Energizer Chart Data

Explanation of columns and values

1. Impedance type (wide or low)
A simple way to indicate which units are more capable of responding to challenges of drier soils, snow-covered soils, and pushing energy through animals with high internal electrical resistances (deer, goats, rabbits, poultry and small sheep).

2. Peak output (in joules)
Guide to an energizer's ability to cope with high levels of green vegetation contacting energized wires. Higher joules are better (for green grass).

3. Joules at 5000 ohms
The ohms refer to total circuit resistance (*see below*). Units with higher joules can energize more fence when soil is dry or snow-covered.

4. Pulses per minute
More is better. Less time between pulses means it's more likely to deter an untrained animal.

5. Battery input
This column describes the battery input required by each energizer.

6. Fence load LED lights
Not the same as a simple "on" light. These indicate if voltage and energy levels are enough to stop most animals. If not lit, check the fence for problems.

7. Minimum ground rods (ft)
Normal total ground rod requirements. More may help in certain conditions.

8. Draw in watts/hour
Expected AC draw in watts.

9. High-low output
If there is a switch to reduce output energy and battery input demand.

10. Battery amp draw per hour on clean(c) and weedy(w) fences
Expected milliampere (mA) drain from battery per hour at high output levels for clean or weed-laden fences.

Predicts size of battery needed (or solar panel) and how often you will need to recharge it. Large numbers mean larger panels or more frequent recharges.

Note that mA draw of Patriot units is the same for both clean and weedy fences. For IntelliShock units, when a fence is clean (no green weeds), the mA draw is low. If a fence is weedy, the mA draw of IntelliShock energizers is higher. Thus battery and solar panel requirements (columns 11 and 12) are higher and lower.

Use Deep Cycle (DC) instead of automotive batteries. Why? Automotive batteries can only be drawn down 5% before they lose recharging ability. DC batteries can be drawn down 60%. DC batteries recharge slowly (1 to 2 amp/hr).

Do not go below a 40% charge on a DC battery whether in use or in storage.

11. Days between recharging for clean(c) and weedy(w) fences
Predicts when a 12v 100 amp hr deep cycle battery will need recharging under clean (no weeds) conditions. Assumes being drawn down to 40% between recharges. (An equal size vehicle battery must be recharged 3X more often to prevent damage to battery.)

12. Solar panel for clean(c) and weedy(w) conditions
Predicts solar panel size (in watts) advised for each energizer under clean vs weed-laden fence conditions.

The low number of a range assumes 6 average solar insolation hours per day (southern US or summer in north).

The high number assumes only 4 insolation hours per day. Using a larger panel allows a smaller battery to be used and vice versa.

Note regarding 10, 11 and 12: Clean (c) fences have no contact with green/wet weeds. Wires in contact with green weeds (w) 6" from soil cause 7 times more energy drain than wires contacting weeds 30" from soil.

What's total fence circuit resistance?

The size of the pulse that travels from an energizer's fence terminal varies in volts and joules according to the sum total of the resistances in the path between the 2 terminals.

These resistances in ohms (Ω) include all of these "numbers":

a. The resistance of wire/rope/polywire/tape (100 to 10,000Ω/mile).
b. The resistance of the animal at the point of contact (50 to 2,000Ω).
c. The internal resistance of the animal's body, hooves, hair (100 to 500Ω).
d. Resistance at point of contact with the soil (grass, leaves, wet vs dry soil).
e. Resistance of the soil (20 to 50,000Ω) if it's not a Pos/Neg-wired fence system.
f. The resistance of the ground rod system and the soil around it.
g. The resistance of weeds (25 to 50,000Ω). It operates in "parallel" with b, c and d.

The total circuit resistance of a fence varies enormously by the hour, day and week. The key factor is the moisture in the soil, air, plants and the animal's nose, hide and feet. They depend on changes in dew, rain, type of vegetation, wind, etc.

The only constant is the conductor.

Therefore, the total resistance of a mile of single-strand, weed-free cattle/deer/horse fence may vary from 600 to 10,000Ω throughout the season. But an extra mile may add only 10Ω to either total (because the other factors do not change).

The circuit resistance of 1500 ft of weed-free, temporary electric netting varies from 200Ω to 10,000Ω depending on the soil moisture. Again, adding an extra 1500 ft of ElectroNet may add only 50Ω.

A Pos/Neg fence (alternating hot/ground) is a wise option when the soil and animal resistances exceed 5,000Ω.

What is heavy weed load?
Grass growing up to and onto the conductive strands of the fence (this drains the pulse strength). Green (moist) grass drains a fence; brown (dry) does not.

Does the length of the grass/weed stems that reach the lowest live wire make a difference?
A big difference. The longer the stem the less energy leakage will occur.

Why should I care?
More resistance and weed drain = a weaker pulse. Livestock and predators will not be stopped by weak pulses.

Wide-impedance vs low-impedance?
Wide-impedance energizers offer higher pulse strength when the soil is dry and grass is brown.

Low-impedance units excel when soil is moist and grass is green.

