

ENVIROMUX-PBD-DOxxx

Photoelectric Beam Detector

Manual



Model #	Outdoor Range	Indoor Range
ENVIROMUX-PBD-DO390*	390 ft. (120m)	790 ft. (240m)
ENVIROMUX-PBD-DO290	290 ft. (90m)	590 ft. (180m)
ENVIROMUX-PBD-DO190	190 ft. (60m)	390 ft. (120m)
ENVIROMUX-PBD-DO90	90 ft. (30m)	190 ft. (60m)

* Multi-frequency version



MAN234 Rev 4-4-17

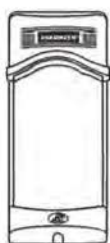
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Features:

- | Four selectable beam frequencies (ENVIROMUX-PBD-DO390 only)
- | 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.
- | Non-polarized power inputs.
- | Automatically adjusts beam strength to compensate for different weather conditions
- | Automatic input power filtering with special noise rejection circuitry.
- | N.C./N.O. alarm output.
- | N.C. tamper circuit included.
- | Quick, easy installation with built-in laser beam alignment system.
- | Interruption time adjustable for nearly all situations.

Included:



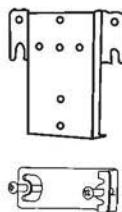
Transmitter x 1



Receiver x 1



Mounting plates x 2

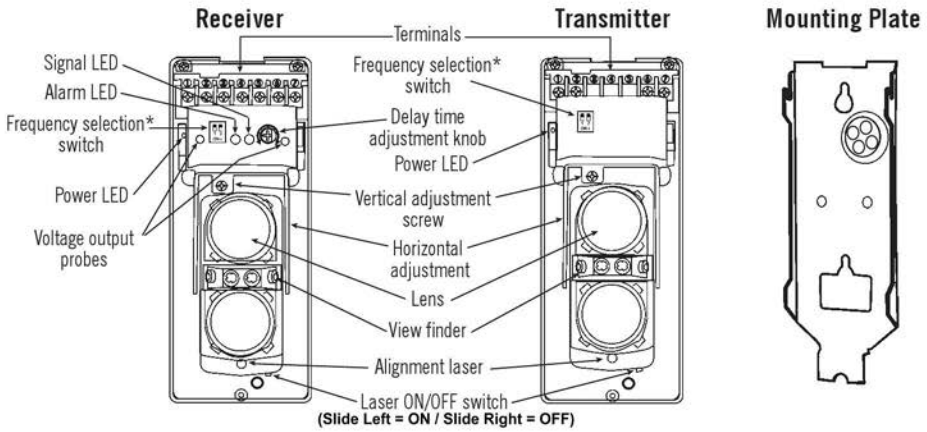


Pole mounting brackets (2 sets)

Mounting hardware also included.

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

Fig. 1: Identifying the Sensors



*For multi-frequency ENVIROMUX-PBD-DO390 model only

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.

Fig. 2: Vertical and Horizontal Adjustments

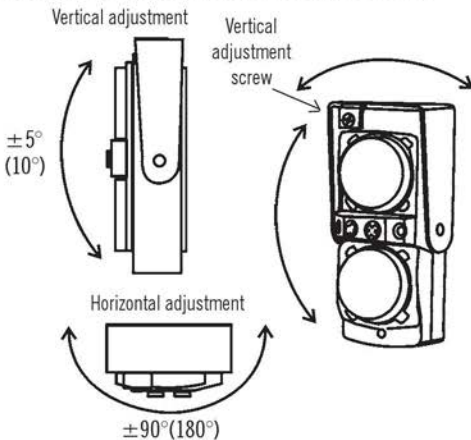
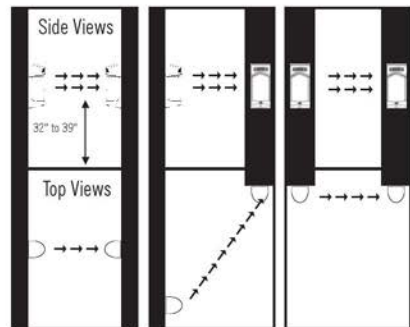


Fig. 3: Typical Installations



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.

Note: The maximum guaranteed 22AWG cable distance between a transmitter or receiver and the ENVIROMUX-2D/5D/16D is 1000 feet. To increase that distance, a larger gauge cable will be required.

