HE-6800 Series Humidity Transmitters with Temperature Sensor Installation Guide

Part No. 24-10409-28 Rev. F

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Applications

The HE-6800 Series Humidity Transmitters with Temperature Sensor provide both humidity and temperature sensing in room wall-mount applications. The transmitter offers local warmer/cooler temperature setpoint adjustment and temporary occupancy override. The humidity sensor provides Relative Humidity (RH) accuracy of ±2% or ±3% RH and measures RH over the entire range of 0 to 100%.

A warmer/cooler dial is included on certain models for minor temperature adjustments from the setpoint. All models feature an occupancy override button that allows the user to override time-of-day scheduling when the space is occupied outside of the normal occupied hours schedule. The transmitter also includes DIP switches to enable or disable override andLight-Emitting Diode (LED) functions. In addition, all models feature a user-selectable 0 to 5 VDC or 0 to 10 VDC humidity output switch, and a power supply selection switch.

The HE-6800 Series Humidity Transmitters include screw terminal block terminations that provide flexibility for field wiring. All models include a 6-pin modular jack access port for connecting accessories to the Zone Bus. This feature allows a technician to commission or service the controller via the transmitter.

➤ **Important:** Use the HE-6800 Series Humidity Transmitter only to provide input to equipment under normal operating conditions. Where failure or malfunction of the transmitter could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the transmitter. Approved March 14, 2003.

North American emissions compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Industry Canada Statement(s)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Installation

Special Tools Needed

A 1/16 in. (1.5 mm) Allen wrench or a Johnson Controls® T-4000-119 Allen-Head Adjustment Tool is required during installation.

Accessory

Installing the HE-6800 Series Humidity Transmitter on a wallbox requires accessory NS-WALLPLATE-0, ordered separately.

Mounting

About this task:
Locate the HE-6800 Series Humidity Transmitter:

- on a partitioning interior wall, and approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight, radiant heat, outside walls, behind doors, air discharge grills, stairwells, or outside doors

- away from steam or water pipes, warm air stacks, unconditioned areas (no heating and no cooling), or sources of electrical interference

Note: The HE-6800 Series Humidity Transmitter is shock and vibration resistant; however, be careful not to drop the unit or mount it where it could be exposed to excessive vibration.

The following ambient operating conditions apply:

- Temperature: 32 to 131°F (0 to 55°C)
- Humidity: 10 to 95% RH, noncondensing; 86°F (30°C) maximum dew point

To mount the transmitter to the wall:

1. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool to loosen the security screw on the top of the unit.
2. Insert a blade screwdriver into the slot next to the security screw location, and then carefully pry the top edge of the transmitter assembly away from its mounting base and remove.

   Important: Do not remove the Printed Circuit Board (PCB). Removing the PCB voids the product warranty.
3. Pull out approximately 6 in. (152 mm) of cable from the wall, and insert the cable through the hole in the mounting base.
4. Align the mounting base on the wall, and use the base as a template to mark the location of the two mounting holes on the surface.

   Note: Make sure the mounting base is positioned correctly with the security screw located on the top edge of the base.
5. Secure the mounting base to the wall using the appropriate mounting hardware (field furnished).
6. Set DIP switches for the desired operation. See the *Internal Wiring Diagrams* and *Setup and Adjustments* sections for additional information.
7. Align the tabs on the bottom edge of the mounting base with the slots on the bottom edge of the transmitter assembly, and rotate the assembly onto its mounting base.

   Note: Make sure the terminal block pins align with the holes in the terminal block.
8. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool to tighten the security screw and fasten the network transmitter assembly to the mounting base.

Wiring

NOTICE

Risk of Property Damage

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

NOTICE

Risque de dégâts matériels

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Important: Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations.

Keep wires as short as possible to minimize sensor error. Each 250 ft (76 m) run of 18 AWG wire or 50 ft (15 m) of 24 AWG wire creates 1F° (0.56C°) error for a nickel sensor or 1.5F° (0.83C°) error for a platinum sensor due to wire resistance.

To maintain less than 1F° (0.56C°) error for nickel or 1.5F ° (0.83C°) error for platinum, hold the total resistance of all sensor wiring below 3 ohm. When wiring the HE-6800, do not run low voltage wiring in the same conduit as line voltage wiring or other conductors supplying highly inductive loads.

