



Photobeam 5000

ISC-FPB1-W60QS, ISC-FPB1-W120QS, ISC-FPB1-W200QS



BOSCH

en Installation and Operation Guide

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1 Introduction

This document contains information that a trained installer needs to install the Photobeam 5000 quad-beam photoelectric detector contained inside the packaging.

1.1 About documentation

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Trademarks

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1.2 Bosch Security Systems, Inc

Use the serial number located on the product label and refer to the Bosch Security Systems, Inc. website at <http://www.boschsecurity.com/datecodes/>.

Manufacturing date information is contained in digit no 1 – 3: DDD.

2 System overview

The ISC-FPB1-W60QS, ISC-FPB1-W120QS and ISC-FPB1-W200QS are quad-beam photoelectric detectors designed for indoor and outdoor applications. Consisting of a separate transmitter and receiver, an alarm is activated when a person passes through all four beams. Combination of features and adjustable parameters allow for better catch performance, lower false alarm rates and reduced effects of environmental disturbances.

2.1 Features

For stable operation, the detectors are equipped with the following features:

100% Sensitivity Allowance

Maintains stable operation even if 99% of beam energy is cut, for example by rain, fog, frost, and so on.

Quad Beam Detection

Fewer false alarms caused by birds and other small animals because all four beams must be blocked simultaneously to cause an alarm.

Beam Power Control

Select the appropriate beam intensity relative to the detection range to minimize reflection on nearby walls and cross-talk with other detectors.

Beam Interruption Time Control

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

2.2 Photobeam overview

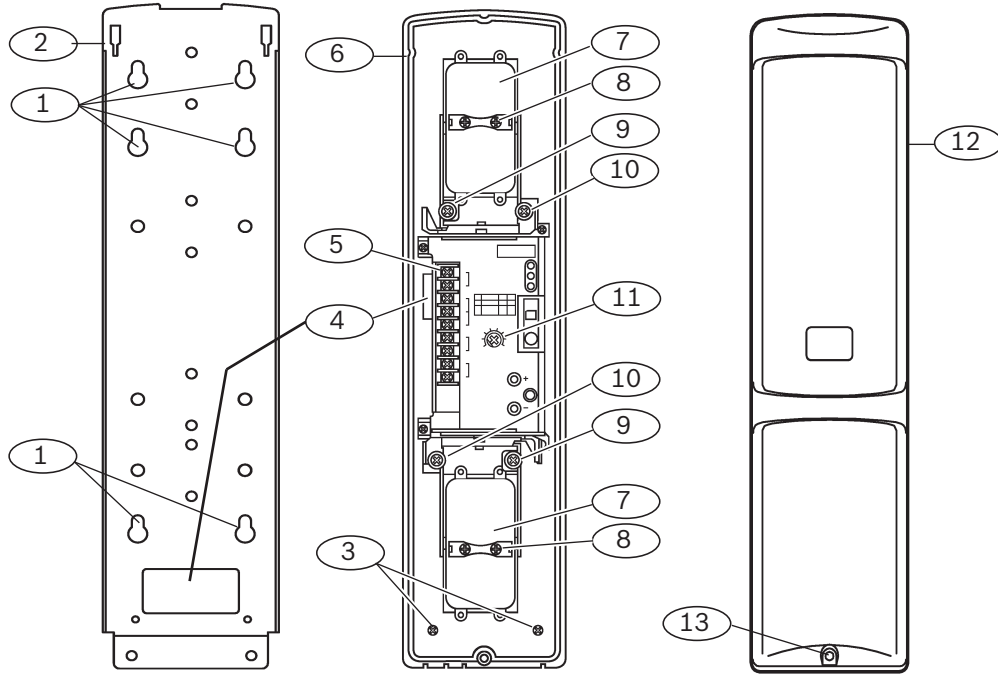


Figure 2.1: Photobeam components overview

Callout — Description	Callout — Description
1 — Mounting holes	8 — Optical alignment
2 — Mounting plate	9 — Vertical adjustment
3 — Device securing screws	10 — Horizontal adjustment
4 — Wire entry	11 — Console
5 — Wiring terminals	12 — Cover
6 — Detector	13 — Cover securing screws
7 — Optical module	

2.3 Console overview

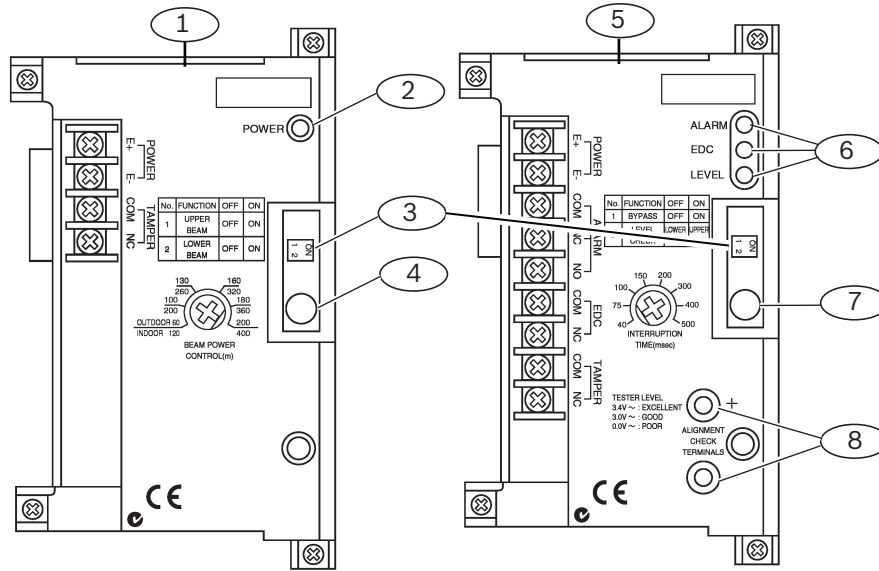


Figure 2.2: Console components overview

Callout — Description	Callout — Description
1 — Transmitter console	5 — Receiver console
2 — Power Indicator	6 — Status Indicators
3 — Function switches	7 — Sensitivity control
4 — Beam Power Control	8 — Alignment check terminals

