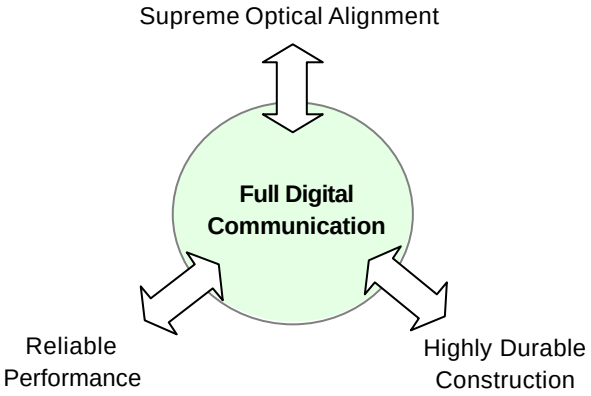
AX-350/650DH MKIII Features

The AX-350/650DH MKIII is the world's first photoelectric detector with full digital communication.

By utilising digital technology, the AX-350/650DH MKIII provide easy and highly accurate optical alignment whilst offering a great reduction of false and missed alarms that can be a problem in hostile outdoor environments. The durability has been improved extensively by advancing Optex's original structure and now meets IP65.



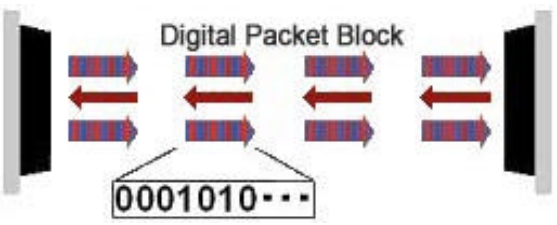
What is the “Full Digital Communication”?

Communication method with conventional detector

Conventional photoelectric detectors exchange only 1 bit data information between the transmitter and receiver. It means that only the information ON or OFF, can be understood by the receiver.

Full Digital Communication with AX-350/650DH MKIII

Using digital packet block communication method, the AX-350/650DH MKIII exchanges huge amounts of information like the address setting, cover open or closed, beam power level, etc… All of this information is communicated between the transmitter and receiver.



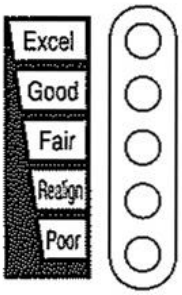
Supreme Optical Alignment

No need for beam blocking plate

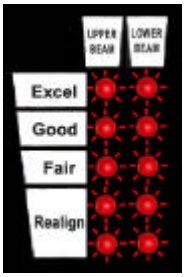
With conventional models, a beam blocking tool has to be used so that the upper and lower beam alignment is carried out independently.

The AX-350/650DH MKIII is equipped with the dual alignment level indicator, which allows adjustment of both the upper and lower beams at the same time.

Conventional model



AX-350/650DH MKIII



The Peak Finder Interface provides the highly accurate optical alignment

With conventional models, it is advisable to use a voltmeter after alignment is completed. This is to check that accurate optical alignment has been achieved.

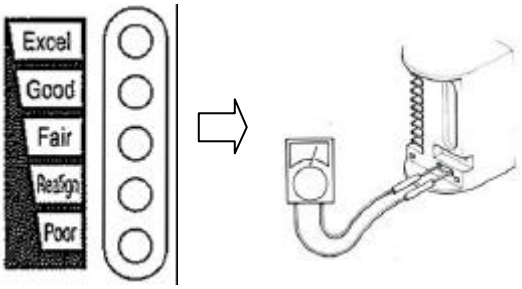
The Peak Finder Interface of AX-350/650DH MKIII allows 2 steps for beam adjustment, "rough tuning mode" and " fine tuning mode".

Once the beam level achieves an “excellent” level during rough tuning mode, it automatically changes to fine tuning mode and the lowest peak of the received beam level is searched for repeatedly. This function makes for highly accurate optical alignment.

[There is no need to check the alignment condition with voltmeter but this function is still available.]

* Please see Information Sheet “AX-350/650DH MKIII Supreme Optical Alignment” for further details of the peak finder interface function.

Conventional model

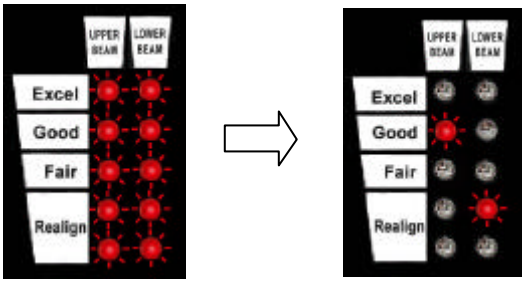


AX-350/650DH MKIII

2 steps beam adjustment with digital technology.

Rough Tuning Mode

Fine Tuning Mode



No need for a screwdriver
Beams can be adjusted by dial control easily

The mirrors can be adjusted with the dial controls so that delicate angle adjustment can be achieved.

