

Q-LS™ Battery Cabinet



Installation and Operation Manual

MNL129

Rev 4.9

Export Classification EAR99

READ THIS MANUAL CAREFULLY

SAVE ALL INSTRUCTIONS

This manual contains important information that you will need to operate the Q-LS™ Battery Module safely and efficiently. Please read all instructions carefully before installing or operating equipment.

Keep this manual handy for easy reference.



ELECTRICAL WARNING

Applying information contained in this manual to any other product, including customized *Q-LS Battery Modules™* with nonstandard specifications, may cause injury.

This Uninterruptible Power Quality system includes the Q-LS, as well as any attached battery cabinets. Therefore, by extension, the ETL Listed Conformance notice on the Q-LS cabinet also indicates that the battery cabinets in the system conform to UL STD 1778 and are certified to CSA std. C22.2 No. 107.3. Battery cabinets as well as Q-LS cabinets have been tested and approved by ETL (Intertek).

The Q-LS cabinet and accompanying battery cabinets that constitute each complete Q-LS™ system are registered trademarks of Power Innovations International, Inc.

This manual may accompany other instructional addendums about additional customizations to standard Q-LS™ systems.

Please contact Power Innovations if additional manuals are needed and have not been received.

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1—Introduction

1.1—Overview of Battery Cabinets

Q-LS Battery Cabinets come in the following configurations:

- Q-LS (Standard) Battery Cabinets
- Q-LS-ST (Sliding-out locking Tray) Battery Cabinets

The quantity and individual specifications of attached Q-LS Battery Modules determine the amount of battery backup time that a Q-LS system can provide.

The battery cabinet modules are available in both standard and sliding-tray configurations. Their dimensions are designed to match the dimensions of the Q-LS cabinet(s) that they accompany.

1.1.1—Battery Size Configurations

Inside the front door of each battery cabinet, a label specifies the quantity and the ampere-hour (Ah) rating of the batteries contained inside the cabinet.

1.1.1.1—Q-LSA Battery Module

The Q-LSA battery module is a single-wide cabinet containing (1) string of (29) SLA Batteries, 12V, 26Ah distributed among (4) cabinet sections or sliding trays (depending on the option chosen). The batteries take up the lower half of the cabinet, making the top half of the cabinet available for other uses. The battery cabinet has (1) Battery Breaker. Available options for this module include:

- **Q-LSA:** The single battery string is contained in a standard battery cabinet without slide-out trays/drawers. The battery string is distributed in (4) cabinet sections, totaling (29) 12V SLA Batteries, connected in series.
- **Q-LSA-ST:** The single battery string is contained in a standard battery cabinet distributed within (4) slide-out locking trays, totaling (29) 12V SLA Batteries, connected in series.
- **Q-LSA-ST Rugged:** The single battery string is contained in a ruggedized battery cabinet, which includes Shock isolators at the top and base. As before, the battery string is distributed within (4) slide-out locking trays, totaling (29) 12V SLA Batteries, connected in series.

1.1.1.2—Q-LSB Battery Module

The Q-LSB battery module is a single-wide cabinet containing (2) strings of (29) SLA Batteries, 12V, 26Ah, distributed among (8) cabinet sections or slide-out locking trays (depending on the option chosen). The (2) Strings are in parallel with each other. The battery cabinet has (2) Battery Breakers, one per string. Available options for this module include:

- **Q-LSB:** (2) battery strings are distributed among (8) cabinet sections, totaling (58) 12V SLA Batteries. Each string of (29) batteries is connected with the other in parallel. No slide-out trays in this option.
- **Q-LSB-ST:** (2) battery strings are contained in a standard cabinet distributed among (8) slide-out locking trays, totaling (58) 12V SLA Batteries. Each string of (29) is connected with the other in parallel.
- **Q-LSB-ST Rugged:** (2) battery strings are contained in a ruggedized battery cabinet, which includes Shock isolators at the top and base. As before, the battery strings are distributed within (8) slide-out locking trays, totaling (58) 12V SLA Batteries. Each string of (29) is connected with the other in parallel.



Figure 1—Q-LSA-ST / Q-LSB-ST Battery Module

1.1.1.3—Q-LSC/D Battery Modules

The Q-LSC/D battery module is a double-wide cabinet containing (1) string of (29) SLA Batteries, 12V, 100Ah, distributed among (8) cabinet sections or slide-out locking trays (depending on the option chosen). The battery cabinet has (1) Battery Breaker. Available options for this module include:

- **Q-LSC/D:** The battery string is contained in a standard double-wide cabinet. No slide-out locking trays with this option.
- **Q-LSC/D-ST:** The battery string is contained in a standard double-wide cabinet, consisting of eight locking slide-out locking trays.
- **Q-LSC/D-ST Rugged:** The battery string is contained in a standard double-wide cabinet, consisting of eight locking slide-out locking trays. Shock isolators are added to the Top and base of the cabinet.



Figure 2— Q-LSC-ST or Q-LSD-ST Battery Module

1.1.1.4—Q-LSE Battery Module

The Q-LSC/D battery module is a custom double-wide cabinet containing (1) string of (29) SLA Batteries, 12V, 139Ah, distributed among (8) slide-out locking trays. The battery cabinet has (1) Battery Breaker. Due to the weight of the larger batteries, the breaker and terminal blocks are located at the top front of the system. Available options for this module include:

- **Q-LSE:** The battery string is contained in a customized double-wide cabinet.
- **Q-LSE-ST:** The battery string is contained in a customized double-wide cabinet, consisting of eight locking slide-out trays.
- **Q-LSE-ST Rugged:** The battery string is contained in a custom double-wide cabinet, consisting of (8) slide-out locking trays. Shock isolators are added to the Top and base of the cabinet.

