



10kW VPOC™ Power System

USER GUIDE



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Introduction

Virtual Power On Call (VPOC™) is a highly-efficient backup power solution that uses a fraction of the space of a conventional Uninterruptable Power System (UPS). The 10kW VPOC™ module, along with two Lithium Ion (Li-ion) battery modules, slides into the 1U VPOC™ Shelf. VPOC automatically manages transitions between normal (AC) operation and battery mode (DC) to keep IT equipment safe during power interruptions. An external VRLA battery solution may be substituted for Li-ion batteries for even longer backup times. For more information about the 10kW VPOC™ Power Shelf, refer to the *Lite-On 10kW VPOC™ Power Shelf Datasheet*.

The 10kW Power Module efficiently supplies both main output DC power and standby DC power from either AC or DC sources. For more information about the 10kW VPOC™ Power Module, refer to the *Lite-On 10kW VPOC™ Power Module Datasheet*.

This user guide provides instructions to install and use the 10kW VPOC™ Power System. For instructions on initial startup, refer to the *Lite-On VPOC™ System Startup Guide*.

General Safety Conventions

This user guide uses the safety conventions described below. Ensure that you follow the safety instructions in this guide and observe its directives to protect you from injury and to protect your equipment from damage.

WARNING

Indicates highly-dangerous consequences such as fire, serious injury, or death when failing to comply with the instructions.

Caution

Indicates dangerous consequences such as moderate injury or equipment damage when failing to comply with the instructions.

Safety Cautions and Warnings

WARNING

The VPOC™ system is a high-voltage DC power source when batteries are installed or when it is connected to external batteries. Terminals may be energized even if the system is disconnected from AC power source.

Caution

Batteries should only be serviced by personnel knowledgeable with VPOC™ system batteries. Keep unauthorized personnel away from batteries. Properly dispose used batteries; refer to your local laws and regulations for disposal requirements.

Caution

Ensure that the VPOC™ system is properly grounded at all times.

Caution

Do not block or insert any object into ventilation holes.

WARNING Turn off the VPOC™ system before cleaning it. Use a soft cloth to clean it, never use liquid, or aerosol cleaners.

WARNING Do not install the VPOC™ system near liquids or in a damp environment.

Caution Do not expose the VPOC™ system to direct sunlight or a source of heat.

Caution If the VPOC™ system must be stored prior to installation, store in a dry place.

Required Tools for Installation and Maintenance

The following tools are required for installing and maintaining the Power System.

- #2 and #3 Phillips screwdrivers
- Flat blade screwdriver
- Torque driver to tighten connectors and cables
- Digital Multimeter (DMM) for testing and verifying power

Unpacking and Checklist

Carefully unpack the rack (if applicable), VPOC™ Power Shelf, VPOC™ Power Module, and batteries. Move all components to the staging area for assembly. It is recommended that you keep the packaging in case equipment needs to be returned to the supplier.

The following tools may be required for unpacking.

- Screwdriver for removing screws from rack packaging
- Wrench for removing bolts from rack packaging
- Crowbar for opening wooden boxes (if nailed)
- Box cutter or utility knife for opening cardboard packaging

WARNING A least two people are required to remove the rack from its shipping container to ensure that the rack stays upright and does not fall on personnel.

To unpack the rack from its shipping crate:

1. Remove the front panel from the shipping crate.
2. Remove any shipping bolts from the rack that hold the rack to the crate.
3. If necessary, remove any shipping blocks or straps from around the rack.
4. If necessary, raise the leveling feet to their highest position.
5. Secure a ramp to the front of the crate.
6. Using two or more people, carefully roll the rack out of the crate and down the ramp.
7. Inspect the rack to ensure that it was not damaged during shipping.

To unpack items from cardboard shipping boxes:

1. If necessary, remove any shipping straps from around the box.

2. Place the box upright and cut through the tape on the top of the box.
3. Remove the item(s) from the box along with any shipping foam if necessary.
4. Remove the item(s) from any shipping foam or wrapping material.

After all items have been unpacked, verify that you have received all the items as specified by the shipping paperwork.

Equipment Inspection

After unpacking the equipment, inspect it for damage that might have resulted from shipment. Check for the items below and contact the shipper in the unlikely event that damage is found.

- Bent connectors, alignment pins, or chassis
- Any cracks or chips on plastic components
- Unusual scratches or marks
- Dents in sheet metal or panels
- Corrosion or evidence of water or chemical damage
- Indications that the device was dropped
- Loose parts inside the equipment

VPOC™ Power System and Rack Preparations

These instructions assume that the rack has been moved into place and is installed properly.

The VPOC™ Power Shelf slides into a 19-inch rack and is supported in the rack by shelf support brackets. If the Shelf Support Brackets are not already installed in the rack, follow instructions

Rack Mounting Brackets Installation

The VPOC™ Power Shelf, PDU, and VRLA battery are secured to the rack by supplied rack mounting brackets.

To Install Rack Mounting Brackets:

1. Remove rack mounting brackets and screws from the device packing box.
2. Install the left and right rack mounting brackets with the supplied screws.
3. Torque all rack mounting bracket screws to 0.8N-m (0.6 ft-lbs).

Shelf Support Brackets Installation

The weight of the VPOC™ Power Shelf and VRLA battery are supported in the rack by two Shelf Support Brackets. Each bracket is held in place by four M6 x 12mm self-threading screws.

To Install the Shelf Support Brackets:

1. Place a Shelf Support Bracket in the correct position in the rack and loosely attach it to the shelf with four M6 screws.
2. Place the other Shelf Support Bracket in the correct position in the rack and loosely attach it to the shelf with four M6 screws.
3. Torque all Shelf Support Bracket screws to 6.1 N-m (4.5 ft-lbs).

