

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

FEATURES

- **AX-100TFR** : Detection range: 30 m (100 ft.)
- **AX-200TFR** : Detection range: 60 m (200 ft.)
- Battery-operated detector
Batteries are not included.
Use four LSH20 (3.6 V, 13 Ah) batteries manufactured by SAFT.
Battery life: AX-100TFR Approximately five years
AX-200TFR 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.

CONTENTS

① INTRODUCTION	
1-1 BEFORE YOUR OPERATION	1
1-2 PRECAUTIONS	2
1-3 PARTS IDENTIFICATION	2
② PREPARATIONS	
2-1 ORDERING DETECTOR BATTERIES	2
2-2 CHECKING THE WIRELESS TRANSMITTER SIZE ..	2
③ INSTALLATION	
3-1 WALL MOUNTING	3
3-2 POLE MOUNTING	4
3-3 MOUNTING IN THE BEAM TOWER	5
3-4 WIRING	7
④ SETTING	
4-1 FUNCTION	8
4-2 4 CHANNEL BEAM FREQUENCY SELECTOR ..	8
4-3 OPTICAL ALIGNMENT	9
4-4 BEAM INTERRUPTION ADJUSTMENT	9
4-5 ADJUSTING OUTPUT	10
⑤ OPERATION CHECK	
5-1 LED INDICATION	11
5-2 OPERATION CHECK	11
5-3 TROUBLE SHOOTING	11
⑥ SPECIFICATIONS	
6-1 SPECIFICATIONS	12
6-2 DIMENSIONS & OPTION	12

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.

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

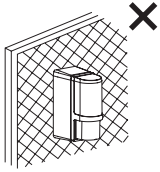
This symbol indicates prohibition. The specific prohibited action is provided in and/or around the figure.

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

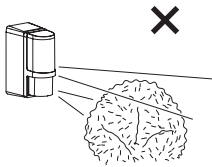
Install the unit on a stable surface.



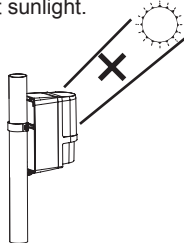
Install the pole in a location where sufficient stability can be ensured.



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



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



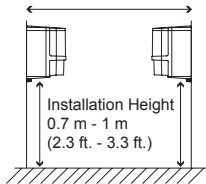
Observe the prescribed transmitter-receiver distance (range) and installation height.

AX-100TFR

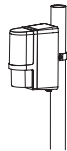
Detection range: 30 m (100 ft.)

AX-200TFR

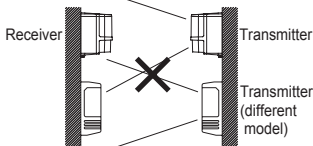
Detection range: 60 m (200 ft.)



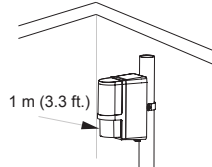
The pole size should be $\phi 43 - 48$ mm ($\phi 1.69" - 1.89"$).



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

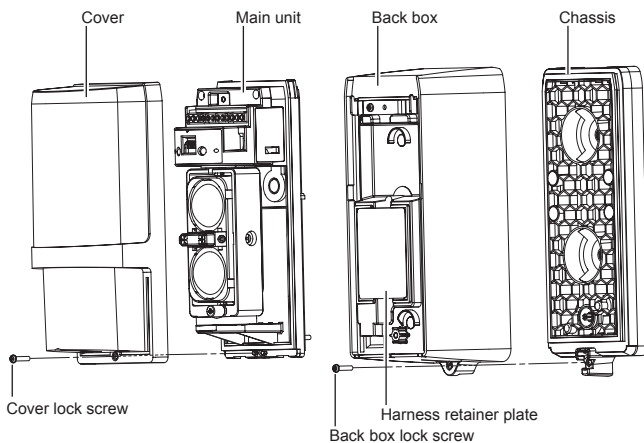


Install the unit more than 1 m (3.3 ft.) away from the wall or fence that are running parallel to the beam.

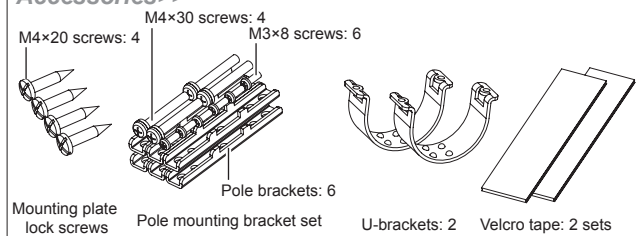


The cross (X) mark indicates prohibition.

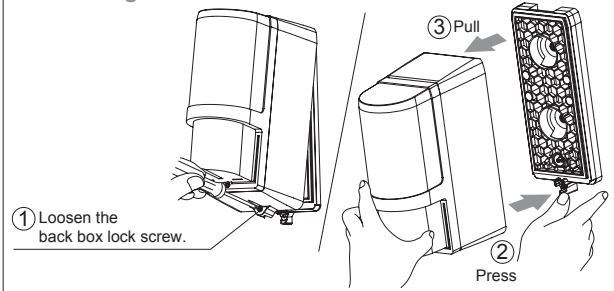
1-3 PARTS IDENTIFICATION



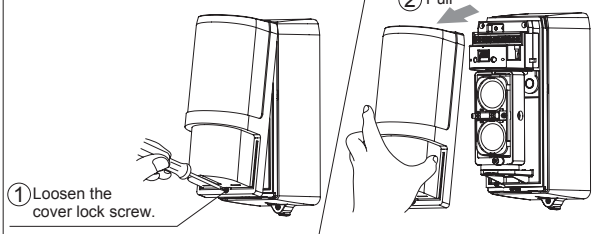
Accessories >>



Removing the Back Box >>



Removing the Cover >>



2 PREPARATIONS

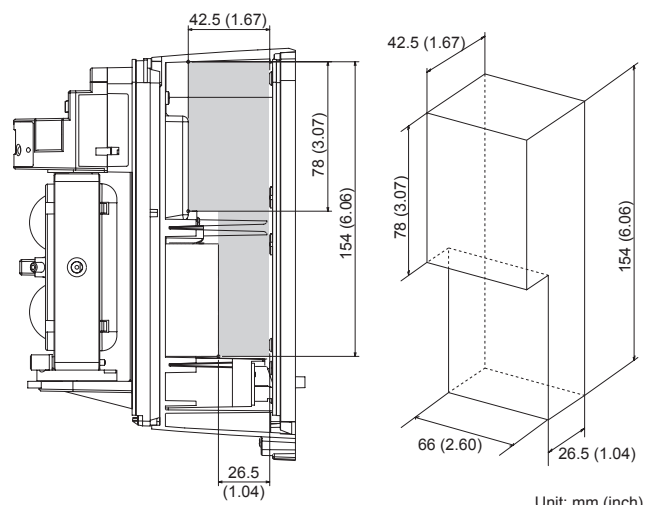
2-1 ORDERING DETECTOR BATTERIES

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 CHECKING THE WIRELESS TRANSMITTER SIZE

Use two wireless transmitters for each of receivers and transmitters. When wireless transmitters with two or more inputs are available, use one wireless transmitter for each of transmitters and receivers.

