Neosensor
Room Temperature/Humidity Sensor
Models HTY7043, TY7043, TY7053, HY7043

General

Neosensors are electronic room sensors including temperature sensors (Models TY7043, TY7053), humidity sensors (Model HY7043) and temperature/humidity sensors (Model HTY7043). The Neosensors are coordinated in terms of design and dimension with the Neostat electric room temperature/humidity controllers.
Room temperature/humidity sensor Model (HTY7043) uses a Pt100 resistance thermometer sensor (JIS* C1604 Class A) for a temperature sensing element, and a polymer capacitive humidity sensor (FP3^{TM} specially developed by Yamatake Corp.) for a humidity sensing element, enhancing accuracy and reliability of temperature/humidity sensing. It is suitable for various applications such as commercial buildings or other indoor uses.

* JIS: Japanese Industrial Standards.

Features

1) Wide temperature/humidity sensing range with high accuracy
2) Excellent long term stability
3) High environmental resistance
4) Quick response and high repeatability
5) Lightweight (thin) and compact.

Safety Instructions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby 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 Yamatake's sales representatives. Yamatake Corporation will not bear any responsibility for the results produced by the operators.

⚠ CAUTION

- Installation must be performed by qualified personnel in accordance with all applicable safety standards.
- This product must be operated within its operating ranges specified in this manual. Failure to comply will cause equipment damages.
- Installation must be carried out under the operating conditions specified in this manual to prevent equipment damages.
- Always disconnect power source before performing any wiring to prevent equipment damages.
- All wiring must comply with local codes of indoor wiring and electric installation rules.
- Do not disassemble the product at any time except when removing the cover to install the product main unit. Equipment damages may occur.
- Use crimp terminals with insulation for connecting to the external wires.
- When the product is faulty, reduced output may cause over-humidification. Provide safety measure on the controller side.
- Note that substances contained in gases to be measured, such as corrosive gases and organic solvents, can cause measurement errors, shortened service life, and malfunctions. If the product is used in non -standard atmospheric environments, consult with our sales personnel.
- Do not incinerate this product for waste disposal. Do not recycle all or a part of this product, either.
- Dispose of the product as an industrial waste complying with the local regulations.

Models Number Configuration

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
	5								High Sensitivity Neosensor
		3							—
			T						24 V DC / 24 V AC
			Z						No power supply required
			D						24 V DC
				0					Without humidity sensor
				1					Humidity output 1 V DC to 5 V DC
				4					Humidity output 4 mA DC to 20 mA DC (2-wire type)
					0				Without temperature sensor
					4				Temperature output 4 mA DC to 20mA DC (2-wire type)
					P				Temperature Pt100
						0			—
							0		Lead wire output
							1		Modular jack output
									With company logo
								-1	Without company logo

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

Available model numbers

HTY7043T1P00	Humidity (1-5 V DC) + Temperature (Pt100)	Neosensor	With company logo
HTY7043T1P00-1			Without company logo
TY7043Z0P00	Temperature (Pt100)	Neosensor	With company logo
TY7043Z0P00-1			Without company logo
TY7053Z0P00	Temperature (Pt100)	High Sensitivity Neosensor	With company logo
TY7053Z0P00-1			Without company logo
TY7043Z0P01	Temperature (Pt100)	Neosensor with modular jack output	With company logo
TY7043Z0P01-1			Without company logo
HY7043T1000	Humidity (1-5 V DC)	Neosensor	With company logo
HY7043T1000-1			Without company logo
HTY7043D4400	Humidity (4-20 mA DC) + Temperature (4-20 mA DC)	Neosensor	With company logo
HTY7043D4400-1			Without company logo
HY7043D4000	Humidity (4-20 mA DC)	Neosensor	With company logo
HY7043D4000-1			Without company logo
TY7043D0400	Temperature (4-20 mA DC)	Neosensor	With company logo
TY7043D0400-1			Without company logo

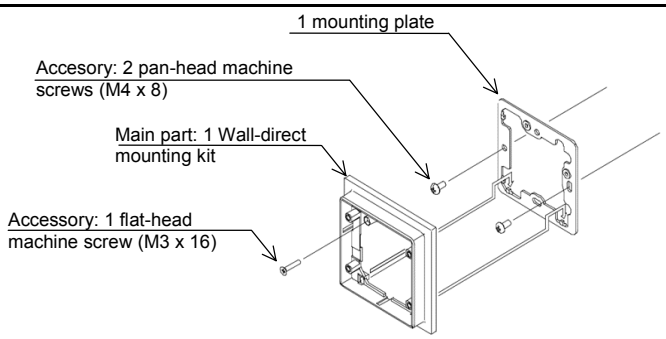
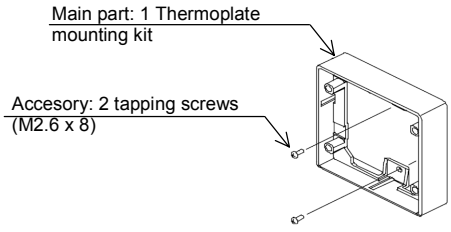
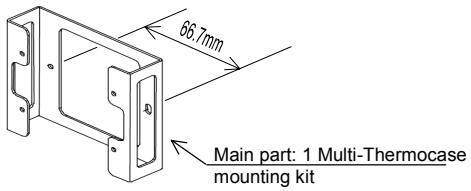
Specifications

