

How an electric fence works



Factors that affect a pulse's strength and shock effect.

- **Joules** of output from the energizer equal the volume of electrons in a pulse. The more joules, the larger the potential shock effect to an animal.
- **Resistance** of conductors, animal and soil. High total resistance absorbs more electrons and reduces the shock effect.
- **Electron loss** via grass contact & poor insulators. Electrons that leak this way are not available to shock the animal.
- **Soil resistance.** This also absorbs electrons and reduces the total electrons that complete the circuit.

Ground rods?

Ground rods guide the pulse from the the soil to the energizer. The larger the pulse or higher the resistance of the soil (because it's dry, sandy or rocky), the more ground rods that are needed to collect the electrons from the soil.

What is the effect of dry soil?

Soil moisture determines the conductivity (or not) of soil. Dry soil increases resistance—a weaker, less effective pulse occurs that does not deter animals.

To overcome this, use more ground rods, Pos/Neg fence and possibly a higher output energizer.

Soil Resistance?

Rocky or sandy soils increase resistance. Sandy soils do not hold moisture well, so they behave similar to clay soils during droughts (increased resistance).

Rocky soils are a little different. The rocks act as a physical barrier to the path of the pulse. In order to reach the ground rod, the pulse must go around the rocks, which reduces available energy at the end of its path.

In these instances, a Pos/Neg fence is recommended. Additional ground rods may also be used in order to increase the receptivity of the ground system.



I just wanted to say how pleased we are with the customer service your company has provided. Fixing our battery free of charge was super awesome of you guys and we really appreciate it. Having four of your poultry nets and two pig fences, we really love your products and, again, the customer service is top notch. You can expect business from us in the future. Please keep up the good work! Thanks again!

– Kelly & Ralph S., Connecticut

A fence will not do something for which it was not designed

3 basic fence designs:

1. Fences that stop animals by pain (energized strands).

Often referred to as pain barrier or psychological barrier fences. These deter animals by the memory of a painful electric shock. If livestock is crowded against these fences, the animals *will* break through. The result is damaged fences, escaped animals and animals that have learned not to fear (and thus avoid) a pain-barrier/ electric fence.

2. Fences that stop animals solely by physical strength.

We use these around corrals, handling yards and lanes. They work well for this but are often too expensive for fencing large fields.

3. Fences that stop animals by both physical strength and pain (energized strands). Our preference for permanent fences.

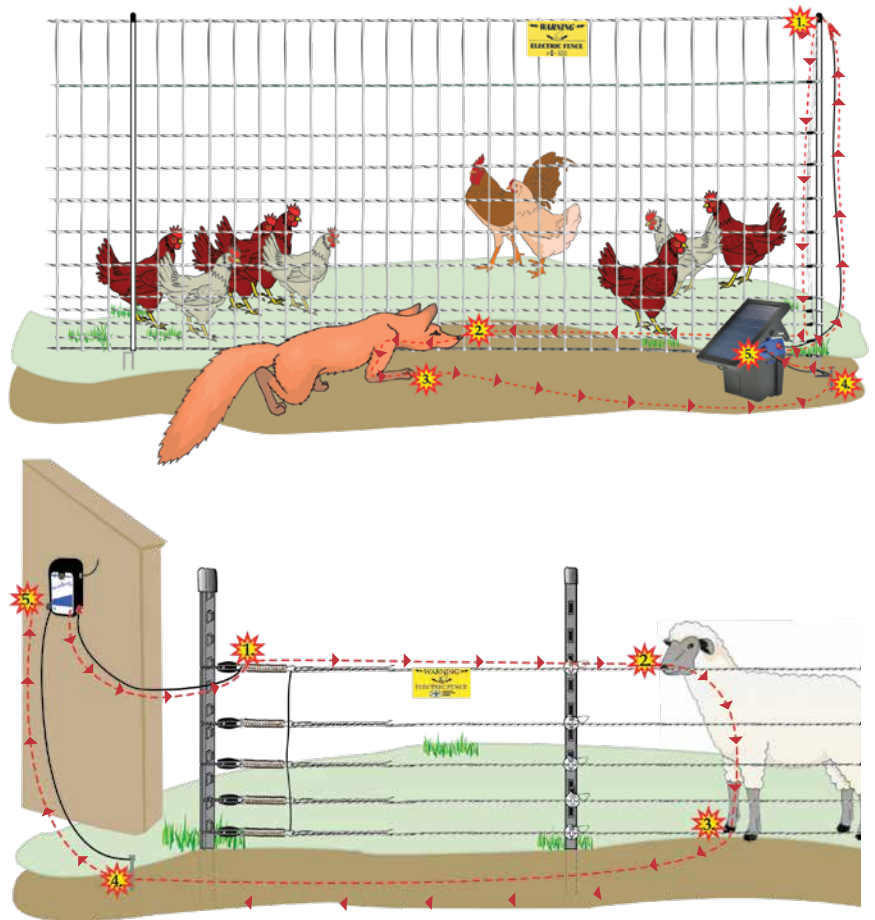
Energized wires are used:

