



Water Heating Controller

# User Manual

[www.ihot.com.au](http://www.ihot.com.au)

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## About this manual

This manual provides detailed installation and operating instructions for the iHot solar heating controller. The installer of the iHot must be a qualified electrician and Licensed Solar installer and be familiar with the system design and wiring rules.

The installation information in this manual is for professional installers only.

## 1. IMPORTANT SAFETY INSTRUCTIONS

To ensure your safety, please read this manual carefully before installing and using the iHot, and keep this manual for future use.

The following symbols are used in this manual to indicate potentially hazardous conditions or to mark important safety items.



**WARNING !**

Indicates there is a chance of electric shock, please ensure all components are de-energised before starting works.



**CAUTION!**

Indicates the key steps to ensure the safe operation of the iHot.



**NOTE!**

Indicates the safe and correct procedures for use of the iHot.

## Security Information.

- Read the instructions and precautions in this manual carefully before starting the installation.
- DO NOT disassemble the iHot for maintenance
- Before installing or moving the iHot, be sure to disconnect all sources of energy connected to the iHot.
- During the normal operation of the iHot, heat will be generated inside the iHot, which may cause skin burns. The iHot should be installed in a suitable location preferably out of direct sunlight.
- Use insulated tools when connecting the power cabling.
- The cable connections must be torqued up to prevent the tunnel connectors from overheating or potentially catching fire due to loose connections, and faulty installation.
- Always use cabling and circuit breakers of appropriate specifications and current ratings.

## 2. GETTING STARTED

### 2.1 Overview

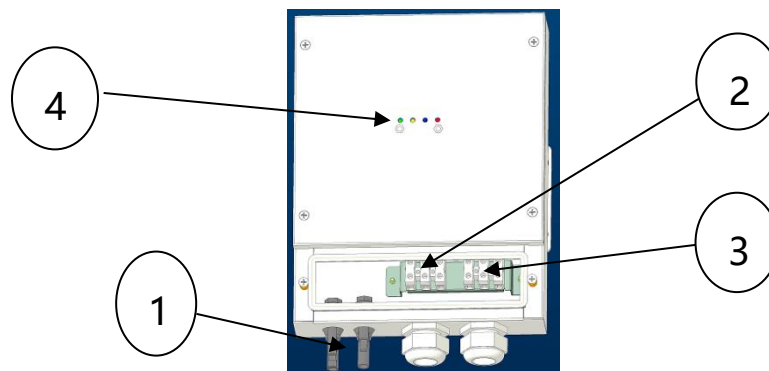
The iHot solar heating Controller (hereinafter referred to as the iHot) provides solar energy, generated from photovoltaic panels to the electric heating element, with maximum efficiency, via MPPT technology. It converts PV direct current, which can then be used to connect to traditional electric storage hot water units. Allowing the standard thermostat to switch on and off as necessary.

The iHot is built with intelligent control functions to allow solar and AC, switching to grid or generator boost, when solar is not available.

This manual will help you make full use of the advantages of the iHot to establish an optimal solar photovoltaic hybrid electric heating system.

### 2.2 Appearance features

The appearance characteristics of the iHot and the function description of each part are shown in the figure below



1. PV input terminal

+ Connect PV positive (+)

- Connect PV negative (-)

2. Hot Water OUTPUT terminals

L-----Connect to Hot Water System Active

N-----Connect to Hot Water System Neutral

PE-----Earth Cable to Hot Water System

3. AC INPUT terminals

L-----Active from grid or generator

N-----Neutral from grid or generator

PE-----Earthing Cable from Earthing system

4. LED indicators

Indicates the current status of the iHot:

