

MGG LX-Polar Electric Fence Energiser

Operator's Manual for Model: LX-Polar II

This MGG LX-Polar II Electric Fence Energiser is a comprehensive perimeter or strip fencing energiser and is an ideal solution for those who want a simple, efficient and cost-effective system to power their fences. It is easy to install and can be operated using either AC mains power, 12 volt (v) deep cycle lead-acid/gel battery or in conjunction with a 40 watt (w) solar panel, making this a suitable system for larger scale settings where no mains power is available. As a combination, fixed or portable system, the MGG LX-Polar II Electric Fence Energiser provides flexibility with pasture management and is the ideal solution for short or long-term animal control or rotational crop grazing.

Main features include:

- Energises up to 30km of clean wire
- Powered by: AC mains power or,
12v deep cycle lead-acid/gel battery (not included)
40w solar panel (not included) in conjunction with a 12v battery as above
- 6 operating modes including a cost-efficient day/night power save
- 2 different pulse intervals of 1.5 seconds and 2.5 seconds
- LED display which shows the pulse voltage
- LED display which shows the voltage and status of the battery
- Waterproof and dustproof

Performance Characteristics

- Working distance of single wire fence is up to 30,000m
- Stored energy: 2.7joules
- Output energy: 2.0joules
- Consumption: 3.5w

Package Contents

- Operator's Manual
- 1 x MGG LX-Polar II Electric Fence Energiser
- 1 x Mains power adaptor
- 1 x Lead-out cable (red) to connect energiser to fence
- 1 x Earthing cable (green) to connect energiser to earthing system
- 1 x Set of leads to connect energiser to 12v deep cycle lead-acid/gel battery option (red and black clips)

Warranty

MGG electric fence energisers are warranted against faulty manufacture for a period of 12 months. This is a “return to base” warranty and if the unit cannot be repaired immediately it will be replaced with a new one. The customer will cover the cost of returning the unit to MGG and MGG will cover the cost of returning the repaired/replaced unit to the customer.

MGG Operator’s Manual

This manual is designed to ensure you achieve optimum results from your MGG LX-Polar II Electric Fence Energiser. To ensure maximum output with minimum complications and optimum safety, we advise you to follow the guidelines carefully concerning the correct installation of your fence energiser and the required earthing system. Anything less will substantially affect the performance of the energiser and can result in unnecessary complications and installation expense.

Contents	Page number
How does an electric fencing system work?	3
Installing the MGG LX-Polar II Electric fence Energiser	3
Installing the earthing system	5
-location of the earthing system	6
-earth stakes	7
-connecting the earthing system to the energiser	7
-testing the earthing system	7
Lead-out from the energiser	8
-connecting the lead-out cable	8
-longer length lead-out cable/wire	8
Connecting to the power source	9
-mains power	9
-battery	9
-solar/battery	9
Operational modes of the MGG LX-Polar II Energiser	10
Post and wire spacings	12
Safety	13
Troubleshooting	14
Maintenance	15
Contact information	15

How does an electric fencing system work?

An electric current, generated from an energiser which is earthed, travels along a fence wire as a pulse. The circuit between the fence and the ground is completed when an animal touches the fence wire and consequently receives a short, sharp but safe shock. This provides enough of a deterrent to an animal, making the electric fence a psychological barrier rather than a physical one.

Installing the MGG LX-Polar II Electric Fence Energiser

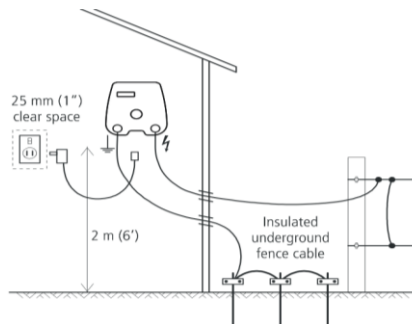
The best place to site the MGG LX-Polar Electric Fence Energiser depends upon which of the three power supplies you choose; mains power, battery or solar/battery. See table 1

