

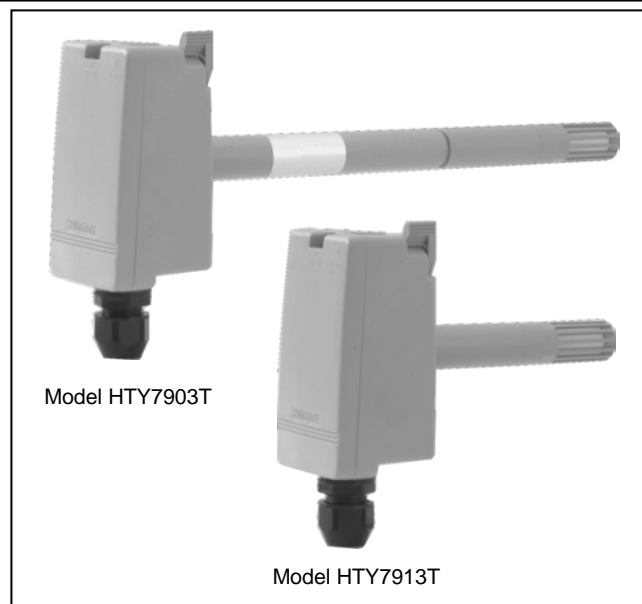
## Insertion Dewpoint Temperature Sensor

### Model HTY79X3T (with Separate Temperature Sensor), Model HY79X3T

#### General

Insertion dewpoint temperature sensor Model HTY79X3T series uses a Pt100 resistant thermometer sensor (JIS\* C1604 Class A, equivalent to IEC60751: 95 Class A) for a temperature sensing element, and a polymer capacitive humidity sensor (FP3™ specially developed by Yamatake Corporation) for a dewpoint temperature sensing element, enhancing accuracy and reliability of temperature sensing. It is suitable for various applications such as a duct or chamber for building air conditioning and outdoor air measurement, as well as industrial applications. Model HY79X3 series (for dewpoint temperature sensing without temperature sensor) is also available.

\* JIS: Japanese Industrial Standards



#### Features

- Wide dewpoint temperature sensing range with high accuracy.
- Highly environmental resistance.
- Excellent long term stability.
- Quick response and high repeatability.
- Easy installation in a duct/chamber with the quick detachable bracket (dedicated).
- Dust-proof and splash-proof housing (IP54).
- CE Marking certified product:  
Models HTY79X3T and HY79X3T conform to all the applicable standards of CE Marking.



## 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 Yamatake's sales representative. Yamatake Corporation will not bear any responsibility for the results produced by the operators.

 **WARNING**



- Do not disassemble the product. Disassembly may result in electrical shock or equipment damage.

 **CAUTION**



- Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.



- This product must be operated under the operating conditions (power, temperature, humidity, vibration, shock, installation position, atmospheric condition, etc) specified in this manual to prevent equipment damages.



- This product must be operated within its rated operating ranges specified in this manual. Failure to comply will cause equipment damages.



- All wiring must comply with local codes of indoor wiring and electric installation rules.



- This product does not have a power switch. Be sure to install a power circuit breaker for the power source.



- Lightning protection based on the regional characteristics and the building structure is necessary to minimize lightning damages to the product.



- Always disconnect power source before performing any wiring to prevent equipment damages.



- Use crimp terminal lugs with insulation for electric wires to be connected to the product screw terminals.



- Make sure all the wires are tightly connected to prevent heat generation or equipment malfunction. Insufficient tightening of the screw terminals also can cause inaccurate measurement.



- Leave vacant terminals unconnected to prevent product damage.



- Do not step on the product. External force can damage the product.



- If more than the rated power supply voltage is applied, product replacement is required for safety.



- Do not use two-way radio or any wireless device within 3 m radius of the product. It may lower the product sensing accuracy.



- Carefully press the rubber packing. Personal injury can be caused when your fingers holding the tool slip.



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

**IMPORTANT:**

- When the product is faulty, reduced output may cause over-humidification. Provide safety measure for the controller in connection.
- 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 may be required.
- Corrosive gas or organic solvent may damage the product or shift the product output. Before using the product in abnormal atmosphere, consult with Yamatake's sales personnel.

Trademark information:

FP3 is a trademark of Yamatake Corporation in Japan or in other countries.

### Model Numbers

Base model number	Shape	Type	Power supply	Humidity output	Temperature output	Fixed	Description
HTY79							Insertion dewpoint temperature sensor (with separate temperature sensor)
HY79	0						Insertion dewpoint temperature sensor
	1						Insertion length: Long
		3					—
			T				24 V DC / 24 V AC
				1			Dewpoint temperature output: 1-5 V
				4			Dewpoint temperature output: 4-20 mA
				6			Dewpoint temperature output: 0-10 V
					0		Without temperature sensor
					P		Temperature: Pt100
						00	—

Select a model number from below.

