

# INSTRUCTION MANUAL

INVERTER WITH ENERGY METER



## ***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. So 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.

### NZ Distributor:

1 Heremai Street, Henderson, Auckland, New Zealand, 0612  
PO Box: 19 501, Auckland, New Zealand, 1746  
Phone: +64 9 835 0700, Free call NZ: 0800 654 668  
Fax: +64 9 837 3446, [www.innovative.co.nz](http://www.innovative.co.nz)

**TABLE OF CONTENTS****PAGE**

INSTALLATION

2

DC WIRING / DC EARTHING

3

AC WIRING

5

WIRING DIAGRAMS

7

INVERTER OPERATION

10

SPECIAL FEATURES

12

DIP SWITCH SETTINGS

13

SOLAR INPUT CONFIGURATION

14

FAULT FINDING

15

RADIO FREQUENCY INTERFERENCE

16

WARRANTY CONDITIONS

17

TECHNICAL SPECIFICATIONS

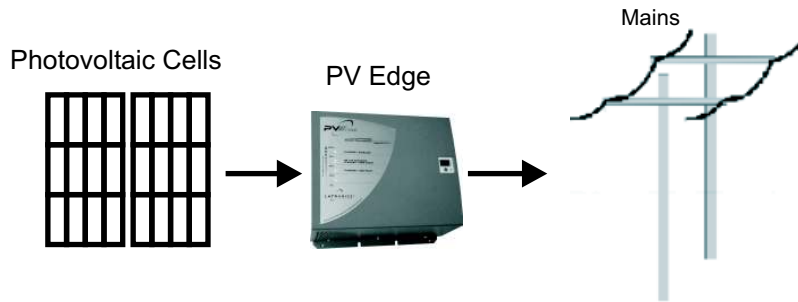
18

DECLARATION OF CONFORMITY

19

## INSTALLATION

- Grid Interactive Solar Systems have become increasingly popular in recent years. These systems do not necessarily require batteries for storage and therefore can have a very simple configuration.



## BEFORE 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, dust etc.).
- The PV Edge is designed for indoor installation in a suitable location where ambient temperature will not exceed rated values.
- If the PV Edge is to be installed outdoors, please use the Latronics Outdoor Enclosure (Part no: OE)
- The Inverter can be mounted horizontal on table or floor. The Inverter can also be mounted on a wall, taking note of the sticker being the correct orientation.



It is important that all wiring in the installation complies with the relevant standards such as AS4777 and AS3000 .

**Any work carried out is to be preformed by  
Qualified and Licensed personnel.**

## DECLARATION OF CONFORMITY

Manufacturer:  
Latronic Sunpower Pty Ltd  
105 Grigor St West  
Moffat Beach Industrial Park  
Caloundra Queensland 4551  
Australia

Declare that the PV Edge grid connected Inverter Model No. PVE1200 and PVE2500 conform to the requirements of following standards

EN61000-6-1  
EN61000-6-3  
EN55014  
AS1044  
EN60335-1  
AS3100  
AS4777



And therefore conform to the regulations of the EC directives  
Directive 2004/108/CE (EMC directive), Directive 2006/95/CE (low Voltage  
Directive)  
Date that CE marking was first affixed 2007

Also conforms to the regulations of C-tick mark for Australian emission standards

Australian Safety Certificate approval number CS06713V

All products are manufactured with full traceability in accordance with the  
Quality System Requirements of AS/NZS ISO 9002

Signed

A handwritten signature in blue ink, appearing to read 'W. Pettit'.

