



# ANALYTIC SYSTEMS

Power Conversion Solutions

## INSTALLATION & OPERATION MANUAL

### IPSi3600 PURE-SINE INVERTER



An ISO9001 and AS9100 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

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# IMPORTANT & SAFETY INSTRUCTIONS

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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.

**LIFE SUPPORT** — Analytic Systems does not recommend the use of the IPSi3600 Series Inverters in life support applications where failure or malfunction of the 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), autotransfusion 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 IPSi3600 Inverter weighs more than 50 pounds / 23 kilograms. Please use appropriate measures when lifting or moving this part.



## Introduction

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The IPSi3600 Series 3600 Watt 'Pure Sine Wave' Inverter is designed specifically for running sensitive electronic equipment. It produces pure sine wave AC power exactly the same as a regular AC outlet.

The IPSi3600 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 either 110 or 220 VAC at either 50 or 60 Hz as well as filtering the AC output to reduce or eliminate electrical noise that could interfere with sensitive communications equipment.

## 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 ( $\pm 0.01$  Hz) at either 50 or 60 Hz.
- 3600 Watts output power sufficient for up to 3 complete computer workstations 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.
- Two circuit breaker protected AC receptacles plus a hard wire terminals for easy connection.
- Three year parts and labor warranty.



# Specifications

Electrical (Input)		
Nominal (ip)	24, 28, 32 or 36 VDC	48 or 72 VDC
Actual (Vdc)	20 - 45	40 - 80
Input Amps (max)	180	90

Electrical (Output)		
Output Volts Nominal	110 VAC	220 VAC
Output Amps Actual (AC)	110 ± 10 VAC (user adjustable)	220 ± 20 VAC (user adjustable)
Output Amps	30A (cont) / 36A (peak)	15A (cont) / 18A (peak)
Output Frequency	50.00 or 60.00 Hz ± 0.01 Hz (user selectable)	
Output Distortion	< 2% at 3600 Watts into resistive load	
Regulation (Line & Load)	< +/-2%	
Duty Cycle	Continuous 100% for 24 hours per day	
Efficiency	>90% @ Maximum Continuous Output	

Environmental	
Operating Temperature Range	-25°C to +40°C @ maximum output (-40°C Optional)
Humidity	0 - 95% Relative Humidity (non-condensing) with standard conformal coating
Audible	< 34.5 dB @ 3 ft / 1 meter
Typical Service Life	>10 years (87,600 hrs)
Isolation	Input to Output, Output to Case & Input to Case 1500 VDC

General	
Length	15.6 +/- 0.1 in / 39.7 +/- 0.3 cm
Width	12.0 +/- 0.1 in / 30.5 +/- 0.3 cm
Height	8.0 +/- 0.1 in / 21.3 +/- 0.3 cm
Clearance	1 Inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black Anodize / Powder Epoxy
Fastenings	18-8 Stainless
Weight	69.5 lb / 13.5 kg
Connection	DC In – 3/8 x 16 Inch Imperial Threaded Studs c/w nuts AC Out – 2 x 20A 125V NEMA 5-15 receptacles or 2 x 16A 250V CEE 7/7 receptacles with circuit breaker protection, plus one 30A hardwire connection AC In – one 30A hardwire connection

\* Specifications subjects to change without notice.



Designed and manufactured by: **ANALYTIC SYSTEMS WARE (1993) LTD.**

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## Installation

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### 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 leads are connected, and in the unlikely event of a failure, sparks may be generated inside the unit.

### INPUT CONNECTION

Prepare a circuit breaker protected power source for the IPSi3600 Inverter, making sure the breaker is OFF. Connect the input power to the DC IN terminal blocks using at least AWG2 stranded wire for -20 model and AWG4 for the -40 model. Connect the positive to the RED terminal and the Negative to the BLACK terminal. The Inverter has Inrush Protection on the DC input to reduce sparking during the connection process.

**CAUTION:** Do Not Reverse Connect the Input Wires. This will cause serious Damage to the Inverter and will not be covered by Warranty.

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

Two standard circuit breaker protected 20 Amp AC receptacles are provided for connection. In addition a 30 amp, 250V rated CSA/UL approved terminal block is provided for wiring to a distribution panel. This terminal block is NOT circuit breaker protected so each device wired to the distribution panel must have its own breaker. Ensure that the total average load of all the devices does not exceed the continuous current rating of the unit.

**CAUTION:** Do not apply AC voltage to the outlets. Damage caused by this action will not be covered under warranty.

## DISCONNECTION

If you disconnect the unit 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.

## Operation

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

## Controls and Indicators

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The IPSi3600 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 setpoints, to choose the output frequency (50 or 60 Hz) and to fine tune the output voltage +/- 10% in 1 VAC steps.



**Note:** The microUSB port and PowerWizard software are not currently implemented for the IPSi Inverters, but are expected to be available in mid 2016.



There are 8 LED indicators labelled 1 through 8. Their functions are as follows:

1. **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.
2. **High Input Voltage:** Blinks 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 excess voltage damage is not covered under warranty.
3. **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.
4. **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.
5. **50 Hz:** This LED will be on Green if the inverter is set for 50 Hz operation.
6. **60 Hz:** This LED will be on Green if the inverter is set for 60 Hz operation.
7. **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.
8. **Invert:** This LED will be on Green when the inverter is in normal operation.



## Limited Warranty

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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 3 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.