Table 1: Cable Length

Model	E-PBD-DO90		E-PBD-DO190		E-PBD-DO290		E-PBD-DO390	
	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.	200m 660 ft.	1,600m 5,250 ft.	110m 390 ft.	900m 2,950 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.	350m 1,150 ft.	3,000m 9,840 ft.	170m 560 ft.	1,400m 4,590 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.	500m 1,640 ft.	4,200m 13,780 ft.	250m 820 ft.	2,200m 7,220 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.	590m 1,940 ft.	5,200m 17,060 ft.	310m 1,020 ft.	2,600m 8,530 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.
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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.

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. 4: Remove the Transmitter cover

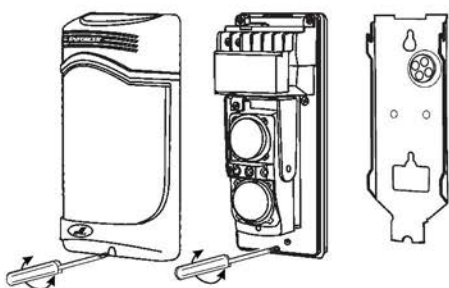


Fig. 5: Wall Mount, Wire from Inside Wall

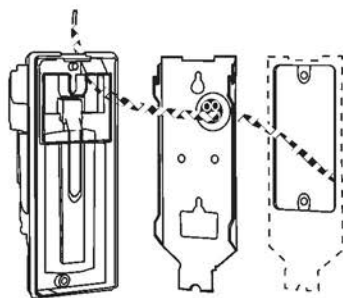


Fig. 6: Wall Mount, Wire Runs Along Wall

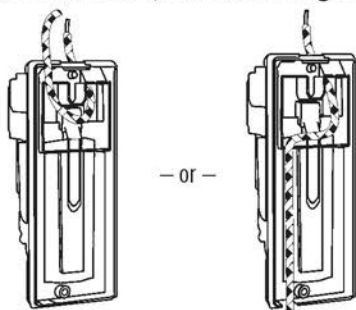


Fig. 7: Pole Mount

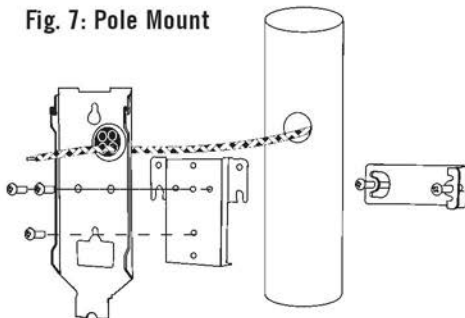
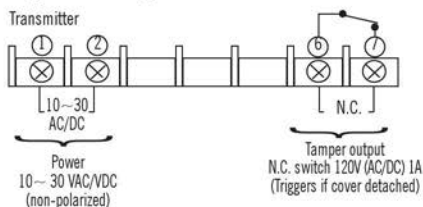