Side-by-Side Energizer Comparisons

Type		Energizer	Product Number	Price	(1) Impedance Type	(2) Peak Output (in joules)	(3) Joules at 5000Ω	(4) Pulses per Minute	(5) Battery Input	(6) Fence Load LED
AC 110V Plug-In		**Kube 4000**	115110	$159	wide	2.30	1.24	48		
		HotShock 600	113700	$294	low	5.00	0.29	50		
AC/DC Plug-In or Battery		**HotShock 5**	1120051	$99	low	0.50	0.24	38	12v	
		Patriot P5	115000	$102	low	0.50	0.26	40	12v	
		IntelliShock 10	1120101	$127	low	1.00	0.32	38	12v	
		Patriot P10	115010	$132	low	1.00	0.35	40	12v	
		Speedrite 1000	119006	$149	low	1.00	0.35	25–40	12v	•
		IntelliShock 20	1120201	$157	low	2.00	0.45	38	12v	
		Patriot P20	115020	$161	low	2.00	0.40	40	12v	
		Speedrite 2000	119005	$221	low	2.00	0.39	25–40	12v	•
		Patriot P30	115030	$196	low	3.00	0.45	40	12v	
		Speedrite 3000	119004	$251	low	3.00	0.45	25–40	12v	•
		PrimaShock 4	113001	$149	low	4.3	0.60	24-45	12v	•
		Speedrite 6000	119003	$416	low	6.00	0.59	25–40	12v	•
		Speedrite 6000(i)	119002	$628	low	6.00	0.59	25–40	12v	•
		PrimaShock 8	113101	$179	low	8	0.76	24-45	12v	•
		Speedrite 12000(i)	119001	$769	low	12.00	0.60	25–40	12v	•
		Speedrite 18000(i)	119050	$963	low	18.00	0.86	25–40	12v	•
DC Battery		**Speedrite AN90**	119008	$101	low	0.12	0.09	25–40	6v/12v	
All-in-One Solar		**Solar IntelliShock 30**	113200	$208	low	0.30	0.16	40	12v	
		Solar IntelliShock 60	113300	$258	low	0.60	0.27	40	12v	
		Solar IntelliShock 120	113500	$359	low	1.2	0.37	40	12v	
		Solar IntelliShock 120X	113501	$383	low	1.2	0.37	40	12v	
		Premier PRS 100X	114050	$524	low	1.00	0.35	40	12v	
		Premier PRS 200	114052	$660	low	2.00	0.40	40	12v	
		Premier PRS 200X	114070	$935	low	2.00	0.40	40	12v	

(7) Min. Ground Rods (ft)	(8) Draw in Watts/hr	(9) High Low Output	(10c) mA per hr draw Clean (c)	(10w) mA per hr draw Weedy (w)	(11c) Days per Charge Clean (c)	(11w) Days per Charge Weedy (w)	(12c) Solar Panel Clean (c)	(12w) Solar Panel Weedy (w)
6	4.5							
16	8							
3	4.5		46	46	54	54	7	7
3	4.5		42	42	59	59	6	6
3	4.5		31	90	80	27	10	10
3	4.5		87	87	28	28	10–20	10–20
3	2.0	•	90	90	28	28	10–20	10–20
6	3.3		32	196	78	13	10–20	20–40
6	4.5		163	163	15	15	20–40	20–40
6	3.2	•	180	180	14	14	20–40	20–40
9	4.5		210	210	12	12	20–60	20–60
9	4.8	•	295	295	8.5	8.5	20–60	20–60
12	2.7	•	200	200	27	13	20–60	20–60
18	10	•	650	650	4	4	50–70	50–70
18	10	•	650	650	4	4	50–70	50–70
24	4	•	330	330	17	9	20–60	20–60
36	15	•	1100	1100			90–120	90–120
54	19	•	1400	1400			120–160	120–160
built-in		•	31	31	80	80	n/a	n/a
1			15	29	166	86	built-in	built-in
1.8			20	58	125	43	built-in	built-in
3			28	104	89	24	built-in	built-in
3			28	104	89	24	built-in	built-in
3			87	87	28	28	built-in	built-in
6			163	163	15	15	built-in	built-in
6			163	163	15	15	mounted-on	mounted-on

Notes…

Red numbers indicate energizers with a "wide" impedance output curve.

The larger the number in column (2) the longer the fence can be, the more weed contact can occur and still have an effective fence.

2 joules will cope with twice as many weeds as a 1 joule unit.

The higher the number in column (3) the better this unit will perform in dry soils and with species that have high electrical resistance (i.e. deer, goats).

The higher the number in column (3) the better this unit is for species with higher internal electrical resistance, such goats, deer and poultry.

Draw in watts per hr in column (8)—Plug-in units use relatively little energy when compared to bulbs.

A Patriot P5 uses less than 5 watts per hour. At 13¢ per kwH, that's only 1.5¢ per day.

The Kube 4000, at current prices, is an excellent combination of value and performance for a plug-in unit for short fences—because of its capabilities in both dry and moist soils.

