HO2

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⚠ WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions can result in death, serious injury or equipment damage.

This product is intended for use in HVAC and building environmental control applications.
It is not intended for direct medical monitoring of patients.
Read and understand these instructions before installing this product.
The installer is responsible for all applicable codes.
If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

HO2 Series

Duct Mount Outdoor Humidity Sensors

Product Overview

HO2 Series Outdoor Humidity Sensors provide an ideal solution for measuring relative humidity in a wide range of conditions. All models are equipped with a solid state capacitive sensor that is easy to replace in the field. The housing is completely weatherproof and intended for outdoor mounting.

The HO2 is an all-in-one device combining humidity and temperature sensing. The device ensures a building's optimum temperature and humidity levels, resulting in greater energy efficiency.

Each device is an active sensor that converts a humidity or temperature measurement into an analog output (4-20 mA) or a voltage level (0 to 5 Vdc or 0 to 10 Vdc).

Different models are available based on application requirements for lower-cost installations.

Product Identification

	User Interface	*Output*	*RH Accuracy*	*Temp.*
HO2	[X]	[A]	[ ]	[ ]
	X = None	A = Analog Output	2 = 2% 3 = 3%	A = Transmitter only. B = 100R Platinum, RTD C = 1000 PT RTD D = T2 Thermistor G = 10K CPC Thermistor H = 10K T3 Thermistor K = 10K Curve G/11K Shunt M = 20K NTC Thermistor N = 1.8K TAC Thermistor R = 10K Curve G

Note: Replaceable RH and temperature modules available to be ordered separately per table below.

Replaceable RH Elements & Temperature and Humidity Calibration Modules

Model	Description
HS2N	Replaceable RH sensor, 2% with NIST certificate
HS2X	Replaceable RH sensor, 2%
TS2*	Replaceable temperature module with 2-point calibration certificate
THS2*	Replaceable temperature and humidity module with 2-point calibration certificate

**For temperature transmitter models only.*

Specifications

OPERATING / STORAGE ENVIRONMENT	
Operating Temp. Range	-40 to 55 °C (-40 to 131 °F)
Operating Humidity Range	0 to 95% RH (non-condensing)
Storage Temp. Range	-40 to 60 °C (-40 to 140 °F)
Storage Humidity Range	0 to 95% RH (non-condensing)
Power Supply	3-wire volt mode: 20 to 30 Vdc, 24 Vac, 50 to 60 Hz; loop powered 20 to 30 Vdc
Output	Selectable 4 to 20 mA, 0 to 5 Vdc, 0 to 10 Vdc

Specifications (cont.)

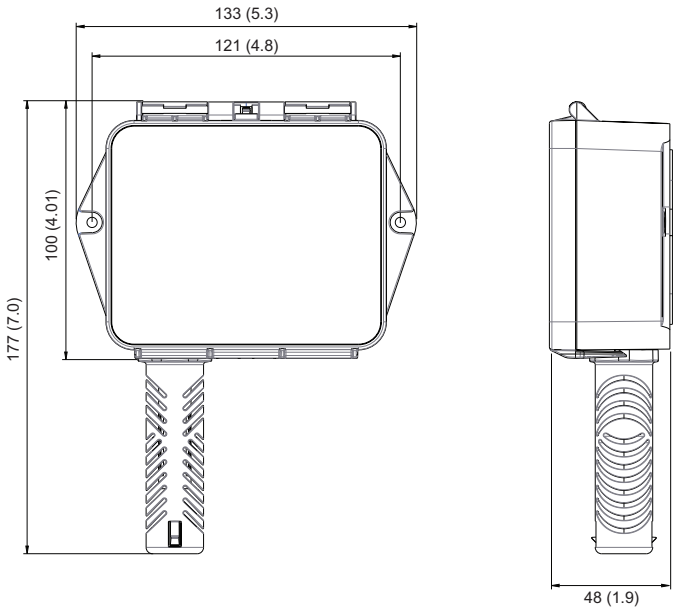
Power Consumption	0.8VA @ 24VAC Voltage Mode 0.96W @ 24V DC Current Mode
Output Load	Voltage mode ≥ 5K Ohms Current mode ≤ 250 Ohms
Housing Material	Polycarbonate; flammability rating UL 94 V0
Mouting Location	For outdoor use.
IP Rating	IP65
Protection Class	Class III
RH SENSOR	
Sensor Type	Solid state capacitive, replaceable
Accuracy*	±2% / ±3% from 10 to 80% RH @ 25 °C (77 °F) ±2% NIST and 2% replaceable option
Hysteresis	1.5% typical
Linearity	Included in accuracy specification
Stability	±1% @ 20°C (68 °F) annually for 2 years
Output Range	0 to 100% RH
Temperature Coefficient	±0.1% RH/°C above or below 25 °C (77 °F) typical
TEMPERATURE SENSOR	
Sensor Type	Solid state, integrated circuit
Temp. Sensing Element**	See Product Identification section on page 1 for available temp sensing elements
Accuracy***	±0.2 °C (±0.4 °F) typical typical
Resolution	0.1 °C (0.1 °F)
Range	-40 to 55 °C (-40 to 131 °F)
WIRING TERMINALS	
Terminal Blocks	Screwless terminal block with spring actuator, 16-24 AWG
WARRANTY	
Limited Warranty	5 years
COMPLIANCE INFORMATION	
Agency Approvals	UL 916, European conformance CE: EN61000-6-2, EN61000-6-3, EN61000 Series - industrial immunity, EN 61326-1 FCC Part 15 Class A REACH, RoHS, RoHS 2 (China), ICES-003 (Canada), UKCA (UK)

