

ZFR1800 Series Wireless Field Bus System

Description

The ZFR1800 Series Wireless Field Bus System provides a wireless platform for all Metasys® Field Equipment Controller (FEC) family controllers using BACnet® protocol over 2.4 GHz wireless ISM band.

One ZFR1811 router is required per field controller. This pairing of a router and any FEC Family device is referred to as a Wireless-Enabled Field Controller (WEFC). An FEC Family device is an Advanced Application Field Equipment Controller (FAC), FEC, Input/Output Module (IOM), or VAV Modular Assembly 16 Series (VMA16) field controller.

A ZFR1800 Series system consists of:

- up to eight ZFR1810 Wireless Field Bus Coordinators per field bus
- up to 35 Wireless-Enabled Field Controllers (WEFCs) per coordinator
- up to 100 WEFCs per field bus, depending on the network engine (32 with NCE, 50 with NAE35)
- up to nine WRZ Sensors per FEC or VMA16 field controller
- additional ZFR1811 Wireless Field Bus Routers connected to MS-ZFRRPT-0 Repeater accessories, as required, acting as repeaters

Note: Repeaters extend the wireless transmission distance of the BACnet data communications, fill in any gaps within the wireless mesh network, and provide multiple wireless data transmission pathways. 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 Multidrop Serial Bus/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.

Refer to the *ZFR1800 Series Wireless Field Bus System Product Bulletin (LIT-12011336)* for important product application information.

Features

- wireless communications for a Metasys system
- wireless mesh network
- improved application mobility and flexibility
- support of up to nine WRZ Series Wireless Room Sensors per Wirelessly Enabled Field Controller
- multiple diagnostic Light-Emitting Diodes (LEDs)
- compact, easy-to-install, and versatile ZFR1811 routers

Applications

The wireless Metasys products within a Metasys system are ideal for any location where it is cost-prohibitive, difficult, or aesthetically unappealing to hardwire between Metasys products. 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



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

- buildings with marble, granite, glass, mirrored, wood veneer, or other decorative surfaces that present challenges to hard-wiring
- 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*](#).

Locations or applications that prohibit cellular telephones or Wi-Fi systems are unsuitable for the wireless Metasys products:

- 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 wireless Metasys products 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

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.

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Selection Charts

ZFR1800 Series Wireless Field Bus System Components

Code Number	Description
MS-ZFR1810-x	Wireless Field Bus Coordinator, 10 mW Transmission Power; functions with NAE35, NAE45, NAE55, and NCE25 Models
MS-ZFR1811-x	Wireless Field Bus Router, 10 mW Transmission Power; functions with Metasys BACnet FECs, IOMs, VMA16s, and WRZ Series Sensors
WRZ-MHN0100-0	Wireless Remote Transmitter with Temperature, Relative Humidity (RH) and Occupancy Motion Detector (PIR) only, No Display
WRZ-MNN0100-0	Wireless Remote Transmitter with Occupancy Detection (PIR), No Display
WRZ-MTB0100-0	Wireless Remote Transmitter with Display, Temperature, Relative Humidity (RH), and Occupancy Detection only, Warmer/Cooler (+/-) Setpoint Adjustment (setpoint configured in the Metasys system)
WRZ-MTN0100-0	Wireless Remote Transmitter with Temperature and Occupancy Detection only, No Display
WRZ-RMT10K-0	Wireless Remote Temperature Transmitter designed to operate with a TE-6300 Series 10k ohm Johnson Controls® Type II Thermistor Sensor (order separately) to sense temperature in warmer applications up to 158°F (70°C). Includes one Transmitter, one Mounting Base, strips of Double-Sided Adhesive Foam Tape (all factory assembled), and one Strain Relief
WRZ-STR0000-0	Wireless Transmitter and Temperature Sensor with Display and F/C Button. Includes Temperature Probe encased in a Clear Acrylic Cylinder, 9 ft (2.7 m) Wire Lead, one Probe Mounting Strap, and a strip of Double-Sided Adhesive Foam Tape, 10 mW Transmission Power
WRZ-STRNIST-0	NIST Rated Wireless Transmitter and Temperature Sensor with Display and F/C Button. Includes Temperature Probe encased in a Clear Acrylic Cylinder, 9 ft (2.7 m) Wire Lead, one Probe Mounting Strap, and a strip of Double-Sided Adhesive Foam Tape, 10 mW Transmission Power
WRZ-THB0000-0	Wireless Temperature/Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment or Setpoint Adjustment Scale: 13 to 29°C/55 to 85°F, F/C Button, Relative Humidity (RH) Button and Occupancy Button, 10 mW Transmission Power
WRZ-THN0000-0	Wireless Temperature/Humidity Sensor, Occupancy Button, No Temperature adjustment and No LCD temperature/humidity display, 10 mW Transmission Power
WRZ-THP0000-0	Wireless Temperature/Humidity Sensor, Warmer/Cooler (+/-) Setpoint Adjustment and Occupancy Button, No LCD temperature/humidity display, 10 mW Transmission Power
WRZ-TTB0000-0	Wireless Temperature Sensor with Display and F/C Button, 10 mW Transmission Power
WRZ-TTD0000-0	Wireless 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

