

# COMPANION

## OWNERS MANUAL

### SOLAR MAT KIT 125W

Part No. COMPBI023



AUSTRALIA'S ORIGINAL OUTDOOR BRAND

## INTRODUCTION

The Companion 125W Solar Mat Kit includes the latest high performance monocrystalline cells with an outstanding 19.5% efficiency making it the ideal portable solar charging solution for charging all types of 12V DC batteries (excluding lithium).

Ideally suited for camping, 4WD driving, caravanning, boating and other activities to power a range for 12V DC accessories directly from your 12V DC battery, including; portable fridge, lighting, television, DVD player, bilge pump, food warmer and even a water pump for a shower or hot water system. You can also connect a 240V AC inverter to your battery to power a limited range of 240V AC appliances.

Companion Solar Mat Kits are designed for Australia's tough conditions, using the latest high quality components which provide dependable performance and reliability in an easy to use compact solar kit.

Utilising the abundance of free sunlight available, the monocrystalline cells convert this sunlight into usable DC (direct current) electricity. Due to the cells high power output, the electricity produced or voltage output (measured directly at the cell) is too high to be used effectively. To better control the voltage output we have included a 'Smart' 5 Stage 12 Amp PWM (Pulse Width Modulation) weatherproof controller to automatically adjust the voltage output no matter what type of battery is being charged from the four different types available.

Simply, select the correct 'DIP' switch setting on the rear of the controller to match the type of battery being charged. Select from either; GEL, AGM, WET (conventional lead-acid) or Calcium, then connect the supplied battery clamps to the corresponding battery terminals and the 'Smart' controller will automatically decide the amount and rate of charge the battery needs.

**WARNING: THE CONTROLLER SUPPLIED WITH THIS PRODUCT IS NOT SUITABLE FOR CHARGING ANY TYPE OF LITHIUM BATTERY. ATTEMPTING TO CHARGE A LITHIUM BATTERY WITH THIS CONTROLLER COULD RESULT IN FIRE OR EXPLOSION.**

## PRODUCT FEATURES

- 27 x 19.5% highly efficient monocrystalline cells
- 6 panels
- 30A heavy duty Anderson style plugs on extension leads
- 5m extension lead – twin core 2.08mm<sup>2</sup> 'fig 8' cable
- Fused 0.8m extension lead with battery clamps
- Support stand



## GENERAL WARNINGS

**IMPORTANT: THIS USER MANUAL CONTAINS IMPORTANT SAFETY INFORMATION AND OPERATING INSTRUCTIONS. PLEASE READ THIS MANUAL CAREFULLY TO FAMILIARISE YOURSELF WITH THE PRODUCT AND ACCESSORIES BEFORE CONNECTING TO THE BATTERY BEING CHARGED. KEEP THIS MANUAL IN A SAFE PLACE FOR FUTURE REFERENCE.**

- Do not connect the solar panel output wire directly to the battery being charged. A controller/regulator must be used inline. Failure to do so, could cause permanent damage to the battery and or personal injury if the battery ruptures
- Follow the assembly instructions within this manual carefully as to not cause harm to yourself or others, particularly when 'connecting' and 'disconnecting' the DC clamps (Direct Current clamps) to or from the battery being charged
- Do not charge 'dry' cell rechargeable batteries with this product. To charge 'dry' cell rechargeable batteries, connect an appropriate sized 240V inverter to the 12V DC battery being charged by the solar panel. Then connect the 240V AC 'dry' cell charger which came with the batteries to the 240V inverter ensuring that the manufactures guidelines are followed
- Do not charge 'dry' cell non-rechargeable batteries
- Do not charge a damaged battery
- Do not charge a frozen battery
- Do not use this solar mat kit if it is damaged in anyway, contact Customer Service for advice if necessary, details are at the back of this booklet
- Do not disassemble the solar mat or controller
- Ensure that the battery being charged is in a well ventilated area as poisonous gasses are emitted during the charging process
- Ensure that appropriate personal protective equipment (PPE) is worn while in close proximity to the battery being charged; safety glasses, gloves, protective clothing as a minimum
- Ensure that no metal objects or jewellery contacts the battery terminals. It is recommended to remove rings, bracelets etc when working with 12V DC batteries. A 12V DC battery can produce a short-circuit current high enough to melt metallic materials possibly causing severe burns
- Do not smoke or have the battery in the vicinity of sparks, open flame, fuel or solvents while the battery is being charged. Gases emitted could be 'EXPLOSIVE'
- Battery acid is highly corrosive. Avoid 'CHEMICAL BURNS' wash effected area immediately with clean running water if contact is made with your skin or eyes. Seek medical advice
- Disconnect power from the solar mat by separating at least one join between either extension lead before connecting' or 'disconnecting' the DC clamps to or from the battery
- Ensure correct DC clamp connection '**sequence**' when 'connecting' and 'disconnecting' the DC clamps to or from the battery being charged. A simple way to remember is; The negative '-' DC clamp is '**Last**' on and '**First**' off (the negative '-' battery terminal). This will reduce the dangers of potential short-circuit and excessive sparking of the battery terminals