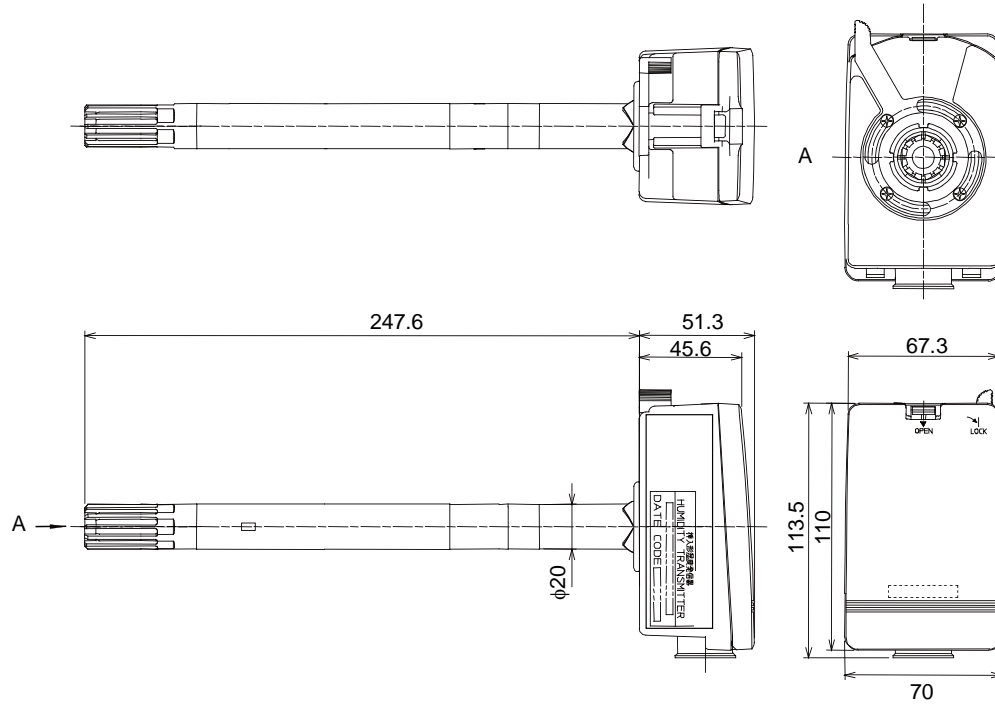
Model number	Description	Insertion length
HTY7903T1P00	Dewpoint temperature (1-5 V) + temperature (Pt100)	Long
HTY7903T4P00	Dewpoint temperature (4-20 mA) + temperature (Pt100)	Long
HTY7903T6P00	Dewpoint temperature (0-10 V) + temperature (Pt100)	Long
HTY7913T1P00	Dewpoint temperature (1-5 V) + temperature (Pt100)	Short
HTY7913T4P00	Dewpoint temperature (4-20 mA) + temperature (Pt100)	Short
HTY7913T6P00	Dewpoint temperature (0-10 V) + temperature (Pt100)	Short
HY7903T1000	Dewpoint temperature (1-5 V)	Long
HY7903T4000	Dewpoint temperature (4-20 mA)	Long
HY7903T6000	Dewpoint temperature (0-10 V)	Long
HY7913T1000	Dewpoint temperature (1-5 V)	Short
HY7913T4000	Dewpoint temperature (4-20 mA)	Short
HY7913T6000	Dewpoint temperature (0-10 V)	Short

