www.jva-fence.com.au

JVA Electric Fence Energizer Installation and User Manual

(M1.5, M3, MB1.5, MB3.0, MB4.5, RSG1, SV2)

Congratulations on your choice of a JVA Energizer. In choosing to purchase the JVA brand you have opted for the highest quality in electric fencing. Please read this manual entirely before installing your new energizer.

All JVA products offer a three-year warranty against faulty components and workmanship but excludes Acts of God, i.e. lightning, flood damage, etc. or malicious damage to the unit or faulty application. Consumable components (i.e. batteries) are also not covered under the warranty agreement. To ensure your eligibility for this warranty program, *please retain your proof of purchase.*

DANGER! Risk of shock!

High voltages exist inside the electric fence energizer and on the fence terminals.

1 Table of Contents

2 Important notes – **PLEASE READ**

2.1 Electric Fences

1. Electric fences are not toys; do not let children play with them.
2. Electric fences should only be installed with regard to the relevant Standards and work place health and safety requirements.
3. Electric fences must have an 'earth'. An electric fence ground is one or more pieces of metal (e.g. 1.8m Galvanized earth rods) driven into the earth to a depth of at least 1.2m.

2.2 Energizers

1. The energizer places a very short, safe, high voltage pulse on the fence live wires approximately once every second. Please be advised that there is always a risk associated with any device designed to impart an electric shock. Do not allow children or elderly persons to touch the energizer or fence live wires.
2. The maximum length of fence able to be energised depends on many factors, for example the earth resistance, number and spacing of wires on the fence, type/quality of insulators, resistance of wire, whether the wiring configuration is series or parallel etc. The amount of grass or shrubbery touching the wires also alters the performance. Fence circuit layout is very important. Another factor to consider is acceptable fence voltage, for some stock situations this is 3kV others require more or less. Therefore the rated mileage of fence that the energizer will power effectively is a guide only.
3. DANGER! The Energizer should never be operated with the cover removed as high voltages exist inside the enclosure while operating. High voltage may remain on some internal parts long after the unit has been switched off.

2.3 Power Supply Options

The JVA MB series of electric fence energizers can be powered from a range of power sources.

- 12V Battery
- 24V Battery
- 12V Battery with Solar panel
- 240Vac (direct or via Power Pack)

The JVA M1.5, M3, M4.5, RSG1 and SV2 energizers have limited power supply options. For more information please refer to section 3.2.

2.3.1 Important Notes

- Always ensure adequate ventilation is given to the battery. Lead Acid batteries may emit explosive gases while charging!
- Always mount the power supply either indoors or undercover.

3 JVA Models and Features

3.1 **Features**

Models	**Features**
Mains	
M1.5, M3	Digital control “Smooth” wave shape Fence OK indicator Ant & moisture protection Lightning protection AC surge protection Fused Plug Large Knobs Power on demand
Mains/Battery	
MB1.5, MB3.0, MB4.5	Battery protection Solar capability Digital control “Smooth” wave shape Fence OK indicator Ant and moisture protection Lightning protection Power on demand
Battery	
RSG1	Internal Rechargeable Battery 7 day battery life Ant and moisture protection Recharge from your car or mains power Portable Large Knobs Energizer OK LED
Solar	
SV2	Integrated Solar panel and battery Angled Mounting Bracket Low battery indication Digital control “Smooth” wave shape Ant & moisture protection Lightning protection Power on demand

3.2 **Specifications**

Model	Specifications									
	Energizer output voltage #	Stored Energy	Power	~12V drain	*Solar Panel Size for Minimum Expected Sun Hours Per Day				*Solar Battery	Peak Output
					3hrs	4hrs	5hrs	>6hrs		
M1.5	8.0kV	1.6J	230Vac	-	-	-	-	-	-	1.5J
M3	8.0kV	3.3J	230Vac	-	-	-	-	-	-	3.0J
MB1.5	8.2kV	2.1J	12Vdc^	165mA	30W	20W	20W	15W	26Ah	1.5J
MB3.0	8.5kV	4.2J	12Vdc^	300mA	40W	30W	25W	20W	40Ah	3.0J
MB4.5	8.8kV	6.3J	12Vdc ^	490mA	85W	60W	40W	40W	65Ah	4.5J
MB8	8.2kV	12J	12 to 24Vdc^	0.9A	150W	120W	100W	85W	150Ah	8J
MB12	8.2kV	18J	12 to 24Vdc^	1.25A	180W	150W	120W	100W	200Ah	12J
MB16	8.2kV	24J	12 to 24Vdc^	1.6A	220W	180W	150W	120W	260Ah	16J
RSG1	9.2kV	0.1J	12Vdc	14mA	2W	2W	2W	2W	-	0.08J
SV2	6.4kV	0.14J	solar	-	-	-	-	-	-	0.1J
SV5	7.5kV	0.7J	solar	-	-	-	-	-	-	0.5J
SV10	7.5kV	1.1J	solar	-	-	-	-	-	-	0.8J

No load, actual voltage on a short fence can be as high as 10kV

* Minimum recommended sizes for 5 consecutive days of overcast weather.

