# azbil

Duct Temperature/Humidity Sensor

■ Overview

The duct temperature/humidity sensor (Model HTY78_5 series) is a highly precise and reliable sensor using the resistance temperature detector (Pt100) for the temperature sensor and the polymer capacitive humidity detector (FP5*) for the humidity sensor.

With a wide measurement range and excellent stability, it can be applied to various industrial applications such as outdoor air measurement as well as it is used in the ducts, chambers, etc. of general buildings for air conditioning.

* A sensor element developed by Azbil Corporation

▲ Model HTY7805

▲ Model HTY7815
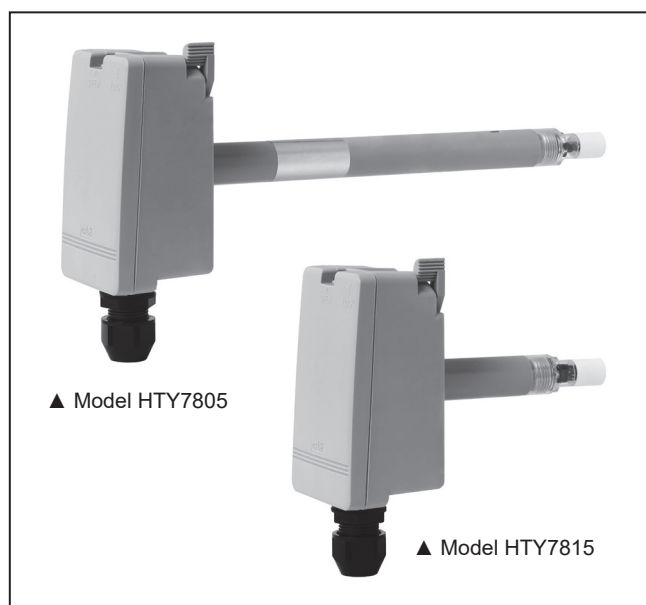
■ Features

- Wide temperature and/or humidity sensing range with high accuracy
- Excellent long-term stability
- High environmental resistance
- Quick response and high repeatability
- A dedicated bracket is used enabling easy attachment or detachment of the sensor.
  It is easily attached in the ducts or chambers.
- Dust-proof and splash-proof (IP54) housing

IMPORTANT ● The measuring accuracy of this product is the value when it is shipped from the factory.
Even if it is used in normal air, the output may be shifted depending on the operating environment.
Periodical inspection is recommended.
● Corrosive gases or organic solvents may cause a shift in humidity output or damage the product.
If the sensor is used in an environment different from the ordinary air, please contact Azbil Corporation.

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

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 shown in the following table.

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

For maintenance, refer to ■ "Maintenance" in this manual.

Product	Recommended design life
Duct temperature/humidity sensor	8 years

■ 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.

■ Signs

Electric shock	Alerts users to possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
Disassemble	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.)
General	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	
Electric shock	Before wiring or maintenance, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
Electric shock	After the wiring work, attach the cover at the original position. Failure to do so may result in electric shock.

⚠ CAUTION	
General	Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
General	Take anti-lightning surge measures based on regional and building characteristics. Lightning may cause fire or critical damage to this product if protective measures are not taken.
Prohibition	Do not put a load or weight on this product. Doing so may damage the product.

<table>
<tr><td colspan="2" align="center">⚠ CAUTION</td></tr>
<tr><td>❗
General</td><td>For the sake of safety, installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
Failure to do so may cause fire or electric shock.</td></tr>
<tr><td>❗
General</td><td>All wiring must comply with applicable codes and ordinances.
Otherwise there is a danger of fire.</td></tr>
<tr><td>❗
General</td><td>Provide a power circuit breaker for the power source to this product.
The product does not have a power switch.</td></tr>
<tr><td>❗
General</td><td>Use crimp terminals with insulation for connections to the product terminals.
Failure to do so may cause short circuit leading to fire or device failure.</td></tr>
<tr><td>❗
General</td><td>Firmly tighten the terminal screws.
Insufficient tightening of the terminal screws may cause fire or overheating.</td></tr>
<tr><td>🚫
Prohibition</td><td>Do not use unused/spare terminals on this product as relay terminals.
Doing so may cause device failure.</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">⚠ CAUTION</td></tr>
<tr><td>❗
General</td><td>If more than the rated power voltage is accidentally applied to this product, replace the product with a new one for your safety.
Failure to do so may cause device failure or cause overheating.</td></tr>
<tr><td>🚫
Prohibition</td><td>Do not disassemble or modify this product.
Doing so may cause device failure or electric shock.</td></tr>
<tr><td>❗
General</td><td>Do not replace a filter or a sensor unit in a high place because there is a risk of falling or dropping things.
When replacing a filter or a sensor unit that is mounted in a high place, remove the sensor from the mounted location and work where there is no risk of falling or dropping things.</td></tr>
</table>

IMPORTANT • Do not use transceivers or low-power wireless devices near this product.
Doing so may cause radio wave interference and malfunction of the product.

■ Model Numbers

Model No.	Shape	Type	Power	Humidity output	Temperature output	Fixed	Description
HTY78							Duct temperature/humidity sensor
	0						Insertion part: long
	1						Insertion part: short
		5					FP5 (humidity-sensing element)
			T				24 V AC/DC
				1			Humidity output: 1–5 V
				4			Humidity output: 4–20 mA
					1		Temperature output: 1–5 V
					4		Temperature output: 4–20 mA
					P		RTD (Pt100)
						00	–

Only the following combinations are available for ordering.