- Ensure correct DC clamp connection '**polarity**' when 'connecting' to the battery being charged. Connect the '**Red**' coloured DC clamp to the positive '+' battery terminal. Then connect the '**Black**' coloured DC clamp to the negative '-' battery terminal
- Immediately cease charging if the battery being charged is found to be excessively hot, leaks or appears to be taking a long time to charge
- This product must not be used by children or by an adult who has reduced physical or mental capabilities. Also, this product is not to be used by an adult who has a lack of knowledge or experience with this type of product, unless they are being supervised by a person who is competent in the safe use of this type of product
- Caution should be taken when charging an accessory battery when connected to a 'Dual Battery Monitor' or a 'Volt Sensitive Relay' (VSR). It is important that the battery circuit is 'open'
- **Note: This product is designed for portable short term use. It is NOT suitable for long term permanent installation**

## CAUTION

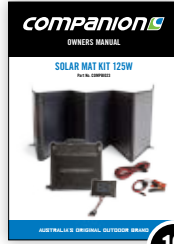
### Care must be taken when handling this product and while in use:

- Do not stand on the Solar Mat panels
- Do not bend the Solar Mat panels
- Do not throw or drop the Solar Mat onto the ground
- Ensure that the Solar Mat is unfolded carefully, while at the same time supporting each panel
- Ensure that the Solar Mat is placed onto a cleared and flat as possible area while in use
- Pick up and fold the Solar Mat by supporting the whole panel, not by the panel corner or edge
- Ensure that the Solar Mat is packed within the vehicle as to not cause damage by crushing or bending
- Any damage to the Solar Mat, Panels or Cells caused by inappropriate handling may void the warranty

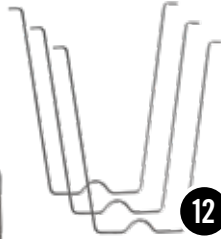
## UNDERSTANDING YOUR SOLAR CHARGER AND SOLAR MAT

### Solar Mat Kit includes:

- 1 – 125W solar mat (folded)
- 2 – Heavy duty 900D polyester material
- 3 – Carry handle with rubber grip insert
- 4 – Retaining straps with quick release buckles
- 5 – Front and rear storage pockets
- 6 – Output lead with 30A Anderson style plug
- 7 – 5m Extension lead with 30A Anderson style plugs
- 8 – 0.8m Fused battery clamp extension lead
- 9 – 12A PWM weatherproof controller
- 10 – Instruction manual
- 11 – 125W solar mat (unfolded)
- 12 – Support stand



