



# WRS-RTN Series Receivers for Many-to-One Wireless Room Temperature Sensing Systems

## Installation Instructions

WRS-RTN0000-0, WRS-RTN0000-1

Part No. 24-10126-0, Rev. G

Issued February 2016

### Application

The WRS-RTN Series Receivers for the Many-to-One Wireless Room Temperature Sensing Systems are designed to receive wireless Radio Frequency (RF) temperature data from multiple WRS-TTx Series Wireless Room Temperature Sensors for multiple temperature zones. Up to 60 WRS-TTx Series Sensors can be associated with a single WRS-RTN Series Receiver. The practical average due to typical application environments is 10 to 20 sensors per receiver.

**Note:** The WRS-RTN0000-1 Receiver (CE Mark compliant model) has a reduced transmission power (10 dBm) and transmission range to comply with the requirements of select countries.

The WRS-RTN Series Receiver works in conjunction with a Metasys® system Network Automation Engine (NAE) or Network Control Engine (NCE) and provides temperature data over Ethernet to the NAE or NCE. The NAE or NCE processes the temperature data and distributes the data to various field controllers on the Metasys network.

The receiver uses direct-sequence, spread-spectrum RF technology and operates on the 2.4 GHz ISM band. The receiver meets the IEEE 802.15.4 standard for low power, low duty cycle RF transmitting systems.

The WRS-RTN Series Receiver operates as a transceiver to create a bidirectional association with the sensors, which allows the temperature sensing system to confirm and synchronize data transmissions between the sensors and the receiver.

**IMPORTANT:** The WRS-RTN Series Receiver is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the 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 receiver.

**IMPORTANT:** Le WRS-RTN Series Receiver est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du receiver 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 receiver.

**IMPORTANT:** The WRS-RTN Series Receiver is not designed or intended for use in mission-critical or life/safety applications.

Refer to the *WRS Series Many-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011095)* for information on commissioning and configuring a WRS-RTN Series Receiver for operation in a Many-to-One sensing system.

## North American Compliance Statement

### United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

#### **RF Transmitters: 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 20 cm separation distance between the antenna and all persons.

### Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

#### **RF Transmitters: Industry Canada Statements**

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

This device has been designed to operate with an antenna having a maximum gain of 2 dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

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.

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

Cet appareil a été conçu pour fonctionner avec une antenne d'un gain maximum de 2 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 50 ohms.

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.

## Installation

**IMPORTANT:** Before installing the WRS-RTN Series Receiver in plenum applications, verify acceptance of exposed plastic materials in plenum areas with the local building authority. Building codes for plenum requirements vary by location. Some local building authorities accept compliance to UL 1995, Heating and Cooling Equipment, while others use different acceptance criteria.

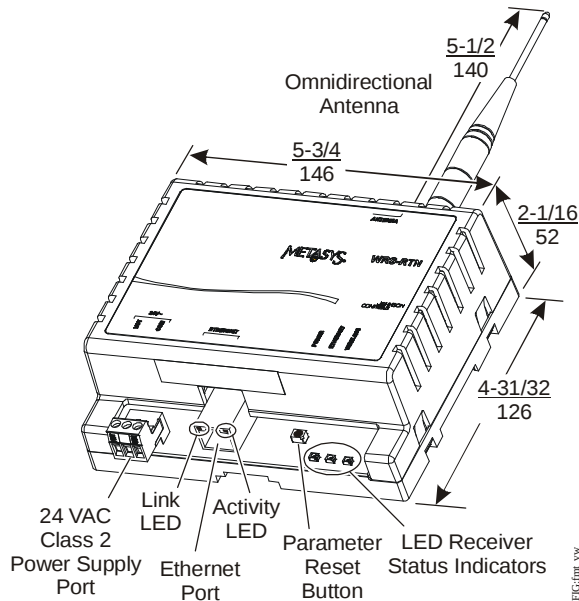
Follow these guidelines:

- Transport the WRS-RTN Series Receiver in the original container to minimize vibration and shock damage to the receiver.
- Verify that all the parts shipped with the receiver.
- Do not drop the receiver or subject it to physical shock.