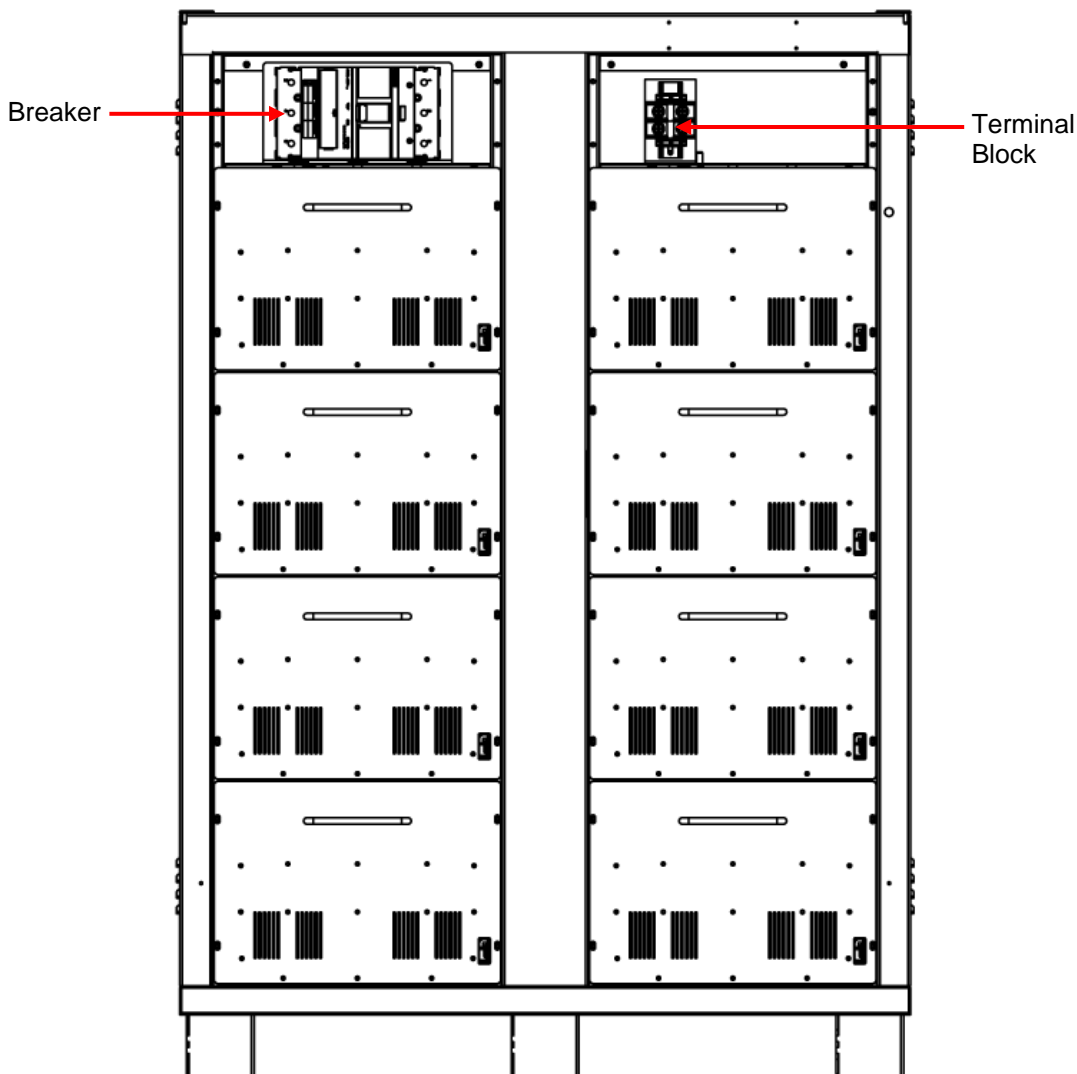


Figure 3— Q-LSE-ST Battery Module

1.2—Using This Manual

This manual is intended to help with the process of safely receiving, unpacking, and installing Power Innovations International, Inc.'s Q-LS Uninterruptible Power Quality™ (UPQ™) systems. Refer to **2.1—Key Features** to find an index relating to the sections most helpful for correctly operating one particular feature on the Q-LS.

Read and understand this manual to make installing and operating the system as easy as possible.

1.3—Conventions Used in This Manual

1.3.1—Breaker Positions

Because some breakers on the front of the Q-LS Series share names with its subsystems or operation modes, breakers and their positions will be identified using all caps. Additionally, the words ON and OFF are always capitalized to stress which position is correct.

This convention exists to prevent the system components from becoming confused with names of breakers. Skimming the words that are capitalized can also serve as a quick-reference method for learning the functions of the breakers located on the front of the cabinet.

1.3.2—Cabinet vs. System

In this manual, the word *cabinet* refers to the actual Q-LS cabinet (or cabinets, for multi-cabinet systems). An external battery cabinet (or cabinets, for more than one string of batteries) will be referred to as a *battery cabinet* or *battery unit*.

The entire power quality system will be referred to as an Uninterruptible Power Quality (or UPQ) system, a Q-LS or a Q-LS system. These terms do not refer to one cabinet or set of cabinets. They refer to the system and everything that supplies power to it, including the battery cabinets, the cabinet that controls the system, and any other cables or external controls.

1.3.3—Notes and Additional Advice

This manual will occasionally provide additional advice. When it is provided, this information will be enclosed by a set of lines to separate it from the rest of the text, like this:

This advisory text is separated from the rest.

Some of the information can be very important, while other information may just be useful to know. To show the importance of each piece of information, the following symbols are used:

ELECTRICAL WARNINGS



Denotes advice that, if not followed, could cause severe bodily harm due to electrical shock.

WARNINGS



Denotes advice that, if not followed, could cause severe bodily harm due to other types of injury.

Cautionary Statements



These offer advice that, if not followed, may harm equipment or indirectly cause physical hazards.

These symbols will be listed in order of importance.

1.4—Safety Warnings and Cautionary Statements

This section provides important information that you will need to remember to safely operate your system. Read it carefully.

This manual provides very little information about maintaining the batteries. Such information is provided in a separate manual for Q-LS trained and certified service personnel.

For ease in reading warnings and cautions, they have been divided into four sections, **Manual Use**, **Installation and Maintenance**, **Safe Transport and Storage**, and **Operation and Batteries**.

1.4.1—Manual Use



Read this manual carefully before operating or troubleshooting the Q-LS and follow all operating instructions. Failure to do so may cause physical harm.



Obey all warnings within this manual. Failure to do so may void the system warranty.