Green: Heating from Solar

Orange indicator : Heating from AC

Red indicator: Fault status

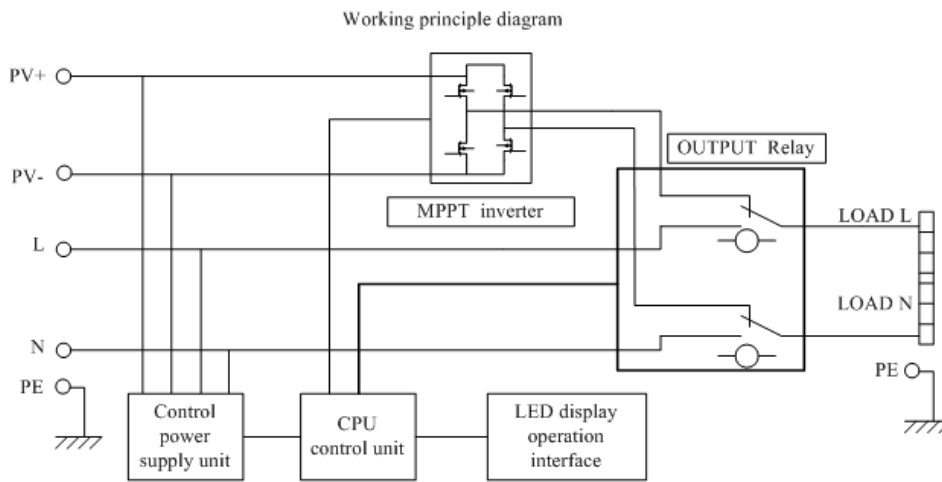
Blue indicator: iHot ready status

## 2.3 Datasheet

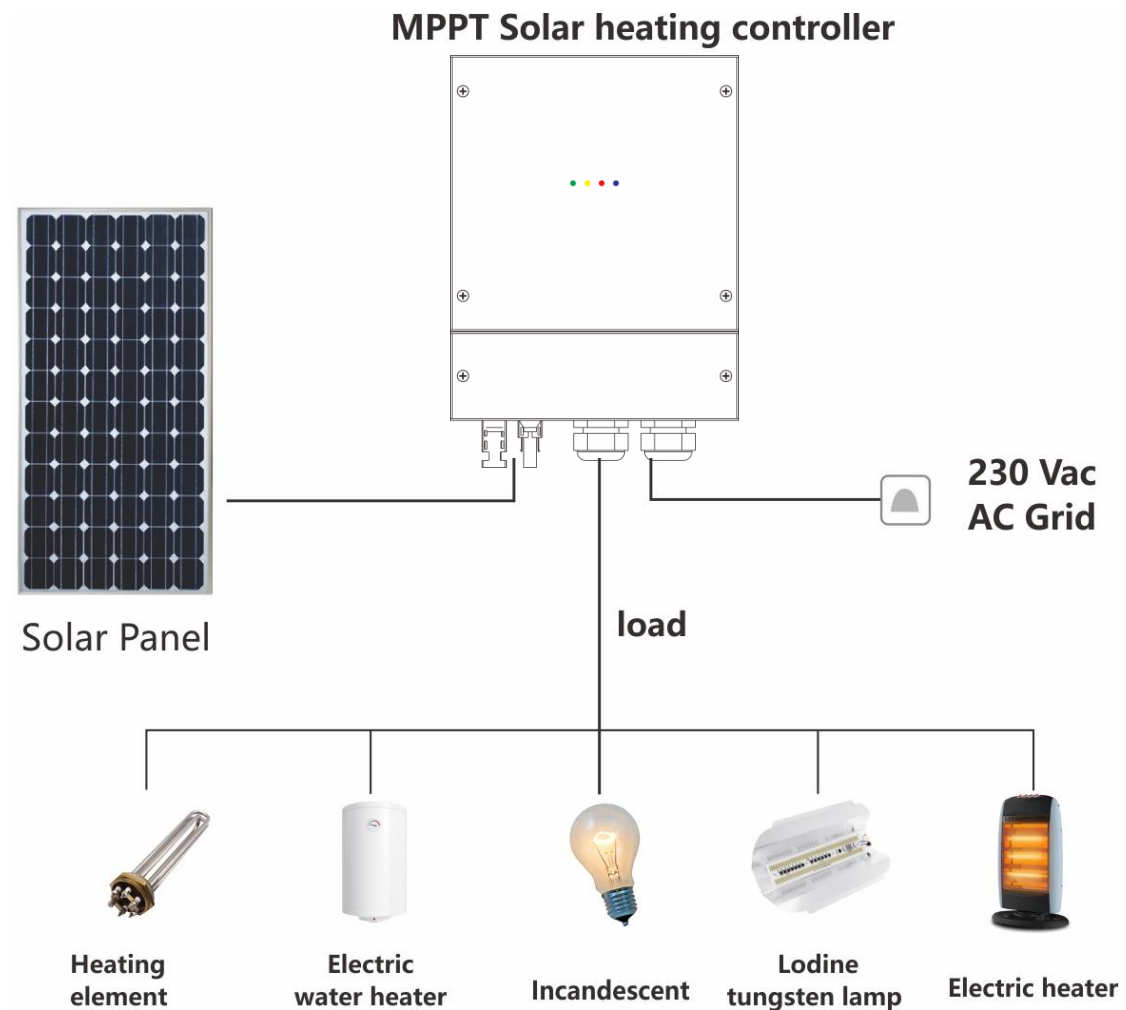
Rated power	3600W
Scope of application	The iHot water heating iHot is only suitable for resistive loads. Elements must be 3.6kw or less.
Photovoltaic characteristics	
Solar Max. input power	4000 W
Solar input current	≤ 20 A
Solar input voltage range	160 Vdc~350 Vdc
MPPT operating voltage range	120 Vdc~340 Vdc
MPPT efficiency	>99%
AC characteristics	
AC heating rated power(bypass)	3600 W
AC rated voltage	230 Vac
AC working voltage range	180 Vac~260 Vac
AC rated current	≤20 A
Load requirement	
Load	The load should not be higher than 230V/3600W, and the resistance value Must be <b><u>GREATER THAN 13 ohms</u></b>
iHot dimensions	
Dimensions	250*155*80 mm
Net weight	1.8 Kg
Enclosure	IP65

