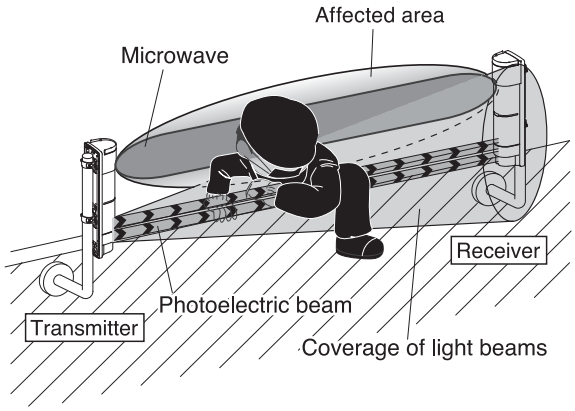
TAKEX COMBINATION SENSOR

COM-50XTL : OUTDOOR 165ft (50m)

Instruction Manual

Thank you for purchasing this product.
Read this instruction manual before using the product to make sure that you use it correctly.

- Combination sensor COM-50XTL integrates two kinds of sensors, one consisting of a transmitter that transmits microwave in the 24 GHz band, and its receiver, and another consisting of transmitter that transmits photoelectric beam, and its receiver, as shown in the figure on the right. This sensor has same size as the 4-beam photoelectric sensor, which is suitable for detecting intruders climbing over wall/fence.
- Alarm signal is output by detecting the change in the reception level of microwave and the interruption of photoelectric beams, when the object passes.
- The wavelength of microwave is extremely longer than photoelectric beam, which prevents the sensor from being affected by torrential rainfall, snow fall, fog or frost especially during the cold wintertime to ensure stable detection performance.



- For photoelectric sensor, four modulation frequencies are selectable with modulation frequency selection to prevent mutual interference when applying multi-level straight line protection.

Main Features

(1) DOUBLE MODULATION

Double modulated beams are designed to distinguish the external lights.
It increases the reliability in the outdoor security system.

(2) STRONG UNDER HARSH ENVIRONMENT

The microwave sensor adopted in the upper part reduces malfunctions caused by environmental degradation, such as fog, snow and heavy rain with AND protection.

(3) HEIGHT ADJUSTMENT

Mounting height is adjustable after mounting the sensor to minimize the influence of reflected microwave from the ground.

(4) DUAL ALARM OUTPUT

Environmental output is switchable to alarm output for CCTV activation switch.

(5) INSECT/WATER PREVENT

Anti-insect bushing and special gasket enable IP65 rated tight housing.

(6) ANTI-BIRD SPIKE

Keeps birds and small animals away from the sensor, signiticantly reducing false alarms.

(7) DRIP-PROOF HOUSING

Prevents rain and snow from streaming down the front side of housing, reducing false alarm.

(8) DUAL RING SIGHT

Enables better and clear view for easy beam alignment.

(9) TARGET COLOR

The vivid color of the internal structure can be recognized easily at distance during the beam alignment procedure.
The color differs between a transmitter and a receiver for easy installation and checking.

(10) WIRELESS ALIGNMENT CHECKER

Enables easy and accurate beam alignment. (Sold separately)

(11) LIGHTNING PROTECTION

The surge protection is improved in order to reduce the damage caused by induced lightning (improved by 10 times as much as COM-IN-50HF)

* This does not guarantee a failure by lightning strike.

(12) IMPROVED POLE INSTALLATION

With new Pole mounting attachment, mounting sensors to the pole back to back gets easier.

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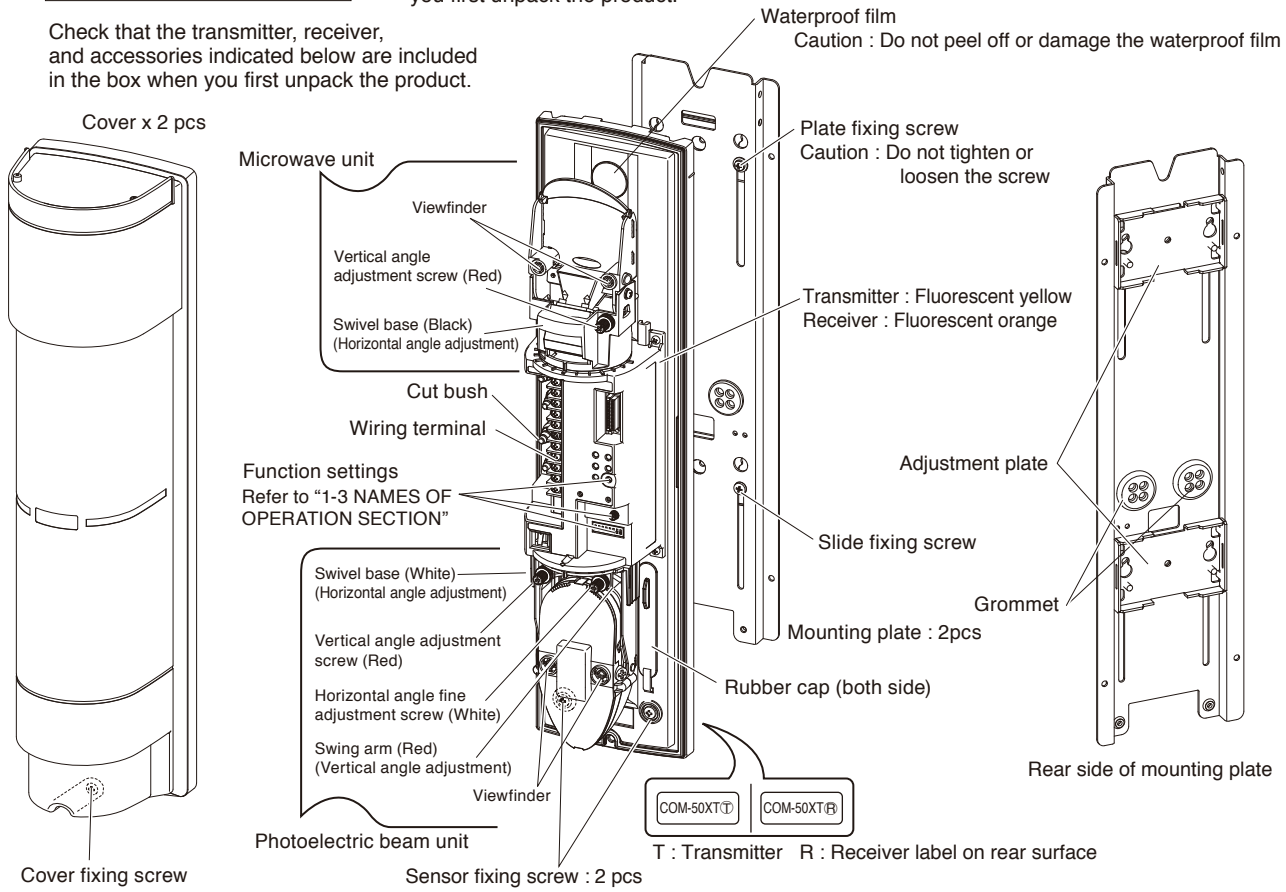
1 PRODUCT COMPONENTS

This section describes the contents of the product package and the names and functions of the parts that appear in this instruction manual.

1-1 PARTS DESCRIPTION

- Check that the following transmitter, receiver, and accessories are included in the box when you first unpack the product.

Check that the transmitter, receiver, and accessories indicated below are included in the box when you first unpack the product.

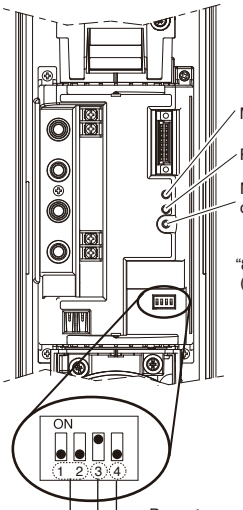


1-2 ACCESSORIES

Pole mounting attachment Ø1.65"(Ø42mm) to Ø1.95"(Ø49mm)	Self-tapping screw for mounting Ø4 x 30 : 8 pcs	Countersunk oval-head screw (M4 x 20) : 8 pcs	Cable tie : 4 pcs	Anti-bird spike : 4 pcs	Instruction manual : 1 pc

1-3 NAMES OF OPERATION SECTION

< Transmitter >



Microwave transmission LED : Red

Photoelectric beam transmission LED : Red

Microwave / Photoelectric beam changeover switch

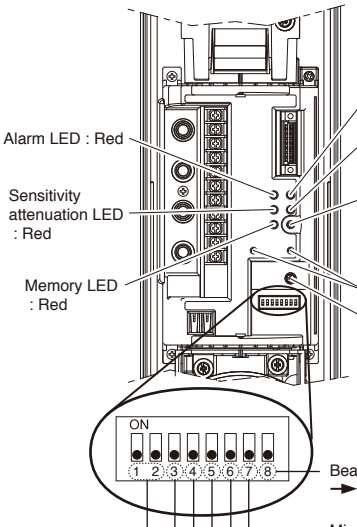
→ "8. EXPLANATION OF FUNCTIONS (8-9 MICROWAVE/PHOTOELECTRIC BEAM CHANGEOVER)"

Beam tower (Factory setting : OFF)
→ "8. EXPLANATION OF FUNCTIONS (8-3 BEAM TOWER SELECTION)"

Beam power (Factory setting : H)
→ "8. EXPLANATION OF FUNCTIONS (8-2 BEAM TRANSMISSION POWER SELECTION)"

Transmitter channel changeover swicth (Factory setting : 1CH)
→ "8. EXPLANATION OF FUNCTIONS (8-1 MODULATION FREQUENCY SELECTION)"

< Receiver >



Alarm LED : Red

Sensitivity attenuation LED : Red

Memory LED : Red

Microwave reception authorization LED : Red

Photoelectric beam reception authorization LED : Red

Microwave/Photoelectric beam changeover switch
→ "8. EXPLANATION OF FUNCTIONS (8-9 MICROWAVE/PHOTOELECTRIC BEAM CHANGEOVER)"

Monitor jack

Photoelectric beam detection response time adjustment volume (Factory setting : Standard position [0.05 sec])
→ "8. EXPLANATION OF FUNCTIONS (8-8 RESPONSE TIME ADJUSTMENT FUNCTION)"

Beam tower (Factory setting : OFF)
→ "8. EXPLANATION OF FUNCTION (8-3 BEAM TOWER SELECTION)"

Microwave detection response time selection switch (Factory setting:Standard [0.04 sec])
→ "8. EXPLANATION OF FUNCTION (8-8 RESPONSE TIME ADJUSTMENT)"

AND/OR selection switch (Factory setting:AND)
→ "8. EXPLANATION OF FUNCTION (8-7 AND/OR-GATE SETLECTION)"

Environment/Alarm selection switch (Factory setting : Environment)
→ "8. EXPLANATION OF FUNCTION (8-6 ENVIRONMENT/ALARM OUTPUT SELECTION)"

Sound check switch (Factory setting : OFF)
→ "8. EXPLANATION OF FUNCTION (8-5 SOUND CHECK)"

Alarm memory changeover switch (Factory setting : Manual)
→ "8. EXPLANATION OF FUNCTION (8-4 ALARM MEMORY DISPLAY)"

Receiver channel changeover switch (Factory setting:1CH)
→ "8. EXPLANATION OF FUNCTION (8-1 MODULATION FREQUENCY SELECTION)"

2 PRECAUTIONS

●This manual describes precautions to be observed for safe operation of the device by classifying them according to the degrees of danger and damage that would be generated when using the unit incorrectly. Read carefully this manual.

●Explanation is done by classifying the degree of harm and damage that occurred when using incorrect usage.

⚠ Warning: This indicates the risk of severe injury, and even death, if ignored or a user handles the unit incorrectly.

⚠ Caution: This indicates the risk of minor injury and/or damage to properties, or of a notification delay in your system due to false operations and/or non-detection, if ignored or a user handles the unit incorrectly.

●These precautions are categorized throughout the manual using the following symbols.

⃠ A prohibited action, you must not do.	❗ An action you must do, and information you should keep in mind.

⚠ Warning

⃠ If the following events occur, turn off the power of the unit immediately, and ask the place of purchase for repair. Failure to follow this may result in fire, electric shock and/or malfunction.
- Smoke, abnormal odor, and/or sound are found.
- Liquid, such as water, and/or foreign material have entered the unit.
- The unit has deformed and/or damaged parts.

⃠ Do not dissemble or modify the unit. This may cause a fire, an electrical shock, or a malfunction of the unit.

⃠ Do not use the unit powered with other voltage level than the specified power supply voltage (12 – 30V DC). This may cause a fire, or an electrical shock.

⃠ Do not connect to the output contact of the unit other devices exceeding the rated capacity indicated.

⃠ Make sure to mount the unit firmly. Do not mount it at the location that cannot support its weight. The unit may fall and cause an injury or a malfunction consequently.

