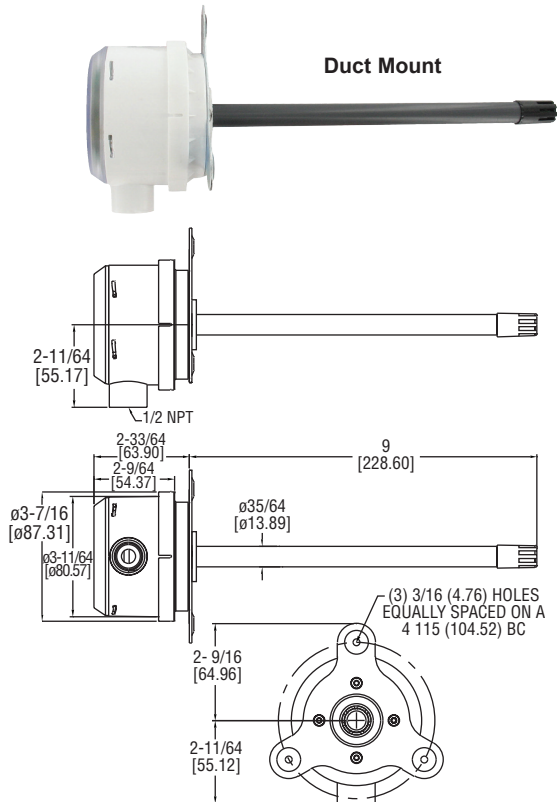




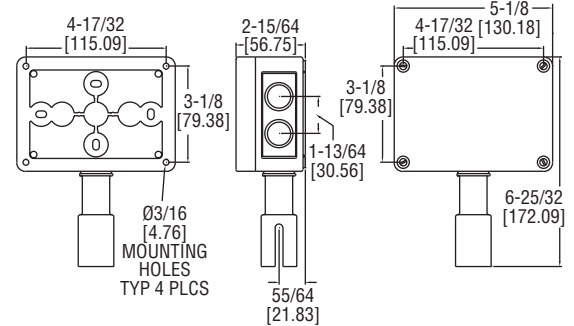
# Series RHP Temperature/Humidity Transmitter

## Specifications - Installation and Operating Instructions

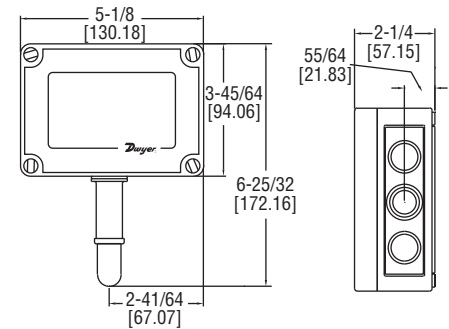


Duct Mount

OSA (Outside Air)



Sintered Filter Version



The Series RHP Humidity and Temperature Transmitter offers flexibility, high accuracy, long term stability, and reliable operation. Utilizing the duct and outside air mounting configurations, the Series RHP monitors and controls humidity or both humidity and temperature in a building energy management systems, commercial and residential HVAC applications, clean rooms, museums, and climate chambers.

The state of the art sensor technology allows the Series RHP to fully recover from 100% saturation and is calibration-free. The removable filter and field replaceable sensor allows for quick service and reduced inventory of complete units. The metal mounting flange on the duct mount models reduces the time to attach the transmitter to the duct.

The Series RHP can be ordered with at single current or voltage output for humidity or can be factory configured to have an additional current, voltage, or passive RTD or thermistor temperature output. The RTD and thermistor outputs are interchangeable in the field without any additional calibration. The optional display for the duct mount models allows the user to read both the temperature and humidity simultaneously.

### NOTICE

For best results, our model RHRS radiation shield is recommended for sintered filter versions of the outside air transmitter.

### SPECIFICATIONS

**Relative Humidity Range:** 0 to 100% RH.

**Temperature Range:** -40 to 140°F (-40 to 60°C).

**Accuracy, RH:**

Model RHP2  $\pm 2\%$  10-90% RH @ 25°C; Model RHP3  $\pm 3\%$  20-80% RH @ 25°C.