2.4 Transmitter/receiver dimensions

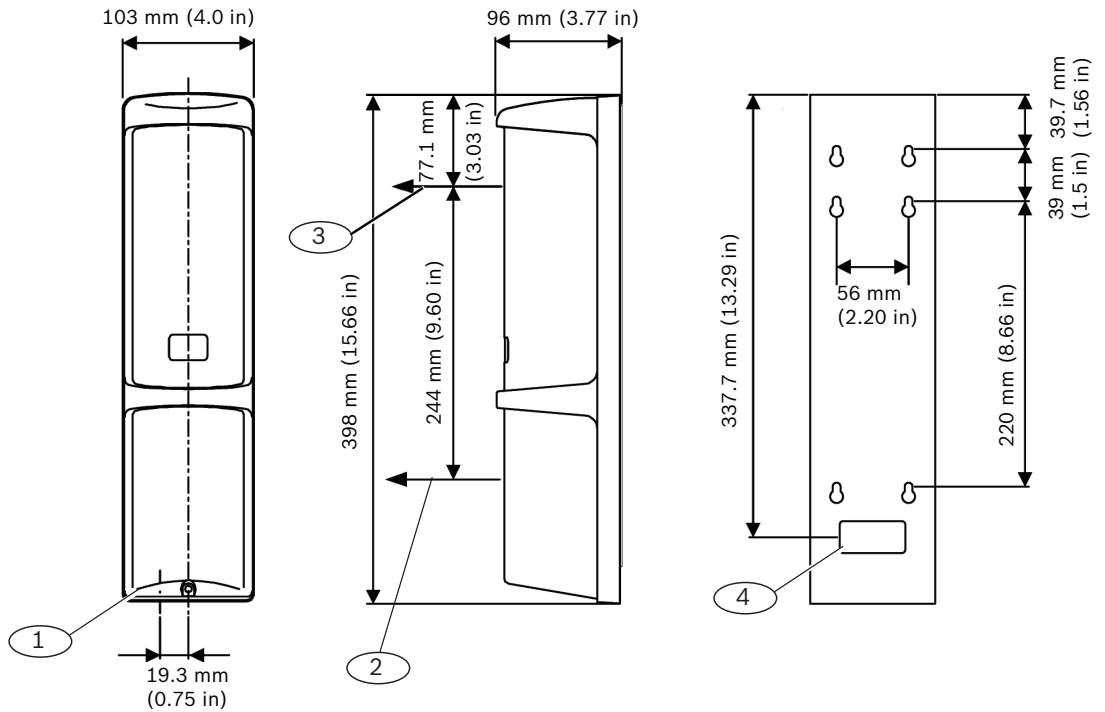


Figure 2.3: Transmitter/receiver dimensions

Callout – Description	Callout – Description
1 – Knockout wire entrance	3 – Center of the Upper Beam
2 – Center of the Lower Beam	4 – Wire entrance

3 Installation

Prior to installing the devices, please review the installation considerations below:

- Install in an area that is clear of objects
- Install the transmitter/receiver within the maximum protection range of the model
- Do not install:
 - Receivers into intense sources of light (for example, rising and setting sun)
 - On movable surfaces subject to vibrations
 - Detectors where immersion to water, corrosive liquids, or exposure to high levels of dust can occur
 - Detectors in close proximity to strong electromagnetic noises
- Do not use detectors with other photobeam detectors or receivers
- Do not stack detectors
- Do not disassemble or modify this detector
- Do not install while the power is on
- Avoid extreme temperature and humidity ranges as defined in the products specifications
- Avoid installing detectors near magnets and/or magnetized materials
- Avoid beam interference between other units when multiple units are installed.

3.1 Beam spread

The beam spread angle is $\pm 0.7^\circ$ from the transmitter to the receiver. Refer to the diagram and table below to determine the installation conditions.

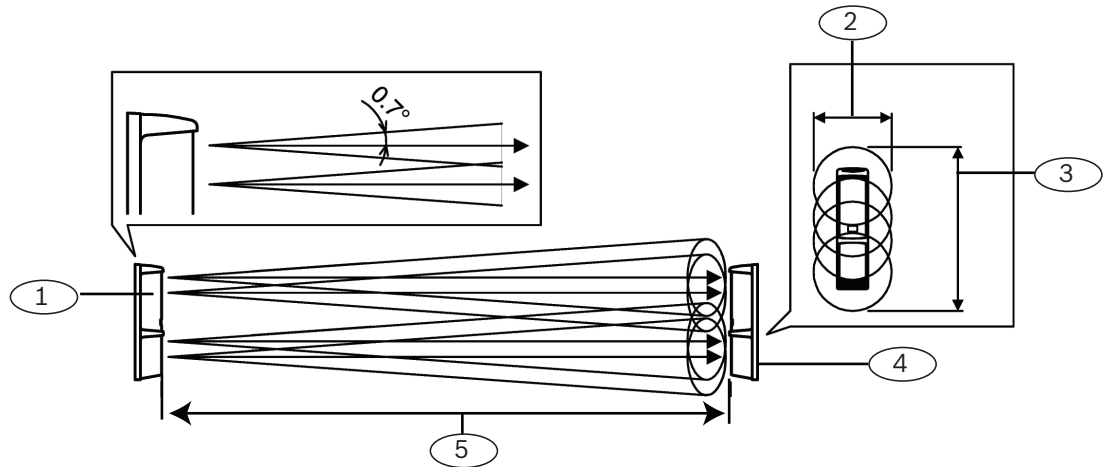


Figure 3.1: Beam distance and spread

Callout – Description	Callout – Description
1 – Transmitter	4 – Receiver
2 – Horizontal spread (B)	5 – Distance (A)
3 – Vertical spread (C)	

