

TAKEX PHOTOELECTRIC BEAM SENSOR

PB-60TX

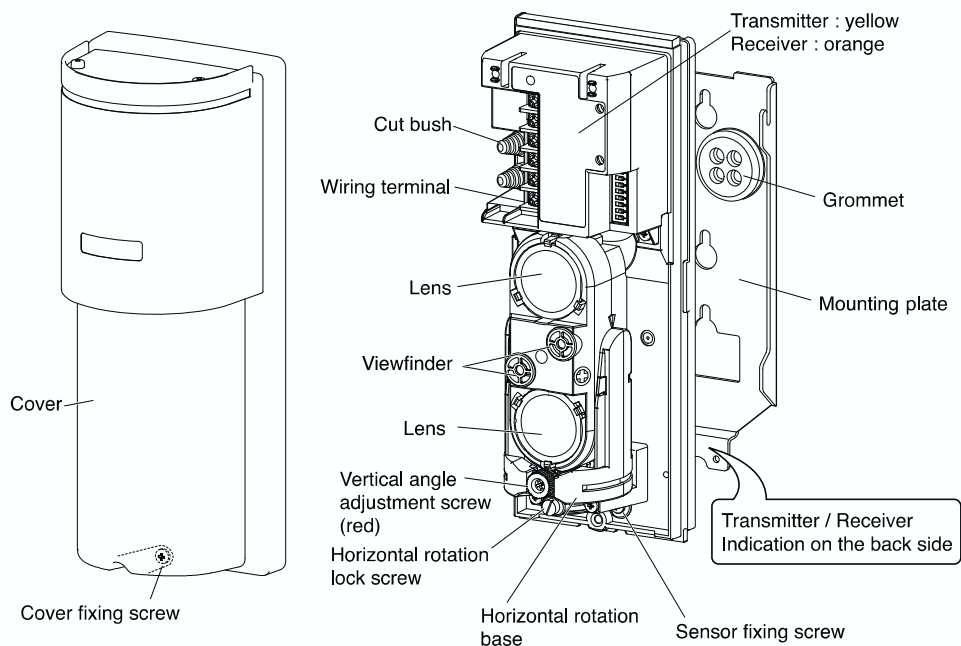
Instruction Manual

Thank you for purchasing this product. Before using the product, please read this instruction manual to ensure correct operation.

1 PARTS DESCRIPTION

This section describes the contents of the product package and the names and functions of the parts that appear in this instruction manual. Check that the following transmitter, receiver, and accessories are included in the box when you first unpack the product.

MAIN UNIT



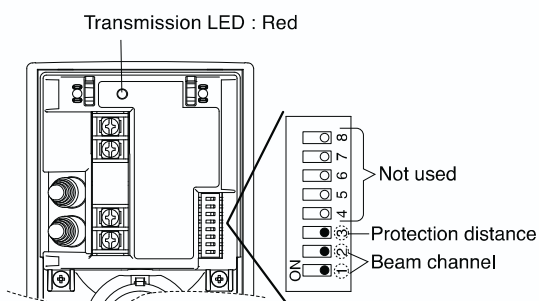
ACCESSORIES

Self-tapping screw
for installation
($\phi 4 \times 20$)
: 4 pcs

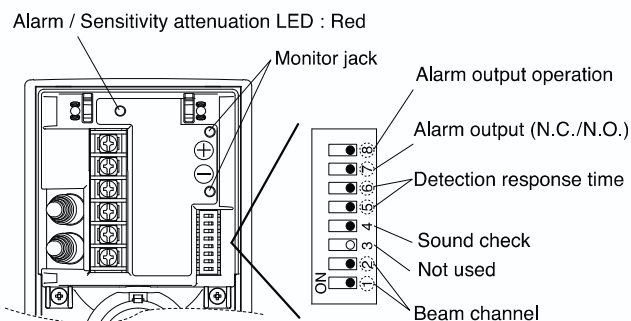
Instruction manual
: 1 pc

NAMES OF OPERATION SECTION

[Transmitter]



[Receiver]



2 PRECAUTIONS

Be sure to observe

• This manual describes precautions by classifying them based on degrees of danger and damage that would be generated when using the unit incorrectly.

Warning

This indicates the possibility of severe injury, and even death, if ignored or a user handles the unit incorrectly.

Caution

This indicates the possibility 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



Do not use this sensor with power and voltage other than those indicated (10~28V DC). Fire or electric shock may result.



Do not connect a device that exceeds the indicated capacity to the output contact of this unit. Fire or electric shock may result.



Do not touch the terminals with wet hands. Electric shock may result.



Do not disassemble or modify this device. Fire, electric shock, or malfunction may result.



