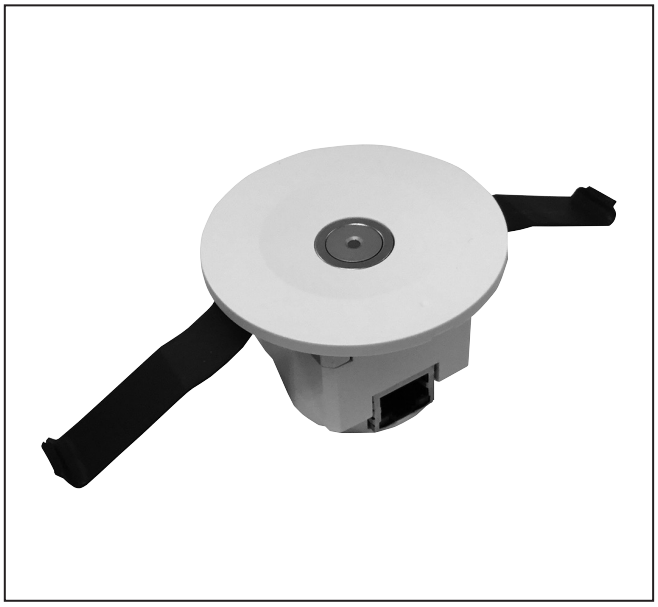
Infrared Array Sensor

■ Description

This product (model number TY2000) is a sensor that consists of an array of multiple infrared sensing elements. It provides noncontact, highly accurate detection of the distribution of surface temperature on objects.
Thanks to small size and excellent design, the sensors are inconspicuous even if multiple units are installed on the ceiling.
The surface temperature distribution data is integrated by an IR sensor controller.*
The IR sensor controller calculates data that can be applied to various solutions, such as estimating the presence/absence or number of occupants and controlling air conditioning by determining the heat load.
The calculated data is shared with Azbil building management system savic-net™ FX or savic-net™ G5 and lighting system using BACnet to achieve solutions.

* The infrared (IR) array sensor cannot be used alone. Connect it to the IR sensor controller.



■ Features

The IR sensor controller, which aggregates the information from sensors, has the functions below.

(Ref.) AB-7512, *Infrared Array Sensor System IR Sensor Controller User Guide*

- Detection of people*
  The infrared array sensor can detect people even if they do not move much, which was not possible with conventional pyroelectric sensors, etc.
  Not only the presence or absence of occupants, but also their number can be estimated.
  * For detecting people, there are restrictions on installation height and the distance between sensors. For details, please contact Azbil Corporation.
- Monitoring screen
  The detected surface temperature distribution and the position of people can be viewed on the monitoring screen.
  What is found by identifying the hot and cold places and the position of people can be helpful for handling complaints about the thermal environment.
- Lighting control
  Information on the presence/absence of people is transmitted to the controller for the lighting system when the state changes.
  Turning off the lights or lowering brightness in unoccupied areas contributes to energy efficiency.
- Ventilation control
  The estimated number of people can also be used for adjusting the volume of ventilation, etc., by transmitting the information to Azbil's control system.
- Cooling/heating control
  The detected surface temperature readings for walls, floor, etc., are used to calculate the heat load in the room and also the temperature and volume of air required from the air conditioner to cancel out the heat load.
  The calculation aims to minimize the air supply volume, so the control is more energy-efficient than a conventional one. If the heat load changes suddenly, the AC can respond before the change affects the room temperature, thereby maintaining a comfortable indoor space.
- Screen recording function
  In connection with the intruder alert, images on the monitoring screen are recorded.

Safety Precautions

Please read instructions carefully and use the product as specified in this manual.
Be sure to keep this manual nearby for quick reference.

Restrictions on Use

This product was developed, designed, and manufactured for general air conditioning use.

Do not use the product in a situation where human life may be at risk or for nuclear applications in radiation controlled areas. If you wish to use the product in a radiation controlled area, please contact Azbil Corporation.

Particularly when the product is used in the following applications where safety is required, implementation of fail-safe design, redundant design, regular maintenance, etc., should be considered in order to use the product safely and reliably.

- Safety devices for protecting the human body
- Start/stop control devices for transportation machines
- Aeronautical/aerospace machines

Also, this product cannot be directly connected to the communication lines (including public wireless LANs) of telecommunications carriers such as mobile/fixed-line communication companies and Internet providers.

For system design, application design, instructions for use, or product applications, please contact Azbil Corporation.

Azbil Corporation bears no responsibility for any result, or lack of result, deriving from the customer's use of the product.

■ Recommended Design Life

It is recommended that this product be used within the recommended design life.

The recommended design life is the period during which you can use the product safely and reliably based on the design specifications.

If the product is used beyond this period, its failure ratio may increase due to time-related deterioration of parts, etc.

The recommended design life during which the product can operate reliably with the lowest failure ratio and least deterioration over time is estimated scientifically based on acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameters.

The recommended design life of this product is 10 years.

The recommended design life assumes that maintenance, such as replacement of the limited life parts, is carried out properly.

