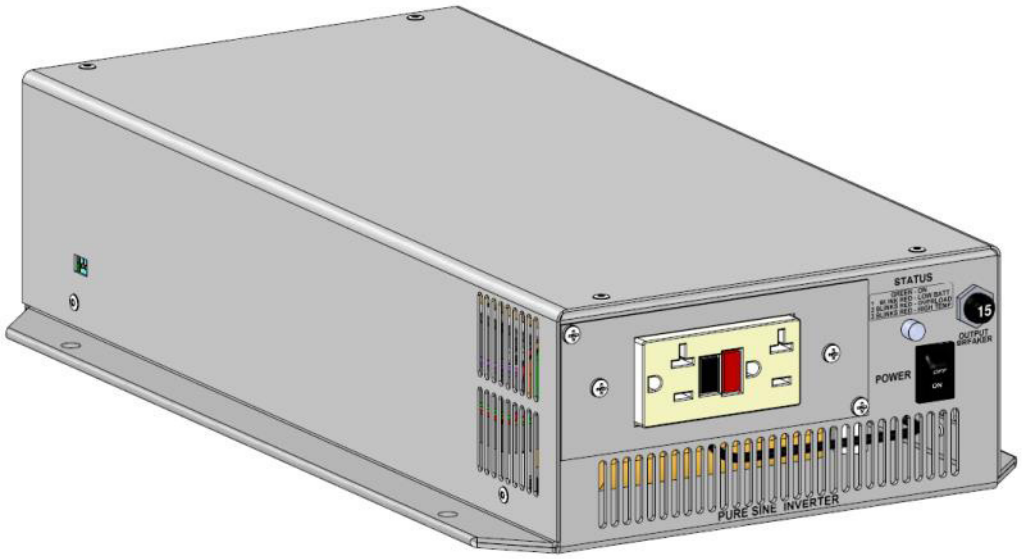
DIMENSIONS™

DC to AC Power Inverter
Pure Sine Wave Output

Owner's Manual



Models:
12LP10
12LP10H
12LP10HR

Sensata
Technologies

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INTRODUCTION

Thank you for purchasing a Dimensions™ Inverter from Sensata Technologies®! We think that you will find this product to be extremely reliable and easy to use.

Please read this manual completely before installing or operating the unit.

Contact Us

Sensata Technologies can be reached by phone or email if you need assistance with this product.

Phone: 1-800-553-6418 or 1-651-653-7000
Fax: 1-888-439-3565 or 1-651-653-7600

E-mail: inverterinfo@sensata.com
Website: http://magnum-dimensions.com/

Important Safety Information

Read this manual before installation. This manual contains important instructions pertaining to safety, installation, and operation.

Save this manual and keep it in a safe place.

Sensata Technologies is an ISO 9001:2015 Registered Company.

Sensata uses the following special notices to help prevent injury and/or damage to equipment:

Safety Symbols

⚠ DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION is used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE is used to notify of installation, operation, or maintenance information that is important but not hazard related.

Safety Listing

c UL us LISTED

Power Inverter, E100666

Important Safety Information Continued

Inverter Safety Instructions

- ⚠ WARNING: Power inverters produce hazardous voltages. To avoid risk of harm or fire, the unit must be properly installed.
- ⚠ WARNING: There are no user serviceable parts inside. Do not remove the cover.
- ⚠ WARNING: Power inverters should not be mounted in a location that may be exposed to rain or spray.
- ⚠ WARNING: Power inverters should not be installed in a zero-clearance enclosure.
- ⚠ WARNING: Damage to the power inverter will occur if correct polarity is not observed when installing the inverter's DC input cables.
- ⚠ WARNING: Damage to the power inverter will occur if an external AC power source is applied to the inverter's AC hardwire output.
- ⚠ WARNING: Power inverters contain a circuit breaker and capacitor that may produce a spark upon connection or during normal operation. Do not mount in a confined battery or gas compartment
- ⚠ WARNING: Be sure the power inverter is turned OFF and AC power is disconnected when batteries are being connected, disconnected, serviced, and replaced or personal injury and/or damage to the inverter could result.
- ⚠ WARNING: Working near lead-acid batteries is dangerous. There is a risk of acid exposure.