**Accuracy, Thermistor Temp Sensor:**  $\pm 0.22^\circ\text{C}$  @ 25°C ( $\pm 0.4^\circ\text{F}$  @ 77°F).

**Accuracy, RTD Temp Sensor:** DIN Class B;  $\pm 0.3^\circ\text{C}$  @ 0°C ( $\pm 0.54^\circ\text{F}$  @ 32°F).

**Accuracy, Solid State Temperature Sensor:**  $\pm 0.9^\circ\text{F}$  @ 72°F ( $\pm 0.3^\circ\text{C}$  @ 25°C)

**Hysteresis:**  $\pm 1\%$ .

**Repeatability:**  $\pm 0.1\%$  typical.

**Temperature Limits:** -40 to 140°F (-40 to 60°C).

**Storage Temperature:** -40 to 176°F (-40 to 80°C).

**Compensated Temperature Range:** -4 to 140°F (-20 to 60°C).

**4-20 mA Loop Powered Models:**

**Power Requirements:** 10-35 VDC.

**Output Signal:** 4-20 mA, 2 channels for humidity/solid state temperature, sensor models (loop powered on RH).

**0-5, 0-10V Output Models:**

**Power Requirements:** 15-35 VDC or 15-29 VAC.

**Output Signal:** 0-5, 0-10V @ 5 mA max, 2 channels for humidity/solid state temperature sensor models.

**Response Time:** 15 seconds.

**Electrical Connections:**

Removable screw terminal block.

**Conduit Connection:** Duct mount: 1/2" NPS; OSA: 1/2" (22.3 mm).

**Drift:** <1% RH/year.

**RH Sensor:** Capacitance polymer.

**Temperature Sensor:**

Curves A,B,C, F: Thermistor; Curves D,E: Platinum RTD DIN 385; Curve 0: None. Curve 1,2: Solid state band gap.

**Housing Material:** Duct Mount: PBT; OSA: Polycarbonate.

**Enclosure Rating:** NEMA 4X (IP65) for OSA mount only.

**Display:** Duct Mount only, Optional 2-line alpha numeric, 8 characters/line.

**Display Resolution:** RH: 0.1%; 0.1°F (0.1°C).

**Weight:** Duct Mount .616 (.3 kg) OSA 1 lb (.45 kg).

**Agency Approvals:** CE.

**INSTALLATION**

**WARNING** Disconnect power supply before installation to prevent electrical shock and equipment damage.

Make sure all connections are in accordance with the job wiring diagram and in accordance with national and local electrical codes. Use copper conductors only.

**CAUTION** Use electrostatic discharge precautions (e.g., use of wrist straps) during installation and wiring to prevent equipment damage.

Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present. NEMA Type 4X (IP65) housings are intended for outdoor use primarily to provide a degree of protection against wind-blown dust, rain, and hose-directed water.

Do not exceed ratings of this device, permanent damage not covered by warranty may result. The 4-20 mA models are not designed for AC voltage operation.

**Duct Mount**

The transmitter should be mounted away from fans, corners, heating and cooling coils, and other equipment that will effect the measurement of the relative humidity. It should also be mounted in a location that receives adequate air flow for proper operation. The transmitter should be mounted such that the conduit connection points down to prevent moisture from entering.

1. Drill a 1" diameter hole into the duct at the desired location.
2. Insert the transmitter probe through the hole such that the mounting flange is flush to the duct.
3. Use three #8 x 1/2" pan head sheet metal screws to attach the mounting flange to the duct. Do not over tighten.
4. Remove top screw cover to access wiring terminals.

**OSA (Outside Air)**

The transmitter should be mounted under an eave, shield, or in an area that is out of the elements or direct sunlight. The transmitter should be mounted with the sensor pointing down to prevent water collection in the sensor cavity.

