

# High-Resolution Infrared Array Sensor

## Description

This product (model number TY2001) 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.

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.

For details, refer to 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 you mount the product on a ceiling tile, there is a possibility that it will be scraped by the metal mounting plate, generating debris that may get into your eyes. Be careful when installing the product.

### CAUTION



Use this product under the operating conditions (for temperature, humidity, power, vibration, shock, mounting method, atmosphere, etc.) listed in the specifications. Failure to do so may cause fire or device failure.



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.



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

### ● 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.

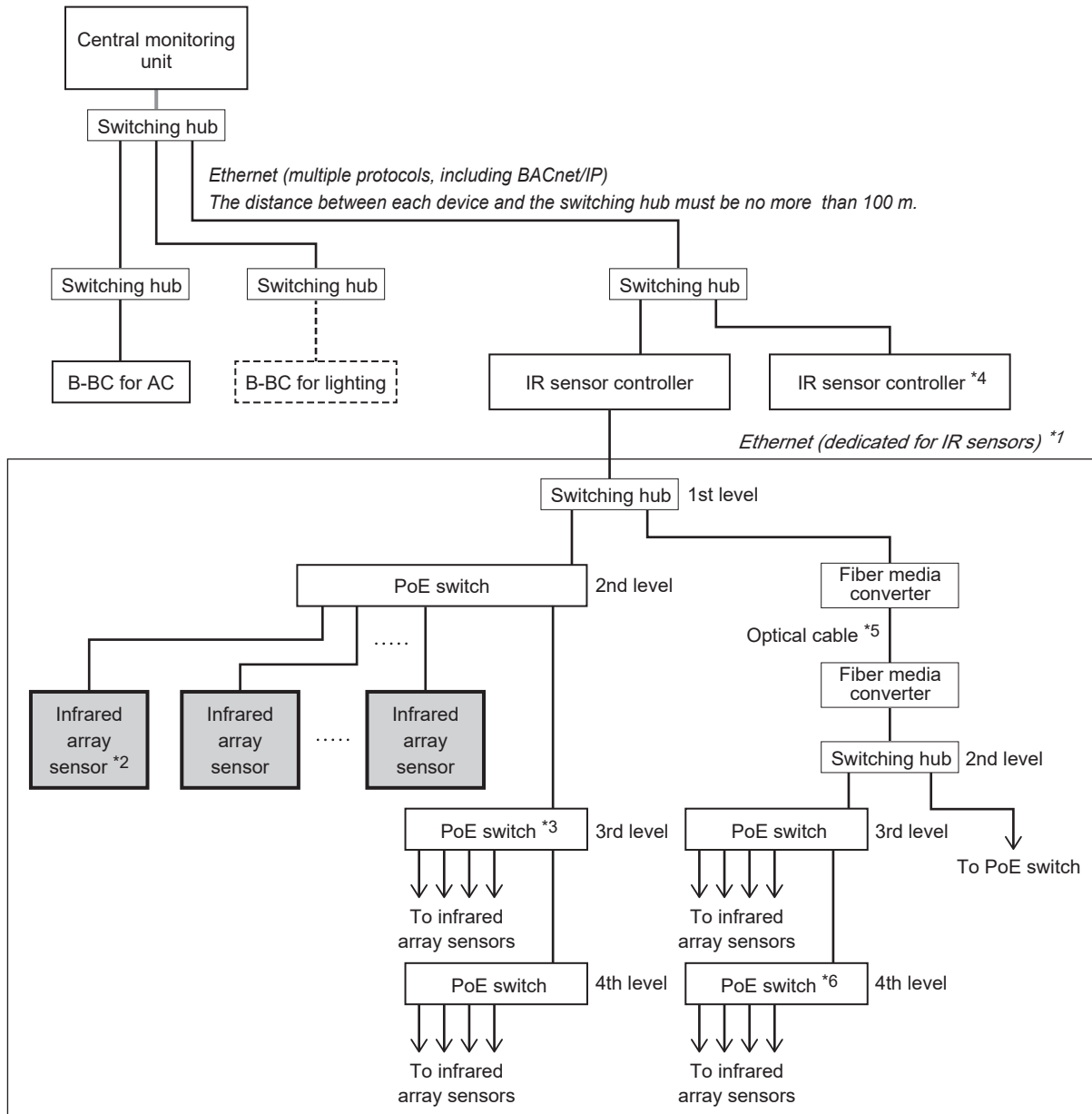
Depending on the conditions, this function of the IR sensor controller may not work properly.

