NS8000 Series

Vertical Wallbox-Mounted or Surface-Mounted NS Series Network Sensors

Product Bulletin

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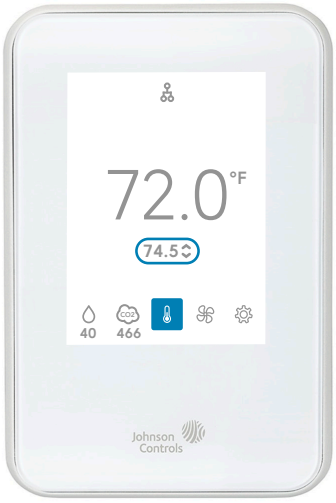

Overview

The NS Series Network Sensors function directly with *Metasys*® system Field Equipment Controllers (FECs), Metasys Network and Control Engines (NCEs), Advanced Application Field Equipment Controller (FACs), Metasys VAV Box Equipment Controllers (CVM), General Purpose Application Controllers (CGM), Input/Output Modules (IOMs), VAV Modular Assembly (VMA16) Controllers, and Facility Explorer™ FX-PC Series Programmable Controllers (FX-PCGs, FX-PCVs, and FX-PCXs). The sensors are also compatible with Verasys® and Johnson Controls® Smart Equipment.

The NS Series Network Sensors monitor zone temperature, relative humidity (RH), carbon dioxide (CO_2), motion, and local temperature setpoint adjustments. The sensor transmits this data to a controller on the Sensor/Actuator (SA) bus.

Some NS Series Network Sensors models include an onboard passive infrared (PIR) occupancy sensor that detects motion to determine if a space is occupied. This feature maximizes up to 30% energy savings in high-energy usage environments such as schools, dormitories, offices, hospitals, and hotels by adjusting the temperature of the space based on the occupancy status. In addition, the PIR occupancy sensor facilitates trending of floor space usage in these environments.

Display models of the NS Series Network Sensors are available with a backlit LCD fixed segment display or a full color graphical LCD interface. These models allow the user to view zone temperature, RH, CO_2, and adjust the zone temperature setpoint and fan speed. Graphical models provide a summary of sensor values at the base of the display. Fixed segment models have the capability to set the default display to temperature, RH, or temperature setpoint.

The user can also choose between degrees Fahrenheit (F) and degrees Celsius (C). To prevent tampering with the sensor, display models also include a screen lockout feature. The graphical display allows the user to choose between a light or dark color theme and to set the sleep mode to dim or turn off.

Some models also have a Warmer/Cooler interface to adjust the zone temperature. Instead of a display, these models have two cap touch buttons with seven LED lights that represent the current setpoint.

The display models include the following fan speeds: automatic, off, low, medium, or high.

Interaction with the sensor sets the occupancy override function to signal to the controller that the zone is occupied and to override the scheduled mode.

The LCD full color graphical models use the graphical user interface to set a unique BACnet® address for applications that require multiple sensors.

Other models have DIP switches to set a unique address for applications that require multiple sensors. All models ship standard with modular phone jacks and screw terminals to terminate the wiring connecting the sensors to the controller.

Note: To connect the NS Series Network Sensor to the same SA bus segment, use only one of the two connection methods, either the modular phone jack or the screw terminals.

Each network sensor includes a SA bus access port, allowing for accessories to connect to the SA bus. Through this connector, the user can use accessories to service or commission the connected controller or gain access to any other controller on the same field controller (FC) bus.

Note: Device programming for the NS8000 sensor connected to the controller does not include balancing functionality and features.

The NS Series Network Sensors can be surface mounted or vertical wallbox mounted to meet the requirements of the specific application. All display models are optimized for the California Energy Code (Title 24). To suit specific architectural and interior design needs, the models come with either black or white enclosures.