Item	Specification	
Measuring range	Temperature	Models HTY7043T and TY70X3Z series: 0 °C to 60 °C Models HTY7043D and TY7043D series: 0 °C to 50 °C
	Humidity	0 %RH to 100 %RH (15 °C to 35 °C)
Output signal	Temperature	Models HTY7043T and TY70X3Z series: 100 Ω / 0 °C Models HTY7043D and TY7043D series: 4 mA DC to 20 mA DC, 2-wire (linear to 0 °C to 50 °C) (max. allowable range: 500 Ω or lower)
	Humidity	Models HTY7043T and HY7043T series: 1 V DC to 5 V DC (linear to 0 %RH to 100 %RH) (10 kΩ or higher input impedance of the controller connected) Models HTY7043D and HY7043D series: 4 mA DC to 20 mA DC, 2-wire (linear to 0 %RH to 100 %RH) (max. allowable range: 500 Ω or lower)
Sensing accuracy	Temperature	Models HTY7043T and TY70X3Z series: ±0.3 °C (in 0 °C to 60 °C) Models HTY7043D and TY7043D series: ±0.3 °C (15 °C to 35 °C, at 50 %RH)* ±0.5 °C (0 °C to 50 °C, at 50 %RH)* * Conditions: 24 V DC input power supply, 250 Ω resistive load, 0.15 m/s wind velocity, and 60 minute warm-up period
	Humidity	Models HTY7043T and HY7043T series: ±3 %RH (in 30 %RH to 70 %RH, 25 °C) ±5 %RH (in 20 %RH to 80 %RH, 15 °C to 35 °C) Models HTY7043D and HY7043D series: ±3 %RH (in 30 %RH to 70 %RH, 25 °C)* ±5 %RH (in 20 %RH to 80 %RH, 15 °C to 35 °C)* * Conditions: 24 V DC input power supply, 250 Ω resistive load, 0.15 m/s wind velocity, and 60 minute warm-up period
Time constant (for wind velocity of 0.15 m/s)	Temperature	Neosensor: 4.5 minutes or less High Sensitivity Neosensor: 2.5 minutes or less (Reference values)
	Humidity	Neosensor: 40 seconds or less
Environmental conditions	Temperature	Rated operating conditions Models HTY7043T and TY70X3Z series: 0 °C to 60 °C, 0 %RH to 100 %RH (non-condensing) Models HTY7043D and TY7043D series: 0 °C to 50 °C, 0 %RH to 100 %RH (non-condensing) Extreme operating conditions: -10 °C to 60 °C, 0 %RH to 100 %RH (non-condensing) Transport/storage conditions: -20 °C to 70 °C, 5 %RH to 95 %RH (non-condensing)
	Humidity	Rated operating conditions: 15 °C to 35 °C, 20 %RH to 80 %RH (non-condensing) Extreme operating conditions: -10 °C to 60 °C, 0 %RH to 100 %RH (non-condensing) Transport/storage conditions: -20 °C to 70 °C, 5 %RH to 95 %RH (non-condensing)
Power supply voltage	Models HTY7043T and HY7043T series: 24 V AC +10/-15 % (50 Hz/60 Hz), 24 V DC ±10 % Models HTY7043D, HY7043D, and TY7043D series: 24 V DC ±10 %	
Power consumption	0.15 VA for 24 V AC (Models HTY7043T and HY7043T series with 1 V DC to 5 V DC output) 100 mW for 24 V DC (Models HTY7043T and HY7043T series with 1 V DC to 5 V DC output) 550 mW for 24 V DC (Models HTY7043D, HY7043D, and TY7043D series)* * For 1 pt of 4 mA DC to 20 mA DC output.	

Specifications

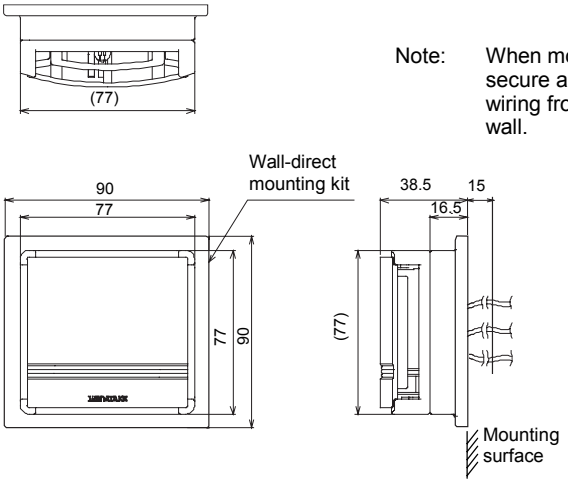
Item	Specification
Withstand voltage	500 V AC for 1 mA or less leakage current per 1 minute
Insulation resistance	500 V DC, 20 MΩ or higher
Installation	With the mounting kits (separate order required) specified below
Connection	Lead wire (300 mm long, 0.75 mm² cross section) Modular jack connector (only for Model TY7043Z0P01)
Materials	Cover: PC resin, pale gray (JPMA (Japan Paint Manufacturers Association): BN-85 (2003 edition)) Base: modified PPE resin, pale gray (JPMA: BN-85 (2003 edition))
Weight	Models HTY7043T, HY7043T, and TY7043Z series: Approx. 80 g Models HTY7043D, HY7043D, and TY7043D series: Approx. 110 g
Accessories	4 mounting screws for Neosensor main unit (M3 × 16)
Dedicated mounting kits and auxiliary devices (separate order required)	The Neosensors can be used in combination with mounting kits and auxiliary devices that require separate order. Dedicated mounting kit: Wall-direct mounting kit (Part No. 83165803-001) Thermoplate mounting kit (Part No. 83165803-011) Multi-Thermocase mounting kit (Part No. 83165803-021) Auxiliary devices: Thermoplate for individual room control Models QY1100C, QY1100D (with rotary switch) Thermoplate Model DY2000A1022 (1-unit lengthwise mounting) Model DY2000A1023 (1-unit crosswise mounting) Model DY2000A2023 (2-unit crosswise mounting; with outlet box) Model DY2000A2024 (2-unit crosswise mounting; with switch box) Model DY2000A3022 (3-unit crosswise mounting) Conduit connection type Thermoplate Model DY2000A1021 (1-unit square mounting)* Model DY2000A2021 (2-unit crosswise mounting)* Model DY2000A3021 (3-unit crosswise mounting)* * Used for open wiring Multi-Thermocase Model TY1100Z (only for Models HTY7043T, HY7043T, and TY70X3Z series)

Mounting Kits for Each Mounting Method

Mounting method	Mounting kit	Composition
Mounting directly on a wall Mounting onto conduit connection type Thermoplate	Wall-direct mounting kit (Part No. 83165803-001)	
Mounting onto Thermoplate	Thermoplate mounting kit (Part No. 83165803-011)	
Mounting in Multi-thermocase	Multi-Thermocase mounting kit (Part No. 83165803-021)	 * Mounting screws are included in Multi-Thermocase (separate order required).

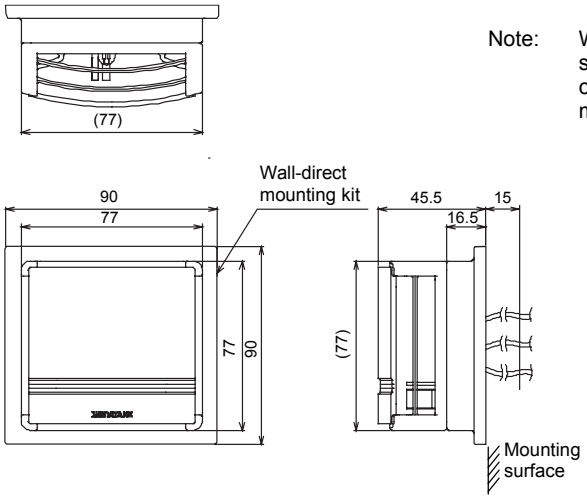
Dimensions (mm)

1) Dimensions of Neosensor main unit with Wall-direct mounting kit
(Neosensor)



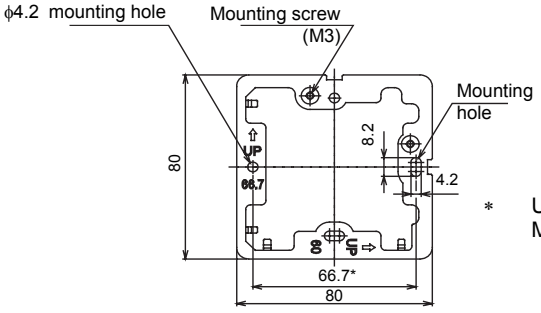
Note: When mounting the Neosensor, be sure to secure a longer than 15 mm clearance for wiring from the mounting surface inside the wall.