For details, refer to AB-7512, Infrared Array Sensor System IR Sensor Controller User Guide, or 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.
- \*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) and up to 40 high-resolution infrared array sensors (model number TY2001) can be connected to the IR sensor controller. If models TY2000 and TY2001 are mixed, each TY2001 unit should be counted as equivalent to 5 TY2000 units when figuring the 200 unit maximum. 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
TY2001B2000	88 × 68° (wide-angle type)	Ceiling	Yes
TY2001B4000	88 × 68° (wide-angle type)	Ball head	—
TY2001C2000	37 × 33° (standard angle type)	Ceiling	Yes
TY2001C4000	37 × 33° (standard angle type)	Ball head	—

### Included item

AB-7526, *High-Resolution Infrared Array Sensor Basic Instructions*

### 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		± 1.5 °C*
Power		PoE (Alternative A, Class 1, IEEE 802.3at) 55 V DC, 28mA
Power consumption		1.8 W max.
Communication method		Ethernet
Rated operating conditions	Temperature	0–50 °C
	Humidity	10–90 % RH (without condensation)
	Vibration	1.96 m/s <sup>2</sup> (10–150 Hz)
Transportation/storage conditions	Temperature	-20–60 °C
	Humidity	5–90 % RH (without condensation)
	Vibration	9.8 m/s <sup>2</sup> (10–150 Hz)
Enclosure protection		Indoor use
Sensing range	Model number TY2001B_000	About 88° × 68°
	Model number TY2001C_000	About 37° × 33°
Sensor movable range	Model number TY2001B2000	Ceiling-mounted type. -9°, 0°, or +9° in a vertical direction
	Model number TY2001C2000	
	Model number TY2001B4000	Freely adjustable by the ball head
	Model number TY2001C4000	
Mass	Model number TY2001B2000	325 g
	Model number TY2001B4000	225 g
	Model number TY2001C2000	340 g
	Model number TY2001C4000	240 g
Materials	Cover	Polycarbonate resin
	Cover for detector	Aluminum
	Metal mounting plate	Rolled steel (model number TY2001_2000)
Color of cover		White (equivalent to Munsell N9)

\* Average accuracy for each sensing element per minute when the temperature of the target object and the ambient temperature is 15–35 °C

