



by Schneider Electric

# Symmetra PX 250/500 kW and Symmetra MW Third-Party Battery Cabinet

## Installation





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# Safety

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## IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS

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



**WARNING:** When not provided with the shunt trip option; The final installation must include a suitably rated disconnect switch between the battery and the load. The disconnect switch must be rated in accordance to local electrical codes and the rating of the battery cabinet.



**WARNING:** Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.



**WARNING:** When replacing batteries, replace with the same number and type.



**WARNING:** DO NOT dispose of battery or batteries in a fire. The battery may explode.



**WARNING:** DO NOT open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.



**WARNING:** A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on 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. Disconnect charging source prior to connection or disconnecting battery terminals.



**WARNING:** VRLA batteries can contain an explosive mixture of hydrogen gas. The following procedures should be followed: DO NOT SMOKE when near batteries. DO NOT cause flame or spark in battery area. Discharge static electricity from body before touching batteries. DO NOT open or mutilate batteries. DO NOT dispose of battery in a fire-the battery may explode.



**WARNING:** Do not dispose of lead acid batteries except through approved channels in accordance with local codes and regulations.



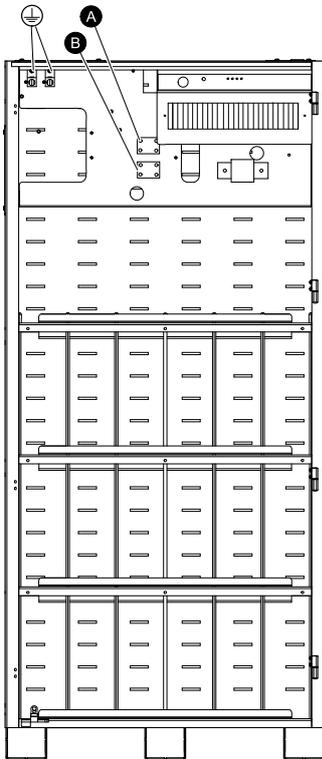
**WARNING: The battery system contains valve regulated recombinant lead acid batteries. Do not attempt to add water to these batteries or sample electrolyte specific gravity.**



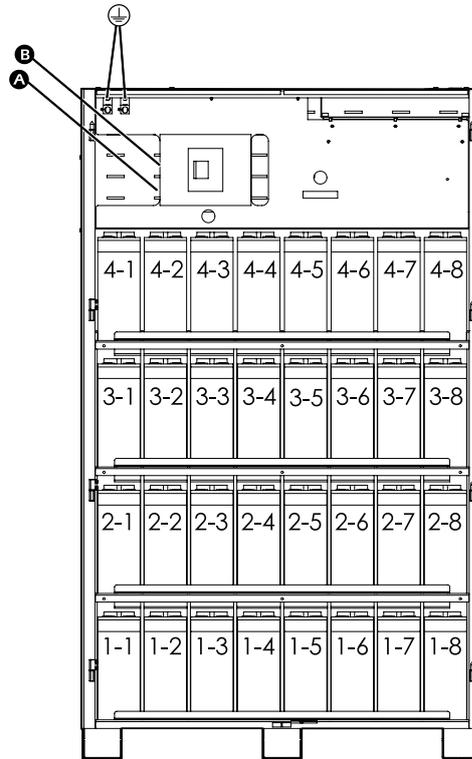
**WARNING: Handling hazards and personal safety: Cabinets weigh from 500 to 2050 kg (1100 to 4500 lbs). Use care in selection of method and type of handling equipment. Fully extend forks under load. Spread forks to maximum possible width under load. Wear safety shoes.**

