

USER'S GUIDE

Series RHPX

Humidity/Temperature Analog Transmitter

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Bulletin AQ-RHPX-A

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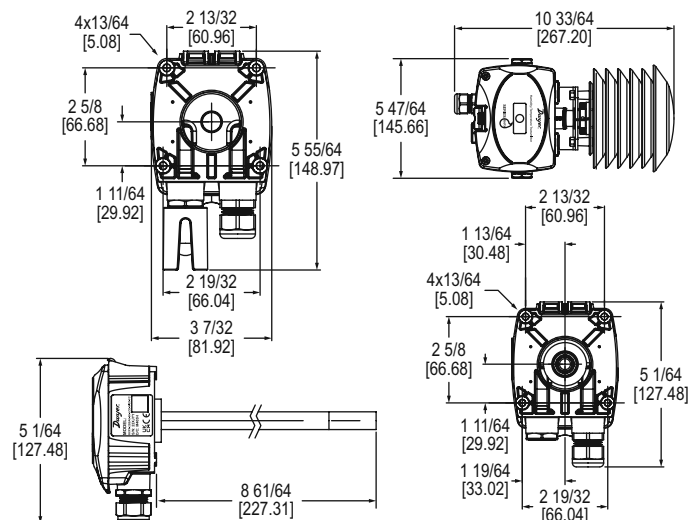
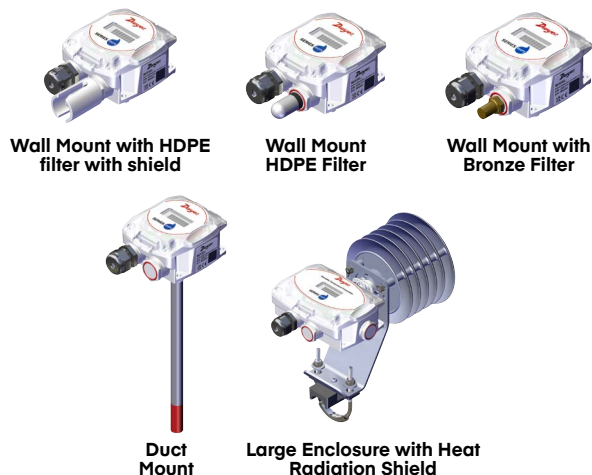
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The **Series RHPX Humidity and Temperature Transmitter** offers field selectable voltage and current output for humidity with an active temperature output or a passive temperature sensor connection. Featuring capacitive polymer humidity sensors, models are available in 2% and 3% accuracies.

The high accuracy, long term stability, and reliable operation in multiple enclosure styles make the Series RHPX an excellent choice to monitor humidity and temperature in building energy management systems, commercial HVAC systems, clean rooms, museums and data centers.

The Series RHPX can be optionally configured to supply absolute or relative humidity or dew point in addition to enthalpy. The optional two line alphanumeric display allows the user to read both the temperature and humidity simultaneously. There is also a remote sensor configuration as well.

NOTICE For best results, our model RHRS radiation shield is recommended for sintered filter versions for the outside installations.

NOTICE Sensor is sensitive to electrostatic discharge (ESD). Follow industry standard practice for control and protection against ESD. Failure to exercise good ESD practices may cause damage to the sensor.

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.

NOTICE Avoid locations where severe shock, vibration, excessive moisture, corrosive or volatile organic compounds are present. NEMA Type 4X (IP66) housings are intended for outdoor use primarily to provide a degree of protection against wind blown dust, rain, and hose directed water.

NOTICE 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 affect 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 base of the enclosure is flush to the duct.
3. Use four #8 x 1/2" pan head sheet metal screws to attach the enclosure to the duct. Do not over tighten.
4. Open the enclosure by pressing on the snap and lifting the lid.
5. Proceed with wiring according to the desired output configuration.