- To discourage animals during breeding season.
- To hold back mothers and their progeny desperate for each other during the days of weaning.
- To prevent animals from damaging posts and wires via scratching and rubbing (hair removal or general itches).

The majority of fences we work with are of the first design. Electric fences deter animals by pain and the memory of pain.

Electric fences are not designed to contain animals in crowded areas (feeders, water tanks). Do not expect them to work in these situations. They will work (and work well) if animals are given plenty of feed, forage and space.

Electric Fence Circuit



When animals (or predators) touch a fence...

- The energizer pushes an electric pulse through its "+" terminal to the fence.
- The pulse travels through the conductors and pressurizes the fence with excess electrons. That pressure is measured in volts.
- When an animal touches the fence, excess electrons enter it and travel through the animal to the soil.
- After exiting the animal, the pressurized electrons travel via the soil's moisture back to the energizer's ground rod.
- The electrons enter the energizer via the ground rod. The amount that returns is the shock effect.

Positive/Negative Fence

A positive/negative fence has half (every other strand) of the conductive strands connected to the fence terminal and the other half connected directly to the ground rod.

The result? When an animal touches both a "+" and a "-" strand, the pulse travels from the "+" strand, through the animal into the "-" strand. From there, it travels directly to the negative terminal via the ground rod.

*Warning: In 1991 a fatality occurred when a 2-year-old child's head contacted an electrified fence while he was crawling on wet grass. The fence was correctly installed. The energizer was a UL approved unit. That is why Premier strongly tells users to keep young children away from all electrified fences. Due to this incident and others like it, experts worldwide now suggest that **human contact by an energized wire to the head and neck is the most dangerous point of contact.** Having said that, known human fatalities from electric fences (all types) are less than one per year worldwide.*

Electrified Netting



What is it?

- It's an electrifiable, prefabricated, portable mesh that arrives at your door as a complete fence. Electric netting requires a fence energizer and a ground rod.
- The mesh is composed of vertical struts or strings welded to electrifiable horizontal strings. It's supported by white (or green) plastic posts.
- The posts are pre-fitted into each roll. Each post has 1 steel spike (or 2) at the base that's inserted into the soil for extra support.
- A typical roll (164 ft) of net including built-in posts weighs only 23 lbs. Shorter rolls are available.

How does netting work?

The horizontals (except for the bottom one that rests on the ground) are electrified by a fence energizer. When livestock (and predators) touch it, they receive a shock from the brief electric pulse—and learn to avoid it.

How reliable is it?

Very reliable—if it's adequately electrified by the energizer.

History?

Electrified netting was invented in the 1960s in England. Premier imported it to the US in the 1970s and has been improving it ever since.

Why is it so popular?