The following figure shows the dimensions of the wireless transmitter installation space in the back box. Note that transmitters with dimensions greater than those are not applicable.



Unit: mm (inch)

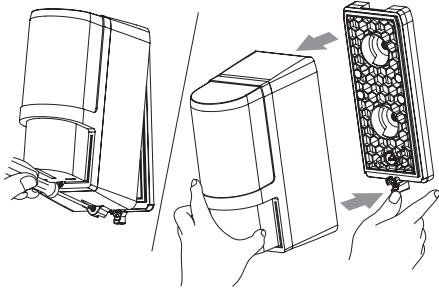
Note >>

- Be sure to monitor the alarm and low battery outputs.
- To monitor the tamper output, include a wireless transmitter supporting three or more inputs into the system.

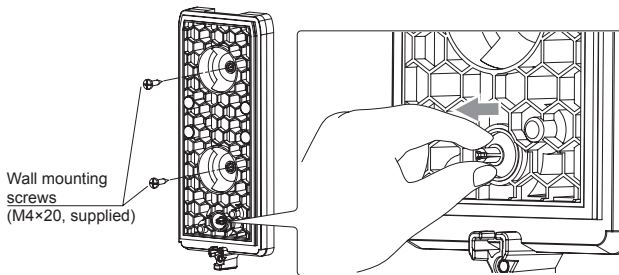
3 INSTALLATION

3-1 WALL MOUNTING


1 Remove the chassis from the back box.



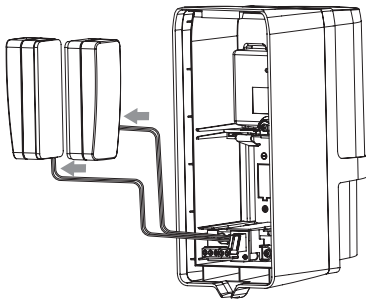
2 Fix the chassis to the wall.



⚠ Caution

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

3 Connect the cables from the back box to the wireless transmitters.




Receiver-Wireless Transmitter Connection

Yellow/Yellow-white cable: For alarm
Green/Green-white cable: For low battery
Black/Black-white cable: For tamper

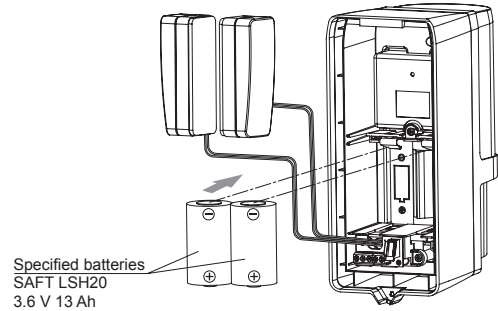
Transmitter-Wireless Transmitter Connection

Green/Green-white cable: For low battery
Black/Black-white cable: For tamper


⚠ Caution

• When N.O. wireless transmitters are used, see "Using the N.O. type transmitter" in sec. "3-4" to change the wiring. 
• Use the specified batteries for the wireless transmitters.


4 Insert the specified batteries into the back box.



⚠ Warning

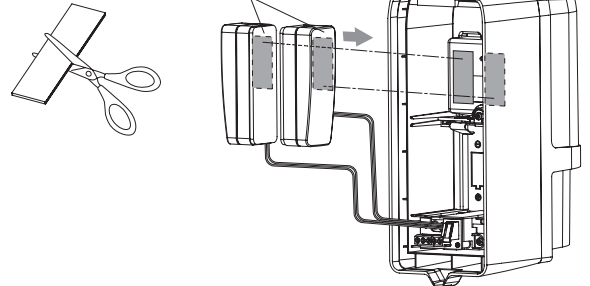
• Do not use batteries other than those specified. Specified batteries:
Four LSH20 batteries manufactured by SAFT
• Do not mix batteries that have different levels of power remaining (i.e., new and used batteries). Not observing the above may result in an explosion, leakage of electrolyte, emission of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

⚠ Caution

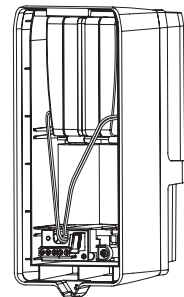
Remove **all** batteries prior to replacing with new ones. If this is not followed, the low battery indicator LED will not reset and continue to flicker. 

5 Fix the wireless transmitters in the back box.

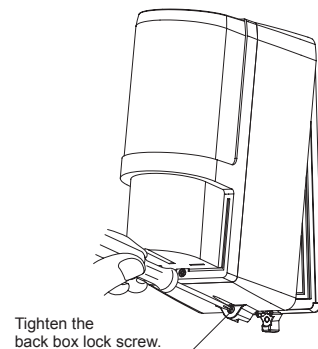
Cut the supplied Velcro tape to an appropriate length and apply.



6 Run the cables so that they are not pinched between the chassis and back box.



7 Install the back box onto the chassis.

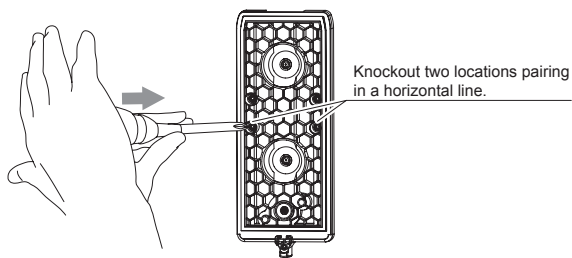


Tighten the back box lock screw.

