



BOLERO

HIGH PERFORMANCE SINEWAVE INVERTER



OPERATION & INSTALLATION MANUAL

Serial No: _____

Model No: _____

SOLAR ENERGY AUSTRALIA Pty Ltd ACN 081 639 938

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CONTENTS

Introduction and General Information	2
Warranty	3
Pre Installation Information Electrical Requirements	4
Installation / AC Wiring	5
DC Wiring	6
Start Up Procedure	6
Controls and Display Load Sense Feature and Adjustment	7
Adjusting Load Sensitivity	7
Troubleshooting	8
How Long Will My Battery Last	9
Technical Data	10
Mounting Specifications	11

Introduction and General Information

Thank you for choosing to purchase another quality inverter from Solar Energy Australia. This product has been developed to provide you with years of trouble free operation. Your SEA inverter provides True Sinewave output with power quality and voltage regulation equal to or better than grid electricity.

It is important to us that you get the best out of your inverter, so please take a few minutes to read this manual carefully; it could save you from frustration. If you have any comments regarding our products and / or service, please do not hesitate to contact us to discuss your thoughts.

Remember: As soon as your Solar Energy Australia inverter has been installed please complete and return your warranty card. This will enable us to efficiently handle any service enquiries you may have, and keep you updated with any relevant.



FEATURES INCLUDE:

- TRUE SINEWAVE AT 50HZ
- DYNAMIC BATTERY LOW VOLTAGE CONTROL
- TOTAL HARMONIC DISTORTION (THD) <2.0%
- DESIGNED FOR HARSH CLIMATIC CONDITIONS
- HIGH SURGE CAPACITY
- MANUFACTURED IN SMD TECHNOLOGY
- EXTREMELY HIGH OVERALL EFFICIENCY
- ALUMINIUM BASE WITH STEEL COVER
- INTELLIGENT OVERLOAD CONTROL
- INTEGRATED DC CIRCUIT BREAKER
- SHORT CIRCUIT PROTECTION
- 35MM SQ BATTERY CABLES
- QUICK RESPONSE STAND-BY FUNCTION
- M.E.N. COMPATIBLE
- AC & DC EMC ATTENUATION

IMPORTANT: YOU MUST REGISTER YOUR WARRANTY

SOLAR ENERGY AUSTRALIA WARRANTY Terms and Conditions

Solar Energy Australia considers reliability of your power system/inverter as absolutely critical. Many external influences can affect the reliability of an inverter. For these reasons we request that you register your warranty within 60 days of purchase.

These terms and conditions do not exclude your rights under the statutory or implied warranty within your state or territory.

Solar Energy Australia warrant this product against defects in material or workmanship, to the original purchaser only for an initial period of 6 months from date of purchase, when in normal use and service. **The warranty period will be extended to a total of two (2) years when you register your warranty within 60 days of purchase.** No warranty will be provided on units, which have not been paid for in full.

This warranty does not extend to products which have been opened, altered or repaired by persons other than authorised by Solar Energy Australia or to products which become defective due to acts of God, fire, sabotage, vandalism, contaminated fluids, negligence or failure to operate, house and maintain the product in accordance with instructions provided in this manual.

It is extremely important that all installation and operating instructions contained within this manual are strictly adhered to. Failure to do so may void your warranty. Units, which are to be permanently installed/used within 1km of the coast should use the marine version of our product. This will help to avoid corrosion problems, which are not covered under the terms of this warranty.

Solar Energy Australia will repair or replace the defective product in accordance with its best judgement. For service under warranty, the buyer or installer must contact Solar Energy Australia to obtain appropriate paper work and shipping instructions before returning the unit. To make a warranty claim you must produce proof of purchase when returning the unit. Units returned without prior authorisation or warranty registration may be delayed. The buyer will pay all charges incurred in returning the product to the factory including any charges incurred for the uninstallation or reinstallation of the inverter and/or its system components. Solar Energy Australia will pay return freight charges, if the product is found to be defective, within the terms of the warranty. Repair or replacement of any unit does not extend the original warranty terms in any way.