**Humidity sensor measurement uncertainty should include: accuracy, hysteresis, temperature coefficient and stability. Humidity accuracy range up to -20 °C.*

***See thermistor table Z202030 for accuracy.*

**** ±0.5 °C accuracy from 0 to 55 °C, ±1 °C accuracy from -40 to 0 °C.*

Dimensions
mm (in.)



Installation

NOTICE

PRODUCT DAMAGE DUE TO ELECTRO-STATIC DISCHARGE
Circuit boards and components can be damaged by static electricity or electro-static discharge (ESD). Observe the following electro-static precautions when handling this product and cables and components connected to the product.

- Keep static-producing material such as plastic, upholstery, carpeting, etc. out of the immediate work area
- Store the product in ESD-protective packaging when it is not installed in the panel
- When handling the product or a conductive cable/ESD-sensitive component connected to the product, wear a conductive wrist strap connected to ground through a minimum of 1 MΩ resistance
- Do not touch exposed conductors and component leads with skin or clothing

Failure to follow these instructions can result in equipment damage.

NOTICE

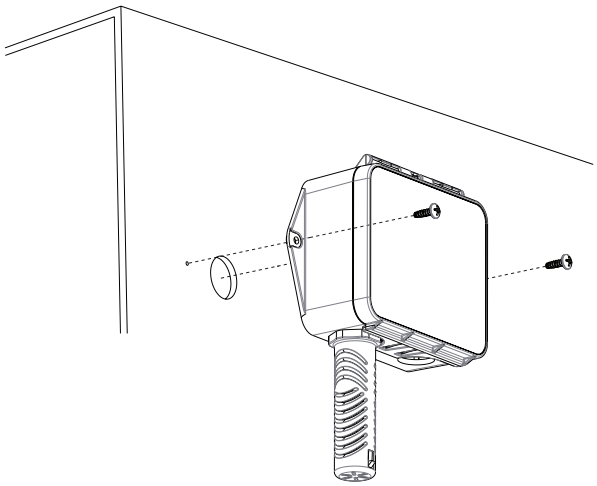
INCORRECT PRODUCT INSTALLATION

- Choose an outdoor location in a sheltered area, out of direct sunlight.
- Mount unit with probe pointing down. Unit may be suspended by conduit. Do not obstruct vent openings.

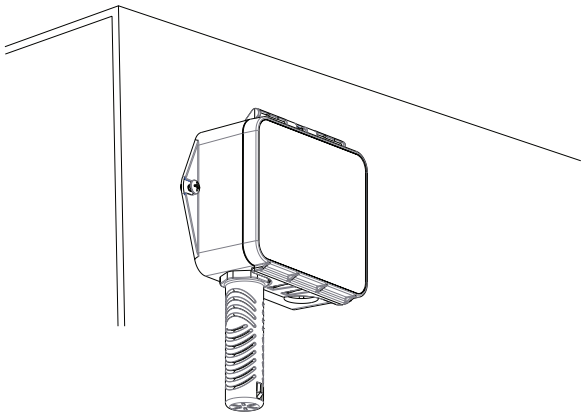
Failure to follow these instructions will lead to incorrect sensor readings.