Refer to the section on maintenance in this manual.

■ Warnings and Cautions

⚠WARNING	Alerts users that improper handling may cause death or serious injury.
⚠CAUTION	Alerts users that improper handling may cause minor injury or material loss.

■ Symbols

	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left means that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠WARNING	
	If the ceiling panel is acoustic tile, there is a possibility that it will be scraped due to bouncing of the mounting springs if they are not held tightly, generating debris that may get into your eyes.

⚠ CAUTION	
	Use this product under the operating conditions (for temperature, humidity, power, vibration, shock, mounting method, atmosphere, etc.) listed in the specifications. Doing so may cause fire or product damage.
	Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Failure to do so may cause fire or electric shock.
	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
	Before wiring or maintenance, turn off the power to this product. Failure to do so may result in electric shock or device failure.
	Provide a circuit protector (e.g., a fuse or circuit breaker) for the power source. Failure to do so may cause a short circuit leading to fire or device failure.

⚠ CAUTION	
	Do not use transceivers or low-power wireless devices near this product. Doing so may cause radio wave interference and malfunction of the product.
	Do not disassemble this product. Doing so may cause device failure or electric shock.

■ Cautions and Notes

● Cautions for installation location

Places where the product should not be installed

Do not install the product in the following kinds of environments.

- Where it would be exposed to direct wind or rain
- Where water droplets may fall
- Where it would be exposed to direct sunlight
- Where it would be subject to vibration or shock (outside of the specifications)
- Where it would be exposed to steam directly
- Where chemicals or oils may adhere
- Where it can be touched by occupants who do not have specialized knowledge about instrumentation or electricity
- Where the temperature may change rapidly

● Notes for measuring surface temperature

Measurement accuracy is the accuracy at the time of shipment.
Even if the product is used within the specifications, the degree of accuracy might drop due to time-related deterioration.

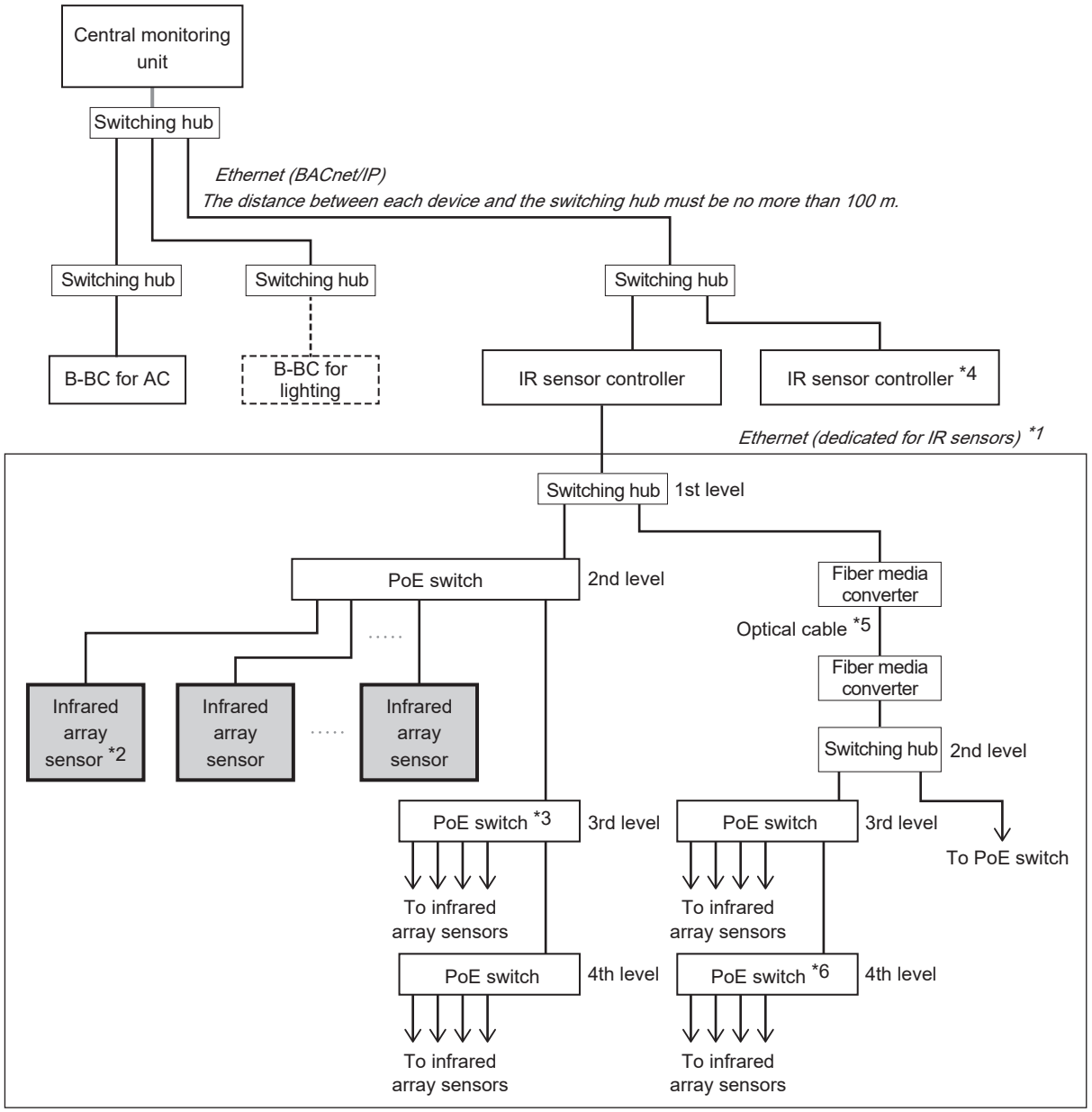
● Notes for enabling the human detection function of the IR sensor controller

