Installation and Operations Manual

SEI 150/48-SEL-XXX
DC-UPS

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TABLE OF CONTENTS

DESCRIPTION

The SEI 150/48-SEL-XXX DC-UPS is a compact unit designed to power a wide range of customer equipment requiring battery-backed 48 Vdc power. The unit comes equipped with 150 Watts of rectifier power. The power distribution is provided on the rear of the unit via a fuse protected terminal block. The Alarm Contact Closures (ACC) are also accessed via this rear panel terminal block. Commercial (AC) power is applied to the left side of the rear unit. The SEI 150/48-SEL-XXX is designed to be mounted on a 19-inch rack and occupies 5.25 inches of rack space.

The SEI 150/48-SEL-XXX comes equipped with a field replaceable, non-spillable sealed lead acid battery pack. Circuitry within the DC UPS monitors and periodically tests the condition of the batteries and displays the results via front panel LEDs as well as Alarm Contact Closures (ACC). Loss of AC power is also communicated via the ACC. The DC UPS utilizes a Low Voltage Disconnect (LVD) circuit that prevents damage to the Battery Packs due over-discharge during an extended AC outage.

TECHNICAL SPECIFICATIONS

SEI 150/48-SEL-XXX

AC Input Power

Voltage	85-264 Vac
Frequency	47-63 Hz
Current	1.6 Amps Typical (115 Vac input, 150 W output)
	2.3 Amps Max

DC Output Power

Voltage	42.0 – 55.0 Vdc
Nominal (on AC)	54.8 ± 0.2 Vdc
Power	150 W max
Current	
Continuous (on AC)	2.7 Amps
Surge Current	
Batteries Installed	30 amps for 200ms, once per 15 seconds
Batteries Removed Or Depleted	5 Amps for 100ms
Fuse Rating	15 amps

Alarm Contact Closures

Rated Voltage (max)	380Vac
Switched Current (max)	
240 Vac	10 amps
24 Vdc	8 amps
Switched Power (max)	
AC	2000VA
DC	200W

Terminal Block Torque Rating 5.3 inch-lbs (0.6 Nm)

Battery Pack

Battery Type	Valve Regulate Sealed Lead Acid
Capacity	9 Ahr
Fuse Rating	
Front Panel Fuse	15 amps
Battery Pack Fuse	40 amps

Mechanical Dimensions

Width	19.00 Inches
Depth	8.25 Inches
Height	5.25 Inches
Weight	32 lbs

ENVIRONMENTAL SPECIFICATIONS

Temperature		
	Operating	-20 °C to +50 °C
	Storage	-20 °C to +50 °C
	Battery Charging	-20 °C to +40 °C
Humidity		0-95% non-condensing
Thermal Load		
	SEI-150	70 BTU/hr max

SAFETY INFORMATION

Always insure that the person assigned to the job can perform the job safely.

Always lift all equipment properly.

Always disconnect commercial power and remove the battery fuse before working on the unit.

Always replace the batteries with batteries of the same type and style.

DO NOT work on this equipment during an electrical storm.

DO NOT work in locations where there is condensing moisture or standing water.

Service to the DC UPS should be performed by a qualified technician.

INSTALLATION INSTRUCTIONS

GENERAL

The installation section of this manual will provide all the necessary information for room requirements, proper inspection, and installation.

Inspection

The equipment has been fully tested and inspected prior to shipment. Although the unit has been packed in accordance with good commercial practices, it does not preclude damage in transit.

The following actions should be taken on receipt of the equipment:

- Visually inspect the shipping container for damage. If damaged, request that the carrier inspect the shipment.

- Unpack the inner container from the shipping container and remove the unit from the packaging. Inspect the unit for visible damage.

If a claim for damages is to be made, it should be filed promptly with the transportation company. In addition, notify SEI within two days of delivery. SEI will advise the customer of any further procedures that may be required, including an RMA number, in the event that the unit has to be returned to the factory for repair.

