

DIMENSIONS®

DC to AC Power Inverter/Charger
Pure Sine Wave Output

Owner's Manual



Models:
12NP10
12NP12
12NP15
12NP18
12NP20
12NP24



Model:
12NP30



Sensata
Technologies

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. We have put a lot of time and effort into this system to make it a product that you will be completely satisfied with.

Please read this manual completely, before installation and operation.

Contact us by phone or email if you need assistance with this product.

We can be reached at:

1-800-553-6418

<http://dimensions.sensata.com>

inverterinfo@sensata.com

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

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 or personal injury and/or damage to the inverter could result.

Battery Safety Instructions

⚠️ WARNING: Working in the vicinity of lead-acid batteries is dangerous. There is a risk of acid exposure.

⚠️ 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.

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SPECIFICATIONS

MODEL NUMBER							
INVERTER	12NP10	12NP12	12NP15	12NP18	12NP20	12NP24	12NP30
Output Power (Watts Cont.)	1000	1200	1500	1800	2000	2400	3000
Output Current (Amps AC Cont.)	8.3	10	12.5	15	16.7	20	25
Input Current (Amps DC Cont.)	Up to 106	Up to 129	Up to 167	Up to 188	Up to 214	Up to 255	Up to 315
Peak Power (Watts)	2000		2500		4500		5500
Peak Output (Amps AC)	35	37	40	58	68	74	80
Motor Starting Rating (hp)	1/3	1/2	1/2	3/4	1	1	1
Weight (lbs.)	40	40	40	40	40	40	68
Dimensions in. (L x W x H)	12 x 14.5 x 5.7	12 x 14.5 x 5.7	13.4 x 14.5 x 5.7	12 x 14.5 x 5.7	12 x 14.5 x 5.7	13.4 x 14.5 x 5.7	14.8 x 17.1 x 8
Output Voltage (VAC)	120 +/- 3%						
Output Frequency:	60 +/- .05%						
Output Waveform:	Pure Sine < 5% THD						
Input Voltage: (VDC)	10.5-17.0						
Operating Temperature:	-20C to 65C (0F to 149F)						
Efficiency:	Up to 88%						
BATTERY CHARGER							
AC Input Voltage Range (VAC)	95-135						
Input Current (Amps AC)	Up to 9	Up to 8.7	Up to 13	Up to 13.5	Up to 17	Up to 18.7	Up to 22
Output (Amps DC)	Up to 60	Up to 65	Up to 75	Up to 95	Up to 115	Up to 130	Up to 150
BYPASS* (Amps AC)	20	20	20	20	30	30	30

*Note – Bypass relay is rated at 30 amps for all models.

OTHER DESIGN FEATURES

Other Design Features: thermally controlled cooling fan, GFCI outlet protection, and Remote LED Display Panel or “On/Off” switch hookup.

Unit Protection: Automatic electronic short circuit/overload protection, Automatic over temperature shutdown, and AC output circuit breaker(s).

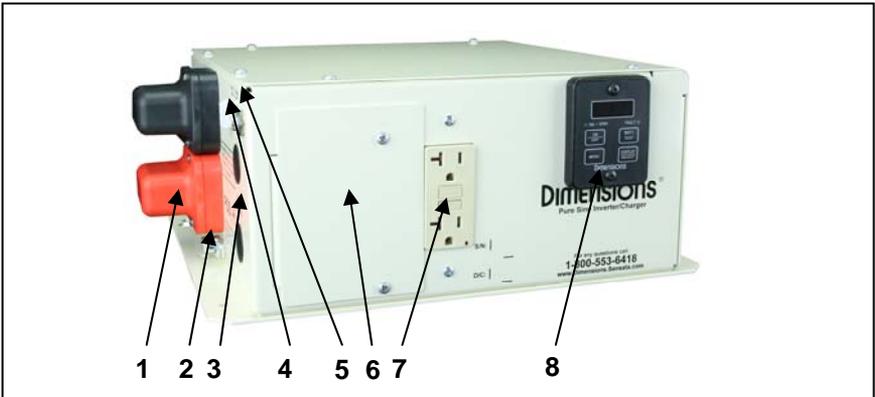
Battery Protection: Automatic low battery shutdown at 10.5VDC with in-rush delay.

Temperature Compensated Charging: Allows for proper temperature charging across the operating range of the inverter.

Auto Sleep Mode: When the LED Display Panel is used, the inverter can be programmed to go to sleep after no load is detected over programmed interval.