⃠ For wall mounting, mount the unit on firm surfaces where reinforcement materials are used. When mounting the unit on non-wood materials, such as plaster board or concrete, mount it firmly by using anchors and screws that match the wall. Unstable mounting may cause injury or property damage.

⃠ Do not touch the terminal section with wet hands. This may cause an electrical shock.

⚠ Caution

⃠ Do not apply impact to the unit. Strong impact may cause deterioration in performance and damage to the unit.

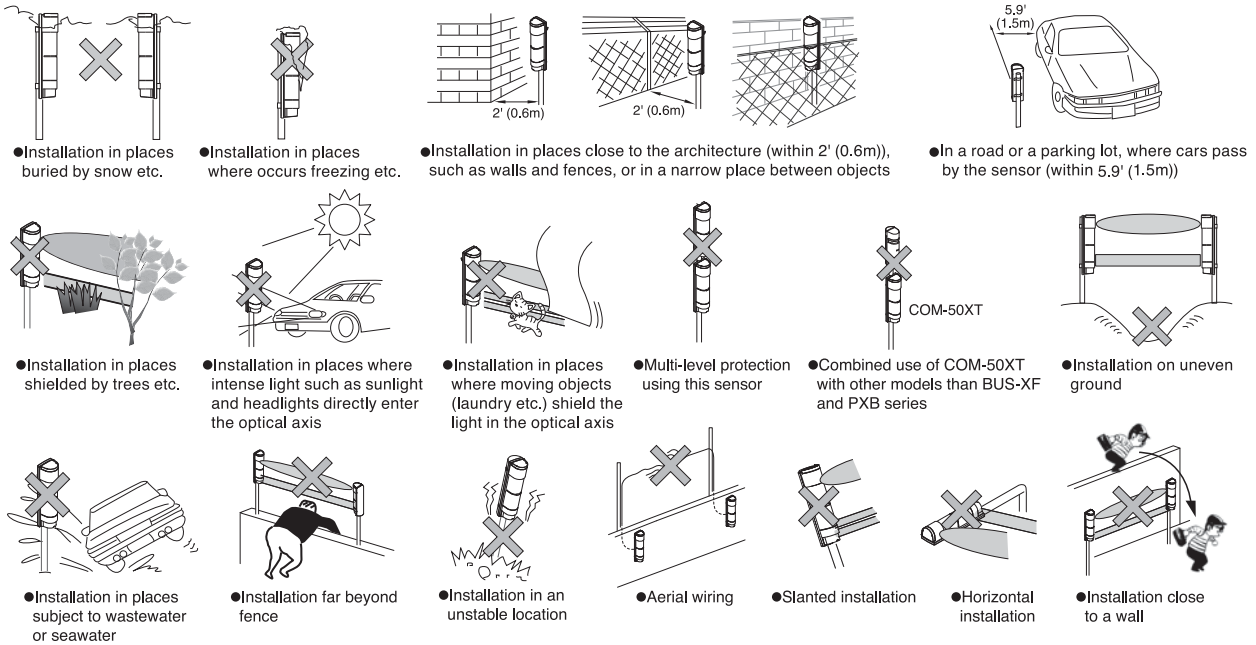
⃠ This unit may not operate properly near the devices that generate a strong electric or a magnetic field.

⃠ Be sure to make adjustment after installation and check that it works properly.

❗ If the mounting height is not correctly adjusted, the microwave forms an unstable detection area, and it may not detect the objects even by passing through the area.

⃠ The devices near this unit may not operate properly due to the magnetic field and/or magnetism generated from the unit.

Do not install the unit as shown below. This may cause false or lost alarm.



●Installation in places buried by snow etc.
●Installation in places where occurs freezing etc.
●Installation in places close to the architecture (within 2' (0.6m)), such as walls and fences, or in a narrow place between objects
●In a road or a parking lot, where cars pass by the sensor (within 5.9' (1.5m))
●Installation in places shielded by trees etc.
●Installation in places where intense light such as sunlight and headlights directly enter the optical axis
●Installation in places where moving objects (laundry etc.) shield the light in the optical axis
●Multi-level protection using this sensor
●Combined use of COM-50XT with other models than BUS-XF and PXB series
●Installation on uneven ground
●Installation in places subject to wastewater or seawater
●Installation far beyond fence
●Installation in an unstable location
●Aerial wiring
●Slanted installation
●Horizontal installation
●Installation close to a wall

Cautions when using the combination sensor (Daily maintenance)

1. In areas where there are trees or weeds, the photoelectric beams may get obstructed by overgrown branches or leaves, which may cause false detection. Be sure to trim down leaves and branches according to the growth of the plants. Furthermore, the photoelectric beams may get obstructed by swaying branches or leaves in the wind. Keep in mind the swaying area of leaves and branches when trimming them.
2. Bine plants may wrap around the beam sensors causing false detection. Be sure to prune such plants regularly.
3. Insects, bird droppings, or other natural phenomena may also soil the sensors causing false detection. Be sure to clean the sensors regularly.

3 BEFORE INSTALLATION

Carefully read this manual and choose the installation location and protection distance in order to use the sensor properly. Highly reliable protection may not be achieved in case of incorrect installation.

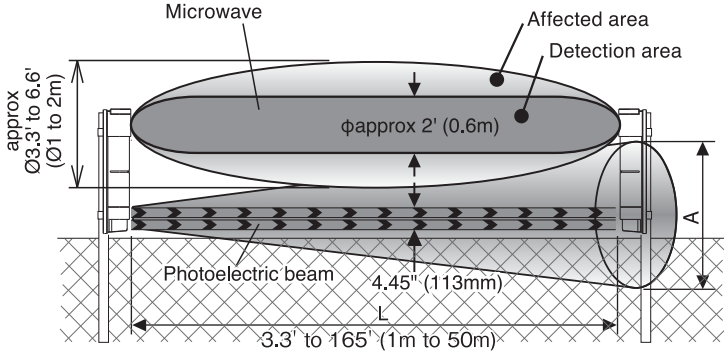
3-1 PROTECTION DISTANCE AND DETECTION RANGE

Detection range of Microwave sensor

①The transmitter emits microwaves to be received by the receiver as direct waves, but microwaves spreading around the sensors reflect on surrounding structures, fences, ground, etc., to affect direct waves.
②The reception level may increase or decrease according to the distance from the ground or buildings, depending on the position of the sensor and the reflecting objects.
③When setting the reception level to the maximum position only on the receiver side, protection distance may be adjusted away from the intended detection line. In this case, adjust also the position of the transmitter to shorter distance. Be sure to perform temporary installation and adjust the position and height to achieve the highest reception level.
④Detection area covers approx. ϕ2' (0.6m). However, its surroundings 3.3' to 6.6'(1 to 2m) are also sensitive enough to possibly detect trees trembling or blowing in the wind.
※If the mounting height is not adjusted properly, the detection area becomes unstable not to detect the object by crossing the area.

Detection range of photoelectric beam sensor

①As the photoelectric beam leaves the transmitter, it expands into light beams in conical shape and its center forms the optical axis.
②As for the receiver, same as the transmitter, the light reception range spreads in a conical shape, and its center forms the optical axis.

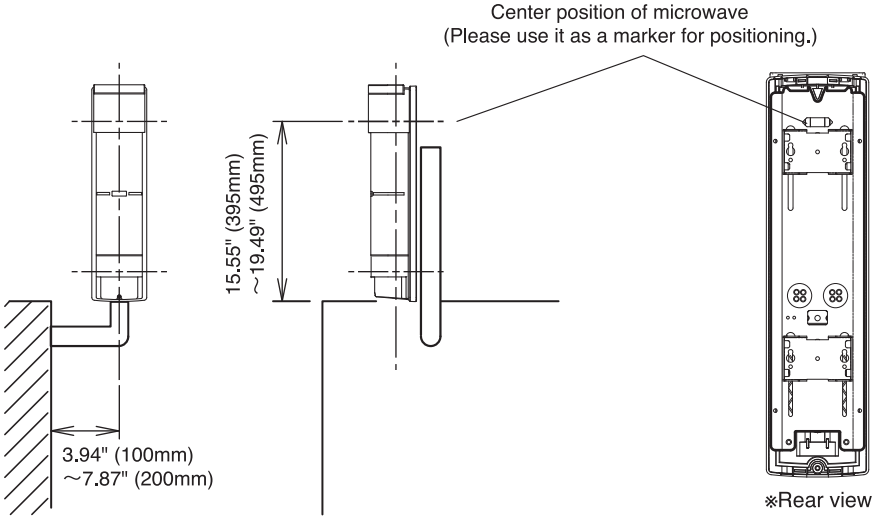


※Depending on the distance (L), the spread of light (A) will increase in proportion to the formula below.

A= (4ft (1.2m)/165ft (50m)) × L
A : Spread of photoelectric light
L : Detection distance

The range of the detection area may change depending on location/distance of installation and environmental fluctuation. Use the above just as reference. If the mounting position/height are not optimal, the detection area may become wider than 2 m,

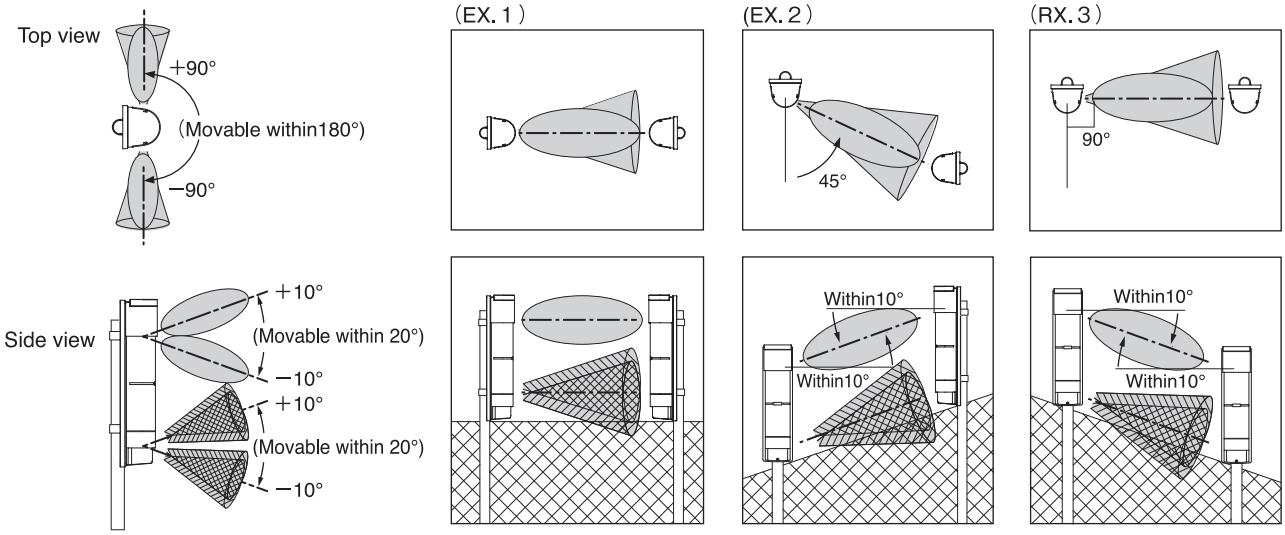
3-2 MOUNTING HEIGHT



As the sensor is used, near the wall or fence, to detect the person trying to climb it over, make sure to mount it in an appropriate position.

3-3 ADJUSTABLE RANGE

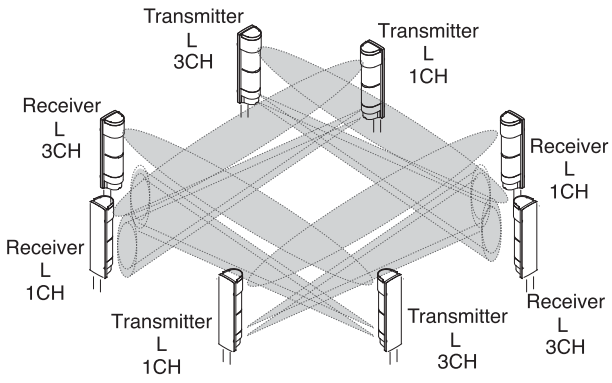
● Refer to the diagram below, and install the sensors within the adjustable range of optical axis. (Areas are drawn in simplified form)



3-4 EXAMPLE OF PRACTICAL APPLICATION

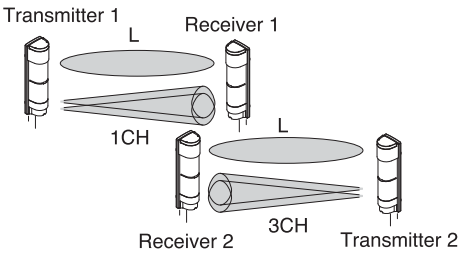
● In order to minimize the occurrence of malfunctions, refer to the protection diagram below for optimal operation. Incorrect operation may cause malfunction. (Areas are drawn in simplified form)

●External Perimeter protection

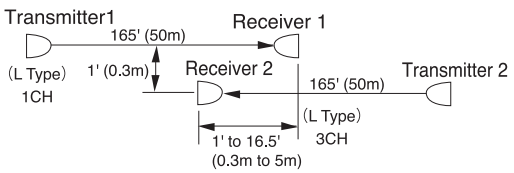


Install the sensors so that only transmitters or receivers come at the corner. Same Modulation frequency can be used in this installation.

