# TEC Series Wireless Thermostat Controller System for Staged Equipment

## Product Bulletin

TEC2001-3, TEC2002-3,
TEC2003-3, TEC2004-3

The TEC Series Wireless Thermostat Controller System provides wireless networked control of Heating, Ventilating, and Air Conditioning (HVAC) equipment on a Building Automation System (BAS) that enables remote monitoring and programming. This TEC Series System integrates into a supervisory controller using BACnet® Internet Protocol (IP) or BACnet Master-Slave/Token-Passing (MS/TP) communications.

TEC20 Coordinators allow the supervisory controller to communicate with multiple TEC Wireless Thermostat Controllers. TEC200x-3 Series Wireless Thermostat Controllers provide networked control of a variety of staged equipment:

- TEC2001-3 Single-Stage Wireless Thermostat Controllers control fan coil units, unit heaters, and single-stage packaged heating/cooling equipment

- TEC2002-3 Heat Pump Wireless Thermostat Controllers control heat pumps with up to three heating and two cooling stages

- TEC2003-3 Multi-Stage Wireless Thermostat Controllers control multi-stage packaged heating/cooling equipment



**Figure 1: TEC Wireless Thermostat Controller and TEC20 Coordinator with Direct-Mount Antenna and Remote Mount Antenna**

- TEC2004-3 Multi-Stage Economizer Wireless Thermostat Controllers control economizer operation for single- and multi-stage unitary rooftop equipment

The wireless mesh network uses ZigBee™ technology to enable remote monitoring and programming and to enhance reliability by providing redundant transmission paths through other TEC Wireless Thermostat Controllers, creating a resilient, self-healing mesh network.

**Table 1: Features and Benefits**

| Features | Benefits |
|---|---|
| Wireless Communication | Allows BAS communications capability in applications where field bus wiring within the building is prohibitive. |
| Integral Wireless Signal Strength Testing Built into Wireless Thermostat Controllers and Coordinators | Provides quick, easy, visual indication of the wireless Radio Frequency (RF) signal strength between a sensor and associated receiver; helps locate optimum device positions during installation; and aids troubleshooting your applications. |
| Backlit Liquid Crystal Display (LCD) | Offers real-time control status of the environment in easy-to-read, English text messages with constant backlight that brightens during user interaction. |
| Two Configurable Binary Inputs on Many Models | Provide additional inputs for advanced functions such as remote night setback, service or filter alarms, or occupancy override. |
| Over 20 Configurable Parameters | Enable the TEC Wireless Thermostat Controller to adapt to any application, allowing installer parameter access without opening the cover. |
| Economizer Output (TEC2004-3 Model) | Provides control of economizer operation for single- and multi-stage unitary rooftop equipment. |

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## Applications

> **IMPORTANT:** Use the TEC Series Wireless Thermostat Controller System only to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat controller 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 TEC Series Wireless Thermostat Controller System.

The TEC Series Wireless Thermostat Controller System is ideal for any location where it is cost-prohibitive, difficult, or aesthetically unappealing to hard wire between BACnet devices, including supervisory controllers (such as NAE35/45/55 or NCE25 engines) and thermostat controllers. Examples of these locations include the following:

- commercial structures with brick or solid concrete walls and/or ceilings that impede hard-wired TEC Series Thermostat Controller applications

- office buildings, retail stores, and other commercial real estate where tenant turnover is frequent

- museums, historical buildings, atriums, and other sites where building aesthetics and historical preservation are important

- buildings with marble, granite, glass, mirrored, wood veneer, or other decorative surfaces that present challenges to hard-wired applications

- buildings with asbestos or other hazardous materials that must not be penetrated or disturbed

- buildings with occupants sensitive to disruptions to business

Locations or applications that prohibit cellular telephones or Wireless Fidelity (WiFi) systems are unsuitable for the TEC Series Wireless Thermostat Controller System:

- operating rooms or radiation therapy rooms

- validated environments

- UL 864 applications

### Wireless Communication

The TEC Series Wireless Thermostat Controller System uses Direct-Sequence, Spread-Spectrum (DSSS) Radio Frequency (RF) technology and operate on the 2.4 GHz Industrial, Scientific, and Medical (ISM) band. The system meets the IEEE 802.15.4 standard for low power, low duty-cycle RF transmitting systems, and is compatible with wireless mesh networks compliant with the ZigBee standard. The TEC Series Wireless Thermostat Controller System uses a transmission power of 10 dBm.

For more information on wireless communication in the TEC Wireless Thermostat Controller System, refer to the *TEC Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011414)*.

### Wireless Signal Transmission Range

Line-of-sight transmission ranges between a TEC20 Coordinator and a TEC Wireless Thermostat Controller (or between TEC Wireless Thermostat Controllers) can be less than the recommended distances shown in Table 2. The effective transmission range for indoor applications varies because of RF signal absorption and reflection due to metal obstructions, walls (or floors), and furniture found in typical building interiors.