- Much easier and faster than other fences to install, adjust, relocate and remove. Takes less than 10 minutes per roll. Can be done alone but handling tall and/or long rolls of net is easier with 2 people.
- Unlike permanent fences, electrified netting easily adapts to fence lines with corners and curves—and dips and hills.
- No tools are needed. Only hand-tension is needed—which is why it adapts easily to curves, dips, hills and corners. We use FiberTuff posts for additional support at corners and ends.
- Close spacing of the verticals and lower horizontals creates both a physical and a visual barrier for livestock—and their 4-footed predators (foxes, coyotes, etc.).

Why we're netting experts?

- We've been using it for over 50 years. (Premier's founder first used net fencing in England during the 1960s.)
- We use miles of it on our 3 farms year-round, in all weather. (Call us for helpful tips if you plan to use netting during winter.)
- We hear customer likes and dislikes about netting daily.
- We've been the leading US netting source for over 35 years.

Premier's innovations:

- White/black and yellow nets instead of orange to increase visibility to both humans and animals.
- Better net conductivity (Premier's 38 ohms vs others' 380 ohms).
- PermaNet option in 2007 with much stronger, stiffer posts.
- Stronger line posts in 2010.
- Adding more posts per roll in 2011 (we call these Plus Nets).
- FiberTuff support posts in 2013.
- ElectroNet, ElectroFence and Poultry NetGates in 2017.

Netting protects or contains...

What users like about it...

- It works so well. No other portable fence even comes close to netting's effectiveness in the field.
- It's so quick and simple to move. So users fence a few days' worth of grass as needed instead of an entire field.
- Each roll is a complete fence.
- Requires little tension and adapts easily to curves and hills. The adage "the best fence is a straight fence" does not apply to netting.
- Does not need a gate. Instead, just disconnect the power and remove an end post to make an opening.
- The rolls, with posts included, are not heavy (average 23 lbs). Most folks are able to carry them with ease. Shorter nets are even easier to carry and handle.

What users dislike about it...

- It must be moved when tall grass covers the lower "live" strands. The alternative? Apply a strip of a herbicide to kill vegetation.
- Ice and heavy snow can flatten and thereby damage it.
- High winds can bend it.
- Animals can become entangled in it and die. On a % basis, entanglement is very rare, but it can and does occur.
- **That you can't (or shouldn't) ever jump or step over netting when it is energized. First turn it off—always!**

To reduce risk of animals challenging netting...

- Use a high output energizer to combat weed contact and intimidate animals. If your soil is dry, use a wide-impedance unit.
- **Never** leave netting unenergized.
- **Do not** allow animals of the same species (i.e. sheep/sheep) to be on both sides of a net simultaneously.
- **Never** use netting to separate mothers from weaned progeny.
- **Never** force animals against netting. It's not a physical barrier.

Why a taller net is not always the best choice...

- Because shorter nets are:
- Easier to install and remove.
 - Less affected by high winds.
 - Less expensive (usually).



Sheep & Goats

ElectroNet 9/35/12 contains sheep/lambs and goats/kids and protects them from coyotes, stray dogs and foxes.



Poultry

PoultryNet protects poultry from ground based predators—coyotes, foxes, dogs, raccoons and (yes) even bears.



Pigs/Feral Hogs

QuikFence 6/30/12 is an instant fence for pastured pigs. Also see our HogNet to protect against feral hogs.



Sweet Corn

RaccoonNet 4/18/12 is the most reliable fence to keep raccoons from sweet corn. 18" netting is easy to install around your patch.



Gardens

VersaNet Plus 12/60/3 keeps dogs and wildlife out of fruit, flower and vegetable gardens.



Beehives

Bear QuikFence 12/35/12 protects beehives from wildlife (bears) and curious livestock (cattle, goats or pigs).



Windbreaks

PermaNet in heights from 48" to 68" keeps out deer. You can also use Deer QuikFence.



Soft Fruit

Use PermaNet 12/48/3 (above) & 10/48/6 to protect soft fruits from raccoons, deer and other wildlife.



