SEL-UPS Data Sheet

Uninterruptible Power Supply

Major Features and Benefits

The SEL-UPS offers continuous simple and economical auxiliary power for SEL relays or any other load requiring up to 0.6 A at 48 Vdc, allows battery replacement without loss of relay protection, and helps prevent deep battery discharge and the resulting permanent battery damage.

- Supplies 6 AH nominal to a 48 V load
- Sources 30 A surge current for 200 ms
- Prevents deep discharge with automatic undervoltage shutdown of battery
- Maintains relay power when batteries are replaced
- Uses charge limiting and temperature compensation to prevent battery venting

Product Overview

The SEL-UPS offers simple and economical auxiliary power for SEL relays, or any load requiring up to 0.6 A at 48 Vdc. The SEL-UPS consists of four 12 V, 6.5 AH sealed lead acid batteries and a temperature-compensated battery charger.

Available Configurations

The SEL-UPS is available configured for either 120 Vac input or 240 Vac input. While input power is present, the SEL-UPS can drive a 0.6 A, 48 V load indefinitely and maintain the storage batteries at 100 percent capacity. Upon removal of ac input power, the batteries provide output power, and the SEL-UPS supports a 0.25 A load (one SEL-100 or 200 series relay) for 24 hours or a 0.6 A load (e.g., two relays) for eight hours. When the batteries discharge to less than 40 V, the load is automatically isolated to prevent deep battery discharge and possible permanent battery damage.

Temperature-Compensated Charging

When ac power is restored, the batteries are recharged to 90 percent of full capacity within 24 hours and 100 percent of full capacity within 48 hours. The charging process is temperature compensated and carefully controlled for safe and accurate recharging over the entire specified temperature range. This process avoids undercharging, overcharging, and venting.

Surge Current Source

With the battery pack installed and charged to more than 25 percent of full capacity, the SEL-UPS can supply a 30 A surge current for 200 ms. Surges drawn from a battery discharged to less than 25 percent of full capacity may trip the load isolation circuit intended to prevent deep battery discharge. Surge currents larger than 30 A or longer than 200 ms may degrade the ability of the battery fuse to survive 2000 trip operations at 30 A.

Long Battery Life

The batteries in the SEL-UPS can operate for 120 charge/discharge cycles over an expected four-year lifetime, and retain 80 percent of full capacity after eight months of open-circuit storage at +40°C.

