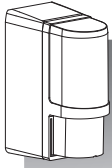


INSTALLATION INSTRUCTIONS



BATTERY OPERATED PHOTOELECTRIC DETECTOR AX-100TFRi/AX-200TFRi

FEATURES

- UL Listed for Commercial/Residential applications, and for c-UL Listed for Residential applications.
- Prewiring ; Battery operated photoelectric detector & wireless transmitter
 - You need to prepare just batteries, and easy to layout you wireless system
- Battery-operated detector
Batteries are not included.
Use four LSH20 (3.6 V, 13 Ah) batteries manufactured by SAFT.
Battery life: AX-100TFRi Approximately five years
AX-200TFRi Approximately three years (transmitter)
Approximately five years (receiver)
- Back box for wireless transmitters
Back box can conceal two wireless transmitters and batteries.
- N.C./N.O. selection switch
Both N.C. and N.O. input wireless transmitters can be used.
- Battery saving function for wireless transmitter
Turning ON the battery saving timer switch reduces the battery consumption of the wireless transmitter.
- Intermittent output function
Turning ON the intermittent output function, alarm signals are sent periodically to avoid missed alarms while the beam is broken.
- 4 channel beam frequency selector
Crosstalk is eliminated with 4, channel selectable, beam frequencies. Used when stacking beams or for long range applications.
- International protection
IP55
- LED indicator for an easy alignment
It flickers on/off to help with easy alignment located on the receiver.
- D.Q. circuit (environmental disqualification)
The environmental compensation circuit is designed to eliminate false alarms caused by snow, fog, heavy rain, ice and misalignment.
- Tamper
Form C output activates when either cover or back box or chassis is removed.
- Beam interruption adjustment function
This function allows you to select the suitable beam interruption time for any environment.

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AX-100 TFRi

consists of AX-100 TFR and EN 1941.
(30m/100ft. with 4 selectable beam frequencies and INOVONICS' wireless transmitter)

AX-200 TFRi

consists of AX-200 TFR and EN 1941.
(60m/200ft. with 4 selectable beam frequencies and INOVONICS' wireless transmitter)

1 INTRODUCTION

1-1 BEFORE YOUR OPERATION

- Read this instruction manual carefully prior to installation.
- After reading, store this manual carefully in an easily accessible place for reference.
- This manual uses the following warning indications for correct use of the product, harm to you or other people and damage to your assets, which are described below. Be sure to understand the description before reading the rest of this manual.

⚠ Warning

Failure to follow the instructions provided with this indication and improper handling may cause death or serious injury.

⚠ Caution

Failure to follow the instructions provided with this indication and improper handling may cause injury and/or property damage.



This symbol indicates prohibition. The specific prohibited action is provided in and/or around the figure.



This symbol requires an action or gives an instruction.

⚠ Warning

Do not use the product for purposes other than the detection of moving objects such as people and vehicles.
Do not use the product to activate a shutter, etc., which may cause an accident.



Do not touch the unit base or power terminals of the product with a wet hand (do not touch when the product is wet with rain, etc.). It may cause electric shock.



Never attempt to disassemble or repair the product. It may cause fire or damage to the devices.



Do not use batteries other than those specified.
Specified batteries:
Four LSH20 batteries manufactured by SAFT



Do not use batteries that have different levels of power remaining (i.e., new and used batteries).
Not observing the above may result in an explosion, leakage of electrolyte, emission of toxic gases or other outcomes that may be harmful to people and property.



[Handling of Batteries]

Fire, explosion and severe burn hazard. Do not recharge, short circuit, crush, disassemble, heat above 100 C (212 F), incinerate, or expose contents to water.
Do not solder directly to the cell.



⚠ Caution

Do not pour water over the product with a bucket, hose, etc. The water may enter, which may cause damage to the devices.

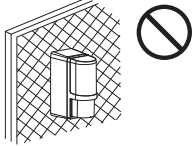


Clean and check the product periodically for safe use. If any problem is found, do not attempt to use the product as it is and have the product repaired by a professional engineer or electrician.

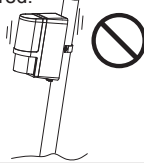


1-2 PRECAUTIONS

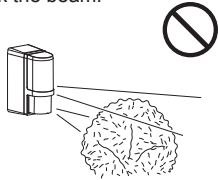
Do not install the unit on an unstable surface.



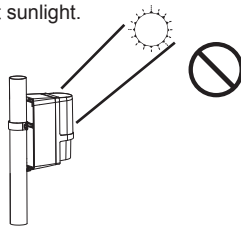
Do not install the pole in a location where sufficient stability can not be ensured.



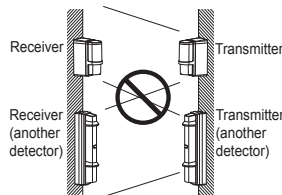
Do not install the unit in trees, leaves, or other objects that may swing in the wind and block the beam.



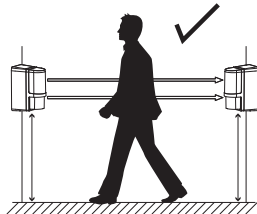
Do not install the receiver in a location where it is exposed to direct sunlight.



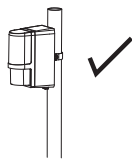
Do not allow the infrared beam from a different model to reach the receiver.



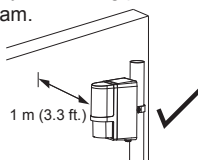
Install the unit at a height where an object can be detected without fail.



The pole size should be $\phi 43 - 48 \text{ mm}$ ($\phi 1.69'' - 1.89''$).



Install the unit at least 1 m (3.3 ft.) away from the wall or fence that may be running parallel to the beam.

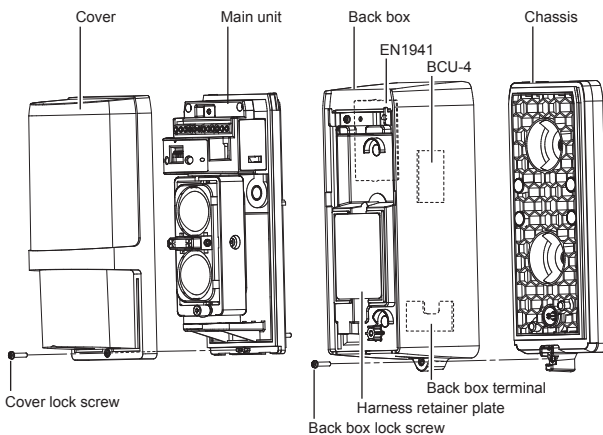


This symbol indicates prohibition.



