Neosensor (Two-Wire 4-20mA Output Sensor)

Room Temperature Sensor Model TY7043D
Room Humidity Sensor Model HY7043D
Room Temperature/Humidity Sensor Model HTY7043D

General

Neosensor (two-wire 4-20mA output sensor) is a series of electronic room sensors including temperature sensor (Model TY7043D), humidity sensor (Model HY7043D), and temperature/humidity sensor (Model HTY7043D). Neosensor is coordinated in terms of design and dimension with Neostat electronic room temperature/humidity controller.

Pt100 resistance thermometer sensor (JIS* C1604 Class A) for temperature sensing element and polymer capacitive humidity sensor (FP3™ developed by Azbil Corporation) for humidity sensing element enhance accuracy and reliability of Neosensor sensing. Neosensor is thus suitable for various applications such as commercial building or other indoor uses.

Note that the specification data of Neosensor the Pt100, 1-5V, and 0-10V output sensors is not included in this document. Refer to the following document.

AB-7050 Specifications/Instructions:
Neosensor
Room Temperature Sensor Models TY7043, TY7053,
Room Humidity Sensor Model HY7043,
Room Humidity/Temperature Sensor Model HTY7043

* JIS: Japanese Industrial Standards

Features

- Wide temperature and/or humidity sensing range with high accuracy.
- Excellent long-term stability.
- High environmental resistance.
- Quick response and high repeatability.
- Compact (thin) and lightweight.
- CE Marking certified product:
  Neosensor Models TY7043D, HY7043D and HTY7043D conform to all the applicable standards of CE Marking.

CE

Safety Instructions

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

Usage Restrictions

This product is targeted for general air conditioning. Do not use this product in a situation where human life may be affected. If this product is used in a clean room or a place where reliability or control accuracy is particularly required, please contact our sales representative. Azbil Corporation will not bear any responsibility for the results produced by the operators.

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

	Alerts users 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.)
	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 notifies 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.)

⚠ CAUTION	
	Use the product under the operating conditions (temperature, humidity, power, vibration, shock, mounting direction, atmospheric condition, etc.) as listed in the specifications. Failure to do so might cause fire or device failure.
	Use the product within the rated operating ranges as listed in the specifications. Failure to do so might cause device failure.
	Before wiring, be sure to turn off the power to the product.
	Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
	All wiring must comply with applicable codes and ordinances.
	Do not disassemble the product. Doing so might cause device failure.
	Dispose of the product as industrial waste in accordance with your local regulations. Do not reuse all or part of this product.

IMPORTANT:

- Operating conditions such as wind velocity and load resistance affect Neosensor sensing accuracy. Refer to **Specifications** and **Installation** sections for its installation.
- Product sensing accuracy is preset before shipment. Output of the product, used even in normal air, may be shifted depending on the operating conditions. Periodic inspection therefore is recommended.
- Corrosive gas or organic solvent may shift the humidity output or damage the humidity sensing element. Before using the product (Models HY7043D, HTY7043D) in abnormal atmosphere, consult with our sales personnel.

Model Numbers

Base model number	Shape	Type	Power supply	Humidity output	Temperature output	Fixed	Output line	Company logo	Description
HTY70									Room temperature/humidity sensor
TY70									Room temperature sensor
HY70									Room humidity sensor
	4								Neosensor
		3							—
			D						24 V DC
				0					Temperature sensing only
				4					4 mA to 20 mA humidity output
					0				Humidity sensing only
					4				4 mA to 20 mA temperature output
						0			—
							0		Lead wire connection
								—	With company logo
								-1	Without company logo

Regarding the available model numbers, refer to the table below.

Available model numbers

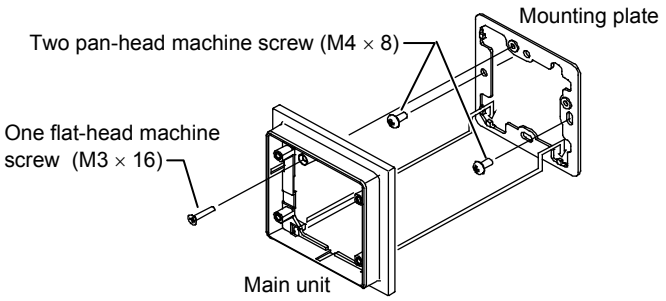
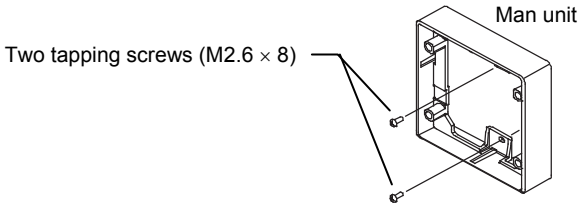
Model number	Sensor type		Company logo
HTY7043D4400	Humidity (4-20 mA) + Temperature (4-20 mA) sensor	Neosensor	Yes
HTY7043 D4400-1			No
HY7043D4000	Humidity (4-20 mA) sensor	Neosensor	Yes
HY7043D4000-1			No
TY7043D0400	Temperature (4-20 mA) sensor	Neosensor	Yes
TY7043D0400-1			No

Part Numbers of Optional Devices

Mount Neosensor with the following optional items (sold separately). Order necessary items.

