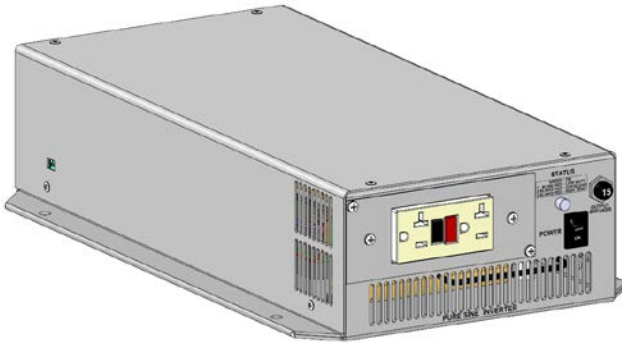


MAGNUM DIMENSIONS

DC to AC Power Inverter
Pure Sine Wave Output

Owner's Manual



Models:
12LP10
12LP10H
12LP10HR
12LP10R



Sensata
Technologies

INTRODUCTION

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

SAFETY INSTRUCTIONS

IMPORTANT

Read this manual before installation. It contains important safety, installation and operating instructions. Save this manual and keep it in a safe place.

Sensata Technologies is an ISO 9001:2008 Registered Company.

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



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 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



**Power Inverter, E100666
Listed to UL 458 6th Edition**

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 during installation.
- ⚠ WARNING:** Be sure the Power Inverter is turned OFF and AC power is disconnected when batteries are being connected, disconnected, serviced, and replaced.
- ⚠ WARNING:** Working in the vicinity of 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; risk of explosion exists.
- ⚠ 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.

TABLE OF CONTENTS

INTRODUCTION.....	2
SAFETY INSTRUCTIONS	2
Inverter Safety Instructions	3
Battery Safety Instructions	3
SPECIFICATIONS	5
OTHER DESIGN FEATURES.....	5
PHYSICAL DESCRIPTION.....	6
SLEEP MODE / SHUT DOWN TIMER / LOW BATTERY	7
MOUNTING THE INVERTER	8
Installation Tools	8
Inverter Mounting Recommendations	8
DC WIRING GAUGE & FUSING.....	9
Inverter Cable.....	9
Cable Recommendations	9
AC OUTPUT CONNECTIONS.....	10
REMOTE INVERTER ON/OFF SWITCH.....	10
WIRING DIAGRAM	11
Typical DC Wiring Diagram	11
OPERATION	12
Inverter Power Mode.....	12
Sleep Mode	12
Shutdown Timer	12
Low Battery Shutdown	12
THEORY OF OPERATION.....	13
Inverter Power Mode.....	13
TROUBLESHOOTING GUIDE.....	13
LED Status Chart	13
Troubleshooting	14
APPENDIX	15
Accessories & Replacement Parts.....	15
Inverter Model Options.....	15
LED Remote Switch Panel Mounting.....	15
LIMITED WARRANTY TERMS & CONDITIONS.....	16

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. (L x W x H)	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 24Vdc
Operating Temperature:	-20C to 65C (0F to 149F)
Efficiency:	Up to 82%

OTHER DESIGN FEATURES

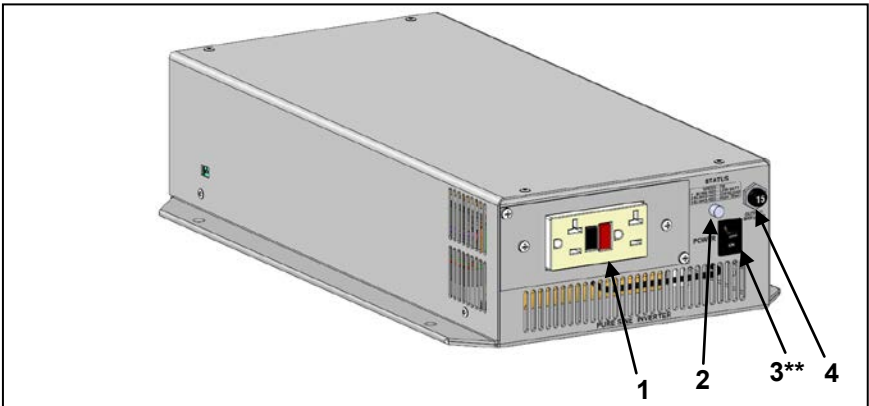
Other Design Features: GFCI receptacle protection, and Remote LED Remote Switch or “On/Off” switch hookup.