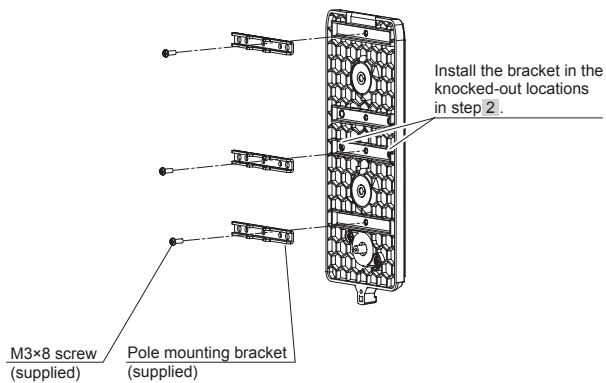
3-2 POLE MOUNTING

-Single set

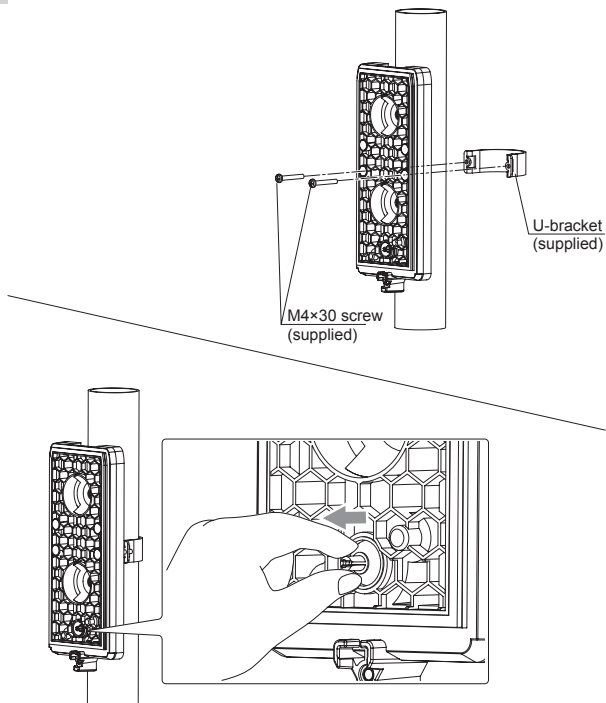
- 1 Remove the chassis from the back box.
- 2 Using a screwdriver or similar tool, break the knockout portion as shown.




- 3 Install three pole mounting brackets on the chassis.



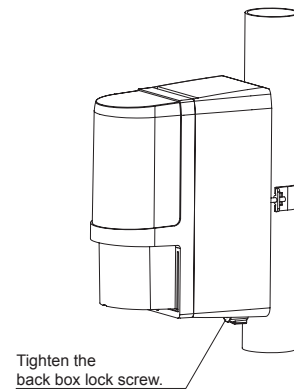
- 4 Fix the chassis on the pole.



⚠ Caution

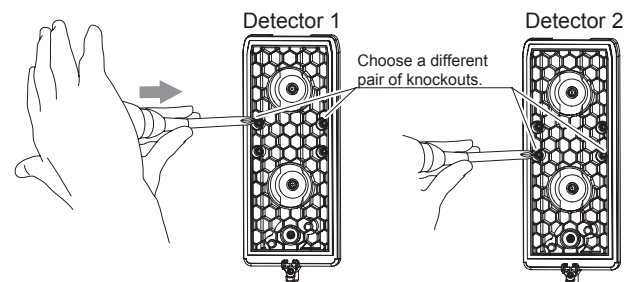
After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly. 

- 5 Take steps 3 through 6 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.

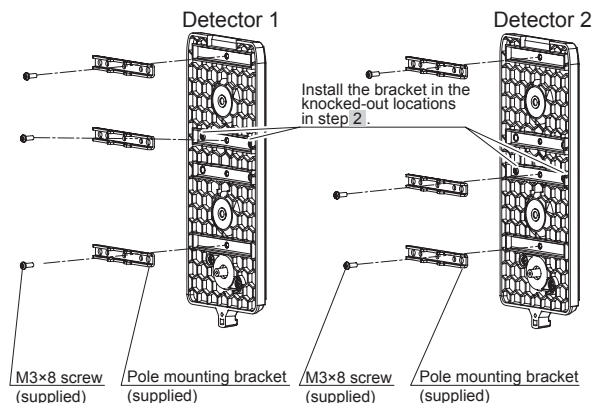


-Two detectors in opposing directions

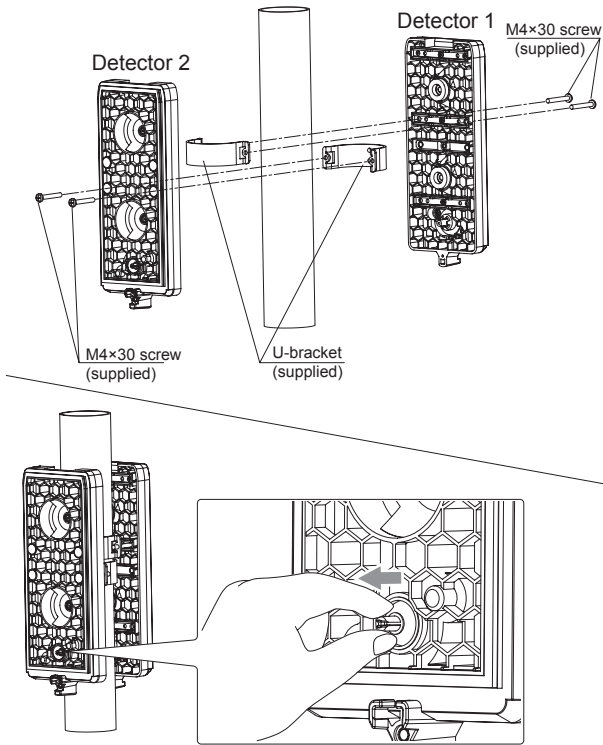
- 1 Remove the chassis from the back box.
- 2 Using a screwdriver or similar tool, break the knockout portion as shown.



- 3 Install three pole mounting brackets on the chassis.



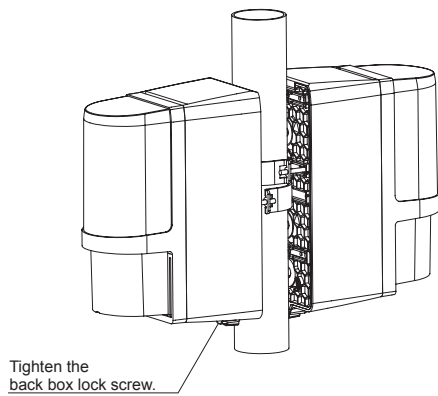
- 4 Fix the chassis on the pole.