Internal Wiring Diagrams

Internal wiring diagrams are shown in Figure 1 and Figure 2. Terminal block designations are shown in Figure 3. The terminals are identified in Table 1. See the *Setup and Adjustments* section and Figure 4 for an explanation of the LED and Pushbutton (PB) modes. Make connections pairing the following wires:

- sensor (Terminal 1 and Terminal 2)
- setpoint (Terminal 3 and Terminal 4)
- Zone Bus and Common (COM)(Terminals 6 and 7)

Shielding is not required. If used, follow the system controller's recommendations for grounding the shield.

Note: The Manual Override PB does not respond when the DIP switch positions are all down (LED mode NO PB, as shown in Figure 2 and Figure 4).

Manual Override is selected for either Terminals 1 and 6 to short sensor (with DIP switch set for LED Off) or Terminal

6 and Terminal 8 to short LED (with DIP switch set for LED On).

Figure 1: Terminal Block Wiring Designations (LED ON Mode [Factory Default] and Manual Override PB Enabled)

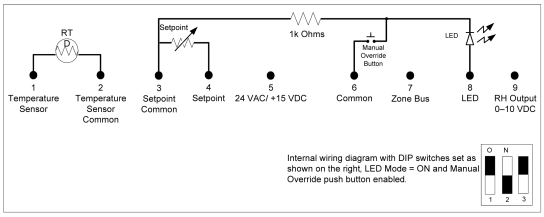
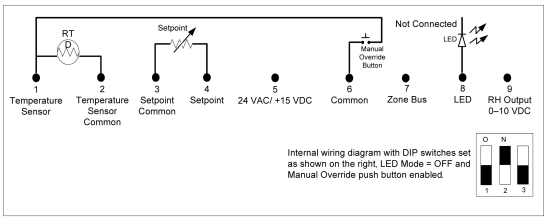


Figure 2: Terminal Block Wiring Designations (LED OFF Mode and Manual Override PB Enabled)



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Figure 3: Terminal Block Location and Wiring

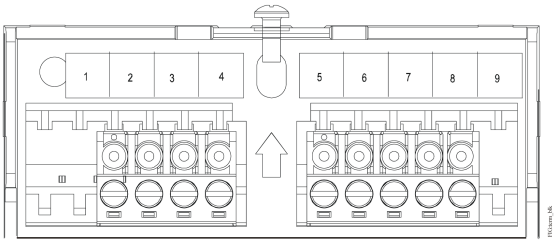


Table 1: Terminal Block Wiring

Terminal	Signal Designation
1	Temperature Sensor and Manual Override
2	Temperature Sensor Common
3	Setpoint Common and LED Common
4	Setpoint
5	1 24 VAC (+15 VDC – VMA Only[1])
6	Common (for Power, RH Output, Zone Bus, or Manual Override)
7	Zone Bus
8	LED and Manual Override
9	RH Output (0 to 10 VDC)

1 The +15 VDC power supply is used only when an HE-6800 Series Humidity Transmitter is connected to a VMA Controller.

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Setup and Adjustments

Controller Configuration DIP Switch and LED Mode

A DIP switch configures the HE-6800 for use with the desired controller by enabling or disabling the manual override PB and the LED. To change the controller mode, use the three position DIP switch located on the PCB. See Figure 4 and consult Table 2 to determine the controller compatibility.

For all transmitter models, the factory default LED mode is **LED Mode:ON**. The DIP switch positions enable/disable the functions listed in Table 3

NOTICE

Risk of Property Damage

Do not use switch settings other than those shown in Figure 4. Using other switch settings may cause incorrect controller operation or damage to the element, controller, [and/or] controlled equipment.

NOTICE

Risque de dégâts matériels

Ne pas utiliser un paramétrage des commutateurs différent de celui-ci illustré à la Figure 4. L'utilisation d'autres paramètres de commutateurs risque de provoquer un fonctionnement incorrect du contrôleur ou d'endommager l'élément, le contrôleur [et/ou] l'équipement contrôlé.