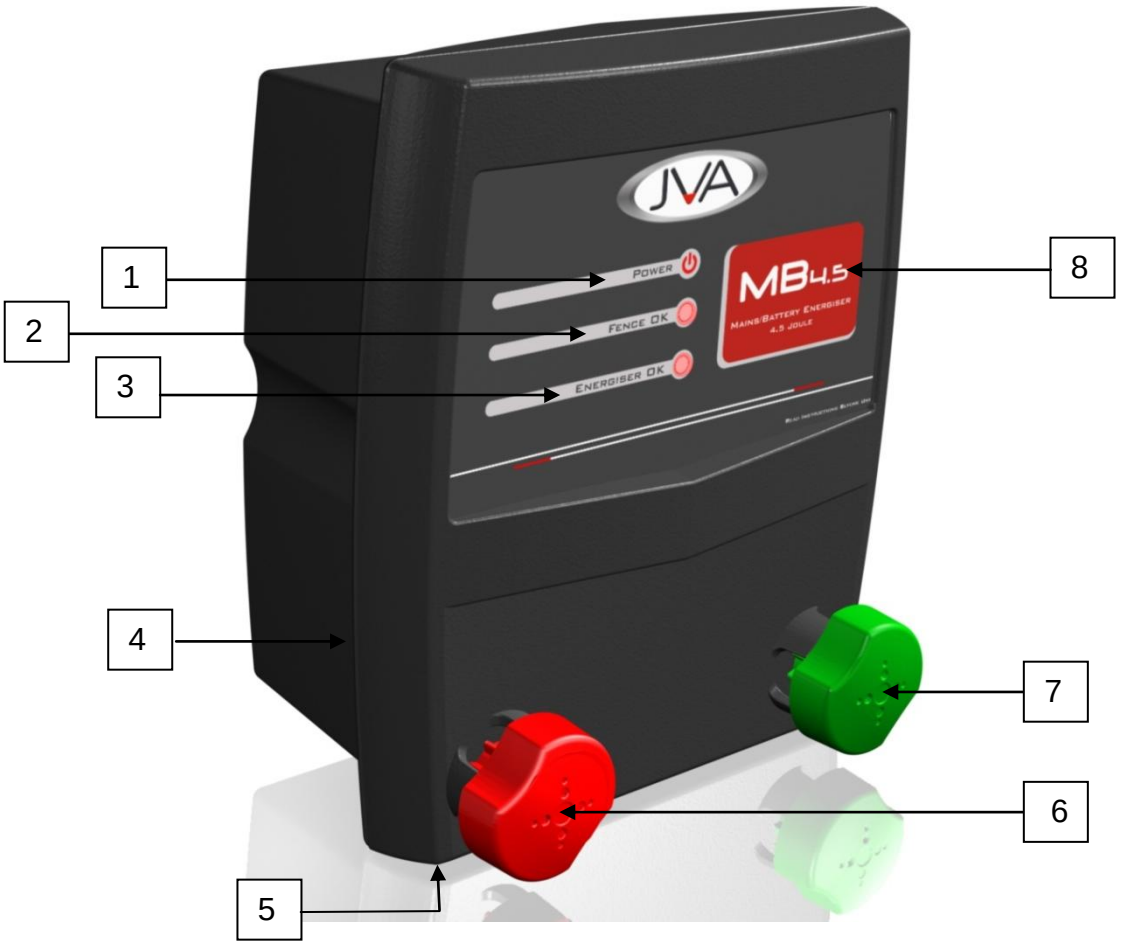
^The energizer can also be powered from 240Vac by using the external power pack supplied with the energizer.

~Current drain rating is for a 12V power source. Current drain will vary with voltage.

Due to our policy of continual improvement specifications are subject to change without notice.