Caution

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

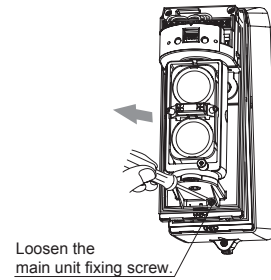
- 5 Refer to sec. "3-1" steps 3 through 6 to install the wireless transmitters and batteries in the back box, and then install the back box on the chassis.



3-3 MOUNTING IN THE BEAM TOWER

Mounting inside optional beam tower.

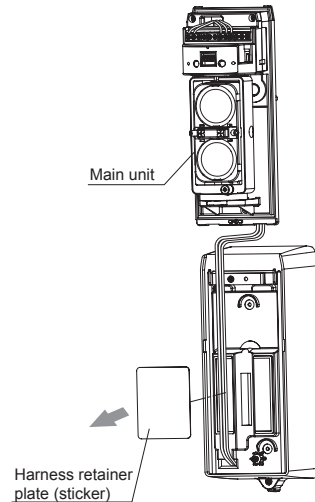
- 1 Remove the cover from the detector.
- 2 Loosen the main unit fixing screw and remove the main unit from the back box.



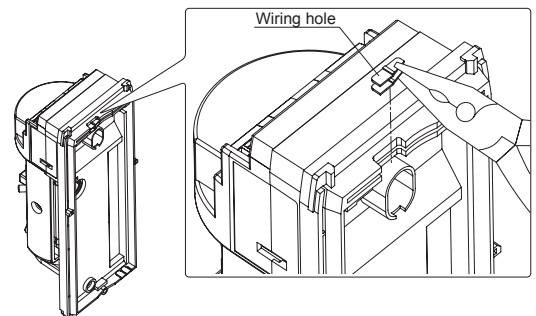
Caution

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. **!**

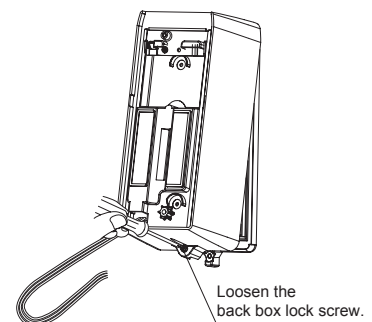
- 3 Remove the harness retainer plate.



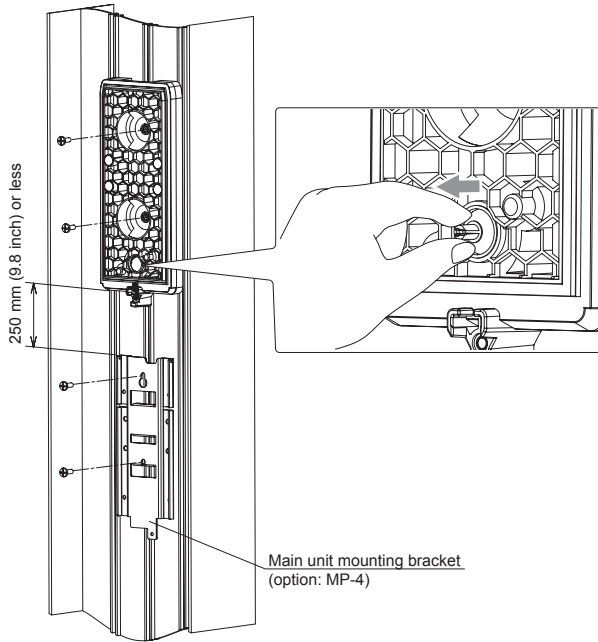
- 4 Open the wiring hole in the top of the main unit using pliers.



- 5 Remove the chassis from the back box.

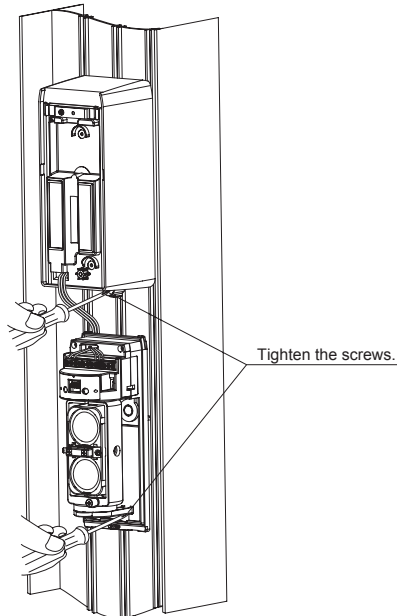


- 6 Fix the chassis and main unit mounting bracket (optional) in the tower.

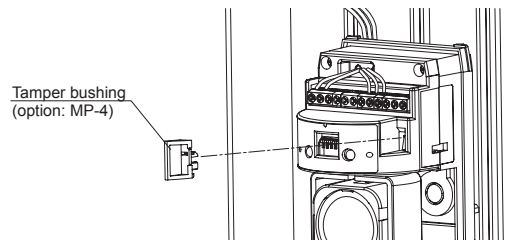


⚠ Caution
 After mounting the chassis, wiggle the tamper bushing with your thumb and forefinger to ensure the tamper works properly. **!**

- 7 Refer to sec. "3-1" steps 3 through 6 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. **!**