Battery Safety Instructions

- ⚠ WARNING: Batteries generate explosive gases during operation.
- ⚠ WARNING: There is risk of high current discharge from shorting a battery that can cause fire and explosion. Use insulated tools during installation.
- ⚠ WARNING: Remove all rings, watches, jewelry, or other conductive items before working near the batteries.
- ⚠ WARNING: Inspect the batteries at least once a year for cracks, leaks, or swelling.
- ⚠ WARNING: Dispose of the batteries according to local regulations. Do not incinerate batteries; there is risk of explosion.
- ⚠ WARNING: A fuse must be installed between the battery and the inverter to protect against shorted cables.

Specifications

Output Power (Watts Cont.)	1000
Output Current (Amps AC Cont.)	8.3
Input Current (Amps DC Cont.)	Up to 110
Peak Power (Watts)	2000
Peak Output (Amps AC)	23.5
Motor Starting Rating (hp)	1/3
Weight (lbs.)	20
Dimensions (in inches) (LxWxH)	17.3 x 9.0 x 3.6
Output Voltage (VAC)	120 +/- 5%
Output Frequency	60 +/- .05%
Output Waveform	Pure Sine <5% THD
Input Voltage (VDC)	10.5 – 16.0
DC Surge Voltage	Up to 24 VDC
Operating Temperature	-20°C to 65°C (0°F to 149°F)
Efficiency	Up to 82%

Table 1 Specifications

Components

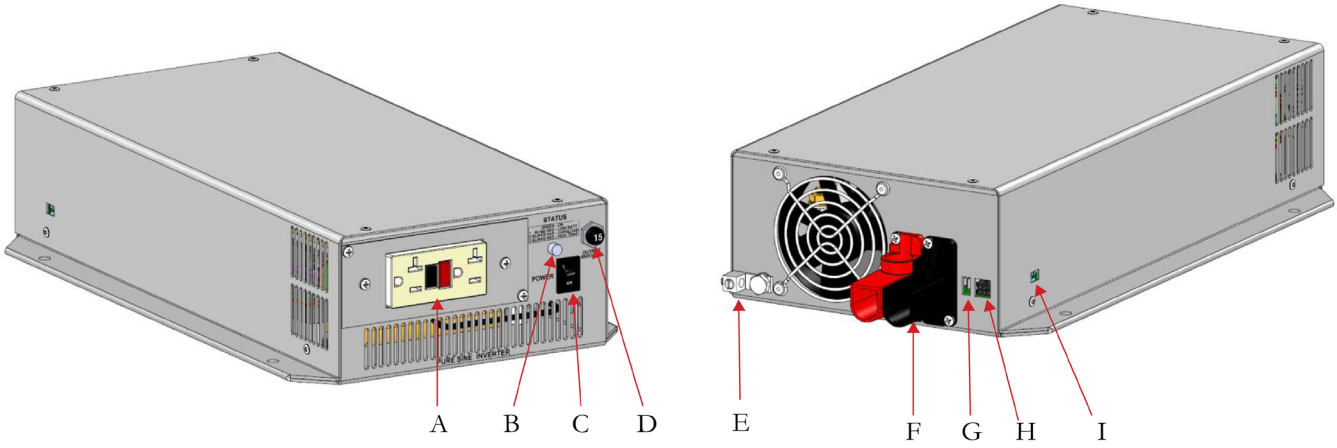

Figure 1

A. GFCI
B. Status LED
C. Inverter On/Off
D. Output Breaker
E. Bonding Lug
F. DC Input Connections
G. Remote Switch Wiring Tab
H. Remote Switch Connector
I. Sleep Mode/ Shutdown Timer/ Low Battery Settings