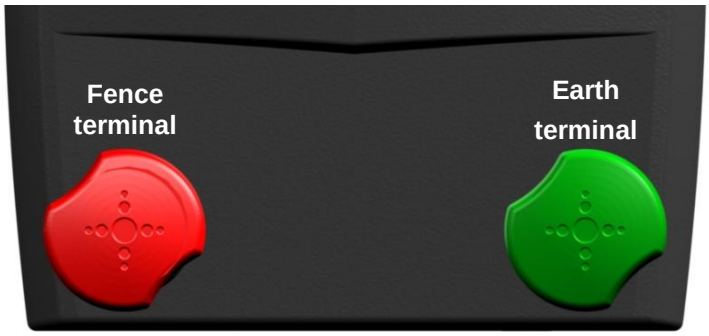
4 Parts of the Energizer

(M1.5, M3, MB1.5, MB3.0, MB4.5, RSG1, SV2)



1. On/Off Switch (not on M1.5 and M3)
2. Fence OK indicator (red LED)
3. Energizer On and OK indicator (green LED)
4. Rubber O-ring seal between front and back case pieces
5. Power Cable extends from base of case
6. Fence connection terminal
7. Earth connection terminal
8. Model Number

4.1 Fence Connectors



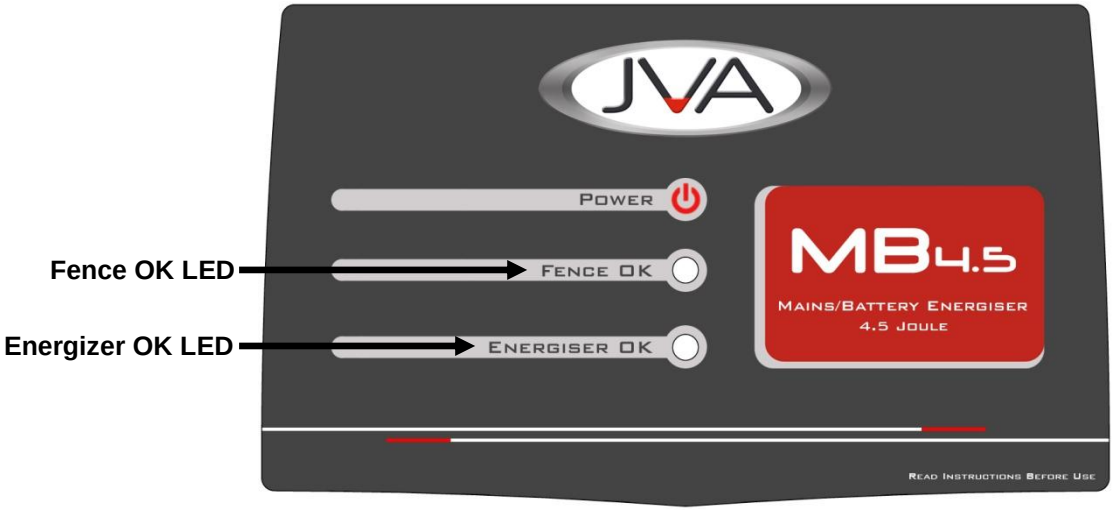
Fence Connections

Fence terminal – should be connected to the live wires of the fence.

Earth terminal – should be connected to a suitable electric fence earth rod.

4.2 Energizer LED Display

This feature is included on all units.



LED display

Fence OK red LED – Flashes if fence voltage is good. If it goes out there is a problem on the fence. (Note: SV2 does not have a Fence OK LED)

Energizer OK green LED – Flashes with each pulse to show the unit is on and operating correctly.

5 Important notes – PLEASE READ

5.1 Electric Fences

1. Electric fences are not toys; do not let children play with them.
2. Electric fences should only be installed with regard to the relevant Standards and work place health and safety requirements.
3. Electric fences should be signed. Warning signs that comply to IEC standards should be prominently displayed on electric fences at distances specified by the country in which they are installed..
4. Electric fences must have an 'earth'. An electric fence ground is one or more pieces of metal (eg. 1.8m Galvanized earth rods) driven into the earth to a depth of at least 1.2m.

5.2 Solar Panels

1. Mount solar powered energizers so that the solar panel is facing the noon sun (due north in the Southern hemisphere, due south in the Northern hemisphere, and at an angle of degree latitude plus 10 degrees). If in doubt, confirm with an online solar panel angle calculator.
2. Solar panels need as much direct sunlight as possible, preferably full sun all day. Unlike small solar powered items such as calculators, all JVA solar-powered energizers **need direct sunlight** to generate enough electricity to charge the battery.
3. The solar panel also needs to be clean to operate properly. Clean off any dust or dirt using a damp cloth.

