



**Sensata**  
Technologies

Manufacturer of Dimensions™ Inverters  
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**OWNER'S MANUAL**

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ISO 9001:2000 Certified Company



# **DIMENSIONS™**

## **DC to AC Power Inverters**

Models:

**24/2200N**

**24/3300N**

**24/4800N**

Including Options: **A, B1, D, R, T, T1**

**OWNERS MANUAL  
FOR SENSATA TECHNOLOGIES  
DIMENSIONS INVERTERS**

Model 24/2200N

Model 24/3300N

Model 24/4800N

Including Options: A, B1, D, R, T

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**1. GENERAL**

**1.01** Dimensions inverters have been designed and manufactured for many user applications and long life. They utilize patented construction methods and high technology electronic parts and circuitry.

**1.02 CAUTION:** Inverters produce hazardous voltages, to avoid risk of harm or fire the unit must be properly installed.

There are no user serviceable parts inside, do not remove the cover.

**CAUTION:** The inverter should not be mounted in a location that may be exposed to rain or spray.

**CAUTION:** The inverter should not be installed in a zero clearance enclosure.

**CAUTION:** Damage to the inverter will occur if correct polarity is not observed when installing the DC input cables.

**CAUTION:** Damage to the inverter will occur if an external AC power source is applied to the inverter's AC output or its hardwire output.

**CAUTION:** The inverter contains a circuit breaker and capacitor that may produce a

spark. Do not mount in a confined battery or gas compartment.

**CAUTION:** Working in the vicinity of lead-acid batteries is dangerous. Batteries generate explosive gases during operation. There is a risk of acid exposure. There is also a risk of high current discharge from shorting the battery that can cause fire and explosion.

**CAUTION:** Be sure the inverter and, if used, the external AC input circuit breaker or fuse are turned "OFF" during installation.

**2. DESCRIPTION**

<u>Inverter</u> <u>Model</u>	<b>Inverter Rating</b>		
	<u>Input</u> (VDC) (ADC)	<u>Output</u> (VAC) (Watts)	
24/2200N	25.2 Up to 110	120	2200
24/3300N	25.2 Up to 165	120	3300
24/4800N	25.2 Up to 240	120	4800

**2.01** The inverter converts 24 VDC to 120 VAC, 60 HZ, having a pure-sine wave form.

**2.02** The inverter has internal protection against output short circuit, output overload and high temperature conditions. Also, there is a thermally controlled cooling fan.

**2.03** The inverter is designed to operate any 120 VAC, 60 HZ single phase appliance, equipment or tool within its power ratings.

**2.04** The battery charger ("B1" option) has sophisticated, patented recharge detection circuitry to ensure complete battery charging. It is fully automatic and regulated, and is temperature compensated.

**3. INSTALLATION**

**3.01** The following instructions should be thoroughly read and understood before installation.

**3.02 CAUTION:** Inverters produce hazardous voltages, to avoid risk of harm or fire the unit must be properly installed.

**CAUTION:** Damage to the inverter will occur if correct polarity is not observed when installing the DC input cables.

**CAUTION:** Damage to the inverter will occur if an external AC power source is applied to the inverter's AC outlet or its hardwire output.

**CAUTION:** Be sure the inverter's circuit breaker or fuse (if needed) are turned "OFF" during installation.

**NOTE:** All wiring must follow the National Electric Code, Provincial or other codes in effect at the time of installation, regardless of suggestions in this manual. All wires should be copper conductors.

### 3.03 Mounting

**3.03.1** Locate a suitable, secure vertical or horizontal mounting surface as close to the battery as possible without being in the same air tight compartment. The maximum recommended distance between the mounting location and the battery is 20 feet.

**CAUTION:** If mounting the inverter on a vertical surface, mount with the front control panel pointing down.

**3.03.2** The location should provide adequate ventilation and clearance to maintain room temperature during operation. At least 1/2 inch of clearance is required on all sides.

**3.03.3** Secure the unit with 1/4 inch screws or bolts in the mounting slots on the flanges of the chassis.

### 3.04 Chassis Bonding Lug - FIG. 1

**3.04.1** Connect a #8 gauge or greater copper wire between the bonding lug on the inverter and the earth grounding system or the vehicle chassis.

### 3.05 Battery Cabling - FIG. 1

**3.05.1 CAUTION:** Assure that hydrogen gas does not accumulate near the battery by keeping the area well ventilated. A spark may result when connecting the final battery wiring due to the initial charging of the internal input capacitor.

**3.05.2** Use stranded copper wire between the battery and inverter as indicated. A line fuse must be installed between the battery and the inverter. U.L. requires that the fuse be within 18 inches of the battery.