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## CONTROLLER/REGULATOR SPECIFICATION AND OPERATION

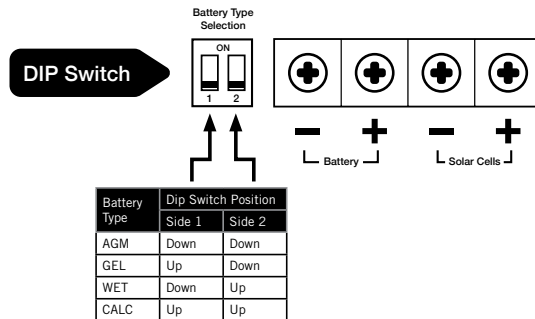
### Features:

- Advanced Micro Control Unit (MCU) uses Pulse Width Modulation (PWM) technology for high efficient operation
- Able to charge four types of 12V DC batteries; GEL, AGM, WET (conventional lead-acid) and Calcium ONLY
- 5 stage charging with built-in regulator prevents your battery from being over or undercharged. Overcharging occurs when the charge voltage is unregulated and can result in premature battery failure. Undercharging is common with some conventional lead-acid and calcium batteries causing the battery not to perform to capacity
- Automatic equalisation feature to revive deeply drained lead-acid and calcium batteries
- Can be connected to the battery permanently to keep the battery fully charged by using a process called 'float charge'. This means the controller will stop charging when the battery is full and will automatically start charging the battery as required. This process will also reduce water loss and help prevent the battery from 'drying out'
- Coloured LED's to easily indicate the operational status, battery condition and fault codes
- Built-in protection to prevent your battery from discharge in low or no light conditions
- Multiple protection against reverse polarity, short circuit, over temperature and over voltage
- Surface mountable
- Weatherproof design

## OPERATION – DIP SWITCH

Please check your battery manufacture's specifications to select the correct battery type to be charged. There are four battery types to select from, including; GEL, AGM, WET (conventional lead-acid) and Calcium.

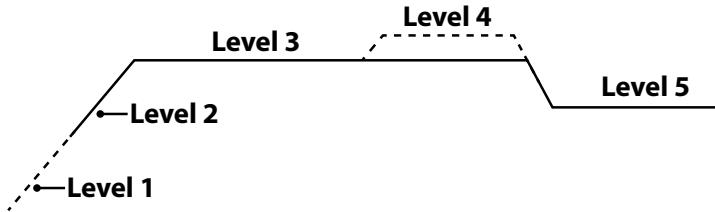
The 'DIP' switch is located on the rear of the solar controller. Use the 'DIP' switch to select the corresponding settings to match the battery type that you are charging from the diagram below. The default setting from the factory is AGM type battery.



**IMPORTANT: ONCE THE 'DIP' SWITCH SETTING HAS BEEN SELECTED AND THE CHARGING PROCESS HAS BEGUN, DO NOT CHANGE THE 'DIP' SWITCH SETTING AT THIS POINT AS DAMAGING TO THE BATTERY MAY OCCUR. DISCONNECT THE BATTERY BEFORE CHANGING THE 'DIP' SWITCH SETTING.**

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## OPERATION – CHARGING



- Level 1. Soft Charge:** When a battery has been over-discharged, the controller will softly ramp up the battery voltage to 10V
- Level 2. Bulk Charge:** Maximum current charging until the battery rises to absorption level
- Level 3. Absorption Charge:** Constant voltage charging until the battery is over 85%
- Level 4. Equalization Charge:** Only for WET or Calcium battery types and when the battery is deeply drained below 11.5V. It will automatically run this stage to bring the internal cells to an equal state in an attempt to restore lost capacity. (GEL and AGM type batteries do not run this equalization charge)
- Level 5. Float Charge:** Battery is fully charged and maintained at a safe level.

## OPERATION – LED INDICATION AND FAULT CODES

Three LED's indicate the charging status & fault connection	FAULT	CHARGE	FULL
	Red	Blue	Green
Solar power present - no battery connected	ON	SLOW Flash	SLOW Flash
Battery reversed	ON	FAST Flash	FAST Flash
Solar panel reversed	OFF	OFF	OFF
Soft start charging	OFF	SLOW Flash	OFF
Bulk, Absorption, Equalization charging	OFF	ON	OFF
Float charging	OFF	OFF	ON
Solar panel weak	SLOW Flash	OFF	OFF
At night, no charge	OFF	OFF	OFF

## OPERATION – SET UP

### Step 1:

Remove the solar mat and accessory leads from the original packaging. Check the solar mat, leads and connectors for any damage before use.