If you notice smoke, strange smells or sounds, immediately turn off the power supply to the device, check that the problem is gone, and ask the seller to repair it. Continued use may result in fire or electric shock.

Caution



Accumulation of the followings on the cover surface may result in false detection.

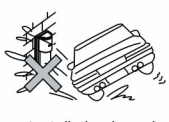
- Periodically clean the cover.
- Yellow dust/sand, snow, and/or ice
 - Insect droppings and/or nests
 - Bird droppings
 - Paint
 - Objects caught in the wind such as trash and newspaper



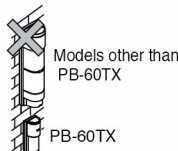
Installing the unit in the following places may result in false and/or non-detection.



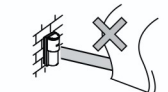
- Installation in a place shaded by trees, etc



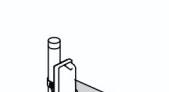
- Installation in a place exposed to sewage or seawater



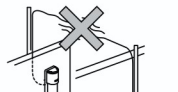
- Models other than PB-60TX
- PB-60TX
- Using PB-60TX together with other models



- Installation in a place shielded from light by moving objects on the optical axis (laundry, etc.)



- Horizontal installation



- Overhead wiring



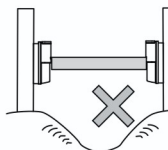
- Installation in a place where strong light such as (sunlight, headlights, LED lighting, IR rays for cameras, and LED lighting) enters the optical axis directly.



- Installation right above the fence



- Installation near the fence



- Installation on an uneven ground



- Installation in an unstable and wobbling place



Before actual installation, perform a sufficient operation check in a place of operation and confirm that the receiver can clearly receive the beams.



Use the sensor within the rated protection distance.



Do not install the device in a location that cannot support its weight. The device may fall and cause injury or malfunction.



Make sure to perform a sufficient operation check on the whole system before operation.



Do not install the unit in places subject to oil smoke, steam, high humidity, and/or a lot of dust. Electricity that travels through these substances may result in fire, electric shock, and/or false operation.



In order to ensure the rainproof structure, install the unit in the correct direction. Installing it sideways or upside down may result in malfunction.



Install the unit straight so that it does not look inclined from the front.



This unit has a rainproof structure, not a waterproof structure. Do not hose it directly. Do not use the unit in places constantly subject to water and/or high humidity, such as a bathroom. Failure to follow this could result in malfunction.



Securely conduct installation work according to the instruction manual. Also, make sure to use the supplied accessories and specified components. Failure to follow this may result in injury and/or property damage in the event of fire, electric shock or fall of the unit.



When branches, leaves of trees and weeds around the detection line blow in the wind, they may interrupt the detection line and result in false detection. Periodically trim (cut) branches, leaves, and weeds.



Vine plants may entwine the unit when growing, which may result in false detection. Periodically trim them.



Do not use models other than this series (PB-60TX) on the extension of the same detection line. Failure to follow this could result in false and/or non-detection due to interference between the sensors.

Cautions when using the outdoor photoelectric beam sensor (Regular maintenance)

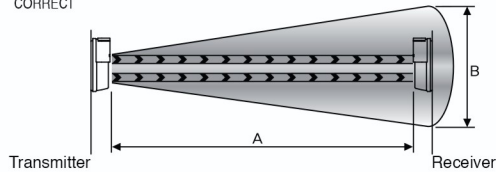
- In areas where there are trees or weeds, the photoelectric beams may become obstructed by overgrown branches or leaves. As this may cause false detection, be sure to trim down leaves and branches according to the growth of the plants. Furthermore, the photoelectric beams may get obstructed by swaying branches or leaves due to wind.
- Vine plants may wrap around the photoelectric beam sensors causing false detections. Therefore, be sure to prune such plants regularly.
- Insects, bird droppings, or other natural phenomena may also soil the sensors causing false detection. Be sure to clean the sensors regularly.

PROTECTION DISTANCE AND LIGHT BEAM COVERAGE

As the infrared light leaves the transmitter, it expands into conical shaped light beams. The optical axis is in the center of the light beams. Adjust the reflector so that the device on the opposite side is in the center of the light beams.



If the optical axis (center of the light beams) is aligned correctly, a detection line with sufficient margin of sensitivity is formed.