1.4.2—Installation and Maintenance

All maintenance must be performed by a service technician who has completed a training and certification course on the Q-LS system offered through Power Innovations. During that training course, a separate manual is provided to the service technician to use while maintaining the unit.



The Q-LS system must incorporate an earth ground.

The Q-LS Battery *Module* contains high voltage power that is potentially dangerous if not handled properly. All repairs should be performed only by those who have completed Power Innovations' service-level training course.



For the warranty to apply, wiring, and setup verification for the Q-LS system must be commissioned by personnel who have completed Power Innovations' Q-LS training and certification course.

This unit contains no interior parts that can be serviced without qualified personnel. If troubleshooting processes specified in this manual fail to solve a problem, qualified personnel must service the unit.

For the Q-LS to operate properly, it should be periodically inspected and cleaned. This routine inspection and cleaning should be completed every 90–180 days.

1.4.3—Safe Transport and Storage



To avoid accidental worker injury, place this system in an area with limited access and ensure that all cables are placed carefully.

The battery should be stored in a temperature-controlled indoor environment that is clean, dry, and free of flammable liquids and corrosive substances such as hazardous gases.



The Q-LS system should be transported carefully so that the units are not damaged. Avoid dropping a unit, tipping it upside down, or any other rough handling.



If the Q-LS system will be stored for long periods of time, the battery (batteries) should be charged by the Q-LS once every 90 days to maintain optimal battery life or placed on Battery Keepers (available from Power Innovations) and connected to utility power.

1.4.4—Operation and Batteries



If your battery model includes the slide-out tray option, the battery unit **MUST be installed on a solid surface. It should be bolted securely to the floor, if at all possible. Doing so will prevent the cabinet from tipping and causing injury.**

Always ensure that **ONLY ONE battery drawer is open at any given time. Opening more than one drawer of the cabinet at a time will cause the cabinet to become unbalanced and tip.**



Use **10.5—Troubleshooting Tables** in the *Q-LS 10–160 Installation and Operation Manual* to handle any unusual situation that arises while operating the Q-LS system.



Retain the load within the Q-LS system rating guidelines to ensure that it functions well.

DO NOT insert any object into any of the ventilation holes or any other cabinet openings.

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2—Battery Parts (*Q-LS-ST*)

2.1—Controlling the Battery

Sliding Battery Tray: The Sliding Tray Battery houses and protects individual batteries. Prior to sliding-out each of the trays, the screws securing it to the cabinet need to be removed and the yellow locking lever push down. To close, the reverse steps are required. The drawers slide out for ease of maintenance and service. When the drawers slide out, they are automatically disengaged from the battery string.

The Q-LSA-ST houses four individual battery slide-out locking trays.

The Q-LSB-ST through Q-LSE-ST cabinets each house eight individual battery slide-out locking trays.

Locking Battery Tray: As briefly mentioned above, the battery trays are equipped with slide locks; the yellow lock levers (at the lower right side of the tray) must be held down to unlock and open the battery tray.



Figure 4—Sliding Battery Tray in a Q-LSB-ST Cabinet

When fully opened, an open battery tray will lock itself open. To close the tray, hold the yellow lock lever down while pushing in the tray.



Figure 5—Using the Tray Locks

WARNING



Sliding battery trays **SHOULD NOT** have more than one drawer open at a time, or the cabinet may become unbalanced and fall forward.

A locking battery will not automatically lock all closed drawers when any one drawer is fully opened.

Terminal Block: The terminal block is located behind the lower-right access panel and the right battery access door (Q-LSC/D-ST) or the right-side panel (Q-LSA/B-ST) of the cabinet. The terminal block is used to connect the external battery module to the Q-LS cabinet and to the optional battery charger.

Note: The terminal block for the Q-LSE-ST battery cabinet is located above the right-hand set of battery drawers within the system.



For instructions on how to connect, see **5.2—Connecting Batteries**.

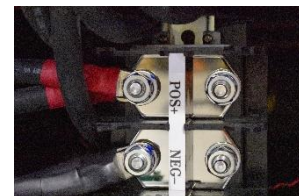


Figure 6—From left to right: Breaker, Terminal Block, Ground Bus Bar, and Sample Terminal Block Configuration

Ground Bus Bar: The ground bus bar allows the cabinet or module to be grounded, helping to prevent electric shock. Before using the *Q-LS Battery Module*, ensure that the module is properly grounded using this bus bar. The negative battery terminal should not be grounded. For more information about battery grounding, see **5.1.2—Grounding**.

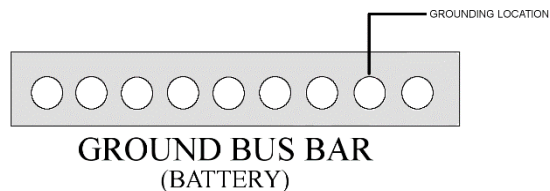


Figure 7—Grounding to the Ground Bus Bar

Right Breaker: The right circuit breaker controls power input to the top (or right) four battery drawers.

Left Breaker: The left circuit breaker controls power input to the bottom (or left) four battery drawers.

ELECTRICAL WARNING



Even if the circuit breaker is OFF, the batteries are an independent power source and remain charged. Batteries should not be handled unless absolutely necessary.

Illuminated Logo: The right battery access door includes an illuminated Power Innovations logo. Power to illuminate the logo is drawn from the main breaker to the door through a cable connected at the top of the door.

2.2—Additional Options

2.2.1—Battery Keeper (Charger)

If an optional Battery Keeper has been installed, it can be connected to the utility to continually charge the batteries during storage.

2.3—Storing the Battery Module

The battery module is equipped with 12 V rechargeable batteries. These batteries offer up to five years of standby service or more than 260 cycles at 100% discharge in cycle service. The batteries should be more than 75% capacity if they will be stored for more than six months at ambient temperature (25 °C). If storing a battery module that is not connected to a live Q-LS system for more than 90 days (three months), the batteries should be charged using the Battery Keeper to prevent degradation.

3—Installation

3.1—Unpacking the System

The Q-LS Battery Module is packed in a specially designed carton to protect it from damage during shipping. To transport or ship cabinets, use the original packaging.

When unpacking the battery, carefully remove all packaging materials from the module and ensure that all items are received with the cabinets.

