True Sinewave Power Inverter

1000W & 2000W
230V
21100-03, 21200-03

Owner's Manual

Revision: 2.0
Revision date: 2018-07-11

For safe and optimum performance, the Power Inverter must be used properly. Carefully read and follow all instructions and guidelines in this manual and give special attention to the **CAUTION** and **WARNING** statements.

PLEASE KEEP THIS MANUAL FOR FUTURE REFERENCE

Disclaimer

While every precaution has been taken to ensure the accuracy of the contents of this guide, **Modul-System** assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

Important

Please be sure to read and save the entire manual before using your **Modul-System Power Inverter.** Misuse may result in damage to the unit and/or cause harm or serious injury. Read manual in its entirety before using the unit and save manual for future reference.

Product Numbers

True Sinewave series

21100-03	Power Inverter 12V 1000W 230VAC with European socket
21200-03	Power Inverter 12V 2000W 230VAC with European socket

Document Part Number

MSIN1000W/2000W_rev2

Service Contact Information

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1. INTRODUCTION

Thank you for purchasing the Modul-System Power Inverter. With our state of the art, easy to use design, this product will offer you reliable service for providing AC power and 5V USB power for your service vehicle. The Modul-System Power Inverter can run many AC-powered appliances when you need AC power anywhere. The 5V USB power can charge many USB powered devices.
This manual will explain how to use this unit safely and effectively. Please read and follow these instructions and precautions carefully.

IMPORTANT SAFETY INFORMATION

This section contains important safety information for the Modul-System Power Inverter. Each time, before using the Modul-System Power Inverter, READ ALL instructions and cautionary markings on or provided with the inverter, and all appropriate sections of this guide.
The Modul-System Power Inverter contains no user-serviceable parts. See Warranty section for how to handle product issues.

WARNING: FIRE AND/OR CHEMICAL BURN HAZARD

- Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

WARNING: FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH OR SERIOUS INJURY

- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Study and follow all the battery manufacturer's specific precautions when installing, using and servicing the battery connected to the inverter.
- Wear eye protection and gloves.
- Avoid touching your eyes while using this unit.
- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, cleanse right away with soap and water for a minimum of 15 minutes and seek medical attention.
- Batteries produce explosive gases. **DO NOT** smoke or have an open spark or fire near the system.
- Keep unit away from moist or damp areas.
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool that may create an explosion.

WARNING: Shock Hazard. Keep away from children!

- Avoid moisture. Never expose unit to snow, water etc.
- Unit provides 230 VAC, treat the output socket the same as regular wall AC sockets at home.

WARNING: Explosion hazard!

- DO NOT use the Modul-System Power Inverter in the vicinity of flammable fumes or gases (such as propane tanks or large engines).
- AVOID covering the ventilation openings. Always operate unit in an open area.
- Prolonged contact to high heat or freezing temperatures will decrease the working life of the unit.

CE EMC INFORMATION

This equipment has been tested and found to comply with the limits for CE EMC standard. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

LIMITATIONS ON USE

Do not use in connection with life support systems or other medical equipment or devices.

2. PRODUCT DESCRIPTION

The Modul-System Power Inverter package includes the items list below.

- Power Inverter base unit
- Cable boots
- Owner's manual

3. INSTALLATION

WARNING: Modul-System recommends that all wiring be done by a certified technician or electrician to ensure adherence to the applicable electrical safety wiring regulations and installation codes. Failure to follow these instructions can damage the unit and could also result in personal injury or loss of life.

CAUTION:

Before beginning your Modul-System Power Inverter installation, please consider the following:

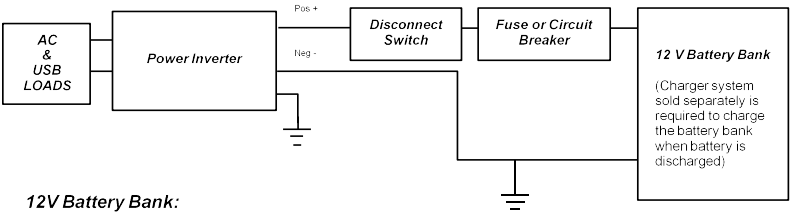
- The Modul-System Power Inverter base unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of 80 mm of space around the unit for optimal ventilation.

Understanding the unit features

DC Input Rear Panel

Material Prepare for Installation

Typical Wiring block diagram of the Power Inverter:



12V Battery Bank:

- The use of an AGM battery is highly recommended for power inverter application.
- For battery size, you need to identify how much you will be using them between charges. Modul-System recommends you purchase as much battery capacity as possible. Minimum battery size required is 100Ah for the 1000W inverter, and 200Ah for the 2000W version.

