

ZFR1800 Series Wireless Field Bus System

Product Bulletin

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The ZFR1800 Series Wireless Field Bus System uses ZigBee™ technology to provide a new wireless platform for Metasys® Field Equipment Controllers (FEC), Input/Output Module (IOM), or Variable Air Volume (VAV) Modular Assembly (VMA) 16 field controllers using BACnet® protocol.

Any Metasys FEC, IOM, or VMA16 field controller can be wirelessly enabled using a ZFR1811 Wireless Field Bus Router. One router is required per field controller. This pairing is referred to as a Wireless Enabled Field Controller (WEFC).

A ZFR1800 Series System consists of:

- up to eight ZFR1810 Wireless Field Bus Coordinators per field bus
- up to 35 WEFCs per coordinator
- up to 100 WEFCs per field bus
- additional ZFR1811 routers connected to ZFR-PWRs, as required, acting as repeaters
- multiple WRZ Series Wireless Room Temperature Sensors



Figure 1: ZFR1811 Routers (top left), ZFR1810 Coordinator (top center), and WRZ Series Sensors (bottom)

Together, these components create a wireless mesh network that allows the exchange of data between the collection of devices within the ZFR1800 Series System's wireless network and wired BACnet Master-Slave/Token-Passing (MS/TP) devices.

The wireless mesh network enhances reliability by providing redundant transmission paths for the data through other routers in the mesh network. The result is a resilient, self-healing network.

Table 1: Features and Benefits (Part 1 of 2)

Features	Benefits
Wireless Communications for a Metasys System	Provide a wireless platform for Metasys BACnet devices across multiple levels of a Metasys Building Automation System (BAS), from supervisory engines, to field controllers, to room temperature sensors; enable wireless devices to coexist with hard-wired devices on the same Metasys network; offer simple add-on hardware to seamlessly enable standard hard-wired Metasys BACnet field controllers to function wirelessly.
Wireless Mesh Network	Enables quick, economical, and low-maintenance installation; minimizes MS/TP BACnet hardwiring; and enhances reliability through automatically forming wireless links and redundant wireless data transmission paths.
Improved Application Mobility and Flexibility	Provides a wireless alternative to hard-wired counterparts; facilitates easy initial location and relocation with minimal disruption to building occupants; and cost-effectively extends Metasys systems to applications where building aesthetics (such as solid walls or ceilings, temporary walls, or decorative surfaces) normally hinder hardwiring.
Support of up to Nine Wireless Room Temperature Sensors per Wirelessly Enabled Field Controller	Facilitates temperature averaging and high/low selection to optimize comfort in larger zones.

Table 1: Features and Benefits (Part 2 of 2)

Features	Benefits
Multiple Diagnostic Light-Emitting Diodes (LEDs)	Provide quick and easy visual indication of power, FC bus activity, wireless activity, wireless signal strength, and fault conditions; helps locate optimum device positions during installation and aids in troubleshooting.
Compact, Easy-to-Install, and Versatile ZFR1811 Routers	Adapt easily to multiple mounting scenarios; serve multiple functions, including providing wireless interface for numerous Metasys FEC, IOM, and VMA1600 controllers; and function as repeaters to extend wireless transmission range.
Stylish, Lightweight Wireless Room Temperature Sensors with Optional LCD Screen, Occupancy Override Button, and Optional Setpoint Adjustment	Install easily; provide room temperature, setpoint temperature, occupancy status, and low battery status information to a Metasys system; offer extensive battery life of up to 5 years.

Applications

IMPORTANT: Use the ZFR1800 Series Wireless Field Bus System only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the 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 ZFR1800 Series System.

Use the ZFR1800 Series System for applications using NAE35/45/55 or NCE25 supervisory engines.

Recommended applications for this ZFR1800 Series System include the following:

- fan coil, heat pump, central plant, and other applications that have traditionally used Metasys FEC hard-wired counterparts
- single and dual duct VAV applications that have traditionally used VMA16 hard-wired counterparts

While the ZFR1800 Series system can be used in place of most wired MS/TP applications, there are many places where the use of a wireless system is a better fit than a wired solution.

The ZFR1800 Series System is ideal for any location where it is cost-prohibitive, difficult, or aesthetically unappealing to hardwire between Metasys BACnet devices, including NAE35/45/55 or NCE25 engines, field controllers, and room temperature sensors. Examples of these locations include the following:

- hospitals, office buildings, university campuses, educational facilities, correctional facilities, and other commercial structures with brick or solid concrete walls and/or ceilings that impede hard-wired applications
- office buildings, retail stores, and other commercial real estate where tenant turnover is frequent and temporary walls and ceilings are common
- museums, historical buildings, atriums, and other sites where building aesthetics and historical preservation are important
- stadiums, arenas, gymnasiums, convention centers, airports, zoos, and other locations with large, open spaces
- buildings with marble, granite, glass, mirrored, wood veneer, or other decorative surfaces that present challenges to hardwiring
- buildings with asbestos or other hazardous materials that must not be disturbed
- buildings with occupants sensitive to disruptions to business
- regions with high labor costs

The ZFR1800 Series System is approved by national compliance agencies for use only in the United States and Canada. See [*Technical Specifications*](#).