VPOC™ Power Shelf Installation

After the Rack Mounting Brackets have been installed on the VPOC™ Power Shelf and the Shelf Support Brackets have been installed into the rack, the VPOC™ Power Shelf can be installed into the rack.

WARNING To prevent risk of electrical shock to personnel, ensure that power is not activated inside the rack while installing equipment. Use a DMM to test any potentially live wires and verify that electrical power is turned off to the rack.

WARNING To prevent risk of electrical shock to personnel, ensure that all installation and repairs are performed by AUTHORIZED SERVICE PERSONNEL ONLY.

The VPOC™ Power Shelf wiring and power requirements are listed below:

- Connect to branch circuit overcurrent protection in accordance with the National Electric Code, ANSI/NFPA 70 and in accordance with local electrical standards
- Use an external input circuit breaker: 80 amps / 2-pole
- Use conduit or raceway to connect wiring from the VPOC™ Power Shelf to the building
- Use copper wire 60°C / #6 AWG

To install the VPOC™ Power Shelf into the Rack:

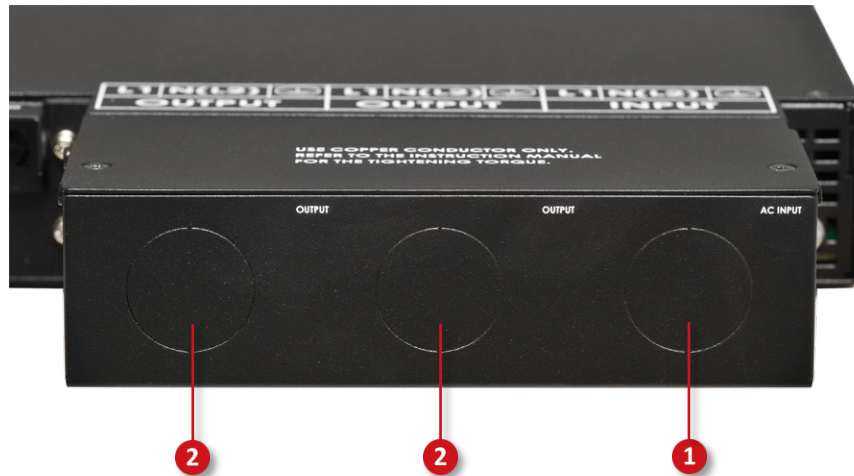
1. If VPOC™ Lithium-Ion Battery Modules are going to be used in this installation, remove both Lithium-Ion Battery Module cover plates by removing the cover plate screws on the bottom of the VPOC™ Power Shelf (see ① below) and removing the cover plates (see ② below).



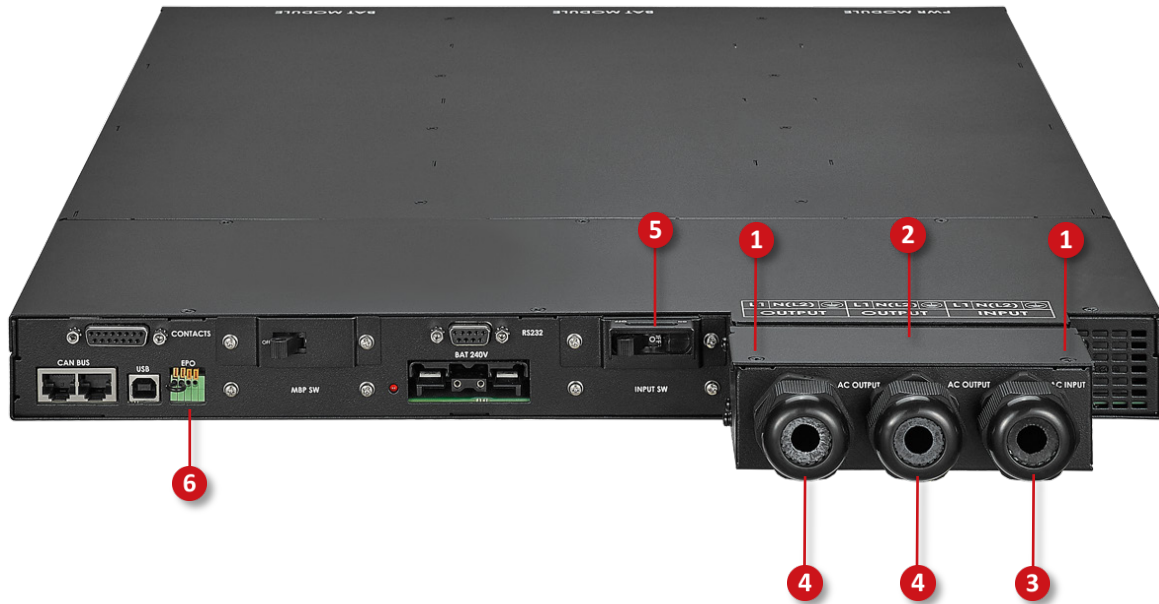
- ① Lithium-Ion battery module cover plate screws (two screws for each plate)
- ② Lithium-Ion battery module cover plate

2. Carefully lift the VPOC™ Power Shelf and move it into the rack on top of the Shelf Support Brackets.
3. Push the VPOC™ Power Shelf into the rack until the Rack Mounting Brackets align with the rack and loosely attach it to the shelf with four M6 screws.
4. Torque all M6 screws to 6.1 N-m (4.5 ft-lbs).

5. On the rear side of the VPOC™ Power Shelf, twist out the AC input knockout plugs (see 1 below) and 1 or 2 output knockout plugs (see 2 below) as required by your output power requirements.