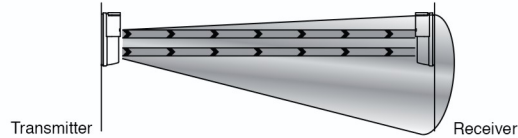
A: Protection Distance	B: Light Beam Coverage
60 m (200')	Approx. 1.8 m (6')

The spread of the light beam can be calculated as follows.

$$B(m) = 0.03 \times A(m)$$



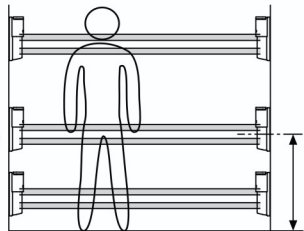
If the optical axis is not aligned correctly, there will be insufficient margin of sensitivity even if the receiver is at the center of the light beams, making the system more susceptible to adverse effects of the environment resulting in a malfunction.



! Perform the correct optical axis adjustment according to the section "5 OPTICAL AXIS ADJUSTMENT"

MOUNTING HEIGHT

As these sensors are designed to detect humans, adjust the center of the sensors to the height of approximately 0.8m(2.6ft) from the ground when installing both on a wall and on a pole.



Approx.
0.8 m (2.6')



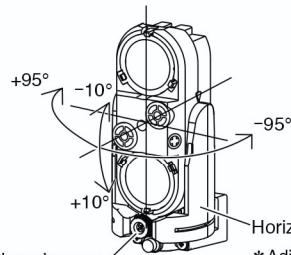
Installing by adjusting the center of the sensor to approximately 0.8m(2.6ft) from the ground i.e. the protection line is at waist height for humans, for reliable detection.



If the installation position is too high or too low, making protection line above shoulder height or below knee height, detection becomes less reliable.

OPTICAL AXIS ADJUSTMENT RANGE

Refer to the diagram below, and install the sensors within the optical axis adjustment range. (Photoelectric beams are shown in simplified form)

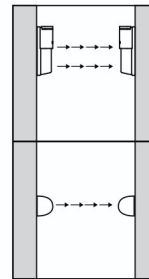


Vertical angle adjustment screw

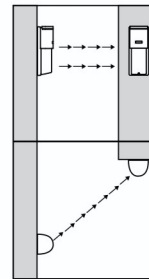
* Adjustable in the range of
0° to ±10° with the
vertical angle adjustment screw

Horizontal rotation base
* Adjustable in the range of
0° to ±95° with the
horizontal rotation base

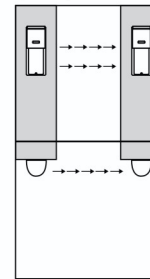
(Ex. 1)



(Ex. 2)



(Ex. 3)



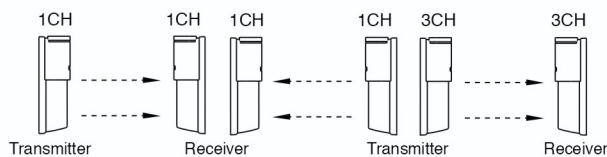
EXAMPLE OF PRACTICAL APPLICATION

In order to minimize the occurrence of malfunctions, refer to the protection diagram below for optimal operation. Using the sensors incorrectly may cause malfunction. (Light beams are shown in simplified form)



- When installing with multi-level or straight line protection, select the correct modulation frequency channel (CH) and place the transmitter/receiver appropriately, by referring to the example below. Mutual interference or wraparound of photoelectric beams can be prevented in this way.
- * Be sure to select the same channel for the transmitter and receiver facing each other.
- When installation is needed in a way other than those described in the instruction manual, contact your dealer or TAKEX.

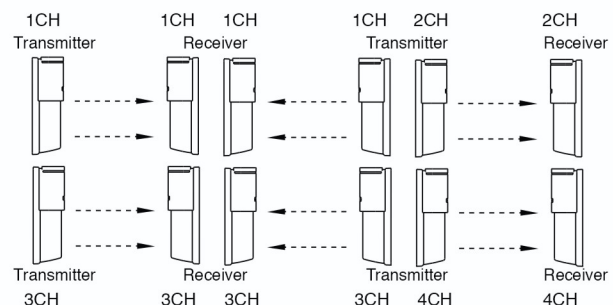
●Straight Line Protection



(Note 1) For multi-level or straight line protection, adjust the optical axis more accurately with a tester, in addition to correct selection of frequency channel.

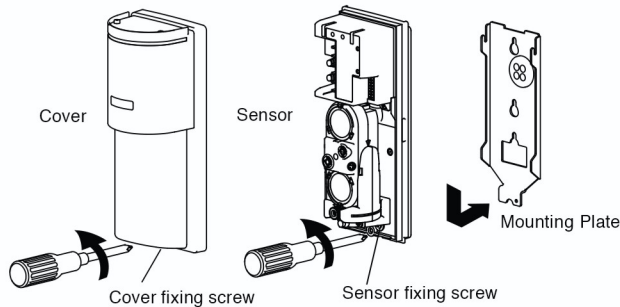
(Note 2) For multi-level protection, use the photoelectric beam sensors of the same model number for the upper and lower sensors.