Applications to Avoid

IMPORTANT: A Network Engine reports an offline alarm within a certain period of time when an associated FEC, IOM, or VMA16 field controller goes offline. For a hard-wired FEC/IOM/VMA16 device, this time period is a nominal 20 seconds. For a wirelessly enabled FEC/IOM/VMA16 device within the ZFR1800 Wireless Field Bus System, this time period is 5 minutes.

Locations or applications that prohibit cellular telephones or Wireless Fidelity (WiFi) systems are unsuitable for the ZFR1800 Series System:

- operating rooms or radiation therapy rooms
- validated environments
- UL 864 applications
- Department of Defense applications requiring Diacap certification (for example, military bases and military hospitals)

Do not use the ZFR1800 Series System (or any other wireless system) in applications that cannot tolerate intermittent interference or where:

- critical control features would affect life safety or result in large monetary loss, including secondary (backup) life-safety applications
- data centers, production lines, or critical areas would be shut down
- loss of critical control would result from loss of data from humidity or temperature sensor communications
- operation of exhaust fans or Air Handling Units (AHUs) would impair a purge or pressurization mode
- missing data would invalidate reporting required by the customer
- security points are monitored

System Overview

Figure 2 illustrates a simple ZFR1800 Series Wireless Field Bus System applied to BACnet field controllers on a Metasys network.

These devices provide wireless monitoring and control of Heating, Ventilating, and Air Conditioning (HVAC) equipment within multiple levels of a Metasys BACnet system.

Refer to the *ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)* for information on commissioning and configuring a ZFR1800 Series Wireless Field Bus System for operation.

The MS/TP trunk and device limits for supported NAE35/45/55 or NCE25 models are the same for hard-wired devices, wireless devices, or a combination of hard-wired and wireless devices. For more information, refer to the *Wireless Metasys System Location Guide (LIT-12011294)*. For information on device quantity limits in a ZFR1800 Series System, see Table 2.

Table 2: ZFR1800 Series System Device Quantity Limits

Device	Quantity Limit
ZFR1810 Coordinator	Up to eight per NAE35/45/55 or NCE25 trunk
ZFR1811 Router Paired with a FEC, IOM, or VMA16 Field Controller	Up to 35 WEFCs per ZFR1810 Coordinator
ZFR1811 Router Used as Repeaters¹	Unlimited ²
WRZ Series Wireless Temperature Sensor	Up to 9 sensors per wireless enabled field controller

1. Requires use of the MS-ZFRRPT-0 optional repeater accessory.
2. Indiscriminate use of ZFR1811 Routers as repeaters can lead to reduced performance.

Component Descriptions

NAE and NCE

NAE35/45/55s and NCE25s are Web-enabled, Ethernet-based, supervisory controllers that connect BAS networks to Internet Protocol (IP) networks and the Web. NAEs and NCEs provide scheduling, alarm and event management, trending, energy management, data exchange, dial-out capability, and password protection. With a computer running Microsoft® Internet Explorer® Version 6.0 (or later), you can browse to a configured NAE35/45/55 or NCE25, and monitor and control BAS field devices in the Metasys User Interface (UI) on the NAE35/45/55 or NCE25.

ZFR1810 Coordinators

A ZFR1810 Wireless Field Bus Coordinator provides a wireless interface between supported field controllers equipped with a ZFR1811 Router and an NAE35/45/55 or NCE25 supervisory controller. Each wireless mesh network requires one ZFR1810 Coordinator, which initiates the formation of the network.

A ZFR1810 Coordinator can operate from either of two power sources:

- a 24 VAC, Class 2 power source
- 15 VDC power provided from the FC Bus Jack on any Field Equipment or Supervisory Controller that is connected directly to the FC Bus

The ZFR1810 Coordinator features a remote-mount antenna and cable to allow transmission when the ZFR1810 Coordinator is mounted inside a metal panel.

ZFR1811 Routers

A ZFR1811 Router is used with any model FEC, IOM, or VMA16 field controller to provide a wireless interface between the field controller and:

- the supervisory engine (by way of a ZFR1810 Coordinator)
- its associated WRZ Series Wireless Mesh Room Temperature Sensors

A ZFR1811 Router is powered directly from the connected field controller's 15 VDC output. It can also be powered by the ZFR1811 Repeater accessory to serve as a stand-alone repeater, extending the range of the BACnet data communications within the wireless mesh network.

Supported Field Controllers

The ZFR1800 Series Wireless Field Bus System enables wireless BACnet connectivity between all FEC/IOM/VMA16 controllers and Network Automation Engines, including NAE/35/45/55 and NCEs. In addition, the wireless field bus system provides wireless communication between FEC/VMA16 controllers and WRZ series wireless temperature sensors.

Note: The ZFR1811 Routers should be at the same Metasys system release version as the wirelessly enabled FEC/IOM/VMA16 field controller. If there is a version mismatch, the Controller Configuration Tool (CCT) provides indication of this, and the ZFR1811 Router is automatically updated during the main code download to the field controller. For information on uploading or downloading the devices to match, refer to the *Loading Devices* chapter of the CCT *Help* (LIT-12011147).