■ Dimensions and Names of Parts

● Model numbers TY2001B2000 and TY2001C2000

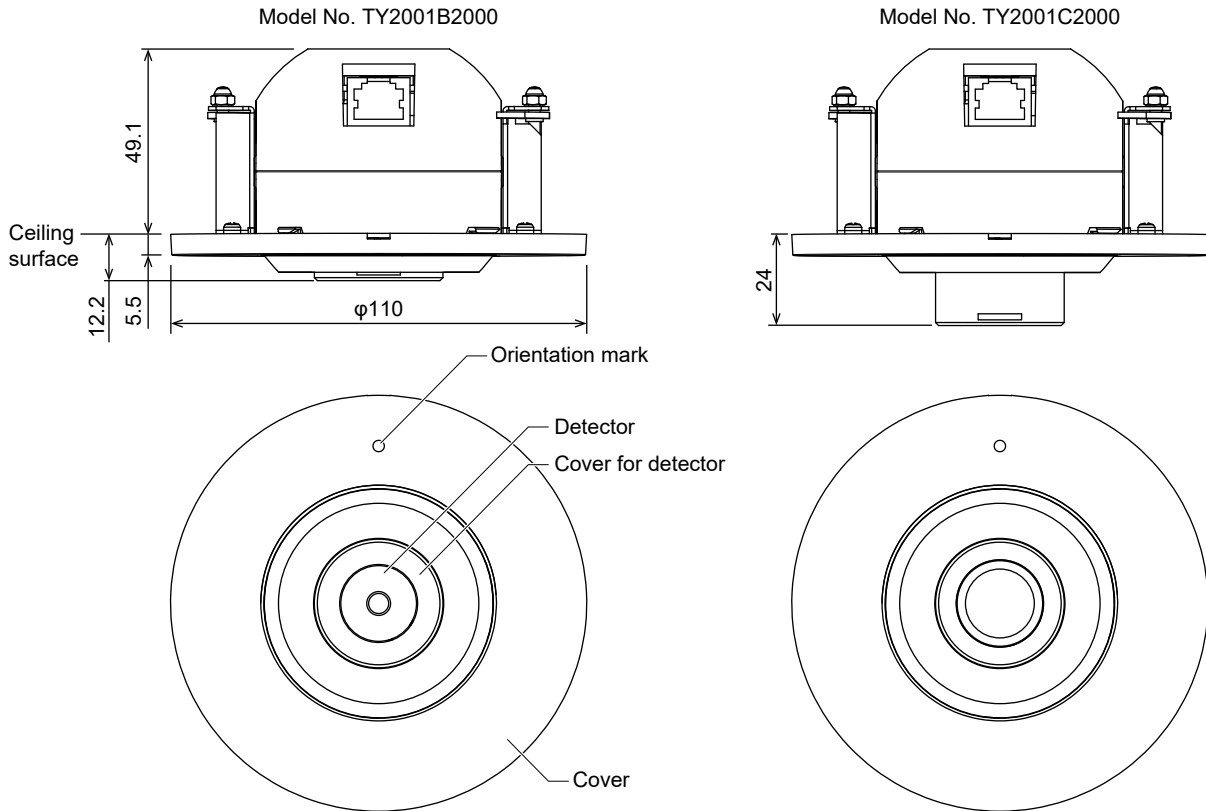


Figure 2 Dimensions (mm)

● Model numbers TY2001B4000 and TY2001C4000

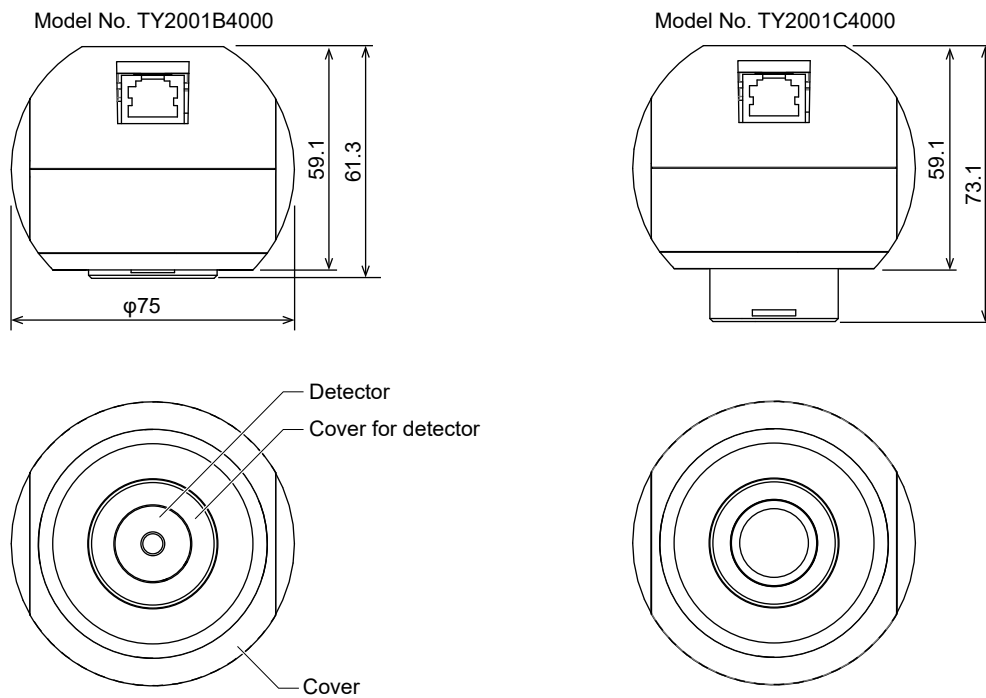


Figure 3 Dimensions (mm)

## ■ Installation and wiring

### ⚠ WARNING



If you mount the product on a ceiling tile, there is a possibility that it will be scraped by the metal mounting plate, generating debris that may get into your eyes. Be careful when installing the product.