This warranty does not cover repairs made necessary due to the product coming in contact with dirt, abrasives, moisture, rust, corrosion, varnish or similar, insufficient system maintenance, failure due to poor quality or poor condition batteries, failure to use an appropriate AC transfer switch or wiring carried out by inappropriately qualified personnel. Solar Energy Australia will in no way be held responsible for any losses incurred due to the malfunctioning or failure of a product

Suitably qualified personnel must carry out all AC & DC permanent wiring. Failure to do so may void warranty.

To register your warranty you must do the following:

Return your completed warranty registration card within 60 days of purchase. This can be faxed to ++ 61 3 9761 7789 or mailed to: Solar Energy Australia Pty Ltd, Unit 2 / 4 Beaumont Road, Mount Kuring-Gai, NSW, 2080.

- Return your completed warranty registration card within 60 days of purchase. This can be faxed to +61 (0) 2 9457 2255 or mailed to: Solar Energy Australia Pty Ltd, Unit 2 / 4 Beaumont Road, Mount Kuring-Gai, NSW, 2080.
- Fixed installations must provide a picture of the installation from a distance of 1 metre; household installations must supply a second picture showing the structure housing the inverter.
- Circuit diagram of installation. This can be obtained from your installer and may be a generic diagram.

Circuit diagrams and pictures can be emailed to sales@solaraustralia.com.au or posted.

If the above items are not received, they may be requested before work can commence on any faulty units, but please be aware, Solar Energy Australia is here to help. Help us to help you.

These measures are put in place to ensure you have years of trouble free service from your Solar Energy Australia inverter.

If you have any questions about this warranty please do not hesitate to contact us.

Pre Installation Information

Batteries

Before installing your Sine Wave Inverter, it is important that you have appropriately sized batteries. A battery that is too small will not allow the inverter to perform to its full specification. Battery performance will vary between different styles of batteries. For example, a Deep Cycle battery will tolerate deep discharges on a regular basis much better than a cranking battery, whereas a cranking battery may provide higher voltage when high battery current is being drawn (eg, when your inverter is starting a motor or Television).

The table below gives a guide to the minimum battery capacity required:

Model	Recommended Minimum Battery Capacity	Maximum Current Draw of Inverter
SEAP-12-850	200Ah	196Amps DC
SEAP-24-1K1	200Ah	160Amps DC

Battery Terminology

I = Current

This is the measure of electrical power flowing. This is expressed in Amps. For example, I = 6A means 6 Amps.

Ah = Ampere Hours

This is the amount of energy a battery can store. In theory this means a 200Ah battery could supply 1 Amp for 200 hours. Alternatively if an appliance draws 2 Amps for 4 hrs then it has used 8 Ah.

CCA = Cold Cranking Amps

This is the maximum amount of current that the battery can supply for a short period of time.

NOTE: Batteries joined in series (+ to -) will increase the voltage but not the Ah. Batteries joined in parallel (+ to +, - to -) will increase the Ah but not the voltage.

For example: 2 x 12V / 200Ah batteries joined in series = 24V / 200Ah
 2 x 12V / 200Ah batteries joined in parallel = 12V / 400Ah

There should be no more than 2 batteries in parallel.

We refer you to Australian Standard AS4509 for further information regarding home power installations.

Electrical Requirements

- DC Input voltage of the inverter must be the same as the battery bank voltage. Please see specification for your model.
- DC cabling must be connected to the correct polarity terminal of the battery bank (Red = Positive, Black = Negative).
- It is not recommended that the DC cables to the inverter be extended. If this is necessary then you will have to increase the DC cable size. Consult your supplier/installer for this calculation.
- Do Not Connect 240V AC or any other power source to the 240V output of the inverter as this may cause irreparable damage to the inverter.
- If you need to switch from Inverter to Generator or Shore Power it is absolutely critical that you install a double-pole "Break before Make" changeover switch, switching both active and neutral between the inverter and the incoming AC supply. A manual switch is preferred.