**NOTE: IF DAMAGE IS FOUND ON ANY PART, IT IS HIGHLY RECOMMENDED THAT THEY ARE REPLACED WITH GENUINE PARTS AVAILABLE FROM COMPANION BRANDS. PLEASE CONTACT COMPANION BRANDS CUSTOMER SERVICE (DETAILS ARE AT THE BACK OF THIS BOOKLET) IF SPARE PARTS ARE REQUIRED.**

Select a suitably cleared area to unfold the solar mat. The position should allow the solar mat to have a clear view of the sun and facing in the direction of 'North' as close as possible. If required, assemble the three wire support stands and adjust the buckle straps to achieve the optimal angle towards the sun.

**WARNING: CELLS (PANELS) WILL START PRODUCING ELECTRICITY AS SOON AS THEY ARE EXPOSED TO THE SUN. CARE MUST BE TAKEN WHEN CONNECTING THE DC CLAMPS TO THE BATTERY AND JOINING THE EXTENSION LEADS. TO REDUCE THE POSSIBILITY OF AN ELECTRIC SHOCK OR SHORT-CIRCUIT, IT IS RECOMMENDED TO PLACE A BLANKET OR TARP OVER THE PANELS TO BLOCK OUT ANY SUNLIGHT TEMPORALLY WHILE ALL CONNECTIONS ARE MADE.**

### Step 2:

Refer to the specification label on your battery or consult the battery manufacturer to establish the type of battery being charged. Set the 'DIP' switch on the rear of the controller to the matching battery type being charged.

### Step 3:

*FIRST*, connect the DC clamp on the 0.8m extension lead to the correct polarity terminals on the battery being charged. Example; **A** 'RED' DC clamp to the Positive '+' terminal and the **B** 'BLACK' DC clamp to the negative '-' terminal.

**C** Connect other end of the 0.8m extension lead (30A plug) to the controller output (30A plug)

**D** Connect the controller input lead (30A plug) to either end of the 5m extension lead (30A plug) then finally, join the remaining end of the 5m extension lead to the solar mat output lead **E**

