Application

The WRZ Series Wireless Room Sensors are designed to sense room/zone temperature and transmit wireless temperature control data. Some models also sense and transmit relative humidity.

In a ZFR1800 Series Wireless Field Bus System application, the sensors communicate with FEC16 Series, FEC26 Series, and VMA16 Series Controllers by means of the ZFR1811 Router.

In wired field bus applications, the sensors communicate with a WRZ-7860 Wireless Receiver. The WRZ-7860 Receiver transfers data to the controller by means of the Sensor Actuator (SA) communication bus. In a typical application, one WRZ Series Sensor reports to one WRZ-7860 Receiver, but up to five WRZ Series Sensors can be associated with a single WRZ-7860 Receiver for multi-sensor averaging or high/low temperature selection.

WRZ Series sensor models are available with or without a Liquid Crystal Display (LCD). Depending on the sensor model, the WRZ Series Sensor can transmit sensed temperature, setpoint temperature, sensed humidity, occupancy status, and low battery conditions to an associated router or receiver. The WRZ Series Sensors are designed for indoor, intra-building applications only.

The WRZ Sensors use 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.

IMPORTANT: The WRZ Series Sensors are intended 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 sensor.

IMPORTANT : Le WRZ Series Sensors est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du sensor risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du sensor.
North American Emissions Compliance

United States

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.

Canada

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.

Installation
Follow these guidelines when installing the WRZ Series Sensors:

- Transport the sensor in the original container to minimize vibration and shock damage.
- Verify that all the parts shipped with the sensor.
- Do not drop the sensor or subject it to physical shock.
- Do not attempt to remove or repair the circuit board from the sensor housing. Other than battery replacement, the sensor is not user-serviceable.

Parts Included
- one WRZ Series Sensor with strips of double-sided adhesive foam tape installed
- one DIP switch overlay for a mesh network application using a ZFR1811 Router
- one DIP switch overlay for a One-to-One application using a WRZ-7860 Receiver.
- one installation instructions sheet
- two AA alkaline batteries

Dimensions
See Figure 1 for dimensions and physical features of the WRZ Series Sensors.

Special Tools Needed
- 1.6 mm (1/16 in.) Allen-head adjustment tool (Johnson Controls® T-4000-119; order separately) for the tamper-resistant set screw that secures the sensor to the mounting base
- straight blade screwdriver (or coin) for unlocking the sensor housing from the mounting base locking tab

Mounting
The WRZ Series Sensors can be surface mounted using the adhesive tape pieces affixed to the back of the sensors.

Location Considerations
Temperature Sensor Considerations
When locating a WRZ Series Sensor, follow the same best practices used to locate a hard-wired temperature control, sensor, or thermostat:

- Mount the sensor on an interior wall where it is easily accessible, at least 1.4 m (55 in.) above the floor, in an area where the temperature is representative of the entire controlled space.
- Avoid enclosed or recessed locations and locations behind curtains, doors, or other obstructions to the controlled space.
- Avoid locations near entry foyers, doors, windows, supply air ducts, and pipes.
• Avoid locations that are exposed to drafts, direct sunlight, and other sources of heat or cooling.
• Avoid locations where the sensor could be exposed to excessive vibration.

**Wireless Transmission Considerations**
In addition to the typical thermostat and temperature control location considerations, follow these guidelines for locating a sensor in wireless applications:

• Locate the sensor on the same building level as the nearest ZFR1811 Router or WRZ-7860 Receiver.

• For best signal transmission, locate the sensor at least 51 mm (2 in.) away from any metal obstructions.

• Wherever possible, locate the sensor in the direct line of sight to the ZFR1811 Router or WRZ-7860 Receiver. Signal transmission is best if the path between the sensor and the router or receiver is as direct as possible. Line of sight is desirable but not required, as long as the path is not blocked by large metal objects.

