WT-4000 Series Pneumatic-to-Direct Digital Control (DDC) Room Thermostats

Product Bulletin

WT-4002-MCR, WT-4002-MCM, WT-4002-MFR,
WT-4002-MFM, WT-ROUTER, WT-BAC-IP

The WT-4000 Series Pneumatic-to-Direct Digital Control (DDC) Room Thermostats provide reliable zone comfort and enhanced energy economy via remote monitoring and temperature setpoint management. This arrangement provides greater energy policy compliance, and facilitates trending of floor space usage in commercial, industrial, and municipal HVAC environments.

The WT-4000 Series Room Thermostats are ideally suited for energy-saving, pneumatic-to-DDC building upgrades. Designed for non-invasive replacement of existing manual pneumatic thermostats, the WT-4000 Series Room Thermostats provide a number of DDC features, including remote wireless setpoint control and occupancy scheduling, and continuous room temperature, branch line pressure, and battery status monitoring. All of these features were previously unavailable in existing pneumatic HVAC control systems.

The innovative design of the WT-4000 Series Room Thermostats completely reshapes the pneumatic HVAC control industry. The room thermostat itself does not utilize any mechanical parts. A solid state temperature sensor replaces the bi-metallic strip elements for precise room temperature monitoring. In addition, an advanced piezoelectric air valve replaces the mechanical relay for improved branch line pressure control. All of these technologies provide longer, more dependable, and maintenance-free operation.

Models are available for wireless mesh communications, or they can be configured in the field for stand-alone applications. In a wireless mesh network application, the WT-4000 Series Room Thermostat communicates with the controller by means of a Johnson Controls® WT-ROUTER Router and Johnson Controls WT-BAC-IP Gateway.

Figure 1: WT-4000 Series Pneumatic-to-DDC Room Thermostat

Some WT-4000 Series Room Thermostats include a binary dry contact input for an occupancy sensor (field furnished), to detect motion and 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.

All WT-4000 Series Room Thermostats include an LCD, with either a Fahrenheit or Celsius temperature display. Depending on the model chosen, the room thermostat can transmit sensed temperature, setpoint temperature, occupancy status, and low battery conditions to an associated router and gateway. The WT-4000 Series Room Thermostat is designed for indoor, intra-building applications only.

The WT-4000 Series uses direct-sequence, spread-spectrum RF technology, and operates on the 2.4 GHz Industrial, Scientific, and Medical (ISM) band. The room thermostat meets the IEEE 802.15.4 standard for low power, low duty cycle RF transmitting systems.

Table 1: Features and Benefits

Features	Benefits
Pneumatic-to-DDC Piezoelectric Air Valve	Eliminates the need for mechanical calibration; provides longer, more dependable, and maintenance-free operation.
Wireless RF Communications	Provides real-time status for proper room thermostat operation; centrally automates the building temperature control system; reduces installation time and costs.
Stand-Alone Capability	Allows the room thermostat to be configured in the field for stand-alone applications.
Optional WT-ROUTER Router	Enhances the wireless mesh network by extending the range of the network; provides multiple routes of communication with the WT-BAC-IP Gateway.
Easily Applicable Data Types	Allows transmission of the sensed temperature, setpoint temperature, occupancy status, and low battery conditions to the associated WT-ROUTER Router and WT-BAC-IP Gateway.
Programmable Temperature Control Schedule	Maximizes energy savings without sacrificing occupancy comfort.
Two-Pipe, Direct Acting/Reverse Acting (DA/RA) Dual Control Action	Allows replacement of a wide variety of existing pneumatic room thermostats.
Motion Sensor Input (WT-4002-MCM and WT-4002-MFM Models)	Maximizes up to 30% energy savings in high-energy usage environments; facilitates trending of floor space usage.
Liquid Crystal Display	Provides an intuitive user experience, with real-time indication of control system and room conditions.

Ordering Information

See Table 2 for a list of models available and accessories designed for use with the WT-4000 Series Pneumatic-to-DDC Room Thermostat.