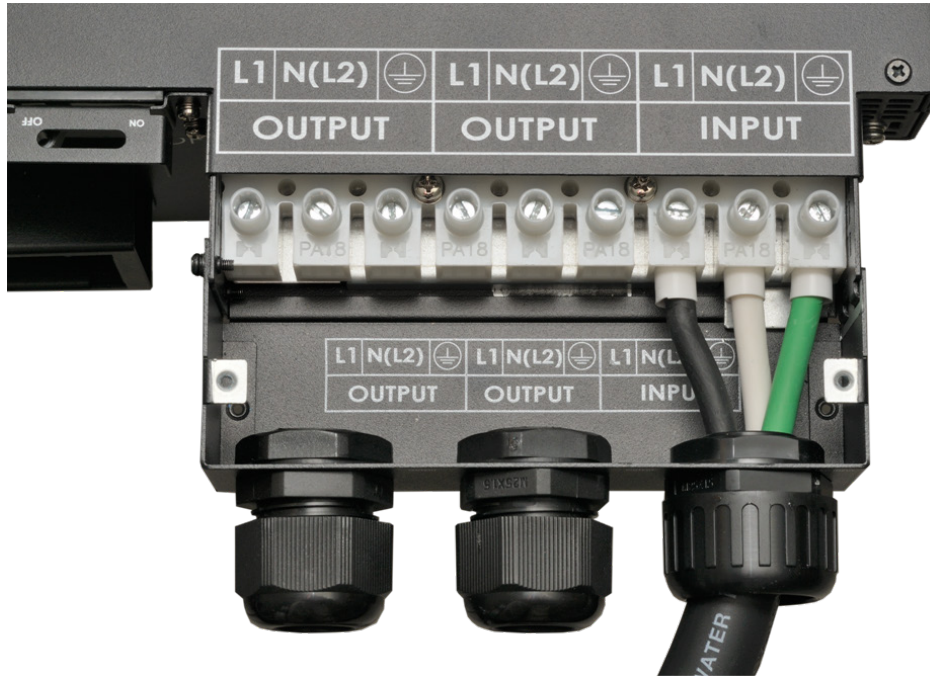
6. On the rear side of the VPOC™ Power Shelf, remove two cover screws (see 1 below) and remove the wiring protective cover (see 2 below).
7. Install supplied cable glands as shown below. One cable gland is supplied with the VPOC™ Power Shelf and one cable gland is supplied for each PDU.
8. Unscrew the cable glands so wires can be fed through them (see 3 and 4 below).
9. Ensure that the VPOC™ Power Shelf input switch (see 5 below) is in the OFF position.



- ① Protective wiring cover screws
- ② Protective wiring cover
- ③ Input wiring port
- ④ Output wiring ports
- ⑤ AC Power input switch
- ⑥ Remote Emergency Power Off connector

WARNING To prevent risk of electrical shock to personnel, ensure that power is not activated when wiring the VPOC™ Power Shelf. Use a DMM to test any potentially live wires and verify that electrical power is turned off.

10. As shown below, install the input and output wires through the cable glands according to the wiring diagram on the VPOC™ Power Shelf and in accordance with local wiring standards. The use of electrical wiring ferrules are recommended on the wires that are attached to the VPOC™ Power Shelf. PDUs are connected directly to the VPOC™ Power Shelf; the *PDU Installation* section (later in this guide) provides for instructions on mounting PDUs to the rack.

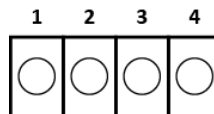


11. Torque the wiring set screws to 1.5 N-m (1.2 ft-lbs).
12. Replace the protective wiring cover and secure with previously-removed cover screws.
13. Tighten the cable glands to secure input and out wiring.
14. If Remote Emergency Power Off (REPO) is used, wire the EPO connector as described in the section below.

Remote Emergency Power Off Configuration

The VPOC™ Power Shelf supports normally closed or normally opened Remote Emergency Power Off (REPO) settings. If necessary, wire REPO according to your system requirements. If REPO is not used, ensure that a jumper wire shorts across pins 1 and 2 on the Remote Emergency Power Connector to prevent VPOC™ Power System shutdown.

To insert or remove a wire from the REPO connector, push in and hold the orange tab above the connector while inserting or removing a wire.

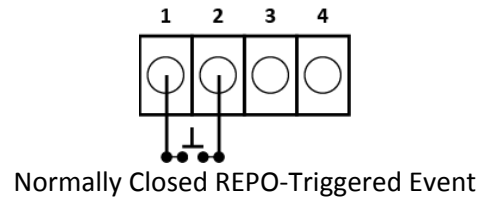
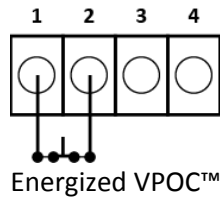


Remote Emergency Power Off Connector

Position	Description
Pins 1 and 2	A REPO will trigger when pins 1 and 2 along with pins 3 and 4 are in the same condition, either both sets open or both sets closed. This provides the flexibility to choose an EPO condition with a normally-closed or open configuration.
Pins 3 and 4	

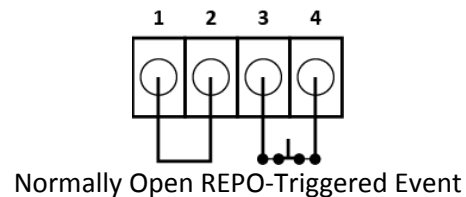
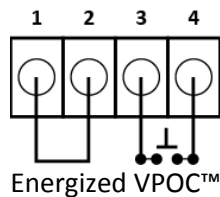
NC (normally closed) Configuration – REPO triggered by opening a switch

The left graphic below shows an “energized” VPOC™ in the normally closed (NC) configuration. Pins 1 and 2 are closed, and pins 3 and 4 are open. If pins 1 and 2 open, as shown in the right graphic below, a REPO event is triggered.



NO (normally open) Configuration – REPO triggered by closing a switch

The left graphic below shows an “energized” VPOC™ in the normally open (NO) configuration. Pins 1 and 2 are closed, and pins 3 and 4 are open. If pins 3 and 4 close, as shown in the right graphic below, a REPO event is triggered.