●Straight Line Protection



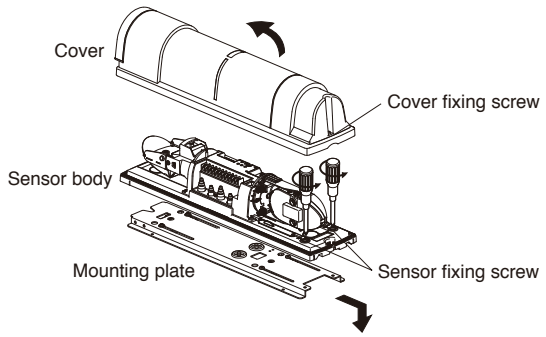
(Top view)



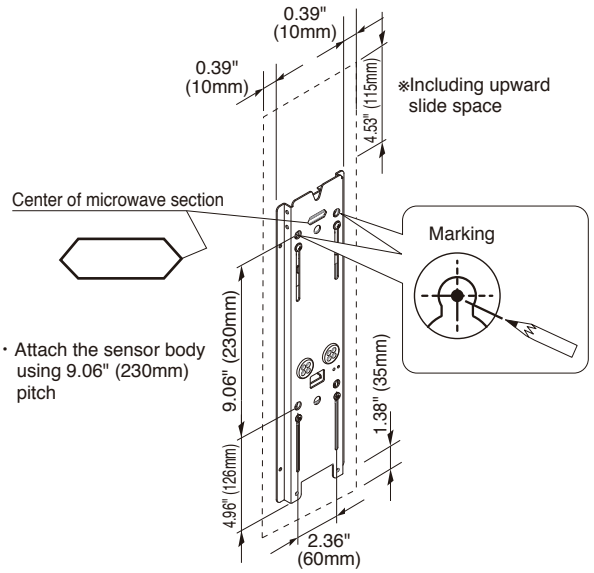
4 MOUNTING METHOD

4-1 WALL MOUNTING METHOD

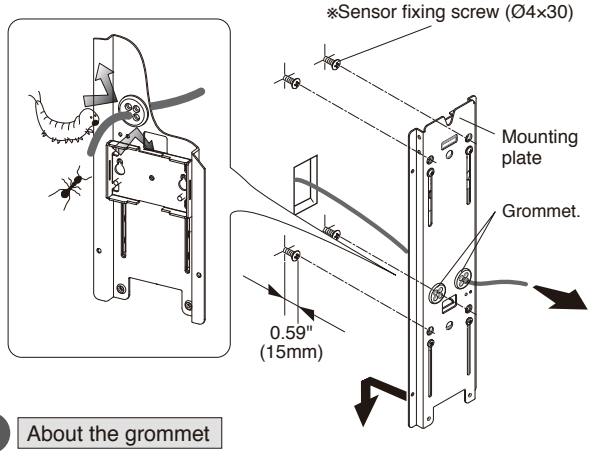
1 • Loosen the cover fixing screw, and remove the cover.
• Loosen the sensor fixing screws (2 pcs), and remove the sensor body.



2 • Place the mounting plate in position, then ensure that the space shown by the dotted lines is allocated before marking the positions of the screws.

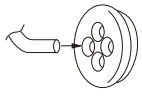


3 • Tighten the self-tapping screws for mounting (4 pcs) in the marking locations up to 0.59" (15mm) of the screw body.
• Pass the wiring material through the grommet.
• Attach the mounting plate and secure it by tightening the screws.



About the grommet

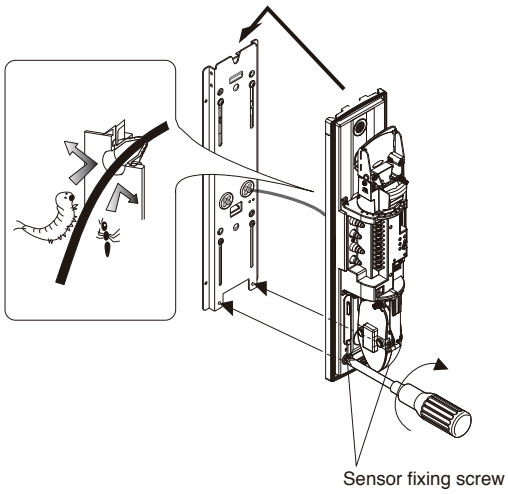
This work is required as an insect-proof and drip-proof countermeasure for the sensor exterior.



Note 1: For wiring with an external diameter of Ø0.12" (3mm) to Ø0.24" (6mm), break the membrane by pressing it through the recess.

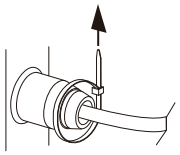
Note 2: For wiring with an external diameter exceeding Ø0.24" (6mm), cut off the section shown by the dotted lines in the drawing below using nippers or equivalent tools. Be sure to caulk the cut section as

4 • Trim down the diameter of the cut bush so that it is to a diameter smaller than that of the diameter of the wiring.
• Pass the wiring through the cut bush.
• Use the sensor fixing screws (2 pcs) to fix the sensor body to the mounting plate.



About the cut bush

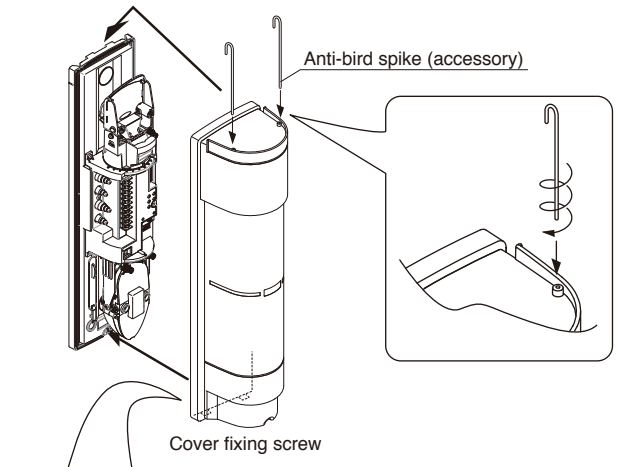
This work is required as an insect-proof and dust-proof countermeasure for the sensor exterior.

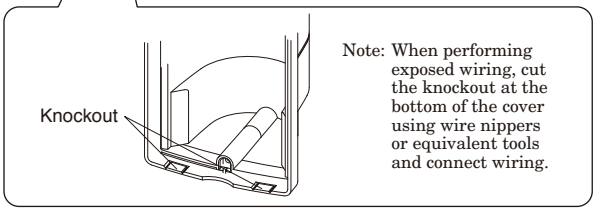


Note: If there is a gap between the wire and the cut bush, use the cable tie included to tighten and close the gap.

5 • Refer to section 5 WIRING METHOD to connect the wiring.
Refer to section 6 RENGE ADJUSTMENT to adjust the optical axis.

6 • Attach the cover to the sensor body, and fix it in place using the cover fixing screws.
• Attach bird stoppers to the cover as and when needed.



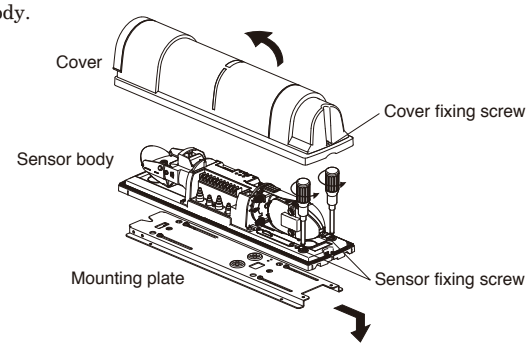


Note: When performing exposed wiring, cut the knockout at the bottom of the cover using wire nippers or equivalent tools and connect wiring.

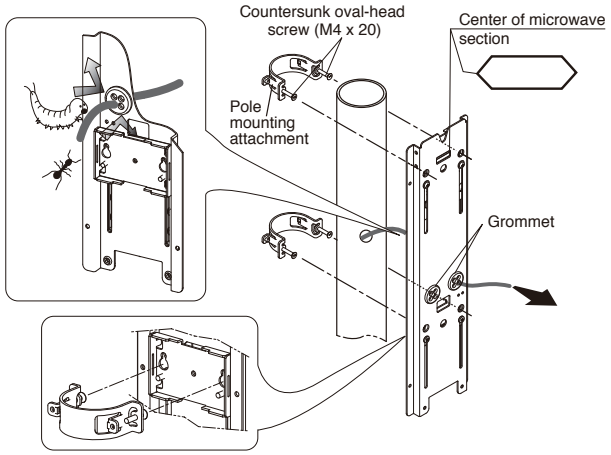
4-2 POLE MOUNTING METHOD

Note : This device can be attached to a pole with diameters of 1.65" (Ø42mm) to 1.95" (Ø49mm).

1
- Loosen the cover fixing screws, and remove the cover.
- Loosen the sensor fixing screws (2 pcs), and remove the sensor body.

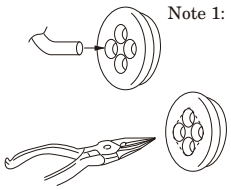


2
- Attach countersunk oval-head screws to the pole mounting attachment. (Secure it to the end of the pole)
- Pass the wiring pulled from the pole through the grommet.
- Fix the mounting plate to the pole using the mounting attachment.



About the grommet

This work is required as an insect-proof and drip-proof countermeasure for the sensor exterior.

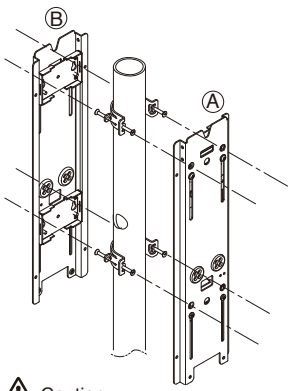


Note 1: For wiring with an external diameter of Ø0.12" (3mm) to Ø0.24" (6mm), break the membrane by pressing it through the recess.

Note 2: For wiring with an external diameter exceeding Ø0.24" (6mm), cut off the section shown by the dotted lines in the drawing below using nippers or equivalent tools. Be sure to caulk the cut section as an insect-proof countermeasure.

Back to back pole mounting

- Pass the wiring material through the grommet.
- After attaching the pole mounting attachment as shown below, fix it in order of mounting plate A, B.



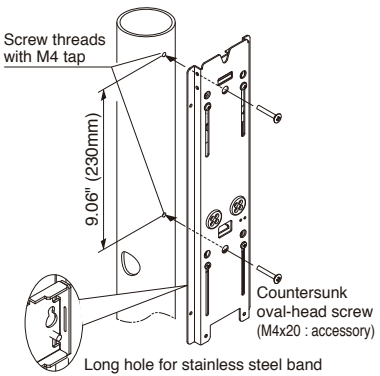
Caution

When removing the mounting plate on the A side, the mounting plate on the B side also falls off the pole. When exchanging the unit, replace only the sensor body without removing the mounting plate. The mounting plate will not

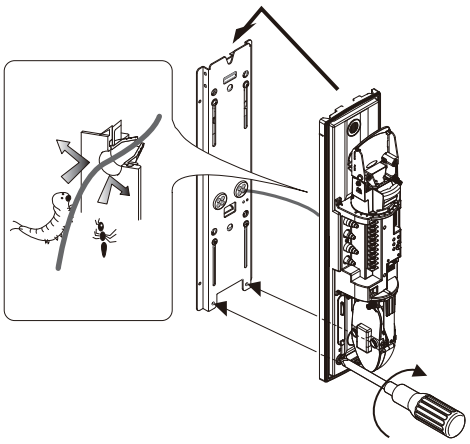
Mounting to a pole exceeding Ø1.95" (Ø49mm)

- Drill a pilot hole of Ø0.13" (Ø3.3 mm) on the pole, and then tap an M4 hole.
  Note : Be extremely careful when drilling a pilot hole on the pole.
- Peel off the label and attach the plate using screws.

[Binding by Stainless steel band]
- Fix the mounting plate using the commercially available stainless steel band etc. by passing the band through the side hole on the adjustment plate on the back side.

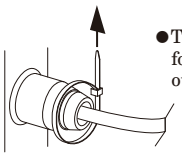


3
- Trim down the diameter of the cut bush so that it is to a diameter smaller than that of the diameter of the wiring.
- Pass the wiring through the cut bush.
- Use the sensor fixing screws (2 pcs) to fix the sensor body to the mounting plate.