WRZ Sensor Model Comparison

Sensor Model	Temperature	3% Humidity	Display	F/C Button	Fan Control	Occupancy Motion Detection (PIR)	Occupancy Override	Setpoint Adjustment Dial ¹
WRZ-MHN0100-0	■	■				■		
WRZ-MNN0100-0						■		
WRZ-MTB0100-0	■					■		
WRZ-MTN0100-0	■		■			■		ABSOL
WRZ-RMT10K-0	■							
WRZ-STR0000-0	■		■	■				
WRZ-STRNIST-0	■		■	■				
WRZ-THB0000-0	■	■	■	■			■	Both
WRZ-THN0000-0	■	■					■	
WRZ-THP0000-0	■	■					■	W/C
WRZ-TTB0000-0	■		■	■			■	Both
WRZ-TTD0000-0	■		■	■	■		■	Both
WRZ-TTP0000-0	■						■	W/C
WRZ-TTR0000-0	■						■	
WRZ-TTS0000-0	■						■	ABSOL

1. Either Absolute Scale (ABSOL), Warmer/Cooler (W/C), or Both (BOTH).

Related Field Controllers (Part 1 of 2)

Code Number	Description ¹
MS-FAC2611-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus with Real-Time Clock
MS-FAC2612-1	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO, and 5 RO
MS-FAC2612-2	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO, and 5 RO. Line voltage input power 90 VAC to 230 VAC.
MS-FAC3611-0	26-Point Advanced Application Field Equipment Controller with 8 UI, 6 BI, 6 BO, and 6 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock; Improved Fast Persistence
MS-FEC1611-0	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO, 4 CO, 24 VAC, and SA Bus
MS-FEC1621-0	Field Equipment Controller Cover with 2 UI, 1 BI, 3 BO, 4 CO, 24 VAC, and SA Bus with LCD Screen, with Mounting Base

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Related Field Controllers (Part 2 of 2)

Code Number	Description ¹
MS-FEC2611-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus
MS-FEC2621-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, and SA Bus with LCD Screen
MS-IOM1711-0	4-Point IOM with 4 BI, FC Bus, and SA Bus Support
MS-IOM2711-0	6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support
MS-IOM2721-0	10-Point Analog IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support
MS-IOM3711-0	12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support
MS-IOM3721-0	16-Point Binary IOM with 16 BI, FC Bus, and SA Bus Support
MS-IOM3731-0	16-Point Binary IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support
MS-IOM4711-0	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), and Relay Output (RO).

Accessories

Code Number	Description
MS-ZFRRPT-0	Optional Repeater Accessory for use with ZFR1811 Router as a repeater. Includes 20 to 28 VAC or 16 to 30 VDC input power, 12 VDC output power supply (regulated at 500 mA maximum, 6 VA), and 4 x 4 in. (10.16 cm x 10.16 cm) electrical box with cover. Kit does not include a ZFR1811 Router.
MS-ZFRCBL-0	Wire Harness with Connectors for use with MS-ZFR1811-x Router for Wireless Field Bus. Allows ZFR1811 Router to function with FEC1620 controller; and with FEC1610, VMA1610, or VMA1620 controllers in conjunction with NS Series Sensors, MS-BTCVT-1 Wireless Commissioning Converter, or DIS1710 Local Controller Display.
ZFR-USBHA-0	Universal Serial Bus (USB) Dongle with ZFR Driver provides a wireless connection through the Controller Configuration Tool (CCT) to allow wireless commissioning of the wirelessly enabled FEC, IOM, and VMA16 Series Field Controllers. Also used for the ZFR Checkout Tool (ZCT) in CCT.
ZFR-1810ANT-700	Replacement antenna kit for ZFR1810 Wireless Field Bus Coordinator. Includes antenna, coaxial cable, and mounting hardware.
WRZ-SST-120	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
MAGNET-BASE-PLW	Magnetic Backplate for Mounting a Transmitter on Metal Surfaces; 5 Magnetic Backplates per Package
T-4000-119	1.6 mm (1/16 in.) Allen-Head Adjustment Tool (30 per Bag) for Accessing and Securing WRZ Series Sensors
1.5 VDC, AA Alkaline Battery	Replacement Battery for WRZ Series Sensors (Purchase Locally.)

