

Installation Instructions

DS433i Single Beam Photoelectric Intrusion Detection Systems

1.0 Specifications

- **Range:** Indoors: 100 ft. (30 m) max.
- **Voltage:** 10 to 26 VDC; 8 to 18.5 VAC.
- **Current:** Transmitter Receiver
(@ 12VDC) 7 mA max. 25 mA max.
- **Standby:** Intended for connection to DC power supplies capable of supplying power if primary power fails.
- **Relay:** "NO" or "NC" (selectable) output. Dry Contacts rated 0.5 A @ 120 VAC, 1 A @ 24 VDC (resistive load).
- **Tamper:** Normally Closed with cover in place.
- **Response Time:** 100 milliseconds minimum.
- **Pointability:** The optical module can be adjusted $\pm 15^\circ$ horizontally or $\pm 5^\circ$ vertically.
- **Beam:** Pulsed Infrared; 950 nm, 1 kHz.
- **Temperature:** -4°F to $+122^\circ\text{F}$ (-20°C to $+50^\circ\text{C}$).
- **Dimensions:** 4.5 in. x 2.8 in. x 2.1 in. (HxWxD)
114 mm x 70 mm x 53.5 mm

2.0 Installation Considerations

- Stay within the listed maximum range.
- Install the system with a clear line-of-sight between the transmitter and receiver.
- Use care when installing near reflective surfaces (i.e. glossy walls or floors). Care should be taken during alignment to ensure beams are line-of-sight aimed and are not reflecting off surfaces.
- Do not install the units where they may be immersed in water or subject to corrosive liquids or sprays.
- Do not install the receivers where they will be facing an intense source of light (e.g. a rising or setting sun). If the sun can not be avoided, mount the receiver slightly higher than the transmitter. Aim the receiver down at the transmitter.
- Do not install the receivers where sunlight could be reflected directly into the receiver optics.
- Do not install either unit on movable surfaces or surfaces subject to strong vibrations.

3.0 Mounting

3.1 Wall Mount

NOTE: The units should be mounted higher than 2 feet (0.6 m). However, mounting height will change depending on the anticipated intruder catch area.

- Choose the appropriate mounting locations. They should be rigid and provide a clear line-of-sight between the transmitter and receiver.
- Cut holes 2.8 inches (72 mm) high by 2.1 inches (52 mm) wide and run appropriate wiring (see Section 4.0 for wiring information).

NOTE: Be sure all wiring is unpowered before routing and connecting.

- Connect wires to Terminal Blocks (see Section 4.0)
- Remove the Transmitter's filter by inserting a small flat-blade screwdriver into the slot at the top of the filter and gently prying it loose (see Figure A).

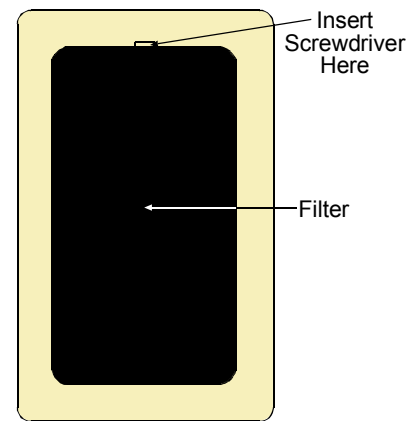


Figure A - Removing Filter

- Slide the Transmitter into the hole in the wall and attach with self-tapping screws through the Mounting Holes (see Figure B).