For detecting people, there are restrictions on the installation of sensors.
Depending on the conditions, this function of the IR sensor controller may not work properly.
(Ref.) AB-7512, *Infrared Array Sensor System IR Sensor Controller User Guide*

For details, please contact Azbil Corporation.

■ System Configuration

The system consists of a dedicated IR sensor network in which the IR sensor controller is connected to infrared array sensors, and a BACnet/IP network where the central monitoring unit or controllers are connected to devices under their control.
The IR sensor controller processes the information collected from the infrared array sensors and shares the necessary information with the air conditioning B-BC and lighting B-BC using BACnet/IP.



*1 The maximum communication distance within the dedicated IR sensor network is 100 m.
Use category 5e or higher cables for the IR sensor network.

*2 The infrared array sensors are directly connected to the PoE switch.
A cable cannot be longer than 100 m. (100 m max.)

*3 A dedicated PoE switch must be used.
A PoE switch with 10 ports that supply power is used, and the infrared array sensors are connected to the ports.
Two ports of the switch do not supply power, and the PoE switches can be connected in series using these ports.

*4 Up to 200 infrared array sensors (model number TY2000) can be connected to the IR sensor controller.
To connect more sensors, install multiple IR sensor controllers.

*5 If the length of a cable within the IR sensor network is 100 m or more, install fiber media converters and connect the optical cables to them. Use optical cable model No. 83105884-_ _ _.

*6 There is a maximum total of 4 levels of switching hubs and PoE switches between the IR sensor controller and the infrared array sensors.

Figure 1

■ Model Number

Model number	Angle of view	Installed location	Angle adjustment mechanism
TY2000A1000	90 × 90°	Ceiling	None
TY2000A2000	90 × 90°	Ceiling	Yes
TY2000A3000	90 × 90°	Wall	Yes

Accessories

AB-7518, *Infrared Array Sensor Basic Instructions*
Ferrite core (for models TY2000A2000 or TY2000A3000)
M4 screws × 2 (for model TY2000A3000)

● Items ordered separately

Contact Azbil for the procedure for ordering.

- IR sensor controller
- Switching hub
- PoE switch
- Fiber media converter and optical cable (depending on wiring length)
- LAN cable (category 5e or higher, unshielded)

■ Specifications

Item			Specification
Measuring range	Surface temperature		−10–100 °C
Measuring accuracy			± 1 °C on average in measured pixels (when the temperature of the measured objects and the ambient temperature of the sensor are between 15 and 35 °C)
Power			PoE (Alternative A, Class 1, IEEE 802.3at) 55 V DC, 23 mA
Power consumption			1.27 W
Communication method			Ethernet
Rated operating conditions	Temperature		0–50 °C
	Humidity		10–90 % RH (without condensation)
	Vibration		1.96 m/s² (10–150 Hz)
Transportation/ storage conditions	Temperature		0–50 °C
	Humidity		10–90 % RH (without condensation)
	Vibration		1.96 m/s² (10–150 Hz)
Enclosure protection			Indoor use
Sensing range			90° × 90°
Sensor movable range	Model number TY2000A	1000	No movable mechanism (senses downward vertically from ceiling)
		2000	±45° vertically (in 5° increments) ±90° horizontally (in 5° increments)
		3000	±45° vertically (in 5° increments)
			±90° horizontally (in 5° increments)
Mass	Model number TY2000A	1000	75 g
		2000	114 g
		3000	128 g
Materials	Cover		Polycarbonate resin
	Cover for detector		Aluminum
	Plate spring		Stainless steel
Color of cover			White (equivalent to Munsell N9)