• Avoid metal obstructions (including equipment rooms and elevator shafts) and concrete or brick walls between the sensor and the ZFR1811 Router or WRZ-7860 Receiver.

• Do not locate the sensor in recessed areas or metal enclosures.

• In mesh network applications, install the sensors within range of two or more ZFR1811 Routers. Redundancy in the layout provides the best reliability in wireless installations.

• Do not mount the sensor closer than 0.61 m (2 ft) or farther than 30 m (100 ft) from the ZFR1811 Router or 45 m (150 ft) from the WRZ-7860 Receiver.

• The recommended indoor line-of-sight transmission range between the sensor and the ZFR1811 Router is 15 m (50 ft).

**Installing the WRZ Series Sensor**
The WRZ Series Sensor can be surface mounted using the double-sided adhesive foam tape factory installed on the back of the device. To mount the sensor base with adhesive foam tape:

1. Clean the desired mounting surface to ensure that the adhesive foam tape sticks to the surface.

   **Note:** The mounting surface, mounting base, and ambient temperature must be at least 10°C (50°F) when mounting the sensor base with adhesive foam tape.

2. Remove the sensor housing from its mounting base (Figure 2).

   1. Loosen (but do not remove) the tamper-resistant set screw on the locking tab on the mounting base.
   2. Insert a coin into the slot in top of the housing and depress the locking tab on the mounting base to release the housing.
   3. Swing the sensor housing off of the mounting base.
   4. Pull bottom of sensor housing down and off of tabs on mounting base.

   **Figure 2: Removing the Sensor Housing from its Mounting Base; LCD Model Shown (Reverse the Steps to Install the Housing)**

3. Peel off the protective paper from one side of the factory-installed strips of adhesive foam tape on the back of the mounting base.

4. When positioned correctly, the arrow between the terminal slots on the inside of the mounting base should point up. Ensure that the mounting base is upright (tamper-resistant set screw on top) and press the base firmly onto the clean mounting surface.

5. See **Preparing the WRZ Series Sensor for Operation**.

   **IMPORTANT:** Do not power up the WRZ Series Sensor until a receiver or controller is installed and operating within the same Radio Frequency (RF) range. If this condition is not met, the sensor uses a higher-than-normal battery current as it attempts to find a receiver or controller within range, resulting in reduced battery life.
Removing a Mounting Base Installed with Double-Sided Adhesive Foam Tape

To remove or relocate a sensor mounted with double-sided adhesive foam tape:

1. Remove the sensor housing from its mounting base (Figure 2).
2. Remove the mounting base from the mounting surface by carefully twisting the base off of the surface.
3. Remove the adhesive foam tape from the mounting base and clean the mounting base to remove any leftover adhesive.

Note: New double-sided adhesive foam tape is required to remount the base on the surface; use Can-Do National Tape (Code No. 99116) adhesive foam tape or its equivalent.

Preparing the WRZ Series Sensor for Operation

To prepare the WRZ Series Sensor for operation, and to reinstall the sensor housing on its mounting base:

1. Place the appropriate DIP switch overlay (based on the application) over the DIP switches. See Figure 3 through Figure 5.

![Figure 3: Mesh Network Application DIP Switch Overlay](image1)

![Figure 4: One-to-One Network Application DIP Switch Overlay](image2)

![Figure 5: Back of WRZ Series Sensor Showing DIP Switches and Batteries](image3)
2. Set the DIP switches located on the back of the sensor.

For a **mesh network application using a ZFR1811 Router** (Figure 3 and Figure 6), set the DIP switches as indicated. See [Commissioning Multiple WRZ Sensors](#) for information on commissioning multiple WRZ Series Sensors in a ZFR1800 Series Wireless Field Bus System.

a. Set the POWER switch to OFF.

b. Set the MODE switch to MESH.

c. Set the PAN OFFSET switches according to the job or system plans.

