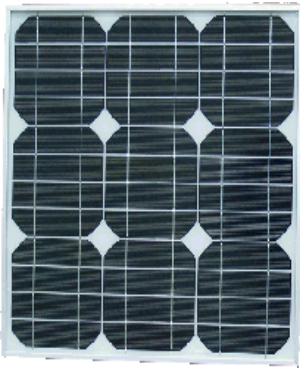




## Solar lighting for containers, sheds and unpowered buildings

Basic Components of all solar lighting systems

Solar Panel



Makes electricity from sunlight. Cloudy days reduce its effectiveness

Battery



Stores the electricity produced by the solar panel, later used to power the lights

Solar Regulator



Regulates the solar panel voltage to prevent overcharging the battery

Led Light



LEDs are the most efficient means of converting electricity to light

## Features & Specifications

### Solar panel

Solar panels are mono-crystalline with toughened glass and sturdy aluminium frames, they are sized to recharge daily battery usage plus 20% to make up for depleted reserves used during cloudy days. Portable solar panels or light weight solar panels (2 mm thin) can also be supplied.

### Battery

Batteries are sealed and are safe to use indoors. They are sized to provide the required daily power plus reserve for 2 days autonomy per week to provide power during cloudy days.

### Solar panel mountings

Flush mount brackets are usually supplied to mount the solar panel on a metal roof, but a tilt mounting kit for level roofs or pole mounting bracket can be supplied instead.

### Lights

Led lights are generally used as they are durable and efficient. The standard lights are waterproof 200 lumen dome style LEDs. Other types such as strip lighting or work floodlights can be added or used instead.

### Light control

Light switching is usually controlled by a motion sensor to minimise power wastage, but can be replaced by a manual on/off switch or a programmable timer switch.

### Wiring & assembly

Cables are fitted with plug-in connectors and are labelled to ensure there is no confusion during assembly. Detailed instructions are included

**Table 1** shows solar panel size (measured in watts) and battery capacity (measured in amp-hours) for various lighting requirements (measured in lumens) in a geographical location with 4 hours of equivalent peak sunlight per day.

**Table 2** shows standard solar light kit sizes for locations where the minimum sun exposure is equivalent to 4 hours of peak sunlight.\*

**\*IMPORTANT Actual solar panel size required for the system depends on the location of the installation**

- Solar power production levels will change during the year from summer to winter.
- Lighting power needs may be higher during the winter months while solar power levels are lower.
- Northern Australia has more consistent daily sun hours while in the southern states it varies greatly.

