



# PHOTOELECTRIC BEAM SENSOR [INTELLIGENT]

## INSTRUCTION MANUAL

PB-IN-50HF OUTDOOR 165' (50m) INDOOR 330' (100m)  
 PB-IN-100HF OUTDOOR 330' (100m) INDOOR 660' (200m)  
 PB-IN-200HF OUTDOOR 660' (200m) INDOOR 1320' (400m)

Thank you for purchasing our "intelligent" quad photoelectric beam. This unit will provide long term dependable service when properly installed. Please read the Instruction Manual carefully for correct and effective use.

**Please note:** This sensor is designed to detect intrusion and initiate an alarm; it is not a burglary-preventing device. TAKEX is not responsible for damage, injury or losses caused by accident, theft, Acts of God (including inductive surge by lightning), abuse, misuse, abnormal usage, faulty installation of improper maintenance.

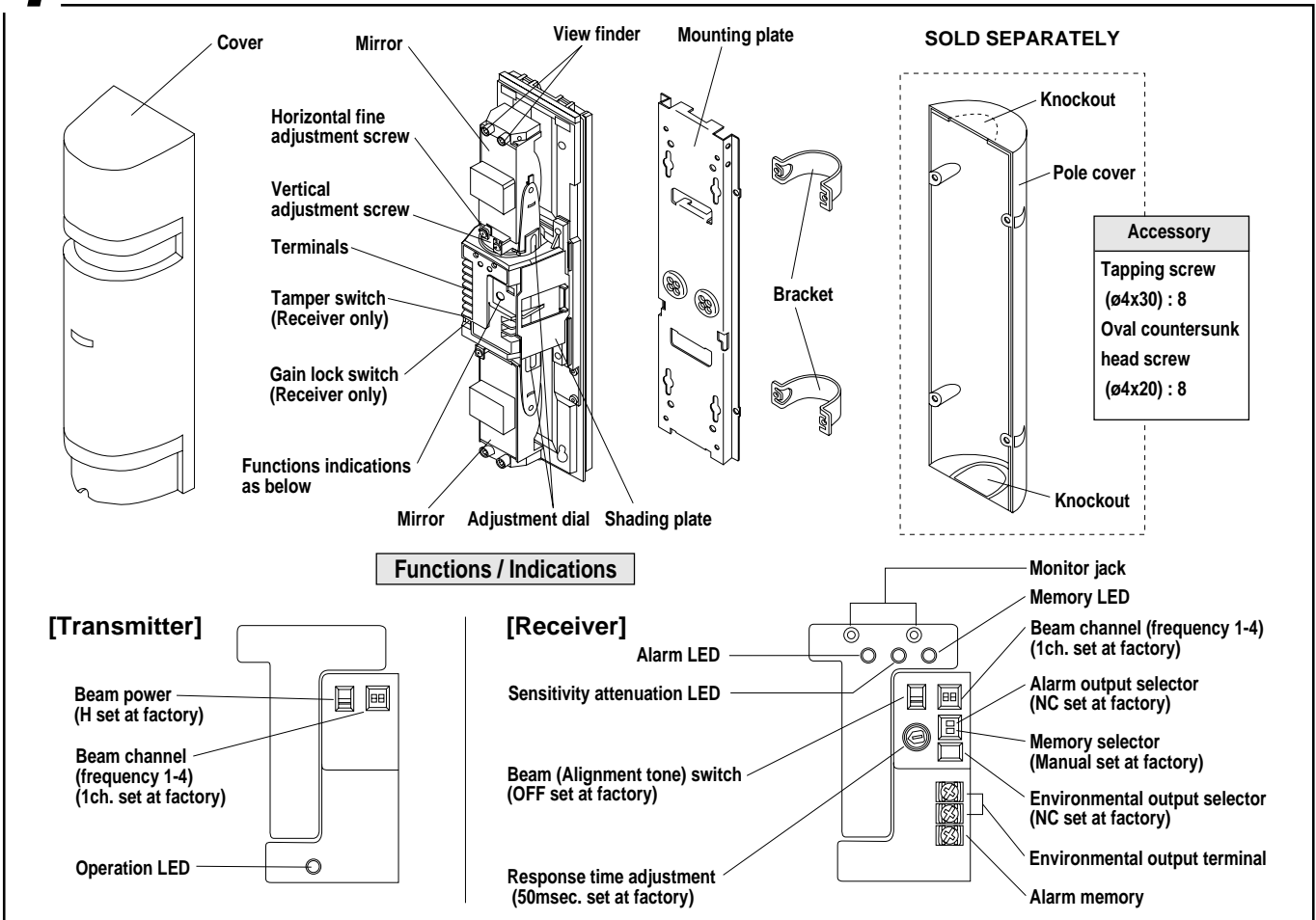
## FEATURE

The PB-IN-HF series beams are equipped with many features, which provide a wide choice of field selectable options. These options result in considerable flexibility for a variety of application requirements. The features are;

- Four synchronised beams**  
 4 beams are "and-gated" which helps to prevent false alarms from flying debris and small animals.
- High power infrared**  
 The active infrared transmission is exceptionally strong with a maximum arrival distance ten times greater than the specified protection distance.
- Four frequency selections**  
 4 separate choices of frequency avoids cross-talk in stacked or long linear installations. Allows stacking of Transmitters or Receivers all on one side.
- Beam transmission strength selection**  
 2 levels of beam transmission strength, which can be set to suit the protection distance.
- Auto-gain lock**  
 Optimal sensitivity gain is automatically set at any coverage distance up to the maximum protection distance. (Audible tone indicates setting is completed.)
- Environmental module**  
 Environmental trouble signal is sent when beam reception level is reduced below an acceptable level.
- Programmed AGC function**  
 Sensitivity is automatically increased in bad weather to contend with fog, rain, or frost.
- Alarm memory indicator**  
 Alarm memory LED located on Receiver can be manually reset (at sensor) or remotely controlled via panel.
- Audible signal for alignment**  
 An alignment tone aids in quick set-up of beams for electrical measurement of alignment.
- Other features**  
 Monitor output, Response time changeover, Tamper output.

