

# E-FENCE1

## Instruction Manual

### Piezo Electric Vibration Detector



The E-FENCE1 is a fence mounted Piezo Electric Vibration Detector. It contains a custom integrated circuit with a Microchip RISC Processor. Both hardware and software have been designed to analyze the piezo electric signal filtering out common noises and responding to any assault on the fence, climbing or cutting.

**GENERAL:** The unit consists of a circuit board potted inside of a NEMA 4X polycarbonate enclosure with two liquid tight wire cord grips at the bottom. There are three LEDs for identifying the response of the sensor to an attack upon the fence. There are three sets of jumpers – JP1-B and JP1-C for selecting the sensitivity of the sensor and JP1-A for turning on the LEDs. There is a programming connector and a power/output terminal Block. The sensor has two outputs – alarm and power failure. The sensor may be used with any alarm control that accepts and open collector input.

#### SPECIFICATIONS:

- Operating Voltage:** 9-15VDC (regulated and filtered)
- Power Consumption:** 30mA (normal); 35mA (alarm)
- Range:** Up to 50 linear feet of fence, 25 ft on either side maximum
- Alarm Output:** 1 Open Collector – 15VDC 50mA Maximum, not to exceed supply voltage.
- Power Failure Alarm Output:** 1 Open Collector, Normally Closed when powered – 15VDC 50mA Maximum, not to exceed supply voltage.
- Alarm Output Activation Time:** 5 seconds
- Alarm LEDs:** 3 internal for testing purposes, may be disabled for power conservation
- Installation:** Four conductor, twisted, shielded with drain (drain connected to ground)
- Operating Temperature:** -4 deg to 131 deg F (-20 deg to 55 deg C)
- Size:** 4.70" high x 2.55" wide x 1.60" deep
- Color / Weight:** Gray / 10 ounces

#### MOUNTING:

*Verify that the fence is in good physical condition with no loose or rattling parts. Tight fabric and rigid fence posts transmit vibrations best. The sensor has a greater range on a good quality fence. Consider testing a single unit, with a 9 volt battery, at various locations on the fence to verify the detection range possible on your particular fence.*

Mount the E-FENCE1 directly to the fabric of the chain link or wire mesh, on the interior side of the protected area as shown in the illustrated examples, at a height of 4-5 feet and 1 foot from a post.



The mounting hardware consists of an aluminum plate with two screws, used to clamp the sensor enclosure to the fence fabric.

Loosely secure the mounting bracket to the E-FENCE1, with one screw only in the upper corner of the E-FENCE1



Feed the bracket thru the fence fabric diagonally, down and to the right, capturing 2-3 wires, depending on link size.