## Specifications

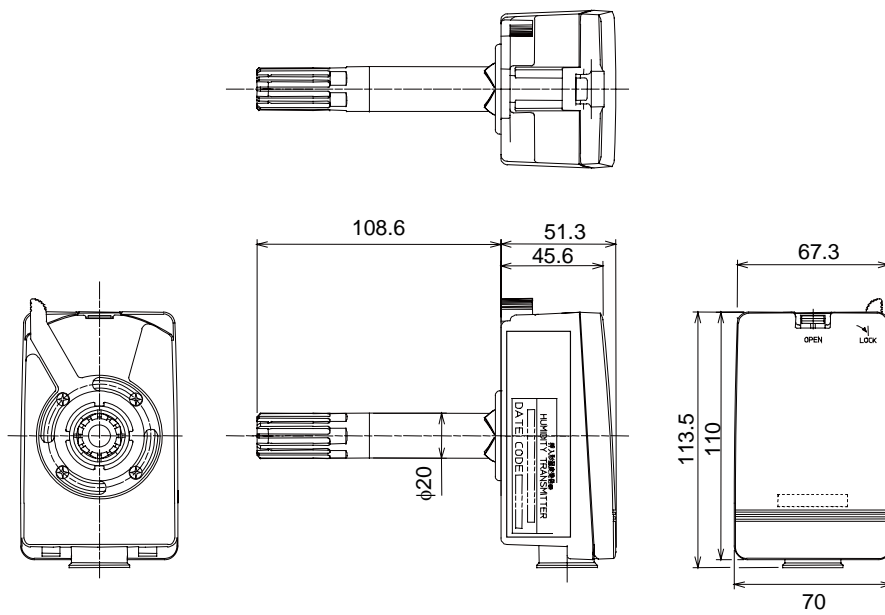
Item	Specification			
Measurement range	Temperature	-20 °C to 60 °C		
	Dewpoint temperature	-40 °C to 60 °C DP (-20 °C to 60 °C) (non-condensing)		
Output signal	Temperature	100 Ω / 0 °C		
	Dewpoint temperature	Models HTY79X3T1, HY79X3T1 series: 1 V DC to 5 V DC (linear to -40 °C to 60 °C DP) (Input impedance of the controller connected: 10 kΩ or higher) Models HTY79X3T4, HY79X3T4 series: 4 mA DC to 20 mA DC (linear to -40 °C to 60 °C DP) (Maximum allowable load: 300 Ω or lower) Models HTY79X3T6, HY79X3T6 series: 0 V DC to 10 V DC (linear to -40 °C to 60 °C DP) (Input impedance of the controller connected: 10 kΩ or higher)		
Sensing accuracy	Temperature	±0.3 °C (at -20 °C to 60 °C) (Pt100 element)		
	Dewpoint temperature	±1 °C DP (at 30 %RH to 90 %RH, 25 °C) ±2.5 °C DP (at 30 %RH to 90 %RH, -5 °C to 60 °C)		
Time constant (at 2 m/s air velocity)	Temperature	4 min. or less		
	Dewpoint temperature	1 min. or less (at constant temperature)		
Environmental conditions			Rated/extreme operating conditions	Transport/storage conditions
	Temperature measuring	Temperature range	-20 °C to 60 °C	-30 °C to 70 °C
		Humidity range	0 %RH to 100 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)
	Dewpoint temperature measuring	Temperature range	-20 °C to 60 °C	-30 °C to 70 °C
		Humidity range	Rated: 10 %RH to 100 %RH Extreme: 0 %RH to 100 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> (10 Hz to 150 Hz)		9.8 m/s <sup>2</sup> (10 Hz to 150 Hz) (in packaged form)
Air velocity	Extreme: 0 m/s to 15 m/s		—	
Power supply voltage	24 V AC +10/-15 % (50 Hz/60 Hz), 24 V DC ±10 %			
Power consumption	Models HTY79X3T1, HY79X3T1 series with 1-5 V output: 0.7 VA for 24 V AC / 600 mW for 24 V DC Models HTY79X3T4, HY79X3T4 series with 4-20 mA output: 1.4 VA for 24 V AC / 1200 mW for 24 V DC Models HTY79X3T6, HY79X3T6 series with 0-10 V output: 0.7 VA for 24 V AC / 600 mW for 24 V DC			
Withstand voltage	1 mA or less leakage current at 500 V AC for 1 minute (between the housing and terminals)			
Insulation resistance	500 V DC, 20 MΩ or higher (between the housing and terminals)			
Enclosure rating	Housing: IP54 (dust-proof and splash-proof with specified water-proof gland and multi-core cables used or with specified conduit connected.)			
Installation	Duct, chamber, thermometer shelter (with dedicated bracket)			
Connection	Terminal block connection			
Material, color	Housing: 20 % GF containing polycarbonate resin, gray Filter cap: Modified PPE resin, gray			
Weight	Models HTY7903, HY7903 series: Approx. 250 g Models HTY7913, HY7913 series: Approx. 220 g			
Accessories	None			
Parts (separate order required)	Part No. 83157235-001: Mounting bracket (packing, indicator label for installation holes, M4 screws) Part No. 83157240-004: Conduit mounting set (cable with φ11 mm to φ14 mm outer diameter is applicable.) Part No. 83104098-004: Seal connector (cable with φ10.5 mm to φ14.5 mm outer diameter is applicable.) Part No. DY8000A1001: Sensor shield for outdoor Part No. DY3002A1005: Mounting bracket for thermometer shelter (L-type bracket)			
Replacement part (separate order required)	Part No. 83162945-003: Filter set (filter, filter cap)			

