



# Installation & User Guide

# Installation Guide

## Welcome to the Powerdiverter!

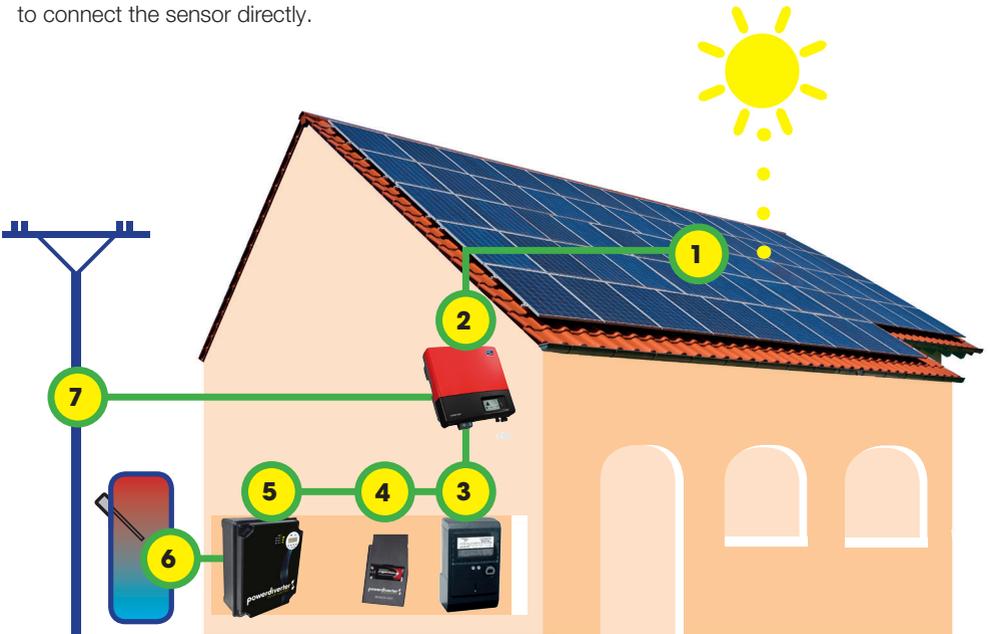
Thank you for purchasing this Powerdiverter. The Powerdiverter is the most flexible, cost-effective solar energy manager on the market, designed to save you money on your fuel bills from the day it's installed.

Powerdiverter works with your solar PV system to store excess solar energy in the form of heat in a hot water storage tank or storage heaters in your home (think of them as "heat batteries"! ). By storing your solar energy, rather than exporting it, Powerdiverter saves you money every day on your electricity bills.

Here's how it works. Your solar panels (1) generate electricity which is converted to standard 240V AC mains energy by the solar inverter (2). This energy is measured by your solar and supply meter (3). If no appliances are turned on in the home to consume the energy, it gets exported out to the grid (7). But with the addition of the Powerdiverter Sensor (4) and a Powerdiverter Controller (5), the excess solar energy can be diverted from going out to the grid and instead stored in your hot water tank (6) during the day for use later. Simple!

Originally launched in the UK, this new Powerdiverter has been re-designed for Australia and New Zealand with full support for higher power water heaters up to 4.8kW and higher ambient temperatures than we see in the UK.

The Powerdiverter offers ease and flexibility of installation. With the wireless solar power sensor unit you can fit the Powerdiverter indoors or outdoors without drilling through walls. With the wired sensor input on the controller, you have the option to connect the sensor directly.



**Figure 1**

*How the Powerdiverter works*

Economy and convenience. The Powerdiverter has a special input for sensing when your controlled load power circuit is activated by the electricity supplier for cheap rate electricity. The Powerdiverter will then heat your water using the cheap rate electricity in addition to solar power so that you always have hot water when you want it and at the lowest cost.

Hot water – your way! Program your own heating schedules with the 7 day 24 hour digital boost timer to provide hot water at any time, day or night.

Need a quick boost? No worries! The boost button on the Powerdiverter gives you a quick 1, 2 or 3 hour heating boost without having to program the timer.

### **What's in the box?**

- 1 x Powerdiverter Controller unit.
- 1 x Powerdiverter Sensor unit (for wireless remote sensor installations only).
- 1 x Powerdiverter Sensor unit AC adapter.
- 1 x Sensor clamp with 5m cable.
- 1 x Wall plugs and screws kit
- 1 x Controller mounting template
- 1 x Powerdiverter installation and User Guide

## Safety Instructions

- If using the wireless sensor unit, use only the supplied Powerdiverter AC power adaptor or 2 x 1.5V C cells.
- Use only the provided Powerdiverter Split Core CT CTSA16-100A 100A/50mA clamp.
- Please follow the installation and usage instructions carefully. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Please note that a qualified electrician must install this product.



When fitting the current sensor clamp, follow the fitting instructions and check the safety of the electrical cables being handled. Parts of the electrical installation may have exposed live terminals. Consult a qualified electrician if in doubt before installing the sensor clamp.



Do not apply the current sensor clamp around or remove from hazardous live conductors. The sensor clamp must only be fitted to insulated cables.

Switch off the circuit before commencing installation to avoid the risk of electric shock.



The Powerdiverter has been tested and registered on the RCM product database.



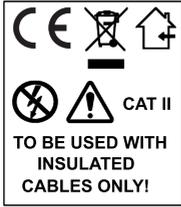
European Conformity is a conformity marking for products sold in the European Economic Area.



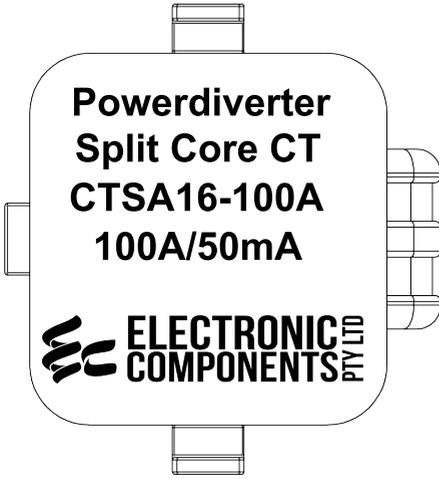
Waste Electrical and Electronic Equipment Directive is a European Community directive that requires you to take any waste electrical and electronic equipment to your nearest recycling facility.



Indoor use only. Unit should be installed in a location protected from weather and moisture. See the Powerdiverter website for your stockist for more information about suitable weatherproof enclosures.