**Table 2:    Recommended Transmission Ranges**

| Type | Distance |
|------|----------|
| **Through Walls** | 10 m (30 ft) |
| **Open Space** | 30 m (100 ft) |

For detailed information on locating devices for optimum signal strength, refer to the *Wireless Metasys System Location Guide (LIT-12011294)*.

### Wireless RF Interference and Security

The TEC Series Wireless Thermostat Controller System is designed to virtually eliminate RF interference with other wireless applications. In most commercial environments, the TEC Series Wireless Thermostat Controller System does not encounter or generate RF interference, even in environments with cell phones and competing WiFi applications. Wireless RF transmissions using ZigBee technology use modulation schemes different from WiFi applications and use frequencies between popular WiFi bands, enabling these networks to exist in the same areas.

While using industry-standard frequencies, the devices use a proprietary protocol that secures the RF data transmissions and inhibits the deciphering of any intercepted RF data.

For more information on RF interference and wireless security, refer to the following documents:

- *TEC Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011414)*

- *Wireless Metasys System Location Guide (LIT-12011294)*

## System Overview

A TEC Series Wireless Thermostat Controller System consists of:

- a supervisory controller

- at least one TEC20 Coordinator and 15 VDC power supply (available separately)

- multiple TEC Wireless Thermostat Controllers

A TEC20 Coordinator enables the TEC Wireless Thermostat Controllers to communicate with the supervisory controller, which schedules occupancy, collects trend data, overrides points, and monitors alarms. The TEC Series Wireless Thermostat Controller System confirms and synchronizes data transmissions between the TEC Wireless Thermostat Controllers and TEC20 Coordinators.

Figure 2 illustrates a simple TEC Series Wireless Thermostat Controller System using BACnet MS/TP or BACnet IP communication protocol.

For information on commissioning and configuring a TEC Series Wireless Thermostat Controller System for operation, refer to the *TEC Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011414).*

### *Component Quantities*

A TEC Series Wireless Thermostat Controller System can support up to:

- 100 TEC Wireless Thermostat Controllers per MS/TP trunk on the supervisory controller

- 254 TEC Wireless Thermostat Controllers integrated through BACnet IP on a supervisory controller

- 30 TEC Wireless Thermostat Controllers per TEC20 Coordinator

Each increment of 30 TEC Wireless Thermostat Controllers requires one additional TEC20 Coordinator. See Table 3 for component quantities.

**Table 3:    TEC Wireless System Component Quantities**

| Number of TEC Wireless Thermostat Controllers | TEC20 Coordinators Required |
|---|---|
| **1-30** | 1 |
| **31-60** | 2 |
| **61-90** | 3 |
| **91-100** | 4 |

TEC Wireless Thermostat Controllers can be added as repeaters, as required, to extend range and provide redundant pathways. TEC Wireless Thermostat Controllers serving only as repeaters do not count towards the totals shown in Table 3; however, indiscriminate use of TEC Wireless Thermostat Controllers as repeaters can lead to reduced performance.

### BACnet MS/TP Limitations

TEC20 Coordinators each count as a single device in the BACnet MS/TP trunk limitations. TEC Wireless Thermostat Controllers do not count toward device limitations; however, they do count towards number of points limitations on a supervisory controller.