### Parts Included

- one WRS-RTN Series Receiver
- one omnidirectional indoor antenna
- four No. 6 pan-head, sheet-metal screws
- one installation instructions sheet

### Dimensions



**Figure 1: WRS-RTN Series Receiver, Physical Features and Dimensions (in./mm)**

## Mounting

### Location Considerations

#### Receivers Using the Omnidirectional Indoor Antenna

Follow these guidelines when locating a WRS-RTN Series Receiver using the omnidirectional antenna.

- Locate the receiver so that it is easily accessible (typically just above the ceiling tiles).
- Locate the receiver near the center of the sensor array associated with the receiver.
- Locate the receiver on the same floor or building level as the associated sensors. (Transmissions may pass through floors. Test the transmission strength before installing associated sensors and receivers on different floors or building levels.)
- Locate the receiver in line-of-sight with as many sensors as possible.
- Mount the receiver in any orientation; but for best signal transmission, the antenna should be oriented vertically with at least 2 in. (50 mm) of the antenna tip exposed below and clear of any pipes, duct work, or other metal obstructions, in direct line-of-sight to the sensors.
- Avoid metal obstructions (including equipment rooms and elevator shafts) and concrete or brick walls between the receiver and sensors.
- Do not mount the receiver in recessed areas, metal enclosures, or shelving units (unless the receiver antenna is positioned as described in *Installing the Omnidirectional Indoor Antenna* on page 5).
- Do not point the tip of the omnidirectional antenna at any of the associated WRS-TTx Series Sensors.

**Note:** For detailed information on estimating the number of WRS-RTN Series Receivers needed for a Many-to-One application and locating the WRS-RTN Series Receivers for optimum signal coverage, refer to the *WRS Series Many-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011095)*.

### Wireless RF Signal Transmission Considerations

The maximum transmission range for indoor line-of-sight transmissions between a WRS-TTx Series Sensor and a **WRS-RTN0000-0 Receiver** is 500 ft (152 m). Taking into consideration RF signal absorption and reflection due to metal objects, walls, and furniture found in typical building interiors, the practical average indoor (line-of-sight) transmission range between a sensor and receiver is 200 ft (61 m).

The maximum transmission range for indoor line-of-sight transmissions between a WRS-TTx Series Sensor and a **WRS-RTN0000-1 Receiver** is 375 ft (114 m). Taking into consideration RF signal absorption and reflection due to metal objects, walls, and furniture found in typical building interiors, the practical average indoor (line-of-sight) transmission range between a sensor and receiver is 165 ft (50 m).

The signal strength between an installed sensor and receiver can be tested by pressing and releasing the occupancy button on the WRS-TTx Series Sensor. Refer to the *WRS Series Many-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011095)* for more information on determining the signal strength between a WRS-TTx Series Sensor and a WRS-RTN Series Receiver.

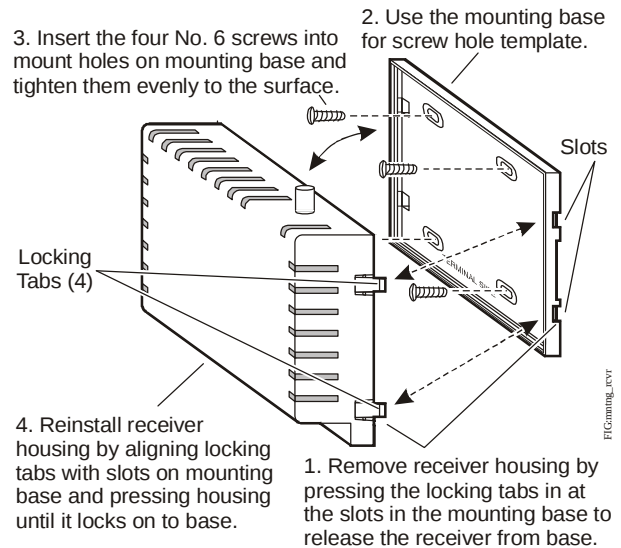
Use a WRS-SST Series Wireless Sensing System Tool to determine the radio frequency signal strength between the sensor and receiver locations. Refer to the *WRS-SST Series Wireless Sensing System Tools Technical Bulletin (Part No. 24-10139-16)* for more information on testing signal strength in your application.

