

ENFORCER[®]

Twin Photobeam Detectors

E-960-D390
E-960-D290
E-960-D190
E-960-D90

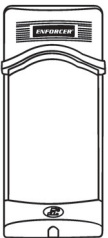


INSTALLATION MANUAL

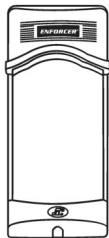
Features:

- ❖ Range — E-960-D390 — 390 ft. (120m) outdoors, 790 ft. (240m) indoors
 - E-960-D290 — 290 ft. (90m) outdoors, 590 ft. (180m) indoors
 - E-960-D190 — 190 ft. (60m) outdoors, 390 ft. (120m) indoors
 - E-960-D90 — 90 ft. (30m) outdoors, 190 ft. (60m) indoors
- Twin beams provide reliable perimeter security, minimizing false alarms from falling leaves, birds, etc.
- Lensed optics reinforce beam strength and provide excellent immunity to false alarms due to rain, snow, mist, etc.
- Weatherproof, sunlight-filtering case for indoor and outdoor use.
- Anti-frost system so that beam functions even in extreme conditions.
- Automatic input power filtering with special noise rejection circuitry.
- N.C./N.O. alarm output.
- N.C. tamper circuit included.
- Non-polarized power inputs.
- Quick, easy installation with built-in laser beam alignment system.
- Interruption time adjustable for nearly all situations.

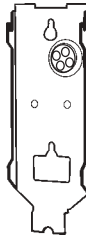
Included:



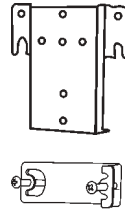
Transmitter x 1



Receiver x 1



Mounting plates x 2



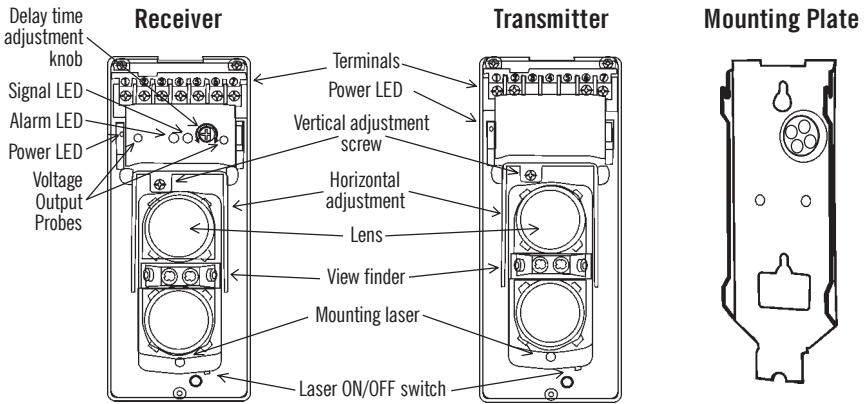
Pole mounting
brackets (2 sets)

Mounting
hardware
also
included.

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Fig. 1: Identifying the Sensors



Important

Do not connect to power until the sensor is completely installed and the installation has been double-checked.

Choose a Location

To prevent erratic operation and/or false alarms:

- Wind will not directly cause false alarms, but could cause leaves or similar objects to fly or wave into the beams. Therefore, do not mount near trees, bushes, or other leafy vegetation.
 - Do not mount where the transmitter or receiver could be splashed by water or mud.
 - Do not mount where the unit could be suddenly exposed to a bright light, such as a floodlight or a passing automobile's headlight.
 - Do not let sunlight or any direct beam of light enter the sensing spot of the transmitter. If needed, mount so the receiver, not the transmitter, faces the sun.
 - Do not mount where animals could break the beams.
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Fig. 2: Vertical and Horizontal Adjustments