William Pettit  
Electronic Engineer  
7<sup>th</sup> Feb 2009

## SPECIFICATIONS

Model	PVE1200	PVE2500
<b>Input Data</b>		
Maximum Solar Input Power	1600W	3100W
Maximum DC Input Current	25A	25A
Maximum DC Input Voltage	103V	206V
Maximum Power Point Tracking Range	54VDC - 100VDC	108VDC - 200VDC
Ideal Operating Window (Array VOC)	75-92VDC	150-185VDC
Automatic Turn ON (PV Mode)	70VDC	140VDC
Automatic Turn ON (Battery mode)	54VDC	108VDC
Starting Operation	10W	
Reverse Polarity Protection	Short Circuit Diode Across DC Input Terminals	
<b>Output Data</b>		
Output Power	1100W at 50°C (1250W Max)	2100W at 50°C (2500W Max)
Output Voltage Range	205 - 265 Vac	
Output Frequency	50Hz tolerance +/- 1Hz	
Peak Efficiency	94%	95%
Night Time Power Consumption	NIL. Automatically Disconnects from AC Grid	
Input/Output Isolation	3500V via Toroidal Transformer	
Operating Temperature	-10°C to 50°C	
Anti islanding Protection	Over/under voltage, Over/under frequency, Active phase shift	
<b>General Data</b>		
Status Indicators	Output power in 25% Increments Grid Monitoring - Stability check Solar Input ON Grid Fault Overload LCD Meter - Power, Voltage, Current, Power Factor,	
Wall Mount Enclosure	Powder Coated Aluminum	
Dimensions	330mm <sub>H</sub> x 296mm <sub>W</sub> x 150mm <sub>D</sub>	370mm <sub>H</sub> x 386mm <sub>W</sub> x 180mm <sub>D</sub>
Weight	11 kg	22 kg
Connections	AC/DC Pluggable Connectors	
Warranty	5 years	

## DC WIRING

***Check solar array will not exceed inverter's maximum voltage rating of 103V (PVE1200) or 206V (PVE2500)***

- \* The inverter is designed to operate with a 48V nominal solar panel array (PVE1200) or 96V nominal solar panel array (PVE2500).
- \* A 48V nominal solar array at a temperature of 25°C should have an open circuit voltage less than 92V
- \* A 96V nominal solar array at a temperature of 25°C should have an open circuit voltage less than 185V
- \* If other sources of DC input are required e.g. wind turbines, micro hydro turbines etc. A battery bank or Latronics Turbine Controller (see pg 9) will be required with the Maximum Power Point Tracking (MPPT) disabled (see pg 13).
- \* The DC input voltage is stated on the PV Edge compliance label and the technical specifications sheet within this manual. Check that the input voltage is within the required limits and does not exceed the maximum limit (see pg 18).
- \* Recommended cable size for the DC Input is 6sqmm with an insulation rating of 0.6/1KV.
- \* A DC isolator is required to be installed next to the inverter to isolate the inverter for maintenance.
- \* **Observe Polarity.**
- \* Ensure the DC Isolators are off when connecting the DC Leads

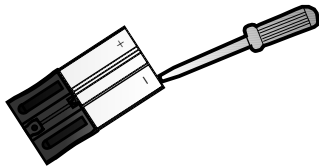
## **POSITIVE/NEGATIVE EARTHING**

The PV Edge inverter is suitable for use with solar arrays that require positive or negative earthing. Due to the inverter's galvanic isolation between AC and DC inputs no additional modifications are required. Simply connect the positive or negative of the solar array to the system earth.

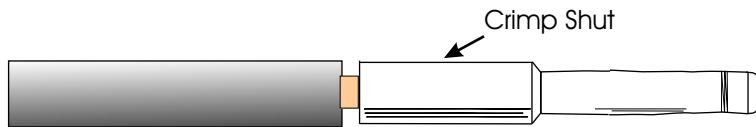
## SBS50 CONNECTOR WIRING

The inverter comes with an SBS50 connector panel mounted on the case. To assemble the connecting partner, take the SBS50 connector and follow the instructions below.

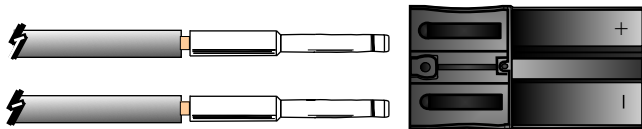
1. Remove the lugs with a screwdriver from the plug by inserting into the end and pressing down on the thin metal retaining strip.



2. First check no voltage is present on the cables, then strip back 10mm of cable (Recommended Cable: 6sqmm or bigger). Insert the stripped DC cable into the metal insert and crimp shut.



3. Push cable lugs into the main body until clipped in, taking care with polarity, which is marked on the connector housing by + & - .