●2Level Straight Line Protection

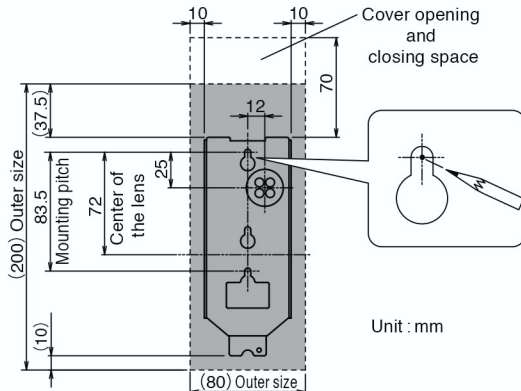


The mounting plate of this product is the same size as PB-****TE** series,
so it can be used as is when replacing the cover if there is enough space to open and close the cover.

- 1 • Loosen the cover fixing screw and remove the cover.
• Loosen the sensor fixing screw and remove the Mounting plate from the sensor unit.



- 2** • Apply the Mounting plate to the mounting position, secure the space indicated by the broken line, and then mark the screw positions. mark the screw positions.



- 3 • Tighten the self-tapping screws for installation (2 pieces) at the marked locations down to 5 mm under the neck.
- Pass the wiring through the grommet.
- Attach the installation plate and tighten the screws to fix it.

Self-tapping screw
for installation (φ4 x 20)

Grommet

Grommet
necessary for
insect- and
drip-proof function

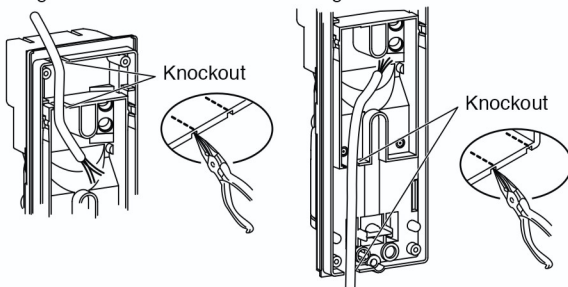
※When using wire with an external diameter of $\phi 3$ to $\phi 6$ mm(0.12" to 0.24"), push it into the recess to break the membrane.

*When using wire with an external diameter exceeding $\phi 6$ mm (0.24"), cut off the part shown by the broken lines in the figure below with a nipper or the like. Be sure to apply caulking to the cut section to secure insect-proof.

For exposed wiring, break the knockouts on the back in two places, route the cable as shown in the figure, and fix it to the Mounting plate.

Wring from above

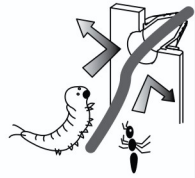
Wiring from below



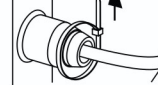
- Cut the cut bush with a smaller diameter than the diameter of the wire.
- Pass the wire through the cut bush.
- Fix the sensor to the Mounting plate with the sensor fixing screw.

Cut bush

necessary for
insect- and
drip-proof function



※If there is a gap between the wire and the cut bush, tighten it with a binding band.

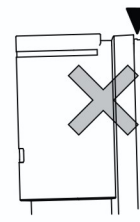
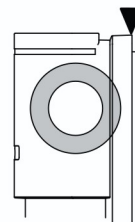


- 5** • Perform wiring referring to “**4 WIRING**” and adjust the optical axis referring “**5 OPTICAL AXIS ADJUSTMENT**”.

- Attach the cover to the sensor unit and fix it with the cover fixing screw.

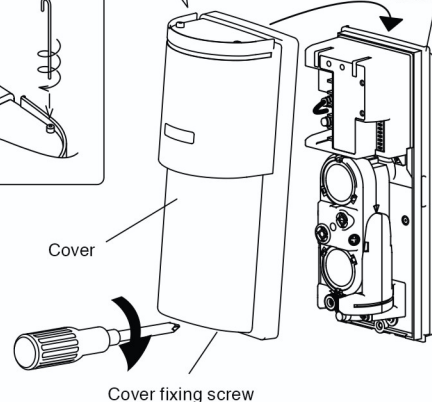
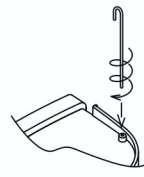
Parallel

Not parallel



Use anti-bird spikes(optional), if necessary.