Modern enclosures in black or white design themes are available in the following styles:

- LCD fixed segment display and LCD full color graphical display: View zone temperature, RH, CO_2, occupancy status, and adjust the zone temperature setpoint and fan speed. These models have the capability to set the default display to temperature, RH or temperature setpoint. On these display models, you can also choose between degrees Fahrenheit (F) and degrees Celsius (C).
- Warmer/Cooler interface: This interface incorporates cap touch buttons with seven LED lights that represent the current setpoint status.
- No display: The NS Series Network Sensors are available in high gloss black or white with or without the Johnson Controls logo.
- All sensors are serialized for quality and warranty purposes. Based on the serial number, the user can obtain factory calibration certificates.

Note: The LCD full color graphical models are only available in white. See Table 1 through Table 4 for ordering information.

Features and benefits

Features	Benefits
BACnet MS/TP protocol communication	Provides compatibility with Metasys system field controllers, Facility Explorer programmable controllers as well as Verasys and Johnson Controls Smart Equipment in a proven communication network.
Single and multifunctional sensors	Choose temperature, RH, CO_2, and occupancy sensing depending on HVAC needs.
Large backlit fixed segment LCD display or LCD full-color graphical display available on some models	Provides real-time status of the environment with backlighting activated during user interaction.
Simple temperature setpoint adjustment or Warmer/Cooler mode available on display models	Configure simple setpoint adjustment or Warmer/Cooler mode.
Onboard occupancy sensor available on PIR models	Maximizes up to 30% energy savings in high-energy usage environments, and facilitates trending of floor space usage.
Temporary occupancy included on all display and Warmer/Cooler models	Provides a timed override command, which initiates a temporary occupancy state.
Field-selectable default display setting on display models	Toggle between temperature, RH or temperature setpoint on the display, and set the desired default for continuous viewing.
Fahrenheit/Celsius (°F/°C) selectable on display models	Display temperature in degrees Fahrenheit or degrees Celsius.
All display models meet California Energy Code (Title 24)	Displays the required State of California Title 24 economizer fault conditions.
All display models include a screen lockout	Prevents sensor tampering.
Serialized sensors and calibration certificates	Obtain factory calibration certificates for all models.

Ordering information

Table 1 through Table 6 list the various NS Series Network Sensors available.

IMPORTANT

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.

Note: Keep the Metasys system software up to date as some NS Series Network Sensor features are not supported in previous releases of Metasys, Facility Explorer, Verasys, or Johnson Controls Smart Equipment system software.

Repair information
If the NS Series Network Sensor fails to operate within its specifications, replace the unit. For a replacement sensor, contact the nearest Johnson Controls representative.

Selection charts

Table 1: NS Series Network Sensor ordering information: temperature, humidity, and CO_2 models (3% RH)

Product code	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BHC040-0	No display	Yes	White	No
NSB8BHC041-0		No	White	No
NSB8BHC042-0		Yes	Black	No
NSB8BHC043-0		No	Black	No
NSB8MHC040-0		Yes	White	Yes
NSB8MHC041-0		No	White	Yes
NSB8MHC042-0		Yes	Black	Yes
NSB8MHC043-0		No	Black	Yes
NSB8BHC240-0	Fixed segment display	Yes	White	No
NSB8BHC241-0		No	White	No
NSB8BHC242-0		Yes	Black	No
NSB8BHC243-0		No	Black	No
NSB8MHC240-0		Yes	White	Yes
NSB8MHC241-0		No	White	Yes
NSB8MHC242-0		Yes	Black	Yes
NSB8MHC243-0		No	Black	Yes
NSB8BHC340-0	Graphical user interface	Yes	White	No
NSB8BHC341-0		No	White	No

Table 2: NS Series Network Sensor ordering information: temperature and humidity models (3% RH)