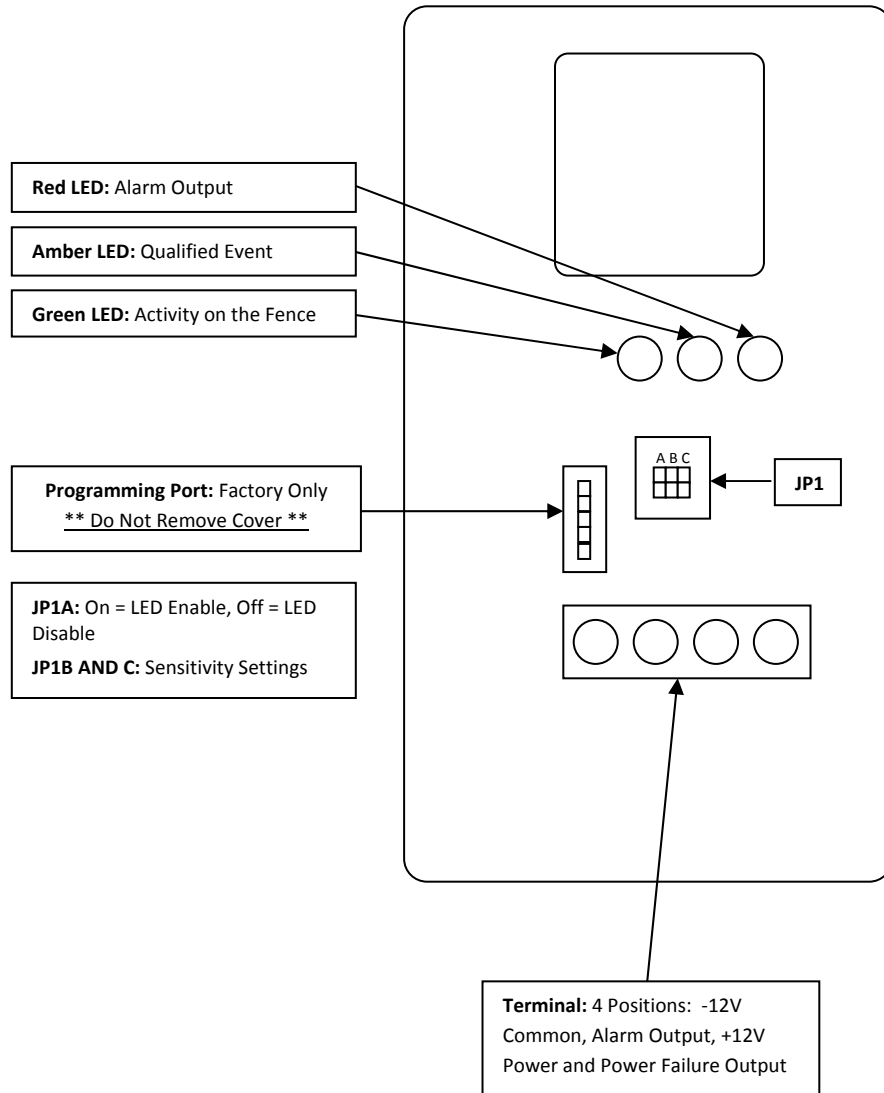
Secure the other corner of the E-FENCE1 to the bracket using the remaining screw, centering the E-FENCE1 in the links and tighten so that the E-FENCE1 makes good contact with the chain links.

**DO NOT OVER TIGHTEN.**



**There is no need to tighten so much that the bracket is pulled fully to the case and bent or that the case of the E-FENCE1 case begins to twist and deform. This will prevent a water tight seal with the lid.**

## KEY COMPONENTS:



## LEDs:

Each E-FENCE1 has three LEDs – Green, Amber and Red. These LEDs indicate the response of the sensor to impacts or cuts to the fence.

**Green LED** - The Green LED will indicate that the E-FENCE1 has received a signal from the impact and will process that signal to qualify it as a valid event. If the Green LED does not flash during a valid attack upon the fence, the sensitivity of the E-FENCE1 must be increased, or the distance between the sensors reduced. Also, if there is a steady wind or the fence is vibrating as if there is a steady wind then the Green LED will not illuminate unless the impact exceeds the vibration due to wind. Note: Disconnect power after each test to reset LED function, see below TESTING.

**Yellow LED** – The Yellow LED will indicate that the E-FENCE1 has qualified a signal as a valid event. If the Green LED flashes, but the Yellow does not flash during a valid attack upon the fence, the sensitivity of the E-FENCE1 must be increased, or the distance between the sensors reduced.

**Red LED** – The Red LED will indicate that the E-FENCE1 has counted enough events to qualify as an alarm and has produced an alarm output.

## SELECTING THE SENSOR SENSITIVITY FOR YOUR FENCE:

Each E-FENCE1 Sensor has four sensitivity settings - High Sensitivity with Wind Mode, Low Sensitivity with Wind Mode, High Sensitivity and Low Sensitivity. A built in microprocessor counts and times the pulses generated by an impact to the fence. The different sensitivities allow you to select an alarm output specific to your fence that matches up with the quantity of pulses and duration of pulses of a valid attack.