1. Remove the cover plugs from the face of the unit and the top cover.
2. Position the transmitter where it is to be mounted and mark the mounting holes in each corner of the housing.
3. Drill or punch out marked locations.
4. Place the transmitter box over mounting holes on wall and align. Install wall mount screws (not provided) in mounting holes.
5. Proceed with wiring according to Figure 1.
6. Replace cover and cover plugs on the face of the unit.

**WIRING**

Use maximum 18 AWG wire for wiring terminals. Refer to Figure 1 or Figure 2 for wiring information. Terminal blocks are removable for ease of wiring.

**4-20 mA Output Models with Thermistor, RTD or No Temperature Sensor**

4-20 mA output units may be powered with a 10-35 VDC supply. (Wire as shown in Figure 1).

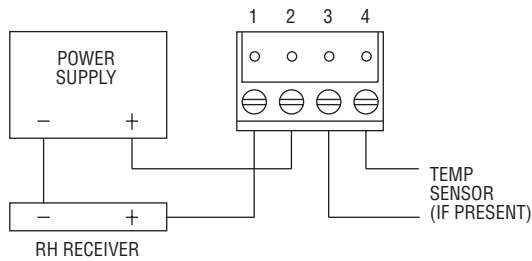


Figure 1

**Dual 4-20 mA RH/Temperature Output Models**

Dual 4-20 mA output units may be powered with a 10-35 VDC supply. The following describes the proper wiring of these transmitters: The model RHP transmitter with dual 4-20 mA output is designed as a two-wire 4-20 mA device with two channels. The channels are common on the positive side of the current loop. Sensor excitation power is derived from the RH channel, so power must always be applied to that channel. If the temperature channel is not used, it can be left disconnected. Wire as shown in figure 2.

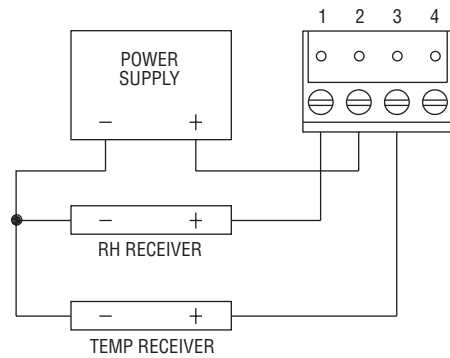


Figure 2

**Note:** If the RH output is not required, wire the "-" terminal of the power supply to terminal 1.

**0-5V and 0-10V Output Models with Thermistor, RTD, or No Temperature Sensor**

The 0-5V and 0-10V output models may be powered with 15-35 VDC or 15-29 VAC. Note polarity when using DC power. The maximum load is 5 mA. Wire as shown in Figure 3.

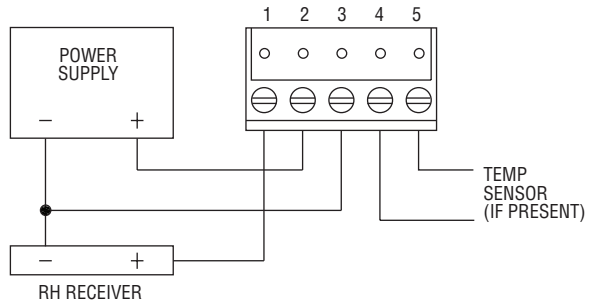


Figure 3

**Dual 0-5V and 0-10V RH/Temperature Output Models**

Dual 0-5V and 0-10V output units may be powered with 15-35 VDC or 15-29 VAC. Note polarity when using DC power. The channels are common on the negative side. If desired, the RH or, temperature output may be used by itself. Wire as shown in figure 4.