Fig. 8: Wiring

Transmitter



Receiver

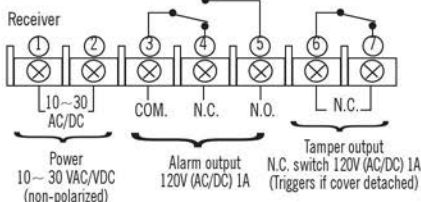
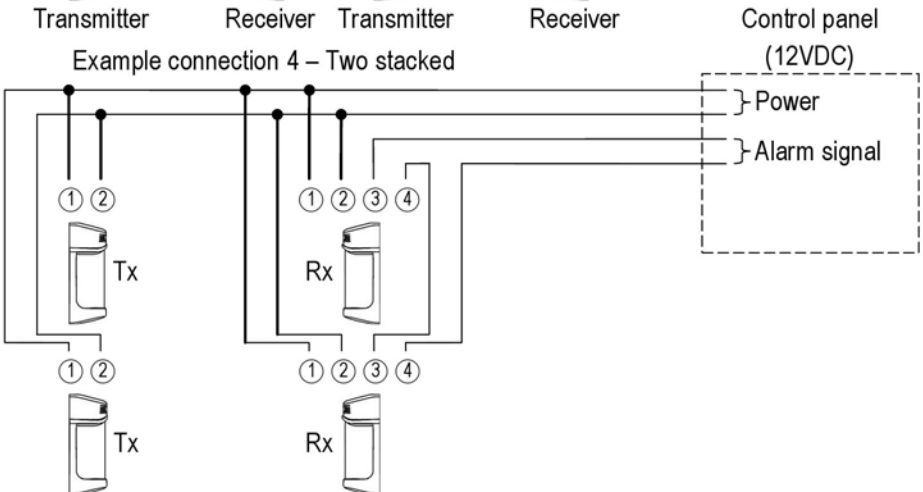
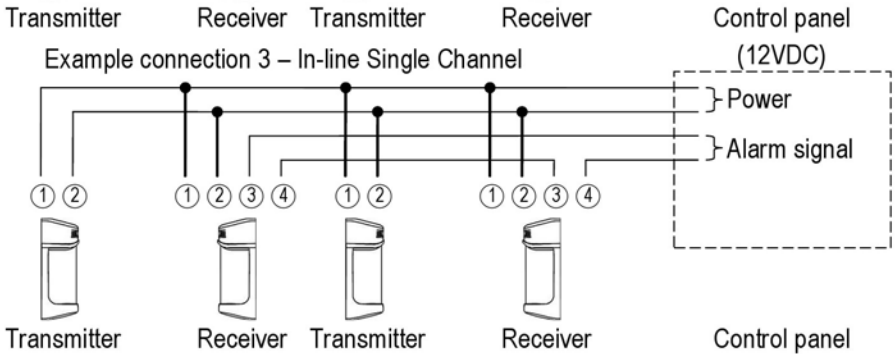
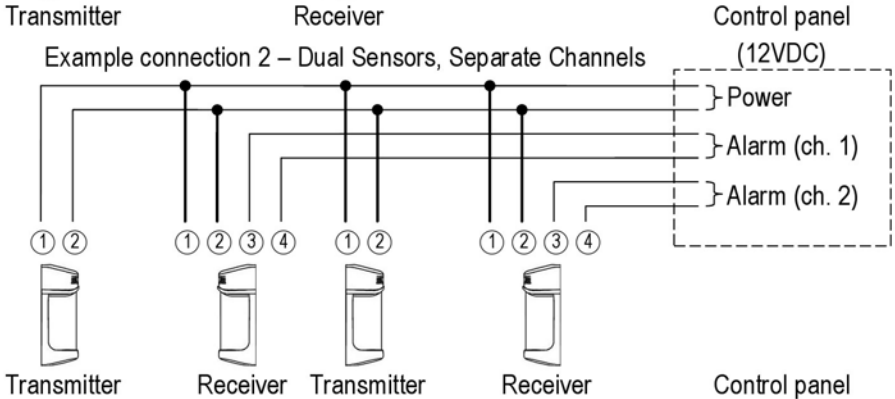
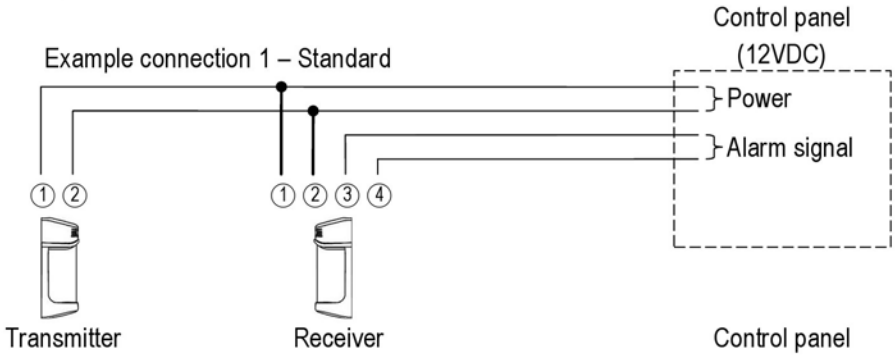


Fig. 9: Examples of Possible Ways to Connect One or More Sensors







Selectable 4-channel beam frequency (For ENVIROMUX-PBD-DO390 model only)

The sensor beam frequency can be set at different levels on-site to avoid interference from other twin photobeam sensors nearby. Useful during multiple sensor applications as shown below. To select between four different beam frequencies, adjust the beam channel switch of the transmitter side and receiver side. See fig. 1 for switch location and table 2 for switch position.

