



■ Important (USA, Canada)

The NS Series Network Sensor is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the network sensor 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 network sensor.

Le NS Series Network Sensor est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du network sensor 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 network sensor.

**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 terms set forth at [www.johnsoncontrols.com/techterms](http://www.johnsoncontrols.com/techterms). Your use of this product constitutes an agreement to such terms. If you do not agree to be bound by such terms, you may return the unused product to your place of purchase.

**North American Emissions Compliance**

**United States**

This equipment has been tested and found to comply with the limits for a Class B 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.

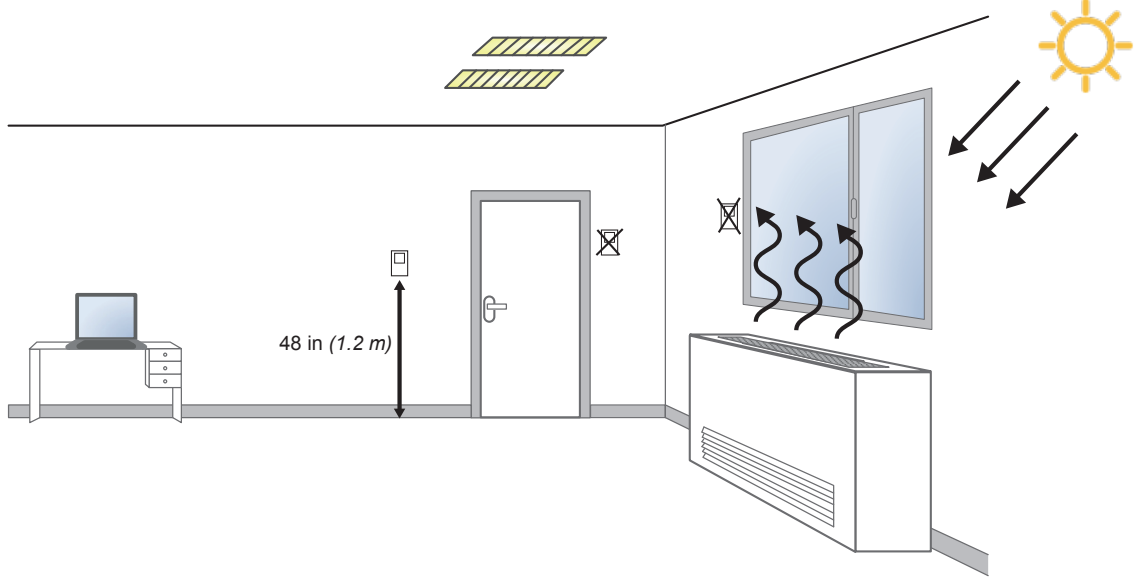
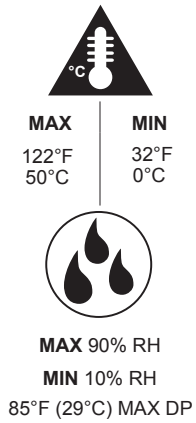
**Canada**

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.

■ Mounting

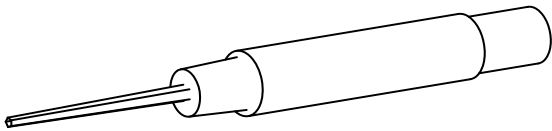
- Note:**
- The NS Series Network Sensor can be surface mounted or wallbox mounted. For wallbox-mounted installations, mount the NS Series Network Sensor on a vertically roughed-in wallbox only. Do not attempt to mount the sensor on a horizontally roughed-in wallbox.
  - Johnson Controls® does not supply the required hardware for mounting.

## Location considerations

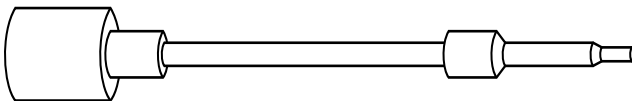


- Note:**
- Locate the network sensor away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference.
  - Height requirements may vary depending on the site.
  - Network sensors without CO<sub>2</sub> sensing are shock and vibration resistant, but not shock and vibration proof. Be careful not to drop the unit or mount it where it could be exposed to excessive vibration. Dropping a CO<sub>2</sub> network sensor may result in readings outside of the specified accuracy tolerance.