### ⚠ CAUTION



Use this product under the operating conditions (for temperature, humidity, power, vibration, shock, mounting method, atmosphere, etc.) listed in the specifications.  
Failure to do so may cause fire or device failure.



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** • If you work in a high place, follow the precautions for working at height.

- 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 (and also the position of the LAN connector) on the sensor is at the top of the image when the image is displayed on the screen for the IR sensor controller.

Note: The area of measurement is shown as a rectangle and the vertical direction is the long sides of the rectangle.

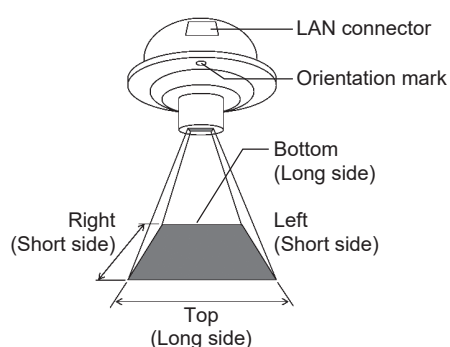
- The installation location of each sensor is determined by its serial number. Please install the products in the correct place.
- This product is powered by a LAN cable. Before installation work, turn off the power of the PoE switch.
- Do not touch the lens or the metal parts inside the lens. Doing so may cause the sensor to fail due to a static electrical charge.

### ● Model numbers TY2001B2000 and TY2001C2000

#### Installation location

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

- Away from direct wind or rain
- Not in direct sunlight and not near water.
- No vibration or shock (outside of the specifications)
- Away from steam
- Where chemicals and oil will not adhere
- Out of reach of occupants who do not have specialized knowledge about instrumentation or electricity
- Where the temperature does not change rapidly
- Flat surface
- On ceiling tile that is 25 mm thick at most
- Where there is enough space so that part of the sensor can be embedded in the ceiling
- Where heat insulation material does not cover the back of the sensor
- Away from direct air flow from outlets or inlets
- Away from heat generated by lights and other devices.

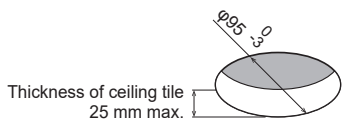


Installation procedure

- (1) Cut a hole of diameter 95 mm in the ceiling where the sensor is to be installed.

**IMPORTANT**

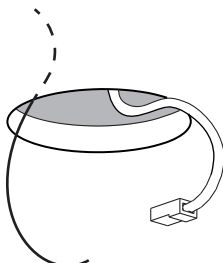
- Be careful about the hole's diameter. (For models TY2001B2000 and TY2001C2000) If it is too large, the edge of the sensor will not cover the hole. If it is too small, it will not be possible to insert the sensor.
- Note: To detect people without interruption using multiple products, the distance between sensors must be close. For details, please contact Azbil Corporation.



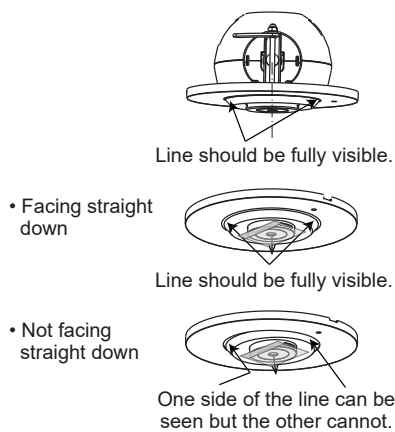
- (2) From the mounting hole, take out the wired cable and the fall-prevention wire that is installed in the ceiling in advance. The opposite end of the wire must be fastened to a structural component of the building or other part that is sufficiently strong.

**IMPORTANT**

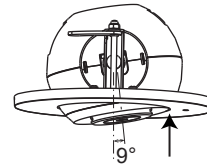
- The LAN cable must be inserted into the product until it clicks. Lightly pull on the cable to make sure it is correctly connected.