(High Sensitivity Neosensor)



Note: When mounting the Neosensor, be sure to secure a longer than 15 mm clearance for wiring from the mounting surface inside the wall.

(Surface view of mounting plate)

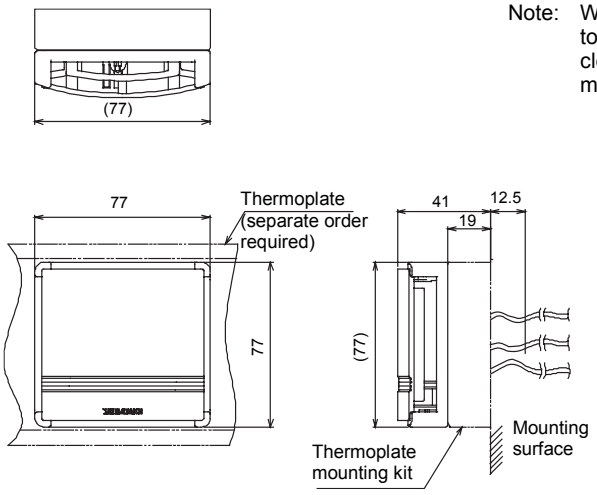


* Use JIS outlet box/box cover (JIS C8340 (1999)).
Mounting dimension: 66.7 mm

Figure 1. Dimensions (mm): Wall-direct mounting

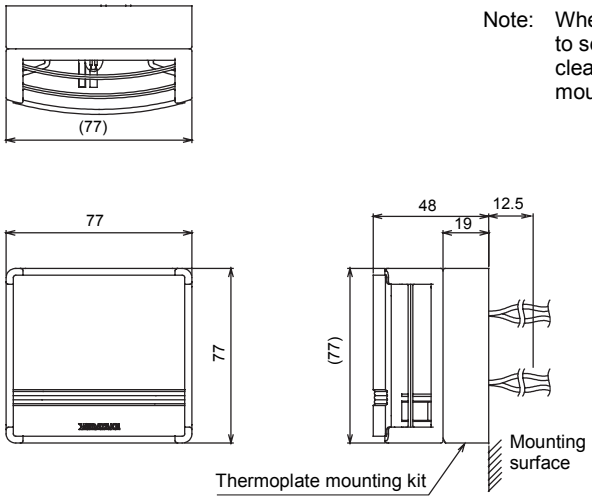
2) Dimensions of Neosensor main unit with Thermoplate mounting kit

(Neosensor)



Note: When mounting the Neostat, be sure to secure a longer than 12.5 mm clearance for wiring from the mounting surface inside the wall.

(High Sensitivity Neosensor)



Note: When mounting the Neostat, be sure to secure a longer than 12.5 mm clearance for wiring from the mounting surface inside the wall.

(Surface view of Thermoplate mounting kit)

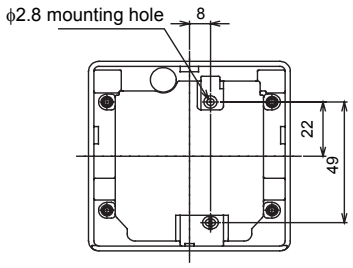
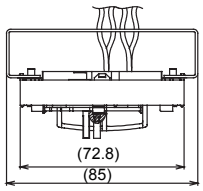
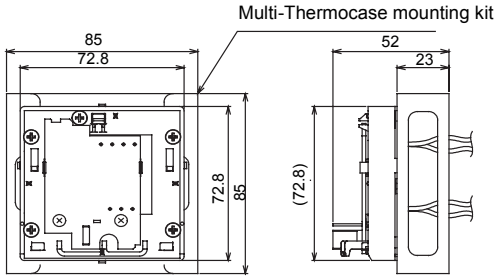


Figure 2. Dimensions (mm): Thermoplate mounting

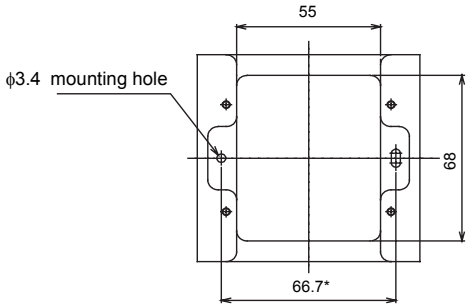
3) Dimensions of Neosensor main unit (with the cover removed*) with Multi-thermocase mounting kit



* When multiple units of Neosensor (and/or Neostat) are installed in a Multi-Thermocase (separate order required), the Neosensor main unit covers are not used.



(Surface view of Multi-Thermocase mounting kit)



* Assembled dimension of device mounting plate of Multi-Thermocase and Multi-Thermocase mounting kit: 66.7 mm

Figure 3. Dimensions (mm): Multi-Thermocase mounting

Installation

Installation requirements

1) Mount Neosensor on a wall approx. 1.5 m high above the floor, where the average temperature and humidity can be measured.
2) Avoid locations where room air circulation is not interfered by furniture or a door, and where heat from office automation equipment stays on.
3) Avoid locations affected by draft, downdraft, hot/cold air from pipes/ducts, and radiant heat from the sun.
   * The ambient air velocity in the Neosensor installation area should be between 0.1 and 0.2 m/s.
4) Choose an installation location with no vibration.
5) Do not install Neosensor where water may drop.
6) Do not allow dew condensation on Neosensor.
7) Do not install Neosensor directly on the wall without Wall-direct mounting kit.
8) Note that the output values for Models HTY7043DXXXX, HY7043DXXXX and TY7043DXXXX (2-wire 4-20 mA output type) may vary depending on Neosensor installation environments, including temperature, humidity and air velocity. Please consult with Yamatake's service personnel in charge regarding the installation.

Installation procedure: Neosensor directly on a wall (See Fig. 4.)