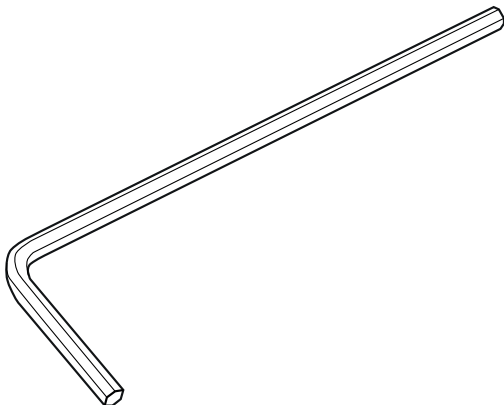
## Special tools (only one type needed)



Johnson Controls T-4000-119 Allen-head adjustment tool



JC 5309 Allen-head flexible tool



1/16 in (1.5 mm) Allen wrench

■ Installation

**⚠ 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.

**IMPORTANT:** Do not insert tools into the housing. Be careful not to damage any components when pushing the tabs on either side of the sensor.

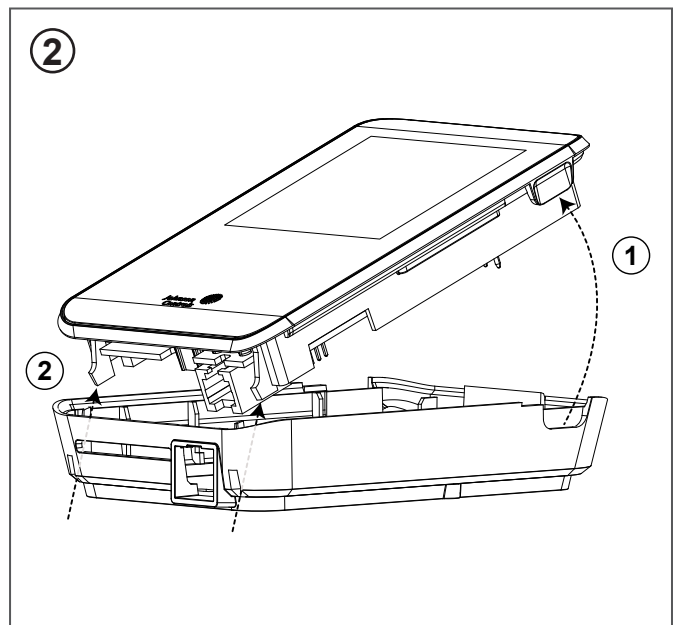
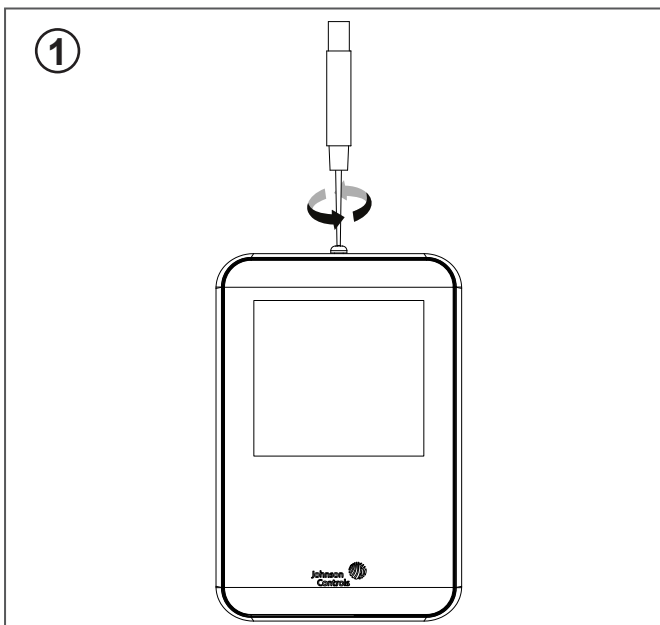
**IMPORTANT:** Do not remove the printed circuit board (PCB). Removing the PCB voids the product warranty.