Mounting Base

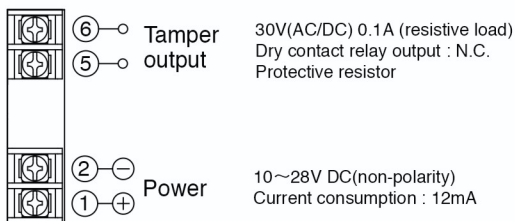


After fixing the cover, make sure it is attached correctly to be parallel to the mounting base.

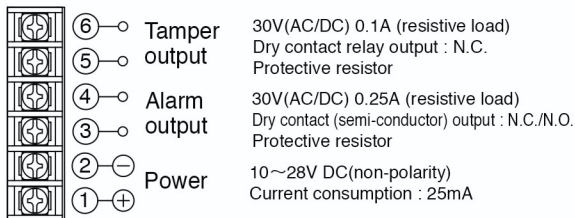
4 WIRING

TERMINAL POSITION AND RATING

<Transmitter>



<Receiver>



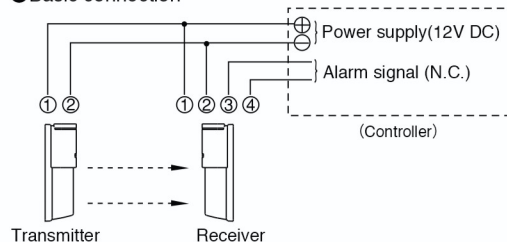
WIRING DISTANCE BETWEEN SENSOR AND POWER SUPPLY

voltage	DC12V	DC24V
wire size		
φ 0.65mm	250	1,800
φ 0.90mm	450	3,400
φ 1.20mm	850	6,200
φ 1.60mm	1,500	11,000
φ 2.00mm	2,400	17,200

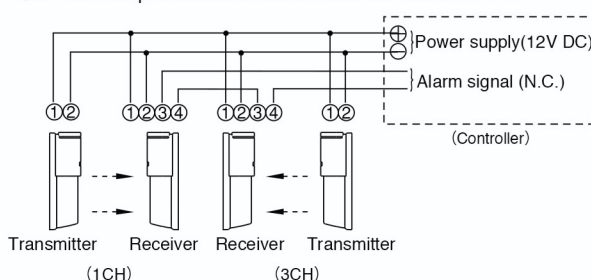
[m]

WIRING SYSTEM DIAGRAM (WIRING DIAGRAM)

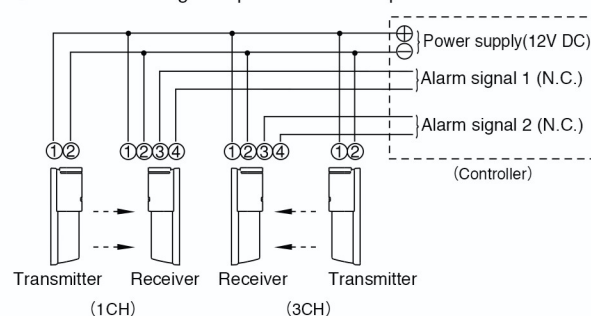
● Basic connection



● When multiple sensors are connected to the same line



● When connecting multiple sensors to separate lines



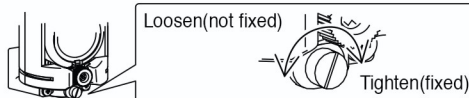
5 OPTICAL AXIS ADJUSTMENT

By accurately aligning the optical axis, a protection line with sufficient sensitivity margin can be created, reducing the malfunctions. Be sure to adjust the optical axis.

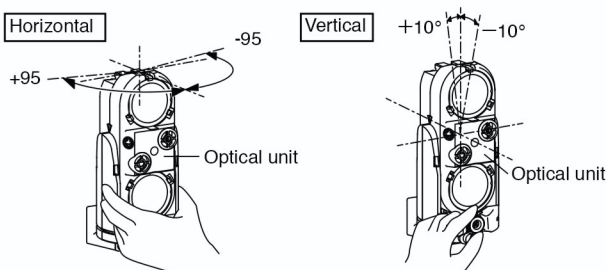
ADJUSTMENT METHOD

When the cover is removed, the lower beam is not transmitted and received for easier optical axis adjustment. It doesn't matter if the lower beam is interrupted by a hand or tool.

1 Loosen the horizontal rotation lock screw.



2 Adjust the horizontal rotation base and vertical angle adjustment screw to make the optical units of the opposing sensors face each other.