SPECIFICATIONS

Humidity Measurement Range: 0 % to 100 % humidity.
Temperature Measurement Range: -40 °C to 60 °C (-40 °F to 140 °F).
Humidity Sensor Accuracy: Model specific, $\pm 2\%$ or $\pm 3\%$, at 10 % - 90 % RH and 25 °C (77 °F).
Temperature Sensor Accuracy, Solid State Band Gap: $\pm 0.9^\circ\text{F}$ @ 77°F ($\pm 0.5^\circ\text{C}$ @ 25°C).
Temperature Sensor Accuracy, Thermistor: $\pm 0.2^\circ\text{C}$ @ 25°C ($\pm 0.36^\circ\text{F}$ @ 77°F).
Temperature Sensor Accuracy, RTD: DIN Class B; $\pm 0.3^\circ\text{C}$ @ 0°C ($\pm 0.54^\circ\text{F}$ @ 32°F).
Resolution: Relative humidity: 0.1%; temperature: 0.1°F/°C; absolute humidity: 0.1 g/m³.
Humidity Analog Output: 4-20 mA or 0-5 V dc, 0-10 V dc at 5 mA max, field selectable.
Active Temperature Analog Output: 4-20 mA or 0-5 V dc, 0-10 V dc at 5 mA max, field selectable.
Passive Temperature Sensors: Types II and III: Solid state band gap; Curves A, B, and F: Thermistor; Curves D and E: Platinum RTD DIN 385, Balco 1K (analog models only, availability is sensor configuration dependent).
Operating Temperature Range: -40°C to 60°C (-40°F to 140°F); With LCD: -20°C to 60°C (-4°F to 140°F).
Power Requirements: Communications model: 14 to 35 Vdc or 10 to 32 Vac; Analog model: 4-20 mA: 10 to 35 Vdc; Vout: 15 to 35 Vdc or 15 to 29 Vac.
Wiring Connection: Removable terminal block.
Electrical Entry: 1/2" NPS thread. Cable gland included.
Humidity Sensor: Capacitive polymer.
Enclosure Material: UL 94 V-0.
Enclosure Rating: IP66.
Optional Display: Two (2) lines of alphanumeric characters with eight (8) characters per line.
Weight: Duct: 198.4 g (0.44 lb); wall mount: 170 g (0.38 lb); large housing: 340.2 g (0.75 lb); large housing with radiation shield: 1247.4 g (2.75 lb).
Storage Temperature: -40°C to 70°C (-40°F to 158°F); With LCD: -30°C to 70°C (-22°F to 158°F).
Additional calculations: Absolute humidity: (0 to 50) g/m³ or (0 to 3000) lb/mmcft; dew point -75 °C to 60 °C (-102 °F to 140 °F); enthalpy (-40 to 411) kJ/kg or (-17 to 177) Btu/lb.
Compliance: BTL, CE, UL 2043*, UL-60335-2-40**.

* UL 2043 compliance limited to models:
 RHPX-XS(B,S,W) Wall Mount
 RHPX-XS(D,E)-XX-X Plastic Probe Duct Mount without LCD
 RHPX-XS(F,G)-XX-X SSTL Duct Mount with LCD
 RHPX-XL(B,S,W) Large Wall Mount without LCD
 RHPX-XL(H) Large Wall Mount without LCD & Solar Radiation Shield
 ** Meets UL-60335-2 clause 30.103DV.1 through UL2043 compliance

Surface and Outdoor Mount

Note: For outdoor mounting 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.

For surface mounting the transmitter should be mounted away from fans, heating and cooling coils, and other equipment that will affect the measurement of the relative humidity. It should also be mounted in a location that receives adequate air flow for proper operation with the sensor pointing down to prevent water collection in the sensor cavity. A vertical mounting surface is preferred but not required.

1. Position the transmitter where it is to be mounted and mark the mounting holes in each corner of the housing.
2. Drill or punch out marked locations.
3. Place the transmitter box over mounting holes on wall and align. Install unit with screws (not provided) in mounting holes.
4. Open lid by pressing in on tab at bottom of front of lid.
5. Proceed to wiring information section.
6. Close lid by pressing down on lid surface until the snap engages into the lower housing (To ensure IP67 compliance, use 10-32 X 5/16" machined screws or #10 X 5/16" plastite screws).

Wiring

Use maximum 18 AWG wire for wiring terminals. Refer to Figures 1, 2, 3 or 4 for wiring information. Terminal blocks are removable for ease of wiring.

Single 4-20 mA output

4-20 mA output with thermistor, RTD or no temperature sensor units may be powered with a 10-35 VDC supply. Wire as shown in **Figure 1**.