> **IMPORTANT:** Use the WT-4000 Series Pneumatic-to-DDC Room Thermostat only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the room thermostat 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 thermostat.

> **IMPORTANT:** The WT-4000 Series Pneumatic-to-DDC Room Thermostat is not designed or intended for use in mission-critical or life/safety applications.

Repair Information

If the WT-4000 Series Pneumatic-to-DDC Room Thermostat fails to operate within its specifications, replace the unit. For a replacement room thermostat, contact the nearest Johnson Controls representative.

Batteries

The four 3.6 VDC, 2700mAh, size AA lithium batteries supplied with the WT-4000 Series Pneumatic-to-DDC Room Thermostat typically have a life of up to 4 years. When replacing the batteries, replace all four 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.

Note: Do not use alkaline batteries with this device.
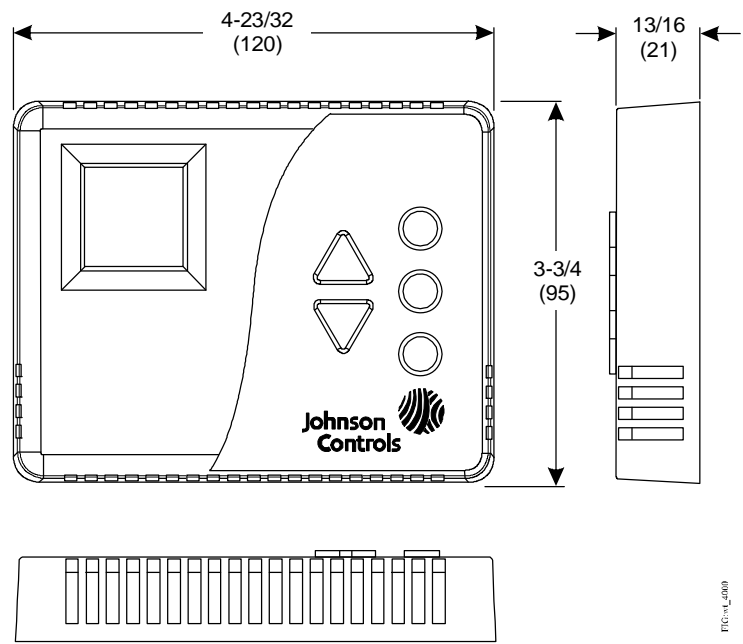
Dimensions

Figure 2: WT-4000 Series Pneumatic-to-DDC Room Thermostat, Dimensions, in. (mm)
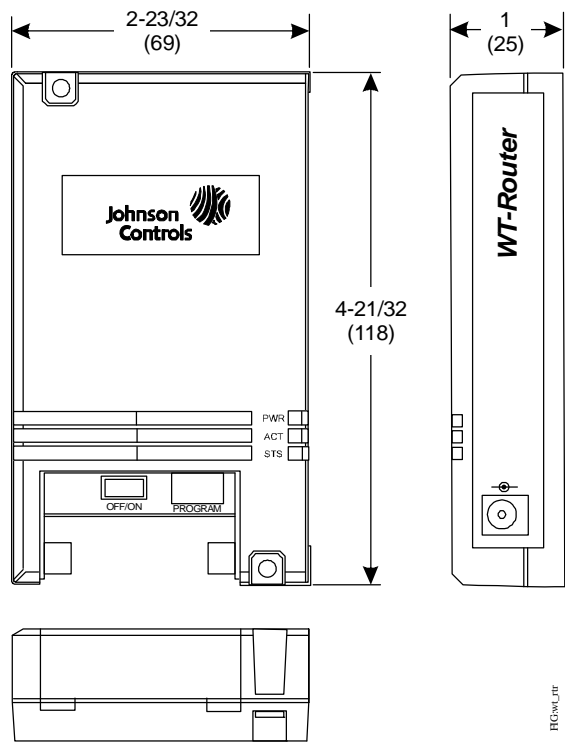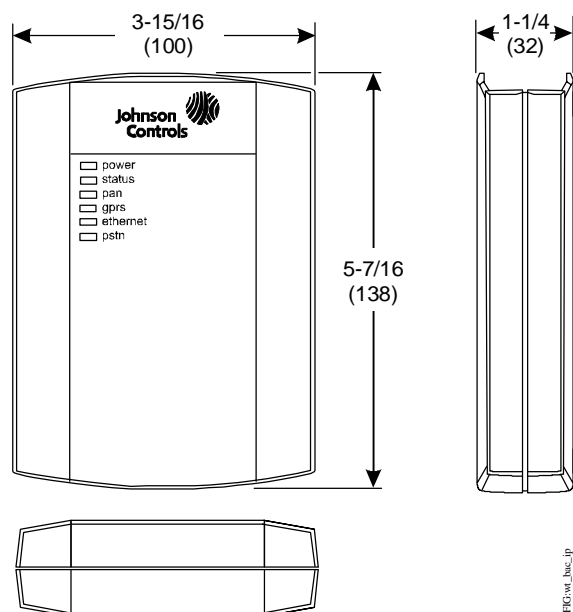