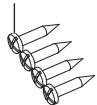
This symbol indicates recommendation.

1-3 PARTS IDENTIFICATION



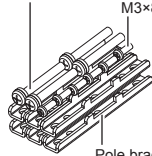
Accessories>>

M4×20 screws: 4



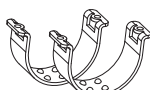
Mounting plate lock screws

M4×30 screws: 4



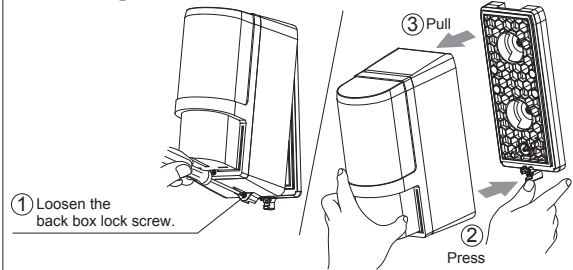
Pole mounting bracket set

M3×8 screws: 6

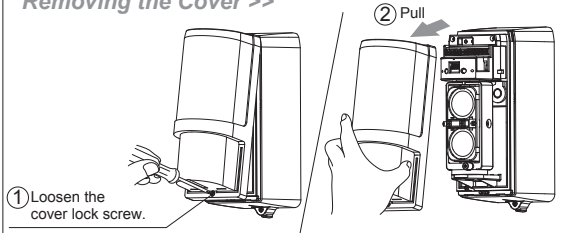


U-brackets: 2

Removing the Back Box >>



Removing the Cover >>



2 PREPARATIONS

2-1 ORDERING DETECTOR BATTERIES

Specified batteries: Four LSH20 batteries manufactured by SAFT. For information about batteries, visit the following website and contact your local SAFT sales representative.
<http://www.saftbatteries.com/Contacts/tabid/72/FP/9/FROM/PROD/UIT/Default.aspx>

2-2 REGISTER WIRELESS TRANSMITTER

Before installing AX-100TFRi/200TFRi, register the INOVONICS' wireless transmitter EN1941, which has been stored and wired in the back box, to the wireless receiver.

The available wireless receivers by INOVONICS are shown below: EN7285, EN4216MR and EN4232MR.

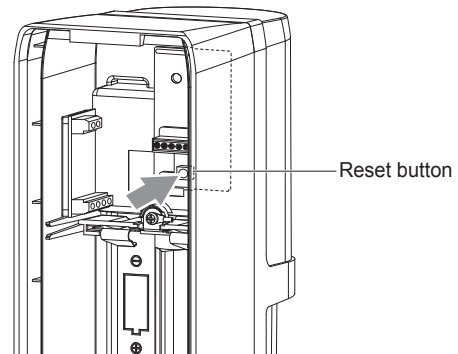
The registration procedure is shown below:

The REGISTER XMITTER option on the wireless receiver allows you to register the wireless transmitter EN1941.

1. From the INSTALL & SERVICE menu, use the Up and Down buttons to navigate to the REGISTER XMITTER prompt. Press the Enter button.
2. Use the Up and Down buttons to choose the point to which you want to register the AX-100TFRi/200TFRi (EN1941).
3. Press the Reset button that is located on the EN1941, at the RESET XMITTER prompt.

Note>>

Refer to RF receiver manual for checking the wireless signal strength of the transmitter.
For UL/c-UL installations the signal strength shall be verified as "good".

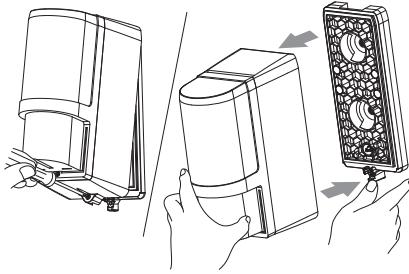


The wireless transmitters are compatible with the INOVONICS' models EN7285, EN4216MR and EN4232MR RF Receiver. Refer to the installation instructions for the RF receiver for full wireless installation, compatible control panels and programming required.

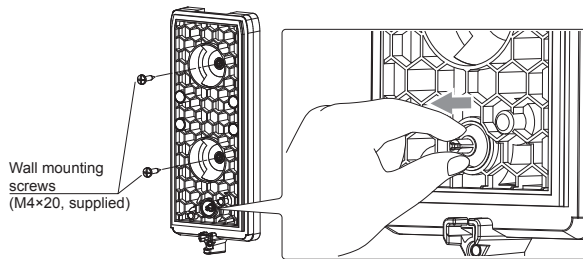
3 INSTALLATION

3-1 WALL MOUNTING

- 1 Remove the chassis from the back box.



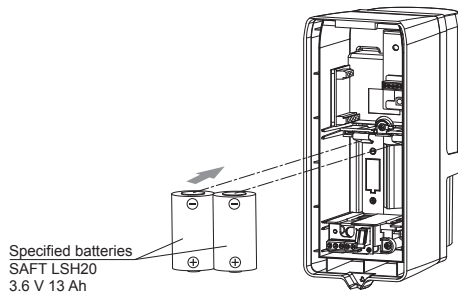
- 2 Fix the chassis to the wall.



⚠ Caution

After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly. !

- 3 Insert the specified batteries into the back box.



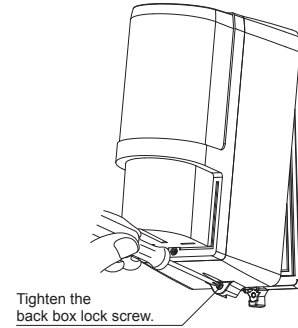
⚠ Warning

- Do not use batteries other than those specified.
Specified batteries:
Four LSH20 batteries manufactured by SAFT
- Do not mix batteries that have different levels of power remaining (i.e., new and used batteries).
Not observing the above may result in an explosion, leakage of electrolyte, emission of toxic gases or other outcomes that may be harmful to people and property. ☹

⚠ Caution

Remove **all** batteries prior to replacing with new ones. If this is not followed, the low battery indicator LED will not reset and continue to flicker. !

- 4 Install the back box onto the chassis.



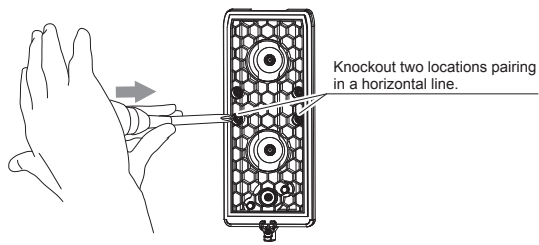
⚠ Caution

Complete the registration to the wireless receiver before mounting the wireless transmitter EN1941 to AX-100TFRi/200TFRi. If not completed, a step to press the reset button is added to the registration procedure. For more information, see "2-2 REGISTER WIRELESS TRANSMITTER" on page 2. !