Large Livestock

Cattle and horses are very sensitive to electric fences (Cattle QuikFence shown above).

And stops predators like these & more...



Some common key fence questions

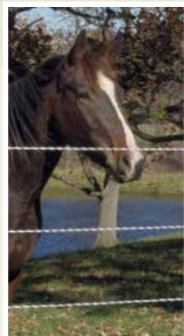
Q. Should the fence be energized?

A. Absolutely. Why?

- An electrified strand has a zone of pain. Fewer strands are needed if one is energized. Both material and the labor to install is reduced.
- Energized fences last longer and require less maintenance—because animals do not crowd, rub or scratch on them. So the fence wires (including wires that are not energized) require less tension to do their job. And braces and corner posts will last longer.
- Animals are more surely contained or excluded during breeding and weaning.



Hi-Tensile Wire Fence



Rope Fence

HT wire fences (left) like these are not easily seen and therefore not advised for horses. By comparison the rope fence (right) is visible and critical for animals that move at high speed (e.g. horses, deer) and/or have poor depth perception.

Q. How visible should a fence be?

A. It depends upon the species.

Horses and deer move at high speed and have restricted color perception (compared to humans). They often fail to see small or dark fence wires like MaxiShock and some polywires and charge through them.

That's why it's wise to include one or more strands of bicolored rope or tape (both highly visible) in multistrand fences.



Q. What specific animals need to be fenced in or out?

A. Always design and build for the most difficult species. Rules of thumb:

- Most sheep and goat fences will stop cattle. The inverse is not always true.
- Fencing adult males (bulls, rams, stallions, billies) in/out during breeding season requires taller fences with closer wire/strand spacing and more powerful electric pulses (in joules, not volts).
- Fences for mixed sizes and species (ewes with lambs, cattle and sheep, etc.) require more strands than uniform groups of animals.
- Certain breeds need better fences (e.g. flighty Romanov sheep, Chianina cattle).

Q. How keen will animals be to breach the fence line?

A. Build for the worst-case situation.

Some situations that require more secure fences:

- **Hunger.** Starved animals will eventually challenge most fences.
- **Weaning.** Strong physical barriers are essential to success.
- **Breeding.** Libido induces animals to challenge rules and fences.
- **Boredom.** Animals in corrals, stalls and feedlots often crave any entertainment or activity.
- **Gateways and handling yards.** Animals often push each other into fences when being moved.
- **Goats.** They are escape artists.
- **Fear and fright.** Predators or loud noises can cause prey species to run in terror into any fence, no matter what fence design.

Q. Do the animals know the fence?

A. Local animals and wildlife get to know a fence by appearance, location and pain memory. If it's a strong or painful fence, they avoid it.

New animals just off a truck often charge into permanent fences and straight through temporary or semi-permanent fences.

Temporary fences that are not physically strong pose the greatest risk of escape.

Q. Where will the fence be located?

A. The best designs depend on:

- Is the terrain flat?
- Will the fence go over hills, across ditches or around curves?
- Is fence line brushy or around trees?
- Are the soils rocky, sandy or firm?

Some advice for folks new to farming and fencing—

Fences...

- All fences, no matter the design, will need maintenance and repairs.
- Electrified fences should never touch wood, metal or any other conductive material. If they do, fence voltage will be sharply reduced.
- Animals and poultry will chew or peck on non-electrified string fences.
- When the soil is dry, fences that rely on the soil to carry the pulse to ground rods do not work as well.
- When the soil is frozen, moving fence is much more difficult.

Energizers, batteries & accessories...

- Repeatedly going below a 40% charge on a lead-acid battery will reduce its ability to hold a charge.
- You need special insulated wire to carry power to a fence, not just any insulated wire from a store.
- You need a ground rod to connect to the negative terminal of the energizer. (Don't connect the energizer's negative terminal to the other end of the netting.)
- No electric fence should be plugged directly into an AC outlet. An electric fence must be connected to an energizer, not an outlet.