**Example:** compare the winter solar power production levels in Hobart TAS to Darwin NT:

**Hobart** has less than 2 daily hours of peak sun in winter - solar panel sizes should be doubled for winter lighting.

**Darwin** has more than 5 hours of peak sun throughout the year - solar panel size can be decreased by 25%.

**Table 1 - Solar panel and battery size VS lighting level and duration - 4 hours of peak sunlight per day**

Two 200 lumen lights	Three 200 lumen lights	Six 200 lumen lights
On time: <b>1 hr per day</b> Solar power: 8 Watts Battery capacity: 4.8 Amp-hours	On time: <b>1 hr per day</b> Solar power: 12 Watts Battery capacity: 7.2 Amp-hours	On time: <b>1 hr per day</b> Solar power: 24 Watts Battery capacity: 14.4 Amp-hours
On time: <b>2 hrs per day</b> Solar power: 16 Watts Battery capacity: 9.6 Amp-hours	On time: <b>2 hrs per day</b> Solar power: 24 Watts Battery capacity: 14.4 Amp-hours	On time: <b>2 hrs per day</b> Solar power: 48 Watts Battery capacity: 28.8 Amp-hours
On time: <b>3 hrs per day</b> Solar power: 24 Watts Battery capacity: 14.4 Amp-hours	On time: <b>3 hrs per day</b> Solar power: 36 Watts Battery capacity: 21.6 Amp-hours	On time: <b>3 hrs per day</b> Solar power: 72 Watts Battery capacity: 43.2 Amp-hours
On time: <b>4 hrs per day</b> Solar power: 32 Watts Battery capacity: 19.2 Amp-hours	On time: <b>4 hrs per day</b> Solar power: 48 Watts Battery capacity: 28.8 Amp-hours	On time: <b>4 hrs per day</b> Solar power: 96 Watts Battery capacity: 57.6 Amp-hours
On time: <b>5 hrs per day</b> Solar power: 40 Watts Battery capacity: 24 Amp-hours	On time: <b>5 hrs per day</b> Solar power: 60 Watts Battery capacity: 36 Amp-hours	On time: <b>5 hrs per day</b> Solar power: 120 Watts Battery capacity: 72 Amp-hours
On time: <b>6 hrs per day</b> Solar power: 48 Watts Battery capacity: 28.8 Amp-hours	On time: <b>6 hrs per day</b> Solar power: 72 Watts Battery capacity: 43.2 Amp-hours	On time: <b>6 hrs per day</b> Solar power: 144 Watts Battery capacity: 86.4 Amp-hours
On time: <b>7 hrs per day</b> Solar power: 56 Watts Battery capacity: 33.6 Amp-hours	On time: <b>7 hrs per day</b> Solar power: 84 Watts Battery capacity: 50.4 Amp-hours	On time: <b>7 hrs per day</b> Solar power: 168 Watts Battery capacity: 100.8 Amp-hours
On time: <b>8 hrs per day</b> Solar power: 64 Watts Battery capacity: 38.4 Amp-hours	On time: <b>8 hrs per day</b> Solar power: 96 Watts Battery capacity: 57.6 Amp-hours	On time: <b>8 hrs per day</b> Solar power: 192 Watts Battery capacity: 115.4 Amp-hours
On time: <b>9 hrs per day</b> Solar power: 72 Watts Battery capacity: 43.2 Amp-hours	On time: <b>9 hrs per day</b> Solar power: 108 Watts Battery capacity: 64.8 Amp-hours	On time: <b>9 hrs per day</b> Solar power: 216 Watts Battery capacity: 129.6 Amp-hours
On time: <b>10 hrs per day</b> Solar power: 80 Watts Battery capacity: 48 Amp-hours	On time: <b>10 hrs per day</b> Solar power: 120 Watts Battery capacity: 72 Amp-hours	On time: <b>10 hrs per day</b> Solar power: 240 Watts Battery capacity: 144 Amp-hours
On time: <b>11 hrs per day</b> Solar power: 88 Watts Battery capacity: 52.8 Amp-hours	On time: <b>11 hrs per day</b> Solar power: 132 Watts Battery capacity: 79.2 Amp-hours	On time: <b>11 hrs per day</b> Solar power: 264 Watts Battery capacity: 158.4 Amp-hours
On time: <b>12hrs per day</b> Solar power: 96 Watts Battery capacity: 57.6 Amp-hours	On time: <b>12 hrs per day</b> Solar power: 144 Watts Battery capacity: 86.4 Amp-hours	On time: <b>12 hrs per day</b> Solar power: 288 Watts Battery capacity: 172.8 Amp-hours



Container with two 200 lumen lights, Optional flexible conduit and junction box was included to run cable along roof

**Options** Solar lighting kits can be customized to suit your lighting needs

- More lights or different types of lights, eg: strip lighting or extra outside work lights
- Extra motion sensors for long containers with divided interiors
- Motion sensor bypass switch to keep lights on regardless of the motion sensor
- On/off light switch or programmable light timer switch
- Longer cables for locating the solar panel or battery further away
- Tilting solar panel roof mounting to improve performance or pole mounting brackets instead of roof mounting
- Smaller kits can have the battery and solar regulator housed in a weatherproof ABS enclosure