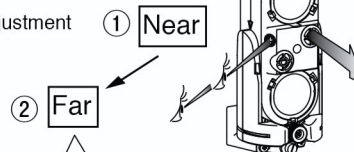
ALIGNMENT MECHANISM

- 1 Turn on the power with the cover removed. Be sure to select the same channel for the transmitter and receiver facing each other (Factory setting : 1CH)
- 2 Look through the viewfinder on the optical unit and adjust the horizontal and vertical directions so that the opposing sensor appears in the center of the ring.

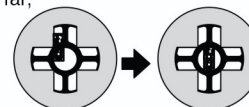
When looking at the viewfinder from near, the view is as the diagram on the right. Adjust the angles so that the target color appears in the center of the ring.



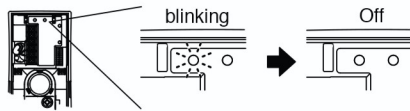
※Order of adjustment
①→②



When looking at the viewfinder from far, the view is as the diagram on the right. Adjust the angles so that the target color appears in the center of the ring.



- 3 Continue adjustment until the sensitivity attenuation LED on the receiver goes out.



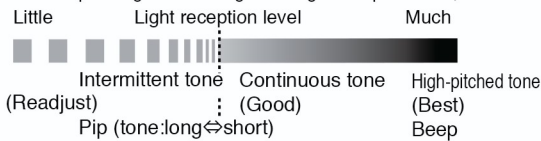
- 4 For adjustment with higher accuracy, make fine adjustment of the optical axis by either "sound check" or "monitor output voltage".

SOUND CHECK *equipped only on the receiver

Set the sound check of the receiver to "ON" (function setting switch No. 4).

When the optical axis is roughly aligned, the beep sound is made. Fine-tune the horizontal and vertical angles of the transmitter and the receiver until the pitch of the beep reaches its highest.

*Pitch of the beep changes according to the light reception level, as below.



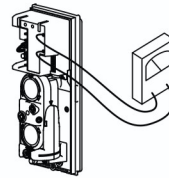
MONITOR OUTPUT VOLTAGE *equipped only on the receiver

Insert a commercially available tester into the monitor jack of the receiver.

Fine-tune the horizontal and vertical angles of the transmitter and the receiver until the monitor output voltage reaches its highest.

Insert a commercially available tester into the monitor jack of the receiver.

Fine-tune the horizontal and vertical angles of the transmitter and the receiver so that the monitor output voltage gets the highest.



Monitor output voltage	Reception sensitivity
More than 1.6V DC	Best
1.4 to 1.6V DC	Good
Less than 1.4V DC	Readjust

Adjust the monitor output voltage as high as possible to improve environmental resistance.

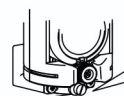


- The monitor jack is polarized.
- Check the polarity of the tester pins before inserting them.
- Use a tester with an internal resistance of 100Ω or more.

- 5 After confirming the specified value by fine-tuning each optical axis, tighten the horizontal rotation lock screw so that the optical unit does not rotate.



- Be careful not to overtighten the screw when tightening it with a tool.
- Loosen the screw beforehand before readjusting.



Loosen(not fixed) Tighten(fixed)

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

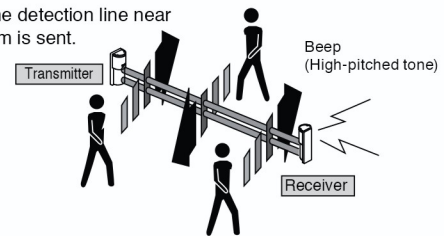
After adjusting the optical axis, attach the cover to the transmitter and receiver. Next, interrupt the detection line near the sensor or near the center of the detection line, and check that a beep* sounds when an alarm is sent.



*When the sound check function is set to ON, and the cover is closed, the unit enters the walk test mode. (activated for approximately 5 minutes after the cover is closed.) The beep sounds in synchronization with alarm output.



Be sure to check that the alarm signal is received on the alarm control panel as well.



7 SENSOR FUNCTIONS

This section describes the functions of this sensor to be set for correct operation. Set the function referring to the explanation below.

SENSITIVITY ATTENUATION DISPLAY

*equipped only on the receiver

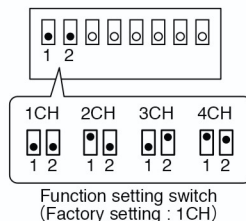
When the amount of received light is insufficient, the alarm/sensitivity attenuation LED blinks to notify you that inspection is required.

MODULATION FREQUENCY CHANGEOVER

*equipped on the transmitter and the receiver

Each channel has its own frequency to prevent mutual interference or wraparound of the photoelectric beams.

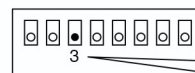
Set corresponding transmitters and receivers to the same channel



PROTECTION DISTANCE CHANGEOVER

*equipped only on the transmitter

By setting the appropriate beam power according to the protection distance, it is possible to prevent wraparound and/or spill-over of the beams.