Cable Side Label



Bottom Label

## How to install the Powerdiverter:

To start off you will need to run through a quick checklist to ensure your home is suitable for the installation. Please check the following:

- Do you have a grid connected solar PV system of at least 1.5kW output power?
- Is the solar inverter output connected to the same phase as the normal supply at the switch box?
- Do you have a hot water tank with a working water heater fitted to it?
- Is your water heater rated at or below 4800W and 240V AC
- Does the water heater have a working thermostat?
- Is the water heater connected to an existing switched spur circuit? No other appliances should be connected to it.

If the answer is yes to the all the above then you are ready to go!

## Identifying Your Type of Electrical Installation

A variety of installation types exist. Please take a moment to look at the house wiring and select the closest matching installation type. If in doubt, please contact Powerdiverter support for more information.

There are two basic types of electrical installation:

### Single Phase Supply

This is where the house has a single Active line supply of power that everything is connected to. The solar inverter, house loads and the water heater all are fed from one Active line into the property.

This is the easiest type of installation for the Powerdiverter to work with as the Powerdiverter measures the net import/export power on the Active line where it leaves the property and controls the water heater in the house fed from the same Active line. The other house loads can all share the solar power as well.

The remainder of the installation instructions cover this type of installation.

### Multi-Phase Supply

This is where the house has two or three Active line supplies.

One will be used for house loads (sockets and lights). The others will be used possibly for the water heater, the solar inverter and/or other heavy loads (such as air conditioning or a pool heater). There can be many variations on what is connected where in these types of installations, far too many to cover in this guide.

The important thing to note is that the Powerdiverter Controller unit controls the active line to the water heater and this must be on the same Active line phase as the solar inverter. The sensor clamp (whether used directly with the Powerdiverter Controller or the wireless Sensor Unit) must measure the net sum power of the solar generation trying to be exported to the grid, less the load of the water heater trying to be imported from the grid **ON THE SAME PHASE**.

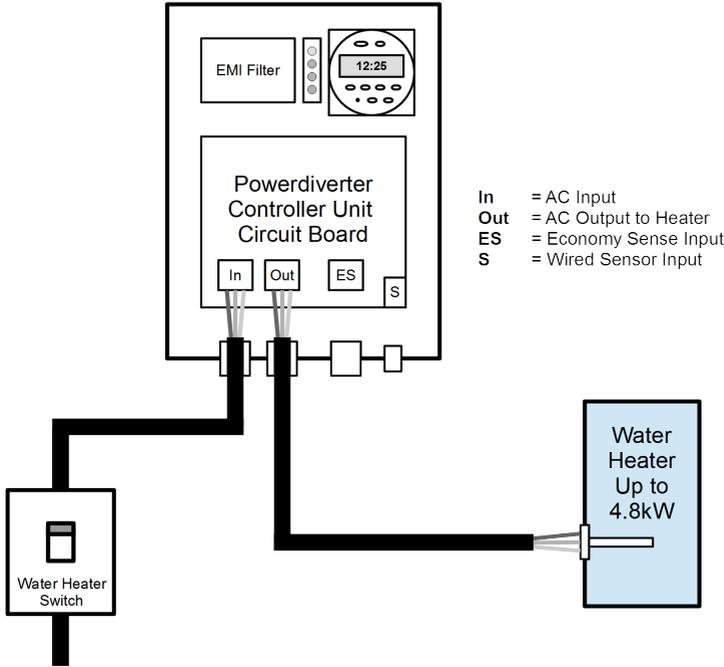
If the water heater is connected to a different phase to that used for the solar inverter, the Powerdiverter will not work. You will need to move the wiring for the water heater to be on the same phase as the solar inverter before installing the Powerdiverter.

You may wish to do this permanently by altering the house wiring to the hot water system or it can be achieved with a Powerdiverter Controlled Load Contactor to allow both power sources to be used.

This is useful in situations where the water heater is installed on a dedicated Controlled Load phase for off-peak cheap electricity to heat the water. In this case, the water heater wiring is modified so that when the Controlled Load power is turned on (by a utility meter with a dedicated Controlled Load output or separate utility provided Load Control Unit), the Powerdiverter Controlled Load Contactor automatically connects the water heater to that power line. When not activated, the contactor automatically connects the water heater to the Powerdiverter Controller unit and feeds it solar power.

See the section of the installation guide on Controlled Loads for more information or contact Powerdiverter support for advice.

**Step 1:** Ensure the power has been isolated to the water heater feed circuit at the consumer unit (and/or turn off the water heater spur switch).



From Water Heater  
Supply Fuse / Breaker

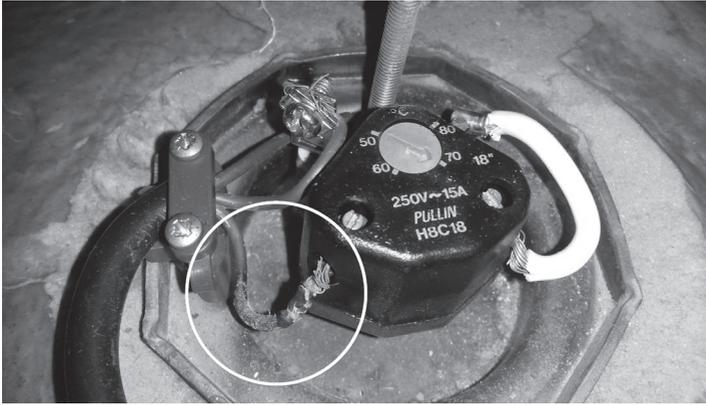
**Figure 2**  
*Wiring the Powerdiverter*

**Step 2:** Check the existing wiring between the water heater spur switch and the inside of the water heater cap. If the wire is not 2.5mm<sup>2</sup> high temperature water heater cable, replace it. If any cable insulation is burned or damaged in any way, replace the cable. If in ANY doubt about the safety of the cable – replace it!

Make absolutely certain that the water heater element is working and the thermostat and the secondary anti-boil cut out are in good condition and safe. If the water heater does not have a secondary anti-boil cut-out, replace the thermostat with a new one that does.

Test the heating circuit with a meter that reads DC Ohms resistance and check that the heating element reads 12 Ohms or more (for a 4.8kW, 240V AC heater element) across the Active and Neutral terminals where the cable from the Powerdiverter connects. If it reads lower than 11.5 Ohms, check the power rating of the heating element and check the wiring for short circuits. If it reads more than 25 Ohms, check the heating element, thermostat and secondary cut-out (if present).