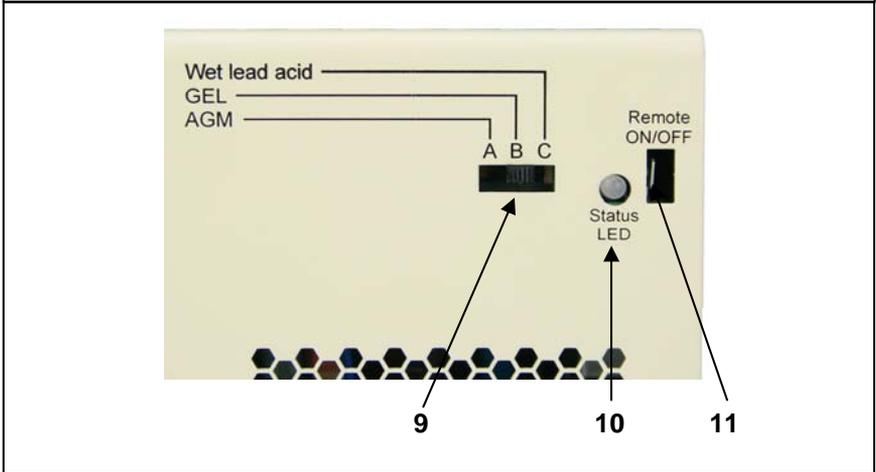
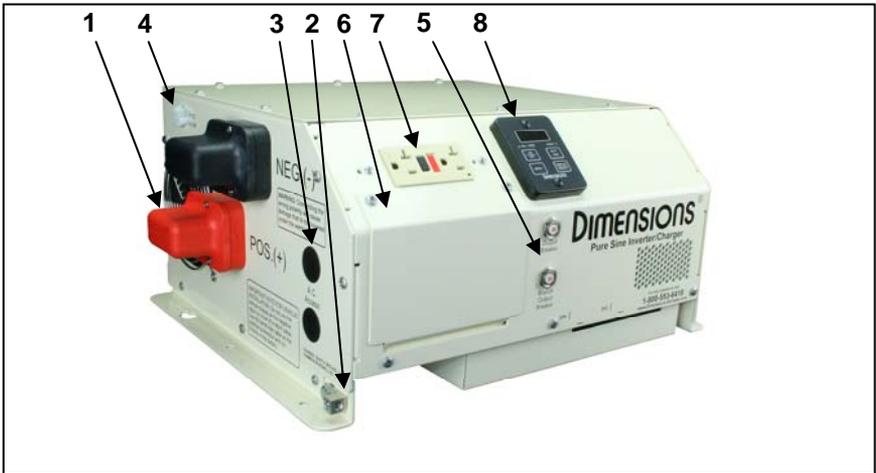
Optional LCD Remote: For an additional cost, we have an LCD remote available

PHYSICAL DESCRIPTION



- (1) **DC input connections:** Connects to the battery bank.
- (2) **Bonding lug:** Connects to the ground system.
- (3) **AC Input & Output (hardwired):** Terminal blocks are provided behind front access cover for hardwiring AC Input and Output.
- (4) **Temp. Sense Connector Port:** Connects to the temp. comp. cable
- (5) **Output Breaker, Branch Breaker:** Trips to protect the inverter’s internal circuitry from shorted AC loads or overload situations.
- (6) **AC Wiring Plate:** Remove this plate to access the AC wiring terminal block or to replace a GFCI outlet.
- (7) **GFCI:** Provides 120VAC output. Only replace with same model GFCI.

- (8) **Display, Inverter On/Off, Remote:** The display will give you current status information as well as allow you to turn the inverter On and Off. This panel can be used as a remote with the remote kit.



- (9) **Battery Type Selector Switch:** Slide this switch to match the type of batteries that you are using for battery proper charging.
- (10) **Status LED:** This LED will show the operation mode of the inverter and charger. The LED also shows troubleshooting information. See the table in the troubleshooting section at the rear of the manual for further operation mode descriptions.
- (11) **Remote ON/OFF Tab:** Use this tab if you wish to wire an inverter remote control switch. NOTE – The LCD Panel can also be relocated as a remote. Order remote LCD panel kit# 625000.

MOUNTING THE INVERTER

Installation Tools

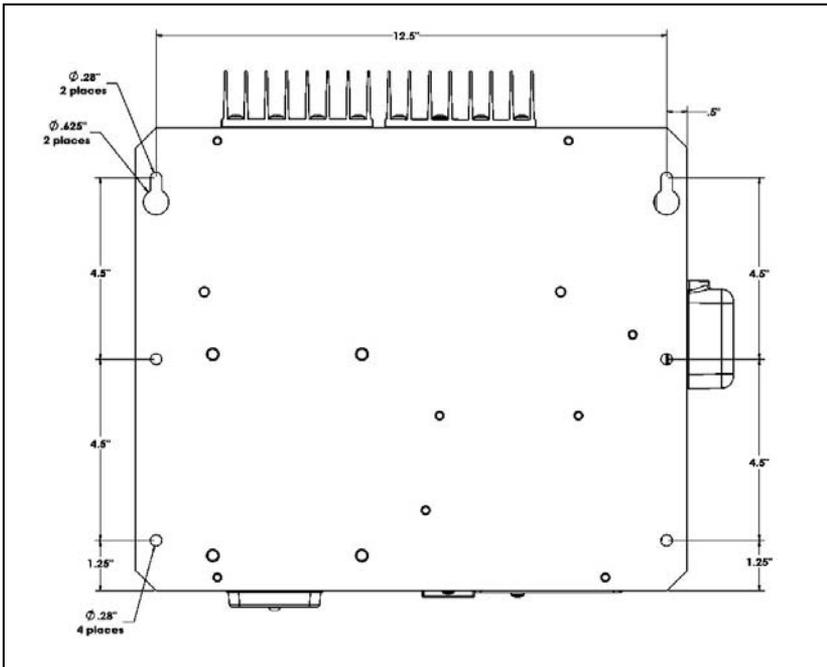
The following tools are required for inverter installation: Crimper, Cable Ties, Cutter, Drill, #2 Phillips Screw Driver, Slotted Screw Driver, Tape Measure, Wire Cutters, and Wire Strippers.