## 1 PARTS DESCRIPTION

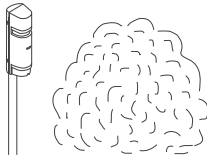
The package contains the following items. Please check them upon opening to ensure all are included. (Pole covers sold separately, part number BP200F)



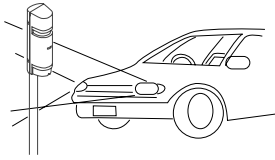
# 2 CAUTIONS

Position the sensor with consideration to installation site, installation height and protection distance for effective use.

## 1) DON'T'S



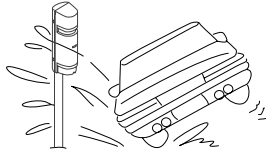
- Do not install in a site where beam may be interrupted by trees or plants, consider seasonal changes.



- Avoid strong light from sun, automobile headlights etc. shining on transmitter or receiver (Avoid light in a direct path of  $\pm 2^\circ$  of optical axis.)

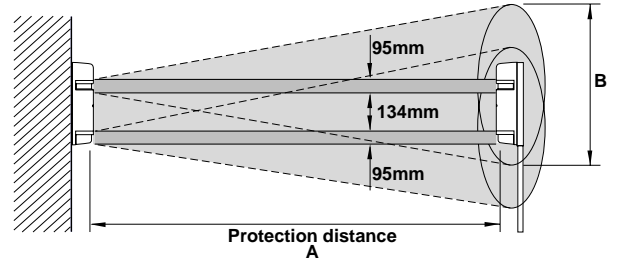


- Do not install the unit on unsteady surfaces.



- Do not install in places where units may be splashed continuously by dirty water or direct sea spray. (Causes dirt or salt build-up on enclosures.)

## 2) Installation height and protection distance



- In most cases, the beam should be installed at a height of 27.5" to 35.5" (70cm-90cm).
- Take into consideration the beam spread of each model type to avoid potential reflection from ground surface or nearby objects.

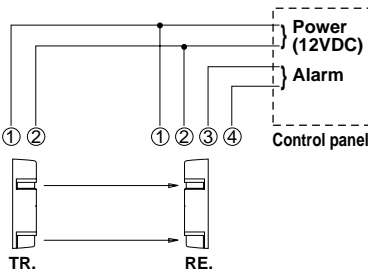
	A	B
PB-IN-50HF	165' (50m) or less	4' (1.2m)
PB-IN-100HF	330' (100m) or less	8' (2.4m)
PB-IN-200HF	660' (200m) or less	16' (5.0m)

# 3 WIRING

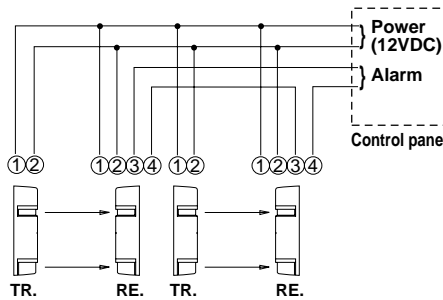
Connecting power to both transmitter and receiver, wiring differs depending on number of sensors or number of zones.

Wire size also differs depending on distance between sensor and control panel/power source.

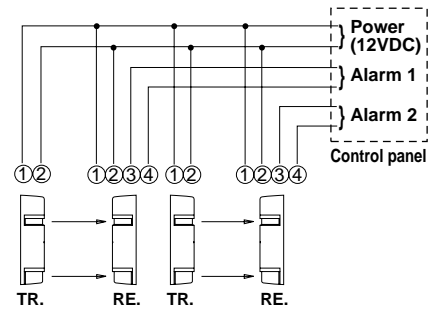
## 1) Standard connection.



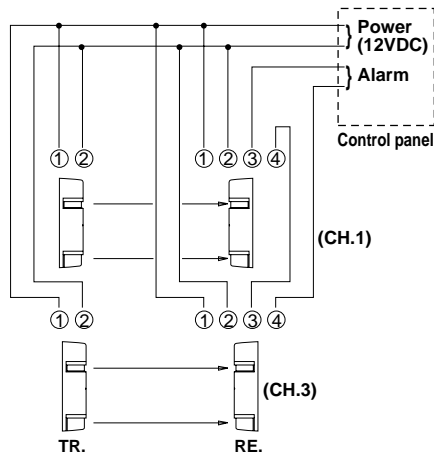
## 2) When 2 or more sensors are connected on the same zone.



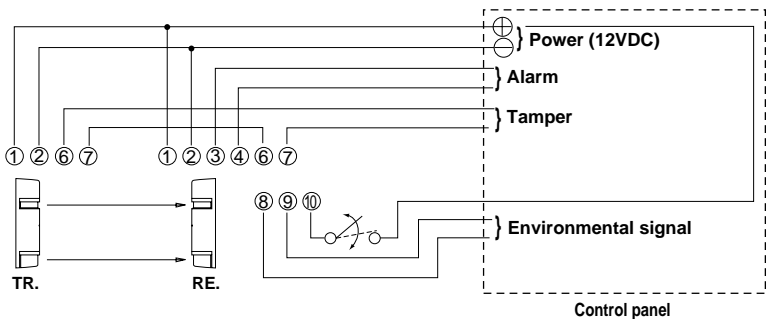
## 3) When 2 or more sensors are on separate zone.



## 4) 2-stacked standard connection.



## 5) When environmental module and manual alarm memory are used.



### [Cautions on wiring]

- Signal output on receiver can not be used independently for the upper/lower optics, only as a set.
- Outdoor wiring should be in PVC if below ground or use direct burial cable. Conduit should be used for above ground wiring.

Note) Refer to 7. FUNCTIONS DESCRIPTION for beam channel (beam frequency selection).

