

ANALYTIC SYSTEMS

Power Conversion Solutions

INSTALLATION & OPERATION MANUAL



IPSi1200M Series PURE-SINE INVERTER

An ISO9001 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

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www.analyticsystems.com

INVERTER

IMPORTANT & SAFETY INSTRUCTIONS

1. **SAVE THESE INSTRUCTIONS** — This manual contains important safety and operating instructions for the inverter.
2. Do not expose the inverter to rain or snow.
3. Use of an attachment not recommended or sold by the inverter manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. Do not disassemble the inverter; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
5. To reduce risk of electric shock, disconnect the inverter from the input power before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
6. Never place the inverter directly above a battery; gases from the battery will corrode and damage the inverter.
7. Never allow battery acid to drip on the inverter.

GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS — Inverters should be grounded to reduce risk of electric shock. This inverter is equipped with a chassis grounding stud, and electric receptacles capable of accepting an equipment-grounding conductor and a grounding plug.

Medical Equipment Notice

Analytic Systems does not recommend the use of their products in life support applications where failure or malfunction of this product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Analytic Systems does not recommend the use of any of its products in direct patient care. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), auto-transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as “critical” by the U.S. FDA

HEAVY DEVICE - The IPSi2400 and IPSi3600 Inverters weigh more than 50 pounds and 70 pounds respectively. Please use appropriate safety measures when lifting or moving these devices.



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Introduction

The IPSi-M Series of Intelligent Pure Sinewave Inverters are designed specifically for running computers and other sensitive AC loads in rugged mobile and other off-grid environments. They produce pure sine wave AC power, exactly the same as a regular AC outlet.

Standardized high current MIL connectors provide a solid connection to the battery and to the AC loads, allowing easy upgrade from 1200 to 2400 or even 3600 watts of power without rewiring.

The IPSi1200M Series Inverter is controlled by a sophisticated Digital Signal Processor (DSP) for optimal control and the most efficient operation possible. The heavy duty Toroidal Power Transformer steps the low voltage AC produced by the Power MosFet Transistors to 110 or 220 VAC at 50 or 60 Hz as well as filtering the AC output to reduce or eliminate electrical noise that could interfere with sensitive communications equipment.

Using the free to download Power Wizard software, the user can select output frequency, output voltage and low voltage shutdown parameters from any laptop through the standard usb interface.

FEATURES

- Pure Sine Wave' 110 VAC / 60 Hz or 220 VAC / 50 Hz fully regulated output, exactly the same as commercial AC.
- Crystal controlled for precise frequency (± 0.01 Hz) at either 50 or 60 Hz.
- 1200 Watts output power sufficient for a complete computer workstation and more.
- State of the art MOSFET technology and sophisticated DSP control for efficient and reliable operation.
- Illuminated ON-OFF switch for positive indication of proper operation.
- Heavy input filtering to shield other devices sharing the same battery.
- Transformer type output to protect computers and other sensitive equipment from surges and spikes.
- Low voltage warning and shutdown circuitry to protect the batteries.
- Over voltage and over temperature warning and shutdown circuitry to protect the inverter.
- Short circuit protection.
- LED indicators and a buzzer to bring attention to the cause of the shutdown.

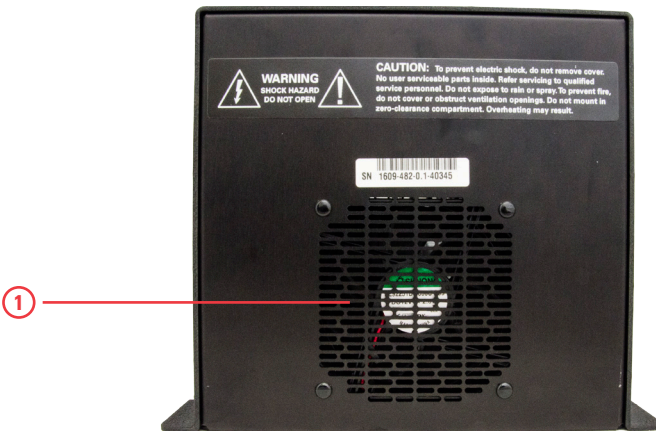


Main Parts



Front Panel

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Indicator LEDs 2. USB port 3. Remote Control / Comm Connector 4. DC Input Connections | <ol style="list-style-type: none"> 5. AC Output Connection 6. On/Off Power Switch 7. AC Input Connection (Option) 8. Ground Stud |
|---|--|



Back Panel

1. Thermostatically controlled cooling fan



Operation

Push the On/Off control to energize the outputs. The switch will glow to indicate the presence of AC power at the receptacles. The LED corresponding to the output frequency will illuminate.