Inverter Mounting Recommendations

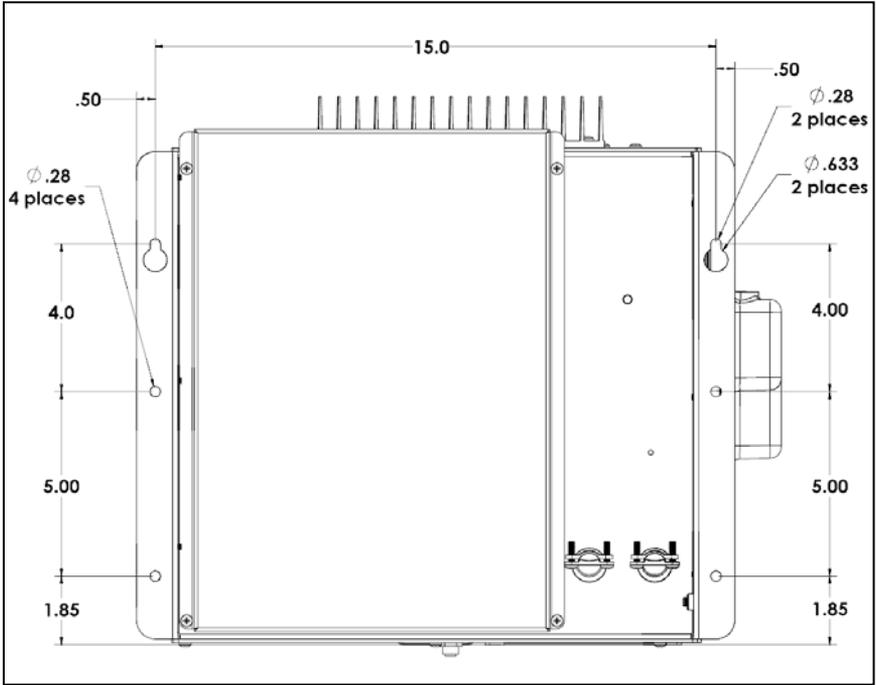
NOTE: The inverter mounting location should provide adequate ventilation and clearance to maintain room temperature during operation. At least $\frac{1}{2}$ " of clearance is required on all sides.

1. Locate a suitable, secure, horizontal mounting surface as close to the batteries as possible without being in the same airtight compartment.
2. Mount the inverter using four, $\frac{1}{4}$ -20 steel bolts, flat and lock washers, and nuts. The length of the bolts should be equal to the mounting material thickness plus $\frac{3}{4}$ ".

Mounting for Models: 12NP10, 12NP12, 12NP15, 12NP18, 12NP20, 12NP24 (units are in inches)



Mounting for Model: 12NP30 (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 single strand cable is also recommended to connect the inverter’s bonding lug to 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 20-ft; it must be fused within 18-in 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 our factory – call for options.

Minimum Cable and Fusing Guide at 5% Voltage Drop at Full Output				
Inverter Model	Full Load (Amps DC)	Inverter to Battery Estimated Cable Length in Feet		
		1 to 10 feet	11 to 15 feet	16 to 20 feet
12NP10	104	4-ga, 200A Fuse	2-ga, 250A Fuse	1-ga, 300A Fuse
12NP12	129	2-ga, 250A Fuse	2-ga, 250A Fuse	1/0, 350A Fuse
12NP15	156	2-ga, 250A Fuse	1-ga, 300A Fuse	2/0, 400A Fuse
12NP18	188	2-ga, 250A Fuse	1/0, 350A Fuse	2/0, 400A Fuse
12NP20	204	1-ga, 300A Fuse	2/0, 400A Fuse	3/0, 500A Fuse
12NP24	255	1/0, 350A Fuse	2/0, 400A Fuse	4/0, 600A Fuse
12NP30	315	2/0, 500A Fuse	3/0, 500A Fuse	Not Recommended

NOTE:

- Temp. Comp. cable is part# 611622-XX (XX=length in feet - 9, 15, 20, 25, 30)

Cable Recommendations

To make your own “Inverter Cable Kit,” follow 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.

TEMP COMP CABLE CONNECTION

Connect the lug end of the temperature compensation cable to the negative post of the most negative point in the battery bank. Connect the two pin connector to the appropriate mating connector located at the side of the inverter labeled “Temp. Sense.” Use the slide switch on the right side of the inverter and select the battery type that you are using for proper battery charging.

NOTE: If the temp. Comp. Cable or Dongle is not connected; the battery charger will not function

AC INPUT & 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 and the hard wire terminal blocks behind the access panel.

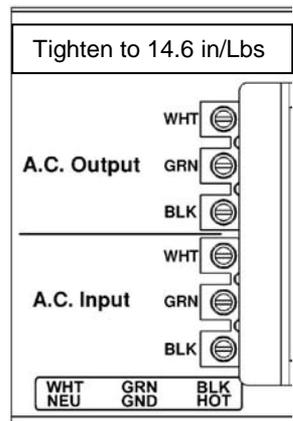
Wire the AC Input to the hard wire terminal blocks behind the access panel for charging and shore power.