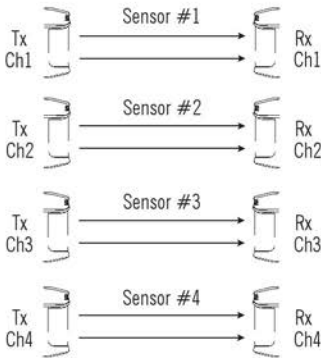
Important – The transmitter and receiver sensor pair must be set with the same frequency.

Table 2: Beam Frequency Selection Chart (For ENVIROMUX-PBD-DO390 model only)

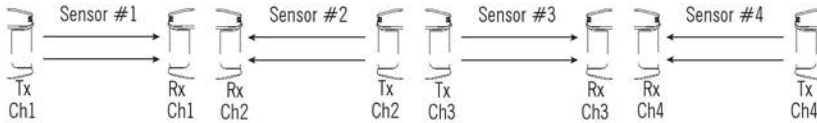
Frequency channel	CH1	CH2	CH3	CH4
Switch position				

Multiple sensor sample applications (For ENVIROMUX-PBD-DO390 model only)

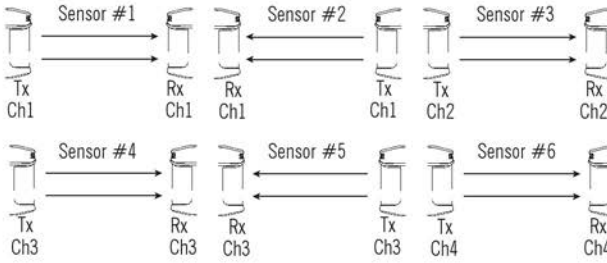
1. Single pair multiple layer application.



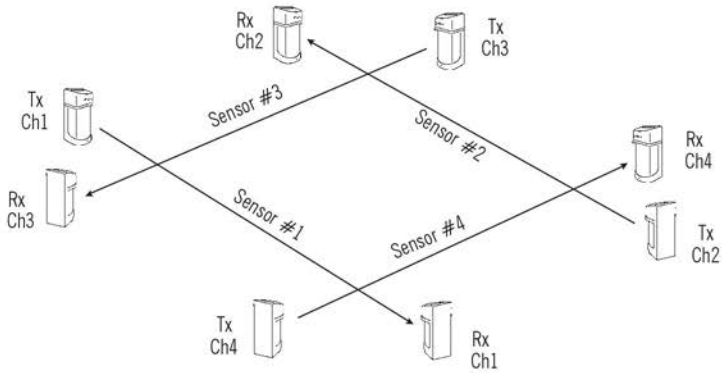
2. Long distance series application.



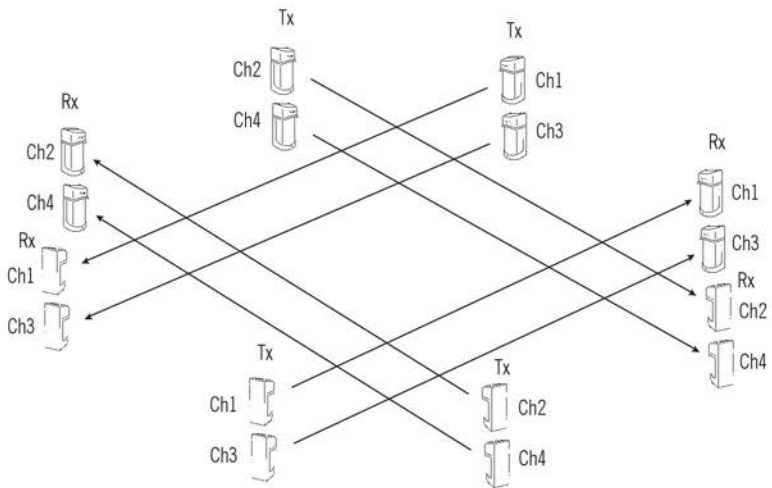
3. Two layer (double stacked) applications.



4. Perimeter security application.



5. Two layer (double stacked) perimeter security application.



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 on page 3).