## 6. Wiring Distance between sensor and control panel.

Model Voltage	PB-IN-50HF		PB-IN-100HF		PB-IN-200HF	
	12V	24V	12V	24V	12V	24V
Wire Size Dia.						
AWG22 0.65	394' (120m)	3610' (1100m)	361' (110m)	3281' (1000m)	328' (100m)	2953' (900m)
AWG20 0.80	690' (210m)	6234' (1900m)	624' (190m)	5578' (1700m)	525' (160m)	4921' (1500m)
AWG18 1.00	1017' (310m)	9187' (2800m)	920' (280m)	8203' (2500m)	820' (250m)	7218' (2200m)
AWG17 1.10	1246' (380m)	11156' (3400m)	1116' (340m)	9843' (3000m)	985' (300m)	8860' (2700m)
AWG16 1.25	1640' (500m)	14765' (4500m)	1477' (450m)	13452' (4100m)	1312' (400m)	11811' (3600m)
AWG15 1.40	2198' (670m)	19686' (6000m)	2000' (610m)	18046' (5500m)	1739' (530m)	15750' (4800m)
AWG14 1.60	2756' (840m)	24936' (7600m)	2494' (760m)	22311' (6800m)	2166' (660m)	19686' (6000m)

### Note

- Max. wiring distance when two or more sets are connected is the above value divided by the number of sets.
- The signal line can be wired to a distance of up to approx. 3281' (1000m) with AGW 22 (Dia. 0.65mm) telephone wire.

• When using this product in a Mercantile Burglar Alarm, UL681, tamper switch should be connected to a 24-hour supervisory loop.

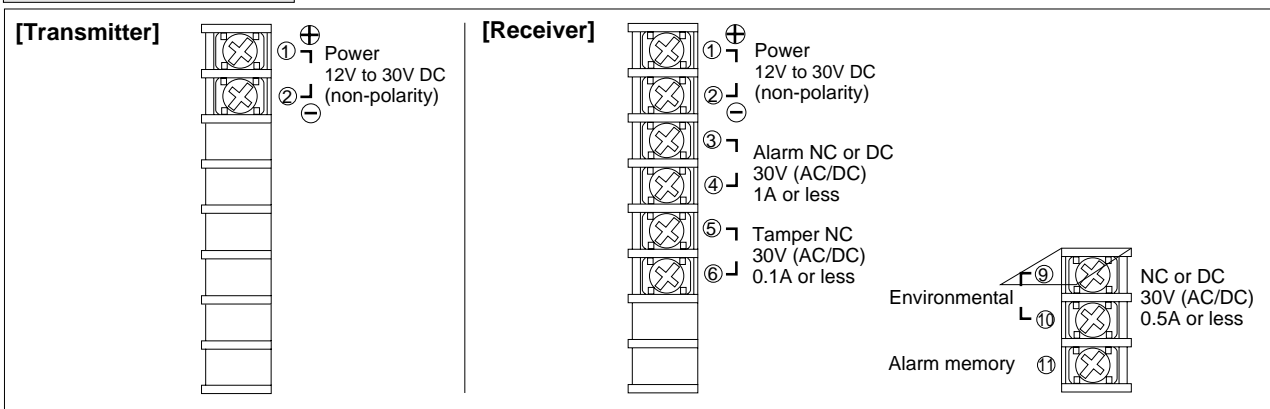
**\*Standby battery** - Be sure the control panel is equipped with adequate standby battery and charging circuit.  
Use 12V (at least) Nicd or lead acid battery with minimum capacity of 0.5AH.

### - Estimated battery life -

No. of pairs	PB-IN-50HF			PB-IN-100HF			PB-IN-200HF		
	Md AA 0.5 AH	Gel Cell 1.0AH	Gel Cell 5.0AH	Md AA 0.5 AH	Gel Cell 1.0AH	Gel Cell 5.0AH	Md AA 0.5 AH	Gel Cell 1.0AH	Gel Cell 5.0AH
1	8 hr.	16 hr.	83 hr.	7 hr.	14 hr.	71 hr.	5 hr.	11 hr.	58 hr.
2	-	8 hr.	41 hr.	-	7 hr.	35 hr.	-	5 hr.	29 hr.
4	-	-	20 hr.	-	-	17 hr.	-	-	14 hr.
8	-	-	10 hr.	-	-	8 hr.	-	-	7 hr.

- Unit should be connected to a listed, class 2 power source capable of providing standby power for a minimum of 4 hours.

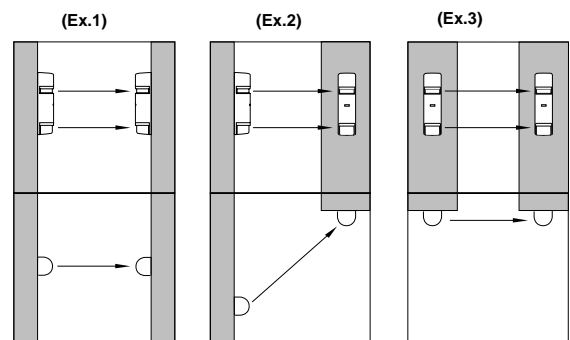
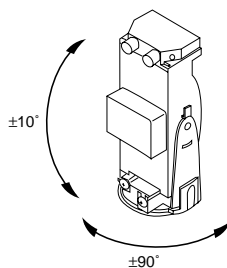
### Terminal arrangement



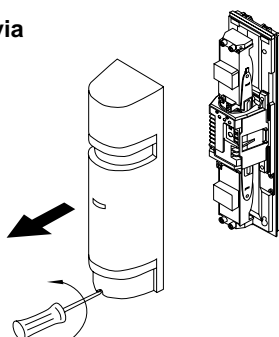
# 4 INSTALLATION

The units can be mounted easily on a pole or flat surface.