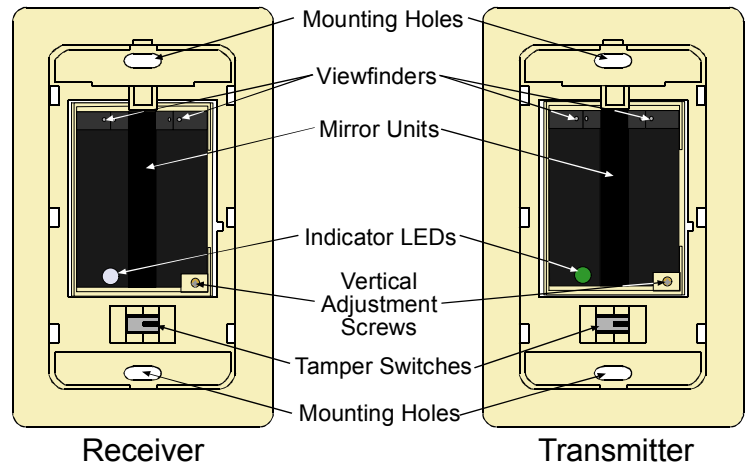


Figure B - Location of the System's Major Items

- Repeat this complete mounting procedure for the Receiver. Be sure to mount the Receiver in direct line-of-sight with the Transmitter.

3.2 Switch Box Mount

NOTE: The units should be mounted higher than 2 feet (0.6 m). However, mounting height will change depending on the anticipated intruder catch area.

NOTE: Use standard single gang switch boxes.

- Choose the appropriate mounting location. Install the switch boxes with a clear line-of-sight between the transmitter and receiver.
- Run appropriate wiring (see Section 4.0 for wiring information).

NOTE: Be sure all wiring is unpowered before routing and connecting.

- Connect wires to Terminal Blocks (see Section 4.0)
- Remove the Transmitter's filter by inserting a small flat-blade screwdriver into the slot at the top of the filter and gently prying it loose (see Figure A).
- Slide the Transmitter into the Switch Box and attach with machine screws through the Mounting Holes (see Figure B).
- Repeat this complete mounting procedure for the Receiver. Be sure to mount the Receiver in direct-line-of sight with the Transmitter.



4.0 Wiring



Only apply power after all connections have been made and inspected.

- Use the following chart (Figure C) to determine the minimum gauge wire needed per length of wire run between the power source and the last unit on the run. The chart is based on one system (one transmitter and one receiver) connected to the same wire run from the power source.

If more than one system is added to the run, the maximum length per gauge decreases and is determined by dividing the length found in the chart by the number of systems on the run.

DS433i Wiring Chart		
SIZE	12 VDC	24 VDC
20 AWG (1.0 mm)	1,000 ft. (300 m)	5,000 ft. (1500 m)
18 AWG (1.2 mm)	1,600 ft. (480 m)	8,000 ft. (2400 m)
16 AWG (1.5 mm)	2,600 ft. (790m)	13,000 ft. (3900 m)
14 AWG (1.8 mm)	4,000 ft. (1200 m)	20,000 ft. (6000 m)

Figure C - Wire chart

- Wire the receiver and transmitter terminal strips (see Figures D and E).

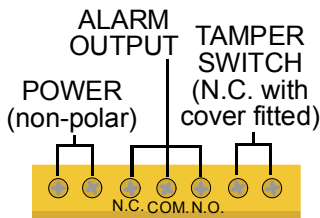


Figure D - Receiver wiring

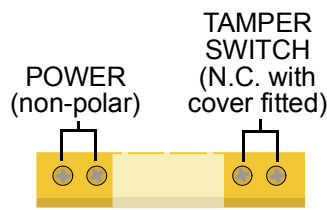


Figure E - Transmitter wiring

5.0 Set-up and Alignment

NOTE: Precise, correct alignment is a critical process for these systems to operate effectively.

- Look through one of the Transmitter's Viewfinders located on either side of the Mirror Unit (see Figure B).
- Rotate the Mirror Unit until the image of the other unit is centered in the mirror (see Figure F). If initially aimed too high or low, adjust the Vertical Fine Tuning Screw (see Figure B) until the unit is centered.

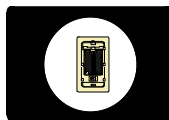


Figure F - Viewfinder Image

NOTE: Alignment may be made easier with the use of an alignment light (see Section 7.0).