NB. This is a touch proof connector as per UL 1977, Section 10.2. The DC connector can be disconnected under load.

## WARRANTY TERMS AND CONDITIONS FOR AUSTRALIA

Latronic Sunpower Pty Ltd ("Latronics") provides the original purchaser of a Latronics product ("You") with the following Limited Warranties as set out in this warranty certificate, in addition to your rights and remedies under consumer law.

The Limited warranty periods of this inverter is 5 years. In all circumstances Latronics products are guaranteed from the date of purchase.

### Part 1 - Warranty Descriptions

Latronics warrants to You that our products are guaranteed against defects in material or workmanship, when in normal use and service.

What you must do

1. For a Limited Warranty to apply the Registration Card must be validly completed by You and returned, prior to the expiration of 3 months from the date of purchase.
2. You must provide proof of purchase.
3. Latronics recommends You keep your receipt as proof of purchase, should any difficulties arise concerning the return of your Registration Card.

Exclusions:

For the avoidance of doubt, the Latronics product warranties provided herein do not cover damage, malfunctions or service failures caused by, amongst other things:

- Unauthorized opening of the products, repair, alteration or substitution of nonstandard parts;
- Incorrect design and/or installation of 'balance of system';
- Acts of god, accident or similar cause;
- Failure to follow Latronics installation, operation or maintenance instructions;
- Abuse, misuse or negligent acts;
- Power failure surges, lightning, fire, flood, pest damage, accidental breakage, actions of third parties and other events or accidents outside Latronics' reasonable control and not arising from normal operating conditions;
- Suitably qualified personnel not carrying out all AC and DC permanent wiring in accordance with relevant wiring rules.

Products supplied by Latronics, or Latronics agents are supplied under the express condition that no responsibility is implied or accepted by Latronics for any damage to any appliance, equipment or property used in combination with the correct operation of a Latronics product.

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 does not undertake any commitment to guarantee continuity of supply in the case of obsolescence. In addition, Latronics reserves the rights to change its standard product range or specification of any model subsequently without notice and no liability as a result of these occurrences will be accepted.

*Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.*

### Part 2 - Returning a Latronics product for service under warranty;

If service is required contact your local supplier/installer or place of purchase for advice.

To Claim Under Warranty:

1. You should contact the Customer Care Centre on 1300 550 204. Product Model number and Serial number need to be readily available to enable prompt processing.
2. If, after investigation, the Customer Care Centre determines the product is or may be defective in material or workmanship and within the warranty period, they will issue instructions on how to proceed with return and shipping to Latronics.
3. When packaging a Latronics product for return appropriate measures must be taken by You to ensure the products are safely packed for transit. Products damaged in transit due to inadequate packaging will be void of warranty.
4. If the product manual has a Warranty Return Form included, this form should be completed and accompany products being returned.
5. If, as a result of further investigation by or on behalf of Latronics, such a defect is confirmed, then Latronics must, at its sole election, either repair or replace your Latronics product. Latronics will also, at their discretion, determine the most appropriate means to return any Warranty repairs (or replacements) to You in a timely manner.

### Part 3 - General Information

Replacement of any part or labour involved in repairs will not have the effect of extending the original period of the Limited Warranty of the goods. Any faulty part replaced under Limited Warranty becomes the property of the Company for purpose of examination and claim under proprietary warranty.

Under these product warranties, Latronics is not responsible for and you hereby agree to bear any costs associated with removal, transportation or reinstallation of your Latronics products or any peripheral components in the balance of any system used in conjunction with Latronics products.

Products returned to Latronics without prior authorisation will be returned to the sender at their expense.

All Warranty repairs are completed ex-factory to ensure

- Fast service turn around time
- Specialised, factory trained technicians
- All required components are available (except in the case of obsolescence)
- Thorough testing to all Latronics specifications
- Dedicated test equipment
- Upgrades/updates to latest Latronics standards/specifications (where applicable).

## 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.

## AC WIRING

Both models require an external circuit breaker for protection of inverter's AC input. Usually mounted in main switchboard and/or next to the inverter. The active and neutral of the AC output are electrically isolated from the DC inputs and earth connections.