### Mounting the Base

The WRS-RTN Series Receiver can be surface mounted using the four No. 6 self-tapping, pan-head screws supplied.

To mount the receiver base with screws:

1. Remove the receiver from the mounting base (Figure 2).



**Figure 2: Mounting the WRS-RTN Series Receiver**

2. Use the mounting base as a template; place the mounting base against the mounting surface.
3. Drill pilot holes at the marked locations and secure the mounting base to the surface with the (four) No. 6 screws supplied.

**IMPORTANT:** Do not overtighten the mounting screws. Overtightening the mounting screws may damage the mounting base or mounting surface.

4. Reinstall the receiver housing to the mounting base.

## Wiring

### Wiring Considerations and Guidelines

#### NOTICE

##### Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

#### NOTICE

##### Risque de dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

**IMPORTANT:** Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations. The WRS-RTN Series Receiver is a low-voltage (less than 30 VAC) device. Do not exceed the receiver's electrical ratings.

**IMPORTANT:** Prevent any static electric discharge to the WRS-RTN Series Receiver. Static electric discharge can damage the receiver and void any warranties.

Follow these guidelines when wiring a receiver:

- Route the power supply wires and Ethernet cables at least 2 in. (50 mm) away from the vent slots on the sides of the receiver housing.
- Provide slack in the wires and cables. Keep cables routed neatly around the receiver to promote good ventilation, Light-Emitting Diode (LED) visibility, and ease of service.

#### Connecting the Power Supply

The WRS-RTN Series Receiver requires a nominal 24 VAC, 50/60 Hz, 4.5 VA (minimum), Class 2 power supply. The required minimum voltage is 20.4 VAC. See Table 1 for recommended Johnson Controls® transformers.

1. Connect the 24 VAC supply power wires from the transformer to the removable three-terminal plug as shown in Figure 3. The middle terminal is not used.

**Note:** Transformers not manufactured by Johnson Controls may have different color wires. Follow the manufacturer's instructions when mounting and wiring transformers.

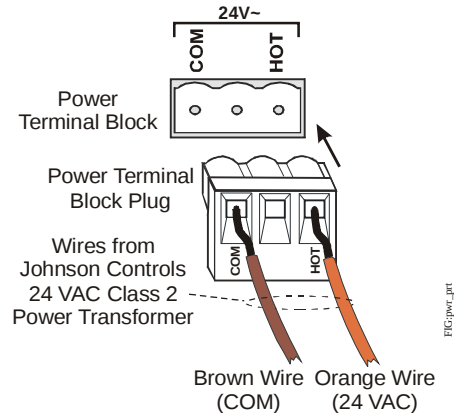


Figure 3: WRS-RTN Power Supply Connection

#### Connecting to the Ethernet Network

The (10 or 100 Mbps) Ethernet connection is an eight-pin RJ-45 network port (Figure 1). Use the Ethernet port to connect to the Internet Protocol (IP) network on which the associated NAE or NCE resides.

**IMPORTANT:** You must assign an Internet Protocol (IP) address to the WRS-RTN Series Receiver before connecting the receiver to the network the first time. Refer to the *WRS Series Many-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011095)* for more information on assigning an IP address to the receiver.

## Setup and Adjustments

#### Installing the Omnidirectional Indoor Antenna

The omnidirectional indoor antenna, supplied with the receiver, fits the reverse polarity male Sub-Miniature version A (SMA) connector.

To install the omnidirectional antenna:

1. Screw the omnidirectional antenna onto the antenna port on the WRS-RTN Series Receiver.
2. Position the antenna in a vertical position with at least 2 in. (50 mm) of the antenna tip exposed and unobstructed by any pipes, duct work, or other metal obstructions and in direct line-of-sight to the sensors.

Refer to the *WRS Series Many-to-One Wireless Room Temperature Sensing System Technical Bulletin (LIT-12011095)* and the *WRS-SST Series Wireless Sensing System Tools Technical Bulletin (Part No. 24-10139-16)* for more information.