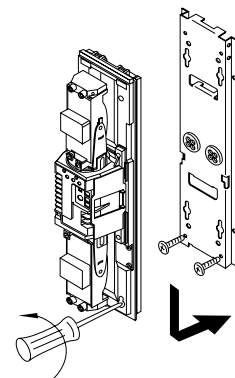
- Direction by rotary mirror. Using the adjustment dial and adjustment screws, the mirrors can move horizontally ( $\pm 90$  degrees) and vertically ( $\pm 10$  degrees) allowing the sensor to work in all directions.



- 1) Remove cover via screw at base of cover.



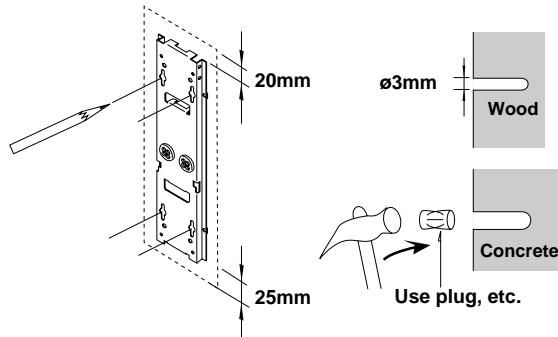
- 2) Loosen screws that fix the sensor body on the mounting plate, and slide the mounting plate downward to detach it.



### 3) Wall mounting

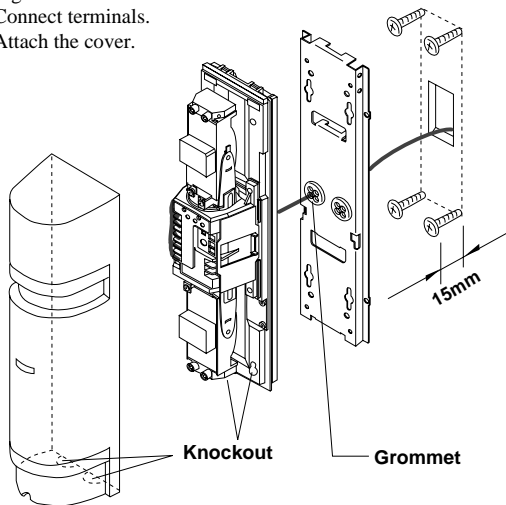
#### (1) Make holes in wall.

- Place the mounting plate on wall as a template for drilling and mark the screw holes. (Allow a space 3/4" (20mm) above the plate and 1" (25mm) below the plate. This will provide easy detachment of the cover after installation.)



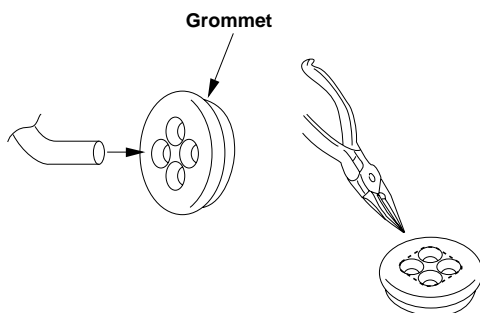
#### (2) Install the sensor.

- Insert mounting screw leaving 1/2" (15mm) exposed.
- Install the mounting plate on exposed screws.
- Pull through wire.
- Tighten screws.
- Connect terminals.
- Attach the cover.



#### (3) The unit can not be installed in an outlet box. But the outlet box can be used for wire-lead.

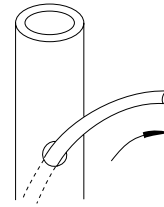
- The grommet is compatible with a wire of  $\phi 3\text{mm}$  to  $\phi 6\text{mm}$  outer dia. When a wire of more than  $\phi 6\text{mm}$  outer dia. is used, cut off the dotted line portion on the below figure by pliers or the like. Do not fail to plug opening of wire hole to prevent insects from entering into the unit.



### 4) Pole mounting

#### (1) Make wiring hole in pole. Pull through wire. Place the pole cap provided on top of pole.

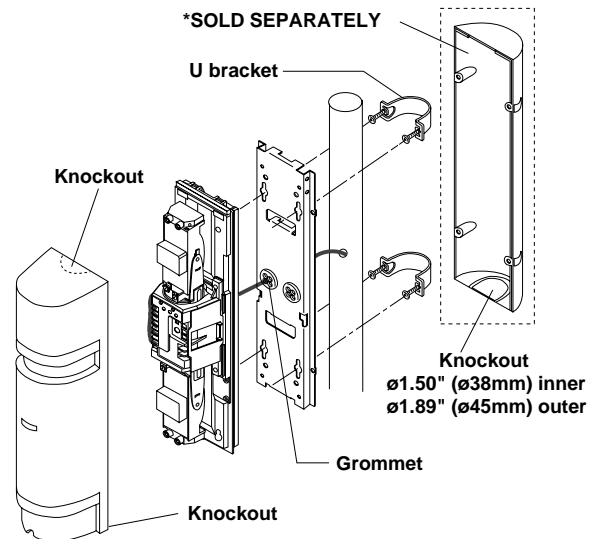
- Unit mounts to a 1.66" - 1.75" O.D. (outside diameter) pole. Use 1.25" I.D. (inside diameter) RIGID CONDUIT or equivalent.



- Drill a 1/4" hole through pole where the PE beam will be mounted for wiring. File all debris and sharp edges around hole to prevent rough edges from damaging wire. A rubber grommet or bushing may be used if desired.

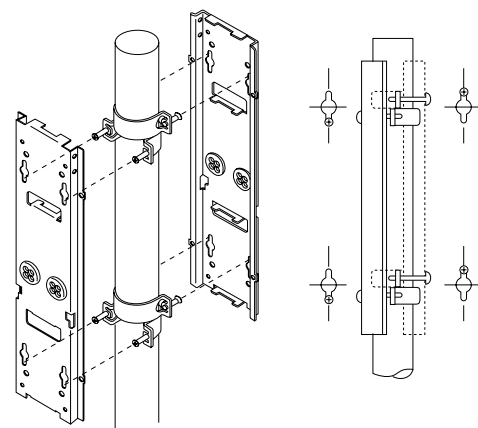
#### (2) Install the sensor on pole.