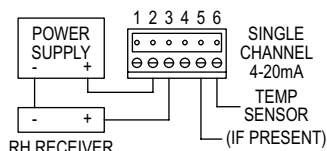


Figure 1: RHPX analog wiring single 4-20mA

Dual 4-20 mA RH/Temperature Output

Dual 4-20 mA output units may be powered with a 10-35 V dc supply. The model RHPX transmitter with dual 4-20 mA output is designed as a 2-wire 4-20 mA device with two channels. The channels are common on the positive side of the current loop. Either channel may be wired to be used individually, or both channels may be wired to be used simultaneously. Wire as shown in **Figure 2**.

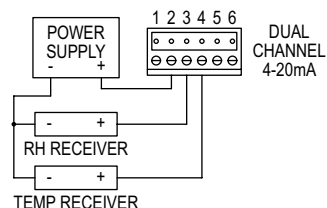


Figure 2: RHPX analog wiring dual 4-20mA

Single Voltage Output with Optional Passive Temperature Sensor

Note: polarity when using DC power. The maximum load is 5 mA. Wire as shown in **Figure 3**.

The 0 V to 5 V and 0 V to 10 V output models may be powered with 15 V dc to 35 V dc or 15 V ac to 29 V ac.

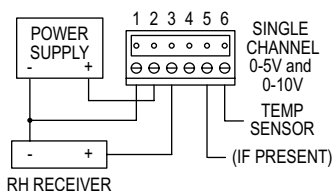


Figure 3: RHPX analog wiring single voltage 0-5V/10V

Dual Voltage Output with Optional Passive Temperature Sensor

Dual 0 V to 5 V and 0 V to 10 V output units may be powered with (15-35) V dc or (15-29) V ac.

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**.

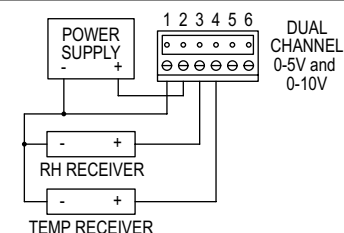
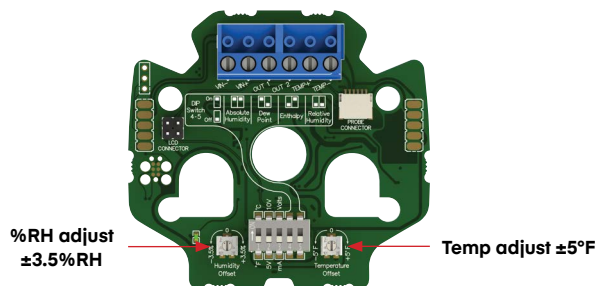


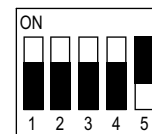
Figure 4: RHPX analog wiring dual voltage 0-5V/10V

DIP switch settings

The RHPX has on board DIP switches to set the units, type of analog output and the type of humidity metric to output. Below are the DIP switch setting definitions. The white rectangle indicates the switch position.



DIP SWITCH SETTINGS		
SW#	On	Off
1	METRIC	IMPERIAL
2	0 V to 10 V	0 V to 5 V
3	VOLTAGE OUT	4-20 mA OUT
4/5	OFF/OFF=%RH	
4/5	OFF/ON=ENTHALPY	
4/5	ON/OFF=DEW POINT	
4/5	ON/ON=ABSOLUTE HUMIDITY	



Example: ON-ON-ON-OFF-OFF
Metric units, 0 V to 10 V output, dew point

Default DIP switch setting: OFF-OFF-OFF-OFF-OFF Imperial units, 4-20 mA output, %RH. When 4-20 mA OUT is selected with switch 3, then switch 2 is inactive.

4-20 mA Models:

Verify appropriate supply voltage. The transmitter requires a minimum of 10 and a maximum of 35 V dc 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 V dc 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.

$$R_{MAX} = \frac{V_{PS} - 10.0 - V_{REC}}{20 \text{ mA}}$$

Voltage Output Mode:

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

MAINTENANCE/REPAIR

Upon final installation of the Series RHPX, no routine maintenance is required. The Series RHPX is not field serviceable and it is not possible to repair the unit. Field repair should not be attempted and may void warranty.



Do not dispose of as unsorted domestic or municipal waste. Consult retailer or local authorities for recycling information.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a Return Materials Authorization (RMA) number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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