## Repair Information

If the WRS-RTN Series Receiver fails to operate within its specifications, replace the unit. For a replacement receiver, contact the nearest Johnson Controls representative.

## Accessories

**Table 1: Accessories Ordering Information**

| Product Code Number         | Product Description                                                                                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WRS-TTP0000-0</b>        | Wireless Room Temperature Sensor, Warmer/Cooler Setpoint Adjustment, 15 dBm Transmission Power                                                                                                                                |
| <b>WRS-TTP0000-1</b>        | Wireless Room Temperature Sensor, Warmer/Cooler Setpoint Adjustment, 10 dBm Transmission Power (CE Mark)                                                                                                                      |
| <b>WRS-TTR0000-0</b>        | Wireless Room Temperature Sensor, No Setpoint Adjustment, 15 dBm Transmission Power                                                                                                                                           |
| <b>WRS-TTR0000-1</b>        | Wireless Room Temperature Sensor, No Setpoint Adjustment, 10 dBm Transmission Power (CE Mark)                                                                                                                                 |
| <b>WRS-TTS0000-0</b>        | Wireless Room Temperature Sensor, Setpoint Adjustment Scale: 55 to 85°F/13 to 29°C, 15 dBm Transmission Power                                                                                                                 |
| <b>WRS-TTS0000-1</b>        | Wireless Room Temperature Sensor, Setpoint Adjustment Scale: 55 to 85°F/13 to 29°C, 10 dBm Transmission Power (CE Mark)                                                                                                       |
| <b>WRS-SST-100</b>          | Wireless Sensing System Tool (Monitors RF Signal Strength and Temperature Data between a WRS-TTx0000-0 Series Sensor and the Associated WRS-RTN0000-0 Series or TE-7800 Series Receiver), 15 dBm Transmission Power           |
| <b>WRS-SST-101</b>          | Wireless Sensing System Tool (Monitors RF Signal Strength and Temperature Data between a WRS-TTx0000-1 Series Sensor and the Associated WRS-RTN0000-1 Series or TE-7800 Series Receiver), 10 dBm Transmission Power (CE Mark) |
| <b>TP-2420</b>              | Transformer, Wall Plug Mount, 120 VAC to 24 VAC, 20 VA, Class 2                                                                                                                                                               |
| <b>Y65T31-0<sup>1</sup></b> | Transformer, 102/208/240 VAC to 24 VAC, 40 VA, Class 2, Foot Mount, 8 in. (20 cm) Primary Leads and Secondary Screw Terminals                                                                                                 |

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

## Technical Specifications

### ***WRS-RTN Series Receivers for Many-to-One Wireless Room Temperature Sensing Systems (Part 1 of 2)***

|                                             |                                                                                                                     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Power Requirements</b>                   | 24 VAC (+10%/-15%), 50/60 Hz, 4.5 VA (Minimum) Class 2 Power Supply                                                 |
| <b>Addressing</b>                           | Configurable via the NAE or NCE for up to 511 Unique Transmitter ID Addresses and up to 31 Property Code Addresses. |
| <b>Ambient Operating Temperature Limits</b> | 32 to 122°F (0 to 50°C )                                                                                            |
| <b>Ambient Operating Humidity Limits</b>    | 5 to 95% RH, Noncondensing                                                                                          |
| <b>Ambient Storage Temperature Limits</b>   | -40 to 160°F (-40 to 71°C)                                                                                          |
| <b>Ambient Storage Humidity Limits</b>      | 5 to 90% RH, Noncondensing                                                                                          |
| <b>RF Band</b>                              | Direct-Sequence, Spread-Spectrum, 2.4 GHz ISM Bands                                                                 |
| <b>Transmission Power</b>                   | <b>WRS-RTN0000-0 Receiver:</b> 15 dBm Maximum<br><b>WRS-RTN0000-1 Receiver:</b> 10 dBm Maximum                      |