Model No.	Insertion part	Power	Humidity output	Temperature output
HTY7805T1P00	Long	Common for 24 V DC, 24 V AC	1–5 V	RTD (Pt100)
HTY7815T1P00	Short			
HTY7805T1100	Long			1–5 V
HTY7815T1100	Short			
HTY7805T4P00	Long		4–20 mA	RTD (Pt100)
HTY7815T4P00	Short			
HTY7805T4400	Long			4–20 mA
HTY7815T4400	Short			

RTD: resistance temperature detector

● **Optional Parts**

Model No.	Description
83157235-001	Mounting bracket (with packing, drilling label, and M4 screws)
83157240-004	Conduit mounting set (applicable cable diameter: φ11–14)
83104098-004	Seal connector (cable diameter: φ10.5–14.5)
DY8000A1001	Outdoor sensor shield
DY3002A1005	Mounting bracket for sensor in Stevenson screen (L-shape metal fitting)

● **Maintenance Parts**

Model No.	Description
83162945-101	Filter (x1)
83162945-103	Filter kit (filter x1, cap x1)
84505300-001	Sensor unit for replacement

■ **Specifications**

(1/2)

Item			Specification
Measuring range	Temperature		-20–60 °C
	Humidity		0–100 % RH
Measuring accuracy	Temp.	RTD (Pt100, 3-wire)	±0.3 °C
		Voltage/current output	±0.3 °C (at 15–35 °C) ±0.4 °C (at 0–50 °C) ±0.5 °C (at -20–60 °C)
	Humidity		±3 % RH (at 30–70 % RH, -20–5 °C) ±3 % RH (at 10–90 % RH, 5–60 °C) ±5 % RH (at 0–100 % RH, -20–60 °C)
Output signal	Temp.	RTD (Pt100, 3-wire)	100 Ω / 0 °C, RTD (Pt100) , conforming to JIS C 1604 Class A, 3-wire
		Voltage output (1–5 V)	1–5 V DC (linear characteristic for 0–50 °C) , 10 kΩ or more input impedance of the controller in connection
		Current output (4–20 mA)	4–20 mA DC (linear characteristic for -20–60 °C) , 500 Ω or less input impedance of the controller in connection
	Humidity	Voltage output (1–5 V)	1–5 V DC (linear characteristic for 0–100 % RH) , 10 kΩ or more input impedance of the controller in connection
		Current output (4–20 mA)	4–20 mA DC (linear characteristic for 0–100 % RH) , 500 Ω or less input impedance of the controller in connection
Time constant	Temperature		4 minutes or less (at air velocity: 2 m/s)
	Humidity		1 minute or less (at air velocity: 2 m/s)
Power supply voltage			24V AC (-15 %–+10 %) (frequency: 50/60 Hz ± 5 %) 24 V DC ± 10 %
Power consumption			For 24 V AC: voltage output 1.0 VA max., current output 2.0 VA max. For 24 V DC: voltage output 0.4 W max., current output 1.5 W max.
Insulation resistance			500 V DC, 20 MΩ min. (between case and terminals)
Withstand voltage			When applying 500 V AC for 1 minute, leakage current 1 mA max. (between case and terminals)

JIS: Japanese Industrial Standards

Item		Specification		
Environmental conditions		Rated operating conditions	Marginal operating conditions	Transportation/storage conditions
	Ambient temperature	-20–60 °C		-20–70 °C
	Ambient humidity	0–100 % RH (without condensation)		5–95 % RH (without condensation) (60 °Ctd or less)
	Vibration	4.9 m/s² (10–150 Hz)		9.8 m/s² (10–150 Hz) (should be in packed state)
	Air velocity	0.1–15 m/s (0.5–15 m/s for Model HTY7815T4P00)	0–15 m/s	–
Enclosure protection	Housing	Dust-proof and splash-proof (IP54) The specified waterproof glands and specified multi-core cables, or the specified conduits must be used.		
Major material, color	Housing	Polycarbonate resin containing 20 % of GF, gray (equivalent to DIC-651)		
	Cap	Polycarbonate resin, transparent		
Weight	Model 7803_	Approx. 240 g		
	Model 7813_	Approx. 210 g		
Installation		Duct, AHU, Stevenson screen (with the dedicated bracket)		
Wiring length		100 m max.		
Connection		Connections using the terminal blocks		

IMPORTANT
- Check the allowable load (maximum current, maximum power consumption) to select the power supply for this product.
- Do not use the Model RYY792D (24 V DC power supply) for the 4–20 mA output model of the sensor. It does not work correctly due to insufficient capacity.

