Facility Explorer One-to-One Wireless Room Sensing System

Product Bulletin

FX-WRZ7860-0

Refer to the QuickLIT website for the most up-to-date version of this document.

The Facility Explorer One-to-One Wireless Room Sensing System enables RF room sensors to wirelessly communicate to FX-PC Series Programmable Controllers (FX-PCA, FX-PCG, and FX-PCV). This One-to-One Wireless Room Sensing System is the functional equivalent of an NS Series Network Sensor, but it eliminates all the hard wiring between the room sensor and the controller.

The two main components of this system are the FX-WRZ Series Wireless Room Sensor and the FX-WRZ7860-0 Receiver. Depending on the model, the FX-WRZ Series Sensor can transmit sensed temperature, temperature setpoint, sensed humidity, occupancy status, and low battery conditions. FX-WRZ Series Wireless Room Sensor models are available with or without an LCD, and are designed for indoor intra-building applications only.

Several models of FX-WRZ Series Wireless Room Sensors 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, and hospitals 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.

The FX-WRZ7860-0 Receiver acts as an interface between the FX-WRZ Series Wireless Room Sensors and the FX-PC Series Programmable Controller. The FX-WRZ7860-0 receives the data from the FX-WRZ Series Wireless Sensors, and passes it onto the FX-PC Series Programmable Controller over its Sensor Actuator (SA) Bus.

Figure 1: Facility Explorer One-to-One Wireless Room Sensing System

In a typical application, one FX-WRZ Series Wireless Room Sensor reports to one FX-WRZ7860-0 Receiver; however, you can associate up to five FX-WRZ Series Wireless Room Sensors with a single FX-WRZ7860-0 Receiver. In these multi-sensor applications, the receiver passes all of the room sensors' data to the FX-PC Series Programmable Controller. You can then configure the FX-PC Series Programmable Controller to either average the room sensors' temperature and humidity inputs, or select the highest or lowest sensed temperature and humidity for control of the target zone.

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

Features	Benefits
One-to-One Wireless RF Design	Enables quick, economical, and low-maintenance installations, which reduce installation and wiring costs.
Stylish, Lightweight Wireless Room Sensors with Occupancy Override Button	Make installation simple and provide room temperature, humidity, setpoint temperature, occupancy status, and low battery conditions to FX-PC Series Programmable Controllers (FX-PCA, FX-PCG, and FX-PCV).
60-Second Transmission Intervals	Greatly extend sensor battery life, and enable continuous operation over the life of the batteries (approximately 4 to 5 years) while maintaining an even temperature in the controlled zones.

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

Features	Benefits
Built-in Integral Wireless Signal Strength Testing	Provides quick, easy, visual indication of the wireless RF signal strength between a sensor and associated receiver, helps locate optimum device positions during installation, and aids in troubleshooting.
Multiple Sensor Temperature Averaging and High/Low Selection	Enhance zone temperature control by enabling up to five sensors to report to a single receiver, which allows the controller to average the sensor temperature or select the highest or lowest temperature value to control the zone.
Onboard PIR Occupancy Sensor Available on Some Wireless Room Sensors	Maximizes up to 30% energy savings in high-energy usage environments, and facilitates trending floor space.
Compact, Easily Installed Receiver	Receives sensed temperature, humidity, setpoint, and low-battery condition from an FX-WRZ Series Wireless Room Sensor, and interfaces directly with an FX-PC Series Programmable Controller.
Simple DIP Switch Settings	Provide easy commissioning and up to 4,096 unique receiver addresses.
Optional, Battery-Powered Wireless Sensing System Tool	Provides wireless mobility to check for best RF link and determine optimum receiver mounting locations.
High Resistance to RF Interference from Other Radio Devices or RF Noise Sources	Results from application-based frequency agility, which allows for automatically changing to a different channel to avoid RF interference and missed messages.
Optional Repeater	Extends the operating range between a sensor and a receiver.
Blinking LED Light to Indicate Firmware Version	Five seconds after the power is applied, the red LED flashes to indicate the firmware revision. For example, firmware revision 3 is indicated by the LED flashing three times during the startup process.