Distance, horizontal and vertical spread values: (A) / (B) / (C)	
Metric	Imperial unit
20 m / 0.5 m / 0.8 m	65 ft / 1.6 ft / 2.6 ft
40 m / 1.0 m / 1.3 m	13.1 ft / 3.2 ft / 4.2 ft
60 m / 1.5m / 1.8 m	196 ft / 4.9 ft / 5.9 ft
80 m / 2.0 m / 2.2 m	262 ft / 6.5 ft / 7.2 ft
100 m / 2.5 m / 2.7 m	328 ft / 8.2 ft / 8.8 ft
120 m / 3.0 m / 3.2 m	393 ft / 9.8 ft / 10.4 ft
140 m / 3.5 m / 3.7 m	459 ft / 11.4 ft / 12.1 ft
160 m / 4.0 m / 4.2 m	524 ft / 13.1 ft / 13.7 ft
180 m / 4.5 m / 4.7 m	590 ft / 14.7 ft / 15.4 ft
200 m / 5.0 m / 5.2 m	656 ft / 16.4 ft / 17.0 ft

3.2 Pole mount installation

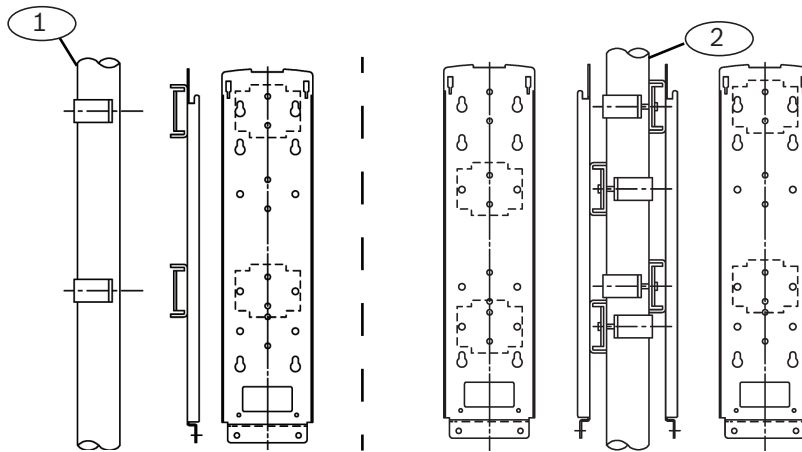


Figure 3.2: Pole mounting view

Callout – Description	Callout – Description
1 — Diameter 38.0 – 42.7 mm (1.50 – 1.68 in)	2 — Back-to-back pole mounting

Attaching the mounting bracket:

1. Choose an appropriate mounting location for the devices. Install the mounting poles with a clear line-of-sight between the transmitter and receiver.
2. Loosen the transmitter’s cover mounting screw and remove the cover.
3. Loosen the two base mounting screws and remove the mounting plate by sliding it down.
4. Attach the mounting hardware to the mounting plate using the clamping screws. Refer to the figure below.

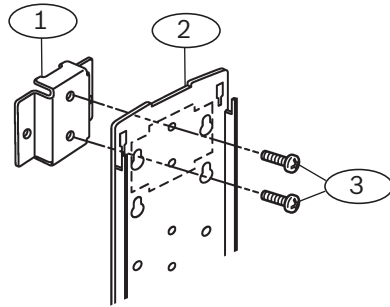


Figure 3.3: Attaching the mounting bracket

Callout – Description
1 – Mounting hardware
2 – Mounting plate
3 – Clamping screws (short)

Attaching the mounting plate:

1. Attach the mounting plate to the poles using the U-clamps.
2. Use the U-clamps and clamping screws to attach the mounting plate firmly to the poles.

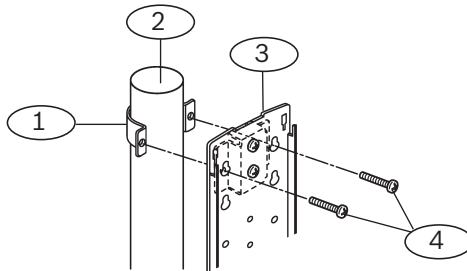


Figure 3.4: Attaching the U-clamp

Callout – Description
1 – U-clamp
2 – Mounting pole
3 – Mounting plate
4 – Clamping screws (long)

Wire routing:

1. Route the wire through the wire entry location of the mounting plate, leave enough wire to reach the terminal strip.
2. Route the wire through the transmitter’s wire entry.
3. Slide the transmitter onto the mounting plate, and secure using the included screws.
4. Repeat this procedure for the receiver, verify line-of-sight with the transmitter.
5. Wire to the terminal strips. Refer to *Wiring*, page 13 for wiring procedures.



Caution!

Ensure that the pole mount installation is secure and stable. Failure to do so may result in personal injury, or damage the device.

3.3 Wall mount installation

Installing the transmitter and receiver:

1. Remove the cover and mounting plate from the transmitter.
2. Route the wire through the mounting plate wire entry if the wire is routed through a wall opening. If the wire is routed on the wall surface, knock-out the thin wall wire hole at the bottom of the transmitter and cover. Route the wire through the opening after the mounting plate is secured onto the wall.
3. Secure the mounting plate to the wall surface.
4. Route the wire through the detector wire entry location.
5. Secure the transmitter to the mounting plate.
6. Wire to the terminal strips. Refer to Wiring for wiring procedures.
7. Repeat this procedure for mounting the receiver.