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 11.7VDC is user selectable.

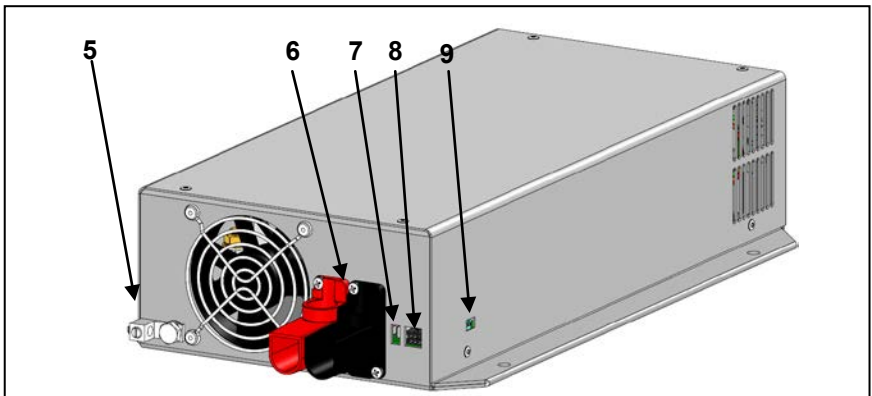
Auto Sleep Mode: Sleep mode helps preserve battery life over long periods of no load operation.

PHYSICAL DESCRIPTION

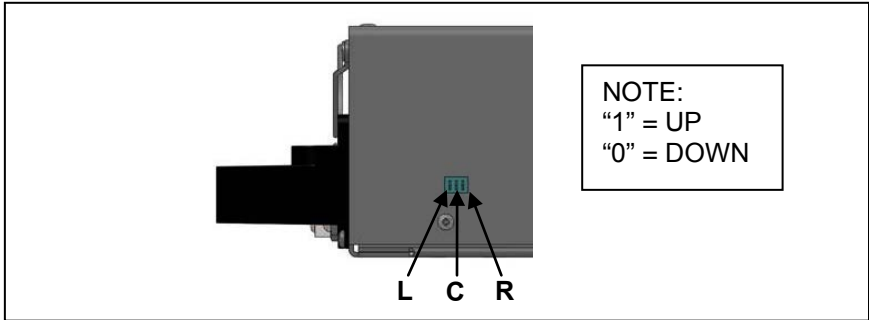


- (1) **GFCI:** Provides 120VAC output. Only replace with an approved GFCI.
- (2) **Status LED:** This LED will show inverter operation mode and troubleshooting information. See the table in the troubleshooting section at the rear of the manual for further operation mode descriptions.
- (3) **Inverter On/Off:** This switch turns the inverter On and Off. **Switch inoperable for "HR" and "R" configurations.
- (4) **Output Breaker:** Protects the inverter.
- (5) **Bonding lug:** Connects to the system ground.
- (6) **DC input connections:** Connects to the battery bank.
- (7) **Remote Switch Wiring Tab:** Terminal is used to wire a customer supplied remote.
- (8) **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.
- (9) **Sleep Mode/Shutdown Timer/Low Battery Settings:** Use these switches to configure the inverter (see next page for details).

NOTE – GFCI LED will blink while inverter is in Sleep Mode. List of approved GFCI's can be found in the appendix.



SLEEP MODE / SHUTDOWN TIMER / LOW BATTERY



Sleep Mode/Shutdown Timer/Low Battery Settings: The setting of these switches affects the Sleep Mode, Shutdown Timer, and Low Battery Shutdown operation of the inverter. Turn the inverter "Off" before changing the settings of the switches.