Application

In a typical application, the FX-WRZ7860-0 Receiver forwards (by means of the SA Bus) zone data sent by an FX-WRZ Series Wireless Room Sensor to any one of several FX-PC Series Programmable Controllers. As an example, in a VAV application, the FX-WRZ Series Wireless Room Sensor sends zone conditions to the FX-WRZ7860-0 Receiver, which passes that data to an FX-PC Series Programmable VAV Controller.

> **IMPORTANT:** Use the Facility Explorer One-to-One Wireless Room Sensing System only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the room sensor or receiver 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 room sensor or receiver.

> **IMPORTANT:** The Facility Explorer One-to-One Wireless Room Sensing System is not designed or intended for use in mission-critical or life/safety applications.

Operation

The Facility Explorer One-to-One Wireless Room Sensing System comprises one or more FX-WRZ Series Wireless Room Sensors and an FX-WRZ7860-0 Receiver that receives wireless RF data from the sensor, and provides zone control data to specified FX-PC Series Programmable Controllers in building HVAC systems. The FX-WRZ Series Wireless Room Sensor and FX-WRZ7860-0 Receiver combination is functionally equivalent to a network sensor, such as an NS-BTP7001-0, minus the communication wiring typically located inside the wall.

Like a network sensor, the FX-WRZ7860-0 Receiver is designed to communicate over an SA Bus interface via BACnet® Master-Slave/Token-Passing (MS/TP) protocol with FX-PC Series Programmable Controllers. The receiver supplies the sensed zone temperature, humidity, temperature setpoint, and occupancy override data.

The FX-WRZ7860-0 Receiver uses direct-sequence, spread-spectrum RF technology and operates on the 2.4 GHz industrial, scientific, and medical (ISM) band. The receiver meets the IEEE 802.15.4 standard for low power, low duty-cycle RF transmitting systems. An FX-WRZ7860-0 Receiver operates as a transceiver to create a bidirectional association with an FX-WRZ Series Wireless Room Sensor.

For installations where the RF signal path between the sensor and receiver provides unsatisfactory results, locate an FX-ZFR1811, which serves as a repeater, between the sensor and the receiver.

Refer to the *Facility Explorer One-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011663)* for information on commissioning the FX-WRZ7860-0 Receiver and configuring One-to-One Wireless Room Sensing Systems.

Dimensions

See Figure 2 for FX-WRZ7860-0 Receiver physical features and dimensions. See Figure 3 for FX-WRZ Series Wireless Room Sensor physical features and dimensions.
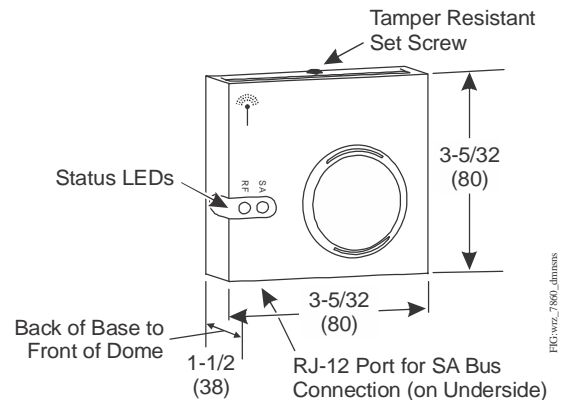