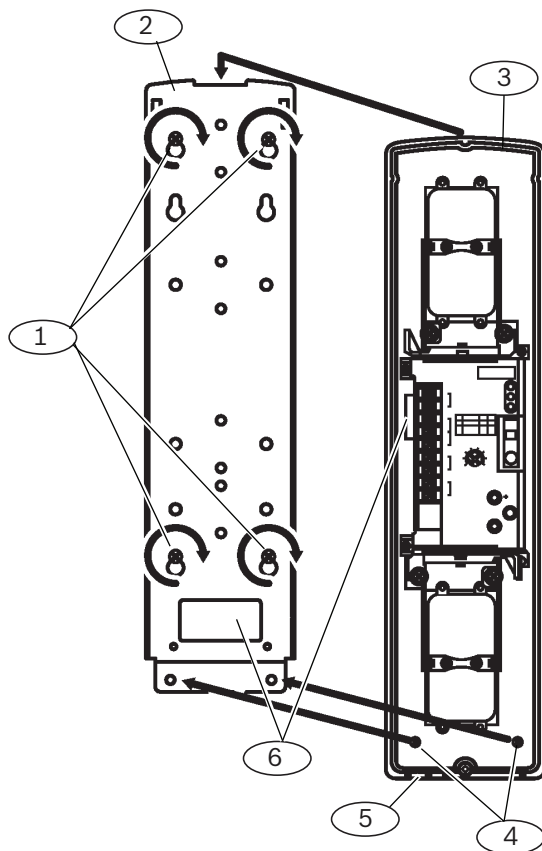


Figure 3.5: Wall mount installation

Callout — Description	Callout — Description
1 — Mounting screws	4 — Device securing screws
2 — Mounting plate	5 — Knockout
3 — Detector	6 — Wire entry

4 Wiring

Refer to *Terminal strip* below for transmitter/receiver terminal locations. Use duct pipes for outdoor wiring. Do not use aerial wiring.



Caution!

Only apply power after all electrical connections are completed and inspected.



Notice!

Tamper and EDC terminals should be connected to a 24-hour supervisory loop



Notice!

Power is to be provided by a UL Listed burglar alarm power supply or burglar alarm control panel. In case of power failure, the power supply or control unit shall have a minimum of 4 hours of standby power.



Notice!

All wiring is to be in accordance with the National Electric Code, ANSI/NFPA 70



Notice!

This system should be tested at least once a week to ensure proper function.

4.1 Terminal strip overview

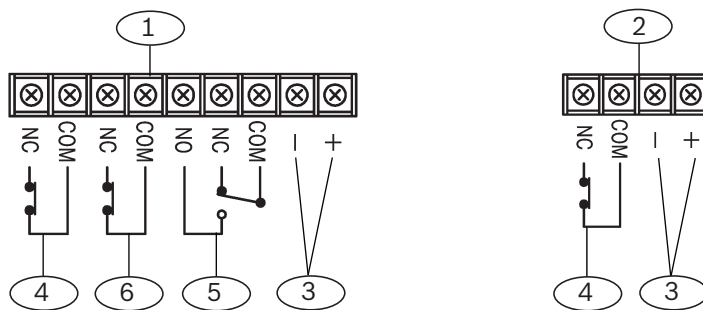


Figure 4.1: Terminal strip component overview

Callout – Description	Callout – Description
1 – Receiver	4 – Tamper
2 – Transmitter	5 – Alarm output
3 – Power (non-polarized)	6 – EDC output

4.2 Wiring distance

Refer to the table to determine the minimum wire gauge for a single sensor system (one transmitter and one receiver). The distances specified are between the power source and the last (farthest) unit on the single wire run. For multiple detector configurations, divide the wire distance in the table by the number of systems in the configuration (1 system = 1 transmitter and 1 receiver).

Wire Gauge		Maximum wiring distance					
		ISC-FPB1-W60QS		ISC-FPB1-W120QS		ISC-FPB1-W200QS	
AWG	Ø mm	12V	24V	12V	24V	12V	24V
22	0.65	120 m (393 ft)	1000 m (3280 ft)	110 m (360 ft)	1000 m (3280 ft)	110 m (360 ft)	980 m (3215 ft)
19	0.90	230 m (754 ft)	2100 m (6889 ft)	220 m (721 ft)	2000 m (6561 ft)	210 m (688 ft)	1900 m (6233 ft)
16	1.29	430 m (1410 ft)	3900 m (12795 ft)	410 m (1345 ft)	3700 m (12139 ft)	390 m (1279 ft)	3500 m (11482 ft)



Notice!

This table does not include wiring gauge requirements for optional heaters.

4.3 Wiring routes

Refer to the graphics below for wiring routes examples. The illustrations depict both one, and two sets of detector systems on a single wire run.

The graphics below show simple examples of wiring concepts, depicting how to power the transmitter and receiver pairs, and how to combine alarm outputs. Local regulatory requirements and technical parameters specific to a connected control panel determine the exact details of the wiring. Review local regulations and the connected control panels technical documentation before planning wire routes and connections. Selecting the proper wire routes and gauges depend on the number of devices, overall distance, and voltage drop parameters for each individual device.

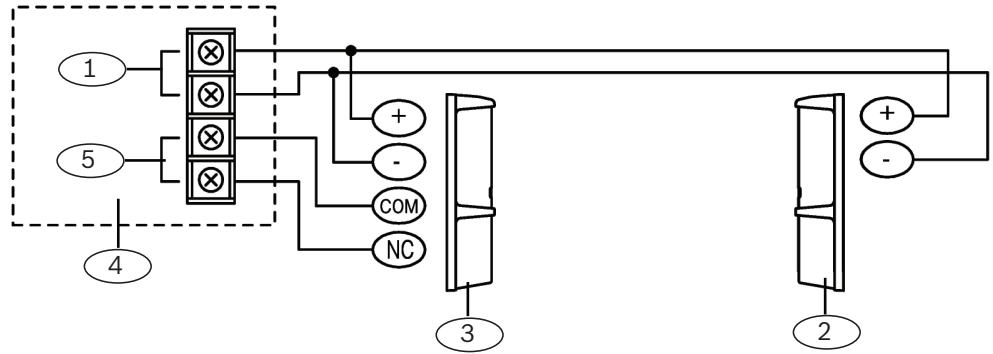


Figure 4.2: Wiring for one set on the run

Callout – Description	Callout – Description
1 – Power output	4 – Control panel
2 – Transmitter	5 – Alarm input. The COM and NC terminals on the unit are the outputs, they connect to a control panel input.
3 – Receiver	