■ Dimensions
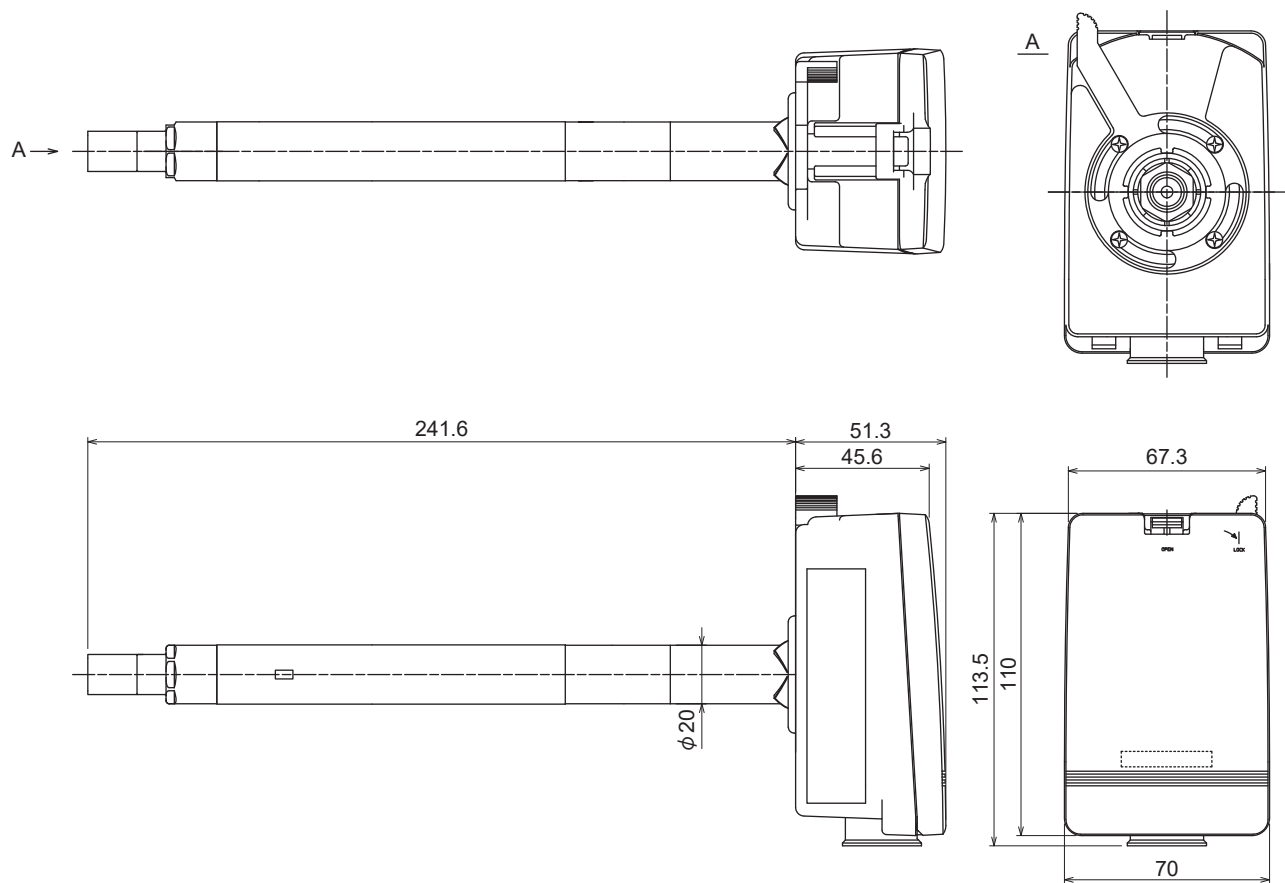
Figure 1.   Long insert - Model HTY7805 (mm)
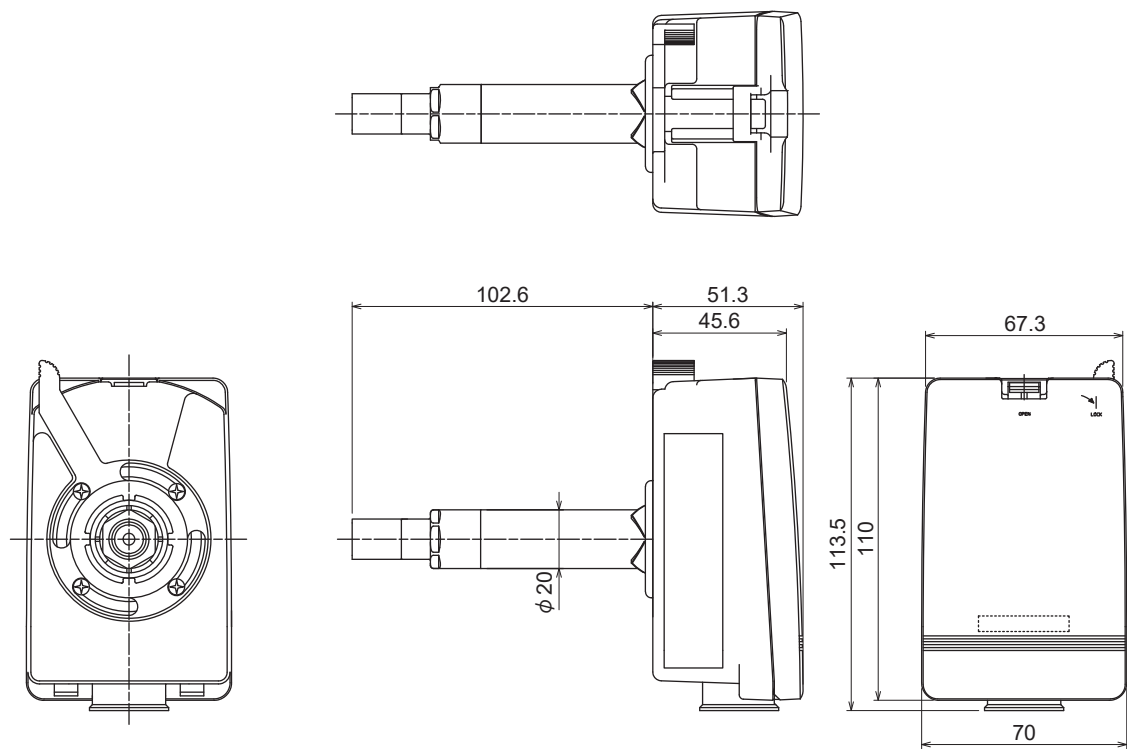
Figure 2.   Short insert - Model HTY7815 (mm)
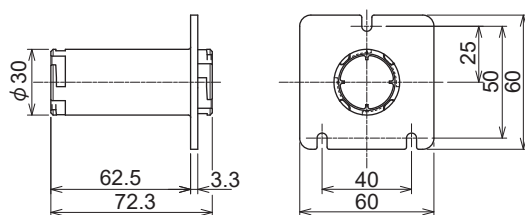
Figure 3.   Mounting bracket (mm)

■ Installation

⚠ CAUTION	
❗ General	Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
🚫 Prohibition	Do not put a load or weight on this product. Doing so may damage the product.
❗ General	For the sake of safety, installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards. Failure to do so may cause fire or electric shock.

● **Precautions for Installation**

• Mount the sensor where representative temperature and/or humidity of the fluid can be measured and air velocity is regulated to be within the specified range.

• Mount the sensor so that whole insertion part is surrounded by the measured fluid and the flow strikes the side of the insertion part.

• Leave enough working space in front of the cover (housing) for maintenance and inspection of the sensor.

• If the sensor is mounted on an AHU using the steam heating method, be sure that high temperature steam does not come into direct contact with the sensor.

  Note: Temperature of the sensor may exceed the marginal operating temperature range due to direct high temperature steam.

• If attaching the insert upward, be especially careful not to cause condensation.

  Note: Condensed water may accumulate in the groove of the filter cap and cause a measurement error until it dries.

• When installing the sensor in an outdoor duct, install it in an outdoor waterproof box so that the housing part is not exposed to direct sunlight or rain.

• Secure a space shown below on the housing side.

  • Model HTY 780 (long insertion) : 310 mm min.

  • Model HTY 781 (short insertion) : 140 mm min.

AHU: air handling unit

• Make sure that the temperature difference between the sensor unit and the housing unit is less than 30 °C. It may not be possible to maintain detection accuracy.

• Make sure that the differential pressure between the sensor unit and the housing unit is less than 10 kPa. Failure to do so may cause device failure.

IMPORTANT	● When the sensor fails, a room or duct may be over humidified due to decline of its output. Take a countermeasure at the controller side.

● **Installing in General Duct**

Describes the procedure to install the long-insert sensor (Model HTY7805) in the general ducts.