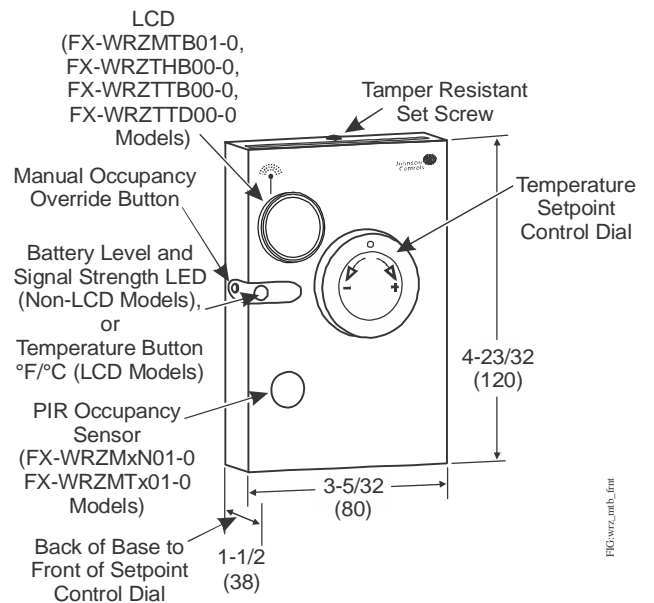**Figure 2: FX-WRZ7860-0 Receiver Physical Features and Dimensions, in. (mm)**

Figure 3: FX-WRZ Series Wireless Room Sensor Physical Features and Dimensions, in. (mm)

Ordering Information

Use Table 2 to order components of the Facility Explorer One-to-One Wireless Room Sensing System. Use Table 4 to order accessories.

Repair Information

If the Facility Explorer One-to-One Wireless Room Sensing System fails to operate within its specifications, replace the affected components. For replacement components, contact the nearest Johnson Controls® representative.

Table 2:   Ordering Information

Product Code Number	Description
FX-WRZ7860-0	One-to-One Wireless Receiver
FX-WRZMHN01-0	Wireless Room Temperature and Humidity Sensor with PIR Occupancy Sensor, Battery Level/Signal Strength LED, and Manual Occupancy Override Button
FX-WRZMNN01-0	Wireless Room Sensor (No Temperature or Humidity Sensing) with PIR Occupancy Sensor, Battery Level/Signal Strength LED, and Manual Occupancy Override Button
FX-WRZMTB01-0	Wireless Room Temperature Sensor with PIR Occupancy Sensor, Display, Setpoint Adjustment Scale: 55 to 80°F (13 to 27°C), F/C Button, and Manual Occupancy Override Button
FX-WRZMTN01-0	Wireless Room Temperature Sensor with PIR Occupancy Sensor, Battery Level/Signal Strength LED, and Manual Occupancy Override Button
FX-WRZTHB00-0	Wireless Room Temperature and Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment or Setpoint Adjustment Scale: 55 to 85°F (13 to 27°C), F/C Button, RH Button, and Manual Occupancy Override Button
FX-WRZTHN00-0	Wireless Room Temperature and Humidity Sensor with Battery Level/Signal Strength LED and Manual Occupancy Override Button
FX-WRZTHP00-0	Wireless Room Temperature and Humidity Sensor with Warmer/Cooler (+/-) Setpoint Adjustment and Manual Occupancy Override Button
FX-WRZTTB00-0	Wireless Room Temperature Sensor with Display, F/C Button, and Manual Occupancy Override Button
FX-WRZTTD00-0	Wireless Room Temperature Sensor with Display, F/C Button, Fan Speed Control, and Manual Occupancy Override Button
FX-WRZTTP00-0	Wireless Room Temperature Sensor with Warmer/Cooler (+/-) Setpoint Adjustment, Battery Level/Signal Strength LED, and Manual Occupancy Override Button
FX-WRZTTR00-0	Wireless Room Temperature Sensor with Battery Level/Signal Strength LED, Manual Occupancy Override Button, and No Setpoint Adjustment
FX-WRZTTS00-0	Wireless Room Temperature Sensor with Setpoint Adjustment Scale: 55 to 80°F (13 to 27°C), Battery Level/Signal Strength LED, and Manual Occupancy Override Button

