

INSTRUCTION MANUAL



LS
SERIES

SINEWAVE INVERTER
2000W to 7000W

Latronics P.O. Box 73 Moffat Beach Qld 4551
Ph 61 7 5491 6988
web: www.latronics.com email: technical@latronics.com

REPLY PAID MB 1
LATRONICS PTY LTD
P. O. BOX 73
MOFFAT BEACH QLD 4551

NO POSTAGE REQUIRED IF
POSTED IN AUSTRALIA



WELCOME

Latronics products are all proudly designed, engineered and manufactured in Australia. As a specialist Sine Wave Inverter company we produce Inverters for a diverse range of applications such as; mining, railways, telecommunications, marine, remote power, motor homes, and other industrial or commercial installations.

In order to produce the most reliable products available, **Latronics** Inverters have been designed to endure the most rugged terrain and the harshest conditions across the Australian continent.

All products are engineered using the latest high quality components and manufactured to stringent quality standards, thus ensuring **Latronics** customers all enjoy many years of trouble free operation.

It is important to us at **Latronics**, that our clients enjoy the maximum benefits from our Inverters, in a safe and productive environment. Thus we strongly advise that you read through the next few pages of this manual, which explains all the modes of operation and relevant safety precautions for your new Power Inverter.

A detailed knowledge of components in your power system will assist us with any Inverter enquiries. You can record the relevant details in **Power System Components (pg 19)**.

Please remember to complete and return your registration card on the last page of this manual to validate your 3-year warranty. Please retain your receipt as proof of purchase.

LATRONICS
PO BOX 73
MOFFAT BEACH Q 4551

PH: 61 7 5491 6988 FAX: 61 7 5491 6792

EMAIL: technical@latronics.com
WEB: www.latronics.com

IMPORTANT !

Please complete and return this Registration Card to validate your 3-year Warranty

Serial No..... Date card returned.....



REGISTRATION CARD

Your 3-year warranty is only valid if this card is completed & returned within 3 months of the date of purchase.

Name:.....Serial No:.....

Address:Post code:.....

Date of Purchase:.....Supplier:.....

Comments:.....

Where is your Inverter being used?

Solar Power Camping/Caravan Marine/Boat Commercial Backup Supply Other

Was your decision made because of?

Features Value for Money Appearance Recommendation Warranty Australian Made

How do you rate the service from your supplier? Fair Good Very Good Excellent

Did your new Inverter meet your expectations? Above Expectations Yes No

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

TABLE OF CONTENTS

PAGE

INSTALLATION	2
BATTERIES	4
DIP SWITCH SETTINGS	5
AUTO TRANSFER SWITCH	7
INVERTER OPERATION	10
EFFICIENCY & OUTPUT WAVEFORMS	12
AC WIRING & SAFETY	13
RADIO FREQUENCY INTERFERENCE	14
FAULT FINDING	16
WARRANTY CONDITIONS	17
INVERTER SPECIFICATIONS	18
POWER SYSTEM COMPONENTS	19
NOTES	20
REGISTRATION WARRANTY CARD	21



INSTALLATION

- Ensure the Inverter has not been damaged in transit.
- The unit must be placed in a well-ventilated and protected area, not exposed to the open environment, and free from contaminants (i.e. exhaust gases, sea air, battery gases, dust).
- A space of 10cm is needed on each side of the Inverter for adequate transfer of internal heat.
- The Inverter can be mounted vertically on a wall or horizontally on a table or shelf.

DC WIRING

- For best performance, the unit should be placed as close as possible, but not directly on top of the Battery Supply.
- The Inverter DC input voltage is stated on the identification label of the Inverter. Check that it is the same voltage as the Battery Supply.
- The Inverter is designed to operate on a Battery Supply only.
- The Inverter is fitted with a circuit breaker in line with the Battery Positive Lead, which negates the need for a Battery Fuse.
- Ensure the Inverter is switched OFF before connecting the DC supply. Turn the Circuit Breaker switch to the OFF position.
- Connect the Inverter DIRECTLY to the Battery Terminals for best performance.
- Input leads marked RED = (positive), & BLACK = (negative).