# System Overview

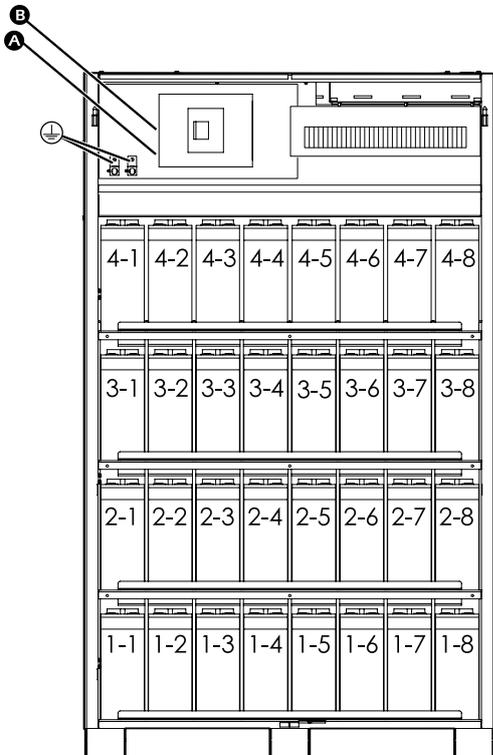
Symmetra PX



Symmetra MW Premium



Symmetra MW Value



- A. Battery Cabinet Negative
- B. Battery Cabinet Positive

# Prepare the Installation

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The battery cabinet system installation is a straightforward process, but does include an important planning step. The planning should include:

1. Assure the battery cabinet system can be off loaded from the delivery truck at the site and can be transported within the site to the installation location. Consider both the packaged weight and dimensions.
2. Assure the floor is rated for loads as presented by the specific cabinet being installed.
3. Draw a wiring schematic representing the cables connected between the cabinet battery system(s) output terminal blocks and any external disconnect switch, junction box, or the critical load/rectifier.
4. If the battery cabinet system is to be placed in storage prior to or following installation, dedicate a cool area for this purpose and provide for charging at six (6) months intervals.

## Move to Installation Site

To prevent damage to the cabinet during handling, do not remove the stretch wrap around the cabinet until the cabinet is in the battery room.

Assure that you have appropriate handling equipment; the load limits for any elevator for use and floors along the route are not exceeded; and that the packaged unit will pass through any doorways along the intended route.

Remove the plastic stretch wrap from the cabinet system once in the area of installation.

## Inspect the Battery System

While the assembled battery system is still on the pallet, inspect all sides for impact or other damage.

1. Remove the front panels and set aside being careful not to scratch the finish.
2. Ensure that all batteries are secure in the cabinet.
3. Ensure that no batteries have been damaged.
4. Ensure that none of the internal parts such as terminal blocks, fuse blocks, fuses, circuit breakers or other parts have been damaged.

## Place the Cabinet

A cool location with free airflow and away from direct heat sources should be selected for the cabinet location. The life of a battery can be dramatically affected by elevated temperature, and life is reduced by 50% for each 8° C above 25° C (each 15° F above 77° F).

1. Prepare the surface on which the cabinet is to be placed. Assure the surface is clean, flat, and capable of supporting the weight of the battery cabinet system.
2. Lay out the area allowing adequate clearance from other equipment and walls so that the internal batteries will be accessible for maintenance. The front panel should be accessible for removal to allow easy access to internal fuses and other over current protection devices.
3. If the cabinet is to be anchored to the floor, install the appropriate anchor bolts located per the drawing detailing the cabinet mounting hole location. Washers supplied by the installation

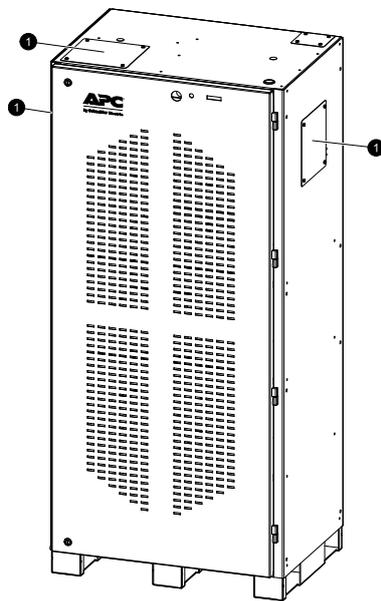
contractor are to be used to create a level surface between the four mounting areas around the anchor bolts.