Product code	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BHN240-0	Fixed segment display	Yes	White	No
NSB8BHN241-0		No	White	No
NSB8BHN242-0		Yes	Black	No
NSB8BHN243-0		No	Black	No
NSB8MHN240-0		Yes	White	Yes
NSB8MHN241-0		No	White	Yes
NSB8MHN242-0		Yes	Black	Yes
NSB8MHN243-0		No	Black	Yes
NSB8BHN040-0	No display	Yes	White	No
NSB8BHN041-0		No	White	No
NSB8BHN042-0		Yes	Black	No
NSB8BHN043-0		No	Black	No
NSB8MHN040-0		Yes	White	Yes
NSB8MHN041-0		No	White	Yes
NSB8MHN042-0		Yes	Black	Yes
NSB8MHN043-0		No	Black	Yes
NSB8BHN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BHN141-0		No	White	No
NSB8BHN142-0		Yes	Black	No
NSB8BHN143-0		No	Black	No
NSB8BHN340-0	Graphical user interface	Yes	White	No
NSB8BHN341-0		No	White	No

Table 3: NS Series Network Sensor ordering information: temperature and CO_2 models

Product code	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BTC040-0	No display	Yes	White	No
NSB8BTC041-0		No	White	No
NSB8BTC042-0		Yes	Black	No
NSB8BTC043-0		No	Black	No
NSB8MTC040-0		Yes	White	Yes
NSB8MTC041-0		No	White	Yes
NSB8MTC042-0		Yes	Black	Yes
NSB8MTC043-0		No	Black	Yes
NSB8BTC240-0	Fixed segment display	Yes	White	No
NSB8BTC241-0		No	White	No
NSB8BTC242-0		Yes	Black	No
NSB8BTC243-0		No	Black	No
NSB8MTC240-0		Yes	White	Yes
NSB8MTC241-0		No	White	Yes
NSB8MTC242-0		Yes	Black	Yes
NSB8MTC243-0		No	Black	Yes
NSB8BTC340-0	Graphical user interface	Yes	White	No
NSB8BTC341-0		No	White	No

Table 4: NS Series Network Sensor ordering information: temperature only models

Product code	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BTN240-0	Fixed segment display	Yes	White	No
NSB8BTN241-0		No	White	No
NSB8BTN242-0		Yes	Black	No
NSB8BTN243-0		No	Black	No
NSB8MTN240-0		Yes	White	Yes
NSB8MTN241-0		No	White	Yes
NSB8MTN242-0		Yes	Black	Yes
NSB8MTN243-0		No	Black	Yes
NSB8BTN040-0	No display	Yes	White	No
NSB8BTN041-0		No	White	No
NSB8BTN042-0		Yes	Black	No
NSB8BTN043-0		No	Black	No
NSB8MTN040-0		Yes	White	Yes
NSB8MTN041-0		No	White	Yes
NSB8MTN042-0		Yes	Black	Yes
NSB8MTN043-0		No	Black	Yes
NSB8BTN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BTN141-0		No	White	No
NSB8BTN142-0		Yes	Black	No
NSB8BTN143-0		No	Black	No
NSB8BTN340-0	Graphical user interface	Yes	White	No
NSB8BTN341-0		No	White	No

Table 5: NS Series Network Sensor ordering information: CO_2 only models without display

Product code	Johnson Controls logo	Color
NSB8BNC040-0	Yes	White
NSB8BNC041-0	No	White
NSB8BNC042-0	Yes	Black
NSB8BNC043-0	No	Black

Table 6: NS Series Network Sensor ordering information: temperature and humidity models (2% RH)

Product code	Display and interface information	Johnson Controls logo	Color
NSB8BPN240-0	Fixed segment display	Yes	White
NSB8BPN241-0		No	White
NSB8BPN242-0		Yes	Black
NSB8BPN243-0		No	Black

NS Sensors with fault code capability error codes

The fault indication comes through the network sensor bus when a network sensor is used in the zone. The display indicates the code number for all the required state of California Title 24 economizer fault conditions. See the following table for fault error codes.

Table 7: Fault code capability error codes

Display text	California Title 24 economizer fault condition	Possible problem
E0	Air temperature sensor failure/fault	Problem with one of the air temperature sensors. Check outdoor air, return air, or supply air sensors.
E1	Not economizing when it should	The economizer is not using outdoor air when it should.
E2	Economizing when it should not	The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation.
E3	Damper not modulating	The economizer damper is not able to modulate properly. Check damper, linkage to actuator, or the actuator.
E4	Excess outdoor air	The economizer is allowing excess outdoor air inside.

