

Fence Hawk Plus Monitor/Sensor Specifications

The **Fence Hawk Plus™** is designed to work with ANY electric fence charger commercially available in the world. It's made in the USA.

We certify it for up to 25,000 volts, which is more than any charger on the market puts out, but we've tested it successfully at 60,000 volts.

Other fence monitors measure the average voltage per second (hertz). A change in the hertz (cycles/second) will give a different voltage reading or output. **This type of voltage measurement is extremely susceptible to false alarms** and is only accurate for the hertz or frequency that the instrument is designed for.

Lightning strikes on or near a fence or array monitored this way will often generate a false alarm.

Any alarm system that generates false alarms is worse than no alarm system at all.

The **Fence Hawk Plus™** measures the **absolute voltage** on the fence. It doesn't matter if it's a 3,000 volt rabbit fence or a 15,000 volt rhino fence – the Fence Hawk works on all electrified fences.

Since the voltage pulse only lasts 50 to 500 microseconds (0.00005 to 0.0005 seconds), this is a good trick. But because we can do this, we know when the fence is being shorted, grounded or jumpered.

This technology also allows the Fence Hawk Plus™ to give a separate warning for low voltage conditions, which are almost always caused by weeds growth.

There are some other conditions that can cause low voltage, too, but the point is this: **low voltage conditions should not generate a full-scale alert**, which would be the equivalent of a false alarm.

A small voltage drain from vegetation will still allow the fence to give a painful shock. This needs to be cleaned before fence drops to an unusable level.

The goal here is to alert someone to clean the fence *before* the voltage drain makes the fence ineffective.

This method of monitoring also prevents false alarms from nearby lightning strikes. **A Fence Hawk Plus™ can take a half million volt lightning strike – directly on the fence – without damage, and without generating a false alarm.** No other electric fence or high voltage array monitor can make this claim.

Our warranty includes lightning damage, and does not require lightning protection on the fence or array.

Technical Specifications

OPERATION

Input Power Requirements: 10 to 16 volts DC.

Power Usage: The input power usage is 0.3 watts. Current consumption is 0.025 amps at 12 volts.

High Voltage Input Pulse: Accepts up to 25,000 volt pulse. If lightning strikes the fence the Fence Hawk will survive over a half million volt pulse without damage.

Pulse Width Accepted: 50 microseconds to 50 milliseconds.

Pulse Period Accepted: 5 hertz to 0.5 hertz (from 5 pulses per second to 2 seconds between pulses).

Low Voltage Output (Weeds) Terminal IO5-IO6: Contact closure rated 0.5 amps @ 60 volts DC and 0.5 amps at 100 volts AC. This is sufficient for most piezo sounders. This maintenance output activates when the high voltage input pulse level drops below the “set-point level,” which is variable from 1.5 k-volt to 8 k-volts. This is sufficient for most fence and array applications.

No Voltage Output (Intrusion) Terminal IO7-IO8: Contact closure rated 0.5 amps @ 60 volts DC and 0.5 amps at 100 volts AC. This is sufficient for most alarm and/or communication circuits, but most sirens will require a power contact or relay. This output activates when high voltage input pulse drops below 0.2kv (200 volts).

Automatic Reset: All circuits will reset when the fence voltage returns to normal operating levels.

On some installations, a latching circuit or latching relay may be desired to hold the alarm “on” until manually reset. Please refer to the installation booklet for more details. The manual is at the bottom of this page.

This electric fence EOL (End Of Line) control (voltage monitor) is designed to connect to any standard 12 volt security alarm control panel that is currently available on the market.

If the unit is not connected or powered by an alarm control panel, but instead installed in a “stand alone” configuration, you will need to add the following components to your circuit.

You will need a 12 volt source, which usually consists of an AC to 12 volt DC “plug-in” supply that will continuously charge a 12 volt battery (4amp-hour sealed gel cell) that will maintain the fence monitoring function in the event of a utility power loss. This is then connected to, and powers the Fence Hawk Plus fence voltage monitor.

Since the power interruption break-in is usually momentary, a 12 volts DC latching relay is usually used to power an alarm which may consist of a siren, dialer and/or other devices that are connected to the Fence Hawk Plus to announce a break of the surrounding fence circuit.

INDICATOR LIGHTS (LEDs)

LED 1 :: This indicator is illuminated in concert with fence pulse. When the controls and adjustments are set correctly this indicator should blink/flash with every voltage pulse that is applied to the fence.

LED 2 :: This indicator is illuminated in concert with the normally open (NO) contacts of X2 to provide an alert when the fence voltage drops to a point where the fence generally needs cleaning. This is an adjustable value which is usually set about 500 volts below the operating fence voltage. The high voltage output from your fence charger is reasonably consistent, but will still vary up to 200-300 volts or more within any normal fence usage and environment.

This indicator has a time delay set at 60 seconds or more to allow for momentary and partial loss of voltage usually caused by wind and other temporary cases. This time delay is adjusted with VR2 and is usually set for the maximum delay.

Even with identical equipment, every fence has a different set of environmental conditions that will change the working voltage of your fence, so settings that work for one fence may not work well for another fence.

LED 3 :: This indicator indicates that the Fence Hawk Plus is producing the 5 volt circuit power required for stable operation

LED 4 :: This indicates a loss of fence voltage and closes the intruder alarm contacts. This occurs when the fence voltage becomes less than the voltage point set with VR4 and indicates a loss of fence voltage which is most often indicates an intrusion. The normal usage delay is 4 seconds which is preset at the factory.