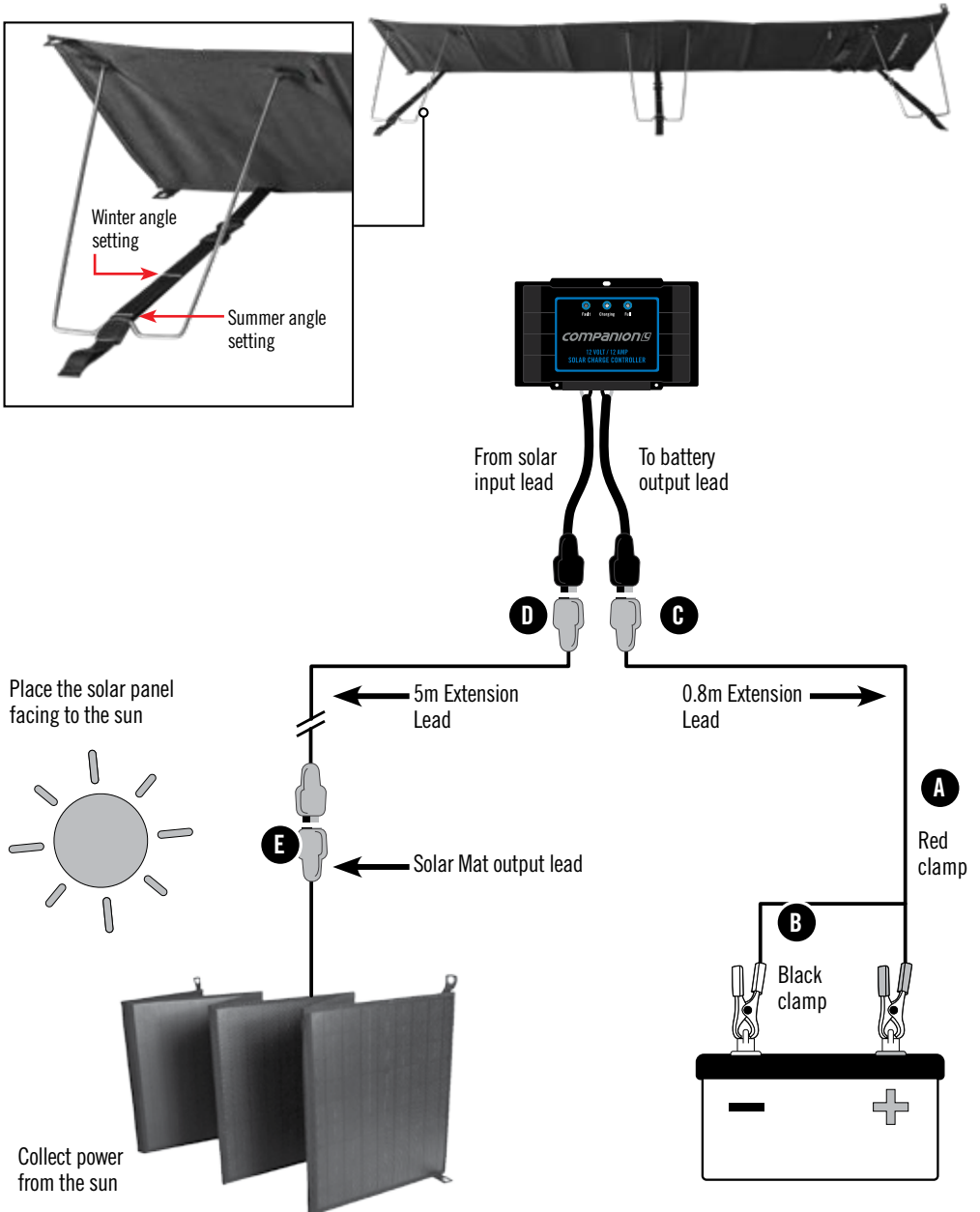
Ensure that all connections are firm and that the extension lead is positioned not to cause a tripping danger to people walking by. And that's it, your battery will now be charging.

**NOTE: IT IS RECOMMENDED TO ESTABLISH CONNECTIONS (DC CLAMPS) AT THE BATTERY BEING CHARGED FIRST. THEN, JOIN THE CONNECTORS IN SEQUENCE WORKING BACK TOWARDS THE SOLAR MAT. THIS WILL ELIMINATE THE DANGER OF HAVING 'LIVE' BATTERY CLAMPS INADVERTENTLY BEING SHORT-CIRCUITED CAUSING SPARKS AND POSSIBLY FIRE.**

Also ensure that the solar panels are kept in direct sunlight for optimum efficiency. The solar panels may have to be moved periodically throughout the day to track the sun's path.



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## FREQUENTLY ASKED QUESTIONS

### **Q: How does the solar mat work?**

A: The solar mat converts sunlight energy into DC (direct current) electric power to charge rechargeable batteries. The batteries are then used to run your lights, fridge or power an inverter.

### **Q: What type of batteries can be charged with this solar mat kit?**

A: The controller is factory set for AGM batteries, however the controller can also be set to charge GEL, WET and Calcium by selecting the corresponding 'DIP' switch setting on the rear of the controller. Do not charge 'dry' cell rechargeable batteries or 'dry' cell non-rechargeable batteries.

### **Q: Can I bypass the controller to charge my battery?**

A: No, the voltage output directly from the solar mat exceeds the optimum voltage recommended to charge the battery. The controller automatically regulates the voltage output to suit the particular battery size and type being charged.