(1) Stick the drilling label at the position where the sensor is to be attached and drill a hole in the duct.
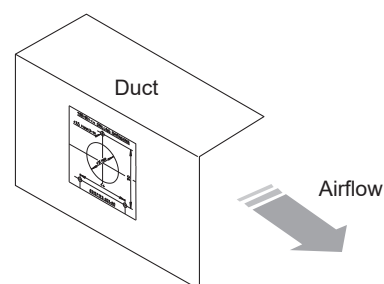

Figure 4.   Drilling a hole

(2) Attach the mounting bracket.

Place the long side of the mounting bracket facing you.

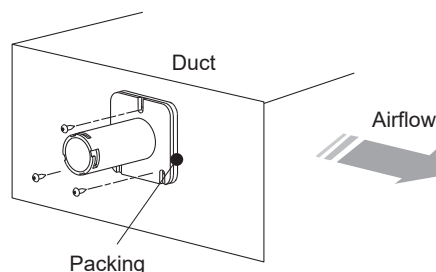Insert the packing between the bracket and the duct, and then tighten with the included M4 screws.

Figure 5.   Attaching the mounting bracket

(3) Wind heat insulation material around the duct. If the heat insulation material is already wound up, remove part of the insulator.

After attaching the mounting bracket, fill the space with insulation.
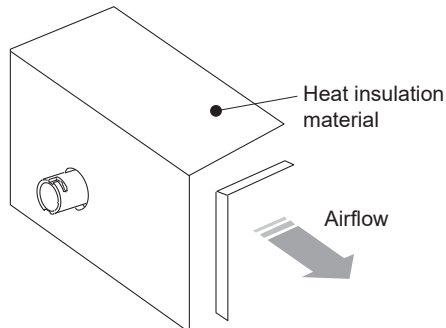

Figure 6. Winding the heat insulation material

(4) Attach the sensor to the mounting bracket.

Set the stopper on the sensor in the direction of ②. Align the tab with the groove on the mounting bracket and insert the body.
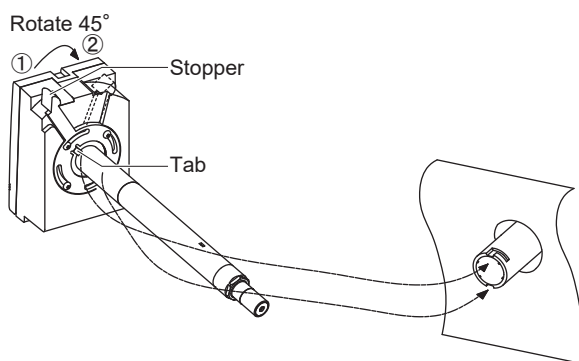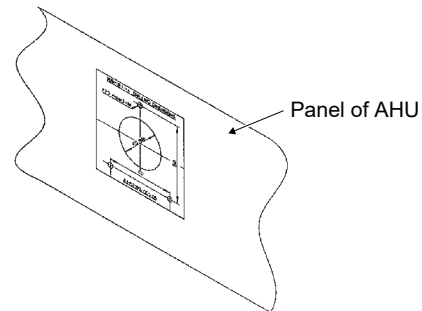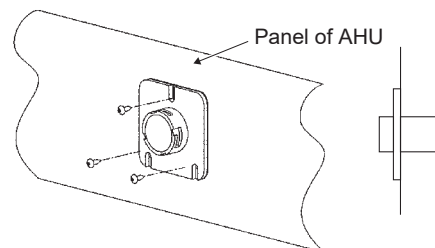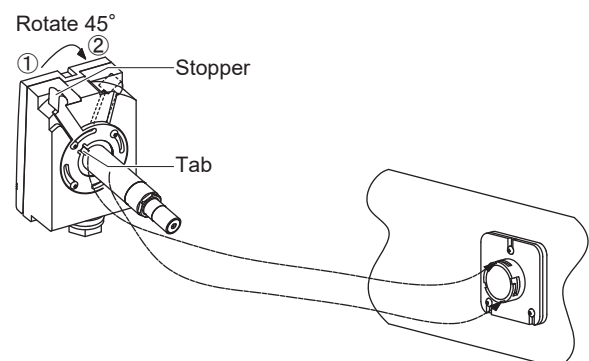

Figure 7. Attaching the sensor

(5) Fix the sensor.

Keep the sensor is fully inserted and rotate the stopper in the direction of ①.

The sensor is fixed to the mounting bracket.
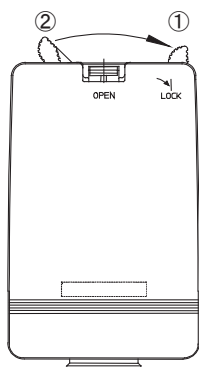
Figure 8. Fixing the sensor

● **Installing in AHU or Stevenson Screen**

Describes the procedure to install the short-insert sensor (Model HTY7815) in AHU or Stevenson screen.

(1) Stick the drilling label at the position where the sensor is to be attached and drill a hole in the panel of AHU.

Figure 9. Drilling a hole

(2) Attach the mounting bracket.

Place the short side of the mounting bracket facing you.

Insert the packing between the bracket and the duct, and then tighten with the included M4 screws.

Figure 10. Attaching the mounting bracket

(3) Attach the sensor to the mounting bracket.

Set the stopper on the sensor in the direction of ②.

Align the tab with the groove on the mounting bracket and insert the body.

Figure 11. Attaching the sensor

(4) Fix the sensor.

Keep the sensor is fully inserted and rotate the stopper in the direction of ①.

The sensor is fixed to the mounting bracket.
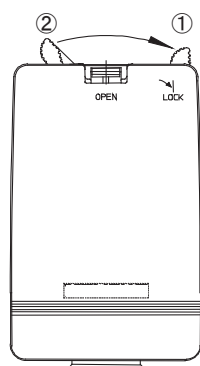
Figure 12.   Fixing the sensor

■ Wiring

⚠ WARNING	
Electric shock	Before wiring or maintenance, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
Electric shock	After the wiring work, attach the cover at the original position. Failure to do so may result in electric shock.

⚠ CAUTION	
General	For the sake of safety, installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards. Failure to do so may cause fire or electric shock.
General	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
General	Provide a power circuit breaker for the power source to this product. The product does not have a power switch.
General	Use crimp terminals with insulation for connections to the product terminals. Failure to do so may cause short circuit leading to fire or device failure.
General	Firmly tighten the terminal screws. Insufficient tightening of the terminal screws may cause fire or overheating.
Prohibition	Do not use unused/spare terminals on this product as relay terminals. Doing so may cause device failure.