Installation

WARNING: Please read these instructions thoroughly before commencing installation. Installation should be performed by a competent professional electrical / renewable energy installer, as dangerous voltage can be present. All relevant Australian Standards must be strictly followed. A licensed Electrician must carry out all AC wiring.

The following steps should be completed in the order shown in this section.

1. Unpacking & Mounting

- a) Unpack your inverter from its shipping container and inspect the unit for any obvious transit damage. Report any concerns immediately to your supplier. Please keep original packaging in case it is required for re-transport at a later date.
- b) Mount the inverter to a suitable surface, paying close attention to the mounting requirements set out below.
 - Select a site that is dry and free of salt or moisture-laden air, dust, exhaust or battery gases and access to any rodents.
 - Never mount the inverter directly above the batteries.
 - Mount the inverter as close to the batteries as possible, but no closer than 500mm, mounting should be on a solid surface capable of withstanding temperatures of 60°C.
 - Allow a cooling space of at least 200mm all around the inverter. Placing the inverter in a cupboard or small enclosure may reduce the available output power. The installation site should not be susceptible to temperatures in excess 50°C.

2. AC Wiring

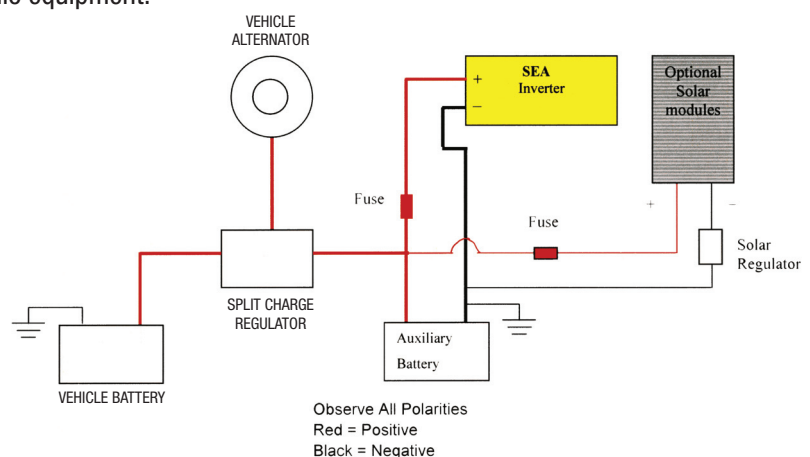
Important: All AC wiring must comply with relevant Australian and local standards, and be performed by a licensed electrician to satisfy warranty requirements and conditions.

- a) Connect active, neutral and earth to a 10 amp 3 pin male AC plug top. Due to the use of a large transformer, max galvanic isolation is provided between the input and output. This means that the Bolero is compatible with M.E.N installations.
- b) It is possible to permanently hard wire the output of the Bolero, this is done by:
 - Firstly ensuring all DC inputs are disconnected.
 - Use a small knife to remove the plastic buttons on the AC outlet.
 - Unscrew and disconnect the AC outlet.
 - Using the screws provided attach a Clipsal 559-3 slimline junction box.
 - Connect the three AC wires to the junction box and secure cover.

Tips

- Avoid running AC/DC wiring next to other DC wires.
- Avoid running AC/DC wiring near any antenna wiring.
- Avoid running AC/DC wiring near audio equipment.