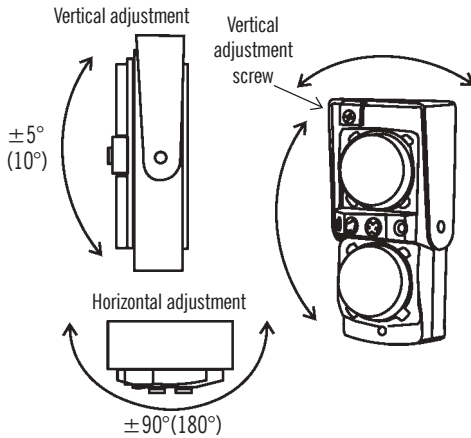
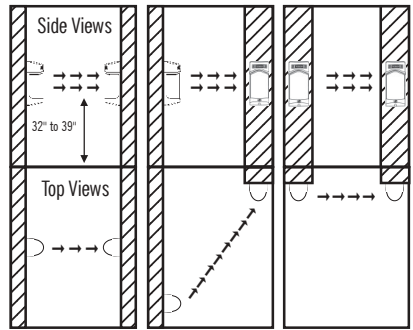


Fig. 3: Typical Installations



Typical Installations

The photoelectric beam lens can be adjusted horizontally $\pm 90^\circ$, and vertically $\pm 5^\circ$ (see fig. 2). This allows much flexibility in terms of how the transmitter and receiver can be mounted. See fig. 3.

Install at a distance of 32" to 39" (80 to 100 cm) above the ground for most situations. See fig. 3.

Running the Cable

Run a cable from the alarm control panel to the photobeam sensor. If burying the cable is required, make sure to use electrical conduit. Shielded cable is strongly suggested. See Table 1 for maximum cable length.

Table 1: Cable Length

Model	E-960-D90		E-960-D190		E-960-D290		E-960-D390	
	12V	24V	12V	24V	12V	24V	12V	24V
AWG22 0.33mm ² 0.0005in ²	320m 1,050 ft.	2,800m 18,000 ft.	280m 920 ft.	2,400m 7,870 ft.	110m 390 ft.	900m 2,950 ft.	200m 660 ft.	1,600m 5,250 ft.
AWG20 0.52mm ² 0.0008in ²	550m 1,800 ft.	4,800m 15,750 ft.	450m 1,480 ft.	4,200m 13,780 ft.	170m 560 ft.	1,400m 4,590 ft.	350m 1,150 ft.	3,000m 9,840 ft.
AWG18 0.83mm ² 0.0013in ²	800m 2,600 ft.	7,200m 23,620 ft.	700m 2,300 ft.	6,200m 20,340 ft.	250m 820 ft.	2,200m 7,220 ft.	500m 1,640 ft.	4,200m 13,780 ft.
AWG17 1.03mm ² 0.0016in ²	980m 3,190 ft.	8,800m 28,870 ft.	850m 2,790 ft.	7,600m 24,930 ft.	310m 1,020 ft.	2,600m 8,530 ft.	590m 1,940 ft.	5,200m 17,060 ft.

Note (1): Max. cable length when two or more sets are connected is the value shown in Table 1 divided by the number of sets.

Note (2): The power line can be wired to a distance of up to 3,300 ft. (1,000m) with AWG22 (0.33mm²) telephone wire.

Wiring the Transmitter – Wall Mount

1. Remove the cover. Remove the screw under the lens unit in order to detach the mounting plate. See fig. 4.
2. If the sensor wiring comes from inside the wall – Break a hole in the mounting plate's rubber grommet, and pull the cable through the grommet's hole. Then run the cable through the hole near the top of the sensor unit so it comes out the front. Using two of the included mounting screws, attach the mounting plate to the wall. Then reattach the sensor unit to the mounting plate, connect the wires, and snap on the cover. See fig. 5.
3. If the sensor wiring is run along the surface of the wall – There are two plastic knockouts on the back of the sensor unit, one on top and one on bottom. Break out the appropriate knockout, and pull the wiring through the knockout. Then run the wiring through the hole near the top of the sensor unit so it comes out the front. Using two of the included mounting screws, attach the mounting plate to the wall. Then reattach the sensor unit to the mounting plate, connect the wires, and snap on the cover. See fig. 6.

Wiring the Transmitter – Pole Mount

(NOTE – Pole mounting bracket required.)

1. Remove the cover. Remove the screw under the lens unit in order to detach the mounting plate. See fig. 4.
2. Break a hole in the mounting plate's rubber grommet, and pull the cable through the grommet's hole. Then run the cable through the hole near the top of the sensor unit so it comes out the front. Use the included mounting bracket to mount to the pole. Then reattach the sensor unit to the mounting plate, connect the wires, and snap on the cover. See fig. 7.

