

# Sureguard

Pro -Tech 5<sup>®</sup>

Solar Electric Fence Energiser



Portable • Light Weight • Rugged

5km  
• Steel Wire  
• Poly-Wire  
• Poly-Braid  
• Poly-Tape

 Anti-Theft System

 In-Built Surge Protection

 Solar Design Enhanced for Cloud Cover

# User Instructions



# Electric Fencing Re-envisioned

## Sureguard's 5th Generation Solar Electric Fence Energizer.

### Features

#### *Latest Solar Panel & Battery Technologies*

- Not just for the Australian sun. Pro-Tech 5 has outstanding fence performance even in prolonged cloudy conditions.

#### *Keylock Security Mounting*

- Your Pro-Tech 5 has a unique key-locking mechanism that safeguards your investment against theft.

#### *Massive 190 Joule Lightning Surge Protection*

- In-built surge protection will safeguard your Solar Energizer. Moreover, you will never have damaging surges to your household power and appliances.

#### *Pure Copper High-Voltage Transformer*

- The high-voltage transformer delivers power to your fence. Sureguard uses a pure copper transformer design eliminating losses common with other designs.

#### *Use with Various Fencing Materials*

- Use Steel Fencing Wire, Polywire, Polytape, Polybraid or Polyrope.

### How does an electric fence work?

An electric fence aims to keep animals within an area or prevent undesired animals from entering. High voltage electrical impulses from the "Live" Terminal of the Energiser are applied to the fence wire to make it "Live". This wire is insulated from its support posts. The "Earth" Terminal of the Energiser is connected to an Earth Electrode driven into the soil. This forms an electrical circuit as illustrated on page 4.

Each electrical impulse lasts only thousandths of a second. It is repeated at 30-50 pulses per minute. An animal that strays into contact with the fence wire completes an electrical circuit with its body. The electrical impulse causes an unpleasant muscle contraction and repels the animal. The experience is so memorable that the animal remembers to avoid the fence.

For best performance, it is essential to choose the right fence design for your situation.

#### *Single Wire Fence*

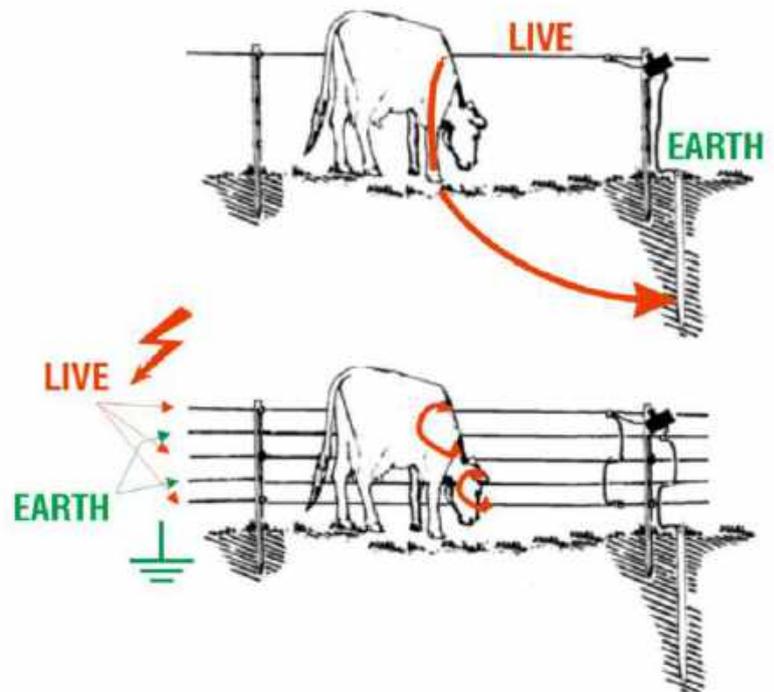
A single wire electric fence is the most uncomplicated design. When an animal contacts the Live wire, the electrical impulse passes through the animal's hide, into its muscles, down into its legs and into the soil. The electrical impulse then travels through the moisture in the sub-soil layer (typically about 1m / 3ft below the surface) back to the "Earth Electrode" and the Energiser's Earth Terminal. In this way, the animal's body completes an electrical circuit between the Live and Earth

Terminals of the Energiser. Although uncomplicated, it has the disadvantage that power in the electrical impulse diminishes with distance travelled through the ground.