■ Dimensions and Names of Parts

● Model number TY2000A1000

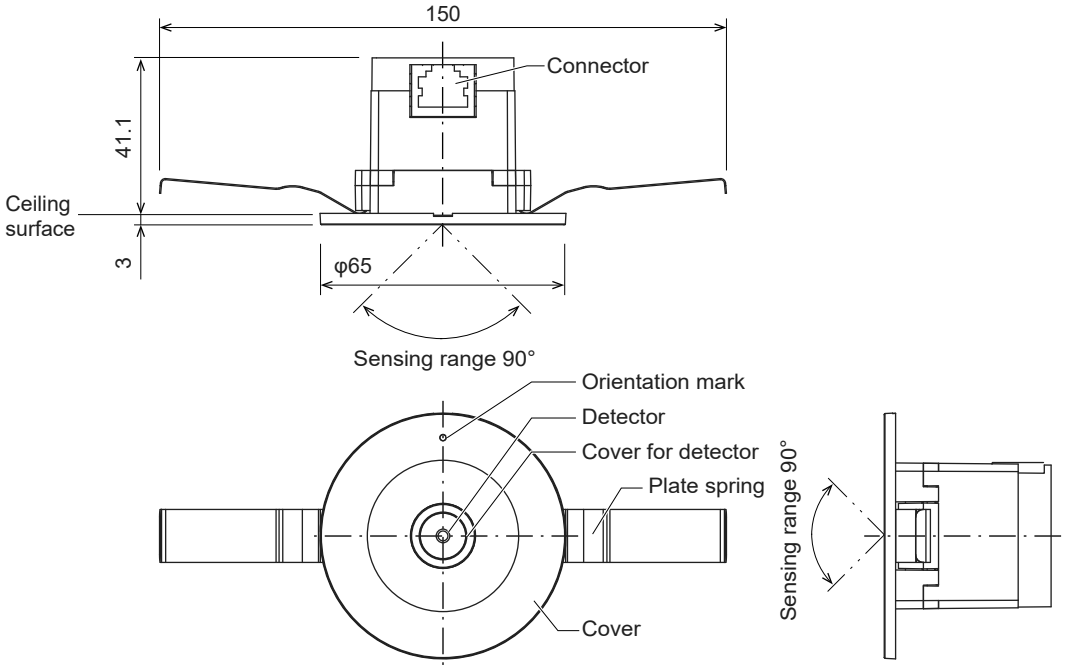


Figure 2 Dimensions (mm)

● Model number TY2000A2000

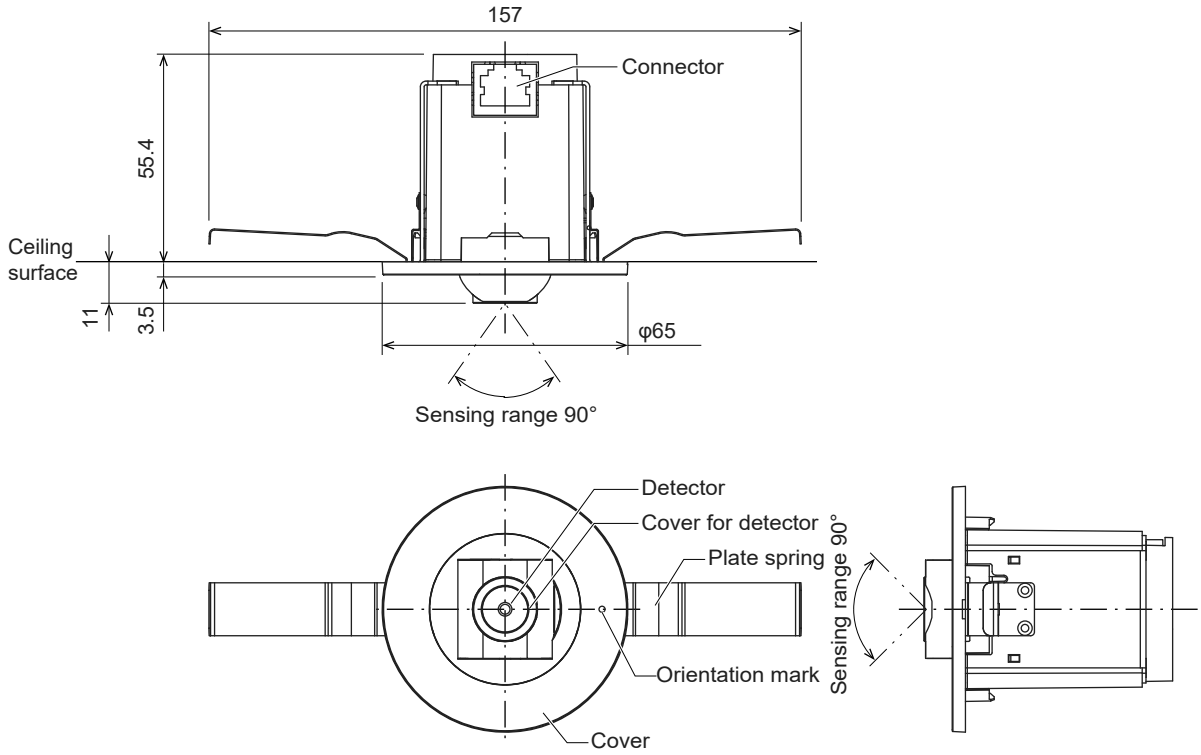


Figure 3 Dimensions (mm)