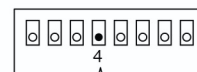


Function setting switch (Factory setting : 30m)

Setting	Corresponding protection distance
60m 3	30m ~ 60m
30m 3	~ 30m

SOUND CHECK *equipped only on the receiver

You can check status of the beam reception or the alarm operation on the receiver by sound tone.



OFF ON
4 4

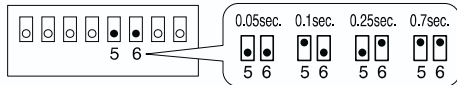
Function setting switch (Factory setting : OFF)

Item	Operation (status)	Other settings
Beam reception level	Beam reception level can be checked by the sound tone. (The tone pitch becomes higher as the light reception level increases.)	While cover on the receiver is removed.
Walk test mode	Beep sound is generated according to the alarm output. (Activated approximately 5 minutes after cover closed.)	SOUND CHECK FUNCTION "ON"

RESPONSE TIME ADJUSTMENT

※equipped only on the receiver

The interruption time of the detection can be adjusted.
(Refer to the diagram and set the response time according to the interruption time of the object to be detected.)



Function setting switch (Factory setting : 0.05sec.)



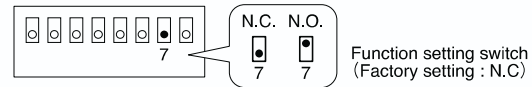
《Caution》

- ① If the interruption time is shorter than the set response time, the obstructing object will not be detected.
- ② In case a large object fluttering in the wind (bird, newspaper, cardboard, etc.) may obstruct the optical axis, set the response time longer, considering the conditions of the installation location.
(Be careful not to set the response time too long, which may cause non-detection of the intruder.)

ALARM OUTPUT CHANGEOVER

※equipped only on the receiver

Alarm output is selectable, whether N.C. or N.O.



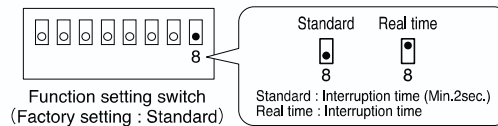
Function setting switch (Factory setting : N.C)

ALARM OUTPUT OPERATION CHANGEOVER

※equipped only on the receiver

Alarm output operation is selectable, whether Standard or Real time.

! When setting to "real time", be sure to check the input receiving time of the connected controller, etc. If it is not compatible, normal operation may not be possible.



Function setting switch (Factory setting : Standard)

Standard Real time
8 8
Standard : Interruption time (Min.2sec.)
Real time : Interruption time

8 TROUBLESHOOTING

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

Status	Cause	Action
Transmission LED does not light (cover is open)	(1) No power supply (2) Wiring failure, broken wire, or short-circuit	(1) Check the power wiring (2) Connect wiring correctly
Alarm/Sensitivity attenuation LED does not light even if the photoelectric beam is interrupted	(1) No power supply (2) Wiring failure, broken wire, or short-circuit (3) Photoelectric beam is reflected by some object and entering the receiver (4) Two levels are not interrupted simultaneously (5) Interrupted for shorter time than set response time	(1) Check the power wiring (2) Connect wiring correctly (3) Remove reflective objects, change the installation place or reorient optical axis (4) Ensure that all the beams are interrupted at the same time (5) Set the response time for a shorter time
Alarm/Sensitivity attenuation LED blinks without alarm output	(1) Optical axis misaligned (2) Presence of objects between the transmitter and the receiver (3) Dirt on the cover or lens of the transmitter and the receiver	(1) Readjust the optical axis (2) Remove objects (3) Clean with a soft cloth
Alarm/Sensitivity attenuation LED does not go out (Alarm output does not stop)	(1) Optical axis misaligned (2) Presence of objects between the transmitter and the receiver (3) Dirt on the cover or lens of the transmitter and the receiver (4) Different frequency channel is set for the transmitter and the receiver	(1) Readjust the optical axis (2) Remove objects (3) Clean with a soft cloth (4) Match the frequency channel
Intermittent alarm signal is output	(1) Incorrect wiring (2) Fluctuations in power supply voltage (3) Obstruction between transmitter and receiver (plants, etc, swaying in the wind) (4) Wiring of the transmitter/receiver is located near a power line. (5) Unstable installation of the sensor (6) Dirt on the cover or lens of the transmitter and the receiver (7) Optical axis misaligned (8) Large bird or cat may obstruct the beams	(1) Connect wiring correctly (2) Ensure appropriate power supply voltage (3) Remove obstruction (4) Change wiring route (5) Firmly secure the sensor (6) Clean with a soft cloth (7) Readjust the optical axis (8) Set the detection response time slightly longer (except places where intruders can run at full speed)