Note: Some field controller applications do not support the occupancy/temperature setback function.

Note: Wirelessly enabled FEC and VMA16 field controllers can also use hard-wired NS Series network sensors.

WRZ Series Sensors

Depending on the sensor model, the WRZ Series Wireless Room Temperature Sensors transmit temperature, setpoint, occupancy status, and low battery conditions to an associated ZFR1811 Router.

The WRZ Series Sensors are designed for indoor, intra-building applications only.

The WRZ Series Sensors require two 1.5 VDC AA alkaline batteries. The WRZ sensors minimize power consumption by transmitting data only once per minute, which yields an expected battery life of approximately 4 to 5 years.

Refer to the *ZFR1800 Series Wireless Field Bus System Technical Bulletin* (LIT-12011295) for information on configuring a ZFR1800 Series System.

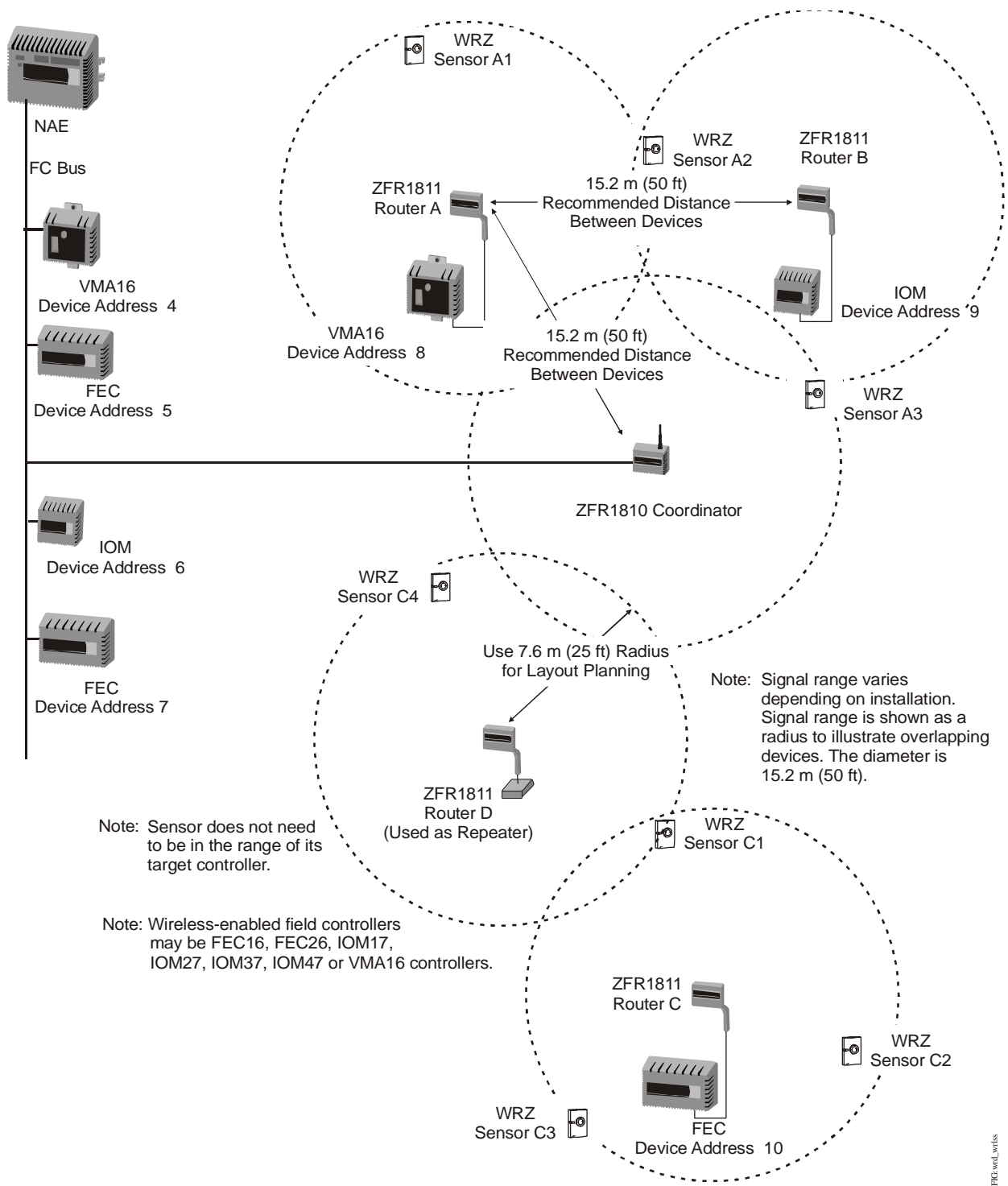


Figure 2: ZFR1800 Series Wireless Field Bus System as Part of a Metasys Network

ZFR1800 Series System Wireless Communication

The ZFR1800 Series System devices create a wireless mesh network using ZigBee technology. The mesh network provides redundant wireless paths, enabling the BACnet data to traverse the network through alternate, automatically forming paths and arrive at the target destination device even if a ZFR1811 Router or Repeater within the wireless mesh network experiences interference or drops out of the network.