**IMPORTANT:** Ensure that the PAN OFFSET is the same for each ZFR1810 Coordinator, ZFR1811 Router, and WRZ Series Sensor in a mesh network. See Figure 6.

d. Set the ZONE DIP switches according to the job or system plans.

e. Set the Master-Slave/Token-Passing (MS/TP) ADDRESS DIP switches to match the MS/TP address of the controller with which the sensor is intended to communicate.

f. Set the TRANSMIT LEVEL switch to 10 mW.

**Figure 6: Sample DIP Switch Settings**
For a One-to-One network application with a WRZ-7850 Receiver (Figure 4), set the DIP switches as indicated, ensuring that the AREA and TRANSMITTER ID switches on the WRZ-7850 Receiver. Receiver and the WRZ Series Sensor(s) are set to the same value.

a. Set the POWER switch to OFF.

b. Set the MODE switch to 1-to-1.

c. Set the SENSOR# to 199 for applications with only one sensor per controller. Use the other settings for additional sensors in applications with a single controller performing temperature averaging or high/low selection within a zone. Refer to the WRZ Series One-to-One Wireless Room Sensing System Technical Bulletin (LIT-12011641) for information on commissioning multiple WRZ Series Sensors in a WRZ Series One-to-One Wireless Room Sensing System.

d. Set the AREA switches to match the AREA switch on the WRZ-7860 Receiver.

e. Set the Transmitter ID switches to match the Transmitter ID on the WRZ-7860 Receiver.

3. Install two AA alkaline batteries (supplied) into the battery compartment on the back of the sensor. Ensure that the batteries are installed in the proper polarity (Figure 5).

4. If the address DIP switches are set to the correct positions and the temperature sensing system is ready for operation or testing, set the POWER DIP switch to the ON position (Figure 3 or Figure 4).

   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.

5. Align the tabs on the bottom edge of the mounting base with the slots on the bottom edge of the sensor housing, and rotate the sensor assembly onto its mounting base. (Reverse the procedure shown in Figure 2.)

6. Use a 1.6 mm (1/16 in.) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool to tighten the tamper-resistant set screw and secure the sensor assembly onto its mounting base (Figure 2).

Testing Signal Strength

Once the WRZ sensor is communicating with the ZFR1811 Router of WRZ-7860 Receiver, press and release the manual occupancy override button to display signal strength.

Press and hold the manual occupancy override button on the WRZ Series Sensor (Figure 1) for 5 seconds or more to place the sensor into Rapid Transmit Mode and initiate a signal strength test with the associated ZFR1811 Router or WRZ-7860 Receiver. See Rapid Transmit Mode.

Table 1: WRZ Sensor to ZFR1811 Router or WRZ-7860 Receiver Wireless Signal Strength

<table>
<thead>
<tr>
<th>Flashes</th>
<th>Signal Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Excellent/Sensor has joined network</td>
</tr>
<tr>
<td>2</td>
<td>Good/Sensor has joined network</td>
</tr>
<tr>
<td>1</td>
<td>Weak/Sensor has joined network</td>
</tr>
<tr>
<td>0</td>
<td>None/Sensor has not joined network</td>
</tr>
<tr>
<td>Fast Flash Rate (8)</td>
<td>Unable to locate associated wireless enabled field controller</td>
</tr>
</tbody>
</table>

On LCD models, the signal strength is shown on the display on the face of the sensor (callout in Figure 7).
An optional WRZ-SST-120 Wireless Sensing System Tool can also be used with any WRZ Series Sensor prior to installation as a site survey tool, to determine potential locations for system devices and to determine the wireless signal strength between the system devices in the application.

Refer to the WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (Part No. 24-10563-71) for more information on testing signal strength. For additional location consideration details, also refer to the following documents:

• ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)
• WRZ Series One-to-One Wireless Room Sensing System Technical Bulletin (LIT-12011641)

Rapid Transmit Mode
Rapid Transmit Mode forces wireless transmissions between the sensor and the parent ZFR1811 Router or WRZ-7860 Receiver, and indicates wireless signal strength between the devices.