VPOC™ Power Module Installation

The VPOC™ Power Shelf ships without any installed modules; they can be installed after the shelf is installed into the rack. The 10kW VPOC™ Power Module slides into the front of the VPOC™ Power Shelf. After the VPOC™ Power Module is installed, its ribbon cable is connected to the VPOC™ Power Shelf bezel.

WARNING

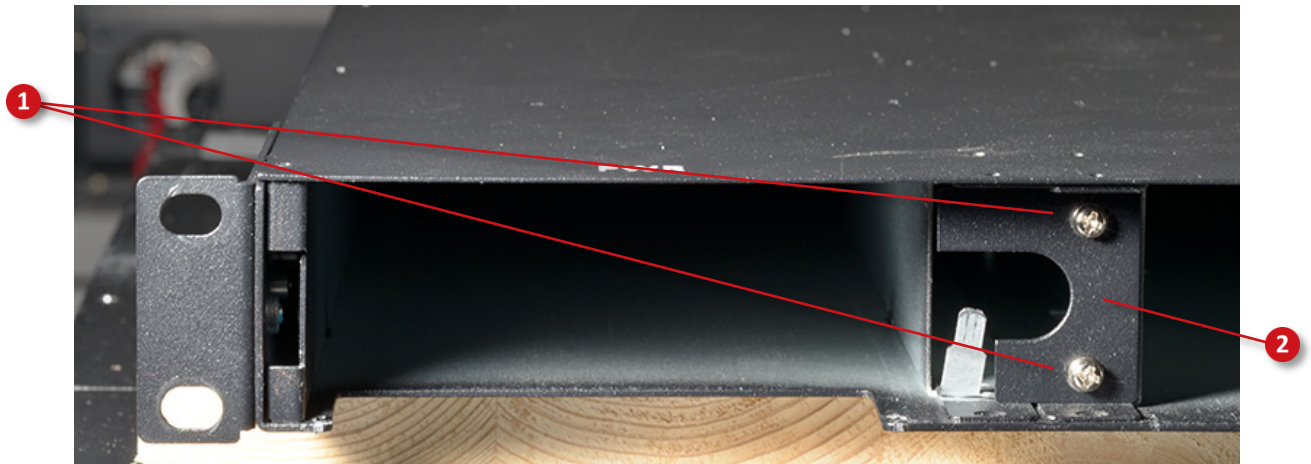
To prevent risk of electrical shock to personnel, ensure that the VPOC™ Power Shelf is empty and does not contain VPOC™ Lithium Ion Battery Modules. If batteries are installed, terminal blocks may be energized even if the system is disconnected from the AC power source.

To install the VPOC™ Power Module:

1. Remove the bezel from the front of the VPOC™ Power Shelf by pressing in the tabs on each side of the bezel and pulling out the bezel (see ① below).



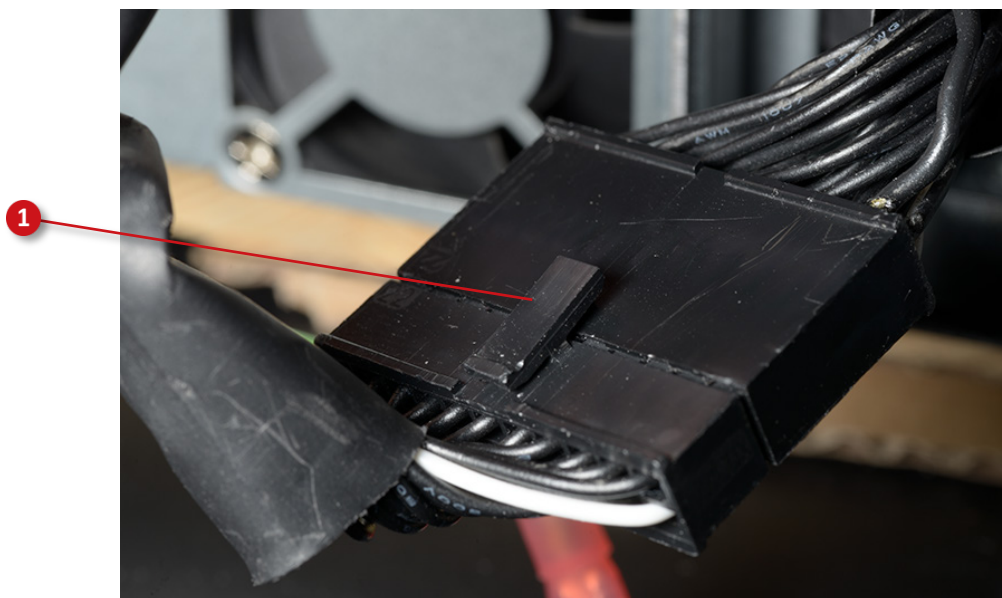
2. Remove two screws holding the cable locking bracket (see ① below) and remove the cable locking bracket (see ② below).