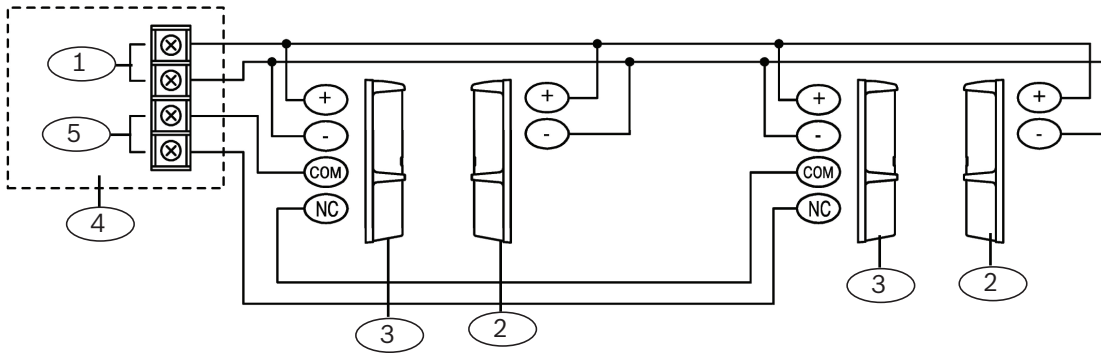


Figure 4.3: Wiring for two sets on a single run

Callout – Description	Callout – Description
1 – Power output	4 – Control panel
2 – Transmitter	5 – Alarm input. The COM and NC terminals on the unit are the outputs, they connect to a control panel input.
3 – Receiver	



Notice!

The BH12T heater is an optional device. Refer to the BH12T installation instructions (P/N: W. 97.2195) for more information.

5 Special features

Refer to the following for sensitivity adjustments.

5.1 Level LED

The Level LED shows the beams energy level received during alignment. As more beam energy is received, the illumination time shortens as follows: ON => OFF once => OFF twice => OFF three times => Flashing => ON three times => ON twice => ON once => OFF.

When the LED turns off, the alignment is complete.

Refer to *Console overview, page 7* for Status Indicator locations (callout #6).

5.2 EDC (Environmental Discrimination Circuit)

The EDC generates a signal when the beam power level is significantly reduced due to environmental conditions such as fog or rain. Two Bypass switch features are used at the receiver, Bypass Switch Off, and Bypass Switch On.

The inability to operate for more than 3 seconds due to environmental conditions is defined as a “Poor Environmental Condition.”

Switch	Condition	Description
Off	When poor environmental conditions present:	The EDC LED turns on and the EDC output activates. Alarm signal is generated upon further loss of the beam energy.
	When either optical module is blocked for 3 or more seconds:	The EDC LED turns on and the EDC output activates. No alarm is generated.
	When both optical modules are blocked for 3 or more seconds:	The alarm LED turns on and an alarm signal is generated. EDC LED turns on and EDC output activates.
On	When poor environmental conditions present:	The EDC LED turns on and the EDC output activates. Alarm LED turns on after further loss of beam energy but does not generate an alarm signal.
	When either optical module is blocked for 3 or more seconds:	The EDC LED turns on and provides a EDC signal. Alarm LED turns on without generating an alarm signal if another optical module is blocked.
	When both optical modules are blocked for 3 or more seconds:	The alarm LED turns on and alarm signal is generated. EDC LED does not turn on and does not activate the EDC output. It is recommended to connect the EDC output to a trouble input point at the control panel. It is recommended to check the system any time the EDC relay has been activated.



Notice!

Connect the EDC to an input circuit and check the system any time the EDC relay is activated.



Notice!

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

5.3 Beam interruption time

The beam interruption time defines the amount of time an intruder must spend in the beam path before an alarm is generated. For instance, if the interruption time is set at 100 ms, the detector only generates an alarm if the beams are blocked for more than 100 ms.



Notice!

For UL applications, do not set the interrupt time above 75 ms.

5.4 Beam power control

The receiver is at optimal detection level when the transmitter's Beam Power Control setting matches the installation range. When the Beam Power is not reduced to match shorter distance, reflection off of nearby surfaces may occur and may cause a missed alarm (no catch). Beam Power level set to greater than the installation range may also cause cross-talk with other devices in the line of sight of the transmitter. The Beam Power Control adjusts the amount of beam energy for optimal range.

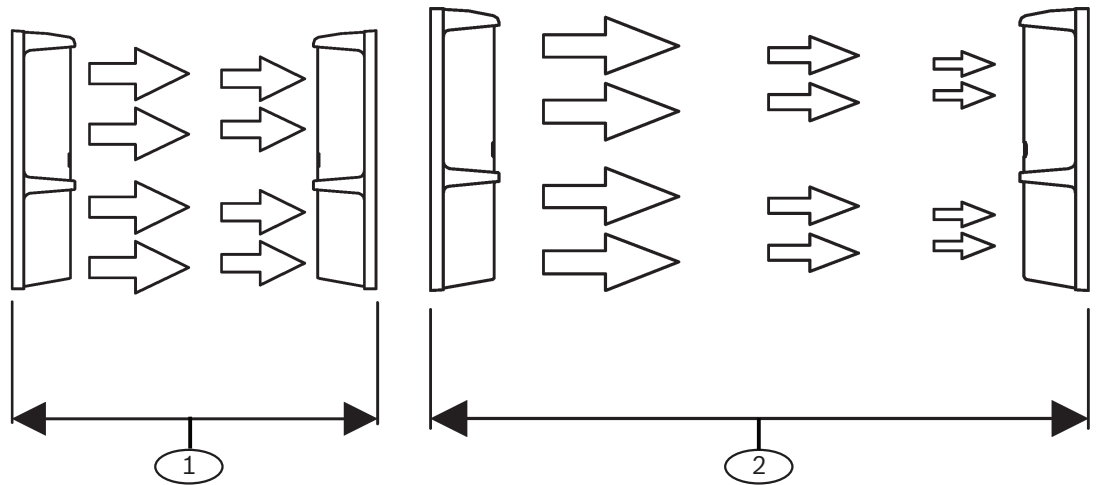


Figure 5.1: Detection range

Callout – Description
1 – Short range
2 – Maximum detection range

6 Setup

Turn the Bypass switch on to activate the bypass feature.