NOTE: Remove the black hole covers as needed for hardwire AC wiring. Use a romex type clamp to protect the wires from the metal edge of the hole. Apply 14.6 in/Lbs torque to the terminal block screws.

NOTE: Systems rated at 2500 watts and above should be powered with a 30A circuit.

NOTE: Connecting the plug-in cord to GFCI protected outlets may cause some interference with the inverter’s GFCI.

NOTE: For GFCI protected hardwire output. Wire directly to the GFCI “Load” terminals. Verify that you are connecting to the un-used “Load” terminals.



REMOTE STATUS PANEL & REMOTE INV. ON/OFF SWITCH

Remote Status Panel

The display panel can be removed from the inverter and installed in a different location in the vehicle for remote control and monitoring. Please follow the following procedure closely.

Unscrew the two screws that hold the panel in using a 3/32" allen wrench. Disconnect the RJ45 connector from the back of the remote panel and re-connect it to the backside of the replacement RJ45 cover plate.

⚠ WARNING: Mount the RJ45 cover plate on the inverter with the two screws provided in the remote extension kit (8-32x3/8"). DO NOT USE the screws that held the display to mount the RJ45 cover plate. Using any other screw type or length than that provided in the kit may damage the inverter and/or harm the installer. Tighten the screws to 16-17 in/Lbs.

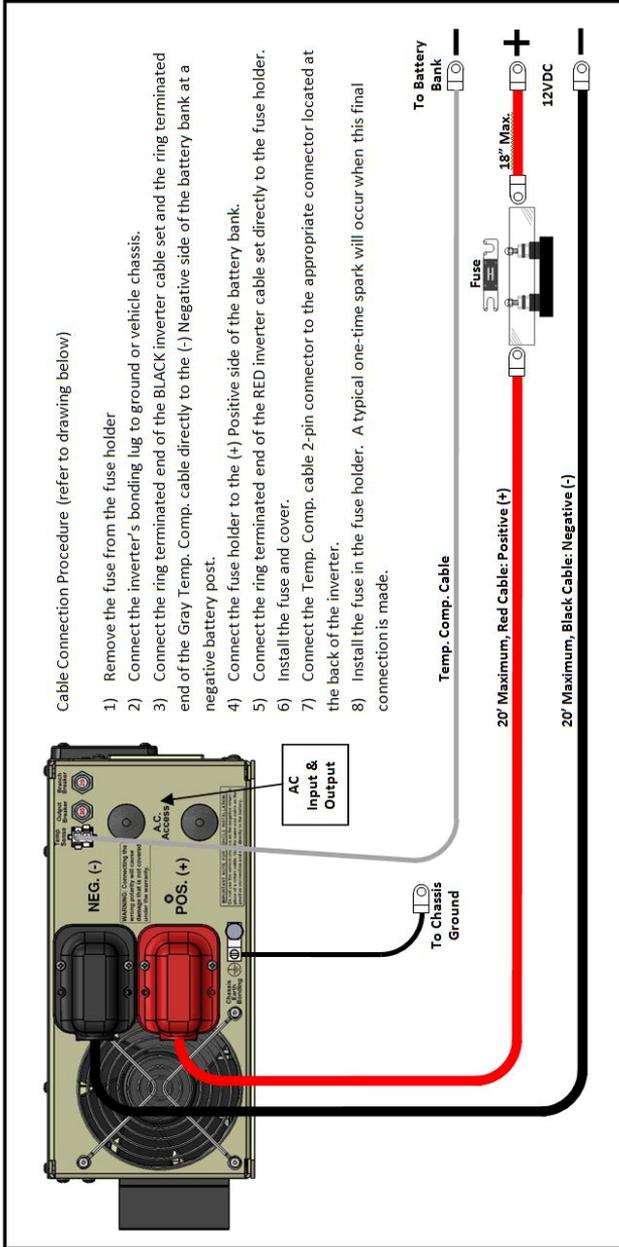
Connect the extension cable to the RJ45 jack and route through the vehicle to the desired location. See the appendix for mounting hole size and placement information. Install the remote display panel at the desired new interior location using installer supplied #8 screws and connect the extension cable to it.

Remote Inverter ON/OFF Switch

An optional customer supplied remote switch can also be used to control the inverter. Mount the remote switch in a convenient location. Using 18awg wire and an insulated 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. Make sure to have a 5-amp in-line fuse installed in series within 10 inches from the positive (+) terminal of the battery.

WIRING DIAGRAM

Typical DC Wiring Diagram



OPERATION (Using LED Display Panel)

Once the inverter has been fully installed and wired, and DC power has been applied, the 7 segment display panel will come to life. This display panel shows the status and configuration information of the inverter and charger. You can also turn the inverter on and off by pressing the [ON/OFF] key and also make configuration changes using the [MENU] and [DISPLAY/SELECT] keys.



NOTE: This LED Display Panel can be removed from the front of the inverter and mounted in a convenient and dry location (e.g.; in the cab of the vehicle). Order remote extension kit #625000

NOTE: The inverter can also be controlled by the ignition of the vehicle, see Appendix for detailed information on this feature.

The first message that you will see scroll on the 7 Segment Display once DC power is applied is:

ch9r | nu OFF | chEc | Ac

This message is “charger inverter off check AC,” which simply means that both the charger and inverter are off and that the unit is not plugged into shore power or there is a problem with AC power coming to the unit.