- Repeat this complete alignment sequence for the Receiver.



Only apply power after all connections have been made and inspected.

- Apply power to the units.
- Check the Transmitter. The Indicator LED (see Figure B) should be on (green). If the lamp is not on, the unit is not receiving power.
- When properly aligned the Receiver's Indicator LED should be lit (green). If the Indicator LED is not on or lit red, either the Receiver is not properly wired to the power source, the units are not properly aligned, or the mirrors are dirty. Inspect the wiring, clean the mirrors, and realign the system as needed.

NOTE: The Mirror Units may be cleaned with a soft, clean, damp cloth.

- Once the system is properly aligned, replace the Filters.

6.0 Final Check

NOTE: The following test should be performed at least once per year to assure proper performance and operation. Furthermore, the system mounting (including alignment), wiring, and condition of all components should be inspected periodically.

- Once the system has been aligned and all components are reassembled, walk through the beam path at several locations and from varying directions (see Figure G). Be sure the system alarms as desired.

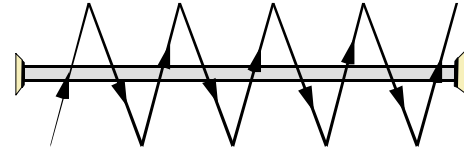


Figure G - Walk Testing

- The system should alarm during each crossing of the beam. If not, re-check alignment.

NOTE: If a tamper circuit has been installed, it should be tested now by removing the Filters.

- Replace the Filters after testing.

7.0 Other Information

7.1 Alignment Lights

Alignment may be made easier by using a flashing high intensity light placed in front of the units. This makes a very distinct target when looking at the other unit through the viewing port. A recommended light source is model AL402.

7.2 Maintenance

At least once a year the Filters should be cleaned. Use a soft, clean damp cloth.

On a daily basis, the end user should walk through the beams before arming. This will verify operation.

8.0 Application Tips

When using photoelectric detectors for motion detection, there are a few installation techniques that will make the system more versatile.

8.1 Beam Stacking

Beam stacking gives a wall of protection by stacking several units at different heights and providing an alarm activation on the blockage of only one pair of beams (see Figure H for the correct set-up technique). Note that the system is installed with alternating transmitters and receivers at each end. This eliminates the possibility of a receiver being covered by more than one transmitter.

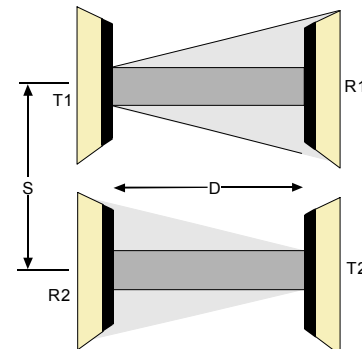


Figure H - Beam Stack Method

The maximum spacing between receivers (S) can be calculated by dividing the distance between the transmitter and its receivers (D) by 20.

Therefore, if the distance between a transmitter and receiver is 100 feet (30 m), the maximum spacing between receivers would be 100 ft. (30 m) ÷ 20, or 5 ft. (1.5 m)

$$S = D/20 \quad S = 100 \text{ ft. (30 m)}/20 \quad S = 5 \text{ ft. (1.5 m)}$$

A potential problem when installing systems in a beam stack is "Near Field Reflection." Near field reflection is caused when a reflective object is placed in the line-of-sight of the detectors and causes the transmitted signal to be reflected to the wrong receiver (see Figure J).