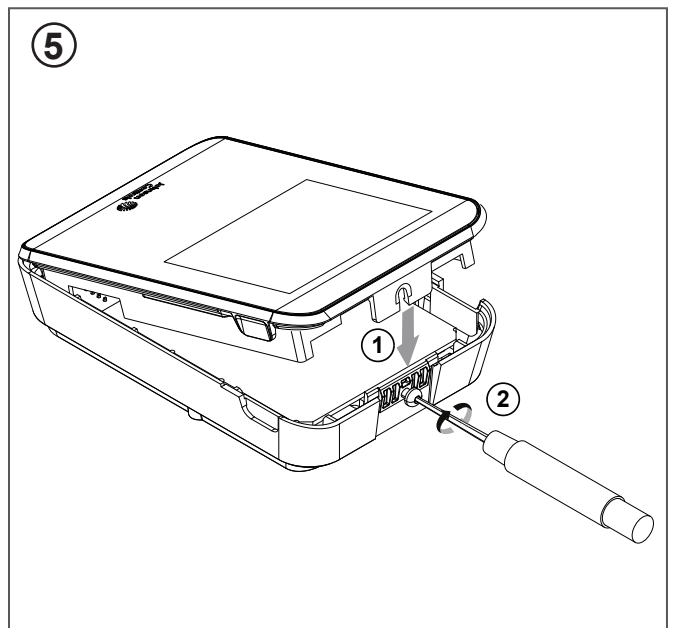
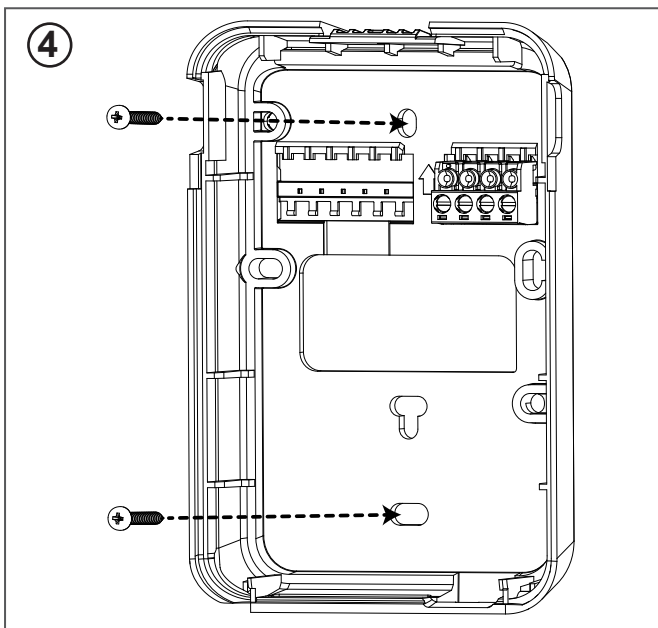
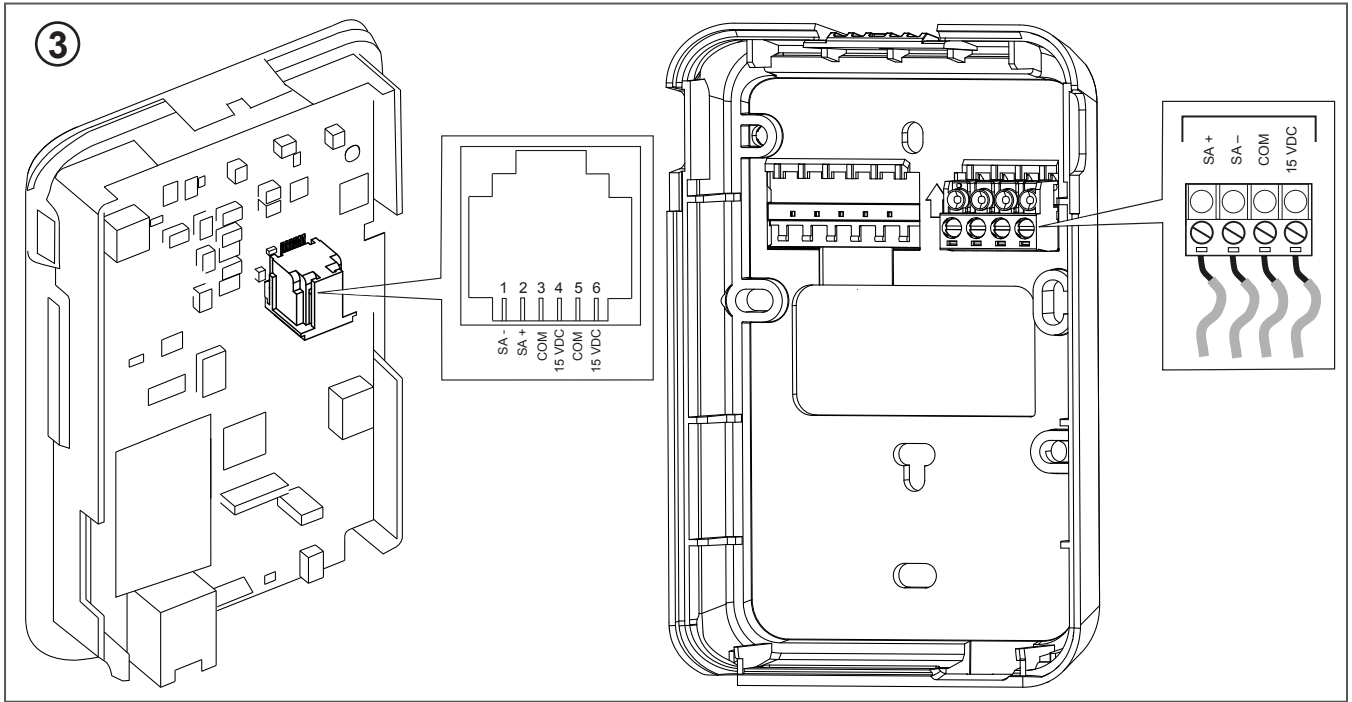
**IMPORTANT:** Do not connect the Sensor/Actuator (SA) connection at the controller until the cables have completely been terminated.