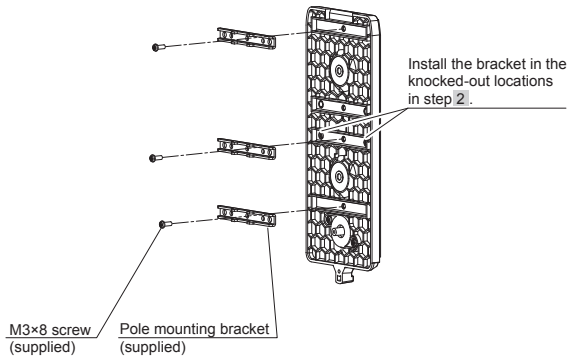
3-2 POLE MOUNTING

-Single set

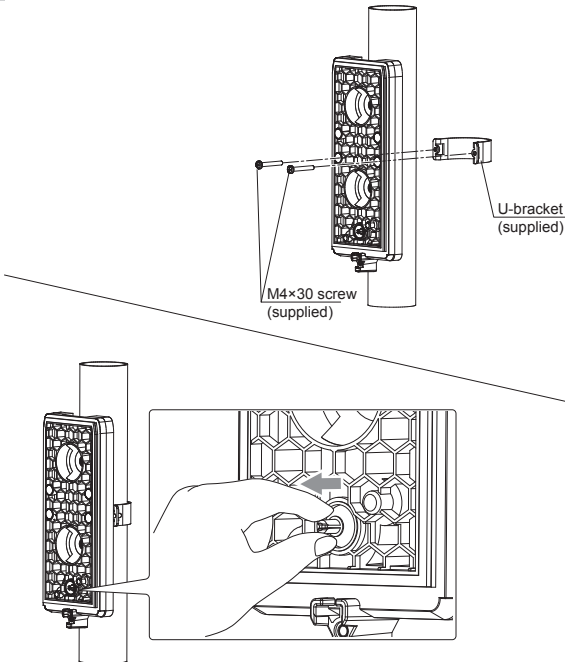
- 1 Remove the chassis from the back box.
- 2 Using a screwdriver or similar tool, break the knockout portion as shown.



- 3 Install three pole mounting brackets on the chassis.



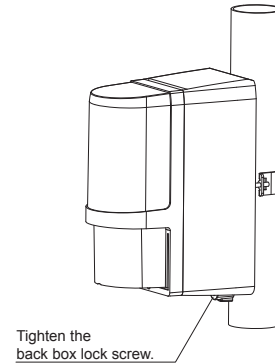
- 4 Fix the chassis on the pole.



⚠ Caution

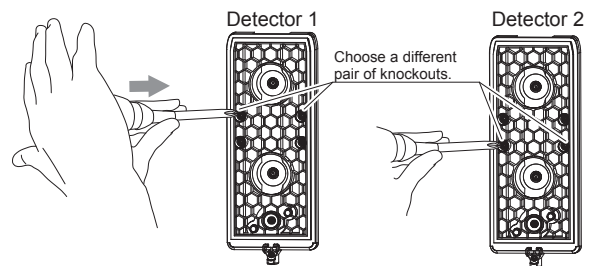
After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly.

- 5 Take steps 3 through 4 refer to sec. "3-1" to install the wireless transmitters and batteries in the back box, and then install the back box on the chassis.

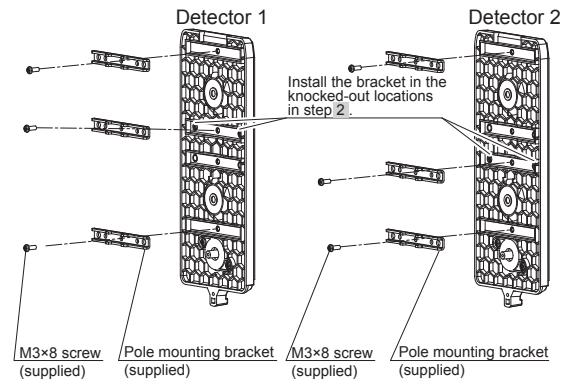


-Two detectors in opposing directions

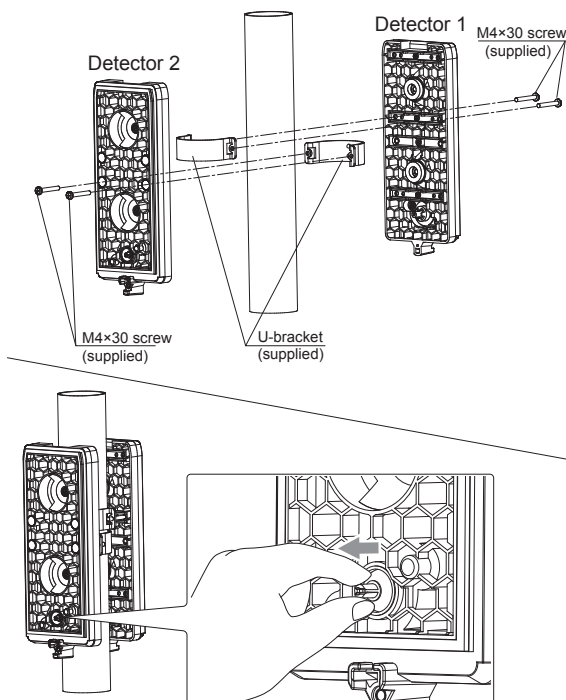
- 1 Remove the chassis from the back box.
- 2 Using a screwdriver or similar tool, break the knockout portion as shown.



- 3 Install three pole mounting brackets on the chassis.



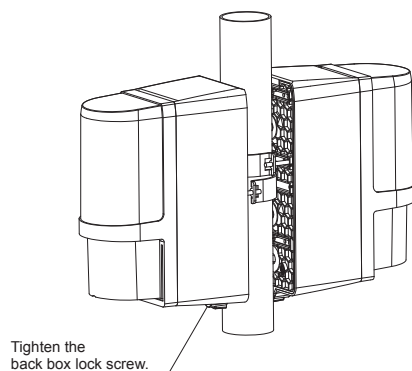
4 Fix the chassis on the pole.



⚠ Caution

After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly.