About the cut bush

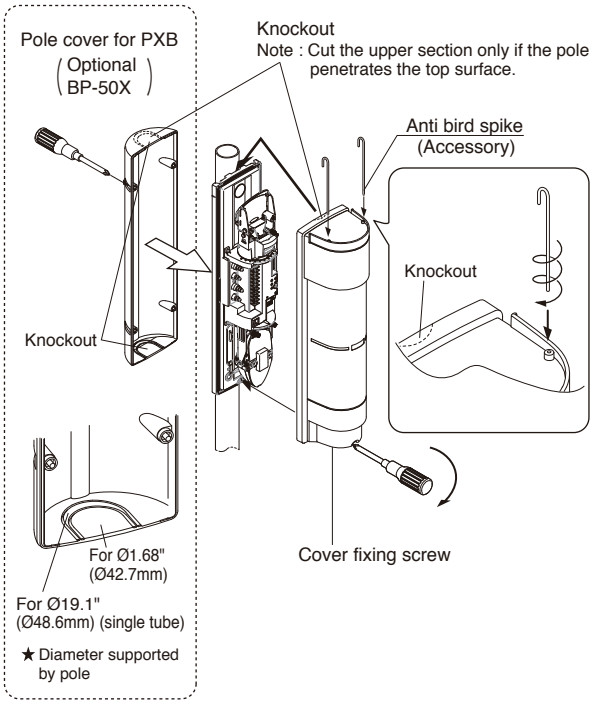
If there is a gap between the wiring material and the cut bush, tighten it with the attached cable tie.



●This work is required as countermeasure for insect, dust and drip entering from outside of the sensor.

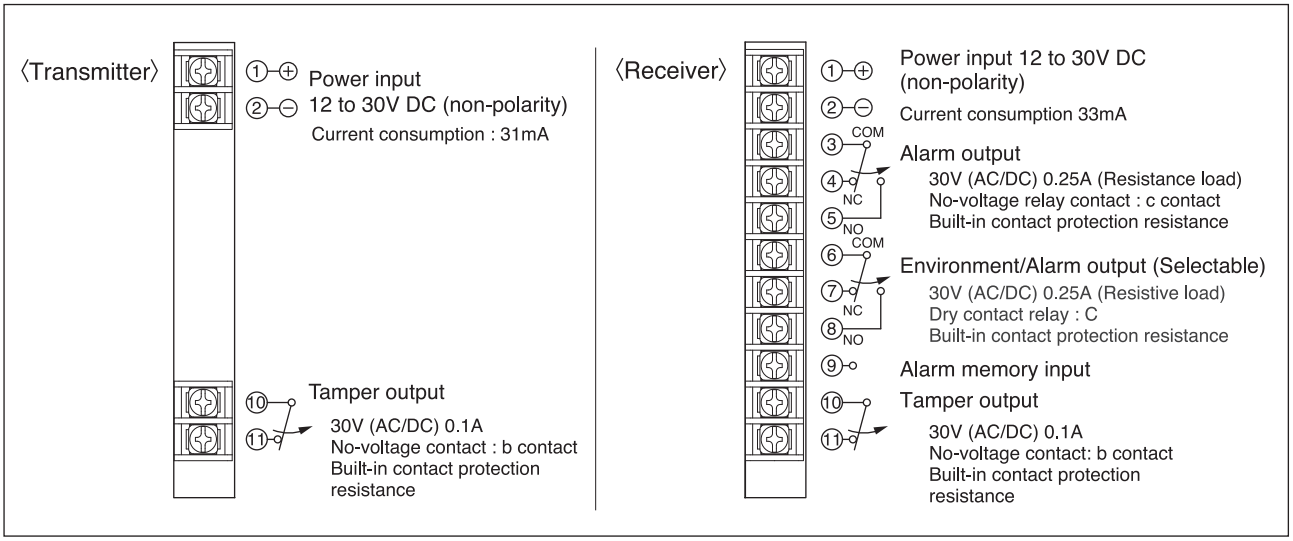
4
- Refer to section 5 WIRING METHOD to connect the wiring. Refer to section 6 RANGE ADJUSTMENT to adjust the optical axis.

5
- Attach the cover to the sensor body, and fix it in place using the cover fixing screws.
  Note : Cut the knockout at the top using nippers or equivalent tools as and when needed.
- Attach bird stoppers to the cover as and when needed.



5 WIRING METHOD

5-1 POSITION AND RATING OF TERMINALS



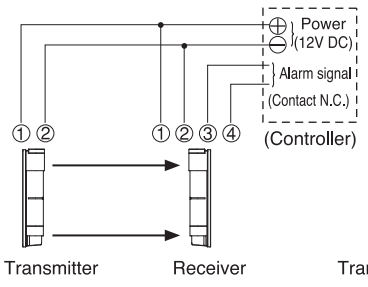
5-2 WIRING DISTANCE BETWEEN SENSOR AND POWER SUPPLY

Size of electrical cable used \ Supply voltage	12V DC	24V DC
AWG 20 (Dia,0.8mm)	Up to 1,150ft. (351m)	Up to 8,300ft. (2,500m)
AWG 18 (Dia,1.0mm)	Up to 1,850ft. (564m)	Up to 13,000ft. (3,960m)
AWG 17 (Dia,1.1mm)	Up to 2,250ft. (686m)	Up to 15,500ft. (4,730m)
AWG 16 (Dia,1.25mm)	Up to 2,900ft. (884m)	Up to 20,000ft. (6,000m)
AWG 15 (Dia,1.4mm)	Up to 3,600ft. (1,100m)	Up to 25,550ft. (7,770m)
AWG 14 (Dia,1.6mm)	Up to 4,700ft. (1,430m)	Up to 33,000ft. (10,000m)

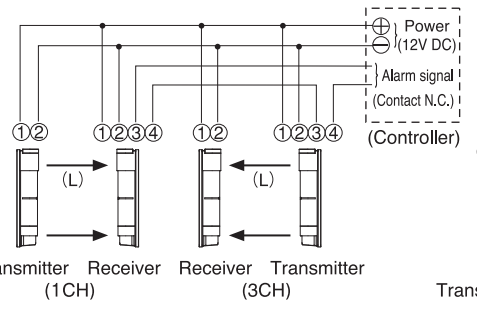
●When 2 or more units are connected, the wiring distance is calculated as follows : [Above value/number of units]

5-3 WIRING DISTRIBUTION DIAGRAM (WIRING DIAGRAM)

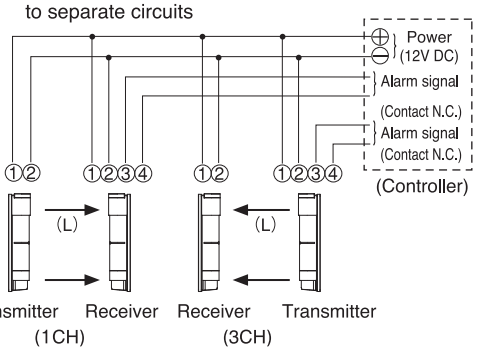
●Basic connection



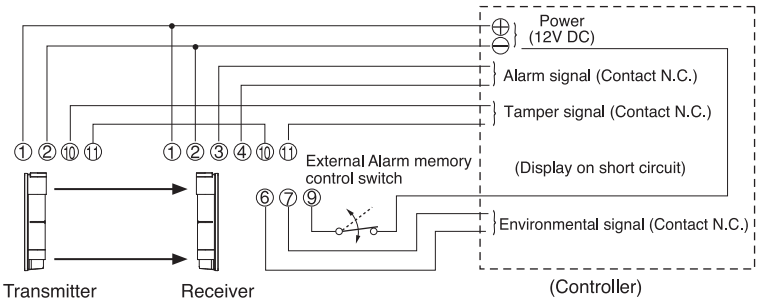
●When multiple sensor units are connected to the same circuit



●When multiple sensor units are connected to separate circuits



●When using alarm memory display in the remote mode (for environmental/tamper/alarm output)



< Caution for construction >

①The signals of microwave and photoelectric beam on the receiver cannot be output individually.

②For outdoor wiring installation, carry out pipe laying work whenever possible.

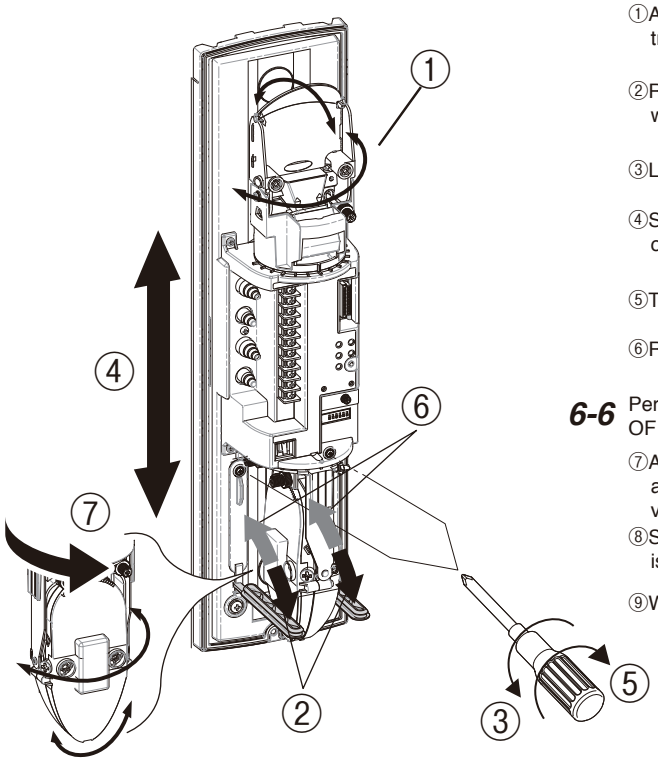
③Never use overhead wiring.

6 AREA ADJUSTMENT

By aligning the optical axis correctly, a protection line with sufficient margin of sensitivity can be created, reducing the occurrence of malfunction. Always perform area adjustment for both microwave and photoelectric beam sensors. Also, make the following settings before area adjustment.

> < Important > Be sure to make adjustment in order firstly for the microwave sensor and secondly for the photoelectric beam sensor.

6-1 METHOD OF AREA ADJUSTMENT



6-5 Perform the following ① to ⑥ with reference to the "**6-5** ALIGNMENT OF MICROWAVE SENSOR"

①Adjust the microwave sensor by using viewfinder so that the transmitter and receiver would face each other. → **6-5** - 1 ～ 3

②Remove the rubber cap after adjusting the microwave sensor with viewfinder. → **6-5** - 4

③Loosen the slide fixing screws → **6-5** - 5

④Slide the main unit up and down to find the position where the monitor output voltage value is 1.8 V or more and maximal. → **6-5** - 5

⑤Tighten the slide fixing screws to fix the mounting height → **6-5** - 6

⑥Replace the rubber cap. → **6-5** - 7

6-6 Perform the following ⑦ and ⑧ with reference to the "**6-6** ALIGNMENT OF PHOTOELECTRIC BEAM SENSOR"

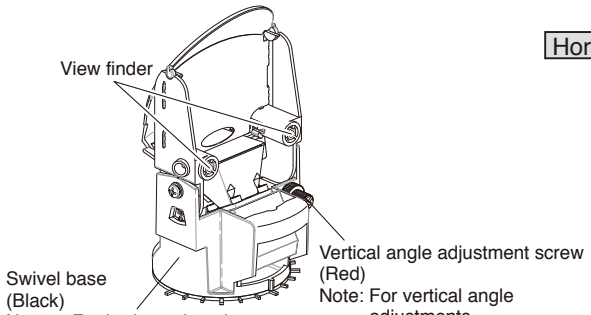
⑦Adjust the direction of the photoelectric beam sensor and adjust the optical axis so that the monitor output voltage value is 2.3 V or more and maximal. → **6-6** - 1 ～ 4

⑧Stop infrared beam from the transmitter to check if there is any wraparound from the surroundings. → **6-6** - 5

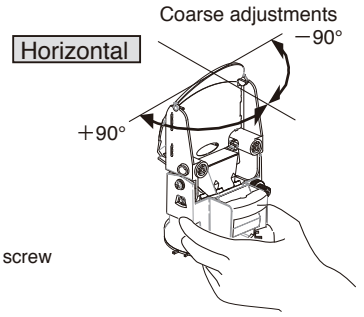
⑨When range adjustment finished, go to "7. OPERATION CHECK".

6-2 NAMES AND FUNCTIONS OF MICROWAVE SENSOR

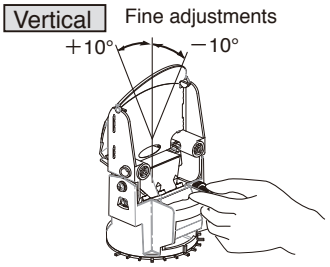
●Names of microwave unit



●Horizontal/Vertical Angle Adjustment Method

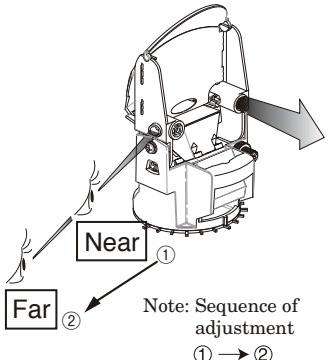


Coarse adjustments can be made by moving the swivel base within the range of 0˚ to ±90˚.



Next, fine adjustments of 0˚ to ±10˚ can be made using the vertical angle adjustment screw.