Figure 4: Controller ConfigurationDIP Switch Positions

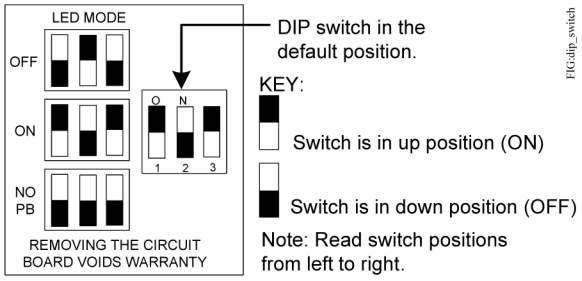


Table 2: Controller Compatibility with LED Mode and PB

Types of HE-6800	LED Mode (Figure 4)	Features Enabled on HE-6800	Features Recognized by Controller				
			AHU	UNT1100	VAV1xx or UNT1xx	VMA12 Series[1]	VMA14 Series[1]
All Models	2 LED Off[2]	Sensor and Manual Override	No	Yes	Yes	Yes	Yes
	LED On	Sensor, Manual Override, and LED	No	No	No	Yes	Yes
	No PB	Room Sensor Only	Yes	Yes	Yes	Yes	Yes

1 For these controllers, the LED appears brighter when pressing the manual override PB.
2 Holding the manual override PB for more than 2 seconds may affect the sensor reading.

Table 3: LED Mode and Functions

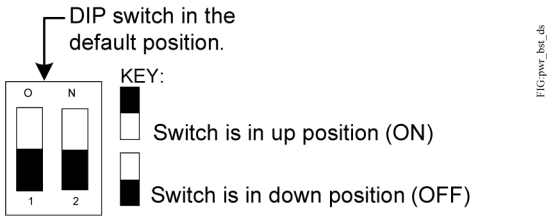
LED Mode	Functions		Switch Positions
	Enabled	Disabled	
OFF	Sensor, PB	LED	Switch positions are down, up, and down. The LED remains off at all times.
ON	LED, Sensor, PB	---	Switch positions are factory set up, down, and up. The controller determines the LED mode.
NO PB	Sensor	LED and PB	Switch positions are all down. LED is off, and the PB does not function.

Humidity Output and Power Supply Selection Switch

A 0 to 10 VDC or 0 to 5 VDC selector DIP switch enables you to change the output for % RH. The default factory setting is OFF (0 to 10 VDC output).

The HE-6800 also features a power supply selection DIP switch. If you are using the transmitter where supply voltage is 24 VAC or higher, set this switch to ON.

Figure 5: Humidity Output and Power Supply DIP Switch Positions



Switch 1
OFF = 0–10 VDC output, corresponding to 0–100%RH
ON = 0–5 VDC output, corresponding to 0–100%RH

Switch 2
OFF = Low supply voltage operation
ON = High supply voltage operation

Temperature Setpoint

Adjust the setpoint using the setpoint adjustment dial. Rotate clockwise to raise the temperature; rotate counterclockwise to lower the temperature.

Troubleshooting

About this task:

HE-6800 Series Humidity Transmitters are recommended for use only with Johnson Controls digital controllers. If the HE-6800 is not functioning properly, use the following procedure to identify the problem and determine a solution:

1. Check that the HE-6800 is mounted in a location indicative of the space temperature (for example, away from drafts or sunlight).
2. Verify that the wiring is correct.
3. Check all supply voltage connections. See Figure 1, Figure 2, or Figure 3, if necessary.
4. Check the settings:
   - Verify that any scaling modifications, setpoint adjustments, and overrides have been saved and downloaded to the controller.
   - Check the override status (Temporary Occupancy mode vs. Unoccupied mode) at the controller.
   - Check the setpoint settings.
5. Confirm DIP switch positions if:
   - the LED remains on or is dim
   - the room sensor reading is outside of the normal range for the space being sensed

   Note: Make sure the DIP switch setting is correct for the controller used with the HE-6800.
6. Replace the HE-6800 if the troubleshooting suggestions fail to remedy the problem.

Accessories

Contact the nearest Johnson Controls representative to order any of the parts listed in Table 4.

Note: Review the technical specifications of the accessories prior to their use in an application.

Repair Information

Do not field repair the HE-6800 Series Humidity Transmitters. As with any electrical device, keep the air vents clean and free from dust or obstruction. If an HE-6800 Series Humidity Transmitter fails to operate within its specifications, replace the unit. For a replacement transmitter, contact the nearest Johnson Controls representative.