Posts...

- For ends, curves and corners, posts must be strong and stable in order to take the strain.
- For very hard or frozen soil, drill pilot holes for netting posts. Never use a hammer to drive in standard net posts—it will damage them. Use a dead-blow hammer for drivable posts.

Animals...

- Will at some time get sick or hurt.
- You cannot save every animal that gets sick or injured.
- If you own animals you will need a veterinarian at some point. So establish that relationship before an emergency occurs.
- You must train animals to know and respect electrified fences.
- Animals can get caught in nearly any type of fence and may become injured when they do.
- If you do not keep a fence energized at all times your animals will lose fear of it. Then they will go over, under or through it. Retraining is difficult.



Q. How visible is Premier's white/black net (and now also yellow) compared to orange or red nets?

A. White/black provides contrast against all backgrounds 24/7 and is therefore more visible to humans and animals.

Orange and red are visible to humans in daylight but not at night. To most animals these colors appear gray in daylight and are nearly invisible at night—not safe for them.

Yellow is visible to both animals and humans—but less so than white/black. Less visually attractive too.

Q. What's the cost if the fence fails?

A. The higher the potential cost (in time and money) of a failure, the more reliable the fence design should be.

Examples:

- **Along public highways.** In some states you are liable for damages.
- **Around stored feed.** If animals gorge on grain, death may occur.
- **High-value protection,** gardens or livestock from predators.
- **Fences with animals on both sides.** Mix-ups are time-consuming and costly.



Q. Will heavy snow or ice occur?

A. Ice can bring down the strongest power lines so all fences are vulnerable to it. Heavy ice/snow can weigh down electroplastic conductors. This stretches and wears the plastic and metal filaments.

Q. Why are lane and corral fences considered special situations?

A. Animals are often forced into contact with these fences. They need better visibility, more strength and, if possible, no energized wires.



Q. Are dry periods common?

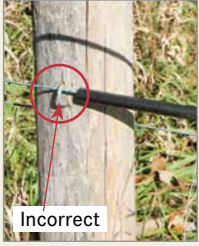
A. Electric fences typically rely on soil moisture as a conductor. When the soil is dry or covered in dry snow, normal electric fences and low-impedance energizers may not work effectively to keep animals in/out.

Solutions for this:

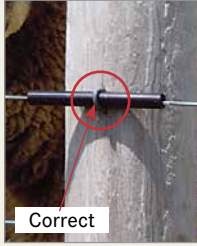
1. Use a wide-impedance energizer. They're less affected by dry soil.
2. Use a Pos/Neg fence. This type of fence has wires connected to energizer's negative terminal. Animals must touch both a "+" and "-" strand, but it works well.

Common Fencing Mistakes

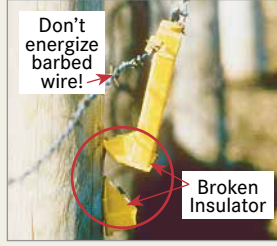
Insulator/Conductor Mistakes



Incorrect



Correct



Don't energize barbed wire!

Broken Insulator

Insulator was too weak to withstand the up and down strain from the wire. Energizing barbed wire is a serious risk.



Most common tube insulator error

This SupaTube has slid sideways out from under the staple—allowing the post to leak energy to the soil (if wet from dew or rain).

While HT wires need to be allowed to move inside a staple, it's the opposite for tube insulators. We prefer ring insulators instead of tube insulators.

Too weak to take up/down strain

Years ago almost all insulators were weak and badly designed. Now only 50% are not up to the task.

Buy the best (not necessarily the most expensive) that have plenty of plastic in them. Stick to white or black ones, and only those labeled with added UV resistance.