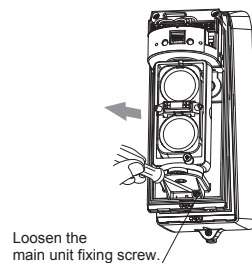
5 Refer to sec. "3-1" steps 3 through 4 to install the wireless transmitters and batteries in the back box, and then install the back box on the chassis.



3-3 MOUNTING IN THE BEAM TOWER

Mounting inside optional beam tower.

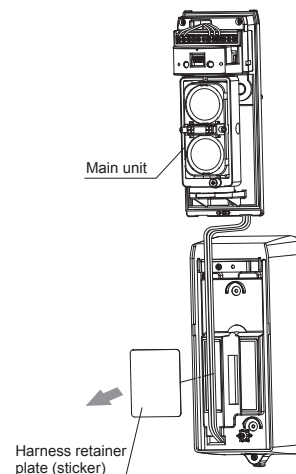
- 1 Remove the cover from the detector.
- 2 Loosen the main unit fixing screw and remove the main unit from the back box.



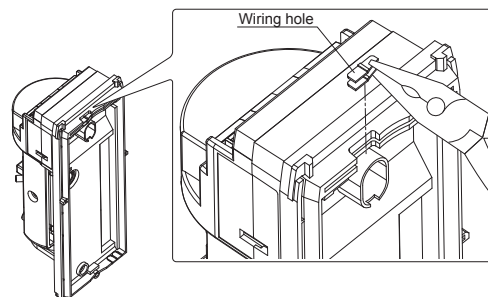
⚠ Caution

Cables are connected between the back box and the main unit. Do not exert an excessive amount of force on the cables. Handle the main unit with care.

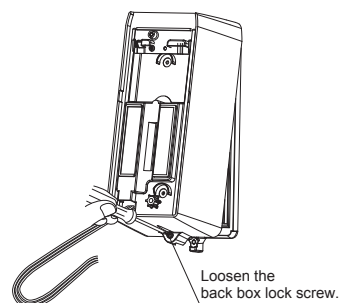
- 3 Remove the harness retainer plate.



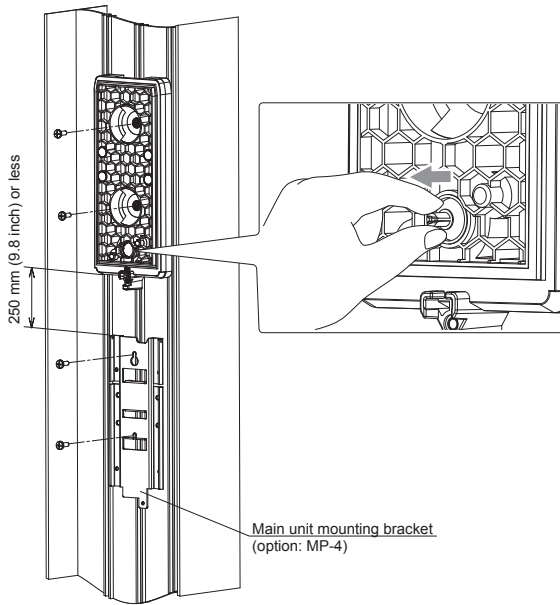
- 4 Open the wiring hole in the top of the main unit using pliers.



- 5 Remove the chassis from the back box.



- 6 Fix the chassis and main unit mounting bracket (optional) in the tower.

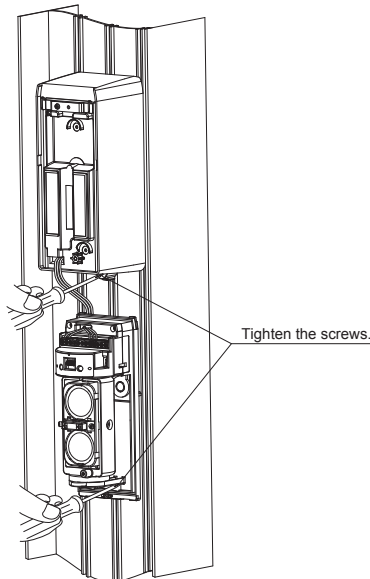


⚠ Caution

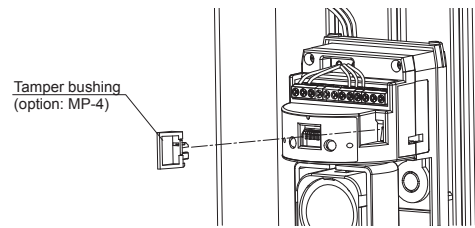
After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly.



- 7 Refer to sec. "3-1" steps 3 through 4 to install the wireless transmitters and batteries in the back box, and then install the back box on the chassis. Install the main unit on the main unit mounting bracket.



- 8 After completing the settings and operation check, insert the tamper bushing into each transmitter/receiver.

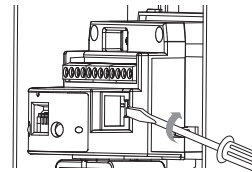


⚠ Caution

- The switch selection is not recognized with the tamper bushing inserted. Remove the tamper bushing before selecting a function using the switch. !
- After completing the settings, be sure to insert the tamper bushing to check that all LEDs are OFF. Without the tamper bushing, the LEDs are kept ON, which consumes more battery power. !
- Monitor Jack Output become disable when tamper bushing inserted. !
- When inserting the tamper bushing, the beam alignment test point will be disabled. Please complete the alignment procedure before inserting tamper bushing. !
- For UL/c-UL installations tamper switches shall be enabled.

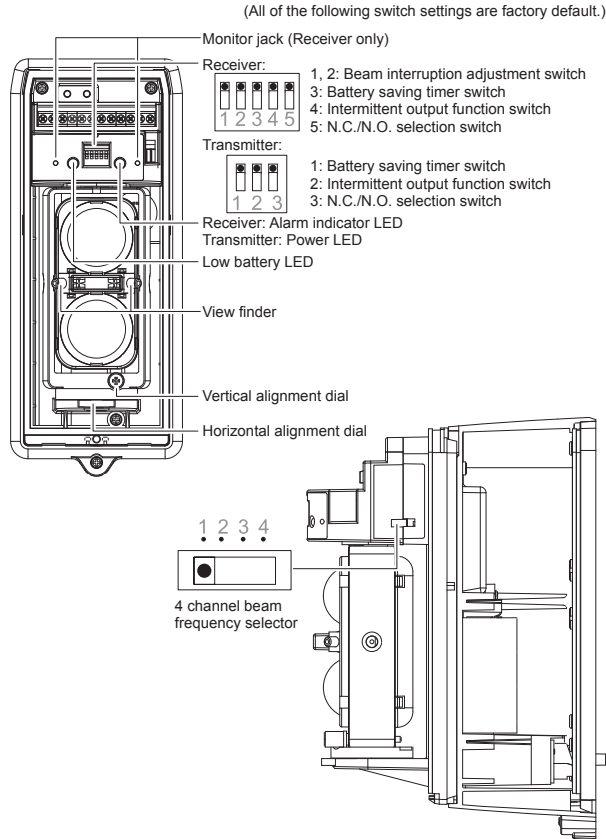
How to remove the tamper bushing >>

Insert a flat-blade screwdriver, and twist it lightly to remove the tamper bushing.