*Tip: If you do not have a test meter, a quick check is provided by the Powerdiverter LEDs. When the heating circuit is being fed power but the circuit is open, the 'Knight Rider' display shows on the red LEDs. This normally means the water is hot but could mean the thermostat or heater or wiring is faulty if the water is cold.*



**Figure 3**  
Checking existing wiring

Figure 3 shows a classic example of burned out wiring from a faulty thermostat on an old water heater. In this case the wiring and the thermostat had to be replaced before fitting the Powerdiverter.

**Step 3:** Open the Powerdiverter controller unit to see the connections. Install the supplied cable glands into the pre-cut holes. If the existing cabling is long enough to reach into the Powerdiverter and back out to the heater and is in good condition, you can simply cut the cable between the spur switch and the immersion heater and re-use it in step 5.

**Step 4:** The unit should always be sited out of direct sunshine or places that are likely to reach more than 40 degrees Celsius to avoid the unit becoming too warm and reducing its output power.

If installed outdoors, the unit should be installed in a weatherproof enclosure with ventilation to allow cooling air to circulate around the Powerdiverter.



**Figure 4**  
Installation locations and position

The unit should ALWAYS be installed in a vertical position to allow cooling air to circulate from the bottom to the top vents on the Powerdiverter enclosure.

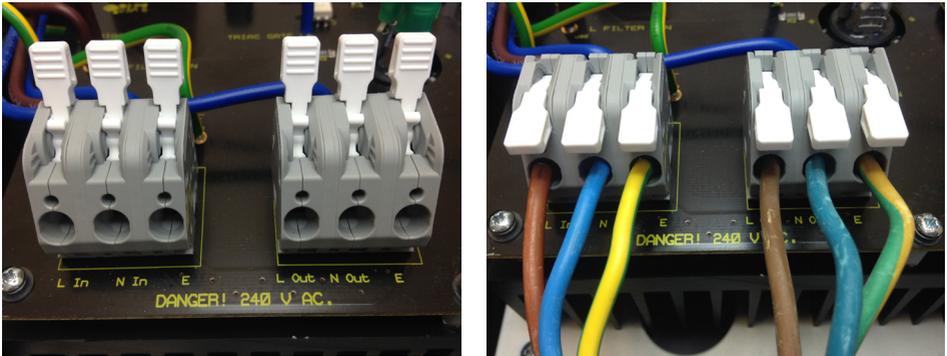
Please ensure there is at least 10cm of clear space from the top and bottom and 5cm of clear space to each side of the Powerdiverter control unit for air circulation.

*If the unit is installed in an airing cupboard do not cover the unit with anything or allow items of clothing to block the air vents as the unit may become too warm and shut down to protect itself.*

Fit the controller unit to the wall using the four screw holes provided in the enclosure corners. Use the wall plugs and screws provided or ones suitable to the type of wall. Check for cables and pipes in the wall before drilling or screwing into the wall!

A cardboard drilling template has been provided to make this easier.

**Step 5:** Connect the power cable from the spur switch to the AC input connector on the left hand side of the circuit board, following the Live (Active), Neutral and Earth markings. Solid core or stranded cables up to 6mm<sup>2</sup> can be used. To open the connector, lift up the white levers. Strip 1cm of insulation from the wires, twist the strands together and insert the bare wire end into the hole. Flip down the lever.



**Figure 5**  
*Before wiring and after wired*

**Step 6:** Connect the water heater cable to the middle connector block on the circuit board in the same way as in step 5 above.

### **Economy Sensor Connector**

If required, connect a feed from the controlled load circuit to the right hand connector block.



**Figure 6**  
*Economy Sense*

Please consult your energy supplier to determine if your “normal” supply is also charged at a lower rate during these times as this depends on the type of supply meter(s) fitted at your property.

This optional connection is for sensing the presence of power on the economy / cheap rate circuits controlled by the electricity supplier.

When AC power is applied to this connector, the Powerdiverter assumes that it is from a controlled load circuit that tells it that the electricity supply is in a cheap rate period. This will trigger the Powerdiverter to apply full power to the heater from the normal power circuit feeding the Powerdiverter.

The economy rate sensor input does not require heavy gauge cable, as it draws a maximum of 1.5 watts of power. It does not require an earth connection but one is provided in case a 3 core cable is used. Any cable of 1.5mm<sup>2</sup> or greater can be used, if appropriately fused at the source.

### **Fitting the Sensor**

You have two choices for fitting the sensor:

You can use either a wired sensor clamp, which plugs into the controller or a wireless sensor unit that can be installed remotely.

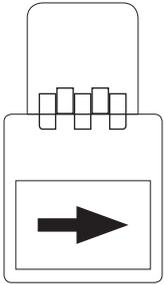
To use the wired sensor clamp, the controller unit must be located close to the place where the sensor clamp needs to be installed (a cable where the supply comes into the property) and close to the wiring for the heater. The supplied sensor clamp has 5 meters of cable.

To use the wireless sensor, you need the wireless sensor unit and the plug-in sensor clamp. The sensor unit can be powered by batteries or an AC adaptor, which will need a socket to be located near to the sensor unit. If not using the batteries to power the unit, please remove them to prevent eventual leakage.

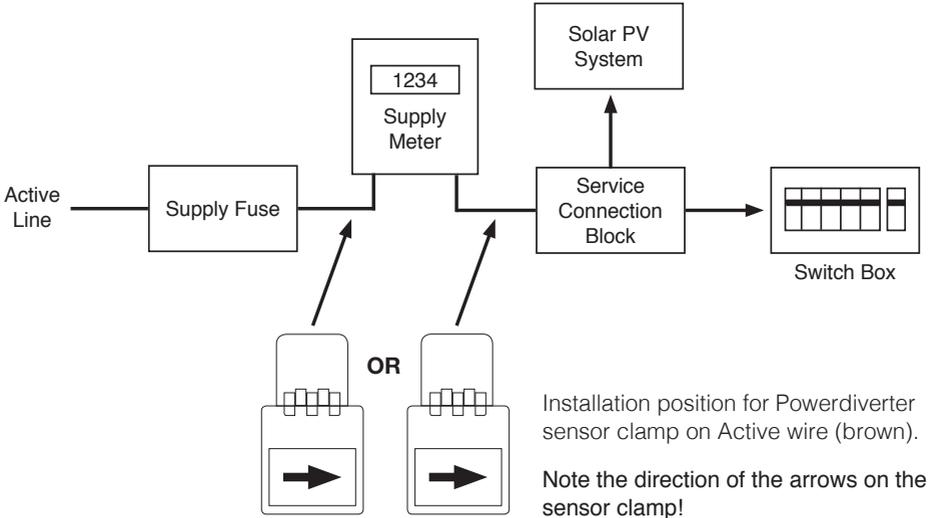
To use the wireless sensor outdoors, make sure that the sensor unit and AC adaptor are installed in a weatherproof box. See your Powerdiverter supplier for an all-weather enclosure.