Make sure the following items are included inside the package:

- SEI 150/48-SEL-XXX DC-UPS
- One AC Power Cord. (–IEC versions only)
- One Installation and Operations Manual.
- One 15A Front Panel Battery Fuse

Installation Requirements

AC Electrical Requirements

- The last three letters of the part number determines the method used to connect AC power to the unit.
    a. For – 0XX suffix units, the DC-UPS is equipped with a set of un-terminated 14 AWG wires, penetrating the rear panel. The value of the –0XX suffix denotes the length, in feet, of the wires. The Black wire is AC Line and the White wire is AC neutral.
    b. For –IEC suffix units, the DC-UPS is equipped with an IEC-320 C14 AC entry module. A 7 foot 6 inch power cord with a molded NEMA 5-15 plug is supplied.

Mounting Instructions

1. Unit Weight - The SEI 150/48-SEL-XXX weighs 32 lbs with the battery pack installed and 12 lbs with the battery pack removed. It may be advantageous to remove the battery pack before mounting the unit.
2. Battery Pack Removal
    a. Remove and retain the front panel battery fuse. (Not installed when unit ships.)
    b. Loosen the four cover retention screws and remove the front cover.
    c. Disconnect the 2-Pin Battery Pack connector on the left side of the battery pack.

Figure 1 Disconnect Battery Pack Connector

d. Remove and retain the two Battery Pack retention screws on the top of the battery pack.

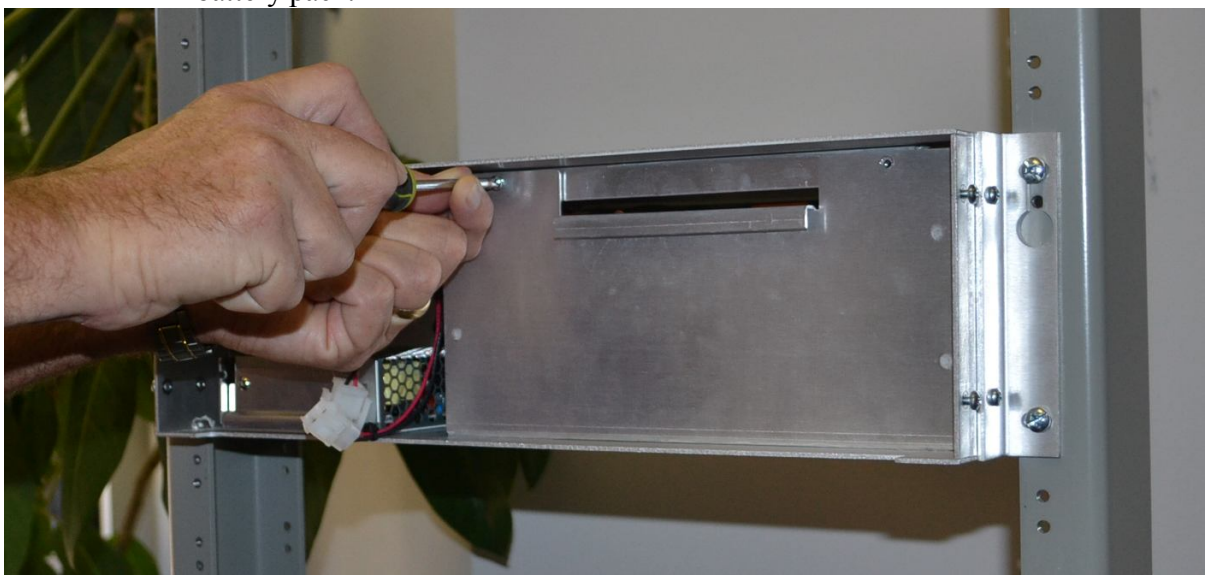

Figure 2 Remove Battery Pack Retention Screws

e. Slowly slide the battery pack out of the unit. When the rear of the battery pack contacts the retaining bracket, lift the front of the battery pack up and continue to slide the battery pack until it is out of the unit.