5.3 Rechargeable Batteries

1. JVA's MB and SV energizers are compatible with sealed lead acid (SLA) batteries. SLA battery life is shortened considerably if it is
   a) left in a discharged state or;
   b) exposed to high temperatures.
2. When not in use store the energizer in such a way as to allow the panel to get as much light as possible, say on a window sill with the panel facing out. Take the energizer out into sunlight for a few hours once every month to keep the battery from self discharging.
3. *WARNING*
   SLA batteries can produce hydrogen. JVA Energizers that come with internal batteries are designed to release hydrogen gas to prevent an explosion. Do not take steps to further seal the case. Return the unit for repair if the O-ring seal has become damaged.

5.4 Other

1. Keep any energizers from being immersed in water and out of extreme heat.
2. Be aware that thieves target solar powered items, so a padlock may be useful in securing the energizer to a fence post.

6 Installation

6.1 Mounting the Energizer

1. Location of Energizer:
   - Ensure the energizer is kept in a dry environment if operating from mains power (M1.5, M3), either indoors or covered.
   - Mount any solar energizer so that the solar panel is facing the noon sun (due north in the Southern hemisphere, due south in the Northern hemisphere, and at an angle of degree latitude plus 10 degrees).
2. Mounting the Energizer
   - The M1.5, M3, MB1.5, MB3.0, MB4.5 and RSG1 can be hung from the plastic hanger bracket.
   - There are two different methods for mounting the SV2. These are shown below.

Post or Star Picket Mounting

1. Position the Energizer's Mounting Bracket against the post.
2. Insert the U-Bolts around the post and into the appropriate holes.
3. Slide the flat metal piece over the bolts and tighten with nuts. Make sure the energizer is stable in its fixed position.

Star Picket Mounting

Simply slide the bracket over the star picket.

6.2 Connecting to the Fence

3. The electric fence requires an ‘earth’. Drive a galvanized earth rod into the earth. Attach a wire from the Green Earth Connector on the front of the energizer to the earth stake.
4. Connect a wire from the Red Fence Connector on the front of the energizer to the live wire of the fence.
5. Powering the Energizer:

   Mains Power Source (M1.5, M3, MB1.5, MB3.0, MB4.5): Plug the mains power cable (M1.5, M3) or the power adapter (MB1.5, MB3.0, MB4.5) supplied with the energizer into an AC power source and the energizer. Turn the energizer ON at the On/Off switch.

   Battery Power Source (MB1.5, MB3.0, MB4.5 & RSG1): Attach the battery, red to positive and black to negative battery terminals. For battery choice see specification table 3.2. Turn the energizer ON at the On/Off switch.

   Solar Power Source (MB1.5, MB3.0, MB4.5): It is recommended that a solar regulator is used in conjunction with a solar panel and a rechargeable battery (For battery choice see specification table 3.2). Please refer to instructions provided with the solar regulator for information regarding its setup. Once the solar regulator, solar panel and rechargeable battery have been configured, connect the energizer to the rechargeable battery. Red to positive and black to negative battery terminals. Turn the energizer ON at the On/Off switch.

7 Operation

7.1 **Electric Fences**

The energizer places a very short, safe, high voltage pulse on the fence live wires approximately once every second. Please be advised that there is always a risk associated with any device designed to impart an electric shock. Do not allow children or elderly persons to touch the energizer or fence live wires.

The high voltage comes from the Fence terminal of the energizer and is connected to the fence wire or electric fence tape to make a “live” or “hot” wire. Live wires must be insulated (e.g. with insulators) from earth or any conductive material touching earth (e.g. fence posts).

The other connection on the energizer is the ‘earth’ (or ground). Electric fences need ‘earthing’ to complete the circuit: When anything touches the live wire current will flow from the live wire, through the animal to earth back to the ‘earth’ rod and into the energizer earth terminal.

You should not feel a shock from the earth connection or earth rod. If you do, the ‘earth’ is probably not sufficient. An electric fence ‘earth’ is some metal in contact with the soil. The more metal in the earth the better, the moister the soil the better. The larger the energizer and the longer the fence the more ‘earth’ is required.

For best results place the energizer in the middle of long lines of fence. A cartwheel pattern of farm fences with the energizer positioned centrally is more effective than a tree arrangement with the energizer at the base of the trunk with many branches.