### Multi-Wire Fence

An alternative arrangement is a multi-wire fence that incorporates one or more Earth wires. The Earth wires can run through metal support posts, which helps establish a regular connection to the soil. The Earth wires also allow you to connect additional Earth Electrodes along the fenceline.

A multi-wire fence can have 3, 5, 7 or more wires that are alternately connected to Live or Earth. This system is used for fences longer than about 1km (3000ft) and in areas with low soil moisture, sandy soil, shallow topsoil or drought conditions. It is also popular for stubborn animals, vermin control, and varying sizes of animals.



A multi-wire fence has two paths by which the electrical impulse can flow back to the Energiser: **1/** From the Live wire, through the sub-soil back to the Energiser (performance depends on the amount of soil moisture and distance from the animal back to the Earth Electrode). **2/** Through the two contact points of the animal with the Live and Earth wires. This design is preferred for maximum deterrence because it has the least electrical resistance back to the Energiser.

For vermin control, e.g. foxes, wild dogs, etc., an earthed mesh fence with one or two Live wires above make for the ultimate deterrent. The mesh stops animals from pushing through, and the Live wires repel animals from climbing over. Climbing animals are grounded to the mesh fence, so the electrical impulse is strong.

### Earth Electrode

You must install a proper Earth Electrode. Use ONLY GALVANISED steel, namely, pipe or fence posts (star pickets). DO NOT use bitumen covered posts or rusty metal because these will reduce the intensity of the pulse to the animal. **You want the Earth Electrode to have as much conductive surface area in contact with sub-soil moisture as possible.** Typically, you should drive the Earth Electrode 1.5m into the ground. **Don't overlook this point!** Then at distances of about every 500~1000m along the fence add more Earth Electrodes and connect these to the Earth wires of the fence. By minimising the distance that the impulse travels through the soil, you maintain strong deterrence over long distances.

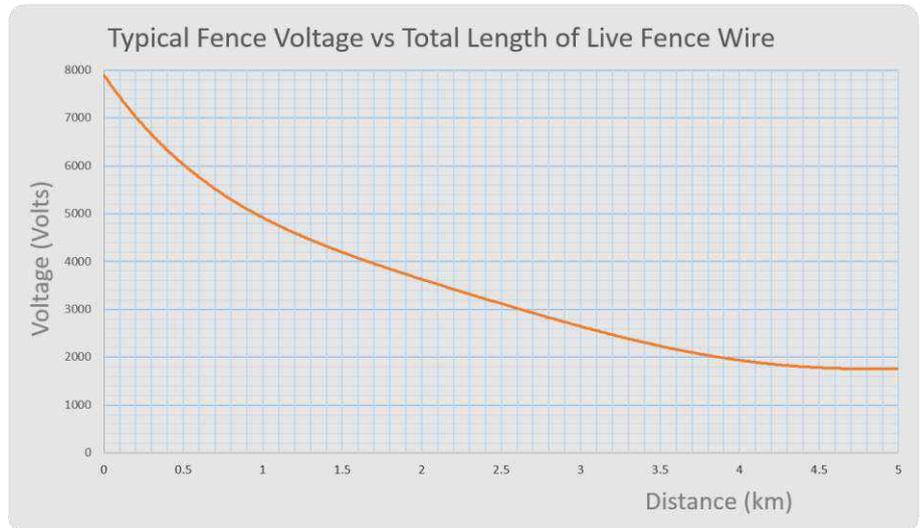
For more design information & worthwhile tips, visit our web site at:

**Electric Fence Design:** [www.sureguard.com.au/page/electric-fence-design](http://www.sureguard.com.au/page/electric-fence-design)

**Tips and videos:** [www.sureguard.com.au/page/video-pro-tech-5](http://www.sureguard.com.au/page/video-pro-tech-5)

# Specifications

- **Maximum Distance Rating:** 5km or 3 miles.
- **Weight:** 0.93kg (33oz)
- **Dimensions:** 195mm Wide. 100mm High. 220mm Deep. (4.95" x 3.95" x 8.65").
- **Output Impedance:** Excellent (Low).
- **Pulse Energy:** 0.2 Joules (stored energy).
- **Pulse Voltage:** 8000 Volts max.
- **Surge Protection:** Varistor technology 190 Joules.
- **Battery Life:** 5 to 8 years under typical operating conditions. [Battery Technology LiFePO4](#).
- **Running Time in Cloud:** Continuous.



# Solar Powered Fence Energiser



- 1 Shock-Resistant Rubber Corners
- 2 Anti-Theft Key-Lock System
- 3 Screw Mounting Option for Timber Posts & Fences
- 4 Anti-Theft Locking Bolt Attaches to Steel Star Post
- 5 Quality Push-Button Output Terminals including Leads & Clips
- 6 Mounting Post (Optional Accessory)
- 7 Simple, Easy to use ON / OFF Power Switch
- 8 Rubber Hand Grips
- 9 High Power Solar Panel with Long Life Battery
- 10 **Control Panel:** Touch Switch & LED Control Indicators:
  - \* In-built Fence Voltage Tester
  - \* In-built ON / OFF Automatic Timer
  - \* Smart Fault Alarm with ON/OFF Option

## Mounting Location

The Energiser is solar-powered, and it must have an uninterrupted view of the sky from east to west with no shadows falling over the Energiser. The Energiser must also face towards the equator; in Australia, that means northward. In the northern hemisphere, the equator is southward. The solar panel will charge quickly in full direct sunlight. In cloudy conditions, the sun's intensity is lower, and the charge time is longer, but the solar panel collects power from the full view of the overcast sky. If the Power LED changes from green to red, confirm the setup requirements listed above.

**NOTE: The Solar Panel only charges while the Energiser is switched ON.**

## Mounting Options

The Energiser has several mounting options – see Key #3, #4 & #6 illustrated on page 5.

### Steel Post Anti-Theft Mounting

Refer to Key #4. We recommend you mount the Energiser on top of a steel post or “star picket”. The Energiser locks to the post using the supplied key to open the internal mounting bolt. The locking mounting is compatible with most brands of post.



## Locking Procedure:

- 1/ Remove the rubber sealing plug and insert the supplied key (see Key #2 page 5).
- 2/ Align the mounting bolt (see Key #4) with the top hole in the post.
- 3/ Rotate the key anticlockwise to retract the mounting bolt.
- 4/ Push the Energiser onto the post. Jiggle until you hear the bolt click into place.
- 5/ Rotate the key clockwise to lock.
- 6/ Make sure the Energiser cannot come off. Then remove the key
- 7/ Put the rubber sealing plug back into the keyhole as an insect/weather seal.

**IMPORTANT:** The top of the steel post must not be mangled or damaged.

### Screw Mounting

Refer to Key #3 on page 5. Insert a single M4 screw (4mm with head no more than 9mm) into timber, steel or plastic fencing or posts to hang the Energiser using the screw mounting option (illustrated on the right).



### Plastic Mounting Post

Refer to Key #6 on page 5. A plastic Mounting Post is available as an optional accessory. Assemble its three parts. Remove the protective rubber bung and push the post into the base of the Energiser. Push the other end of the post into the soil or screw it onto an existing fence using two 25mm Saddle Clamps (clamps and post not included).