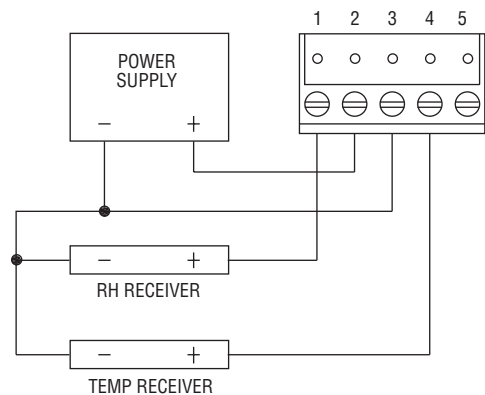
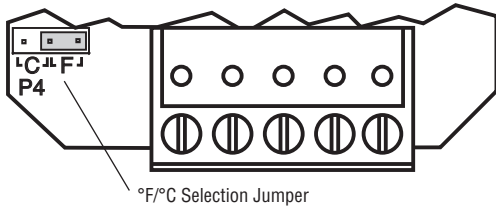


Figure 4

**DISPLAY**

The temperature indicated on the display, if equipped with the LCD option, is field selectable via a jumper located on the circuit board. Position the jumper for °F or °C according to Figure 5.



**Figure 5**

**Note:** The display will indicate temperature even if the unit does not have a temperature output.

**TROUBLESHOOTING**

1. Verify that the unit is mounted in the correct position.

**2. 4-20 mA Models:**

Verify appropriate supply voltage. The transmitter requires a minimum of 10 and a maximum of 35 VDC at its connection for proper operation. Choose a power supply with a voltage and current rating which meets this requirement under all operating conditions. If the power supply is unregulated, make sure voltage remains within these limits under all power line conditions. Ripple on the supply should not exceed 100 mV.

**Loop Resistance** – The maximum allowable loop resistance depends on the power supply voltage. Maximum loop voltage drop must not reduce the transmitter voltage below the 10 VDC minimum. Maximum loop resistance can be calculated with the following equation.  $V_{ps}$  is the power supply voltage.

$$R_{max} = \frac{V_{ps} - 10.0}{20 \text{ mA}}$$

Some receivers, particularly loop powered indicators, may maintain a fixed loop voltage to power the device. This voltage drop must also be subtracted from the power supply voltage when calculating the voltage margin for the transmitter. The following equation takes this into account.  $V_{rec}$  is the receiver fixed voltage.

$$R_{max} = \frac{V_{ps} - 10.0 - V_{rec}}{20 \text{ mA}}$$

**0-5V and 0-10V Output Models:**

Verify appropriate supply voltage. The 0-5V and 0-10V output models require a DC supply of 15 to 35 V or an AC supply of 15-29 V for proper operation maximum. Maximum output load is 5 mA.

**FIELD SENSOR REPLACEMENT**

Replacement sensors and sensor covers are available. Also, for models with removable plastic cover, a polyester filter is included for added sensor protection.

**NOTICE**

Sensor is sensitive to Electro-Static Discharge (ESD). Follow industry standard practice for control and protection against ESD. Failure to exercise good ESD practices may cause damage to the sensor.

**Date of Manufacture**

The Date of Manufacture can be found on the wiring diagram label as part of the serial number. The wiring diagram label is located on the inside of the cover of the Outside Air Models and on the side of the housing on the duct models. The date code consists of a letter for our manufacturing location, followed by two numbers for the week of manufacture, and ending with a letter for the year of manufacture (i.e. E50W would be built in the 50th week of 2011). Units manufactured after January 2012 would be E01X or later and dates after March 2012 would be E10X or later.

**For Duct Mount Models Manufactured Before 01/01/2012:**

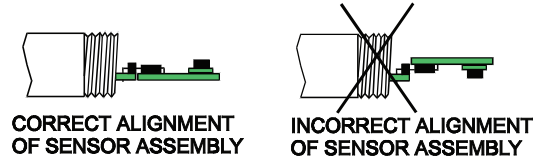
1. Remove plastic cover or sintered filter.
2. Remove and discard old sensor.
3. Replace sensor making sure all six pins mate correctly with the socket and that the boards are correctly aligned as shown in Figure 6.
4. Replace plastic cover or sintered filter.