Controls and Indicators

The IPSi1200M Inverter has 8 LED indicators, a microUSB port and a Push On / Push Off power switch. The power switch will glow to indicate the presence of AC power at the receptacles.



The microUSB port is used to connect the IPSi Inverter to a laptop computer running the PowerWizard software and can be used to update the firmware, to adjust the low and high voltage alarm set points, to choose the output frequency (50 or 60 Hz) and to fine tune the output voltage +/- 10% in 1 VAC steps.

- Low Input Voltage:** Blinks Red when the input voltage is near the lower limit for proper operation. Glows Red when the input voltage is too low for proper operation and will be accompanied by the Bypass LED glowing Red and the On/Off switch will not be glowing. Check for the reason for low voltage.
- Sync / High Input Voltage:** If two inverters are operating in series for combined 110 /220 volt operation, this LED will blink green when the second inverter is detected, and will come on solid green combined with a beep when the inverters are synchronized (Sync Option). The LED will blink Red when the input voltage is near the upper limit for proper operation. Glows Red when the input voltage is too high for proper operation and will be accompanied by the Bypass LED glowing Red and the On/Off switch not glowing. Check for the reason for high voltage. The inverter can be damaged if the input voltage exceeds the maximum rating, and over-voltage damage is not covered under warranty.
- Over-Temp:** Blinks Red if the internal temperature of the inverter is approaching the safe limit. The inverter will reduce its maximum power rating to try to maintain the temperature within safe limits. The LED will glow Red if the inverter is too hot to operate and the Bypass LED will also glow Red and the On/Off switch will stop glowing. Either the cooling fan is defective, or there is not enough air circulation for the inverter. If the fan is running, add extra ventilation. If the fan is NOT running the inverter must be returned for repair.
- Overload:** Blinks Red if the load on the inverter reaches the continuous rating. Solid Red if the load on the inverter reaches the maximum rating. Reduce the load on the inverter.
- 50 Hz:** This LED will be on Green if the inverter is set for 50 Hz operation.
- 60 Hz:** This LED will be on Green if the inverter is set for 60 Hz operation.
- Bypass:** This LED will be on Green if the inverter is in Bypass mode, or on Red if the inverter is in an Alarm condition as described above.
- Invert:** This LED will be on Green when the inverter is in normal operation.



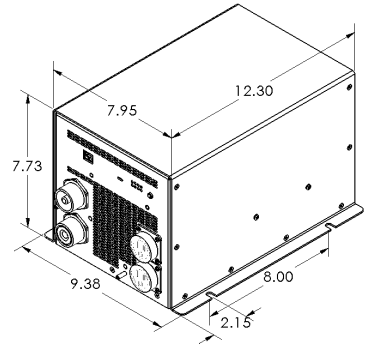
Installation

MOUNTING

Mount the unit in a DRY location. Mount the unit in a ventilated area. Allow at least 1 inch of clearance around the unit for adequate cooling.

CAUTION

The case of the inverter is connected to AC Ground and AC Neutral to meet regulatory requirements and to reduce the possibility of it generating any radio frequency interference. The case must be bonded appropriately to the grounding system of the vehicle or marine vessel. On a vehicle bond the case to the frame and on a marine vessel bond the case to the hull. A grounding stud is provided on the front of the inverter for this purpose. To ensure proper grounding, check the connection with an ohmmeter. The case is isolated from the DC Input, so the DC power can be on a different ground from the AC output.



CAUTION: Do not mount the unit where explosive gases may accumulate as a slight arc may occur when the power lead

DISCONNECTION

If you disconnect the inverter to remove it for service or storage, turn the power switch on for at least one minute after it has been disconnected to discharge the storage capacitors. s are connected, and in the unlikely event of a failure, sparks may be generated inside the unit.