**Table 2 - Solar lighting kits for shipping containers and sheds and unpowered buildings in remote areas**

<b>3M (10ft) containers</b> <b>3m x 3m sheds</b> <b>Two 200 lumen dome lights</b>	<b>6M (20ft) containers</b> <b>6m x 3m sheds</b> <b>Three 200 lumen dome lights</b>	<b>12M (40ft) containers</b> <b>6m x 6m sheds</b> <b>Six 200 lumen dome lights</b>
<b>2 Hours lighting per day</b>  <b>20 watt solar panel</b> <b>12 Ah battery</b> <b>6 Amp solar regulator</b>	<b>2 Hours lighting per day</b>  <b>30 watt solar panel</b> <b>17 Ah battery</b> <b>6 Amp solar regulator</b>	<b>2 Hours lighting per day</b>  <b>50 watt solar panel</b> <b>28 Ah battery</b> <b>6 Amp solar regulator</b>
<b>4 Hours lighting per day</b>  <b>40 watt solar panel</b> <b>21 Ah battery</b> <b>6 Amp solar regulator</b>	<b>4 Hours lighting per day</b>  <b>50 watt solar panel</b> <b>28 Ah battery</b> <b>6 Amp solar regulator</b>	<b>4 Hours lighting per day</b>  <b>100 watt solar panel</b> <b>65 Ah battery</b> <b>10 Amp solar regulator</b>
<b>6 Hours lighting per day</b>  <b>50 watt solar panel</b> <b>28 Ah battery</b> <b>6 Amp solar regulator</b>	<b>6 Hours lighting per day</b>  <b>80 watt solar panel</b> <b>42 Ah battery</b> <b>6 Amp solar regulator</b>	<b>6 Hours lighting per day</b>  <b>160 watt solar panel</b> <b>2x 42 Ah batteries</b> <b>10 Amp solar regulator</b>
<b>12 Hours lighting per day</b>  <b>100 watt solar panel</b> <b>65 Ah battery</b> <b>6 Amp solar regulator</b>	<b>12 Hours lighting per day</b>  <b>160 watt solar panel</b> <b>2x 42 Ah batteries</b> <b>6 Amp solar regulator</b>	<b>12 Hours lighting per day</b>  <b>2x 160 watt solar panels</b> <b>150 Ah battery</b> <b>20 Amp solar regulator</b>



# Assembling a solar light kit requires minimal technical knowledge

Only basic handyman skills are required to install the solar panel and light fittings.  
Pages 4 and 5 show typical instructions included with all solar lighting kits.

## Solar lighting kit assembly instructions

**This is a 12V DC system.**  
**It uses a solar panel to charge a battery.**  
**The battery powers the lights.**

The lights are activated by a PIR motion sensor.  
The fully charged battery will provide a maximum of 4.5 hours of lighting.  
In daily use it can provide 2 hours of lighting per day and still have reserve battery capacity for another two days without solar power, this is required during cloudy days when solar power levels are low.

### Components

40 watt solar panel with 5 metres of electrical cable.  
Four solar panel mounting brackets.  
21 amp-hour battery to store the solar power.  
Solar regulator.  
Six 4 watt led dome lights.  
Motion sensor to activate the lights.  
Twin core electrical cable for the lights, fitted with quick connectors.

### Technical data

40W solar panel with an output current of 2 amps.  
Daily solar power generation assumes 4 hours of equivalent peak sunlight per day.  
2 amps output for four hours = 8Ah.  
21 Ah 12V battery will provide 10.5Ah with 50% of battery charge remaining to ensure a full battery service life.  
Daily maximum lighting requirement is 2 hours.

Six dome lights consume 2.4 Ah in one hour, therefore the battery can provide 4.8 Ah daily with an extra 5.7 Ah capacity in reserve.

### How it works (refer to the diagrams)

The solar panel is connected to the solar regulator.  
The solar regulator is connected to the battery to control the battery charging procedure.  
The lights are powered by the battery.  
Light switching is controlled by the motion sensor.

