



NS Series Network Sensors with Fault Code Capability

Installation Instructions

NS-ATB7F03-x, NS-BTB7F03-x

Part No. 24-10094-76, Rev. C

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Refer to the [QuickLIT website](#) for the most up-to-date version of this document.

Applications

The surface-mounted NS Series Network Sensor with Fault Code Capability is an electronic zone sensor designed to function directly with Johnson Controls® BACnet® Master-Slave/Token-Passing (MS/TP) digital controllers in HVAC systems. Models in this series monitor the temperature setpoint and zone temperature and transmit this data to a field controller on the Sensor Actuator (SA) Bus.

This sensor is designed to assist with the California Energy Code (Title 24), providing a visual indication of operational faults with rooftop equipment. The NS Series sensor displays codes that may indicate the system is operating inefficiently. Fault codes include air temperature sensor failure or fault, not economizing properly, economizer return air, economizer not using outdoor air, outdoor air not suitable, and damper not modulating. See Table 2 for additional Fault Code information.

You may adjust the setpoint while the sensor displays the fault. You must reset the fault at the equipment controller. The sensor cannot reset the fault.

All models feature a temperature setpoint dial and LCD designed to make adjusting the temperature setpoint and viewing the zone temperature easier.

A °F/°C push button is available on certain models to provide temperature scale options for display. An occupancy override function is featured on all models, which allows the user to signal the controller that the space is occupied, to request an override of time-of-day scheduling. Rotating the setpoint dial signals occupancy. See [Temperature Setpoint Adjustment/Occupancy Override/Fault Temporary Override](#) for more information.

All models include an SA Bus access port for connecting accessories to access the SA Bus. This feature allows a technician to commission or service the controller via the network sensor.

IMPORTANT: The surface-mounted NS Series Network Sensor with Fault Code Capability 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.

IMPORTANT : Le surface-mounted NS Series Network Sensor with Fault Code Capability 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.

North American Emissions Compliance

United States

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

Installation

Special Tools Needed

A 1/16 in. (1.5 mm) Allen wrench or a Johnson Controls T-4000-119 Allen-Head Adjustment Tool is required during installation.

Mounting

Location Considerations

Locate the network sensor:

- on a partitioning wall, approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight, radiant heat, outside walls, outside doors, air discharge grills, or stairwells; and from behind doors
- away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference

Note: The network sensor is shock and vibration resistant; however, be careful not to drop the unit or mount it where it could be exposed to excessive vibration.

The following ambient operating conditions apply:

- Temperature: 32 to 104°F (0 to 40°C)
- Humidity: 10 to 90% Relative Humidity (RH), noncondensing; 85°F (29°C) maximum dew point

To mount the network sensor to the wall:

1. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool to loosen the security screw on the top of the unit.
2. Insert a coin into the slot next to the security screw location, then carefully pry the top edge of the sensor assembly away from its mounting base and remove.

IMPORTANT: Do not remove the Printed Circuit Board (PCB). Removing the PCB voids the product warranty.

3. Pull out approximately 6 in. (152 mm) of cable from the wall, and insert the cable through the hole in the mounting base.
4. Align the mounting base on the wall, and use the base as a template to mark the location of the two mounting holes on the surface.

Note: Confirm that the mounting base is positioned with the proper edge up. The mounting base is positioned properly when the security screw is located on the top edge of the base.

5. Secure the mounting base to the wall using the appropriate mounting hardware (field furnished).
6. Wire the network sensor. For more details on wiring the MS/TP Communications Bus, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

Wire the screw terminal block as illustrated in Figure 2.



CAUTION: Risk of Electric Shock.

Disconnect the power supply before making electrical connections to avoid electric shock.

MISE EN GARDE : Risque de décharge électrique.

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

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 wireless commissioning converter or the handheld VAV balancing tool, and you will not be able to expand the system with future offerings.