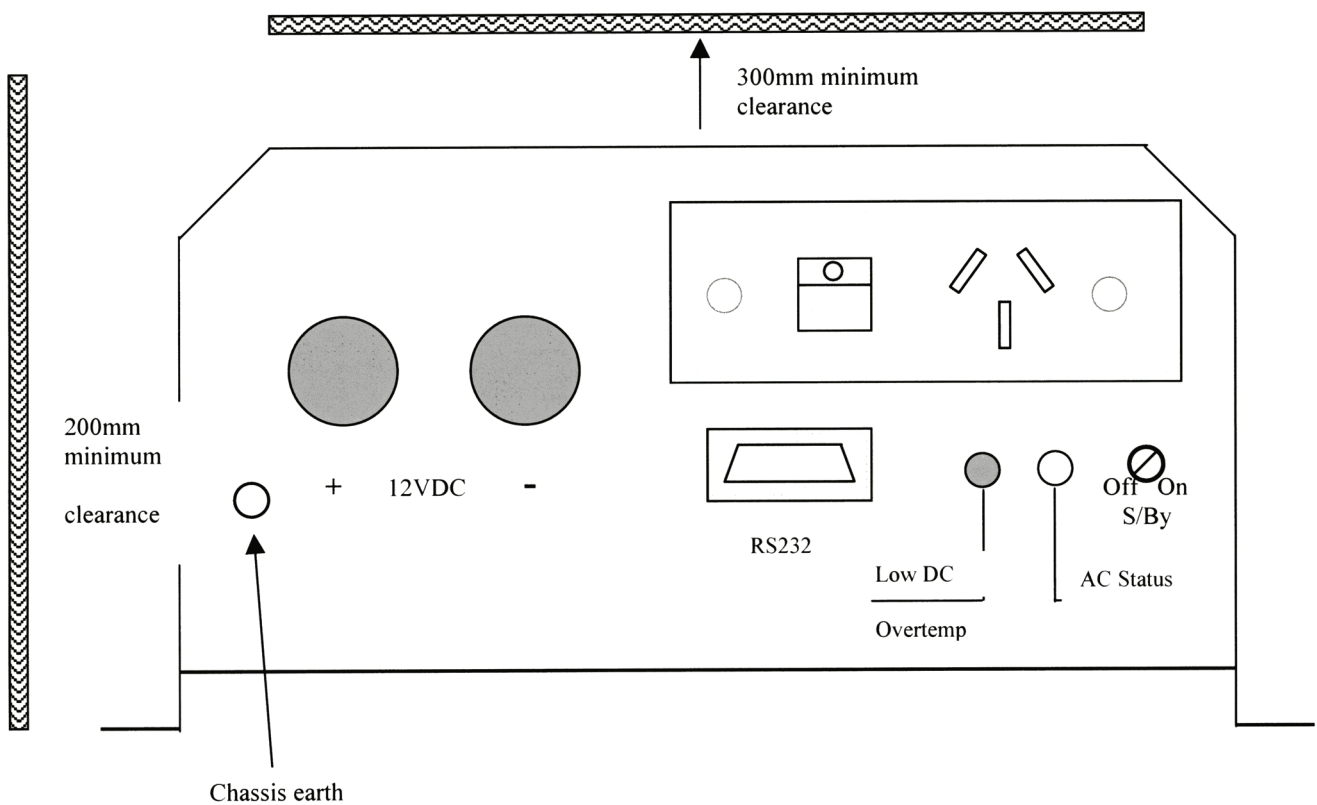
3. DC Wiring - Vehicle



DC Wiring

The primary consideration is to ensure that the battery bank voltage matches the DC input voltage rating of the inverter. The batteries should be located only a short distance from the inverter in order to obtain best results, but not closer than 500mm. A battery fuse must be installed no closer than 500mm from the battery to protect all wiring connected to the battery; we suggest the use of an 80Amp motor start fuse for 12v input and 63Amp for the 24v unit.

Before making any connections, ensure the Bolero’s circuit breaker is in the OFF (down) position. Connect the inverter DC input cables to the battery terminals via the battery fuse, ensuring the correct polarity (RED = positive).



4. Start-Up Procedure

- a) Check battery condition and voltage are within specifications.
- b) Ensure the DC circuit breaker is set to the OFF (down) position.
- c) Plug in the AC connector, but do not switch ON.
- d) Switch DC circuit breaker to the ON (up) position.
- e) If all is well the AC status LED will be flashing green. This indicates all parameters are normal and the unit is in Standby waiting for an AC load to be switched ON.
- f) Switch ON the AC.