### DC Input Wire Lengths (maximum) and Fusing Guide

Model	Distance(feet)				
	1-10	11-15	16-20		
24/2200N	4 ga	2 ga	1 ga		
24/3300N	1 ga	1 ga	1/0 ga		
24/4800N	2/0 ga	2/0 ga	3/0 ga		
Fuse: 200A	250A	300A	350A	400A	500A
AWG: 4	2	1	1/0	2/0	3/0

**3.05.3 NOTE:** Using smaller input cable or longer length will greatly degrade the inverter peak performance.

### IMPORTANT NOTE FOR VEHICLE

**INSTALLATION:** Do not use the vehicle chassis as the negative return in place of a return cable. Use the same size cable as the positive connection and run directly to the battery.

**3.05.4** Install the wires at the battery, inverter and then fuse holder. Make sure that good, clean connections are made. Use care not to touch the positive and negative wires together. This will result in a violent spark and could result in exploding batteries and fire.

**3.05.5** The battery input terminals are located in the wiring compartment. A mounting spark may result when connecting the battery wire, due to an initial charging of the internal input capacitor.

**3.05.6 CAUTION:** Connecting the inverter incorrectly to the battery will cause damage that is not covered under warranty.

### 3.06 Remote Switch for Inverter Operation - Fig. 1

**3.06.1** All material used for the remote switch should be U.L. listed and installed per low voltage, Class 2, wiring code.

**3.06.2** If the "R" option is included, then connect the cable from the remote panel/ status lights with the mating connector extending from the inverter. Extension cable is available if necessary.

**3.06.03** If the "R" option is not included,

a remote switch may be connected to the violet wire marked "Remote Switch Hookup" in the wiring compartment. Disconnect the violet wire from the battery positive input terminal. Connect the violet wire to the load side of the remote switch. The line side of the switch must be connected to the +24 VDC power source with a fuse within 18" of the source. The cable clamp strain relief should be used to secure the field wires.

**3.06.4** The switch should be mounted at a convenient location in a listed outlet box with approved strain relief.

**3.06.5 NOTE:** A remote switch, if installed, will operate **only if** the local On/Off switch on the face of the inverter is turned "On". You may use several switches or relays in parallel in lieu of one remote switch.

### **3.07 Remote Temperature Sense ("B1" option)**

**3.07.1 CAUTION:** Failure to connect the remote temperature sense probe correctly will result in high output voltage that will cause improper battery charging.

**3.07.2** A 10 foot long cable with temperature sense probe is provided with the unit. This allows the unit to know the exact battery temperature for correct operation of the temperature compensated circuitry. This changes the output voltage as required by the battery at a given temperature.

**3.07.3** Install the probe end on a NEGATIVE battery terminal post.

### **3.08 120 VAC Output**

**3.08.1 CAUTION:** Do not connect another source of AC power directly to the output of the inverter. This will result in damage to the inverter that is not covered under warranty!

**3.08.2** The 120 VAC output of the inverter is provided at the GFCI receptacle outlet on the inverter.

**3.08.3** The output is also presented behind the wiring compartment panel using direct hardwire wire leads. The black wire is hot, the white wire is neutral and the green wire is ground. The cable clamp strain relief

should be used to secure the field wires.

**3.08.4** The hardwire A.C. output is not ground fault circuit interrupt, (GFCI) protected unless the inverter has option "A". GFCI outlets should be installed at all appropriate locations per NEC 551. The GFCI outlet should be Hubbell GFR5352XX (20A) or GFR5252XX (15A).

**3.08.5** The remote AC outlets should be mounted at a convenient location in a listed outlet box with approved strain relief.

### **3.09 120/240 VAC Dual Output (D Option)**

**3.09.1** The output is presented behind the wiring compartment panel for direct hardwire wire leads. The two black wires are hot, the white wire is neutral and the green wire is ground. The cable strain relief should be used to secure the field wires.

### **3.10 120/240 VAC Input (T, T1, B1, and D options)**

**3.10.1** 120 or 120/240 VAC (D Option), 60HZ power from the electric utility or generator can be connected to the inverter with hardwire connections at the AC Input wire leads provided in the hardwire compartment. The black wire is hot, the white wire is neutral, and the green wire is ground. On the "D" option, the two black wires are hot, the white wire is neutral, and the green wire is ground. The cable clamp strain relief should be used to secure the field wires.

**3.10.2** The input circuit should have 30 amp circuit protection from the distribution panel ("T" option) or 50 amp circuit protection from the distribution panel ("T1" option).

**3.10.3** When external AC is supplied, the internal transfer switch is automatically activated, the inverter is turned "Off", and the inverter's loads will operate from external AC input.

**3.10.4** Units having the "B1" option require a separate 120 VAC (240 VAC with D option) input circuit. The first circuit activates the internal transfer switch supplying utility or generator power to the

inverter's output loads, and turns "Off" the inverter. The second circuit activates the battery charger and also turns "Off" the inverter. Both the transfer switch input and the battery charger input must be the same phase.