## Connecting Energiser to Fence

Included with your Energiser are quality Silicone High-voltage Cables with a stainless steel alligator clip on one end and a 15mm pre-cut insulation on the other end. For each Cable, remove the pre-cut 15mm of insulation with a twisting motion so the copper wires become twisted together. Then fold the copper wires back over themselves 5mm. (As illustrated with the red wire). With the Energiser switched OFF, push the Red Terminal to open the metal jaw and insert the copper wire so it is touching the Terminal's metal contacts. Release the button. Repeat for the Green Cable. Attach the Red Alligator Clip to the Live fence wire and Green Alligator Clip to the Earth Electrode and/or Earth wires. Switch ON to energise the fence.

For steel fencing wire and Polywire, simply attach the Red Alligator Clip as shown below. You cannot do this for Polytape. The Alligator Clip won't correctly energise all the wires, and you may create sparks. The correct method is to:



- 1/ cut the Polytape,
- 2/ tie the two ends together in a secure knot,
- 3/ pull ALL the wires free from each end,
- 4/ twist all the wires together,
- 5/ connect the Red Alligator Clip to these twisted wires. You can also use this method to reliably join two pieces of Polytape or Polywire together anywhere along the fence.



## Switch Energiser ON

Use the **ON/OFF** button on the underside of the Energiser to switch it **ON** or **OFF**.

When you switch the Energiser ON, you will see two LED lights on the Solar Panel. The **POWER LED** relates to the charge in the battery. The **FENCE LED** relates to the fence voltage. Each LED can light Green, Red or Blue. Refer to the table below for what the colours mean. Two green lights mean you are good to go!

**NOTE:** Critical issues will cause the LED to **flash RED** & Alarm Buzzer sound. Read Advanced User Features if you want to customise the Buzzer.



## What the LED Colours Mean:

<b>POWER LED</b>	<b>GREEN</b>	Normal operation. The internal battery has plenty of power.
	<b>RED</b>	The internal battery is low. Check solar panel is clean and set up correctly.
	<b>RED FLASHING</b>	Critically low battery. <b>Rectify immediately!</b> (Troubleshooting page 11)
	<b>BLUE</b>	Displayed while using the advanced optional Settings Switch (page 10).
	<b>NOT LIT</b>	The energiser is in stand-by mode waiting for the solar panel to charge the battery. Power LED flashes RED momentarily about every few seconds while charging.
<b>FENCE LED</b>	<b>GREEN</b>	The fence voltage is good.
	<b>RED</b>	The fence voltage is low. Check the condition of the fence.
	<b>RED FLASHING</b>	The fence voltage is very low. <b>Rectify immediately!</b> The Energiser may be pulsing more slowly. (Troubleshooting page 12)
	<b>BLUE</b>	You have selected the ON/OFF Timer. The fence is currently inactive. (Refer to page 10).
	<b>BLUE FLASHING</b>	It displays when you switch the energiser ON. It is analysing the fence voltage.
	<b>NOT LIT</b>	The energiser is not powering the fence.

## Advanced User Features

The cog icon on the solar panel is a Touch Switch. When you switch the Energiser ON, it is active for the first 45 seconds. During this time, you can customise the operation of the Energiser.

### How to Enter the Advanced Features Mode

1. Switch the Energiser OFF. Wait 10 seconds. Switch ON.
2. Wait until the FENCE LED stops flashing BLUE.
3. Touch the cog icon for about 1-second until you see both LED lights glow BLUE.

**TIP:** Touch lightly, don't press hard. If your finger is small, use your thumb.



4. As soon as you see both LEDs glow BLUE, remove your finger off the cog.
5. Wait until both BLUE LEDs go OFF.
6. Momentarily tap the cog icon the number of times required to match the function you are trying to enter (as per the list below). **TIP:** You'll find the Touch Switch responds better when you press and release by moving your finger at least 2cm away from the cog.

#### ❖ Touch once (Function #1):

**Reset all functions** to factory default and performs the following hardware tests:

1/LED's light in sequence RED-GREEN-BLUE.

2/ Alarm Buzzer sounds.