There are two ways to adjust alignment:

1. Laser adjustment (see fig. 1 on page 3):
 - a. Remove the transmitter cover, then turn the laser on with the ON/OFF switch (see fig. 1 on page 3). 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 3. 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

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 1~4VDC.
- b. Insert the red (+) probe into the (+) terminal and the black (-) probe into the (-) terminal.
- c. Measure the voltage (see table 4).
- 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

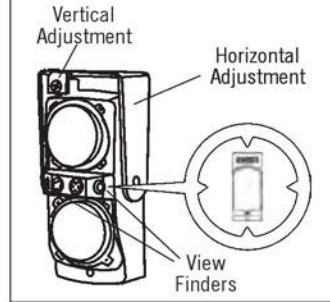


Table 3: Receiver LED Indicators

Alarm (Red LED)	Signal (Yellow LED)		Signal strength
		Multi frequency	
OFF	OFF	OFF	Best
OFF	ON	Flash	Good
OFF	ON	ON	Fair
ON	ON	ON	Re-adjust

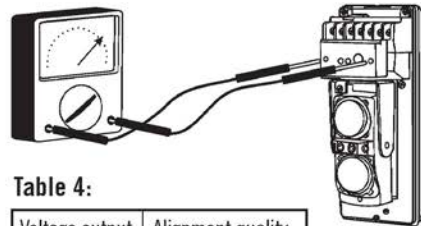


Table 4:

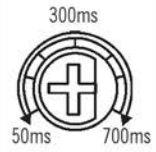
Voltage output	Alignment quality
> 2.8V	Best
2.0~2.7V	Good
1.2~1.9V	Fair
< 1.1V	Re-adjust

Note: 4VDC 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 5: Specifications

Model	E-PBD-DO90	E-PBD-DO190	E-PBD-DO290	E-PBD-DO390
Max. range (outdoor)	90' (30m)	190' (60m)	290' (90m)	390' (120m)
Max. range (indoor)	190' (60m)	390' (120m)	590' (180m)	790' (240m)
Max. current (Tx & Rx)	64mA	70mA	74mA	88mA
No. of beam channel	N/A	N/A	N/A	4
Voltage output (+/-10%)	1~4V			
Power	10~30 VAC/VDC (non-polarized)			
Detection method	Simultaneous breaking of 2 beams			
Interrupt speed*	50msec~700msec (variable)			
Alarm output	NO/NC relay, 1A @ 120VAC, min. 1 sec.			
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 (Tx & Rx)	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

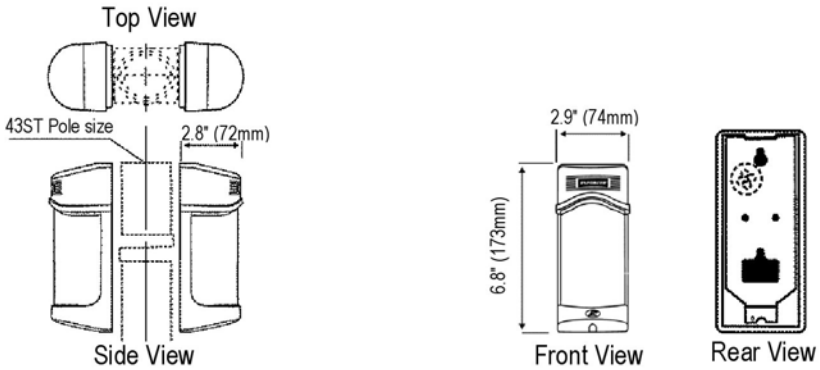


Fig. 13: Beam Spread

The beam spread (s) can be calculated as $s=0.03xd$.

Distance (d)	Beam spread (s)
90ft (30m)	2.7ft (0.8m)
190ft (60m)	5.7ft (1.7m)
290ft (90m)	8.7ft (2.7m)
390ft (120m)	11.7ft (3.6m)