OBSERVE POLARITY

NOTE: Cables connecting the Inverter to the Battery are designed to achieve maximum efficiency and output power:

DC CABLES SHOULD NOT BE EXTENDED

POWER SYSTEM COMPONENTS

- Inverter Power RatingWatts
- DC Battery VoltageVolts
- Battery Bank Capacity (Ah)Amp hrs
- Battery Charger RatingAmps
- Solar Regulator
- Solar Modules
- Wind Generator
- Generator Size
- Local Supplier
- Phone
- Installer Details
- Phone

NOTES.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

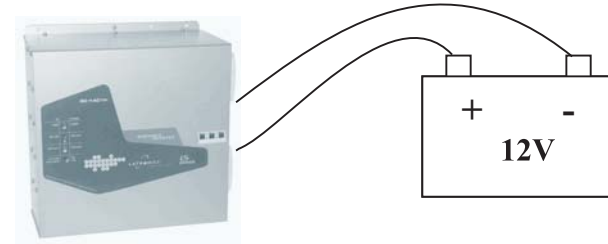
INVERTER SPECIFICATIONS

INVERTER MODEL	LS-2012	LS-2324	LS-2548	LS-3024	LS-3548	LS-4024	LS-5048	LS-7048
Nominal DC Voltage	12V	24V	48V	24V	48V	24V	48V	48V
Continuous Power	2000W	2300W	2500W	3000W	3500W	4000W	5000W	7000W
1/2 Hour Rating	2200W	2800W	3000W	3700W	4100W	4500W	6000W	8500W
Surge Rating (5 Secs)	6000W	7000W	7500W	9000W	10500W	12000W	15000W	20000W
Input Voltage Range	10.5-17V	21-34V	42-68V	21-34V	42-68V	21-34V	42-68V	42-68V
Standby Current	75mA	45mA	35mA	50mA	40mA	60mA	55mA	60mA
Inverter ON-no load	1.1A	0.51A	0.30A	0.6A	0.33A	1.1A	0.47A	0.49A
Peak Efficiency	90%	94%	94%	93%	94%	94%	95%	95%
Weight	22Kg	22Kg	22Kg	24Kg	24Kg	30Kg	30Kg	34Kg
Dimensions	370mm(L) x 386 mm(W) x 180 mm(H)			475mm x 458mm x 187mm				
Output Voltage	240Vac +/- 4%							
Output Frequency	50Hz +/- 0.1%							
Output Waveform	True Sinewave							
THD	< 4%							
Power Factor	All Conditions							
Autostart Sensitivity	0 - 20 W adjustable							
Operating Temperature	-10° C to +50° C							
DC to AC Isolation	3500 V							
Protection Circuitry	Overtemperature, Overload/Short Circuit, Battery Undervoltage/Overvoltage							
Battery Leads	1.5 m long with 10 mm mounting lugs							
AC Output Wiring	3 Terminal Hardwired Junction Box, labelled 'AC Output'							
AC Input Wiring	3 Terminal Hardwired Junction Box, labelled 'AC Input'							
AC Transfer Switch	40 Amps		65Amps					
Chassis	Powder Coated 3mm Aluminum		P.C 4mm Aluminum					
Warranty	3 Years Parts and Labour							
Standards	AS2279, AS3000, AS3100, EN55014, & C-TICK							
Ratings	Specifications @ 25° C ambient nominal battery voltage & unity power factor							

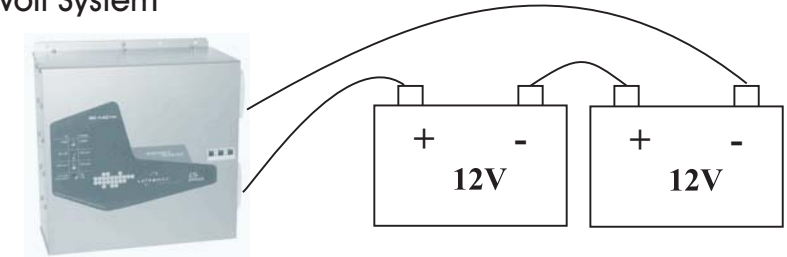
Due to constant improvements, specifications are subject to change without prior notice.

WIRING DIAGRAMS for 12, 24 & 48 Volts DC

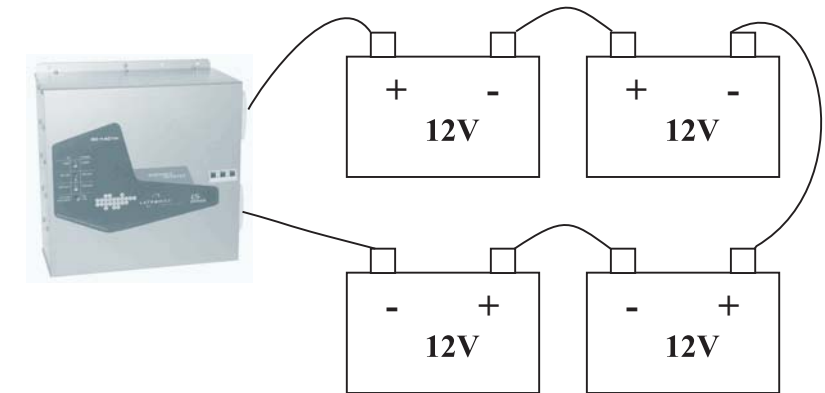
12-Volt System



24-Volt System



48-Volt System



N.B. Ensure sufficient battery capacity to match load requirements!