3/ Solar panel, in sunlight, is linked to the POWER LED. It will flicker BLUE to verify power is going into the battery. **NOTE:** If the battery is fully charged, the POWER LED will not flicker BLUE. This is normal but you can run the Energiser overnight and recheck this.

4/ Energiser reboots automatically after 20 seconds.

#### ❖ Touch twice (Function #2):

Timer is switched OFF. Energiser will operate **24-hours a day**. (Factory default setting).

#### ❖ Touch 3 times:

Timer is switched onto **Night Mode**. The Energiser will operate at night, starting about 15-minutes after sunset. During the day the Energiser is OFF, and the FENCE LED glows **BLUE**. **NOTE:** The Alarm Buzzer is always controlled by Function #5, #6 or #7.

#### ❖ Touch 4 times:

Timer is switched onto **Day Mode** & will only operate during the day, starting about 15

minutes after sunrise. At night the Energiser is OFF, and the FENCE LED glows **BLUE**.

**NOTE:** The Alarm Buzzer is always controlled by Function #5, #6 or #7.

❖ **Touch 5 times:**

Switch the **Alarm Buzzer OFF**.

**Touch 6 times:**

Switch the **Alarm Buzzer ON** only during daylight hours. (Factory default setting).

❖ **Touch 7 times:**

Switch the **Alarm Buzzer ON** for day or night operation.

**Touch 8 times:**

Report the **current fence voltage** in kilo-volts (0.5 to 9.9kV). This is useful for fence diagnostics. Count the number of flashes of POWER LED; this is the first digit.

Count the number of flashes of the FENCE LED; this is the second digit.

Normal voltage range is 2kV to over 8kV

**NOTE:** If necessary, select Function #2 to put the Energiser into 24-hour Mode.

❖ **Touch 9 times:**

Like Function #8, this reports the **lowest fence voltage** since mid-night. (Useful for diagnostics).

❖ **Touch 10 times:**

Like Function #8, this reports the **highest fence voltage** since mid-night.

## Rectifying Power Faults

### *POWER LED Continuously RED:*

The internal battery needs more charge. The Energiser will automatically lower its power consumption to continue operation. It will pulse less frequently. Check the following:

1. Clean the solar panel with water; remove bird droppings and dust.
2. Confirm your solar setup is as described on page 6 “Mounting Location”.
3. Confirm the panel is facing toward the equator (not east or west), not experiencing shadowing and can see as much of the sky in all directions as possible.
4. A temporary low power condition may occur during dark cloudy conditions.

### *POWER LED Flashing RED:*

1. In addition to the above points, select Function #1 to test the hardware and solar panel.
2. If your solar location is not ideal, consider setting the Energiser to run in either Night-Mode or Day-Mode.

### *POWER LED is OFF:*

The Energiser has entered a low power **Stand-by Mode** to avoid the battery becoming fully depleted. This condition might happen if you forgot to switch the Energiser OFF when putting it into storage. To rectify this, switch the Energiser **OFF** for at least 24-hours. Then place the Energiser in FULL sun and switch **ON**. As it commences charging, the POWER LED should flash briefly every few second. If it doesn't, switch OFF for another 24-hours then try charging again. If the battery still does not come good, replace it. **IMPORTANT:** Once charging begins, do not switch the Energiser OFF. After a few hours (or the next day if it is cloudy) you should see the Power LED go GREEN and the fence commence working.

## Rectifying Fence Faults

### *FENCE LED Continuously RED:*

The Energiser is functional, but the output voltage is medium to low. Possible reasons:

1. The total length of Live wire is more than 5km.
2. Excessive foliage touching the Live wire is draining power from the fence.
3. Insulators are faulty due to dust, dirt, lichen, etc. causing electrical leakage, particularly during wet conditions.
4. The Live wire is short-circuiting to ground, perhaps through a metal post or adjacent earth wire. Look for the cause.
5. Insulating materials are experiencing electrical breakdown due to age or damage.
6. Replace any insulators not purposely designed for high voltage use.