Controls and Display

Your Bolero inverter has two straightforward indicators known as LED's (light emitting diodes).

AC Status LED

This multicolor LED shows the status of the output as described below.

Colour of LED	
Flashing Green	Inverter is in stand-by waiting for an AC load to be switched ON.
Steady Green	Inverter is operating normally
Orange	This LED blinks orange just before the inverter switches back to stand-by or if the load is too small. Use this information to adjust the standby level to your load. (see section on standby adjustment)
Steady Red	AC-Output has shutdown due to an AC short circuit or the output has been overloaded. Reduce load or check for faulty wiring. Warning! The inverter restarts automatically after 20 seconds.

Low DC/Overtemp LED

Steady Red	Low DC. DC battery volts have dropped to an insufficient level, re charge batteries or reduce load. CAUTION: Inverter will restart automatically once 12v (24v) has been re-established
Flashing Red	Over temperature. Inverter has shut down due to excessive internal temperature. Reduce load or improve ventilation around the inverter. CAUTION: Inverter will restart automatically once the internal temperature has been reduced to a safe level.

Load Sense Feature and Adjustment

Your Bolero inverter features a Standby circuit for automatic load sensing, which allows the inverter to remain in Standby when no AC load is switched ON. Once an AC load is switched ON the inverter will immediately start. This feature conserves valuable battery energy as the inverter only uses approx 10% of the normal power when in standby (flashing green). The amount of AC power required to start the inverter can be adjusted; the procedure for this (adjusting the sensitivity) is outlined below.

When no AC load is present, the inverter should remain in standby (AC status LED flashing GREEN).

Adjusting load sensitivity:

Ensure battery voltage is as close to nominal as possible, that is either 12V or 24V DC

1. Turn all AC loads OFF, keeping the AC wiring connected. Some loads such as TV's must be turned OFF at the power point as they can still represent a small load to the inverter.
2. Using a small screwdriver adjust the black plastic trim pot located to the right of the two LED's below the power point. Adjusting this pot clockwise will make the inverter less sensitive. Turning the pot all the way clockwise will override the standby circuit and keep the inverter ON all the time, this could be used when you have a very small load that must stay ON at all times. Turning the pot all the way counter clockwise will turn the inverter OFF.

3. Adjust the pot until the LED is steady green, now turn the pot back the opposite way until the LED flashes green. Allow 10 seconds in between adjustments for stabilisation.

Clockwise = less sensitive, anti clockwise = increased sensitivity.

When the LED flashes GREEN, the unit is instandby mode.

4. Turn on the smallest AC load in the home. The unit should now deliver power, and the AC Status LED should be GREEN. However, if the LED is ORANGE the sensitivity must be increased.
5. Now turn OFF the AC load. The LED should return to flashing GREEN, if this does not occur, reduce sensitivity.

Troubleshooting

AC Load does not stay ON

Some AC loads may not be large enough to hold the inverter ON. This condition may be recognised by the load turning off after every eight to ten seconds, then back on again. AC Status LED will also be flashing orange.

There are two possible solutions to this:

- a) Increase the sensitivity of the inverter by turning the Standby Pot slightly counter clockwise until the LED shows steady green.
- b) Increase the amount of AC load on the inverter.

Inverter shuts down due to Over Temperature

Your inverter will safely provide the output power as described in the technical data section in the conditions specified. If your inverter shuts down and indicates over temperature, it may be that you have exceeded one of the parameters.

Check for the following:

- Ensure the inverter has adequate ventilation; insufficient ventilation can severely restrict the power output of your inverter.
- Ensure the true power rating of your appliance (including power factor) does not exceed the rating of your inverter.

Inverter shuts down when trying to start a load

When starting a load such as a motor it may cause the inverter to shut down. If this is the case:

- a) Ensure the battery voltage is within spec when the appliance is trying to start, if not, you may need to increase the size of your batteries.
- b) If battery voltage is OK then the inverter may be too small, consult your Solar Energy Australia representative.