4. The forks should be at maximum width within the cabinet clearance opening and fully inserted to prevent tipping. Be careful not to damage the sheet metal floor of the cabinet with the forks.
5. If the cabinet is to be secured to the floor, carefully align and lower the cabinet system down on the floor anchor bolts and secure it in place.
6. If the cabinet is not being secured to the floor, lower it into the designated space and then level it using shims (not included).

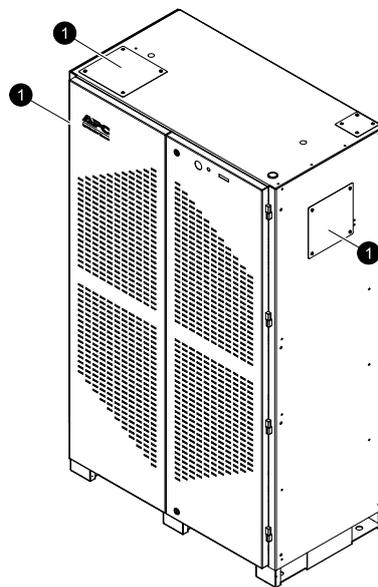
Leveling does not affect the performance but does align the cabinet battery system vertically with other equipment in the facility.

## Prepare for Cables

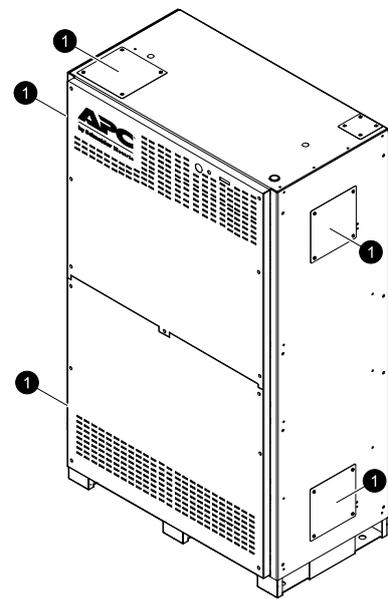
Symmetra PX



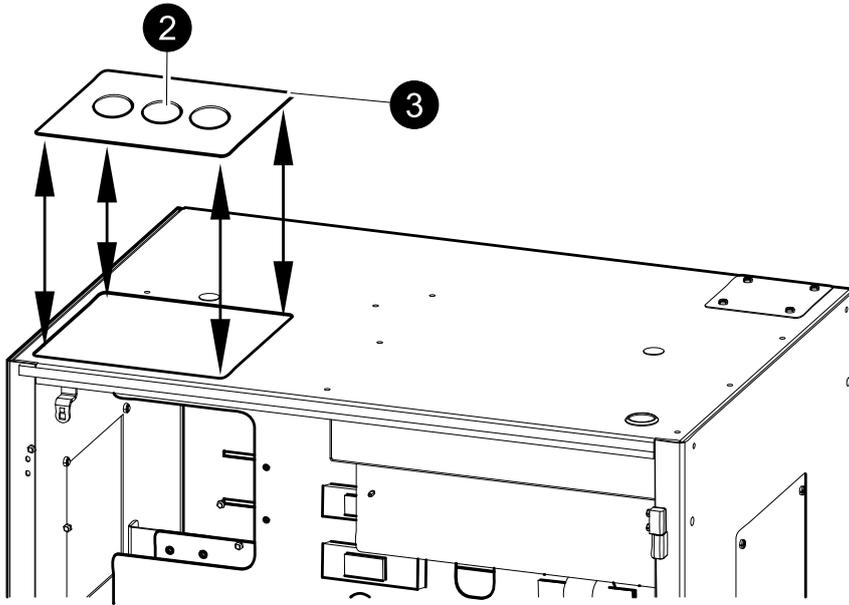
Symmetra MW Premium



Symmetra MW Value



1. Loosen the screws and remove the relevant cover plate.
2. Drill/punch holes for the cables or conduits.



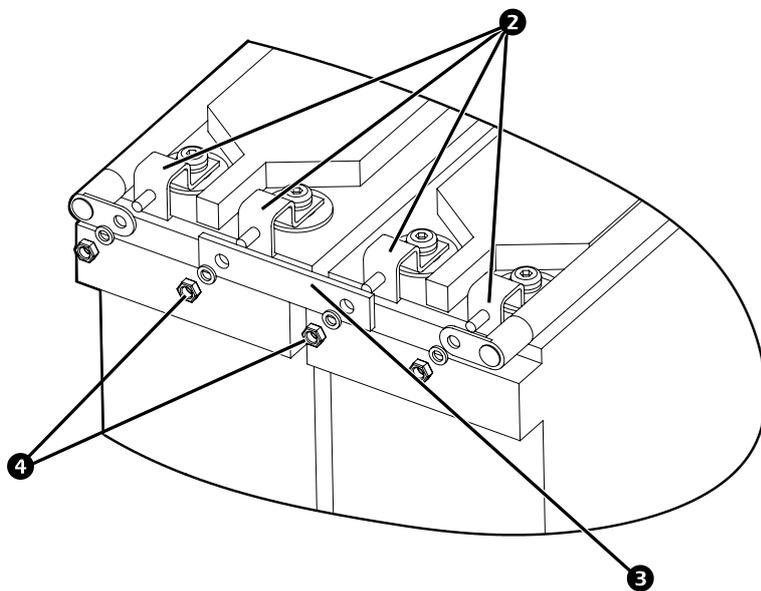
3. Reinstall the cover with conduit connectors installed (if applicable).

# Interconnect the Batteries

Before interconnecting the batteries, the voltage must be measured following the manufacturer's commissioning charge procedure.

Measure the voltage of the batteries. Depending on the voltage of the batteries, the batteries might need a charge with a higher voltage initially. See below table for charging times in relation to OCV:

OCV	Charge
> 12,8 V	Overnight charge at float voltage
12.6 – 12.8 V	3 days of charging
12.3 – 12.6	24 hours of charging at 14.4 V
12.1 – 12.3	72 hours of charging at 14.4 V



1. Start from the bottom and place the batteries on the shelves — six on each shelf for Symmetra PX and eight on each shelf for Symmetra MW.
2. On top of each battery, place the plastic bracket and secure the two studs to the positive and negative terminals. Torque to 50 in-lb.