Inverter Power Mode (Using LED Display Panel)

1) Turning the Inverter “ON” or “OFF” (no AC applied):

Simply press the [ON/OFF] key and the inverter will turn on. The “ON/STBY” LED will also come on green. Press the [ON/OFF] key again to turn the inverter off.

While the inverter is on the following message will display:

1 nu | 550 | 12.6v

This message shows that the inverter is on, the load is consuming 550 watts of power, and that the battery voltage is currently at 12.6 volts.

2) Inverter “Stby”

The inverter standby feature allows the inverter to automatically come on anytime that it senses a loss of shore power and then go back to standby when shore power is returned (after 22 seconds of line qualify time).

This feature is enabled by turning the inverter on by pressing the [ON/OFF] key. If this is done while shore power is applied the “ON/STBY” LED will come on Amber and the display will show:

1 nU **Stby** **PUSH** **OFF**

This message is stating that the inverter is in standby and that to exit this mode you need to press the [ON/OFF] key.

NOTE - To exit Inverter standby mode, press the [ON/OFF] key.

If you turn off the inverter while shore power is applied the display will show:

1 nU **OFF** **PUSH** **Stby**

This message is stating that the inverter is off and that to put it back to standby you need to push the [ON/OFF] (Stby) key.

3) Other inverter messages:

1 nU **LO!** **bAtt** **9_Bu**

Low battery condition due to start surge or undersized battery cable gauge. If this condition remains for => 5seconds the inverter will shutdown.

1 nU **OL** **bAtt** **11_Bu**

Overload condition due to excessive loads or short circuit. If this condition remains for => 5seconds the inverter will shutdown.

4) Battery Test

The battery voltage can be tested at anytime by pressing the [BATT TEST] key. The mode will stay active for 1 minute or until the [BATT TEST] or [MENU] key is pressed.

12.6v

5) Battery Trough (low battery voltage point)

If while using the inverter, the inverter temporarily shuts down due to a low DC input condition, you can check to see how low the DC input voltage momentarily went to. To see this value, press the [BATT TEST] key. Then

press the [DISPLAY/SELECT] key. The display will show “LO BATT” followed by the recorded minimum low input condition (trough) voltage. The mode will stay active for 1 minute or until the [BATT TEST] or [MENU] key is pressed. The following message shows the low point at 10.1 volts.

Lo bAtt 10.1v

If there is not a value stored, the message will just say “Lo batt ---” and not list any voltage.

You can clear the stored value manually by pressing the [DISPLAY/SELECT] key while the message is scrolling. You will then see the following flash twice:

CLr bAtt

A newly recorded value will also clear the old value and replace it with the new.

6) Auto Sleep Mode

This feature is used to turn the inverter off if there has been zero watts drawn for the set amount of time. For example if the sleep mode is set to 30 minutes and 30 minutes of time has elapsed with no power being drawn from the inverter, the inverter will shut off. The inverter must then be manually turned back on again when needed. You can adjust this setting by pressing the [MENU] key twice. You will then see:

Auto SLEP OFF

To change the setting press [DISPLAY/SELECT] repeatedly until the desired setting appears. The options are OFF, 30M, and 15M. The default setting is Off.

External Power Mode (Using LED Display Panel)

- 1) **Bypass Relay:** The loads attached to the inverter output will operate directly from the external AC power line independently of the inverter ON/OFF status. If the inverter is left ON (standby mode), the built-in bypass relay will automatically cycle back and forth between “Inverter Power” mode and “External Power” mode depending on the availability of the external AC power line.

BATTERY CHARGER

The battery charger will engage automatically and independently of the inverter ON/OFF status. The 3-step charging process modes are; Bulk, Acceptance, and Float.

2) **AC Input Limit (Charger AC current limit)**

The maximum AC current that the charger will be allowed to draw is adjustable. This value can be set to 30-0A (maximum value is factory set based on model). The default setting is for 15 amps. Press [MENU] to display the current setting. The message will then scroll:

AC In LIt 15A

To change the value press [DISPLAY/SELECT] and the value will decrease in 5A increments. The charger stores the last value shown on the display.

3) **Charger Modes**

The charger has three modes of operation; Bulk, Accept, and Float. The display panel will state which mode the charger is in when shore power is applied. The mode along with the charge voltage and current will be displayed.

Bulk Mode:

chgr BULH 12.3V 50A

Accept Mode:

chgr AcPt 14.4V 15A

Float Mode:

chgr FLOt 13.1V 0A

4) **Temperature Compensation Cable or Dongle**

If the temperature compensation Cable or Dongle is not connected to the “Temp. Sense” connector on the inverter; the battery charger will not function, the red “FAULT” LED will come on, and the display will show:

chgr OFF bAtt PrOb

Check to make sure that the cable is connected.

OPERATION (Using Remote ON/OFF tab)

Once the inverter and remote On/Off switch have been fully installed and wired, and DC power has been applied, the inverter is ready to turn on. The Status LED on the right side of the inverter shows the status information of the inverter and charger.

Inverter Power Mode (Using Remote ON/OFF tab)

1) **Turning the Inverter “ON” or “OFF” (no AC applied):**

The inverter can now be turned on by turning on the remote switch. When the inverter is on the Status LED will blink Amber.