Vertical Alignment Dial

Horizontal Alignment Dial

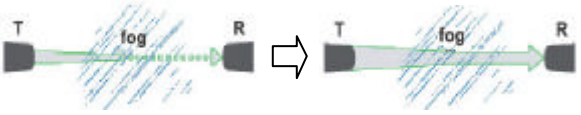
Reliable Performance - Outstanding Functions to Prevent False and Missed Alarms -

ATPC™ (Auto Transmit Power Control)

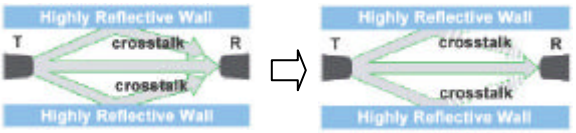
Conventional models output an alarm and alert the users or monitoring station that the environment of the installation site has been de-graded when the beam strength levels are changed substantially by fog, frost, or reflection from surrounding surfaces.

ATPC™(Auto Transmit Power Control) of AX-350/650DH MKIII automatically controls, adjusts, and optimizes the power of beams and maintains optimal performance suitable to the application and environment.

If the received level decreases because of dense fog or heavy rain, the AX-350/650DH MKIII automatically increases the beam power and maintains optimal performance.



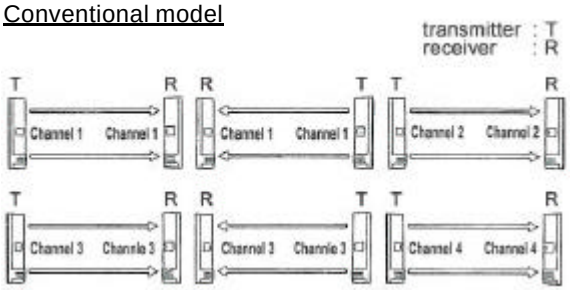
There is a danger of over transmission of infrared energy if beams are installed near walls or floors with reflective surfaces. The new AX-350/650DH MKIII automatically reduces the transmitted beam power and keeps the system stable.



TDM (Time Division Multiplex) Communication

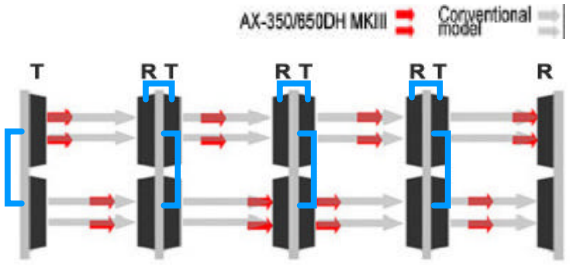
With conventional models, separate frequency channel settings are required when stacking. This is to avoid the false and missed alarms by crosstalk of beams. However this is time consuming and complicated.

Conventional model



AX-350/650DH MKIII does not require the channel settings. This product employs TDM Communication, which sends beams from transmitter to receiver by shifting the timing on the same time axis. By using this method, beams do not overlap each other and false alarms caused by interference can be prevented.

AX-350/650DH MKIII



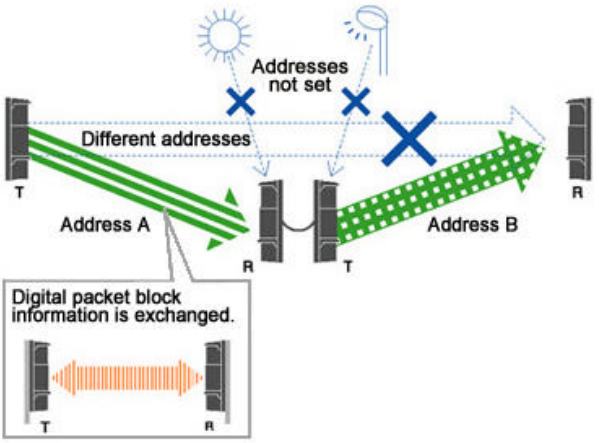
(NOTE)

1. Layout of the AX-350/650DH MKIII is different from conventional models.
2. Setting will be completed by just making a simple connection of synchronous wires.
   - For stacking application with multiple units: connect of synchronous wires with upper and lower transmitters and highest rung of transmitters.
   - For in-line protection with multiple units: connect the synchronous wires between the receiver and transmitter.

Auto Address Recognition

Digital communication exchanges huge packets of information between the transmitter and receiver, but also to prevent crosstalk of beams, individual addresses are assigned to each pair of beams. This eliminates possible crosstalk from other beams or external infrared sources like sun light because each address is unique.

(NOTE)
The assignation of addresses is completed when either transmitter or receiver is closed.

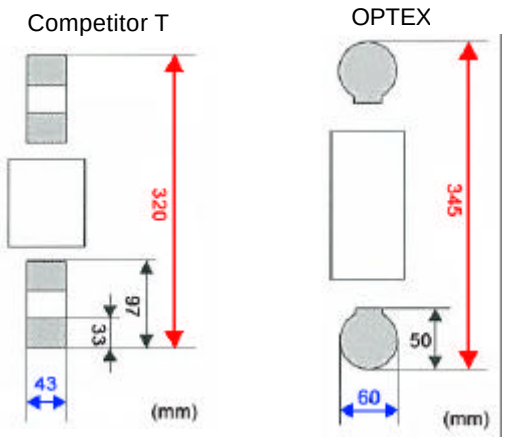


Upper and lower optical spread

Compared with our competitor's Quad Beam, the optical width and upper and lower optical pitch of AX-350/650DH MKIII are designed to be wider.