Item		Part number/Model number	
Dedicated mounting kit	Wall-direct mounting kit	Part No. 83165803-001	
	Thermoplate mounting kit	Part No. 83165803-011	
Auxiliary device	Thermoplate for individual room control	Models QY1100C, QY1100D (with rotary switch)	
	Thermoplate	Model DY2000A1022	For one Neosensor, lengthwise mount
		Model DY2000A1023	For one Neosensor, crosswise mount
		Model DY2000A2023	For two Neosensor, crosswise mount (94mm (H) x 192mm (W)), attached to outlet box
		Model DY2000A2024	For two Neosensor, crosswise mount (106mm (H) x 198mm (W)), attached to outlet box
		Model DY2000A3022	For three Neosensor, crosswise mount
	Thermoplate for open wiring * Thermoplate for open wiring is used for open wiring installation.	Model DY2000A1021	For one Neosensor, square mount
		Model DY2000A2021	For two Neosensor, crosswise mount
		Model DY2000A3021	For three Neosensor, crosswise mounting

Dedicated mounting kits for each mounting method

Mounting method	Mounting kit	Contents
Mounting directly on a wall Mounting onto Thermoplate for open wiring	Wall-direct mounting kit (Part No. 83165803-001)	
Mounting onto Thermoplate	Thermoplate mounting kit (Part No. 83165803-011)	

Specifications

Item		Specification
Measuring range	Temperature	0 °C to 50 °C
	Humidity	0 %RH to 100 %RH (15 °C 35 °C)
Output signal	Temperature	4 mA DC to 20 mA DC, 2-wire type (linear to 0 °C to 50°C) (Max. allowable load: 500 Ω or lower)
	Humidity	4 mA DC to 20 mA DC, 2-wire type (linear to 0 %RH to 100 %RH) (Max. allowable load: 500 Ω or lower)
Sensing accuracy	Temperature	± 0.3 °C (at 15 °C to 35 °C, 50 %RH) ± 0.5 °C (at 0 °C to 50 °C, 50 %RH) ∗ Required conditions 24 V DC input power voltage, 250 Ω resistive load, 0.15 m/s wind velocity, and 60 minute warm-up time Note that the wind velocity other than 0.15 m/s lowers the sensing accuracy. Model TY7043D at 0.35 m/s wind velocity → -0.7 °C Model HTY7043D at 0.35 m/s wind velocity → -0.9 °C If using Neosensor under conditions not specified above, ask our salesperson.
	Humidity	± 3 %RH (at 30 %RH to 70 %RH, 25 °C) ± 5 %RH (at 20 %RH to 80 %RH, 15 °C to 35 °C) ∗ Required conditions 24 V DC input power voltage, 250 Ω resistive load, 0.15 m/s wind velocity, and 60 minute warm-up time Note that the wind velocity other than 0.15 m/s lowers the sensing accuracy. Model HY7043D at 0.35 m/s wind velocity → +2.4 %RH Model HTY7043D at 0.35 m/s wind velocity → +2.8 %RH If using Neosensor under conditions not specified above, ask our salesperson.
Time constant (at 0.15 m/s wind velocity)	Temperature	4.5 min. or less
	Humidity	40 sec. or less
Environmental conditions	For temperature sensing	Rated operating condition: 0 °C to 50 °C, 0 %RH to 100 %RH (non-condensing) Limit operating condition: -10 °C to 60 °C, 0 %RH to 100 %RH (non-condensing) Transport/storage condition: -20 °C to 70 °C, 5 %RH to 95 %RH (non-condensing)
	For humidity sensing	Rated operating condition: 15 °C to 35 °C, 20 %RH to 80 %RH (non-condensing) Limit operating condition: -10 °C to 60 °C, 0 %RH to 100 %RH (non-condensing) Transport/storage condition: -20 °C to 70 °C, 5 %RH to 95 %RH (non-condensing)
Power supply		24 V DC ± 10 %
Power consumption		550 mW per 4-20 mA output point
Withstand voltage		1 mA or less leakage current at 500 V AC for 1 min.
Insulation resistance		500 V DC, 20 MΩ or higher
Installation		With the mounting kit (sold separately).
Connection		Lead wire (0.75 mm^2 × 300 mm long) connection
Materials / color		Cover: PC resin / Pale gray Base: Modified PPE resin / Pale gray
Weight		Approx. 110 g
Accessory		4 main unit mounting screws (M3 × 16)

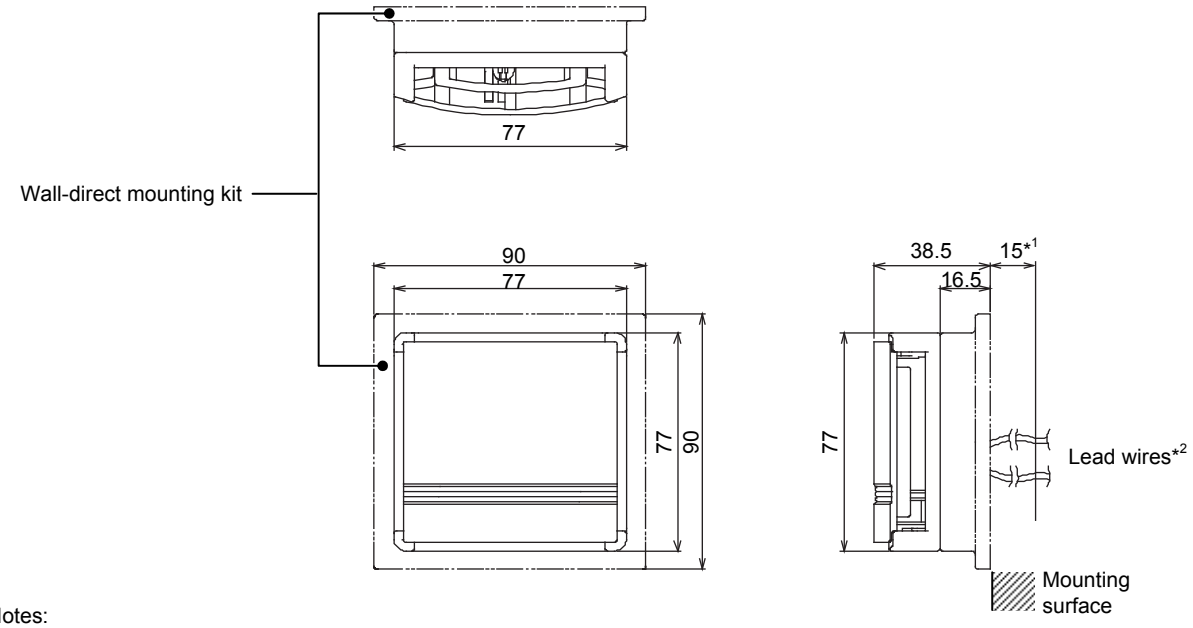
CE Marking Conformity

Models TY7043D, HY7043D and HTY7043D comply with the following Electromagnetic Compatibility (EMC).