Power supply	Benefits	Energiser best positioned
Mains power	<ul style="list-style-type: none"> • Cost-effective • Reliable 	<ul style="list-style-type: none"> • Mount out of reach of children & animals • Position near to a power point either inside or outdoors • Avoid long lead-outs running adjacent to power or telecommunications cables or other earthing systems • Site at least 10metres (m) away from any other electric or telecommunications cables or earth systems • If possible, site the energiser in the middle of the fencing system
Battery	<ul style="list-style-type: none"> • Practical choice in areas of inaccessible mains power • MGG LX-Polar Electric Fence Energiser can be fitted with a 12v deep cycle lead-acid/gel battery* (80Ah is recommended) 	<ul style="list-style-type: none"> • Mount out of reach of children & animals • Position near a power point if using combination mains power/battery and follow guidelines as for mains power • Keep energiser off the ground if siting outside to protect electrical components from insect and moisture damage • If necessary, build a protective box/fence around the energiser • If possible, site the energiser in the middle of the fencing system
Solar	<ul style="list-style-type: none"> • Logical choice for remote areas where no mains power available • For the MGG LX-Polar Electric Fence Energiser a 12-volt deep cycle lead-acid/gel battery (80Ah is recommended) plus a 40w solar panel 	<ul style="list-style-type: none"> • Mount out of reach of children & animals • Keep energiser off the ground to protect electrical components from insect, livestock and moisture damage • If necessary, build a protective box/fence around the energiser • If possible, site the energiser & solar panel in the middle of the fencing system • Position the solar panel to face north in the southern hemisphere and south in the northern hemisphere. Protect from possible damage by livestock • Some adjustment of the panel may be required to accommodate the midday, winter sun

Table 1: Siting the energiser depending on the choice of power supply

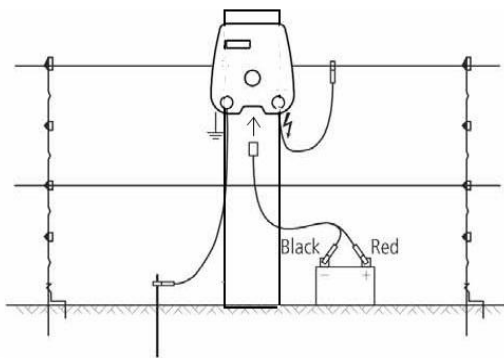
* Important: If using a rechargeable battery, choose one that withstands regular, charge and discharge cycles without damage, such as a marine or deep cycle type. Do not use automotive batteries because they supply high current for short periods and may not provide the continual output you require.

Permanent inside installation – refer to table 1



Drill 2 holes, 87mm apart on the horizontal. Fix the screws (not supplied) leaving a 4mm gap between the head of the screw and the wall. Once in place, line the back of the energiser with the mounting screws and slide down into place.

Temporary outdoor installation – refer to table 1



Mount to a wooden fence post using 1 central screw (not supplied), leaving a 4mm gap between the head of the screw and the post. Once in place, line the back of the energiser with the mounting screw and slide down into place. Alternatively, the handle of the energiser can be hung over a tread-in at the end of the fence, away from animals and children and high enough to avoid vegetation.

Installing the earthing system

This is a vital component of any powered fence system. Electrons travelling from the energiser must complete a circuit in order to give the animal an electric shock. From the energiser, electrons travel along the insulated fence wires, through the animal's body, through the soil to the earthing system – a number of connected earth stakes that absorb electrons in the soil - then return to the energiser. If an electric fence is not earthed correctly, it will be much less effective – see table 2.