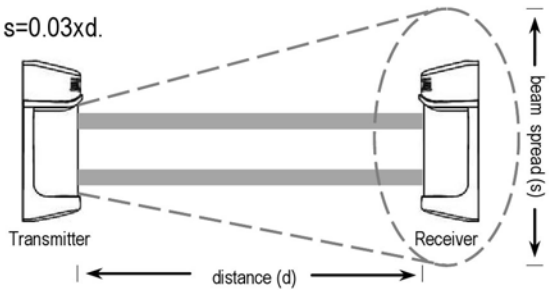
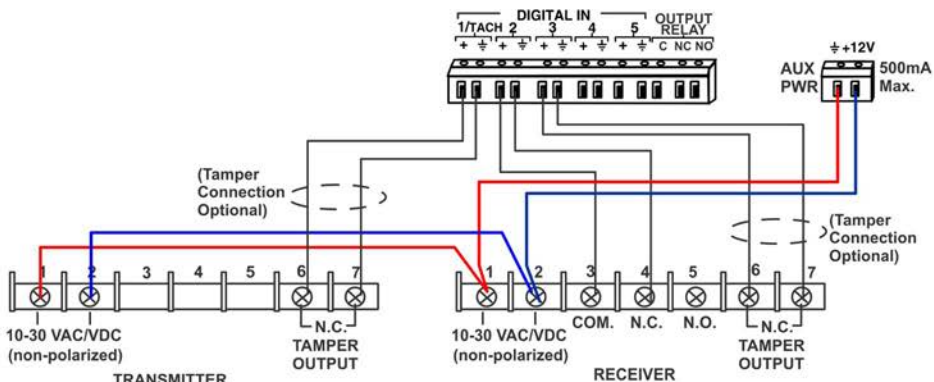


Table 6: Troubleshooting

Situation	Possible Solution	Solution
Transmitter LED does not light.	Incorrectly wired and/or insufficient voltage.	Ensure the power supply to the transmitter is 12 to 24 VAC/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.

FOR ENVIROMUX-2D

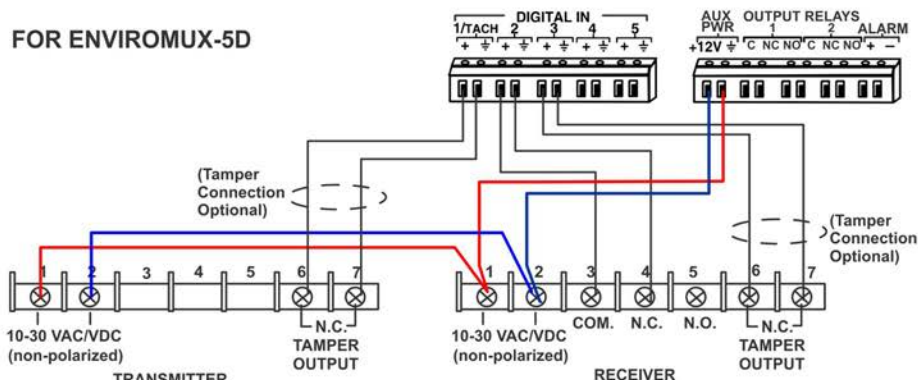
VIEW OF TERMINALS ON ENVIROMUX-2D



TERMINAL BLOCKS OF ENVIROMUX-PBD-DOxxx

FOR ENVIROMUX-5D

VIEW OF TERMINALS ON ENVIROMUX-5D

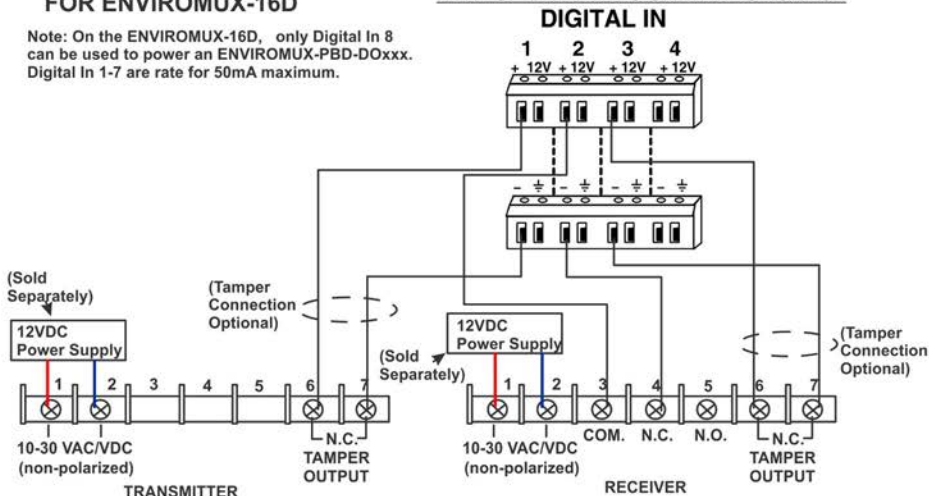


TERMINAL BLOCKS OF ENVIROMUX-PBD-DOxxx

FOR ENVIROMUX-16D

VIEW OF TERMINALS ON ENVIROMUX-16D

Note: On the ENVIROMUX-16D, only Digital In 8 can be used to power an ENVIROMUX-PBD-DOxxx. Digital In 1-7 are rate for 50mA maximum.