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

Technical Specifications

ZFR1810 Wireless Field Bus Coordinator (Part 1 of 2)	
Product Code Number	MS-ZFR1810-x
Power Supply Input	One of the following: 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 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 OUT RJ-12 jack for external devices. Note: You can only use the power supply output when the ZFR1810 device is powered from the 24 VAC power supply input.
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	White Plastic Housing with Plenum rating per UL1995 UL94-5VB Flammability Rating
Terminations	Two spade terminals with three-position screw terminal pluggable block for 24 VAC power supply input. Four spade terminals with four-position screw terminal pluggable block for RS-485 communications. RJ-12 IN jack for 15 VDC power supply and communications connection from an NxE or FEC FC Bus jack. RJ-12 OUT jack supplies 15 VDC and communications to BTCVT Wireless Commissioning Converter.
Dimensions	146 x 122 x 52 mm (5.8 x 4.8 x 2.1 in.)

The performance specifications are nominal and conform to acceptable industry standards. For applications 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. © 2014 Johnson Controls, Inc. www.johnsoncontrols.com

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ZFR1810 Wireless Field Bus Coordinator (Part 2 of 2)	
Mounting Hardware	Four No. 6 Trade Size Sheet Metal Screws
Shipping Weights	0.45 kg (1.0 lb)
Compliance	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 Identification ZFR1810-0: FCC: TFB-MATRIXL Transmitter Identification ZFR1810-1: FCC: OEJ-WRZRADIO Canada: CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits Industry Canada (IC) RSS-210 Transmitter Identification ZFR1810-0: 5969A-MATRIXLP Transmitter Identification ZFR1810-1: 279A-WRZRADIO Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the R&TTE Directive 1999/05/EC and the EMC Directive 2004/108/EC. Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant
ZFR1811 Wireless Field Bus Router	
Product Code Number	MS-ZFR1811-x
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)
Compliance	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 Identification ZFR1811-0: FCC: TFB-MATRIXL; Transmitter Identification ZFR1811-1: FCC: OEJ-WRZRADIO; Canada: CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits Industry Canada (IC) RSS-210 Transmitter Identification ZFR1810-0: 5969A-MATRIXLP Transmitter Identification ZFR1810-1: 279A-WRZRADIO Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the R&TTE Directive 1999/05/EC and the EMC Directive 2004/108/EC. Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant

ZFR1800 Series Wireless Field Bus System (Continued)

WRZ Series Sensors	
Product Codes	WRZ-MHN0100-0: Temperature/Humidity Sensor with Occupancy Motion Detection (PIR) WRZ-MNN0100-0: Occupancy Sensor with Occupancy Motion Detection (PIR) WRZ-MTB0100-0: Temperature/Humidity Sensor with Display and Occupancy Motion Detection (PIR) with Warmer/Cooler (+/-) Setpoint Adjustment (setpoint configured in the Metasys system) WRZ-MTN0100-0: Temperature Sensor with Occupancy Motion Detection (PIR) with No Display WRZ-RMT10K-0: Temperature Transmitter designed to operate with a TE-6300 Series 10k ohm Johnson Controls® Type II Thermistor Sensor (order separately) to sense temperature in warmer applications up to 158°F (70°C) WRZ-STR0000-0: Transmitter and Temperature Sensor with Display and F/C Button WRZ-STRNIST-0: NIST Rated Transmitter and Temperature Sensor with Display and F/C Button WRZ-THB0000-0: Temperature/Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment or Setpoint Adjustment Scale: 13 to 29°C/55 to 85°F, F/C Button, RH Button and Occupancy Button WRZ-THN0000-0: Temperature/Humidity Sensor with Occupancy Button WRZ-THP0000-0: Temperature/Humidity Sensor with Warmer/Cooler (+/-) Setpoint Adjustment and Occupancy Button 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)
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, PAN 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 (±20 Seconds)
Temperature System Accuracy	0.6°C/1.0°F° Over the Range of 13 to 29°C (55 to 85°F); 0.9°C/1.5°F° 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
Humidity Calibrated Range	10% to 90% RH at 23°C (73°F)
Humidity Accuracy	±3% RH across the Range of 20% to 80% RH, ±6% RH across the Range of 10% to 20% RH and 80% to 90% RH; within the Temperature Range of 13 to 29°C (55 to 85°F)
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)
Compliance	United States: Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TFB-MATRIXL Canada: Industry Canada IC: 5969A-MATRIXL Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the R&TTE Directive 1999/05/EC and the EMC Directive 2004/108/EC. Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant