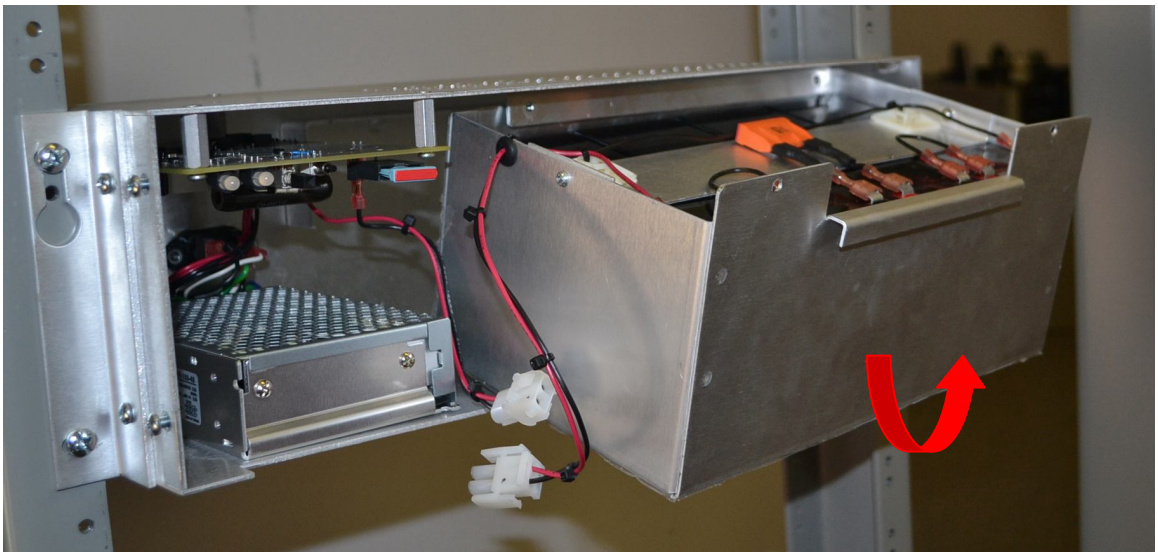

Figure 3 Slide Battery Pack Out – Lift Up to Remove

3. Rack Mounting - The SEI DC-UPS is designed to mount to a 19" rack using two rack screws per side. The mounting slots on each rack adapter are spaced in conformance with EIA standard RS-310-B.

4. Ventilation - It is important that the DC-UPS's ventilation ports not be blocked. Therefore, leave adequate space on top and bottom of the unit to ensure unrestricted airflow to the unit. It is recommended that a minimum of 3 inches of space be allowed on the top and bottom of the unit. The unit should be installed in a clean dry area where the ambient temperature does not exceed 50°C.
5. Attach Customer Equipment - Attach the equipment to be powered to terminal block on the rear of the unit. The maximum screw torque value is 5.3 inch-lbs (0.6 Nm).