Fig. 4: Remove the Transmitter cover

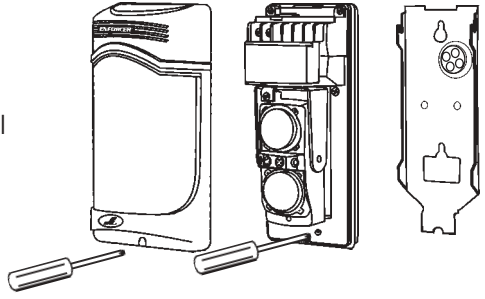


Fig. 5: Wall Mount, Wire from Inside Wall

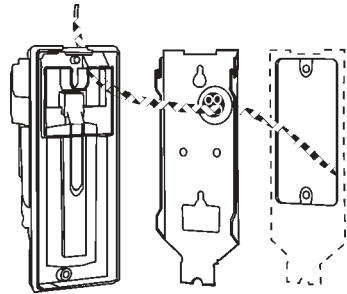


Fig. 6: Wall Mount, Wire Runs Along Wall

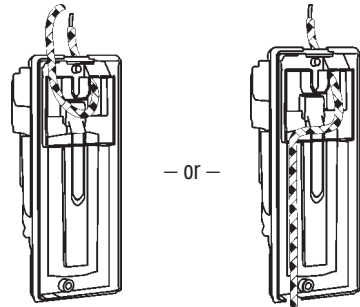
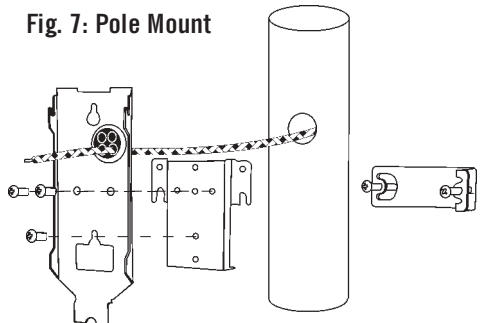


Fig. 7: Pole Mount



Wiring (fig. 8)

1. Screw the wires tightly to avoid slipping off the terminals, but not so tight that they break.
2. Screws on terminals which are not used should be tightened.
3. Grounding may be necessary, depending on the location.

Fig. 8: Wiring

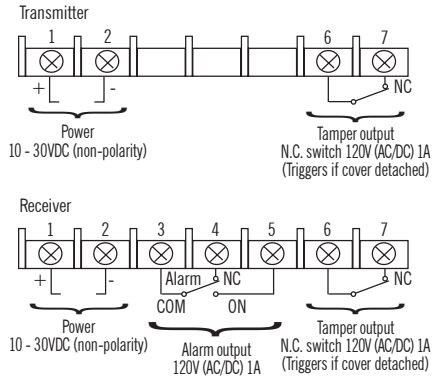
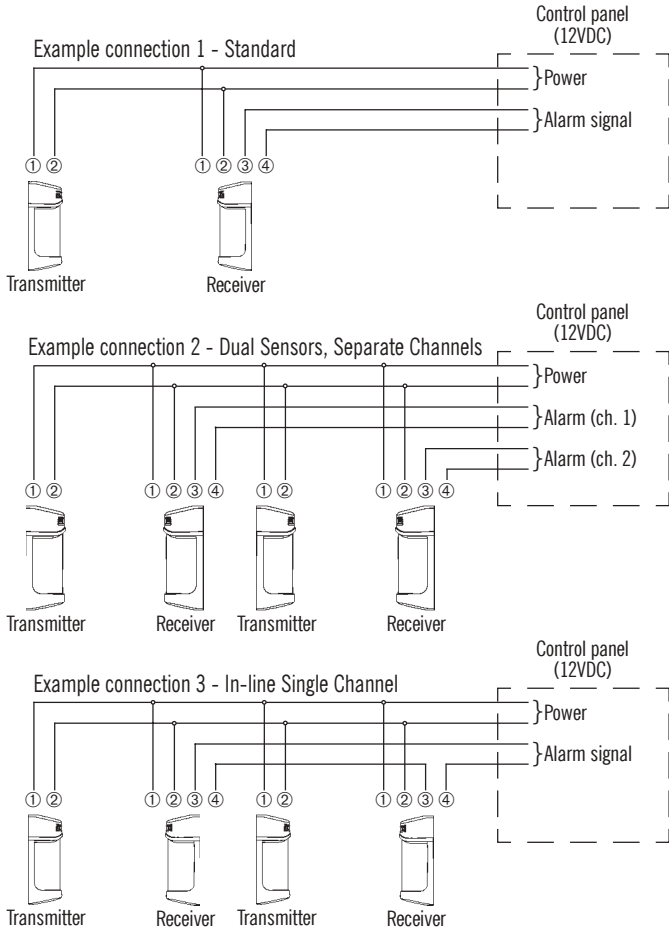