Please reference your purchase order for a list of items included.



Note

The Q-LS *Internal Battery Module* comes from the factory already installed in the cabinet.

3.1.1—System Contents

All accessories, options, and items included with the cabinet or module should be compared with the purchase order and packaging receipt.

Included items will vary according to the order. Items often include, but may not be limited, to the following:

- Two standard 10-foot, 1/0 AWG cables (unless specified differently on the purchase order. one positive with red ends, one negative with black ends)
- One 14-foot 6 AWG green wire (for grounding)
- Manual on CD (if batteries are not part of a Q-LS system order)
- Four 0.5-inch diameter anchoring screws (fastened to pallet and cabinet)
- Four Mounting brackets (screwed to pallet and cabinet)

3.1.2—Inspecting the System

The Q-LS Battery Module has passed detailed production and quality control procedures for all electrical and mechanical characteristics before factory shipment. The system has also been packaged so it should arrive in perfect condition.

When receiving the module, check the general condition and mechanical structure for physical damage that may have occurred during shipment. If any physical damage is apparent have, the carrier must note the damage and contact Power Innovations immediately (see **Contacting Power Innovations** at the back of this manual).

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4—Preparing the Site

This chapter will explain how the site should be prepared to handle the system. Before installing the battery module, consider the following placement considerations:

4.1—Facility Readiness

Before installing battery cabinets, examine the installation site carefully. Wiring modifications and other changes may need to be made in preparation for attaching the Q-LS to the battery.

4.1.1—Electrician or Electrical Engineer Approval

It is important that an electrician or electrical engineer examine the site before the battery cabinets are installed. The electrician or electrical engineer should:

- Verify and approve the facility's wiring.
- Complete any necessary wiring preparations.
- Ensure that wiring to the battery and Q-LS complies with all local electrical codes.
- Install breakers to protect feed and output lines of the Q-LS.
- Verify and approve input and output cable sizes.
- Ensure that the system is grounded before it is made operational.
- Ensure that all outputs are properly referenced to ground.

ELECTRICAL WARNING



An electrician should be consulted about any external wiring decisions related to the system. Any facility wiring that may interact with the system should be approved by an electrician before installation.

WARNING



Inadequate cable size or oversized breakers may cause fire or damage. Decisions about electrical cable sizes should be approved by a qualified professional before the system is operated.

4.1.2—Personnel Access

Because the batteries store large amounts of power, personnel using the cabinets should know how to use them correctly. To ensure that no unauthorized individuals attempt to operate the system:

- The cabinets should be placed in a location where access is limited.
- Personnel who operate the cabinets should be proficient in normal and emergency operational procedures.
- Before operating the batteries or Q-LS, new personnel should be trained in their operation.
- The cabinet doors have locks, which can be used to prevent access if the cabinets are placed in a ready access area.

4.1.3—Site Considerations

Ensure that the placement of the Q-LS system complies with all local building codes.

Consider the following when choosing where the system will be installed:

- Select a site which has a floor strong enough to bear the weight of the *Q-LS Battery Module (Table 1)* and its associated Q-LS cabinets. (See MNL120 – Q-LS 10-160 kVA or MNL123 – Q-LS 180-550 kVA manual, as applicable.)
- Install the system on a level surface.
- Install the system in a location where the walls, ceilings, and floors are constructed from non-combustible materials.

Table 1—Cabinet Weights in Pounds and Kilograms*

Cabinet Type	Battery Size	Weight (lbs.)	Weight (kg.)
Single-wide	QLSA	1082	491
Single-wide	QLSA-ST	1082	491
Single-wide	QLSB	2165	982
Single-wide	QLSB-ST	2165	982
Double-wide	QLSC	3175	1440
Double-wide	QLSC-ST	3175	1440
Double-wide	Q-LSD-ST	3300	1496
Double-wide	Q-LSE-ST	3590	1628

*All weights are approximate and may change based on any requested customizations.



Caution

Do not place cabinets on uneven or unstable surfaces, especially without anchoring them. If any cabinet is placed on an unstable surface or anchored insufficiently, the cabinet could tip and cause injury.

4.1.4—Space and Ventilation

The Q-LS Battery Module should be placed in an environmentally controlled environment (see **Section 4.2**).

Measure the desired location of the system to ensure that all space requirements can be met (see **Figure 8** and **Figure 9**).

- Install the system with 762 cm (30 in) left open at its front so the system's door can open.