## 2.4 System diagram

### 2.4.1 Wiring diagram



### 2.4.1 Wiring Layout





## **3. Installation Notes**

### **3.1 GETTING STARTED**

The installation environment is critical to the performance and service life of the iHot. The iHot should be installed in a dry environment preventing water ingress. Installers must ensure sufficient ventilation around the iHot and sufficient air flow.

**Never install the iHot in a sealed box !**

**The iHot cannot be used in parallel !**



Warning: Risk of equipment damage!

If the iHot is installed in a large enclosure, make sure that there is sufficient ventilation. Otherwise the iHot will overheat and severely reduce its service life.

Please read all installation instructions carefully before installing the iHot, and operate according to this manual. Any variations may cause damage to the iHot and affect warranty.

Installation tools:

- Wire stripper
- Wire cutter
- Phillips screwdriver
- Drill/Impact driver
- Level
- Mounting Hardware

## 3.2 Installation

### 3.2.1 Cable selection

Cable selection is important for system performance and efficiency. The voltage drop of the cable from the iHot to the solar panel, the iHot to the heating element, and the iHot to the hot water system **MUST** be less than 2% of the total system voltage.

The following table provides the minimum cable diameter requirements at an ambient temperature of 45 degrees Celsius:

	<b>Maximum current</b>	<b>Cable material</b>	<b>Recommended cable diameter</b>	<b>Minimum required cable diameter</b>
Between iHot and photovoltaic panel	20A	copper	4.0mm <sup>2</sup>	2.5mm <sup>2</sup>
Between iHot and load	20A	copper	4.0mm <sup>2</sup>	2.5mm <sup>2</sup>
Between iHot and AC input	20A	copper	4.0mm <sup>2</sup>	2.5mm <sup>2</sup>