Latronics Inverters have the AC output (active and neutral) floating with respect to the DC and Earth. This configuration provides the highest degree of safety and flexibility for installation wiring. The earth **E** is connected internally to the Inverter case and is suitable for *MEN* wiring.

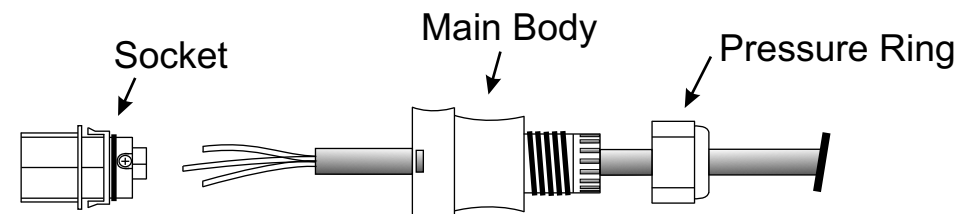
The unit is supplied with both male and female 20Amp Wieland Gesis lockable AC connectors.

To install connectors read the following procedure.

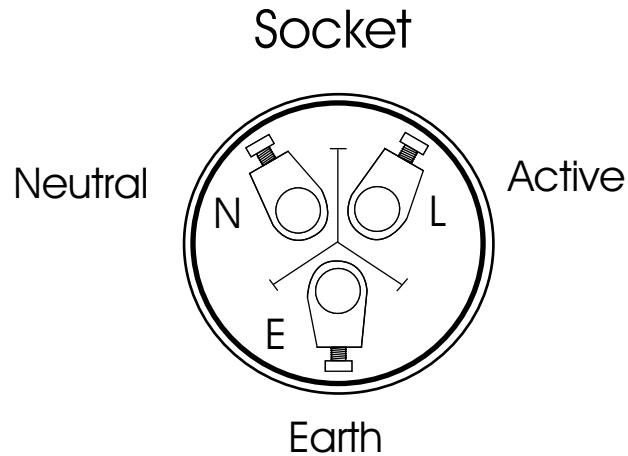
1. Turn external AC Circuit Breaker switch into OFF position and make sure it cannot be switched back on.
2. Test the wiring with a voltmeter to make sure no voltage is present.
3. Peel back 30mm of cable jacket and cut Active and Neutral cables 5mm shorter than Earth.



4. Strip 5mm off all three cables.
5. Take the Wieland Gesis connector, disassemble into three main sections and insert stripped wire through as shown below.



6. Connect the Active, Neutral and Earth cables as per diagram below.



7. Push the socket back into the Main Body until it clips in.

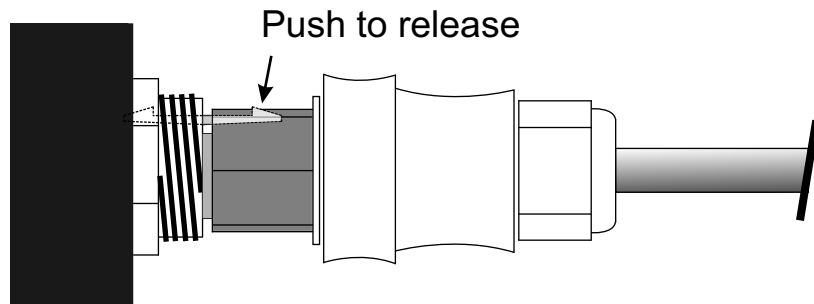
8. Screw the Pressure Ring back in to form a tight seal.

9. Plug into PV Edge.

---

To disconnect the plug, simply push the release clip in and unplug.

Note: The release clip section can be completely taken out if a lockable connector is not desired.