EMC: EN61326-1 Class B, Table 1 (For use in a basic electromagnetic environment)
(CISPR11: 2003, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11)

Dimensions: Main Unit with Wall-Direct Mounting Kit

Neosensor



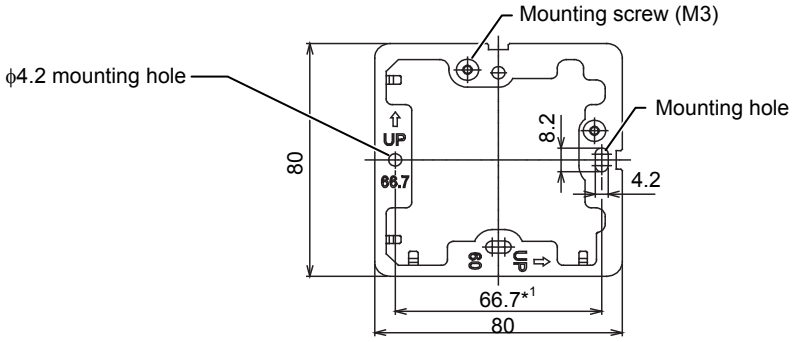
Notes:

∗1 For wiring, secure more than 15 mm clearance inside the mounting surface when installing Neosensor with Wall-direct mounting kit.

∗2 Models HY7043D (humidity sensor model) and TY7043D (temperature sensor model) has two wires as shown in the above figure. Model HTY7043D (temperature/humidity sensor model) has four lead wires.

Figure 1. Mounting dimensions (mm): Neosensor with Wall-direct mounting kit

Mounting plate



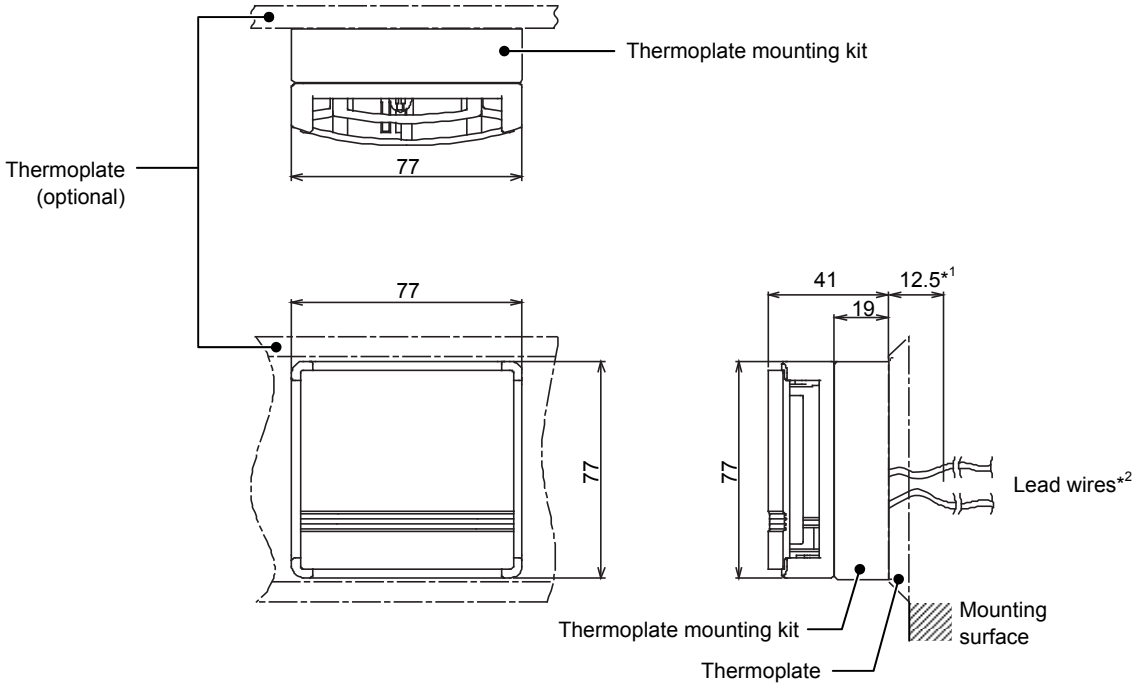
Note:

∗1 Use JIS outlet box/box cover (JIS C8340:1999) with 66.7 mm mounting dimension.

Figure 2. Dimensions (mm): Mounting plate of Wall-direct mounting kit

Dimensions: Main Unit with Thermoplate Mounting Kit (on Thermoplate)

Neosensor



Notes:

∗1 For wiring, secure more than 12.5 mm clearance from the Thermoplate surface to the inside of the mounting surface when installing Neosensor with Thermoplate mounting kit.

∗2 Models HY7043D (humidity sensor model) and TY7043D (temperature sensor model) has two wires as shown in the above figure. Model HTY7043D (temperature/humidity sensor model) has four lead wires.

Figure 3. Mounting dimensions (mm): Neosensor with Thermoplate mounting kit

Thermoplate mounting kit

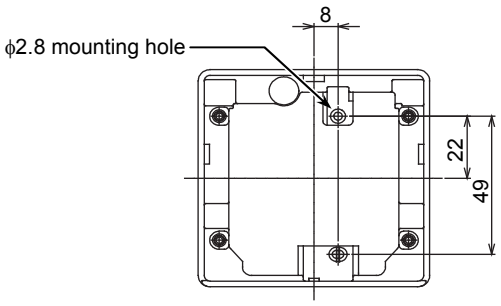


Figure 4. Dimensions (mm): Mounting plate of Thermoplate mounting kit

Installation

Requirements for installation location

IMPORTANT:
Installation location of Neosensor largely affects temperature/humidity control. Carefully select the location.

