Wireless Metasys® System

Product Bulletin

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The Wireless Metasys® System provides a wireless platform for multiple levels of the Johnson Controls® Metasys system extended architecture. Several wireless Metasys solutions are available for integrating wireless connectivity in desired portions of a Metasys network.

- ZFR1800 Series Wireless Field Bus System
- TEC Wireless Thermostat Control System for Heating, Ventilating, and Air Conditioning (HVAC) Equipment
- WRS Series Many-to-One Wireless Room Temperature Sensing System
- TE-7800 Series One-to-One Wireless Room Temperature Sensing System
- WRZ-7840 One-to-One Wireless Room Temperature Sensing System

These wireless solutions minimize wiring, provide application mobility and flexibility, and simplify the challenges of difficult or cost-prohibitive installations. The wireless solutions can coexist with each other, and offer the flexibility of coexisting with hard-wired Metasys solutions.

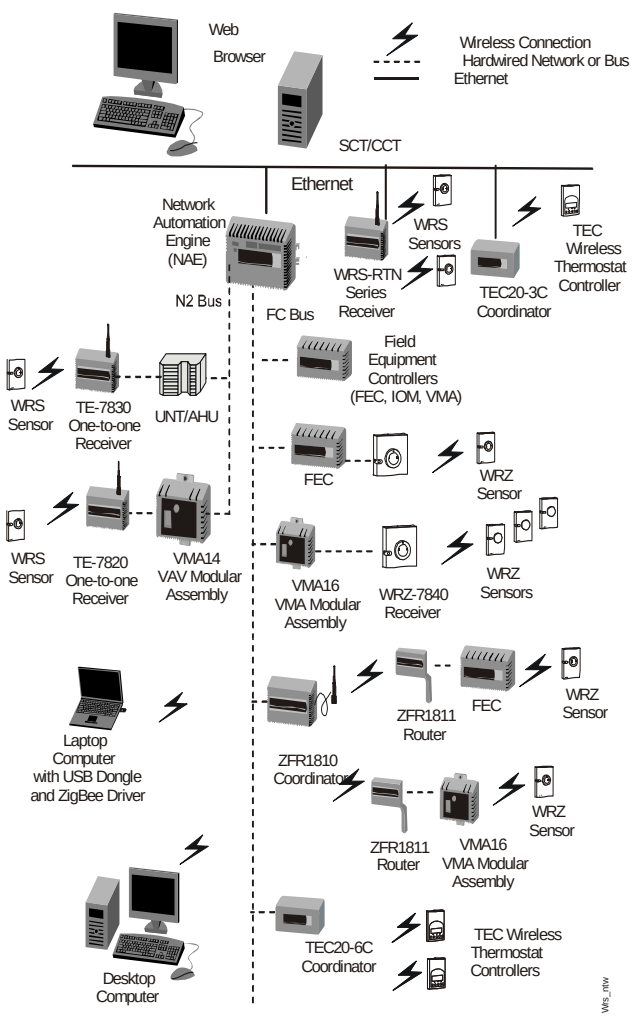

Figure 1: Wireless Metasys System

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

Features	Benefits
Wireless Networks	Enable quick, economical, and low-maintenance installation through minimized hardwiring.
Metasys System Extended Architecture Design	Leverages the Metasys system Web-based platform to provide wireless temperature control across multiple levels of the Building Automation System (BAS).

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

Features	Benefits
Improved Application Mobility and Flexibility	Provide a wireless alternative to hard-wired counterparts; Facilitate easy initial location and relocation with minimal disruption to building occupants; Cost-effectively extend Metasys systems to applications where building aesthetics (such as solid walls or ceilings, temporary walls, or decorative surfaces) normally hinder hardwiring.
Open Technology Standards and Multi-frequency Technology	Use Institute of Electrical and Electronics Engineers (IEEE) 802.15.4 transmitters to meet the IEEE 802.15.4 standard for low power, low duty-cycle wireless systems. The ZFR1800 System and TEC Wireless Thermostat Controller Systems use ZigBee™ technology to create a wireless mesh network that enhances reliability through automatically forming wireless links and multiple wireless data transmission paths.
Optional Wireless Tools – ZFR Checkout Tool (ZCT) and WRS-SST Series Wireless Sensing System Tools	Provide quick and easy method to determine system status, wireless signal strength, and optimum device locations in your application.

Applications

IMPORTANT: Use the wireless Metasys systems only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the solutions 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 wireless Metasys systems.