●Dual ring sight mechanism visible through view finder

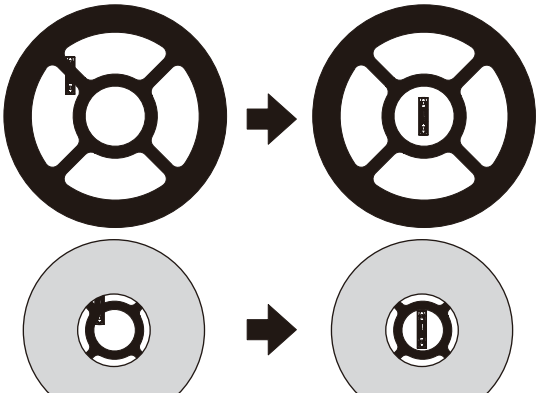


Near

When the view finder is looked closely, view appears as the diagram on the right.Adjust the angle so that the center of the ring.

Far (The accuracy high)

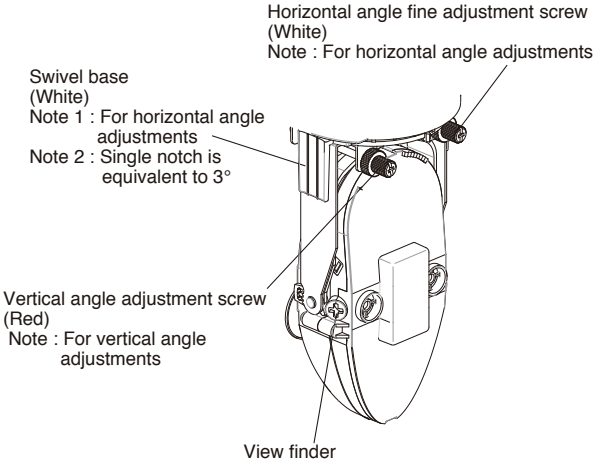
When the view finder is looked from a distance, the view appears as the diagram on the right. Adjust the angle so that the target color appears



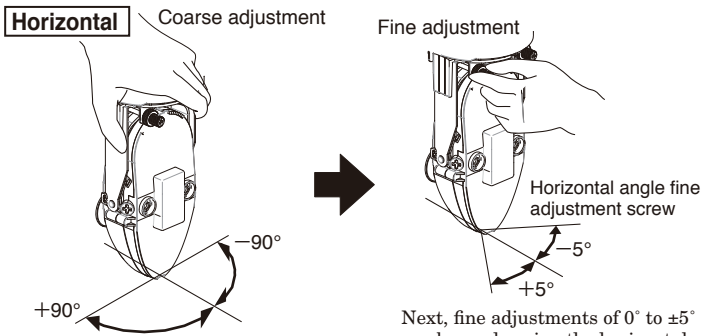
6-3 NAMES AND FUNCTIONS OF PHOTOELECTRIC BEAM SENSOR

●Names of photoelectric beam unit

* Be careful not to shade the front of the sensor with a hand during the adjustment.

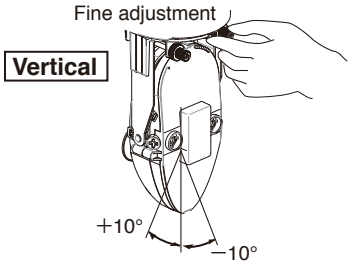


●Horizontal / vertical angle adjustment



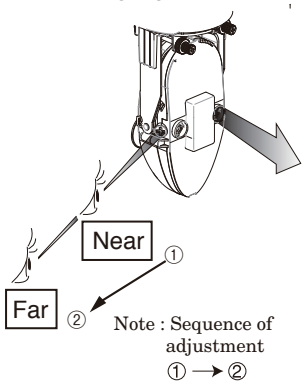
Coarse adjustments can be made by moving the swivel base within the range of 0˚ to ±90˚.

Next, fine adjustments of 0˚ to ±5˚ can be made using the horizontal angle adjustment screw.



Next, fine adjustments of 0˚ to ±10˚ can be made using the vertical angle adjustment screw.

●Dual ring sight mechanism visible through view finder

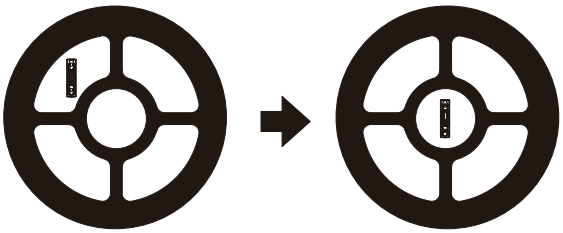


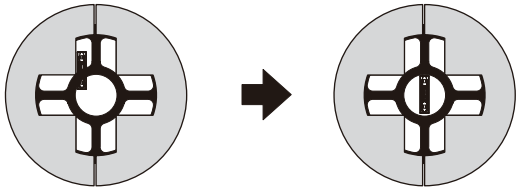
Near

When the view finder is looked closely, view appears as the diagram on the right.Adjust the angle so that the center of the ring.

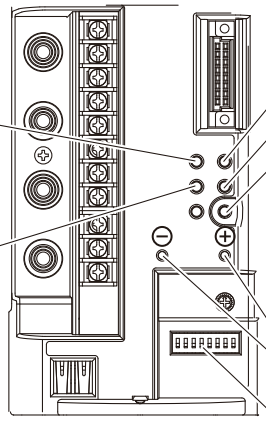
Far (The accuracy high)

When the view finder is looked from a distance, the view appears as the diagram on the right.Adjust the angle so that the target color appears in the center of the ring.





6-4 NAMES OF THE OPERATION SECTION



Alarm LED
Note : Only available on the receiver
• Lights up when an alarm is output.

Sensitivity attenuation LED
Note : Only available on the receiver
• Lights up when the sensitivity is insufficient.

MW transmission LED (Tx) or MW reception authorization LED (Rx)

Beam transmission LED (Tx) or Beam reception authorization LED (Rx)

The corresponding LED lights up when the light transmission/reception is authorized.
(The upper and lower can be switched by he MW / Beam changeover switch.)

MW / Beam changeover switch

Transmitter

Each time the MW/Beam changeover switch is pressed, the LED switches as shown below.

Both MW/Beam valid → Only MW valid → Only Beam valid → Both MW/Beam invalid

Receiver

Each time the MW/Beam changeover switch is pressed, the LED switches as shown below.

Both MW/Beam authorized → Only MW authorized → Only Beam authorized

Monitor jack Note : Only available on the receiver
• The monitor output voltage can be checked by using a commercially available tester.

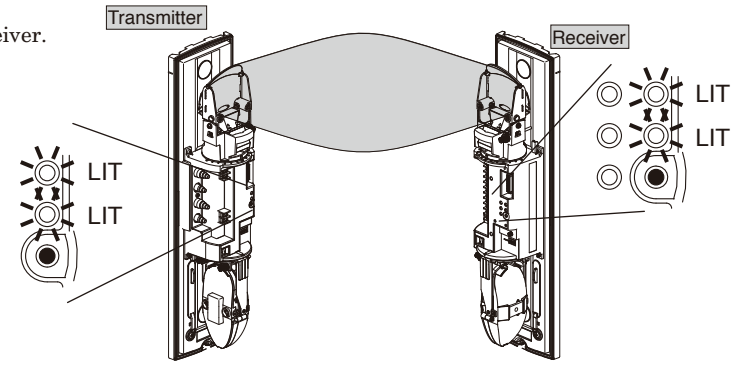
Sound check switch Note : Only available on the receiver
• Light reception level can be checked by the sound tone.
In the walk test mode, the bleep sound is generated according to the alarm output.

6-5 ALIGNMENT OF MICROWAVE SENSOR

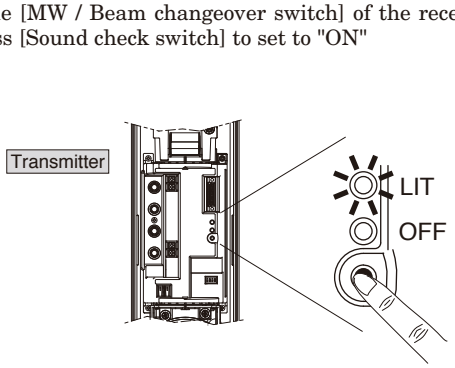
: LIT ◎ : OFF

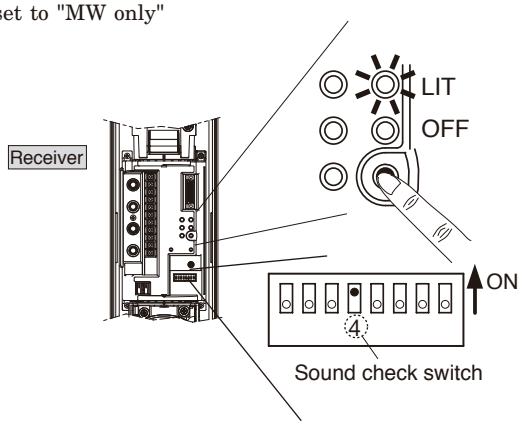
Adjust the angle of the transmitter / receiver on the microwave unit

1. Turn on the power to the transmitter and receiver.



2. Press [MW / Beam changeover switch] of transmitter to set to "MW only".
   Press the [MW / Beam changeover switch] of the receiver to set to "MW only" and press [Sound check switch] to set to "ON"

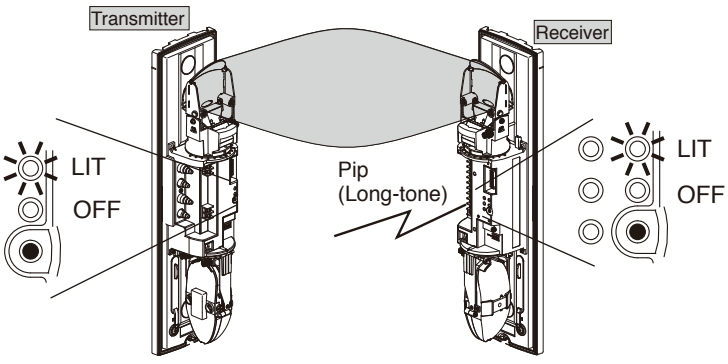


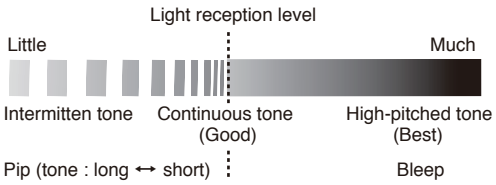


3. Adjust the angle of microwave with the viewfinder both on the transmitter and the receiver.
   Perform firstly horizontal adjustment and secondly vertical adjustment in order.

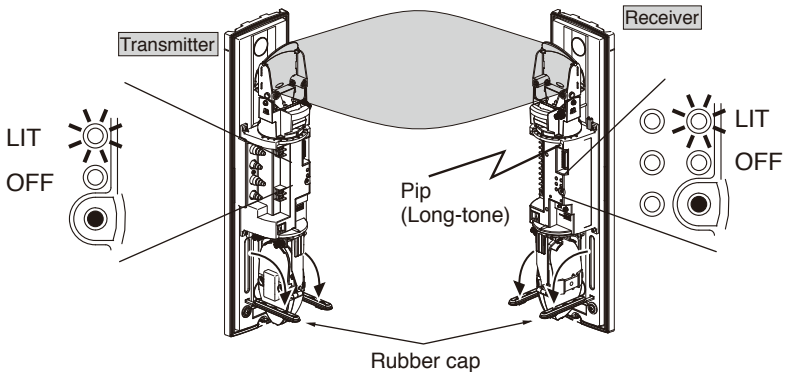
   For more detail on adjusting the direction of the microwave section, refer to " 6-2. NAMES AND FUNCTIONS OF MICROWAVE SENSOR ".

   When the sound check switch is "ON", a bleep sound is generated according to the reception level.





4. Remove the rubber cap of each transmitter / receiver.



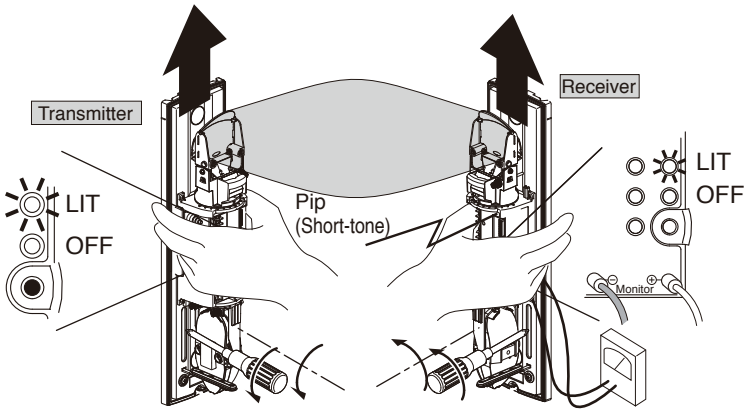
: LIT　　: OFF

5. Loosen the slide fixing screw slightly and slide the sensor body up and down to find the height reaching the highest monitor output voltage while checking the value of the tester. Thus the optimal height is secured with little interference of reflected waves of microwave.