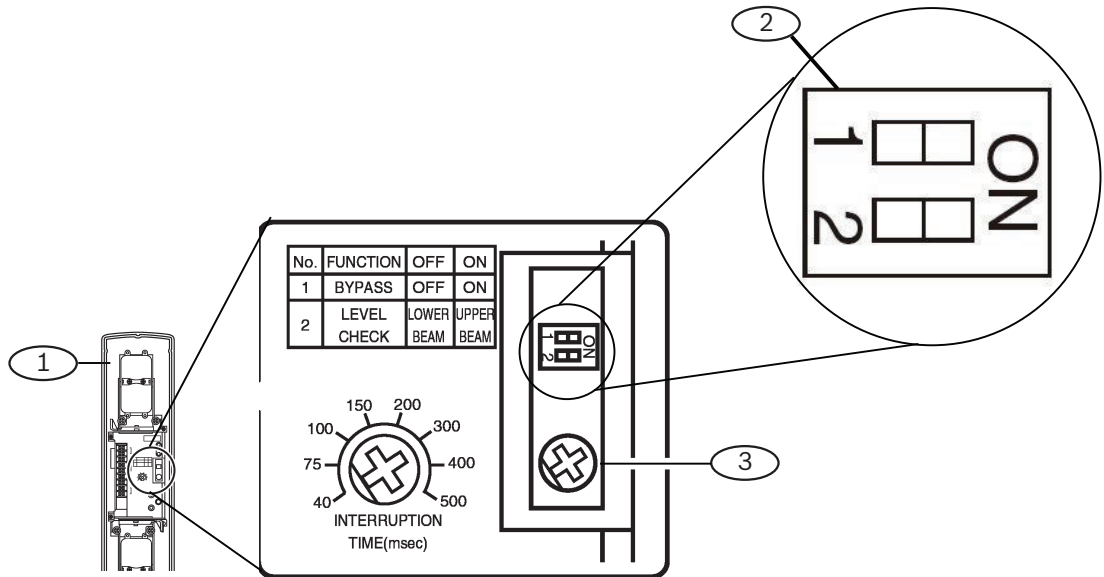


Figure 6.1: Receiver Bypass switch

Callout — Description
1 — Receiver
2 — Bypass switch (switch 1)
3 — Sensitivity control

Interruption time

Turn the sensitivity control on the receiver clockwise to reduce sensitivity and counterclockwise to increase sensitivity.

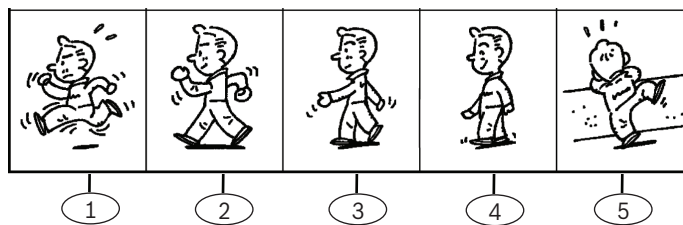


Figure 6.2: Interruption time settings

Callout — Description	Callout — Description
1 — 40 ms running	4 — 300 ms slow walking
2 — 75 ms jogging	5 — 400 – 500 ms slow walking
3 — 150 – 200 ms walking	

Beam power control

Turn the Beam Power Control on the transmitter clockwise to increase beam power. Turn counter-clockwise to decrease beam power. Refer to table below. For UL applications, the interruption time cannot exceed 75 ms.

Model	Volume setting of beam power control						
ISC-FPB1-W60QS	volume	20	30	40	50	55	60
	range	<20 m (65 ft)	20-30 m (65-98 ft)	30-40 m (98-131 ft)	40-50 m (131-164 ft)	50-55 m (164-180 ft)	55-60 m (180-196 ft)
ISC-FPB1-W120QS	volume	40	60	80	100	110	120
	range	<40 m (131 ft)	40-60 m (131-196 ft)	60-80 m (196-262 ft)	80-100 m (262-328 ft)	100-110 m (328-360 ft)	110-120 m (360-393 ft)
ISC-FPB1-W200QS	volume	60	100	130	160	180	200
	range	<60 m (131 ft)	60-100 m (131-328 ft)	100-130 m (328-426 ft)	130-160 m (426-524 ft)	160-180 m (524-590 ft)	180-200 m (590-656 ft)

Upper/Lower Beam Switch

ON - the upper/lower beam turns on. OFF - the upper/lower beam turns off.