Power Wizard Program

The PowerWizard Program for laptops will be available to download by mid October, 2016 and will allow programming of:

- Low Voltage Shutdown parameters to match battery voltage
- Output Frequency (50 or 60 Hz)
- Output Voltage over a +/- 10 percent range

It will also allow graphing of certain parameters such as Input Voltage, Input Current, Output Voltage and Output Current.



Input Connections

DC INPUT POWER CONNECTION

Prepare a circuit breaker protected power source for the IPSi1200 Series Inverter, making sure the breaker is OFF. Connect the input power to the DC IN terminals using appropriate sized wire for the maximum input current, terminated in connectors compatible with the MS3454W20-2 MIL connectors provided. On the inverter, the Positive connection is Female and the Negative connection is Male.

Tip: For maximum compatibility with the other inverters in the IPSi series up to 3600 watts, use the largest gauge of welding wire that will fit the MS3454W20-2 series connector, and make sure the female (Positive) connection is RadSok. Then upgrading to a higher power IPSi Inverter in the future will be a simple plug-in replacement.

CAUTION: Do Not Reverse Connect the Input Wires. This will cause serious Damage to the Inverter and will not be covered by Warranty. Turn on the external circuit breaker and then press the ON/OFF switch to turn on the inverter. The ON/OFF switch should illuminate and the Invert LED should come on Green. Once proper operation is confirmed, turn the inverter OFF by pressing the ON/OFF switch again.

Output Connections

AC OUTPUT CONNECTION

One GTS02R-20-19S output connection is provided. Connect to the loads with the matching cable connector.

CAUTION: Do not apply AC voltage to the output connection. Damage caused by this error will not be covered under warranty.

AC INPUT CONNECTION (A Option)

If the inverter is equipped with the Off-Line UPS option, there will also be one GTS02R-20-19P connection for the AC input. Connect a source of AC to this connector using the matching cable connector.

HINT: AC Output connections are always Female. AC Input connections are always Male.

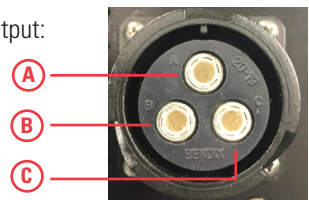
AC Output and Input Wiring Pinout

The wiring pinout is the same for both the AC Input and AC Output:

Pin A - AC Hot

Pin B - AC Neutral

Pin C - AC Ground (Chassis)

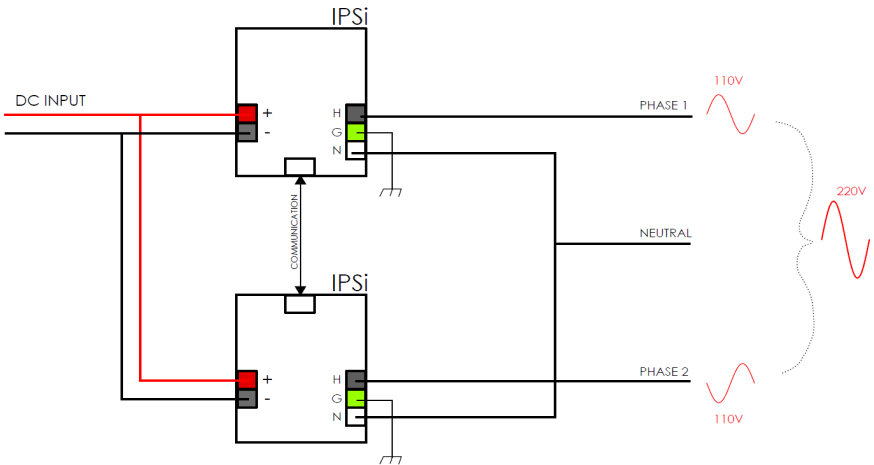




Optional Connections

SYNC CONNECTION (K Option)

If the inverter is part of a series pair providing combined 110 and 220 outputs, the inverters will need to be interconnected using the supplied cable. Simply the cable into the SYNC port on each inverter and combined operation will automatically be initiated. Wire the two inverters to the distribution panel or loads as show below.



MIL461F & MIL810G Tested Option (C Option)

Physical tests and reports for MIL461 conducted emissions and MIL810 for vibration and temperature for each individual unit (not a full test protocol but essential tests performed). Must be combined with the M option.

European ROHS Compliant (Lead Free Manufacture) (E Option)

The normal manufacture of Analytic Products is with lead based solder for reliability. Lead Free manufacture may be requested. The printed circuit boards inside the product will be Red color (Red for ROHS).

MIL461F Tested Option (I Option)

Physical tests and reports for MIL461 conducted emissions only. Must be combined with M Option.

MIL810G Tested Option (J Option)

Physical tests and reports for MIL810 for vibration and temperature only for each individual unit (not a full test protocol but essential tests performed). Must be combined with M option.



Specifications

Input Voltages			
Nominal (Vdc)	12	24, 28, 32 or 36	48 or 72
Actual (Vdc)	11 - 15	20 - 45	40 - 90
Input Amps (max)	140	70	35
Input Fuses	None, external fuse or breaker required		

Output Voltages		
Voltage	110 +/- 2 Vac	220 +/- 4 Vac
Output Amps (max)	10A (cont) / 12A (peak)	5A (cont) / 6A (peak)
Output Frequency	50.00 or 60.00 Hz ± 0.01 Hz (user selectable)	
Output Distortion	<2% at 1200 Watts into resistive load	
Regulation (Line & Load)	< +/- 2.0%	
Duty Cycle Continuous	100% for 24 hours per day	

General	
Efficiency	> 90% @ maximum output
Temp Range	-25 to +40 deg C @ maximum output
Isolation	Input-Output, Input-Case & Output-Case 1500Vdc Input
Length	12.3 in / 31.2 cm
Width	9.4 in / 23.8 cm (including mounting flanges)
Height	7.7 in / 196.8 cm
Clearance	1 Inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black Powder Epoxy
Fastenings	18-8 Stainless Steel
Weight	30 lb / 13.6 kg
Connections	Positive In – MS3454W20-2S c/w cover, Negative In – MS3454W20-2P c/w cover AC Output Connection - GTS02R-20-19S AC Input Connection - GTS02R-20-19P (with Off-Line UPS Option)

* Specifications subjects to change without notice.



Limited Warranty

1. The equipment manufactured by Analytic Systems Ware (1993) Ltd. (the "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service.
2. This warranty is in effect for 2 years from the date of purchase by the end user.
3. Analytic Systems will determine eligibility for warranty from the date of purchase shown on the warranty card when returned within 30 days, or
 - a. The date of shipment by Analytic Systems, or
 - b. The date of manufacture coded in the serial number, or
 - c. From a copy of the original purchase receipt showing the date of purchase by the user.
4. In case any part of the equipment proves to be defective, the Purchaser should do the following:
 - a. Prepare a written statement of the nature of the defect to the best of the Purchasers knowledge, and include the date of purchase, the place of purchase, and the Purchasers name, address and telephone number.
 - b. Call Analytic Systems at 800-668-3884 or 604-946-9981 and request a return material authorization number (RMA).
 - c. Return the defective part or unit along with the statement at the Purchasers expense to the Warrantor; Analytic Systems Ware (1993) Ltd., 8128 River Way, Delta, B.C., V4G 1K5, Canada.
5. If upon the Warrantor's examination the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense by the most economical means. Requests for a different method of return or special handling will incur additional charges and are the responsibility of the Purchaser.
6. Analytic Systems reserves the right to void the warranty if:
 - a. Labels, identification marks or serial numbers are removed or altered in any way.
 - b. Our invoice is unpaid.
 - c. The defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.
7. No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so.
8. Only the Warrantor shall perform warranty service. Any attempt to remedy the defect by anyone else shall render this warranty void.
9. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically stated to be waterproof.
10. No other express warranty is hereby given and there are no warranties that extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.
11. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof.
12. The Warrantor assumes no liability for incidental or consequential damages of any kind.




DESIGNED AND MANUFACTURED BY



ANALYTIC SYSTEMS
Power Conversion Solutions

Battery Chargers • Inverters • Power Supplies • Voltage Converters

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