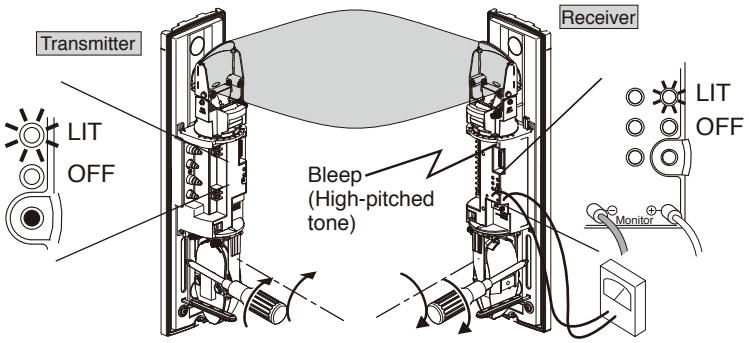
   *Confirm that the highest voltage value is classified as "good" or more

Monitor output voltage	Voltage level
More than 2.1V DC	Best
1.8 to 2.1V DC	Good

Above values are for "MW only".

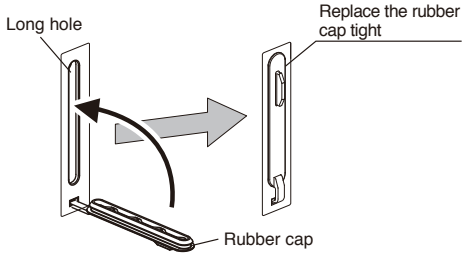


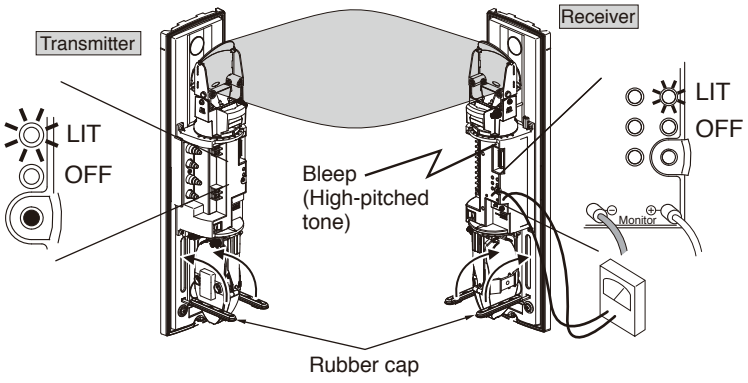
6. Tighten the slide fixing screws both on the transmitter and the receiver at the highest reception level.



7. Replace the rubber cap to securely cover the long hole.

> ⚠ If the rubber cap is not replaced properly (like making gap, or being pushed too deeply), water, insects, or dust may enter the inside and cause malfunction.

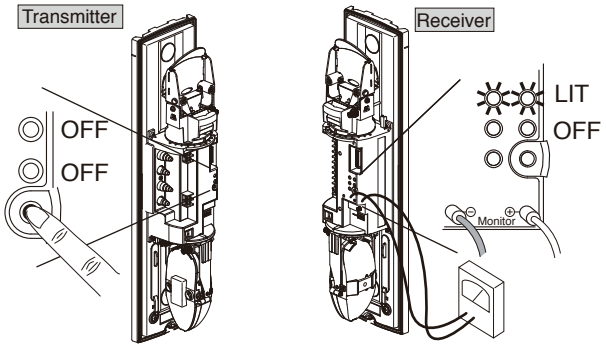




8. ①Press "MW / Beam changeover switch" on the transmitter to switch to " Both MW/Beam invalid", to check if it is not receiving any wave from another transmitter.
   ②Press "MW / Beam changeover switch" on the receiver to switch to "MW only".
   ③Check if the alarm LED on the receiver lights on.

●When the alarm LED does not light up

The unit may be receiving waves from another sensor. In this case, turn off the power of other sensors or switch to "Both MW/Beam invalid", and identify the sensor causing problems.
After that, switch to another transmission power (H/L) or slightly shift the direction of the microwave section to check if the alarm LED lights up.

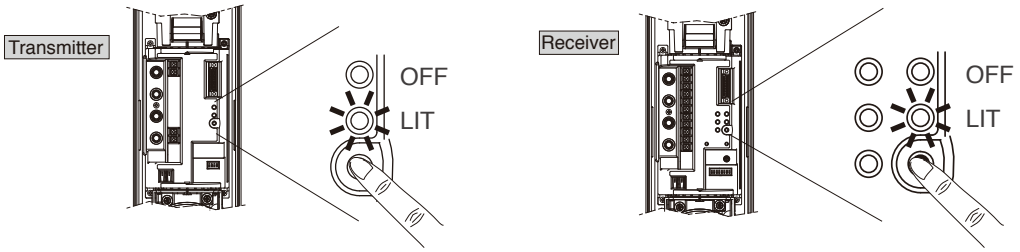


6-6 ALIGNMENT OF PHOTOELECTRIC BEAM SENSOR

: LIT ◎ : OFF

Adjust the optical axis of the transmitter and the receiver of the photoelectric beam sensor.

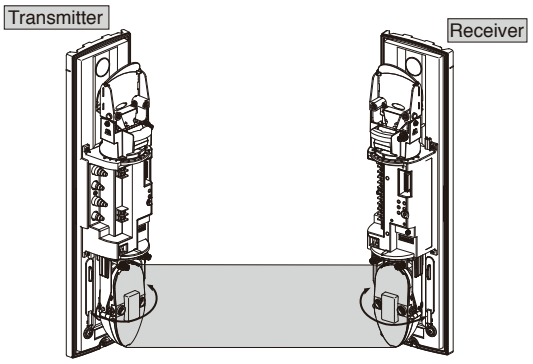
1. Press "MW / Beam changeover switch" and switch to “Only Beam valid” on the transmitter and to "Only Beam authorized" on the receiver.



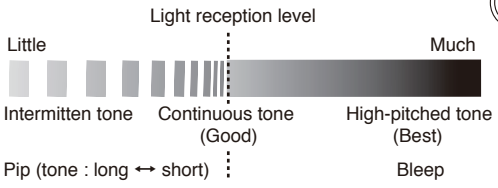
2. Adjust the horizontal angle of the photoelectric beam sensors so that the transmitter and the receivers face each other.

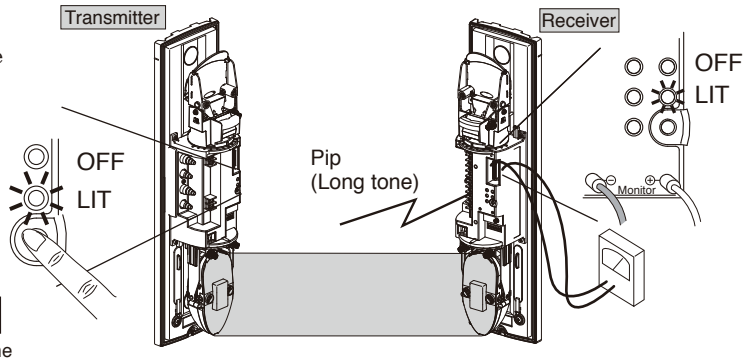
●Refer to the chart below to check the status of the LED on the receiver.

		Status
Receiver		①Infrared light enters to some extent
		①Infrared light enters but reception level is insufficient (optical axis is not adjusted properly)
		①Modulation frequency channel of the transmitter and the receiver is different. ②Infrared light gets some interference
		①Infrared light does not enter at all (optical axis is not adjusted)



3. Perform fine adjustment horizontally and vertically by turning the adjustment screws so that the pitch of the beep sound becomes the highest.
(Adjust both the transmitter and the receiver)
For more detail on adjusting the direction of the photoelectric beam section, refer to " 6-3. NAMES AND FUNCTIONS OF PHOTOELECTRIC BEAM SENSOR ".
* When the sound check switch is "ON", a beep sound is generated according to the reception level

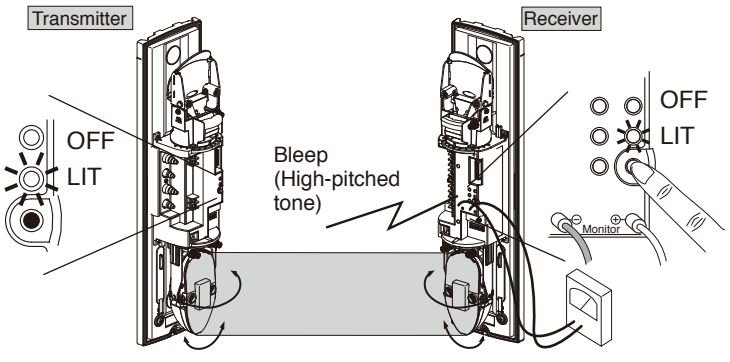




4. Turn the adjustment screw to make fine adjustment so that the monitor output voltage is the highest.
(Adjust both the transmitter and the receiver)
* Confirm that the highest voltage value is classified as "good" or more.

Monitor output voltage	Voltage level
More than 2.5V DC	Best
2.3 to 2.5V DC	Good

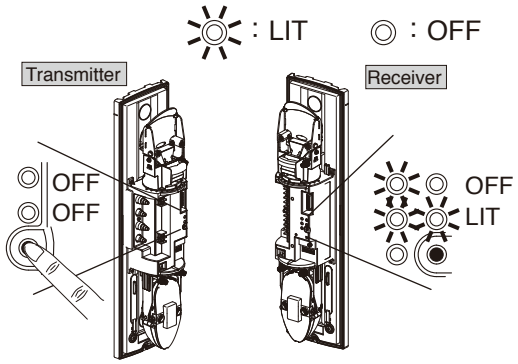
Above values are for "Beam only".



5. ①Press "MW / Beam changeover switch" on the transmitter to switch to " Both MW/Beam invalid", to check if it is not receiving any wave from another transmitter.
   ②Press "MW / Beam changeover switch" on the receiver to switch to "Beam only".
   ③Check if the alarm LED and sensitivity attenuation LED on the receiver light on.

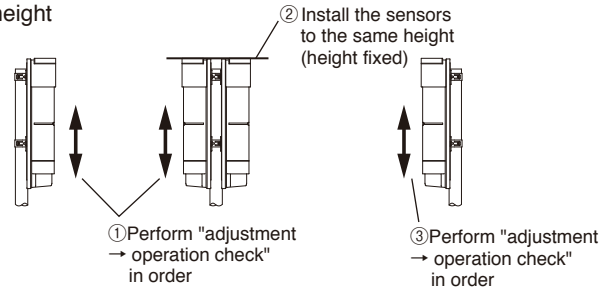
●When the alarm LED and sensitivity attenuation LED do not light up, the unit may be influenced by infrared light from other sensors. In this case, adjust other sensors again to reduce the influence.

Check also if the selection of modulation frequency channel is properly set.



When adjusting sensors mounted back-to-back to the same height

The height of the sensors mounted back-to-back may not be same depending on the installation location, by adjusting the unit according to the procedure described in this manual. When matching the height of the sensors installed back-to-back from aesthetic point of view, perform adjustment and operation check with the following procedure.
However, as the height is adjusted only either on the transmitter or the receiver of the sensor, accuracy of such adjustment may deteriorate and cause false or lost alarm.
Be sure to check the operation after adjusting the sensor at each span.
In case false or lost alarms occur at the operation check, perform adjustment again including the mounting height.



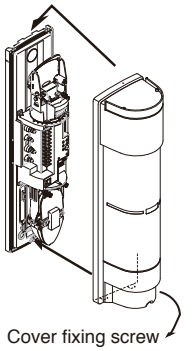
7 OPERATION CHECK

Be sure to perform an operation check after the optical axis adjustment.

1 After the area adjustment completed, replace the cover on the receiver while continuing the light reception and wait for approx. 5 sec.
Once one bleep (High-pitched tone) sound is generated, the auto gain lock is activated.

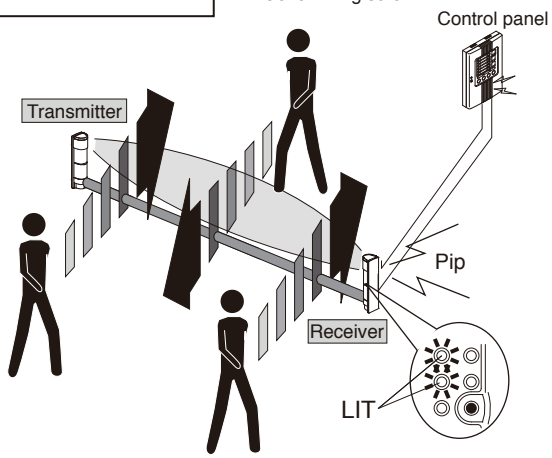
- When the pip (Long tone) sound is intermittently generated, the light reception level is insufficient. Reception authorization LED brinks at the same time due to lack of the light reception level. Adjust again the optical axis of the photoelectric beam sensor.
- Auto gain lock function is available only on the photoelectric beam sensor.