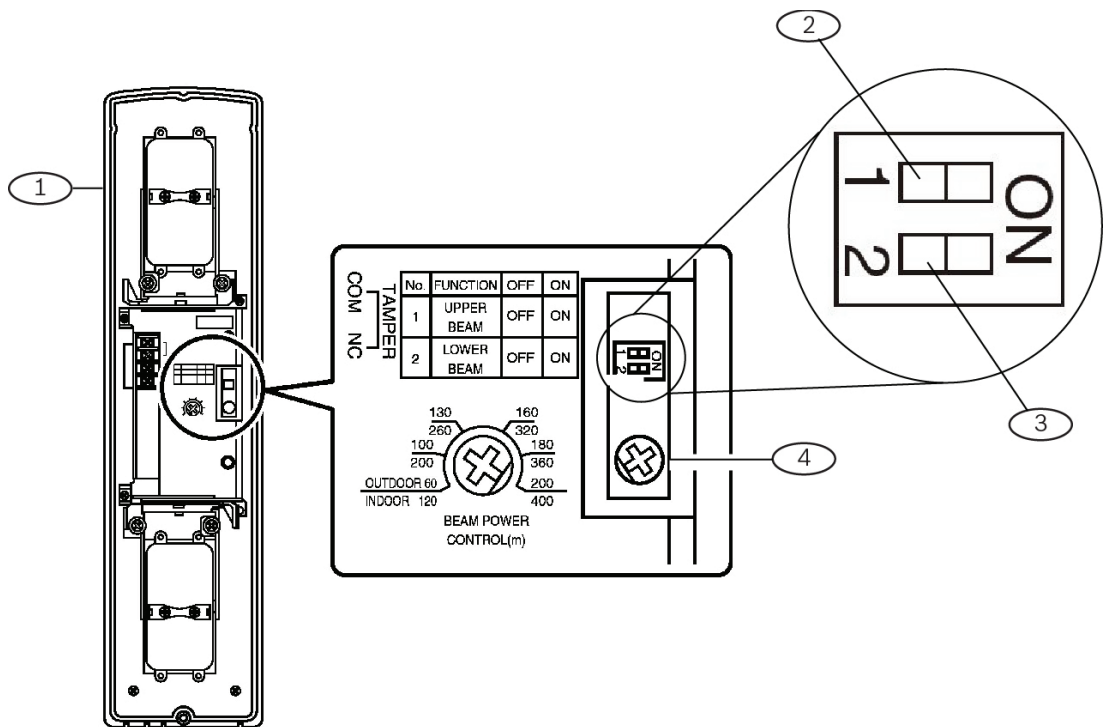


Figure 6.3: Beam switch

Callout — Description	Callout — Description
1 — Transmitter	3 — Lower beam switch 2
2 — Upper beam switch 1	4 — Beam power control

7 Optical alignment

Perform the following to align the detector.

7.1 Level LED - alignment of the Upper Beam

Perform the following to align the upper beam.

Aligning of the upper beam:

1. Turn on the transmitter Function switch 1 (Upper Beam). The monitor LED flashes (5 times/sec).
2. Turn on the receiver Function switch 2 (Level Check) of the receiver.
3. Look into the scope at the center of the lens from a 10-15 cm (4-5 in) distance, adjust the horizontal direction by rotating the turntable and the horizontal adjustment screw. Adjust the vertical direction by rotating the vertical adjustment screw. Adjust until you locate the other part of the sensor in the center of the scope view.
4. Check the level LED of the receiver. Perform fine adjustments and repeat procedure until LED turns off. Refer to *Volt meter alignment*, page 21.

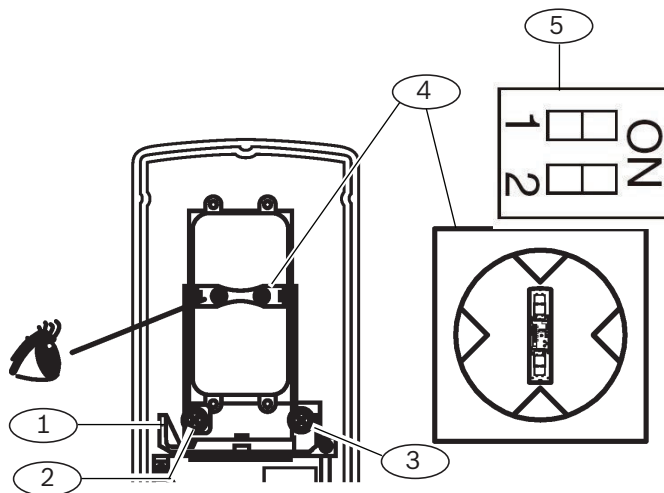


Figure 7.1: Optical alignment

Callout — Description	Callout — Description
1 — Turntable	4 — Scope view finder
2 — Vertical adjustment screw	5 — On/Off switch
3 — Horizontal adjustment screw	6



Notice!

Turn on Function switches 1 and 2 of the transmitter after finishing the alignment to verify the monitor LEDs light up once every 3 seconds.

7.2 Level LED - alignment of the Lower Beam

Perform the following to align the lower beam.

Aligning of the lower beam:

1. Turn on the transmitter Function switch 2 (Lower Beam).

- Turn on the receiver Function switch 2 (Level Check). Follow steps 3 and 4 as listed in the *Level LED - alignment of the Upper Beam*, page 20. If the LED turns off, alignment is complete.

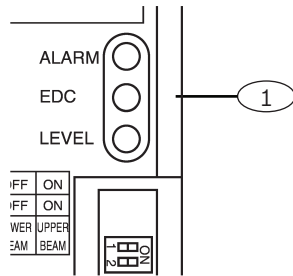


Figure 7.2: LED alignment

Callout – Description
1 — Receiver LED console

7.3 Volt meter alignment

Insert the volt meter leads into the alignment check terminals of the receiver to check voltage. If the value is 3.0 V or higher, the adjustment is completed. If less than 3.0 V, adjust the receiver and transmitter until 3.0 V is obtained.



Notice!

In an ideal environment, the voltage is 3.0 VDC or above.

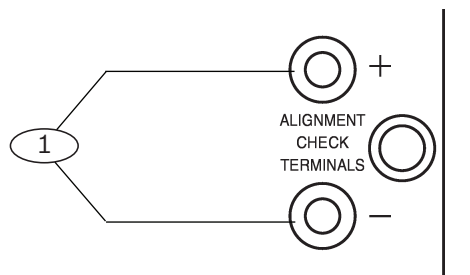


Figure 7.3: Volt meter alignment

Callout – Description
1 — Alignment check terminals



Notice!