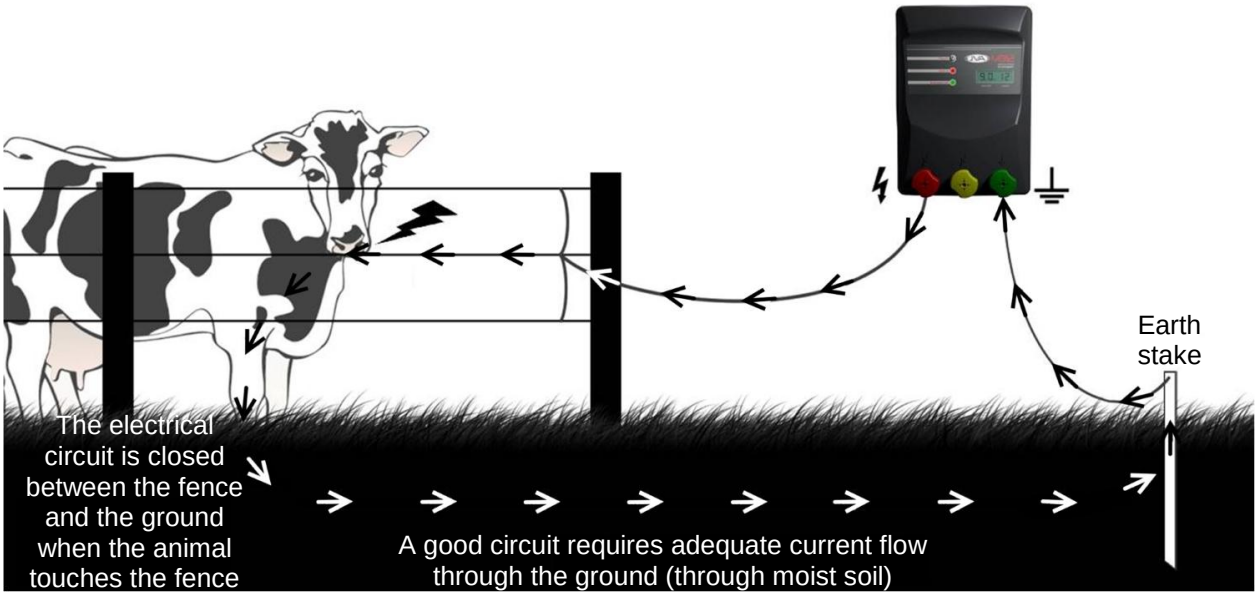
The fence and the ‘earth’ can be measured with an electric fence Digital Voltmeter or Digital Power Probe.

7.2 **Benefits of Electric Fences**

- An electric fence offers a psychological barrier as well as a physical barrier.
- The risk of injury to livestock is lower than with barbed wire fences.
- Electric fences cost less to install and maintain than conventional fencing. Users enjoy low maintenance costs because their stock stays off the fence.
- Their use is versatile -
    - they can be permanent or portable systems,
    - they can be arranged in variety of designs to suit needs
    - they are quick and easy to erect
- They improve pasture and grazing control.
- They can improve existing fence life due to less physical pressure.
- Easy to set up compared to a traditional fence.