BATTERIES

BATTERY SIZING

It is important to match your Battery size according to the power rating of the Inverter.

To ensure peak performance, it is important to choose the right Battery for your Inverter. The Battery size required will depend on the load and intended running time. Use this formula as a general guide:

Recommended Battery Size = Inverter rating in watts ÷ input voltage × 10

e.g. 1200W ÷ 12V × 10 = 1000Ah

Minimum Battery Size = Inverter rating in watts ÷ input voltage × 3

e.g. 1200W ÷ 12V × 3 = 300Ah.

Do not use an undersized Battery as this may result in an Inverter that does not start or that will rapidly discharge the Battery and may cause damage to the Battery.

MAINTENANCE

Battery Terminals require frequent care and maintenance. Very high current (up to several hundred amps), is drawn by the Inverter when starting electrical motors and other high power appliances. We recommend an inspection of the Batteries and the interconnecting cable connections once every 1-3 months or as recommended by the Battery manufacturer.

1. **Regularly check all connections;** make sure they are always tight. Battery terminals are made of soft lead which will slowly compress over time eventually causing loose connections.
2. **Check all connections are free of corrosion.** Remove any corrosion and coat the terminals with Vaseline or grease to help prevent future corrosion.
3. **Take specific gravity or SG readings of each cell using a hydrometer to check the level and performance of each Battery.** Alternatively a Battery Voltage reading for each cell will suffice but may not be accurate for multiple Batteries connected in parallel. Report any serious imbalance to your system installer or Battery supplier for corrective action.

SAFETY

When working on Batteries protective clothing and eye wear should be worn. Extreme care should be taken not to short circuit any Battery terminals especially with tools. If in doubt have the work carried out by qualified personnel.

WARRANTY CONDITIONS

- All conditions and warranties expressed or implied by statute, common law, equity, trade, custom, usage, or otherwise howsoever are hereby expressly excluded to the maximum extent permitted by law. Where so permitted the liability of Latronics for a breach of condition or warranty that cannot be excluded is limited (at Latronics option) to the replacement or repair of the goods or of acquiring equivalent goods or the cost of replacing or repairing the goods or of acquiring equivalent goods. Latronics shall not be liable in any way whatsoever for indirect or consequential loss or damage whatsoever (whether based on tort or contract or otherwise).
- Damage caused by unauthorized repair, alteration or substitution of non-standard parts, incorrect installation, misuse, negligence, accident or similar cause, or usage other than in accordance with the operating instructions, is not covered under warranty.
- Unauthorized opening of the goods will render the Warranty invalid.
- The company may, at its discretion, agree to act as agent for the owner where delivery is requested and all costs for cartage and insurance will be for the owners account.
- The replacement of any part or labor involved will not have the effect of extending the period of the warranty of the goods.
- Any faulty part replaced under Warranty becomes the property of the Company for purpose of examination and claim under proprietary Warranty.
- Registration Card must be returned within 3 months from date of purchase to validate your 3-year warranty.
- Keep your receipt as proof of purchase, should any difficulties arise concerning the return of the registration card.
- Inverters are supplied by the manufacturer, or the manufactures agents, under the express condition that no responsibility is implied or accepted by the above parties for any damage to any appliance, equipment or property associated with the correct or otherwise operation of the Inverter.
- If service is required contact your local supplier/installer, or contact Latronics direct on Ph: 61 7 5491 6988. **Please ensure that you have the Inverter Model and Serial number available to enable prompt processing.**

FAULT FINDING

Should the Inverter appear to be malfunctioning we suggest the following to eliminate any external problems:

1. Turn the Inverter "OFF" via the Circuit Breaker switch on the front panel.
2. Disconnect all AC wiring from the Inverter.
3. Disconnect DC Battery leads from Battery. Clean all terminals by removing all grease/corrosion on both DC leads and Battery terminals.
4. Ensure you have sufficient Battery capacity at the nominal voltage (specified on the compliance label of your Inverter).

Please note: Use minimum 100AH Battery or the size of a substantial Car Battery.

5. Make connection directly to Battery terminals and ensure all connections are tight.
6. Ensure Battery voltage is within the correct limits as outlined in the section ***INVERTER SPECIFICATIONS*** of this manual. If you do not have a DC voltmeter or multimeter check the front panel for Overvolts and Undervolts LED'S.
7. Turn the Inverter ON via the Circuit Breaker switch on the front panel. Observe the lights on the front left of your Inverter. Refer to ***INVERTER OPERATION*** sections for explanation of Indicator lights.
8. Plug in various appliances and monitor the Inverters operation.

HELPFUL HINTS

- * Remember that the Inverter automatically starts when a load is applied.
- * Make sure leads and terminals are not corroded or faulty in any way.
- * Make sure the Inverter goes into STANDBY with no load switched on.
- * Make sure the Circuit Breaker is reset properly. If unsure switch OFF and ON again.