External Power Mode (Using Remote ON/OFF tab)

- 1) **Bypass Relay:** The loads attached to the inverter output will operate directly from the external AC power line independently of the inverter ON/OFF status. If the inverter is left ON (standby mode), the built-in bypass relay will automatically cycle back and forth between “Inverter Power” mode and “External Power” mode depending on the availability of the external AC power line.

BATTERY CHARGER

The battery charger will engage automatically and independently of the inverter ON/OFF status. The 3-step charging process modes are; Bulk, Acceptance, and Float.

2) **Battery Charging Modes**

The charger has three modes of operation; Bulk, Accept, and Float. The Status LED will state which mode the charger is in when shore power is applied.

Charging Status LED Normal States		
LED Color	LED State	Operating Conditions
Green	1 blink	Bulk Charge
Green	2 blinks	Accept Charge
Green	3 blinks	Float Charge
Green	4 blinks	Load Management Active

3) **Temperature Compensation Cable or Dongle**

If the temperature compensation Cable or Dongle is not connected to the “Temp. Sense” connector on the inverter; the battery charger will not function and the Status LED will blink Red 5 times.

THEORY OF OPERATION

Inverter Power Mode

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

The Display Panel [ON/OFF] key or a voltage between 8 and 20 volts applied to the "Remote On/Off" input controls the inverter.

Operational modes: "External Power" mode and "Inverter Power" mode.

The LED Display Panel "ON/STBY" LED will be on Green and the Status LED will blink Amber 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 17 volts. Above 17 volts the system will stop operating due to input voltage being out of range. The inverter can tolerate up to 17V DC input. When the input voltage drops to 10.5 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%.

External Power Mode

The LED Display Panel will show charger mode and output and the Status LED will blink Green indicating that there is a valid external AC power line applied to the inverter AC input.

Bypass Relay: The loads attached to the inverter output will operate directly from the external AC power line independently of the inverter ON/OFF status. If the inverter is left ON (standby mode), the built-in bypass relay will automatically cycle back and forth between "Inverter Power" mode and "External Power" mode depending on the availability of the external AC power line.

Battery Charger: The battery charger will engage automatically and independently of the inverter ON/OFF status. The 3-step charging process modes are; Bulk, Acceptance, and Float.

The LED Display Panel will show charger mode and the Status LED located on the side of the inverter will blink Green to indicate the charging process mode (1 blink = Bulk, 2 blinks = Accept, 3 blinks = Float).

NOTE: The charger is capable of charging AGM, GEL, or Wet cell batteries. Select battery type by using the slide switch on the right side of the inverter.

Charger operation with temperature compensation cable:

The battery charger temperature compensation cable measures the battery temperature and automatically adjusts the charger output voltage for the fastest and safest charge.

When batteries are cold, their chemical reaction is slowed, so they will not take on a charge as easily. A charge voltage optimized for room temperature will not charge the battery at low temperatures. The temp comp cable allows the charger to increase the charge voltage for optimum charging at low temperatures.

When batteries are hot, their chemical reaction is accelerated and they absorb energy too readily. A charge voltage optimized for room temperature will tend to overcharge the batteries and cause gassing. The temp comp cable will cause the charger to decrease the charge voltage to a safe level.

Our charger will switch to a “warm battery” mode in which the charger will only provide a float voltage when the batteries reach 122F/50C -140F/60. If the battery temperature continues to rise over 140F/60C the charger will shut off. The charger will resume charging in the “warm battery” mode when the battery cools to 131F/55C. Further, the charger will resume normal charge modes when the battery cools to 113F/45C.

Charger operation with temp comp bypass dongle:

Proper battery charging is best achieved by the use of the temperature compensation cable. If this is not feasible then the temperature compensation dongle can be used.

If the charger is used with the Temp Comp Cable Bypass Dongle, the charger will lock in to a hot setting for the charge voltages per the table. The bypass dongle may significantly reduce charger effectiveness at low temperatures and will not sense an overheated battery, and may not avoid a hazardous condition.

3 step Battery Charger Recipes, voltages with Temp Comp Bypass Dongle			
Battery type	AGM	GEL	Wet
Acceptance charge voltage (VDC)	13.9	13.3	14.2
Float voltage (VDC)	13.0	13.0	12.7

Load Management:

Incoming AC power is shared between the AC loads and the charger. The AC loads are given priority; this means the charger will reduce its output with large AC loads. This feature controls the total amperage draw of the system so the utility service circuit breaker is not tripped. The Load Management feature will return the charger to full output when the AC loads are removed or reduced.

Dead battery charging:

The charger will operate anytime the AC line is within the valid range. There is no minimum battery voltage required for the charger to start.

TROUBLESHOOTING GUIDE

Look at the “LED DISPLAY PANEL MESSAGES” and “LED STATUS CHART” below for LED descriptions. See also the troubleshooting section for more troubleshooting information.

⚠ 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; <http://dimensions.sensata.com>

LED Display Panel Messages

1) Inverter Off Low Battery

ON OFF LOW BATT

The inverter is off due to a low battery voltage condition (≤ 10.5 volts for 5 seconds). Both the Amber “ON/STBY” and Red “FAULT” LED’s are on. Check battery charge and DC wiring cable size.

2) Inverter Off Overload

ON OFF OL

The inverter is off due to an overload condition. The Red “FAULT” LED is on. Remove one or more loads from the output of the inverter. Reset the inverter.