Figure 3: WT-ROUTER Router, Dimensions, in. (mm)

**Figure 4: WT-BAC-IP Gateway,
Dimensions, in. (mm)**

Table 2: Ordering Information[1]

Product Code Number	Description
WT-4002-MCR	Wireless pneumatic-to-DDC room thermostat, two-pipe, DA/RA dual control action, Celsius display; can be configured in the field for stand-alone applications
WT-4002-MCM	Wireless pneumatic-to-DDC room thermostat with binary dry contact input for an occupancy sensor (field furnished), two-pipe, DA/RA dual control action, Celsius display; can be configured in the field for stand-alone applications
WT-4002-MFR	Wireless pneumatic-to-DDC room thermostat, two-pipe, DA/RA dual control action, Fahrenheit display; can be configured in the field for stand-alone applications
WT-4002-MFM	Wireless pneumatic-to-DDC room thermostat with binary dry contact input for an occupancy sensor (field furnished), two-pipe, DA/RA dual control action, Fahrenheit display; can be configured in the field for stand-alone applications
WT-ROUTER	Router that extends the range of transmissions between the WT-4000 Series Pneumatic-to-DDC Room Thermostat and the WT-BAC-IP Gateway in mesh network applications, to accommodate physical distances up to 750 ft (229 m), overcome physical barriers, and provide for multiple transmission routes
WT-BAC-IP	Gateway and BACnet® server that acts as a bridge between the devices in a mesh network application and the BACnet client
A-4000-1037	In-line oil indicating supply air filter, barbed connections for 1/4 in. (6 mm) O.D. polytubing, 125 psig (861 kPa) maximum input pressure, five in-line filters per package
WT-BATTERY	3.6 VDC, 2700mAh, size AA lithium batteries compatible with WT-4000 Series Room Thermostats, four batteries per package

1. Refer to the *Brass Barb Fittings, Tubing, and Accessories Catalog Page (LIT-1929020)* for additional air supply accessories. Refer to the *A-4000 Series Oil Removing Filters Catalog Page (LIT-1921125)* for additional oil removal accessories.