1) Attach the mounting plate to the box cover (outlet box mounting dimension: 66.7 mm (JIS C8340:1999)) located inside the wall.
2) Install the main part of the Wall-direct mounting kit on the mounting plate. (See Fig. 9.)
3) Connect the output lead wires of the Neosensor main unit to the external wires (for the load side). (See Figs. 15 and 16)
4) Remove the cover from the Neosensor main unit, and mount the main unit on the main part of the Wall-direct mounting kit with the 4 main-unit accessory screws (M3 × 16). When mounting the main unit onto the Wall-direct mounting kit, make sure to set the height-adjusting levers on the left and right sides (See Fig. 12.) to the upper positions (indicated by "L").
5) Place the cover back on the Neosensor main unit to complete the installation procedure. (See Fig. 8.)

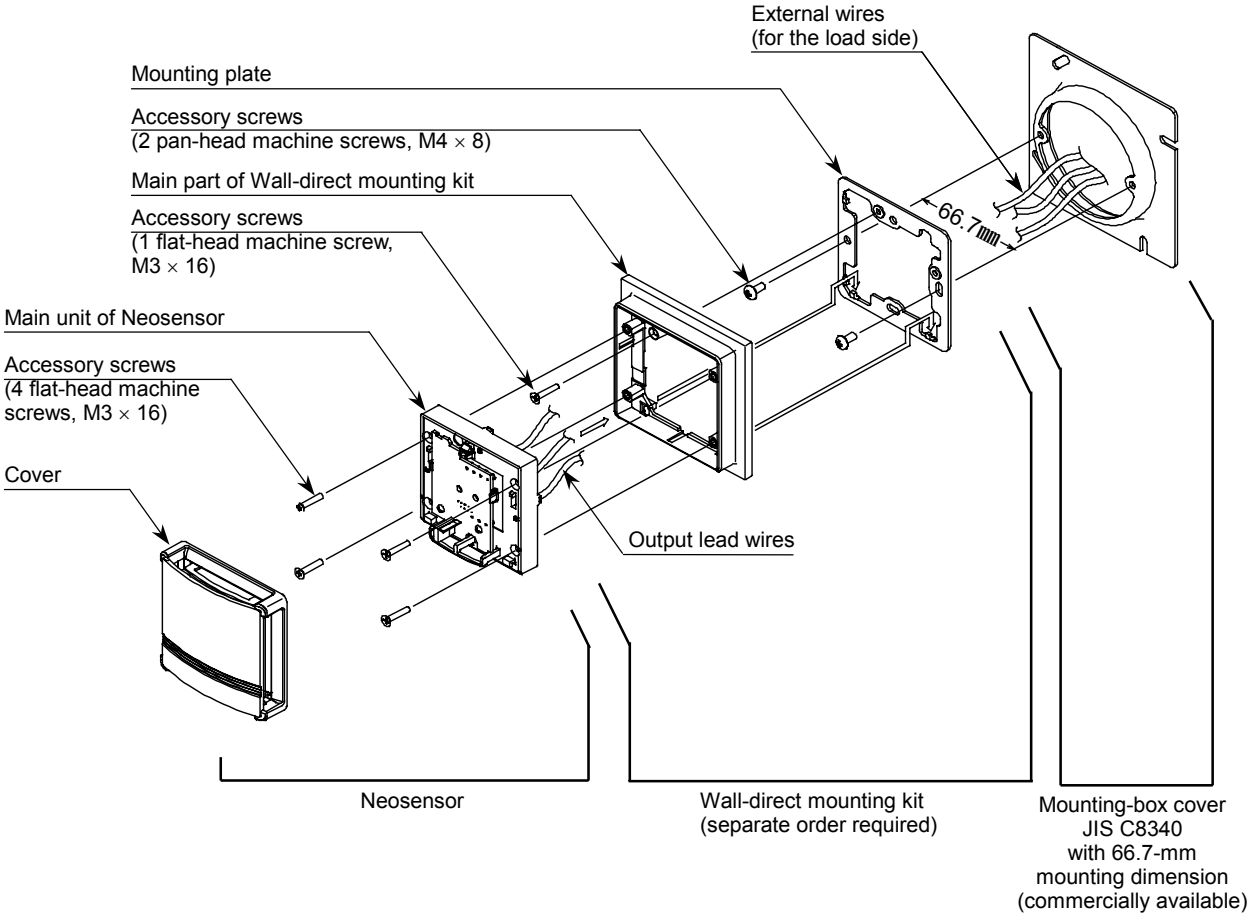


Figure 4. Installation: Neosensor with Wall-direct mounting kit

Installation procedure: Neosensor on conduit connection type Thermoplate (See Fig. 5.)

1) Attach the mounting plate to the conduit connection type Thermoplate.
2) Install the main part of Wall-direct mounting kit on the mounting plate. (See Fig. 9.)
3) Connect the output lead wires of the Neosensor main unit to the external wires (for the load side). (See Figs. 15 and 16.)
4) Remove the cover from the Neosensor main unit, and mount the main unit on the Wall-direct mounting kit with the 4 main-unit accessory screws (M3 × 16). When mounting the main unit onto the Wall-direct mounting kit, make sure to set the height-adjusting levers on the left and right sides (See Fig. 12.) to the upper position (indicated by "L").
5) Reinstall the cover to the main unit to complete the installation procedure. (See Fig. 8)