The Speedrite 12000 units are not suitable for horse or domestic pig fences (too much energy).

The AN90 is not large enough in output for electrified netting fences.

Energizer Systems

To Reduce Risk & Liability

Are electric fences a serious safety risk to humans?

Because touching an electric fence is painful and the voltages are high, most assume that the risks from an energized fence must also be high.

That's a myth. Consider that millions of people throughout the world are "exposed" to millions of miles of electric fences every day—***yet there is less than one death or serious injury per year worldwide—and the fence is often not the cause.***

Compare that to the number of annual injuries and deaths that occur from exposure to tractors, skid loaders, PTO shafts, balers, mowers, combines, bulls, stallions, etc.

This is not to suggest that there is no risk at all. There is, indeed, a small level of risk.

And with risk, there is also liability.

To reduce the risk…

1. Be especially careful not to touch an energized wire with the head or spine. For reasons not fully understood, this contact point is worse than contact with hands, arms, feet or legs.
2. Never approach a fence without footwear. Also, wear footwear that ***fully encloses the foot*** (not sandals). Why? Most footwear are poor conductors. So they reduce (by absorbing it) the energy that will pass through your body if you touch a fence with your hands or head.
3. Never energize barbed wire. Animals and humans can become entangled and repeatedly shocked—and thus die.
4. Hang warning signs in all areas and on fences where children and adults may encounter electrified fencing.
5. Use smaller energizers on fences located near children and untrained adults. (Most experts agree that smaller energizers are safer than large ones as long as animal control isn't put at risk.)
6. Make the fence as visible as possible to both humans and animals. Use conductors and posts that can be seen both day and night, and against all backgrounds. That's why Premier has long advised the use of white/black conductors—to provide contrast and visibility. Fence suppliers worldwide are now following our lead.
7. If possible, do not energize wires lower than 12". This allows humans who might contact a wire enough space to fall away from energized wires.
8. Build fences so all energized wires are on the ***inside*** of your boundary fence (less likely to be touched, and anyone who touches them without your permission is trespassing). We achieve this with internal energized offset wires.
9. Never connect 2 energizers to the same fence. (It doubles the pulse frequency).
10. The shock from electric fences can panic animals (e.g. horses) and cause them to crash into fences (or people) resulting in injury to one or both. To reduce this risk:
    a. Do not install electrified wires on feedlot fences, corral fences or around riding arenas.
    b. Reduce the available volts and joules on fences that enclose very small areas (e.g. night pens) to lessen the likelihood of animal stress and possible panic.

What **NOT** to do!

- Never place your head or upper spine near an electrified wire. Accidental head or neck contact can occur when pushing a voltage probe into the soil. Be careful when doing so to avoid head-to-wire contact!
- Never attempt to step over or climb through an energized fence of any kind. Never encourage anyone to touch an electric fence.

What **TO** do!

- Instruct all visitors and children to never touch electric fence.

Warning: *In 1991 an accidental fatality occurred when a young child's head contacted an electrified fence while the child was crawling on wet grass. The fence was correctly installed and functioning properly. The energizer was a UL approved unit. As a result, Premier strongly advises against allowing toddlers access to any electrified fences. Also, due to this incident and others, experts now suggest that human contact by an energized wire to the head and neck may be the most dangerous point of contact. We urge all to especially avoid this kind of contact.*

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Key Definitions

Volts/voltage: A measure of the pressure upon electrons to move from "A" to "B". Very similar to psi in water and air systems.

Electrons can't flow from A to B unless enough voltage (pressure) exists to overcome the sum of the resistance between the 2 points.

Joule(s): A measure of the volume of electrical energy (electrons) in a pulse. Comparable to pints, quarts or gallons in water systems.

When enough electrons (joules) suddenly pass through an animal's (or human's) nervous system, the pain is memorable and cause for avoidance in the future.

Amps/ampere/amperage: Measure of the rate of flow of electrons per unit of time. Similar to gallons per minute for water systems.

Pulse frequency: The number of pulses that occur each minute; 40 pulses/minute equals a pulse every 1.5 seconds.

Ohms (Ω): Measure of resistance to electrical flow. More Ω = more resistance. It's additive. If 1000 ft of wire is 200Ω then 2000 ft is 400Ω.

Conductor: Any material with low ohms/1000 ft numbers such as copper, aluminum, tin or steel.

Water is a conductor. Wood, if wet internally (e.g. sap) or externally (dew, rain), can become a conductor. Similarly moist soil and grass stems are conductors. Animal tissue with moisture in or on it is a conductor.

Electroplastic conductors/netting: A cable or ribbon comprised of small conductive metal (copper and/or steel) filaments and nonconductive plastic filaments. The metal carries the electrons. The plastic provides visibility, strength and elasticity.

Insulators: Materials with high resistance (ohm numbers) such as fiberglass and plastic.

Wood is an insulator—if it is dry internally and externally.

Dry animal hair, wool and hooves are poor conductors and thus are insulators (albeit often poor ones).