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

3-4 WIRING

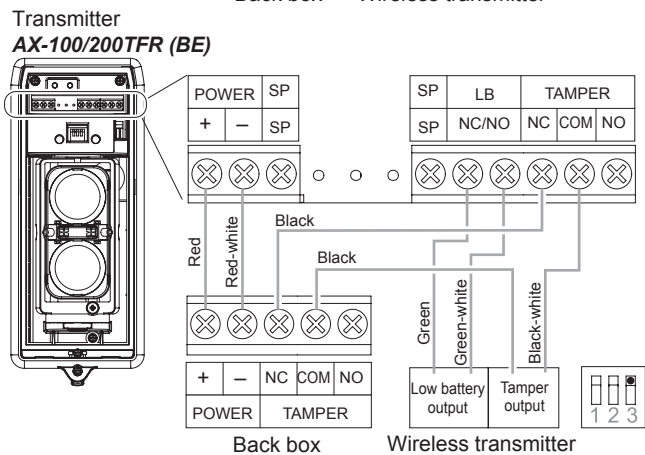
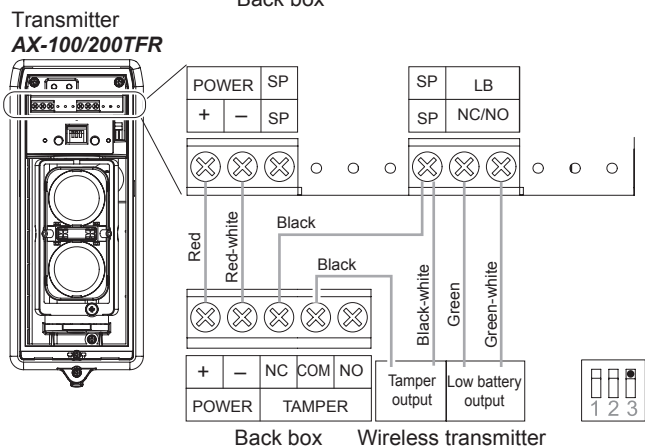
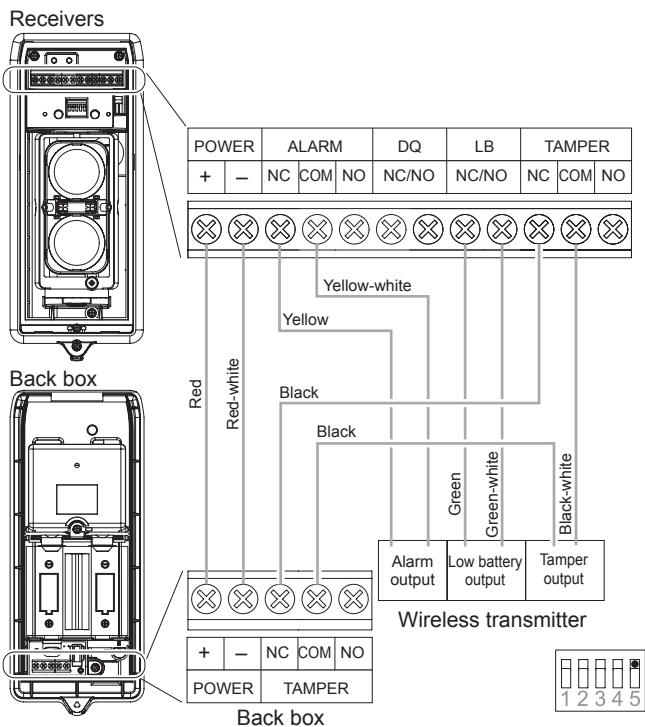
-Using the N.C. type transmitter

This product is provided with wiring based on the assumption that N.C. wireless transmitters are used.

Connect the cables from the back box (Yellow/Yellow-white, Green/Green-white, and Black/Black-white) to the respective terminals on the wireless transmitters.

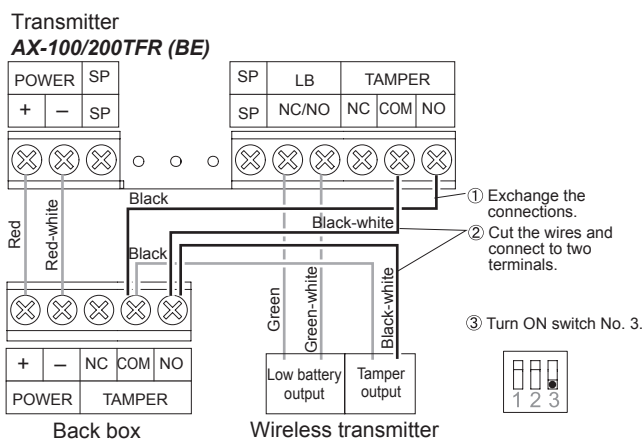
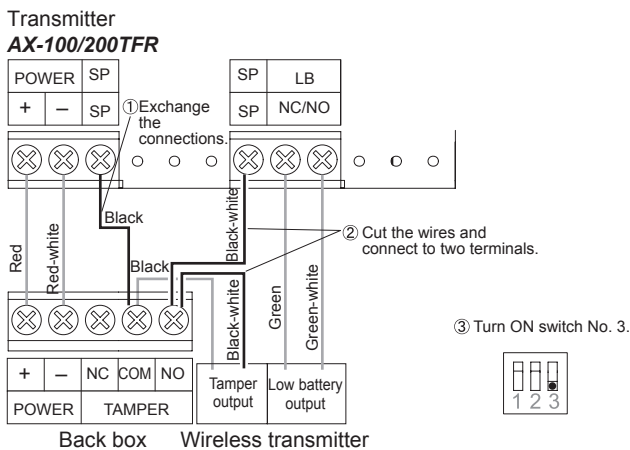
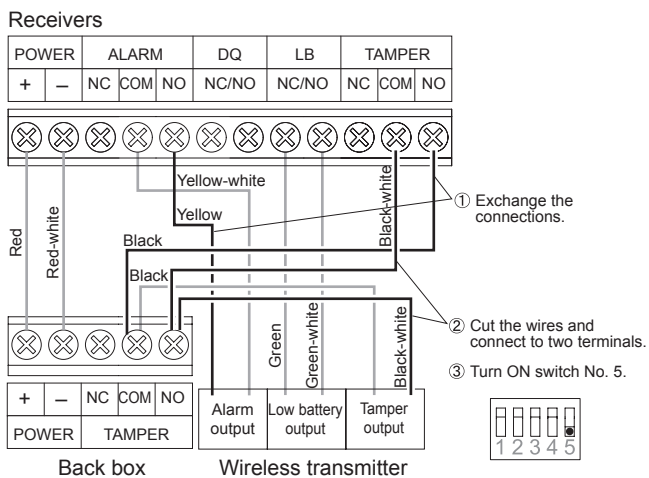
NOTE>>

- To monitor the tamper output, include a wireless transmitter supporting three or more inputs into the system.
- When you want to use the D.Q. output, share the terminal with the alarm, low battery, or tamper output. For information about wiring, see the wiring diagram in "Setting the D.Q. output" in "4-5".