Metasys wireless systems can be used in applications that also support wired field-level communications. The wireless Metasys systems are ideal for locations where it is cost prohibitive, difficult, or aesthetically unappealing to hardwire between supported Metasys devices. 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 wireless Metasys systems are approved by national compliance agencies for use in select countries. Refer to the Technical Specifications section of the respective Product Bulletins for each system. See the *Related Documentation* section for the list of the related Product Bulletins.

Applications to Avoid

Locations or applications that prohibit cellular telephones or Wireless Fidelity (WiFi) systems may be unsuitable for the wireless Metasys systems:

- operating rooms or radiation therapy rooms
- validated environments
- UUKL 864 applications
- department of defense applications requiring Department of Defense Information Assurance Certification and Accreditation Process (DIACAP) certification (for example, military bases and military hospitals)

ZFR1800 Series Wireless Field Bus System

A ZFR1800 Series System provides wireless monitoring and control of HVAC equipment within multiple levels of a Metasys system using BACnet® protocol – from supervisory engines, to field controllers, to room temperature sensors.

Figure 2: ZFR1811 Routers, ZFR1810 Coordinator, and WRZ-TTx Series Sensors

Any Metasys Field Equipment Controller (FEC), Input/Output Module (IOM), or Variable Air Volume (VAV) Modular Assembly (VMA)16 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 Wireless Field Bus Routers connected to ZFR-PWRs, as required, acting as repeaters

  Note: Use the MS-ZFRRPT-0 optional repeater accessory with a ZFR1811 Router to serve as a repeater to extend wireless mesh network and provide multiple wireless transmission pathways.

  Note: The supervisory engine limits apply when determining the total number of both wired and wireless field controllers per trunk.
- multiple WRZ-TTx Series Wireless Room Temperature Sensors

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.

TEC Series Wireless Thermostat Controller Systems

The TEC Series Wireless Thermostat Controller System provides wireless networked control of HVAC equipment on a BAS that enables remote monitoring and programming. The TEC Series Wireless Systems integrate to an NAE or NCE supervisory engine using BACnet Internet Protocol (IP) or BACnet MS/TP communications.

Figure 3: TEC Wireless Thermostat Controller and TEC20 Coordinator with Direct-Mount Antenna and Optional Remote Mount Antenna

The TEC wireless system controls staged, fan coil, and zoning equipment. This system consists of:

- at least one TEC20 Coordinator and 15 VDC power supply (available separately) connected to a Metasys NAE or NCE supervisory engine
- multiple TEC Wireless Thermostat Controllers

A TEC20 Coordinator enables the TEC Wireless Thermostat Controllers to communicate with the NAE or NCE supervisory engine, which schedules occupancy, collects trend data, overrides points, and monitors alarms. The TEC Series Wireless Thermostat Controller Systems confirm and synchronize data transmissions between the TEC Wireless Thermostat Controllers and TEC20 Coordinators.

Two Coordinator models are available to function with multiple TEC Themostat Controller models:

- TEC20-3C-2 BACnet IP Wireless Coordinator that connects over the Ethernet to an Network Automation Engine (NAE) or Network Control Engine (NCE).
- TEC20-6C-2 BACnet MS/TP Wireless Coordinator that connects on the Field Controller (FC) Bus of an NAE or NCE.

WRS Series Many-to-One Wireless Room Temperature Sensing System

The Many-to-One Wireless Room Temperature Sensing System is designed to gather temperature and zone data from multiple wireless room temperature sensors, and distribute that data to multiple field controllers on a Metasys network. The Many-to-One system replaces hard-wired temperature sensors, simplifying installation of wireless sensors, especially in applications where hard-wired temperature sensors are impractical or costly to install.

Figure 4: WRS-TTx Series Wireless Room Temperature Sensors and WRS-RTN Series Receiver for Many-to-One Wireless Room Temperature Sensing Systems

A Many-to-One system consists of multiple WRS-TTx Series Wireless Room Temperature Sensors communicating with a WRS-RTN Series Receiver (Figure 4). The receiver collects wireless temperature setpoint, zone, and battery condition data and routes that data over Ethernet to an NAE or an NCE. The NAE or NCE distributes the temperature and zone data to supported BACnet, N2, and LONWORKS® controllers on Metasys networks.

TE-7800 Series One-to-One Wireless Sensing System

The TE-7800 Series One-to-One Wireless Room Temperature Sensing System is designed to interface with supported Johnson Controls N2 protocol field controllers to provide wireless temperature monitoring and control of single-zone, room temperature applications.

