



3-Phase 10-Slot Power Supply System

USER GUIDE



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Introduction

The 22.5kW Power System is a 3-phase, 10-slot chassis with 2.5KW Power Supply Units (PSUs) that provides stable DC output power (12.5VDC / 1800A). This 21-inch power system uses up to 10 high-power, hot-swappable PSUs for flexibility in full power or redundant operation. For more information about the 22.5kW Power Shelf, refer to the *Lite-On 22.5kW Power Shelf Datasheet*.

The 2.5kW PSUs efficiently supply both main output DC power and standby DC power from either AC or DC sources. These compact PSUs provide 2.5kW, 12.5V / 200A for main power output and 30W, 12V / 2.5A for standby power applications. In addition, they support PMBUS 1.2 with boot loader, LED status indicators, and circuit protection features. For more information about the 2.5kW PSU, refer to the *Lite-On 2.5kW Power Supply Unit Datasheet*.

This user guide provides instructions to install and use the 22.5kW Power System. For instructions on initial startup, refer to the *Lite-On 3-Phase 22.5kW Power Supply System Startup Guide*.

General Safety

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.

Required Tools for Installation and Maintenance

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

- #2 Phillips screwdrivers
- Torque wrench
- 10mm and 13mm wrenches for connecting linking bus bars
- Digital Multimeter (DMM) for testing and verifying power

Unpacking and Checklist

Carefully unpack the rack, Power Shelf, and Power Modules and move them 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 are 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 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.

Description	Part Number	Quantity
Power Shelf	PF-2223-1	1
Linking Bus Bars	823352	3
Linking Bus Bars	823353	3
M8 x 15mm length SEMS Screws	823385	1 package (28 pieces)

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

Power Shelf and Rack Preparations

These instructions assume that the rack has been moved into place and is installed properly. If necessary, refer to the *Lite-On 21-inch Open Compute Project compliant Rack User Guide* for more information about installing the 21-inch OCP rack.

The Power Shelf slides into a 21-inch OCP 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 “Shelf Support Brackets Installation” on page 5 to install the brackets.

Before the Power Shelf is installed into the rack, Linking Bus Bars are loosely installed on the rear of the Power Shelf; they are tightened after the Power Shelf is mounted into the rack.