**Dimensions**

**Models HTY7903, HY7903 series**



**Models HTY7913, HY7913 series**



**Mounting bracket Part No. 83157235-001**

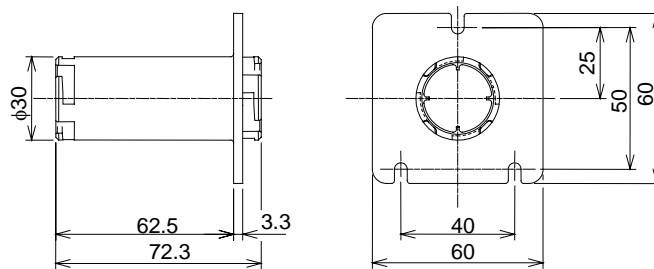


Figure 1. Dimensions (mm)

## Installation

### Installation requirements

- Select a location where the typical temperature and humidity of the measured gas can be sensed with the wind speed specified.
- Make sure that the entire probe is immersed in the measured gas. Also, make sure that airflow passes perpendicular to the side of the probe.
- Leave adequate maintenance clearance in front of the housing cover.
- When installing in steam-heating AHU, make sure the probe is not directly exposed to the high-temperature steam that exceeds the probe allowable operating condition.
- Do not install the sensor with the probe pointing upward.

 <b>CAUTION</b>
 Do not step on the product. External force can damage the product.

### Installing Models HTY7903, HY7903 series (for general AHU duct insertion)

- 1) Prepare the dedicated mounting bracket.  
Attach the indicator label for mounting hole at the probe mounting position, and make a mounting hole on the duct.

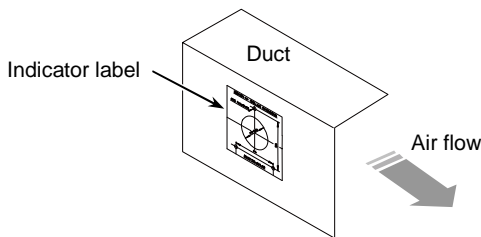


Figure 2. Indicator label on the duct

- 2) Fix the mounting bracket onto the duct with M4 screws (supplied with the bracket), inserting packing between the duct and the bracket. (The side with longer protruding part needs to face outward. See Fig. 3.)

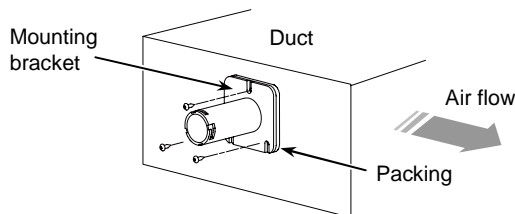


Figure 3. Mounting bracket on the duct

- 3) Cover the duct with an insulating material. (If the duct is already covered with it, partially remove the insulating material for the bracket. Then, fill the clearance between the bracket and the duct with the insulating material after fixing the bracket.)

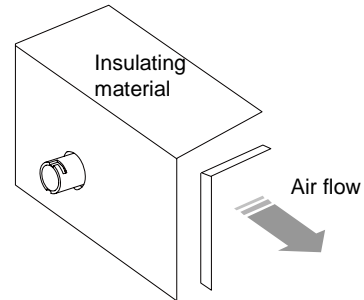


Figure 4. Duct and the mounting bracket covered with insulating material

- 4) Turn the main unit stopper 45 degrees (from 'a' to 'b' shown in Fig. 5) to unlock, and insert the probe of the main unit into the bracket as the main unit claws and the bracket slits match.

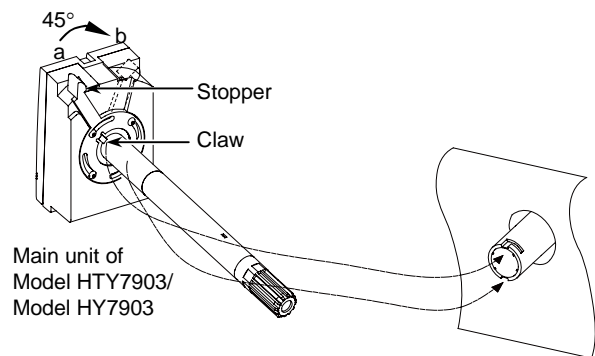


Figure 5. Mounting the main unit on the duct (with the mounting bracket)

- 5) Completely insert the probe into the duct. Then, fix the probe and the bracket by turning the stopper 45 degrees (from 'b' to 'a' shown in Fig. 6) to lock.

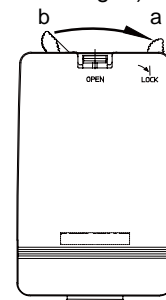


Figure 6. Fixing the main unit on the duct (with the mounting bracket)

**Installing Models HTY7913, HY7913 series  
(for equipment, including chamber and thermometer  
shelter, insertion)**

- 1) Prepare the dedicated mounting bracket. Attach the indicator label for mounting hole at the probe mounting position, and make a mounting hole on the equipment panel.