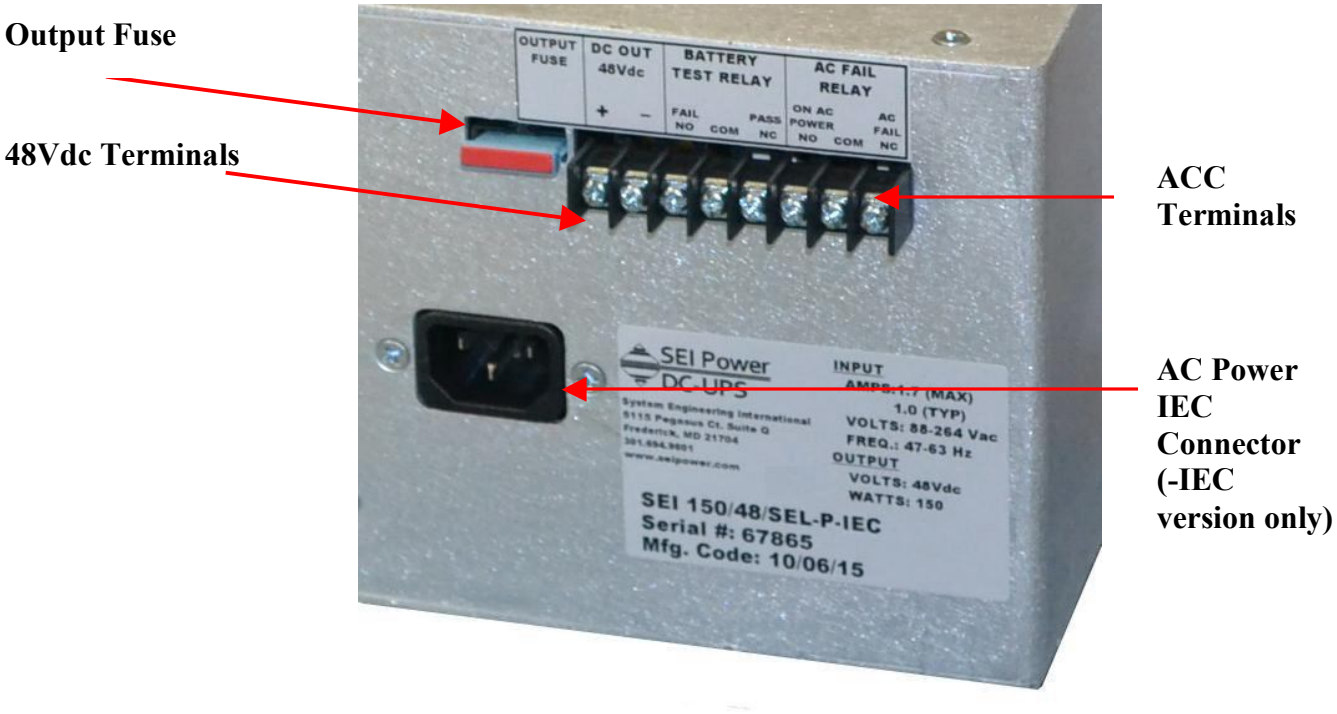

Figure 4 Rear Panel Connections

6. Attach to the ACC Connector – If desired, attach customer monitoring or indicating equipment to the Alarm Contact Closure via the rear panel terminal block.
7. Install the Battery Pack – If the battery pack was removed when mounting the unit
    a. Set the back of the Battery Pack into the unit.
    b. Lift the front of battery pack and slide the battery pack in until the rear of the battery pack clears the retention bracket. Lower the front of the battery pack and slide the battery fully into the unit.
    c. Install the two Battery Pack retention screws on the top of the battery pack.
    d. Connect the 2-Pin Battery Pack connector on the left side of the battery pack. Slide the battery cable harness to the left side of the battery pack.
    e. Install the cover and tighten the four cover retention screws.
8. Install the Battery Fuse – Install the ATO Battery fuse on the front panel of the unit.
9. Attach the AC-Power
    a. For standard units, attach the provided AC Power Cord to the IEC receptacle on the rear of the DC-UPS.

b. For –XXX option units, connect the hardwired AC power wires to the AC power feed. A 10-24 grounding stud is provided next to the AC power cable strain relief.