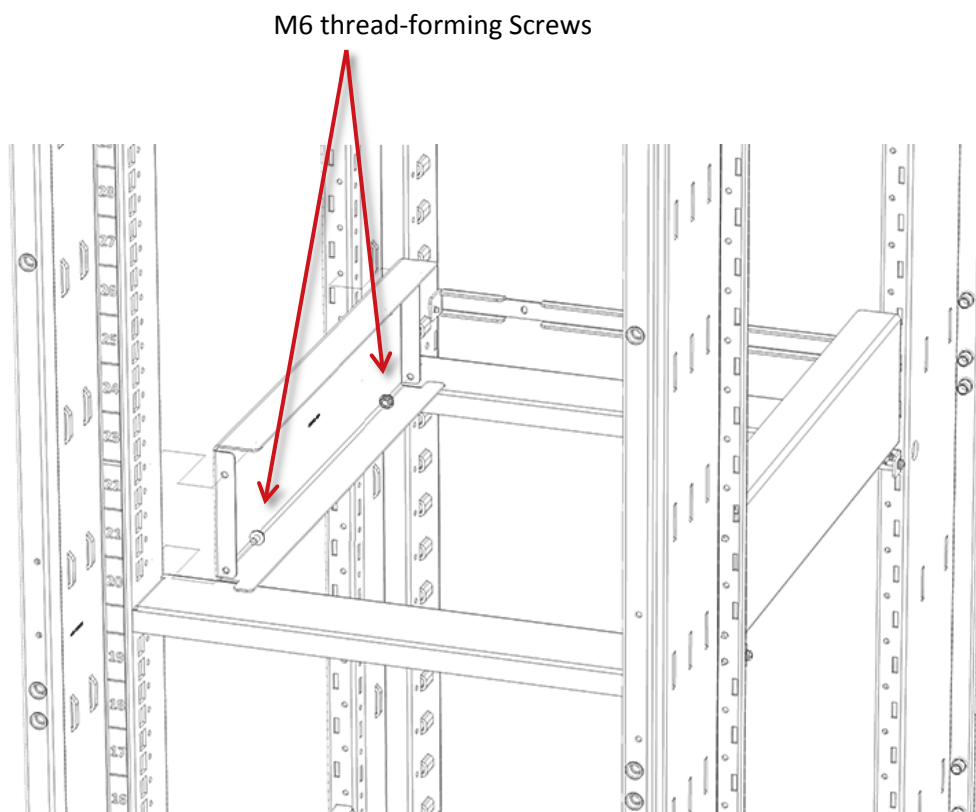
Shelf Support Brackets Installation

Note: Shelf Support Brackets are ordered separately.

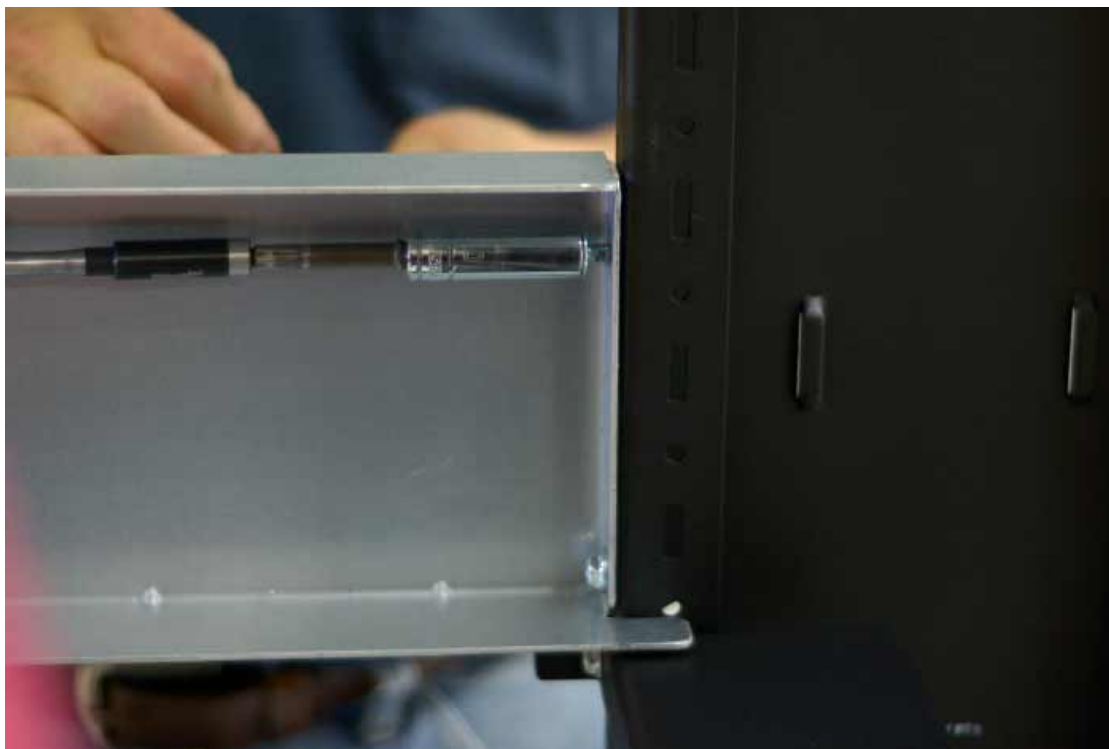
The weight of the power shelf is supported in the rack by two Shelf Support Brackets. Each bracket is held in place by four M6 x 12mm self-threading screws.

To Install the Shelf Support Brackets to a Lite-On OCP rack:

1. Place a Shelf Support Bracket in the correct position in the rack as shown below and attach it to the shelf with four M6 thread-forming screws.



2. In like manner, place the other Shelf Support Bracket in the correct position in the rack on the opposite side and attach it to the shelf with four M6 thread-forming screws.