Table 4: Optional Accessories

Product Code Number	Description
ACC-INSL-0[1]	Wallbox Mounting Pad (10 per Bag)
ACC-INSL-1[1]	Surface Mounting Pad (10 per Bag)
NS-WALLPLATE-0	Adapts an HE-6800 Series Humidity Transmitter (3-3/16 x 3-3/16 in. [80 x 80 mm]) to a Standard 3-3/16 x 4-3/4 in. (80 x 120 mm) Wallbox
T-4000-119	Allen-Head Adjustment Tool (30 per Bag)

1 These foam pads help prevent drafts from entering the unit through the wall, and make installation easier when mounting on an uneven surface.

Technical Specifications

Table 5: HE-6800 Series Humidity Transmitters with Temperature Sensor technical specifications

Specification		Description
Power Requirements		4.5 to 7.5 mA at 14 to 30 VDC and 5K ohm Load, or 18 to 25 mA at 20 to 30 VAC and 5K ohm Load
Terminations		9-Position Screw Clamp Terminal Block
Wire Size		16 to 24 AWG (1.3 to 0.6 mm Diameter); 18 AWG (1.0 mm Diameter) Recommended
Temperature Measurement Range		32 to 131°F (0 to 55°C)
Humidity Measurement Range	**Full Range**	0 to 100% RH
	Calibrated Range	10 to 90% RH

Table 5: HE-6800 Series Humidity Transmitters with Temperature Sensor technical specifications

Specification		Description	
Temperature Sensor	**Nickel(HE-68Nx Models)**	**Sensor Type**	1,000 ohm Thin Film Nickel
		Coefficient	Approximately 3 ohm per F° (5.4 ohm per C°)
		Reference Resistance	1,000 ohm at 70°F (0°C)
		Accuracy	±0.34F° at 70°F (±0.18C° at 21°C)
	Platinum(HE-68Px Models)	**Sensor Type**	1,000 ohm Thin Film Platinum
		Coefficient	Approximately 2 ohm per F° (3.9 ohm per C°)
		Reference Resistance	1,000 ohm at 32°F (0°C)
		Accuracy	±0.35F° at 70°F (±0.19C° at 21°C)
	Nonlinear NTC, Thermistor,Type II(HE-686x Models)	**Sensor Type**	10,000 ohm NTC Thermistor
		Coefficient	Nonlinear NTC, Johnson Controls Type II
		Reference Resistance	10,000 ohm at 77°F (25°C)
		Accuracy	±0.9F° (±0.5C°) at 32 to 158°F (0 to 70°C)
Humidity Sensor Type		Capacitive Polymer Sensor	
Humidity Element Accuracy	**HE-68x2 Models**	±2% RH for 20 to 80% RH at 50 to 95°F (10 to 35°C);±4% RH for 10 to 20% RH and 80 to 90% RH at 50 to 95°F (10 to 35°C)	
	HE-68x3 Models	±3% RH for 20 to 80% RH at 77°F (25°C);±6% RH for 10 to 20% RH and 80 to 90% at 77°F (25°C)	
Setpoint	**Range**	Warmer/Cooler	
	Resistance	1500 Ohms	
Temperature Sensor Time Constant		10 Minutes at 10 ft per Minute	
Manual Override		Integral Momentary Pushbutton (DIP Switch Selectable)	
LED		Green LED Indicates Three Modes of Operation (VMA12 and VMA14 Series Controllers Only)	
Ambient Operating Conditions		32 to 131°F (0 to 55°C), 10 to 95% RH Noncondensing;86°F (30°C) Maximum Dew Point	
Ambient Storage Conditions		-40 to 140°F (-40 to 60°C), 5 to 95% RH Noncondensing;86°F (30°C) Maximum Dew Point	
Materials		White ThermoplasticProtection: IP30 (EN 60529)	
Dimensions(H x W x D)	**HE-68xx-0 Models**	3-3/16 x 3-3/16 x 1-5/16 in. (80 x 80 x 32 mm)	
	HE-68xx-1 Models	3-3/16 x 3-3/16 x 1-7/16 in. (80 x 80 x 35 mm)	
Shipping Weight		0.44 lb (0.20 kg)	
Compliance	**United States**	UL Listed, File E107041,CCN PAZX, Under UL 916, Energy Management Equipment	
	Canada	UL Listed, File E107041,CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment	
CE	**Europe**	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive, WEEE Directive, and RoHS Directive.	
	Australia and New Zealand	RCM, Australia/NZ Emissions Compliant	

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damage resulting from misapplication or misuse of its products.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

Single point of contact

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