Design Features

- **GFCI**: Provides 120 VAC output. Only replace with an approved GFCI. Includes GFCI receptacle protection.
- **Status LED**: This LED will show inverter operation mode and troubleshooting information. See the table in the troubleshooting section at the rear of the manual for further operation mode descriptions.
- **Inverter On/Off**: This switch turns the inverter on or off. Switch inoperable for "HR" and "R" configurations.
- **Output Breaker**: Protects the inverter from output short circuits and overloads.
- **Bonding Lug**: Connects to the system ground.
- **DC Input Connections**: Connects to the battery bank.
- **Remote Switch Wiring Tab**: Terminal is used to wire a customer supplied remote "On/Off" switch.
- **Remote Switch Connector**: Connect a Sensata-manufactured LED lighted remote switch to this connector for remote inverter control. The remote switch assembly must be ordered separately.
- **Sleep Mode/ Shutdown Timer/ Low Battery Swttings**: Use these switches to configure the inverter.
- **Unit Protection**: Automatic electronic short circuit/overload protection, automatic over temperature shutdown, and AC output circuit breaker.
- **Battery Protection**: Automatic low battery shutdown at 10.5VDC with in-rush delay. Optional setting of 11.7 VDC is user selectable.
- **Auto Sleep Mode**: Sleep mode helps preserve battery life over long periods of no load operation.

INSTALLATION

Mount Inverter

⚠ WARNING: Power inverters produce hazardous voltages. To avoid risk of harm or fire, the unit must be properly installed.

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⚠ WARNING: Power inverters contain a circuit breaker and capacitor that may produce a spark upon connection or during normal operation. Do not mount in a confined battery or gas compartment.

Installation Tools

- Wire Termination Crimper
- Cable Ties
- Drill
- #2 Phillips Screw Driver (with a magnetic end)
- Slotted Screw Driver
- Tape Measure
- Wire Cutters
- Needle Nose Pliers
- Wire Strippers

Mount Inverter Continued

Inverter Mounting Recommendations

NOTE: The inverter mounting location should provide adequate ventilation and clearance to maintain room temperature during operation. At least ½" of clearance is required on all sides except the bottom.

1. Locate a suitable, secure mounting surface as close to the batteries as possible without being in the same compartment.
2. Mount the inverter using four each ¼-20 steel bolts, flat and lock washers, and nuts. The length of the bolts should be equal to the thickness of the mounting surface plus ¾".

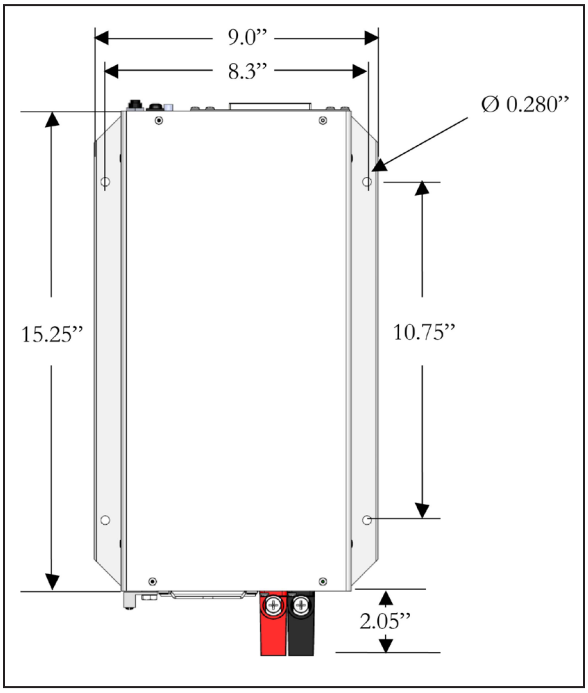

Figure 2 Mounting for All Models (Inches)

DC Wire Gauge & Fusing

⚠ WARNING: Damage to the power inverter will occur if correct polarity is not observed when installing the inverter's DC input cables.

Inverter Cable

Wiring should meet all local codes and standards and be performed by qualified personnel such as a licensed electrician.