3. Torque all Shelf Support Bracket screws to 6.1 N-m (4.5 ft-lbs).

Linking Bus Bar Installation

Note: Linking Bus Bars are supplied with the Power Shelf.

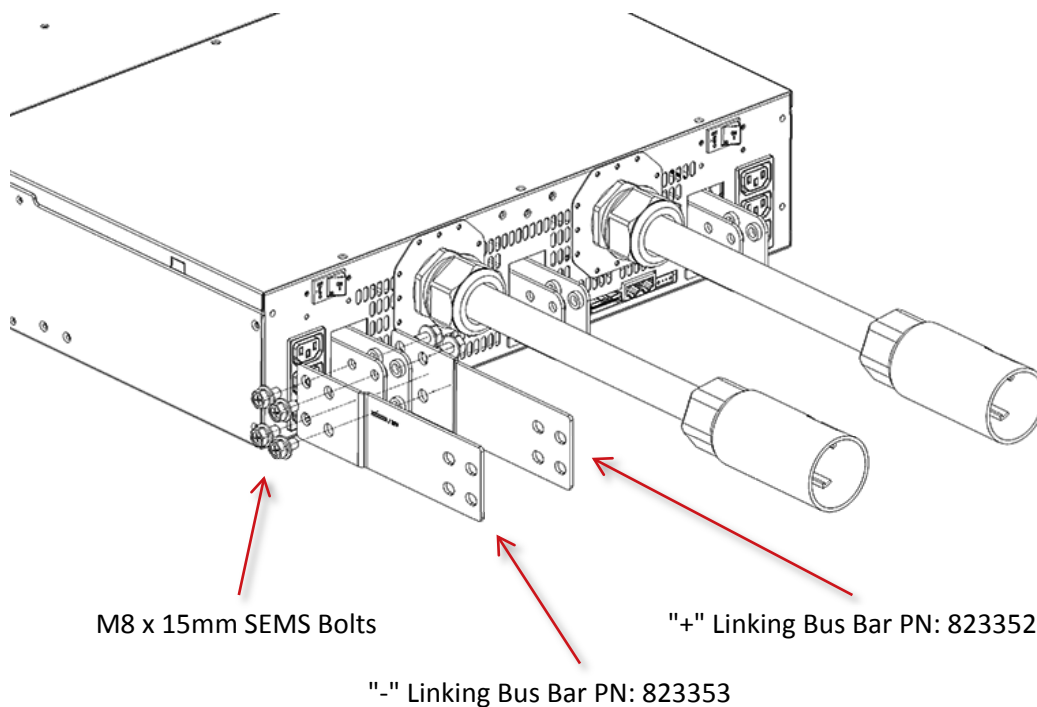
Linking Bus Bars are installed, but not tightened, to the output power connectors on the rear of the Power Shelf before it is mounted into the rack. After the Power Shelf is installed in the rack, the other ends of the Linking Bus Bars are connected to the rack bus bars and their bolts are tightened then.

Caution

If the Linking Bus Bars are color coded, ensure that they are installed on the correct bus that corresponds with its color.

To Install Linking Bus Bars to the Power Shelf:

1. As shown below, with four M8 x 15mm SEMS bolts (supplied with the Power Shelf) for each Linking Bus Bar, install a Linking Bus Bar to each output power bus bar on the Power Shelf, but do not tighten the bolts. These bolts will be tightened later after the Power Shelf is mounted into the rack.



2. Install the remainder of Linking Bus Bars to the bus bars on the Power Shelf, but do not tighten the bolts. The Power Shelf is now ready to be installed into the rack.



Power Shelf Installation

After the Shelf Support Brackets are installed into the rack and the Linking Bus Bars are installed on the rear of the Power Shelf, 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.

Caution

The Power Shelf with Linking Bus Bars weighs more than 50 pounds. Use two or more people to move the Power Shelf and to install the Power Shelf into the rack.

To Install the Power Shelf into the Rack:

1. If necessary, remove bus bar access covers.
2. Carefully lift the Power Shelf with its Linking Bus Bars and move it into the rack on top of the Shelf Support Brackets.