- Attach U brackets to pole and secure to mounting plate with screws.
- Attach sensor body.
- Pull through wire.
- Connect terminals.
- Attach covers. (Break knockouts on cover and \*pole cover to adapt to pole diameter and configuration.)



#### (3) Pole mounting back to back.

- Attach four U brackets to poles in two pairs, one on top of the other, facing opposite directions. (See illustration.)



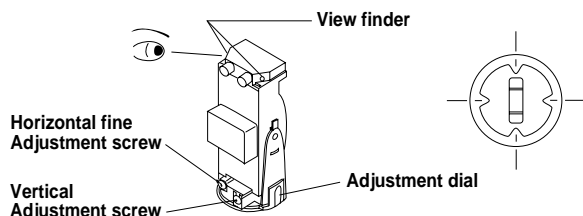
# 5 SET-UP OF FUNCTIONS AND BEAM ALIGNMENT

- 1) Supply power with cover detached.
- 2) Set function options.  
(Refer to 7. FUNCTIONS DESCRIPTION for detailed explanation of each option.)

Location	Functions	Function Switches
TR / RE	Beam channel (frequency)	<input type="checkbox"/> 1 ch. <input type="checkbox"/> 2 ch. <input type="checkbox"/> 3 ch. <input type="checkbox"/> 4 ch.
TR. only	Beam power	<input type="checkbox"/> H <input type="checkbox"/> L
RE. only	'Beep' alignment tone	<input type="checkbox"/> ON <input type="checkbox"/> OFF
	Response time adjustment	<input type="checkbox"/> 50msec. (standard) <input type="checkbox"/> 300msec. <input type="checkbox"/> 700msec. <input type="checkbox"/> Others
	Alarm output	<input type="checkbox"/> NC <input type="checkbox"/> NO
	Alarm memory	<input type="checkbox"/> Auto-reset <input type="checkbox"/> Manual
	Environmental output	<input type="checkbox"/> NC <input type="checkbox"/> NO

## 3) Adjust optical angle.

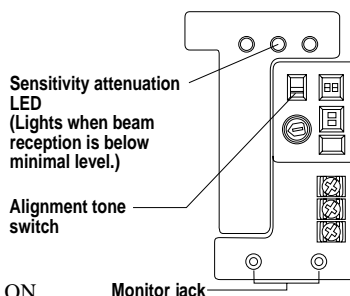
- 1) Look through view finder on either side of transmitter optical unit and move until receiver unit is visible.
- 2) Repeat the procedure for lower optical unit, and then repeat on receiver.



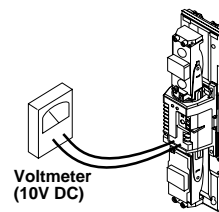
## 4) Fine tuning

Initial beam alignment can be achieved by using the alignment tone indicator.

- 1) Attach the shading plates (stored on sides on both TR/RE) to the lower optics of both TR and RE.
- 2) Turn the receiver alignment tone switch to ON.
- 3) Adjust the optics with the adjustment screws until highest tone is reached. (Note: There will be no sound if the attenuation alignment tone LED is lit.)
- 4) Reverse the procedure, i.e. attach shading plates to upper optics of TR/RE and repeat adjustment.
- 5) After adjustment, replace the shading plates in storage areas of TR/RE.
- 6) Turn the alignment tone indicator to OFF.



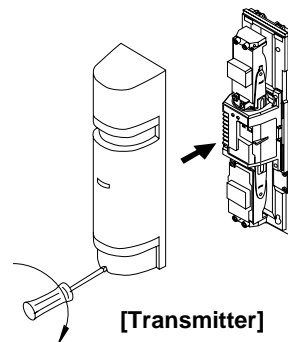
- Beam alignment using voltmeter.  
A precise alignment can be accomplished by using a voltmeter (10V DC). Insert leads from voltmeter in monitor jacks of receiver. Readings for alignment are as follows:



Alignment	Voltage reading
Best	2.7V or more
Good	2.0 to 2.7V
Poor, Re-adjust	2.0V or less

## 5) Attach cover.

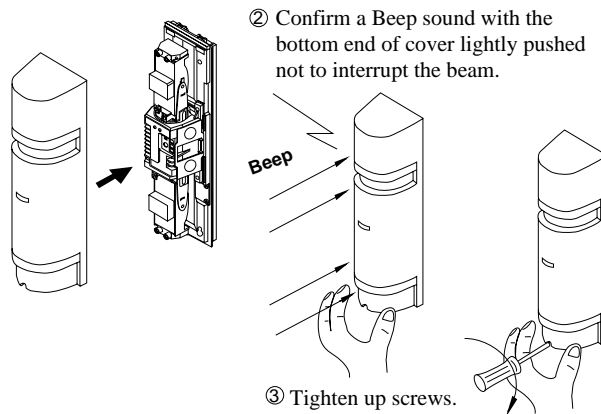
- 1) Attach transmitter cover, first.
- 2) Confirm that receiver sensitivity attenuation LED stays OFF. Place cover in position, but do not secure. A "beep" sound will occur after 5 seconds. After this signal, secure the receiver cover with screws.



- Note
- 1) Sensitivity allowance is automatically set when the beep sound is initiated.
  - 2) If tone alignment switch is left accidentally ON, tone will stop when receiver cover is pre-attached.

## [Receiver]

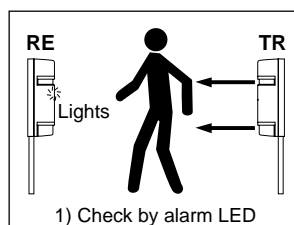
- ① Pre-attach cover.
  - ② Confirm a Beep sound with the bottom end of cover lightly pushed not to interrupt the beam.
  - ③ Tighten up screws.
- 3) If there is a continuous "beep" sound, detach receiver cover and re-adjust referring to section 5 part 3) Auto-gain lock function.



