

Installation

- **Important:** The HL-6900 Series Multi-function Humidity Device is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the HL-6900 Device 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 HL-6900 Device.
- **Important:** Le HL-6900 Series Multi-function Humidity Device est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du HL-6900 Device risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du HL-6900 Device.

Parts included

- HL-6900 Device
- Two 8 in. x 1 in. Phillips-head sheet metal screw
- Washer for use with conduit fitting; conduit fitting and nut not provided

Tools required

- Hole saw with 1 in. (25 mm) diameter blade
- Drill with 1/8 in. (3 mm) drill bit
- No. 2 Phillips screwdriver
- Pliers
- Gasket, sealer, or other materials to seal the area between the unit and the duct

Location requirements

- **Important:** To avoid damage to the circuit board and components, do not mount the unit in a location where high concentrations of corrosive vapors are present.

When you select a location for the HL-6900 Device, consider the following:

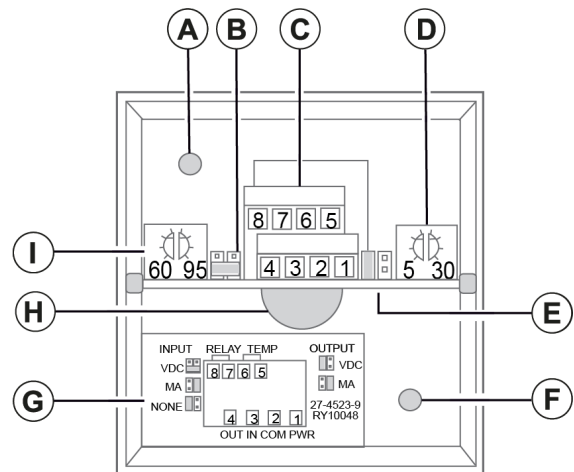
- **Position:** The HL-6900 Device is designed for duct mounting in any position, except with the probe tip pointed up.
- **Duct Diameter:** Recommended minimum diameter (round ducts) or width (square ducts) is 12 in. (305 mm).
- **Air Stratification** (when the unit is mounted on the discharge side of the fan): Recommended location is at least 8 ft (2.4 m) downstream from humidification equipment, where duct air and water vapor are sufficiently mixed. Avoid areas where the probe might be exposed to condensation.

Application setup

Before installation, configure the multi-function humidity device for the following: input and output signals, and setpoint and proportional band.

The HL-6900 Device has a setpoint potentiometer, adjustable from 60% to 95% Relative Humidity (RH), and a proportional band potentiometer, adjustable from 5% RH to 30% RH. See Figure 1 to change the setpoint or proportional band for the application desired. See Table 1 and Table 2 for more details about the input and output jumper setting.

Figure 1: Internal view of the HL-6900 Device



Callout	Description
A	Hole for mounting screw
B	Input jumper
C	Terminal block
D	Proportional band potentiometer
E	Output jumper



Callout	Description
F	Hole for mounting screw
G	Label
H	Probe
I	Setpoint potentiometer

Table 1: Input jumper setting






Setting	Description
	0 VDC to 10 VDC, factory set
	0 mA to 20 mA
	No input

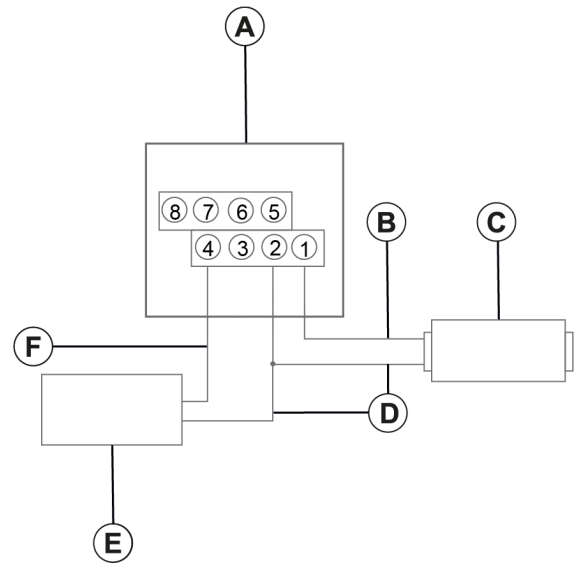
Table 2: Output jumper setting

Setting	Description
	0 VDC to 10 VDC or relay, factory set
	0 mA to 20mA

Setup and adjustments

- Use a 1/8 in. (3 mm) flat-blade screwdriver to adjust the setpoint potentiometer to the humidity level where the humidification equipment is completely off.
- Adjust the proportional band potentiometer to the desired range of humidity below the setpoint.
- Select the appropriate input and output jumpers for the application.
 - If you use the HL-6900 as a stand-alone device as shown in Figure 2, set the input jumper for no input. Set the output jumper for the type of signal the humidifier receives. See Figure 1.
 - If you use the HL-6900 as a proportional override device, see Table 3 for jumper positions. Figure 3 shows a typical proportional override application for the HL-6900. You cannot use the relay output in this application.