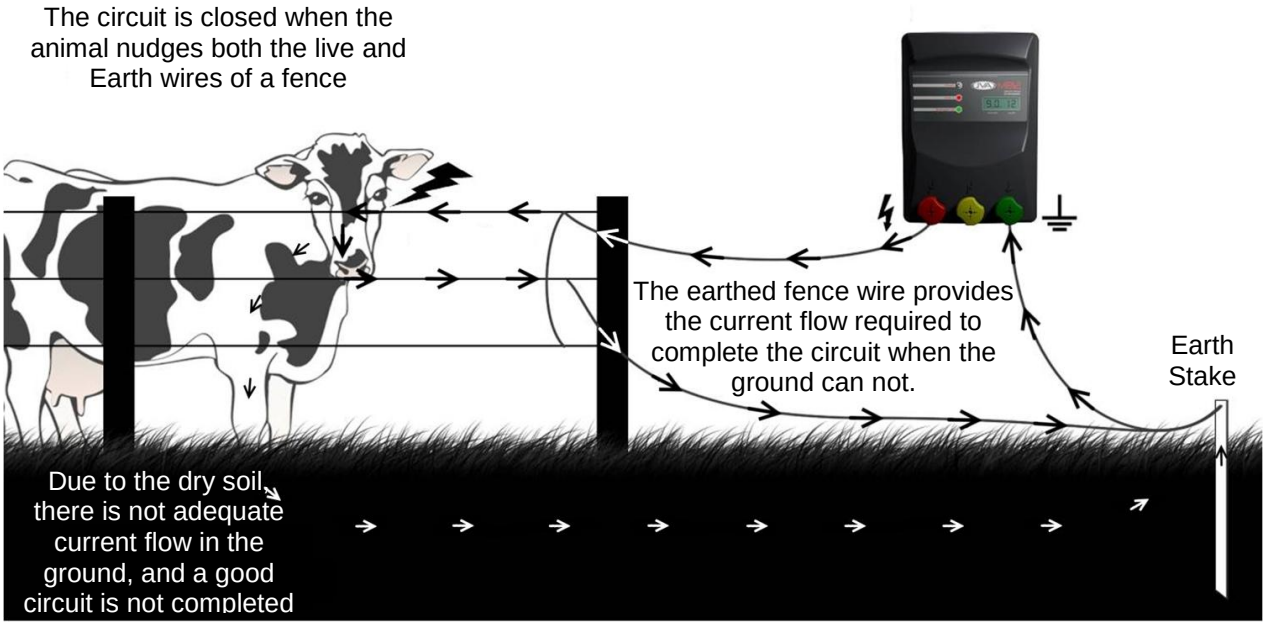
7.3 **Earth Return System**

The Earth Return (also called Ground Return) configuration is the most common method for electric fences, particularly smaller fence applications like “strip grazing”, due to its lower cost and ease of setting up. The fence live wire(s) are electrified and rely on the dirt to complete the circuit back to the energizer Earth terminal when an animal touches the fence.



7.4 **Fence Return System**

The Fence Return configuration for electric fences is used where the soil could be too dry to complete the circuit, or the animals are likely to try to force their way through between the fence wires. In this system earth wire(s) are also run along the fence with the live wire(s) to provide a low resistance path for the current to return to the energizer. In this system if the soil is moist enough it will also function as a return path for the current when the animal touches the live wire, but if the soil is not moist or has poor conductance, this system will keep your fence effective provided the animal touches both a live and the earth wire simultaneously.



8 Common Energizer Problems

The most common problems with electric fence energizers are:

- Moisture and Ants
- Lightning
- Blown Fuses (AC units only)
- Flat batteries

8.1 Moisture and Ants

Moisture and Ants should not be a significant problem for the JVA range of energizers as they come in a weatherproof case. Still, where possible, keep the energizer protected from the weather.

8.2 Lightning

The JVA range of energizers is covered with a three-year warranty that excludes Lightning. Surge protection components inside the energizer are fitted to reduce the risk of damage by lightning. However, nature is capable of performing more extremely than can be tested for in the laboratory; to ensure the wellbeing of your JVA investment for the long term, it is recommended that a Lightning Protection Kit is installed to prevent lightning damage and possible costly repairs.

8.3 Flat Batteries (battery units only)

The JVA series energizers require a battery that is in good condition to run correctly. The energizer will protect the battery by slowing down and eventually stopping altogether as the battery charge is depleted. For best results, check on the energizer at regular intervals. If you are not getting the expected life from the battery consider having it checked by an auto electrician.

8.4 Changing the Battery (battery units only)

Before you start, see "**Important Notes**" on page 3. If the SV2 stops as soon as the sun sets (and it has been getting 8 hours or more sun a day) or if the RSG1 battery charge does not last more than 5 days (a good battery will last 7 days and needs 18 hours to charge), the battery may need replacing. The battery is a sealed, lead acid, 6V, 4.2ah battery. Open the unit and read the battery **ah** and **part number** before ordering a new one. These may be available from the manufacturer or through the store where the SV2 or RSG1 was purchased. This type of battery is also readily available through general electronics stores and hardware stores.

Notes:

- The battery must be a rechargeable sealed lead acid battery, never use non rechargeable batteries.
- The battery should last up to 5 years depending on average temperature and usage. Are you sure it needs replacing?
- Lead acid batteries should be recycled, not sent to land fill. Send it back to the manufacturer if unsure.

- If you don't feel confident in changing the battery, or can't find the correct replacement please call us, for a small fee we will be happy to service your unit.

Steps

Attention: Take Care: Risk of electrical shock! Risk of fire (See "Important Notes" on page 3)

1. Turn the SV2/RSG1 off. Be careful not to press firmly on the front of the case as this can sometimes turn the unit on.
2. Place the SV2/RSG1 face down on a clean working surface.
3. Unscrew the six main case screws.
4. Turn the unit over so that its face is facing up.
5. Pry the front off, note there is an o-ring seal. The seal may be stuck to either or both surfaces. If it comes out of the groove simply press it back in.
6. Disconnect the battery leads. Always disconnect the leads at the battery terminals NOT the PCB. Do not allow the wires from battery terminals to touch each other.
7. Remove the old battery.
8. Place the new battery in and secure it in the same way as the original was secured. Do not short the battery terminals.
9. Reconnect the battery leads.
10. Replace the cover ensuring the o-ring seal is in the groove and cables are NOT pinched between the lid and case.
11. While holding the unit together firmly, turn it back over onto its face and replace the six main case screws.