The ZFR1800 Series System uses Direct Sequence Spread Spectrum (DSSS) Radio Frequency (RF) technology and operates on the globally accepted 2.4 GHz Industrial, Scientific, and Medical (ISM) band. All ZFR1800 Series System components use a transmission power of 10 mW. The WRZ Series sensors meet the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.15.4 standard for low power, low duty-cycle wireless transmitting systems and are compatible with wireless mesh networks compliant with the ZigBee standard.

For detailed information on locating devices for optimum signal strength, refer to the *Wireless Metasys System Location Guide (LIT-12011294)*.

For more information on wireless transmissions and signal strength, refer to the following documents:

- *ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)*
- *Wireless Metasys System Location Guide (LIT-12011294)*

Wireless Signal Transmission Range

The effective transmission range for indoor applications varies because of wireless signal absorption and reflection due to metal obstructions, walls (or floors), and furniture found in typical building interiors. Transmission ranges between a ZFR1810 Coordinator, ZFR1811 Router, and/or a WRZ Series Sensor can be less than the maximum distances shown in Table 3.

Table 3: Indoor Line-of-Sight Transmission Ranges

Range Type	Transmission Distance	
	ZFR1810 Coordinator, ZFR1811 Router	WRZ Series Sensor
Recommended	15.2 m (50 ft)	15.2 m (50 ft)
Maximum	76.2 m (250 ft)	30 m (100 ft)

ZFR Checkout Tool (ZCT)

The ZFR Checkout Tool is an optional tool that allows you to validate the wireless connectivity and health of wireless devices within a ZFR1800 Series Wireless Field Bus system, helping ensure a reliable mesh network is in place. You can use the information provided by the ZCT to analyze and troubleshoot the wireless mesh network created by a ZFR1800 Series System.

The ZCT gathers information by discovering the wireless field controllers on your network and analyzing their status and communication paths. The ZCT provides a simple report of wireless network performance, including online status verification and wireless signal strength information. The ZCT also provides wireless device lists, signal strength information, and diagnostic measurements of the wireless mesh network.

The ZCT is a tool included with the installation of CCT. The ZCT requires a Universal Serial Bus (USB) adapter with ZigBee driver. For information on this adapter and how to order it, see Table 5.

WRZ-SST-100 Wireless Sensing System Tool

The optional, battery-operated WRZ-SST-100 Wireless Sensing System Tool used with any model WRZ Series Sensor serves as a site survey tool. Position the battery-operated WRZ-SST-100 Tool and the WRZ Series test sensor in potential locations of ZFR1800 system devices to survey your application and adjust ZFR1800 device locations before installing the devices. Refer to the *WRZ-SST-100 Wireless Sensing System Tool Installation Instructions (Part No. 24-10393-17)* for more information on the tool.

Wireless Interference and Security

The ZFR1800 Series Wireless Field Bus System is designed to minimize the potential for wireless interference with other wireless applications. In most commercial environments, the ZFR1800 Series System does not encounter or generate wireless interference, even in environments with cell phones and competing Wireless Fidelity (WiFi) applications. ZFR1800 Series Wireless transmissions use different modulation schemes than WiFi applications and use frequencies between popular WiFi bands, enabling WiFi and ZFR1800 Series Wireless networks to exist in the same areas.

For more information on wireless interference and security, refer to the following documents:

- *ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)*
- *Wireless Metasys System Location Guide (LIT-12011294)*

Physical Features and Dimensions

Figure 3 shows the ZFR1810 Coordinator with the remote-mounted antenna.