**For Duct Mount Models Manufactured After 01/01/2012:**

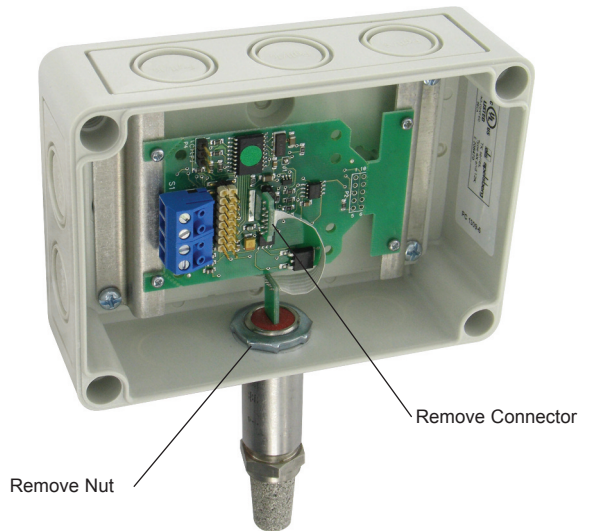
1. For models with plastic cap, remove plastic cap and membrane filter.
2. Open up cover and remove terminal block with current wiring.
3. Remove screws from circuit board.
4. Pull out circuit board from housing.
5. Disconnect old sensor board and plug in new board.
6. Attach gasket to probe board.
7. Slide board back into the housing aligning with screw holes.
8. Replace screws, terminal block and housing cover.
9. Slide membrane filter over sensor board and screw on plastic cap.

**For OSA Sintered Filter Models Manufactured Before 03/01/2012:**

1. Remove cover.
2. Refer to Figure 7, remove connector from socket on circuit board.
3. Loosen and remove nut, then carefully remove assembly from unit.
4. Remove second nut and o-ring on sensor and reinstall on new sensor.
5. Carefully install new sensor in unit. Place nut over cable and tighten.
6. Insert connector into socket on circuit board. Connector will only go one way.



**Figure 6**



**Figure 7**

**MAINTENANCE**

Upon final installation of the Series RHP Temperature/Humidity Transmitter and the companion receiver, no routine maintenance is required. A periodic check of the system calibration is recommended. Except for sensor replacement, the Series RHP is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

**Model Chart**

Example	RHP	2	D	1	A	LCD	RHP-2D1A-LCD
Series	RHP						RH/Temperature Sensor Transmitter
Accuracy		2 3					2% Accuracy 3% Accuracy
Housing Type			D F O S R				Duct Mount w/Plastic Tip Duct Mount w/Sintered Filter OSA (Outside Air) OSA w/Sintered Filter Radiation Shield
RH Output				1 2 3			4-20mA 0-10V 0-5V
Temperature Sensor/Output					A B C D E F 0 1 2 3		10K @ 25°C Thermistor Dwyer Curve A 10K @ 25°C Thermistor Dwyer Curve B 3K @ 25°C Thermistor Dwyer Curve C 100Ω RTD DIN 385 1KΩ RTD DIN 385 20KC 25°C Thermistor Curve F No Temperature Output 4-20 mA Solid State 0-10V Solid State 0-5V
Option						LCD	LCD Display; Blank: No Options

**ACCESSORIES**

**Duct Mount replacement sensor part number table:**

**For units manufactured before January 2012:**

RHP Model #	Replacement Sensor Part #
RHP-2(D or F)XA	RHPS-D2A
RHP-2(D or F)XB	RHPS-D2B
RHP-2(D or F)XC	RHPS-D2C
RHP-2(D or F)XD	RHPS-D2D
RHP-2(D or F)XE	RHPS-D2E
RHP-2 (D or F)XF	RHPS-D2F
RHP-2 (D or F)X(0,1, 2)	RHPS-D20
RHP-3(D or F)XA	RHPS-D3A
RHP-3(D or F)XB	RHPS-D3B
RHP-3(D or F)XC	RHPS-D3C
RHP-3(D or F)XD	RHPS-D3D
RHP-3(D or F)XE	RHPS-D3E
RHP-3(D or F)XF	RHPS-D3F