## **FAULT FINDING**

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

- Turn the Inverter OFF by switching the External DC and AC isolators OFF. Leave OFF for 60 seconds.
- Reconnect the DC Solar Input by switching external DC Isolator ON. All lights on the Inverter should come ON for 1 second at power up and then go OFF. The 75% light should remain ON to indicate the Solar Input is available. Solar Input voltage needs to be above the automatic turn ON voltage, for the light to turn ON, see pg 18. If the light does not illuminate check Solar Input for correct operation.
- Next reconnect the AC grid by switching the external AC breaker ON. After 20 seconds the 75% light should begin flashing to indicate Inverter reconnecting to the AC grid. The light will flash for 60 seconds while the PV Edge checks that the mains voltage and frequency are stable. Should the light not begin flashing check if the AC grid is present.
- After the 75% light stops flashing the Inverter will begin feeding power into the AC Grid.

## **HELPFUL HINTS**

- Make certain that you understand the operation of the Inverter.
- Remember that it has automatic reconnection to the AC grid.
- Make sure leads and terminals are not corroded, loose or faulty in any way.
- Make sure all external DC and AC isolators are reset properly. If unsure switch OFF and ON again.



## SOLAR INPUT CONFIGURATION

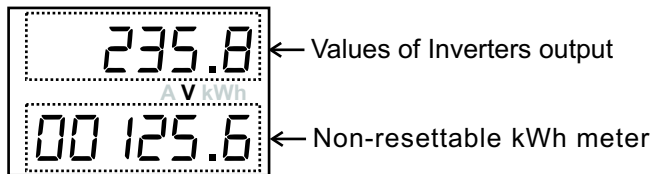
- To configure your panels with the PV Edge inverter please go to [http://www.innovative.co.nz/pdf/PVE\\_PanelSizing\\_details.pdf](http://www.innovative.co.nz/pdf/PVE_PanelSizing_details.pdf)
- The DC input is suitable for connection to solar modules only, when MPPT is enabled.
- Do not exceed recommended Maximum DC Input Power.
- All solar modules should be of the same type and brand. Therefore the maximum power point and voltage variation with temperature are consistent for all modules, which will ensure maximum system output.

### Energy Meter

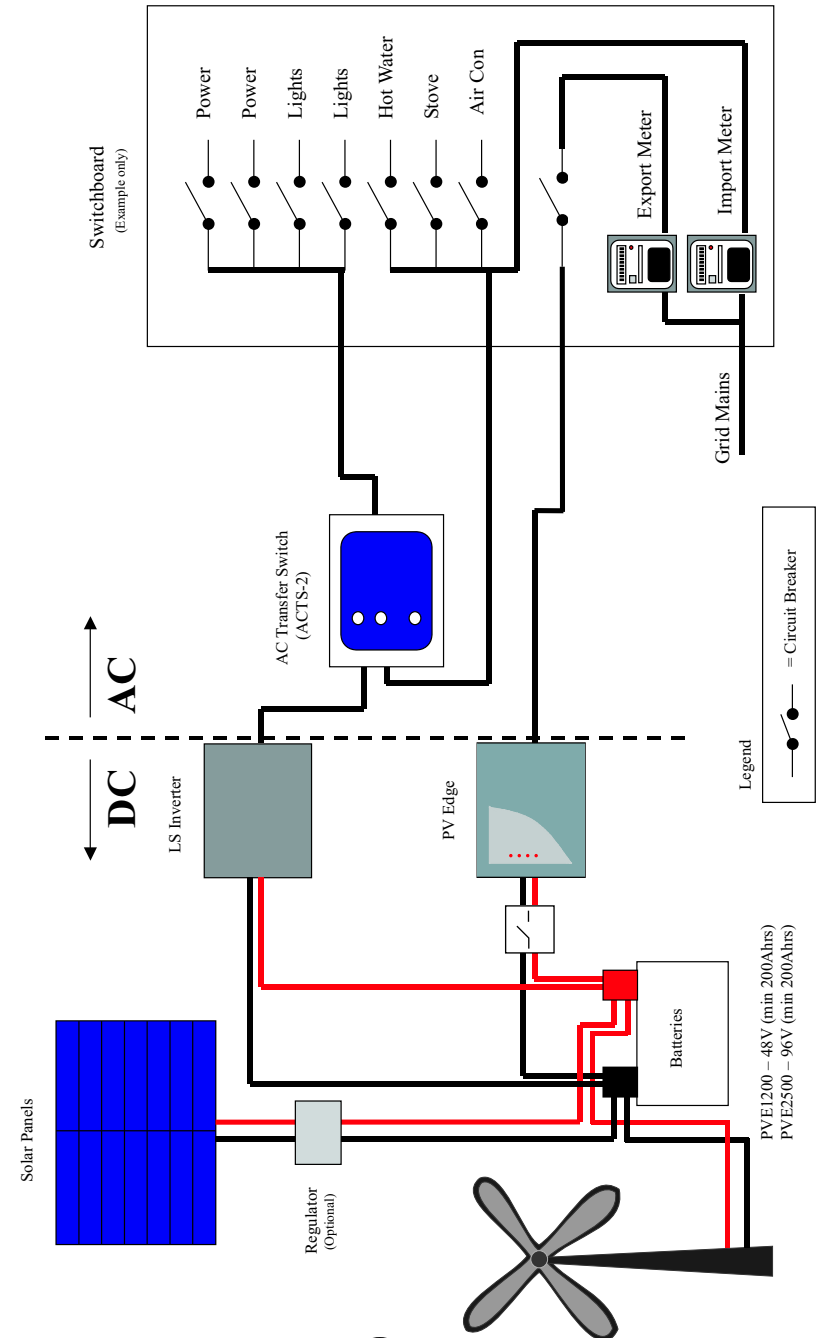
- The PV Edge meter shows the following measurements on screen. To scroll through the values Use the button below the screen.