**Step 7:** With either setup, fit the sensor clamp to the active incoming supply cable tail. The arrow embossed on the top of the sensor clamp should point towards the switch box/load. This sensor clamp must be located before the solar inverter circuit. If the inverter is installed via a service connection block, be sure to install the Powerdiverter sensor clamp before the block so that it measures the sum of the generation and load.

See Figure 7 and 8 for more details on where to install the sensor clamp. Follow these instructions carefully as the Powerdiverter will not work properly if the sensor clamp is installed in the wrong place or the wrong way round.



**Figure 7**  
Sensor clamp



**Figure 8**  
Installing the sensor clamp

### Step 8: For wireless sensor installations

Plug the 3.5mm jack from the sensor clamp or extension cable into the Powerdiverter sensor unit. If using the extension cable, plug the sensor clamp into the end of the extension cable.

If you are using the AC adapter, remove the batteries from the unit (to avoid leakage), and plug the AC adaptor into a mains power socket. Plug the AC adaptor's DC power plug into the Powerdiverter sensor unit. Switch on the AC adaptor at the wall socket.

Note for houses with 2 or 3 phase power: Make sure the mains adaptor is plugged into a socket that is on the same phase as the Powerdiverter controller unit and the solar system. If it is plugged into a socket on a different phase, the Powerdiverter will not function correctly.

If using the batteries, open the hatch on the sensor unit and install two C-sized battery cells.

Once activated, the LED on the sensor unit should blink red and then green once as a test and then blink orange for 2 minutes.

In the Powerdiverter controller unit, set the jumper on J3 "Sensor Select" to be on pins 2 and 3 for "Wireless" sensor operation.

### Step 8: For wired sensor installations

Route the sensor wire to the Powerdiverter controller unit and feed the 3.5mm jack plug from the sensor clamp through the 16mm gland on the Powerdiverter controller box.

Plug it into the sensor socket on the Powerdiverter controller circuit board. Set the jumper on J3 "Sensor Select" to be on pins 1 and 2 for "Wired" sensor operation.



**Figure 9**  
*J3 Wired sensor selection*

**Step 9:** Once you are happy with the wiring installation of the controller unit, please fit the front of the unit back on, using the four captive screws built into it. The holes in the front face should be matched up to the LEDs and the timer clock and then the front face can be pushed home on to the seal.

### You are now ready to test the system!

Switch on the spur switch next to the water tank and you will see the LEDs on the Powerdiverter controller unit blink twice as a self-test. Depending on whether you have installed using a wired or wireless sensor, follow the instructions in the following relevant sections.

## Testing For Wireless Sensor Installations

Make sure that the wireless sensor unit is turned on at the mains or has the batteries installed so that it is transmitting.

After two minutes, the green LED on the Powerdiverter controller unit will then start to flash every 2 seconds (showing that the sensor unit is communicating to the controller unit).

When first installed, each Powerdiverter is pre-set at the factory to a unique communication pairing code. For all normal installations, the system is 'plug and play' and it should not be necessary to pair the units. If you experience difficulty with getting a signal from the sensor unit to the controller unit, please look at the suggestions in Appendix A to see if these can solve any problems.

If you need to re-pair the units for any reason, see Appendix B for details on how to do this.

### Testing the Installation – “The Kettle Test”

It is very important to test the installation before leaving it to work. The sensor clamp must be installed in the correct place in the wiring and the correct way round in order to correctly detect exported solar energy. If not installed properly, the system can work “backwards”, resulting in energy being diverted at the wrong times.

The easiest way to test the installation is with a “Kettle Test”.

1. Turn off the solar inverter. This allows us to be sure that the house is importing energy.
2. Turn on a large load (such as a kettle filled with cold water). The LED on the Powerdiverter sensor unit should blink red every 2 seconds (AC powered) or 6 seconds (battery powered) to show that energy is being imported from the grid to run the load. All the red LEDs on the controller unit should be out or rapidly turn off if any were on. If the sensor LED blinks green in this step, check the position and direction of the sensor clamp.
3. Turn off the kettle and turn on the solar inverter. After a couple of minutes the inverter will start up and commence generating if it is sunny. At this time, the LED on the Powerdiverter sensor unit should start to blink green if there is excess solar power being exported from the house. If there is enough excess solar power, one or more of the red LEDs on the controller will start to light up to show that diversion has started.

**Note: Do not install the sensor clamp on the power line to the solar inverter itself. If a service connection block is used to connect the solar inverter circuit, make sure the clamp is installed on the supply side of the block, closest to the supply meter.**

## Testing For Wired Sensor Installations

When turning on the Powerdiverter controller in wired sensor mode, the usual LED test will show and then after a few seconds the green LED will blink every 2 seconds when there is no excess solar power detected or the house is consuming energy from the grid. This also serves to show that the Powerdiverter is switched on.

The Powerdiverter controller cannot be used simultaneously with a wired and wireless sensor. If J3 is set to “Wireless” operation, the wired sensor will be ignored. Similarly, if J3 is set to “Wired” operation, the wireless sensor will be ignored.

### Testing the Installation – “The Kettle Test”

It is very important to test the installation before leaving it to work. The sensor clamp must be installed in the correct place in the wiring and the correct way round in order to correctly detect exported solar energy. If not installed properly, the system can work “backwards”, resulting in energy being diverted at the wrong times.

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3. Turn off the kettle and turn on the solar inverter. After a couple of minutes the inverter will start up and commence generating if it is sunny. At this time, the green LED on the Powerdiverter controller unit should light solidly if there is excess solar power being exported from the house. If there is enough excess solar power, one or more of the red LEDs on the controller will start to light up to show that diversion has started.