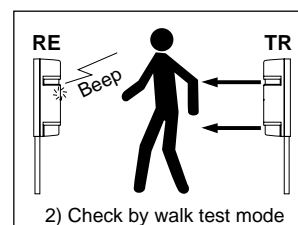
# 6 OPERATION CHECK

After installation, alignment and auto-gain set, test operation by walk testing the beam. Two methods may be used :

- 1) Alarm LED only.
- 2) Alarm LED and sound check via tone alignment switch. If tone alignment switch is set to "ON", tone will stop when cover is replaced but be effective for an audible test of operation for five minutes after auto-gain is locked.



1) Check by alarm LED

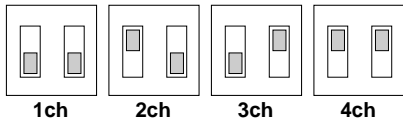


2) Check by walk test mode

# 7 FUNCTIONS DESCRIPTION

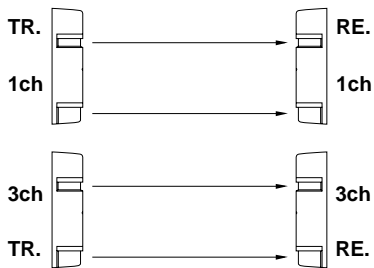
## 1. Four channel frequency selection

The beam pairs may be set at various frequency levels to avoid crosstalk between units which are stacked, in-line, or other configurations which have the potential of spill-over transmission from one beam to another. Set the frequency level as illustrated.

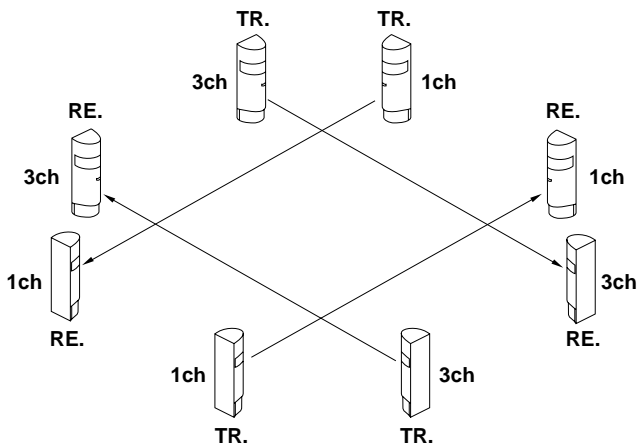


MAKE SURE TRANSMITTER AND RECEIVER OF PAIR ARE SET AT SAME CHANNEL ! Paired TR/RE will not set up unless set at the same channel.

### 2) Double stack protection



### 4) Perimeter protection



- The use of a voltmeter for alignment is advised to ensure highest level of stability.

## 2. Beam power selection

This option allows field selection of the appropriate beam intensity relative to the application. For distance significantly less than the specified protection distance, the beam intensity should be reduced to eliminate potential reflection problems. For zones reaching maximum protection distance, the beam level should be set to the highest level.

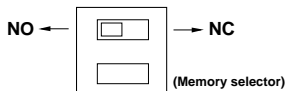
Note: For interior applications where greater chance for reflection occurs, the setting should be at LOW.

Beam power Model	L	H
PB-IN-50HF	82' (25m) or less	Over 82' (25m) to 165' (50m)
PB-IN-100HF	246' (75m) or less	Over 246' (75m) to 330' (100m)
PB-IN-200HF	495' (150m) or less	Over 495' (150m) to 660' (200m)

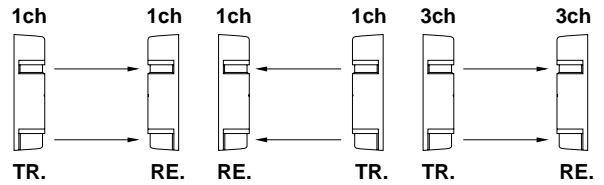
## 3. Alarm output selection

The use at NO alarm output change Alarm output selection switch to NO side.

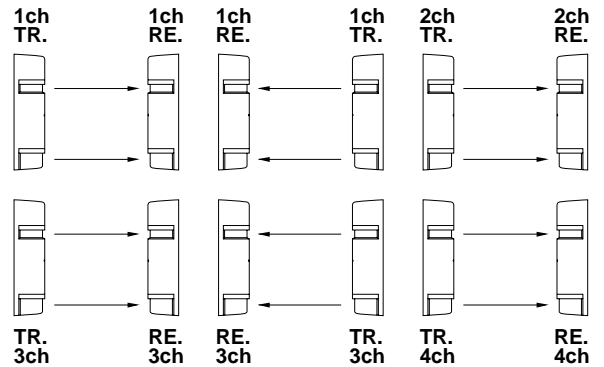
[Alarm output selector]



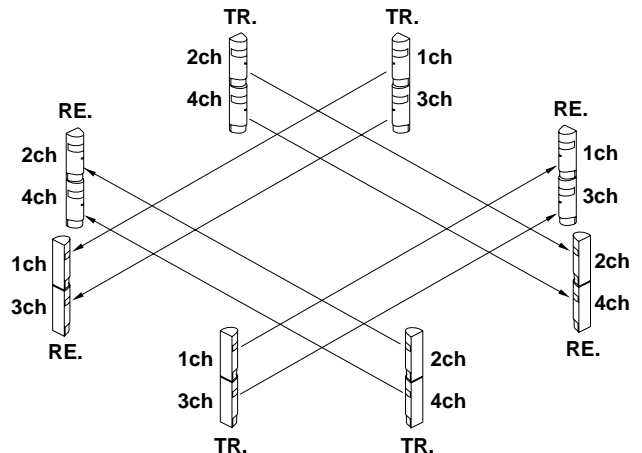
### 1) Linear protection



### 3) Double stacked linear protection



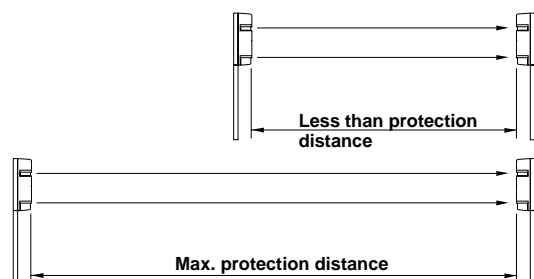
### 5) Perimeter double stacked protection



- Upper and lower beams should be the same model type in stacked configurations.

