ENFORCER Quad-Photobeam Detectors

Also available from SECO-LARM:

- E-960-D290Q
- E-932-D33TBQ
- E-9622-4B25

Twin Photobeam Detectors
- Range: up to 290' outdoors.
- 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 conditions.
- Quick easy installation with built-in laser-beam alignment system.

Flush-Mount Photobeam Sensors
- E-932-D33TBQ – Photoelectric Through-Beam Sensor.
- E-932-S16RRQ – Photoelectric Reflective-Beam Sensor.
- Suitable for entrances, hallways, room in office or home.
- Fits single-gang box.
- Adjustable alignment angle from 45°-15° horizontally/vertically.

Curtain / Barrier Sensors
- Available in 4, 6, 8 or 10 beams.
- Range: 25 ft. outdoor, 50 ft. indoor.
- Slim-line design 1/4" x 1"/4".
- Weatherproof IP65 construction.
- Triggers on breaking of any single or 2 adjacent beams (programmable).

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- U.S. pat. no. D485774 ; Taiwan pat. no. 89463 ; China pat. no. ZL0331103.0
- Other international patents are pending.

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ENFORCER® SENSOR

MANUAL

Multi-Frequency Quad Photobeam Detectors

E-964-Q660Q – 660 ft. (200m) outdoors, 1320 ft. (400m) indoors
E-964-Q495Q – 495 ft. (150m) outdoors, 990 ft. (300m) indoors
E-964-Q330Q – 330 ft. (100m) outdoors, 660 ft. (200m) indoors
E-964-Q165Q – 165 ft. ( 50m) outdoors, 330 ft. (100m) indoors

Note: Products with model number that ends with “Q” or have a green “Q” sticker represents RoHS compliant products.
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**Introduction:**

The ENFORCER E-964-Q Series Quad-Photobeam Sensors are ideal for long-distance protection. Four selectable beam frequencies allow for superior perimeter protection by eliminating crosstalk and interference between multiple units. False alarms created by animals and falling leaves are minimized by the sensor’s detection method of all 4 beams simultaneously broken.

The E-964-Q Series of sensors is designed to work in even the most extreme conditions. A built-in heater automatically turns on and off depending on the outside temperature. An environmental control output senses a slow degradation in beam strength when weather conditions worsen preventing false alarms.

Installation and alignment is quick and easy with the ENFORCER E-964-Q Series. The built-in laser and visual alignment systems quickly and easily pinpoint the approximate mounting location for the transmitter and aid in aligning the transmitter and receiver units once mounted. A beam strength indicator clearly displays the strength of the beam at the receiver with 5 LEDs.

**Features:**

- Four selectable beam frequencies to eliminate interference between multiple units for enhanced perimeter protection.
- Audible beam alignment (buzzer).
- Beam strength indicator (5 LEDs).
- Environmental Output (Selecteable N.O. or N.C.): Signal is sent if a degradation in environmental conditions is detected such as thickening fog to prevent false alarms.
- Built-in heater.
- IP-55 ingress protection.
- Lensed optics reinforce beam strength and provide excellent immunity to false alarms due to rain, snow, mist etc.
- Automatic input power filtering with special noise rejection circuitry.
- Voltage testing points for fine tuning the beam alignment.
- Input voltage: 12-24V AC/DC.
- Delay time adjustable for nearly all situations.

**Troubleshooting:**

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter LED not lit</td>
<td>Make sure the input power to the transmitter is 12 to 24 VAC/VDC.</td>
</tr>
<tr>
<td>Receiver LED does not light when interrupted</td>
<td>Check the input power to the receiver is 12 to 24 VAC/VDC.</td>
</tr>
<tr>
<td>Beams are interrupted and LED lights, but the alarm does not trigger</td>
<td>Check the continuity of the wiring from the receiver to the alarm.</td>
</tr>
<tr>
<td>Signal LED continuously lit</td>
<td>Clear any obstacles between the transmitter and receiver.</td>
</tr>
<tr>
<td>Alarm trigger becomes erratic in bad weather</td>
<td>Check overall system installation. Realign the lenses.</td>
</tr>
<tr>
<td>Frequent false alarm triggers</td>
<td>Adjust the response time.</td>
</tr>
<tr>
<td></td>
<td>Change location of transmitter and receiver.</td>
</tr>
</tbody>
</table>
Adjusting the Delay Time

1. The delay time adjustment knob sets how long the beam can be interrupted before triggering the alarm (see fig. 13):
   a. A short delay time (high sensitivity) is suitable for catching fast moving intruders, but more susceptible to false alarms.
   b. A long delay time (low sensitivity) reduces false alarms, but fast moving intruders may not trigger the sensor.