	OPTEX	Competitor T
optical width	60mm	43mm
optical pitch	345mm	320mm

This optical design prevents false alarms caused by birds and fallen leaves. AX-350/650DH MKIII is equally as good if not better at combating this type of false alarms as Quad Beams.



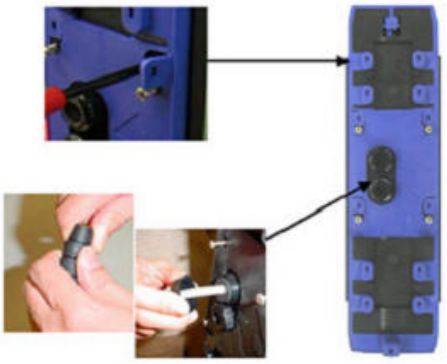
Optical width: Blue
Optical pitch: Red

IP65 Highly Durable Construction

IP65 Structure Resists Water and Dust

Rubber packing is used for all conceivable points where water or dust may penetrate, such as wiring holes, wire ports and the outer chassis. Prevention from dust, bugs and water delivers performance with higher reliability against false alarms and breakdowns.

The chassis and installation plate are integrated to improve the degree of sealing. AX-350/650DH MKIII is ideal for use in severe outdoor environments.



Anti-Frost Hood Cover

With conventional models, the Anti-Frost Design consists of a series of slits on the front cover to prevent frost and to reduce false alarm caused by frost. The inside of the slits is transparent to stop insects and dust getting into the detector. On conventional models this feature is only on the lower beam.

By designing Anti-Frost hoods for both the upper and lower beams, AX-350/650DH MKIII has improved stability against frost forming on either upper or lower beams. This is also effective at preventing water from “flooding” the cover in very heavy rain.

AX-350/650MKII

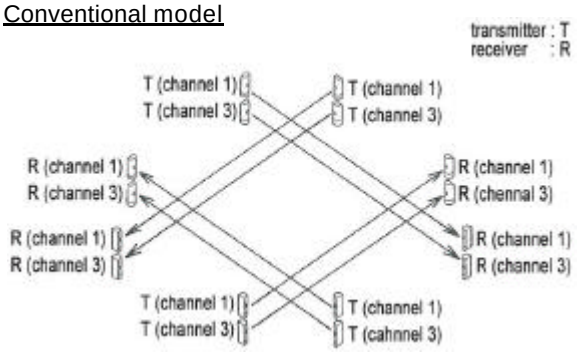
AX-350/650DH MKIII

Stacking Applications

Trouble Free Channel Setting

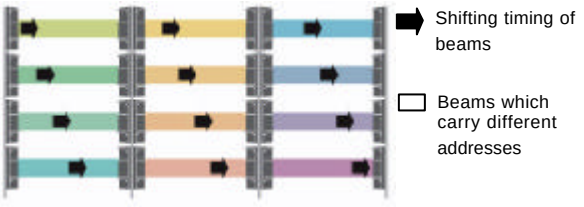
Conventional models require that separate channels are selected when beams are used in stacking applications. This is very complicated and time consuming work.

Conventional model



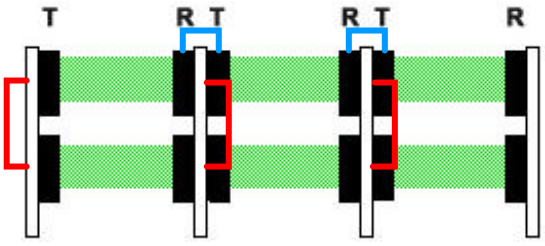
The AX-350/650DH MKIII eliminates the need for channel setting because it eliminates the possible crosstalk from other beams by assigning individual address to each pair of beams (Auto Address Recognition) and sends beams by shifting its timing from transmitter to receiver on the same time axis (TDM communication).

AX-350/650DH MKIII



Trouble free settings can be easily achieved by making use of synchronous wires with upper and lower transmitters and the highest level of transmitters. A maximum of 4 units can be used in a stacking application without crosstalk.

This simple channel setting reduces the costs for installation time and planning of large systems.