● Wiring Diagrams
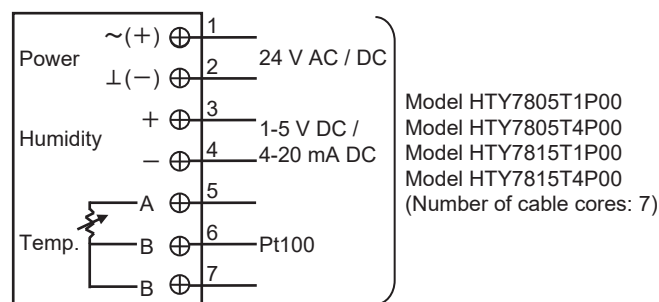
Figure 13.   Terminal number and the number of cable cores (Model HTY78_5T_P00)
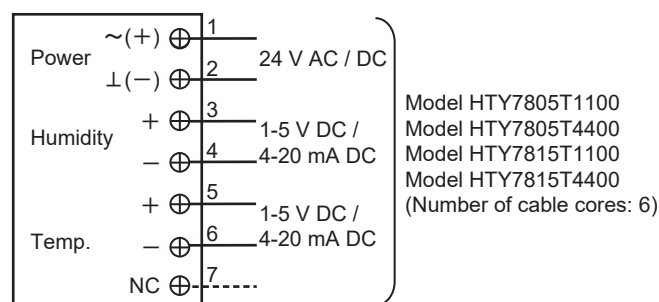
Figure 14.   Terminal number and the number of cable cores (Model HTY78_5T1100, Model HTY78_5T4400)

● Precautions for Wiring

IMPORTANT	• Do not connect the lead wires for temperature output to the power supply lines. Doing so may cause smoke, burnout. • Do not share the 24 V AC transformer (24 V AC power supply) with other products. • Make sure that all the wires are correctly connected before supplying power.

For wiring the power supply wiring and temperature/humidity outputs, the 1.25 mm^2 or 2.0 mm^2 shielded multi-core cables (CVV-S) are recommended.

- The maximum cable length is 100 m.
  For the wiring length, refer to the Specifications/Instructions of the controllers to which the sensor is connected.

- If there is no need to apply dust-proof and splash-proof configurations, the 1.25 mm^2 or 2.0 mm^2 IV wires are also usable.
  Also, the 1.25 mm^2 shielded wires are usable for the humidity outputs.

- Be sure to ground the shielding on the controller side.

● **Power Supply Wiring Method**

Connect the sensor as described below.

When installing the sensor newly

• DC power supply

IMPORTANT • The 24 V DC power supply can be shared only with the same series sensors.
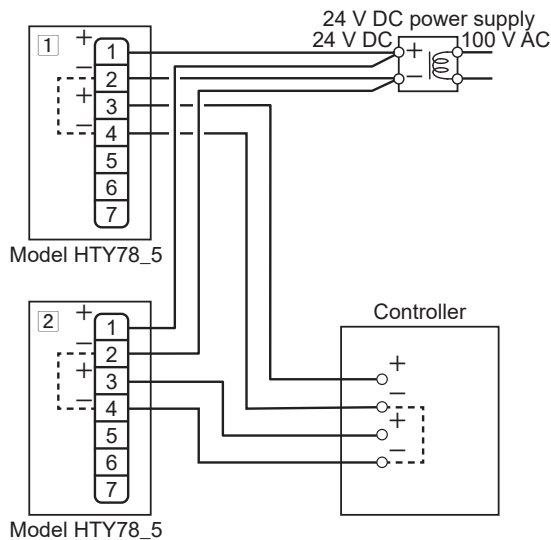• Be sure to connect between ⬜1 1 (+) and ⬜2 1 (+), between ⬜1 2 (-) and ⬜2 2 (-) as shown in Fig. 15.

Figure 15.

• AC transformer (24 V AC power supply)

IMPORTANT • The AC transformer (24 V AC power supply) cannot be shared.
The same number of AC transformers (24 V AC power supply) as the sensors are required.
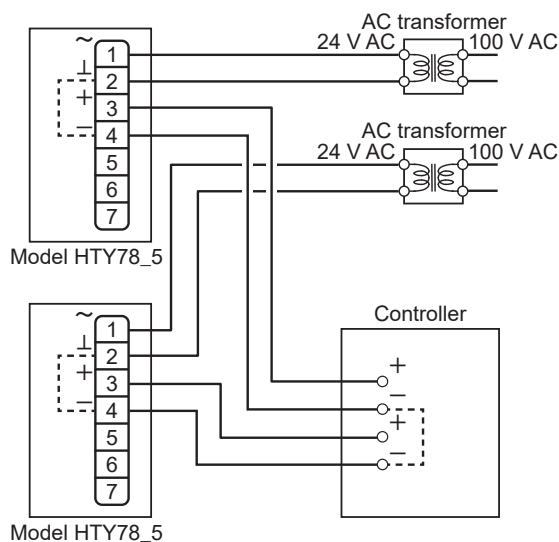
Figure 16.

When replacing the existing sensors

IMPORTANT • If two or more sensors are used, the same number of AC transformers (24 V AC power supply) as the sensors are required.
Do not share the 24 V AC transformer.

If replacing the existing sensors with these sensors (including mixture of existing sensors), check whether the AC transformer (24 V AC power supply) is shared or not.