Install Neosensor on an indoor wall where:

- Representative temperature and humidity (of the room/zone to control) are measured (approx. 1.5 m high above the floor).
- There is enough maintenance space left in front of Neosensor.
- Environmental conditions including temperature, humidity, and wind velocity of installation location can affect output value (sensing accuracy). Ask our salesperson for the use of the two-wire 4-20mA output Neosensor.

Do not install Neosensor on a wall where:

- Heat (generated by office device or equipment, for example) stays on.
- Air circulation is interfered (by furniture or door, for example).
- Temperature and/or humidity sensing is affected by draft, downdraft, and hot/cold air from water pipes/ducts.
- Temperature and/or humidity sensing is affected by weather conditions (including sunlight and outdoor air).
- There is vibration.
- Dew condensation occurs.
- Water drops.
- Corrosive gas, organic solvent, or other chemicals is contained in the atmosphere.

Do not install Neosensor outdoors or in a duct.

Do not horizontally install Neosensor directly on a ceiling.

Precautions for installation

- Install Neosensor with a dedicated mounting kit (sold separately) suitable for your application.
- Do not allow any refuse such as an electric wire scrap to get inside Neosensor.
- Do not get a cable caught between the Neosensor main unit and the mounting surface.
- Carefully handle the Neosensor when the cover is removed so that the element does not get damaged.
- Check that the ambient wind velocity is sufficient in a location where Neosensor will be horizontally installed even not on a ceiling.
- If air infiltrates to the rear side of the Neosensor from the inside of the installed wall through the outlet box, shut off the air by sealing the outlet box.

IMPORTANT:

- Change in environmental conditions (wind velocity, temperature, humidity, power voltage, load resistance) will cause an offset. After the offset is compensated, a further compensation may be required each time when environmental conditions change.
- Chemical (organic solvent) atmosphere may shift the output values.
- Corrosive gas, organic solvent, and other chemicals contained in the atmosphere can cause measuring error of Neosensor, shorten the service life of Neosensor, or damage Neosensor.
- Ask our salesperson for a special application, as mentioned above.

Installation steps: Neosensor directly on a wall with Wall-direct mounting kit

1) Attach the mounting plate of the Wall-direct mounting kit to the outlet box cover (JIS C8340:1999 Boxes and box covers for rigid metal conduits (mounting dimension: 66.7 mm)) on the mounting surface.
2) Attach the main unit of the Wall-direct mounting kit to the mounting plate. (See Fig. 7.)
3) Connect the lead wires of the Neosensor to the external wires (from the load). (See Fig. 15.)
   Note: The number of the lead wires differs depending on the models.
   Models HY7043D (humidity sensor model) and TY7043D (temperature sensor model): 2 lead wires,
   Model HTY7043D (temperature/humidity sensor model): 4 lead wires
4) Remove the cover of Neosensor as shown in Fig. 9, and check that the depth change levers on the bilateral sides of the Neosensor main unit are set at the upper position (indicated with "L" shown in Fig. 12). Then, mount the main unit of Neosensor on the main unit of the Wall-direct mounting kit with the 4 mounting screws (M3 × 16) supplied with Neosensor.
5) Attach the cover back to the Neosensor main unit and complete the installation. (See Fig. 9.)