### *FENCE LED Flashing RED:*

Perform the following **self-test** of the Energiser:

1. Switch OFF the Energiser.
2. Disconnect both wires from the terminals.
3. Switch ON the Energiser. If the Energiser now displays a GREEN FENCE LED, your Energiser is good. You have excessive power loss somewhere on the fence Live wires. If the Energiser doesn't pass this self-test, then call Sureguard for advice.

### *FENCE LED is OFF:*

The Energiser has entered a low power Stand-by Mode. Read above "POWER LED is OFF".

# “Instructions for installation and connection of electric fences”

*Excerpts from Australian Standard AS NZS 60335.2.76, Annex BB*  
*© Standards Australia/Standards New Zealand*

## *Annex BB.1 Requirements for electric animal fences*

**Electric animal fences** and their ancillary equipment shall be installed, operated and maintained in a manner that minimises danger to persons, animals or their surroundings.

**Electric animal fence** constructions that are likely to lead to the entanglement of animals or persons shall be avoided.

INSTALLERS/USERS SHOULD NOTE:

WARNING: Avoid contacting electric fence wires especially with the head, neck or torso. Do not climb over, through or under a multi-wire electric fence. Use a gate or a specially designed crossing point.

An **electric animal fence** shall not be supplied from two separate **energisers** or from independent **fence circuits** of the same **Energiser**.

For any two separate **electric animal fences**, each supplied from a separate **Energiser** independently timed, the distance between the wires of the two **electric animal fences** shall be at least 2,5 m. If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.

Barbed wire or razor wire shall not be electrified by an **Energiser**.

A non-electrified fence incorporating barbed wire or razor wire may be used to support one or more off-set electrified wires of an **electric animal fence**. The supporting devices for the electrified wires shall be constructed so as to ensure that these wires are positioned at a minimum distance of 150 mm from the vertical plane of the non-electrified wires. The barbed wire and razor wire shall be Earthed at regular intervals.

Follow the Energiser manufacturer’s recommendations regarding earthing.

A distance of at least 10 m shall be maintained between the **Energiser Earth Electrode** and any other earthing system connected parts such as the power supply system protective Earth or the telecommunication system Earth.

**Connecting leads** that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated High-Voltage Cable.

**Connecting leads** that are run underground shall be run in conduit of insulating material or else insulated High-Voltage Cable shall be used. Care must be taken to avoid damage to the **connecting leads** due to the effects of animal hooves or tractor wheels sinking into the ground.

**Connecting leads** shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.

**Connecting leads** and **electric animal fence** wires shall not cross above overhead power or communication lines. Crossings with overhead power lines shall be avoided wherever possible. If

such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it.

If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, the clearances shall not be less than those shown in Table BB1.

**Table BB1 – Minimum clearances from power lines for electric animal fences**

Power line voltage (volts)	Clearance (m)
≤ 1000v	3m
> 1000v and ≤ 33000v	4m
> 33000v	8m

If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, their height above the ground shall not exceed 3 m. This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of:

- 2 m for power lines operating at a nominal voltage not exceeding 1 000 V;
- 15 m for power lines operating at a nominal voltage exceeding 1 000 V.

**Electric animal fences** intended for deterring birds, household pet containment or training animals such as cows need only be supplied from low output **energisers** to obtain satisfactory and safe performance.

In **electric animal fences** intended for deterring birds from roosting on buildings, no **electric fence** wire shall be connected to the **Energiser Earth Electrode**. A warning sign shall be fitted to every point where persons may gain ready access to the conductors.

Where an **electric animal fence** crosses a public pathway, a non-electrified gate shall be incorporated in the **electric animal fence** at that point or a crossing by means of stiles shall be provided. At any such crossing, the adjacent electrified wires shall carry warning signs.

Any part of an **electric animal fence** that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the fence posts or firmly clamped to the fence wires.