**IMPORTANT:** Do not connect the SA bus ground, the modular phone jack GND or the screw terminal COM, to the negative communication terminal SA-.

**IMPORTANT:** Failure to adhere to these wiring details causes the network sensor to function incorrectly. You will not be able to connect to the system using the Bluetooth® Wireless Commissioning Converter (BTCVT), Mobile Access Portal Gateway (MAP), or the handheld VAV balancing tool, and you will not be able to expand the system with future offerings.

- Notes:**
- Do not use both the modular phone jack and screw terminal connections on the same SA bus segment at the same time.
  - The modular phone jack and screw terminal connections cannot be used simultaneously.





■ Applications

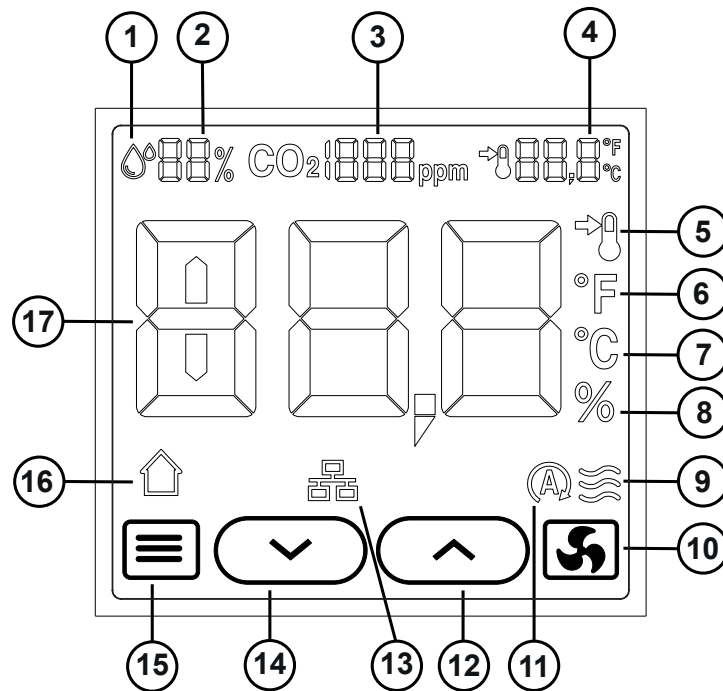


Table 1: Display icons

Icon	Description
1	Humidity indicator icon
2	Humidity measurement
3	CO <sub>2</sub> measurement
4	Configurable setpoint or current temperature
5	Setpoint indicator icon
6	Fahrenheit icon
7	Celsius icon
8	Percent relative humidity icon
9	Fan speed bars
10	Fan icon
11	Automatic fan speed icon
12	Up adjustment or navigation icon
13	SA bus online indicator
14	Down adjustment or navigation icon
15	Menu or enter icon
16	Occupancy indicator
17	Default display value (setpoint, zone temperature, relative humidity)

## ■ Setup and adjustments for the fixed segment display model

- Notes:**
- The touch display is sensitive to surrounding capacitance and may not respond to touch when you hold the sensor in your hand. Mount the sensor vertically on the wall or place it on a flat surface to use the icons and change settings with ease.
  - To activate the home screen when the backlight is off, touch the screen to turn the backlight back on for ten seconds.
  - All icons are visible on the home screen during configuration.

### Adjusting the temperature setpoint

1. To view the current setpoint value, press the **Up** or **Down** icon once.
2. To increase or decrease the temperature setpoint by 0.5 degrees Fahrenheit or Celsius, press the **Up** or **Down** icon again.
3. To save the new settings, press the **Menu** icon once to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.
4. **Optional:** Press and hold the **Up** or **Down** icon to continuously increase or decrease the temperature setpoint.

### Adjusting the fan speed

1. To view the current fan speed, press the **Fan** icon once.
2. To adjust the fan speed, continue to press the **Fan** icon to cycle through the automatic, off, low, medium or high fan speed settings.
3. To save the new settings, press the **Menu** icon once to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

### Viewing the SA bus sensor address and the firmware version

1. Press the **Menu** icon once to view the SA bus sensor address. See Table 3 for setting the SA bus sensor address
2. Press the **Menu** icon a second time to view the firmware version.
3. Press the **Menu** icon a third time to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

### Adjusting the temperature unit

To change the temperature units from Fahrenheit to Celsius or Celsius to Fahrenheit, complete the following steps:

1. On the home screen, press and hold the **Up** and **Down** icons for five seconds until the middle display disappears and the Celsius and Fahrenheit indicator icons blink.
2. To toggle between Fahrenheit and Celsius, press the **Up** or **Down** icon.
3. To save the new settings, press the **Menu** icon six times to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

### Changing the home screen default value

Choose whether you want to display current temperature or the setpoint value in the middle of the home screen. To change which value displays in the middle of the home screen, complete the following steps:

1. Press and hold the **Up** and **Down** icons for five seconds until the Fahrenheit and Celsius indicator icons start to blink. All icons are visible on the display.
2. Press the **Menu** icon once.
3. To select and switch between current temperature or setpoint value, press the **Up** or **Down** icon.
4. To save the new settings, press the **Menu** icon five times to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

### Selecting the setpoint display value

To change whether current temperature or setpoint temperature displays in the upper-right corner, complete the following steps:

1. Press and hold the **Up** and **Down** icons for five seconds until the Fahrenheit and Celsius indicator icons start to blink.
2. Press the **Menu** icon twice.
3. To select and switch between current temperature or setpoint value, press the **Up** or **Down** icon.
4. To save the new settings, press the **Menu** icon four times to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

### Selecting the maximum fan speed settings

The fan speed is set to high speed by default. To change the value of the maximum fan speed that displays on the home screen, complete the following steps:

1. Press and hold the **Up** and **Down** icons for five seconds until the Fahrenheit and Celsius indicator icons start to blink.
2. Press the **Menu** icon three times.
3. To increase or decrease the maximum fan speed, press the **Up** or **Down** icon.
4. To save the new settings, press the **Menu** icon three times to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