3. Place the copper brackets over the studs from the positive side on one battery to the negative side on the next battery.
4. Secure with the M6 fasteners and torque to 50 in-lb.

## Measure Output Voltage

The measured voltage should be between 13.5 and 13.74 VDC. Units outside this range should be monitored and if voltage does not normalize, consult the manufacturer for recommended action.

Measure the battery cabinet system output voltage at the load output connection points. The measured voltage should be approximately that as noted on the cabinet nameplate and equal to the number of installed individual batteries in series multiplied the per unit voltage.

If the measured voltage is significantly different than anticipated, determine the cause (e.g. low state of charge, shorted cell, reverse battery, wiring, etc.) and correct.

# Electrical Connection

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## Wiring Principle

A battery cabinet system must be connected to the load through a DC disconnect switch or a DC circuit breaker. This allows the battery to be disconnected from the load and charger for maintenance and/or repair.

The DC rated molded-case disconnect switches are UL LISTED for branch circuit protection. These components have been selected for each specific application and if replacement is required, UL LISTED components with the same voltage and current rating must be used.

The size of the load connecting cables must consider maximum allowable voltage drop as well as the cables continuous ampacity and anticipated ampere discharge rate of the individual cabinet battery system. A maximum voltage drop of 1.5 VDC in the load connection cables is recommended.

Refer to local and state codes and the NEC code for appropriate cable size and ratings.



**Note:** The output terminal blocks, fuse blocks, disconnect switches, and circuit breakers will accommodate up to 500 MCM cables.