This voltage level is adjustable with VR4 to allow for voltage noise on the fence which can be generated from several sources, which may not have anything to do with your fence. Your fence is essentially a massive antenna which will and does receive voltages signals from various extraneous sources. This interference problem is solved by setting the alarm voltage threshold slightly above the noise threshold. This is usually in the range between 500 and 1,000 volts.

This adjusted with the voltmeter probe inserted into IO-9. Remember that 0.1 volts reading is 450 volts, an adjustment of 0.1 to 0.2 volts is pretty much what

This alarm can also be delayed for specific installations that require a delay before providing an alarm when fence voltage is lost usually because of a broken or cur fence wire. This alarm may also be delayed for up to 60 seconds and is set by adjusting VR3. The factory setting for this delay is set at 4 seconds for normal operation. A longer delay is only used to allow entry when

the controls are inside the protected perimeter, although this is better served with a simple remote control device.

The voltage setting is adjusted with VR1. The time delay that is adjusted with VR2 allows for the normal variation of the fence voltage of 200 to 300 volts that will occur from a variety of sources. That voltage level (VR1) in conjunction with 60 plus seconds of delay (VR2) will eliminate 99.9% of false alarms from blowing trash, grass and weeds.

Set the voltage read at IO -10 at 0.04 to 0.06 volts lower than the cusp reading. This will allow for normally occurring fence voltage fluctuations without creating unwanted false alarms.

During normal operation this intermittent indicator will flash once for every fence pulse working at the correct set voltage. When/if it stops flashing, this indicates that fence voltage is less than the voltage setting as described in LED2 operation.

TERMINAL CONNECTIONS

12 volt power positive (+) is to be connected to terminal IO-3. While the unit is designed for standard 12 volt DC input, it will fully function at any voltage between 10vdc and 16vdc where 12vdc is the nominal input voltage.

Terminals IO-4 and IO-2 are connected and common and should be connected to earth ground, the same as the ground side of the fence sensor that is mounted directly to/on the fence. This common ground should be hard wired to the circuit ground. We suggest that all your grounds are connected together, as this is usually done through your ground wires on your fence, which are all connected together or not performing any useful function,

Terminal IO-1 is the pulsed input from the fence voltage divider that is usually directly mounted to, and connected to the high voltage wire. This is usually connected at the far end of the high voltage fence loop.

Isolated Outputs

The unit has two (2) on-board outputs. Terminals IO-5 and IO-6 which are the output terminals of the **low voltage** relay. The operation as described below is adjusted by VR2.

Terminals IO-7 and IO-8 are the outputs of the **no voltage** relay. The operation as described below is adjusted by VR3.

These are electrically isolated normally-open (NO) contacts which are rated at 0.5 amps at 30 volts, and are sized to connect directly to a security control panel. If your fence is not connected to, or part of a security system, then an auxiliary relay should be utilized to provide the current and voltage rating that your equipment requires.

IO-9 and IO-10

These are the actual voltage measurement points for the **low voltage (10)** set-point voltage which is usually adjusted to 500 to 600 volts below the actual fence voltage.

The **no voltage (9)** set-point voltage is usually set for 400 – 500 volts. When set a few volts above zero will eliminate most spurious and induced voltages which may false alarm.

Either will measure less than 3 volts and will vary depending upon what brand of fence charger you are using and the condition of your fence.

There are several areas in the circuitry where the voltage is reduced, and then reduced again to a usable level. The actual voltage value of the fence voltage pulse is divided several times to a final voltage reading that can be easily handled which is 1/4500 of the actual value of the voltage pulse that is on the fence. This voltage value can be read at the cusp at IO-10 for LED1 from blink to off and will provide the actual fence voltage when multiplied by 4,500 times.

OPERATION

This high voltage sensor – Fence Hawk Plus™ – takes an electric fence charger pulse and analyzes it for peak voltage, pulse width and period.

The Fence Hawk Plus™ can accurately measure voltage pulses from almost any fence charger or pulse source, including the spark plug voltage on a gasoline engine.

The design algorithm used in this device was determined for stability, longevity, and reliability under a wide set of usage parameters. (Patents pending.)

The LED 1 will flash for every pulse that is higher than the maintenance voltage. The maintenance threshold voltage is set at 6 kv at the factory and is user-adjustable via (VR 1).

This “maintenance set-point voltage” is usually set about 1 kv to 2 kv less than the fence energizer output. Then creeping weed growth will be noticed before the fence voltage drops below an effective level.

This maintenance voltage is adjustable from 3.0 kv to 12.0 kv. If flora (grass, bushes, limbs and leaves) partially load or partially short out the high voltage and reduce the effective pulse voltage to below the adjustable maintenance level voltage set point, then the LED 2 will light and the maintenance contacts will close.

The maintenance function (Weed Alert™ LED 2) has approximately a 100 second adjustable delay, to avoid false alarms. This can be adjusted via VR 1.

If the grass or limb is blown off or removed and the charger pulse voltage is restored, then the maintenance alarm will reset itself and the maintenance contacts will open.

When the pulse voltage drops or becomes less than the set minimum voltage, the “no voltage” contacts will close. There is a factory set delay of 5 seconds before the LED 4 will light and the alarm contact closes, to eliminate false alarms from spurious voltage spikes. This time delay can be adjusted via VR 3.

The algorithm used in this circuit also eliminates false alarms from reverse pulses that may occur from close proximity lightning strikes. If the voltage drop is intermittent the circuit will reset itself without generating an alarm. (For some security applications, a latching relay contact may be desired on some output relays.)

This device is designed for long life with ease and consistency of operation. **All units have a one year warranty that includes lightning damage.**