## 4. Auto-gain lock function

- The auto-gain lock serves to standardize the responsiveness and tolerance level of the units regardless of varying distance in an installation.



The situations above have exactly the same tolerance and responsiveness levels even though the distance are different.

2) A "beep" tone is issued from the receiver approximately 5 seconds after the cover is put into position. This tone indicates the Auto-gain has been set. Refer to the chart below.

Tone	Indicates	Result	Cause	Remedy
One pulse (Beep)	Optimal sensitivity has been set.	OK		
Continuous tone (20 seconds)	Optimal sensitivity can not be set.	NG	1. Beam is interrupted once cover is replaced. 2. Beams are mis-aligned and sensitivity attenuation LED lights.	1. Remove any blockage items or ensure hand is not breaking beam if holding cover in temporary position. 2. Check beam power setting at transmitter with cover attached and re-adjust beam alignment.

- Note 1) A tone is generated regardless of whether "beep" (alignment tone) switch is set to ON or OFF.  
 2) The auto-gain setting is locked in for approximately two weeks even if power is disrupted.  
 3) If the receiver cover is detached while power is supplied or if power is discontinued for longer than two weeks (but cover left in place), the auto-gain automatically reset to maximum sensitivity. (Gain is automatically locked with power re-supplied.)

## 5. Tone indicator

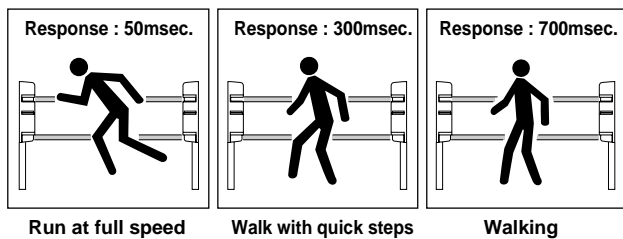
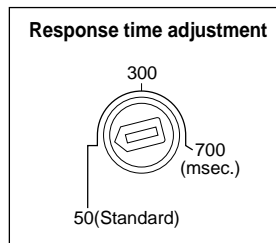
This feature provides audible testing or signals for the following items.

Test / Signal	Alignment tone switch	Other condition	Description
Beam alignment	ON	Receiver cover detached.	• Reception strength monitored. Tone pitch increases as reception improves. (Note : No tone is given if sensitivity attenuation LED is lit or if receiver cover is attached.)
Walk test	ON	For approx. 5 min. after gain is locked.	• Tone is linked to alarm LED. Both trip simultaneously.
Alarm memory	ON	Set to manual memory.	• "Beep" is initiated if alarm condition occurs. (Note : This configuration is not recommended for most security applications. The tone could alert an intruder to his detection.)
Auto-gain lock	ON or OFF	After receiver cover is attached.	• Short tone indicates lock is set. Continuous tone (20sec.) indicates readjustment.

## 6. Response time changeover function

This feature can be used to alert the response time of the beam to best fit the application. Exercise caution in using the 700msec setting. Non-detection of fast moving human could result.

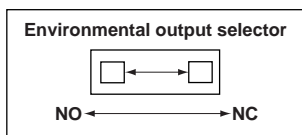
[Note] Turning the pot up voids the UL listing.



## 7. Environmental Module

The environmental signal is initiated if the beam reception level is reduced to approx 50% or more. The module "Watches" for a gradual degradation of the beam reception which is indicative of extremely poor weather conditions. NC or NO signal output is selectable.

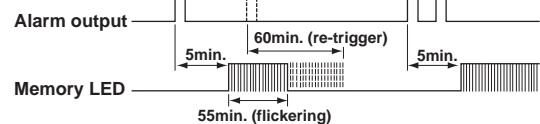
[Contact capacity 30V (AC/DC) 0.5A or less]



## 8. Alarm memory function

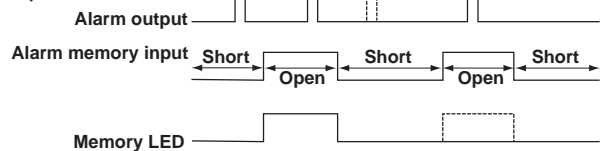
The alarm memory LED indicates which sensor has triggered when two or more sensors are placed on a zone. An audible tone in addition is an optional selection. Reset can be automatic or manual.

### 1) Auto-reset



- The memory LED will light five minutes after an alarm signal and then continue to flicker for 55 minutes before returning to normal mode. If additional alarm signals are triggered, the process repeats.

### 2) Manual



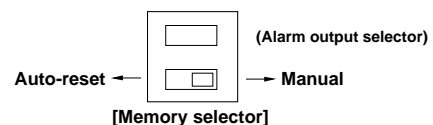
### Beep Sound at beam interruption (Alignment tone ON)

- The memory LED will light with the reset button switched over. The memory is reset manually via a reset button open. Reset button can be located in any convenient location on premises.

### 3) Tone alarm with LED

If an audible signal is desired in conjunction with the memory LED, turn alignment tone switch to ON.

(Note : If alarm memory function is not used, set the memory selector to "manual" and leave receiver terminal 11 unconnected.)