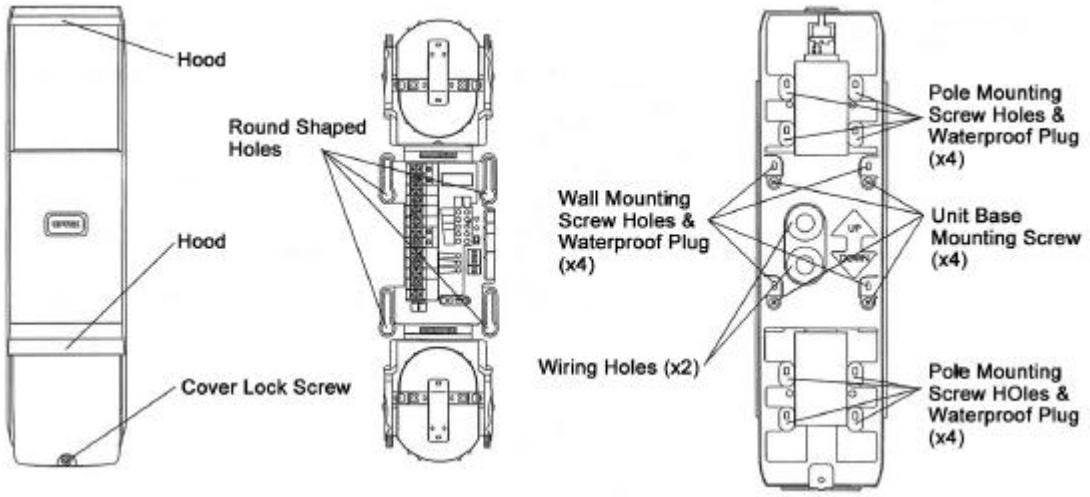


AX-350/650DH MKIII Installation Method

(Step by step guide from opening to closing the units)

How to release the cover and unit base

Parts Identification



Loosen a cover lock screw, take the bottom of the chassis with your thumb, and remove the cover with your other hand, please note this will be very tight due to the rubber seals used to obtain IP65.

(NOTE)
When removing the cover, do not pull it by the Anti-Frost hoods, which may cause damage.

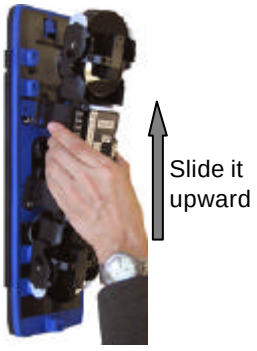
Loosen a cover lock screw

Remove the cover

Loosen the electronic unit base mounting screws (x4) and remove this from the main base by lifting it upwards

(NOTE)
There is no need to undo the unit base mounting screws completely. Just loosen them to remove the electronic base, and reuse them to install again later.

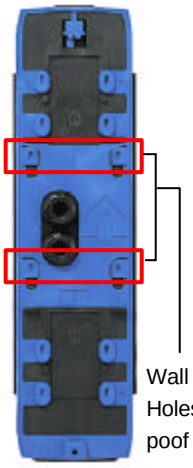
Loosen the four unit base mounting screws



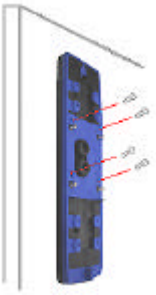
Mounting chassis

■ Wall Mounting

Remove the waterproof plugs (as shown). Fix the base to the wall or other stable surface with the screws provided, once secured re-fit the waterproof plugs to make sure that the integrity of the base is not compromised. Failure to install the plugs correctly could lead to water ingress and damage the electronics module.



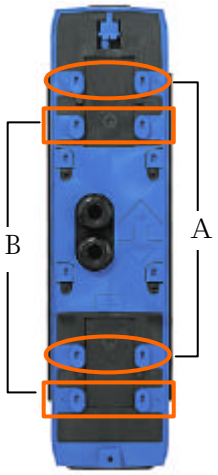
Mounting by self-tapping screws



■ Pole Mounting

For pole mounting, you may use either the holes shown A or B.

Remove the waterproof plugs from the pole mounting screw holes and secure the chassis with U-shaped brackets and screws. After the chassis is mounted on the pole, put the waterproof plug back on to the screw holes. As above failure to install the waterproof plugs may lead to water ingress, which could damage the electronic module.



Mounting by U-shaped bracket

View from font

View from back

■ Two units Installation (back to back)

1. Mount one of the units on the pole under instruction of pole mounting above using either A or B holes (as shown above) provided.
2. Mount the second unit using the opposite holes to the ones used above, for example if set 1 uses holes A then set 2 should use holes B.
3. Secure the chassis with screws and refit the waterproof plugs as described above.

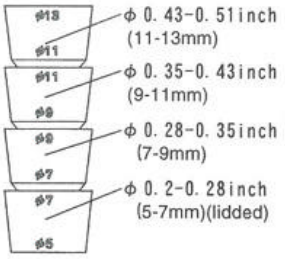
* Using a combination of both A & B holes on opposing units allows the chassis to be mounted at the same height.

U-shaped bracket can be placed even if one of the units has already mounted on the pole.

Wiring

1. Cut the wiring grommet required according to the wire diameter to be used. Use the lidded grommet for the wiring hole not to be used.

(NOTE)
Break the lid of the grommet to be used with a driver or punch.

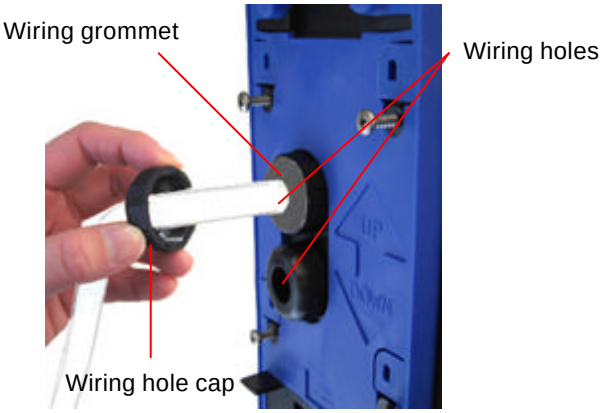


2. Remove the cap from the wiring hole and pull the wire through the hole.

3. Then thread the wiring grommet down to about 10cm from the end of the wire, apply the wiring grommet to the indentation at the wiring hole.