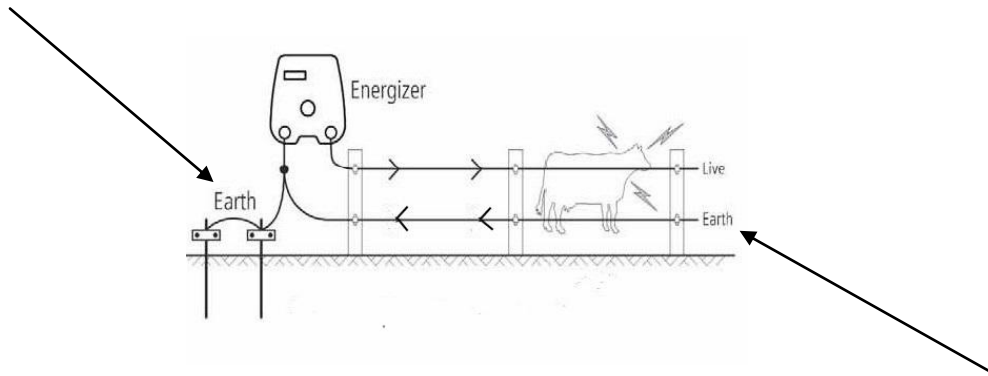
Known factors	What happens?	What's the solution?
Dry, sandy &/or pumice soil types	Allows electrons to disperse rather than be absorbed completely by earthing stakes. Reduces effectiveness.	<ul style="list-style-type: none"> • If possible, choose a better location or an alternative method of earthing such as a bentonite salt earth system (refer to page 6) • Consider additional earthing stakes • Water earthing system to improve soil conductivity
Weeds/vegetation touching live fence wires	Electrons leak causing fence circuit to 'short' and voltage to drop	<ul style="list-style-type: none"> • Check entire fence lines regularly • Weed/grass management to ensure nothing touches the fence wires • Trim back over-hanging tree branches which may also touch the fence wires
Rusty or corroded earthing stakes	Do not conduct electrons	<ul style="list-style-type: none"> • Use clean, GALVANISED earth stakes
Animal urine and manure	Long term exposure corrodes earth stakes	<ul style="list-style-type: none"> • Site earthing system away from animal excreta
Metal pipes, dairy-shed pipework, other electrical or telephone earths	Interference	<ul style="list-style-type: none"> • Ensure the earthing system is sited at least 10m away from any mains earth system and 20m from any dairy-shed pipework
Steel or iron-clad buildings	Interference	<ul style="list-style-type: none"> • Do not connect earthing system to metal buildings
Machinery or livestock	Can damage components of earthing system	<ul style="list-style-type: none"> • Position earthing system away from livestock or other traffic thoroughfares
Mixed metals within the earthing system	Electrolysis, causing some components of the earthing system to corrode	<ul style="list-style-type: none"> • Do not mix metals of differing conductivity e.g. never use copper wire directly onto galvanized earth stakes

Table 2: Factors known to affect an earthing system

Location of the earthing system

The following examples are to help you locate a suitable position for your earthing system given a variety of conditions:

- All-live earthing system: Recommended where the soil is highly conductive, i.e. most moist soils.



- Earth-wire return earthing system: Where soils are not conductive e.g. dry, sandy, pumice soils as well as frozen soils or snow conditions, an earth-return wire should be used in conjunction with the earthing system – as per diagram
- Bentonite salt earthing system: A known alternative for extremely dry soil conditions. A mixture of bentonite and coarse salt (10lbs bentonite: 5lbs coarse salt, mixed into a slurry) is placed in and around each earth stake. The salt attracts moisture making it highly conductive, while the bentonite retains moisture over prolonged periods.
Note: For this particular application stainless steel earth stakes are required to prevent salt corrosion and should be spaced 10m apart. You will find some great information about the use of Bentonite at the following website: <http://informedfarmers.com/the-bi-polar-system-ef/>

Earth stakes

- For normal earthing use clean, GALVANISED earth stakes. Rust will not conduct electricity!
- The MGG LX-Polar II Electric Fence Energiser output capacity is 2 joules. A minimum of 3 earth stakes is recommended, each 2m in length. Depending on the location and conditions of the earthing system, additional stakes may be required
- Space the earth stakes at least 3m apart (10m apart if using the bentonite salt earthing system) then drive them deeply into the soil leaving a minimum of 10 centimetres (cms) above ground level for the single connecting cable
- Join the earth stakes in a continuous series using clamps and insulated connecting cable
- If using the bentonite salt earthing system, use stainless steel earth stakes and space them at least 10m apart

Connecting the earthing system to the energiser

The MGG LX-Polar II Electric Fence Energiser comes with an earthing cable suitable for portable powered fencing which can be connected as follows:

- Unscrew the BLACK cap on the energiser unit
- Insert the rod of the GREEN earthing cable through the hole of the screw
- Replace the BLACK cap, tighten to secure the rod in place
- Attach the GREEN clip at the other end of the cable to one of the EARTH STAKES
- Test the earthing system