To force the WRZ Series Sensor into rapid transmit mode:

1. Press and hold the manual occupancy override (Occ) button on a WRZ Series Sensor for 5 or more seconds. In rapid transmit mode, the sensor transmits once every 10 seconds for 5 minutes, for a total of 30 update messages. After each transmission, the sensor’s occupancy LED flashes to indicate the wireless signal strength between the sensor and the associated parent ZFR1811 Router.

2. In addition, when a sensor is in rapid transmit mode, the target ZFR1811 Router’s LED blinks to indicate the received signal strength:

3. If there is a poor signal or no signal, determine why the signal strength between the sensor and router is not adequate for your application.

4. If there is a good or average signal, the sensor and router are communicating.

Use the sensors’s rapid transmit mode in conjunction with the WRZ-SST-120 Wireless Sensing System Tool to perform a site survey and test the wireless signal strength between potential device locations, and adjust ZFR1800 device locations before installing the devices. For more information on using the sensor’s rapid transmit mode with the tool, refer to the WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (Part No. 24-10563-71).
Commissioning Multiple WRZ Sensors

*Mesh Mode*

You can add up to nine WRZ Series Sensors per FEC or VMA16 Controller in the mesh mode.

The Zone DIP switches on the WRZ Sensor relate to the Zone Netsensor (SA Bus device) address configured for the sensor in the Controller Configuration Tool (CCT). For example, if you set the Zone DIP switches to a value of 3 (that is, DIP switch 1 and 2 are set to ON), you must use Zone Netsensor address 202 in the CCT. You can add up to nine WRZ Sensors per field controller. You can use any nine of the sixteen available Zone Netsensor address settings at a time.

The mesh mode of operation is intended for use with the ZFR1810 Coordinator and ZFR1811 Router. Table 2 describes the Zone DIP switch settings for the wireless applications in mesh mode.

**Table 2: Zone Switch and SA Bus Settings When Using Multiple WRZ Sensors**

<table>
<thead>
<tr>
<th>Zone DIP Switch ON</th>
<th>Zone Netsensor (SA Bus Device) Address Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (All OFF)</td>
<td>199</td>
</tr>
<tr>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>201</td>
</tr>
<tr>
<td>1 and 2</td>
<td>202</td>
</tr>
<tr>
<td>4</td>
<td>203</td>
</tr>
<tr>
<td>1 and 4</td>
<td>204</td>
</tr>
<tr>
<td>2 and 4</td>
<td>205</td>
</tr>
<tr>
<td>1, 2, and 4</td>
<td>206</td>
</tr>
<tr>
<td>8</td>
<td>207</td>
</tr>
<tr>
<td>1 and 8</td>
<td>208</td>
</tr>
<tr>
<td>2 and 8</td>
<td>209</td>
</tr>
<tr>
<td>1, 2, and 8</td>
<td>210</td>
</tr>
<tr>
<td>4 and 8</td>
<td>211</td>
</tr>
<tr>
<td>1, 4, and 8</td>
<td>212</td>
</tr>
<tr>
<td>2, 4, and 8</td>
<td>213</td>
</tr>
<tr>
<td>1, 2, 4, and 8</td>
<td>214</td>
</tr>
</tbody>
</table>

1. Use the one-to-one application DIP switch overlay in the one-to-one mode of operation, or the mesh application DIP switch overlay in the mesh mode of operation. The switch numbers described in this table refer to the numbers on the overlays.

*One-to-One Mode*

You can add up to five WRZ Series Sensors per WRZ-7860 receiver in the One-to-One mode.

The one-to-one mode of operation is intended for use with the WRZ-7860 Receiver. For one-to-one mode, Figure 4 shows DIP switch settings.

**Repair Information**

If the WRZ Series Wireless Room Sensor fails to operate within its specifications, replace the unit. For a replacement sensor, contact the nearest Johnson Controls representative.