External circuit protection devices (fuses or circuit breakers) must consider the discharge rate of the battery, wiring to be protected, and battery DC short circuit current.

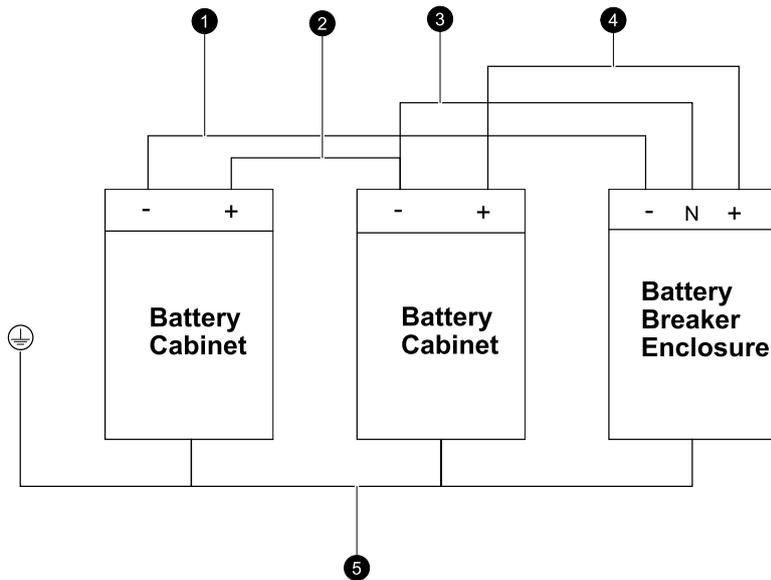
When the battery cabinet systems are connected in parallel, they must be joined together utilizing separate output cables of equal total length at a junction box or other suitable distribution panel.

Before connecting the battery cables ensure that:

- The battery has not been inadvertently grounded by measuring the voltage between the cabinet grounding lug and the positive load connection point within the cabinet. This voltage should measure zero (0) volts DC. If the measured voltage is greater than zero, determine the cause and correct before proceeding.
- The internal disconnect switch is placed in an open position during the connection of the output cables to prevent damage should cables be accidentally shorted.

# Connect Battery Cables

The battery system consists of a minimum of two battery cabinets — a positive and a negative string.



All battery connection instructions in the UPS installation manual must be followed precisely. The most current revision of the UPS installation manual should be obtained and studied prior to connecting any battery system to the UPS. In general, the procedures described below will be used for connecting either the Symmetra PX 250/500 kW or the Symmetra MW to the battery cabinet.

If a non-standard configuration is being installed, installation drawings and instructions provided by APC Custom Engineering Group (CEG) must be followed precisely. If there are any questions about the custom installation, contact APC CEG.

1. Connect a battery cable from the negative terminal in the first battery cabinet to the negative connection in the Battery Breaker Enclosure.
2. Connect a battery cable from the positive terminal in the first battery cabinet to the negative terminal in the second battery cabinet. This creates a neutral point.
3. Connect a battery cable from the negative terminal in the second battery cabinet to the neutral connection in the Battery Breaker Enclosure.
4. Connect a battery cable from the positive terminal in the second battery cabinet to the positive connection in the Battery Breaker Enclosure.
5. Make a serial connection of ground to all enclosures.

## Final Electrical Checkout

Prior to closing any connecting circuit breaker or disconnect switch:

1. Verify the cabinet output voltage is correct.
2. If the cabinet systems are to be operated in parallel, verify that each individual system output voltage is within 2.0 VDC of each other.
3. Verify that zero voltage is measured between each output terminal and the cabinet ground.
4. Should any of the above checks disclose an irregularity, determine and correct the cause.

# Maintenance

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## Periodic Maintenance

The battery cabinet system contains Valve Regulated Recombinant Lead Acid Batteries which are maintenance free with regards to the electrolyte.

However, it is necessary to periodically check the charging voltage, temperature, and connections of each individual unit.



