Description

Figure 1: NS8000 Series Network Sensor models

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) and General Purpose Application Controllers (CGM), 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 enables 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 full color graphical LCD 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 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 and LCD full color graphical displays: 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 6 for ordering information.

Refer to the *NS 8000 Series Network Sensors Product Bulletin (LIT-12013113)* for important product application and single point of contact information.

Features and 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 LCD fixed segment display or LCD full color graphical display 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.

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- 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.

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.

Ordering information

See Table 1 through Table 6 for the various NS Series Network Sensor models available. See Table 7 for accessories.

ⓘ **Note:** Product codes marked with an asterisk are made in America to meet the Buy American Standard.

❯ **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.

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Selection charts

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

Product code number	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
NSB8BHC040-0G*		Yes	White	No
NSB8MHC040-0G*		Yes	White	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
NSB8BHC240-0G*		Yes	White	No
NSB8MHC240-0G*		Yes	White	Yes
NSB8BHC140-0	Warmer/Cooler interface	Yes	White	No
NSB8BHC141-0		No	White	No
NSB8BHC340-0	Graphical user interface	Yes	White	No
NSB8BHC341-0		No	White	

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

Product code number	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
NSB8BHN240-0G*		Yes	White	No

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

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
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
NSB8BHN040-0G*		Yes	White	No
NSB8BHN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BHN141-0		No	White	No
NSB8BHN142-0		Yes	Black	No
NSB8BHN143-0		No	Black	No
NSB8BHN140-0G*		Yes	White	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 number	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
NSB8BTC040-0G*		Yes	White	No
NSB8MTN040-0G*		Yes	White	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
NSB8BTC240-0G*		Yes	White	No
NSB8BTC340-0	Graphical user interface	Yes	White	No
NSB8BTC341-0		No	White	No

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

Product code number	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
NSB8BTN240-0G*		Yes	White	No
NSB8MTN240-0G*		Yes	White	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
NSB8BTN040-0G*		Yes	White	No
NSB8BTN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BTN141-0		No	White	No
NSB8BTN142-0		Yes	Black	No
NSB8BTN143-0		No	Black	No
NSB8BTN140-0G*		Yes	White	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 number	Johnson Controls logo	Color
NSB8BNC040-0	Yes	White
NSB8BNC041-0	No	White
NSB8BNC042-0	Yes	Black
NSB8BNC043-0	No	Black
NSB8BNC040-0G*	Yes	White

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

Product code number	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
NSB8BPN240-0G*		Yes	White

Table 7: Accessories

Product code number	Description
NS-WALLPLATE-0	Wall plates fit seamlessly around the NS8000 Sensor models and enable you to mount a sensor where a larger one was previously mounted.

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 LCD indicates the code number for all the required state of California Title 24 economizer fault conditions.

Display text	California Title 24 economizer fault condition	Possible problem
E00	Air temperature sensor failure/fault	Problem with one of the air temperature sensors. Check outdoor air, return air, or supply air sensors.
E01	Not economizing when it should	The economizer is not using outdoor air when it should.
E02	Economizing when it should not	The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation.
E03	Damper not modulating	The economizer damper is not able to modulate properly. Check damper, linkage to actuator, or the actuator.
E04	Excess outdoor air	The economizer is allowing excess outdoor air inside.

Technical specifications

Table 8: NS8000 Series Network Sensors technical specifications

Description			Specification
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 during measurement
		Other models	15 mA maximum additional current during measurement

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Table 8: NS8000 Series Network Sensors technical specifications

Description		Specification
	Fixed segment display models - backlight on	10 mA additional current
	Warmer/Cooler models - LEDs on	8 mA additional current
	ⓘ **Note:** The MAP gateway is connected to the SA bus. 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 enables you to connect a MAP Gateway 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 graphical display 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 pairs, six conductors
	Screw 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 (0°C) to 122°F (50°C), 10% RH to 90% RH, noncondensing 85°F (29°C) maximum dew point
	Storage — Display models	-40°F (-40°C) to 122°F (50°C), 5% RH to 95% RH, noncondensing
	Storage — Non-display models	-40°F (-40°C) to 185°F (70°C), 5% RH to 95% RH, noncondensing
Temperature resolution	±0.5°F (±0.5°C)	
Temperature element accuracy	±0.36°F (±0.2°C) at 70°F (21°C)	
Humidity element accuracy	NSB8BPN24x-0 models	±2% RH for 20% RH to 80% RH at 50°F (10°C) to 95°F (35°C) ±4% RH for 10% RH to 20% RH and 80% RH to 90% RH at 50°F (10°C) to 95°F (35°C)
	NSB8BHxxxx-0 models	±3% RH for 20% RH to 80% RH at 50°F (10°C) to 95°F (35°C) ±6% RH for 10% RH to 20% RH and 80% RH to 90% RH at 50°F (10°C) to 95°F (35°C)
CO_2 measurement range	0 ppm to 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/300m)
	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 (0°C) to 122°F (50°C)
Time constant		10 min 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

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Table 8: NS8000 Series Network Sensors technical specifications

Description		Specification
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 (H x W x D)		3.4 in. (85.3 mm) x 5 in. (127.55 mm) x 1.1 in. (26.8 mm)
Shipping weight		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.

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

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Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local Johnson Controls representative: www.johnsoncontrols.com/locations
Contact Johnson Controls: www.johnsoncontrols.com/contact-us

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