Switches			Inverter Operation
L	C	R	
0	0	0	Sleep mode enabled / Shutdown timer off / Low battery 10.5V
0	0	1	Sleep mode enabled / Shutdown timer off / Low battery 11.7V
0	1	0	Sleep mode disabled / Shutdown timer off / Low battery 10.5V
0	1	1	Sleep mode disabled / Shutdown timer off / Low battery 11.7V
1	0	0	Sleep mode disabled / Shutdown timer 30 min. / Low battery 10.5V
1	0	1	Sleep mode disabled / Shutdown timer 30 min. / Low battery 11.7V
1	1	0	Sleep mode disabled / Shutdown timer 60 min. / Low battery 10.5V
1	1	1	Sleep mode disabled / Shutdown timer 60 min. / Low battery 11.7V

1. Sleep Mode:

If Sleep Mode is enabled the inverter output will automatically turn off when AC loads greater than 15W 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 it reappears. NOTE – The LED on the GFCI will blink when the inverter has gone to sleep.

2. Shutdown Timer:

This feature is used to turn the inverter off after the set amount of time. For example if the timer is set to 30 minutes and 30 minutes of time has elapsed, the inverter will shut off 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 0.5mA.

3. Low Battery Shutdown:

This is the voltage point when the inverter will shut off due to the battery voltage being low. The set points available are 10.5VDC & 11.7VDC.

MOUNTING THE INVERTER

Installation Tools

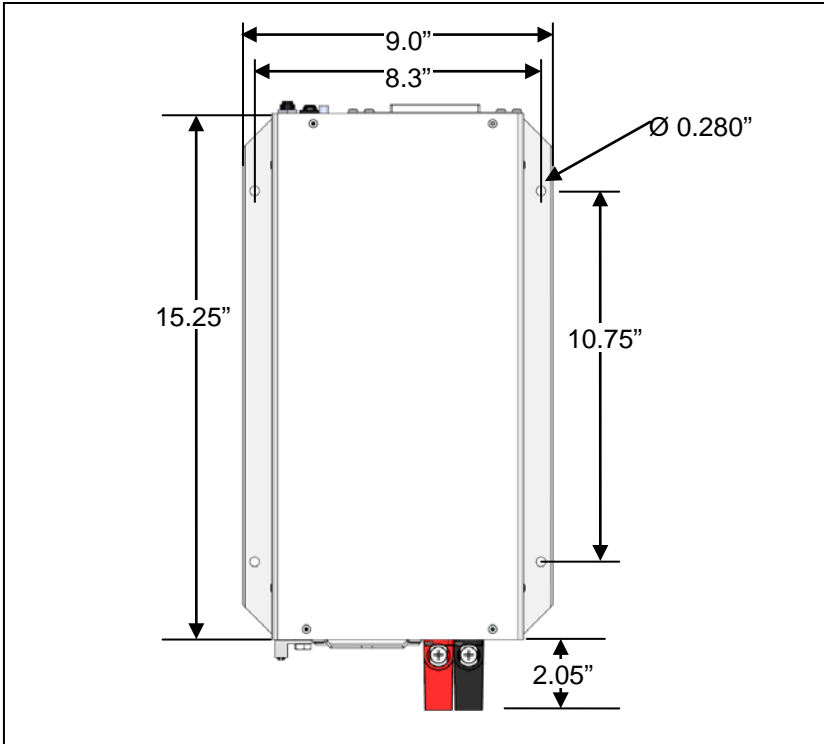
The following tools may be required for inverter installation: Crimper, Cable Ties, Cutter, Drill, #2 Phillips Screw Driver (with a magnetic end), Slotted Screw Driver, Tape Measure, Wire Cutters, and Wire Strippers.

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 ¼-20 steel bolts, flat and lock washers, and nuts.

Mounting for all models (units are in inches)



DC WIRE GAUGE & FUSING

Inverter Cable

An “Inverter Cable Kit” (positive cable, negative cable, and proper fuse) is needed to connect the inverter to a battery bank. An 8-gauge wire is also recommended to connect the inverter’s bonding lug to system ground.