**For units manufactured after January 2012:**

RHP Model #	Replacement Sensor Part #
RHP-2(D or F)XA	RHPF-D2A
RHP-2(D or F)XB	RHPF-D2B
RHP-2(D or F)XC	RHPF-D2C
RHP-2(D or F)XD	RHPF-D2D
RHP-2(D or F)XE	RHPF-D2E
RHP-2 (D or F)XF	RHPF-D2F
RHP-2 (D or F)X(0,1, 2)	RHPF-D20
RHP-3(D or F)XA	RHPF-D3A
RHP-3(D or F)XB	RHPF-D3B
RHP-3(D or F)XC	RHPF-D3C
RHP-3(D or F)XD	RHPF-D3D
RHP-3(D or F)XE	RHPF-D3E
RHP-3(D or F)XF	RHPF-D3F

Duct Mount replacement screw on sensor cover part numbers:

Plastic cover - order part # A-453

Sintered filter cover - order part # A-452

**OSA Sintered filter replacement sensor part number table:**

**For units manufactured before March 2012:**

RHP Model #	Replacement Sensor Part #
RHP-2SXA	RHPS-S2A
RHP-2SXB	RHPS-S2B
RHP-2SXC	RHPS-S2C
RHP-2SXD	RHPS-S2D
RHP-2SXE	RHPS-S2E
RHP-2SXF	RHPS-S2F
RHP-2SX(0, 1, 2)	RHPS-S20
RHP-3SXA	RHPS-S3A
RHP-3SXB	RHPS-S3B
RHP-3SXC	RHPS-S3C
RHP-3SXD	RHPS-S3D
RHP-3SXE	RHPS-S3E
RHP-3SXF	RHPS-S3F
RHP-3SX(0, 1, 2)	RHPS-S30