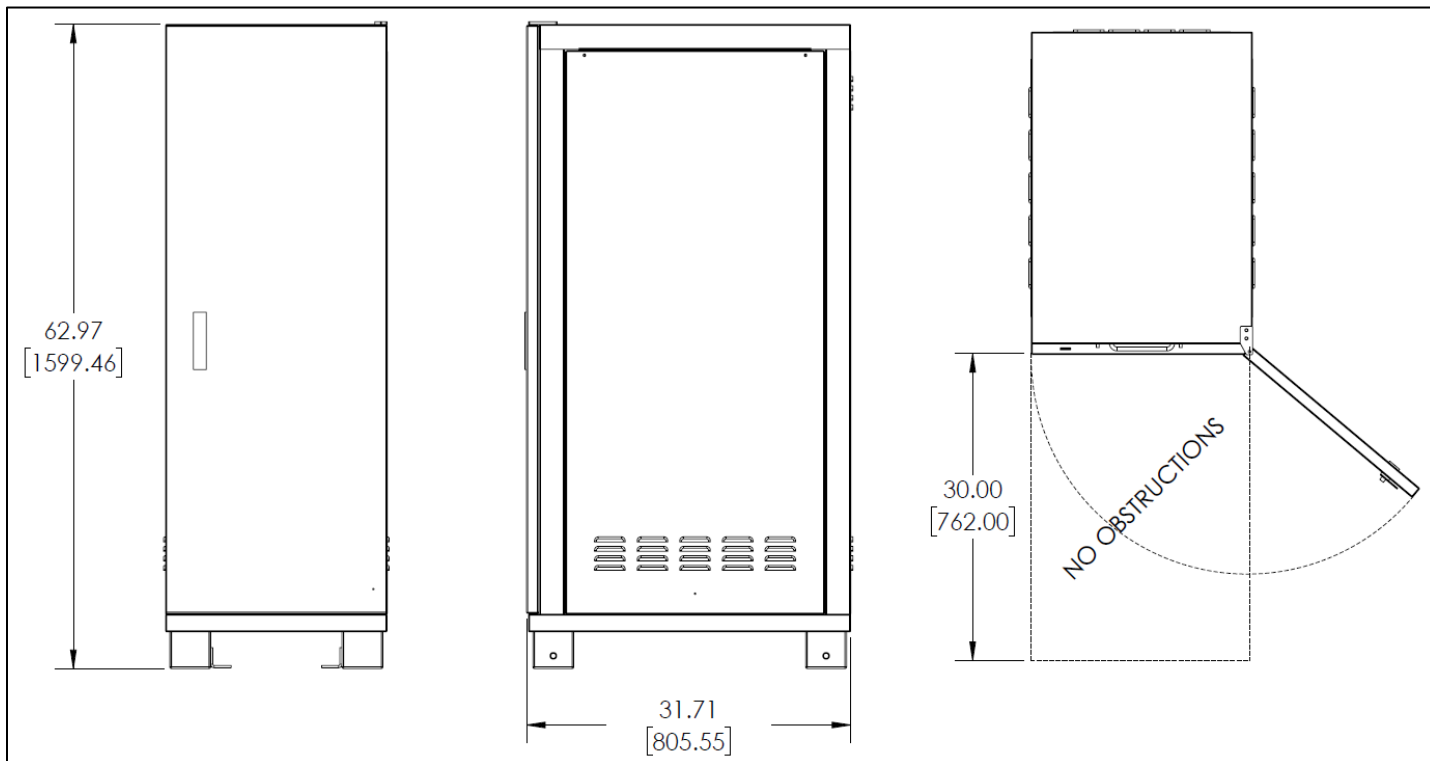


Figure 8—Single-wide Cabinet Dimensions and Clearances

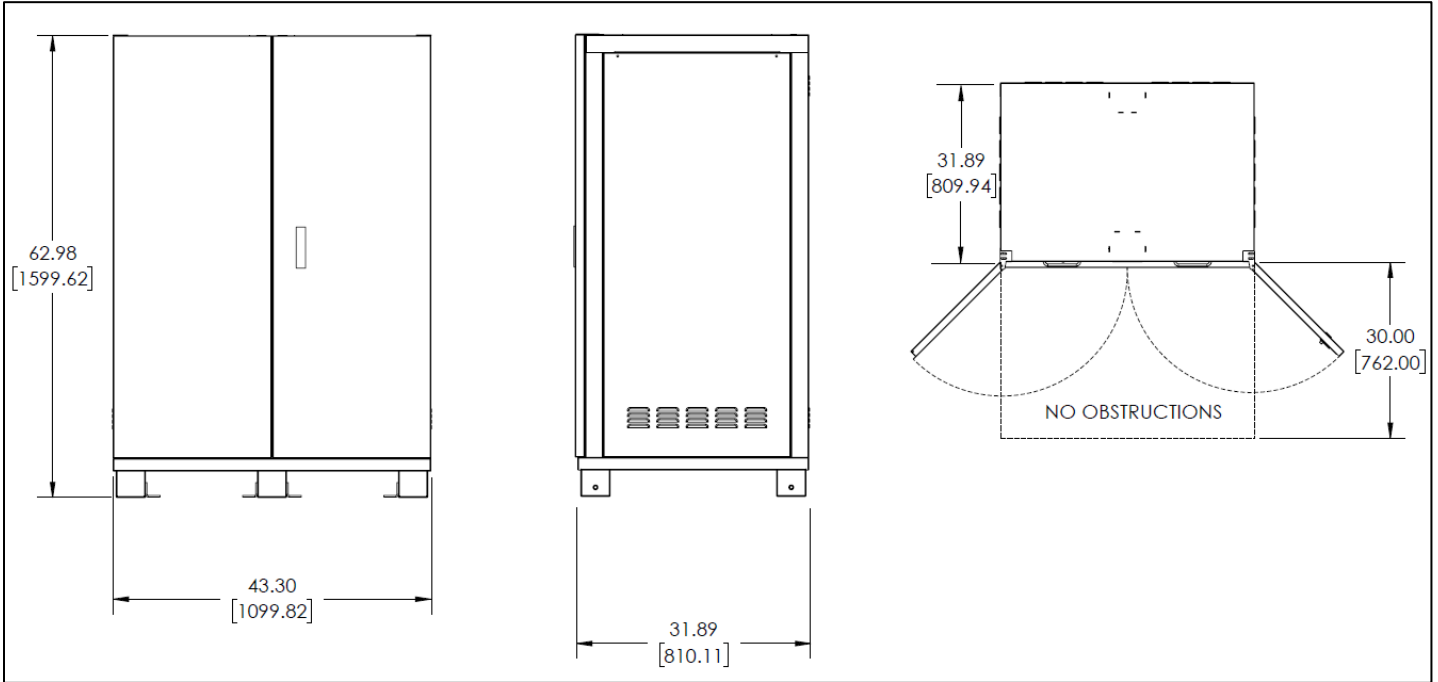


Figure 9—Double-wide Cabinet Dimensions and Clearances



Caution

Do not put objects directly on top of the cabinet.

4.2—Environmental Conditions

Other environmental factors may influence the life span of the unit(s). Q-LS Battery Modules can function in more extreme environments, but will work more efficiently in clean, dry environments with moderate temperatures.

4.2.1—Weather and Temperature

The system will operate better if placed in a controlled environment. An indoor location is the best, but the system can also be installed outdoors with appropriate accommodations.

The ideal temperature for batteries is 25 °C (77 °F), with humidity less than 80% noncondensing.

The system can operate normally in other environments. Consider the following factors, however:

- The standard batteries have a temperature range from -15 °C (5 °F) to 40 °C (104 °F), so the Q-LS system can operate normally in environments where the temperature is between 0 °C (32 °F) and 40 °C (104 °F).
- If a wider temperature range is desired, rugged batteries that can operate between -40 °C (-40 °F) and 80 °C (176 °F) with special metal jackets are available from Power Innovations.
- Avoid exposing the systems directly to the elements (sunlight, rain, snow, sand, dust, wind). If a system must be installed in an environment where the system will be exposed to the elements, request a system loaded into a container (see Caution and Note below).