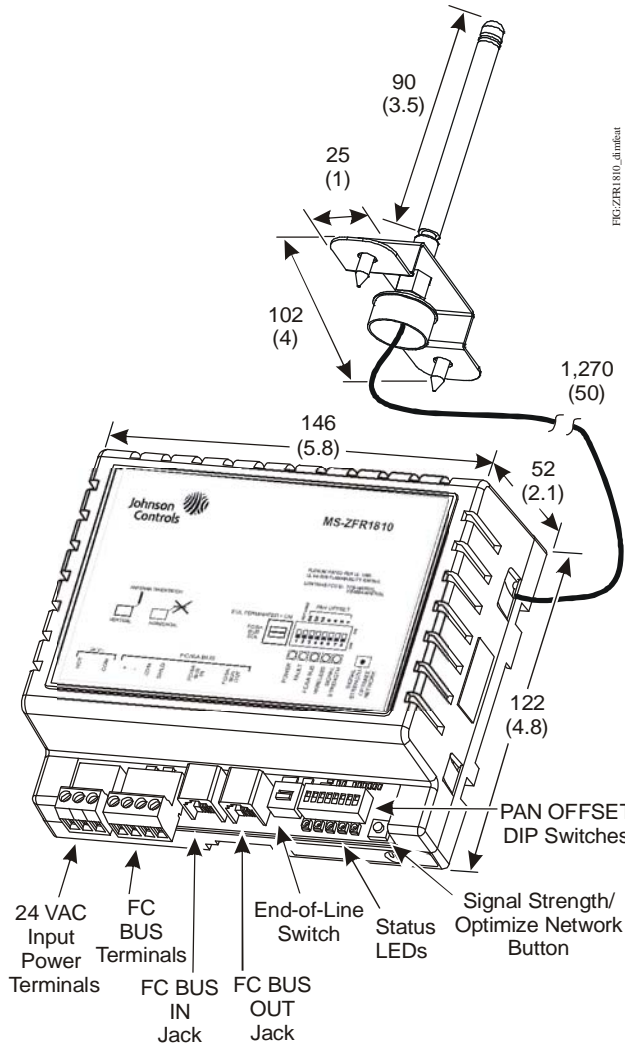


Figure 3: ZFR1810 Wireless Field Bus Coordinator, Physical Features and Dimensions, mm (in.)

Figure 4 shows the ZFR1811 Router.

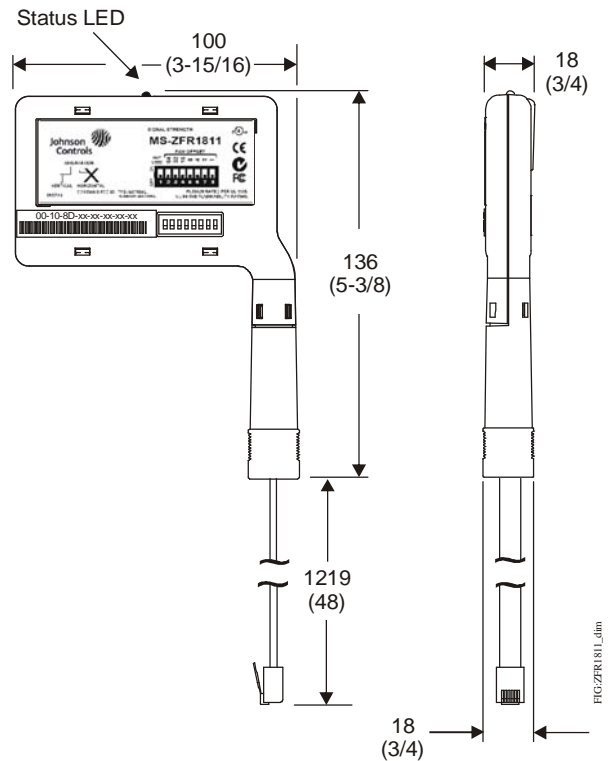


Figure 4: ZFR1811 Wireless Field Bus Router, Physical Features and Dimensions, mm (in.)

Figure 5 shows the WRZ Series Sensor.

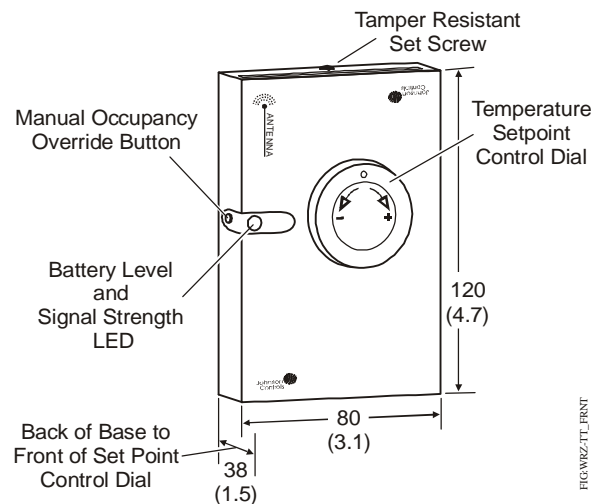


Figure 5: WRZ Series Sensor, Physical Features and Dimensions, mm (in.)

Ordering Information

For ZFR1800 Series System product ordering information, see Table 4. For ZFR1800 Series System accessories product ordering information, see Table 5. For supported models of the NAE35/45/55 and NCE25 supervisory engines, see Table 6. For supported models of the Metasys BACnet field controllers, see Table 7.

Contact the nearest Johnson Controls® representative to order the products in Table 4 through Table 7. Specify the desired product code number from these tables.

Refer to the *Network Automation Engine (NAE) Product Bulletin (LIT-1201160)* and the *Metasys System Field Equipment Controllers, Network Sensors, and Related Products Product Bulletin (LIT-12011042)* for additional information on related products.

Repair Information

If a ZFR1800 Series Wireless Field Bus System component fails to operate within its specifications, replace the unit. For a replacement ZFR1800 Series System component, contact the nearest Johnson Controls representative.