-Using the N.O. type transmitter

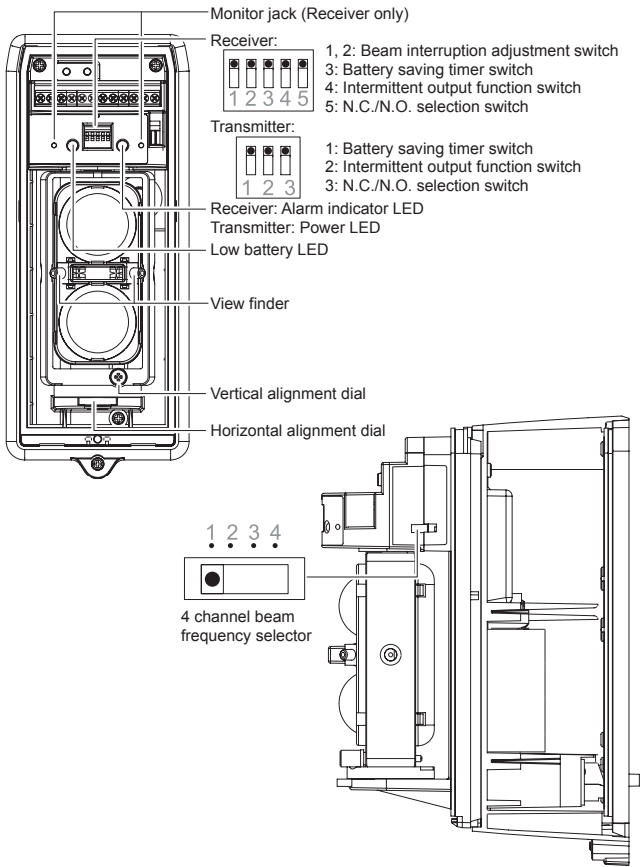
When N.O. wireless transmitters are used, change the wiring and switch settings from initial setting.



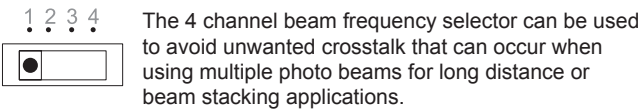
4 SETTING

4-1 FUNCTION

(All of the following switch settings are factory default.)



4-2 4 CHANNEL BEAM FREQUENCY SELECTOR



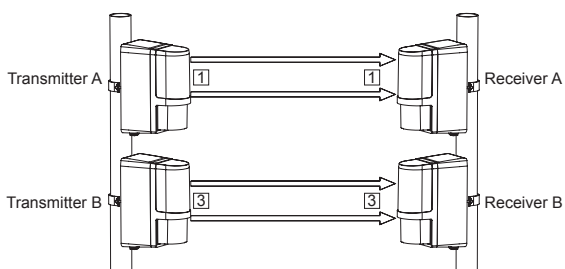
The 4 channel beam frequency selector can be used to avoid unwanted crosstalk that can occur when using multiple photo beams for long distance or beam stacking applications.

- 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>>

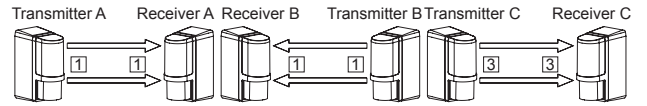
Always switch the frequencies TWO channels apart when stacking units on top of one another. (See following example.) The upper unit is set on channel 1 while the lower is on channel 3, channels 2 and 4 could have also been used.

a) Double stacked protection



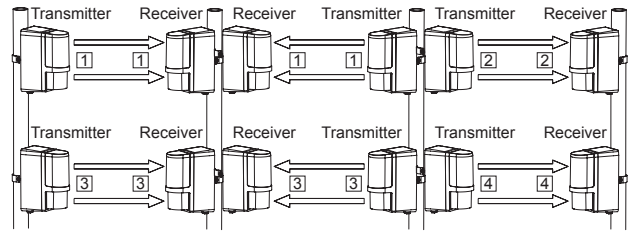
Since Receiver B may receive the infrared beam from Transmitter A, select their frequencies as shown in the figure above. (In the figure, each number in the square indicate a channel numbers.)

b) Long distance protection



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

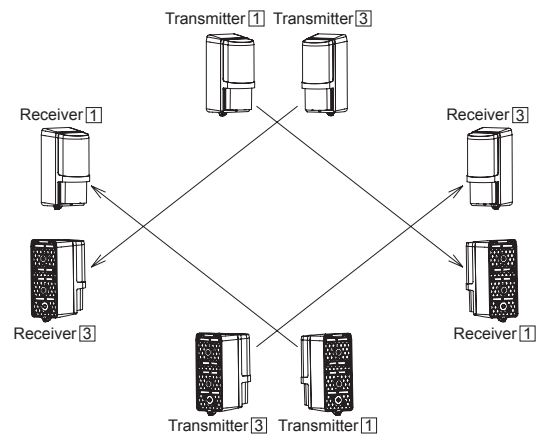
c) Double stacked long distance protection



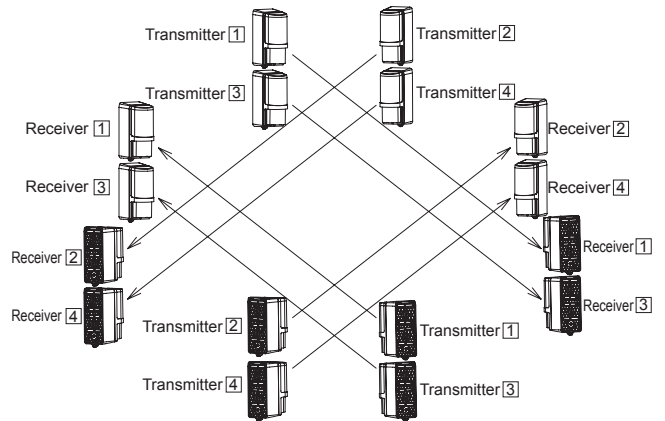
Note>>

More than double stacked application is not possible.

d) Perimeter protection

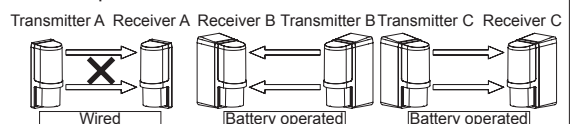


e) Perimeter protection in a two-stack configuration

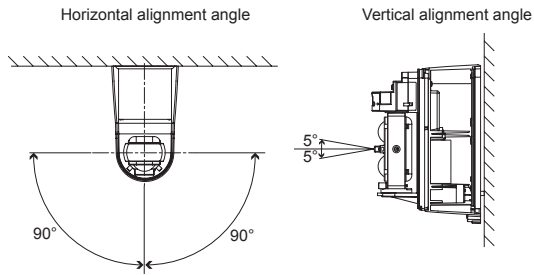


Warning

- 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.