Pay attention to the little things

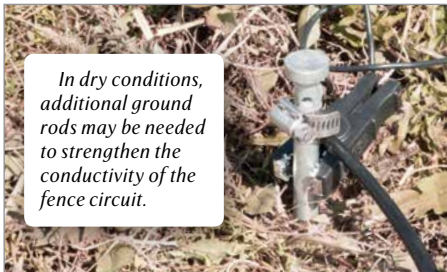
This insulator was installed upside down—which allowed the tape to drop out of it.

Broken strands

Deer and livestock can break insulators and conductors. It is essential to repair them immediately.

This rope was easily repaired with a RopeLink.

Energizer and Battery Errors



Not enough earth (ground) rods

Extra ground rods increase the size of the energy "collection field" of the earth terminal. This, in turn, usually increases the potential size of the pulse.

Use galvanized ground rods (rust is an insulator). Connect them properly with stainless steel clamps.

Buying an energizer or battery that's too weak or too small

When most folks first use electric fencing, they have limited ideas about its potential. So they limit their investment.

If done properly it works. Most folks then extend the fence line further, etc.

Soon, the longer fence is too long for the small energizer to keep fully energized.

The same is true of batteries. A 12 aH battery discharges quickly if paired with a .5 joule energizer without a solar panel. Pair with a solar panel or larger battery.

Believing the "miles of fence" claims

They are flat-out misleading. Units may run miles in ideal conditions, but not actual field conditions.

So why do many manufacturers still emphasize miles? Because other manufacturers do it. They fear that, if they don't include a "miles" claim, a customer will not buy their product.

For 40 years, Premier has refused to make such inaccurate claims.

Allowing bare copper wires to touch steel wires or ground rods

If you do, corrosion by electrolysis will occur. **Result?** Poor contact and a weaker pulse. It's best not to use bare copper materials at all in electric fences. (Tinned copper is not a problem. The tin coating prevents any electrolysis.)

Most common DC battery error

Not keeping the battery charge level high enough. When a deep-cycle lead acid battery is drawn below a 40% charge, it is less able to ever be fully recharged.

Batteries with reduced charge levels may freeze in extremely cold weather. It pays to check the energizer batteries often—particularly during the cold of winter—to make sure your energizer and fence are working.

Solar Panel Errors



Not keeping the panel clean

Snow, dirt, dust and debris stop panels from recharging batteries. Solution? Clean the panels often.

Solar panels not in full sun

A solar panel won't function at its full potential if it's not fully facing the sun's rays (perpendicular to the sun at midday) for the maximum number of hours per day.

Depending on the time of year and your geographical location, the energizer's solar panel angle should change from nearly flat in summer to nearly vertical in winter to maximize sun exposure.

Common Fencing Mistakes



Grounding out on metal or wood

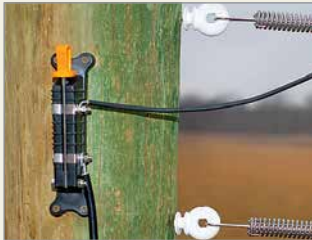
When netting touches a building (or any grounded object) it can leak energy away, particularly if the building or post is metal. To avoid this, install the net 2"–3" away from the building. It's far enough to prevent voltage loss and close enough to deter predators (conductors are tied off around the posts).

Common voltmeter mistakes

1. **Not buying a good one.**
I know we sell 5-Light testers—but a true digital voltmeter is more accurate and informative for the user.
2. **Not using it.**
Many folks wait for animals to tell them (by escaping) when the voltage is too low.
3. **Allowing your tester or voltmeter to shock you.**



Don't grab the ground probe while the tester is still on the fence (see above right). Remove tester from the electrified wire first. Then pull the ground probe out of the soil. Do not pull out the ground probe by its wire.



Too few cut-out switches

Cut-out switches allow you to disconnect sections of fence without turning off the entire fence.

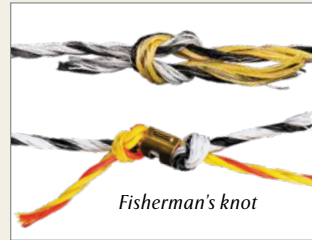
When looking for shorts in the fence, cut-out switches allow you to quickly determine which length of fence contains the problem.