Caution

Exposure to extreme conditions, sunlight, wind, or weather may cause system malfunction.



Note

Power Innovations provides a service in which Q-LS systems can be installed into modular, climate-controlled shipping containers that provide permanent protection.

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5—Mounting and Making Connections

5.1—Placing and Mounting

Using a pallet jack or forklift, move all cabinets near the locations where they will be mounted (recommended) and operated.

WARNING



Not mounting battery cabinets could cause injury from tipping or falling. Injury is especially likely to result if battery cabinets become unbalanced.

Before mounting system cabinets, be sure all placing recommendations presented in **4—Preparing the Site** and **3—Unpacking the System** have been followed.

WARNINGS and Cautions



When mounting systems, pick a floor that can handle system weight. Systems are very heavy and may cause injury if weight factors are disregarded. To add approximate weights of each cabinet, see *Table 1—Cabinet Weights in Pounds and Kilograms*.



Placing or mounting cabinets unwisely may lead to floor or structural damage.

- 1 Find the pallet-attaching brackets and bolts that came attached to the pallets. They will be used for cabinet mounting. If the cabinet to be mounted is a single-wide, skip **Step 2**.
- 2 If the cabinet received was a double-wide, check the bracket drilling location on the bottom of the cabinet *before* drilling mounting holes.

In **Figure 9**, eight bolt holes are shown for a double-side cabinet, but each double-wide cabinet will have six holes. Only one of the center holes on the long side of the cabinet will need to be drilled.

The front predrilled bracket hole will often require floor drilling on the right side of the center leg. The rear predrilled bracket hole will often require floor drilling on the opposite side.

The bolt hole will be 18.6 inches from the farthest side of the cabinet on either the left or right side of the center leg. It should be 0.5–0.625 inches wide.

- 3 Make sure the area where the cabinet is to be mounted is swept and dust-free. Clear all clutter.
- 4 Measure and mark the cabinet dimensions on the floor, using **Figure 11**.
- 5 Using **Figure 11**, measure the distance from system sides to each hole-drilling location. Mark each drilling location.
- 6 Drill one hole at each location.
- 7 Clear away floor shavings and any debris.
- 8 Move the cabinet to the location where it will operate. To match the holes in the floor to the predrilled holes in the cabinet chassis, line up the cabinet with the dimensions marked on the floor.
- 9 Using the six pallet-attaching brackets and twelve 19 mm nut and bolt sets, anchor each of the bolts to the chassis in the locations noted in **Figure 11**.

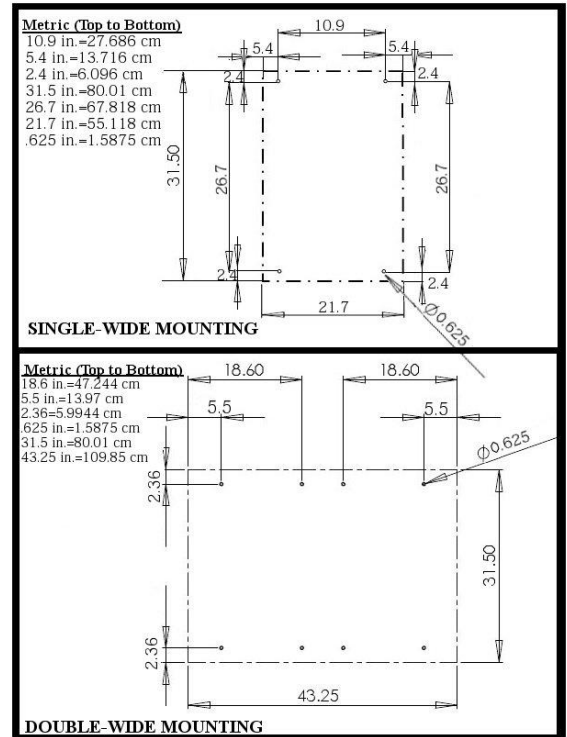


Figure 10—Cabinet Drilling Locations

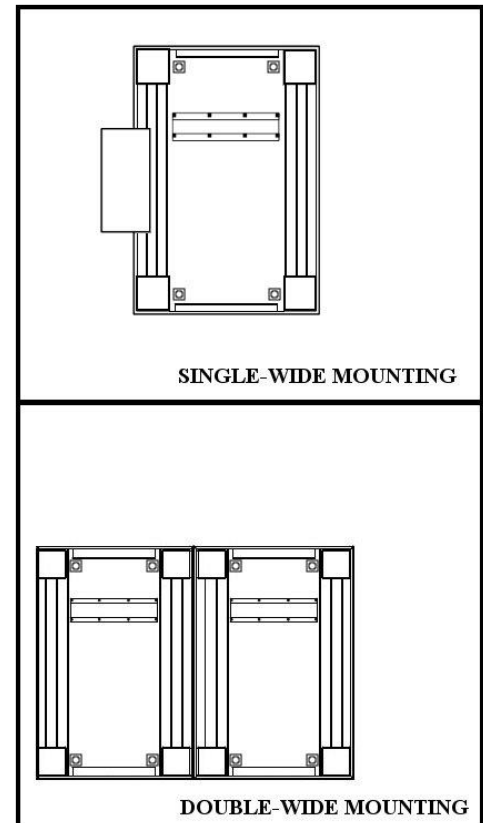


Figure 11—Predrilled Mounting Holes

5.1.1—Grounding Connections

- 1 Connect one end of a green ground cable into the grounding buss bar located on the bottom of the Q-LS chassis. Run the cable out through the bottom panel.
- 2 Connect the opposite end of the green ground cable up through the battery disconnect panel into the grounding buss bar in the Q-LS Battery system chassis (if using an external battery cabinet).
- 3 If all of the connector slots on the bus bar are being used, connect no more than two Phoenix Ferrule connectors to one slot.
- 4 Replace the bottom panel and re-secure it with the four securing screws. For torque settings, see **Appendix A: More about Installation.**