Table 4: Product Ordering Information

Product Code Number	Product Description
MS-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power; functions with NAE35, NAE45, NAE55, and NCE25 Models
MS-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power; functions with Metasys BACnet FECs, IOMs, VMA16s, and WRZ Series Wireless Room Temperature Sensors
WRZ-TTB0000-0	Temperature Sensor with Display and F/C Button, 10 mW Transmission Power
WRZ-TTD0000-0	Temperature Sensor with Display, F/C Button and Fan Speed Control, 10 mW Transmission Power
WRZ-TTP0000-0	Wireless Room Temperature Sensor, Warmer/Cooler (+/-) Setpoint Adjustment, 10 mW Transmission Power
WRZ-TTR0000-0	Wireless Room Temperature Sensor, No Setpoint Adjustment, 10 mW Transmission Power
WRZ-TTS0000-0	Wireless Room Temperature Sensor, Setpoint Adjustment Scale: 13 to 29°C/55 to 85°F, 10 mW Transmission Power

Table 5: Accessories (Part 1 of 2)

Product Code Number	Product Description
MS-ZFRRPT-0	Optional Repeater Accessory for use with ZFR1811 Router as a repeater. Includes 20-28 VAC or 16-30 VDC input power, 12 VDC output power supply (regulated at 500 mA maximum, 6 VA), and 4 x 4 in. electrical box with cover.
MS-ZFRCBL-0	Wire Harness for use with ZFR1811 Router. Allows ZFR1811 Router to function with FEC1620; and with FEC1610, VMA1610, or VMA1620 controllers in conjunction with NS Series Sensors, Wireless Commissioning Converter, or DIS1710 Local Controller Display.
IA OEM-DAUB1 2400	Universal Serial Bus (USB) Dongle with ZigBee Driver provides a wireless connection through the Controller Configuration Tool (CCT) to allow wireless commissioning of the wirelessly enabled FEC, IOM, and VMA1600 field controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. (Purchase through Johnson Controls® eCounterline. Obtain the necessary price and description information from the Johnson Controls <i>Computer Price List</i> , which is available on the Johnson Controls Portal intranet site by Information Technology Acquisition Services [ITAS].)
WRZ-SST-100	Optional Wireless Sensing System Tool to be used with a WRZ Series Sensor to indicate wireless signal strength between potential locations of ZFR1800 System devices.
MS-BTCVT-1	Wireless Commissioning Converter, with Bluetooth® technology
MS-DIS1710-0	Local Controller Display for FEC1610 and FEC2610 models
TP-2420	Transformer, Wall Plug Mount, 120 VAC to 24 VAC, 20 VA, Class 2
Y65T31-0 ¹	Transformer, 120/208/240 VAC to 24 VAC, 40 VA, Class 2, Foot Mount, 20 cm (8 in.) Primary Leads and Secondary Screw Terminals.

Table 5: Accessories (Part 2 of 2)

Product Code Number	Product Description
T-4000-119	1.6 mm (1/16 in.) Allen-Head Adjustment Tool (30 per Bag) for Accessing and Securing WRZ-TTx Series Wireless Room Temperature Sensors
1.5 VDC, AA Alkaline Battery	Replacement Battery for WRZ-TTx Series Wireless Room Temperature Sensors (Purchase Locally.)

1. Additional Y60 Series Transformers are available from Johnson Controls.

Table 6: Related NAE35, NAE45, NAE55, and NCE25 Supervisory Engines^{1, 2}

Product Code Number	Product Description
MS-NAE3510-2	Supports one N2 or BACnet MS/TP (RS-485) trunk; includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the RS-485 port.
MS-NAE3511-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NAE3514-2	Supports one N2 or BACnet MS/TP (RS-485) trunk (RS-485 port); features Basic Access support; includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NAE3515-2	Supports one N2 or BACnet MS/TP trunk (RS-485) trunk; features Basic Access support; includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NAE4510-2	Supports one N2 or BACnet MS/TP (RS-485) trunk; includes an additional RS-232-C serial port for optional external modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NAE4511-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an internal modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NAE5510-1	Simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk.
MS-NAE5511-1	Simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; includes an internal modem.
MS-NAE5512-1	MS-NAE5512-1 simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; to support N2 Tunneling, do not configure both trunks for BACnet MS/TP.
MS-NAE5513-1	SMS-NAE5513-1 simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; to support N2 Tunneling, do not configure both trunks for BACnet MS/TP; includes an internal modem.
MS-NAE5520-1	Includes a LONWORKS® port and simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk, and a LONWORKS trunk. Supports up to 255 devices on the LONWORKS port.
MS-NAE5521-1	Includes a LONWORKS port and simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk, and a LONWORKS trunk; includes an internal modem. Supports up to 255 devices on the LONWORKS port.
MS-NCE2560-0	Supports one Field Controller (FC) Bus trunk with up to 32 MS/TP devices.
MS-NCE2561-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes an internal modem.
MS-NCE2566-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen.
MS-NCE2567-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen and an internal modem.

1. Each NAE35/45 or NCE25 requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one Universal Serial Bus (USB) serial port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery. Each NCE25 Series model supports 33 hard-wire Input/Output points.
2. Each NAE55 requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port, and an MS-BAT1010-0 Data Protection Battery. Each NAE55 Series model supports 100 hard-wire Input/Output points, unless otherwise noted.