TERMINAL BLOCKS OF ENVIROMUX-PBD-DOxxx

Example for Digital Input Configuration in ENVIROMUX Web Interface

Digital Input Configuration

Digital Input Settings	
Description	<input type="text" value="E-PBD Photo Detector"/> Descriptive name for the digital input
Normal Status	<input type="text" value="Open"/> <input type="button" value="v"/> Select the normal status for the digital input
Refresh Rate	<input type="text" value="1"/> <input type="button" value="Sec"/> <input type="button" value="v"/> The refresh rate at which the digital input view is updated
Group Settings	
Schedule Settings	
Alert Settings	
Disable Alerts	<input type="checkbox"/> Disable alert notifications for this digital input
Alert Delay	<input type="text" value="1"/> <input type="button" value="Sec"/> <input type="button" value="v"/> Duration the digital input must be out of normal status before alert is generated
Notify Again Time	<input type="text" value="30"/> <input type="button" value="Min"/> <input type="button" value="v"/> Time after which alert notifications will be sent again
Notify on return to normal	<input type="checkbox"/> Send a notification when this digital input returns to normal status
Auto acknowledge	<input checked="" type="checkbox"/> Automatically acknowledge alert when digital input returns to normal status
Enable Syslog Alerts	<input type="checkbox"/> Send alerts for this digital input via syslog
Enable SNMP Traps	<input type="checkbox"/> Send alerts for this digital input via SNMP traps
Enable E-mail Alerts	<input checked="" type="checkbox"/> Send alerts for this digital input via e-mail
E-mail Subject	<input type="text" value="E-PBD Photo Detector"/> Subject of e-mails sent for alerts
Select IP Camera	<input type="text" value="D-Link DCS-933L"/> <input type="button" value="v"/> Select IP camera for image capture on alert
Attach IP camera capture to e-mail	<input checked="" type="checkbox"/> Attach captured image from selected IP camera to alert e-mail
Save image to USB	<input type="checkbox"/> Save captured image from selected IP camera to USB Flash

The Alert Delay configured here will be added to the Delay Time configured at the transmitter (pg. 10) to determine how long an alert condition must exist before an alert will be sent.

Example of Event Configuration in ENVIROMUX Web Interface

Event #9 E-PBD Photo Detector Configuration

Event Settings	
Description	Event #9 E-PBD Photo Det Descriptive name for the event
Trigger Status	Closed Select the Digital Input status that will trigger the event
Event Delay	0 Sec Duration the sensor must be out of thresholds before the event is triggered
When triggered, acknowledge the following event	None
Group Settings	
Event Notifications	
Notify Again Time	30 Min Time after which alert notifications will be sent again
Notify on return to normal	<input type="checkbox"/> Send a notification when this sensor returns to normal status
Auto acknowledge	<input checked="" type="checkbox"/> Automatically acknowledge alert when sensor returns to normal status
Enable Syslog Alerts	<input type="checkbox"/> Send alerts for this event via syslog
Enable SNMP Traps	<input type="checkbox"/> Send alerts for this event via SNMP traps
Enable E-mail Alerts	<input type="checkbox"/> Send alerts for this event via e-mail
E-mail Subject	Event #9 E-PBD Photo Det Subject of e-mails sent for alerts
Select IP Camera	D-Link DCS-933L Select IP camera for image capture on alert
Attach IP camera capture to e-mail	<input type="checkbox"/> Attach captured image from selected IP camera to alert e-mail
Save image to USB	<input type="checkbox"/> Save captured image from selected IP camera to USB Flash
Enable SMS Alerts	<input type="checkbox"/> Send alerts for this event via SMS
Enable Siren	<input type="checkbox"/> Turn on the siren when event is triggered
Enable Beacon	<input type="checkbox"/> Turn on the beacon when event is triggered
Remote SSH Commands	
<input type="button" value="Save"/>	

For a quicker alert response (dependent only on the delay configured at the ENVIROMUX-PBD-DOxxx transmitter), select "Disable Alert" in the Alert Settings (pg. 13) and configure an Event Alert with an Event Delay of 0 seconds.