**Note: Do not install the sensor clamp on the power line to the solar inverter itself. If a service connection block is used to connect the solar inverter circuit, make sure the clamp is installed on the supply side of the block, closest to the supply meter.**

## Note on Water Heater Thermostat Wiring and Setting

It is very important that the water heater has a working thermostat and that it is wired into the Active (brown wire) feed from the Powerdiverter. Without this, the water in the tank can boil, resulting in damage to the tank and/or serious personal injury from the excessively hot water.

Adjust the thermostat to a temperature higher than 60°C so that bacteria cannot grow in the tank. Check the instructions from your water heater for details on how to do this.

Adjust any external tank thermostat for a gas/oil boiler similarly. Best effectiveness of the Powerdiverter is obtained by setting the water heater thermostat to a higher temperature than the boiler thermostat. This allows the Powerdiverter to heat the water to a temperature that prevents any external boiler from turning on, which saves wasted fuel.

A typical water heater with thermostat correctly wired is shown in Figure 10. Be sure to replace and secure the insulated water heater cap when wiring is completed. Note that this thermostat has an integral anti-boil cut-out switch. If this is triggered or the thermostat is new, you may need to press the reset button on the thermostat body to allow the heater to work.



**Figure 10**  
*Setting the thermostat temperature and anti-boil cut-out*

## Installations With Controlled Load Circuits for Water Heating

The Powerdiverter needs to be connected to the normal day circuit phase where your solar inverter is connected in order to receive solar power during the day. The output of the Powerdiverter needs to be connected to the heater element directly and no other appliances.

Depending on your type of electrical installation and local electrical regulations, you may have a dedicated hot water circuit and meter that supplies cheap rate electricity to your hot water tank heater. This is known as a Controlled Load circuit and is controlled by your utility company through the meter by remote control (ripple frequency control) or a built in timer switch programmed by your utility company for off peak times of the day or night.

For single phase supplies, you may have a “E2” type of utility supply meter which has a separate cheap rate meter output or your utility company may have fitted a separate Load Control Unit (LCU) which receives power all the time from the meter but which has the ripple frequency receiver or timer unit in it to turn on/off the line to the water heater.

Some single phase installations may switch the whole house to use cheap rate electricity while others may only allow the Controlled Load circuit to receive cheap rate electricity with the rest of the house always receiving full rate electricity.

In using a hot water storage tank with a Powerdiverter, you have a few choices of how to deal with the Controlled Load circuit.

### Permanent Wiring of Water Heater to Normal Circuit

You may choose to permanently rewire the water heater to use the solar output of the Powerdiverter, disconnecting it from the Controlled Load circuit.

Note: Some utility companies may require you to change tariffs and/or remove or change your Controlled Load meter or LCU if you chose to permanently disconnect the water heater from the Controlled Load circuit. Please consult your utility company for advice.

### Use of Economy Sense Input for Homes with Whole House Off Peak Electricity

If all the house circuits also receive cheap rate electricity, you can connect the Controlled Load circuit to the Economy Sense input on the Powerdiverter so that the Powerdiverter knows when the electricity is cheap and automatically boosts the water temperature (overriding the solar or timer functions). This is shown in Figure 11 (over the page). If you do not wish to have the water heater run when cheap rate electricity is available, turn off the Controlled Load main switch (MCB/RCBO) to the Powerdiverter.

### No Cheap Rate Power Use

Even if cheap rate electricity is not provided to the whole house normal supply, the benefit of solar power to heat the water will most likely out-weigh the cost of sometimes running the water heater on “normal” full rate electric, rather than the cheap rate dedicated supply.

In this case, do not connect the Economy Sense input to anything and use the manual boost button or the programmable timer built into the Powerdiverter Controller unit to run the water heater as required, in addition to the automatic solar power use.

### Other Uses of the Economy Sense Input

The economy rate sensor circuit can be used to cause the Powerdiverter to boost to the heater by applying 240V AC to the terminals and may be used for other purposes such as remote wireless boosting, for example. Please contact Powerdiverter support for more information.