2. Adjust the knob to the site’s situation. You may need to make adjustments later after the walk-through test.

Testing the Unit

1. Power up the transmitter and receiver.
2. If the red alarm LED remains steady ON even when the beam is not interrupted, re-adjust the alignment.
3. 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

<table>
<thead>
<tr>
<th>Model</th>
<th>E-964-Q165Q</th>
<th>E-964-Q330Q</th>
<th>E-964-Q495Q</th>
<th>E-964-Q660Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. range (outdoor)</td>
<td>165' (50m)</td>
<td>330' (100m)</td>
<td>495' (150m)</td>
<td>660' (200m)</td>
</tr>
<tr>
<td>Max. range (indoor)</td>
<td>330' (100m)</td>
<td>660' (200m)</td>
<td>990' (300m)</td>
<td>1320' (400m)</td>
</tr>
<tr>
<td>Current (Tx &amp; Rx)</td>
<td>110mA</td>
<td>115mA</td>
<td>120mA</td>
<td>125mA</td>
</tr>
<tr>
<td>Current (Tx &amp; Rx &amp; heaters)</td>
<td>260mA</td>
<td>270mA</td>
<td>280mA</td>
<td>290mA</td>
</tr>
<tr>
<td>Input voltage</td>
<td>12~24 VAC/VDC (non-polarity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay time</td>
<td>50msec~700msec (variable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detection method</td>
<td>All 4 beams simultaneously broken</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selectable beam frequencies</td>
<td>Four (4) channels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alarm output</td>
<td>Form &quot;C&quot; relay COM/N.O./N.C. 1A@125VAC/24VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamper output (Tx &amp; Rx)</td>
<td>NC switch, 1A @ 120VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental output</td>
<td>Selectable N.O. or N.C. 1A@125VAC/24VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beam-strength indicator</td>
<td>5 LEDs indicate signal strength from high to low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal LED (Rx)</td>
<td>Red LED ON - beam is broken or Tx and Rx out of alignment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power LED (Tx &amp; Rx)</td>
<td>Green LED - illuminated when power is on</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser wavelength</td>
<td>650nm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser output power</td>
<td>≤5mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alignment angle</td>
<td>Horizontal: ±90° Vertical: ±15°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-13<del>131°F (-25</del>55°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>5.7 lbs. (2.6kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>PC Resin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>15¼” x 4½” x 4½” (387 x 113 x 110mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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.

IMPORTANT – Do not connect to power until the sensor is completely installed and the installation has been double-checked.
### Choosing a Location

1. Find a suitable location for the receiver within wiring distance of a power supply and the alarm panel.
2. Establish a clear line-of-sight area between the receiver location and the transmitter location.
3. Make sure no trees or vegetation will cause false alarms during windy conditions.
4. Find locations away from standing water that could be splashed on to the receiver or the transmitter.
5. Do not mount the receiver where sunlight or bright lights shine directly into the unit.
6. 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

<table>
<thead>
<tr>
<th>Model</th>
<th>E-964-Q165Q</th>
<th>E-964-Q330Q</th>
<th>E-964-Q495Q</th>
<th>E-964-Q660Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Size</td>
<td>12V 24V</td>
<td>12V 24V</td>
<td>12V 24V</td>
<td>12V 24V</td>
</tr>
<tr>
<td>AWG22</td>
<td>320m 1,050ft</td>
<td>2,800m 18,000ft</td>
<td>2,400m 7,870ft</td>
<td>2,400m 7,870ft</td>
</tr>
<tr>
<td>AWG20</td>
<td>550m 1,800ft</td>
<td>4,800m 15,750ft</td>
<td>4,200m 13,780ft</td>
<td>3,500m 9,840ft</td>
</tr>
<tr>
<td>AWG18</td>
<td>800m 2,600ft</td>
<td>7,200m 23,620ft</td>
<td>6,200m 20,340ft</td>
<td>5,000m 13,780ft</td>
</tr>
<tr>
<td>AWG17</td>
<td>980m 3,190ft</td>
<td>8,800m 28,870ft</td>
<td>7,600m 24,930ft</td>
<td>5,900m 17,060ft</td>
</tr>
</tbody>
</table>

Note (1): Max. cable length when two or more sets are connected is the value shown in Table 1 divided by the no. of sets.

### Fine Tuning

The most accurate way to align the transmitter and receiver is to measure the voltage using the voltage output jack.

1. Set the range of a multimeter to 0~10VDC.
2. Insert the red probe into the (+) terminal and the black probe into the (-) terminal.
3. Using Table 3, adjust the receiver's sensors vertically and horizontally until the best possible voltage output is achieved.