Table 3: FX-WRZ Series Sensor Model Comparison

Sensor Model	Temperature	3% Humidity	Display	F/C Button	Fan Control	Occupancy Override Button	PIR Occupancy Sensor	Setpoint Adjustment Dial[1]
FX-WRZMHN01-0	x	x				x	x	NO DIAL
FX-WRZMNN01-0						x	x	NO DIAL
FX-WRZMTB01-0	x		x	x		x	x	CONFIG
FX-WRZMTN01-0	x					x	x	NO DIAL
FX-WRZTHB00-0	x	x	x	x		x		CONFIG
FX-WRZTHN00-0	x	x				x		NO DIAL
FX-WRZTHP00-0	x	x				x		W/C
FX-WRZTTB00-0	x		x	x		x		CONFIG
FX-WRZTTD00-0	x		x	x	x	x		CONFIG
FX-WRZTTP00-0	x					x		W/C
FX-WRZTTR00-0	x					x		NO DIAL
FX-WRZTTS00-0	x					x		SCALED

1. Warmer/cooler temperature offset (W/C), single-value in 55 to 85°F (13 to 29°C) range (SCALED), system-configured - available on display models only (CONFIG), no setpoint dial (NO DIAL)

Table 4: Accessories

Product Code Number	Description
T-4000-119	Allen-Head Adjustment Tool: 1/16 in. (1.6 mm), 30 Tools per Bag
FX-WRZSST-120	Wireless Sensing System Tool: For Use with an FX-WRZ Series Sensor to Function as a Site Survey Tool for the FX-WRZ7860-0 One-to-One Room Temperature Sensing System or for the FX-ZFR1800 Series Wireless Field Bus System
CBL-NETWORK6-0	6 ft (1.8 m) SA Bus Interface Cable to Connect FX-WRZ7860-0 Receiver to FX-PC Series Programmable Controller
CBL-NETWORK25	25 ft (7.6 m) SA Bus Interface Cable to Connect FX-WRZ7860-0 Receiver to FX-PC Series Programmable Controller
CBL-NETWORK50	50 ft (15.2 m) SA Bus Interface Cable to Connect FX-WRZ7860-0 Receiver to FX-PC Series Programmable Controller
CBL-NETWORK75	75 ft (22.9 m) SA Bus Interface Cable to Connect FX-WRZ7860-0 Receiver to FX-PC Series Programmable Controller
CBL-NETWORK100	100 ft (30.5 m) SA Bus Interface Cable to Connect FX-WRZ7860-0 Receiver to FX-PC Series Programmable Controller
FX-ZFR1811-0	Wireless Field Bus Router
FX-ZFRRPT-0	Power Supply for Optional FX-ZFR1811-0 Wireless Field Bus Router