Figure 5: WRS-TTx Series Wireless Room Temperature Sensor, TE-7820-x Series Receiver, and TE-7830-x Series Receiver for the One-to-One Wireless Room Temperature Sensing System

A TE-7800 One-to-One wireless sensing system consists of one WRS-TTx Series Wireless Room Temperature Sensor communicating single-zone temperature data to a TE-7800 Series Receiver and associated field controller. Up to four sensors can report to a single receiver and associated field controller to provide enhanced zone control.

Two receiver models are available to function with the WRS-TTx Series Wireless Room Temperature Sensors:

- A TE-7820-x Series Receiver with zone bus interface communicates with a single Johnson Controls VMA1400 Series Controller.
- A TE-7830-x Series Receiver with analog interface communicates with a single Johnson Controls AS-AHU, AS-UNT, AS-VAV, DX9100, or FXxx Series Controller.

WRZ-7840 One-to-One Wireless Room Temperature Sensing System

The WRZ-7840 One-to-One wireless room temperature sensing system is designed to interface with supported Johnson Controls BACnet MS/TP controllers to provide wireless temperature control of single-zone, room temperature applications. The WRZ-TTx Sensor and WRZ-7840 Receiver combination is a functional equivalent to an NS-BTP7001-0 Sensor but eliminates communication wiring, which is usually placed inside the wall.

A WRZ-7840 One-to-One wireless sensing system consists of one WRZ-TTx Series Sensor communicating single-zone temperature data to an associated WRZ-7840 Series Receiver. Up to nine sensors can report to a single receiver and associated field controller to provide enhanced zone control. The system consists of:

- A WRZ-7840-x Series Receiver with Sensor Actuator (SA) Bus interface communicating with a single Johnson Controls Field Equipment Controller (FEC) or VMA1600 Controller.
- A ZFR1811 Router acting as a repeater, which can be used to extend the operating range of a WRZ-7840 system

Figure 6: WRZ-7840 Series One-to-One Wireless Room Temperature Sensing System

Related Documentation

Refer to the product bulletins listed in Table 2 for technical specifications and features of the various Wireless Metasys Systems.

Table 2: Wireless Metasys System Related Documentation

For Information On	See Document	LIT or Part Number
Applications, Features, and Benefits of the ZFR1800 Series Wireless Field Bus System	*ZFR1800 Series Wireless Field Bus System Product Bulletin*	*LIT-12011336*
Applications, Features, and Benefits of the TEC Series Wireless Thermostat Controller System	*TEC Series Wireless Thermostat Controller System for Staged Equipment Product Bulletin*	*LIT-12011400*
	TEC Series Wireless Thermostat Controller System for Fan Coil and Zoning Equipment Product Bulletin	*LIT-12011401*
Applications, Features, and Benefits of the WRS Series Many-to-One Wireless Room Temperature Sensing System	*WRS Series Many-to-One Wireless Room Temperature Sensing System Product Bulletin*	*LIT-12011094*
Applications, Features, and Benefits of the TE-7800 Series One-to-One Series Wireless Room Temperature Sensing System	*TE-7800 Series One-to-One Wireless Room Temperature Sensing System Product Bulletin*	*LIT-12011096*
Applications, Features, and Benefits of the WRZ-7840 One-to-One Wireless Room Temperature Sensing System	*WRZ-7840 One-to-One Wireless Room Temperature Sensing System Product Bulletin*	*LIT-12011410*

Product Selection

Table 3 provides a product feature selection guide to help in the selection of the appropriate Wireless Metasys System for your application.

Table 3: Wireless Products Selection Guide (Part 1 of 3)

	System	ZFR1800 Series Wireless Field Bus System	TEC Wireless Thermostat Controllers	WRS Series Many-to-One Wireless Room Temperature Sensing System	TE-7800 One-to-One Wireless Sensing System	WRZ-7840 One-to-One Wireless Sensing System with SA Bus Interface
	Products	**ZFR1810 Coordinator, ZFR1811 Routers, WRZ-TTx Sensors, WRZ-STR Sensors**	**TEC20-x Coordinators, TEC20x Thermostats**	**WRS-RTN Receiver, WRS-TTx Sensors**	**TE7820 Receiver with Zone Bus Technology or TE-7830 Receiver with Analog Interface, WRS-TTx Sensors**	**WRZ-7840 Receiver, WRZ-TTx Sensors, WRZ-STR Sensors**
Field Bus Protocol	BACnet	X	X	X		X
	N2			X	X	
	LONWORKS			X		
Wireless Connectivity Levels	Field Controllers to Room Temperature Sensors, and to Supervisory Engine	X				
	Wireless Room Temperature Sensors Only			X	X	X
	Wireless Thermostat Controllers to Supervisory Engine		X			
Supported Supervisory Engines	Network Automation Engines (NAE)	X	X	X	X	X
	Network Control Engines (NCE)	X	X	X	X	X
	Network Controller Modules (NCM)				X	