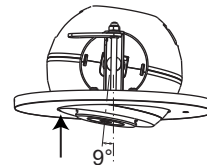
- (3) Adjust the angle of the sensor.
  - To scan the area under the sensor Adjust the angle to 0°. Make sure that the line engraved around the movable part can be fully seen.



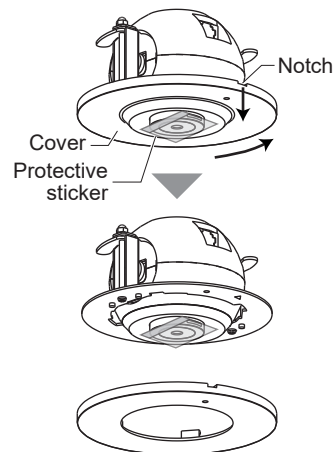
- To scan in the direction of the orientation mark Align the edge of the concave part with the surface of the cover.



- To scan in the direction opposite the orientation mark Align the edge of the concave part with the surface of the cover.

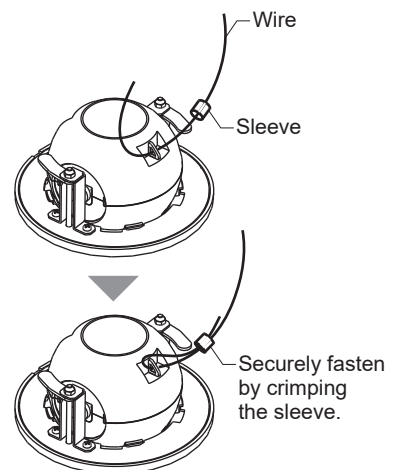


- (4) While pulling the notch on the cover downward, turn the cover counterclockwise to remove it. Be careful not to change the angle that was adjusted in step (3).



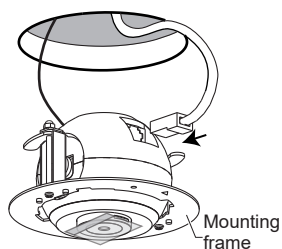
- (5) Thread the fall-prevention wire through the sensor and fasten the wire securely.

Note: The figure below shows a sample wire-fastening method.





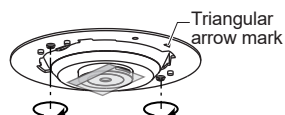
- (6) From the mounting hole, take out the cable that was wired in advance and connect it to the sensor.



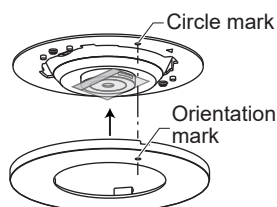
- (7) Push the sensor into the mounting hole. Orient the triangular arrow mark on the mounting frame so that the detector faces the area to be scanned. Fasten the product to the ceiling tile by turning the two screws.

Note:

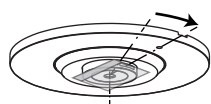
1. Make sure that the orientation mark on the cover and the arrow on the mounting frame are in the same direction after attaching the cover.
2. Do not turn the screws with too much force.
3. To remove the sensor after mounting it, turn the screws counterclockwise until they do not turn any further.



- (8) Attach the cover removed in step (4). Align the position of the orientation mark on the cover with the circle mark on the mounting frame.



- (9) Turn the cover clockwise to secure it in place. Turn it until it clicks and make sure it is securely fastened.



- (10) If installing the sensor facing straight down (adjustment angle of 0°), check with a level to make sure it is horizontal after installation.

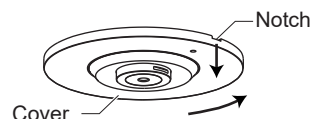
- (11) Remove the protective sticker.

**IMPORTANT** • There is a protective sticker over the lens. If the protective sticker is not removed, the sensor cannot measure temperature or detect people. Be sure to remove it after installation.

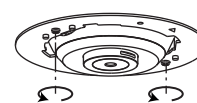
### Removal procedure

**IMPORTANT** • Do not touch the lens directly with your hands. If the lens is dirty, the sensor may not be able to measure temperature or detect people correctly.

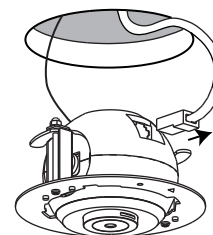
- (1) While pulling the notch on the cover downward, turn the cover counterclockwise to remove it.