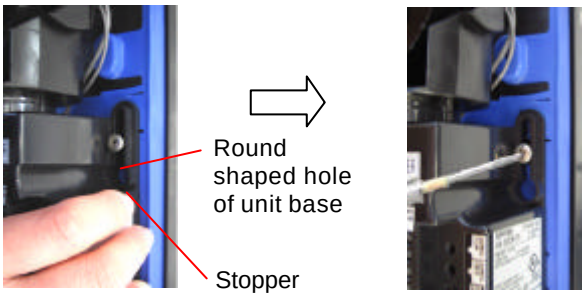
4. Securely tighten the wiring hole with cap.

(NOTE)
There are 2 wiring holes. Fit the lidded grommet to the hole not being used.



5. Mount the unit base on chassis.
Put the unit base mounting screws through round shaped hole of unit base, slide the unit base downward and secure the unit base mounting screws.

Make sure that the round shaped hole of unit base touches the stopper.



6. Make the optical alignment after connection to the terminals is completed and the power is turned on.

* Refer the support tool “AX-350/650DH MKIII supreme optical alignment” for the details of optical alingment.

7. Close the cover after the optical alignment is completed.

(NOTE)
Put on the hook at the top of the cover to attach the cover until it makes click noise and tighten the cover lock screw.

AX-350/650DH MKIII Supreme Optical Alignment

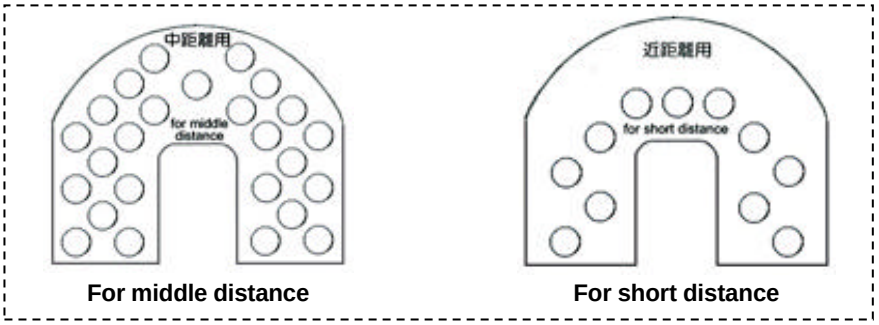
(Optical alignment with PEAK FINDER INTERFACE and operation of LED)

[Important]

Please read below before proceeding with the alignment procedure

The AX-350DH MKIII is suitable for a detection range of 40–100m and the AX-650DH MKIII is for detection range of 100–200m. If this product is used for close range or middle-range (as specified by model below), please make sure to use the attached "beam blocking plates" during optical alignment. Otherwise, it will be difficult to make accurate optical alignment.

AX-350DH MKIII	detection range	10 - 40m	40 - 100m	
	beam blocking plate	for short distance	-	
AX-650DH MKIII	detection range	20 - 50m	50 - 100m	100 - 200m
	beam blocking plate	for short distance	for middle distance	-



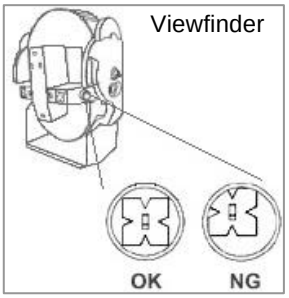
For middle distance **For short distance**

Normal operation check for Dual Alignment Level Indicator with viewfinder

First roughly align the upper and lower beam heads so they are pointing towards each other. Next use the viewfinder provided on the sides of the upper and lower beams (Please check the LED level of both upper and lower beams is at least registering in the lowest section marked “realign”).

After you finish above setting, the upper and lower beams will be in Rough Tuning mode.

(NOTE)
If either of upper or lower beam LED achieves an “Excellent” level at this stage, it skips the rough tuning mode and automatically changes to fine tuning mode though even if the other is level is unstable, please be careful at this point.



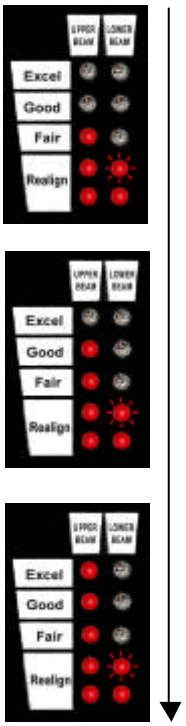
Peak Finder Interface (rough tuning mode)

<u>In rough tuning mode, only the optical alignment of upper beam is set.</u>

Make the upper beam optical alignment until the LED achieves to “Excellent” level by turning the alignment dials, make only small adjustments at a time as this will make the procedure easier. When completed it automatically changes to fine tuning mode.