Energized wires too close to barbed wire

A stuck animal or human could receive multiple shocks before getting away. This can kill.

- Fences should be either:
- All barbed, no hot wires.
 - Smooth wire with an offset energized wire.



Poor knots

Square knots for electroplastic conductors (twine, rope, polywire) often make poor electrical contact.

A fisherman's knot is more reliable. Adding a brass ferrule (included in net repair kits) in the center enhances electrical contact.



Exposing the public to "hot" fences

Always put warning signs on energized wires so visitors know they will "hurt."

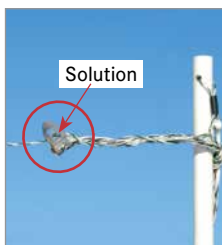
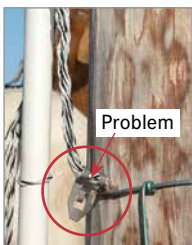
Place all conductive wires on the *inside* of permanent fences so "outsiders" can't readily make contact with them.

Too busy to check the fence

Problems increase and effectiveness declines without routine checking. Some fence designs are easier to maintain than others.

If animals ever lose their fear of electrified fences and its pain-giving effect (which can happen without proper maintenance), it takes considerable extra time and effort to retrain them.

What to do with net clips



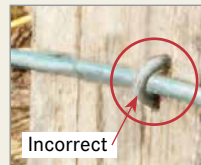
Problem: Allowing clips to come in contact with grounded wires and posts.

Solution: Wrap the clip back around an electrified strand on the netting to hold it in place.

Post Mistakes

Driving staples that hold HT smooth wires tight against the post

High-tensile wires need to be free to move. This enables the total length of wire to expand and contract as temperatures change and when animals or tree limbs hit the fence.



Spacing line posts in permanent fences too far apart

Those who suggest long spacing distances are describing straight HT smooth-wire fences in flat open country (not hilly country).

Much closer spacings are necessary for uneven terrain and irregular fence lines.



Troubleshooting Electric Fences

Is the problem with the energizer or the fence?

1. To check—first turn off the energizer.
2. Then disconnect the wires going to the fence and ground rod system.
3. Turn the energizer back on.
4. Then measure the voltage on the energizer between the 2 terminals (fence and earth) with a digital fence voltmeter or other fence testing device. Touch one end to “-” earth terminal and the other end to “+” fence terminal.
5. If the tester reads under 4000v, the energizer (or possibly the battery if it’s a battery/solar energizer) is the problem.
6. If the tester reads more than 4000 volts, the energizer is working properly and the fence is the problem.

If the fence is at fault...

How to find the fault(s)

First, re-attach the fence and ground wires to the energizer and turn it on. Then you must walk or drive along the fence looking for situations that are reducing the voltage.

1. If you have a **Fault Finder**, use it.

The arrow will tell you which direction the energy is flowing (leaking). Follow the fence from the energizer outward. Move in the direction of the arrow, testing as you go until you arrive at the problem.



Note: Fault Finders can tell which section of net is at fault if you touch it to the clips where 2 nets join. But they are not able to locate the exact location within a net because energy flows in multiple directions within a net.

2. If you don't have a **Fault Finder**, but do have a **voltmeter or fence tester**: Walk or drive along the fence.

a. **Netting**—look for:

- The lowest live strand touching a post's metal spike near the soil.
- Damaged strands touching the soil.
- Netting touching a wire or steel post.



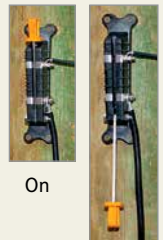
- b. **HT wire, twine or rope fences**—look for:

- Damaged or broken insulators.
- Any point where an energized wire touches the soil, a steel or wood post or a non-energized wire. Separate them.
- Branches lying on the fence, forcing wires together (*above*). Remove them immediately.