### 3.2.2 Heating element selection

**Output interface: heating element power is no more than 230V/3600W, resistance value MAXIMUM 13 ohms.**

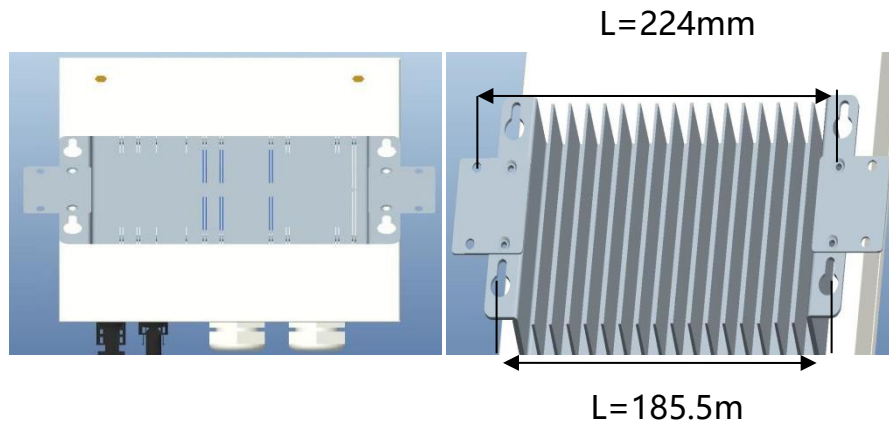
#### Wall mount installation



**Note: Wall-mounted installation is important! The wall on which the iHot is installed must be suitable for the weight of the unit to prevent personal injury and damage caused by the iHot falling off.**

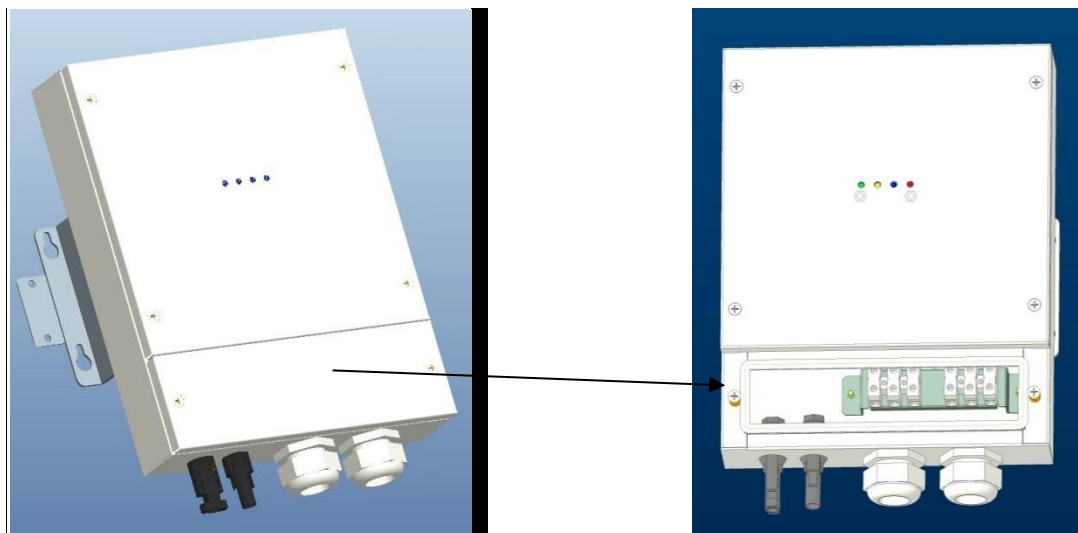
The iHot is required to be perpendicular to the mounting surface, If the installation angle deviates from vertical by too much, it will cause poor heat dissipation through the cooling fins, which will affect the power output and service life of the iHot.

### 3.2.3 Wall mounted installation



Choose any set of mounting holes, and install the iHot vertically on the wall with appropriate mounting hardware.

### 3.2.4 Removing the wiring cover





### **Warning: Electrical Work DANGER !**

Before removing the wiring cover, please make sure that the iHot is disconnected from all power sources, then let the iHot discharge for at least 5 minutes to ensure that all residual power is dissipated. ALL installations must take place de-energised. Remove the wiring cover as shown in the figure above.

### **3.2.5 Power cable connection**



#### **Warning: Risk of electric shock!**

The maximum open circuit voltage of the solar panel array must not exceed 350VDC. Before installation, make sure that the solar panels and the cables are disconnected from the iHot.