Applications

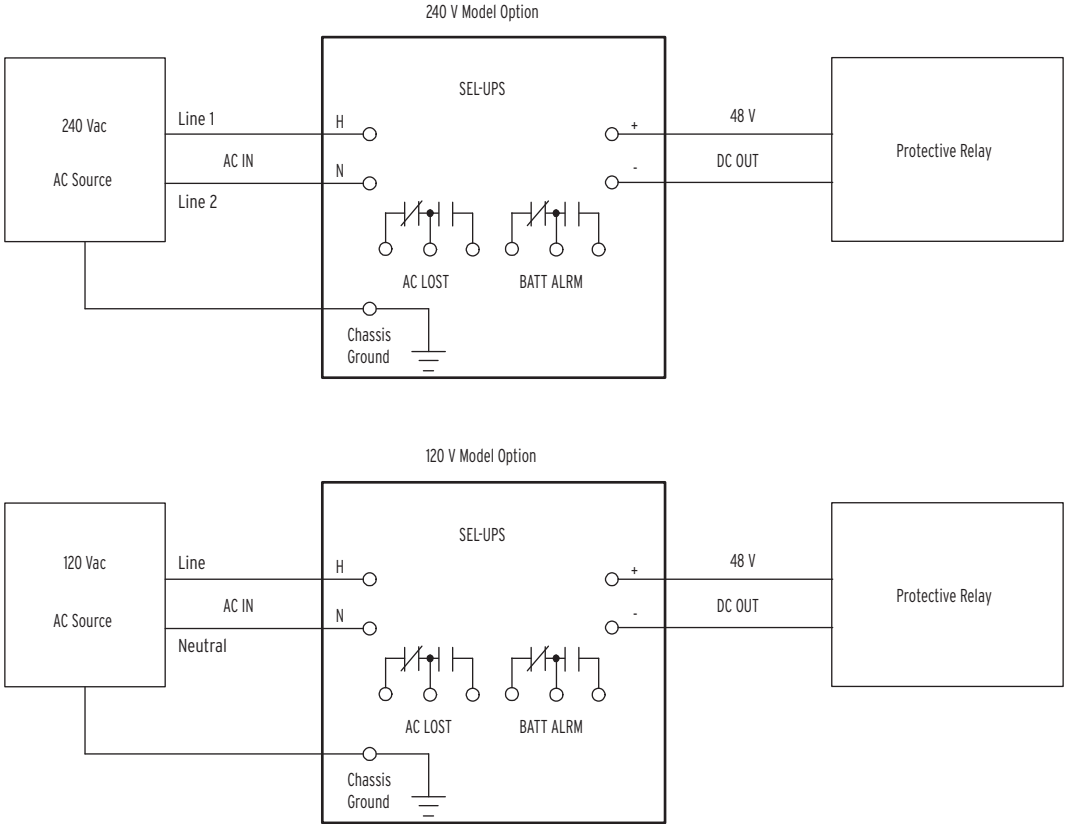

Figure 1 Application Diagram

Installation

Much of the weight of the SEL-UPS is contained in the two drawout assemblies. If the assemblies are removed before mounting, the chassis will be lighter and easier to mount.

The SEL-UPS is designed for mounting by its front vertical flanges in a 19" vertical relay rack. It may also be mounted semiflush in a switchboard panel. Use four #10 screws for mounting (see *Figure 5*).

AC power should be connected to the three-position terminal strip on the back of the SEL-UPS. Power should be connected to the two terminals marked "AC IN." DO NOT connect safety ground to this terminal strip. A ground lug is located below the three-position terminal strip. This lug should be connected to the equipment ground bus (see *Figure 1* for model-specific connection diagrams).

To avoid discharge caused by leakage current, the SEL-UPS batteries have been disconnected for shipping and storage. Before the unit is placed in operation, the batteries must be reconnected. To reconnect the batteries, first withdraw the battery drawout assembly. Then find the wire jumper that is temporarily attached to the top of the batteries. Install this jumper between the vacant terminals on the second and third batteries.

A one-inch space should be left directly above and below the SEL-UPS to allow for adequate ventilation and cooling. Because the SEL-UPS is ventilated, it must be installed indoors or in a weatherproof enclosure.

The SEL-UPS signals failure conditions via Form C (normally open and normally closed) relay output contacts on the main rear-panel terminal block. *Table 1* describes the alarm contact conditions.

Table 1 SEL-UPS Alarm Contacts

Alarm Contact	Description
BATT ALARM	Indicates that the battery fuse is open while the battery is connected. In addition, the BATT ALARM contacts change state when the DC OUTPUT voltage drops below approximately 30 Vdc. Note that the BATT ALARM contacts do not provide any indication of battery availability when AC power is present.
AC LOST	Alerts operators that ac input power is not present.

Testing the SEL-UPS

Functional

The SEL-UPS may be tested before or after installation is complete.

Perform the following steps to test the unit before installation:

Step 1. Connect a suitable load such as any 48 V SEL relay to the DC OUT terminals noting the polarity markings on the SEL-UPS and on the load.

Step 2. Press the Battery Start Switch.

Step 3. Verify:

a. Power out (POWER OUT) LED illuminates,

b. Battery alarm (BATT ALRM) output pulls in,

c. SEL-UPS supplies current to the load.

Step 4. To end the test, withdraw the battery drawout assembly until the power out (**POWER OUT**) LED goes out.

Perform the following steps to test the unit after installation:

Step 1. Connect a suitable load such as any 48 V SEL relay to the DC OUT terminals noting the polarity markings on the SEL-UPS and on the load.

Step 2. Apply rated ac power.

Step 3. Verify that the power (**POWER IN** and **POWER OUT**) LEDs illuminate, and the fuse (**BATTERY FUSE**) LED is extinguished. The battery charging (**BATTERY CHRG**) LED may be illuminated if the batteries have less than a full charge.

Step 4. Confirm that the SEL-UPS is supplying load current by removing the ac line fuse located on the front panel of the PCB drawout assembly.

Step 5. After the ac line fuse is removed, verify that the power out (**POWER OUT**) LED is illuminated, and the SEL-UPS still supplies load current.