## WRS-RTN Series Receivers for Many-to-One Wireless Room Temperature Sensing Systems (Part 2 of 2)

|                                                                                                                                       |                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transmission Range</b>                                                                                                             | <b>WRS-RTN0000-0 Receiver:</b> 500 ft (152 m) Maximum Indoor Line-of-Sight; 200 ft (61 m) Practical Average Indoor<br><b>WRS-RTN0000-1 Receiver:</b> 375 ft (114 m) Maximum Indoor Line-of-Sight; 165 ft (50 m) Practical Average Indoor |
| <b>Receiver Outputs</b>                                                                                                               | One Ethernet Connection for Communicating Temperature, Setpoint, Occupancy Status, Field Strength Measurements, and Low Battery Conditions                                                                                               |
| <b>Temperature System Accuracy</b>                                                                                                    | 1F° (0.6C°) Over the Range of 55 to 85°F (13 to 29°C);<br>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)                                                                                              |
| <b>Wiring Terminations and Network Interfaces</b>                                                                                     | One Three-Position Terminal Block with Removable Terminal Plug for 24 VAC Supply Power; One 10/100 Mbps, Eight-Pin, RJ-45 Ethernet Port                                                                                                  |
| <b>Network Bandwidth Requirement</b>                                                                                                  | Less than 0.02% on a 10 Mbps Ethernet Connection                                                                                                                                                                                         |
| <b>Materials</b>                                                                                                                      | Gray Plastic Housing with UL94-5VB Flammability Rating                                                                                                                                                                                   |
| <b>Mounting</b>                                                                                                                       | Screw Mount; Four No. 6 Pan-Head, Sheet-Metal Screws Included                                                                                                                                                                            |
| <b>Compliance (WRS-RTN0000-0 Receiver)</b><br><br><br><br><br><br><br><br><br><br>                                                    | <b>United States:</b> Intended for NEC Class 2 Connection                                                                                                                                                                                |
|                                                                                                                                       | UL Listed, File E107041, CCN PAZX                                                                                                                                                                                                        |
|                                                                                                                                       | UL 94-5VB Flammability Rating                                                                                                                                                                                                            |
|                                                                                                                                       | FCC Compliant to CFR 47, Part 15, Subpart B, Class A                                                                                                                                                                                     |
|                                                                                                                                       | Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters                                                                                                                                             |
|                                                                                                                                       | Transmitter FCC Identification: CB2-TMPSENS2400A                                                                                                                                                                                         |
|                                                                                                                                       | <b>Canada:</b> Intended for CEC Class 2 Connection                                                                                                                                                                                       |
|                                                                                                                                       | UL Listed, File E107041, CCN PAZX7                                                                                                                                                                                                       |
|                                                                                                                                       | UL 94-5VB Flammability Rating                                                                                                                                                                                                            |
|                                                                                                                                       | Industry Canada IC: 279A-TSENS24A                                                                                                                                                                                                        |
| <b>Compliance (WRS-RTN0000-1 Receiver)</b><br><br> | <b>Europe:</b> 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.                                                       |
|                                                                                                                                       | <b>South Africa:</b> Accepts Directives for Europe                                                                                                                                                                                       |
| <b>Shipping Weight</b>                                                                                                                | 1.0 lb (0.45 kg)                                                                                                                                                                                                                         |

### European Single Point of Contact:

JOHNSON CONTROLS  
WESTENDHOF 3  
45143 ESSEN  
GERMANY

### NA/SA Single Point of Contact:

JOHNSON CONTROLS  
507 E MICHIGAN ST  
MILWAUKEE WI 53202  
USA

### APAC Single Point of Contact:

JOHNSON CONTROLS  
C/O CONTROLS PRODUCT  
MANAGEMENT  
NO. 22 BLOCK D NEW DISTRICT  
WUXI JIANGSU PROVINCE 214142  
CHINA

*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.*



### Building Efficiency

507 E. Michigan Street, Milwaukee, WI 53202

*Metasys® and Johnson Controls® are registered trademarks of Johnson Controls, Inc.  
All other marks herein are the marks of their respective owners. © 2016 Johnson Controls, Inc.*

## WRS-RTN Series Receivers for Many-to-One Wireless Room Temperature Sensing Systems Installation Instructions