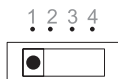


4 SETTING

4-1 FUNCTION



4-2 4 CHANNEL BEAM FREQUENCY SELECTOR



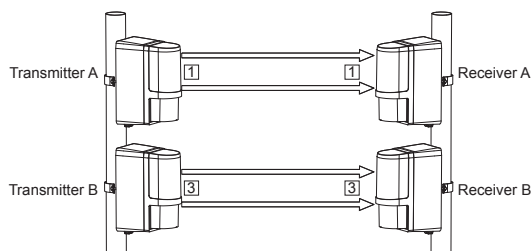
The 4 channel beam frequency selector can be used to avoid unwanted crosstalk that can occur when using multiple photo beams for long distance or beam stacking applications.

- To select between 4 separate beam frequencies, use the switch provided.
- Make sure the receiver and transmitter that are facing each other are set to the same channel.
- More than double stacked application is not possible.

Note>>

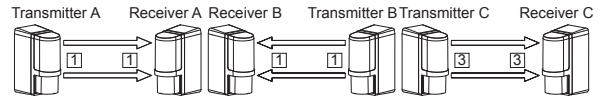
Always switch the frequencies TWO channels apart when stacking units on top of one another. (See following example.) The upper unit is set on channel 1 while the lower is on channel 3, channels 2 and 4 could have also been used.

a) Double stacked protection



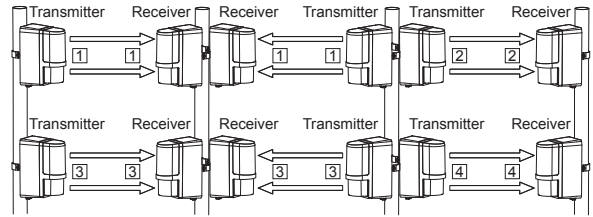
Since Receiver B may receive the infrared beam from Transmitter A, select the frequencies as shown in the figure above. (In the figure, each number in the square indicate a channel numbers.)

b) Long distance protection



Since Receiver C may receive the infrared beam from Transmitter A, select their frequencies as shown in the figure above.

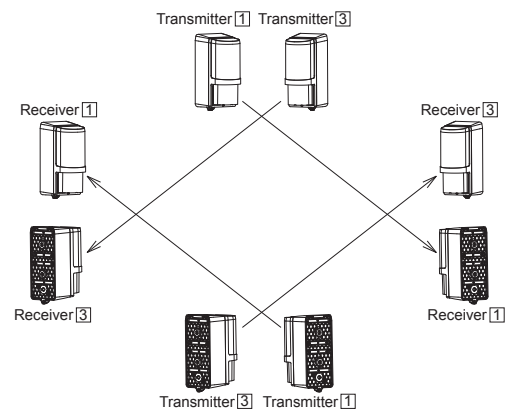
c) Double stacked long distance protection



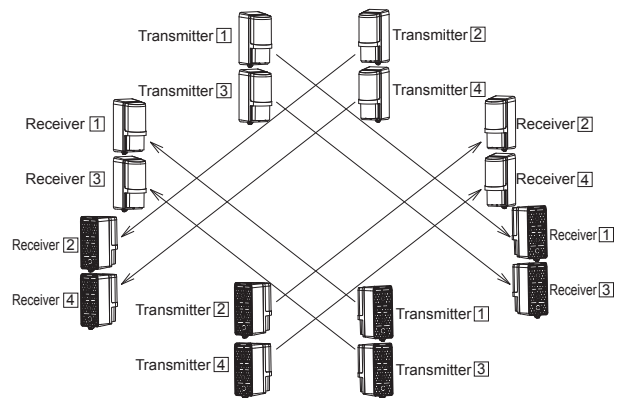
Note>>

More than double stacked application is not possible.

d) Perimeter protection



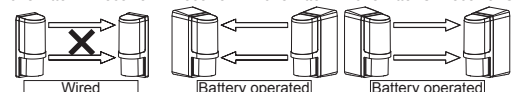
e) Perimeter protection in a two-stack configuration



Warning

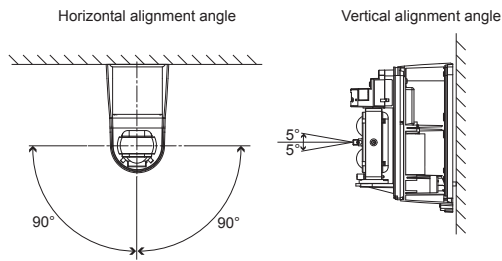
- Do not attempt to install this product with any other photoelectric detector. It may cause the detector to fail or not respond to movements. If the receiver of this product receives the beam from the wired photoelectric detector, it could be a factor of false alarm.
- In case that you install the battery operated photoelectric detector with Optex hard-wired photoelectric detector at the same site, ensure that the hard-wired transmitter cannot affect any other battery operated receivers for avoiding cross talk between photoelectric detector.

Transmitter A Receiver A Receiver B Transmitter B Transmitter C Receiver C



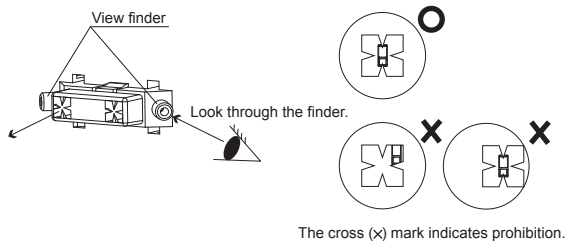
The cross (X) mark indicates prohibition.

4-3 OPTICAL ALIGNMENT

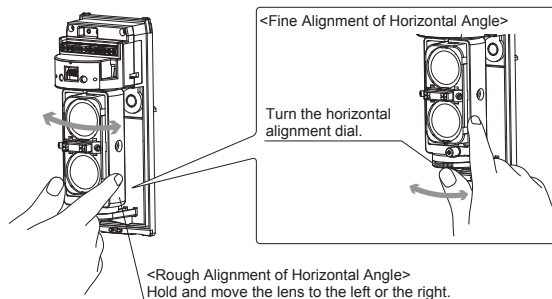


Optical alignment is an important adjustment to increase reliability. Be sure to take adjustment steps **1** through **5** described below to attain the maximum level of the output through the monitor jack.

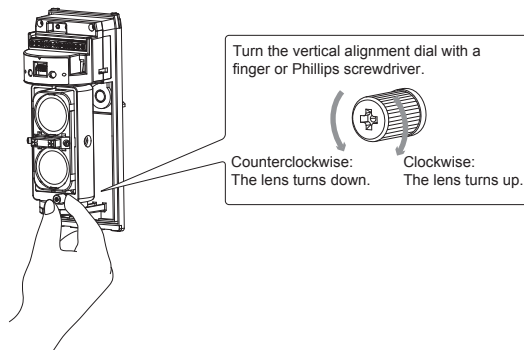
- 1** See “4-2” and set the 4 channel beam frequency selector.
- 2** While looking through the view finder, adjust the horizontal and vertical angles so that the pairing detector is at the center of the sight.



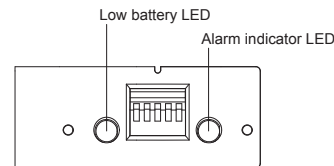
Rough and Fine Alignment of Horizontal Angle



Fine Alignment of Vertical Angle



- 3** Adjust the horizontal and vertical angles while checking the light receiving status by Alarm indicator LED on the pairing receiver.

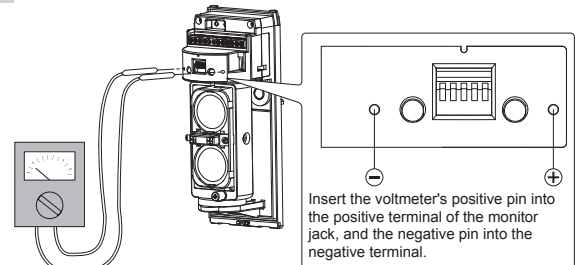


Alarm indicator LED	Light interrupted	Light received		
	ON (Red)	Fast flicker	Slow flicker	OFF
Adjustment level	●	●●●	●●●	○
Monitor jack output	0 V	▷	1.0 V ▷ 2.0 V ▷ 2.5 V ▷	

⚠ Caution

The Alarm indicator LED is a supporting tool for easy alignment. Be sure to perform fine alignment to ensure the maximum output level through the monitor jack. **!**

- 4** Connect a tester to the monitor jack on the receiver.



- 5** Set the voltmeter range to 5 to 10 VDC. After checking the receiving level of optical axis by using the alarm indicator, make sure to make fine alignment for both transmitter and receiver with voltmeter until it reaches maximum monitor output over “good” level.

4-4 BEAM INTERRUPTION ADJUSTMENT

Initial setting is at 50 ms for normal work.

According to the speed of a supposed target you select one specific setting out of 4 steps.

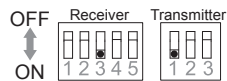
Set the beam interruption adjustment switches of the Receiver according to the speed of the human object to detect.

SELECTOR POSITION	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Typical interruption time setting	Running (50 msec)	Jogging (100 msec)	Walking (250 msec)	Slow movement (500 msec)

4-5 ADJUSTING OUTPUT

-Setting the battery saving timer

Alarm output activation are limited by a timer 2 minutes. Even if there are continuous alarm events, the alarm output operates only once in the timer period.



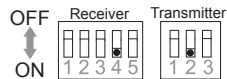
- Alarm output: 1 output/2 minute
- D.Q. output: 1 output/2 minute
- Low battery output: 1 output/15 minutes

⚠ Caution

Remove **all** batteries prior to replacing with new ones. If this is not followed, the low battery indicator LED will not reset and continue to flicker.

-Setting the intermittent output function

When wireless configuration is being used, which is unable to determine whether the alarm output continues, setting the intermittent output function to the "ON" position, turns on the intermittent alarm output. This configures the wireless transmitter to send alarms at a specific time intervals.



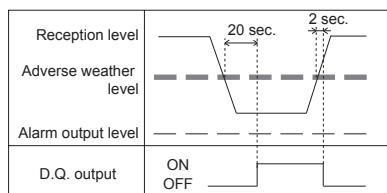
Intermittent Output Times

- Alarm output: 1 output/1 minute
- D.Q. output: 1 output/1 minute
- Low battery output: 1 output/5 minutes

-Setting the D.Q. output (environmental disqualification)

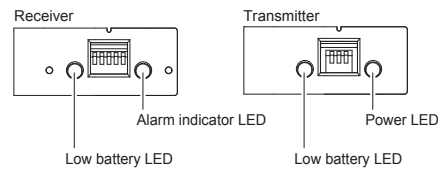
D.Q. will send an independent signal when the beam strength is below acceptable levels, for more than 20 seconds, due to rain, snow, or heavy fog.

Operating Time Chart



5 OPERATION CHECK

5-1 LED INDICATION

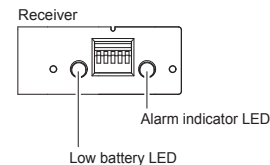


DETECTOR STATUS	LED Indications
Power ON	The power LED turns ON.
Detection (beam interruption)	The alarm LED turns ON.
Low battery power	The low battery LED flickers.

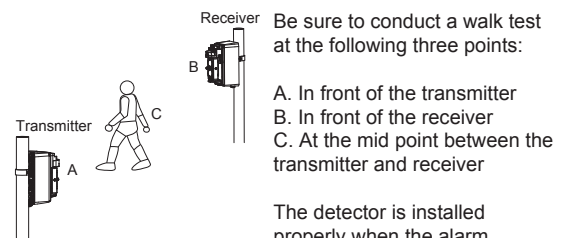
5-2 OPERATION CHECK

After installation is complete, be sure to check the operation.

- 1 See "Setting the battery saving timer" in "4-5" to turn OFF the battery saving mode.
- 2 Make sure that the alarm indicator is off. If it is illuminated even when the beams are not blocked, make optical alignment again.



- 3 Check that the low battery indicators on both transmitter and receiver are OFF. If the LED is flickering, the battery power is low. Replace with the new batteries.
- 4 Conduct a walk test to check that the alarm indicator LED on the receiver turns ON as the walker interrupts the beams.