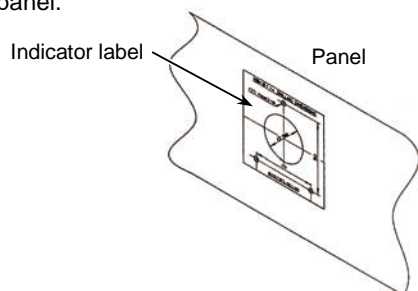


Figure 7. Indicator label on the panel

- 2) Fix the mounting bracket onto the equipment panel with M4 screws (supplied with the bracket). (The side with shorter protruding part needs to face outward. See Fig. 8.)

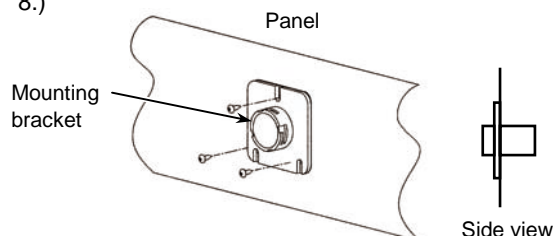


Figure 8. Mounting bracket on the panel

- 3) Turn the main unit stopper 45 degrees (from 'a' to 'b' shown in Fig. 9) to unlock, and insert the probe of the main unit into the bracket as the main unit claws and the bracket slits match.

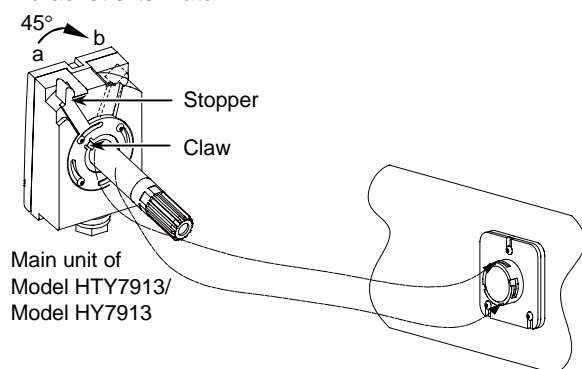


Figure 9. Mounting the main unit on the panel  
(with the mounting bracket)

- 4) Completely insert the probe into the panel. Then, fix the probe and the bracket by turning the stopper 45 degrees (from 'b' to 'a' shown in Fig. 10) to lock.

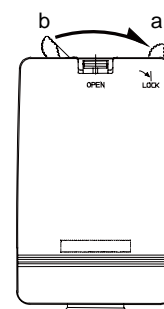


Figure 10. Fixing the main unit on the panel  
(with the mounting bracket)

**Wiring (common to Models HTY7903/HY7903 and  
HTY7913/HY7913 series)**

**Wiring procedure**

- 1) Open the front cover by pressing the claw of the case. (See 'a' in Fig. 11.) At this time, open 30 degree wide or wider. (See 'b' in Fig. 11.) Then lift the front cover to detach. (See 'c' in Fig. 11.)

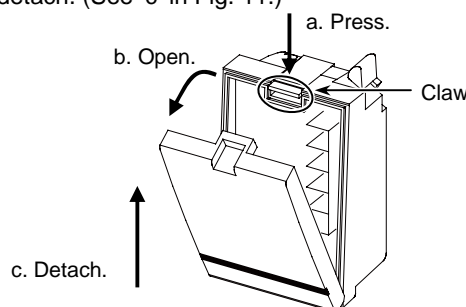


Figure 11. Detaching the front cover

- 2) Lead the cable through the wiring port.

Seal connector connection

Prepare the appropriate seal connector (with separate order required), depending on the quantity of core cables. Screw the threaded seal connector onto the wiring port and lead the cables through the port.

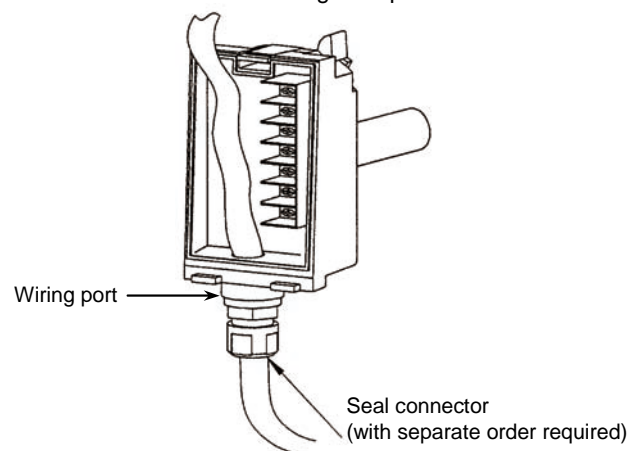


Figure 12. Seal connector connection

Conduit connection

Prepare the appropriate conduit set (with separate order required), depending on the quantity of core cables. Temporarily screw the conduit connector and the attachment, and select an O-ring appropriate for the cable.