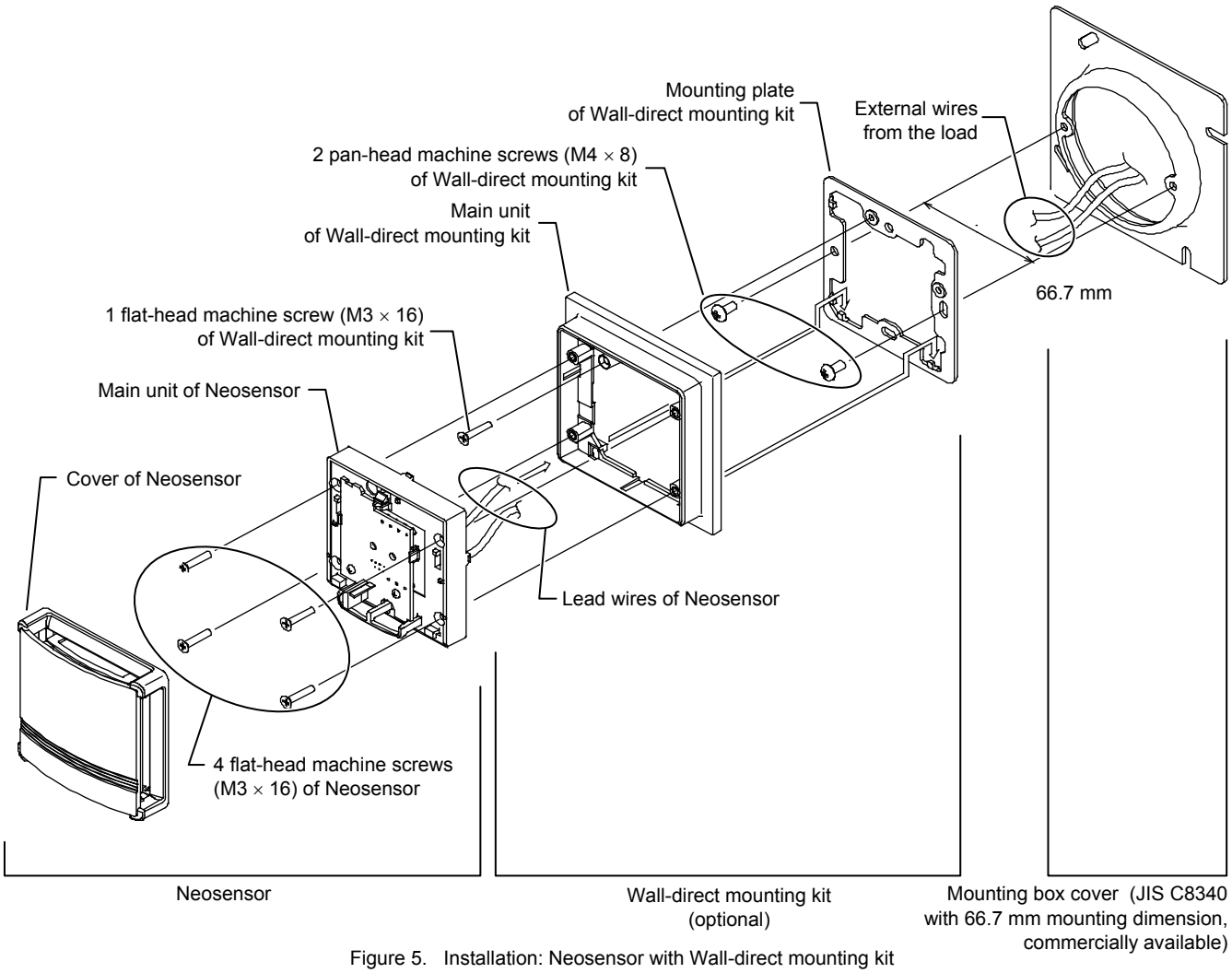


Figure 5. Installation: Neosensor with Wall-direct mounting kit

Installation steps: Neosensor on the Thermoplate for open wiring with Wall-direct mounting kit

1) Attach the mounting plate of the Wall-direct mounting kit to the Thermoplate for open wiring on the mounting surface.
2) Attach the main unit of the Wall-direct mounting kit to the mounting plate. (See Fig. 7.)
3) Connect the lead wires of the Neosensor to the external wires (from the load). (See Fig. 15.)
   Note: The number of the lead wires differs depending on the models.
   Models HY7043D (humidity sensor model) and TY7043D (temperature sensor model): 2 lead wires,
   Model HTY7043D (temperature/humidity sensor model): 4 lead wires
4) Remove the cover of Neosensor as shown in Fig. 9, and check that the depth change levers on the bilateral sides of the Neosensor main unit are set at the upper position (indicated with "L" shown in Fig. 12). Then, mount the main unit of Neosensor on the main unit of the Wall-direct mounting kit with the 4 mounting screws (M3 × 16) supplied with Neosensor.
5) Attach the cover back to the Neosensor main unit and complete the installation. (See Fig. 9.)

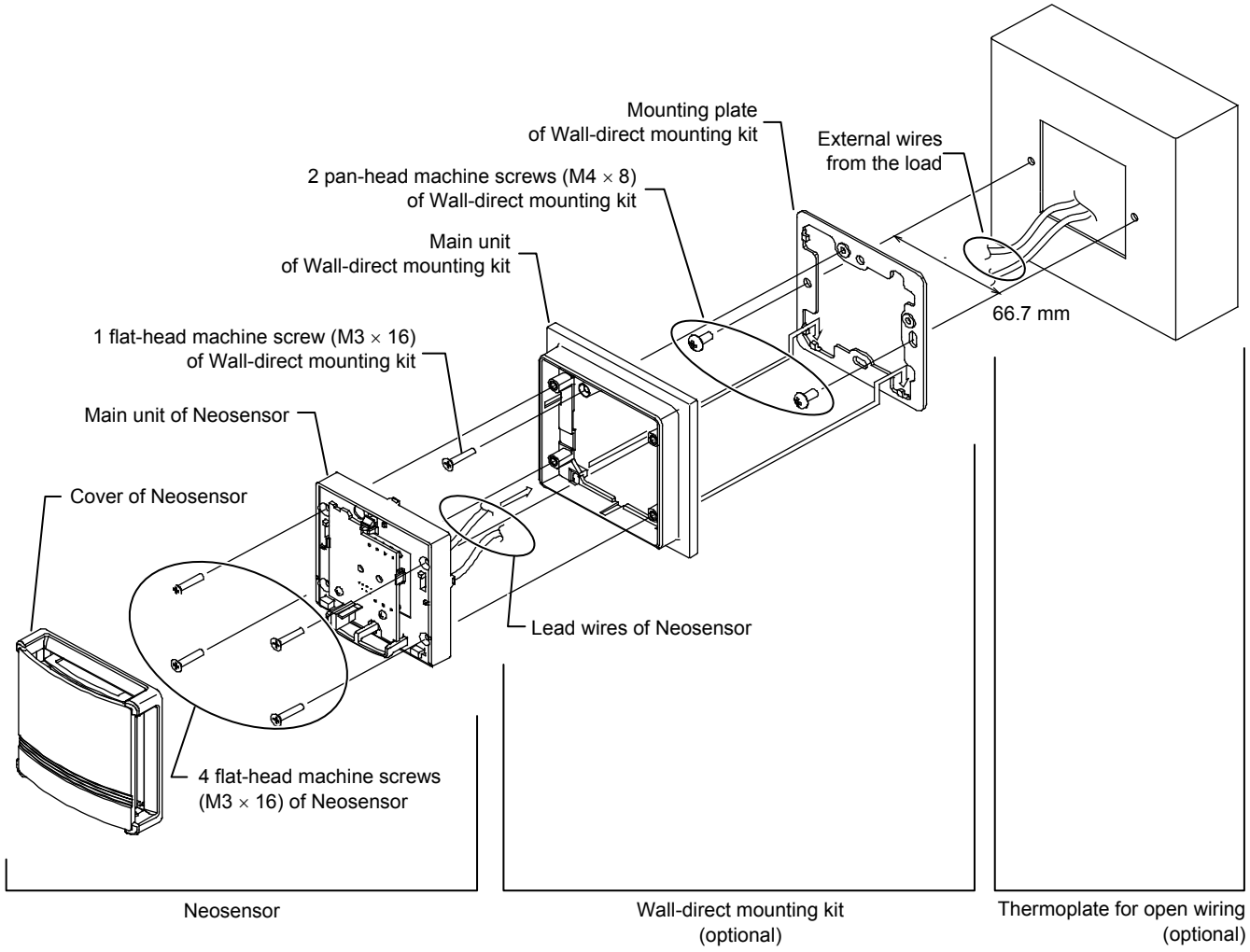


Figure 6. Installation: Neosensor with Wall-direct mounting kit (on Thermoplate for open wiring)