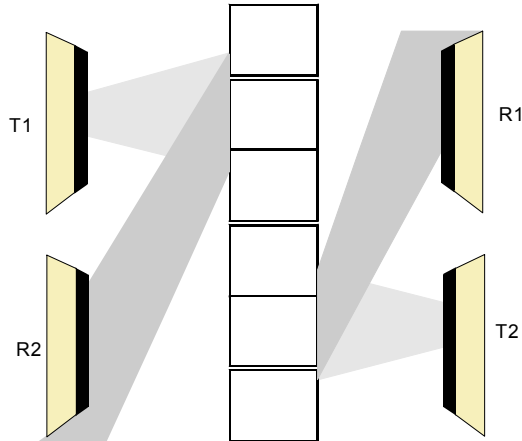


Figure J - Near Field Reflection

It may be desirable to have more than two sets of beams to create taller stacks. This can be accomplished by adding receivers as shown in Figure K. Note that the beam from each transmitter is covering two receivers. (T1 covers R1 and R3, T2 covers R2 and R4). To achieve this the receivers must be spaced closer together than the "S" distance calculated with the above equation.

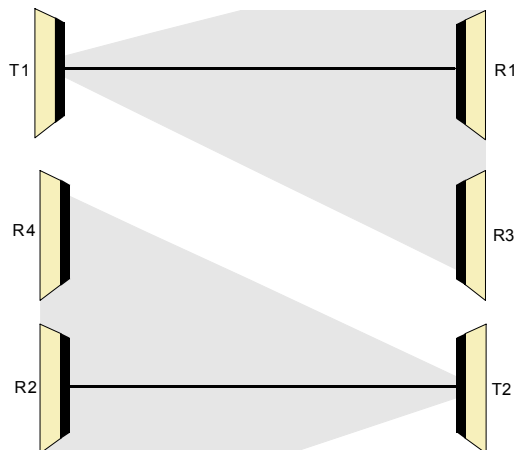


Figure K - Multi-system Stack

8.2 Perimeter Protection

When protecting the interior of an installation, a good technique is to mount the units at 90° angles around the coverage area (see Figure L).

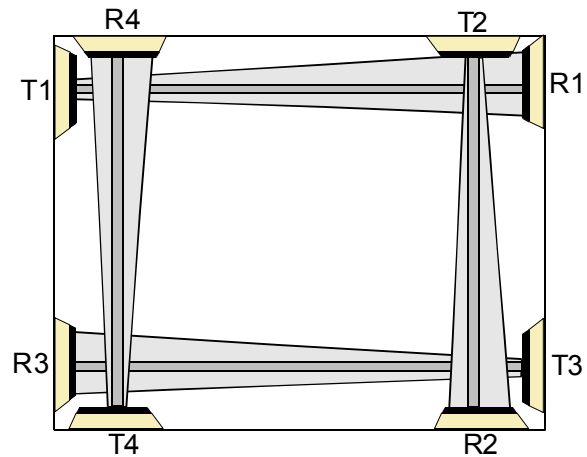


Figure L - Perimeter Protection

Note that the beams are mounted so they cross each other. This way, an intruder can not enter the area by walking between the units. When installing multiple transmitters and receivers, test with all the receivers powered-up, but with only one transmitter powered-up at a time. A transmitter should set-up only its receiver.

Receivers physically too close to a different system's transmitters may be set-up even if the transmitter is not pointed at them (see Figure M).

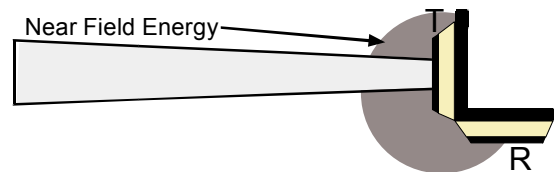


Figure M - Close Proximity Field Problem

If a receiver is being set-up by the wrong transmitter, the signals can usually be eliminated by masking the sides of the transmitter and receiver. Use electrician's tape or duct tape inside each enclosure's filter.

When installing these systems, remember that the infrared signal may reflect off objects (e.g. glossy walls or floors) in the coverage area and still set up the receiver.

A thorough walk test performed at several different points within the coverage area will catch this problem. Re-aligning the units should solve this problem.

The only way to insure proper continual protection is to perform regular walk tests of the desired coverage area.