An inverter cable kit (positive cable, negative cable, and proper fuse) is needed to connect the inverter to a battery bank. An inverter cable kit designed to SAE guidelines can be purchased directly from Sensata – call for options.

Min. Cable and Max. Fusing Guide at 5% Voltage Drop at Full Output

Full Load (ADC)	Inverter to Battery Est. Cable Length in Feet	
	1 to 10 feet @ 25°C (77°F)	11 to 15 feet @ 25°C (77°F)
110	4 AWG, 200 A Fuse	2 AWG, 250 A Fuse

Table 2 Cable Sizing

NOTE: Using a smaller cable may cause a low battery or high temperature fault.

NOTE: 100% duty rating assumes the inverter is continuously operating at its full rated output power for at least an hour. Values in the provided table assume the inverter is operating in an ambient temperature of 25°C (77°F). For higher ambient temperatures, additional derating may be required (i.e. may need to use a larger cable size).

DC Wire Gauge & Fusing Continued

Make an Inverter Cable Kit

1. Use a stranded copper cables in all cases.

NOTE: The recommended maximum length of the inverter cable is 15 ft, and it must be fused within 18 inches of the positive (+) terminal of the battery.

2. Use SGX cross-linked polyurethane insulation type that complies with the high temperature insulation requirements (125°C.) of SAE J-1127 and vehicle manufacturer requirements. Reference Table 2. For 1/4" ring lugs, use JST 38-S6.
3. Torque the DC connections on the inverter to 95 in-lbs.
4. Torque the inverter bonding lug to 45 in-lbs for 6 AWG or 40 in-lbs for 8 AWG.

NOTE: Use a 3/8" deep socket wrench to install the ¼"-20 serrated flanged hex bolt.

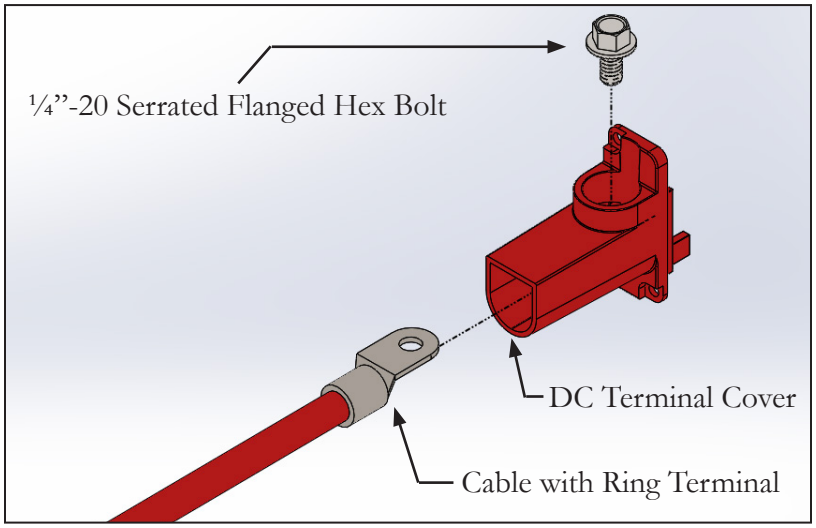

Figure 3 Proper Installation of Cable into DC Terminal Cover

DC Wire Gauge & Fusing Continued

Typical Cable Connection Procedure

NOTE: Refer to Figure 4 for a typical DC wiring diagram. See Table 2 for proper cable sizes.

1. Remove the fuse from the fuse holder.
2. Connect the inverter's bonding lug to ground of the vehicle chassis.
3. Connect the ring terminated end of the black inverter cable set directly to the negative (-) side of the battery bank at a negative battery post.
4. Connect the fuse holder to the positive (+) side of the battery bank.
5. Connect the ring terminated end of the red inverter cable set directly to the fuse holder.
6. Install the fuse in the fuse holder. A typical one-time spark will occur when this final connection is made.
7. Install the fuse holder cover.