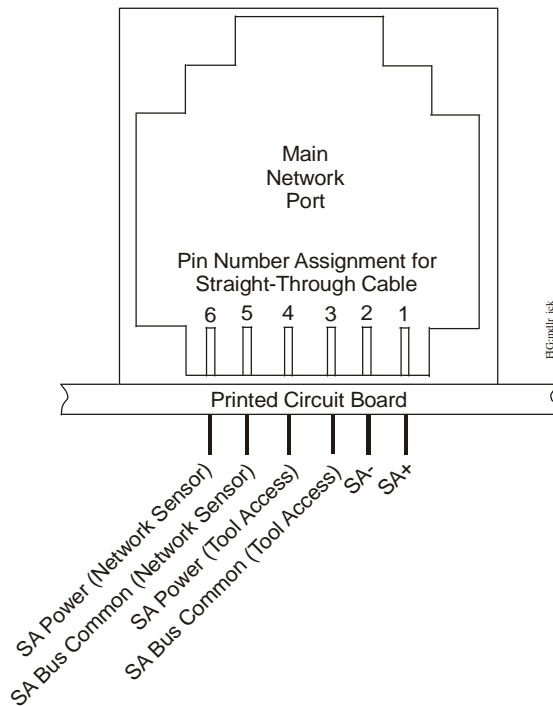


Figure 1: Pin Number Assignments

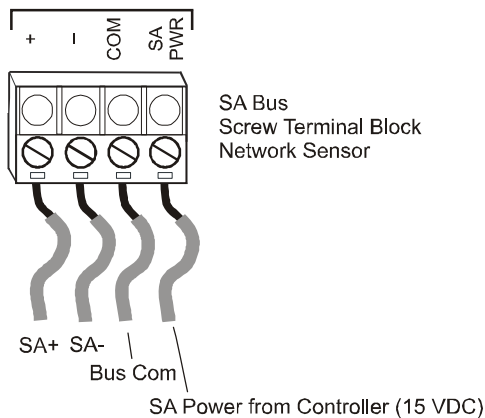


Figure 2: Wiring to the Screw Terminal Block

7. Align the tabs on the bottom edge of the mounting base with the slots on the bottom edge of the network sensor assembly, and rotate the assembly onto its mounting base.

Note: Ensure the terminal block pins align with the holes in the terminal block.

8. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool to tighten the security screw and fasten the network sensor assembly to the mounting base.

Note: Do not overtighten the security screw to avoid damaging the unit.

9. Use the local LCD on the controller to commission and configure the network sensor.

Setup and Adjustments

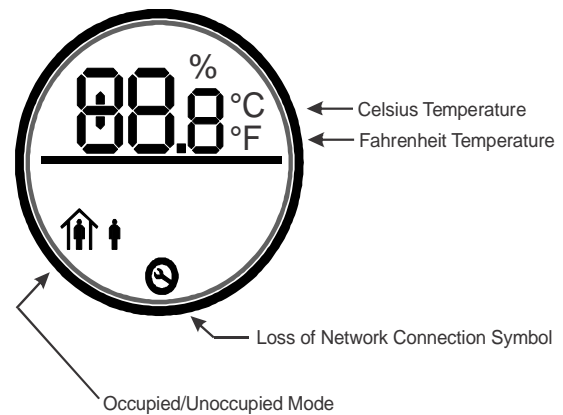


Figure 3: LCD for NS Sensors with Fault Code Capability

Temperature Setpoint Adjustment/Occupancy Override/Fault Temporary Override

The large dial on the face of the network sensor functions in two ways: to increase or decrease the setpoint temperature, and to change the controller mode from unoccupied and occupied. When the dial is rotated slightly, the backlight on the LCD lights up. If the dial is rotated slightly again, and the controller is in the unoccupied mode, the controller changes from the after-normal-working-hours setback mode to the normal-working-hours comfort mode. To adjust the setpoint, continue rotating the dial until the current setpoint is displayed and flashing. Turn the dial clockwise to increase the setpoint and counterclockwise to decrease the setpoint. Stop turning the dial once the desired setpoint is reached. The new setpoint stops flashing and becomes fixed after a few seconds.

If a fault code appears, the setpoint operation continues to function. Rotate the dial slightly and the backlight on the LCD lights up. The fault code disappears and the setpoint reappears. You can adjust the setpoint. The fault reappears after approximately 35 seconds of adjusting the setpoint.

°F/°C Temperature Mode Selection

Certain models include a °F/°C push button on the face of the network sensor to provide temperature scale options for display. Pressing the push button toggles the temperature mode between Fahrenheit and Celsius on the LCD.

