local requirements regarding battery recycling or disposal.

 WARNING



Only authorized personnel are allowed to remove the batteries due to the risk caused by high energy and voltage.

Do not discard waste electrical or electronic equipment in the trash. For proper disposal, contact your local collecting/recycling/reuse or hazardous waste center and follow the local legislation.

The following symbols indicate a product requiring special handling:



Figure 7. WEEE symbol



Figure 8. Recycling batteries symbol

When handling waste from electrical and electronic equipment, use proper local collecting centers that meet local legislation.

⚠ WARNING

HAZARDOUS MATERIALS.

Batteries may contain high voltages and caustic, toxic and flammable substances. If used improperly, batteries can injure or kill people and damage equipment.

Do not discard of unwanted batteries or battery material in the public waste disposal system. Follow all the applicable local regulations regarding the storage, handling and disposal of batteries and battery materials.



4.4 Maintenance training

For more information about training and other services, contact your Eaton representative.

5 Technical data

For a complete technical specification, contact your Eaton representative. Due to continuous product improvement programs, specifications are subject to change without notice.

5.1 Standards

Safety	IEC 62040-1: Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS IEC 60950-1: Information technology equipment - Safety - Part 1: General requirements (as referred through the IEC 62040-1)
Performance & tests	IEC 62040-3: Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements
Environmental	IEC62040-4: Uninterruptible Power Systems (UPS) - Part 4: Environmental Aspects - Requirements and Reporting IEC 62430: Environmentally conscious design for electrical and electronic products
RoHS	2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
WEEE	2012/19/EU on waste electrical and electronic equipment (WEEE)
ECO Design Directive	2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products
Batteries	2006/66/EC on batteries and accumulators and waste batteries and accumulators
Packaging	94/62/EC on packaging and packaging waste

5.2 Battery specification

Battery type	VRLA, 12 VDC
Battery quantity	32 blocks, 192 cells per battery string Note! Do not connect battery strings with different battery quantity and voltage in parallel!
Battery voltage	384 V (32 blocks)

5.3 Environmental specifications

Recommended storage temperature range	From -25 °C to +25 °C in the protective package
Ambient operating temperature range	From 0 °C to +40 °C
Recommended operating temperature range	From +20 °C to +25 °C
Relative humidity range	5 to 95%, no condensation allowed

6 Warranty

6.1 General

The product is warranted against defects in materials and workmanship for a period of twelve (12) months from its original date of purchase. The local office or distributor may grant a warranty period different to the above. Please refer to local terms of liability as defined in the supply contract.

The UPS manufacturer is not responsible for:

- Any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the equipment do not fulfill the requirements specified in the documentation delivered with the unit and other relevant documentation.
- Equipment subjected to misuse, negligence or accident.
- Equipment comprised of materials provided or designs stipulated by the purchaser.

The warranty is only valid if the installation inspection and initial startup of the UPS unit is carried out by a service engineer approved by Eaton. Service and maintenance of the UPS shall also be performed only by a service engineer approved by Eaton. Otherwise the warranty will be voided.

If the product fails to meet its published specifications due to a defect in material and workmanship, covered by this warranty, the seller will repair or replace the warranted product. Such repair or replacement will be made by Eaton or by a service provider approved by Eaton. Repair or replacement during the warranty period does not extend the original warranty. Warranty does not cover taxes, which will be due in connection with replacement or repair of the product.

Batteries are warranted against failures in material and workmanship, not against the normal aging and reduction of ampere-hour capacity. The product storage environment has to meet manufacturer's specifications, failure to do this will cause the warranty to be voided.

Under no circumstances shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

The technical data, information and specifications are valid at the time of printing. The UPS manufacturer reserves the right to modifications without prior notice.

6.2 Whom to contact in case of Warranty

In case of Warranty, or while unsure if the unit in question is covered by warranty, contact the respective sales organization where the unit was purchased. Have the following information available:

- Purchase order number and purchase order date
- Installation date
- OR
- Serial number and part number of the unit (information available on the unit's label)



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