Be sure to conduct a walk test at the following three points:

- A. In front of the transmitter
- B. In front of the receiver
- C. At the mid point between the transmitter and receiver

The detector is installed properly when the alarm indicator LED turns ON in the tests at all the three points.

- 5 Conduct a walk test and a battery check at least once a year.

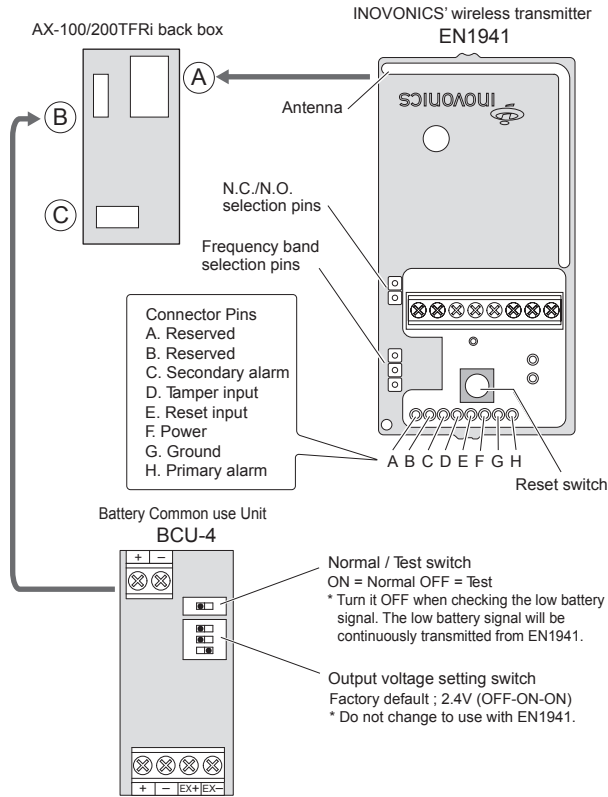
⚠ Caution

For battery power savings, perform the operation check before checking the following items.

- (1) When installing on a wall or pole, make sure the cover is properly attached to main unit.
- (2) When installing in a beam tower, make sure the tamper bushing is properly attached to main unit. (See page 6 "Caution".)

6 WIRELESS DEFAULT SETTINGS (reference)

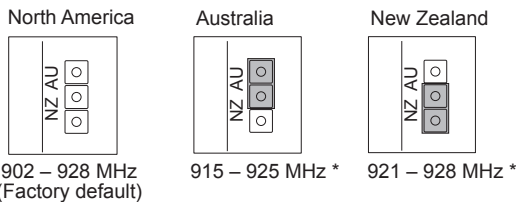
6-1 PARTS IDENTIFICATION



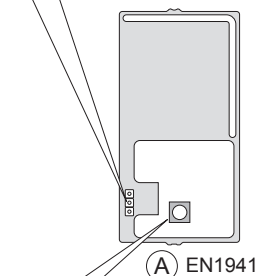
- * When assembling the chassis and the back box, be sure that the wires not to get caught.
- * Accessories for AX-100/200 TFRi are same as those shown on page 2 of the enclosed AX-100/200 TFR Installation Instructions except three cables that are already assembled and two sets of Velcro tapes that are not used for this product.

6-2 AREA SETTINGS

< Frequency band selection pins >
Frequency can be set with the pin connector.



- * To switch the frequency, insert the attached pin connector as shown above.
- * For UL and ULC installations Only the North America frequency is to be used.



< Reset switch >

The reset switch is used when the wireless transmitter is registered.

NOTE >>

When this switch is pressed, a wireless signal is transmitted and the registered information is reset.

6-3 SIGNAL CONFIGURATION

Each event signal is transmitted as shown below in accordance with the factory default prewiring and settings.

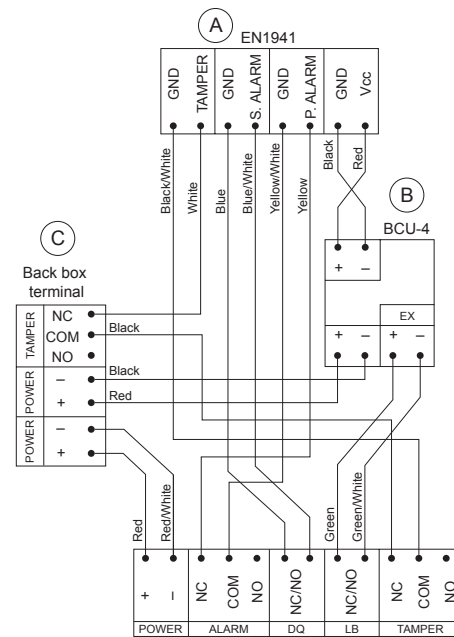
< AX-100/200 TFRi Receiver >

AX-100/200 TFRi	EN1941
ALARM	Primary alarm
DQ	Secondary alarm
LB	Low battery
TAMPER	Tamper

