DS484Q/DS486Q

Security Systems

Installation Instructions

Quad Beam Photoelectric Detectors

EN

BOSCH

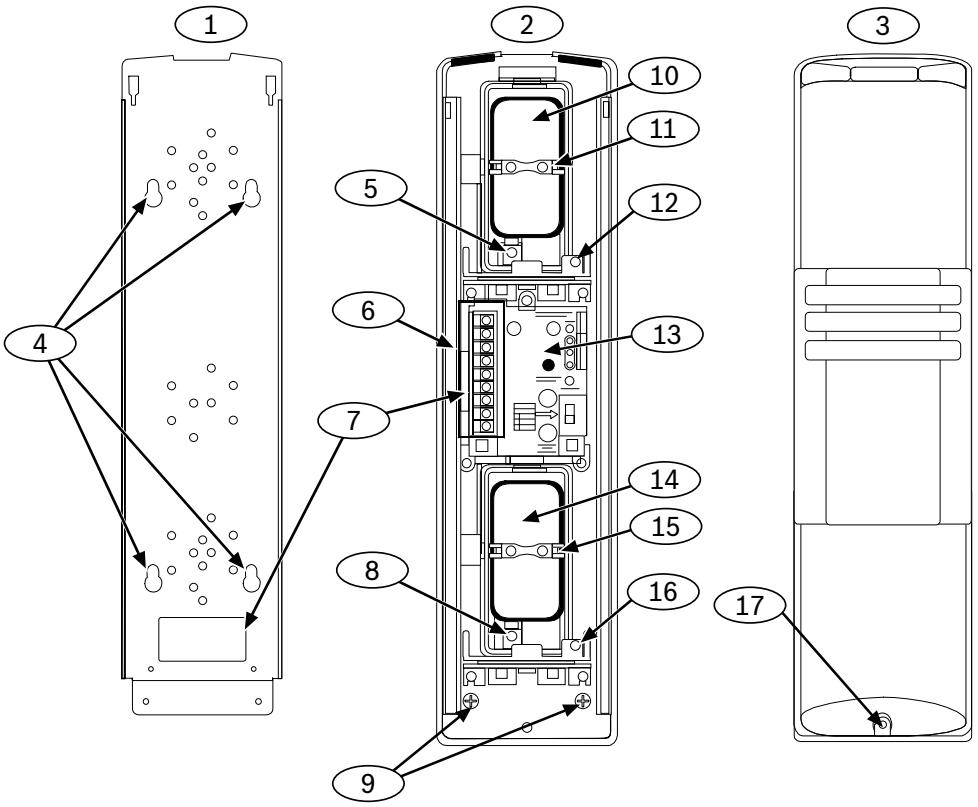
1.0 Overview

1.1 Description

The DS484Q and DS486Q are photoelectric quad beam detectors that use four pulsed infrared beams to activate an alarm relay upon detection of an intruder. Both models contain a transmitter that emits an invisible infrared beam, and a receiver. If the beam is broken, the receiver signals an alarm. Multiple channel operation provides increased system flexibility by allowing multiple devices to be used near each other without cross-talk or other interference.

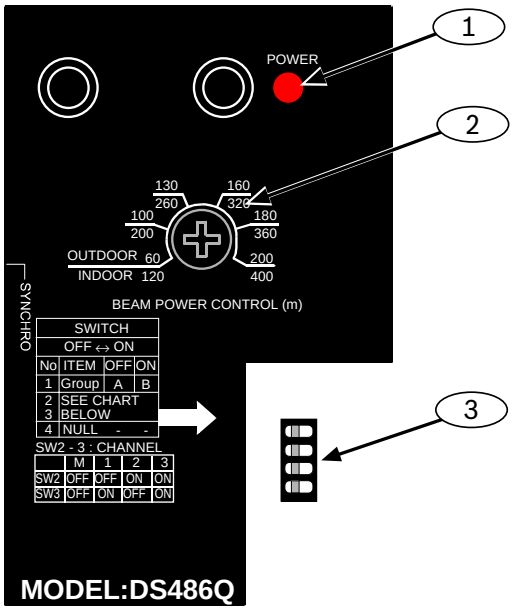
1.2 Components

Figure 1: DS484Q/DS486Q Components



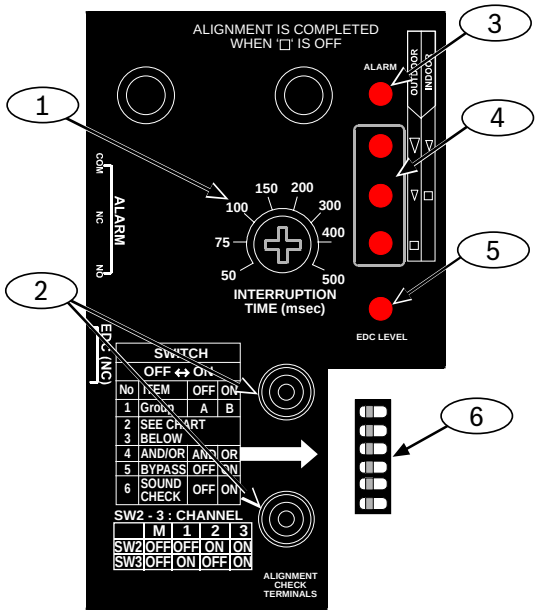
1 - Chassis
2 - Base
3 - Cover
4 - Mounting holes
5 - Vertical adjustment screw (upper)
6 - Terminal block (transmitter has five terminals, receiver has nine terminals)
7 - Wire entrance
8 - Vertical adjustment screw (lower)
9 - Base mounting screws
10 - Optical module (upper)
11 - Scope (upper)
12 - Horizontal adjustment screw (upper)
13 - Operation panel (refer to Figure 2 *or* Figure 3*)*
14 - Optical module (lower)
15 - Scope (lower)
16 - Horizontal adjustment screw (lower)
17 –Cover mounting screw

Figure 2: DS486Q Transmitter Operation Panel



1 - POWER LED
2 - Beam power control
3 - DIP switches

Figure 3: DS486Q Receiver Operation Panel



1 - INTERRUPTION TIME switch
2 - Alignment check terminals
3 - ALARM LED
4 - Level meter
5 - Environmental discrimination circuit (EDC) LED
6 - DIP switches

1.3 Features

1.3.1 100 Times Sensitivity Allowance

Stable operation is maintained even if 99% of beam energy is cut by environmental disturbances such as rain, fog, or frost.

1.3.2 Beam Power Control

Use this feature to select the appropriate beam intensity for the detection range. Controlling beam intensity minimizes the risk of reflection off nearby walls and cross detection with other detectors.

1.3.3 Beam Interruption Time Control

Use this feature to change the beam interruption time to best fit the application.

1.3.4 Using Multiple Transmitter-and-Receiver Sets

Up to four transmitter-and-receiver sets can be stacked.

1.3.5 Selectable Beams

The beams in the DS484Q and DS486Q are configurable into eight different combinations (two groups by four channels). These combinations can eliminate false alarms that can occur from cross-talk when multiple beams are stacked, or when the transmitter and receiver are separated by a long distance.