#### Charger Ratings

<u>Model</u>	<u>Input 120VAC, 60Hz</u>	<u>Output</u>
24/2200N	Up to 20 Amp AC	50 Amp DC
24/3300N	Up to 30 Amp AC	75 Amp DC
24/4800N	Up to 30 Amp AC	100 Amp DC

#### 4. START UP / OPERATION

**4.01** The battery charger will operate anytime that there is external AC power and the battery is not 100% charged. The status lights will indicate that there is external power and the battery's condition.

**4.02** If the unit has the "B1" option, there are two switches on the right side that should be set.

**4.03** The switch labeled "Battery Type" should be set to the correct setting based on the composition of the batteries attached to the inverter. Use the following table to determine the correct setting.

#### BATTERY TYPE SELECTION

<u>SETTING</u>	<u>BATTERY TYPE</u>
A	Vented Nickel-Cadium 10 cells
B	Vented Lead-Acid (Antimony) Flooded Electrolyte
C	Sealed Lead-Acid Absorbed or Vented Nickel-Cadium 9 cell
D	Sealed Lead-Acid Gelled

**NOTE:** Used batteries should be put through 5 charge cycles with the switch set one position lower (to the right) than desired. Example: Start a used vented-lead acid battery on the "C" setting.

**4.04** The switch labeled "Battery Size" should be set to the correct setting based on the total amp hour capacity of the batteries attached to the inverter. Use the following table to determine correct setting.

#### BATTERY CAPACITY SELECTOR

<u>SETTING</u>	<u>AMP HOUR CAPACITY</u>
A	Over 600
B	600 - 400
C	400 - 200
D	Less than 200

**4.05** To operate the inverter, turn the On/Off switch to "ON". Assure that the output breakers are reset. If a remote switch is used, the inverter is turned "On" or "Off" by the remote switch.

#### 5. TROUBLESHOOTING

**5.01** Sensata offers free phone consultation concerning installation or troubleshooting. Call the Customer Service Department at: 1-800-553-6418 or 651-653-7000 fax: 1-651-653-7600 e-mail: [inverterinfo@sensata.com](mailto:inverterinfo@sensata.com)

**5.02** If the inverter fails to operate, use the following troubleshooting procedure.

**5.02.1** Connect a 100 watt light bulb to the inverter output.

**5.02.2** Make sure that the inverter is turned "On", and the circuit breakers are reset.

**5.02.3** Check the connection to the remote switch, if used. +24VDC **must** be present at the violet wire for the unit to operate. If not, check any fuses in the remote switch circuit.

**5.02.4** Observe the fault indicating lights on the front of the inverter.

a) The Low input voltage light indicates a low battery condition. Switch the inverter "Off" for 5 seconds, then "On" again. The light coming on again indicates a fault in the battery wiring, battery capacity and voltage or the line fuse.

b) The Overload light indicates an output wiring short circuit or a load that is too large for the power rating of the inverter. Switch the inverter "Off", remove the short circuit or excessive load from the output, then switch the inverter back "On".

c) The High temperature light indicates the inverter has overheated. The unit will automatically turn back on when it has cooled to 40°C (104°F). Verify that the inverter is not in a closed compartment and that the fan is not blocked.

**5.03** When the battery charger fails to operate correctly check the inverter trouble shooting procedure in 5.02, assure that the remote temperature probe is installed correctly, then observe the front panel lights:

a) The external power light should be lit, if not, verify that the external power circuit is providing 120 or 240 VAC, 60HZ power to the unit. Check all external power wiring and external circuit breakers or fuses.

b) The green Timer Complete light indicates the unit's battery charger was unable to completely charge the battery(ies) during the 12 hour charge cycle. One or more of the following conditions can cause this condition.

1) Verify that the two switch settings ("BATTERY TYPE" and "BATTERY BANK SIZE") are correctly set.

2) The charger was unable to detect the 80% charge level point during the 12 hour cycle due to a defective battery.

3) The battery's voltage dropped below 25.2 volts while the charger was attempting to detect the 80% charge level. A battery with a shorted cell or incorrect acid density can cause this condition.

4) More than 20 Amps of DC load current was drawn directly from the batteries during the charge cycle.

5) AC power loss (brown out) in the external AC input that limited the amount of AC power available to the battery charger.

**5.04** A new charge cycle may correct the Timer Complete condition if the cause seems to be conditions 1, 4, or 5. The new charge cycle can be started by disconnecting both external AC inputs for 5 seconds then reconnecting them.

**5.05** Call Sensata for technical assistance and/or a Return Authorization Number if the above steps are completed and the inverter or battery charger will not operate satisfactorily.

FIG. 1 INSTALLATION WIRING

**WARNING: CONNECTING THE BATTERY WITH THE WRONG POLARITY TO THE INVERTER WILL CAUSE DAMAGE THAT IS NOT COVERED UNDER THE WARRANTY.**