3) Inverter Off High Temperature

ON OFF H IGH T EMP

The inverter is off due to a high temperature condition ($>60^{\circ}\text{C}/140^{\circ}\text{F}$). Both the Amber “ON/STBY” and Red “FAULT” LED’s are on. The inverter will turn back on when the temperature is $< 45^{\circ}\text{C}/113^{\circ}\text{F}$.

4) Inverter Off High Battery

ON OFF H IGH BATT

The inverter is off due to a high charging voltage condition (>16.9 volts) and the display reports the value. Both the Amber “ON/STBY” and Red “FAULT” LED’s are on. Inverter restarts at 15.5 volts. Check the vehicle alternator/regulator.

5) **Charger Off High Temperature**

CHGR OFF HIGH TEMP

The charger is off due to a high temperature condition ($>60^{\circ}\text{C}/140^{\circ}\text{F}$). The Red “FAULT” LED is on. The charger will turn back on automatically when the temperature is $<45^{\circ}\text{C}/113^{\circ}\text{F}$.

6) **Charger Off Battery Temperature**

CHGR OFF BATT TEMP

The charger is off due to a high battery temperature ($>47^{\circ}\text{C}/117^{\circ}\text{F}$ - $50^{\circ}\text{C}/122^{\circ}\text{F}$). The Red “FAULT” LED is on. Check the battery compartment for proper ventilation.

7) **Charger Off Battery Probe**

CHGR OFF BATT PROB

The charger is off due to a shorted or open (missing) temperature compensations sensor. The Red “FAULT” LED is on. Check the connections.

8) **Charger Off High Battery**

CHGR OFF HIGH BATT

The charger is operating in a high DC output voltage condition. The Red “FAULT” LED is on. Disconnect other battery charger or source and reset.

9) **Charger Warm Battery**

CHGR WARM BATT

The charger reduced output due to warm battery temperature. The Red “FAULT” LED is on. Check battery compartment for proper ventilation.

LED Status Chart

Status LED Normal States		
LED Color	LED State	Operating Conditions
Green	1 blink	Bulk Charge
Green	2 blinks	Accept Charge
Green	3 blinks	Float Charge
Green	4 blinks	Load Management Active
Amber	1 blink	Inverting
Status LED Fault States		
None	Off	No power to unit or internal fault
Any	Constant ON	Internal fault
Red	1 blink	Inverter Low Battery shut down*
Red	2 blinks	Inverter Overload shut down
Red	3 blinks	Transformer High Temp*
Red	4 blinks	MOSFET High Temp*
Red	5 blinks	Battery probe open or shorted
Red	6 blinks	Charger high battery temp*
Amber	2 blinks	Charger warm battery*
Amber	3 blinks	High battery voltage*
Amber	4 blinks	System overload, reset required
Faults marked with* will self recover when the condition returns to normal range		

Troubleshooting

4) **No AC output power during inverter mode:**

No LED's On:

- Check the in-line fuse which is located within 18" from the battery's positive post.
- DC connections tight and clean?
- Battery voltage to be above 10.5VDC?
- Check Remote Power Switch.

LED blinks Amber once: Disconnect all loads and connect a test light to the GFCI outlet.

- Check the GFCI to see if it is tripped (Cooper brand GFCI has the LED go on when tripped, other brands are dark)
- If test light is off: Possible failed inverter

LED blinks Green: Repeat above test

LED blinks Red: See "Led Status Chart"

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

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

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

- Overload condition clears, check for short circuits or check load size versus inverter output wattage size.
- If the overload persists, possible failed inverter

7) **High Temp.:** Let the inverter cool down

8) **Check Battery:** Reset the inverter (unplug/plug AC Input cord from the utility power) and remove the fuse from the fuse holder. Turn "on" the inverter for 30 seconds. Turn "off" the inverter. Re-install the fuse.

- Possible battery cell shorted or corroded/loose DC wires
- Check voltage and current against charger recipe table

APPENDIX

Ignition Switch Control with the LED Display Panel

The LED Display Panel can be wired to the vehicle ignition circuitry to control operation of the inverter. When the ignition is turned on, the inverter has a built-in delay which will turn it on after 10 seconds. In order for the inverter to work in this way the LED Display Panel must be programmed for this type of operation. This is done by having either AC or DC power applied to the inverter and then following these instructions:



Ignition Programming:

1. Press and hold [MENU] & [DISPLAY/SELECT] for 5 seconds. A Green "FAULT" LED comes on.
2. Press [MENU] once. Display scrolls:

CEL **LAB** **OFF**

3. Press [DISPLAY/SELECT]. Display stops at:

OFF

4. Press [DISPLAY/SELECT] and the display changes to:

19n

The "ON/STBY" LED will also blink Amber (if unit is connected to AC power).

5. Press the [BATT TEST] key. Disconnect power to the system and complete wiring as stated below.

The next step is to use an insulated female faston and using 18awg wire, connect to the faston tab on the backside of the LED Display Panel. Wire the other end through a 5 amp inline fuse to the ignition circuitry of the vehicle.