The diameter of the transmitted beam increases with increased distance between the transmitter and receiver. At distances that approach the maximum range, the beam might reach two or more receivers. Refer to *Section 2.1.2 Beam Spread* on page 5 for additional information.

1.3.6 Selectable AND/OR Gate

The photoelectric intrusion detection system in the DS484Q and DS486Q provides alarm relay activation for different considerations. Use the DIP Switches to select the required protection:

AND gate – All four beams must be blocked simultaneously to cause an alarm. This setting results in fewer false alarms caused by birds and other small animals.

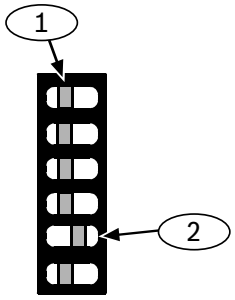
OR gate – Either the upper or lower pairs of beams must be blocked. This setting can detect an intruder crawling on the ground.

1.3.7 Environmental Discrimination Circuit (EDC)

The Environmental Discrimination Circuit (EDC) sends a signal when maintaining stable operation becomes difficult due to environmental disturbances. The EDC detects the gradual loss of signal along the beam's path because of dirt built up on the cover, or because of rain, fog, or snow. If the signal decreases by 95% over at least 4-seconds, the EDC activates the EDC LED (refer to *Figure 3* on page 3) and relay. This indicates that something is partially blocking a beam, or that the covers need cleaning.

The EDC feature was not evaluated by Underwriters Laboratories (UL).

Figure 4: Receiver DIP Switches



1 - DIP switches 1through 4 and 6 in the OFF position

2 - DIP Switch 5 (EDC BYPASS Switch) in the ON position

To use the EDC Bypass Switch, set the receiver's DIP Switch 5 to ON or OFF (*Figure 4*). Refer to *Table 1* for information about the functions and detector status.

Connect the EDC to a trouble circuit.

Check the system after the EDC relay activates.

Table 1: EDC BYPASS Switch States

Detector Status	BYPASS Switch OFF	BYPASS Switch ON
Poor Environmental Condition*	EDC LED lights and EDC signal is provided through the normally-closed relay output at the receiver. The alarm is generated by loss of beam energy.	EDC LED turns on and EDC signal is provided through the normally-closed relay output at the receiver. With the loss of beam energy, the ALARM LED lights but alarm signal is not generated (alarm relay is automatically shunted).
When either optical module is blocked for 3 or more seconds.	EDC LED turns on and EDC signal is provided No alarm output is generated.	EDC LED turns on and EDC signal is provided. If another optical module is blocked, the ALARM LED turns ON, but no alarm signal is generated.
When both optical modules are blocked for 3 seconds.	After the specified interruption time, the ALARM LED turns ON and alarm signal is generated. If beams are blocked for more than 3 seconds, EDC LED turns ON, and EDC signal is generated.	After the specified interruption time, the ALARM LED turns ON, and alarm signal is generated. EDC LED does not turn ON, and EDC signal is not provided.

* Poor environmental condition refers to difficulty in maintaining stable operation due to environmental disturbances like fog or rain.

2.0 Installation

2.1 Installation Considerations

Read the following information before installing, wiring, and performing regular maintenance on the equipment.

Do not install the detector:

- near trees and plants where falling leaves can block the beam
- where intense sources of light and sunlight can reflect directly into the receiver optics

A beam of light shining at a ±3-degree angle of each receiver can cause false alarms.

- on movable surfaces
- where subject to splashing water or sea spray
- beyond the maximum range of each model
- where strong electrical noise or radio frequency interference occurs
- where strong vibration occurs
- in the presence of corrosive or explosive gas

Face upper and lower optical modules toward each other on the transmitter and the receiver.

- Do not install or wire detectors during a thunderstorm.
- Do not supply power until all wiring is completed.
- Maintain power between 10.5 VDC and 28 VDC at all times.
- Do not disassemble or modify the base.

2.1.1 Beam Strength over Distance

The beam strength is best if used within the maximum range of the detectors. If used for shorter distances, excess beam energy reaches the receiver resulting in reflection off nearby walls and incorrect communication with other detectors.

2.1.2 Beam Spread

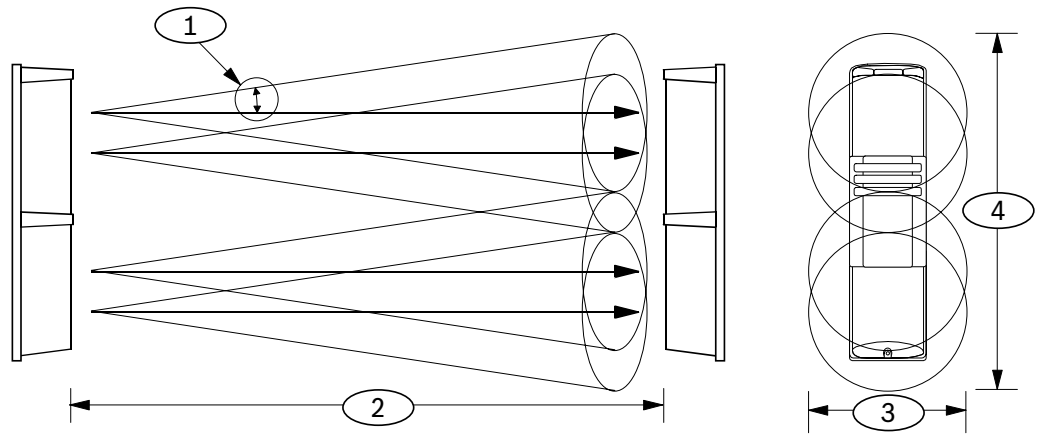
The beam spread is +0.7°. Refer to *Figure 5* and *Table 2* to determine the installation conditions.

Table 2: Beam Spread Distances

Between Transmitter and Receiver*		Horizontal Spread*		Total Vertical Spread*	
m	ft	m	ft	m	ft
20	66	0.5	1.7	0.8	2.6
40	131	1.0	3.3	1.3	4.3
60	197	1.5	4.9	1.8	5.9
80	263	2.0	6.6	2.2	7.2
100	328	2.5	8.2	2.7	8.9
120	394	3.0	9.8	3.2	10.5
140	459	3.5	11.5	3.7	12.1
160	525	4.0	13	4.2	13.7
180	591	4.5	14.8	4.7	15.4
200	656	6.0	16.4	5.2	17.1

* Refer to Figure 5.

Figure 5: Beam Spread



1 - Beam spread
2 - Distance between transmitter and receiver
3 - Horizontal spread
4 - Total vertical spread

2.2 Mounting

Mount the DS484Q and DS486Q in one of two ways:

- Pole mounted
- Wall mounted

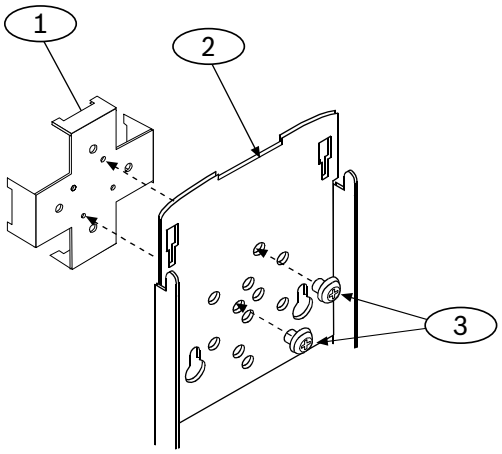
2.2.1 Pole Mounting

1. Choose an appropriate mounting location for the system. Install poles with a clear line-of-sight between the transmitter and the receiver.
2. Loosen the transmitter's cover mounting screw and remove the cover. Refer to *Items 3* and *17* in *Figure 1* on page 2.
3. Loosen the two mounting screws and remove the chassis by sliding it down against the base Refer to Refer to *Items 1* and *9* in *Figure 1* on page 2.