The inverter cable length and the size of the inverter will determine the cable gauge and the fuse size to use. The maximum inverter cable recommended is 15-ft; it must be fused within 18 inches from the positive (+) terminal of the battery.

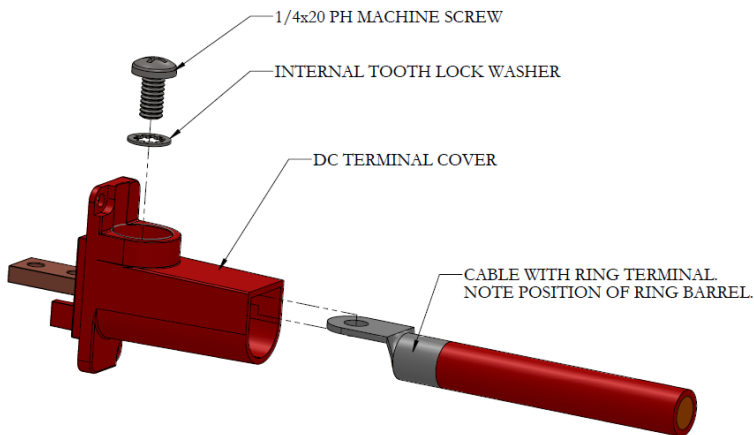
Cross reference the inverter model and the estimated cable length in the table below to determine the proper cable gauge and fuse size. An inverter cable kit designed to SAE guidelines can be purchased directly from Sensata – call for options.

Minimum Cable and Max Fusing Guide at 5% Voltage Drop at Full Output		
Full Load (Amps DC)	Inverter to Battery Estimated Cable Length in Feet	
	1 to 10 feet	11 to 15 feet
110	4-ga, 200A Fuse	2-ga, 250A Fuse

To make your own “Inverter Cable Kit,” follow the below recommendations:

1. Use stranded copper cables in all cases.
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.
3. For 1/4" ring lugs, use Waytek 35000 or JST 22-6 for 4 gauge cable. Use Waytek 35020 or JST 38-S6 for 2 gauge cable.

Proper installation of cable into DC terminal cover



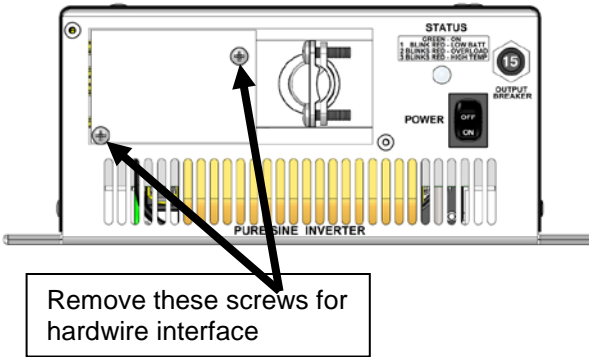
AC OUTPUT CONNECTIONS

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

The inverter's 120 VAC output power is provided at the GFCI receptacle or through the hardwire connections for the "H" option.

"H" Option – Hardwire Interface:

Remove the cover for hardwire AC wiring. Insert AC wiring through the cable clamp to protect the wires from the metal edge of the hole. Use the supplied wire nuts and wire Black to Black, White to White, and Green to Green.



REMOTE INVERTER ON/OFF SWITCH

Remote Inverter ON/OFF Switch

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 mounting hole size in the Appendix section. Also see Appendix for 20' cable part number.