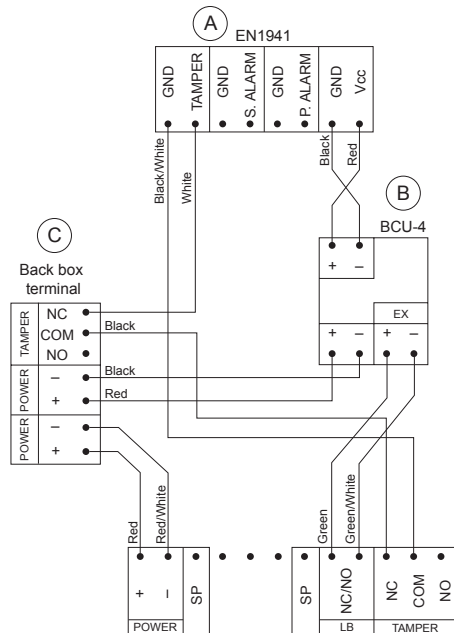
< AX-100/200 TFRi Transmitter >

AX-100/200 TFRi	EN1941
LB	Low battery
TAMPER	Tamper

6-4 PRE-WIRING



< AX-100/200TFRi Receiver >



< AX-100/200TFRi Transmitter >

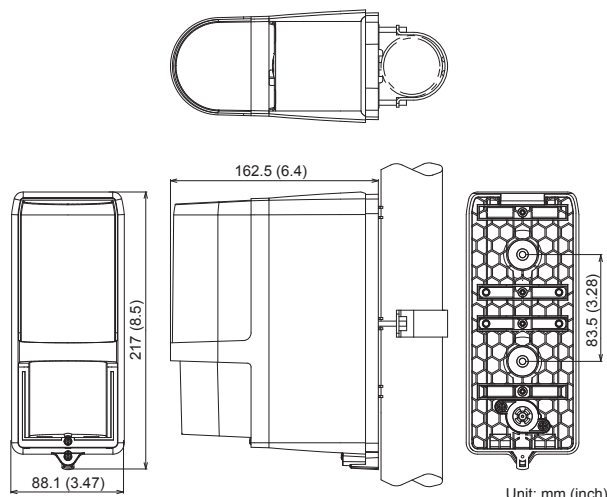
7 TROUBLE SHOOTING

7-1 TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
LEDs are not illuminated. (transmitter/receiver)	Reversed battery polarity.	Check the battery polarity.
Low battery indicator flickers even though the battery has been inserted. (transmitter/receiver)	Reversed battery polarity.	Check the battery polarity.
Alarm is not output.	Reflection from the floor or wall.	Align beams away from the floor or wall.
	Beam has not been blocked.	Block all two beams.
Alarm is kept output.	Channels of transmitter and receiver are different.	Set the same channel to both transmitter and receiver.
	Multiple photoelectric detector for long distance or beam stacking applications.	Set the combination of channels as 1, 3, 2, 4 or 1, 4
	Optical alignment was not performed properly.	See "4-2 OPTICAL ALIGNMENT" on Page 9.
Batteries are going flat too quickly.	Tamper button has not performed properly.	Set the cover, the main unit and the back box to the chassis properly.
Frost, snow or heavy rain causes false alarm.	Optical alignment not optimized.	See "4-2 OPTICAL ALIGNMENT" on Page 9, and make realignment.
Improper output	The wiring is incorrect.	Make correct wiring.
Wall tamper does not activate.	Screws between the chassis and the back box are loose.	Tighten screws completely.
	The waterproof packing on back box is misplaced.	Remove chassis from the back box and align the waterproof packing onto the chassis.
The wireless receiver does not receive an alarm, or the reception level is low.	The radio waves are being interrupted by a building.	Change the installation location of AX-100/200TFRi or the wireless receiver.
A false alarm occurs due to heavy rain, or the wireless receiver does not receive the alarm.	Heavy rain is blocking the infrared beam or attenuating radio waves.	Change the installation location of AX-100/200TFRi or the wireless receiver.

8 DIMENSIONS

8-1 DIMENSIONS



Unit: mm (inch)

9 SPECIFICATIONS

9-1 SPECIFICATIONS

Model	AX-100TFRi	AX-200TFRi
Detection range	30 m (100 ft.)	60 m (200 ft.)
Maximum arrival distance	265 m (870 ft.)	530 m (1 740 ft.)
Detection method	Infrared beam interruption detection	
Beam frequency selection	4 channels	
Interruption period	Variable between 50, 100, 250, 500 msec (4 steps)	
Power source	3.6 V 13.0 Ah: LSH20 lithium batteries manufactured by SAFT (not installed)	
Current draw	660 μ A T: 320 μ A + R: 340 μ A (at 25°C, 3.6 VDC)	845 μ A T: 505 μ A + R: 340 μ A (at 25°C, 3.6 VDC)
	* Battery life	Approx. 5 years
RF module	Transmitter	Approx. 3 years
	Receiver	Approx. 5 years
	Description	One-way binary RF Module
	Model	EN1941
Frequency option	Manufacturer	INOVONICS
	Frequency option	**** 902 - 928 MHz for North America 915 - 925 MHz for Australia 921 - 928 MHz for New Zealand
Indicator	Alarm indicator (Receiver)	(1) Light on - IR beam not received. (2) Flickering light - IR beam not received sufficiently. (3) Light off - IR beam received.
	Alarm indicator (Transmitter)	Power ON: ON Power OFF: OFF
	Low battery	Voltage reduction: flickering
Operating temperature	-20°C to +60°C (-40°F to +140°F)	
Operating ambient humidity	95% (max.)	
Alignment angle	±90° Horizontal, ±5° Vertical	
Mounting	Indoor/Outdoor, Wall/Pole/Tower mounting (optional main unit mounting brackets are required, when the units mount in the tower.)	
Dimensions	H x W x D mm (inch.) 217 (8.5) x 88.1 (3.47) x 162.5 (6.4)	
Weight	1 900 g (67.0 oz)	
International protection	IP55	

Specifications and design are subject to change without prior notice.

* The value is based on the condition that it is used within the ambient temperature range of 20 to 25°C.

** The unit can be installed in a UL commercial, residential applications and ULC residential installation.

*** The unit shall be tested at least once a year.

**** For UL and ULC installations Only the North America frequency is to be used.

NOTE

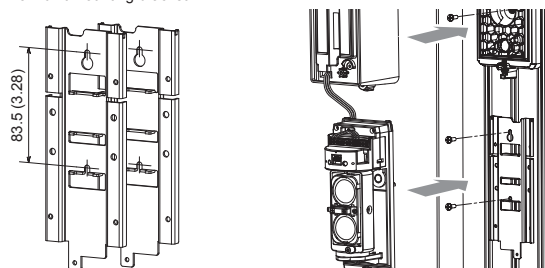
These units are designed to detect an intruder and activate an alarm control panel. Being only a part of a complete system, we cannot accept responsibility for any damages or other consequences resulting from an intrusion.

10 OPTIONS

10-1 OPTIONS

MP-4: Main unit mounting bracket set (for tower mounting)

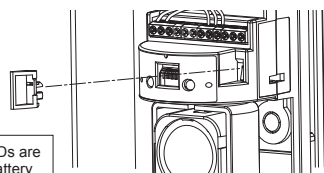
Main unit mounting bracket



Tamper Busing



Without the tamper busing, the LEDs are kept ON, which consumes more battery power.



Unit: mm (inch)



OPTEX CO., LTD. (JAPAN)
URL: <http://www.optex.net/>

OPTEX INC. (U.S.)
URL: <http://www.optexamerica.com/>

OPTEX DO BRASIL LTDA. (Brazil)
URL: <http://www.optex.net/br/es/sec/>

OPTEX (EUROPE) LTD. / EMEA HQ (U.K.)
URL: <http://www.optexeurope.com/>

**OPTEX TECHNOLOGIES B.V.
(The Netherlands)**
URL: <http://www.optex.nl/>

OPTEX SECURITY SAS (France)
URL: <http://www.optex-security.com/>

OPTEX SECURITY Sp.z o.o. (Poland)
URL: <http://www.optex.com.pl/>

OPTEX PINNACLE INDIA, PVT., LTD. (India)
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