Single Unit Pole Mounting

1. Use the short clamping screws to attach the mounting plates to the chassis. Refer to *Figure 6*.
2. If the pole diameter is between 3.8 cm and 4 cm (1.5 in. and 1.6 in.), use the shorter flange (1.0 cm [0.4 in.]) of the mounting plate.
   If the pole diameter is between 4 cm (1.6 in.) and 4.3 cm (1.7 in.), use the longer flange (1.5 cm [0.6 in.]) of the mounting plate. This ensures that the end of the screw does not contact the pole.

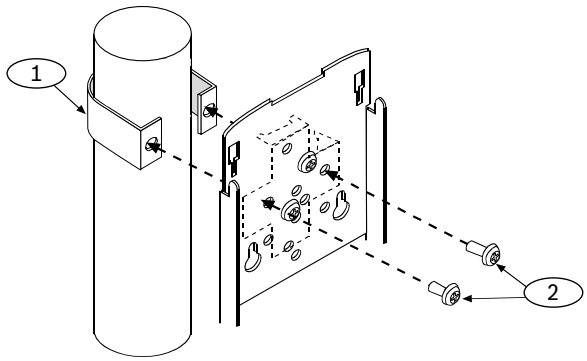
Figure 6: Using Mounting Plates



1 - Mounting plate
2 - Chassis
3 - Short clamping screws

3. Use the U-clamps and the long clamping screws to attach the chassis firmly. Refer to *Figure 7*. Make sure the transmitter is mounted in direct line-of-sight of the receiver.

Figure 7: Using U-clamps

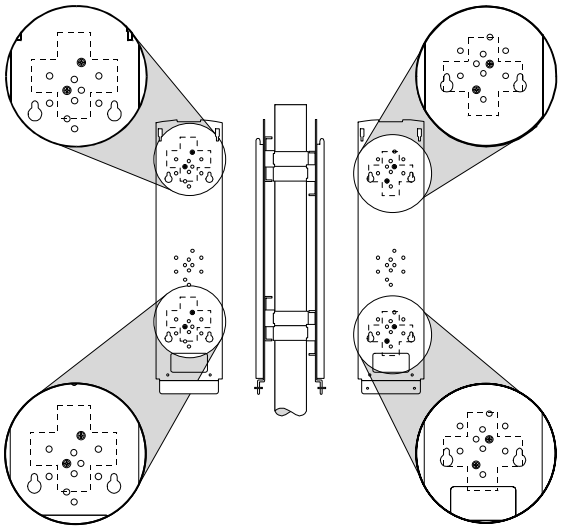


1 - U-clamp
2 - Long clamping screws

4. Insert the wiring through the chassis wire entrance, leaving enough wire to access the transmitter's terminal block. Refer to *Items 6* and *7* in *Figure 1* on page 2.
5. Slide the transmitter onto the chassis. Tighten the base mounting screws. Refer to *Figure 1* on page 2.
6. Repeat the mounting process for the receiver. Make sure to mount the receiver in direct line-of-sight of the transmitter.

Back-to-Back Pole Mounting

Figure 8: Back-to-Back Pole Mounting



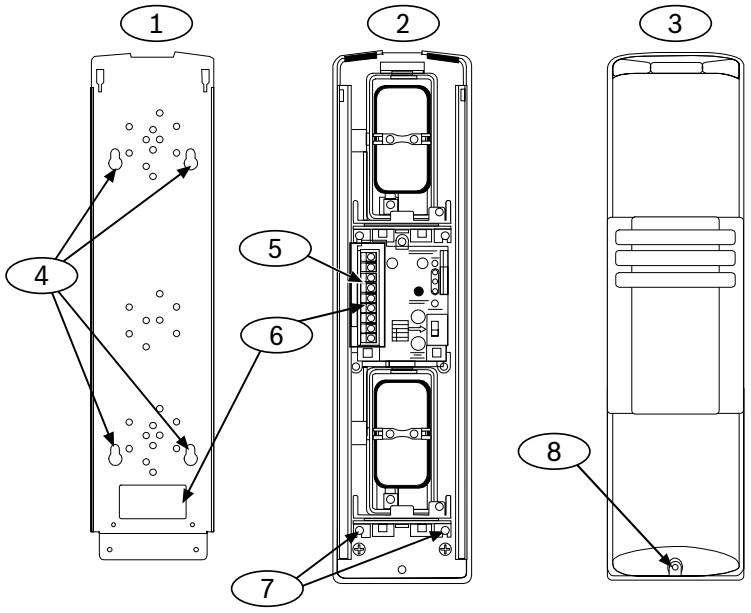
1. With spacers between the two units, mount the transmitter and the receiver back-to-back. Refer to *Figure 8*.
2. Use nuts and bolts to attach each unit firmly to the pole.
3. Make sure that the units are aimed so that the transmitter and the receiver in the same set are aligned with each other.

2.2.2 Wall Mounting

Refer to *Figure 9* for Steps 1 through 7.

1. Loosen the transmitter's cover mounting screw and remove the cover.
2. Loosen the two base mounting screws and remove the chassis by sliding it down against the base.
3. Insert wiring through the chassis wire entrance, leaving enough wire to access the transmitter's terminal block.
4. Insert the chassis mounting screws through the mounting holes to mount the chassis on the mounting surface.
5. Insert wiring through the wire entrance of the transmitter. Remove the wire entrance at the bottom of the transmitter.
6. Reattach the transmitter to the chassis.
7. Repeat this mounting procedure for the receiver. Make sure it is mounted in a direct line-of-sight to the transmitter.

Figure 9: Wall Mounting



1 - Chassis	*5 - Terminal block*
2 - Base	*6 - Wire entrance*
3 - Cover	*7 - Base mounting screws*
4 - Mounting holes	*8 - Cover mounting screw*

3.0 Wiring

Apply power only **after** all connections are made and inspected.

Install these detectors according to the National Electrical Code, NFPA-70.

Table 7 is based on one set (transmitter and receiver) connected to the same wire run from the power source.

When installing two or more sets on one wire run, calculate the maximum length by dividing the maximum listed wire length by the number of sets installed.

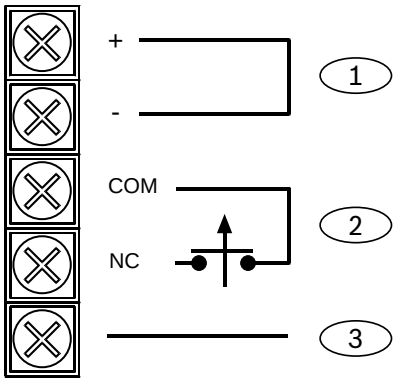
Connect the transmitters and receivers to a UL Listed power supply or control panel capable of providing standby power for at least 4 hours.