## Changing the decimal separator

1. Press and hold the **Up** and **Down** icons for five seconds until the Fahrenheit and Celsius indicator icons start to blink.
2. Press the **Menu** icon four times.
3. To switch between decimal point or decimal comma, press the **Up** or **Down** icon.
4. To save the new settings, press the **Menu** icon twice to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

## Hiding icons on the home screen

1. Press and hold the **Up** and **Down** icons for five seconds until the Fahrenheit and Celsius indicator icons start to blink.
2. Press the **Menu** icon five times.
3. To go through each icon on the display, press the **Down** icon.
4. When the icon you want to hide blinks, press the **Up** icon to hide it.
5. To save the new settings, press the **Menu** icon five times to return to the home screen or wait for ten seconds for the screen to return to the home screen automatically.

## Activating and deactivating the screen lockout

Lock the screen to prevent users from making setpoint changes or entering the commissioning mode. To activate and deactivate the screen lockout, complete the following steps:

1. Press and hold the **Menu** icon for ten seconds until the **Up** and **Down** icons vanish on the display to activate the screen lockout.
2. Press and hold the **Menu** icon for ten seconds until the **Up**, **Down** and **Fan** icons reappear to deactivate the screen lockout.

## ■ Setup and adjustments for the Warmer/Cooler (W/C) model

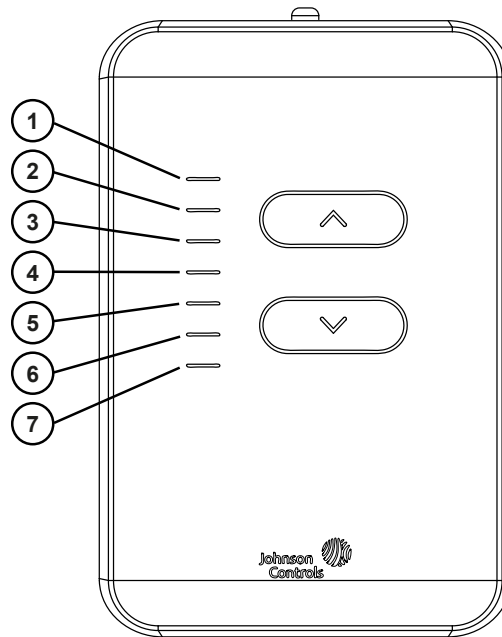


Table 2: Warmer/Cooler (W/C) model LEDs

LED Number	Description
1	Partially lights up in red and fully lights up in red
2	Partially lights up in red and fully lights up in red
3	Fully lights up in red
4	Center LED fully lights up in white
5	Fully lights up in blue
6	Partially lights up in blue and fully lights up in blue
7	Partially lights up in blue and fully lights up in blue

The non-display NS8000 W/C model uses LEDs to indicate the temperature setpoint change. The center white LED is the midpoint of the temperature setpoint range configured in the controller. The incremental increase or decrease in temperature assigned to the **Up** and **Down** arrows depends on the temperature setpoint adjustment set in the controller. The red LEDs indicate an increase from the current room temperature setpoint. The blue LEDs indicate a decrease from the current room temperature setpoint.

See Table 2 for further information about the LEDs.

## Increasing the temperature

1. To activate the W/C sensor model, press the **Up** arrow once. The center white LED lights up.
2. To increase the temperature setpoint, press the **Up** arrow again.
3. To increase the temperature further, continue to press the **Up** arrow.
4. **Optional:** Press and hold the **Up** arrow to continuously increase the temperature setpoint.

**Note:** When you press the **Up** arrow, the temperature increases by one-tenth of the temperature setpoint adjustment set in the controller.

## Decreasing the temperature

1. To activate the W/C sensor model, press the **Down** arrow once. The center white LED lights up.
2. To decrease the temperature setpoint, press the **Down** arrow again.
3. To decrease the temperature further, continue to press the **Down** arrow.
4. **Optional:** Press and hold the **Down** arrow to continuously decrease the temperature setpoint.

**Note:** When you press the **Down** arrow, the temperature decreases by one-tenth of the temperature setpoint adjustment set in the controller.