● **Model number TY2000A3000**

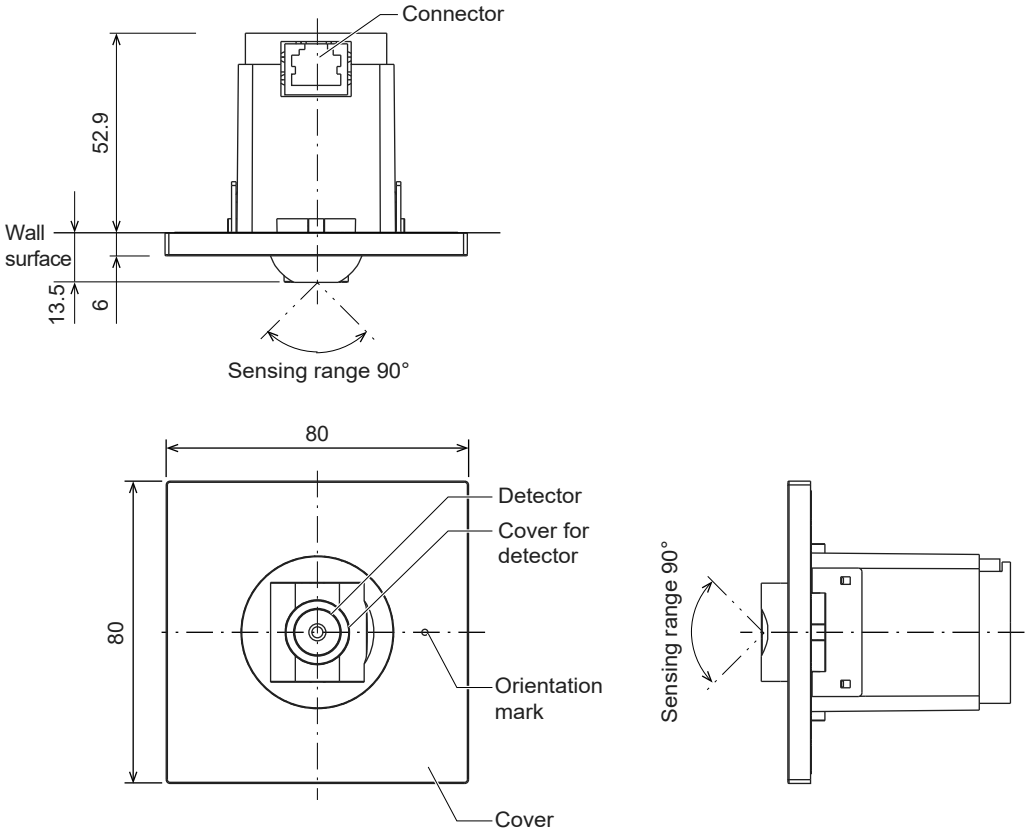


Figure 4 Dimensions (mm)

■ Installation and wiring

⚠ WARNING	
❗	If the ceiling panel is acoustic tile, there is a possibility that it will be scraped due to bouncing of the mounting springs if they are not held tightly, generating debris that may get into your eyes.

⚠ CAUTION	
❗	Use this product under the operating conditions (for temperature, humidity, power, vibration, shock, mounting location, atmosphere, etc.) listed in the specifications. Doing so may cause fire or product damage.
❗	Installation and wiring must be performed by personnel qualified to do instrumentation and electrical work. Failure to do so may cause fire or electric shock.

IMPORTANT
- Install correctly in the specified orientation. If the product is out of position by 1° or more, it may not be possible to detect people correctly. The position of the orientation mark on the sensor is at the top of the image when the image is displayed on the screen for the IR sensor controller.
- The installation location of each sensor is determined by its serial number. Please install the products in the correct place.
- This product is powered by a LAN cable. Before installation work, turn off the power of the PoE switch.
- After unplugging the LAN cable, do not plug it in again for 1 second. If power is being supplied, the product may be damaged.
- If the metal part of the infrared array sensor comes into contact with an electrical conductor such as a metal fitting, the sensor may not operate. If additional fall-prevention measures are required, use an insulated cable tie or string.
- Make sure that the metal parts are not exposed due to damage to the tube that insulates the metal spring.

● Model numbers TY2000A1000 and TY2000A2000

Installation location

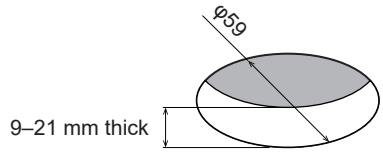
Make sure to install this product on a ceiling where the following conditions are met.

- Flat surface
- On the ceiling tile that is between 9 mm and 21 mm thick.
- Where there is enough space so that part of the sensor can be embedded in the ceiling and the plate springs can be spread.
- Where heat insulation material does not cover the back of the sensor
- Away from direct air flow from outlets or inlets

Installation procedure

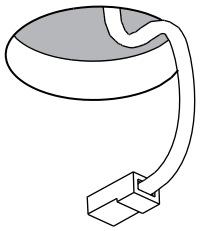
(1) Cut a hole of diameter 59 mm in the ceiling where the sensor is to be installed.

IMPORTANT
- Be careful about the hole's diameter. If it is too large, the edge of the sensor will not cover the hole. If it is too small, it will not be possible to insert the sensor.