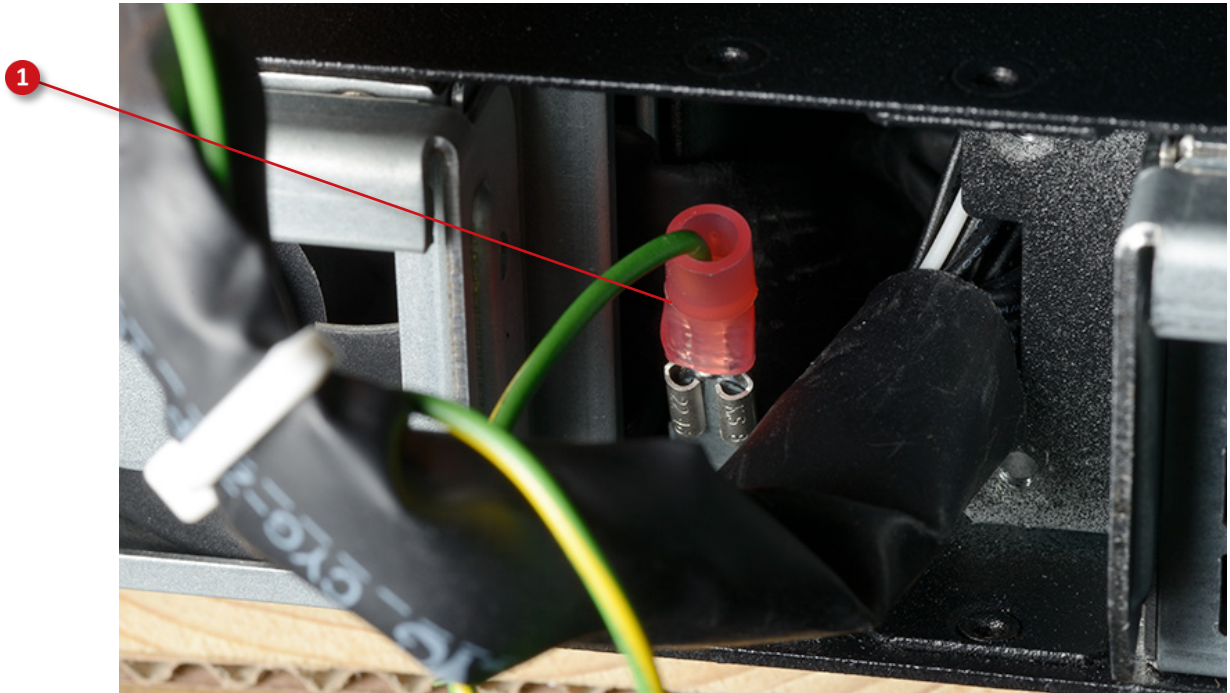
3. Pull out the locking handle of the VPOC™ Power Module (see 1 below) and insert the module into the left-most slot labeled PWR MODULE as shown below. Put your thumb under the locking handle when pushing it in; as module engages the chassis, the locking handle will move up slightly.



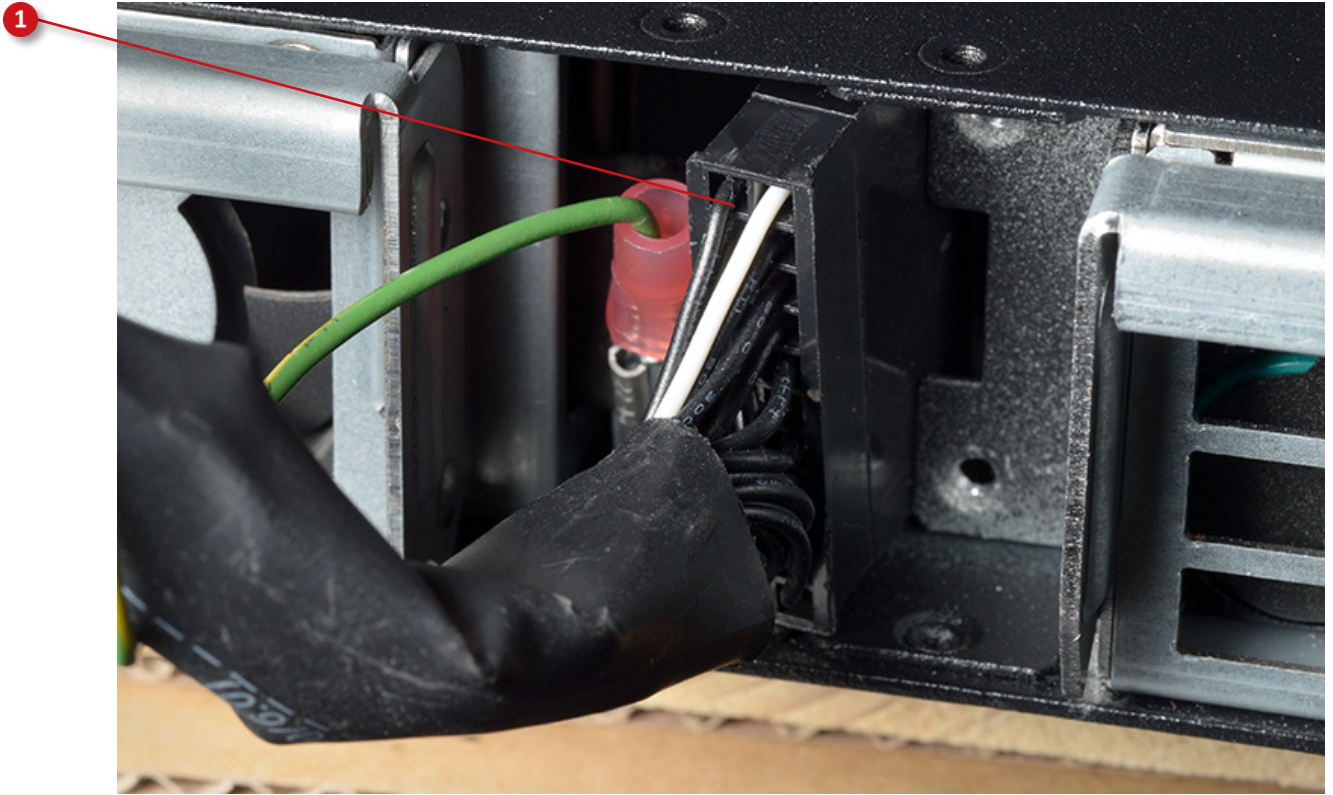
4. Complete module installation by pushing up the locking handle until it locks into place into the chassis.
5. Connect cable from the front bezel to the VPOC™ Power Module (see 1 below) until it latches into place. **Note:** You must press down this latch to separate this connector when removing the Power Module from the bezel.