### Table 3: Voltage Output

<table>
<thead>
<tr>
<th>Voltage Output</th>
<th>0V</th>
<th>&lt;1.1V</th>
<th>1.1~1.4V</th>
<th>1.4~1.7V</th>
<th>1.7~2.0V</th>
<th>&gt;2.0V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alignment Quality</td>
<td>No Signal</td>
<td>Bad</td>
<td>Poor</td>
<td>OK</td>
<td>Good</td>
<td>Strongest</td>
</tr>
</tbody>
</table>

### Beam Alignment Procedure

1. Remove the sensor cover and turn On the top and bottom lasers of both the transmitter and receiver. There are a total of four lasers.
2. Adjust the transmitter's sensor unit vertically and horizontally until the red dot is centered on the receiver and the receiver's signal LED turns Off.
3. Repeat step 2 for the receiver then turn Off the lasers.
4. Look through the viewfinder on the transmitter's lower sensor and adjust it vertically and horizontally until the receiver is clearly seen in the viewfinder.
5. Repeat step 4 for the receiver.
6. Turn On the beam alignment buzzer DIP switch (fig. 9). If the beams are not aligned the buzzer will sound.
7. Cover the top sensor on the receiver with the included template (as shown in fig. 10). Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the buzzer stops sounding. Repeat while covering the lower sensor and adjusting the top sensor.
8. Turn the buzzer Off.
9. Turn On the beam strength indicator DIP switch (fig. 9). If the beams are not aligned, the indicator will display little or no beam strength, see fig.12.
10. Cover the top sensor on the receiver. Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the beam strength indicator displays a strong signal. Repeat while covering the lower sensor and adjusting the top sensor.
11. Turn the beam strength indicator Off.

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Fig. 2: Wiring Diagram

Fig. 11: Horizontal and Vertical Sensor Adjustment

Beam Alignment Procedure

- Remove the sensor cover and turn On the top and bottom lasers of both the transmitter and receiver. There are a total of four lasers.
- Adjust the transmitter's sensor vertically and horizontally until the red dot is centered on the receiver and the receiver's signal LED turns Off.
- Repeat step 2 for the receiver then turn Off the lasers.
- Look through the viewfinder on the transmitter's lower sensor and adjust it vertically and horizontally until the receiver is clearly seen in the viewfinder.
- Repeat step 4 for the receiver.
- Turn On the beam alignment buzzer DIP switch (fig. 9). If the beams are not aligned, the buzzer will sound.
- Cover the top sensor on the receiver with the included template (as shown in fig. 10). Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the buzzer stops sounding. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the buzzer Off.
- Turn On the beam strength indicator DIP switch (fig. 9). If the beams are not aligned, the indicator will display little or no beam strength, see fig.12.
- Cover the top sensor on the receiver. Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the beam strength indicator displays a strong signal. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the beam strength indicator Off.

### ENFORCER Quad-Photobeam Detectors

Fig. 10: Fine Tuning

- Set the range of a multimeter to 0~10VDC.
- Insert the red probe into the (+) terminal and the black probe into the (-) terminal.
- Using Table 3, adjust the receiver's sensors vertically and horizontally until the best possible voltage output is achieved.

### ENFORCER Quad-Photobeam Detectors

Fig. 12: Beam Strength Indicator

- Cover the top sensor on the receiver with the included template (as shown in fig. 10). Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the buzzer stops sounding. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the beam alignment buzzer DIP switch (fig. 9). If the beams are not aligned, the buzzer will sound.
- Cover the top sensor on the receiver. Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the beam strength indicator displays a strong signal. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the beam strength indicator Off.

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Fig. 13: Using a Multimeter

- Cover the top sensor on the receiver with the included template (as shown in fig. 10). Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the buzzer stops sounding. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the beam alignment buzzer DIP switch (fig. 9). If the beams are not aligned, the buzzer will sound.
- Cover the top sensor on the receiver. Adjust the horizontal angle of the receiver's lower sensor vertically and horizontally until the beam strength indicator displays a strong signal. Repeat while covering the lower sensor and adjusting the top sensor.
- Turn the beam strength indicator Off.
ENFORCER Quad-Photobeam Detectors

Multiple sensor sample applications

1. Long distance series application.

   Channel #1
   Tx  Rx  Rx  Tx  Tx

   Channel #2
   Tx  Rx

   Channel #3
   Rx  Tx

   Channel #4

2. Two layer (double stacked) applications.

   Channel #1
   Tx

   Channel #2
   Tx  Rx

   Channel #3
   Tx  Rx

   Channel #4
   Rx  Tx

3. Perimeter security application.

4. Single pair multiple layer application.

   Channel #1
   Tx

   Channel #2
   Rx

   Channel #3
   Rx

   Channel #4
   Rx

Fig. 9: Receiver Detail

Fig. 10: Included Beam Alignment Template:

Use the included SECO-LARM template to aid in aligning the transmitter and receiver.

Table 2: Channel Beam Frequency Selection Chart

<table>
<thead>
<tr>
<th>Freq. channel</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch position</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

Important – The transmitter and receiver must be programmed to the same channel.

Selectable 4-channel beam frequency:

The sensor beam frequency can be set at different levels on-site to avoid interference from other photobeam sensors nearby. To select between four different beam frequencies, adjust the beam channel switch of the transmitter side and receiver side. See pg. 3, fig. 1 for switch location and table 2 for switch position.
Wiring the Transmitter – Pole 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 bottom 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 four plastic knockouts on the back of the sensor unit, two on top and two on bottom. Break out the appropriate knockout, and pull the wiring through the knockout. Then run the wiring through the hole near the bottom 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 (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.