**kW:** Instantaneous power that is being generated.  
**kWh:** Resettable accumulative Power (kWh meter)  
**V:** Output Voltage (V)  
**A:** Output Current (A)  
**F:** Output Frequency (Hz)  
**PF:** Output Power Factor

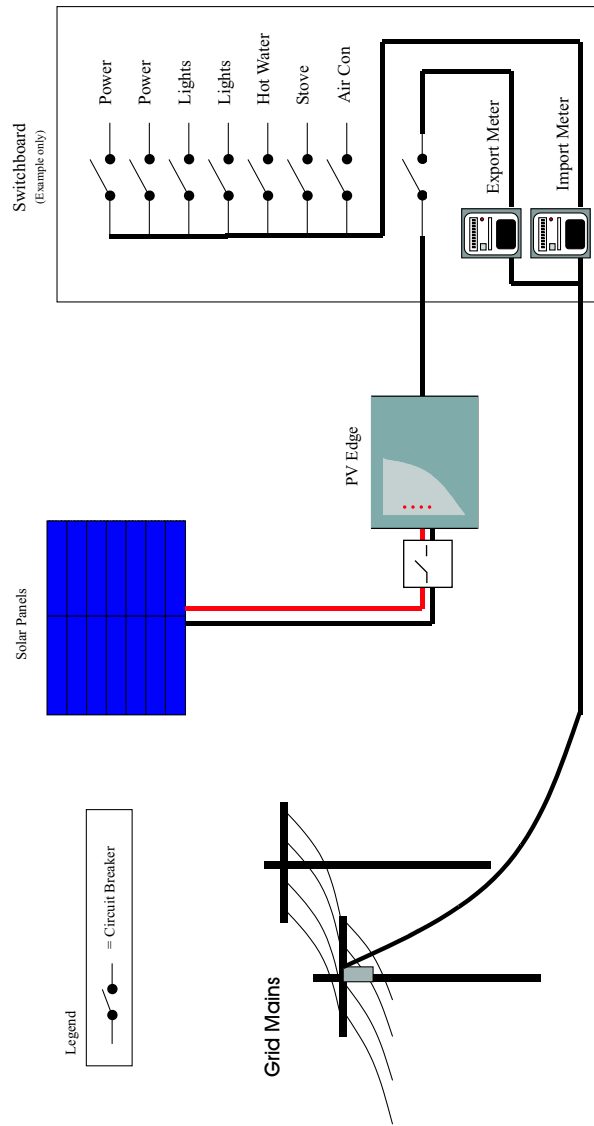
Note: To reset the Resettable kWh meter. Press on hold for 10sec



## Battery Back-Up System



## Standard Grid Connect System



8

### **WARNING:**

The Inverter output is connected to mains electricity, thus it is important that all AC wiring complies with the requirements of the relevant wiring standards, (AS3000, AS4777).