Assembling the Wall-direct mounting kit (the main unit to the mounting plate)

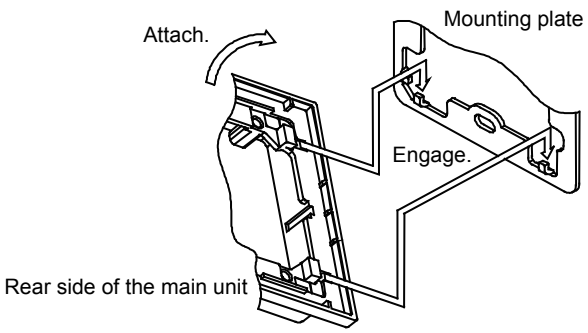


Figure 7. Assembling the Wall-direct mounting kit

Installation steps: Neosensor on Thermoplate with Thermoplate mounting kit

1) Attach the mounting plate of Thermoplate to the outlet box cover (JIS C8340:1999 Boxes and box covers for rigid metal conduits (mounting dimension: 83.5 mm)) on the mounting surface.
2) Attach the main unit of Thermoplate to the mounting plate.
3) Attach the Thermoplate to the Thermoplate mounting kit.
4) Connect the lead wires of the Neosensor to the external wires (from the load). (See Fig. 15.)
   Note: The number of the lead wires differs depending on the models.
   Models HY7043D (humidity sensor model) and TY7043D (temperature sensor model): 2 lead wires,
   Model HTY7043D (temperature/humidity sensor model): 4 lead wires
5) Remove the cover of Neosensor as shown in Fig. 9, and check that the depth change levers on the bilateral sides of the Neosensor main unit are set at the upper position (indicated with "L" shown in Fig. 12). Then, mount the main unit of Neosensor on the main unit of the Wall-direct mounting kit with the 4 mounting screws (M3 × 16) supplied with Neosensor.
6) Attach the cover back to the Neosensor main unit and complete the installation. (See Fig. 9.)

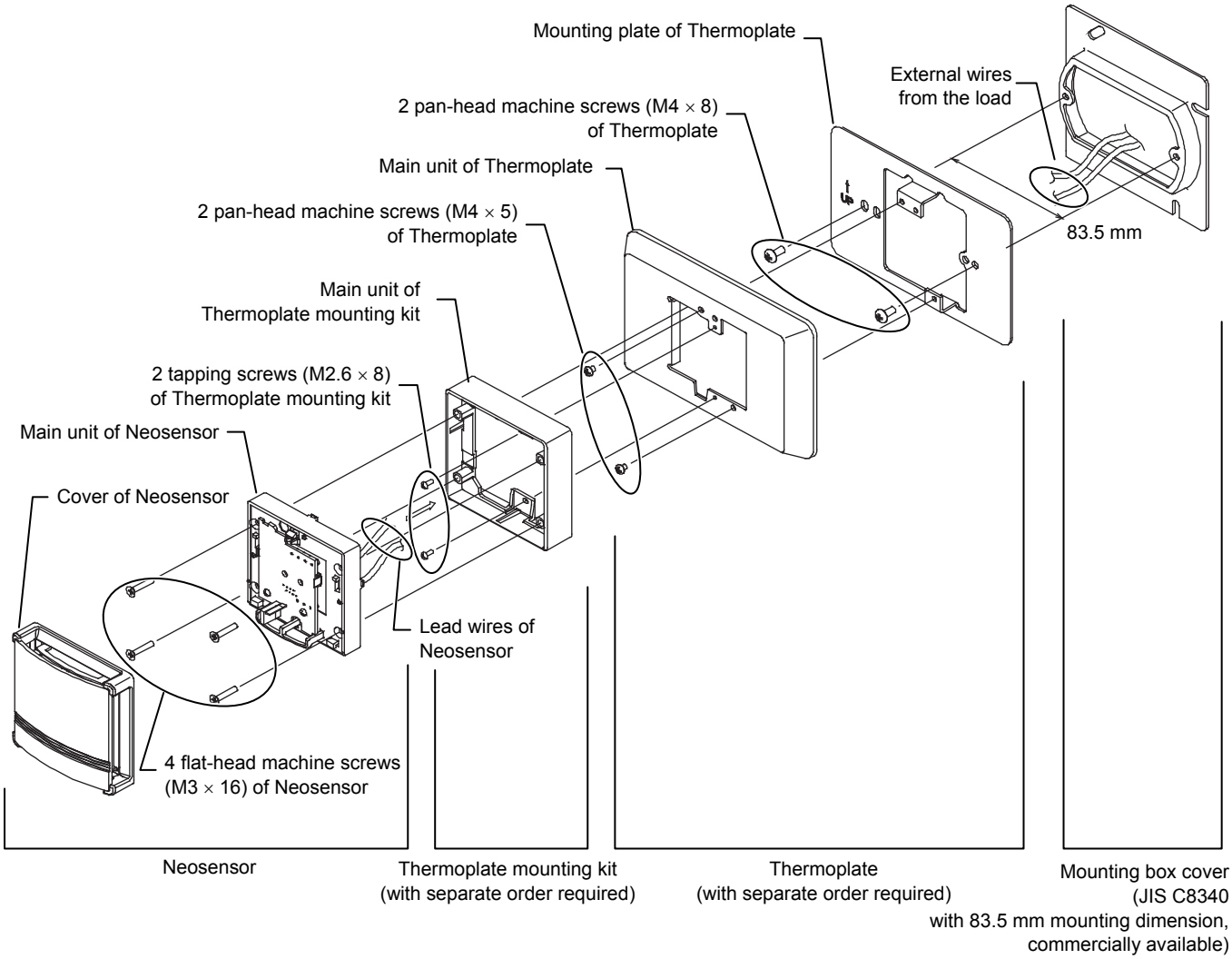


Figure 8. Installation: Neosensor with Thermoplate mounting kit (on Thermoplate)

Cover removal

Do not bend the humidity sensing element attached to the PCB board assembly. Otherwise, sensing accuracy may drop.