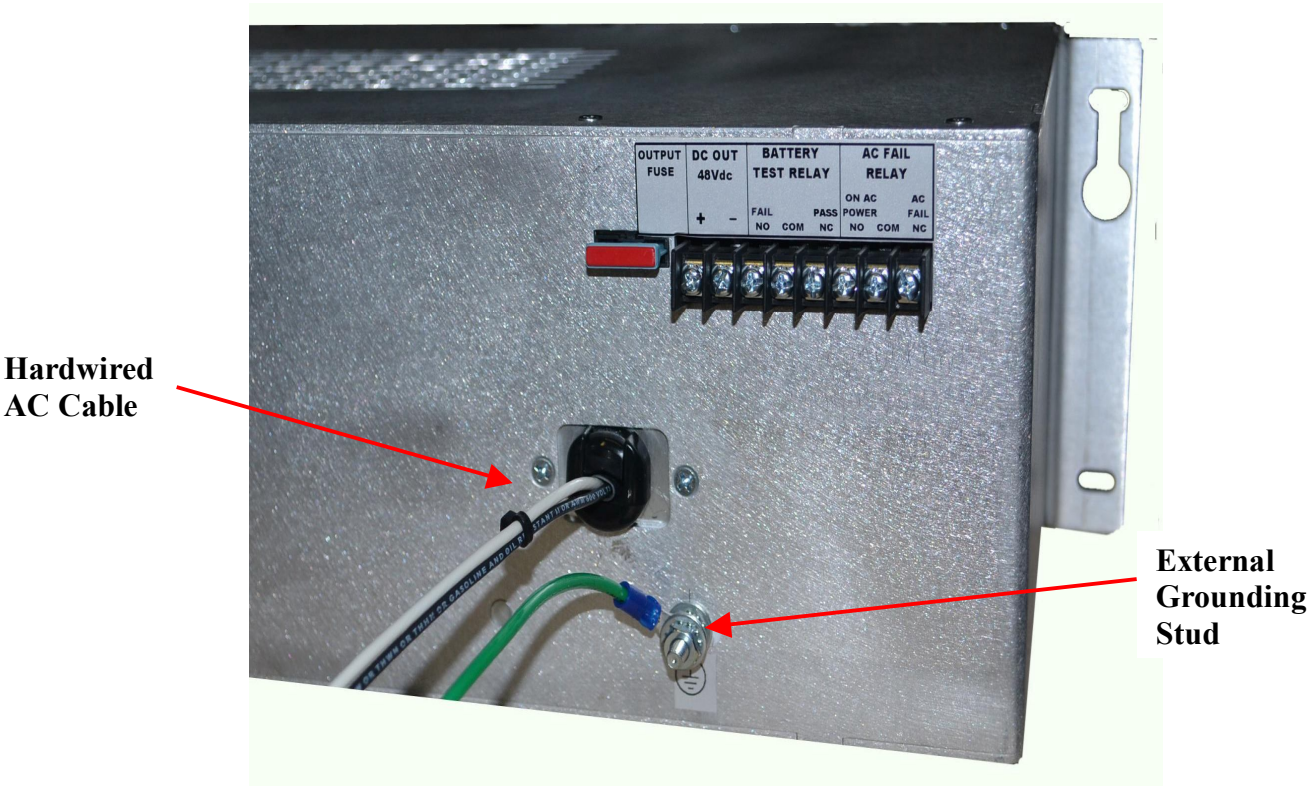

Figure 5 HW option AC connection

START UP AND CHECKOUT

Power On Checkout.

1. Once the unit is properly mounted, you may begin the checkout procedure. First, insure that all the equipment to be powered by the unit is installed.
2. Turn on the AC power feed to the unit.
3. When power is first applied, the front panel LEDs will go through a three second start-up sequence of red, green and flashing.
4. After the start-up sequence, the DC power output will turn on. Verify that the connected customer equipment is receiving power.
5. The Battery Charge Status LED will flash green. This indicates that the Battery Pack is charging.
6. Disconnect the AC feed. Verify that the Battery Charge Status LED is red. If there is no load on the DC-UPS this may take several seconds. Verify that the connected equipment is still receiving power.
7. Reconnect the AC power feed. The Battery Charge Status LED will flash green. This indicates that the batteries are charging.
8. If you have a specific question not addressed in this manual, please call **301-694-9601**, for technical support.

SYSTEM SHUTDOWN

1. The SEI 150/48-SEL-XXX DC-UPS is an uninterruptible power system. Therefore, cutting the AC power feed to the unit will not shutdown the DC power distributed to the loads until the battery pack is full discharged.
2. Disconnect the AC power feed.
3. Once the System Status LED turns red, press and hold the Battery Test Switch for 5 seconds. The front panel LEDs will turn off, indicating no power output.
    a. Alternatively, remove the Battery Fuse on the front panel of the unit.
    b. Wait a least 10 seconds before re-installing the Battery Fuse.