- Be sure not to obstruct the protection line to set the auto gain lock function properly when replacing the cover.



2 Obstruct the sensor beams near the sensor or the center of the detection line and check that an alarm can be output correctly.

● If the sound check switch is set to ON, the walk test mode is activated for five minutes after the cover is closed.
The beep sounds is generated in synchronization with the alarm output.
The alarm LED lights up according to the alarm output.



If no alarm is output

Turn off the power to the transmitter and check that an alarm is output.

An alarm is output
- The sensor beams are not obstructed → Change the height or location of the sensor so that the light on the detection line can be obstructed completely.
- Light entrance due to wraparound of the beams (Due to light entrance caused by reflection) → Readjust the optical axis, and move the direction of the optical axis away from the reflection surface within the allowable range. (Perform this for both the transmitter and receiver)

No alarm is output
- Light reception from other transmitter. → Check the method of installation.

The microwave section of this combination sensor is equipped with Automatic gain control (AGC) circuit so that a certain level of reception can be obtained even under all the operating conditions.
When a human being stops within the detection area, the reception level drops and once an alarm is output, the reception level gradually rises with the elapse of time due to the AGC function.
Therefore, alarm may be restored after a certain time, which is normal operation by AGC.
(Object passing through can be detected, but continuous interruption cannot be detected except for complete shut off.)

8 EXPLANATION OF FUNCTIONS

● This section describes the detailed information of the functions that appear in this instruction manual. Set each function according to the description below.

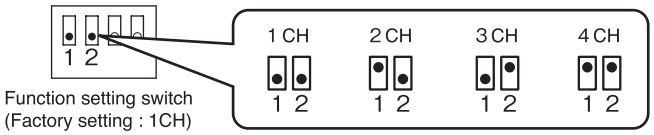
This device features the functions that must be set for operating the device, as well as those that are necessary for adjustment procedures. Perform setting and adjustment by checking the following table.

Whether to set on transmitter or receiver	Setting item	Fitting
Transmitter only	Beam channel	☐ 1CH ☐ 2CH ☐ 3CH ☐ 4CH
	Beam power	☐ H ☐ L
	Beam tower	☐ OFF ☐ ON
Receiver only	Beam channel	☐ 1CH ☐ 2CH ☐ 3CH ☐ 4CH
	Alarm memory	☐ Auto reset ☐ Manual
	Sound check	☐ ON ☐ OFF
	Environment/Alarm output	☐ Environment ☐ Alarm
	AND/OR-gate selector	☐ AND ☐ OR
	Microwave response time	☐ 0.04sec. ☐ 0.3sec.
	Beam tower	☐ OFF ☐ ON

8-1 MODULATION FREQUENCY CHANGEOVER

Note : Installed on the transmitter and the receiver

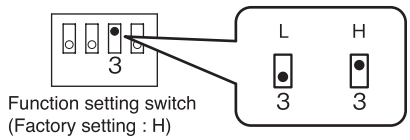
●Changing the channel changes the modulation frequency, which can prevent mutual interference or wraparound of the photoelectric beams.



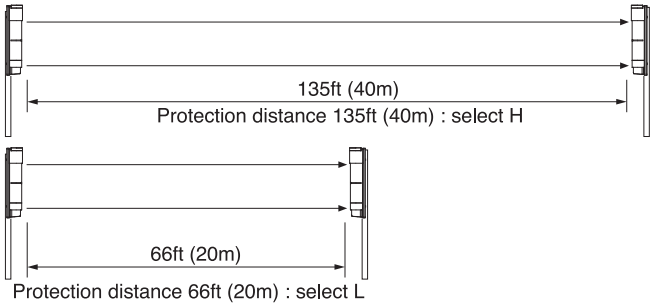
8-2 BEAM TRANSMISSION POWER SELECTION

Note : Only installed on the transmitter

●This function switches the transmission power relative to the protection distance.
Interference or spill-over transmission of photoelectric beams can be prevented by setting an appropriate transmission power.



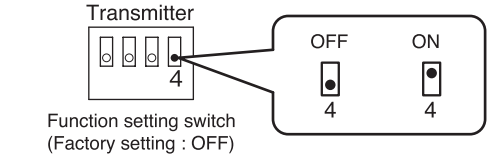
Power	L	H
Protection distance	Within 83ft (25m)	Over 83ft (25m) but within 165ft (50m)

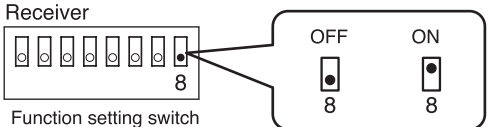


8-3 BEAM TOWER SELECTION

Note : Installed on the transmitter and the receiver

●When this sensor is installed in beam tower without the front cover, various operation LED turn off and the AUTO GAIN LOCK function activates by switching ON.





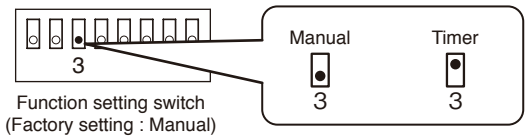
8-4 ALARM MEMORY DISPLAY

Note : Only installed on the receiver

- When multiple sensors are used, this function allows you to check which sensor was activated by flashing or lighting of the memory LED.

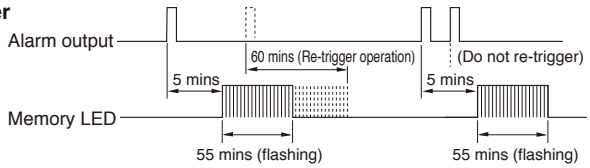
  Note : In order to activate a beep sound in synchronization with the alarm output, set the sound check setting to [ON] in the remote mode.

- If you do not wish to use the memory display function, select manual and keep terminal (9) (alarm memory input) open on the receiver.

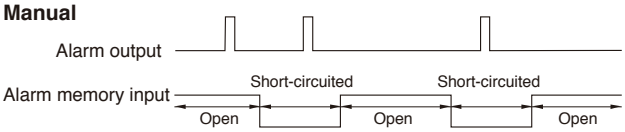


Function setting switch
(Factory setting : Manual)

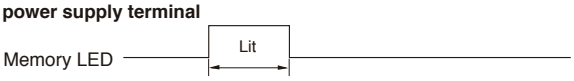
1. Timer



2. Manual



- **Open/Short circuit between the alarm memory terminal and power supply terminal**



You can check whether an alarm has been output while the alarm memory input is open by shorting the alarm memory input to light the memory LED. (The alarm memory input does not light up if there is an alarm output when it is being shorted.)

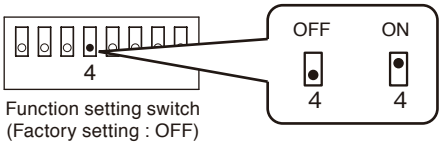
(Sound check switch ON)

If an alarm is output while the memory LED is lit, the beep sound is generated.

8-5 SOUND CHECK

Note : Only installed on the receiver

- You can be notified of the light reception status or current alarm operation on the receiver by the sound of alarms.



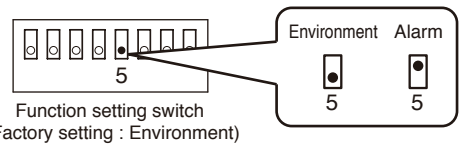
Function setting switch
(Factory setting : OFF)

Item	Operation (status)	Other settings
Light reception level	Light reception level can be checked by the sound tone. (The tone pitch becomes higher as the light reception level increases.)	While the receiver cover is removed.
Walk test mode	The beep sound is generated according to the alarm output.	Activated for approximately 5 minutes after auto gain lock
Alarm memory display	If an alarm is output while the memory LED is lit, the beep sound is generated.	Set the alarm memory display function to the remote mode.

8-6 ENVIRONMENT/ALARM OUTPUT SELECTION

Note : Only installed on the receiver

- Set the environment / alarm output according to the intended application. When setting it for alarm to make the two alarm outputs available, one of them can be used as a start switch to activate cameras and so on.



Function setting switch
(Factory setting : Environment)

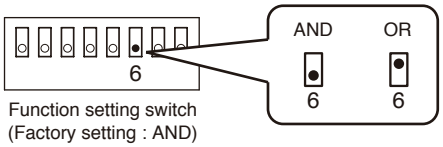
Environment : The signal is output when the environment deteriorates

Alarm : If additional alarm output is required, this terminal can be used as the second alarm output .
(The contact operation is synchronized with the alarm output terminal)

8-7 AND/OR-GATE SETLECTION

Note : Only installed on the receiver

- It is possible to set the alarm output to "AND detection" to output an alarm when both the microwave and the photoelectric beams are blocked, or to "OR detection" to issue an alarm if either one is blocked.



Function setting switch
(Factory setting : AND)

AND : When both the microwave and the photoelectric beams are interrupted at the same timing, it is regarded as detected to perform an alarm operation.

OR : If either one of the microwave and the photoelectric beam is interrupted, it is regarded as detected to perform an alarm operation.

8-8 RESPONSE TIME ADJUSTMENT

●The detectable interruption time can be adjusted

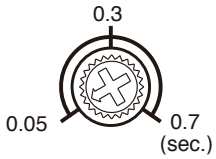
①Detection is not performed when the light interruption time is shorter than the response time.

②If there is a risk of big flying objects (birds, newspapers, cardboard, etc.) to shield the area, set the response time longer in consideration of the conditions of the installation site.
(However, intruder may not be detected if the response time is set too long.)

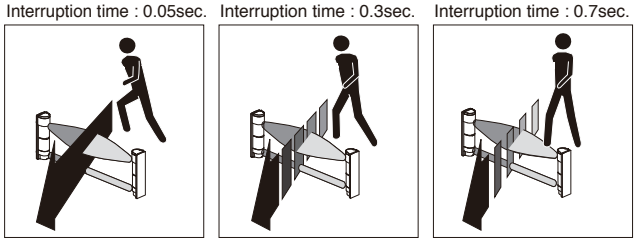
Response time of the photoelectric beam

Note: Only installed on the receiver of Photoelectric beam

(Refer to the diagram below to adjust the response time)



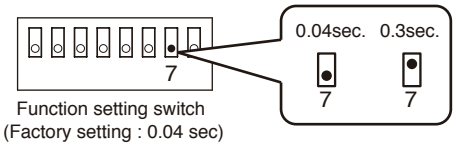
Volume switch for response time adjustment
(Factory setting : 0.05 sec.)



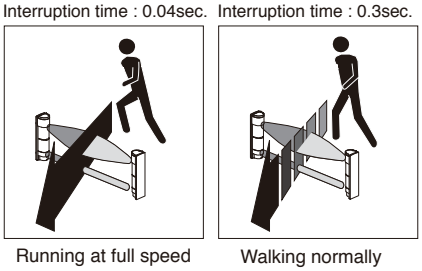
Response time of the microwave

Note : Only installed on the receiver of Microwave

(Refer to the diagram below to adjust the response time)



Function setting switch
(Factory setting : 0.04 sec)

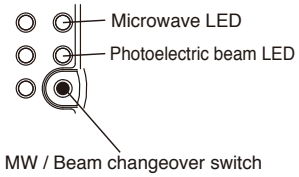


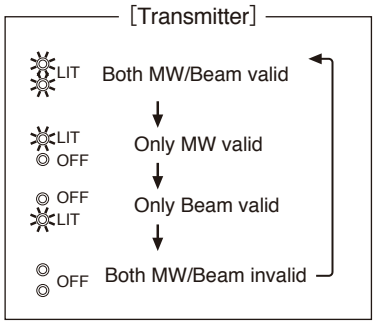
8-9 MICROWAVE/PHOTOELECTRIC BEAM CHANGEOVER

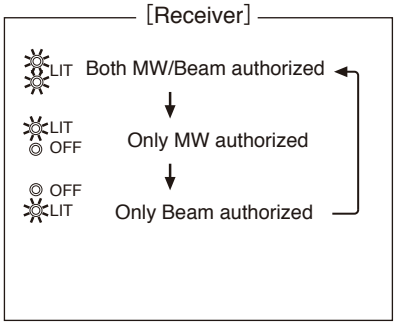
Note : Installed on the transmitter and the receiver

●Switching the reception unit to microwave and/or beam sensors can be done by pressing MW / Beam changeover switch.
Note : Each time the MW / Beam changeover switch is pressed, the LED switches as shown below.

When the receiver is set to "MW only", the transmitter quickly adjusts the reception level according to the condition of the area. Therefore, the value of the monitor output voltage fluctuates sharply, and the detection may become difficult depending on the interruption time of the area even in the detection operation.
Note : When "Both MW / Beam valid" is set, it operates normally.