(NOTE)
It is possible not to change to the fine tuning mode if the environment is extremely harsh or unstable. In this case use a voltmeter for the alignment procedure.

LEDs under peak level LED maintain light during rough tuning mode.



Make alignment until the LED achieves to “Excellent” level.

Optical Alignment Dial

Vertical Alignment

Horizontal Alignment

Peak Finder Interface (fine tuning mode)

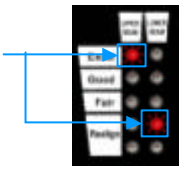
In fine tuning mode, make the optical alignment from upper beam.

After rough adjustment of the beams, LEDs blink all together for one second. This is a sign that AX-350/650DH MKIII changes to the fine tuning mode. The lowest peak of the received beam level is searched for repeatedly.

Adjust the beam level until it achieves to “Excellent”, the LED indicator blinks all together again and you can make the optical alignment repeatedly.

(NOTE)
- The number of adjustments required depends on the detection range and surrounding environment.
- The optical alignment can be done easily if this product is used for suitable detection range. In case that they are used for close range, it makes alignment difficult and the number of adjustment time increases. Also in this case you should use the beam blocking plates as described at the start of this paper.

Only the LED of peak level blinks during fine tuning mode.



LED Operation of Upper Beam

It automatically changes to fine tuning mode after LEDs blink all together for one second.

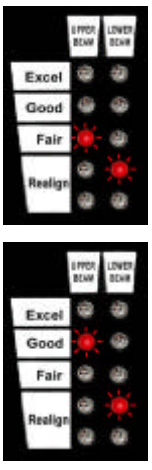
Continue the optical alignment repeatedly until the LED achieves to “Excellent”.

LEDs blink all together for one second again and still continue the alignment.

After making the optical alignment few times, it's completed.

(NOTE)
There is no sign to let users know that the optical alignment is completed. Consider that the optical alignment of upper beam is completed when the LED level doesn't go up any more even if turning the dials.

When the alignment of upper beam is completed, use the same procedure described above for the lower beam.



Even if the beam received level achieves peak condition, the LED might not achieve to “Excellent” level.

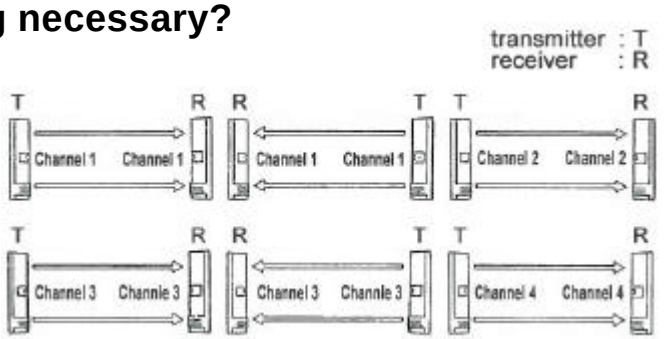
*** The operation of the LED indicator in this paper is an example for your reference and may different from the actual operation of optical alignment when on site.**

AX-350/650DH MKIII
Synchronous Wiring and Applications

■ Why is the synchronous wiring necessary?

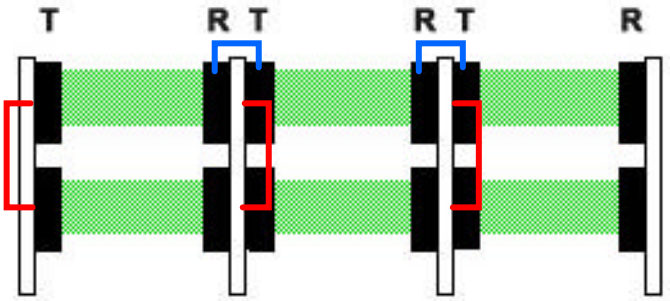
When using multiple beams in a stacking application separate channels need to be selected to allow the system to function correctly.

The installer has to memorise which beams are assigned to which channels and this can be both complicated and time consuming.



The AX-350/650DH MKIII range eliminates the need for channel setting by assigning individual address to each pair of beams and sends transmits each beam by shifting its timing from the transmitter to the receiver on the same time axis.

Red color line: T-T synchronous wiring
Blue color line: R-T synchronous wiring



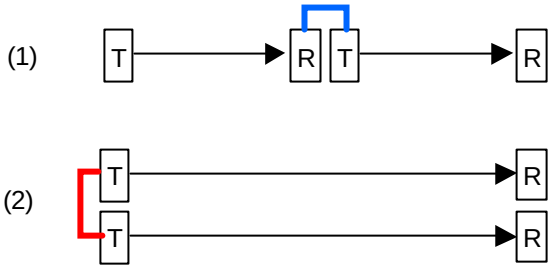
? stacking application with multiple units :
connect of synchronous wires with upper and lower transmitters and highest rung of transmitters.

? line protection with multiple units :
connection of synchronous wires with between transmitter and receiver.