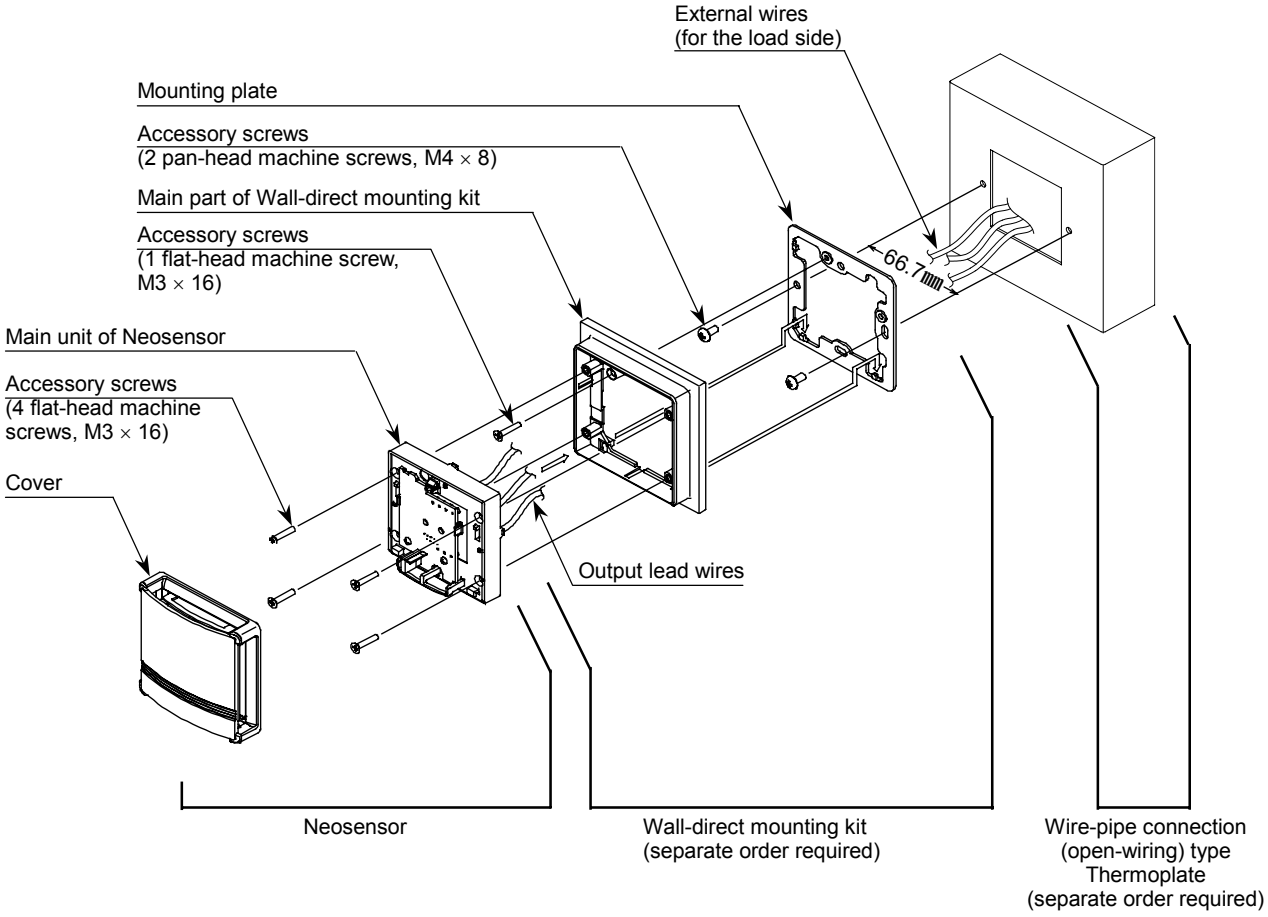


Figure 5. Installation: Neosensor with Wall-direct mounting kit (on conduit connection type Thermoplate)

Installation procedure: Neosensor on Thermoplate (See Fig. 6.)

1) Attach the mounting plate supplied with Thermoplate to the mounting box cover (switch box mounting dimension: 83.5 mm (JIS C8340:1999)) located inside the wall.
2) Mount Thermoplate on the mounting plate.
3) Install the main part of the Thermoplate mounting kit on Thermoplate.
4) Connect the output lead wires of the Neosensor main unit to the external wires (for the load side). (See Figs. 15 and 16.)
5) Remove the cover from the Neosensor main unit, and mount the main unit on the main part of the Thermoplate mounting kit with the 4 main-unit accessory screws (M3 × 16). When mounting the main unit onto the Thermoplate mounting kit, make sure to set the height-adjusting levers on the left and right sides (See Fig. 12) to the upper position (indicated by "L").
6) Place the cover back on the Neosensor main unit to complete the installation procedure. (See Fig. 8.)