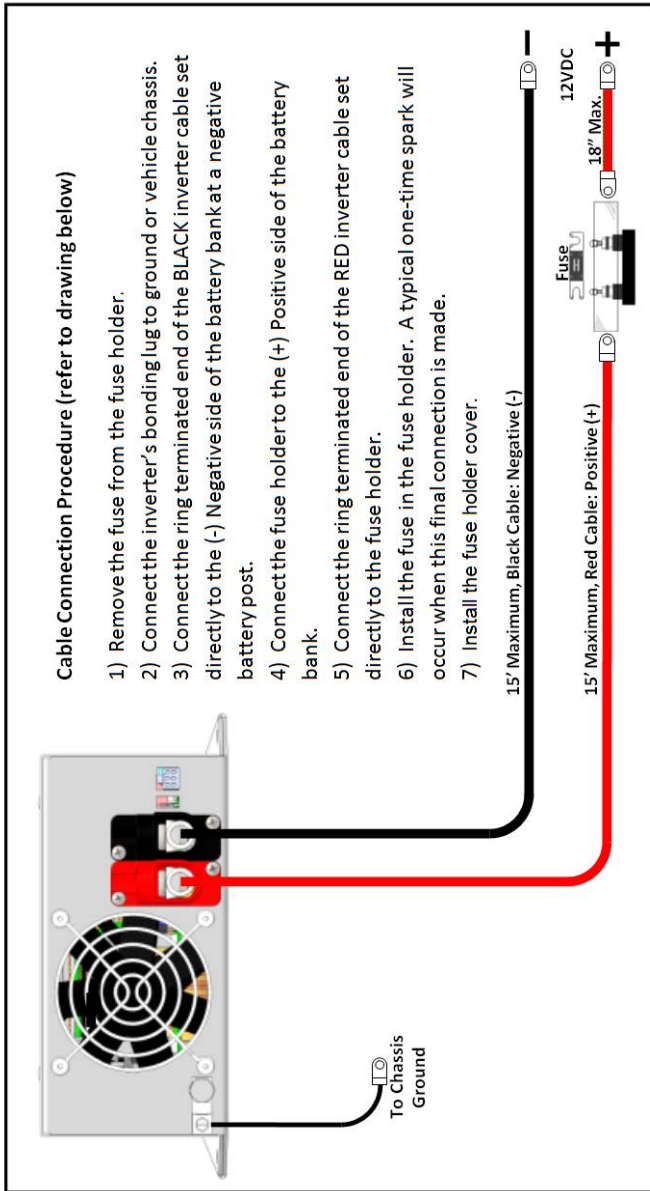
Note: The local indicator light will be green when functioning correctly, while the remote ON/Off switch will have a solid red light when functioning correctly.

Remote Inverter ON/OFF Switch – Customer Supplied

An optional customer supplied remote switch can also be used to control the inverter. Mount the remote switch in a convenient location. Using 18 gauge wire and an insulated 1/4" female faston, wire between the "Remote ON/OFF" connection on the right side of the inverter and the remote switch. Wire from the remaining connection on the remote switch to the battery positive (+) terminal. Be sure to install a 5-amp in-line fuse in series within 10 inches from the positive (+) terminal of the battery.

WIRING DIAGRAM

Typical DC Wiring Diagram



OPERATION

Once the inverter has been fully installed and wired, and DC power has been applied, the inverter is ready to turn on. The Status LED to the right side of the GFCI shows the status information of the inverter.

Inverter Power Mode

1) **Turning the Inverter “ON”**

The inverter can now be turned on by using the front panel switch (standard or "H" version only) or the remote switches – 2 options: cable Assy or customer provided switch. When the inverter is On, the local Status LED will be a constant green. The optional Sensata provided 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

1) **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 15W 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 it reappears. **NOTE** – The LED on the GFCI will blink when the inverter has gone to sleep.

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

NOTE – The LED on the GFCI will blink when the inverter has gone to sleep. Refer to page 7 for configuration information.

Shutdown Timer

1) **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. Refer to page 7 for configuration information. Following shutdown, the DC input current will be less than 0.5mA. Cycling the ON/OFF control will restart the inverter.

Low Battery Shutdown

1) **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. There are two user-selectable shutdown points of 10.5VDC & 11.7VDC. Refer to page 7 for configuration information.

THEORY OF OPERATION

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 a sophisticated electronic inversion process. A transformer, a Metal Oxide Silicon Field Effect Transistors (MOSFET), a filter capacitor and microprocessor control 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 24V DC for 5 minutes. Durations longer than 5 minutes will result in a shut down. Input voltages above 24V DC will result in an immediate shutdown. The inverter will restart when the input voltage drops below 16V DC. 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.