Step 6. To end the test, replace the ac line fuse.

Dielectric Strength Testing

High-potential (2500 Vdc) testing can be performed with both the battery drawout assembly and the PCB drawout assembly installed. All terminals can be bonded together and tested with respect to chassis, or any group (AC IN, DC OUT, BATT ALRM, AC LOST) can be tested with respect to any other group or with respect to the chassis.

Maintenance

Batteries

The batteries in the SEL-UPS are rated for 120 charge-discharge cycles over a four-year period. *Figure 2* shows typical discharge time versus temperature at various discharge rates. The capacity of the batteries should be tested yearly by comparing actual discharge times to those shown in *Figure 3*.

Figure 3 represents typical resistive load battery capacities starting fully charged and ending at 40 V. A battery pack is fully charged if charging current is less than 85 mA at a charging voltage of 54 V.

The battery drawout assembly can be removed for testing or replacement without interrupting power to the load. The batteries in the SEL-UPS are sealed and no periodic maintenance, such as electrolyte level checks, is required. On SEL-UPS units shipped after December 1, 2008, a temperature recording strip is provided in the

battery compartment. The temperature recording strip is located on top of the batteries and indicates a temperature range of +43° to +71°C. Battery inspection should include checking the temperature recording strip for indications of operating temperatures at or above +60°C. Temperatures in this range reduce the battery charging capacity and may cause battery case distortion.

Battery Fuse and AC Line Fuse

The battery fuse is located inside the battery compartment, behind the battery drawout assembly. The BATT ALRM is activated and the **BATTERY FUSE** LED is illuminated if the fuse is blown or removed. The fuse is intended to protect the SEL-UPS from short circuit current. Replace only with a 3AG type, 8 A slow-blow fuse.

The ac line fuse is located in a panel-mount fuse holder on the front of the electronics drawout assembly. The AC LOST alarm is activated and the power in (**POWER IN**) LED is extinguished if the fuse is blown or removed. Replace only with an MDL type, slow blow fuse as stated in the *Specifications*.

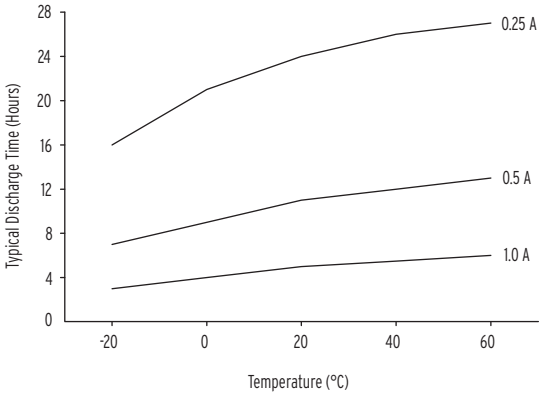

Figure 2 Typical Discharge Time Versus Temperature at Various Discharge Rates

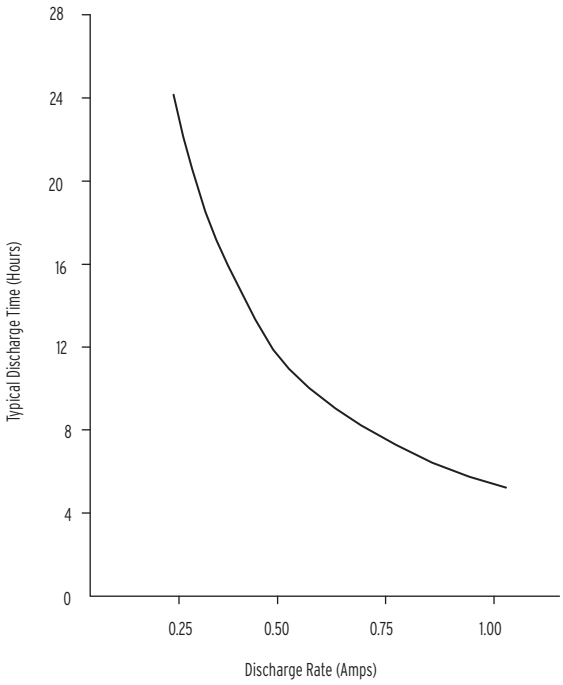

Figure 3 Typical Discharge Time Versus Discharge Rate at +25°C

Guideform Specification

The uninterruptible power source shall provide dc power for equipment that must maintain operation should the primary ac power source fail. Specific requirements are listed below:

- **Temperature Compensated Charging.** The device shall compensate battery charging using internal ambient temperature sensors.
- **Sealed Lead-Acid Batteries.** The device shall support sealed, lead-acid type batteries with a rating of 6.5 ampere-hours (Ah) at 48 Vdc.
- **Drawout Battery Tray**. The device shall provide a drawout battery tray with retention to prevent the tray from accidentally being fully removed from the chassis.
- **Fuse Protection of AC Power Source**. The device shall provide a fuse to protect the input ac power source. The fuse shall be serviceable without the need for special tools. The ac LOST alarm is activated and the **POWER IN** LED is extinguished if the fuse is blown or removed.
- **Fuse Protection of DC Power Source.** The device shall provide a fuse to protect against overcurrent conditions on the dc output. The BATT ALRM contact output is energized and the **BATTERY FUSE** LED is illuminated if the fuse is blown or removed.

- **No Loss of Load Voltage During Transition from AC to Battery Power.** The device shall provide uninterrupted dc power to the load during a transition between ac and battery power sources.
- **Front-Panel Power In and Power Out Indications.** The device shall provide LED indications on the front panel for ac power In (source) and dc power out (load).
- **Long Battery Life.** The batteries in the SEL-UPS can operate for 120 charge/discharge cycles over an expected four-year lifetime, and retain 80 percent of full capacity after eight months of open-circuit storage at +40°C.
- **Reliability.** The vendor shall supply the actual measured Mean Time Between Failures (MTBF) for the device upon request.
- **Service.** The device shall include no-charge technical support for the life of the product.
- **Manufacturer.** The device shall be manufactured in the U.S.A.
- **Warranty Return.** The vendor shall support a 72-hour turnaround on all warranty repairs.