## Network sensor addressing

Figure 1: Three-position switch

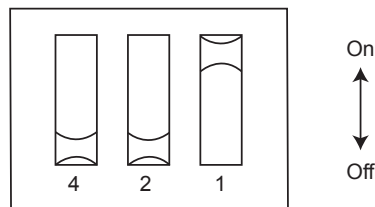


Table 3: Network sensor addressing

DIP switch SA bus address	Switch 4	Switch 2	Switch 1
199	Off	Off	Off
200	Off	Off	On
201	Off	On	Off
202	Off	On	On
203	On	Off	Off
204	On	Off	On
205	On	On	Off
206	On	On	On

## CO<sub>2</sub> altitude compensation

The Johnson Controls NS Series CO<sub>2</sub> Network Sensors ship from the factory calibrated for an altitude range of 0 ft to 2,000 ft (0 m to 600 m) without compensation.

For altitudes above 2,000 ft (600 m) where optimum accuracy of the CO<sub>2</sub> concentration measurement is essential, modify the offset property of the NS Series CO<sub>2</sub> Network Sensors (Zone Quality [ZN-Q] Analog Input [AI]). The offset represents the local atmospheric pressure in hectopascals (hPa). Set the offset to the known local pressure or use the local altitude value listed in Table 4. The factory default value is 978 hPa.

As of Release 5.3 of the Controller Configuration Tool (CCT) and Facility Explorer® Programmable Controller Tool (FX-PCT) software, the NS Series CO<sub>2</sub> Network Sensors (Zone Quality [ZN-Q] Analog Input [AI]) automatically change the hPa value entered from Table 4 into the correct offset value in the CCT and FX-PCT software. The offset value for the SA bus device is labeled ppm; however, it is the proper field to enter the hPa value found in Table 3. Refer to the *Controller Tool Help (LIT-12011147)* for more details.

**Note:** Enter the pressure value only in units of hPa. The sensor reads the value entered as hPa. The CO<sub>2</sub> present value may require several minutes to settle after changing the offset value.

See Table 4 for local altitude values.



Table 4: CO<sub>2</sub> altitude compensation


Altitude above sea level		Absolute pressure
Feet	Meters	hPa
-656	-200	1,038
0	0	1,013
656	200	989
1,312	400	966
1,969	600	943
2,625	800	921
3,281	1,000	899
3,937	1,200	877
4,593	1,400	856
5,249	1,600	835
5,906	1,800	815
6,562	2,000	795
7,218	2,200	775
7,874	2,400	756
8,530	2,600	738
9,186	2,800	719
9,843	3,000	701

## Repair information

If the NS Series Network Sensor fails to operate within its specifications, replace the unit. For a replacement NS Series Network Sensor, contact the nearest customer service center or Johnson Controls representative.