To remove the cover:
Press the spring, located inside the top of the Neosensor main unit, using a thin object.

To attach the cover:
Engage the tabs, located on the lower part of the cover and on the lower part of the main unit. Then fix the cover with the spring, located on the top of the Neosensor main unit.

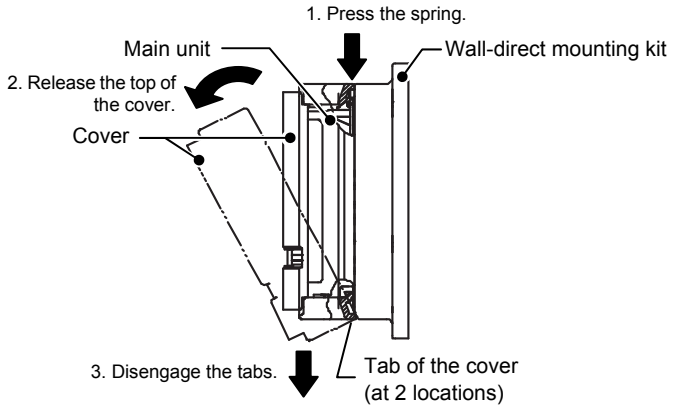


Figure 9. Cover removal

Protection form heat radiation and conduction

To protect the sensing accuracy from disturbances (including heat radiation and conduction) caused by the mounting surface where Neosensor is mounted, the distance between the Neosensor sensing element and the mounting surface (depth of the Neosensor main unit) can be changed. See the following steps to change the depth.

1) Remove the 4 mounting screws of Neosensor.

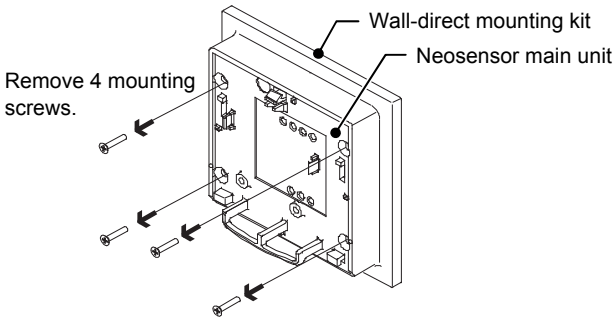


Figure 10. Depth change: removing the mounting screws

2) Raise the Neosensor main unit from the Wall-direct mounting kit. 9 mm max. can be raised.

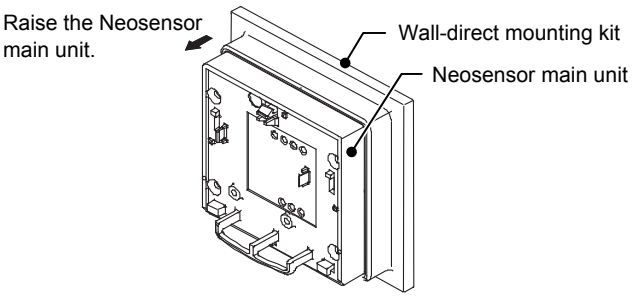


Figure 11. Depth change: Raising the Neosensor main unit

3) Set the depth change levers, located on the bilateral sides on the main unit front surface, at the lower position. (The levers are factory-set at the upper position.)

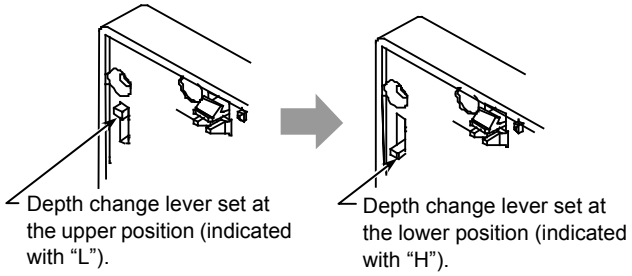


Figure 12. Depth change: Setting the depth change lever

4) Fix the raised Neosensor main unit to the Wall-direct mounting kit with 4 mounting screws.

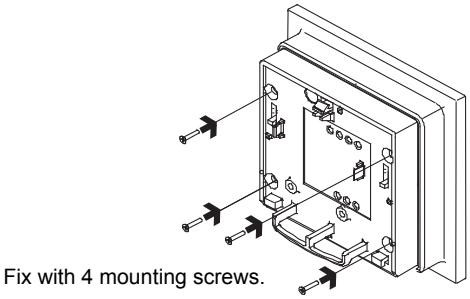


Figure 13. Depth change: Fixing the raised main unit

5) Check that the depth of the Neosensor is changed. Follow the same steps to change the depth of Neosensor installed on Thermoplate.

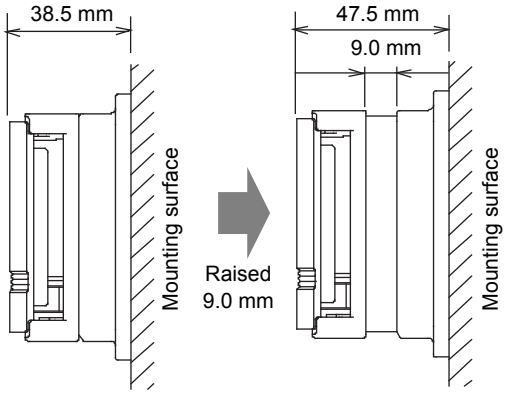


Figure 14. Depth change: Side view of the raised Neosensor

Note:
Effect of raised Neosensor differs depending on its installation environment.