Caution

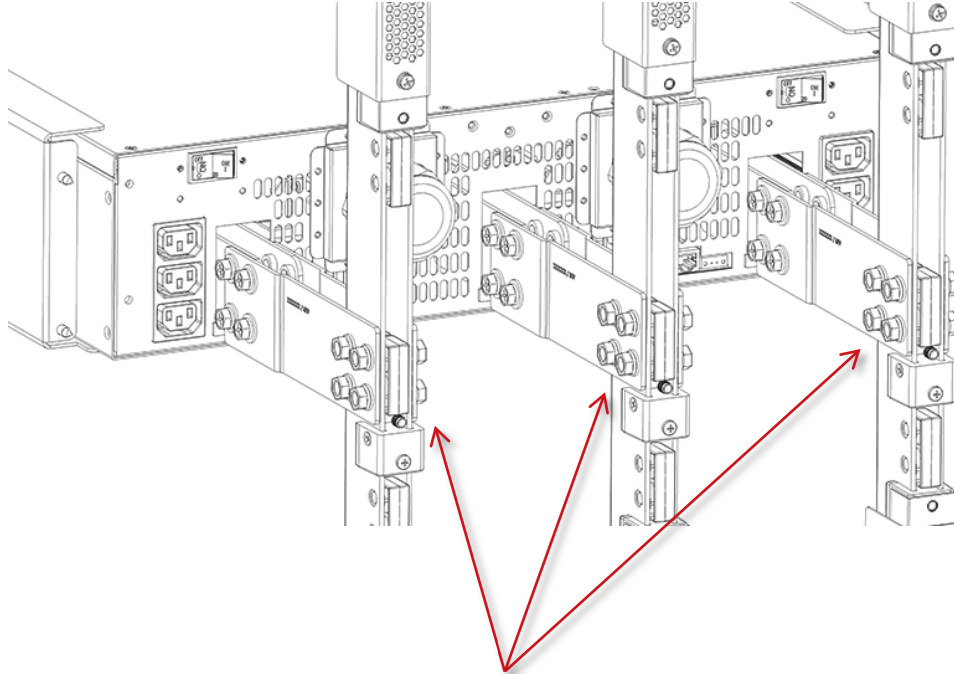
Two or more people are required to install the Power Shelf with its installed Linking Bus Bars into the rack. One person pushes the Power Shelf into the rack from the front of the rack and the other person guides the Linking Bus Bars in place from the rear of the rack.



3. As shown below, push the Power Shelf into the rack until the latch brackets connect into the matching slots in the front of the rack. Ensure that the Linking Bus Bars are properly aligned to the rack bus bars.



4. As shown below, install four M8 x 15mm SEMS bolts for each Linking Bus Bar to attach the Linking Bus Bar to the rack Bus Bar. **Note:** For clarity purposes only, the graphic below does not show the rack nor the power cords.



M8 x 15mm SEMS Bolts (supplied with Rack Bus Bar assembly)

5. Torque all Linking Bus Bar bolts to 15 N-m (11 ft-lbs).
6. Install bus bar covers M5 screws and torque to 3.6 N-m (2.7 ft-lb).

Cable and Wire Installation

After the Power Shelf is installed into the rack, it can be connected to rack bus bars.

Input Power Connections

The Power Shelf accepts input power through supplied cables and connectors on the rear of the shelf.

WARNING

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

To install input power to the Power Shelf:

1. Push in one of the power plugs from the rear of the Power Shelf into its matching power receptacle and turn the power plug clockwise to lock it in place.
2. Push in the other power plug from the rear of the Power Shelf into its matching power receptacle and turn the power plug clockwise to lock it in place.

3. Dress the power cables as necessary to secure them in place on the rack. Refer to the *Lite-On 21-Inch Open Compute Project Compliant Rack Assembly and User Guide* for more details if using the Lite-On 21-inch OCP rack.

C13 Receptacle Connections

There are six C13 receptacles on the rear of the Power Shelf that provide single-phase AC power output.