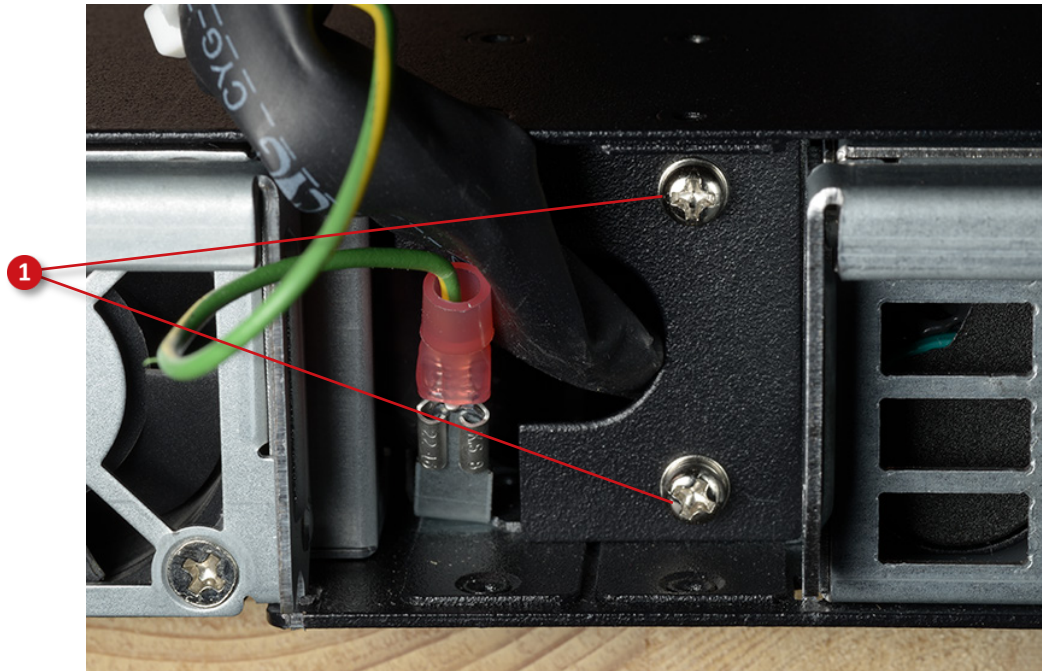
6. Connect the bezel ground strap (see 1 below) to the chassis as shown below.



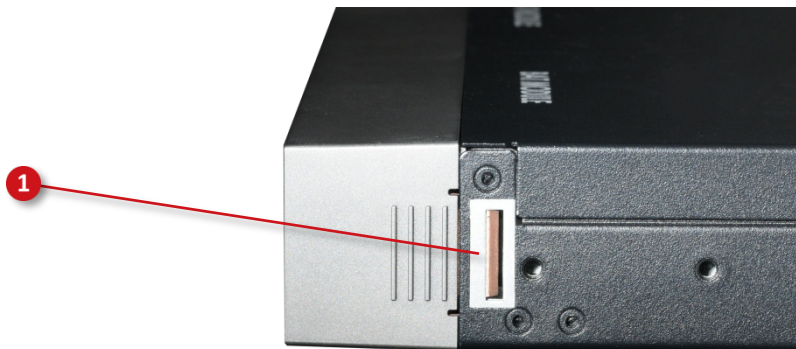
7. Push the connector vertically into the channel (see **1** below).



- Secure cable to chassis with cable locking bracket and two screws that were removed in a previous step (see 1 below).



- Push the bezel back onto the front of the VPOC™ Power Shelf until the tabs lock into place (see 1 below).



PDU Installation

Power Distribution Units (PDUs) distribute output power from the VPOC™ Power Shelf to rack-mounted equipment. A PDU can be mounted horizontally or vertically in the front or rear of a rack. When power is activated to a PDU, an indicator light illuminates.

WARNING

To prevent risk of electrical shock to personnel, ensure that power is not activated inside the rack while installing equipment. Use a DMM to test any potentially live wires and verify that electrical power is turned off to the rack.

To install a PDU to a rack:

1. Using the supplied M3 screws, install rack mounting brackets on the PDU in accordance to your mounting requirements so the brackets align with the holes on the rack. The rack mounting brackets can be mounted so the tabs are flush to the front of the PDU or flush to the rear of the PDU.
2. Torque the rack mounting bracket M3 screws to 0.6 N-m (0.45ft-lbs).
3. If not already connected, wire the PDU to the VPOC™ Power Shelf or distribution unit according to your electrical requirements.
4. Install the PDU to the rack and loosely attach it with four M6 screws.
5. Torque all M6 screws to 6.1 N-m (4.5 ft-lbs).

VPOC™ Lithium Ion Battery Module Installation

The VPOC™ Power System supports either lithium-ion batteries or VRLA batteries.

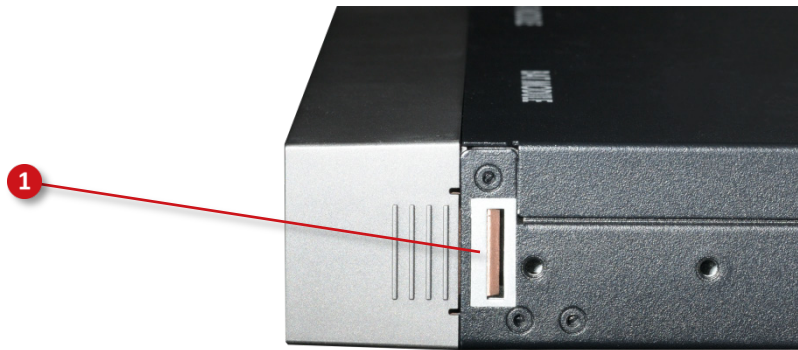
Caution To prevent damage to the VPOC™ Power System, ensure that it is powered off before adding or removing lithium-ion batteries.