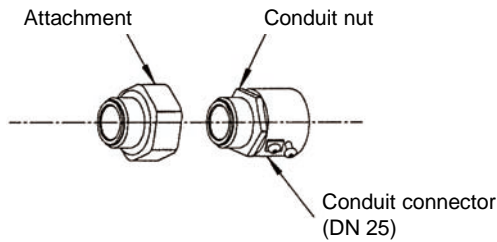


Figure 13. Conduit connection (1/2)

Lead the cable in, as shown in Fig. 14. Pull up the cable ('a' in Fig. 14) and screw the attachment onto the wiring port. Tighten the conduit nut on the conduit at a position where the conduit set screw can be tightened easily. Then, seal the wiring port ('b' in Fig. 14).

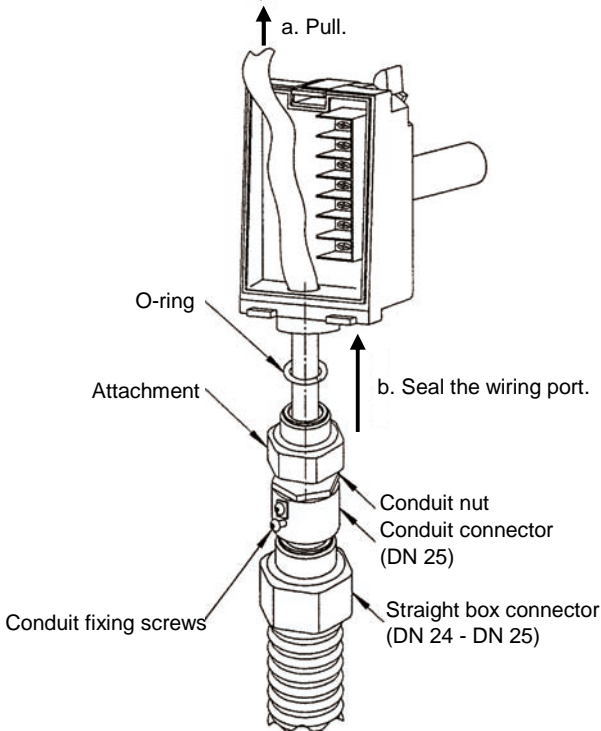


Figure 14. Conduit connection (2/2)

- 3) Connect the cables to the terminals.  
Connect the core cables to the terminals, and attach the front cover.

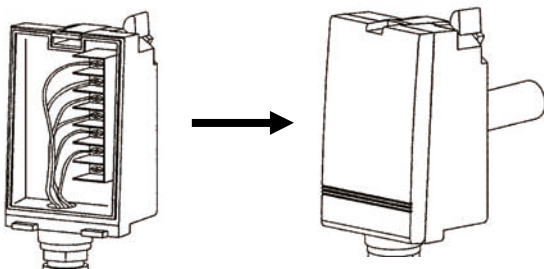


Figure 15. Attaching the front cover

Then, tighten the seal connector (for seal connector connection).

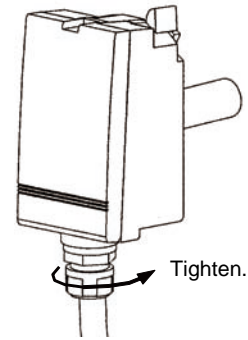


Figure 16. Tightening the seal connector

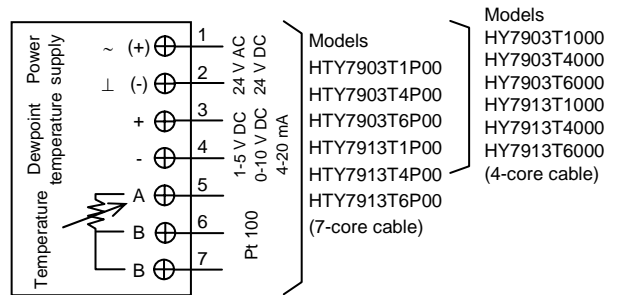


Figure 17. Connection of 7- and 4-core cables to terminals

**⚠ CAUTION**

- Make sure all the wires are tightly connected to prevent heat generation or equipment malfunction. Insufficient tightening of the screw terminals also can cause inaccurate measurement.
- Leave vacant terminals unconnected to prevent product damage.

- 4) After completing wiring, be sure to attach the front cover.

**Wiring requirements**

- Shielded multi-core cables (JCS\* CVV-S cables) of 1.25 mm<sup>2</sup> or 2 mm<sup>2</sup> are recommended for power line and dewpoint temperature output line. Be sure to ground the shielded cable for the controller.
- Without dust-proof or splash-proof enclosure, a 1.25 mm<sup>2</sup> or 2 mm<sup>2</sup> cable (JIS IV cable) can be used for power line and temperature output line, and a 1.25 mm<sup>2</sup> shielded cable for dewpoint temperature output line. The maximum cable length is 100 m.
- Never connect power to temperature output terminal to prevent smoking.
- Always check wiring before supplying power. Never share 24 V AC transformer with other products.