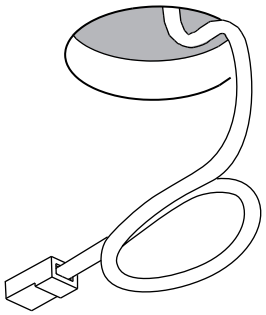


(2) Take out the wired cable from the mounting hole.

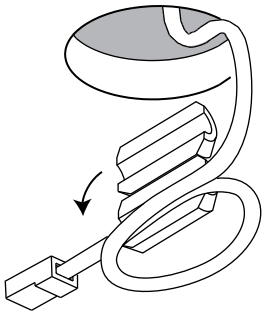
- For model number TY2000A1000
  Connect the cable to the connector of the sensor.



- For model number TY2000A2000

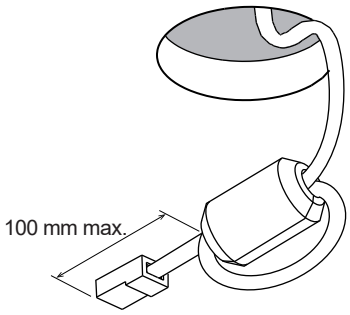


① Attach a ferrite core to the cable.



② Connect the cable to the connector of the sensor.

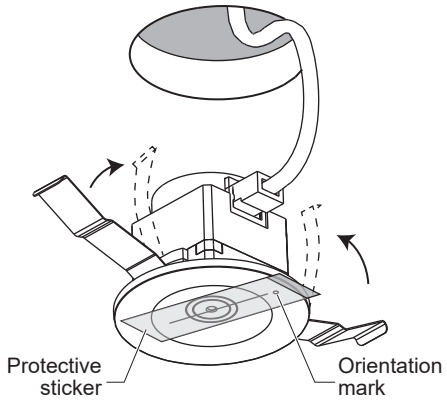
IMPORTANT
- The LAN cable must be inserted into the product until it clicks. Lightly pull on the cable to make sure it is correctly connected.



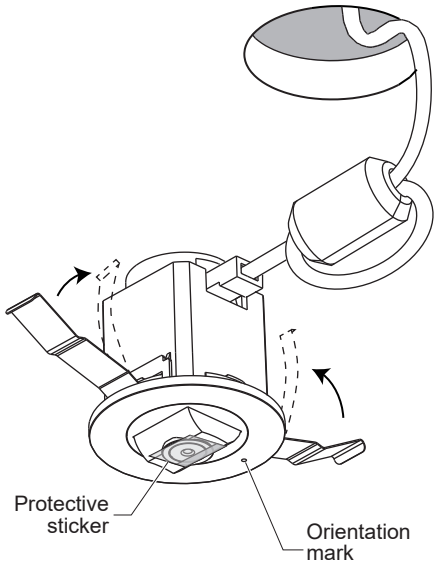
Note: The ferrite core must be attached to the cable within 100 mm from the end of the connector.

(3) While closing the plate springs on both sides in the direction of the arrows, push the product halfway into the mounting hole.

- For model number TY2000A1000



- For model number TY2000A2000



(4) Use the sensor's orientation mark or the straight line on the protective sticker (only for model number TY2000A1000) as a guide to determine the installation direction, and insert the sensor deeply into the mounting hole.
If the orientation is not correct, insert a screwdriver into the groove behind the orientation mark to pull the sensor out from the ceiling.
Adjust the orientation and then push it in again.

(5) Remove the protective sticker.

IMPORTANT
- If the protective sticker is not removed, the sensor cannot measure temperature or detect people.
- After removing the protective sticker, do not touch the lens when adjusting the orientation of the infrared array sensor, etc. If the lens is dirty, the sensor may not be able to measure temperature or detect people correctly.

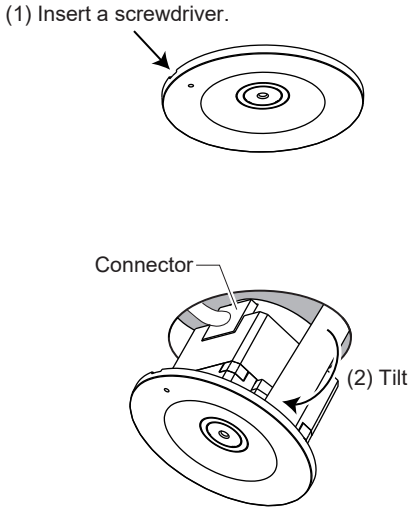
Removal procedure

IMPORTANT
- Do not touch the lens.
  If the lens is dirty, the sensor may not be able to measure temperature or detect people correctly.

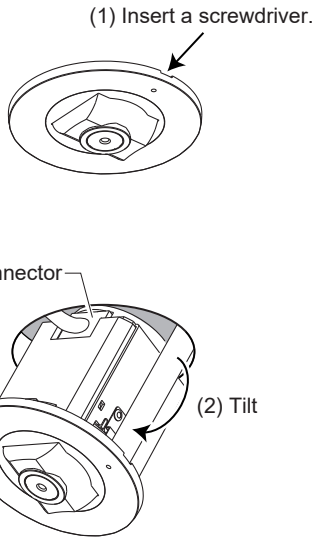
(1) Insert a thin screwdriver (5 mm or less) into the groove near the orientation mark to pull the sensor from the ceiling.