Table 7: Related Field Controllers

Product Code Number	Product Description ¹
MS-FEU1610-0	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO, 4 CO, 24 VAC, and SA Bus, with Mounting Base
MS-FEU1620-0	Field Equipment Controller Cover with 2 UI, 1 BI, 3 BO, 4 CO, 24 VAC, and SA Bus with LCD Screen, with Mounting Base
MS-FEU2610-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus with Mounting Base
MS-FEU2620-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus with Mounting Base with LCD Screen
MS-IOM1710-0	4-Point IOM with 4 BI, FC Bus, and SA Bus Support
MS-IOM2710-0	6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support
MS-IOM3710-0	12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support
MS-IOU4710-0	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus with Mounting Base
MS-VMA1610-0	Integrated VAV Controller/Actuator/Pressure Sensor (Cooling Only), FC Bus, and SA Bus
MS-VMA1620-0	Integrated VAV Controller/Actuator/Pressure Sensor (with Reheat and Fan Control), FC Bus, and SA Bus

1. Universal Input (UI), Binary Input (BI), Binary Output (BO), Analog Output (AO), Configurable Output (CO), Sensor Actuator (SA)

Technical Specifications

ZFR1810 Wireless Field Bus Coordinator (Part 1 of 2)

Product Code Number	MS-ZFR1810-0
Power Supply Input	<p>One of the following:</p> <ul style="list-style-type: none"> 24 VAC +10%/-15%, 50/60 Hz, Class 2. Transformer allowance should be 2.5 VA maximum, 2 VA typical. Provided through the three-position 24 V~ screw terminal pluggable block. 15 VDC, 180 mA (7 to 18 VDC, 185 mA maximum current draw) on the FC Bus provided through the FC/SA BUS IN RJ-12 jack from the FC Bus Jack on a Field Controller or NxE supervisory engine.
Power Supply Output	15 VDC; Provided through the FC/SA BUS, FC/SA BUS OUT RJ-12 jack for external devices.
Addressing	DIP Switches, Field Adjustable
Wireless Band	Direct-Sequence Spread-Spectrum, 2.4 GHz ISM Bands
Transmission Power	10 mW Maximum
Transmission Range	76.2 m (250 ft) Maximum Line-of-Sight 15 m (50 ft) Recommended
Ambient Conditions	<p>Operating: 0 to 50°C (32 to 122°F), 5 to 95% RH, Noncondensing</p> <p>Storage: -20 to 70°C (-4 to 158°F), 5 to 90% RH, Noncondensing</p>
Materials	White Plastic Housing with Plenum rating per UL1995 UL94-5VB Flammability Rating
Terminations	<p>Two spade terminals with three-position screw terminal pluggable block for 24 VAC power supply input.</p> <p>Four spade terminals with four-position screw terminal pluggable block for RS-485 communications.</p> <p>RJ-12 IN jack for 15 VDC power supply and communications connection from an NxE or FEC FC Bus jack.</p> <p>RJ-12 OUT jack supplies 15 VDC and communications to BTCVT Wireless Commissioning Converter.</p>


ZFR1810 Wireless Field Bus Coordinator (Part 2 of 2)

Dimensions	146 x 122 x 52 mm (5.8 x 4.8 x 2.1 in.)
Mounting Hardware	Four No. 6 Trade Size Sheet Metal Screws
Shipping Weights	0.45 kg (1.0 lb)
Compliance	<p>United States: Intended for Connection to an NEC Class 2 Power Source; UL 916 Energy Management Plenum rated per UL1995 UL94-5VB Flammability Rating FCC Compliant to CFR47, Part 15, Subpart B, Class A Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TFB-MATRIXL</p> <p>Canada: CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits Industry Canada IC: 5969A-MATRIXL</p> <p>Europe: CE Mark – Radio TTE Directive 1999/5/EC and EMC Directive 2004/108/EC (formerly 89/336/EEC) Hereby, Johnson Controls, Inc., declares that the MS-ZFR1810-0 is in compliance with the essential requirements and other relevant provisions of directive 1999/5/EC and directive 2004/108/EC. This device has been tested and found to comply with the limits for a Class 1 radio equipment. This device is designed for use in all countries of the European Union and in Switzerland, Norway and Iceland.</p> <p>Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant</p>

ZFR1811 Wireless Field Bus Router (Part 1 of 2)

Product Code Number	MS-ZFR1811-0
Supply Voltage	8 to 18 VDC, 15 VDC nominal, provided from the FC/SA BUS RJ-12 jack on the FEC, IOM, or VMA1600
Current Consumption	90 mA maximum
Addressing	DIP Switches, Field Adjustable
Wireless Band	Direct-Sequence Spread-Spectrum, 2.4 GHz ISM Bands
Transmission Power	10 mW Maximum
Transmission Range	76.2 m (250 ft) Maximum Line-of-Sight 15 m (50 ft) Recommended
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F), 5 to 95% RH, Noncondensing Storage: -20 to 70°C (-4 to 158°F), 5 to 90% RH, Noncondensing
Materials	Translucent Plastic Housing with Plenum rating per UL1995 UL94-5VB Flammability Rating
Terminations	RJ-12 plug for connection to FEC or VMA1600 FC/SA Bus jack
Dimensions	136 x 100 x 18 mm (5-3/8 x 3-15/16 x 3/4 in.)
Mounting Hardware	1/2 in. trade size Electrical Mechanical Tubing (EMT) connector
Shipping Weights	0.095 kg (0.21 lb)