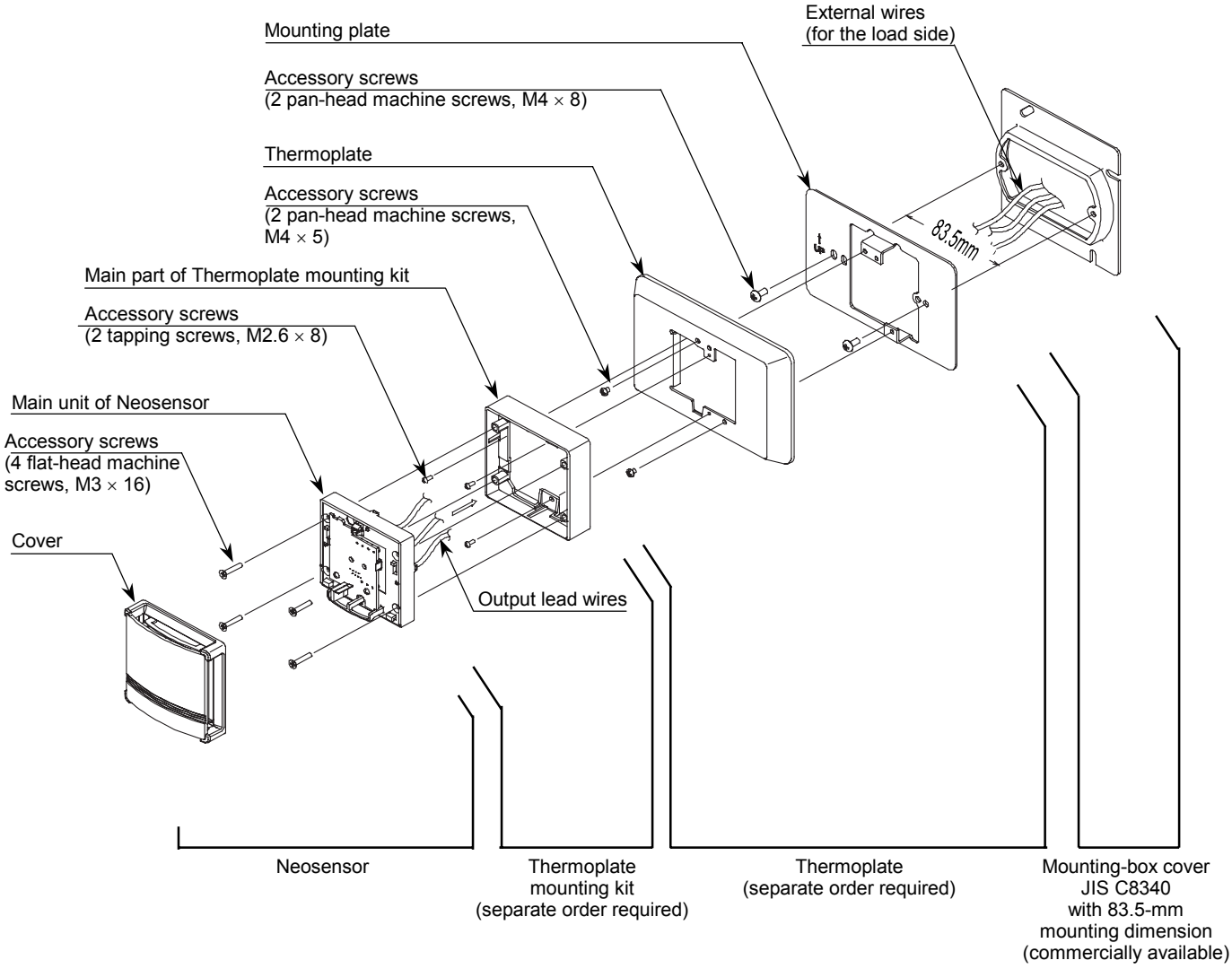
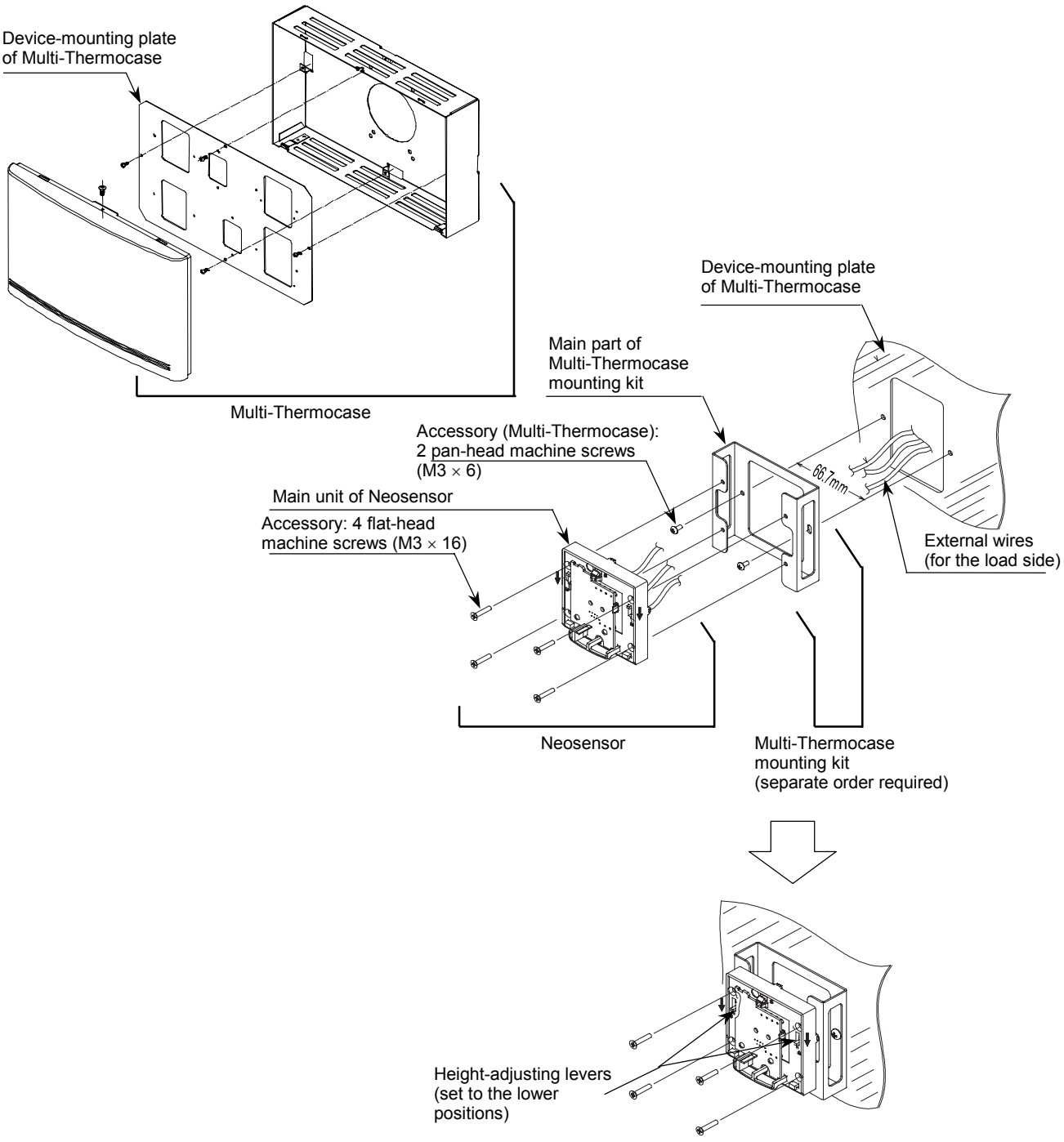


Figure 6. Installation: Neosensor with Thermoplate mounting kit (on Thermoplate)

Installation procedure : Neosensor in Multi-Thermocase (See Fig. 7.)

1) Attach the main part of the Multi-Thermocase mounting kit to the device-mounting plate of Multi-Thermocase.
2) Connect the output lead wires of the Neosensor main unit to the external wires (for the load side).
3) Remove the cover from the Neosensor main unit, and set the height-adjusting levers on the left and right sides to the lower position (indicated by "H"). Then, mount the main unit on the Multi-Thermocase mounting kit with the 4 main-unit accessory screws (M3 × 16). Neosensor installed in the Multi-Thermocase is used with the cover removed.

IMPORTANT:
When installing Neosensor in the Multi-Thermocase, be sure to set the height-adjusting levers on the left and right sides of the Neosensor main unit to the lower position (indicated by "H").



Note: To mount the Neosensor main unit, set the height-adjusting lever on the left and right sides to the lower position before fixing the main unit on the Multi-Thermocase mounting kit with the 4 main unit accessory screws.

Figure 7. Installation: Neosensor (in Multi-Thermocase) with Multi-Thermocase mounting kit

⚠ CAUTION

- Do not bend the humidity sensing element attached to the printed circuit board assembly, as sending accuracy may drop.

Removing and installaing the cover

- Removing the cover
  Remove the cover by pressing the spring, using a thin stick, located inside the top section of the Neostat main unit.
- Installing the cover
  Insert the two cover tabs into the two mounting holes located at the bottom of the main unit and fix the cover in place with the spring located at the top of the main unit.