To add Lithium Ion Battery Modules to the VPOC™ Power System:

1. Remove the bezel from the front of the VPOC™ Power Shelf by pressing in the tabs on each side of the bezel and pulling out the bezel (see **1** below).



2. Ensure that the Lithium Ion Battery Module plates have already been removed as described in the VPOC™ Power Shelf Installation section.
3. Slide the Lithium Ion Battery Modules into the battery module slots (labeled BAT MODULE) in the VPOC™ Power Shelf.
4. Push the bezel back onto the front of the VPOC™ Power Shelf until the tabs lock into place (see **1** below).



VRLA Battery Installation

After the VRLA Battery Shelf Support Brackets are installed into the rack, it can be installed into the rack.

WARNING

To prevent risk of electrical shock to personnel, ensure that power is not activated inside the rack while installing equipment. Use a DMM to test any potentially live wires and verify that electrical power is turned off to the rack.

WARNING

To prevent risk of electrical shock to personnel, ensure that the breaker on the VRLA Battery Shelf is switched to OFF when connecting or disconnecting it to the VPOC™ Power Shelf or connecting to other VRLA Battery Shelves.

Caution

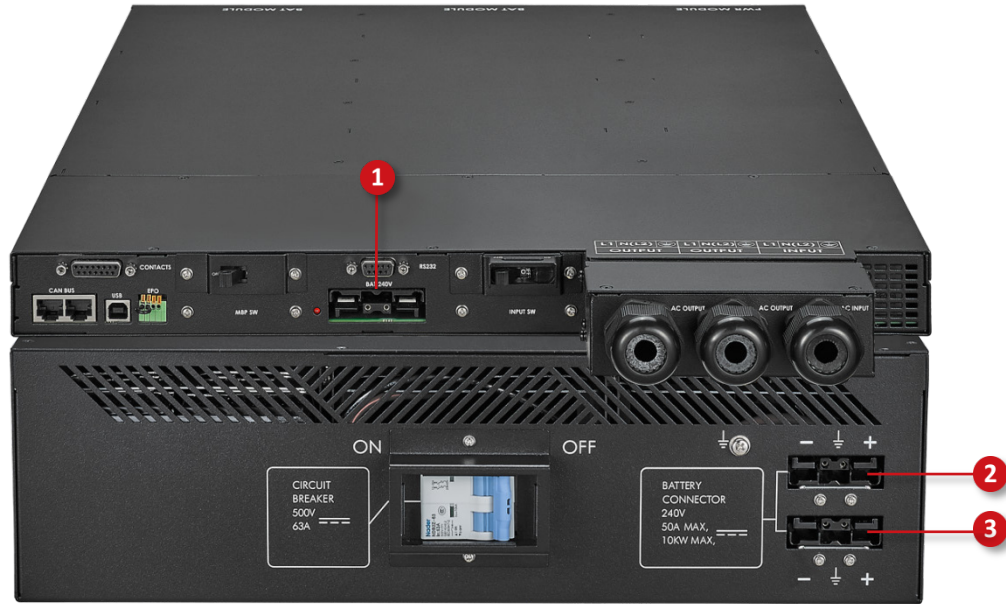
The VRLA Battery shelf weighs more than 140 pounds. Use two or more people to move the VRLA Battery shelf and install it into the rack.

Caution

Only use the supplied electrical cable that ships with the VRLA Battery shelf to connect a VPOC™ Power Shelf to a VRLA Battery shelf.

To Install the VRLA Battery Shelf into the Rack:

1. Carefully lift the VRLA Battery Shelf and move it into the rack on top of the Shelf Support Brackets.
2. If necessary, installed VRLA Battery Shelf rack mounting brackets.
3. Torque the rack mounting bracket screws to 0.6 N-m (0.45ft-lbs).
4. Push the VRLA Battery Shelf into the rack until the rack mounting brackets align with the rack.
5. Install the PDU to the rack and loosely attach it with four M6 screws.
6. Torque all M6 screws to 6.1 N-m (4.5 ft-lbs).
7. Connect the supplied electrical cable from the back of the VPOC™ Power Shelf (see 1 below) to either the top or bottom VRLA Battery Shelf power port (see 2 and 3 below).



- ① VPOC™ Power Shelf VRLA battery connector
- ② VRLA Battery Shelf battery connector
- ③ VRLA Battery Shelf battery connector

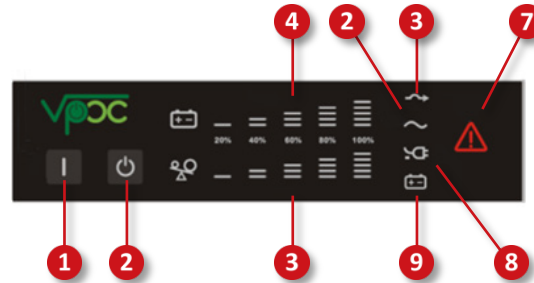
Note: multiple VRLA Battery Shelves can be connected to the VPOC™ Power Shelf to extend runtime. To connect another VRLA Battery Shelf, install it close to an existing VRLA Battery Shelf and install the supplied electrical cable between the batteries (see ② and ③ above).






VPOC™ Power System Startup

Refer to the *10kW VPOC™ Power System Startup Guide* for startup instructions.