Fuse or Circuit Breaker:

- DC-rated fuse or DC-rated circuit breaker connected along the DC positive line is required.
- For 21100-03 select a fuse or circuit breaker with a minimum of 100Adc.
- For 21200-03 select a fuse or circuit breaker with a minimum of 200Adc.
- Based on the size of the battery bank chosen on the 12V Battery Bank above, determine the overall short circuit current rating of the battery bank from the battery manufacturer. The fuse or circuit breaker chosen has to be able to withstand the short circuit current that may be generated by the battery bank.

Disconnect Switch:

- Select a Disconnect Switch with the same or higher the rating of the selected fuse or circuit breaker from the above.
- The Disconnect Switch can be used to disconnect the DC power between the power inverter and the battery bank during service, maintenance or trouble shooting.

DC Input and Grounding Cable:

- Use of low resistance wire is required for all the DC connections between the inverter and the battery bank.
- For 21100-03 use minimum 25mm^2 wire with maximum cable length of 3 m.
- For 21200-03 use minimum 40 mm^2 wire with maximum cable length of 3 m.

- **Important:** The unit is grounded through the ground stud of the unit located near the DC Input terminal.
- For the grounding cable connected between the power inverter chassis to the earth ground, use a matching cable size as used on the DC Input Cable section.

Installing the Power Inverter System **WARNING**: Electrical Shock Hazard

The unit's 'On/Off' switch does not disconnect the DC power from the battery. Use the DC Disconnect Switch or disconnect the DC input cables connection to disconnect the DC power from the battery before working on any circuits connected to the unit. Failure to follow these instructions can result in death or serious injury.

Power Inverter Installation:

- Choose an appropriate mounting location.
- The unit has to be mounted flat on horizontal surface.
- Use a mounting template to mark the positions of the mounting screws.
- Drill the 4 mounting holes and place the inverter in position and fasten the inverter to the mounting surface.

Power Inverter Chassis Grounding Connection:

DANGER: The Power Inverter has to have the chassis grounded properly. Never operate the Power Inverter without properly grounded. Failure to do so will result in death or serious injury.

- Connect the grounding cable's ring terminal to the unit ground screw.
- Connect the other side of the cable to the common grounding point.

Power Inverter DC Input Connection:

CAUTION: Reverse the DC Input terminal will damage the unit and cannot be repaired. Damage caused by reverse polarity connection is NOT covered by the warranty.

- Connect one end of the negative DC input cable to the Power Inverter DC negative terminal. Connect the other end of the negative DC input cable to a suitable earth point or the battery negative terminal.
- Make sure the Disconnect Switch is in the OFF position.
- Connect one end of the positive DC input cable to the Power Inverter DC positive terminal. Connect the other end of the positive DC input cable to one of the terminal of the Disconnect Switch.
- Connect a DC input cable between the other terminal of the Disconnect Switch and one side of the terminal of the fuse holder.
- Connect a DC input cable between the other terminal of the fuse holder and the battery positive terminal.
- Install the selected fuse to the fuse holder.
- Turn Disconnect Switch to ON position.

Remote Switch (optional) Connection:

- Insert the Remote Switch to the RJ11 Remote Port located at the Front AC panel of the Power inverter. Please note polarity.

Test the Power Inverter connection:

- Turn unit on by pressing and holding the On/Off button on the main unit for about a second until a beep sound occur. The 'Status' light turns on indicating the Modul-System Power Inverter is ON. Check the digital display show measured battery voltage and output power alternatively. Both AC output and 5V USB are now available.
- Plug in a small AC load like a 40W table lamp or small appliance to the AC socket to verify AC is available. If AC is not available, check for error code on display or troubleshooting section. The unit is successfully installed and functioning properly.

4. UNIT OPERATION

WARNING: RISK OF EQUIPMENT DAMAGE

- Do not connect an AC power source like utility power or generator to the unit 230 VAC outlets.

Turn ON and OFF the unit

- Press and hold the "Power/Select" button for 1 second until you hear a beep. Display will show the measured battery voltage and output power alternatively. Status LED will turn green. 5V USB and 230 VAC are available.
- Press "Power/Select" button to turn unit off.

Remote ON /OFF (Optional)

- If optional remote is used, the Remote ON/OFF momentary switch is connected in parallel with the "Power/Select" button on the unit. Same procedure applies to ON and OFF the unit.