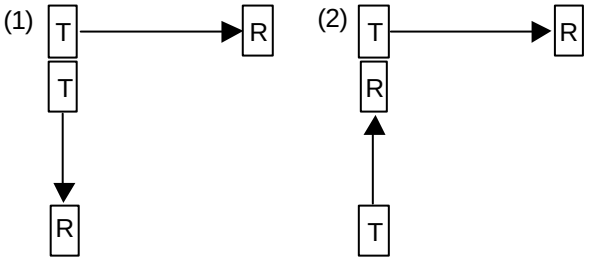
■ Installation sites where the synchronous wiring is necessary

When more than two transmitters can be seen from a receiver, there is a possibility of crosstalk. To prevent crosstalk, the synchronous wires are required.

[The synchronous wiring is required]
More than two transmitters can be seen from a receiver. There is a possibility of crosstalk of beams.



[The synchronous wiring is not required]
There is no a possibility of crosstalk of beams because receivers see different direction.



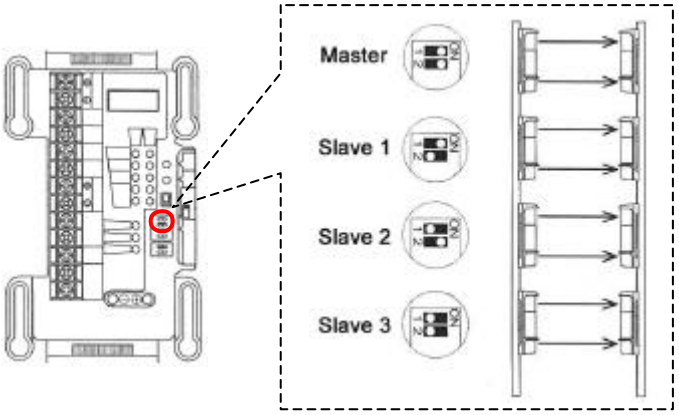
Master/Slave Selector Switch Setting

[This switch setting is necessary when AX-350/650DH MKIII is used for stacking application]

The master/slave selector switch is provided to prevent crosstalk and identify to the system that more than one set of beams is being used.

From the top level, set the switches of both the transmitter and receiver to Master - Slave 1 - Slave 2 - Slave 3 etc...

(NOTE)
Be sure to set the switch to Master only for single-level installation.

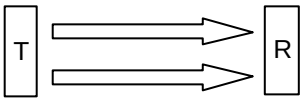


Basic Setting of Synchronous Wiring

■ In-line protection with 1 pair of units

The synchronous wiring is not needed

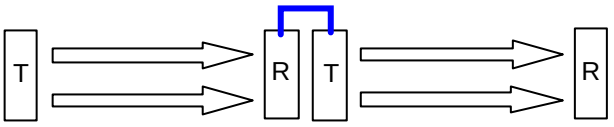
(NOTE)
Set the master/slave selector switch to “Master”



■ In-line protection with 2 pairs of units

When more than two transmitters can be seen from a receiver. Connect R-T (blue) synchronous wiring next to each other.

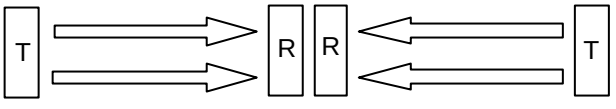
(NOTE)
Set the master/slave selector switch to “Master”



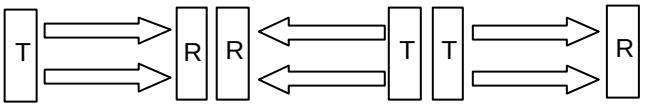
■ Line Protection in the same installation array with conventional models

1. The synchronous wiring is not needed.

(NOTE)
Set the master/slave selector switch to “Master”



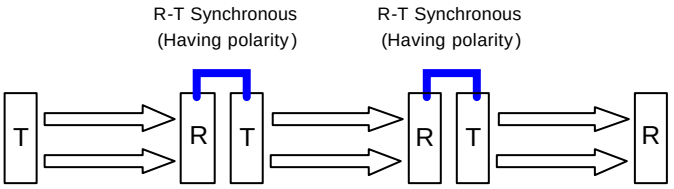
2. In a situation where more than three sets of units are installed, a receiver can see more than 2 transmitters and beams can crosstalk easily. Contact us if ithis installation type is needed.



In-line Protection with multiple units

Connect the R-T (blue) synchronous wiring next to each other.

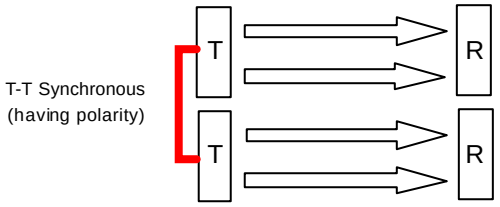
(NOTE)
Set the master/slave selector switch to “Master”.



Two steps protection with 2 pairs of units

Connect T-T (red) synchronous wiring of upper and lower transmitters.