**Note:** It is recommended that maintenance practices follow IEEE 1188.

## Maintenance Schedule

- A. Quarterly Checks
  - i. Battery temperature at the negative terminal of selected pilot batteries
  - ii. Individual battery float charging voltages
  - iii. Cabinet system float charging voltage
- B. Semi-annual Checks
  - i. Repeat quarterly checks
  - ii. Optionally perform a impedance or conductance check of individual batteries
  - iii. Optionally perform a high rate, 100 Amp, 10 second load test of individual batteries
- C. Annually
  - i. Repeat Semi-annual checks
  - ii. Torque all connections to appropriate values
  - iii. Optionally perform inter battery connection resistance checks

## Check the voltage spread

Before connecting the batteries in series the voltage variation must be checked. If the voltage varies more than 0.15 V, the batteries should be charged individually before being connected in series.

Alternatively the batteries can be matched in each string so all batteries spread less than 0.15 V.

## Float voltage check

The float charging voltage must be 13.62 per battery provided that the temperature will be close to 25° C (20–30° C). For other temperatures, refer to the table below:

Temperature	U (float)	SYPBV250-XX	SYMWB-XX or SYMWBV-XX
20° C (68° F)	13.74	329.8	439.7
25° C (77° F)	13.62	326.9	435.8
30° C (86° F)	13.50	324.0	432.0
35° C (95° F)	13.38	321.1	428.2

The measured voltage should be between 13.5 and 13.74 VDC. Units outside this range should be monitored and if voltage does not normalize, consult the manufacturer for recommended action.

## Temperature Checks

The temperature of the batteries can be measured using a digital thermometer and placing the surface thermocouple on the flat surface of the negative terminal (not on the “L” connection surface). An infrared temperature monitor can also be used.

Temperatures below 25° C (77° F) reduce battery performance and temperatures above 25° C (77° F) affect life. Life is reduced by 50% for each 8° C above 25° C (each 15° F above 77° F) – e.g. @ 33° C (92° F) the battery is at half-life.)

## Terminal Hardware Checks

The individual battery connection hardware should be torqued to 8 Nm (71 in–lbs). The specification sheet will list the initial torque to be used at installation and the annual re-torque value to be used for routine maintenance.

## Performance Capacity Test



**Note:** This test must not be followed until the batteries have been fully charged as directed by the manufacturer and allowed to stabilize. Discharge testing must not be done until the battery is fully formed and ready to function.

The performance capacity test is identical to the acceptance test and the same procedure should be followed.

The performance test is performed periodically to provide assurance of performance and for comparison with previous test results. Conduct the tests in accordance with IEEE standards.

## Fuse Removal and Replacement

The battery cabinet system may contain a listed branch rate fuse in the positive output and is located at the front top of the cabinet.

Before attempting to change the fuse, open the disconnect between the battery cabinet system and the load/charger.

Remove the front panel from the battery cabinet. Before attempting to change the fuse, determine that the battery is not shorted to the cabinet. Use a DVM to measure any voltage between the cabinet and both sides of the fuse holder. If any voltage is detected, determine the cause and correct before proceeding.

Wearing rubber gloves and using insulated tools, remove any cables and/or terminal plates from the output side of the fuse holder. Using the appropriate hex socket remove the fuse from the holder.

The replacement fuse should have the same voltage and current rating as labeled on the body of the fuse that is being replaced.

- A. For Nominal Cabinet voltages up to 384 VDC use fused rated at 500 VDC.
- B. For Nominal Cabinet voltages above 384 VDC use fuses rated at 700 VDC.

Install the replacement fuse and reconnect the output cables and/or terminal plates to output side of the fuse holder.

Re-install the front panel and close the disconnect between the battery cabinet system and the load/charger.



## **Worldwide Customer Support**

Customer support for this or any other product is available at no charge:

- Contact the Customer Support Center by telephone or e-mail. For local, country-specific centers: go to [www.apc.com/support/contact](http://www.apc.com/support/contact) for contact information.

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