Note: The signal output waveform produced by the inverter when in "inverter mode" is pure sinusoidal. It has a total harmonic distortion of less than 5% at nominal input.

TROUBLESHOOTING GUIDE

Refer to the "LED STATUS CHART" below for LED descriptions.

⚠ WARNING: Do not remove chassis cover. No user-serviceable parts inside. Call or e-mail customer service for free consultation during business hours (7:30am-5:30pm central time) at 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://dimensions.sensata.com>

LED Status Chart

Mode	Inverter LED (Bi-color)	Remote Switch LED (Red)
ON (normal operation or sleep mode)	Green, constant	Constant
Low battery 0-5 sec	Orange, constant 0-5 sec	Constant
Overload 0-5 sec	Red, constant 0-5 sec	Constant
Low battery > 5 sec	Red, 1 blink	1 blink
Overload > 5 sec	Red, 2 blinks	2 blinks
High temperature	Red, 3 blinks	3 blinks
Feedback fault	Red, 4 blinks	4 blinks
High battery 0-5 mins	Red, 5 blinks	Constant
High battery > 5 minutes or > 24V	Red, 6 blinks	6 blinks
Off (Inv. Switch Off or Shutdown By Timer)	Off	Off

Troubleshooting

1) No AC output power during inverter mode:

- Check the in-line fuse which is located within 18" from the battery's positive post.
- DC connections tight and clean?
- Is output circuit breaker tripped?
- Check the inverter power switch and remote power switches. Switches inactive in "R" and "HR" configurations.

- Check the GFCI to see if it is tripped, and reset if necessary.
 - If GFCI is set, disconnect all loads and connect a test light.
 - If the test light is off, replace GFCI or return the inverter for service.
- For model 12LP10H, check AC hardwire connections.

Note: If the status LED's are illuminated, refer to the "LED Status Chart" on the previous page for additional information.

2) **Low Battery:** The use of a battery isolator is not recommended due to excessive voltage drop across isolator terminals.

- Battery voltage must be above 10.5/11.7 VDC) (measured at the inverter) for the inverter to be on.
- Check for proper DC wire gauge (see DC Wire Gauge & Fusing section)

3) **Overload:** Unplug all loads and reset the inverter On/Off.

- 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

4) **High Temperature:** Let the inverter cool down

- Verify that all vent openings are clear of obstruction.
- Reduce ambient temperature and/or load.

APPENDIX

Accessories & Replacement Parts

Part Number	Item Description
431021	Fuse holder with cover
430010	Fuse 200A, ANN-200
430011	Fuse 250A, ANN-250
430012	Fuse 300A, ANN-300
430005	GFCI Outlet, Leviton N7899 (may be substituted with Leviton GFNT2)
611975	20FT LED Remote Cable (for longer lengths, contact factory)

NOTE – GFCI Outlets: When replacing a GFCI outlet, only use the exact replacement part unless instructed to do otherwise by the factory. Other types may fail to operate properly when connected to this unit.

GFCI MFG	Catalog No.
Leviton	411-N7899-X# (for #, I=Ivory, W=White)
Leviton	7899-# (for #, I=Ivory, W=White)
Leviton	GFNT2-# (for #, I=Ivory, W=White)
Hubbell	GF20#LA (for #, I=Ivory, W=White)
Hubbell	GFR5362SG# (for #, I=Ivory, W=White)
Cooper Wiring	VGF20# (for #, <u>V</u> =Ivory, W=White)
Cooper Wiring	TRSGF20# (for #, <u>V</u> =Ivory, W=White)

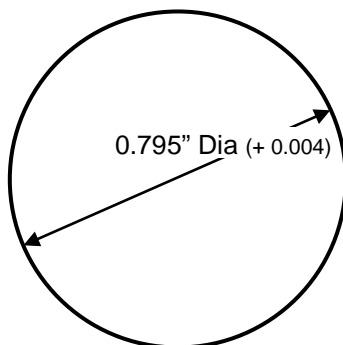
Inverter Model Options

The following model options are available:

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

LED Remote Switch Panel Mounting

The LED remote switch needs a mounting hole as shown below (not shown actual size).