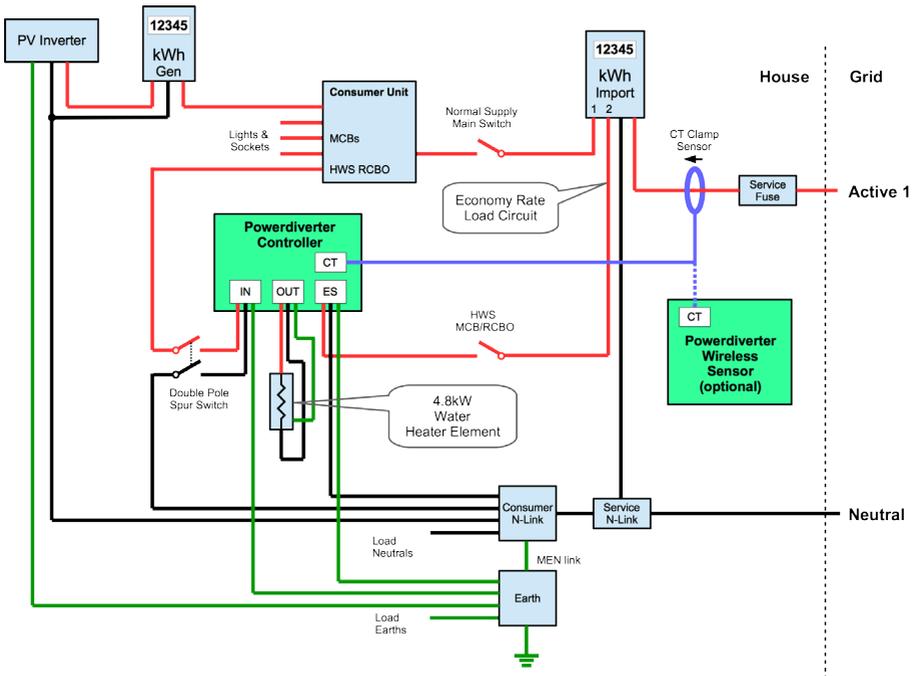


Figure 11

## Connecting to Controlled Load Power and Normal Power Lines

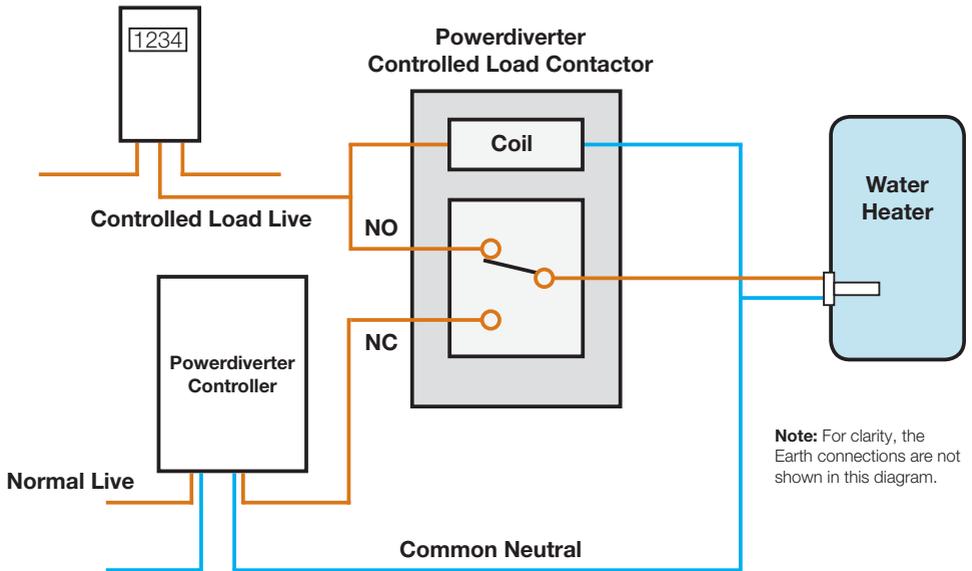
By using an optional Powerdiverter Controlled Load Contactor, the water heater may be connected to both the Controlled Load power line and the output of the Powerdiverter Controller at the same time.

The wiring diagram in Figure 12 opposite shows how the Powerdiverter Controlled Load Contactor works and should be connected.

This is especially useful for installations where you wish to use the cheap rate electricity supplied by the Controlled Load power line from your utility meter or LCU and the utility company requires that the water heater load be permanently connected to that supply line.

The Powerdiverter Controlled Load Contactor is a special DIN rail contactor switch which has its activation coil connected to the Controlled Load Active / Live line.

The contactor has a Normally Closed position that is selected automatically by a spring when there is no power applied to the Controlled Load line. This allows the water heater to be connected to the Powerdiverter Controller and receive solar power (or manual boost power or timed boost power) from the Normal day circuit. This electricity is either "free" solar power or Normal rate power.



**Figure 12**

When the utility company activates the Controlled Load (either by the LCU or meter), the Powerdiverter Controlled Load Contactor coil is energised and immediately and automatically switches the water heater to be connected to the Controlled Load circuit via the Normally Open contacts for as long as it is energised by the utility company.

In this way the water heater is effectively “permanently connected” to the water heater as it is automatically connected to the Load Controlled circuit whenever it is actually supplying power.

### **Anti-bacterial Timer**

In any event, the automatic anti-bacterial water heating function will operate whenever the Powerdiverter is turned on and senses that the water heater has not reached the set thermostat temperature in at least once in every 7 days of operation.

### **Help and Support**

For more help with installing or using the Powerdiverter, please check out the support pages with our “how to” videos on our web site at:

**[www.powerdiverter.com.au](http://www.powerdiverter.com.au)**

# User Operation Guide

## Sensor Unit Indications

The Powerdiverter sensor unit has a single LED that blinks to let you know that it is transmitting data and whether the house is importing or exporting energy.

The sensor unit LED will blink every two seconds when mains powered and every six seconds when battery powered.

The LED blinks red when the house is importing grid energy and it blinks green when the house is exporting energy.

In time with the sensor unit LED, the green LED on the Powerdiverter controller should blink to confirm communication. If it does not, either move the sensor unit to a different location or try re-pairing the transmitter and controller units, as detailed earlier.

When powered by batteries, the sensor unit will also indicate if it is out of radio range. If it is out of range, it blinks the LED in a 'green-red, green-red' pattern every 6 seconds.

**Note: During the first two minutes of operation, the LED blinks orange every 2 seconds to show that it is possible to re-pair the radios. During this time, the Powerdiverter will not divert energy and Easy Boost mode cannot be started.**

## Powerdiverter Controller Operation

The Powerdiverter is normally completely automatic when working from solar or wind power.

It constantly measures the power available to export to the grid and when there is more than the minimum excess power available, it starts to gradually feed power to your water heater. When the sensor unit is AC powered, the Powerdiverter starts diverting power when there is more than 50W power available. When the sensor unit is battery powered, the Powerdiverter starts diverting power when there is more than 100W power available.

The three red LEDs on the controller unit indicate the level of power being diverted to the water heater, with one LED meaning that the Powerdiverter has started to feed energy to the heater, two meaning that over half power is applied, and all three red LEDs meaning that full power to the heater is applied.

When the water is fully hot, the thermostat on the heater will click open to stop heating. The Powerdiverter recognizes this and signals that the water is hot by showing the three red LEDs running up and down on the controller (like the red lights on the car in 'Knight Rider', if you remember that 1980's classic TV series!).

To turn off the Powerdiverter, simply use the existing wall mounted water heater spur switch.

## Easy Boost Mode

To call for hot water at any time of day or night, you can simply press the Easy Boost button on the top of the Powerdiverter controller unit. Each time you press the button the Easy Boost timer increases one step and the red LEDs indicate as shown below:



### Easy Boost 1 hour

Press the Easy Boost button once to call for 1 hour of water heating boost time.



The bottom red LED flashes.



When the LED stops flashing the Powerdiverter returns to automatic operation.



### Easy Boost 2 hours

Press the Easy Boost button a second time to call for 2 hours of water heating boost time.



The middle red LED flashes and the bottom red LED lights.



When the LEDs turn off, the Powerdiverter returns to automatic operation.



### Easy Boost 3 hours

Press the Easy Boost button a third time to call for 3 hours of water heating boost time.



The top red LED flashes and the middle and bottom red LEDs light.



When the LEDs turn off, the Powerdiverter returns to automatic operation.



### Easy Boost OFF

Press the Easy Boost button a fourth time to cancel the Easy Boost mode.



All the red LEDs turn off.



The Powerdiverter immediately returns to automatic operation.

When the water is fully heated, the 'Knight Rider' LED display will show and this will also cancel the Easy Boost mode. You also cannot enter Easy Boost mode when the water is already fully heated. In this case, the Powerdiverter reverts to its normal solar water heating mode when the water has cooled and the thermostat has closed.