Maintenance

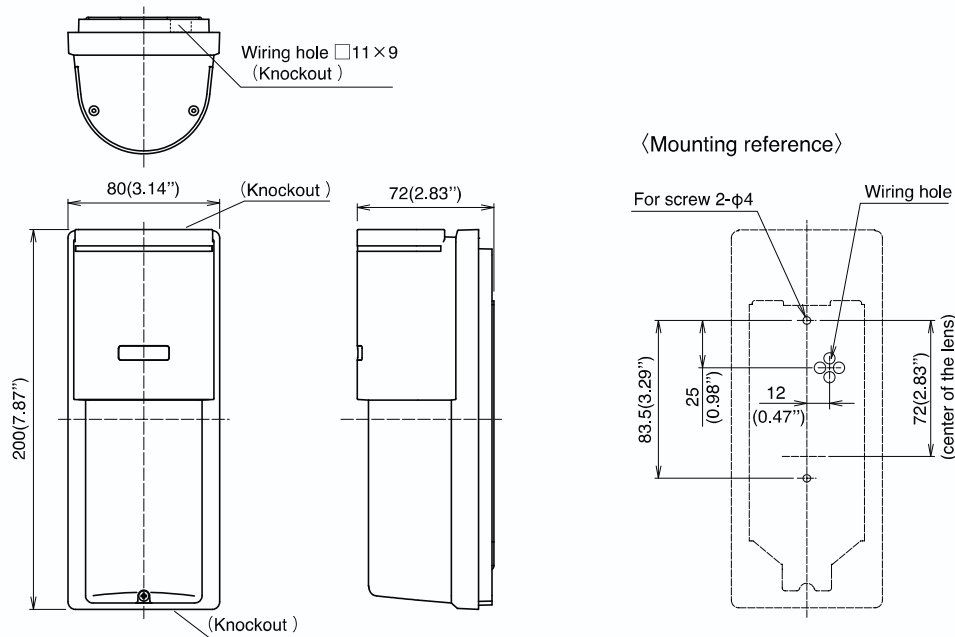
- To clean the device, use a soft, wet cloth and then wipe off any water drops.
- If the device is particularly dirty, dip soft cloth in water that contains a weak neutral detergent. Wipe the device gently with the cloth, then wipe off any detergent that remains. Do not use substances such as thinner or benzene. (The plastic parts may be deformed, discolored or deteriorated.)
- Perform operation checks on a regular basis.

9 SPECIFICATIONS

Model	PB-60TX
Detection system	Near infrared pulsed beam interruption system (TR-RE 2 beam simultaneous interruption)
Protection distance	Outdoor 60m (200') or less
Distance margin (maximum arrival distance)	10 times 600m (2000')
Protection distance setting	30m (100'), 60m (200') (2 distances selectable)
Response time	0.05sec., 0.1sec., 0.25sec., 0.7sec. (4-level changeover)
Power supply voltage	10~28V DC (non-polarity)
Current consumption	37mA (max.)
Alarm output	Dry contact(semi-conductor) output : N.C./N.O. selectable • Contact capacity : 30V (AC/DC) 0.25A max. (Resistive load) Protective resistor • Contact operation : Standard/Real time selectable (Dip switch) Standard : Interruption time (Min. 2sec.) Real time : Interruption time
Tamper output	Dry contact relay output : N.C. • Contact capacity : 30V (AC/DC) 0.1A (resistive load) Protective resistor • Contact operation : Activated when cover is detached
Transmission LED	Red LED (Transmitter) : ON when powered (when the cover is open)
Alarm/sensitivityattenuation LED	Red LED (Receiver) : Lights when an alarm is output/Blinks when beam is attenuated
Functions	Modulation frequency selectable, Tamper, Response time adjustment, Monitor jack, Sound check
Beam adjustment	Horizontal:±95° Vertical:± 10°
Ambient temperature	-25°C to+60°C (-13°F to+140°F) (No freezing or condensation)
Mounting position	Outdoor, Indoor IP 55
Wiring	Terminals
Weight	Transmitter : 380g (13.1oz) (excluding batteries) Receiver : 400g (14.1oz) (excluding batteries)
Appearance	Cover : Resin (Wine red) Base : Resin (Black)

*Specifications and design are subject to change without prior notice.

10 EXTERNAL DIMENSIONS Unit: mm (inch)



■Option : Pole attachment BP-60A

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 Acts of God (including inductive surge by lightning), 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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