Wiring

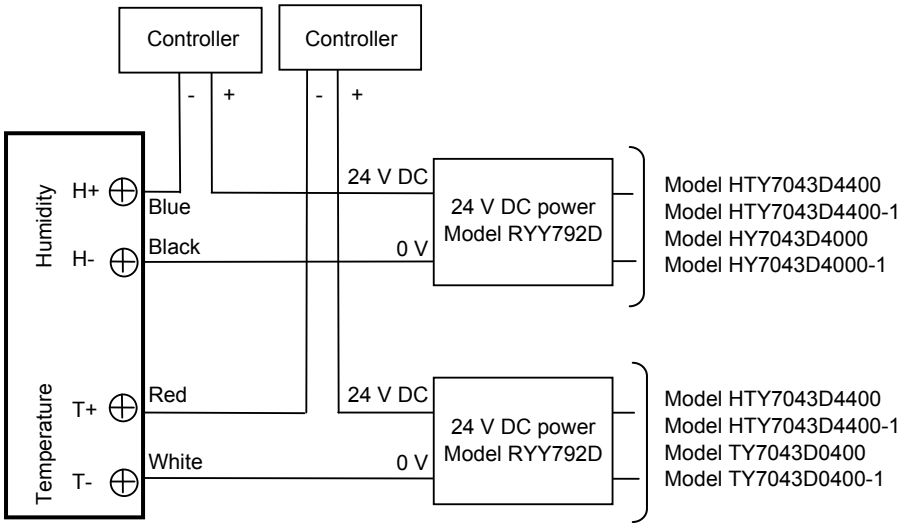


Figure 15. Wire connection: Neosensor (two-wire sensor, 24 V DC power)

Precautions for wiring

1.25 mm^2 or greater shielded multi-core cables (JIS CVV-S) are recommended. Be sure to ground the shielded cable on the device (connected to the Neosensor) side.
The maximum cable length is 100 m.

Notes for signal line connection

Induction current can flow from the Neosensor (humidity sensor, temperature/humidity sensor models) to the controller input circuit, and inadequate time constant of the controller can generate noise. To prevent such things, see the following.

- No problem will occur for connecting Neosensor to our controller.
- Provide a controller with low pass filter (40 dB or higher removal ratio in normal mode) that receives signals from Neosensor.
- For insufficient removal ratio, provide an isolator on the controller input line.

IMPORTANT:

- When Neosensor is faulty, reduced output may cause over-humidification. Provide safety measure against over-humidification.
- Corrosive gas or organic solvent can cause sensing error, shorten the service life, or damage the Neosensor. Before using Neosensor in abnormal atmosphere, consult with our salesperson.

Inspection and Maintenance

Neosensor (two-wire 4-20 mA output sensor) is factory-inspected, in order to suppress internal heat generation effects because of two-wire sensor characteristics. However, internal heat generation depends on five parameters: Power voltage, load resistance, wind velocity, temperature, and humidity. Set the controller as follows, according to the conditions in the installation location.

- Subtract the offset value from the PV (actual temperature/humidity).
- Add the offset value to the SP (set temperature/humidity).

etc.

For inspection and maintenance, follow the instructions below.

Periodic inspection

Periodically inspect Neosensor for its sensing accuracy, and clean the cover. Set the period between inspections based on atmospheric dust and other contaminants in the installation environment.

If Neosensor is installed in an animal holding room or a hospital operating room, cover the Neosensor when the room is sterilized.

Troubleshooting

If any problem occurs during operation, refer to the table below for appropriate solutions.

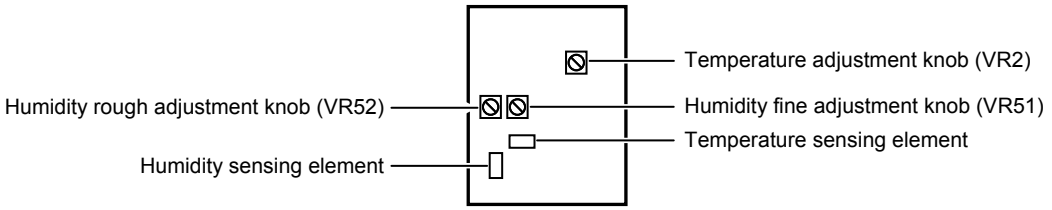
Troubleshooting

Problems	Check points	Solutions
• No output • Unstable output	• Loose wiring • Disconnected wiring • Inappropriate power supply voltage • Neosensor main unit damages	• Re-perform wiring. • Replace the Neosensor.
• Slow response to output	• Moisture/condensation on Neosensor	• Remove the cover. Disconnect the power and air-dry the Neosensor in a clean air.
• Error in output	• Inappropriate installation location • Inappropriate environmental conditions • Dust and contamination on the Neosensor	• Refer to **Installation** section. • Clean the cover. • Calibrate. • Replace the Neosensor.

Calibration

Neosensor is factory-calibrated and does not require field calibration right after installation. However, field-calibrate the Neosensor having output shift due to offset, change in environmental conditions, and aged deterioration.

For a humidity or temperature output error, calibrate the Neosensor with adjustment knobs on the board inside the main unit. Two adjustment knobs (VR51 for fine adjustment and VR52 for rough adjustment) are provided for humidity calibration, and one adjustment knob (VR2) is provided for temperature calibration.
Turn clockwise to increase the output value and counterclockwise to decrease the output value.



Notes:
* Model HY7043D (humidity sensor model) does not have the temperature adjustment knob (VR2) or the temperature sensing element.
* Model TY7043D (temperature sensor model) does not have the humidity adjustment knobs (VR51, VR52) or the humidity sensing element.

Figure 16. Locations of the adjustment knobs VR2, VR51, VR52 on the board: Models TY7043D, HY7043D, HTY7043D

Handling Precautions

- After installation, leave Neosensor well so that it adapts to ambient conditions (atmospheric environment).
- Be sure not to affect Neosensor with the heat generated from human body and/or appliances while calibrating.
- Carefully field-calibrate Neosensor so that the heat on your hands do not affect the Neosensor.
- After field-calibration with the adjustment knobs, the sensing accuracy specified hereinbefore will not be guaranteed.
- Use a reliable calibration instrument under the correct procedure in an appropriate environment. Digital multimeter is recommended to check output value.

Specifications are subject to change without notice.

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