**Batteries**

The two AA alkaline batteries supplied with the WRZ Series Sensor typically have a life of 5 years or more. The sensor reports a low battery condition to the receiver or controller, which relays the low battery condition to the Metasys® system.

Battery strength can also be checked at the WRZ Series Sensor by pressing and holding the manual occupancy override button (Figure 1). If the battery level and signal strength LED at the sensor is on while pressing and holding the button, the battery power is acceptable. If the LED is off while pressing and holding the button, the battery power is low and the batteries need to be replaced.

On LCD models, the low battery condition is shown by **Lo bAt** flashing in the display on the face of the sensor.

**Note:** When replacing batteries, replace both batteries at the same time. Batteries removed from this device must be recycled or disposed of in accordance with local, national, and regional regulations. Only certified technicians or qualified building maintenance personnel should service Johnson Controls® products. Lithium batteries with a maximum cell voltage of 1.5 volts can be substituted to extend the period between battery replacement. Do not mix lithium and alkaline batteries in this device.
Accessories
See Table 3 for information on accessories for the WRZ Series Sensors.

Table 3: Accessories Ordering Information

<table>
<thead>
<tr>
<th>Code Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRZ-SST-120</td>
<td>Wireless Sensing System Tool: For Use with a WRZ Series Sensor, to Function as a Site Survey Tool for the WRZ-7860-0 One-to-One Room Temperature Sensing System, or for the ZFR1800 Wireless Field Bus System</td>
</tr>
<tr>
<td>T-4000-119</td>
<td>Allen-Head Adjustment Tool: 1.6 mm (1/16 in.), 30 Tools per Bag</td>
</tr>
</tbody>
</table>

Technical Specifications

WRZ Series Wireless Room Sensors (Part 1 of 2)

<table>
<thead>
<tr>
<th>Product Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRZ-THB0000-0</td>
<td>Temperature/Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment Scale: 13 to 29°C/55 to 85°F, F/C Button, Relative Humidity (RH) Button, and Occupancy Button</td>
</tr>
<tr>
<td>WRZ-THN0000-0</td>
<td>Temperature/Humidity Sensor with Occupancy Button</td>
</tr>
<tr>
<td>WRZ-THP0000-0</td>
<td>Temperature/Humidity Sensor with Warmer/Cooler (+/-) Setpoint Adjustment and Occupancy Button</td>
</tr>
<tr>
<td>WRZ-TTB0000-0</td>
<td>Temperature Sensor with Display and F/C Button</td>
</tr>
<tr>
<td>WRZ-TTD0000-0</td>
<td>Temperature Sensor with Display, F/C Button, and Fan Speed Control</td>
</tr>
<tr>
<td>WRZ-TP0000-0</td>
<td>Temperature Sensor with Warmer/Cooler (+/-) Setpoint Adjustment</td>
</tr>
<tr>
<td>WRZ-TTR0000-0</td>
<td>Temperature Sensor with No Setpoint Adjustment</td>
</tr>
<tr>
<td>WRZ-TTS0000-0</td>
<td>Temperature Sensor with Setpoint Adjustment Scale: 13 to 29°C (55 to 85°F)</td>
</tr>
</tbody>
</table>

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 (±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)
## WRZ Series Wireless Room Sensors (Part 2 of 2)

<table>
<thead>
<tr>
<th>Compliance</th>
<th>United States:</th>
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<tbody>
<tr>
<td></td>
<td>Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters</td>
</tr>
<tr>
<td></td>
<td>Transmitter FCC Identification: TFB-MATRIXL or OEJ-WRZRADIO</td>
</tr>
<tr>
<td>Canada:</td>
<td>Industry Canada IC: 5969A-MATRIXL or 279A-WRZRADIO</td>
</tr>
<tr>
<td>Europe:</td>
<td>CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the R&amp;TTE Directive.</td>
</tr>
</tbody>
</table>

**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant

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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.

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