REPAIR AND MAINTENANCE

The SEI DC-UPS is engineered to operate unattended and with low maintenance overhead for extended periods of time. Although the electronics within the DC-UPS require no routine maintenance, the battery pack will have to be replaced periodically. When the unit indicates a Battery Test Failure via the front panel LED and the Alarm Contact Closure, the battery pack should be replaced immediately to ensure continued back-up power operation.

The battery pack can be removed and replaced without taking the power unit off-line. Follow the procedures outlined in the mounting instructions above to remove and re-install the battery pack.

STORAGE

The SEI 150/48-SEL-XXX may be stored at temperatures of 25°C or below for up to six months. The DC-UPS must be powered up for at least 48 hours every six months to maintain the batteries. For storage temperatures between 26°C and 40°C, the un-powered storage time must not exceed three months. For storage temperatures above 40°C, the un-powered storage time must not exceed one month. Failure to maintain the batteries will result in decreased battery capacity, decreased battery life and battery failure.
Note: The front panel battery fuse must be installed to charge the battery pack.

THEORY OF OPERATION

Theory of Operation

The following will provide you with an outline of operations and a list of modules found in the DC-UPS.

Modules

- Rectifier
- System Controller/LVD
- Battery Pack
- Output Terminal Block
- Alarm Contact Closure (ACC)

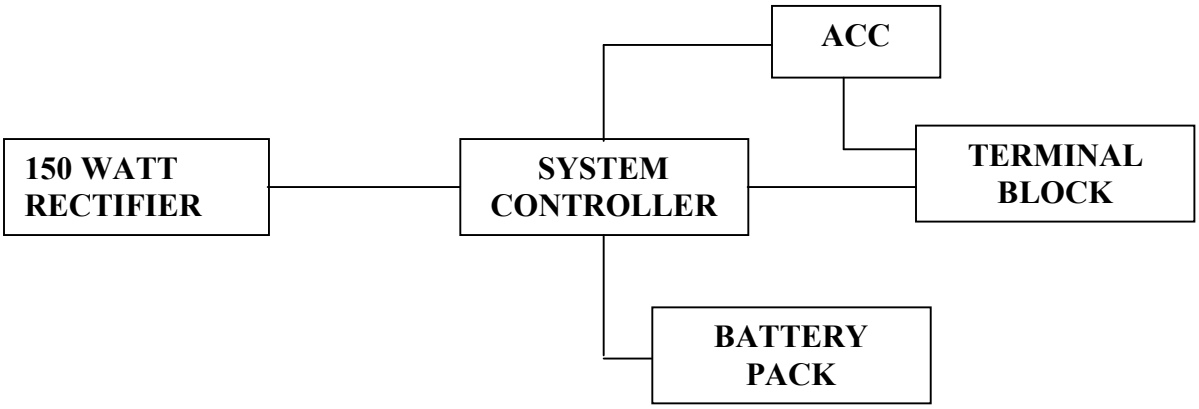

Figure 6 Functional Block Diagram DC-UPS

Rectifier

The 150W rectifier converts AC input power to regulated DC power to properly charge the battery pack. The input of the rectifier is fused for protection. This fuse is not user accessible.

System Controller/LVD

The System Controller has the following functions:

- Distribution of the DC power
- Battery charge voltage and current control and monitoring
- Battery Low Voltage Disconnect Function (LVD)
- Battery charge and test status indicators
- Automatic (every 24 hours) and manual battery test

Low Voltage Disconnect Function
The low voltage disconnect function will disconnect the battery when the battery voltage drops below 42.0 Vdc. This is done to prevent deep discharge of the batteries, which can adversely affect battery life.