Before wiring, make sure that all connections to the iHot are switched off.



**Warning ! Ensure correct polarity of DC connections, reversal of connections will damage the iHot, and void warranty.**



**Warning ! Please ensure Earth cabling is wired correctly per AS3000 !**



**Warning ! Maximum heating element size is 3.6kw. Higher than this will void warranty and damage the iHot.**

1. Connect the solar panel + (positive) from the DC Isolator to the PV+ terminal on the iHot.

Connect the solar panel-(negative) from the DC Isolator to the PV- terminal on the iHot.

2. **Connect the LOAD wire to the OUTPUT terminal of the iHot. Please ensure the LOAD is not more than 3600W, and the resistance is greater than 13 ohms.**

Load L line to OUTPUT L;

Load N line to OUTPUT N;

Load PE line to OUTPUT PE.



**Warning !** The iHot is only suitable for using solar power to heat resistive loads, and the iHot load can only be used to connect resistive loads below 230V/3600 watts, such as AC water heaters and heating elements. DO NOT use for capacitive or inductive loads.

### 3. AC input connection.

AC L line to AC IN L;

AC N line to AC IN N;

AC PE line to AC IN PE.

### 3.2.6 POWER-ON



**Warning ! Pay attention to the cable terminations!**

Connecting the photovoltaic to the AC IN or AC OUT terminal or connecting the AC IN to the photovoltaic connection terminal or connecting the AC IN to AC OUT connection will cause the iHot irreversible damage.



**Warning ! CHECK that the polarity is correct!**

If the positive and negative poles of the solar array are connected in reverse polarity, the iHot will not work properly.



**Warning ! Before powering on, you must make sure that the earthing is wired correctly. Poor earthing connections will affect the mains leakage protection function of the iHot and cause danger to end users!**

- Confirm that the polarity of the solar array is correct.
- Confirm that the earth cabling is correct.
- Close the PV input switch. If the voltage from the solar panels is above 120VDC, the iHot will start to use solar energy for heating.
- Close the AC input switch. If voltage from the panels is below 90VDC, the iHot will switch to AC boost feature within 5 minutes.

### **3.2.7 POWER-OFF**



**Warning ! Pay attention to the power-off sequence!**

**First switch off the AC connected to the iHot and then the PV Array DC Isolator, once these are completely off, you can remove other cables, or begin servicing the system.**

## **4. Operating instructions**

After the iHot is installed, it will operate using on board intelligence. Solar is the priority source, when solar is insufficient \*(Below 90VDC) the iHot will switch to AC boost function automatically.

### **4.1 Maximum power point tracking technology**

The MPPT can adjust the power generated by the solar panels in real time to ensure that the solar array will work at the current maximum power point. This process is automatically realized by the DSP (Digital Signal Processor) through a series of calculations.

### **4.2 Protection functions**

#### **Solar array too large**

The maximum output current of the iHot is limited by the rated values specified above. When the power of the solar array connected to the iHot exceeds the rated maximum value, the maximum output power of the iHot will be limited to the rated value. This means the utilisation rate of the solar array will be greatly reduced.

#### **Solar panel input line short circuit**

When the solar **panel** input line is short-circuited, it is equivalent to no solar input. After the short-circuit is removed, the iHot will automatically resume normal operation.

#### **Over temperature protection**

If the ventilation around the iHot is poor, the temperature of the iHot will increase, exceeding the normal operating temperature range, the iHot will continuously reduce the photovoltaic output power until the output stops. When the iHot temperature drops below the protection value, the iHot automatically restores output to the load.

## **4.3 Alarm function**

### **AC high voltage alarm**

When the AC voltage exceeds 270VAC, the Red indicator will show fault, the AC output will be cut off. Once the voltage drops below 260VAC, the Fault indicator will switch off, and the iHot will begin operation again.