8.5 Dirty Solar Panels

The solar panel on the SV2 needs to be clean to operate properly and keep the battery charged. Clean off dust etc. using a damp cloth.

8.6 **Errors and Error Codes**

The JVA energizer may stop and display error codes. The error codes are displayed in two places. The first of these is on the Status (red) LED, where it will flash rapidly a number of times. The number of these flashes corresponds to the Error Code. The second place is on the LCD, where it will display a message.

Error Code #	Red LED Flashes	LCD Display	Meaning
2	2	Battery symbol & "Lo b"	Flat Battery: the energizer will recover and re-start when the battery is recharged.
3	3	"Er 03"	Charging failure
4	4	"Er 04"	Fast Pulsing
5	5	"Er 05"	Discharge failure
6	6	"Er 06"	High battery: the energizer will re-start when the battery voltage is supplied.
7	7	"Er 07"	EEPROM write failure
8	8	"Er 08"	Self-calibration failure – insufficient output
9	9	"Er 09"	Self-calibration failure – insufficient capacitor charge
10	10	"Er 10"	Capacitor failure, charged too quickly
11	11	"Er 11"	Calibration error, voltage reading too low for fence conditions
21	n/a	"Er 21"	Opto-coupler failure

For errors 3 and 5 the energizer will try and recover these three errors which are classed as severe errors. This automatic recover process will occur at 7 minute intervals. Error 4 is classed as a fatal error. The energizer will not attempt to automatically restart due to safety concerns. Errors 2 and 6 indicate the battery voltage is either too low or too high. The energizer will restart as soon as the voltage returns to the correct range. All other errors indicate an internal malfunction.

Should the error continue to re-occur, please return the unit to a qualified service centre for repair. There are no user serviceable parts inside the energizer. All internal fuses will automatically reset themselves.

9 Common Fence Problems

The most common problem with electric fences is low voltage on the live wires caused by

- Insufficient ‘earth’
- Shorts on the fence

For tips on fence construction please see an Electric Fencing Manual.

9.1 **Testing the ‘Earth’.**

The ‘earth’ is essential to all electric fence systems. Larger energizers require more earth rods. Additionally, all energizers require a low resistance wired connection from the energizer earth terminal to the earth rod.

Short the end of your fence to earth by hammering a metal stake into the soil and connecting this to the live fence wire. Using an electric fence volt meter or a JVA Electric Fence Fault Finder (do not use a standard multimeter) check what the voltage is at the earth terminal of the energizer. In general you should see a reading less than 300 volts (0.3kV).

9.2 **Testing the Fence, Finding Shorts**

To test the performance of the fence or find faults on the fence an electric fence voltmeter is essential, and a Digital Power Probe is even better. An effective fence will have more than 2 kV (2000 volts).

10 Instructions for installation and connection of electric fences as required under IEC 60335.2.26

10.1 Definitions

Connecting lead

an electric conductor, used to connect the **energizer** to the **electric fence** or the **earth electrode**

Electric animal fence

an **electric fence** used to contain animals within or exclude animals from a particular area

Electric fence

a barrier which includes one or more electric conductors, insulated from earth, to which electric pulses are applied by an **energizer**

10.2 General requirements for electric fences

1. **Electric animal fences** shall be installed and operated so that they cause no electrical hazard to persons, animals or their surroundings.
2. **Electric animal fence** constructions which are likely to lead to the entanglement of animals or persons shall be avoided.
3. An **electric animal fence** shall not be supplied from two different **energizers** or from independent fence circuits of the same **energizer**. For any two separate **electric animal fences**, each supplied from a separate **energizer** independently timed, the distance between the wires of the two **electric animal fences** shall be at least 2 m. If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.
4. Barbed wire or razor wire shall not be electrified by an **energizer**.
5. 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.
    1. The size of the warning sign shall be at least 100 mm x 200 mm.
    2. 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 1, or
        - the substance of TAKE CARE – ELECTRIC ANIMAL FENCE
    3. The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm.