Testing the earthing system

Ideally, you should perform this test at least ONCE each year and also during any dry season. This ensures the earthing capacity is sufficient to meet the demands of the MGG LX-Polar II Electric Fence Energiser. To perform the test you will need:

Several steel rods or lengths of pipe

Fence tester

1x galvanised metal stake at least 200mm in length

- (i) Turn OFF the energiser.
- (ii) Using several steel rods or lengths of pipe, short circuit the fence by laying these against the fence at least 100m away from the energiser. In dry or sandy soil conditions, drive the rods up to 30cms into the soil.
- (iii) Turn ON the energiser.
- (iv) Measure the fence voltage using the fence tester. The reading should be 2kv or less. If not, put more steel rods against the fence.
- (v) Now, check the earthing system by fully inserting the earth probe of the fence tester into the surrounding soil and attach the clip to the last earth stake. The reading should be no more than 0.2kv. If the reading is higher, the earthing system is insufficient and you should recheck the entire system thoroughly.

Lead-out from the energiser

The lead-out cable/wire, which can be installed overhead or underground, carries the electric current from the energiser to the fence. In order to maintain the full level of power, the lead-out cable/wire should have as little resistance as possible.

Connecting the lead-out cable from the energiser to the fence

The MGG LX-Polar II Electric Fence Energiser comes with a short length, low resistance lead-out cable which can be connected as follows:

- Unscrew the RED cap on the energiser unit
- Insert the rod of the RED lead-out cable through the hole of the screw
- Replace the RED cap, tighten to secure the rod in place
- Attach the RED clip at the other end of the cable, to the FENCE WIRE

Longer length lead-out cable/wire

Should you require a longer length lead-out cable/wire than the one supplied then you must consider the following:

- Choose lead-out cable/wire with low resistance i.e. the larger the diameter, the lower the resistance
- Table 3 shows that a 2.5mm or 12 gauge (g) wire has 2½ times the resistance than 4.0mm or 8g wire. Remember, the lower the resistance, the better
- Longer length lead-out cable/wire increases resistance leading to voltage loss
- DO NOT use household electrical cable. It is intended for low voltage use only
- NEVER use copper wire. Where copper joins galvanized wire, electrolysis occurs, destroying the wire
- NEVER use barbed wire
- Use insulated cable, particularly if there is a possibility of contact with any earthing point

Wire Size		Resistance of wire (ohms/km)
Gauge (g)	Wire diameter (mm)	
8 g	4.0mm	14 ohms/km
10g	3.15mm	22 ohms/km
12.5g	2.5mm	35 ohms/km
14g	2.0mm	54 ohms/km
16g	1.6mm	85 ohms/km

Table 3: DC resistance in ohms of a single galvanized steel fence wire over 1km

Other helpful hints:

- If running lead-out cable underground, feed it through a piece of plastic hose or pipe before burying. This not only gives the lead-out cable protection but acts as a warning to anyone who may dig in the area in the future
- DO NOT install lead-out wire close to the ground where potential 'leakage' through vegetation will result in voltage loss
- Keep stray wires well away from the lead-out cable/wire

Connecting to the power source

The MGG LX-Polar II Electric Fence Energiser can operate using mains power, 12v deep cycle lead-acid/gel battery or solar and lead-acid/gel battery.

Mains power

- Attach the mains power adaptor to the energiser – insertion point on reverse side of unit – and plug into the mains power socket
- DO NOT turn the mains power on until the powered fence system is fully constructed and you are ready to use it

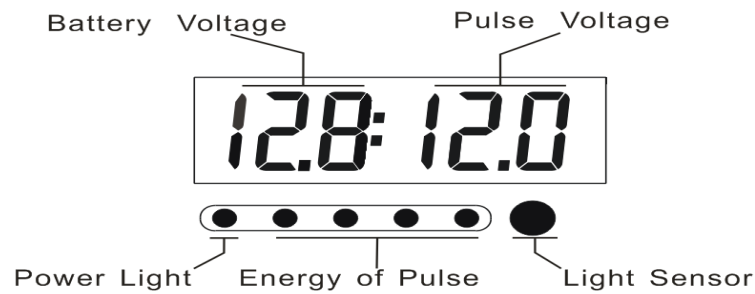
Battery (not included)