Note: Easy Boost mode cannot be used for the first 2 minutes after the Powerdiverter mains power is turned on. During this time the button is used for radio pairing only.

## Anti-Bacterial (Legionella) Protection Program

As the Powerdiverter relies mainly on available solar power to heat the water tank, it may not always reach the set temperature of the water heater thermostat on bad weather days or in winter.

To prevent the possible build-up of bacteria in the tank, the water should be heated to maximum temperature at least once a week.

While this may be achieved by using the timer boost, economy rate boost or manual boost functions, the Powerdiverter software is designed to monitor whether the water has reached maximum temperature at least once in the previous 7 days and boost it automatically if it hasn't.

For the function to work properly, the thermostat on the water heater must be set to at least 60°C.

When the timer is active and the water heater is being boosted, the top two red LEDs blink together.

## 7 Day Digital Timer Operation

The Powerdiverter is equipped with a digital 7 day timer that can be used to schedule when the water heater is boosted, irrespective of solar power.

The timer program will boost the water heater if the economy rate sensor circuit or the anti-bacterial timer is not active (both cause water heater boosting).

Up to 16 on and 16 off programmed times can be set over 7 days.

### Timer control lock

If an "a" symbol is shown on the bottom-left of the LCD display, the controls are locked. To unlock the controls for a short time, press the [C/R] button 4 times. The "a" symbol will disappear and the other buttons can be used. If no button is pressed for 15 seconds, the control panel will lock by itself again.

The timer also allows manual override of timer programs to force the Powerdiverter output on permanently (differently from the count-down Easy Boost mode). An indicator LED lights on the timer unit when the timer is set to on. The Powerdiverter also blinks the top two red LEDs on the power display when the timer boost mode is on.



**Figure 13**  
*Clock drawing*



**Figure 14**  
*Time Display*

To set the day and time: Hold [clock] and press D+ / H+ / M+

To set timer on/off events:

1. Press [P]
2. Press H+ / M+ to set the on/off time
3. Press D+ to cycle through day options
4. Press [P] to move to the next on/off setting or press [clock] to exit.

### **Manual Mode**

Pressing the [Manual] button on the timer causes the timer to cycle through its power modes (Auto -> On -> Auto -> Off -> Auto).

When the timer is in Auto mode, it follows the scheduled on and off times set.

When the timer is in On mode, it is always on, regardless of the scheduled times. In this mode, the Powerdiverter will boost the heater continuously.

When the timer is in Off mode, it is always off, regardless of scheduled times. In this mode the Powerdiverter will operate in auto solar mode or follow the anti-bacterial timer or the economy sense signal and the 7 day timer will be ignored.

To cancel or recall timer on/off events:

If you want to cancel using a timer on/off event in memory you can cancel or recall the settings individually.

[numbered bullet list] Press [P] repeatedly until the on/off event you wish to cancel is shown on the display.

Press [C/R] to cancel the set time event. The display will change to "--:--".

Press [C/R] to recall a previously set time event. The display will change from "--:--" to the timer setting previously stored.

### **Low Battery Indication (wireless sensor mode only)**

The controller unit will indicate when the sensor unit batteries are getting low by reducing the on time of the green LED blink to be very short (a tenth of a second compared to the normal one second blink). When this happens the sensor unit will continue to work but new alkaline batteries should be fitted as soon as possible.

### **Controller Import / Export LED Indication (wired sensor mode only)**

When operating with the wired sensor, the Powerdiverter controller unit green LED changes from showing when wireless data is received to showing when energy is being exported or imported from the house.

When there is excess solar power being exported from the house, the LED will light solidly green. If there is enough excess solar power, one or more red LEDs will start to light.

When the house is importing energy from the grid, the green LED will blink once every 2 seconds just to let you know the unit is on and working. The red LEDs should turn off or remain off as there is insufficient solar energy to divert to the water heater.

## Troubleshooting Tips

**Problem: Water doesn't heat up on a sunny day.**

- Solution:
- Is the water heater wall switch on?
  - Is the breaker at the consumer unit on?
  - Is the fuse in the water heater switch ok?
  - Is the water heater thermostat setting ok?
  - Is the Powerdiverter receiving radio signals?
  - See the points below for other issues.

**Problem: Water doesn't get very hot on a sunny day.**

- Solution:
- If Powerdiverter only shows one or two red LEDs when it is sunny, there may be too many other appliances turned on in the house that are consuming energy.
  - Small solar PV systems (e.g. less than 2kWp) may take longer to heat the water fully.

**Problem: All red LEDs are blinking slowly together on the controller unit.**

- Solution:
- Unit is too hot.
  - Make sure there is nothing blocking the air vents on the Powerdiverter.
  - The Powerdiverter stops supplying energy to the load until it cools and then automatically restarts.

**Problem: All red LEDs are blinking quickly together on the controller unit.**

- The heating element load is too large or there is a wiring problem to the heater.
- Is the heating element rated at or under 4.8kW?
- Check if there is a short circuit in the heater element or wiring. Consult a qualified electrician or heating engineer.
- The Powerdiverter will not restart until you turn the spur switch power off & on again.

**Problem: Red LEDs run up and down quickly on the controller unit ("Knight Rider" display).**

- Solution:
- The thermostat on the heater is open, indicating that the water is up to the set temperature and there is no problem. When the water cools, the thermostat switch will close and the Powerdiverter will resume heating again.
  - If the water is not hot, it may mean the heating element, thermostat or wiring has a fault. Check if a secondary anti-boil cut-out has tripped on the heating element and investigate why it tripped before resetting it.

**Problem: Green LED and top red LED blink alternately every few seconds on the controller unit in a 'green-red, green-red' pattern.**

- Solution:
- Try resetting the sensor and controller units by turning them off for 10 seconds and on again.
  - Try moving the sensor unit to improve radio signal or reduce interference from other devices.
  - Check and replace the batteries in the sensor unit, if it is being battery powered.
  - Check the AC adaptor on the sensor unit is on.

**Problem: Water heats up at night and there are red LEDs lit up on the Powerdiverter.**

- Solution:
- Check the sensor clamp is installed the right way round.  
(see the installation and testing section).