Caution

C13 receptacle voltage is the same as the input voltage to the Power Shelf. Ensure that any device you plug into a C13 receptacle can support this voltage. If you are unsure if your equipment can support this voltage, check with the manufacturer.

If necessary, connect devices to one or more of the C13 receptacles. Each set of three C13 receptacles are protected by a 20A circuit breaker.

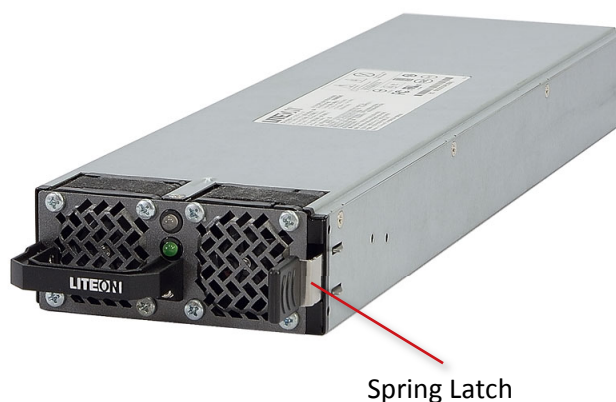
Power Supply Unit Installation and Removal

The Power Shelf supports up to ten hot-swappable Power Supply Units (PSUs). A PSU can be plugged into any slot in the Power Shelf and they are keyed so they cannot be inserted incorrectly. The 3-phase AC input power is distributed as shown in the table below.

	Power Shelf Slots (as viewed from front of Power Shelf left to right)
Phase A Input Power	PSU1-A PSU2-A PSU3-A
Phase B Input Power	PSU1-B PSU2-B PSU3-B PSU4-B
Phase C Input Power	PSU1-C PSU2-C PSU3-C

If all 10 slots in the Power Shelf are not used, populate the appropriate slots so that each phase has an equal number of PSUs or is within 1 PSU of the max on a single phase. For example, if a total of 7 PSUs are used, then the phase breakout should be 3, 2, and 2. Cover any unused slot with a provided slot cover. Also, consider the load on the C13 receptacles when balancing phases.

As shown below, PSUs are held in place with a spring latch.



To install a Power Supply Unit:

1. Slide a PSU into an empty slot of the Power Shelf until it clicks into place. Both lights on the PSU illuminate green to indicate that it is operational. Refer to “Power Supply Unit LED Status” on page 14 for more information on the PSU LED status.



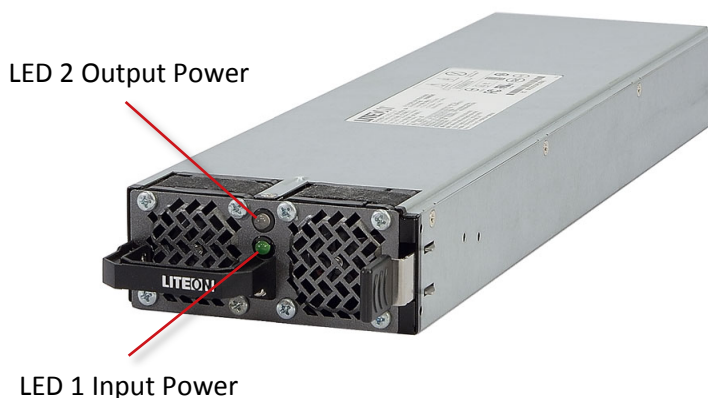
2. Slide the remaining PSUs into the empty slots in the Power Shelf until they click into place.

To remove a Power Supply Unit:

- Lift the spring latch on the front of a PSU, pull the handle, and slide the PSU out from the Power Shelf.

Power Supply Unit LED Status

Under normal operating conditions, both indicator lights LED 1 and LED 2 illuminate solid green; the table below shows other LED combinations and status.