Test this system at least once a week to ensure proper operation.

Table 3: Wire Length / AWG Chart

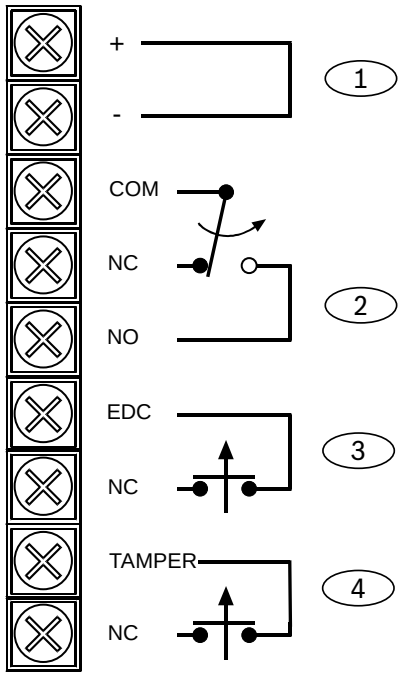
Wire Gauge [mm^2 (AWG)]	Maximum Distance [m (ft)]			
	DS484Q		DS486Q	
	12 VDC	24VDC	12VDC	24VDC
0.8 (22)	90 (295)	850 (2789)	80 (295)	730 (2395)
1.06 (19)	180 (591)	1670 (5479)	150 (492)	1420 (4659)
1.37 (17)	330 (1083)	3020 (9908)	280 (919)	2580 (8465)
1.8 (14)	590 (1936)	5370 (17618)	500 (1640)	4570 (14993)

Figure 10: Transmitter, Terminal Block Wiring



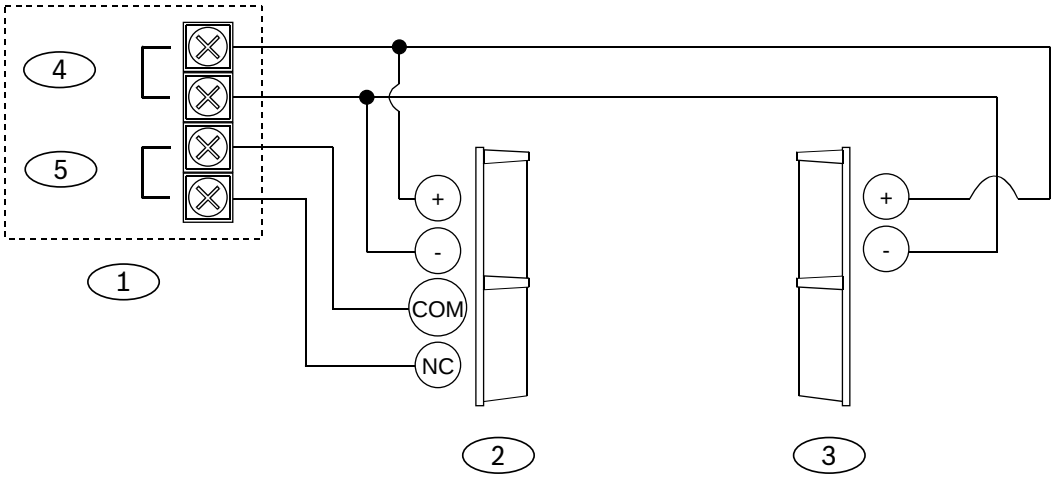
1 - Power (non-polarized), 10.5 VDC to 28.0 VDC
2 - Tamper Output (1b), 30 VDC 0.1 A
3 - Synchronized wiring

Figure 11: Receiver, Terminal Block Wiring



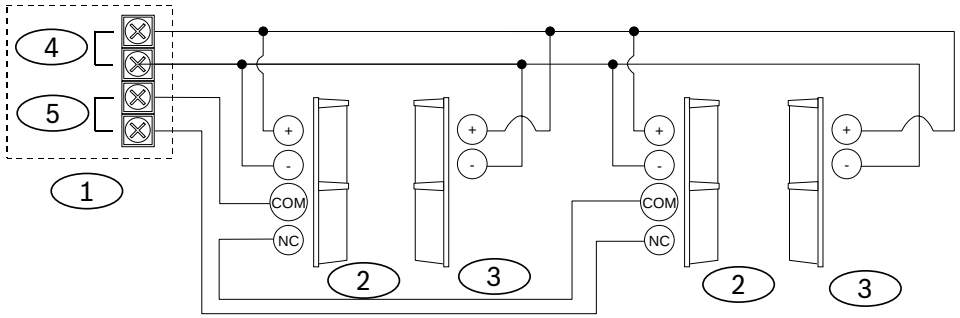
1 - Power (non-polarized), 10.5 VDC to 28.0 VDC
2 - Alarm Output (1c), 30 VDC 0.2 A
3 - EDC Output (1b), 30 VDC 0.2 A
4 - Tamper Output (1b), 30 VDC 0.1 A

Figure 12: Single Set - Wiring Example



1 - Terminal block on transmitter and receiver
2 - Receiver
3 - Transmitter
4 - Power output
5 - Alarm input (INC)

Figure 13: Two Sets on the Run – Wiring Example



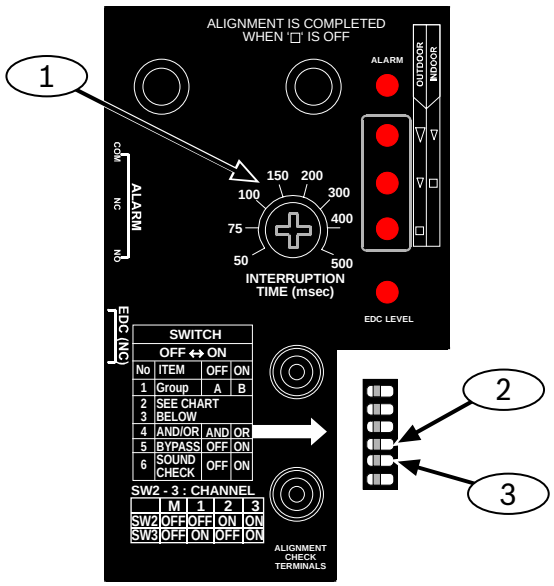
1 - Terminal block on transmitter and receiver
2 - Receiver
3 - Transmitter
4 - Power output
5 - Alarm input (INC)

4.0 Setup and Alignment

4.1 Setup

4.1.1 Receiver Setup

Figure 14: Receiver Setup Switches



1 - INTERRUPTION TIME switch

2 - DIP Switch 4 (ON or OFF for the AND/OR gate)

3 - DIP Switch 5

2. Select the beam alarm condition by setting DIP Switch 4 ON or OFF for the AND/OR gate. Refer to *Figure 14*.
   - If DIP Switch 4 is ON, the OR condition is selected. The upper **or** lower beam pairs must be broken to cause an alarm.
   - If DIP Switch 4 is OFF, the AND condition is selected. The upper **and** lower beam pairs must be broken to cause an alarm.
3. Choose whether or not to bypass alarms by setting DIP Switch 5 to ON or OFF when the EDC activates. Refer to *Section 1.3.7 Environmental Discrimination Circuit (EDC)* on page 4 for more information.
   The EDC is always on. DIP Switch 5 (BYPASS) controls the alarm condition relative to the EDC relay status. Refer to *Figure 4* on page 4.
   - If DIP Switch 5 is ON, the system alarms only if the EDC relay is not activated. If the EDC is activated, the system does not indicate an alarm.
   - If DIP Switch 5 is OFF, the system alarms regardless of whether the EDC relay is activated or not.