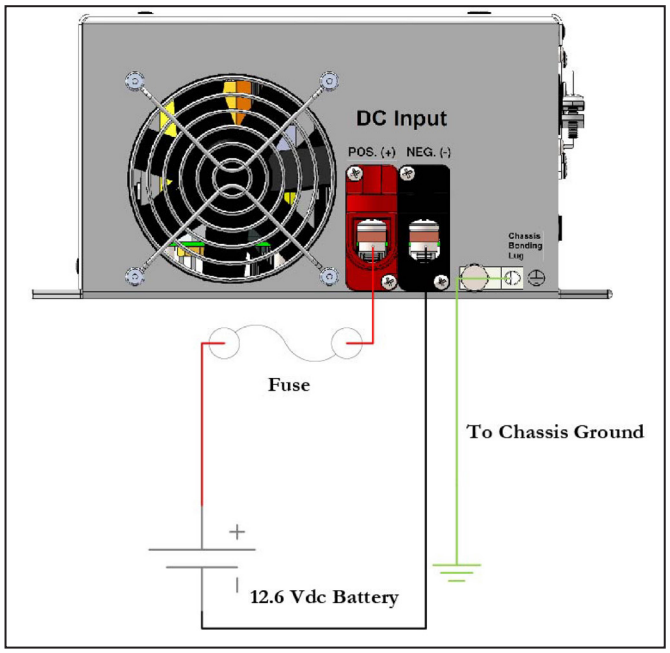

Figure 4 Typical DC Wiring Diagram

AC Input/Output Connections

⚠ WARNING: Damage to the power inverter will occur if an external AC power source is applied to the inverter's AC hardwire output.

⚠ WARNING: Do not directly connect another source of AC power to the AC output of the inverter. This will result in damage not covered under warranty.

"H" Option Hardwire Interface

1. Remove the cover for hardwire AC wiring.
2. Insert AC input and output wiring through the AC output cable clamps to protect the wires from the metal edge of the hole.
3. Connect the AC wiring to the provided internal terminal blocks. Check that the AC input wiring is connected to the AC input terminal blocks and the AC output wiring is connected to the AC output terminal blocks.
4. Torque AC terminal blocks to 10 lbf·in.
5. Connect the hot wires to the black terminal, the neutral to the white terminal, and the ground to the green terminal.

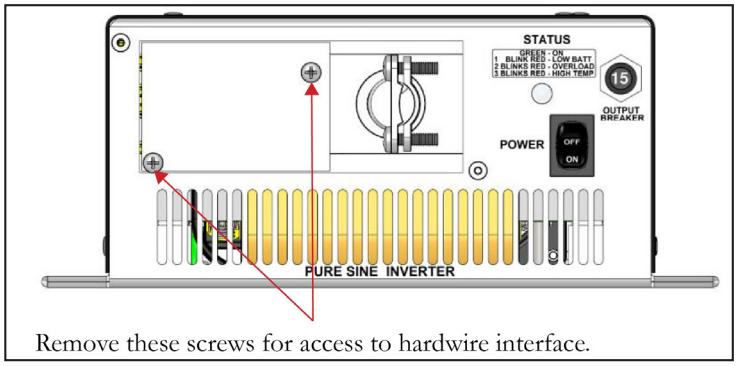

Figure 5 Hardwire Access

Remote Inverter "On/Off" Switch

Install Remote Inverter "On/Off" Switch – Customer Supplied

An optional remote switch with an integral LED can be purchased and used to control the inverter. Mount the remote switch in a convenient location. Route the cable to the inverter and plug into the connector on the back. See Appendix for 20' cable part number.

NOTE: The local indicator light will be green when functioning correctly, while the remote "On/Off" switch will have a solid red light when functioning correctly.

1. Mount the remote switch in a convenient location.
2. Using 18 AWG wire and an insulated ¼" female faston, wire between the "Remote On/Off" connection on the side of the inverter.
3. Wire from the remaining connection on the remote switch to the battery positive (+) terminal.
4. Install a 5 A in-line fuse in series within 10 inches from the positive (+) terminal of the battery.