- Always use a 12v deep cycle lead-acid/gel battery
- Site the battery in a well-ventilated area
- Attach the battery cable to the energiser – insertion point on the reverse of the unit
- Connect the RED clip to the POSITIVE (+) terminal of the external battery
- Connect the BLACK clip to the NEGATIVE (-) terminal of the external battery

Solar/battery (not included)

- The MGG LX-Polar II Electric Fence Energiser is compatible with a minimum 40w solar fence panel and a 12v deep cycle lead-acid/gel battery
- Set up the solar panel as per the instructions enclosed with it using the appropriate regulator. If you bought your solar panel from MGG it will include the correct charging regulator.
- Set up the 12v deep cycle lead-acid/gel battery as per above instructions for Battery

Operational modes of the MGG LX-Polar Electric Fence Energiser



- Power light

Illuminates green only when connected to mains power and/or battery

- Energy of pulse

Four red light indicators display the strength of the pulse. Maximum strength is when all 4 indicator lights are illuminated. When the output decreases, the indicator lights turn off, one by one, starting from the right-hand side

- Light sensor

Detects either daylight or night-time and will automatically adjust to the appropriate pre-selected mode

- Pulse voltage

Displayed on the right-side of the LED screen

- Battery voltage

Displayed on the left-side of the LED screen

Operational Modes



Standby mode

In this mode the energiser does not generate a pulse voltage. Power light illuminates green. All 4 red indicator lights are OFF. LED screen displays battery voltage on the left-side and the pulse voltage, indicated on the right-side, is 00.0



1.5 second pulse mode

The energiser generates a pulse at 1.5 second intervals. Power light illuminates green. All 4 red indicator lights are ON and flash every 1.5 seconds. LED screen displays battery voltage on the left-side and the output voltage on the right-side.



2.5 second pulse mode

The energiser generates a pulse at 2.5 second intervals. All 4 red indicator lights are ON and flash every 2.5 seconds. LED screen displays battery voltage on the left-side and the output voltage on the right-side.



Battery mode

In this mode, the energiser will generate a pulse at 2.5 second intervals. The green power light is ON. All 4 red indicator lights are ON. The voltage of the battery, displayed on the left-side of the LED screen, is greater than 11.8v. Each time the output decreases by 0.1v, one red indicator light will switch off, starting from the right-hand side. When the battery is low, all 4 red indicator lights will be off and no output will be displayed on the right-side of the LED screen.



Short-day, long-night mode

An inbuilt light sensor automatically detects day or night-time. In this mode, the daytime pulse is generated every 1.5 seconds and the night-time pulse is generated every 2.5 seconds.



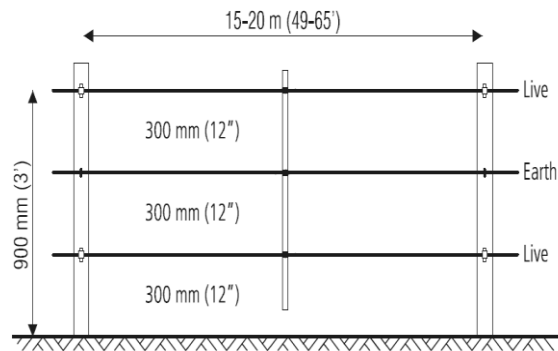
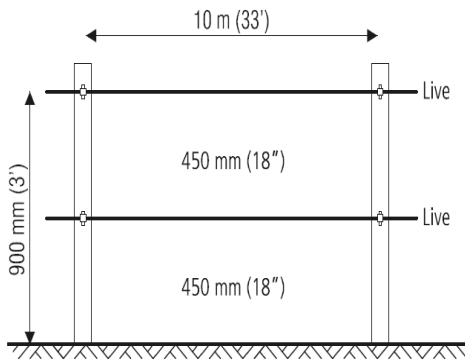
Long-day, short-night mode

In this mode, the daytime pulse is longer and generated every 2.5 seconds while the night-time pulse is shorter and is generated every 1.5 seconds.