The size of the warning sign shall be at least 100 mm × 200 mm. The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either the symbol of Figure BB1, or the substance of “CAUTION: **Electric fence**”.

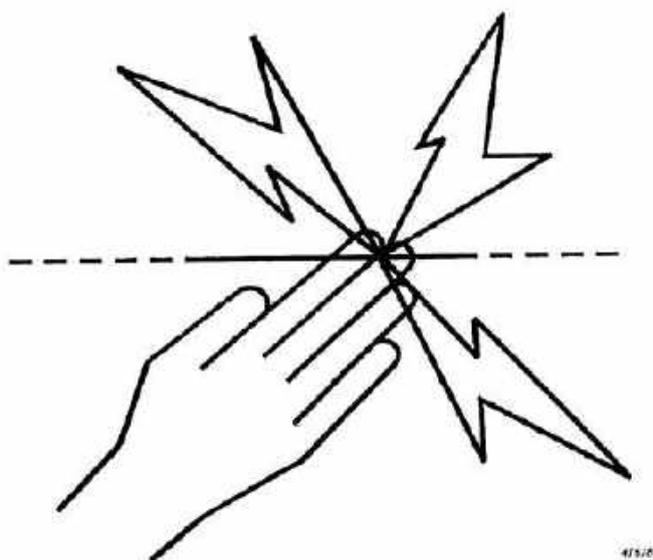
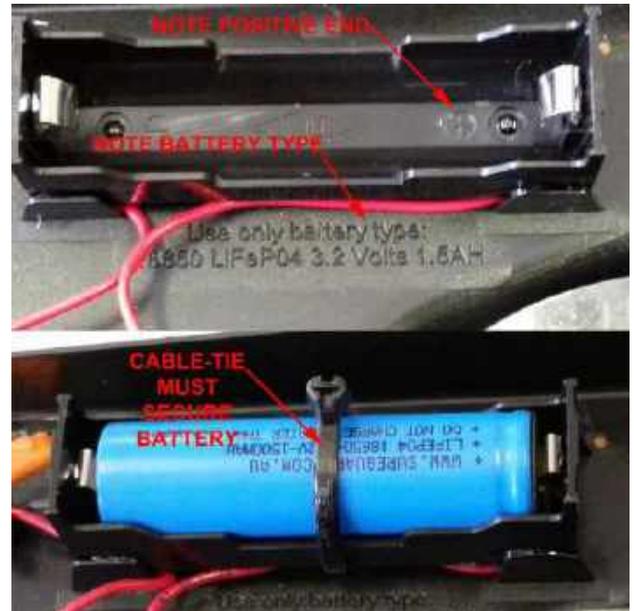


Figure BB1 – Symbol for warning sign

## How to Change the Solar Battery

This Energiser uses a particular long-life lithium battery. You may never need to replace or remove it. But if you do, open the case by removing the four case screws. Then ensure that:

1. The replacement battery is type Lithium-Iron-Phosphate (LiFePO4). This has a voltage of 3.2 volt. **DO NOT substitute** other voltages because they will NOT charge. The original battery has an Amp-Hour rating of 1.5AH, but a larger capacity may be available in future.
2. Note the positive end of the battery holder.  
**Insert the positive end of the battery first** then push the negative end down.
3. Do not install damaged batteries.
4. **ALWAYS Cable-Tie** the battery as illustrated.



## Maintenance

1. Regularly check and clean the solar panel for dust and bird droppings.
2. Every three months, use a damp cloth with a little soap to clean the external rubber corners. This stops mould from taking hold and damaging the rubber.

### Manufacturer's Warranty

Sureguard provides a Manufacturer's Warranty to the original purchaser or gift recipient to cover defects in materials and workmanship for a period of 12 month.

**Extend your Warranty to 3 Years!**

[www.sureguard.com.au/warranty-extended](http://www.sureguard.com.au/warranty-extended)

Full Terms and Conditions at [www.sureguard.com.au/terms](http://www.sureguard.com.au/terms)