\* JCS: Japanese Electric Wire & Cable Makers' Association Standards

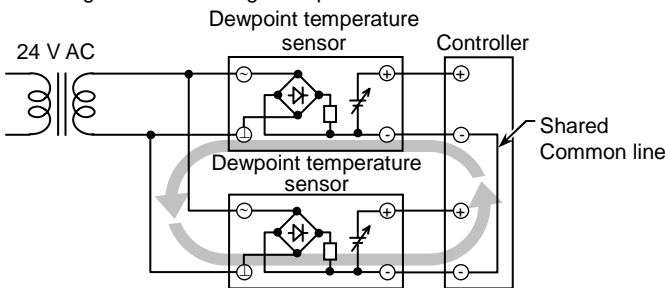
**Never share AC transformer for Model HY79/HTY79 with any other equipment.**

**⚠ CAUTION**

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

24 V AC Transformer shared with two sensors

\* Fig. 18 shows wiring example of Model HY79X3T.

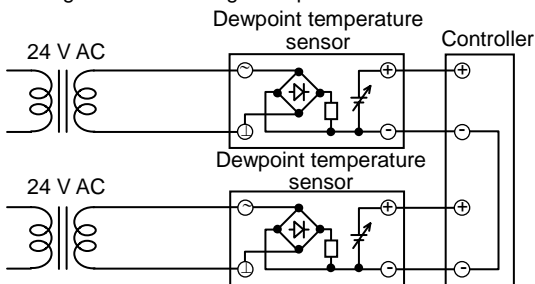


**⊘ Incorrect** A loop is formed at common.

Figure 18. Incorrect wiring: shared 24 V AC transformer

Separate 24 V AC transformers for two sensors

\* Fig. 19 shows wiring example of Model HY79X3T.

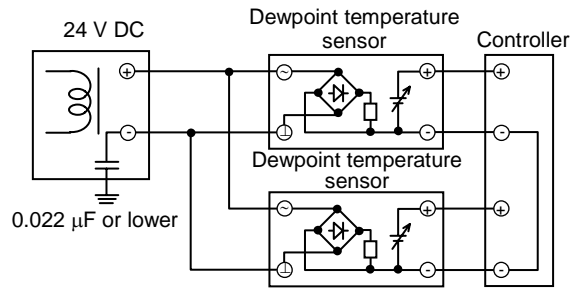


**⊙ Correct** No loop is formed at common.

Figure 19. Correct wiring: separate 24 V AC transformers

24 V DC Transformer shared with two sensors

- \* Fig. 20 shows wiring example of Model HY78X3T.
- \* For connecting terminals [-] and [E] (3 and 2), use power with 0.022 μF or lower capacitive coupling.



**⊙ Correct** Though a loop is formed at common, common mode noise affects little.

Figure 20. Correct wiring: shared 24 V DC transformer

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

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

**IMPORTANT:**

- Select the power for this product based on the allowable load (max. current and max. power consumption).
- Note that 4-20 mA output type is not applicable to Model RYY792D converter.

**Maintenance**

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

**Periodic inspection**

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

**Troubleshooting**

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

Troubleshooting and solution

Problems	Check items	Solutions
<ul style="list-style-type: none"> <li>No output generated</li> <li>Unstable output</li> </ul>	<ul style="list-style-type: none"> <li>Loose wiring</li> <li>Disconnected wiring</li> <li>Power supply voltage</li> <li>Sensor damages</li> </ul>	<ul style="list-style-type: none"> <li>Tighten the terminal block.</li> <li>Re-perform wiring.</li> <li>Replace the sensor.</li> </ul>
<ul style="list-style-type: none"> <li>Slow response to output</li> </ul>	<ul style="list-style-type: none"> <li>Moisture/condensation on the sensor</li> </ul>	<ul style="list-style-type: none"> <li>Detach the main unit from the bracket, and remove the filter cap and the filter.</li> <li>Dry power-off state sensor in clean air seasoning.</li> </ul>
<ul style="list-style-type: none"> <li>Error in output</li> </ul>	<ul style="list-style-type: none"> <li>Installed location</li> <li>Dust and contamination on the sensor</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the 'Installation requirements'.</li> <li>Clean the filter.</li> <li>Replace the filter.</li> <li>Perform dewpoint single-point calibration.</li> <li>Replace the sensor.</li> </ul>

**Filter replacement:**

**⚠ CAUTION**

- Installation must be performed by qualified personnel in accordance with all applicable safety standards.

**IMPORTANT:**

Be sure not to touch the print board or other parts when they are not covered by the filter cap or the filter.