In order to select the desired sensitivity for your fence, there are two removable Jumpers, JP1-B and JP1-C. The Jumpers allow you to select from the four pre-programmed alarm sensitivities.

JP1-B On, JP1-C On = High Sensitivity with Wind Mode

JP1-B On, JP1-C Off = Low Sensitivity with Wind Mode

JP1-B Off, JP1-C On = High Sensitivity

JP1-B Off, JP1-C Off = Low Sensitivity

Remove power to the E-FENCE1 Sensor prior to changing Jumpers.  
Once Jumpers are put back in the desired position reconnect power.

Choosing the sensor sensitivity depends upon the quality of the fence - loose or tight, heavy or light link gauge, old or new, the height of the fence - short 5 ft. to regular 6-8 ft. to tall >8 ft. and the surrounding environment - remote or public, protected or windy. Selecting the sensitivity is a balance between generating an alarm output upon a valid attack to the fence and filtering out nuisance events. On a new tight fence of regular height, the sensor will work well with a low sensitivity setting. On a loose or older fence, the E-FENCE1 will work best with a high sensitivity setting. High sensitivity settings can be selected for remote areas with no public access but low sensitivity settings are better for fences adjacent to public areas.

In addition to two regular sensitivity settings, High and Low, the E-FENCE1 has two sensitivity settings with "Wind Mode". In Wind Mode the E-FENCE1 measures vibration on the fence due to wind or a constant vibration source and measures an impact due to climbing or cutting against this constant vibration. In Wind Mode the sensitivity of the E-FENCE1 sensor will decrease with an increase in wind. For this reason the two sensitivity settings with Wind Mode are less sensitive than the two settings without Wind Mode. If the fence that is being protected is in a clear area with wind then select one of the sensitivity settings with Wind Mode. If the fence is in an area with little wind or protected by other buildings then choose one of the regular settings.

## TESTING:

With the VIB200 mounted to the fence and the cover removed, select the sensitivity with Jumpers JP1-B and JP1-C per the guidelines above. Hook up a 9V battery to the sensor. Test the ability of the sensor to detect impacts and climbs at the desired range (30 to 50 feet). Move the sensor to various parts of the fence and test. The LEDs will alert you to the response of the sensor. One of the unique aspects of the E-FENCE1 is that each individual sensor can be tuned to a particular fence section. Often the quality of the fence can vary from one section to the next.

Decrease or increase the sensitivity of the sensor by changing Jumpers JP1-B and JP1-C to generate an alarm upon the degree of impact / attack to the fence you want to identify. A good rule of thumb is to select a sensitivity that generates an alarm at the 3<sup>rd</sup> or 4<sup>th</sup> step in a climb. At this sensitivity the sensor should not generate an alarm at a single impact to the fence.

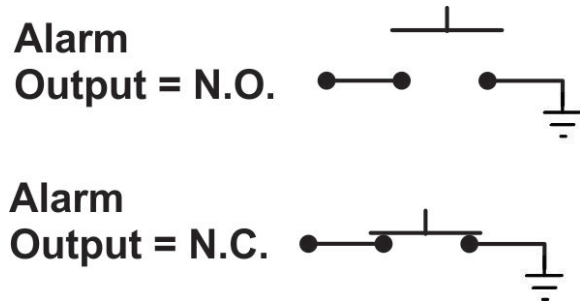
When testing with a battery, you must disconnect the battery from the sensor after each test in order for the sensor counter and timer to reset. The counters will also reset once the sensor produces an alarm output and the RED LED flashes. Don't forget to disconnect the battery when changing the sensitivity setting also.

Once you have selected an appropriate sensitivity and sensor spacing, mount all of the sensors to the fence and wire to power and alarm control. At any time, the sensitivity of one or more of the E-FENCE1 sensors may be changed to tune them to a particular section of fence or desired response.