Fig. 9: Examples of Possible Ways To Connect One or More Sensors



Adjusting the Alignment

The transmitter and receiver sensor units can be adjusted $\pm 5^\circ$ vertically and $\pm 90^\circ$ horizontally once the unit is mounted and power is connected. See fig. 2.

There are two ways to adjust alignment:

1. Laser adjustment (see fig. 1):
 - a. Remove the transmitter cover, then turn the laser on with the ON/OFF switch (see fig. 1). A red dot will show where the photoelectric beams are aimed.
 - b. Adjust the transmitter's sensor unit vertically and horizontally until the red dot is centered on the receiver and both the receiver's LEDs turn off. See Table 2. It may be necessary to adjust the horizontal and vertical angle of the receiver's sensor unit as well.
 - c. Repeat steps a and b for the receiver.
- d. Turn the lasers off, and then replace the covers.

WARNING: Do not look directly at the lasers.

2. Eyeball adjustment (see fig. 10):
 - a. Remove the transmitter cover, and look into one of the alignment viewfinders (one of the four holes located between the two lenses) at a 45° angle.
 - b. Adjust the horizontal angle of the lens vertically and horizontally until the receiver is clearly seen in the viewfinder.
 - c. Repeat steps a and b for the receiver.
 - d. Replace the transmitter and receiver covers.

NOTE - If you cannot see the opposite unit in the viewfinder, put a sheet of white paper near the unit to be seen, move your eyes about 2" (5cm) away from the viewfinder, and try again.

Fine Tuning the Receiver

1. Once the sensor is mounted and aligned, the sensor can be fine tuned using the voltage output jack.
- a. Set the range of a volt-ohm meter (VOM) to 0~10VDC.
- b. Insert the red (+) probe into the (+) terminal and the black (-) probe into the (-) terminal.
- c. Measure the voltage (see table 3).
- d. Adjust the horizontal angle by hand until the VOM indicates the highest voltage.
- e. Adjust the vertical angle by turning the vertical adjustment screw until the VOM indicates the highest voltage.

NOTE - Do not interrupt the beam while adjusting alignment.

Fig. 10:
Horizontal and Vertical Sensor Adjustment

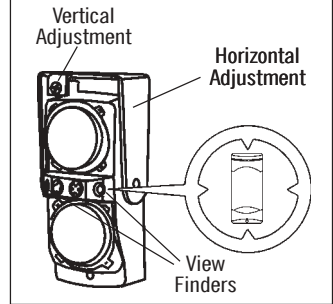


Table 2:
Receiver LED Indicators

Alarm and signal LEDs	Signal strength
Two LEDs OFF	Best
One LED ON	Good
Two LEDs ON	Re-adjust

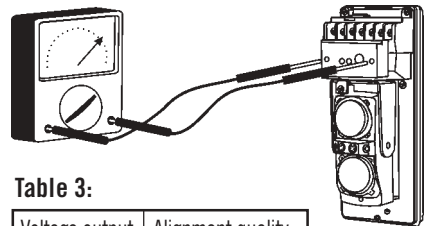


Table 3:

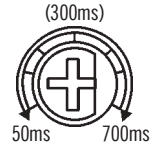
Voltage output	Alignment quality
5~8 V	Best
2.5~5V	Good
1.5~2.5	Fair
<1.5	Re-adjust

Note: 8VDC is maximum possible reading.

Adjusting the Delay Time

- The delay time adjustment knob sets how long the beam can be interrupted before triggering the alarm (see fig. 11):
 - A short interrupt time (high sensitivity) is suitable for catching fast moving intruders, but more susceptible to false alarms.
 - A long interrupt time (low sensitivity) reduces false alarms, but fast moving intruders may not trigger the sensor.
- Adjust the knob to the site's situation. You may need to make adjustments later after the walk-through test.

Fig. 11:
Adjusting the
Delay Time



Testing the Unit

- Power up the transmitter and receiver.
- If the yellow or red LED remains steady ON even when the beam is not interrupted, re-adjust the alignment.
- Walk between the transmitter and receiver to interrupt the beams. Walk at various speeds, and adjust the delay time adjustment knob as needed.

NOTE – The alarm will be triggered only if both the upper and lower beams are simultaneously interrupted.

IMPORTANT – Test the detector periodically to ensure the alignment and delay time settings are suitable for the site.

Table 4: Specifications

Model	E-960-D90	E-960-D190	E-960-D290	E-960-D390
Max. range (outdoor)	90' (30m)	190' (60m)	290' (90m)	390' (120m)
Max. range (indoor)	190' (60m)	390' (120m)	590' (180m)	790' (240m)
Current	36mA	42mA	50mA	58mA
Power	10~30VDC (non-polarized)			
Detection method	Simultaneous breaking of 2 beams			
Interrupt speed*	50msec~700msec (variable)			
Alarm output	NO/NC relay, 1A @ 120VAC			
Tamper output (Tx & Rx)	NC switch, 1A @ 120VAC			
Alarm LED (receiver)	Red LED - ON: When transmitter and receiver are not aligned or when beam is broken.			
Signal LED (receiver)	Yellow LED - ON: When receiver's signal is weak or when beam is broken.			
Power LED (transmitter and receiver)	Green LED ON: Indicates connected to power			
Laser wavelength	650nm			
Laser output power	≤ 5mW			
Alignment angle	Horizontal: ±90°, Vertical: ±5°			
Operating temperature	-13°F (-25°C) to +131°F (+55°C)			
Weight	2.5 lbs. (1.1kg)			
Case	PC Resin			

*This is the minimum time interval between breaking of both beams which will trigger the output. Setting the interval longer will reduce false alarms from birds or falling leaves, etc., while setting it shorter will detect faster moving objects.

Fig. 12: Dimensions

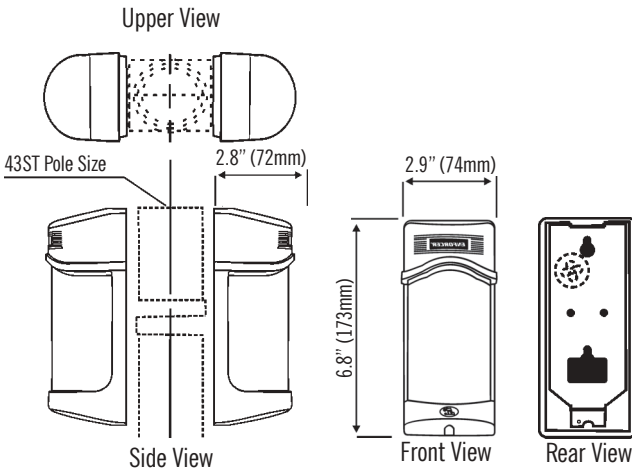


Table 5: Troubleshooting

Trouble	Possible Origin(s)	Remedy(s)
Transmitter LED does not light.	Incorrectly wired and/or insufficient voltage	Ensure the power supply to the transmitter is 10 to 30 VDC.
Receiver LED never lights up when the beam is interrupted.	a. Insufficient voltage b. Beam reflected away from receiver c. Beams not simultaneously interrupted.	a. Double-check the voltage. b. Clean the cover. c. Check overall installation.
Beams interrupted and LED lights, but no alarm trigger.	Alarm trigger cable may be cut, or the relay contact stuck due to overloading.	Check the continuity of the wiring between the sensor and the alarm.
Alarm LED continuously lit.	a. Lenses out of alignment. b. Beams are blocked. c. Cover is foggy or dirty.	a. Realign the lenses. b. Remove any obstacles. c. Clean the cover.
Alarm trigger becomes erratic in bad weather.	Lenses out of alignment.	Check overall system installation. If still erratic, realign the lenses.
Frequent false triggers from leaves, birds, etc.	a. Too sensitive. b. Bad location.	a. Reduce the response time. b. Change the transmitter and/or location.

SECO-LARM® U.S.A., Inc.

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