LED Indicators
There are two LED indicators on the front of the unit; Battery Charge Status and Battery Test Status. The functions of these indicators are as follows:

Battery Charge Status: Constant Green – Fully Charged Flashing Green – Charging Constant Red – On Battery Battery Test Status: Constant Green – Battery Good Fast Flash Red – Wait, Then Test Slow Flash Red – Replace Battery	Manual Battery Test Switch –Push to Test *NOTE*: The Manual Battery Test switch is disabled when the battery is charging. Also, to prevent unnecessary battery discharge, the Manual Battery Test is disabled for 1 minute following a Battery Test. In both cases, the *Wait, Then Test* indication is displayed.

When a battery test is applied (either automatically or by pressing the battery test button) the Battery Test Status LED will turn off. Once the test is complete, the Battery Test Status LED will either be a Slow Flash RED for a failed test or Constant GREEN for a successful test. Additionally, once the test is complete the Battery Charge Status LED will Flash GREEN indicating the unit is charging the battery. During the battery test cycle, a load is applied to the battery. The system detects this discharge from the battery, as it would any other discharge, and automatically recharges the battery.

Battery Pack
The 9 Ahr non-spillable valve-regulated sealed lead acid battery pack provides DC power to load in the event of AC power loss. The battery pack will support a 150W load for up to 2 hours. Optimal battery life is achieved at an ambient temperature of 25°C. Under these conditions, the battery pack should last between three to five years, depending on frequency and depth of discharge. Operation at higher temperatures will decrease battery life.

Alarm Contact Closures

The DC-UPS Alarm Contact Closures provide relay contacts to remotely monitor the status of the unit. The AC Fail relay indicates whether the unit is operating on AC power or on battery power. The function of the Battery Test Fail relay changes based on the status of the AC Fail relay. If the DC-UPS is operating on AC power, The Battery Test Fail Relay indicates the status of the last battery test. If the DC-UPS is operating on Battery power, the Battery Test Fail Relay indicates whether the battery voltage is greater than or less than 48Vdc.

AC Fail Relay State	Battery Test Fail Relay State	DC-UPS Operating Status
NO	NC	On AC Power, Battery Test Pass
NO	NO	On AC Power, Battery Test Fail
NC	NC	On Battery Power, Battery Voltage > 44.0Vdc Or DC-UPS shutdown
NC	NO	On Battery Power, Battery Voltage < 44.0Vdc

Fuses

The SEI 150/48-SEL-XXX DC-UPS contains a total of four fuses.

1. Rectifier AC input fuse – this fuse is not user accessible. If this fuse is blown the unit is no longer safe to operate.
2. Battery Pack Fuse – The battery pack is assembled with a 40 amp fuse between the second and third battery. This fuse is intended to protect the battery pack from a short circuit when the pack is not installed in the DC-UPS.
3. DC Output Fuse – On the rear panel of unit, next to the output terminal block, this fuse limits the output current of the DC-UPS.
4. Battery Fuse – On the front panel of the unit next to the LED indicators. This fuse can be removed to shut down the DC-UPS when operating on battery. After removing this fuse, wait a least 10 seconds before re-installing it.

The unit is shipped with 15 amp fuses for the output and battery fuses. This value is required in order to allow the unit to provide the 200 millisecond, 30 Amp pulse mode operation. If high current pulse operation is not required or is of a lower pulse current value, the fuse value may be reduced per the chart below to provide a greater level of overload protection. The two fuses should always be the same value. The minimum value of both fuses is 5 Amps, to support battery test load current.

Fuse Value	Part Number 80Vdc	Part Number 58Vdc	Max. Pulse (200mSec)
15 Amp	Littlefuse 166.7000.5156	Littlefuse 142.6185.5156	30 Amps
10 Amp	Littlefuse 166.7000.5106	Littlefuse 142.6185.5106	20 Amps
7.5 Amp	Littlefuse 166.7000.4756	Littlefuse 142.6185.4756	15 Amps
5 Amp	Littlefuse 166.7000.4506	Littlefuse 142.6185.4506	10 Amps