- (2) Turn the two screws counterclockwise until they do not turn any further.



- (3) Take out the sensor and detach the cable.



● **Model numbers TY2001B4000 and TY2001C4000**

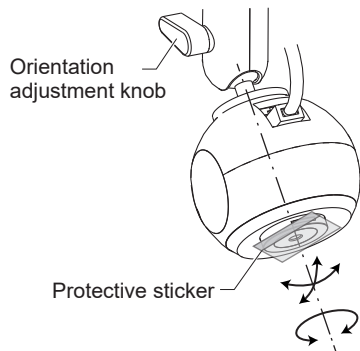
Installation location

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

- Away from direct wind or rain
- Not in direct sunlight and not near water.
- No vibration or shock (outside of the specifications)
- Away from steam
- Where chemicals and oil will not adhere
- Out of reach of occupants who do not have specialized knowledge about instrumentation or electricity
- Where the temperature does not change rapidly
- Where the ball head mount can be securely mounted
- Away from direct air flow from outlets or inlets
- Away from heat generated by lights and other devices

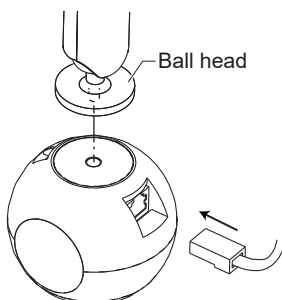
**IMPORTANT** ● If mounting the product on a ball head, select a ball head with an embedded orientation adjustment knob (i.e., a knob that cannot be removed).  
If the knob can be removed, it may fall during adjustment.

- Carefully check the specifications of the ball head, and select one that is suitable for the weight and other specifications of this sensor.



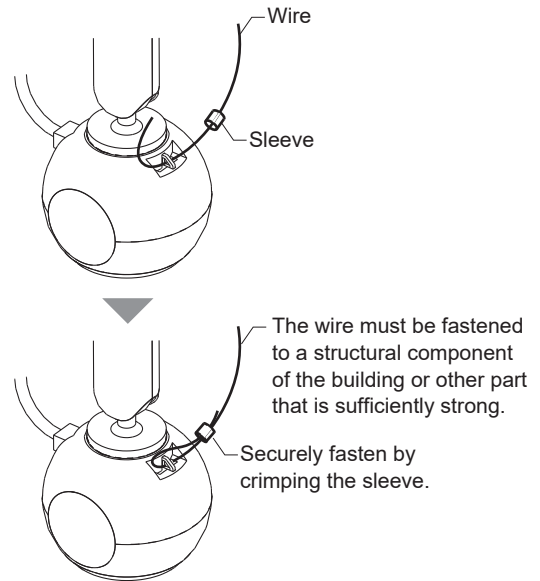
Installation procedure

- (1) Use the screw hole in the back of the sensor to tighten it to a ball head that has been securely installed.  
Connect the cable that was wired in advance to the connector on the sensor.

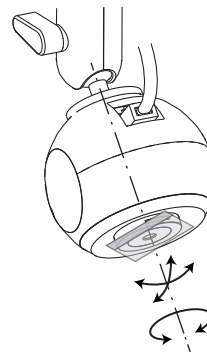


- (2) Thread the fall-prevention wire through the sensor and securely fasten the wire.

Note: The figure below shows a sample wire-fastening method.



- (3) Adjust the ball head so that the detector faces the center of the area to be scanned.  
Note the orientation of the detector as well as the rotation angle.



- (4) Remove the protective sticker.

**IMPORTANT** ● There is a protective sticker over the lens. If the protective sticker is not removed, the sensor cannot measure temperature or detect people. Be sure to remove it after installation.

Removal procedure

- (1) Remove the cable and fall-prevention wire.  
If the fall-prevention wire is threaded through the sensor, detach the wire too.
- (2) Remove the sensor from the ball head.

## ■ 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.

- \* savic-net is a trademark of Azbil Corporation.
- \* BACnet is a registered trademark of ASHRAE.

**azbil**

*Specifications are subject to change without notice.*

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**Azbil Corporation**  
Building Systems Company

<https://www.azbil.com/>

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