Turn on Function switches 1 and 2 of the transmitter after finishing the alignment to verify the monitor LEDs light up once every 3 seconds.

8 Operational check

Perform the following to test the overall operation of the system.

Walk test

Testing the alarm signal:

1. Walk along the beam path near the transmitter and receiver in a pattern crossing the beam signal in three different areas as depicted in the illustration below (callout's 2, 4 and 5 – *Walk test crossing location*), and check the alarm LEDs. Refer to the *Walk test* illustration below. The alarm LED turns on each time you cross the beam path. Make sure the control panel receives an alarm signal.
2. If the alarm LED does not turn on, the beam interruption time may be set too low, or other beams are reflected into the receiver.

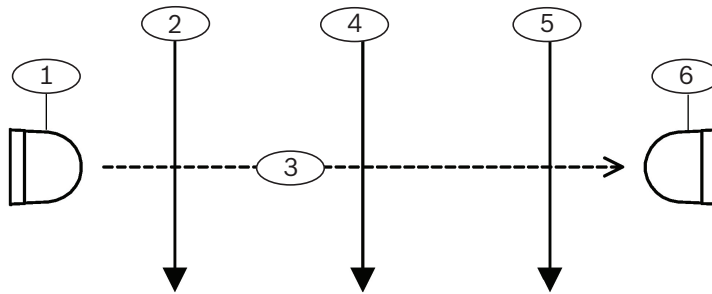


Figure 8.1: Walk test pattern

Callout – Description	Callout – Description
1 – Transmitter	4 – Walk test crossing location 2
2 – Walk test crossing location 1	5 – Walk test crossing location 3
3 – Beam path	6 – Receiver

EDC test

Testing the EDC signal:

1. Block only the upper optical module of the receiver for 3 seconds. Make sure the EDC LED on the receiver turns on.
2. When the EDC LED is ON, block the lower optical module, and confirm the alarm LED on the receiver turns on.
3. Block only the lower optical module of receiver for 3 seconds. Make sure the EDC LED on the receiver turns on. Make sure the control panel receives EDC signal from the receiver. Verify bypass feature settings. Refer to the EDC function description in *EDC (Environmental Discrimination Circuit)*, page 16.

Tamper test

Testing the tamper detect circuit:

1. Place the cover on the detector. Verify the tamper input of the control panel indicates normal status condition.
2. Remove the cover from the detector. Verify the tamper input of the control panel detects the status change and indicates the faulted (active) condition.

9 Troubleshooting

In case of trouble, verify the following:

- Transmitter and receiver power supply voltage is between 10.5 – 28 V
- Transmitter monitor LED is on
- Receiver alarm LED turns on when beam is blocked
- Volume of Beam Power Control is appropriate for the set range
- Receiver level LED is off

Troubleshooting table

Problem	Cause	Solution
Constant alarm	Objects are blocking the beam	Remove object(s)
	Optical modules or covers are dirty	Clean optical modules and covers
False alarms	Unit misaligned	Realign the devices
	Intermittent blocking of the beam	Remove object(s)
	Beam interruption time is set too short	Increase interruption time
	Electro-magnetic or radio frequency interference	Relocate devices away from noise
	Wiring too close to power sources or power line	Change the wiring route
	Unstable mounting surface	Improve installation stability
	Inappropriate beam power control level	Re-adjust the control level
	Transmitter and receiver distance exceed the model's maximum range	Reinstall within supported range or switch to a model with greater range
No alarm when beams are broken	Beams are reflected into the receiver	Remove reflective objects or change the installation site
	Beam interruption time is set too low	Increase the sensitivity
	Other devices' beams interfere with the receiver	Adjust beams power or change location
EDC activation	Beam interruption is set too slow	Decrease interruption time
	Objects are blocking the beams	Remove object(s)
	Unstable mounting surface	Improve installation stability
	Unstable installation site	Improve installation stability
	Transmitter and receiver distance exceed the model's maximum range	Reinstall within supported range or switch to a model with greater range

9.1 Additional information

- At least once a year, clean the optical modules and covers with a soft cloth. Perform walk testing to verify correct operation.

10

Certifications

Region	Agency	Certification
US	UL	UL 639 Intrusion Detection Units and Systems
Europe	CE	Hereby, Bosch, declares that this transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC

11 Specifications

Product Name	Photoelectric Detector		
Model	ISC-FPB1-W60QS	ISC-FPB1-W120QS	ISC-FPB1-W200QS
Outdoor range	60 m (196 ft)	120 m (393 ft)	200 m (656 ft)
Transmitter current draw	20 mA	25 mA	30 mA
Receiver current draw	70 mA		
Power	10.5VDC – 28 VDC		
Optical alignment	+/- 90° Horizontally, +/-10° vertically		
Alarm output	<ul style="list-style-type: none"> - Form C relay (COM, NC, NO) (dry-contact) - Duration - 2 sec - Contact capacity – 30 VDC, 0.2 A (resistive load) - Resistance - 3.0 Ω or less 		
Tamper output	<ul style="list-style-type: none"> - Form B, normally closed relay (dry-contact) - Open when cover is open - Contact capacity – 30 VDC, 0.1 A (resistive load) - Resistance - 3.0 Ω or less 		
EDC output	<ul style="list-style-type: none"> - Form B, normally closed relay (dry- contact) - Open when EDC is activated - Contact capacity – 30 VDC, 0.2 A (resistive load) - Resistance - 3.0 Ω or less 		
Interruption time	40 ms - 500 ms (adjustable)		
Operating temperature	-25° C — +60° C (-13° F — +140° F) (96% or less Relative Humidity)		
Storage temperature	-30° C — +70° C (-22° F — 158° F) (95% or less Relative Humidity)		
IP rating (indoor)	IP66		
Weight (each)	1200 g (2 lbs)		
Dimensions	103 x 398 x 99 mm (4.05 x 15.66 x 3.89 in)		

Bosch Security Systems, Inc.

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