Note: For the DC power supply, it is the same as installing newly. (Fig. 15.)
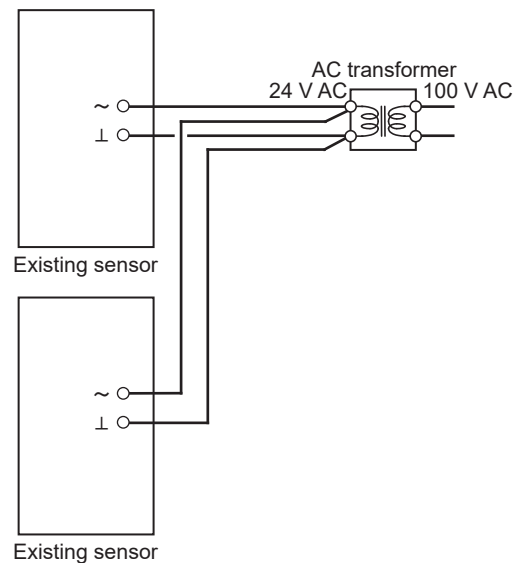
Figure 17. Wiring before replacement
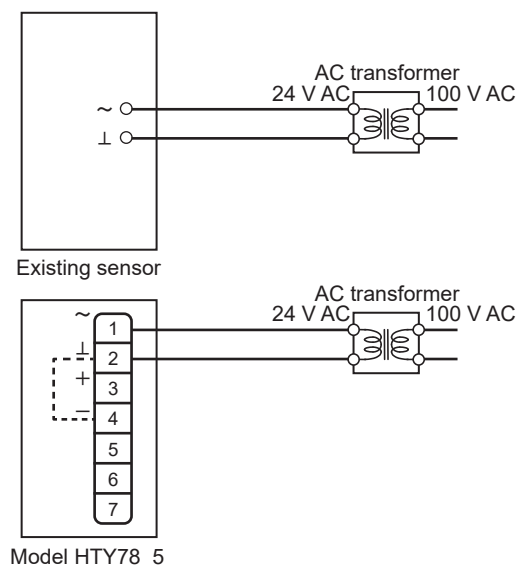
Figure 18. Wiring after replacement

● **Precautions for Wiring Power**

If supplying power to the sensor via the AC transformer (24 V AC power supply), be sure to follow the instructions below.

> IMPORTANT • If the common line (-) of the controller is non-insulated type, do not share the AC transformer (24 V AC power supply) for the temperature/humidity sensor.

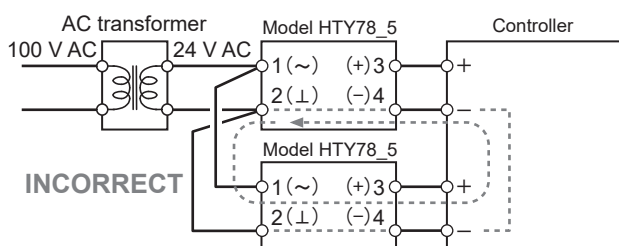• If the AC transformer (24 V AC power supply) is shared, a loop will be made in the circuit and the sensor may fail.

Figure 19.   A loop is made in the circuit

• If the AC transformer (24 V AC power supply) is shared, and if the wires are incorrectly connected between ☐1 1 (~) and ☐2 2 (⊥) or between ☐2 1 (~) and ☐1 2 (⊥), a short circuit will be made in the circuit through the common line and the sensor may fail.
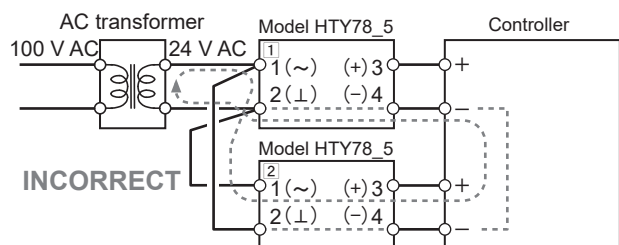
Figure 20.   Incorrectly wired

● **Wiring Procedure**

(1) Detach the cover.
    While pressing the latch ① on the cover, open the cover by 30° or more in the direction of ②. Slide the cover upward in the direction of ③.
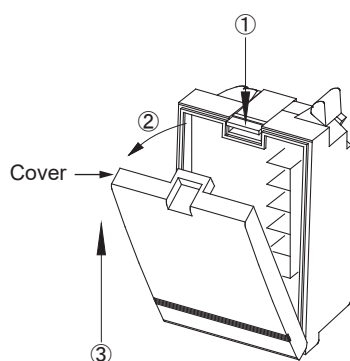
Figure 21.   Detaching the cover

(2) Pass the cable.

• Connecting with the seal connector
Prepare an appropriate seal connector (optional parts) according to the number cores in the cable used.
Attach the seal connector to the housing with the screw and pass the cable.
Use the specified seal connector.
Depending on the sealing performance, air may flow in and cause condensation on the PCB leading to failure.
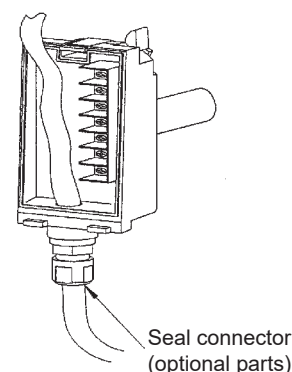

Figure 22.   Connecting with the seal connector

• Connecting with the conduit
Prepare an appropriate conduit mounting set (optional parts) according to the number cores in the cable used.
Temporarily screw the conduit connector and the attachment, and select an O-ring suitable for the cable to be used.
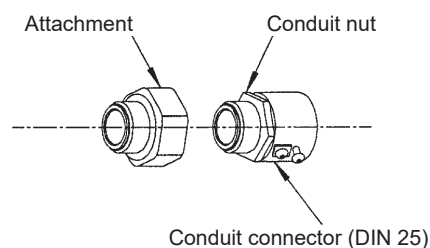

Figure 23.   Conduit connection

PCB: printed circuit board

Pull the cable upward and fasten the attachment to the case with a screw.

Tighten the nut attached on the conduit at the location where the screw for fastening the conduit is easily accessed.
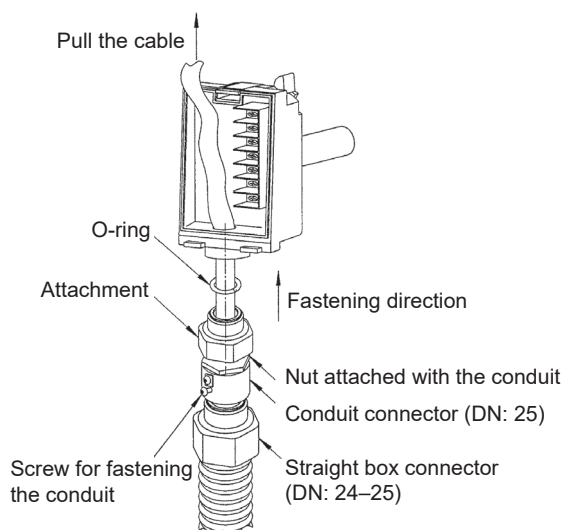

Figure 24.   Connecting with the conduit

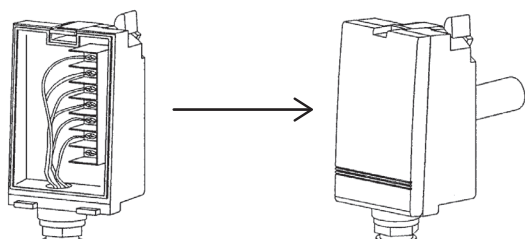(3) Attach the terminal to the cable and connect.