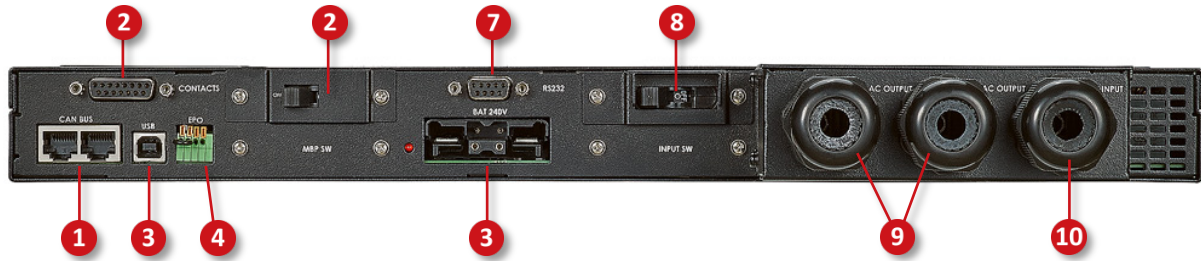
VPOC™ Power Shelf Front Panel Controls and Lights

Refer to the graphic and table below for an explanation of the buttons and lights located on the VPOC™ Power Shelf front panel.



1	Alarm Silence / Manual Battery Test Button	Press for 1 second to silence a connected alarm. After the alarm is silenced, the alarm system is reactivated.	
		<i>For VRLA batteries only:</i> Press for 1 second during normal operation to initiate VRLA battery test. Press for 1 second to end battery test.	
		<i>For Li-ion batteries only:</i> Press for 1 second during normal operation to electrically disconnect Li-ion battery from the VPOC™ Power System. Press for 1 second to reconnect to Li-ion battery.	
2	On / Standby / Manual Bypass Button	<i>For VRLA batteries only without AC input:</i> Press and hold for 4 seconds to cold start VPOC™ operation.	
		Press and hold for 4 seconds when operating in AC mode activates internal automatic bypass mode.	
		When in internal automatic bypass mode, press twice within 4 seconds to turn off all VPOC™ output capability. Ensure that the shelf maintenance bypass switch is engaged to maintain power to the load.	
3	Load Level Indicators	Displays approximate load in 20% increments of full load. The 100% column flashes when operating in an overload condition.	
4	Battery Level Indicators	Displays remaining capacity in 20% increments. The 100% column flashes when batteries are charging.	
2	AC Output Indicator (Green)		On: normal mode — AC out
			Off: output determined by operating conditions
3	Bypass Indicator (Amber)		On: operating with internal bypass — AC out
			Off: output determined by operating conditions
7	Fault Indicator (Red)		On: a fault condition exists
			Off: no faults detected
8	AC Input Indicator (Green)		On: AC input is within allowed range
			Off: no AC input
			Flashing: AC input is outside allowed range
9	Battery Indicator (Amber)		On: operating in Battery mode – DC out
			Off: output determined by operating conditions
			Flashing: Battery source not available

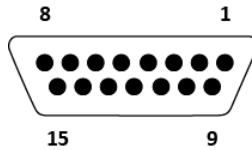
VPOC™ Rear Panel



1	CAN Port	Communication to a site monitor for the operating status of the VPOC power module and battery
2	Dry Contact	DA-15 connector used to provide operating conditions communicated via simple open/closed switches. Refer to the <i>Dry Contact Configuration</i> section below for a description of the contacts.
3	USB Port	Communication to a network server or other computer for the operating status of the VPOC power module and battery
4	Remote Emergency Power Off (REPO)	4-pin connector can be configured “Normally Closed” or “Normally Open”
2	Maintenance Bypass Switch	Manual switch that provides an external AC bypass to allow swapping of power or battery modules for maintenance and repair
6	Battery Connector	DC input from VRLA Extended Battery Module
7	RS232 Port	Communication to a network server or other computer for the operating status of the VPOC power module and battery
8	AC Input Switch	Switch to connect the AC input to the shelf
9	Hardwired Power Output	Hardwire capability for 2 outputs managed by the VPOC Power Module
10	Hardwired Power Input	Hardwire capability for 1 AC input

Dry Contact Configuration

The graphic and table below describe the DA-15 dry contact connector located on the rear of the VPOC™ Power Shelf (see 2 above).



DA-15 Position	Name	Description
Pins 1 – 2	Battery Mode	Closed when operating on battery
Pins 3 – 4	Bypass Mode	Closed when operating on internal Automatic Bypass
Pins 5 – 6	Low Battery	Closed when operating on battery AND the battery voltage is less than the low voltage alarm setting
Pins 7 – 8	Overload	Closed when operating in overload condition
Pins 9 – 10	Alarm	Closed when operating with audible alarm
Pin 11	GND	
Pins 12 – 13	Any Mode Shutdown	Shorting pins 12 to pin 13 will cause a shutdown when operating in any mode
Pins 14 – 15	Battery shutdown	Shorting pins 14 to pin 15 will cause a shutdown if operating in Battery Mode

Warranty

If you experience any problems with your Lite-On equipment, contact Lite-On Power Systems Solutions at 1-469-331-9838.

Related Documentation

For information about the VPOC™ Shelf, refer to the *Lite-On VPOC™ Shelf Datasheet*.

For information about the VPOC™ Power Module, refer to the *Lite-On VPOC™ Module Datasheet*.

For information about the VPOC™ PDU, refer to the *Lite-On VPOC™ PDU Datasheet*.

For information about the VPOC™ Li-ion battery, refer to the *Lite-On VPOC™ Li-ion Battery Datasheet*.

For information about the VPOC™ VRLA battery, refer to the *Lite-On VPOC™ VRLA Battery Datasheet*.

For instructions on installing and using the 10kW VPOC™ Power System, refer to the *Lite-On VPOC™ Power System User Guide*.

For instructions on initial startup for the 10kW VPOC™ Power System, refer to the *Lite-On VPOC™ Power System Startup Guide*.

For more information related to the Lite-On Power Systems, visit the Lite-On Power Systems Solutions web site at: <http://www.liteon-pss.com>.



Innovative Power Management Solutions for Critical Infrastructure