Screeching noise on radio when inverter is operating

Your Solar Energy Australia inverter is manufactured to the highest standards for the reduction of EMI (Electro Magnetic Interference). It is still possible however that in extreme cases, interference may be noticeable in radios or Television sets. Below are some suggestions to try to reduce this noise.

If possible run a heavy gauge earth wire from battery negative to a moist ground stake; also connect this to the earth stud on the chassis of the inverter.

1. Separate AC and DC wiring.
2. Improve signal strength of receiver by improving antenna.
3. Reposition inverter as far away from receiver as possible.



Inverter stays shut down for a long time after overload

The inverter is responding to either a severe overload or repeated overloads. Turn the inverters circuit breaker OFF for 30 seconds and then reconnect. If the cause of the original shutdown is still present, the inverter will shut down again. Reduce load or allow inverter to cool down.

How long will my battery last?

ACWatts = Power in watts from appliance rating plate.

AH – Amphere Hour capacity of the battery.

$$\frac{(AH \div 2)}{(AC\ Watts \div 10^*)} = \text{TIME IN HOURS}$$

Example: A 40cm TV (67 Watts) running on 130AH battery.

$$\frac{(130 \div 2)}{(67 \div 10^*)} = \frac{65}{67} = 65 \div 6.7 = 9.7 \text{ HOURS}$$

* Note: Use a figure of 20 if your battery voltage is 24V DC. Only 50% of the batteries capacity will be used to allow it to recover.

How can I tell if my Inverter is in Standby if I am in the house?

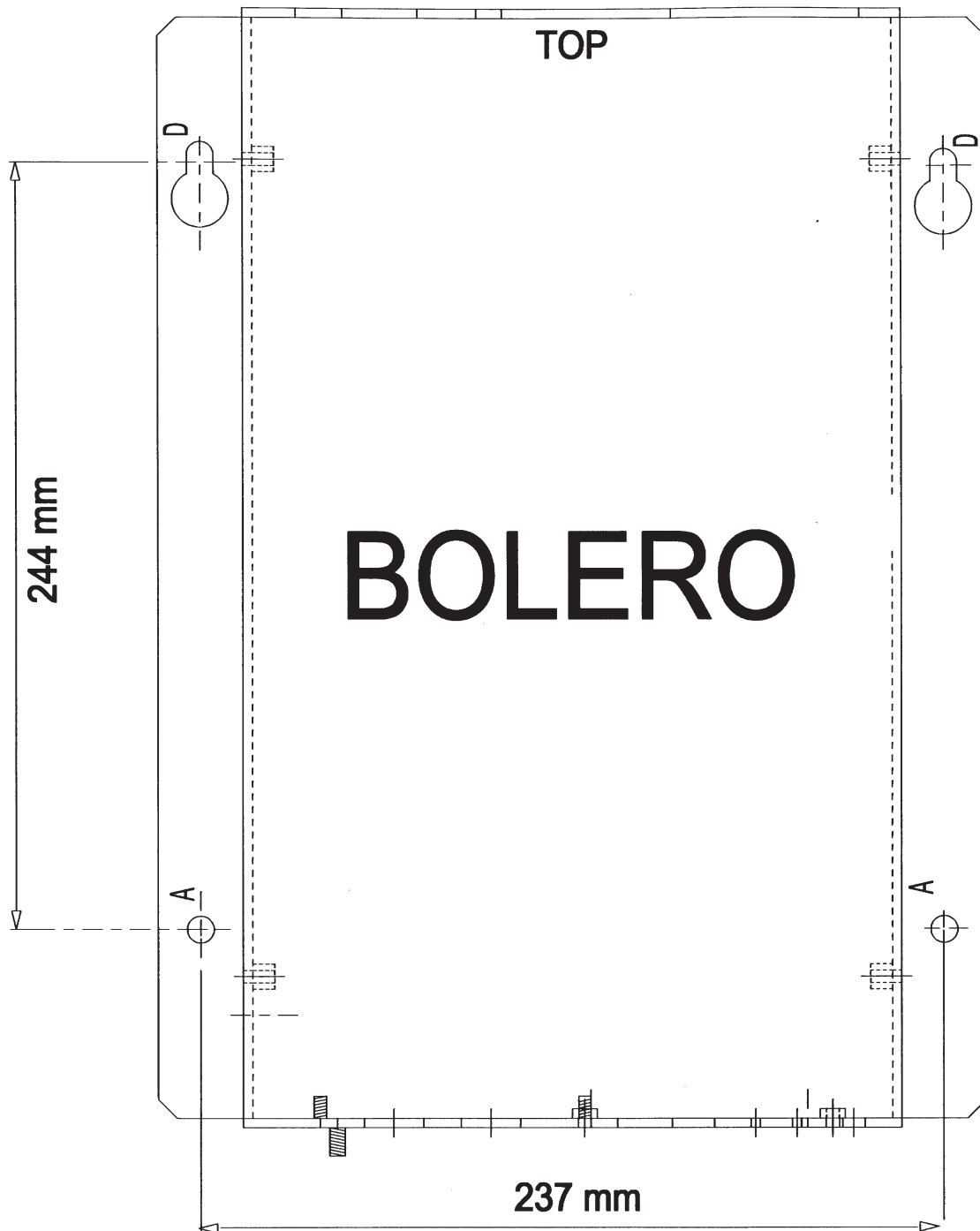
It is important to keep your inverter in standby whenever no power is being used. A power point with a neon indicator or a child’s night light will mimic the output of the inverter. Eg, these will flash when the inverter is in standby. This feature will save unnecessary battery drain.