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

## DIP SWITCH SETTINGS

### **Switch 1 -MPPT / Battery mode**

In the ON position (**default**) the Maximum Power Point Tracking is enabled. This is required when the DC input is Photovoltaic Solar Modules only. In the OFF position the Maximum Power Point Tracking is disabled and the voltage tracking will operate at a fixed voltage of 54V (PVE1200) or 108V (PVE2500). This setting is required in a system where a 48V (PVE1200) or 96V (PVE2500) Battery Bank is required on the DC input.

### **Switch 2 - 50/60 Hz**

In the ON position the Inverter is set for 60Hz operation. In the OFF position (**default**) the Inverter is set for 50Hz operation.

### **Switch 3**

(If Switch 1 OFF)

ON = Gel/SLA battery.

OFF = Flooded battery. (**Default**)

(If Switch 1 ON)

ON = 255VAC sustained operation

OFF= Sustained operation turned off

### **Switch 4**

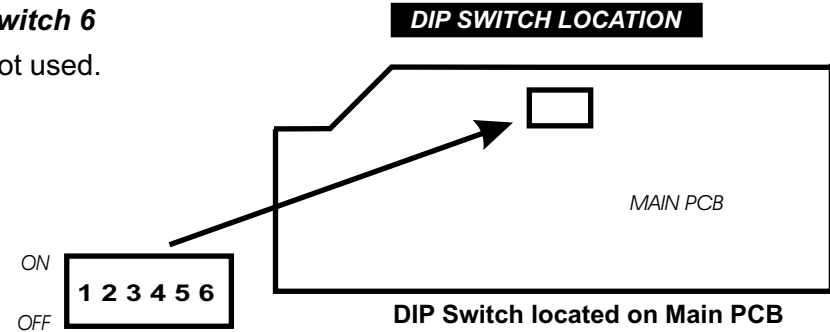
Must be in OFF position (**default**) for normal operation. The ON position is a factory AC test setting.

### **Switch 5**

Must be in the OFF position (**default**) for normal operation. The ON position is a factory DC test setting.

### **Switch 6**

Not used.



### **WARNING:**

Due to dangerous voltages existing inside the unit, make sure the external DC and AC solar isolators are turned off before opening the unit. Only *qualified Trades Persons* are permitted to adjust these settings.

13

## SPECIAL FEATURES

### **Digital Energy Display**

The backlit energy display shows instantaneous power, accumulative power, AC voltage, AC current, AC power factor and AC frequency. See page 14 for more details.

### **Night Time Disconnect**

After dark when the solar input is no longer available the Inverter will automatically disconnect from the AC grid. This feature ensures that during the night, the Inverter cannot consume any power whatsoever while remaining idle. Upon sunrise the next morning when solar input becomes available again, the PV edge will automatically reconnect to the AC grid and begin generating power.

### **Parallel Operation**

The PV edge automatically synchronizes to the AC grid, therefore the output of multiple units can all be connected together, and they will all be synchronized by the AC grid.

**Note:** *The Solar inputs of multiple unit Inverters are not to be paralleled unless used with a battery. Please contact Latronics for more details.*