(2) Tilt the side opposite the connector downward. Hold the sensor and pull it out.

- For model number TY2000A1000



- For model number TY2000A2000



● Model number TY2000A3000

Installation location

Make sure to install this product on a wall where the following conditions are met.

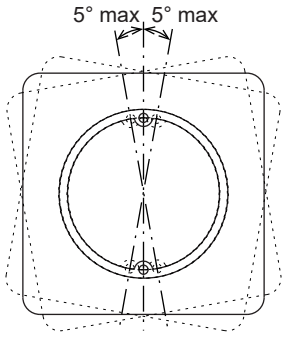
- Flat surface
- A medium or deep square electrical box with a medium-sized square cover with a round hole is installed in the wall in advance

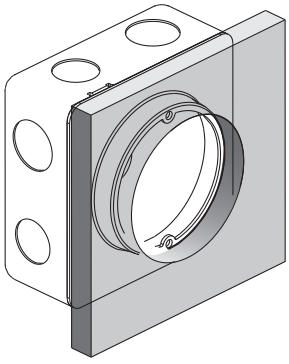
  Note: Installation must be done before the wall is finished.
- For a hollow wall, the thickness of the wall (plaster board, etc.) is 21 mm at most.
- For embedding in concrete wall, the distance between the finished wall surface and the surface of the cover is 21 mm at most.
- Away from direct air flow from outlets or inlets
- Where the product will not be exposed to direct sunlight and will not get wet
- A high place where contact with people is unlikely (160 cm or higher)

Installation procedure

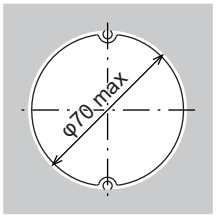
(1) Attach a medium-sized square cover with a round hole (made by Panasonic, part No. DS4311 or equivalent) to a medium or deep square electrical box in advance, and install the box on the back of the wall where the sensor will be mounted.

Note: Install the box so that a line connecting the upper and lower screw holes of the cover is no more than ±5 ° from the vertical.

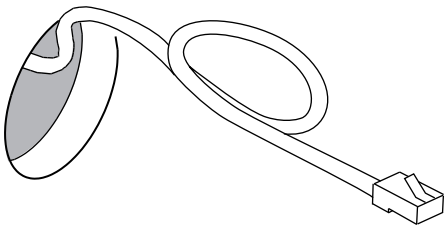




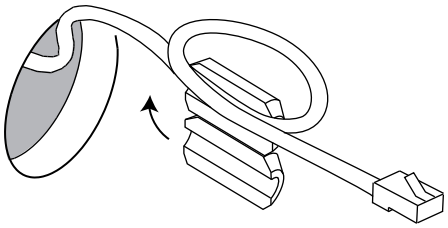
(2) For a hollow wall, make a hole of diameter 70 mm or less.



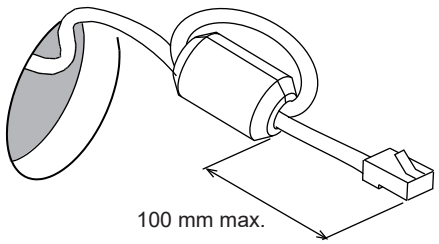
(3) Take out the wired cable from the mounting hole.



(4) Attach a ferrite core to the cable.



(5) Connect the cable to the connector of the sensor.

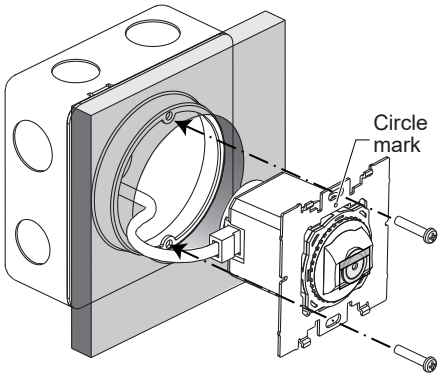


Note: The ferrite core must be attached within 100 mm from the end of the connector.

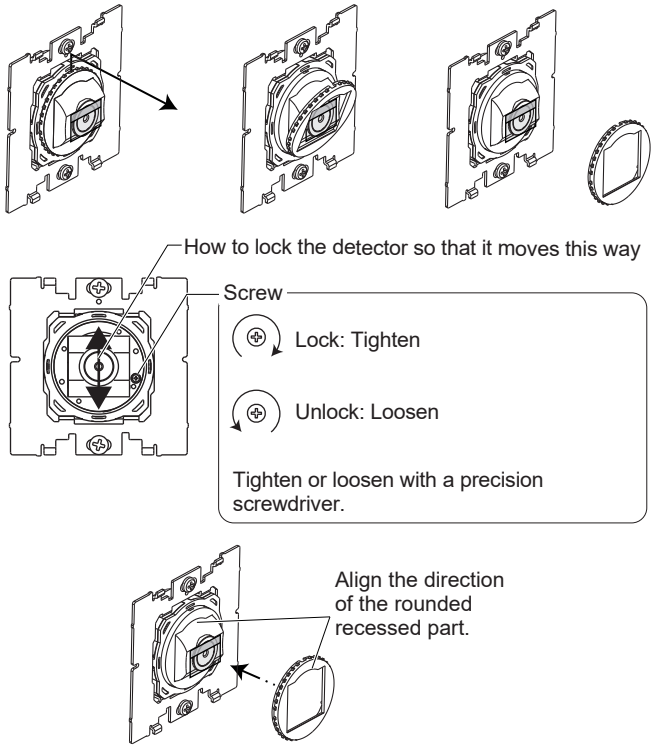
(6) Fasten the sensor with the two M4 screws provided.