Figure 2: HL-6900 as a stand-alone device

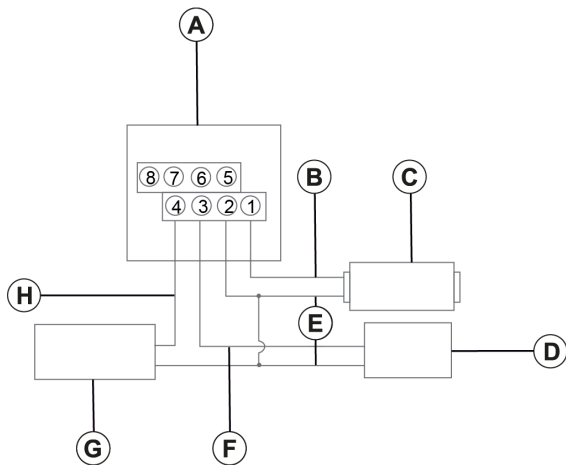


Callout	Description
A	HL-6900 Device
B	Power
C	24 VAC transformer
D	Common
E	Humidification equipment
F	Output

Table 3: Jumper positions with HL-6900 used as a proportional override device

System controller	Input jumper position	Output jumper position
Air handling unit	0 mA to 20 mA	User selectable. See Figure 1.
DX-9xxx or AS-LCPx00-0	0 VDC to 10 VDC	
Digital control module via an FM-OAE		
System 350 with a W351P	0 mA to 20 mA or 0 VDC to 10 VDC	
Generic	User selectable	

Figure 3: HL-6900 using a system controller

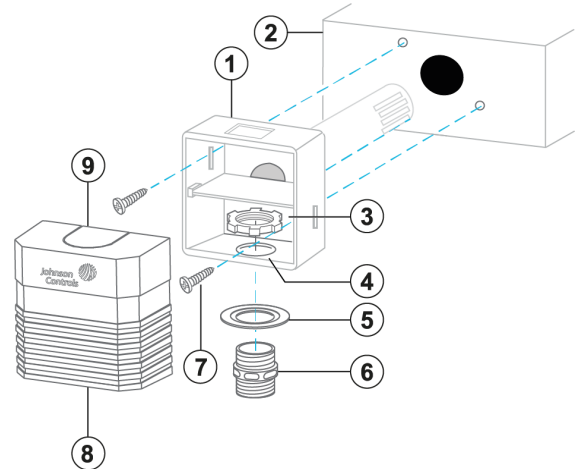


Callout	Description
A	HL-6900 Device
B	Power
C	24 VAC transformer
D	System controller
E	Common
F	Input
G	Humidification equipment
H	Output

Mounting

About this task: To mount the humidity device, see Figure 4, and proceed as follows:

Figure 4: Mounting and assembly



Number	Description
1	Housing
2	Duct
3	Nut for conduit fitting, not provided
4	Conduit hole
5	Washer, cupped side towards housing
6	Conduit fitting, not provided
7	Two 8 in. x 1 in. Phillips-head sheet metal screw
8	Snap-on cover
9	Conduit knockout, top and bottom of cover

- Remove any excess insulation from the duct that prevents the probe from extending a minimum of 3 in. (76 mm) into the air stream.
- Use the hole saw to make a 1 in. (25.4 mm) diameter hole in the duct for inserting the probe.
- Pull the plastic cover off the housing.
- Insert the probe into the duct, and mark the location of the holes for the mounting screws.
- Remove the unit, and drill a 1/8 in. (3 mm) hole for each mounting screw.
 - Important:** Remove the unit before drilling to prevent any metal remnants from falling onto the circuit board. Seal any holes created during installation to help reduce drafts and ensure accurate sensor readings.
- Use a gasket, sealer, or other means to seal the area around the 1 in. (25.4 mm) hole between the unit and the duct.
- Reinsert the probe, and secure the housing to the duct using the two No. 8 screws provided.

Wiring

About this task:

⚠ CAUTION: Risk of Electric Shock. Disconnect the power supply before making electrical connections to avoid electric shock.

⚠ ATTENTION: Risque de décharge électrique. Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

Observe the following when wiring the unit:

- Do not run low voltage wiring in the same conduit as line voltage wiring or other conductors that supply highly inductive loads.
- Use 18 to 24 AWG wire.
- Make all wiring connections in accordance with the National Electrical Code and local regulations.

To wire the device:

1. Route the wires from the controller to the HL-6900 Device through the conduit hole in the housing. See Table 4 for wiring terminal details.

Table 4: Wiring information

Terminal	Terminal designation	Polarity	Source and destination
1	Power	+	From the system controller or a separate 24 VAC transformer
2	Common	-	For power, input, and output
3	Input	+	0 mA to 20 mA or 0 VDC to 10 VDC from the system controller
4	Output	+	To humidification equipment
5	Temperature	N/A	1K ohm nickel temperature sensor
6			
7	Relay	N/A	For ON/OFF humidity equipment
8			

2. Break out the plastic knockout on the cover with pliers to accommodate the wiring or conduit. See Figure 4.

► **Important:** If you use a conduit fitting (not provided), use the washer provided to support the fitting in the housing. If you do not use the washer, the fitting could stress the plastic housing.