RS232 Output

Your Bolero inverter features an RS232 data output, whilst this is mainly intended as a manufacturing tool, it is possible to connect this to a computer to read certain parameters. Use a 9 pin RS232 cable to connect your Bolero to a computer using a program such as ProComm, Hyperterminal etc (setting 4800Baud, 8N1). Please ask for further information regarding this feature.

Technical Data @ 30°C 1.0Pf	SEAP-12-850	SEAP-24-1K1
DC Input Battery Voltage	12V	24V
DC Low voltage cutout	9.0-10.5V	18-21V
DC High voltage cutout	16V	32V
AC Output power @ 30°C Continuous	850watts	1100watts
30 minutes	960watts	1200watts
60 seconds	1600watts	2000watts
5 seconds	2400watts	3000watts
AC Output Voltage	240v +/- 2%	
AC Output Frequency	50Hz +/- .5%	
Total Harmonic Distortion	< 2%	
Maximum AC output current (Short Circuit)	8A	11A
Reset after Short Circuit	Every 60 Seconds	
DC Current draw in Standby	50mA	
DC Current draw no load, AC ON	.38A	.34A
DC Current draw at full continuous load	84A	53A
DC Current draw maximum	250	160A
Efficiency @ 10% of load	92%	91%
Efficiency @ 50% of load	92%	92%
Efficiency @ 90% of load	87%	88%
Peak Efficiency	94%	
Stand-by Adjustment	4-40watts	
AC Output Connection	10A GPO or hardwired via three terminal junction box (not supplied)	
DC Output Connection	1.4metres, 35mm ² flexible cables with 10mm lugs	
Fan Control	ON @ 55° C, OFF @ 45° C, or ON if power exceeds 800wattsfor 24v model, 640watts for 12v	
Operating Range	-25°C to +50°C	
Safety Standards	AS3000 Safety AS.NZS61558-1.2000 Tfx	
Radio Interference Standard	AS/NZS2064-1997	
Warranty	2 years	
Packed Weight	14kgs	
Dimensions in mm when wall mounted	364 high x 264 wide x 124 deep	

Mounting Specifications



NOTES:

Hole 'A' 8.50 mm
Detail 'D' (D-Keyhole)