Installation (cont.)

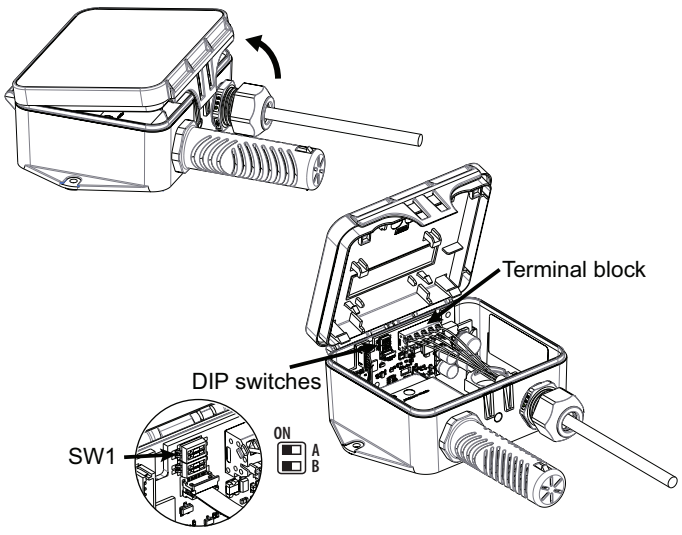
1. Prepare the installation by drilling holes on the wall. Ensure the gasket on the back is depressed to prevent leakage between the product and the wall. Do not over-tighten the screws.



2. Ensure the probes are installed on the wall with no obstruction to airflow around the probe.

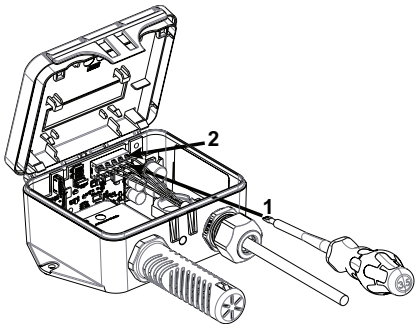


3. Release the latch on the lid to access the DIP switches and terminal block.

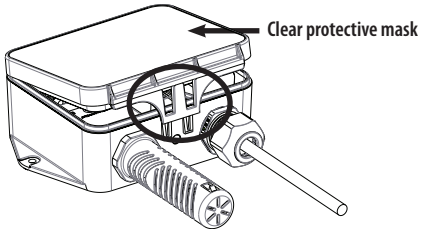


Installation (cont.)

4. Wire the connections per the diagram in the Wiring section below. This device features spring terminals for screwless termination. Open the terminal point by inserting a screwdriver, then insert the wire above. Release the screwdriver to hold the wire in place. Details on wiring and configuration are contained in the next sections of this document.



5. Secure the latch-on cover in the closed position and remove the clear protective mask on the front label of the device.



Wiring

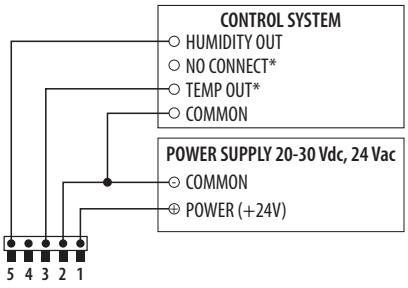
NOTICE

INACCURATE READINGS

- Do not run wiring in the same conduit as AC power wiring. Close proximity to AC power may influence accuracy.

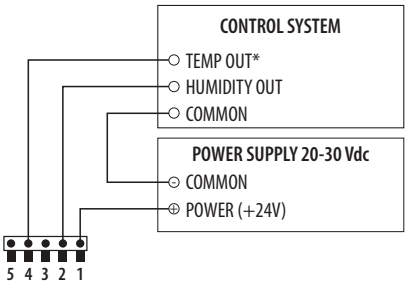
Failure to follow these instructions can result in reduced accuracy.

Voltage Mode Wiring Diagram



**For thermistor or RTD models, pins 3 and 4 are used for thermstor/RTD connection.*

Current Mode Wiring Diagram



**For thermistor or RTD models, pins 3 and 4 are used for thermstor/RTD connection.*

Configuration

Set the DIP switches.