LIMITED WARRANTY TERMS & CONDITIONS

SHIPPING TERMS: F.O.B. St. Paul Minnesota. Freight prepaid and billed, subject to prior credit approval.
MINIMUM ORDER: \$50.00 Net Price

LOSS OR DAMAGE: Loss or damage in transit are the responsibility of the carrier. Any claim should be filed with the delivering transport company. Invoice, Bill of Lading and Delivery receipt with damage noted therein must accompany any claims for freight damage. Claims for shortage and lost shipments must be made in writing to Sensata Technologies within 10 days of date of shipment. Claims not reported within this time frame will not be honored.

PRICES: Prices are subject to change without notice. All orders are subject to acceptance at the factory. We reserve the right to invoice prices in effect at time of shipment.

TERMS: Net 30 days with approved credit, credit card or C.O.D.

RETURN GOODS POLICY:

- No returned materials will be accepted without an accompanying Returned Materials Authorization Number (RMA) from the factory.
- Credit will be issued for returned goods to the original purchaser within 60 days of purchase, provided the inverter is returned to Sensata unused and not mounted. The amount of credit will be issued at Sensata's discretion based on the condition of the product.
- Customer must be in good standing with Sensata Technologies.
- Inverters that are discontinued, high-voltage (over 24vdc), special-order or used are excluded and will not be eligible for credit. Non-inverter items such as cable assemblies, fuses and fuse holders, will not be eligible for credit
- Support components supplied by Sensata vendors will be covered under that manufacturer's credit return policy.
- Customer pays return freight.

PLEASE SHIP AUTHORIZED RETURNS TO:

Sensata Technologies RMA# _____ | 4467 White Bear Parkway | St. Paul, MN 55110
Return Freight Prepaid

LIMITED WARRANTY:

Sensata Technologies extends the following warranty to the original purchaser of those goods subject to the qualifications indicated. Sensata warrants to the original purchaser for use that the goods or any component thereof manufactured by Sensata will be free from defects in workmanship from the date of purchase for the period listed on the product label, provided such goods are installed, maintained and used in accordance with Sensata and the original manufacturer's written instructions. Damages caused by the misuse, undue care or obvious wear through use will not be covered by this warranty.

Components not manufactured by Sensata, but used within the assembly provided by Sensata, are subject to the warranty period as specified by the individual manufacturer of said component, provided such goods are installed, maintained and used in accordance with Sensata and the manufacturer's written instructions.

Sensata's sole liability and the Purchaser's sole remedy for a failure of goods under this limited warranty and for any and all claims arising out of the purchase and use of the goods shall be limited to the repair or replacement of the goods that do not conform to this warranty.

To obtain repair or replacement service under the limited warranty, the purchaser must contact the factory for a Return Material Authorization (RMA) Number. Once obtained, send the RMA Number along with the defective part or goods to:

Sensata Technologies RMA# _____, 4467 White Bear Parkway, St. Paul, MN 55110. Return Freight Prepaid.

THERE ARE NO EXPRESS WARRANTIES COVERING THESE GOODS OTHER THAN AS SET FORTH ABOVE. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO ONE YEAR FROM DATE OF PURCHASE.

SENSATA TECHNOLOGIES ASSUMES NO LIABILITY IN CONNECTION WITH THE INSTALLATION OR USE OF THE PRODUCT, EXCEPT AS STATED IN THIS LIMITED WARRANTY. SENSATA TECHNOLOGIES WILL IN NO EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

WARNING: LIMITATIONS ON USE: MAGNUM-DIMENSIONS® brand products are not intended for use in connection with Life Support Systems and for Avionic use. Sensata Technologies makes no warranty or representation in connection with their products for such uses.

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Sensata Technologies