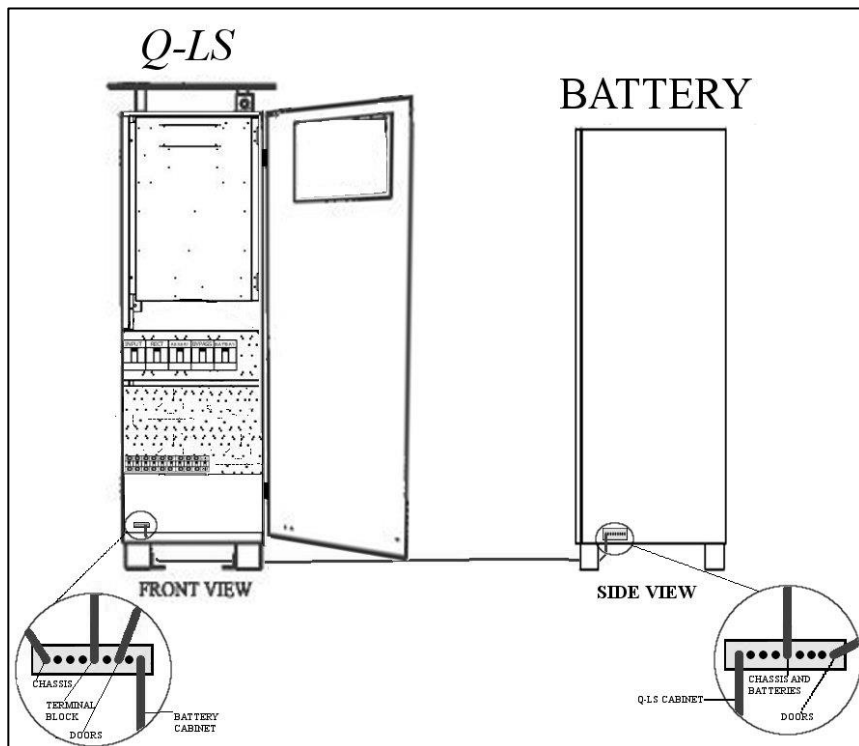


Figure 12—Grounding the Q-LS and Battery

ELECTRICAL WARNING



While making grounding connections, check that the terminal block, chassis, and battery have been correctly grounded to the bus bar on the Q-LS. An incorrect grounding connection could cause severe injury due to electric shock.



Note

Although more or fewer grounding connections may need to be checked, connections noted in **Figure 13** are some of the most common. The bus bar will not necessarily be located exactly where it is shown in **Figure 13**, but the bar will always be grounded to the base of the chassis.

5.1.2—Electrician or Electrical Engineer Approval

Make sure all external connections are verified by a qualified electrician or electrical engineer before the system is operated. Things an electrician should approve are noted in **4.1.1—Electrician Approval**.

If each of these things have been approved by an electrician or electrical engineer before the system has been installed, skip this step, and move to **5.2—Connecting Batteries**.

Have the electrician or electrical engineer verify:

- Downstream and upstream breakers
- Input and output cable sizes
- System grounding cables

5.2—Connecting Batteries

- 1 Open the front door of the Q-LS Battery cabinet. (X stands any of the cabinet options: A, B, C, D or E)
- 2 Unscrew the four screws and remove the battery disconnect panel from the bottom of the Q-LS battery cabinet.
- 3 Run the battery cables up through the bottom of the battery cabinet.
- 4 Remove the plastic covers over the battery terminals.
- 5 Connect the battery cables to the battery terminals.
- 6 Replace the plastic covers over the battery terminals.
- 7 Replace the battery disconnect panel and re-secure it with the four screws. For torque settings, see **Appendix A—More about Installation**.
- 8 Verify battery polarity on both sides of the battery interconnect cable.
- 9 If fuses are received with the system (on an internal system), place the battery fuses in the battery disconnect.



ELECTRICAL WARNING

Leave the battery disconnects OFF until instructed to turn them ON during startup procedures. Failure to do so may cause serious harm.

If the system is not being wired in either redundant configuration, the system is now ready to undergo Commissioning Checks.

6—Operation

6.1—Prestart Recheck

After the Q-LS Battery Module cables have been connected to the Q-LS, the batteries are ready to operate. Before turning ON any switches or breakers, recheck the following items:

- All breakers should be OFF.
- Battery fuses should be open (for internal batteries only)
- No packaging materials, tools, or other foreign materials are inside or on top of the cabinet.
- On the Q-LSx-ST Battery Module, ensure that all drawers are closed and secured.

6.2—Operating Procedures

6.2.1—Startup Procedure

The following steps should be used to start the Q-LS Battery Module:

- 1** Complete all startup instructions for the Q-LS system to which the battery module will be connected (see the *Q-LS Installation and Operations Manual*).
- 2** Make sure the INVERTER has been turned ON.
- 3** Connect the battery to the Q-LS system:
 - **Internal battery:** Insert the fuses.
 - **External battery:** Turn ON the BATTERY breaker(s) located on the front panel of the Q-LS Battery Module and the Battery Breaker in the Q-LS system.



Note

There may be one or two breaker switches in the battery module, depending on the battery configuration.

- 4** The Q-LS Battery module is now ready to power the DC bus whenever it becomes necessary.

6.2.2—Shutdown Procedure

To shut down the Q-LS Battery Module, follow these steps:

- 1** Turn OFF the Q-LS inverter by pushing the right and middle INVERTER buttons OFF simultaneously. The load will automatically transfer to reserve without any interruption to the output.
- 2** Turn OFF the Q-LS BATTERY breaker to disconnect the batteries. They will no longer supply the DC bus with power.
- 3** Turn OFF the battery module:
 - Turn OFF the breakers on the battery module.

7—Preventive Maintenance

Service and maintenance should be performed by certified service personnel only.

7.1—Battery Maintenance

Service technicians should perform preventive maintenance every 6 months.

The Q-LS Battery cabinet generally employs sealed-cell, lead-acid batteries, which do not require electrolyte level to be maintained.

Periodic visual inspections of battery and terminal voltages and connections, however, are necessary. These inspections should be performed following the recommendations outlined by the battery manufacturer.