Technical Specifications

FX-WRZ7860-0 Receiver for One-to-One Wireless Room Sensing Systems

Programmable Controller Interface	Power and SA Bus Interface between FX-WRZ7860-0 Receiver and FX-PC Series Programmable Controller
Supply Voltage	Nominal 15 VDC via the SA Bus; 6.7 to 16.5 VDC Required
Current Consumption	10 mA Maximum
Addressing	DIP Switches, Field Adjustable for up to 4,096 Unique RF Addresses
Ambient Limits	**Operating:** 32 to 122°F (0 to 50°C), 5 to 95% RH, Noncondensing **Storage:** -40 to 160°F (-40 to 71°C), 5 to 90% RH, Noncondensing
RF Band	Direct-Sequence, Spread-Spectrum, 2.4 GHz ISM Bands
Transmission Power	10 mW Maximum
Transmission Range	150 ft (45 m) Maximum Indoor Line of Sight; 100 ft (30 m) Practical Average Indoor
Transmissions	Every 60 Seconds (±10 Seconds)
Receiver Outputs	One RJ-12 Port for SA Communication Bus Output (Sensed Zone Temperature and Humidity, Temperature Setpoint, and Occupancy Override Data)
Temperature Sensor Accuracy	**FX-WRZ Series Wireless Room Sensors (Temperature Only Models, and Temperature and Humidity Models):** 1.0F° (0.6C°) over the Range of 55 to 85°F (13 to 29°C); 1.5F° (0.9C°) over the Range of 32 to 55°F (0 to 13°C) and 85 to 110°F (29 to 43°C)
Temperature Sensor Type	**FX-WRZ Series Wireless Room Sensors (Temperature Only Models, and Temperature and Humidity Models):** Internal 10k ohm Negative Temperature Coefficient (NTC) Thermistor
Humidity Measurement Range	**FX-WRZ Series Wireless Room Sensors (Temperature and Humidity Models):** Full Range 0 to 100% RH; Calibrated Range 10 to 90% RH at 73°F (23°C)
Humidity Sensor Accuracy	**FX-WRZ Series Wireless Room Sensors (Temperature and Humidity Models):** ±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 a Temperature Range of 55 to 85°F (13 to 29°C)
Humidity Sensor Type	**FX-WRZ Series Wireless Room Sensors (Temperature and Humidity Models):** Planar Capacitive Polymer Sensor
PIR Occupancy Sensor Motion Detector	**FX-WRZ Series Wireless Room Sensors (PIR Occupancy Sensor Models):** Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6 m) Based on a Clear Line of Sight
Materials	NEMA 1 White Plastic Housing; UL94-5VB and V-0 Plenum Flammability Rated
Compliance	**United States:** Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TBF-MATRIXL or OEJ-WRZRADIO
	Canada: Industry Canada IC:5969A-MATRIXL or 279A-WRZRADIO
$C\epsilon$	**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.
	Japan: Transmission Complies with Article 38-24 Paragraph 1 of the Radio Law Certification Number: ATCB012834
	Australia and New Zealand: Australia/NZ Emissions Compliant (C-Tick Mark)
Shipping Weight	0.2 lb (0.09 kg)

FX-WRZ Series Wireless Room Sensors

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:** 32 to 122°F (0 to 50°C), 5 to 95% RH, Noncondensing **Storage:** -40 to 160°F (-40 to 71°C), 5 to 95% RH, Noncondensing
Wireless Band	Direct-Sequence, Spread-Spectrum, 2.4 GHz ISM Band
Transmission Power	10 mW Maximum
Transmission Range	100 ft (30 m) Maximum Line of Sight; 50 ft (15 m) Recommended
Transmissions	**Temperature:** Every 60 Seconds (±20 Seconds) **Humidity:** Every 3 Minutes, or 1 Minute Intervals if Temperature or Humidity Changes
Temperature System Accuracy (Temperature Only Models, and Temperature and Humidity Models)	1.0F°/0.6C° Over a Range of 55 to 85°F (13 to 29°C); 1.5F°/0.9C° Over a Range of 32 to 55°F (0 to 13°C) and 85 to 110°F (29 to 43°C)
Temperature Sensor Type (Temperature Only Models, and Temperature and Humidity Models)	Internal 10k ohm Negative Temperature Coefficient (NTC) Thermistor
Humidity Calibrated Range (Temperature and Humidity Models)	10% to 90% RH at 73°F (23°C)
Humidity Accuracy (Temperature and Humidity Models)	±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 a Temperature Range of 55 to 85°F (13 to 29°C)
PIR Occupancy Sensor Motion Detection (Models with PIR Occupancy Sensor)	Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6 m) Based on a Clear Line of Sight
Materials	NEMA 1 White Plastic Housing
Mounting	Screw Mount or Double-Sided Adhesive Foam Tape Mount; Double-Sided Adhesive Foam Tape Included
Compliance C E	**United States:** Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: TFB-MATRIXL or OEJ-WRZRADIO **Canada:** Industry Canada IC: 5969A-MATRIXL or 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. **Japan:** Transmission Complies with Article 38-24 Paragraph 1 of the Radio Law Certification Number: ATCB012834 **Australia and New Zealand:** C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight	0.3 lb (0.14 kg)

The performance specifications are nominal and conform to acceptable industry standards. 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.

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.