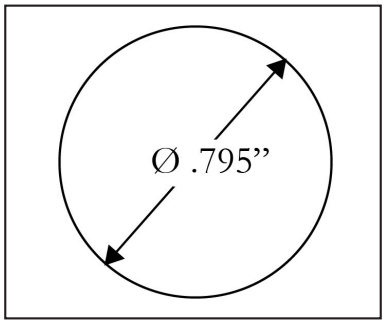

Figure 6

OPERATION

Once the inverter has been fully installed, wired, and DC power has been applied, the inverter is ready to turn on. The status LED beneath the AC wiring box on the left side of the inverter shows the current state of the inverter.

Inverter Power Mode

Usage: Any 120 VAC, 60 Hz single phase product within the inverter's power rating.

The inverter front status LED will be green while the inverter is on. The AC power produced by the inverter comes from the energy stored in the battery bank through an electronic inversion process. A transformer, a Metal Oxide Silicon Field Effect Transistors (MOSFET), a filter capacitor, and a microprocessor are used to generate clean AC power.

The inverter will operate at DC input voltages ranging from 10.5 to 16 volts. Above 16 volts, the inverter may stop operating due to input voltage being out of range. The inverter can tolerate up to 24 VDC for 5 minutes. Durations longer than 5 minutes will result in a shut down. Input voltages above 24 VDC will result in an immediate shutdown. The inverter will restart when the input voltage drops below 16 VDC. When the input voltage drops to 10.5/11.7 volts, the inverter will stop operating due to a low battery condition. When the lead-acid battery bank voltage drops to 10.5 volts, the battery is fully discharged.

Turn the Inverter On

Turn the inverter on by using the front panel switch (standard or "H" version only) or the remote switches – 2 options: cable or customer provided switch. When the inverter is on, the local status LED will be a constant green. The optional remote switch will be a constant red. Any switch may turn on the inverter. All switches must be off to turn off the inverter.

Sleep Mode

The inverter has a sleep mode feature which, if enabled, can significantly reduce DC power drawn over long periods of no-load operation to help preserve battery life. If sleep mode is enabled, the inverter output will automatically turn off when AC loads greater than 15 W are not present for 60 seconds. The inverter will check for the presence of a load once a second and will automatically restart if a load is detected.

NOTE: The LED on the GFCI will blink when the inverter has entered sleep mode.

NOTE: While in sleep mode, it may take up to one second for the load to receive power when the load is applied.

Shutdown Timer

As an alternative to sleep mode, a user-selectable shutdown timer is available to disable the inverter after fixed periods (regardless of output load). Standard timer settings are off, 30 minutes, and 60 minutes. Following shutdown, the DC input current will be less than 0.5 mA. Cycling the on/off control will restart the inverter.

Low Battery Shutdown

Low battery shutdown is a protective measure to prevent deep discharge of the battery and/or to make sure that the starting batteries have enough power to start the vehicle.

CONFIGURATIONS

Configuration Options

Adjust the switch positions on the side of the inverter to configure the sleep mode, shutdown timer, and low battery settings.

NOTE: Turn the inverter off before changing the switch settings.

Figure 7

Switches			Inverter Operation		
L	**C**	**R**	**Sleep Mode**	**Shutdown Timer**	**Low Battery**
Down	Down	Down	Enabled	Off	10.5 V
Down	Down	Up	Enabled	Off	11.7 V
Down	Up	Down	Disabled	Off	10.5 V
Down	Up	Up	Disabled	Off	11.7 V
Up	Down	Down	Disabled	30 min.	10.5 V
Up	Down	Up	Disabled	30 min.	11.7 V
Up	Up	Down	Disabled	60 min.	10.5 V
Up	Up	Up	Disabled	60 min.	11.7 V

Table 3

Sleep Mode

If sleep mode is enabled, the inverter output will automatically turn off when AC loads greater than 15 W are not present for 60 seconds. The inverter will check for the presence of a load once a second and will automatically restart on when a load is detected.