ZFR1811 Wireless Field Bus Router (Part 2 of 2)

	<p>United States: Intended for Connection to an NEC Class 2 Power Source; UL 916 Energy Management Plenum rated per UL1995 UL94-5VB Flammability Rating FCC Compliant to CFR47, Part 15, Subpart B, Class A Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TFB-MATRIXL</p> <p>Canada: CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits Industry Canada IC: 5969A-MATRIXL</p> <p>Europe: CE Mark – Radio TTE Directive 1999/5/EC and EMC Directive 2004/108/EC (formerly 89/336/EEC) Hereby, Johnson Controls, Inc., declares that the MS-ZFR1811-0 is in compliance with the essential requirements and other relevant provisions of directive 1999/5/EC and directive 2004/108/EC. This device has been tested and found to comply with the limits for a Class 1 radio equipment. This device is designed for use in all countries of the European Union and in Switzerland, Norway and Iceland.</p> <p>Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant</p>
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WRZ Series Wireless Room Temperature Sensors (Part 1 of 2)

Product Codes	<p>WRZ-TTB0000-0: Temperature Sensor with Display and F/C Button WRZ-TTD0000-0: Temperature Sensor with Display, F/C Button and Fan Speed Control WRZ-TTP0000-0: Temperature Sensor with Warmer/Cooler (+/-) Setpoint Adjustment WRZ-TTR0000-0: Temperature Sensor with No Setpoint Adjustment WRZ-TTS0000-0: Temperature Sensor with Setpoint Adjustment Scale: 13 to 29°C (55 to 85°F)</p>
Power Requirements	3 VDC Supplied by Two 1.5 VDC AA Alkaline Batteries (Included with Sensor); Typical Battery Life: 48 Months (36 Months Minimum)
Addressing	DIP Switches, Field Adjustable. MS/TP Address, Network Number, and Zone Address
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F), 5 to 95% RH, Noncondensing Storage: -40 to 71°C (-40 to 160°F), 5 to 95% RH, Noncondensing
Wireless Band	Direct-Sequence Spread-Spectrum, 2.4 GHz ISM Band
Transmission Power	10 mW Maximum
Transmission Range	30 m (100 ft) Maximum Line of Sight; 15 m (50 ft) Recommended
Transmissions	Every 60 Seconds (\pm 20 Seconds)
Temperature System Accuracy	0.6C°/1.0F° Over the Range of 13 to 29°C (55 to 85°F); 0.9C°/1.5F° Over a Range of 0 to 13°C (32 to 55°F) and 29 to 43°C (85 to 110°F)
Temperature Sensor Type	Internal 10k ohm Negative Temperature Coefficient (NTC) Thermistor
Materials	NEMA 1 White Plastic Housing
Mounting	Screw Mount or Double-Sided Adhesive Foam Tape Mount; Double-Sided Adhesive Foam Tape Included
Dimensions	120 x 80 x 38 mm (4.7 x 3.1 x 1.5 in.)
Shipping Weight	0.14 kg (0.3 lb)

WRZ Series Wireless Room Temperature Sensors (Part 2 of 2)

<p>Compliance</p> 	<p>United States: Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TFB-MATRIXL</p> <p>Canada: Industry Canada IC: 5969A-MATRIXL</p> <p>Europe: CE Mark – Radio TTE Directive 1999/5/EC and EMC Directive 2004/108/EC (formerly 89/336/EEC) Hereby, Johnson Controls, Inc., declares that the WRZ Series is in compliance with the essential requirements and other relevant provisions of directive 1999/5/EC and directive 2004/108/EC. This device has been tested and found to comply with the limits for a Class 1 radio equipment. This device is designed for use in all countries of the European Union and in Switzerland, Norway and Iceland.</p> <p>Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant</p>
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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, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1. This device may not cause harmful interference, and*
- 2. This device must accept any interference received, including interference that may cause undesired operation.*

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure (OET Bulletin 65) *To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.*

Canadian Emissions Compliance

Industry Canada Statement

The term IC before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Le terme « IC » précédant le numéro d'accréditation/inscription signifie simplement que le produit est conforme aux spécifications techniques d'Industry Canada.

Section 5.5 of RSS-210 *This device has been designed to operate with an antenna having a maximum gain of [x] dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is [y] ohms.*

Cet appareil a été conçu pour fonctionner avec une antenne d'un gain maximum de [x] dBi. En application des réglementations d'Industry Canada, l'utilisation d'une antenne de gain supérieur est strictement interdite. L'impédance d'antenne requise est de [y] ohms.

Section 5.11 of RSS-210 *To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.*

Pour réduire les interférences radio potentielles avec les dispositifs d'autres utilisateurs, le type d'antenne et son gain doivent être choisis de façon à ce que la puissance isotrope rayonnée équivalente (PIRE) ne soit pas supérieure à la puissance nécessaire pour une bonne communication.



Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202

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