DIP SWITCH SETTINGS

Dip Switch Settings apply to all models from 2000W to 7000W inclusive.

In order to access these options you have to open the Inverter. Before altering the settings switch Inverter OFF, adjust the setting and switch Inverter back ON again. We recommend these adjustments be carried out by qualified personnel or your system installer.

SW1 Hz 50/60 Hz

If you need to operate American or Japanese equipment this option will allow your Inverter to operate at 60Hz.

ON = 50Hz (factory setting)

OFF = 60Hz

SW2 IUW Instantaneous Under volts

If you operate the Inverter on a Transformer Power supply with only a small battery attached, the Inverter may shut down in instantaneous under volts when trying to start bigger loads! In such instance it may be advantageous to disable the IUW.

OFF = Enabled (factory setting) ON = Disabled

SW3 SP Special

SW4 AR Automatic Reset

In unattended situations where total shutdown is not desirable, an automatic reset option can be requested. Should the Inverter shut down due to undervoltage, overtemperature or any fault condition it will attempt to reset every 8 minutes until the fault condition clears and normal operation resumes.

OFF = Disabled (factory setting)

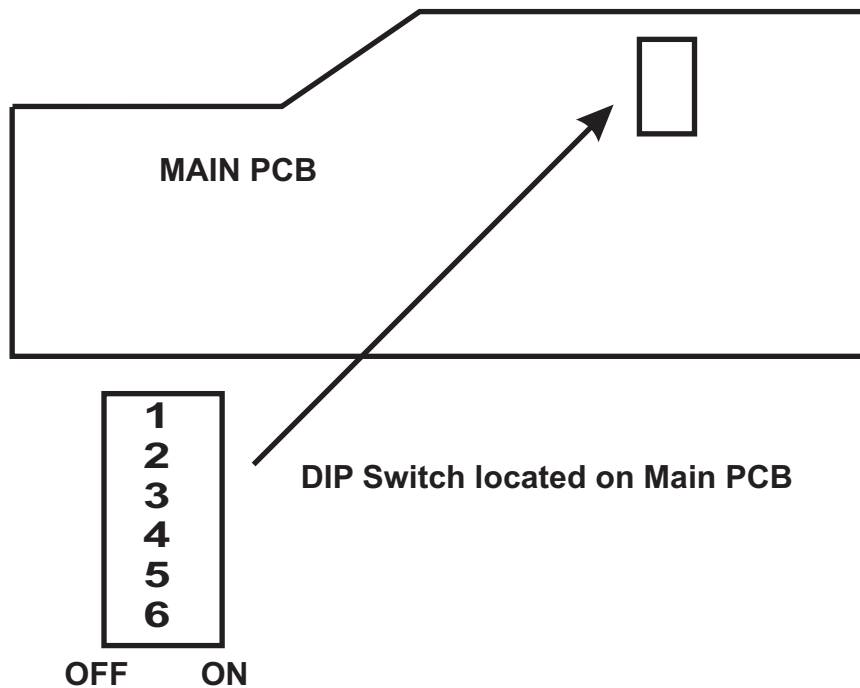
ON = Enabled

SW5 & SW6 UV Under Voltage Settings

SW5 OFF & SW6 OFF = (factory setting)

SW5	SW6	12V Value	24V Value	48V Value
ON	ON	10.0	20.0	40.0
OFF	OFF	10.5	21.0	42.0
ON	OFF	11.0	22.0	44.0
OFF	ON	11.5	23.0	46.0

DIP SWITCH LOCATION



WARNING:

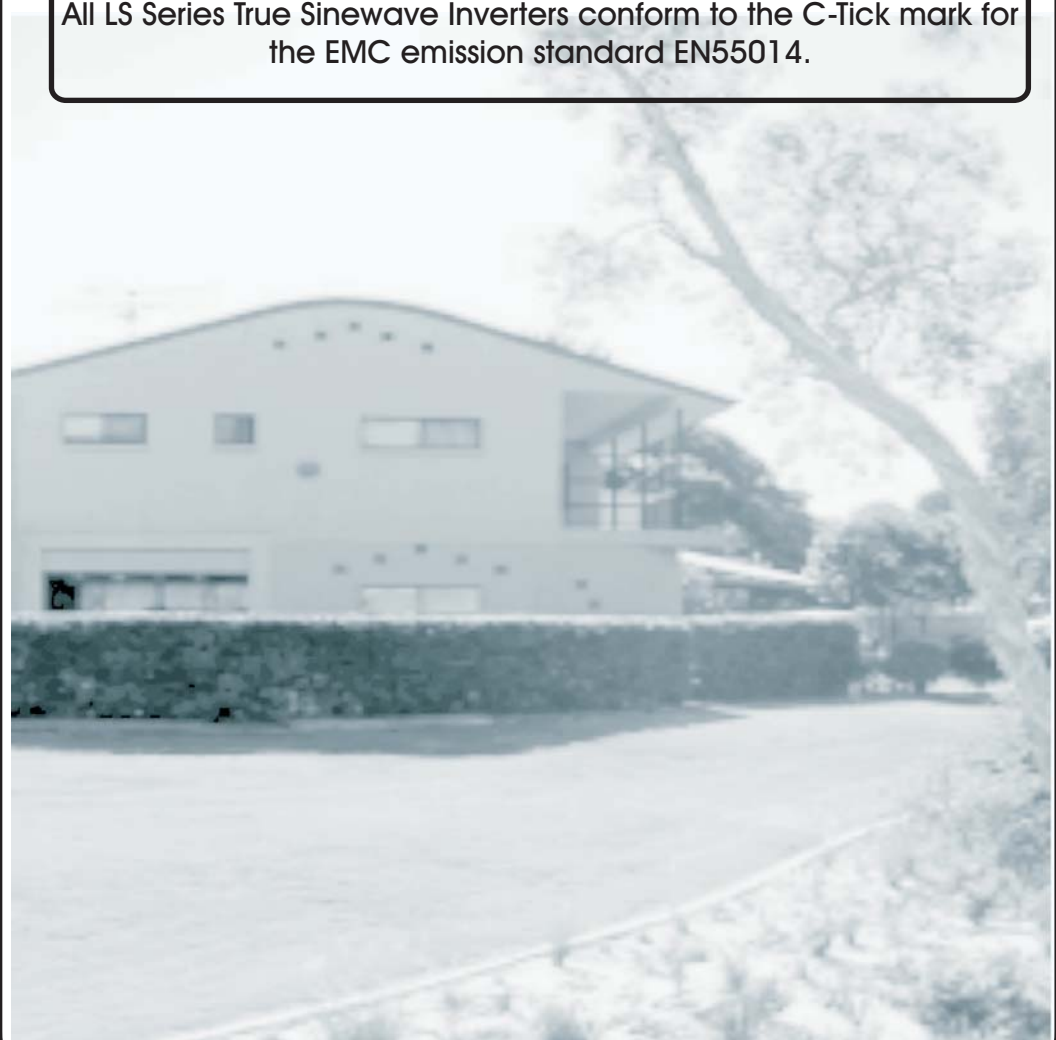
Due to dangerous voltages existing inside the unit, make sure the circuit breaker switch is turned off before opening the unit.

Should you have any doubt about performing these modifications, we strongly recommend the use of a qualified trades person.

STATEMENT OF QUALITY ASSURANCE

The whole of the supplies have been subjected to the Quality System Requirements in accordance with the conditions of AS/NZS ISO 9002: 1994.

All items are manufactured with full traceability. All LS Series True Sinewave Inverters conform to the C-Tick mark for the EMC emission standard EN55014.



RADIO FREQUENCY INTERFERENCE

Radio Frequency Interference (RFI) is a phenomenon that exists in modern society and is a problem in many areas of electronics. For Inverter users, RFI normally presents itself in the form of static and/or interference when listening to an AM radio and in unusual cases may interfere with TV reception.

Over the years Latronics has continued to invest significant time and effort in the reduction of RFI related emissions from the entire product range, so that they comply with the appropriate International and/or Australian Standards.

Even with this compliance, there are situations where RFI may still be a cause for concern, and can differ greatly from installation to installation. Accordingly, the following is a list of recommendations made to assist in the overall reduction of RFI.

1. **Separate DC and AC wiring.** Avoid running DC and AC cables in the same conduits and/or cable trenches. It is strongly recommended that DC and AC wiring be separated by the greatest distance possible. In extreme cases, the use of shielded conduit may be necessary.
2. **Minimize length of DC cabling.** DC cables can act as an aerial, therefore all such cables should be kept as short as is practicable. For best performance minimize DC cable length to Inverter and Batteries and if possible avoid the use of auxiliary DC loads.
3. **240Vac Earth.** For household installations, it is recommended that a "good" Earth Stake is located as nearby the Inverter as is possible.
4. **AM and HF Radios.** These types of radio equipment inherently suffer from all forms of RFI, especially when the received signal level is weak. In such cases reception can sometimes be improved by relocation of the radio itself, alternatively the use of an appropriate external antenna and co-axial cable may be necessary. External antennas should be located in a manner that ensures maximum signal strength whilst affording the greatest possible distance away from the Inverter and Batteries.
5. **Televisions.** TV signals are transmitted as FM waveforms. This type of signal fundamentally reduces the effects of RFI, therefore the use of a good antenna and feeder cable is normally sufficient to ensure quality reception. Locating the television as far as possible from the Inverter may also improve picture clarity.
6. **Mobile Installations.** Due to the limitations of this type of installation, the best results for the minimization of RFI are usually obtained by maximizing the distance between the Inverter and the Radio/Television.