Technical Specifications

WT-4000 Series Pneumatic-to-DDC Room Thermostats

Thermostat Type	Two-pipe
Control Action	DA/RA dual control action
Temperature Element Type	Advanced piezoelectric air valve
Air Connections	Dual barbed fittings for 5/32 or 1/4 in. (4 or 6 mm) O.D. polytubing
Sensitivity	Adjustable from 1 to 5 psi/F° (13 to 65 kPa/C°); factory set at approximately 2 psi/F° (26 kPa/C°)
Flow Capacity	699 scim (191 mL/s) at 14 psi (96 kPa)
Air Consumption	None
Supply Pressure	**Range:** 12 to 18 psig (83 to 124 kPa) nominal; 30 psig (207 kPa) maximum **Note:** The air supply must be clean, dry, and oil-free.
	Accuracy: 1.5% of full scale
Setpoint Range	Adjustable up to ±14F° (±8.4C°); factory set at ±3F° (±1.8C°)
Temperature Measurement	**Range:** 32 to 99°F (0 to 37°C)
	Accuracy: ±1.0F° (±0.6C°)
Power Requirements	**Internal:** Four 3.6 VDC, 2700mAh, size AA lithium batteries; typical battery life up to 4 years
	External: Minimum 3.1 to maximum 12 VDC via screw terminal
Room Thermostat Display	LCD indicates room temperature, branch line pressure, temperature setpoint, occupied/setback mode, heat/cool fan status, battery voltage and wireless connection status; supports temperature setpoint adjustment, HVAC mode selection (auto/heat only/cool only), fan mode selection (auto/on), and maintenance mode selection
Wireless Band	Direct-sequence, spread-spectrum, 2.4 GHz ISM band
Operating Frequency Range	2,405 to 2,475 MHz
Channels	**Quantity:** 15
	Spacing: 5 MHz
Transmissions	**Power:** 18 dBm maximum
	Rate: 250 Kbits per second
Ambient Conditions	**Operating:** 41 to 99°F (5 to 37°C), 5 to 95% RH, noncondensing
	Storage: -40 to 185°F (-40 to 85°C), 5 to 95% RH, noncondensing
Materials	White ABS plastic housing
Compliance	**United States:** Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: HSW-Z2430HPA RoHS compliant (EU Directive 2002/95/EC)
	Canada: Industry Canada IC: 4492A-Z2430HPA
Shipping Weight	0.75 lb (0.34 kg) excluding batteries and packaging

WT-ROUTER Router

Power Requirements	**External DC Supply:** 5 to 30 VDC from the power adaptor (included with the router)
	Minimum Supply Voltage: 3.1 VDC
Wireless Band	Direct-sequence, spread-spectrum, 2.4 GHz ISM band
Operating Frequency Range	2,405 to 2,475 MHz
Channels	**Quantity:** 15
	Spacing: 5 MHz
Transmissions	**Power:** 18 dBm maximum
	Rate: 250 Kbits per second
Ambient Conditions	**Operating:** 14 to 131°F (-10 to 55°C), 5 to 95% RH, noncondensing
	Storage: -40 to 185°F (-40 to 85°C), 5 to 95% RH, noncondensing
Materials	Gray ABS plastic housing
Compliance	**United States:** Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: HSW-Z2430HPA RoHS compliant (EU Directive 2002/95/EC)
	Canada: Industry Canada IC: 4492A-Z2430HPA
Shipping Weight	0.41 lb (0.19 kg)

WT-BAC-IP Gateway

Power Requirements	12 VDC external supply
Communications	**Interface:** Ethernet 10Base-T/100Base-TX with RJ45 connector
	Protocol: BACnet IP
Wireless Band	Direct-sequence, spread-spectrum, 2.4 GHz ISM band
Operating Frequency Range	2,405 to 2,480 MHz
Channels	**Quantity:** 15
	Spacing: 5 MHz
Transmissions	**Power:** 18 dBm maximum
	Rate: 250 Kbits per second
Ambient Conditions	**Operating:** 50 to 104°F (10 to 40°C), 5 to 95% RH, noncondensing
	Storage: -4 to 158°F (-20 to 70°C), 5 to 95% RH, noncondensing
Materials	Gray ABS plastic housing
Compliance	**United States:** Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter FCC Identification: HSW-Z2430HPA RoHS compliant (EU Directive 2002/95/EC)
	Canada: Industry Canada IC: 4492A-Z2430HPA
Shipping Weight	0.33 lb (0.15 kg)

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.

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.

WT-4000 Series Pneumatic-to-Direct Digital Control (DDC) Room Thermostats Product Bulletin