(NOTE)
Set the master/slave selector switch.
Upper transmitter: “Master”
Lower transmitter: “Slave 1”

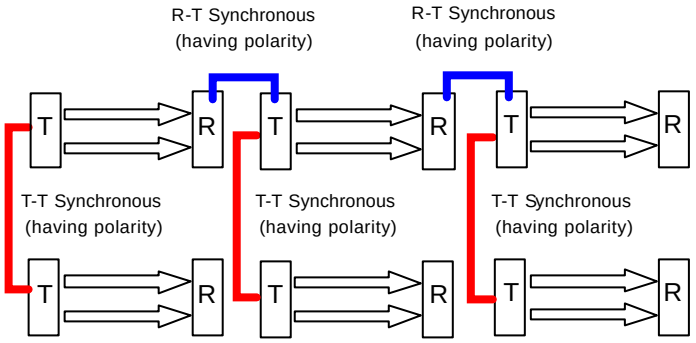


Two steps protection with multiple units

Connect T-T (red) synchronous wiring for the upper and lower transmitters, R-T (blue) synchronous wiring of the transmitter and receiver next to each other.

(NOTE)
- Set the master/slave selector switch
Upper transmitter: ”Master”
Lower transmitter: “Slave 1”

- Transmit of beams stop if the master/slave selector switch is set “Master” for both upper and lower steps. Make sure to set “Slave 1” for lower step and connect the synchronous wiring.



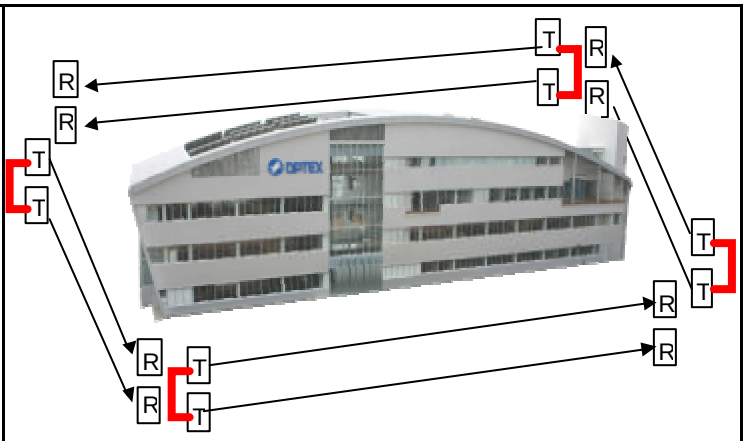
Applications

Application 1
[Single-level installation with multiple units]

The Synchronous wiring is not required if each pair of unit is installed in a different direction from each other. In most cases it is possible to install systems so that transmitters and receivers cannot see each other when only one level of beams is required.

■ Application 2
[Two level installation with multiple units]

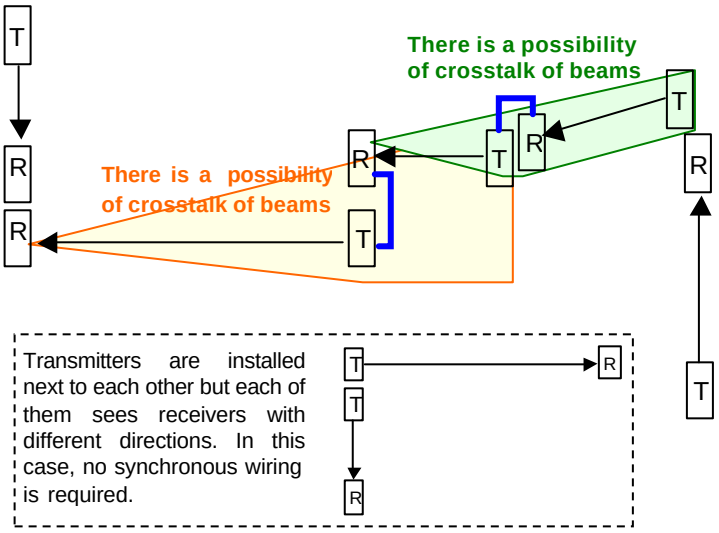
T-T (red) synchronous wiring of upper and lower transmitters is required, as in this example where receivers can see signals from two transmitters. Along the same path.



■ Application 3
[Complicated installation with Multiple units]

R-T (blue) synchronous wiring is required if more than 2 transmitters can be seen from a receiver to prevent crosstalk.

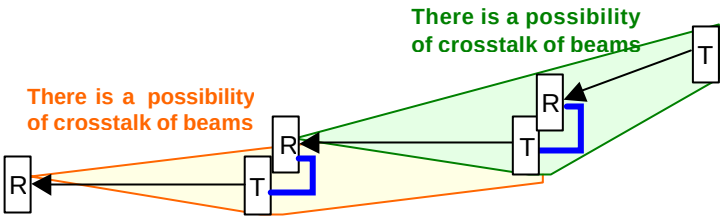
This illustration is an installation example. In this case, a receiver(R) sees more than 2 transmitters, although they are not in the same path. In this case, R-T (blue) synchronous wiring is required.



Precaution

■ Replace the AX-350/650DH MKIII that has been R-T synchronous wired for repair

First of all, turn the power off of equipments previous and next of AX-350/650DH MKIII, which need to be repaired. After the replacement is completed, connect the R-T synchronous wiring and turn the power on.



■ Install the AX-350/650DH MKIII and conventional models (including competitors' products) together

If more than 2 transmitters can be seen from a AX-350/650DH MKIII receiver, set the ATPC cancel switch "ON" and make optical alignment.