Connect the EDC to a trouble circuit, and check the system any time the EDC relay activates.

If the EDC remains activated for prolonged periods when the beam path is clear, the beam might be misaligned. Refer to *Section 4.2 Alignment* on page 13 to re-align the beam.

4. Use a Phillips head screwdriver to adjust the rotary INTERRUPTION TIME switch according to how sensitive you want the detector to be to movement (catch performance). Refer to *Figure 14* for the location of the INTERRUPTION TIME switch. Refer to *Table 4* for interruption times and corresponding catch performance examples.

For UL applications, the interrupt time cannot be set above 75 ms.

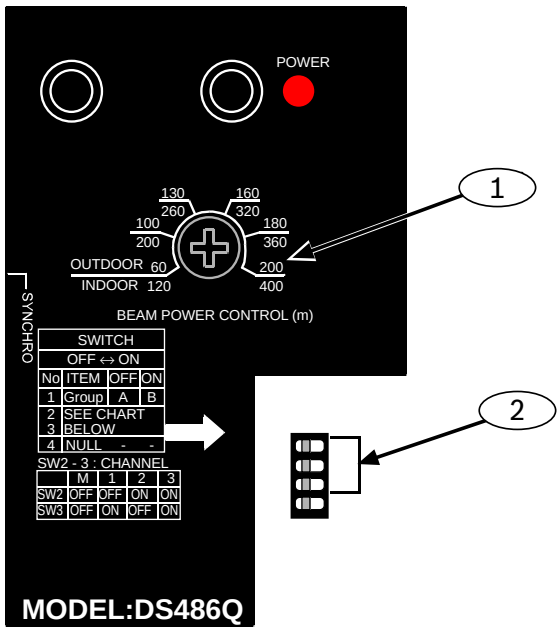
For best performance when using the AND mode, do not exceed 100 ms beam interruption time.

Table 4: Beam Interruption Time Examples

Interrupt Time (ms)	Catch Performance
50	Running
100	Jogging
200	Fast Walking
300	Normal Walking
400	
500	Slow Moving

4.1.2 Transmitter Setup

Figure 15: Transmitter Setup Switches



1 - Beam Power Control rotary switch
2 - DIP Switches 1, 2, and 3

Turn the Beam Power Control rotary switch to the volume setting for the appropriate detection range. Refer to *Figure 15, Table 5* and *Table 6*.

Table 5: Settings for Outdoor Beam Power Control

DS484Q		DS486Q	
Volume Setting	Range m (ft)	Volume Setting	Range m (ft)
40	0 to 40 (0 to 131)	60	0 to 60 (0 to 197)
60	40 to 60 (131 to 197)	100	60 to 100 (197 to 328)
80	60 to 80 (197 to 263)	130	100 to 130 (328 to 427)
100	80 to 100 (263 to 328)	160	130 to 160 (427 to 525)
110	100 to 110 (328 to 361)	180	160 to 180 (525 to 591)
120	110 to 120 (361 to 394)	200	180 to 200 (591 to 656)

Table 6: Settings for Indoor Beam Power Control

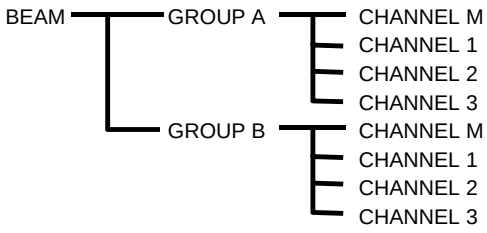
DS484Q		DS486Q	
Volume Setting	Range m (ft)	Volume Setting	Range m (ft)
80	0 to 80 (0 to 263)	120	0 to 120 (0 to 394)
120	40 to 120 (263 to 394)	200	120 to 200 (394 to 656)
160	120 to 160 (394 to 525)	260	200 to 260 (656 to 853)
200	160 to 200 (525 to 656)	320	260 to 320 (853 to 1050)
220	200 to 220 (656 to 722)	360	320 to 360 (1050 to 1181)
240	220 to 240 (722 to 787)	400	360 to 400 (1181 to 1312)

4.1.3 Beam Group and Channel Setup

When installing only one transmitter and one receiver (a set), beam group and channel selection is not required. Leave the switches on the transmitter and receiver in the original (OFF) positions. Refer to *Figure 17* on page 12.

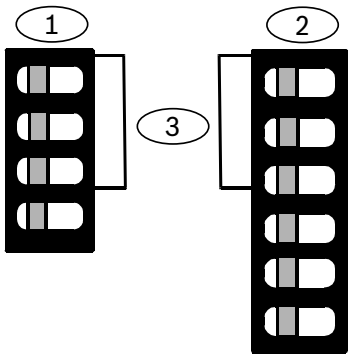
The transmitter and the receiver have eight selectable beams. The beams are divided into two groups (Group A and Group B) of four beams each. The beams are referred to as channels (Channels M, 1, 2, and 3). Refer to *Figure 16*.

Figure 16: Beam Group and Channel Organization



Channels 1, 2 or 3 can emit beams only when Channel M in the same group provides those channels with synchronized (synchro) wiring. Refer to *Section 4.1.4 Synchronized Wiring* on page 12. When installing two or more sets in the same group, set only the first set to Channel M. Set the remaining sets to Channel 1, 2, or 3.

Figure 17: Transmitter and Receiver DIP Switch Settings – One Set

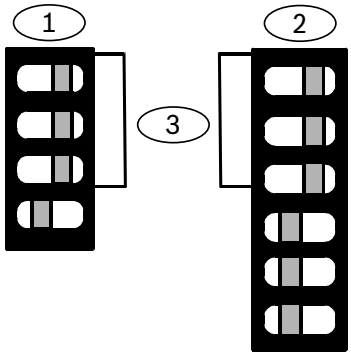


1 - Transmitter DIP Switches with original settings (Group A, Channel M)

2 - Receiver DIP Switches with original settings (Group A, Channel M)

2 - DIP Switches 1, 2, and 3

Figure 18: Example of Transmitter and Receiver DIP Switch Settings – Two or More Sets



1 - Transmitter DIP Switches set for Group B, Channel 3

2 - Receiver DIP Switches set for Group B, Channel 3

2 - DIP Switches 1, 2, and 3

Set DIP Switches 1, 2 and 3 to OFF or ON on each transmitter and receiver, according to the desired group and channel selections. Refer to *Table 7* and *Table 8* for the DIP Switches 1, 2, and 3, and the example for Group B, Channel 2 in *Figure 18*.

Table 7: Group Selection

DIP Switch 1	Group
OFF	A
ON	B

Table 8: Channel Selection

DIP Switch		
2	3	Channel
OFF	OFF	M
OFF	ON	1
ON	OFF	2
ON	ON	3

One transmitter and one receiver facing each other are a set. In a set, each unit must have the same setting for group and for channel.

When installing two or more sets, use different settings for each set (transmitter and receiver) to avoid incorrect communication.

4.1.4 Synchronized Wiring

Synchronized (abbreviated "synchro") wires are required when installing two or more sets in the same group by using the SYNCHRO terminal on each transmitter. Synchro wires are not required between the receivers.

The synchro wire should be more than 0.8 mm (22 AWG) in diameter, run no longer than 20 m (66 ft), and be wired only to the same group (Group A to Group A or Group B to Group B). Do not wire across groups (Group A to Group B).

Synchronized transmitters must use a common power supply.

The system does not activate when synchro wires are connected improperly, or if other unneeded wires are connected.

The POWER LED flashes when the required wires are not connected correctly.

When the POWER LED flashes, shut off the power and reconnect the wires correctly.

4.2 Alignment

4.2.1 Description

Precise, correct alignment is critical for these systems to operate effectively.

The first procedure (*Section 4.2.2 Scope Alignment* on page 14) is a visual alignment and is not precise. Use one of the additional procedures to complete the alignment.

Aligning a paired transmitter and receiver requires a coarse, or visual, alignment followed by a fine alignment.

Coarse Alignment

In the coarse alignment, if the installed devices do not face each other directly, the upper optical module and the lower optical module on each device are manually turned toward the opposite device. Then the opposite device is viewed through the scopes on the upper and lower optical modules while the horizontal and vertical angles are adjusted, using the turntable and the adjustment screws. Refer to *Section 4.2.2 Scope Alignment* on page 14.

Fine Alignment

The detectors have three possible fine alignment methods: Voltmeter, Level LED, and Sound. Alignment interruption sheets (*Figure 19*) are used in all three procedures to cover all optical modules in the installation except the pair that are being aligned. Select a procedure based on the conditions and considerations of the specific installation. Refer to *Table 9*.

Figure 19: Alignment Interruption Sheet

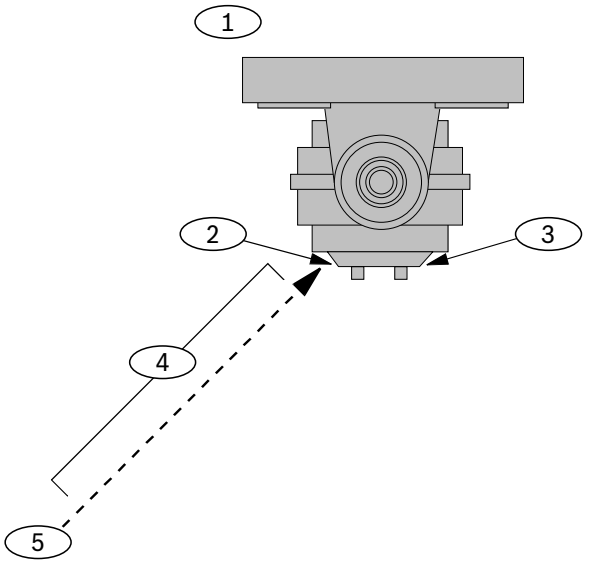
Table 9: Fine Alignment Considerations

Alignment Procedure	Considerations
Voltmeter (Refer to *Section 4.2.3 Voltmeter Alignment* on page 15.)	• Requires a voltmeter and a screwdriver • Works well at any distance between the transmitter and receiver • Requires repeated observation of the voltmeter at the receiver • Most accurate • Might require two people
Level LED (Refer to *Section 4.2.4 Level LED Alignment* on page 15.)	• Requires only a screwdriver • More difficult to do when the transmitter and receiver are installed far apart • Requires repeated visual observation of the level meter on the receiver • Might require two people
Sound (Refer to Section 4.2.5 Sound Alignment on page 15.)	• Requires only a screwdriver • Works well at any distance between the transmitter and receiver • Does not require visual observation of the opposite device • Difficult to do in a noisy environment

4.2.2 Scope Alignment

1. Apply power to all transmitters and receivers in the installation.
2. Select a transmitter and receiver pair to align.
3. For coarse tuning, rotate the turntable on the upper or lower optical module of the transmitter horizontally to face the receiver.
4. Look into the left or right viewfinder of the optical module to see the image reflected through the scope aperture. Stand at a 45° angle and at eye level to the left or right viewfinder, at a distance of 10 cm to 15 cm (4 in. to 6 in.) away. Refer to *Figure 20*.

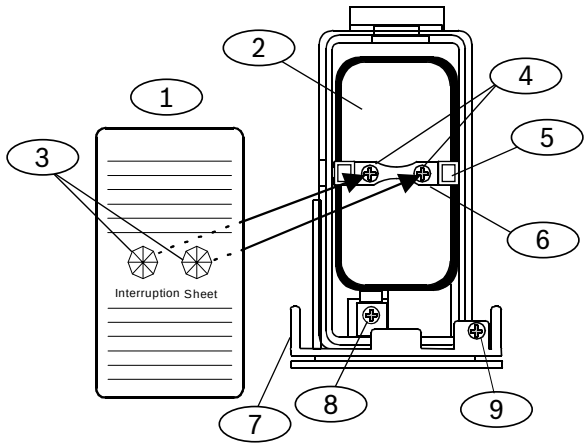
Figure 20: Using the Optical Module Scope



1 - Top view optical module of transmitter or receiver
2 - Left viewfinder
3 - Right viewfinder
4 - Viewing distance (10 cm to 15 cm [4 in. to 6 in.])
5 - Viewing angle (approximately 45° from centerline of optical module)

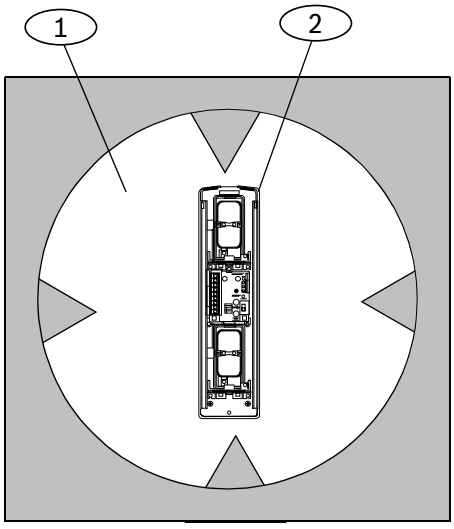
5. Use the turntable to adjust the horizontal angle of the optical module until the receiver image appears in the viewfinder. Refer to *Figure 21* and *Figure 22*.
6. Use the horizontal and vertical adjustment screws to center the receiver image in the outline of the scope aperture. Refer to *Figure 21* and *Figure 22*.
7. Repeat *Steps 3* through *6* for the other optical module on the transmitter.
8. Do *Steps 3* through *6* for the optical modules on the receiver to align the transmitter image.

Figure 21: Optical Module



1 - Interruption sheet
2 - Optical module
3 - Punched holes
4 - Scope apertures
5 - Viewfinder
6 - Alignment scope
7 - Turntable
8 - Vertical adjustment screw
9 - Horizontal adjustment screw

Figure 22: Viewed Image



1 - Scope aperture
2 - Receiver image

9. Use the supplied alignment interruption sheets to cover the upper and lower optical modules of all transmitters and receivers to be aligned.