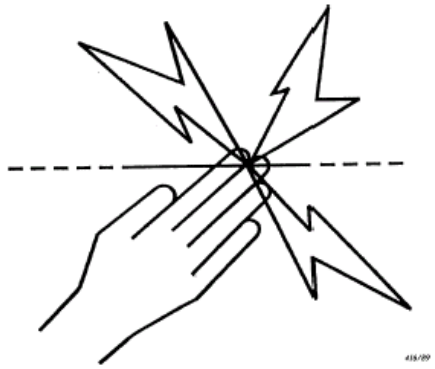


Figure 1 – Warning plate symbol

4. The **energizer earth electrode** shall penetrate the ground to a depth of at least 1.2 m.
5. **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.
6. **Connecting leads** that are run underground shall be run in a 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.
7. **Connecting leads** shall not be installed in the same conduit as the mains supply wiring, communicating cables or data cables.
8. **Connecting leads** and **electric animal fence** wires shall not cross above overhead power or communication lines.
9. 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.
10. If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, the clearances shall be not less than those shown in table 3.

Power line voltage V	Clearance m
<=1 000	3
>1 000 <=33 000	4
>33 000	8

Table 1 – Minimum Clearances from Power Lines

11. If **connecting leads** and **electric animal fence** wires are installed near an overhead power line, their height above the ground shall not exceed 3m. This height applies 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.

10.3 Particular requirements for electric animal fences in Australia

12. A distance of at least 10 m shall be maintained between the **energizer earth electrode** and any other earthing system connected parts such as the power supply system protective earth or the telecommunication system earth.
13. **Electric animal fences** intended for deterring birds, household pet containment or training animals such as cows need only be supplied from low output **energizers** to obtain satisfactory and safe performance.
14. In **electric animal fences** intended for deterring birds from roosting on buildings, no **electric fence** wire shall be connected to the **energizer earth electrode.** A warning sign shall be fitted to every point where persons may gain ready access to the conductors.
15. 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.
16. 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.
17. **Prohibited mounting.** Electric fence conductors should not be mounted on a support used for any overhead power line.

11 Warranty

11.1 **For Assistance**

If you have any questions or need further assistance, or for more information on our complete range of electric fencing products, please see the JVA website at www.jva-fence.com.

11.2 **Service or Repairs**

If service is required, package your energizer carefully and return it to the place of purchase or your nearest JVA distributor along with your proof of purchase.

11.3 **Contacts**

JVA Australia

JVA Technologies
PO Box 408
Narangba QLD 4504
Tel : 07 3013 0582

JVA South Africa

Bloemfontein
36 Kolbe Laan, Oranjesig
Tel : 051 448 6695/6

Cape Town
Unit 15, Viking Business Park
Park Road (off Viking Way)
Epping Industria
Tel : 021 534 5056

Centurion
74 Cantonments Road, Lyttleton
Tel : 012 880 0222

Durban North
Unit B, 213 Kenneth Kaunda Rd
(Old Northway)
Tel : 031 563 0274

East London
Shop 8 & 9, Paphos Park
Devereaux Avenue
Tel : 043 726 6652/60

East Rand (Jet Park)
Aerostar Business Park
219 Jet Park Road, Jet Park
Tel : 011 397 3507

George
Shop 3, 57 York Street, George
Tel : 044 874 0669 / 044 873 2958

Kimberley
29A Schmidtsdrift Road
Rhodesdene
Tel : 053 861 5631

Klerksdorp
72 Central Avenue, Flamwood,
Tel : 018 468 8273

Nelspruit
Unit 4, 20 Rapid Street
Riverside Industrial Park
Tel : 013 752 7152

North Rand (Kya Sand)
174 Bernie Street, Randburg
Tel : 011 708 6442

Pietermaritzburg
51 Winston Road
Tel : 033 342 6727/27

Pinetown
Unit 1, 7 Suffert Street
Tel : 031 702 6351

Polokwane
9 Suez Street, Nirvana
Tel : 015 292 6273

Port Elizabeth
45 Mangold Street, Newton Park
Tel : 041 365 7178/9

Potchefstroom
35 Dr James Moroko Avenue
Tel : 018 297 1488

Pretoria
1185 Steve Biko Road, (977
Voortrekker Rd), Wonderboom South
Tel : 012 335 4290

Rustenburg
Shop 7, Waterfall Mall
1 Howick Avenue
Tel : 014 537 2884

Somerset West
4 Broadway Centre
Urtel Crescent
Tel : 021 851 1978

Upington
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Vanderbijlpark Manufacturing (Pta. Wire)
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7 Elgar Rio, Elgar Street
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