- For mounting of the sensor with the detector facing upward, the circle mark on the mounting frame must be at the top.
- For mounting it with the detector facing downward, the circle on the mounting frame must be at the bottom.

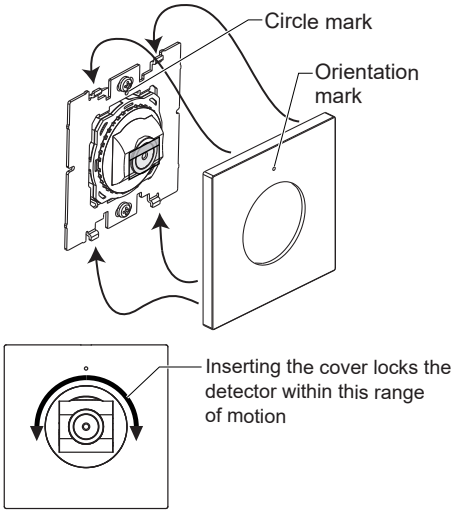
Note: To prevent damage, do not turn them with too much force.



(7) Adjust the angle so that the detector faces the center of the area to be scanned.
Lock it so that it does not move when it is in operation.



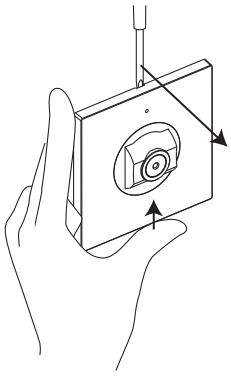
(8) Fit the cover in using the upper and lower hooks.
Align the orientation mark on the cover with the circle on the mounting frame, and then attach the cover. (If the orientation is wrong, the cover cannot be attached.)



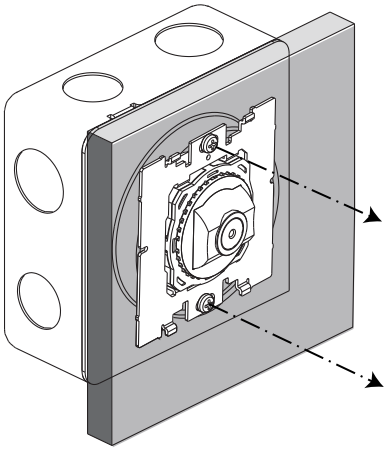
(9) Remove the protective sticker.

Removal procedure

(1) While pushing the cover toward the orientation mark, insert a thin screwdriver (5 mm wide or less) into the groove near the mark and pull it toward you carefully so that the wall surface is not scratched.



(2) Remove the 2 mounting screws fastening the sensor. Hold the sensor and pull it out.



■ Maintenance

This product is inspected at the factory when it is shipped and the measurement accuracy for surface temperatures is adjusted to within the specifications.
No onsite adjustment is required.
The product should be maintained as described below.
There are no replacement parts for this product.
If the product fails due to time-related deterioration, replace the product.

- Periodic maintenance
  The amount of dust, etc., depends on the environment where it is installed.
  Check the sensor's detector periodically.
  If there is a stain on the detector, wipe gently with a cotton swab or soft cloth moistened with ethanol or isopropyl alcohol.
  Do not use chemicals like benzine or thinner.
- Troubleshooting
  If any problem occurs during operation, refer to Table 1, "Troubleshooting," for corrective actions.

Table 1 Troubleshooting

Abnormal condition	Points to check	Corrective action
No output	Check if the connectors are loose	Redo the wiring
	Check if a wire is disconnected	
	Check if the sensor is damaged	Replace the product
Measurement errors	Check the installation location	Refer to "Installation and wiring" and check/ reconsider the installation location.
	Check if there is dust, etc., on the detector	Clean the detector
	Compare the outputs from sensors nearby for the same scanning target (floor, etc.) to check if there is a significant difference.	Consider adjusting the sensor's output. Please contact Azbil Corporation.
The product is starting to come loose.	Check for wobble and looseness of the product	Refer to "Installation and wiring" and remount the product.

■ Disposal

When this product is no longer needed, please dispose of it as industrial waste in accordance with local regulations.
Do not reuse all or part of this product.

azbil

Specifications are subject to change without notice.

Azbil Corporation
Building Systems Company

https://www.azbil.com/

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(J: AI-7510, Rev 5.0)