- c. **Listen for snapping sounds** as you walk along a fence. These occur when a conductor is close to a grounded wire, stake, tree or large green weed.

- d. **Separate the fence into parts**—

by turning off switches, if it's an HT permanent wire fence, or by disconnecting portions of electric netting. Then progressively reconnect it, checking voltage as you do so. When the voltage drops, you've located the problem.



3. If no faults are found the soil may be too dry. Conventional fence systems rely on soil moisture to be effective. However, not all areas have the required moisture.

If that's the case, a **Pos/Neg fence** (*see at right*) can be used. These fences are wired to allow the use of every other horizontal strand as an extension of the ground terminal, eliminating the dependence on soil moisture to carry the energizer's pulse.

In order to receive a shock, the animal must touch both a “+” and “-” strand. This delivers more pain to animals than normal nets. Fence maintenance is very important—grass contact across both a positive and negative wire reduces voltage. Pos/Neg fences can be used as all-positive in moist conditions, if insulated and wired correctly.



If the energizer is at fault...

110 volt plug-in unit

1. Use a test light to check if the 110v outlet is working.
2. If the test light works and the energizer does not, call Premier.



DC battery unit

First determine whether it's the battery or the energizer that's not working.

1. If it's a 12v energizer, carry it to a nearby vehicle. Attach the input cords carefully to the battery.
2. If the energizer works, then the energizer's battery needs to be recharged or replaced.
3. If the energizer does not work, call Premier.



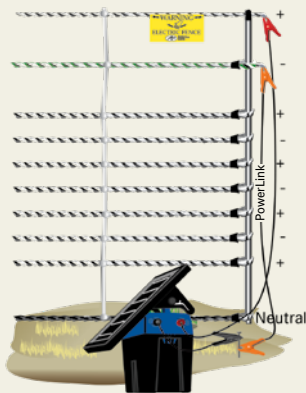
Solar unit

1. Disconnect energizer from the battery.
2. Carry it to a nearby vehicle. Attach the input cords carefully to the vehicle's battery.
3. If the energizer works, then the unit's battery needs to be recharged or replaced.
4. If the energizer does not work, call Premier.



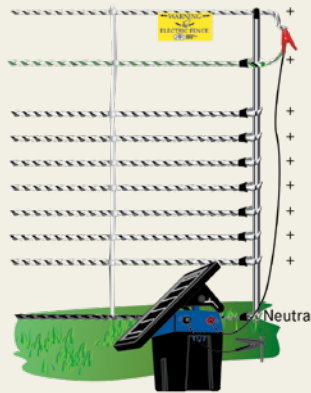
PN (Pos/Neg) for dry conditions

Connect energizer fence lead to positive "+" net clip and energizer ground lead to ground rod. Connect a PowerLink from negative "-" net clip to ground rod.



All strands electrified for moist conditions

Connect both net clips together and attach energizer fence lead to net clips. Then attach energizer ground lead to ground rod.



VS

Fence testing mistakes

- Standard multimeters are not able to test fences (fence voltage is too high). Use a fence voltmeter.
- If receiving an inconsistent reading, check voltmeter's battery.

"Insulated" animals

Animals standing on dry soil or snow may not receive an adequate shock even when the fence is properly energized. Why? Dry soil and dry snow act as insulators, reducing the ability of the energizer's electric pulse to pass through an animal. If this is the case, Pos/Neg fence systems or higher-output energizers are better adapted for such situations.

Is the energizer "On"?

Push-button energizers must have their on/off switch activated.



Energizer testing mistakes

- Some testers require batteries. If the tester's battery is low, it will give no reading or a misreading (sharp contrast in consecutive pulse voltage).
- Fault finders are unable to test fence energizers.
- If a battery energizer's light is pulsing but less than 3000v is measured across the terminals, check the battery charge level (with a digital battery tester). Energizers with undercharged batteries may produce an insufficient pulse.