- 1) Prepare the new filter set (with separate order required) to replace with. Remove the old filter cap and filter (to replace) by hand.

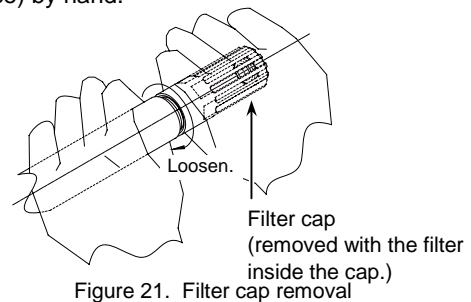


Figure 21. Filter cap removal

- 2) Before attaching the new filter, check that the rubber packing sealing the sensing element is not raised from the probe, as shown in Fig. 22.

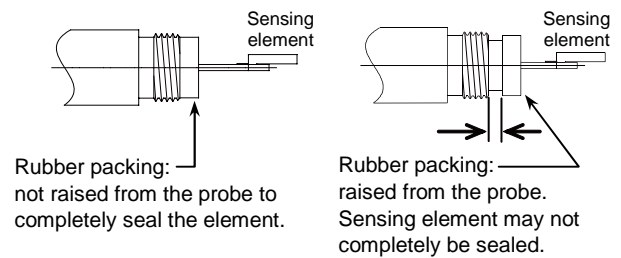


Figure 22. Rubber packing position

For rubber packing raised, press it using a slotted screwdriver as shown in Fig. 23.

Carefully handle the tool so as not to damage the packing or other part of the product.

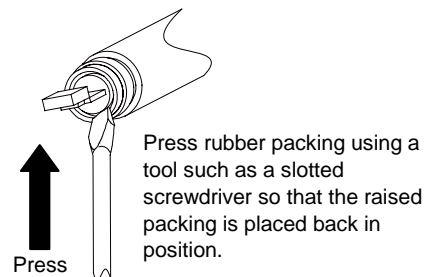


Figure 23. Pressing rubber packing

**⚠ CAUTION**

- Carefully press the rubber packing. Personal injury may result when your fingers holding the tool slip.

- 3) Cover the sensing element with the new filter ('1' in Fig. 24) and then with the new filter cap ('2' in Fig. 24).

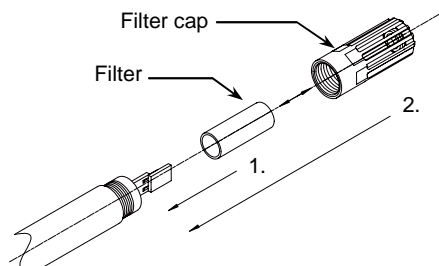


Figure 24. Attaching new filter and filter cap

- 4) Hand-tighten the filter cap.

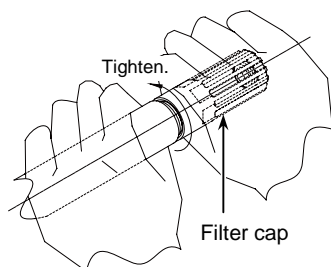


Figure 25. Tightening new filter cap

### Humidity single-point calibration for Model HY79X3T/HTY79X3T

When you find an output error of the dewpoint temperature sensor, the sensor can be calibrated with the adjustment knob RH1 located inside the dewpoint temperature sensor.

Output value is increased by turning RH1 clockwise, and decreased by turning counterclockwise.

Use a reliable measuring instrument for single-point calibration with correct procedure in appropriate environment. Calibrated digital multimeter is recommended to check output.

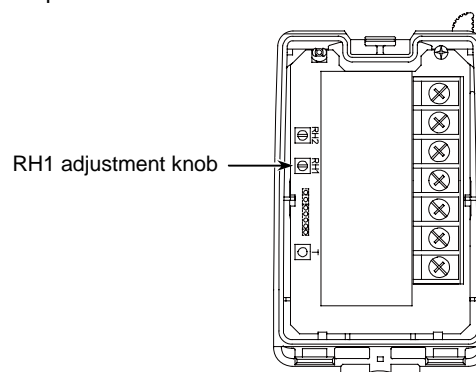


Figure 26. Single-point calibration: Model HY78X3T/HTY78X3T

### Handling Precautions

- After installation, leave the sensor for approx. 24 hours to adapt to ambient conditions (atmospheric environment).
- Be sure not to affect the sensor with heat generated from human body and/or appliances while calibrating the sensor.
- If single-point calibration is performed in the environment where relative humidity is higher than 50 %RH, the dewpoint temperature accuracy in the environment where relative humidity is lower than 50 %RH may not meet the specification.

**azbil**

*Specifications are subject to change without notice.*

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**Yamatake Corporation**  
**Building Systems Company**

**<http://www.yamatake.com>**