## Powerdiverter Specifications

Power supply (controller unit)	220-240V AC, 50Hz
Power supply (sensor unit)	220-240V AC, 50Hz or 2 x C cells
Battery life	Typically 2 years (using alkaline cells)
Maximum heater load capacity	4800W at 240V
Controllable loads	Resistive only (e.g. heater elements)
Control method	Phase angle
Power diversion start thresholds	50W (AC powered transmitter & wired sensor mode) 100W (Battery powered transmitter)
Easy Boost timer	1 hour, 2 hours, 3 hours at full power
AC cable sizes accepted	1.5-6.0mm <sup>2</sup> (2.5mm <sup>2</sup> recommended)
Cable access	Bottom of unit – 20mm & 16mm glands.
Indications	1x Green LED (radio signal, battery low, import/export detected in wired sensor mode) 3x Red LEDs (Easy Boost time, heater power level, hot water ready, status). 1x Green / red LED on sensor (radio signal, import/export, status).
Sensor Unit Cable Size	Up to 16mm diameter insulated mains cables
Sensor Clamp	Powerdiverter Split Core CT CTSA16-100A 100A/50mA 5 metres of cable
Certifications of conformity	AS/NZS 3100, AS 61010.1-2003, AS/NZS 4268, AS/NZS 61000-6-3, incl. partial AS/NZS CISPR22
EMC filtering	Yes, 3 line (A, N and E)
IP Rating	Indoor use only (IP30)
Safety Features	Thermostatic cooling, over temperature cut out, over load & short circuit cut out.
Operating temperature range	-20°C to +40°C (mains operation) -5°C to +40°C (battery operation)
Humidity	10% to 90% (non condensing)
Size (controller unit)	320 x 250 x 140 (HWD mm)
Size (sensor unit)	113 x 75 x 40 (HWD mm)



## Appendix A - Re-Pairing of the Wireless Sensor

Note: The pairing code is saved in both units permanent memories. They will not forget the communication code, even if turned off for a long time. The only time you may need to pair the units again is if a replacement transmitter or controller is used.

If you need to change the code (e.g. if replacing just a sensor unit or a controller unit, rather than a complete set) then please follow the pairing instructions below.

### Sensor Unit & Controller Pairing

1. Turn off both the Powerdiverter controller and sensor unit.
2. Temporarily move the sensor unit close to the controller. Using battery mode makes this easy. You do not need the sensor clamp plugged in to do this. It can remain clamped to the cable and you can simply unplug it from the sensor unit.
3. Turn off and then on both units and carry out the next steps within two minutes. If using the battery mode, take one battery cell out for 10 seconds and refit it. If using the AC adaptor, leave it plugged into the sensor unit but switch it off or unplug it from the AC wall socket for a few seconds.
4. After turning the controller unit on, wait for the two blinks of all the red LEDs and then press and hold the Easy Boost button for 5 seconds, until the green LED on the controller starts to flash rapidly. Let go of the button when it does.
5. Watch the sensor unit LED. In a few seconds, it should also flash green rapidly to signal that it has paired with the controller.
6. Check that the controller green LED now blinks every few seconds in time with the sensor unit blinking.
7. Check the pairing has been saved by once again turning both units off for 10 seconds and then on again. The controller unit green LED should blink every 2 seconds in time with blinks on the sensor unit.
8. Return the sensor unit to the installation location and plug the sensor clamp wire back in.
9. Verify that the green LED still blinks every few seconds on the controller unit.

If the controller lights up both the green LED and the top red LED together for 7 seconds while waiting for pairing and the sensor unit does not blink green rapidly, as in step 5, then pairing has failed. Please try again from step 1.

## Appendix B - Out of Radio Range Indications

If the controller unit blinks the green and top red LED alternately every 10 seconds (blinking green-red, green-red), this means the radio signal is not being received.

When the sensor unit is operating by battery, its LED can also blink the same 'green-red, green-red' pattern to indicate that it is not able to communicate with the controller unit.

As with all radio systems, occasionally interference in the radio signal can cause communication to be lost. If this happens please observe the controller and sensor LEDs for a time to see if the radio blockage clears by itself.

If the out of range indication persists for a time, please reset the system by turning the sensor unit off (take out a battery or turn it off at the mains for 10 seconds) and then turn it back on. Do the same for the controller unit and check that the green LED once again blinks in time with the sensor unit transmissions every few seconds.

Note: During the first 2 minutes after being reset, the Powerdiverter will not start diverting power or allow the Easy Boost mode to be set.

Note: When simply resetting the radio link, it is not necessary to re-pair the units.

## Warranty

This Powerdiverter is guaranteed to be free of manufacturing and materials defects for a period of 3 years from the date of purchase. Please note that this warranty does not cover damage arising from improper installation, misuse of the product, or accidental damage (e.g. from impacts or flooding).

If you experience a problem with the Powerdiverter please, in the first case, refer to the troubleshooting tips section of this guide and our web support page to check for common installation problems and solutions. If this does not help to resolve the problem, please contact your installer / the store where you purchased the Powerdiverter or contact Powerdiverter support via the 'Contact Us' page of our web site at: [www.powerdiverter.com.au](http://www.powerdiverter.com.au)



A P P R O V A L S ®

## Certificate of Suitability

**Certificate No.:** SAA161476

**Certificate Holder:** Power Diverter Ltd  
KBF House, Suite E, 55 Victoria Road,  
Burgess Hill, West Sussex, RH15 9LH  
United Kingdom

**Class Description:** Non-Declared  
**Product Description:** Solar Power Diverter (including Sensor Model 2)  
**Brand Name:** Powerdiverter  
**Model No.:** Model 2  
**Markings:** Controller:  
240V~ 50Hz, Max Load 4800W (resistive load only)

Class I  
Sensor:  
Battery 2x1.5V C cells or Approved AC Adaptor  
Class III

**Standard:** AS/NZS 61010.1:2003 Reconfirmed 2016  
AS/NZS 3100:2009 Inc A1-4

**Conditions:** Nil

**Certification Mark:** SAA161476 or RCM

**Date First Registered:** 14 July 2016

**Date of Expiry:** 14 July 2021

For and on Behalf of  
SAA Approvals Pty Ltd

SAA Approvals Pty Ltd as accredited by JAS-ANZ under ISO/IEC 17065 certifies in accordance with the SAA Approvals Electrical Product Safety Certification Scheme that the product nominated in this certificate complies with standard/s listed.

When using the RCM the requirements of all relevant parts of AS/NZS 4417 applicable to the article must be fulfilled.

For SAA Contact Details and to verify this Certificate go to:  
[www.saaapprovals.com.au](http://www.saaapprovals.com.au)

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Issued: 14-07-16 161476/1