   When covering an optical module, align the punched holes in the interruption sheet with the scope apertures in the center of the optical module (*Figure 21*).

For synchronized applications or stacked sets of transmitters and receivers, **install interruption sheets on all optical modules** except the pair to be aligned.

10. Do one of the fine alignments. Refer to *Table 9* on page 13 to determine which procedure to use.

For the following procedures, make sure that all optical modules are covered with interruption sheets, except the pair to be aligned.

Remove the interruption sheets and close the covers when the alignment is complete.

4.2.3 Voltmeter Alignment

1. Insert voltmeter leads into the alignment check terminals on the receiver panel. Refer to *Figure 3* on page 3
2. Set the voltmeter scale to 10.0 VDC.
3. Use a screwdriver to adjust horizontal and vertical adjustment screws on the transmitter and the receiver. Refer to *Figure 21* on page 14.
4. Check the voltage reading and continue to adjust the adjustment screws as necessary. In an ideal environment, the voltmeter value should be 3.0 VDC or higher. (The maximum voltage is 3.75 VDC.)
5. When the best voltage is achieved, the optical modules are aligned.
6. Repeat the procedure for the other optical module pair.

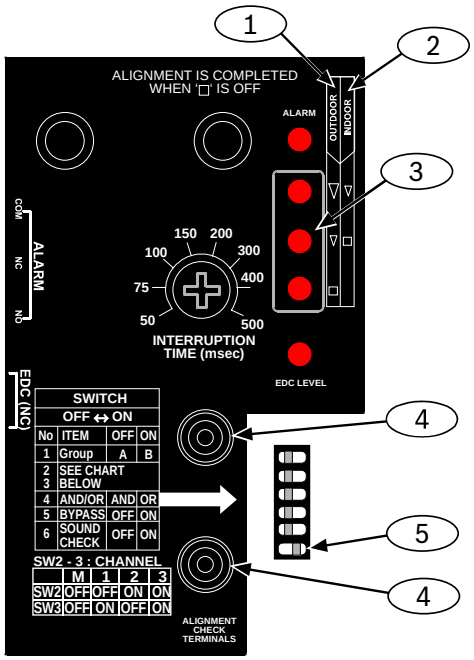
4.2.4 Level LED Alignment

1. Look at the Level Meter on the receiver. Refer to *Figure 23*. When you begin this procedure the LEDs are off.
2. Use a screwdriver to adjust the optical modules. Adjust the horizontal and vertical adjustment screws as necessary. Refer to *Figure 21*.
3. As more beam energy is received, each LED turns on, flashes quickly, flashes slowly, and then turns off.
4. Continue fine tuning until the LEDs turn off.
   - If outdoors, the alignment is complete when all LEDs are off.
   - If indoors, the alignment is complete when the lower two LEDs are off.
5. Repeat the procedure for the other optical module pair.

4.2.5 Sound Alignment

1. Set DIP Switch 6 on the receiver to ON. Refer to *Figure 23*.
2. Use a screwdriver to adjust the optical modules. Adjust the horizontal and vertical adjustment screws as necessary. Refer to *Figure 21*.
3. As more beam energy is received, the sound pitch changes from low to high and from a continuous tone to a two beat sound.
4. Continue fine tuning until the buzzer is a two-beat sound.
5. After the beams are aligned, set DIP Switch 6 to OFF.
6. Repeat the procedure for the other optical module pair.

Figure 23: Receiver Operation Panel



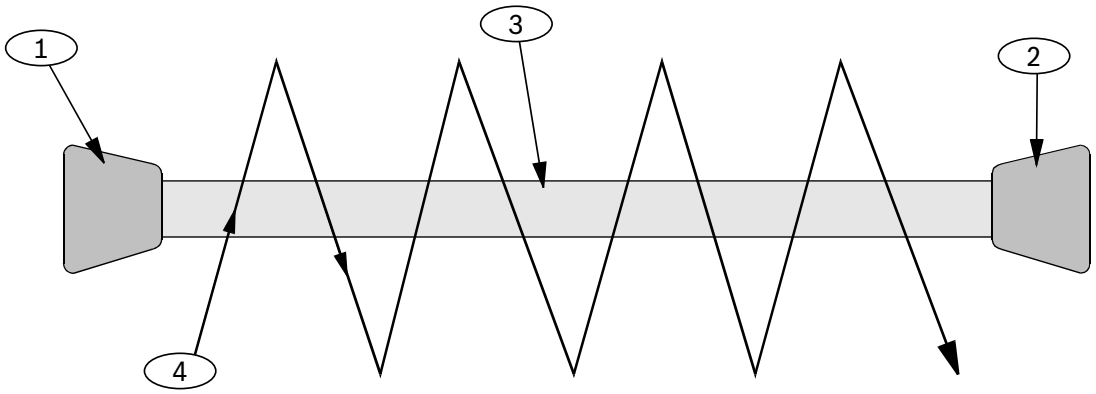
1 - Outdoor level alignment guide
2 - Indoor level alignment guide
3 - Level meter
4 - Alignment check terminals
5 - DIP switch 6 in the ON position

5.0 Walk Test

Walk across the beam path directly in front of one of the detectors. The ALARM LED should activate. If not, the beam interrupt time is set too low or the alignment is not correct.

Walk across the beam path in several locations between the detectors (*Figure 24*).Each time you cross the beam path, the ALARM LED should activate. If not, the beam interrupt time is set too low or the alignment is not correct.