NOTE: The LED on the GFCI will blink when the inverter has entered sleep mode.

Shutdown Timer

This feature is used to turn the inverter off after the set amount of time regardless of the load. The inverter must then be manually turned back on again when needed. When in shutdown mode, the input DC current will not exceed 0.5 mA.

Low Battery Shutdown

This is the voltage point when the inverter will shut off due to the battery voltage being low. The low battery threshold may be set to 10.5 VDC or 11.7 VDC.

TROUBLESHOOTING

⚠ WARNING: **Do not remove chassis cover. No user-serviceable parts inside.** Call or email customer service for free consultation during business hours. Business hours are 7:30am-5:30pm C.S.T

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LED Status Chart

LED Status Chart

LED Color & State	Remote LED State	Operating Condition
Green — Constant on	Constant on	Inverter On
Amber — Constant (0 –5 sec)	Constant on	Low Battery (0–5 sec)
Red — Constant (0 –5 sec)	Constant on	Overload (0–5 sec)
Red — 1 blink	1 blink	Low Battery (>5 sec)
Red — 2 blinks	2 blinks	Overload (>5 sec)
Red — 3 blinks	3 blinks	High Temperature
Red — 4 blinks	4 blinks	System Overload
Red — 5 blinks	Constant on	High Battery (0–5 min)
Red — 6 blinks	6 blinks	High Battery (>5 minutes or >24 V)
Off	Off	Inverter Off

Table 4

Troubleshooting Guide

No AC output during inverter mode	Check if the in-line fuse which is located within 18" from the battery's positive post is installed or open.	
	Check if DC connections are tight and clean.	
	Check if the AC output circuit breaker is tripped.	
	Check if the switches are on. Check if any of the wires connected to the remote switches are loose or disconnected.	
	Check if the GFCI is tripped. Reset if necessary by cycling power.	If GFCI is set, disconnect all loads and connect a test light. If the test light is off, replace the GFCI or return the inverter for service.
	For hardwired connections, remove the DC input voltage and inspect the AC hardwire connections.	
Low Battery	The use of a battery isolator is not recommended due to excessive voltage drop across isolator terminals.	
	Battery voltage must be above the low battery threshold (measured at the inverter) for the inverter to be on (10.5/ 11.7 VDC.)	
	Check for proper DC wire AWG (see DC Wire Gauge & Fusing section).	
Overload	Unplug all loads and reset the inverter. To reset, turn the unit off and wait for 30 seconds to turn on again.	If the overload condition clears, check for short circuits or check load size versus inverter output wattage size.
		If the overload persists, possible failed inverter.
High Temperature	Allow the unit to cool down.	
	Verify that all vent openings are clear of obstruction.	
	Reduce ambient temperature and/or load.	

Table 5

APPENDIX
Accessories & Replacement Parts

Part Number	Item Description
431021	Fuse holder with cover
430010	Fuse 200 A, ANN-200
430011	Fuse 250 A, ANN-250
430012	Fuse 300 A, ANN-300
430005	GFCI Outlet, GFNT2
611975	20 ft LED remote cable (For longer lengths, contact the factory.)

Table 6 Accessories

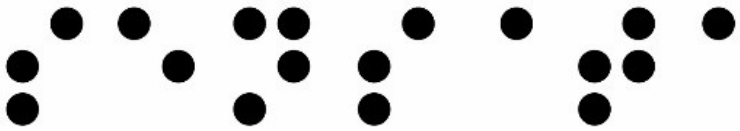
GFCI MFG	Catalog No.
Leviton	GFNT2
Cooper Wiring	TRSGF20

Table 7 GFCI Replacement

Inverter Model Options

Options	Description
H	No GFCI, hardwire only
R	Inverter front panel switch is inactive
HR	Inverter front panel switch is inactive, no GFCI, hardwire only

Table 8 Model Options



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