# 8 TROUBLESHOOTING

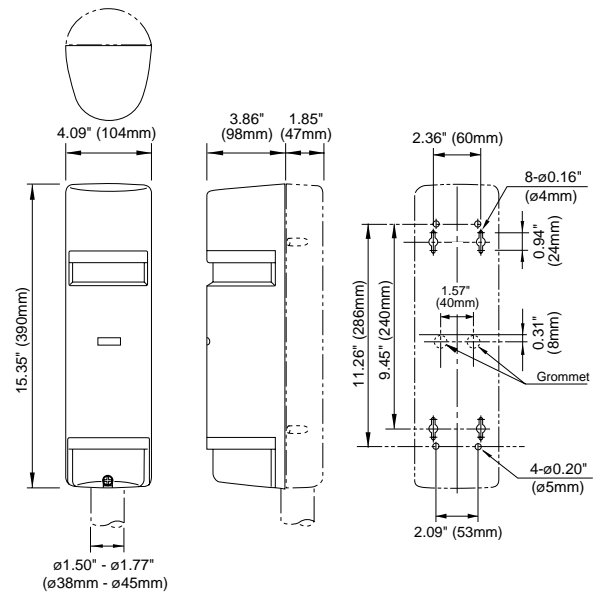
Symptoms	Possible cause	Remedy
Operation LED does not light	<ol style="list-style-type: none"> <li>1. Disruption of power or inadequate power</li> <li>2. Bad wiring connection or broken wire, short</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct power source</li> <li>2. Check and correct wiring</li> </ol>
Receiver Alarm LED does not light when the beam is broken	<ol style="list-style-type: none"> <li>1. Disruption of power or inadequate power</li> <li>2. Bad wiring connection or broken wire, short</li> <li>3. Reflection of beam is flooding receiver and sent into the receiver</li> <li>4. Four beams are not broken simultaneously</li> <li>5. Beam interruption time is shorter than response time</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct power source</li> <li>2. Check and correct wiring</li> <li>3. Remove reflecting object. Set beam power to Low. Contact TAKEX for further remedies</li> <li>4. Ensure all beams are broken at same time</li> <li>5. Adjust response time</li> </ol>
Receiver Alarm LED stays on	<ol style="list-style-type: none"> <li>1. Alignment is off</li> <li>2. Shading object between transmitter and receiver</li> <li>3. Optics of units are soiled</li> <li>4. Frequency channel setting on transmitter does not match with that on receiver</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and adjust</li> <li>2. Check site/remove any possible obstacles</li> <li>3. Clean the optics with a soft cloth</li> <li>4. Readjust to be the same channel</li> </ol>
Intermittent alarm	<ol style="list-style-type: none"> <li>1. Bad wiring connection</li> <li>2. Change of supply voltage</li> <li>3. Shading object between transmitter and receiver</li> <li>4. The wiring of power machine is located nearby transmitter and receiver</li> <li>5. Stabilise</li> <li>6. Optics of units are soiled</li> <li>7. Improper alignment</li> <li>8. Small animals may pass through the 4 beams</li> <li>9. Beam power switch is set at L, which does not keep enough sensitivity allowance</li> </ol>	<ol style="list-style-type: none"> <li>1. Check again</li> <li>2. Stabilise supply voltage</li> <li>3. Remove the shading object</li> <li>4. Change the place for installation</li> <li>5. Unstable installation of transmitter and receiver</li> <li>6. Clean the optics with soft cloth</li> <li>7. Check and re-adjust</li> <li>8. Change environments or the place for installation</li> <li>9. Set beam power switch at H and make the unit gain-locked with receiver cover detached</li> </ol>

(Units should be tested on a regular weekly basis)

# 9 SPECIFICATIONS

Model	PB-IN-50HF	PB-IN-100HF	PB-IN-200HF
Detection System	Near infrared beam interruption system (TR. - RE. 4 beams simultaneous interruption)		
Infrared beam	Double modulation pulsed beam by LED		
Protection distance	Outdoor 165' (50m) or less	Outdoor 330' (100m) or less	Outdoor 660' (200m) or less
Max. arrival distance	Tenfold 1640' (500m)	Tenfold 3280' (1000m)	Tenfold 6560' (2000m)
Response time	50msec. to 700msec variable (Standard: 50msec.)		
Power Supply	12V to 30V DC (non-polarity)		
Current consumption	60mA or less at protection (Max. 95mA or less)	70mA or less at protection (Max. 105mA or less)	85mA or less at protection (Max. 120mA or less)
Alarm Output	Dry contact relay output 1c Reset: interruption time + off-delay (Approx. 1.5 sec.) Contact capacity: 30V AC/DC, 1A or less		
Environmental output	Dry contact relay: 1a or 1b (switchover) Contact operation: Output when weather condition gets worse Contact capacity: 30V AC/DC, 1A or less		
Tamper output	Dry contact relay: 1b Contact operation: Output when receiver cover is detached Contact capacity: 30V AC/DC, 0.1 A or less		
Alarm LED	Red LED (receiver) lights when an alarm is initiated		
Sensitivity attenuation LED	Red LED (receiver) lights when beam reception is attenuated		
Functions	Modulated beam frequency selection, Tone indicator, Environmental module, Beam power selection, Alarm memory indication, Programmed AGC. Auto-gain lock function. Monitor jack.		
Beam adjustment	Horizontal: ±90°, Vertical: ±10°		
Ambient temperature	-31°F to + 151°F (-35°C to +66°C)		
Mounting position	Outdoor, Indoor		
Wiring	Terminals		
Weight	Transmitter: 42 oz (1200g)		Receiver : 45.5 oz (1300g)
Appearance	PC resin (wine red)		

# 10 EXTERNAL DIMENSIONS



### Limited Warranty

All TAKEX Products are subject to 5 years warranty. All other warranty periods agreed are subject to a formal written agreement. During the warranty period, TAKEX Europe Ltd. will repair or replace, as its sole option, free of charge, any defective parts returned prepaid. Our warranty does not cover damage or failure caused by Acts of God, abuse, misuse, abnormal usage, faulty installation, improper maintenance, unauthorised customer modifications or any repairs other than those carried out by TAKEX Europe Ltd.



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PBIN50HF-SIG-10/04 (CRI161)