Network Sensor Addressing

Most network sensors have a default device address of 199 on the SA Bus. For averaging models, the sensor address must be set on the dual-switch DIP switch block on the network sensor Printed Wire Board (PWB).

Averaging models are shipped with both switches set to ON, resulting in a device address of 203. Device addresses can be DIP switch set from 200 to 203; see

Figure 4 and Table 1 for more details.

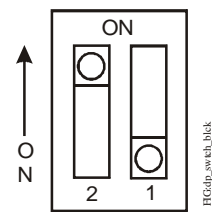


Figure 4: Dual-Switch
DIP Switch Block

Table 1: Network Sensor Addressing

DIP Switch Address	Switch 2	Switch 1
200	OFF	OFF
201	OFF	ON
202	ON	OFF
203	ON	ON

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. Table 2 describes the faults.

Table 2: Network Sensors with Fault Code Capability Error Codes

Display Text	California Title 24 Economizer Fault Condition	Possible Problem
EF1	Air temperature sensor failure/fault	Problem with one of the air temperature sensors. Check Outdoor Air, Return Air, or Supply Air sensors.
EF5	Not economizing when it should	The economizer is not using outdoor air when it should.
EF6	Economizing when it should	The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation.
EF8	Damper not modulating	The economizer damper is not able to modulate properly. Check damper, linkage to actuator, or the actuator.
EF9	Excess outdoor air	The economizer is allowing excess outdoor air inside.

Ordering Information

Table 3: Network Sensors with Fault Code Capability Ordering Information (Title 24 Models for Economizer Fault Detection Diagnostics [FDD])


Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB)	LCD Display, F/C Scale Toggle	Screw Terminals	Address Switches	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Johnson Controls Logo	VAV Balancing Feature
NS-ATB7F03-0	80 x 80	Yes	Yes, Yes	Yes	Yes	Set	Yes	No
NS-ATB7F03-1	80 x 80	Yes	Yes, Yes	Yes	Yes	Set	No	No
NS-BTB7F03-0	80 x 120	Yes	Yes, Yes	Yes	Yes	Set	Yes	No
NS-BTB7F03-1	80 x 120	Yes	Yes, Yes	Yes	Yes	Set	No	No

Repair Information

If the Fault Code Network Sensor fails to operate within its specifications, replace the unit. For a replacement network sensor, contact the nearest Johnson Controls representative.

Technical Specifications

NS Series Network Sensors with Fault Code Capability

Supply Voltage		9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)
Current Consumption		21 mA maximum, non-transmitting (from SA Bus)
Network Sensor Addressing		DIP Switch set from 200 to 203; Factory set at 203
Terminations		Screw Terminal Block
Screw Terminal Wire Size		18 to 22 AWG (1.0 to 6.0 mm Diameter); 22 AWG (0.6 mm Diameter) recommended
Communication Rate		Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps
Temperature Measurement Range		32.0°F/0.0°C to 104.0°F/40.0°C
Temperature Sensor Type		Local Platinum Resistance Temperature Detector (RTD)
Temperature Resolution		±0.5F°/±0.5C°
Temperature Accuracy	NS Series Network Sensor	±1.0F°/±0.6C°
	Temperature Element Only	0.35F° at 70°F (0.19C° at 21°C)
Time Constant		10 Minutes Nominal at 10 fpm Airflow
Default Temperature Setpoint Adjustment Range		50.0°F/10.0°C to 86.0°F/30.0°C in 0.5° Increments
Ambient Conditions	Operating	32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point
	Storage	-4 to 140°F (-20 to 60°C); 5 to 95% RH, Noncondensing
Compliance 	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment
		Industry Canada, ICES-003
	Europe	CE Mark – Johnson Controls, Inc., 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
Dimensions (Height x Width x Depth)		NS-ATBF703-x: 3-5/32 x 3-5/32 x 1-3/8 in. (80 x 80 x 35 mm) NS-BTB7F03-x: 4-23/32 x 3-5/32 x 1-3/8 in. (120 x 80 x 35 mm)
Shipping Weight		0.25 lb (0.11 kg)

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

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