AUTOMATIC AC TRANSFER SWITCH (Option)

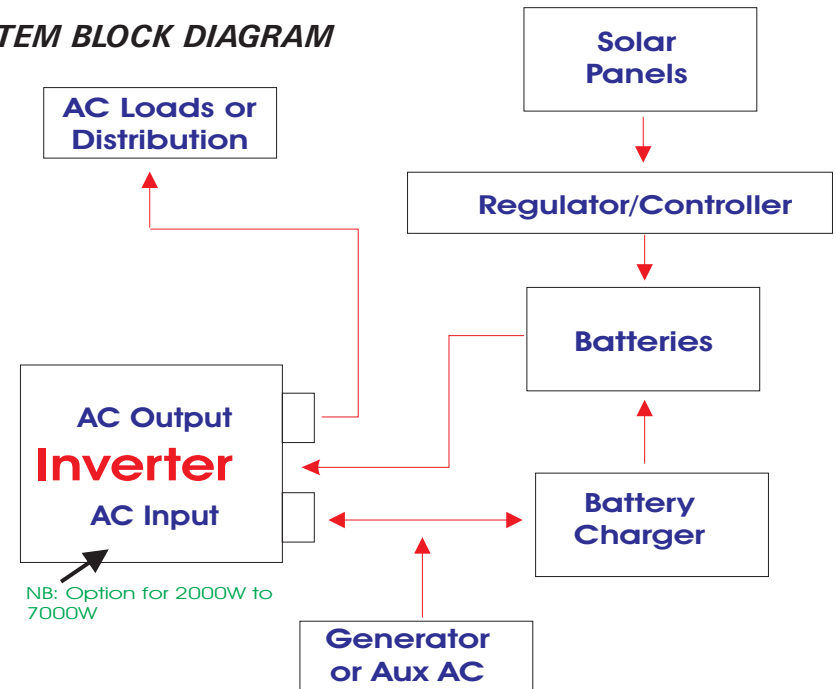
Eliminate the need to manually switch your power source between Inverter and Generator. The Transfer Switch automatically senses Generator AC power and switches the output between Inverter and Generator accordingly.

Take the hassle out of wiring a changeover switch between Inverter and Generator. Have this option fitted to your LS series Inverter to simplify your power system wiring. Simply connect the Generator to the hardware terminals, its that easy!

Features

- * Available exclusively to the new LS series from 2000W to 7000W models.
- * No Break changeover time of 0.02 second (< one cycle).
- * Double pole contactor switching both active and neutral.
- * Minimise and simplify system wiring.

SYSTEM BLOCK DIAGRAM



* Installation of system components and associated interconnecting wiring, should be performed by qualified and licensed personnel only.

ON DELAY TIMER AND VOLTAGE INTERLOCK MODULE

This module is available with the automatic AC Transfer Switch option for the LS series Sine Wave Inverter models from 2000W to 7000W. It offers further protection to connected appliances from Generator voltage fluctuations and ensures a more stable AC supply.

Upon the starting of a Generator, it's output voltage will rise and stabilise as the Generator speed increases. Once the Generator voltage is within the required limits the timer provides a short delay before switching the Generator power to the AC output. This ensures the Generator is warmed up and the output voltage is stable. The Generator output voltage is continuously monitored and if it is outside the set limits the transfer switch will switch back to the Inverter. This prevents problems due to low voltage and overvoltage surges, which can harm appliances.

On Delay Timer - ensures the Generator has warmed up and the output voltage is stable before the transfer switch is activated.

Voltage Interlock - monitors the Generator output voltage. If too high or too low the Transfer Switch reverts back to the Inverter output until the generator output re-stabilises.

Versatile - selectable voltage levels and time delay.

Note: *Highly recommended for Generators with large fly wheels that ramp up and down slowly at start up and shut down.*



Settings are adjustable via DIP switches located inside the **Generator Input Junction Box**.

ENSURE POWER IS DISCONNECTED BEFORE ADJUSTING DIP SWITCHES.
To be adjusted by qualified personnel only!

Available for LS series models from 2000W to 7000W

SAFETY

Inverter Isolation and Safety

- * All Latronics Inverters have an isolation rating of 3500V between AC and DC via the toroidal transformer, which ensures extremely safe and risk free operation.
- * All the switching electronics and control circuitry are on the DC input.
- * The single pole Circuit Breaker assembly ensures that when the Inverter is switched OFF, it is isolated from the Battery supply.

Please refer to relevant Australian Standards for safety procedures.

AC WIRING

- * Make sure the Inverter is switched OFF before working on the mains wiring. Turn the circuit breaker switch into OFF position.
- * The active and neutral of the 240V AC output are electrically isolated from the battery negative, battery positive, and earth connections.
- * The Inverter AC output is connected directly to the Transformer output winding.
- * Latronics Inverters have the AC output (active and neutral) floating with respect to the DC and Earth. The Earth connection is connected to the case only. This configuration provides the highest safety and most flexibility for installation wiring.
- * Latronics Inverters are suitable for MEN connection.
- * The Earth is connected internally to the Inverter case.

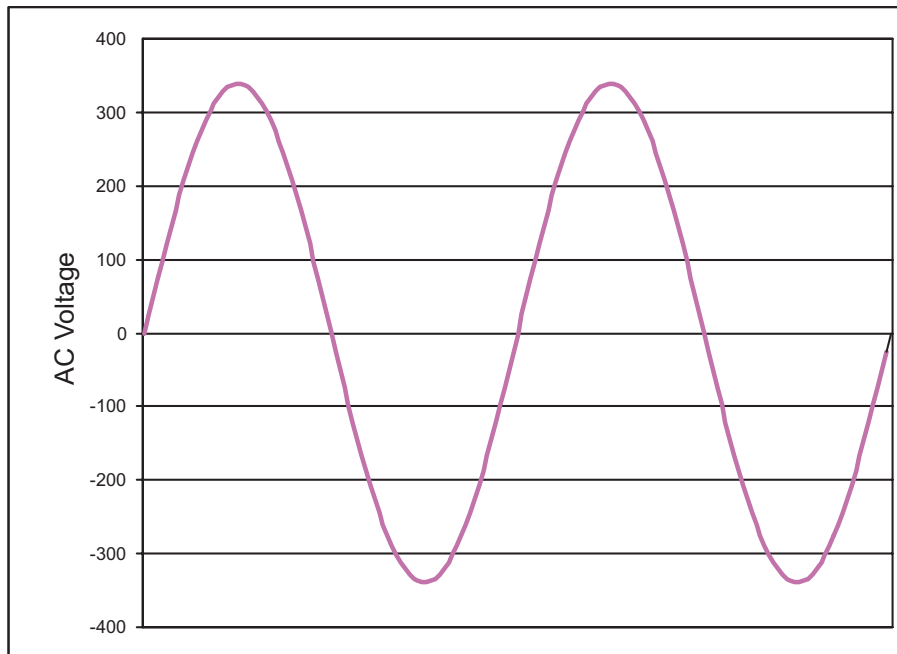
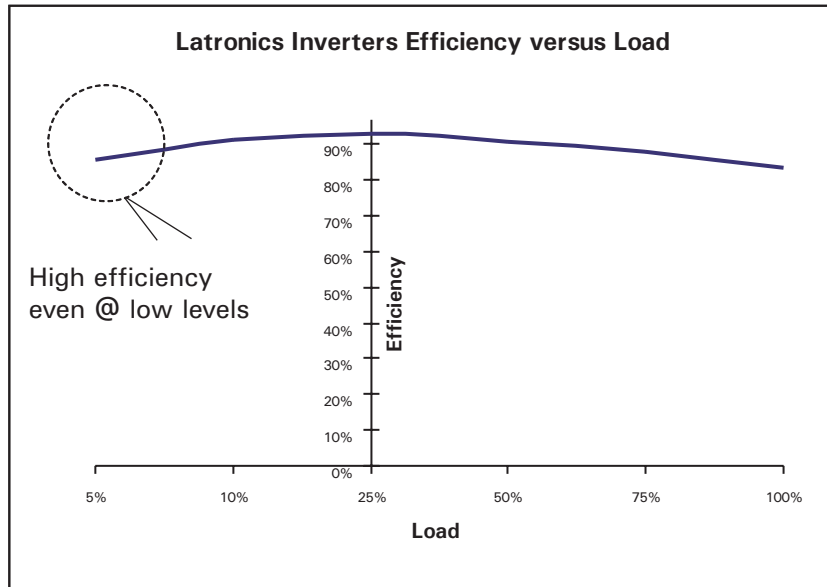
Ensure that power will never be fed into the Inverter AC output Junction Box from the Mains or Generator. ***This would result in the destruction of the unit and will not be covered by warranty.***

WARNING:

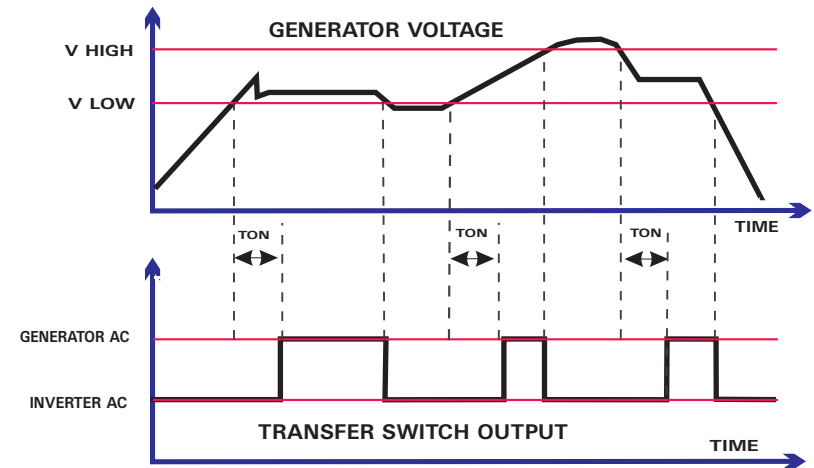
The Inverter output is just as lethal as normal mains electricity, thus it is important that all AC wiring complies with the requirements of the relevant wiring standards, (AS 3000).

Any work carried out on AC/Mains wiring is to be performed by Qualified and Licensed personnel only.

INVERTER EFFICIENCY & OUTPUT WAVEFORM



12



Ton = On Delay timer is selectable at 30 or 120 seconds.
 V low = Low voltage cut out is selectable between 190-220Vac.
 V high = Over voltage cut out is selectable between 260-270Vac.
 Bypass ON = Disable Voltage Interlock and Timer operation.
 Bypass OFF = Normal Voltage Interlock and Timer operation.

Factory Settings are: ON Delay = 30 sec, V low = 190Vac
 V high = 270Vac, Bypass = OFF

DIP Switch Settings

Switch 1	Switch 2	Switch 3	Switch 4	Switch 6	Parameter
ON					Ton = 30 seconds
OFF					Ton = 120 seconds
	ON				V high = 260Vac
	OFF				V high = 270Vac
		ON	ON		V low = 220Vac
		ON	OFF		V low = 210Vac
		OFF	ON		V low = 200Vac
		OFF	OFF		V low = 190Vac
				ON	Bypass
				OFF	Normal Timer Mode

Mode Indicator LED

There is a red Indicator LED directly above the dip switches that turns ON or flashes according to the mode of the timer module.

LED	MODE
OFF	No AC input present
Fast flash	AC input voltage out of range
Slow flash	AC input voltage OK and delay timer ON- 1 flash per second
ON	AC input switched through to output

9

INVERTER OPERATION

When the Inverter is switched on all 3 LED'S light up for 1 second while the microprocessor performs a start up and system check procedure.

Standby/240 volts (Green LED)

This LED flashes when in Standby mode (i.e. no loads connected). When a load is applied the LED will illuminate continuously to indicate that 240V AC is being supplied.

Over temp./Over load (Red LED)

If the internal temperature exceeds safe operating limits of the components for more than five seconds, the Inverter will shut down in Over temp with this LED on continuously. Allow 5 minutes for the Inverter to cool and reset the unit. If the APPLIED load demands more current than the Inverter can safely supply for more than 5 seconds, the Inverter will shutdown in Over load and this LED will flash.

Undervolts/Overvolts (Red LED)

In order to protect the battery the Inverter will shutdown after 5 seconds if the battery voltage falls below its limit, (Undervolts), or exceeds the maximum, (Overvolts), as specified in the Electrical Specifications table. For Undervolts the LED will remain on continuous, while for an Overvolts situation the LED will continue to flash.

AutoStart Sensitivity Adjustment

The screwdriver adjustment slot permits the operator to adjust sensitivity between 0- 20W. Due to lengthy 240V AC cables the Inverter may sense fake loads. To combat this, turn the control clockwise. Alternatively turning the control in the opposite direction increases sensitivity. Turning the control fully anti-clockwise will disable the Auto Start feature and the Inverter will remain constantly ON.

10

Circuit Breaker ON/OFF Switch

The Circuit Breaker is designed for ease of operation and safety. By pushing the switch "UP", the Battery supply is connected to the Inverter. The Circuit Breaker will turn OFF automatically if too large a load is left on the Inverter continuously. Reset the switch after allowing approximately 5 minutes to cool. If the Inverter shuts down due to overload, undervolts or overvolts it can be reset by turning the Circuit Breaker OFF, waiting 10 seconds (or until LED goes out), then turning it on again.

Hardwire - 3 Terminal Output Junction Box
For distribution of AC output power.

Battery Leads
RED = Battery positive.
BLACK = Battery negative.

Hardwire - 3 Terminal Input Junction Box
For connection of AC Input Power e.g. from Generator.
(Available only when AC Transfer Switch option is fitted).

Fan

If the temperature inside the Inverter reaches preset levels, the dual speed fan will switch on initially in low speed and then into high speed if the temperature continues to increase. Obstruction of the air intake and output will reduce the power rating of the Inverter.

11