### **Q: Will the solar mat overcharge my battery?**

A: The controller (regulator) ensures that a steady charge is supplied and will not over charge the battery. The controller has up to five levels of charging and will automatically evaluate the battery's condition to establish whether to; Soft Charge, Bulk Charge, Absorption Charge, Equalization Charge (only for WET or Calcium batteries) or Float Charge.

### **Q: Why is it when it is a clear or slightly overcast day and the solar controller amperage output is a lot less than the rated specification?**

A: The solar controller is smart enough to know what the battery actually needs in regard to amperage input. If the battery is almost fully discharged the solar controller will allow maximum amperage to flow through to the battery. If the battery is almost or fully charged the solar controller will automatically reduce the amperage input to the required level. Amperage output from the solar controller is also affected by shade or intermittent cloud cover.

### **Q: How many Amps do I get out of my 125W Solar Mat and what can I run?**

A: A 125W kit can supply between 5 and 6 Amps in optimal conditions on a sunny day or for most of the sunlight hours of the day. There are many variables, but let's assume that we can achieve 6 to 7 sunlight hours in a day, anymore sunlight hours would be considered a bonus.

Provided it is not too cloudy, the solar mat is moved every now and again to best track the sun's path and the solar mat is kept out of the shade, it is safe to assume that the solar mat can supply between 5 and 6 Amps per charging hour.

So, putting this into perspective, let's assume that the 125W solar mat is charging a 100Ah battery. You wish to run a 40L Fridge which draws on average 1.5A over a 24hr period, and 2 x LED camp lights which draw 1.0A each when running.

### **You want to have the fridge running (cycling) 24 hours a day, and the camp lights on for 3 hours each night.**

Fridge:  $1.5A \times 24h = 36Ah$

Lights:  $1.0A \times 3h = 3Ah \times 2 \text{ lights} = 6Ah$

Total: 42Ah per day.

### **Your solar mat can supply:**

$5.5A \times 6h = 33Ah$  each day.

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**Therefore the battery is being discharged by:**

$42\text{Ah} - 33\text{Ah} = 9\text{Ah}$  each day.

Although you have a 100Ah battery, it is recommended when calculating run times is to allow yourself a buffer and calculate using only 50% of the battery specification. So, in this case using 50Ah you could run your fridge and lights for:

$50\text{Ah} / 9\text{Ah} = 5.5$  days or just under a week without any other form of charge.

**NOTE: THE ABOVE CALCULATIONS ARE INTENDED FOR REFERENCE & INFORMATION ONLY AND ARE BASED ON THE CELL "PEAK POWER" OF THE SOLAR MAT. IT DOES NOT TAKE INTO CONSIDERATION ANY EXPECTED POWER LOSSES DUE TO THE PWM CONTROLLER, LEADS OR ATMOSPHERIC CONDITIONS.**

## MAINTENANCE

Periodically, clean the panels with warm water and a soft sponge or cloth to remove any built up dust or foreign deposits. Keeping your solar panels clean will ensure optimum performance.

## TROUBLESHOOTING

The solar mat and controller are both sealed units and cannot be repaired. If a problem does occur, double checking all connections, including correct polarity of the DC battery clamps and or disconnect the DC battery clamps from the battery and wait 30 seconds (this will reset the controller). If after reconnecting the DC battery clamps and the problem persists, please contact Companion Brands customer service (details are at the back of this booklet).