Table 3: Wireless Products Selection Guide (Part 2 of 3)

	System	ZFR1800 Series Wireless Field Bus System	TEC Wireless Thermostat Controllers	WRS Series Many-to-One Wireless Room Temperature Sensing System	TE-7800 One-to-One Wireless Sensing System	WRZ-7840 One-to-One Wireless Sensing System with SA Bus Interface
	Products	**ZFR1810 Coordinator, ZFR1811 Routers, WRZ-TTx Sensors, WRZ-STR Sensors**	**TEC20-x Coordinators, TEC20x Thermostats**	**WRS-RTN Receiver, WRS-TTx Sensors**	**TE7820 Receiver with Zone Bus Technology or TE-7830 Receiver with Analog Interface, WRS-TTx Sensors**	**WRZ-7840 Receiver, WRZ-TTx Sensors, WRZ-STR Sensors**
Supported Field Controllers	FEC	X		X		X
	VMA1600	X		X		X
	VMA1400			X	X Requires TE-7820 Receiver with Zone Bus Interface	
	AHU			X	X Requires TE-7830 Receiver with Analog Interface	
	UNT			X	X Requires TE-7830 Receiver with Analog Interface	
	VAV			X	X Requires TE-7830 Receiver with Analog Interface	
	DX-9100			X	X Requires TE-7830 Receiver with Analog Interface	
	LN Series			X	X Requires TE-7830 Receiver with Analog Interface	
	FX Series				X Requires TE-7830 Receiver with Analog Interface	
	TEC20xx Series		X			

Table 3: Wireless Products Selection Guide (Part 3 of 3)

	System	ZFR1800 Series Wireless Field Bus System	TEC Wireless Thermostat Controllers	WRS Series Many-to-One Wireless Room Temperature Sensing System	TE-7800 One-to-One Wireless Sensing System	WRZ-7840 One-to-One Wireless Sensing System with SA Bus Interface
	Products	**ZFR1810 Coordinator, ZFR1811 Routers, WRZ-TTx Sensors, WRZ-STR Sensors**	**TEC20-x Coordinators, TEC20x Thermostats**	**WRS-RTN Receiver, WRS-TTx Sensors**	**TE7820 Receiver with Zone Bus Technology or TE-7830 Receiver with Analog Interface, WRS-TTx Sensors**	**WRZ-7840 Receiver, WRZ-TTx Sensors, WRZ-STR Sensors**
Features, Technology	Installation and Configuration are Independent of Ethernet	X	X TEC20-6C-2 BACnet MS/TP Coordinator Only		X	X
	Wireless Mesh Using ZigBee Technology	X	X			
	Wireless Point-to-Multipoint			X		
	Wireless Point-to-Point				X	X
	Direct Sequence Spread Spectrum (DSSS) Wireless Technology	X	X	X	X	X
	2.4 GHz Operating Frequency	X	X	X	X	X
	Number of Controllers Supported	Up to 100 per NAE/NCE Trunk. Up to 35 per ZFR1810 Coordinator.	Up to 100 TECs per NAE/NCE Trunk. Up to 30 TECs per TEC Coordinator.		1 per TE-7800 Receiver	1 per WRZ-7840 Receiver
	Number of Sensors Supported	Up to 4 per Field Controller		Up to 60 per WRS-RTN Receiver	Up to 4 per Field Controller	Up to 5 per Field Controller
	Averaging or High/Low Temperature Sensing	X CCT Application		X CCT Application	X DIP Switch Selectable	X DIP Switch Selectable
	Firmware Field Upgradable	X ZFR1810 Coordinator and ZFR1811 Routers				
	Wireless Tools	Tools Not Required for Setup. Optional ZFR Checkout Tool (ZCT) Available for Checkout and Troubleshooting.	Computer Based and TEC Local Display	Tools Not Required for Setup. Optional WRS-SST Series Tools Available for Checkout and Troubleshooting.	Tools Not Required for Setup. Optional WRS-SST Series Tools Available for Checkout and Troubleshooting.	

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