## WIRING:

The Alarm is an open collector output - normally open. The Power Trouble is an open collector output – normally closed. The Alarm Output will provide an electrical short to ground when activated. The Power Trouble Output will open when activated. **Refer to your Alarm Control Panel's Instruction Manual for instructions on how to wire open collector outputs to the zone inputs of the panel.**

Diagram 1: Output Electrical Configuration



Wrap wire around terminal for best connection.

Jumpers JP1-A is used to turn On/Off LEDs. JP1-B and JP1-C are used to select sensitivity.

Keep white five pin cover on serial port to protect pins.



## WIRING (Continued):

The E-FENCE1 may be wired with one loop for alarm and one loop for power trouble to be monitored by two zones on control panel or the alarm and power trouble may be combined on one loop.

Always connect the End-of-Line Resistors in the last E-FENCE1 along the zone run. **Note:** On long runs you may need to adjust the value of the EOL Resistor to compensate for any voltage drop along the loop. Call NTI to work out best resistor value.

Diagram 2: Wiring Diagram for combined alarm and power trouble loop

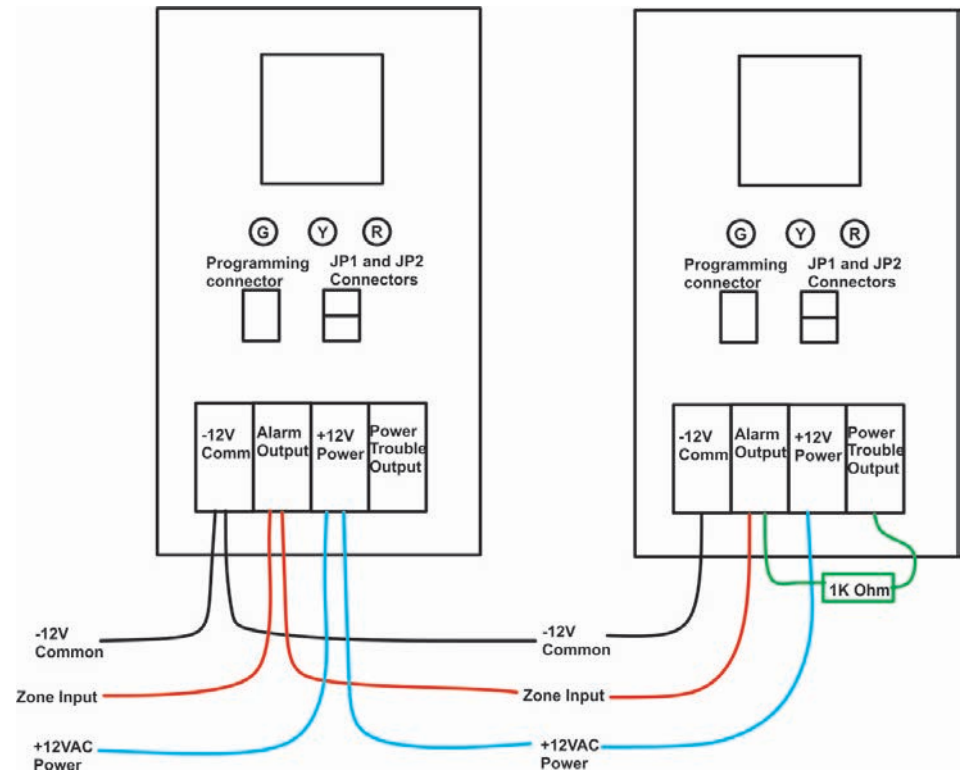
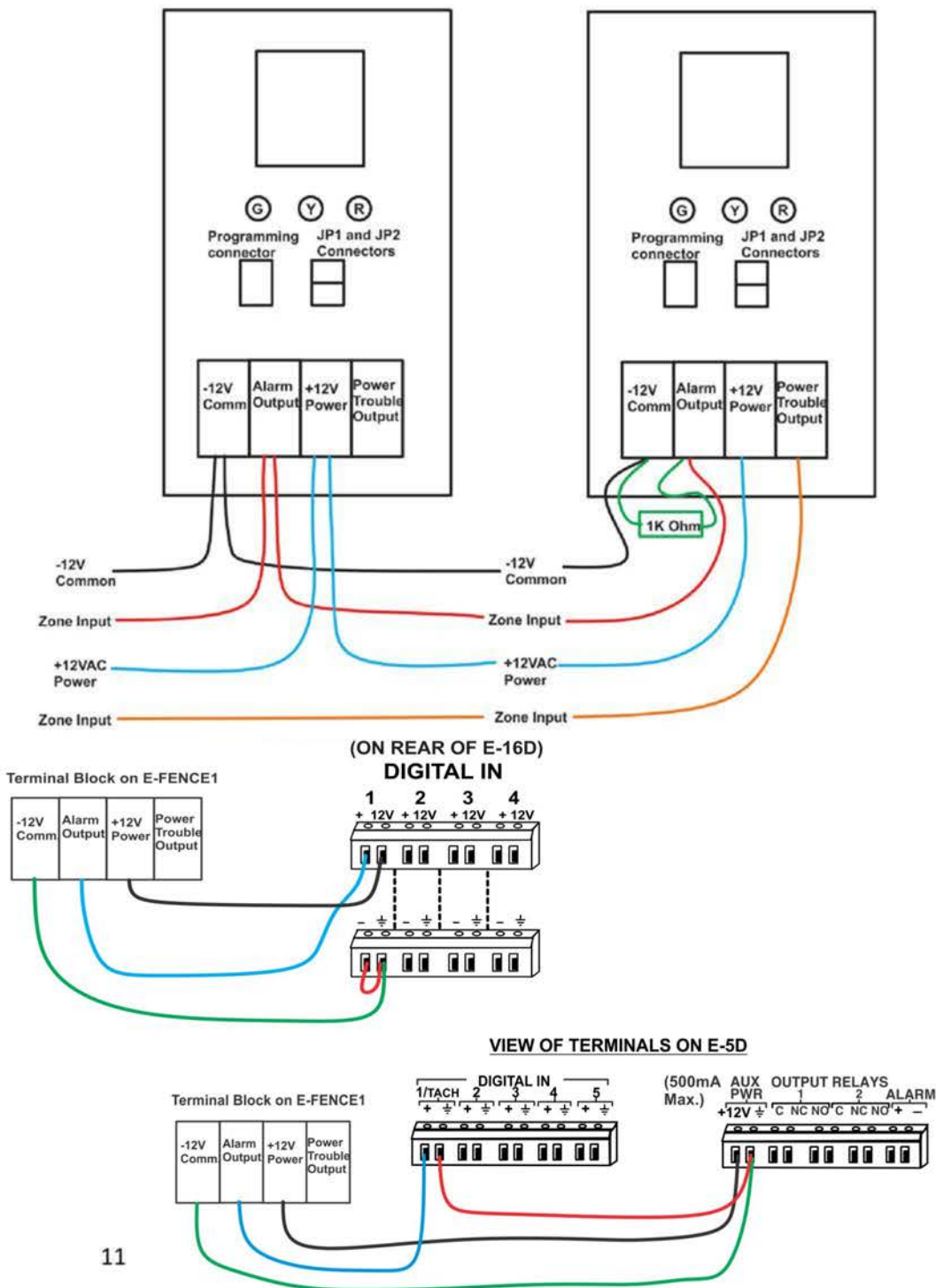


Diagram 3: Wiring Diagram for separate alarm and power trouble



For any single zone on your alarm panel, you can wire a single E-FENCE1 or several together, in parallel, to increase the zone size.

Loosen the Liquid Tight Cordgrip and feed 8" of wire thru the bottom, into the box. Tighten the Liquid Tight cord grip.

Make connections as shown in previous wiring diagrams.



If you are connecting several E-FENCE1 units together on a zone, first mount all units. Run all wires into the enclosures and secure the wire to the fence with wire ties before terminating wire at the connectors. Plug any unused Liquid Tight Cordgrip with the enclosed stainless steel plug.