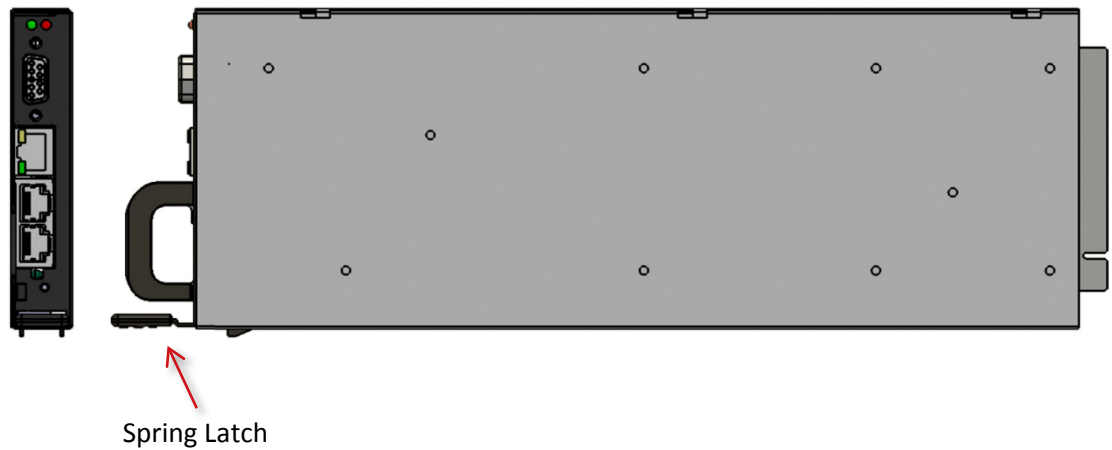


Status	LED 1 (Input) Green Color	LED 2 (Output) Bicolor
AC_LOSS	Off	Off
Vin_OV_Fault	Off	Off
Vin_UV_Fault	Off	Off
AC_Normal	Solid Green	Solid Green
ALL_Normal	Solid Green	Solid Green
Vout_OV_Warning	Solid Green	Blink Green
Vout_UV_Warning	Solid Green	Blink Green
Iout_OC_Warning	Solid Green	Blink Green
OT1_Warning	Solid Green	Blink Green
OT2_Warning	Solid Green	Blink Green
OT3_Warning	Solid Green	Blink Green
PSON	Solid Green	Blink Yellow
FAN_LOCK	Solid Green	Solid Yellow
Vout_OV_Fault	Solid Green	Solid Yellow
Iout_OC_Fault	Solid Green	Solid Yellow
OTP_Fault	Solid Green	Solid Yellow
Vout_UV_Fault	Solid Green	Solid Yellow
LATCH_SD	Solid Green	Solid Yellow
SCP_Fault	Solid Green	Solid Yellow
STB_UV_Fault	Solid Green	Solid Yellow
STB_OV_Fault	Solid Green	Solid Yellow
STB_OCP_Fault	Solid Green	Solid Yellow
STB_OTP_Fault	Solid Green	Solid Yellow

Power Shelf Controller Installation (Optional)

While optional, the Power Shelf Controller is necessary for system communication to the power system created by the power shelf along with a battery shelf. The Power Shelf Controller is an integral part of a complete DC UPS system with communication capabilities. It provides communication to the Lite-On Site Monitoring Controller (SMC) or other monitoring software for information and/or event-based responses.

On the front of the power shelf is a slot for the Power Shelf Controller. As shown below, a Power Shelf Controller is held in place with a spring latch.



To install a Power Shelf Controller:

- Slide the Power Shelf Controller into the Power Shelf Controller slot of the Power Shelf until it clicks into place. The green LED on the Power Shelf Controller illuminates to indicate normal operation.

Power Shelf Controller Slot





To remove a Power Shelf Controller:

- Lift the spring latch on the front of the Power Shelf Controller and slide it out from the Power Shelf.

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 22.5kW Power Shelf, refer to the *Lite-On 22.5kW Power Shelf Datasheet*.

For information about the 2.5kW Power Supply Unit, refer to the *Lite-On 2.5kW Power Supply Unit Datasheet*.

For instructions on initial startup of the 3-Phase 22.5kW Power Supply System, refer to the *Lite-On 3-Phase 22.5kW Power Supply 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>.



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