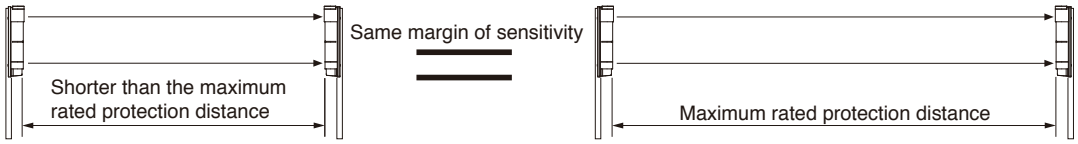




8-10 AUTO GAIN LOCK

Note: Only installed on the receiver of Photoelectric beam

- The margin of sensitivity on this device is set so that an appropriate sensitivity can be obtained when the optical axis is aligned while the device is installed in the maximum protection distance. However, if the actual distance is shorter than the maximum rated protection distance, excessive margin of sensitivity is secured, which could make the device more susceptible to adverse effects of the reflection from the ground or walls. The auto gain lock function helps to adjust to an appropriate margin of sensitivity and fix the setting in the same manner as when the device is installed in the maximum rated protection distance, regardless of the actual installation distance (below the maximum rated protection distance). (However, it is always required that the optical axis is correctly aligned.)



Auto gain lock pass/fail criteria

When the receiver cover is attached, the display appears and the beep sound is generated in approximately 5 seconds according to the pass/fail result.
For detailed information, refer to the table on the right.

Note : The bleep sound is generated regardless of the setting of the sound check switch.

◎ : OFF ☼ : LIT ☼ : Flashing

Bleep sound	Light reception authorization LED	Result	Cesua	Rydeme
Bleep (high-pitch beep) (1 sec)	◎ ◎ (Off for both upper and lower)	Pass	———	———
Bleep-bleep-bleep (high -pitch tone) (Intermittent sound for 20 seconds)	☼ ◎ Light reception level for the beam is insufficient	Fail	(1) Light was being obstructed when the receiver cover was attached. (2) Light reception level is low due to misalignment of the optical axis. Note : The sensitivity attenuation LED is also lit	(1) Remove the item that is obstructing the light beams, re-attach the receiver cover, and check the bleep sound. (2) Also, remove the cover from the transmitter, check the actual protection distance and transmission power before adjusting the optical axis again.

8-11 PROGRAMMABLE AGC

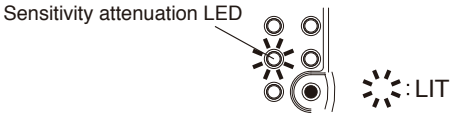
Note : Only installed on the receiver of Photoelectric beam

- During adverse environmental conditions such as dense fog or heavy rain, this function temporarily increases the sensitivity of the receiver.
  Note : The margin of sensitivity is maintained even if there is a sudden worsening in weather conditions.

8-12 LIGHT SENSITIVITY SIGNAL

Note : Only installed on the receiver of Photoelectric beam

- When the reception level of photoelectric beam is judged as insufficient, the LED lights up to show that the inspection is necessary.



8-13 EXTERNAL ENVIRONMENT DIAGNOSTIC

Note : Only installed on the receiver of Photoelectric beam

- The light reception level falls below the specified level under adverse environmental conditions such as dense fog or heavy rain.
  This function issues an environmental output if such conditions continue.

  Note : The environmental output continues until the light reception level for both the upper and lower beams recovers to the specified level (for 5 seconds at the shortest).

8-14 ALIGNMENT WIRELESS CHECKER CONNECTION

Note : Installed on the transmitter and the receiver

- Using the alignment wireless checker that is sold separately enables easy and accurate optical axis adjustment.

  Providing sufficient margin of sensitivity increases the resistance to the dense fog, snow, and heavy rain, which makes it possible to construct a highly reliable intrusion alert system.

9 TROUBLESHOOTING

● Check the device by referring to the table below. If you cannot restore the device to a normal condition after the check, contact the place of purchase or TAKEX.

Status	Cause	Corrective action
Transmitter LED does not light up (when cover is open)	① No power supply ② Poor wiring, breaking wire, short ③ "Both MW/Beam invalid" is selected on the transmitter ④ "ON" is selected with Beam tower mode switch on the transmitter	① Turn on the power ② Check wiring ③ Press MW/Beam changeover switch ④ Select "OFF" with Beam tower mode switch on the transmitter
Alarm LED does not light up with "AND detection", even by interrupting the protection area	① No power supply ② Poor wiring, breaking wire, short ③ Photoelectric beam or microwave, reflected by some object, enters the receiver. ④ Photoelectric beam and microwave are not interrupted simultaneously ⑤ Interruption time is shorter than detection response time. ⑥ Reception is authorized only on the microwave sensor.	① Turn on the power ② Check wiring ③ Remove reflection object or change the place for installation or direction of the area ④ Adjust mounting height for simultaneous interruption on microwave and photoelectric beam. ⑤ Set shorter detection response time ⑥ Authorize both MW/Beam or replace the cover
Alarm LED does not light up with "OR detection", even by interrupting the microwave area	① No power supply ② Poor wiring, breaking wire, short ③ Microwave, reflected by some object or on the ground, is received by the receiver ④ Microwave area is not interrupted ⑤ Interruption time is shorter than detection response time of microwave ⑥ Reception is authorized only on the microwave sensor.	① Turn on the power ② Check wiring ③ Remove reflecting object or readjust detection area of microwave sensor ④ Adjust mounting height to interruption microwave ⑤ Set shorter detection response time on microwave sensor ⑥ Authorize both MW/Beam or replace the cover
Alarm LED does not light up with "OR detection", even by interrupting the photoelectric beam area	① No power supply ② Poor wiring, breaking wire, short ③ Photoelectric beam, reflected by some object, enters the receiver. ④ Photoelectric beam area is not interrupted ⑤ Interruption time is shorter than detection response time of Photoelectric beam	① Turn on the power ② Check wiring ③ Remove reflection object or change the place for installation or direction of the area ④ Adjust mounting height to interrupt photoelectric beam ⑤ Set shorter detection response time on photoelectric beam sensor
Alarm LED does not go out (Alarm output does not stop)	① Alignment is not correctly performed ② Shading object between transmitter and receiver ③ Cover or photoelectric beam section is soiled ④ Same frequency channel is not selected on transmitter and receiver. ⑤ No power supply on transmitter	① Secure distance margin to readjust the detection angle ② Remove object ③ Clean with soft cloth ④ Adjust both to the same channel ⑤ Turn on the transmitter
Intermittent alarm is output often	① Poor wiring ② Fluctuating power supply voltage ③ Shading object between transmitter and receiver (When trees move in the wind) ④ Other power wiring near the wiring to the transmitter/receiver ⑤ Unstable installation of the unit ⑥ Cover or photoelectric beam section is soiled ⑦ Alignment is not correctly performed ⑧ Large birds or cats may interrupt the detection area ⑨ Sensitivity margin insufficient with transmission power "L". ⑩ Mounting height of microwave is not adjusted or the unit is affected by reflection of some object	① Check wiring ② Stabilize power supply ③ Remove object ④ Change the wiring route ⑤ Fix the unit firmly ⑥ Clean with soft cloth ⑦ Readjust area to secure distance margin ⑧ Set detection response time a little longer (except the places where intruders can run through full speed) ⑨ Set transmission power to "H", remove the receiver cover and perform auto gain lock again ⑩ Adjust the area of the microwave, by changing mounting height, etc. or remove the reflecting object in the area

Daily Inspections

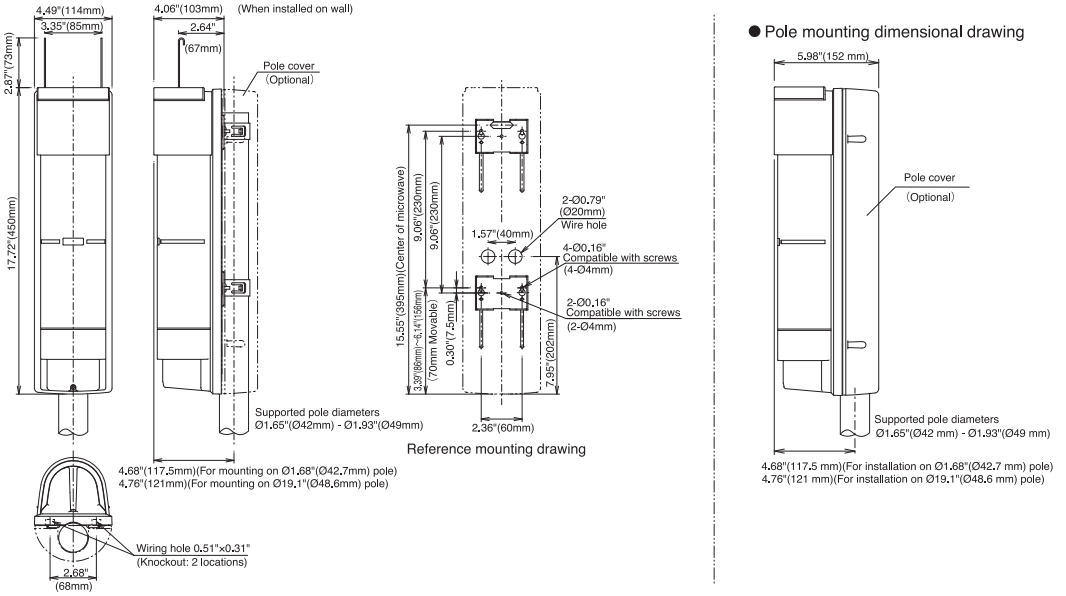
● To clean the device, use a soft, wet cloth and then wipe off any water drops.
If the device is particularly dirty, dip the soft cloth in water that includes a weak neutral detergent.
Wipe the device gently with the cloth, then wipe off any detergent that remains.
Do not use substances such as thinner or benzene. (The plastic parts may deform, discolor or change their properties.)

● Perform operation checks on a regular weekly basis.

10 SPECIFICATIONS

Model	COM-50XTL
Detection system	Microwave : Microwave interruption system Photoelectric beam : Near infrared pulsed beam interruption system (TR-RE 2 beam simultaneous interruption)
Microwave frequency	24.11GHz
Infrared beam	Double modulation pulsed beam by LED
Protection distance	Outdoor 3.3ft. (1m) to 165ft. (50m)
Max. arrival distance	Microwave : Approx 330ft (100m) Photoelectric beam : 1650 ft (500m)
Response time	Microwave : 0.04 / 0.3 sec. (selectable with DIP switch) Photoelectric beam : 0.05 to 0.7 sec. (changeable with volume switch)
Power supply	12 to 30V DC (Non Polarity)
Current consumption	Transmitter : 31mA or less (when armed & Max.) Receiver : 24mA or less (when armed) 33mA or less (Max.)
Alarm output	Dry contact relay output form C Contact action : Interruption time (Min.2sec.) Contact capacity : 30V (AC/DC) 0.25A (resistive load) Protective resistor
Environmental/alarm output	Dry contact relay output form C *Environment/Alarm selectable Contact action : (Env.) Activated when weather condition gets worse (Alarm) Synchronized with alarm output Contact capacity : 30V (AC/DC) 0.25A (resistive load) Protective resistor
Tamper output	Dry contact relay output form b(N.C.) Action : Activated when cover is detached Contact capacity : 30V (AC/DC) 0.1A (resistive load) Protective resistor
Alarm LED	Red LED (Receiver) ON : when an alarm is initiated
Attenuation LED	Red LED (Receiver) ON : When beam is attenuated
Functions	Modulation frequency selectable, Tone indicator, Transmitting power indicator, Alarm memory indication, Programmed AGC, Auto-gain lock, Monitor jack, Tamper, Response time adjustment, MW/Beam changeover, Reception sensitivity display, Environmental module, Wireless checker connectable
Area adjustment range	Horizontal : ±90° Vertical : ±10°
Ambient temperature range	-13 to +140°F (-25 to +60°C)
Mounting position	Indoor, Outdoor (IP65)
Wiring	Terminals
Weight	Transmitter : 56oz (1,600g) Receiver : 57.8oz (1,650g)
Appearance	Resin (wine red)

11 EXTERNAL DIMENSIONS Unit : inch (mm)



12 SPECIAL NOTES

FCC

(1)FCC Regulation Statement : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures : -Reorient or relocate the receiving antenna. -Increase the separation between the equipment and receiver. -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. -Consult the dealer or an experienced radio/TV technician for help.

WARNING : Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(2)RF Exposure Warning Statement : This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must be at least 20 cm from the user and must not be co-located or operating in conjunction with any other antenna or transmitter.

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

Limited Warranty :

TAKEX products are warranted to be free from defects in material and workmanship for 12 months from original date of shipment. Our warranty does not cover damage or failure caused by natural disasters, abuse, misuse, abnormal usage, faulty installation, improper maintenance or any repairs other than those provided by TAKEX. All implied warranties with respect to TAKEX, including implied warranties for merchantability and implied warranties for fitness, are limited in duration to 12 months from original date of shipment. During the Warranty Period, TAKEX will repair or replace, at its sole option,free of charge, any defective parts returned prepaid. Please provide the model number of the products, original date of shipment and nature of difficulty being experienced. There will be charges rendered for product repairs made after our Warranty Period has expired.

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