3. Make wire connections to the appropriate screw terminals. See Table 4.

4. Press the cover onto the base.

► **Important:** Check all connections before applying power to the system. Short circuited or misconnected wires could permanently damage the unit.

Troubleshooting

About this task:

If the humidity device is not functioning properly:

1. Make sure the power supply is functioning and wired properly to the device. Check the output wiring connections.
 2. If the HL-6900 Device is not delivering an output, check the jumper positions and make sure they are appropriately selected for the application. See Figure 1.
 3. If the humidification equipment is cycling excessively, the proportional band setting may be too low. Set the proportional band potentiometer to a higher value. See Figure 1
 4. If room humidity never reaches the desired level, the HL-6900 device's setpoint may be set too low. Gradually raise the setpoint and monitor the results. Make sure the setpoint is not too high, or excess moisture could collect in the duct.
 5. Verify that the system controller operates properly. Refer to the appropriate controller documentation.
 6. If the HL-6900 device's output is still inaccurate after performing Steps 4 and 5, record the proportional band setting and proceed as follows:
 - a. Measure duct humidity with a humidity measuring device, such as an optical dew point hygrometer, and record the result.
 - b. Measure the output of the HL-6900 Device using a Digital Volt Meter (DVM) or a Milliampere (mA) meter, and record the result.
 - c. Measure the system controller's output, the input to the HL-6900, using the DVM or the mA meter, and record the result.
- ⓘ **Note:** If the duct humidity is below the proportional band, the HL-6900 device's output should be equal to the system controller's output. If the duct humidity is above the proportional band, the HL-6900's output should be 0 VDC (0 mA).
- ⓘ **Note:** If the duct humidity is inside the proportional band, calculate the HL-6900's output as follows:

$$\text{HL-6900's output signal} = X \left(\frac{\text{setpoint} - \text{measured RH}}{\text{proportional band}} \right)$$

- ⓘ **Note:** X is either 10 VDC or 20 mA, depending on the application.

Technical specifications

Table 5: HL-6900 Multi-function Humidity Device with Temperature Sensor technical specifications

Specification	Description
Power requirements	Proportional output: 20 VAC to 30 VAC, 1.1 VA at 50/60 Hz or 14 VDC to 30 VDC at 22 mA Relay output: 20 VAC to 30 VAC, 1.1 VA at 50/60 Hz or 20 VDC to 30 VDC at 22 mA
Wire gauge	16 AWG to 24 AWG; 18 AWG optimal
Humidity	Element: Capacitive Setpoint: Adjustable from 60% RH to 95% RH Proportional band: Adjustable from 5% RH to 30% RH
Temperature sensor	Type: Thin-film nickel Resistance: 1K ohm at 70°F (21°C) Accuracy: ±0.34°F (0.18°C) at 70°F (21°C) Coefficient: Approximately +3 ohm/°F; 5 ohm/°C
Controller signal	Input and output: 0 VDC to 10 VDC or 0 mA to 20 mA
Input impedance	Voltage: 20K ohm Current: 500 ohm
Output load	Voltage: ≥1K ohm Current: ≤500 ohm
Relay contact	Single-Pole, Single-Throw (SPST), normally open — open at setpoint and closed at setpoint minus proportional band, stand-alone operation only
Relay contact rating	Maximum: 4A, 24 VAC, Class 2; Pilot Duty, 42.4 VA at 24 VAC Minimum: 100 mA at 5 VDC
Ambient operating conditions	32°F to 150°F (0°C to 66°C); 0% RH to 100% RH noncondensing; 90°F (32°C) maximum dew point
Ambient storage conditions	-40°F to 150°F (-40°C to 66°C); 0% RH to 100% RH; 90°F (32°C) maximum dew point
Materials	Blue plastic cover with blue housing and probe
Dimensions (H x W x D)	3.28 in. x 3.25 in. x 8.27 in. (83 mm x 83 mm x 210 mm) Probe (L x D): 6.25 in. x 0.98 in. (159 mm x 25 mm)
Shipping weight	0.7 lb (0.03 kg)
Duct probe material	94-5V flammability rated per UL 94
Compliance	United States: UL Listed, CCN XAPX, File E27734; to UL 60730-1; and IEC 60730-2-13. Plenum Rated (UL 2043)
	Canada: cUL Listed, CCN XAPX7, File E27734; to CAN/CSA E60730-1; and CAN/CSAE60730-2-13
CE	Europe: CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM Mark, 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, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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Single point of contact

APAC	Europe	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIJANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS WESTENDHOF 3 45143 ESSEN GERMANY	JOHNSON CONTROLS 507 E MICHIGAN ST MILWAUKEE WI 53202 USA

Contact information

Contact your local branch office: www.johnsoncontrols.com/locations

Contact Johnson Controls: www.johnsoncontrols.com/contact-us