### **PV input high voltage.**

**The open circuit voltage of the solar array connected to the iHot is 350VDC. If the open circuit of the solar array exceeds the maximum input voltage specified, the iHot will be damaged, and warranty will be voided.**

## **4.4 Inspection and maintenance**

Please carry out the following inspections once per year to extend the service life of the iHot:

### **4.4.1 System check**

- Confirm the iHot is installed securely and that the surrounding environment is free of dust and debris.
- Confirm that there is good ventilation around the iHot, and clean the dust and debris on the surface of the iHot and cooling surfaces.
- Check the external power cables aren't damaged due to aging, rubbing, vermin etc. If damaged, please replace immediately.
- Check the external power cables are tight in the terminals.
- Check that the LED indicators are consistent with the operation of the equipment. If you find any faults or incorrect indications, please take immediate measures to correct them.
- Ensure the earthing system meets Australian Standards



## 4.4.2 Inspection of iHot wiring cover



### **Danger: Risk of electric shock!**

Before removing the wiring cover, make sure that all power supplies connected to the iHot are disconnected. If the power has not been disconnected, do not open the iHot wiring cover. Before touching the terminals wait 5 minutes after all power is disconnected, to ensure that there is no residual power in the system.

- Check whether the power cable in the junction box is damaged. If there is any damage, please repair or replace immediately.
- Check cable terminals for correct torque.

## 5. Common troubleshooting

There is no LED display, and the iHot appears to have no electrical connection and does not turn on.

### **Solution:**

Use a multi-meter to measure the voltage across the terminals of the photovoltaic panels of the iHot.

The voltage of the photovoltaic panels must be above 30 VDC for the iHot to operate.

If the voltage at both ends of the photovoltaic panel terminal of the iHot is between 30V and 150V, and there is no LED display, please contact your local distributor.

Use a multi-meter to measure the voltage between the AC socket L-N and the AC voltage range.

The voltage must be above AC180V. If the voltage between the AC socket L-N is between AC180V and 270V, check whether the AC plug is installed and connected correctly. If no LED display, please contact your local distributor.

If no voltage is measured at both ends of the photovoltaic panel wiring terminals of the iHot, please check whether the photovoltaic cable is in good condition, and whether there is a switch or disconnection point.

If the AC input terminal do not have voltage, please check whether the AC is within operating range.

## **6. Warranty Information**

### **6.1 Warranty Service Regulations**

If any failures of the device occur within 5 years of the purchase date, and are not a result of faulty installation, please contact your local distributor to provide warranty service.

#### **Non-warranty regulations**

**The following situations (but not limited to the following) are not covered by the warranty service:**

- Damage caused by accident, negligence, improper installation or improper use.
- Damage caused by solar array voltage, power or load current exceeding the rated value.
- The iHot is damaged due to the selection of incorrect heating element \*(MAXIMUM SIZE is 3600w)
- Modifications or repair to the product without authorization.
- Damage occurring during transportation.
- Damage caused by natural disasters such as lightning and extreme weather events.
- Damage caused by factors such as fire and flood.

**The usage scope of the iHot defined in these specifications is final, any application without the authorisation of the manufacturer will not be warranted.**

**No modifications to the product are permitted without the authorisation of the manufacturer.**

**The manufacturer is not responsible for economic losses caused by product failure.**

## 6.2 Repair process

Before applying for warranty, please read the product manual carefully, especially the troubleshooting sections.

1. Please contact the local distributor or agent, the local distributor can solve the warranty problem quickly.

2. Please provide the following information:

(A) The name of the business or company who installed the product.

(B) Full model and serial number (SN is the 16-digit number on the product label).

(C) Failure symptoms, including LED light configuration.

(D) The maximum installed solar power, open circuit voltage, maximum power point voltage, short-circuit current.

(E) AC heating element resistance value and heating element total power.

3. After the warranty is approved, please mail the iHot to the designated repair point and provide the shipping documents to your dealer.

4. Please keep in touch with the dealer. After the iHot is repaired, it will be returned to the original address on the shipping receipt provided by you.

**Note: Tearing or altering product labels, seals, and machine serial numbers will cause the iHot to be out of warranty.**