Dimensions

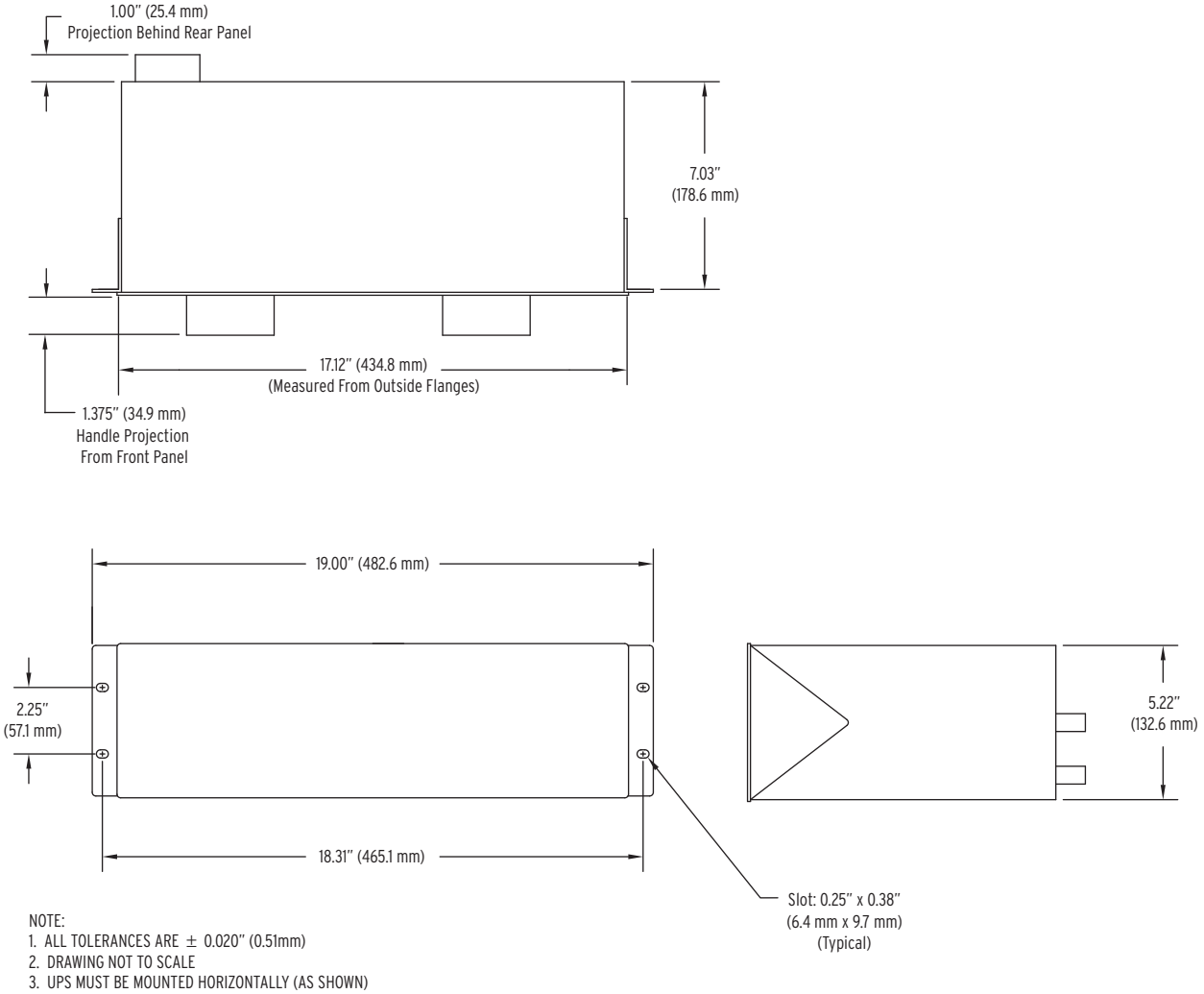

Figure 4 SEL-UPS Dimensions, Panel Cutout, and Drill Plan

Front- and Rear-Panel Diagrams

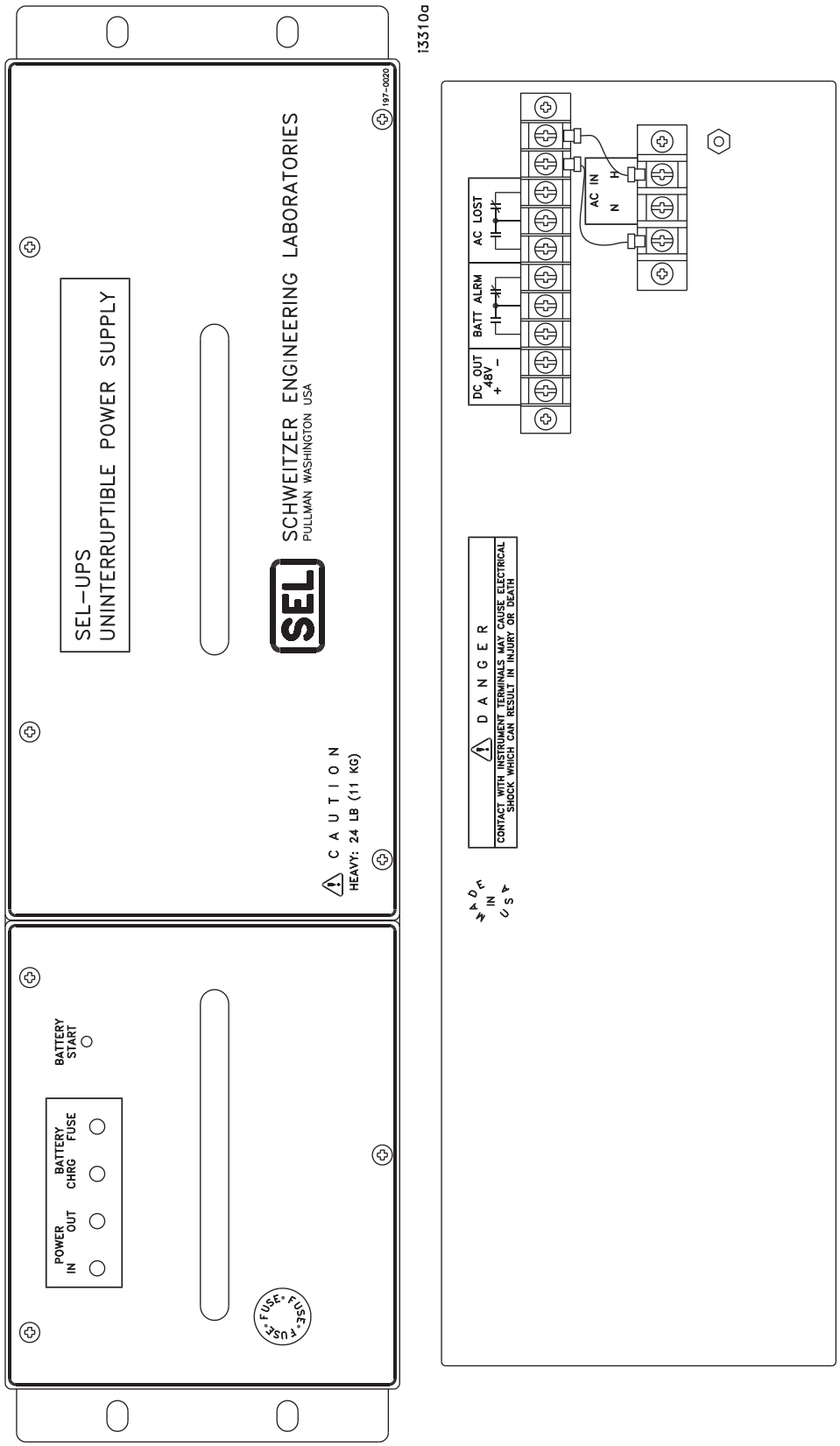

Figure 5 SEL-UPS Horizontal Front- and Rear-Panel Drawings With Factory Installed Real-Panel Jumpers Shown for Clarity

Specifications

General

Dimensions

13.3 cm x 48.3 cm x 21 cm (5.25" H x 19" W x 8.25" D)

Unit Weight

17.7 kg (39 lbs) including batteries

LED Indicators

POWER IN:	(Green) ac power input is present
POWER OUT:	(Green) dc power output is available
BATTERY CHRG:	(Yellow) Battery is charging
BATTERY FUSE:	(Red) Battery fuse is blown

Control

Battery Start Pushbutton

Input

UPS048-4:	100 to 140 Vac, 120 Vac 50/60 Hz nominal, fuse-protected
UPS048-6:	200 to 265 Vac, 240 Vac 50/60 Hz nominal, fuse-protected

Fuses

AC Line, MDL Type:	UPS048-4 2 A slow blow UPS048-6 1 A slow blow
Battery, 3AG or MDL Type:	8 A slow blow

Rated Current Output

0.6 A at 48 Vdc indefinitely while ac power is present.
0.6 A for 8 hours or 0.3 A for 24 hours after loss of ac input power.

Nominal Voltage Output

54.6 Vdc ±0.5 Vdc with unloaded output and charged batteries connected

Battery Charger

Charge Method:	Taper
Float Method:	Constant voltage
Battery Type:	Lead acid
Battery Voltage:	48 Vdc

Surge Current

30 A for 200 ms, once per 15 seconds, 2000 operations with batteries installed and charged to more than 25 percent of full capacity. The battery fuse may degrade after more than 2000 operations and should be replaced accordingly. 5 A for 100 ms, once per 15 seconds, 2000 operations with batteries removed. The ac line fuse may degrade after more than 2000 operations and should be replaced accordingly.

ALARM Contacts

AC LOST Alarm (Form C):	ac power lost
BAT ALRM (Form C):	dc output off or battery fuse blown

Output Contact

30 A make per IEEE C37.90

Configuration:	1 C/O contact, 1 N/O contact, 1 N/C contact
Type:	Single contact
Rated Current:	8 A
Rated Voltage / Maximum Breaking Voltage AC:	250 Vac / 400 Vac
Maximum Breaking Capacity AC:	2000 VA
Make Current (Max. 4 s at Duty Cycle 10%):	30 A

Operating Temperature Range

Discharge:	–40° to +60°C (–40° to +140°F)
Charge:	–18° to +49°C (0° to +120°F)

Note: The batteries may not charge to 100% capacity outside this temperature range.

Storage Temperature Range

Fully Charged:	–40° to +60°C (–40° to +140°F)

Note: Exposure to temperatures outside this range may result in permanent damage to the batteries.

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