Figure 25.   Attaching the cover

(4) After completing the wiring, close the cover.

(5) Tighten the seal connector.
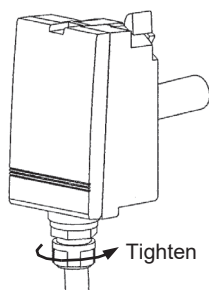
Note: Only for connecting with the seal connector

Figure 26.   Seal connector

IMPORTANT • After installing this product, let the temperature/humidity sensor adapt to the atmosphere (environment) for 24 hours or so.
• After power on, allow minimum 10 min warm-up operation before starting normal operation.

● **Precautions for Other Signals**

Because of the induction current flowing from the temperature/humidity sensor to the controller input circuit, or an inadequate time constant of the controller, the system may be affected by an electrical noise.

In order to suppress noise, check the following items.

• Use a controller, which receives signals from the sensor, with low pass filters (40 dB or higher noise rejection ratio in the normal mode) .

• If the noise rejection ratio is insufficient, provide isolators on the controller input signals.

Note: No problem will occur for connecting the sensor to the Azbil's controller.

■ Maintenance

⚠ WARNING
![Electric shock symbol] Electric shock — Before wiring or maintenance, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.

The temperature/humidity sensor is inspected and its accuracy is tuned when it is shipped from the factory. No field adjustment is required.

The sensor should be inspected as described below.

● Regular Inspection

According to the amount of dust in the air and the condition of dirt, determine the cycle for inspection. Check the sensing accuracy, clogging of the filter and clean it.

● Troubleshooting

Check the sensor according to table 1, if there is an abnormality, take necessary countermeasures. If the abnormality cannot be recovered after taking the countermeasures, please contact Azbil Corporation.

Table 1. Troubleshooting

Abnormality	Possible causes	Countermeasures
No output Unstable output	Loose connections	Retighten the terminal screws.
	Disconnected wires	Redo wiring.
	Power supply voltage	Secure the power supply voltage specified in this manual.
	Damaged sensing element	Replace the product.
Slow response to output	Sensing element soaked with water or condensation	Dry the sensor as follows: 1. Detach the sensor from the bracket. 2. Detach the filter. 3. Dry the sensor naturally in a clean environment without supplying power.
Measurement errors	Installation location/ environment	Secure the installation location/environment specified in this manual.
	Contamination or damage on the filter	Clean or replace the filter.
	Contamination or damage on the sensing element	Replace the sensor.

● Adjustment

This product does not have a tuning volume. When you want to adjust the output value, use the input offset adjustment function of the controller connected to the product.

Note: When executing the adjustment, be sure to consider the heat generated from human body, office equipment, etc. Prepare reliable reference instruments and be aware of the handling method and operating environment for them.
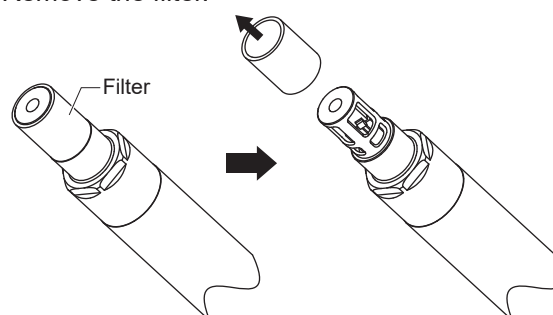
● Replacing Filter

IMPORTANT ● While the filter cap or filter is removed, be sure not to touch the exposed PCB or parts. Doing so may damage the PCB or parts.

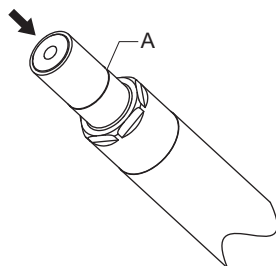**Cleaning the filter**

If the filter becomes dirty due to dust, etc., replace it. Refer to "How to replace the filter" in this section for replacing it.

How to replace the filter

Remove the old filter from the filter cap and insert a new one firmly to the root of the cap.

(1) Remove the filter.
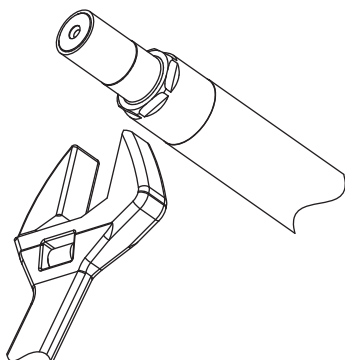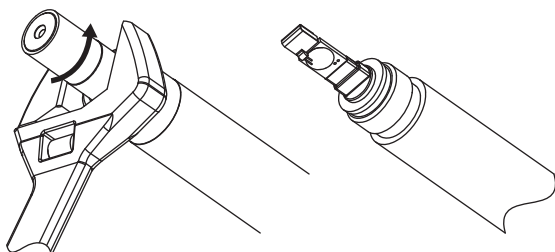

Filter

13

(2) Insert a new filter.

A

Notes:
  1. Insert the filter firmly to the position "A."
  2. After replacing the filter, the measurement data may be become unstable.

● **Replacing Sensor Unit (Replaceable models: HTY78 _ 5T1100, HTY78 _ 5T4400)**

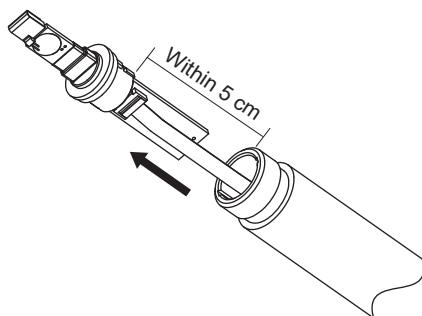(1) Turn off the power to the product.

(2) Remove the cap by turning it with an adjustable wrench, etc.

IMPORTANT ● Be sure not to apply an electrostatic discharge.