Figure 24: Walk Test Pattern



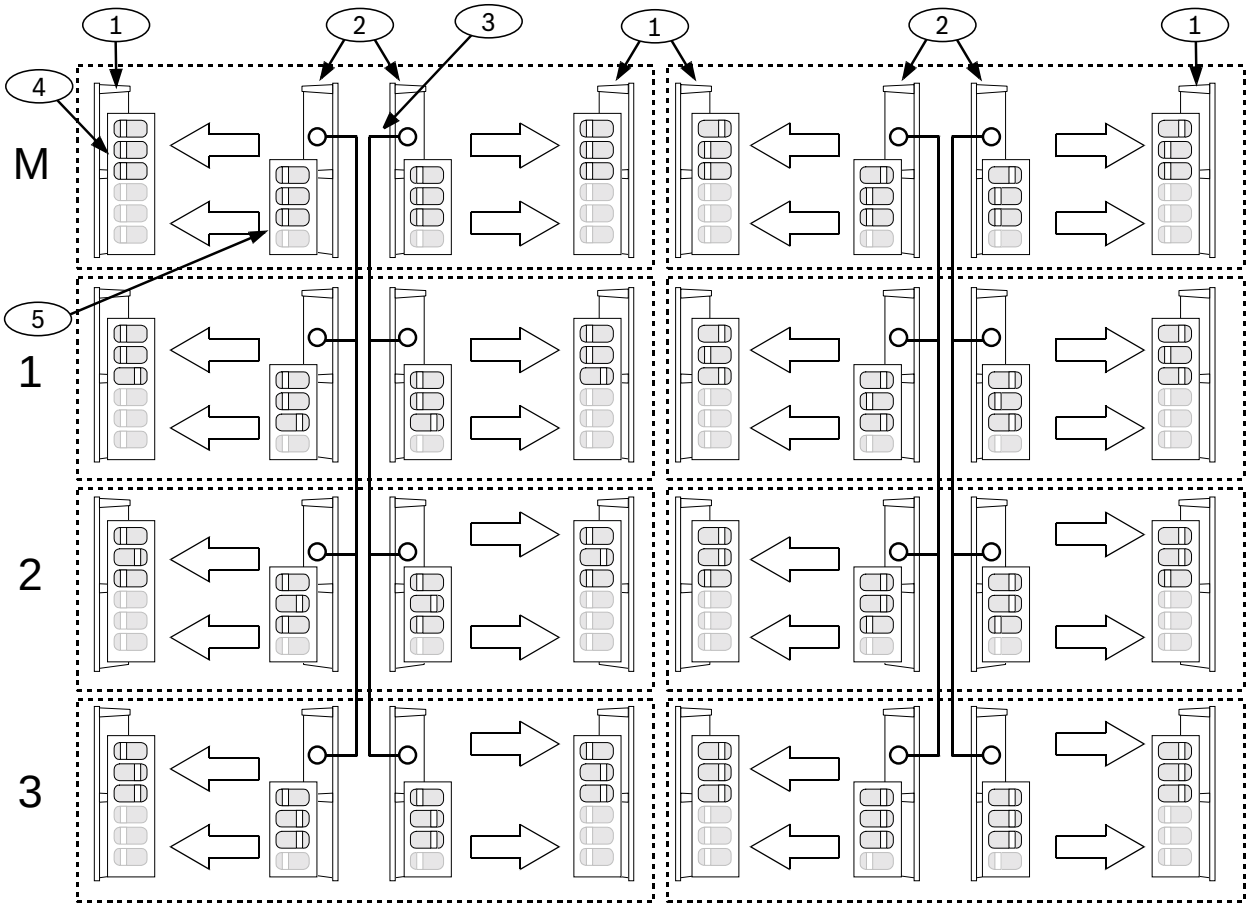
1 - Receiver
2 - Transmitter
3 - Beam path
4 - Crossing the beam path

Inspect the system and perform a walk test at least once a year.

6.0 Stacking Information

When stacking two or more sets, use the group and channel settings shown in *Figure 25*. The correct DIP switch settings are shown for each transmitter and receiver.

Figure 25: Examples of Stacking Multiple Transmitter and Receiver Sets



1 - Receiver	*4- Receiver DIP switches*
2 - Transmitter	*5 - Transmitter DIP switches*
3 - Synchronized wiring	

Each top line set must be set to Channel M, and the other line sets to Channels 1, 2, or 3 to avoid incorrect communication between the stacking sets.

7.0 Troubleshooting

If the system does not operate as expected, check for the following conditions.

The input voltage is between 10.5 VDC and 28 VDC at the terminal on the transmitter and on the receiver.

The loop resistance of the alarm output is less than 100 Ω.

The monitor LED on the transmitter is ON.

The ALARM LED on the receiver is ON when both upper and lower beams are simultaneously adjusted for the beam interruption time.

The output of the beam alignment check terminal on the receiver is 3.0 VDC to 3.75 VDC.

Table 10: Common Troubleshooting Problems and Solutions

Problem	Cause	Solution
Constant alarm output	Something is blocking the beams.	Remove the object(s).
	Optical modules or covers need cleaning.	Clean the optical modules and the covers.
	Improper channel selection	Select the proper channel. Refer to *Section 4.1.3 Beam Group and Channel Setup* on page 11.
	Synchronized wires are not connected.	Connect the synchro wiring correctly. Refer to *Section 4.1.4 Synchronized Wiring* on page 12.
Frequent false alarms	Something is blocking the beams.	Remove the object(s).
	Beam interruption time is set too short.	Decrease the sensitivity. Refer to *Section 4.1.1 Receiver Setup* on page 10.
	Electrical noise or radio frequency interferency (RFI) nearby	Change the installation site.
	Wiring too close to power sources or power line	Change the routing of the wiring.
	Unstable installation site	Fix the installation site.
	Out of maximum protection range	Reinstall the units within the maximum protection range. Refer to *Section 2.1 Installation Considerations* on page 5.
	Inappropriate Beam Power Control level	Readjust the control level. Refer to *Table 5* and *Table 6* in *Section 4.2 Alignment* on page 13.
	Frost or dew is present.	Attach the optical heater.
No alarm when beams are blocked	Beams are reflected into the receiver.	Remove the reflective object or change the installation site.
	Beam interruption time is set too slow.	Increase the sensitivity. Refer to *Section 4.1.1 Receiver Setup* on page 10.
	Not enough beam power	Increase the beam power. Refer to *Table 5* and *Table 6* in *Section 4.2 Alignment* on page 13.
EDC LED turns ON frequently	Something is blocking the beams.	Remove the object(s).
	Installed on unstable ground	Fix the installation site.
	Out of maximum protection range	Reinstall the units within the maximum protection range. Refer to *Section 2.1 Installation Considerations* on page 5.
	Inappropriate Beam Power Control level	Readjust the control level. Refer to *Table 5* and *Table 6* in *Section 4.2 Alignment* on page 13.
	Frost or dew is present.	Attach the optical heater.
POWER LED on transmitter flickers	Synchro wires are not connected.	Connect the synchro wiring correctly. Refer to *Section 4.1.4 Synchronized Wiring* on page 12.

8.0 Specifications

Table 11: DS484Q and DS486Q Specifications

Alarm Output	**Alarm**	Form C 0.2 A @ 30 VDC Output Period: 3 sec	
	EDC	NC 0.2 A @ 30 VDC Output Period: 3 sec	
	Tamper	NC 0.1 A @ 30 VDC Output Period: While the cover is removed	
Beam Interrupt Time		Adjustable from 50 ms to 500 ms	
Selectable Beams		Two Groups by four Channels	
Environmental Discrimination Circuit Output		Normally-closed contacts rated at 0.2 A @ 30 VDC	
Maximum Coverage	**Outdoor**	DS484Q	120 m (400 ft)
		DS486Q	200 m (660 ft)
	Indoor	DS484Q	240 m (800 ft)
		DS486Q	300 m (1000 ft)
Enclosure Design			
Material		Polycarbonate	
Dimensions (HxWxD)		35 cm x 10 cm x 11 cm (13.75 in. x 4 in. x 4.1 in.)	
Total Weight	**Receiver**	1.2 kg (2.64 lb)	
	Transmitter	1.2 kg (2.64 lb)	
Environmental Considerations			
Operating Temperature		-25° C to + 55° C (-13°F to + 130° F)	
IP Rating		IP 54 (protection against dust; protection against splashing water)	
Mounting			
Location		Surface or pole mount	
Pattern Pointability		±90° horizontal, ±10° vertical	
Power Requirements			
Voltage		10.5 VDC to 28 VDC non-polarized	
Current Draw	**Receiver**	80 mA standby, 50 mA alarm	
	Transmitter	DS484Q	35 mA
		DS486Q	55 mA
Backup Power Requirements		4 hours (120 mAh) minimum required for UL Certificated Installations	
Temper Output		Normally-closed contacts rated at 0.1 A @ 30 VDC	
Trigger Response Time		Selectable response time of 35 ms to 700 ms	

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