Understanding the Display & Status LED

Display:

'12.5' Display shows measured battery voltage
'0.80' Display shows total output AC power in kW (800W as shown)
'E01' Display shows error or warning code. See trouble shooting section in details

Status LED:

Green: Unit operation is normal
Amber: Warning is detected. Unit will shut down at any time. Please check error code to troubleshoot the unit.
Red: Error is detected and unit has shut down. Please check error code to troubleshoot the unit.

Understanding the Error Code

Code	Condition	Corrective Action
E01	Unit has sensed input under voltage and has shutdown	Recharge battery immediately and restart unit
E02	Unit has sensed input over voltage and has shutdown	Check battery voltage or if any external charger is connected to the battery bank
E03	Unit output has sensed overload or short circuit and was shutdown	Check load connected to the output. Reduce load and restart the unit
E04	Unit has sensed internal temperature was high and has shutdown	Turn unit off and wait for 15 minutes before restarting. Check if any object has blocked the air flow of the unit
E05	Unit has sensed input voltage is low and warning occurs	Recharge battery as unit will shut down shortly
E06	Unit has sensed load connected is close to overload shutdown limit	Reduce load
E07	Unit has sensed internal temperature is high and is close to thermal shutdown limit	Reduce load and check if any ventilation of the unit is blocked

AC Load on Power Inverter

Although the Power Inverter can provide high surge power up to two times the rated output power, some appliances may still trigger on the inverter protection system. A higher power inverter is required for those appliances.

5. TROUBLESHOOTING

To trouble shoot the unit, please note the error code display on the main unit and review the "Understanding the Error Codes" in section 4.

Problem	Symptom	Solution
No output voltage and Status LED is off	The unit is off	Turn unit ON by following the instruction in Section 4 to turn unit ON
	No power to inverter	Check fuse or the Disconnect switch (if installed) is either blown or turn OFF
No Output. Status LED is in amber	Check error code on display	Verify the error condition and make correction

6. SPECIFICATIONS

Note: Specifications are subject to change without notices.

Specification	***True Sinewave Series***	
	21100-03	***21200-03***
Inverter		
AC Output Power	1000W	2000W
AC Output Current	4.3A	8.7A
AC Surge Power (Peak)	2000W	4000W
AC Output Voltage	230 VAC / 50 or 60 Hz	
AC Output Waveform	True Sinewave	
AC Output Socket	1 pcs	2 pcs
Nominal DC Input Voltage	12.5 VDC	
No Load battery draw	< 1.2 ADC	
DC Input Voltage operating range	10.5 – 15.5 VDC	
Under Voltage Alarm	11.2 VDC	
Under Voltage Shutdown	10.5 VDC	
Under Voltage Recovery	11.8 VDC	
Over Voltage Shutdown	15.5 VDC	
USB	5V, 750 mA	
Safety and Environmental		
Conformance	CE EMC & LVD	
Agency Markings	E9, CE	
Operating Temperature	0°C to 40°C (32°F to 104°F)	
Storage Temperature	-20°C to 60°C (-4°F to 140°F)	
Relative Humidity	5-90% noncondensing	
Operating Altitude	Up to 3000 meters (9,843ft) above sea level	
Weights and Dimensions		
Weight	2.7 kg (6.0 lbs)	5.2 kg (11.5 lbs)
Dimensions	32.1 x 17.5 x 8.7 cm (12.6 x 6.9 x 3.4”)	41.4 x 23.0 x 11 cm (16.3 x 9.1 x 4.3”)

7. WARRANTY

Two Year Limited Warranty

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of Modul-System. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

This unit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for two years from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

Manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes wiring or connecting to improper polarity power sources.

RETURN/REPAIR POLICY:

If you are experiencing any problems with your unit, please contact our customer service department at info@modul-system.com or phone +46 31 746 87 00 before returning product. After speaking to a customer service representative, if products are deemed non- working or malfunctioning, the product may be returned to Modul-System within 30 days of original purchase. Any defective unit that is returned to manufacturer within 30 days of the date of purchase will be replaced free of charge.

If such a unit is returned more than 30 days but less than two years from the purchase date, manufacturer will repair the unit or, at its option, replace it, free of charge. If the unit is repaired, new or reconditioned replacement parts may be used, at manufacturer's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under these terms for the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items.

LIMITATIONS:

This warranty does not cover accessories, such as adapters and batteries, damage or defects result from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire and flood.

If your problem is not covered by his warranty, contact our Customer Service Department at info@modul-system.com or +46 31 746 87 00 for general information if applicable.