X = Any humidity output

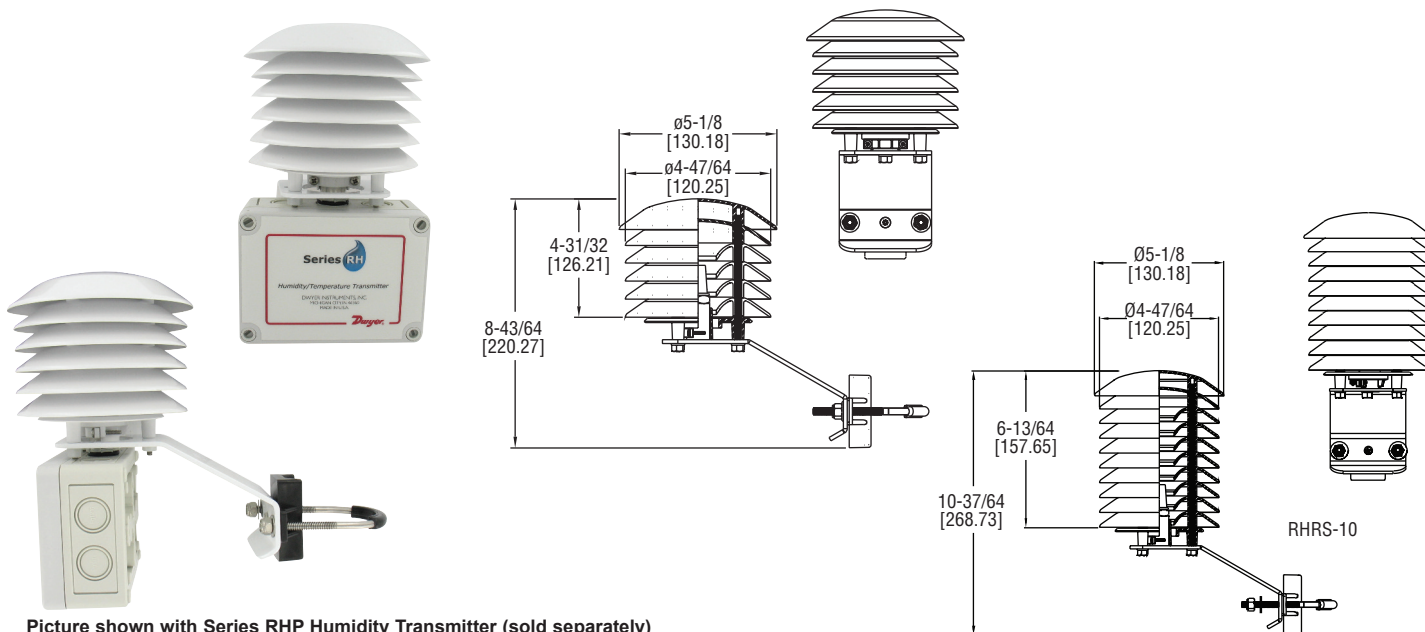
**NOTICE**

OSA models manufactured after March 2012 do not have replaceable sensors.



# Series RHRS Outside Air Humidity Radiation Shield

## Specifications - Installation and Operating Instructions



Picture shown with Series RHP Humidity Transmitter (sold separately)

The Series RHRS Radiation Shield protects outside air humidity transmitters from rain and radiated heat. With the curved shape and color of the plates, air flow is able to move across the sensor to keep radiated temperatures from rooftops and surrounding surfaces from affecting humidity readings. For ease of installation, the Series RHRS has integral pipe mounting hardware which can be removed for surface mounting applications. The brackets on the Series RHRS are specifically designed to be installed on the Dwyer Series RHP outside air humidity transmitters with sintered filters.

### INSTALLATION

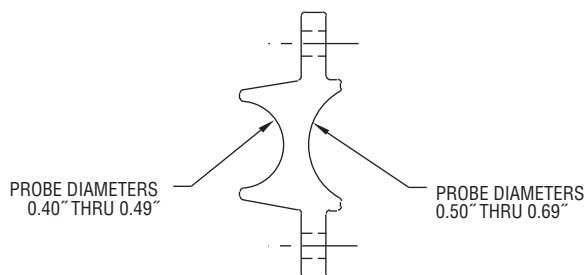
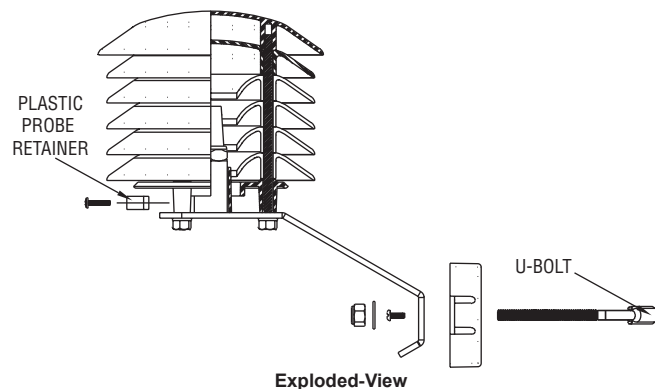
- Step 1: Loosen plastic probe retainer on radiation shield by unscrewing two retainer screws.
- Step 2: Slide humidity transmitter probe completely into radiation shield.
- Step 3: Screw plastic probe retainer to the radiation shield until the probe is firmly held in place. Do not over tighten the screws.

#### For Pipe Mounting

- Step 4: Remove the u-bolt from the mounting bracket.
- Step 5: Secure the radiation shield to 3/4" to 1-1/2" iron pipe.

#### For Surface Mounting

- Step 4: Remove the u-bolt and the screw holding the pipe retaining bracket.
- Step 5: Mark the outer two holes of the mounting bracket on the surface.
- Step 6: Drill the two holes marked in the previous step into the surface.
- Step 7: Attach the radiation shield to the surface.



Optional Two Sided Probe Retainer

### NOTICE

If not using the Dwyer Series RHP Sintered Filter Humidity Transmitter or Series TE Outside Air Temperature Sensor, remove the plastic probe retainer and substitute with the two-sided plastic probe retainer that is included with the unit. This two-sided probe retainer can be used for probe diameters from 0.400" to 0.690" depending on which side of the retainer is being used.