Battery inspection and replacement procedures are detailed in the battery section of the *Q-LS Service Manual*.

ELECTRICAL WARNINGS

Take the following precautions when working with batteries:

- Remove watches, rings, and/or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on the batteries.
- Disconnect the charging source before connecting or disconnecting battery terminals.
- Check that battery terminals are securely connected and insulated. If not, remove connector, insulate, and reconnect.



When replacing batteries, use the battery specified by the manufacturer.

To prevent explosion, do not expose batteries to fire.

Do not open or mutilate batteries. The released electrolytes may be harmful to the skin and eyes.

Contact with any part of a grounded battery array can result in electric shock. The possibility of such shock can be reduced by removing unnecessary ground paths or connections.

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8—Battery Specifications

Table 2—Amperages and Ratings

		Q-LSA/Q-LSA-ST	Q-LSB/Q-LSB-ST	Q-LSC/Q-LSC-ST	Q-LSD-ST	Q-LSE-ST
Battery Amperage Rating		26 Ah	26 Ah	88 Ah	100 Ah	125 Ah
DC Voltage		348 VDC (nominal); 390 VDC (float)				
Recharge time		5 to 8 hours				
Battery charger		Constant voltage with current limit				
Boost charge		402 VDC				
Float charge		390 VDC				
Battery-low voltage		320 VDC				
Battery-low stop voltage		295 VDC				
Hot-swappable		Yes				
Dimensions	WxDxH, in.	21.5 x 32 x 63		43.5 x 32 x 63		43.5 x 32 x 69
	WxDxH, mm	546 x 813 x 1600		1104.9 x 813 x 1600		1105 x 813 x 1752
Weight	lb	1082	2165	3175	3300	3590
	kgs	491	982	1440	1496	1629

Table 3—Battery Backup Times per Q-LS using standard CSB batteries.

	Q-LSA-ST	Q-LSB-ST	Q-LSC-ST	Q-LSD-ST	Q-LSE-ST
Backup Time at Full Load					
Q-LS 10 kVA	47 min	113 min	169 min	180 – 240 min	
Q-LS 20 kVA	16 min	47 min	70 min	101 min	140 min
Q-LS 30 kVA	8 min	26 min	42 min	58 min	75 min
Q-LS 40 kVA	NA	16 min	27 min	46 min	70 min
Q-LS 50 kVA	NA	11 min	22 min	30 min	36 min
Q-LS 60 kVA	NA	NA	17 min	25 min	34 min
Q-LS 80 kVA	NA	NA	9 min (2 Qty-27 min)	15 min	25 min
Q-LS 100 kVA	NA	NA	6 min (2 Qty-22 min)	12 min	30 min
Q-LS 120 kVA	NA	NA	(2 Qty) 17 min	9 min	
Q-LS 160 kVA	NA	NA	(3 Qty) 20 min	5 min	
Q-LS 240 kVA	NA	NA	(4 Qty) 17 min	(3 Qty) 15 min	
Q-LS 320 kVA	NA	NA	(5 Qty) 15 min	(4 Qty) 15 min	
Q-LS 500 kVA	NA	NA	(8 Qty) 16 min	(6 Qty) 15 min	

NOTE: Backup times are approximate only and will gradually decrease as the batteries age.

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9—Warranty

Limited Warranty

Power Innovations International, Inc. (hereinafter “PI”), warrants this product to be free from defects in material and workmanship for a period of one year from the startup date, provided initial power-up is performed by a PI certified technician. The initial power-up must be performed within six months of the PI shipping date, and the product must be stored in a suitable environment prior to power-up, with batteries being charged as recommend. The warranty includes twelve-month coverage of parts only. Various service contracts that cover parts, labor, and travel are sold separately.

This Warranty does not cover any product that has been misused, not operated or handled according to the instructions contained in the User’s Manual, and/or which has been installed or serviced by an unauthorized technician.

Repair or Replacement

If any part or portion on the PI product fails to conform to the Warranty within the Warranty period, PI, will repair or provide a refurbished or new replacement within a reasonable turnaround time. Replacement parts will meet specifications of the original part or unit.

Proof of Purchase

Proof of purchase will be required by Power Innovations to substantiate date of purchase and to verify the Warranty period. Such proof of purchase must be an original bill of sale or receipt containing name and address of seller, purchaser, and the serial number of the product.

Legal Rights and Restrictions

This Warranty gives you specific legal rights. You may also have other rights which vary from state to state. This warranty is limited to the original end user of the product and is not transferrable. This warranty covers only PI supplied components. Any damage or service required because of third-party components is not covered under this warranty.

Limitation of Remedies

PI’s entire liability and the User’s exclusive remedy will be repair or replacement of the unit if all conditions described under Limited Warranty have been met. In no event will PI be liable for indirect, special, incidental, consequential, or exemplary damages of any kind whatsoever arising out of the use of this unit, including without limitation, lost profits, business interruption, or loss of data, whether any claim is based upon theories of contract, negligence, strict liability, tort, or otherwise.

Warranty Claims

Claim Restrictions

The product must not have been altered, repaired, or serviced by anyone other than a certified technician. The serial number of the product must not have been altered or removed. To be covered by this warranty, the product will not have been subjected to accident, misuse or abuse, or operated contrary to the instructions in the User's Manual.

Making a Claim

For any Warranty Claims, customers shall contact PI at 801-785-4123 or <http://powerinnovations.com/support>. It is the obligation of the customer to have the product or part shipped freight prepaid, to PI. All parts or products returned to PI for service and repair MUST have prior approval, which can be obtained by contacting <http://powerinnovations.com/support>. All products must be returned using original packaging.

Replacement of Parts/Components

It is often unnecessary to return a failed piece of equipment/components since this equipment uses plug-in type assemblies throughout. Replacement assemblies for the system covered by this manual are custom made and will be provided as soon as possible.

Contacting Power Innovations

Customer Support

Questions concerning the operation, repair, or maintenance of this equipment should be directed to the Customer Support Department of PI. When making such an inquiry, please provide the model number, serial number, and detailed description of the issue. To service or repair any product, the customer must obtain Customer Support Ticket number from Customer Support.

Contacting Power Innovations

If there is any question or comment about this product, please feel free to contact us.

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