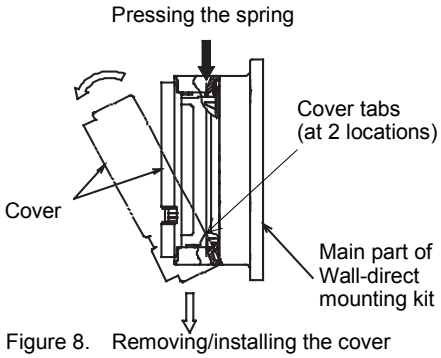


Figure 8. Removing/installing the cover

Installing the main part of Wall-direct mounting kit

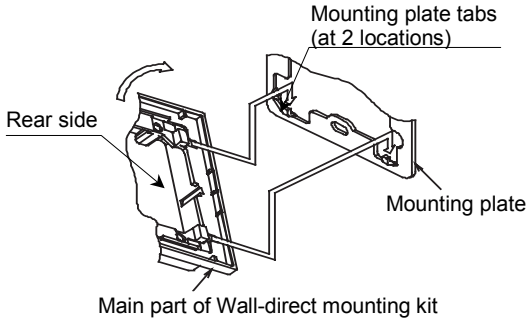


Figure 9. Installing the main part of Wall-direct mounting kit

Measures against disturbance (including heat radiation and conductivity) caused by the mounting wall

Against disturbance from the mounting wall, position (height) of the sensing element can be changed in accordance with the following procedure.

1) Remove the Neosensor mounting screws (4 screws).

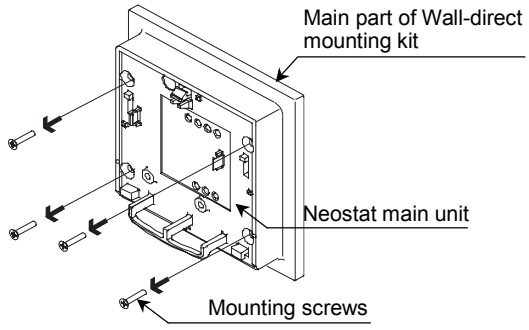


Figure 10. Removing the mounting screws

2) Pull up the Neosensor main unit from the Wall-direct mounting kit (Max. 9 mm).

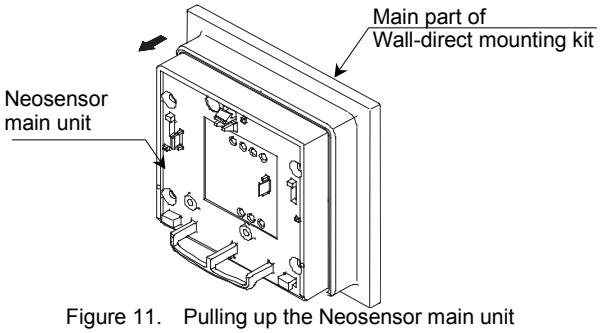


Figure 11. Pulling up the Neosensor main unit

3) Lower the height-adjusting levers on the left and right.

* The height-adjusting levers are set to the upper position (indicated by "L") for factory preset.

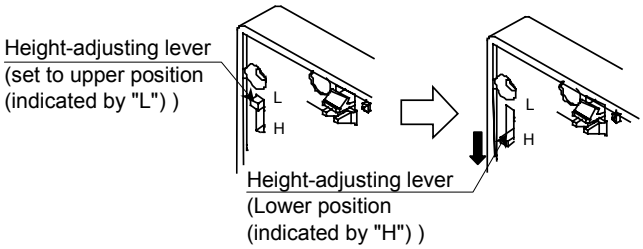


Figure 12. Height-adjusting lever

4) Mount and fix the Neosensor main unit ont the main part of the Wall-direct mounting kit with the 4 mounting screws.

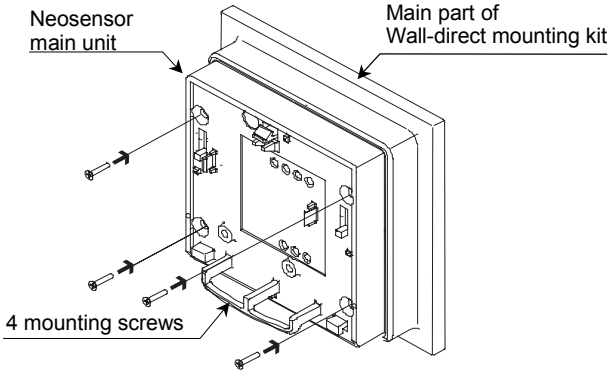


Figure 13. Neosensor mounting on the Wall-direct mounting kit

5) Installation is completed with the Neosensor raised. (Fig.14)

* The effect of the measures against disturbance will depend on the environment.

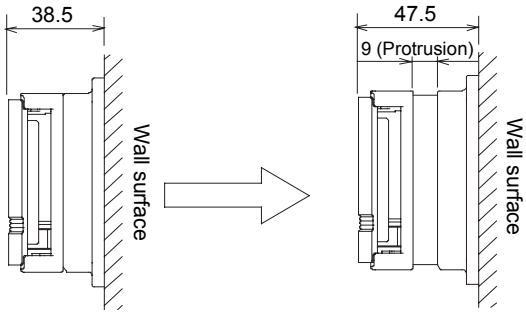
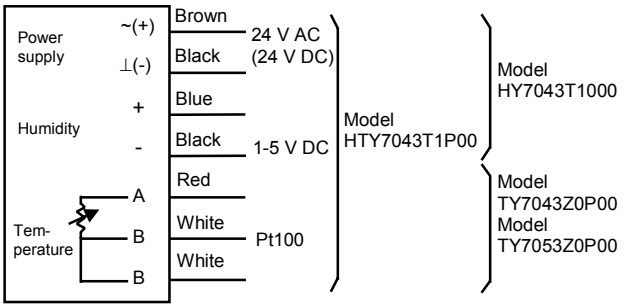


Figure 14. Neosensor with its main unit raised

* Follow the same procedure to install the Neosensor on the Thermoplate.

Wiring



* Black lines for power supply and for humidity output are connected inside the Neosensor.

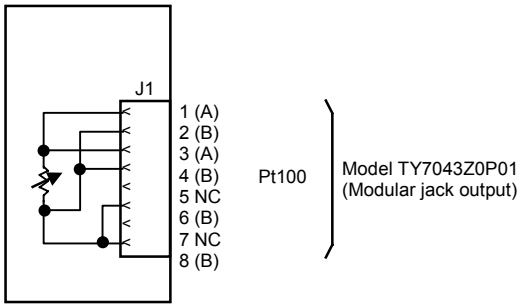


Figure 15. Wiring diagram

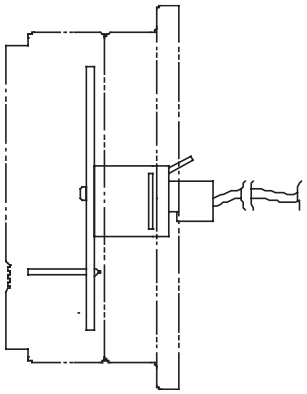


Figure 16. Modular jack connection
(Model TY7043Z0P01 only)