Technical specifications

Supply voltage			9.8 VDC to 16.5 VDC; 15 VDC nominal (from SA bus)
Current consumption	**Base current draw (graphical models)**	**Screen off**	18 mA maximum (non-transmitting)
		Screen on	45 mA maximum
	Base current draw (other models)		3 mA maximum (non-transmitting)
	CO_2 models	**LCD graphical**	13 mA maximum additional current (non-transmitting)
		Other models	15 mA maximum additional current (non-transmitting)
	Fixed segment display models - backlight on		10 mA additional current
	Warmer/Cooler models - LEDs on		8 mA additional current
	Note: 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.		
Terminations			Modular jack and screw terminal block
Network sensor addressing	**LCD full color graphical models**		Configurable through graphical user interface
	Other models		DIP switch set from 199 to 206; factory set at 199
Wire size	**Modular jack models**		24 AWG or 26 AWG (0.5 mm or 0.4 mm diameter); three twisted pair (six conductors)
	Screen terminal block models		18 AWG to 22 AWG (1 mm to 0.6 mm diameter); 22 AWG (0.6 mm diameter)
Communication rate			Auto-detect: 9.6 kbps, 19.2 kbps, 38.4 kbps, or 76.8 kbps
Temperature measurement range			32°F/0°C to 104°F/40°C
Temperature sensor type			Digital temperature sensor
Humidity sensor type			Thin film capacitive sensor
Ambient conditions	**Operating**		32°F to 122°F (0°C to 50°C); 10% to 90% RH, noncondensing; 85°F (29°C) maximum dew point
	Storage	**Display models**	-40°F to 122°F (-40°C to 50°C); 5% to 95% RH, noncondensing
		Non-display models	-40°F to 185°F (-40°C to 70°C); 5% to 95% RH, noncondensing
Temperature resolution			±0.5°F/±0.5°C
Temperature accuracy	**NS Series Network Zone Sensor**		±1°F/±0.6°C
	Temperature element only		±0.36°F/±0.2°C at 70°F/21°C
Humidity element accuracy	**NSB8BPN24x-0 models**		±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)
	NSB8BHxxxx-0 models		±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)
CO_2 measurement range			0 ppm - 2000 ppm
CO_2 sensor accuracy	**Accuracy**		±30 ppm +3% of CO_2 reading at 77°F (25°C) and 978 hPa (1,000 ft/300 m)
	Temperature dependence		±1.4 ppm/°F (± 2.5 ppm/°C)
	Pressure dependence		Refer to the *NS8000 Series Network Sensors Installation Guide (24-11256-00007)* for CO_2 altitude compensation.
CO_2 sensor operation range			32°F to 122°F (0°C to 50°C)
Time constant			10 minutes nominal at 10 fpm airflow
Default temperature setpoint adjustment range			50°F/10°C to 86°F/30°C in 0.5° increments
CO_2 sensor lifespan			10 years under standard operating conditions
LCD lifespan for graphical display models	**Screen timeout set to off**		>10 years
	Screen timeout set to dim		At least 6 years

PIR occupancy sensor motion detection		Minimum 94 angular degrees up to a distance of 26 ft (8m); Based on clear line of sight
Compliance	**United States**	UL Listed, File E107041, CCN PAZX, Under UL 60730-1, Energy Management Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class B
	Canada	cUL Listed, File E107041, CCN PAZX7, Under CAN/CSA E60730-1, Signal Equipment
		Industry Canada, ICES-003
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 and RoHS Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant
	China	RoHS2
Dimensions (height x width x depth)		3.4 in. x 5 in. x 1.1 in. (85.3 mm x 127.55 mm x 26.8 mm)
Shipping weight		0.4 lb/0.18 kg

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 terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: http://jcipat.com

Single point of contact

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