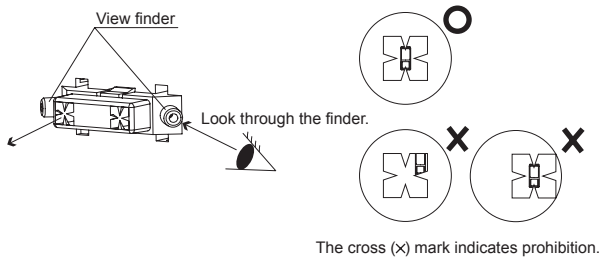


4-3 OPTICAL ALIGNMENT

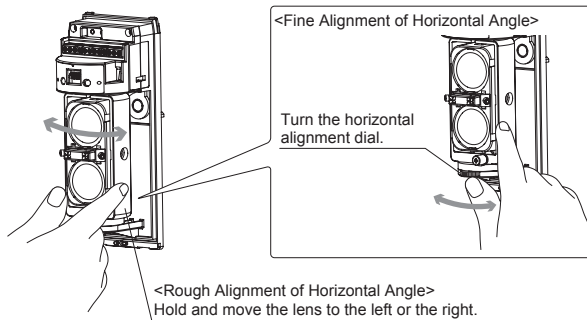


Optical alignment is an important adjustment to increase reliability. Be sure to take adjustment steps 1 through 5 described below to attain the maximum level of the output through the monitor jack.

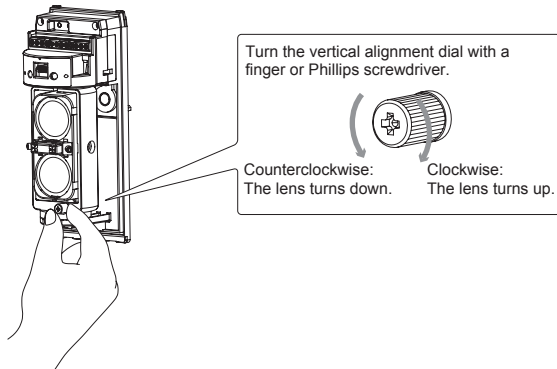
- 1 See "4-2" and set the 4 channel beam frequency selector.
- 2 While looking through the view finder, adjust the horizontal and vertical angles so that the pairing detector is at the center of the sight.



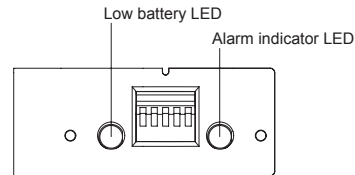
Rough and Fine Alignment of Horizontal Angle



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.

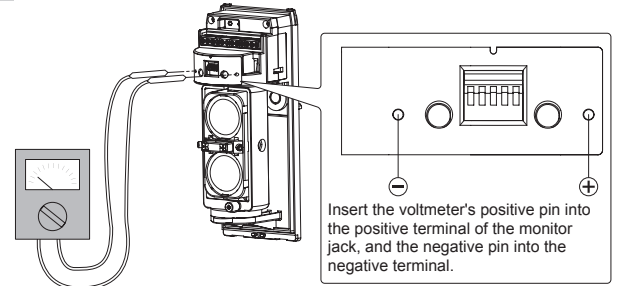


Alarm indicator LED	Light interrupted		Light received		
	ON (Red)	Fast flicker	Slow flicker	OFF	
Adjustment level	Realign		Fair	Good	Excellent
Monitor jack output	0 V	▷	1.0 V ▷	2.0 V ▷	2.5 V ▷

⚠ 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

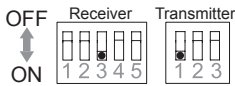
Initial setting is at 50 ms for normal work. According to the speed of a supposed target you select one specific setting out of 4 steps. Set the beam interruption adjustment switches of the Receiver according to the speed of the human object to detect.

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

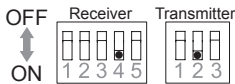
⚠ Caution

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.

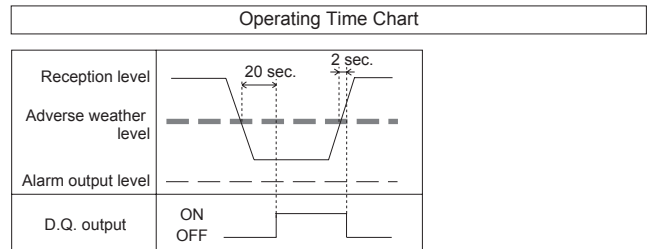
This configures the wireless transmitter to send alarms at a specific time intervals.



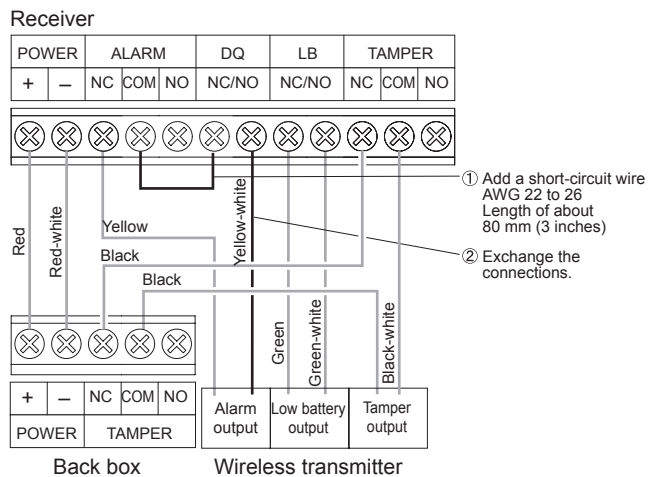
- Intermittent Output Times
- Alarm output: 1 output/1 minute
 - D.Q. output: 1 output/1 minute
 - Low battery output: 1 output/5 minutes

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

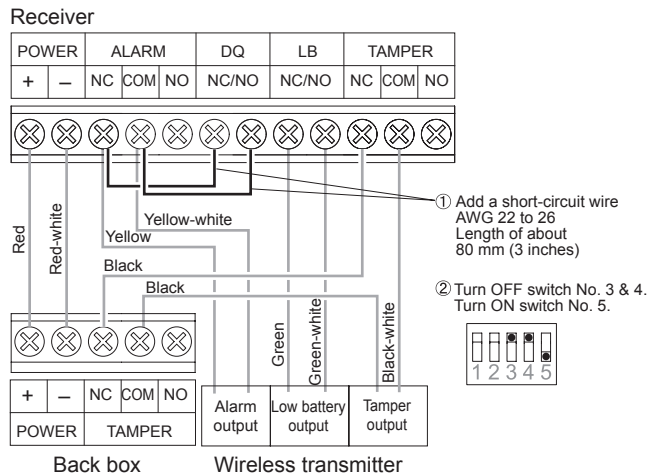
D.Q. will send a trouble signal when the beam strength is below acceptable levels, for more than 20 seconds, due to rain, snow, or heavy fog.