■ Technical specifications

<b>Supply voltage</b>		9.8 VDC to 16.5 VDC; 15 VDC nominal (from SA bus)	
<b>Current consumption</b>	<b>Base current draw (all models)</b>	3 mA maximum (non-transmitting)	
	<b>CO<sub>2</sub> models</b>	15 mA maximum additional current (during measurement)	
	<b>Display models - backlight on</b>	10 mA additional current	
	<b>Warmer/Cooler models - LEDs on</b>	8 mA additional current	
	<b>Note:</b> SA bus applications are limited to a power load of 210 mA. The best practice when configuring an SA bus is to limit the total available operating power consumption to 120 mA or less. This power level allows you to connect a BTCVT Wireless Commissioning Converter temporarily or a DIS1710 Local Controller Display to the bus for commissioning, adjusting, and monitoring.		
<b>Terminations</b>		Modular jack and screw terminal block	
<b>Network sensor addressing</b>	<b>All models</b>	DIP switch set from 199 to 206; factory set at 199	
<b>Wire size</b>	<b>Modular jack models</b>	24 AWG or 26 AWG (0.5 mm or 0.4 mm diameter); three twisted pair (six conductors)	
	<b>Screw terminal block models</b>	18 AWG to 22 AWG (1 mm to 0.6 mm diameter); 22 AWG (0.6 mm diameter)	
<b>Communication rate</b>		Auto-detect: 9.6 kbps, 19.2 kbps, 38.4 kbps, or 76.8 kbps	
<b>Temperature measurement range</b>		32.0°F/0°C to 104°F/40°C	
<b>Temperature sensor type</b>		Digital temperature sensor	
<b>Humidity sensor type</b>		Thin film capacitive sensor	
<b>Ambient conditions</b>	<b>Operating</b>	32°F to 122°F (0°C to 50°C); 10% to 90% RH, noncondensing; 85°F (29°C) maximum dew point	
	<b>Storage</b>	<b>Display models</b>	-40°F to 122°F (-40°C to 50°C); 5% to 95% RH, noncondensing
		<b>Non-display models</b>	-40°F to 185°F (-40°C to 70°C); 5% to 95% RH, noncondensing
<b>Temperature resolution</b>		±0.5°F/±0.5°C	
<b>Temperature accuracy</b>	<b>NS Series Network Zone Sensor</b>	±1°F/±0.6°C	
	<b>Temperature element only</b>	±0.36°F/±0.2°C at 70°F/21°C	
<b>Humidity element accuracy</b>	<b>NSB8BPN24x-0 models</b>	±2% RH for 20% to 80% RH at 50°F to 95°F (10°C to 35°C) ±4% RH for 10% to 20% and 80% to 90% RH at 50°F to 95°F (10°C to 35°C)	
	<b>NSB8BHxxxx-0 models</b>	±3% RH for 20% to 80% RH at 50°F to 95°F (10°C to 35°C) ±6% RH for 10% to 20% and 80% to 90% RH at 50°F to 95°F (10°C to 35°C)	
<b>CO<sub>2</sub> measurement range</b>		0 ppm - 2000 ppm	
<b>CO<sub>2</sub> sensor accuracy</b>	<b>Accuracy</b>	±30 ppm ±3% of CO <sub>2</sub> reading at 77°F (25°C) and 978 hPa (1,000 ft/300 m)	
	<b>Temperature dependence</b>	±1.4 ppm/°F (± 2.5 ppm/°C)	
	<b>Pressure dependence</b>	See Table 4 for CO <sub>2</sub> altitude compensation.	
<b>CO<sub>2</sub> sensor operation range</b>		32°F to 122°F (0°C to 50°C)	
<b>Time constant</b>		10 minutes nominal at 10 fpm airflow	
<b>Default temperature setpoint adjustment range</b>		50°F/10°C to 86°F/30°C in 0.5° increments	
<b>CO<sub>2</sub> sensor lifespan</b>		10 years under standard operating conditions	
<b>PIR occupancy sensor motion detection</b>		Minimum 94 angular degrees up to a distance of 26 ft (8m); Based on clear line of sight	

	<b>United States</b>	UL Listed, File E107041, CCN PAZX, Under UL 60730-1, Energy Management Equipment FCC Compliant to CFR 47, Part 15, Subpart B, Class B
	<b>Canada</b>	cUL Listed, File E107041, CCN PAZX7, Under CAN/CSA E60730-1, Signal Equipment Industry Canada, ICES-003
	<b>Europe</b>	CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	<b>Australia and New Zealand</b>	RCM Mark, Australia/NZ Emissions Compliant
	<b>China</b>	RoHS2
<b>Dimensions (height x width x depth)</b>		3.4 in. x 5 in. x 1.1 in. (85.3 mm x 127.55 mm x 26.8 mm)
<b>Shipping weight</b>		0.4 lb/0.18 kg

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

## ■ UL conformity declaration information

Information	Description
Purpose of control	Operating control
Construction of control	Independently mounted
Type 1 or Type 2 Action	Type 1
External pollution situation	Pollution degree 2
Rated impulse voltage	330 V
External power supply	Intended for connection to Johnson Controls field controllers supporting the standard JCI SA Bus implementation.
CO <sub>2</sub> sensor information	The Model NSx8 Series Wall Mount sensors, sense, in part CO <sub>2</sub> . This functionality is intended to provide an 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 sensor.

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