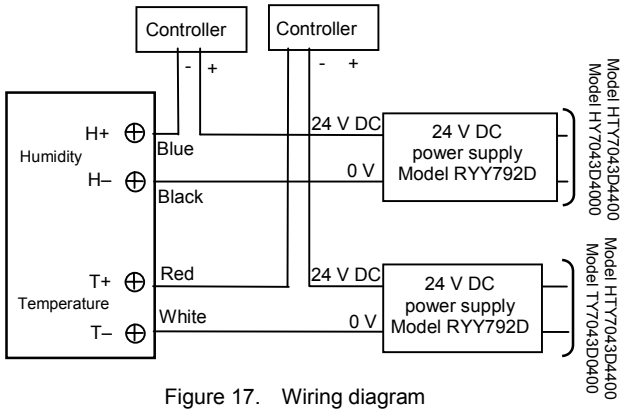


Figure 17. Wiring diagram

Precautions for Wiring

Shielded multi-core cables (JIS CVV-S) of 1.25 mm² or greater for power supply line and for temperature/humidity output line are recommended. 1.25 mm² JIS IV cable can be used for power line and for temperature output line as well. Be sure to ground the shielded cable on the controller side.

The maximum cable length is 100 m.

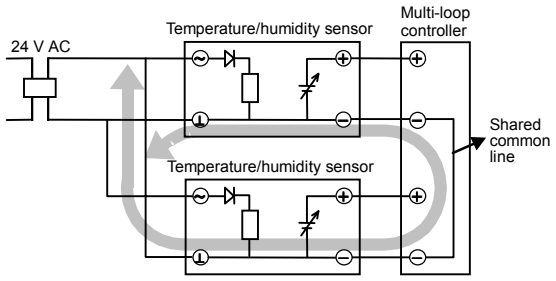
⚠ CAUTION

- Never connect power supply to temperature output to prevent smoking. Always check wiring before supplying power.
- Never share 24 V AC transformer with any other product.

Never share AC transformer of humidity sensor.

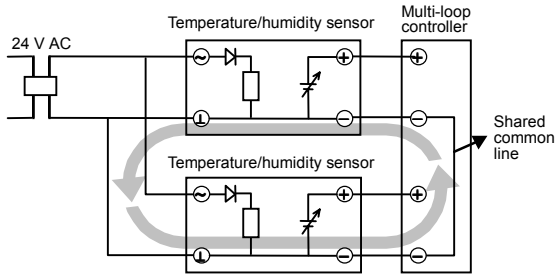
> ⚠CAUTION
>
> - Use insulated transformer to supply 24 V AC power supply voltage. Never share 24 V AC power supply with any other equipment. If a transformer is shared, loop will be formed at common and the sensor may be damaged.

Shared transformer (24 V AC power supply)



Incorrect

The transmitter will short through common if transformer wiring is incorrect.

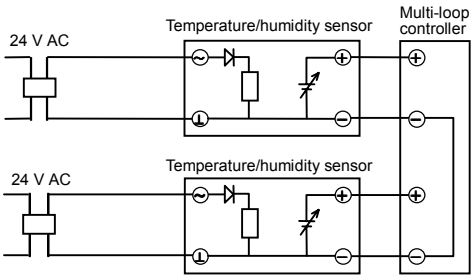


Incorrect

Loop is formed at common.

Figure 18. Shared transformer

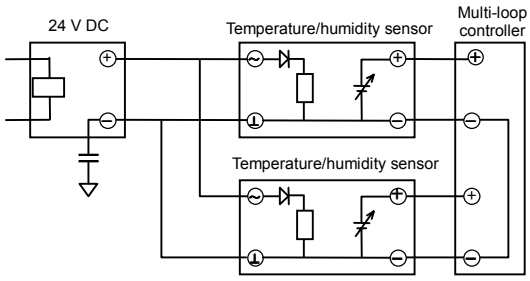
Separate transformer (24 V AC power supply)



Correct

No loop is formed at common.

24 V DC power shared
(Model HTY7043TXXXX/HY7043TXXXX)



Correct

DC power supply can be shared.

(Though loop is formed at common, common mode noise affects a little.)

Figure 19. Separate transformers

Follow the next instructions to prevent an induction current flowing from the humidity sensor to the controller input circuit, or to prevent an influence of the generating noise due to inadequate time constant of the controller.

- Use a controller with a low pass filter (removal ratio of 40dB or higher in normal mode) for receiving signals.
- Connect an isolator for the controller input circuit if a removal ratio is not enough.
- No problem will occur for connecting with a Yamatake's controller.

Maintenance

Since the temperature/humidity sensor is inspected and calibrated for high accuracy at the factory before shipment, no field calibration is necessary. Follow the maintenance instructions below.

1) Periodic inspection
   Determine the frequency of periodic inspection depending on the amount of suspended dust and other contaminants in the environment. Regulary check the sensing accuracy and clean the cover.

2) Troubleshooting
   If any problem occurs during operation, refer to the following table for appropriate solutions.

Troubleshooting and Solution

Problems	Check items	Solutions
• No output generated • Unstable output	• Loose wiring • Disconnected wiring • Power supply voltage • Sensor damages	• Re-perform wiring. • Replace sensor.
• Slow response to output	• Moisture/condensation on the sensor	• Remove cover. • Dry power-off state sensor in clean air seasoning.
• Error in output	• Installed location • Dust and contamination on the sensor	• Refer to 'Installation requirements'. • Clean the cover. • Perform humidity single-point calibration. • Replace the sensor.

3) Humidity single-point calibration (Models HTY7043T, HY7043T)
   When you find an output error of the humidity sensor, the sensor can be calibrated with the adjustment knobs,VR1 for rough adjustment, VR2 for fine adjustment, located inside the humidity sensor. The output value is increased by turning these knobs clockwise and decreased by turning them counterclockwise.
   Use a reliable measuring instrument for humidity single-point calibration with correct procedure in appropriate environment. A digital multimeter is recommended to check the output voltage.

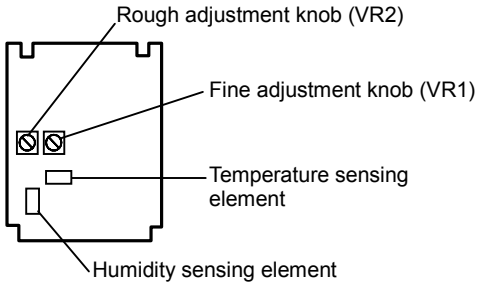


Fig. 20 Adjustment knobs arrangement on the circuit board

Cautions

1. Leave the unpacked sensor in the ambient atmosphere for approx. 24 hours.
2. Be sure not to affect the sensor with heat generation from human body and/or appliances during the sensor calibration.

Specifications are subject to change without notice.

YAMATAKE

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