Wiring example when Using N.C. Transmitters
a) Sharing the D.Q. output with the alarm output



Wiring example when Using N.C. Transmitters
b) Canceling the alarm output in adverse weather conditions

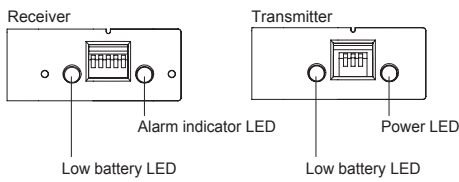


⚠ Caution

This circuit sets N.O. for a low battery output, whereas N.C. for an alarm. Be sure to use N.O. ready wireless transmitter for this configuration. Turn "OFF" both battery saving timer and intermittent output function switches when applying this wiring example. **!**

5 OPERATION CHECK

5-1 LED INDICATION

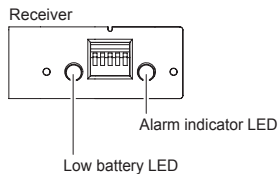


DETECTOR STATUS	LED Indications
Power ON	The power LED turns ON.
Detection (beam interruption)	The alarm LED turns ON.
Low battery power	The low battery LED flickers.

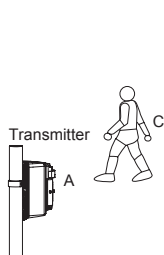
5-2 OPERATION CHECK

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

- 1 See "Setting the battery saving time" 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.

⚠ 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".)



5-3 TROUBLE SHOOTING

If the alarm indicator LED is OFF or flickering even though the beam is being interrupted, do the following:

- 1 Align the optical axis again.
- 2 In a multi-detector configuration, the receiver may be receiving the infrared beam from an unrelated transmitter. See sec. "4-2" and check the 4 channel beam frequency selector setting.
- 3 The beam from the transmitter may reach the receiver by reflecting off the floor or wall of a building. Good reflectors of visible light are also good reflectors of infrared beams. Remove the reflective objects around the detector or install the detector in a different place and then align the optical axis again.

6 SPECIFICATIONS

6-1 SPECIFICATIONS

Model		AX-100TFR	AX-200TFR
Range		30 m (100 ft.)	60 m (200 ft.)
Maximum arrival distance		265 m (870 ft.)	530 m (1740 ft.)
Detection method		Infrared beam interruption detection	
Beam frequency selection		4 channel	
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) Transmitter: 2 units Receiver: 2 units	
Current draw		T: 300 μ A + R: 320 μ A (at 25°C, 3.6 VDC)	T: 490 μ A + R: 320 μ A (at 25°C, 3.6 VDC)
* Battery life	Transmitter	5 years	3 years
	Receiver		5 years
Output	Alarm output	Form C-Solid State Switch: 3.6 VDC, 0.01 A	
	Alarm period	2 sec (\pm 1) nominal	
	D.Q. output	Form A/B-Solid State Switch: 3.6 VDC, 0.01 A	
	Low battery output	Form A/B-Solid State Switch: 3.6 VDC, 0.01 A (Transmitter & Receiver)	
	** Tamper output for Front cover	Form C: 3.6 VDC, 0.01 A activates when cover removed. (Receiver only)	
	Tamper output for Back box	Form C: 3.6 VDC, 0.01 A activates when either back box or chassis is removed from the installment.	
Indicator	Alarm Indicator (Receiver)	(1) Light on - IR Beam not received. (2) Flickering Light - IR Beams not received sufficiently. (3) Light off - IR Beams received.	
	Power (Transmitter)	Power ON: ON, Power OFF: OFF	
	Low battery	Voltage Reduction: flicker	
Operating temperature		-20°C – +60°C (-4°F – +140°F)	
Operating ambient humidity		95% (Max.)	
Alignment angle		\pm 90° Horizontal, \pm 5° Vertical	
Mounting		Indoor/Outdoor, Wall/Pole/Tower mounting (Optional main unit mounting brackets are required, when the units mount in the tower.)	
Weight		1600 g (56.5 oz.) (Total weight of transmitter + receiver, excluding accessories)	
International protection		IP55	

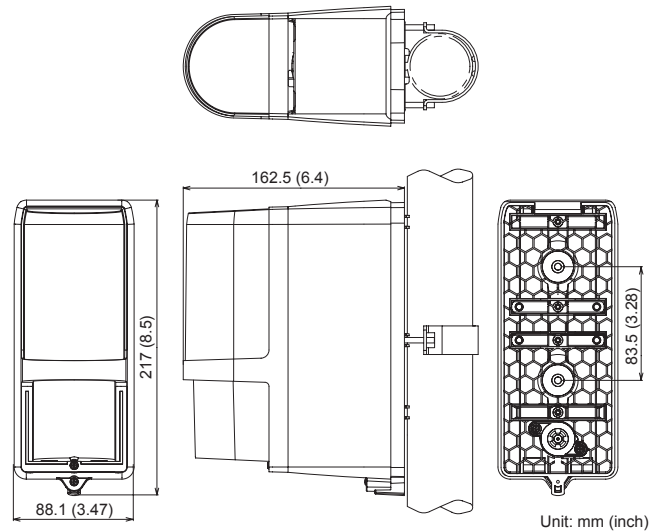
Specifications and design are subject to change without prior notice.

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

** The transmitter is also equipped with AX100/200 TFR (BE).

6-2 DIMENSIONS & OPTION

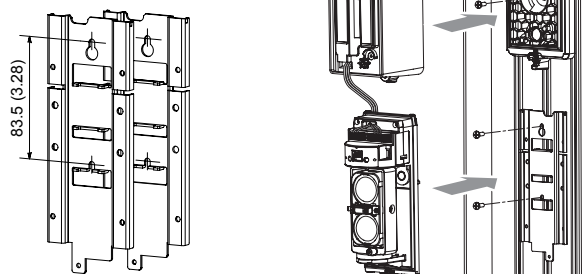
-Dimensions



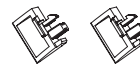
-Option

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

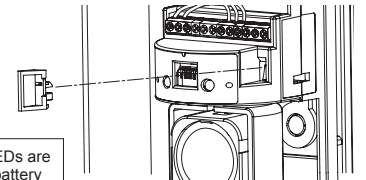
Main unit mounting bracket



Tamper Bushing



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



Unit: mm (inch)

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. These products conform to the EMC Directive 2004/108/EC.



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