### Installation :

Identify the best locations for the solar panel, motion sensor and battery. Take note of the lengths of the cables and allow for corners and obstructions when planning the paths for cables. All cables are labelled for easy assembly. Wrap outdoor connections with mastic tape to prevent corrosion.

### Electrical cable lengths:

5 metres from the solar panel to the solar regulator.  
3 metres from the battery to the motion sensor.  
2.5 metres from the motion sensor to the first light  
2 metres between each light.

### Lights:

Install the lights - twist off the outer ring to allow access to the screw mounting holes. Longer screws and spacers are included to attach the light to a flat surface while allowing a clearance for the power lead at the rear of the housing. Connect the lights power cable to the battery.  
**CAUTION** connect only red wires to the red (+) terminal and black wires to the other terminal.

### Motion sensor:

Install the motion sensor in a high position.  
Drill a 15mm hole in a suitable bracket (not included) to mount the sensor by the threaded ferrule.

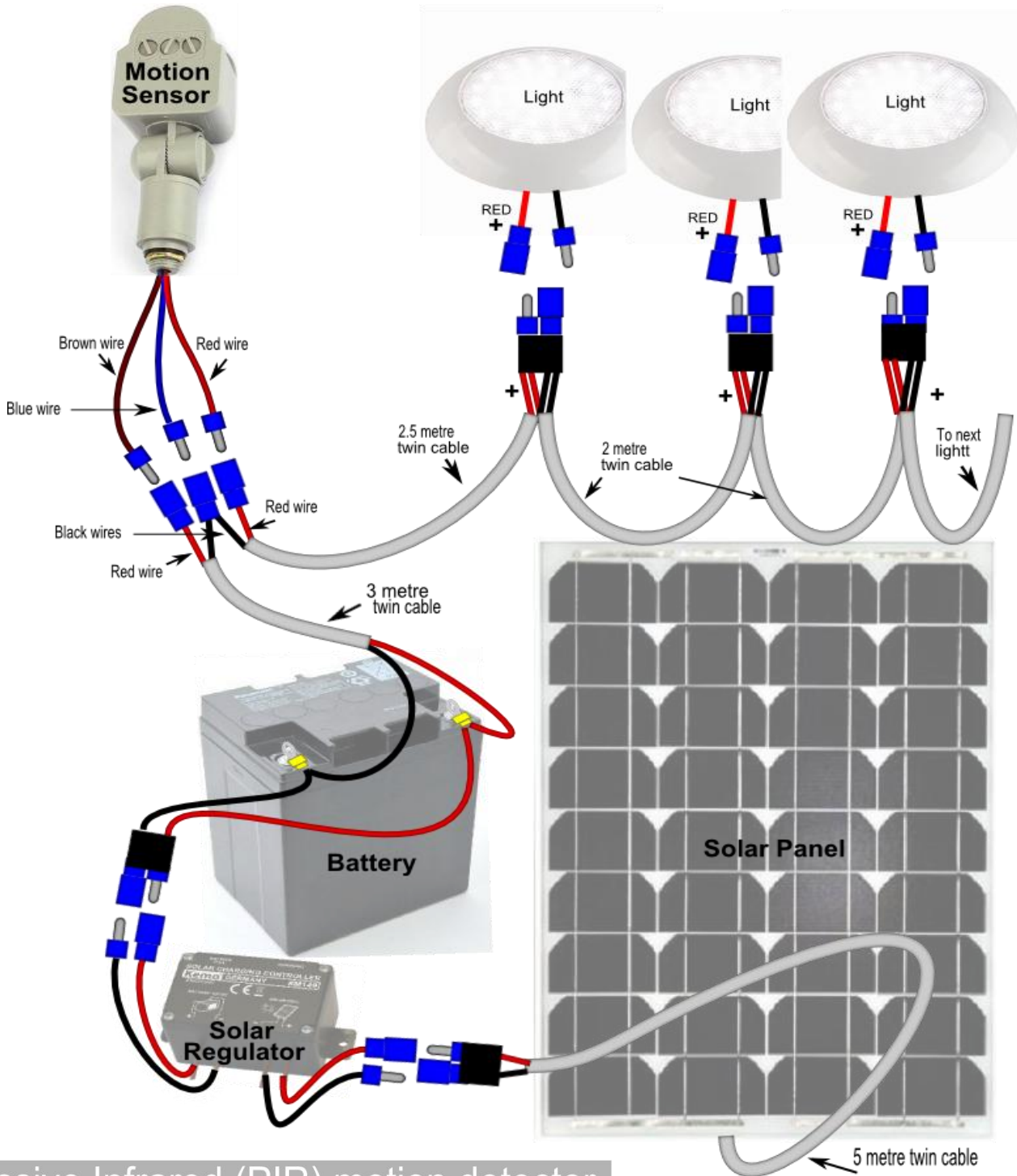
### Battery and solar regulator:

Connect the solar regulator to the short cable joined to the lights power cable and the battery.  
**Caution** connect only red wires to the red (+) terminal and black wires to the other terminal.

### Solar panel:

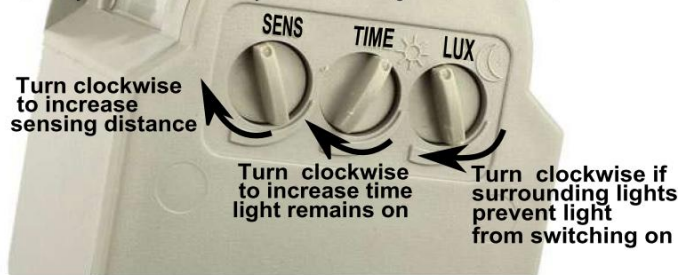
Install the solar panel on a roof or suitable surface where it will be in full sun throughout the day. If possible, position it so that it is tilted and facing north to gather more sunlight. Attach the mounting brackets to the solar panel with the included bolts, then fix the brackets to the roof with suitable screws, rivets or construction adhesive. Connect the solar panel to the solar regulator.

## Solar lighting kit assembly Diagrams

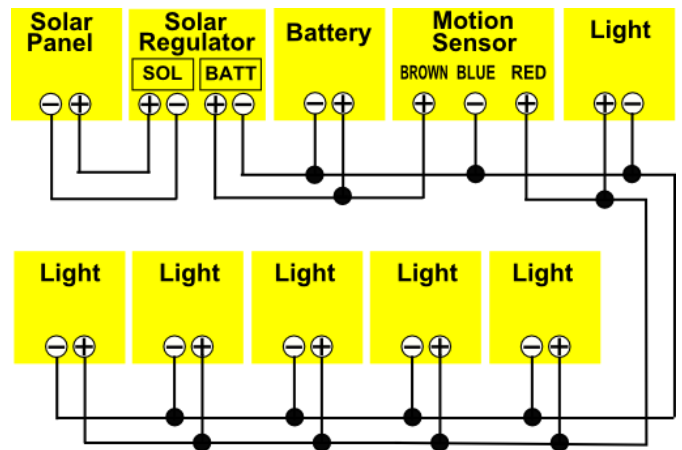


## Passive Infrared (PIR) motion detector

SENS adjustment: Movement detection distance - 5 to 10 Meters  
 TIME adjustment: Length of time light will stay on - 8 Sec to 6 Min  
 LUX adjustment: Sensitivity to Ambient Light - 3 to 2000 LUX



Passive Infrared (PIR) motion detector detects changes in heat levels caused by movement of bodies that emit heat. It can be falsely triggered by tree movement on windy days, large animals, pools of water, or reflections of heat sources. To prevent nuisance activation the lens can be masked or blinkered to hide unwanted heat sources from view.



Solar Lighting kit Electrical Diagram