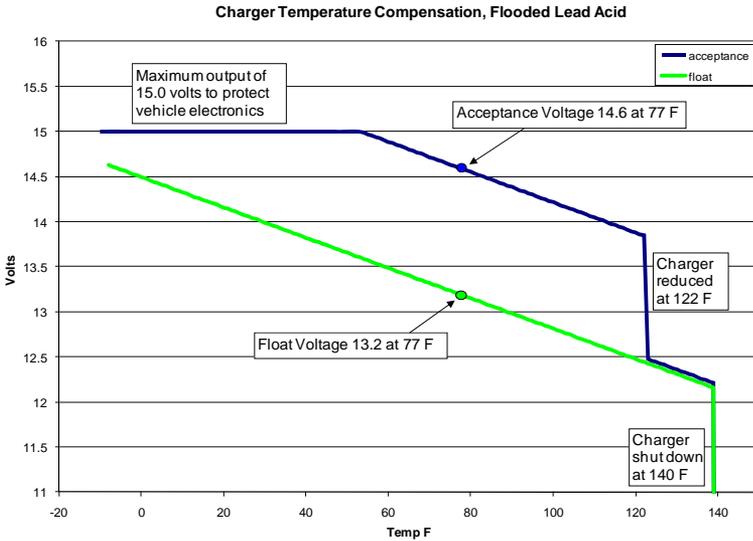
NOTE: It is advisable when using this feature to also take advantage of the Auto Sleep option of the inverter. See page 13, item 5. If this option is used and the inverter has gone to sleep, press [ON/OFF] to turn the inverter back on.

NOTE: Repeat steps 1-5 to turn this feature off again.

3 Step Battery Charger Recipes with Temp. Comp. Cable

Battery type		AGM	GEL	Wet
Bulk charge phase				
Bulk	Bulk charge current limit	SEE SPEC (PAGE 5)		
	Bulk phase terminates	1. When battery voltage reaches the Acceptance voltage 2. When the bulk timeout is reached		
	Bulk phase timeout	6 hours	6 hours	6 hours
Bulk timers will extend when load management reduces charger current below 50% (25A)				
Acceptance charge phase				
Acceptance	Acceptance charge voltage @ 77F/25C	14.3 VDC	13.7 VDC	14.6 VDC
	Acceptance voltage temp comp	5mv/cell/°C		
	Maximum acceptance voltage at low temps	15.0 VDC @ 4C	14.5 VDC @ -6C	15.0 VDC @ 10C
	Acceptance phase terminates	1. When charge current is reduced 2. When the acceptance timeout is reached 3. If the charger can't maintain the Acceptance voltage		
	Acceptance phase timeout	6 hours		
Float charge phase				
Float	Float voltage @ 77F/25C	13.4 VDC	13.4 VDC	13.2 VDC
	Float voltage temp comp	5mv/cell/°C		
Battery Temperature				
Battery Temp	Charger Warm Battery: output switches to compensated float from Bulk/Accept/Off(hot)	>122F/50C <140F/60C		
	Charger High Battery Temp: Output to Off	>140F/60C		
	Charger Resumes in previous mode: Bulk/Accept/Float	<112F/45C		

Charger Output vs. Temperature



Accessories & Replacement Parts

Part Number	Item Description
251048	Compression lugs for battery cables (2 included)
431021	Fuse holder with cover
430010	Fuse 200A, ANN-200
430012	Fuse 300A, ANN-300
430019	Fuse 400A, ANN-400
430067	Fuse 600A, ANN-600
611622-XX	Temperature compensation cable (XX=length in feet)
611877	Temp. Comp. Cable Bypass dongle
625000	LED Display Remote extension kit.
430001	Faceless GFCI Outlet, Leviton X7590
430005	GFCI Outlet, Leviton N7899

NOTE – GFCI Outlets: It is advisable when replacing a GFCI outlet to 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.

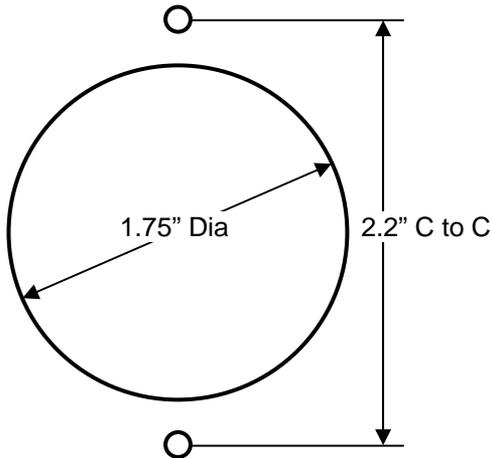
Inverter Charger Model Options

This inverter charger comes in a variety of model options:

G	20A Main Breaker for certain CUBE's (replaces 30A Main), no Branch Breaker
G2N (CUBE)	Dual GFCI, Inverter ONLY (No Charger or Bypass Relays), Main Breaker 20A, no Branch breaker
G2N (LARGE)	Dual GFCI, Inverter ONLY (No Charger or Bypass Relays), adds a second 20A Branch breaker
H	No GFCI or branch breaker, hardwire only
L	Local On/Off Switch, non-upgradeable
N	Inverter-only (no charger, no bypass relays)
R	RJ45 remote jack (instead of 7-segment display, includes plate and jack - no cable or display)

LED Display Panel Mounting

The LED Display panel needs a mounting hole and screw positions as shown below. Use a #8 screw for mounting the display:



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: 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.

NOTES



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Technologies

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