## TECHNICAL DETAILS – CONTROLLER

Electrical	
Rated solar panel amps	12A (max.)
Normal input solar cell array voltage	15-22V DC
Solar cell array voltage (no load)	25V DC (max.)
Lowest operating voltage	9V DC (min)
Standby current consumption at night	2mA (max.)
Voltage drop – solar cell to battery	0.25V DC (max.)
Charging	
Battery start voltage	3V DC (min)
Soft start charging voltage	3-10V DC +/- 0.2
Soft start charging current (50% PWM duty)	up to 4A
Bulk charge voltage	10-14V DC +/- 0.2
Absorption charging voltage at 25°C	
• GEL battery type	14.1V DC +/- 0.2
• AGM battery type (default setting)	14.4V DC +/- 0.2
• WET battery type	14.7V DC +/- 0.2
• Calcium battery type	14.9V DC +/- 0.2
Absorption transit to Equalization or Float condition	
• Charging current drops to	0.8A +/- 0.1
• Absorption charging timer timed out	4 hours
Equalization charging active (only for WET or Calcium battery)	
• Battery voltage discharge to less than	11.5V DC +/- 0.2
• Equalization charging voltage at 25°C	15.5V DC +/- 0.2
• Equalization charging timer timed out	2 hours
Float charging voltage at 25°C	
• GEL, AGM, WET and Calcium battery	13.6V DC +/- 0.2
Voltage control accuracy	+/- 1%
Battery temperature compensation coefficient	-24 mV/°C
Temperature compensation range	-20 to +50°C

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<b>Protection</b>	
Against reverse polarity or short circuit at the solar cell side	Yes
Against reverse polarity or short circuit at the battery side	Yes
No reverse current from the battery to the solar cell at night	Yes
Over temperature protection during charging	65°C
<b>Electrical connections</b>	
Input and output connection	30A Anderson style
DIP switch	Yes
<b>Physical</b>	
Controller material	Plastic, ABS
Weatherproof	Yes
<b>Environment</b>	
Operating temperature	-25 to +50°C
Storage temperature	-40 to +85°C
Operating humidity range	100% no condensation

## TECHNICAL DETAILS – PANELS

<b>Cell type</b>	Monocrystalline
<b>Cell efficiency</b>	19.5%
<b>Maximum power (Pm)</b>	125W*
<b>Current at max. power (Imp)</b>	6.82A
<b>Voltage at max. power (Vmp)</b>	17.6V
<b>Output connection</b>	30A Anderson style
<b>Cell encapsulation</b>	PET lamination
<b>Bag material</b>	Polyester 900D
<b>Dimensions (folded)</b>	368L x 395W x 80Hmm
<b>Dimensions (unfolded)</b>	2140L x 395Wmm
<b>Weight</b>	5.3kg – Including accessories

\* Maximum power as per manufacturers specifications

## CUSTOMER SERVICE

For more information call 1300 555 197

Email: [service@companionbrands.com.au](mailto:service@companionbrands.com.au)

## WARRANTY STATEMENT

### Warranty

The product is guaranteed to be free from defects in workmanship and parts for a period of 12 months from the date of purchase. Defects that occur within this warranty period, under normal use and care, will be repaired, replaced or refunded at our discretion. The benefits conferred by this warranty are in addition to all rights and remedies in respect of the product that the consumer has under the Competition and Consumer Act 2010 and similar state and territory laws.

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 for 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.

### Proof of Purchase

This warranty is valid for the original purchase and is not transferable. Please keep your purchase docket, tax invoice or receipt as the best proof of purchase, and as proof of date on which the purchase was made.

### Extent of Warranty

This warranty is limited to defects in workmanship or parts. All defective products or parts will be repaired or replaced. This warranty does not cover batteries or any other consumable items.

### Normal Wear and Tear

This warranty does not cover normal wear and tear to the products or parts.

### Exclusions

This warranty does not cover:

- Any defects caused by an accident, misuse, abuse, improper installation or operation, lack of reasonable care, unauthorised modification, loss of parts, tampering or attempted repair by a person not authorised by the distributor.
- Any product that has not been installed, operated or maintained in accordance with the manufacturer's operating instructions provided with the product.
- Any product that has been used for purposes other than domestic use.
- Any damage caused by improper power input or improper cable connection.

### To Make a Claim

This warranty against defects is provided by Companion Brands,

If a defect in the goods appears within 12 months you are entitled to claim a warranty, please contact or send all warranty claims to:

COMPANION BRANDS

PO Box 2186, Bundoora Victoria 3083

Help Desk 1300 555 197

(Operating Hours: Mon-Fri 08:30AM to 05:30PM EST)

email: [service@companionbrands.com.au](mailto:service@companionbrands.com.au)