White squares indicate switch position

Switch	Function	Description
A	Output mode	ON - 4-20mA output mode enabled OFF - Voltage output mode enabled
B	Voltage output	ON - 0-5V output range enabled OFF 0-10V output range enabled

Appendix A. Thermistor Table

STANDARD RTD AND THERMISTOR VALUES (Ohms Ω)

°C	°F	100 Ω	1000 Ω	1000 Ω	2.2k	3k	10k Type 2	10K CPC	10k Type 3	10k Dale	10k 3A221	10k "G" US	20k NTC	1800 Ω (NTC)	20k "D"	100k	10k Type 2	10k Type 3
-50	-58	80.306	803.06	740.46	154,464	205,800	692,700	-	441,200	672,300	-	441,200	1,267,600	63.88	-	-	692,700	454,910
-40	-40	84.271	842.71	773.99	77,081	102,690	344,700	336,052.3	239,700	337,200	333,562	239,700	643,800	35.68	803,200	3,366,000	344,700	245,089
-30	-22	88.222	882.22	806.02	40,330	53,730	180,100	176,785.7	135,300	177,200	176,081	135,300	342,000	20.72	412,800	1,770,000	180,100	137,307
-20	-4	92.160	921.60	841.00	22,032	29,346	98,320	96,999.7	78,910	97,130	96,807	78,910	189,080	12.46	220,600	971,200	98,320	79,729
-10	14	96.086	960.86	877.46	12,519	16,674	55,790	55,301.2	47,540	55,340	55,252	47,540	108,380	7.733	122,400	553,400	55,790	47,843
0	32	100.000	1,000.00	913.66	7,373	9,822	32,770	32,650.0	29,490	32,660	32,639	29,490	64,160	4.940	70,200	326,600	32,770	29,588
10	50	103.903	1,039.03	952.25	4,487	5,976	19,930	19,902.9	18,780	19,900	19,901	18,780	39,440	3.240	41,600	199,000	19,930	18,813
20	68	107.794	1,077.94	991.82	2,814	3,750	12,500	12,493.3	12,260	12,490	12,493	12,260	24,920	2.177	25,340	124,900	12,500	12,272
25	77	109.735	1,097.35	1,013.50	2,252	3,000	10,000	10,000.0	10,000	10,000	10,000	10,000	20,000	1.800	20,000	100,000	10,000	10,000
30	86	111.673	1,116.73	1,035.18	1,814	2,417	8,055	8,056.1	8,194	8,056	8,055	8,194	16,144	1.495	15,884	80,580	8,055	8,195
40	104	115.541	1,155.41	1,077.68	1,199	1,598	5,323	5,325.0	5,592	5,326	5,324	5,592	10,696	1.049	10,210	53,260	5,323	5,593
50	122	119.397	1,193.97	1,120.52	811.5	1,081	3,599	3,601.0	3,893	3,602	3,600	3,893	7,234	0.7497	6,718	36,020	3,599	3,894
60	140	123.242	1,232.42	1,166.13	561.0	747	2,486	2,487.1	2,760	2,489	2,486	2,760	4,992	0.5453	4,518	24,880	2,486	2,763
70	158	127.075	1,270.75	1,210.75	395.5	527	1,753	1,751.6	1,990	1,753	1,751	1,990	3,512	0.4931	3,100	17,510	1,753	1,994
80	176	130.897	1,308.97	1,254.55	284.0	378	1,258	1,256.1	1,458	1,258	1,255	1,458	2,516	0.3025	2,168	12,560	1,258	1,462
90	194	134.707	1,347.07	1,301.17	207.4	-	919	916.0	1,084	917	915	1,084	1,833	0.2302	1,542	9,164	919	1,088
100	212	138.506	1,385.06	1,348.38	153.8	-	682	678.4	816.8	679	678	816.8	1,356	0.1775	1,134	6,792	682	821
110	230	142.293	1,422.93	1,397.13	115.8	-	513	509.8	623.6	511	509	623.6	1,016	0.1386	816	5,108	513	628
120	248	146.068	1,460.68	1,447.44	88.3	-	392	388.3	481.8	389	388	481.8	770	0.1095	606	3,894	392	486
130	266	149.832	1,498.32	1,496.28	68.3	-	303	-	376.4	301	299	376.4	591	0.0874	456	3,006	303	380
Sensor Codes		**B**	**C**	**I**	**E**	**F**	**D**	**G**	**H**	**J**	**S**	**R**	**M**	**N**	**U**	**T**	**W**	**Y**

Note: Sensor Code K includes a 10K Curve 9 (R) in parallel with an 11 kΩ resistor.