(3) Slowly pull out the sensor unit from the protective tube. (Within 5 cm)

Within 5 cm

Note: If you pull out the sensor unit strongly, the flexible flat cable (FFC) may come out from the base of the case. (Do not pull it strongly.)
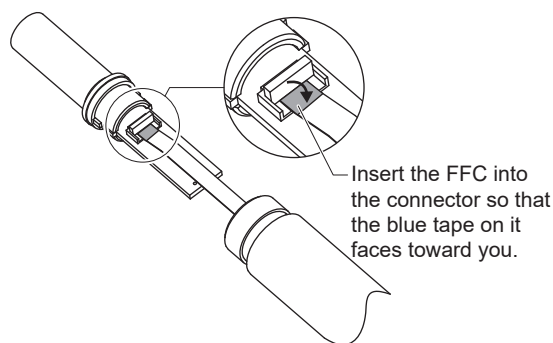
(4) Raise the stopper lever on the connector on the printed circuit board of the sensor unit.
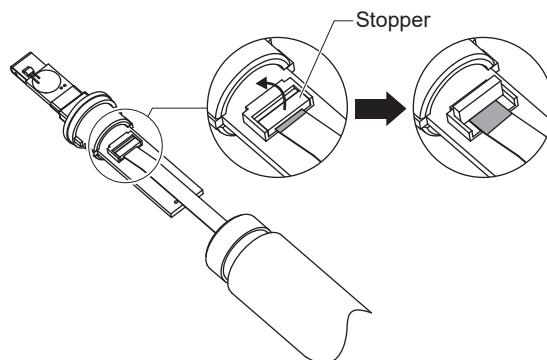

Stopper

(5) Remove the FFC connected to the sensor unit.
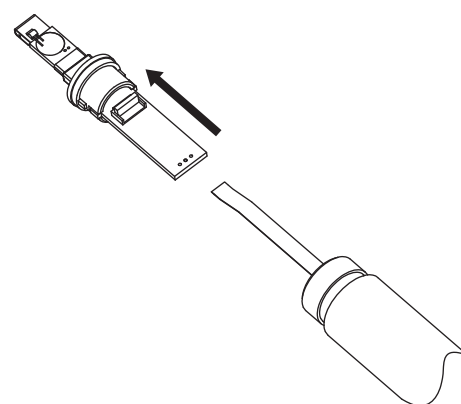
(6) Insert the FFC into the connector of the new sensor unit, and then press down the stopper to fasten it.

Insert the FFC into the connector so that the blue tape on it faces toward you.
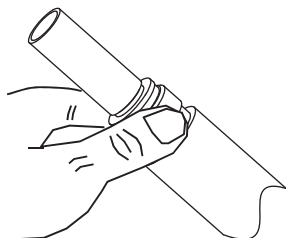
Note: Do not remove the protective tube.

(7) Pick the printed circuit board end and the cable together, and align the convex on the sensor unit with the concave on the protective tube, and then slowly insert it into the protective tube.
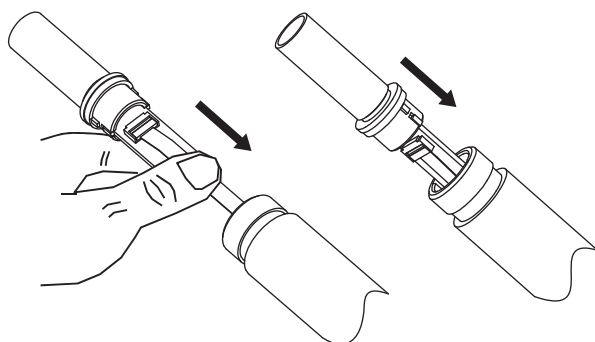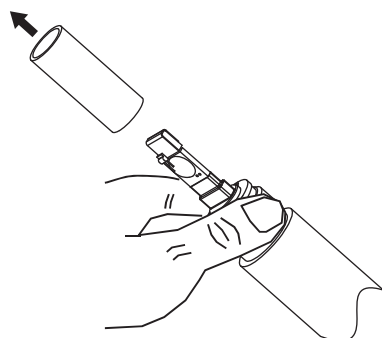
Note: Make sure that the FFC does not protrude from the protective tube.
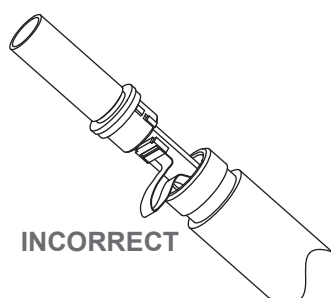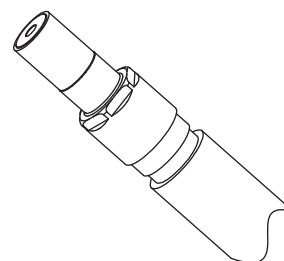
INCORRECT

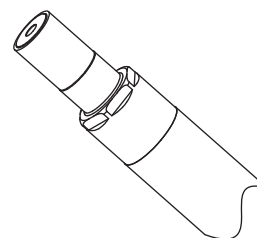(8) Hold the edge of the sensor unit.

(9) Remove the protective tube.

(10) Attach the cap.

Tighten the cap by hand without using a tool.

(11) Turn on the power and check that the sensor works correctly.

Note: This product is inspected and its accuracy is tuned when it is shipped from the factory. After replacing the product, no adjustment is required.

● **Notices:**

- It is allowed to replace the sensor unit up to 10 times

  (Due to flat cable deterioration concerns)

- Tighten the cap firmly until it stops.

- Do not touch the sensor element of the sensor unit.

- Keep the sensor unit avoiding from places exposed to high temperature and humidity or direct sunlight (ultraviolet rays) .

- Do not allow excessive force or shock on the sensor unit.

- Do not replace a sensor unit in a high place because there is a risk of falling or dropping things.
  When replacing a sensor unit that is mounted in a high place, remove the sensor from the mounted location and work where there is no risk of falling or dropping things.

■ **Disposal**

Dispose of this product as industrial waste in accordance with your local regulations.
Do not reuse all or any part of the product.

CE This product complies with the following harmonised standards of the Electromagnetic Compatibility Directive (EMCD) and the Restriction of Hazardous Substances Directive (RoHSD) .
　　EMCD ： EN 61326-1 Class B, Table 1 (for use in a basic electromagnetic environment)
　　RoHSD : EN 50581

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Specifications are subject to change without notice.