### **Maximum Power Point Tracking**

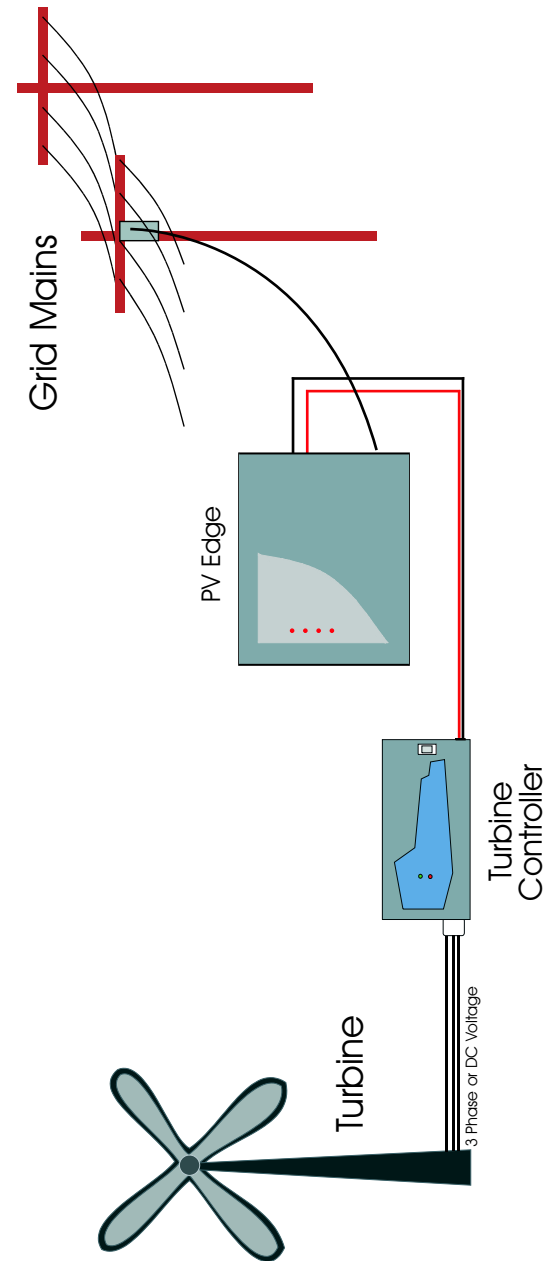
The optimum power level from the solar input depends on the available solar modules. Even in cloudy weather with fluctuations in the solar radiation level, the PV Edge constantly monitors and tracks the optimum operating point to ensure maximum power from the solar modules is achieved.

### **Protection**

The AC grid voltage and frequency is closely monitored by the PV Edge along with anti islanding checks via active phase shifts. Isolation between the DC input and AC output is achieved via the Toroidal Transformer. The Inverter is fitted with a cooling fan, which is temperature controlled and only operates when required.

### **Maintenance Cycle**

When in Battery mode (MPPT disabled) a maintenance cycle is performed every 30 days. This is a short boost cycle for sealed batteries or an equalize charge for flooded cells. In this mode the bottom LED will flash slowly until the cycle is completed.



**NOTE:** PV Edge must be in Battery Mode. (See pg 13)  
Turbine controller may require a dump load. (see Turbine Controller manual)

The Latronics Turbine Controller utilizes the latest in micro-controller design to deliver a stable and safe supply of power to the grid connect inverter. Designed specifically to integrate with the PV Edge line of Latronics inverters, it allows battery-less grid connection of wind and water turbines.

## **INVERTER OPERATION**

When the Inverter is switched on all 4 LED'S light up for 1 second while the microprocessor performs a start up and system check procedure.

### **100% LED (Overload)**

This LED indicates overtemp/overload. In this mode the all other LED's will be OFF and this LED will flash.

### **75% LED(AC Grid)**

This LED has 2 modes of operation.

This LED will be ON solid with all other LED's off when the solar input is present and the AC grid is disconnected and/or awaiting reconnection.

This LED will FLASH for 90 seconds with all other LED's off when the inverter initially connects to the AC grid and performs a voltage and frequency stability check before feeding power into the AC grid.

### **50% LED (AC Fault)**

When an AC fault is present this LED will FLASH and all other LED's off

### **25% LED**

This LED will flash with all other LED's off during a battery maintenance cycle (see pg12).

10

### **Indicator Lamps**

The 4 LED's on the front panel are dual purpose. When in normal run mode they operate as a bar graph  
LED 4 - 76%-100% (top Led).  
LED 3 - 51%-75%.  
LED 2 - 26%-50%.  
LED 1 - 1%-25%. (Bottom Led).  
If the Inverter were supplying 60% of Full power then Led's 1, 2 & 3 would be illuminated.

### **DC Solar Connector**

For easy connection and disconnection of DC Input Power from Solar Panels or Battery Bank.

### **Digital Energy Meter**

Using the yellow button you are able to scroll through the different values. See page 14 for more details.

### **Plug & Play AC Connector**

For easy connection and disconnection to AC grid.

### **Fan**

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

11