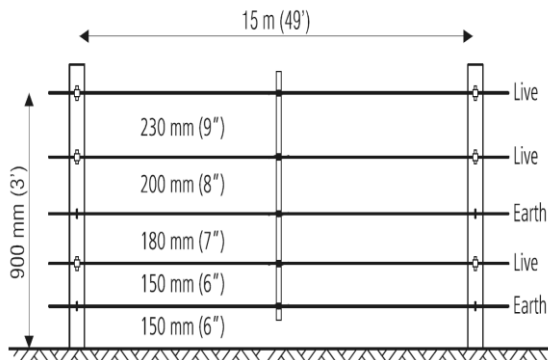
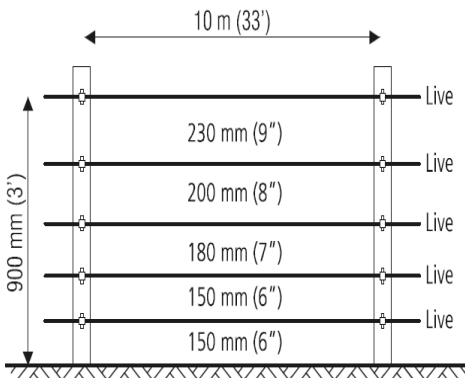
Post and wire spacings

Ideally, plan the fence line, avoiding rough, stony or steep areas. Build the fence with all wires electrified to control your animal type. As a guide, the smaller the animal the more wires required, for example; cattle 1-3 wires, sheep 4-5 wires and for goats and sheep, ensure the bottom wire is 150mm above ground level to prevent them escaping beneath the fence line. The following are some suggestions for post and wire spacings:

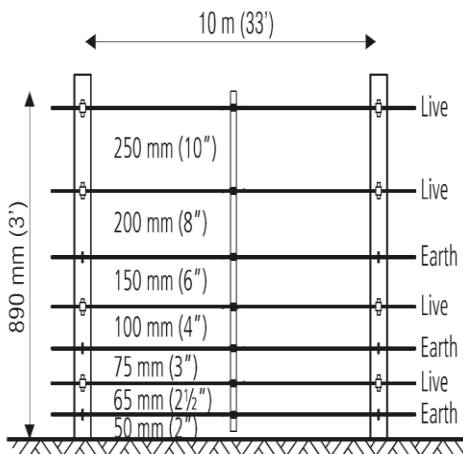
Cattle and horses



Sheep, goat and poultry



Feral animals



For more information on fence construction, please refer to our website www.MGG.co.nz for tips on Permanent Powered Fencing and Temporary Powered Fencing

Safety requirements

- NEVER use more than ONE energiser on one fence at any given time
- The earthing system must be at least 10m from the mains electrical earth
- Try to avoid electric fence wires passing under or parallel to overhead power lines, telephone lines or cables
- If the crossing is unavoidable, make it as close to a right angle as possible
- Electric fences near or under power lines should be no higher than 2m (6ft 8ins)
- All wires should be at least 5.5m (18ft) above ground when crossing a public road
- Don't use power poles to support electric fence or lead-out cable/wire
- Electric fences bordering public walkways require regulation warning signs
Regulation is 200mm x 100mm with 25mm lettering
- Signs should be located within 20m of each end of the fence. Additional signs need to be 100m apart on an electric fence which is adjacent to a public road or thoroughfare and 50m in urban areas
- Under no circumstances should barbed or razor wire be electrified
- Lightning Protection - If lightning strikes your electric fence it will damage your energiser. In areas prone to severe lightning, installing an earthing system to include a lightning diverter is essential. These are generally available from your local Farm Supply Company. The lightning diverter has its own earthing system which provides an alternative path for the lightning that strikes the fence to reach the ground. It consists of separate earthing stakes from the energisers earthing system, (minimum of 3), and should be installed at least 20m away from it. However, **incorporating a lightning diverter is not a guarantee for total protection**, particularly when there is a direct lightning strike to the fence or the energizer itself. Alternatively, completely disconnect the energizer from the power source and earthing system during lightning storms.
- For further information regarding NZ Safety Requirements for electric fencing systems, please visit www.standards.co.nz and see publication number: AS/NZS 3014:2003

Trouble-shooting

A fence tester, such as the MGG Electric Fence Tester, is an essential piece of equipment required to monitor the electrical output along the fence line, perform regular maintenance checks along the fence-lines as well as assisting to find faults quickly and easily, should they occur. If your fence-line is registering less than the recommended 3000v on your fence tester then check the following:

Possible cause	Action
Energiser itself	<ul style="list-style-type: none"> • The MGG LX-Polar II Electric Fence Energiser will power up to 30kms of single, clean fence wire. If you require greater distances, you will need to try a more powerful energiser. Alternatively, re-plan your powered fence system to within the maximum capacity of the energiser. Additional fence requirements will require a second unit • Check the power supply: <ul style="list-style-type: none"> Mains power - check the system is plugged in and switched on -ensure all leads/cables are properly connected Battery -check battery life and amount of stored energy -revert to mains power if battery level below 11.8v Solar/Battery -check battery life and amount of stored energy -change to back-up battery if level low or mains power if possible or charge the battery on mains power
Earthing System	<ul style="list-style-type: none"> • Ensure there are a minimum of 3 earth stakes, more if soil conditions warrant it • Earth stakes must be at least 2m long • Check that earth stakes are spaced 3m apart and buried deeply in the soil • Check all connections to the earth stakes are secure • It is vital that all components of the earthing system are made of the same metal • Ensure the position for the earthing system is damp, preferably shaded and high-mineral content soil, if not, resite the earthing system • If there is a severe dry period, you may need to water the earthing system or consider alternatives such as re-siting your earthing system or using a bentonite/salt mixture – refer to page 6
Lead-out cable/wire	<ul style="list-style-type: none"> • Check the connection to the energiser is secure • If using a longer length lead-out cable/wire to the one supplied, ensure a large diameter, low resistance, cable/wire. Do not use household electrical cable, copper wire or barbed wire • Ensure the wire is sufficiently insulated, particularly if sited underground • Check there are no stray wires and no vegetation touching the lead-out wire • Check all cable joins to ensure connections are insulated and secure
Fence line	<ul style="list-style-type: none"> • Walk the entire fence perimeter tracing a fence tester along the line, checking about every 100m. If the short is serious the voltage will continue to drop until the fault is reached • Check all joins in the wire to ensure they are secure • Check the fence wire itself for any signs of corrosion • Vegetation touching the fence line is the greatest cause of voltage loss. Maintain fence lines, ensuring weeds, low hanging branches and other vegetation growth are kept away from the fence lines. Ensure the wire position and tension is adequate to keep the lines above any vegetative growth

Radio interference	<ul style="list-style-type: none"> • Ensure the earthing system is highly conductive – refer to page 5 • Install the energiser away from any mains power earthing system • Make certain the energiser earth wire does not touch a building or anything which could act as an aerial • Keep all radios and similar equipment away from the energiser • Ensure the mains power supply is properly earthed and all components are in good condition • Keep vegetation away from the energiser itself
<p>Telecommunication interference can be detected by either:</p> <p>i) Clicking noises on the telephone line</p> <p>ii) Slow or variable internet connection</p>	<ul style="list-style-type: none"> • Know where the telecommunications cables are. This includes buried and overhead lines. You may need assistance here from your local telecommunications company • DO NOT run the lead-out cable/wire or the fence wires, for any distance in parallel with telecommunications wires • Lead-out cable/wire and fence wire must be sited at least 100m away from telecommunications lines • Ensure the earthing system is sited at least 10m from telecommunications lines and other earthing systems • Check all wires and connections along the entire perimeter of the powered fence system and ensure they are in good condition • If the fault persists, find an alternate route for the lead-out cable/wire and fence wire so that it runs away from the telecommunications lines rather than alongside them

Maintenance

For a safe reliable electric fencing system, we recommend you follow these helpful tips:

- Regularly wipe down the unit with a soft damp cloth to ensure that there is no build-up of mould etc.
- Do not use any abrasives which may damage the coating of the energiser
- Clean any connections and terminals which may be showing signs of corrosion
- Perform a thorough test of the earthing system at least ONCE each year and also during any dry season
- Inspect fence lines regularly, clearing any weeds, low hanging branches or other vegetation in direct contact with the wire
- Check fence wire positions and tensions to ensure they are adequate to keep the fence lines above vegetative growth
- Ensure all fence wire insulators are intact and in good condition

Contact information

Should you have any questions or concerns please do not hesitate to contact the team at MGG:

Website: www.MGG.co.nz

Email: info@MGG.co.nz