### BACnet IP Limitations

Parameters on TEC Wireless Thermostat Controllers that are integrated into the supervisory controller as points count towards limitations of number of points per supervisory controller.
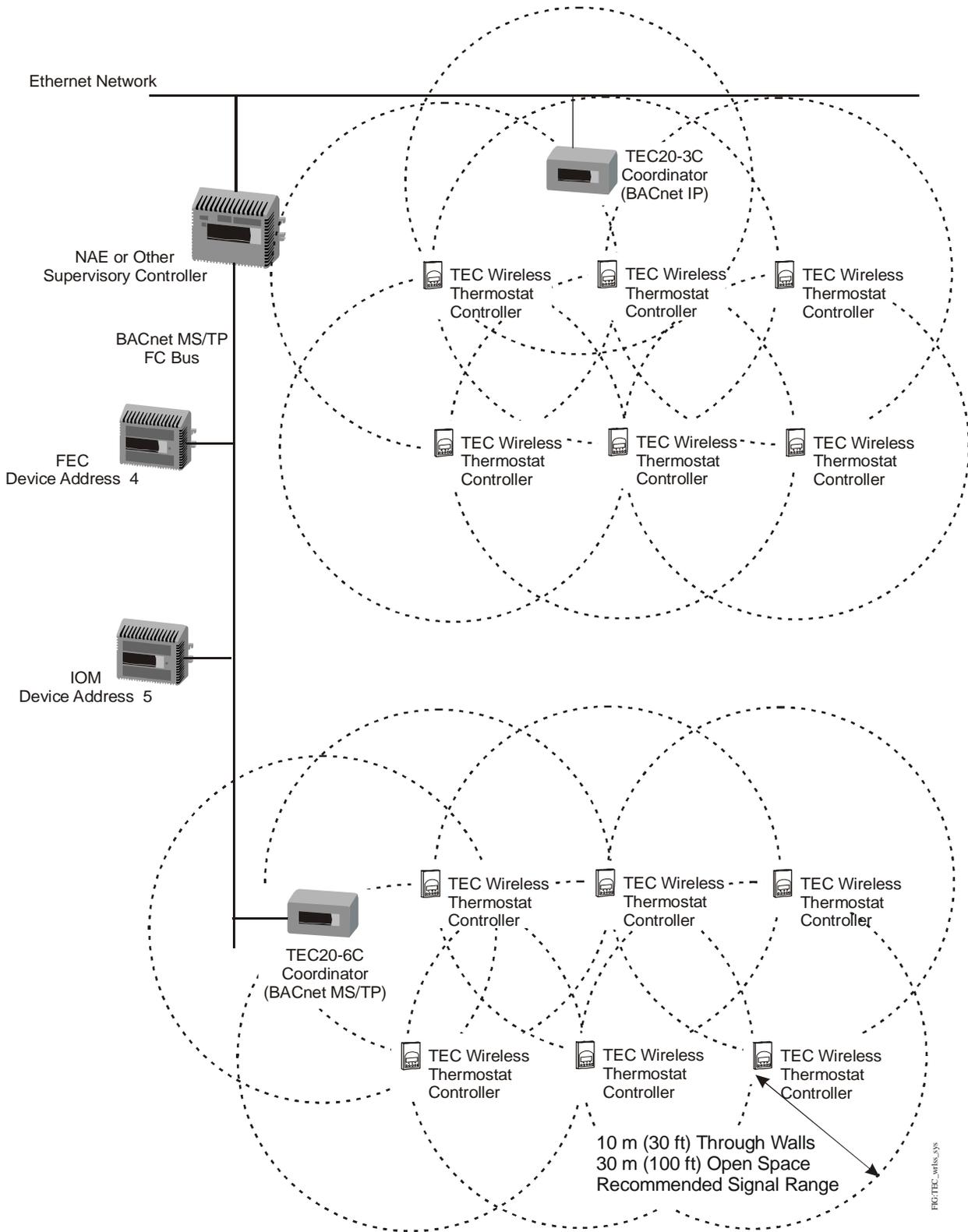
Ethernet Network

TEC20-3C
Coordinator
(BACnet IP)

NAE or Other
Supervisory Controller

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

BACnet MS/TP
FC Bus

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

FEC
Device Address  4

IOM
Device Address  5

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

TEC20-6C
Coordinator
(BACnet MS/TP)

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

TEC Wireless
Thermostat
Controller

10 m (30 ft) Through Walls
30 m (100 ft) Open Space
Recommended Signal Range

FIG:TEC_wrlss_sys

**Figure 2: TEC Series Wireless Thermostat Controller System**

### Component Descriptions

#### Supervisory Controllers

The TEC Series Wireless Thermostat Controller System uses Web-enabled, Ethernet-based, supervisory controllers that connect BAS networks to IP networks and the Web. These supervisory controllers provide scheduling, alarm and event management, trending, energy management, data exchange, dial-out capability, and password protection. With a computer running Microsoft® Internet Explorer® Web browser version 6.0 (or later), you can browse to a configured supervisory controller, and monitor and control BAS field devices in the User Interface (UI).

Refer to the *TEC Series Wireless Thermostat Controller System Technical Bulletin (LIT-12011414)* for information on configuring a TEC Series Wireless Thermostat Controller System.

#### TEC20 Coordinators

A TEC20 Coordinator provides a wireless interface between a supervisory controller and the TEC Wireless Thermostat Controllers, allowing the exchange BACnet IP (TEC20-3C) or BACnet MS/TP (TEC20-6C) messages.

The TEC20 Coordinator initiates the formation of the wireless mesh network – one is required per wireless mesh network. Each TEC20 Coordinator and the TEC Wireless Thermostat Controllers assigned to it share a Personal Area Network Identification (PAN ID).

A TEC20 Coordinator requires a 15 VDC power source (available separately). An optional remote-mount antenna and cable is available to allow transmission when the TEC20 Coordinator is mounted inside a metal panel.

#### TEC Wireless Thermostat Controllers

Depending on the model, the TEC Wireless Thermostat Controllers can communicate sensed temperature, setpoint temperature, and other data with an associated supervisory controller. Using this information, the TEC Wireless Thermostat Controllers control rooftop units (with or without economizers), heat pumps, and single- and multi-stage heating/cooling equipment. See *Applications* for more information. The TEC Wireless Thermostat Controllers are designed for indoor, intra-building applications only.

The TEC Wireless Thermostat Controllers can also serve as repeaters to extend the range of the communications within the wireless mesh network.
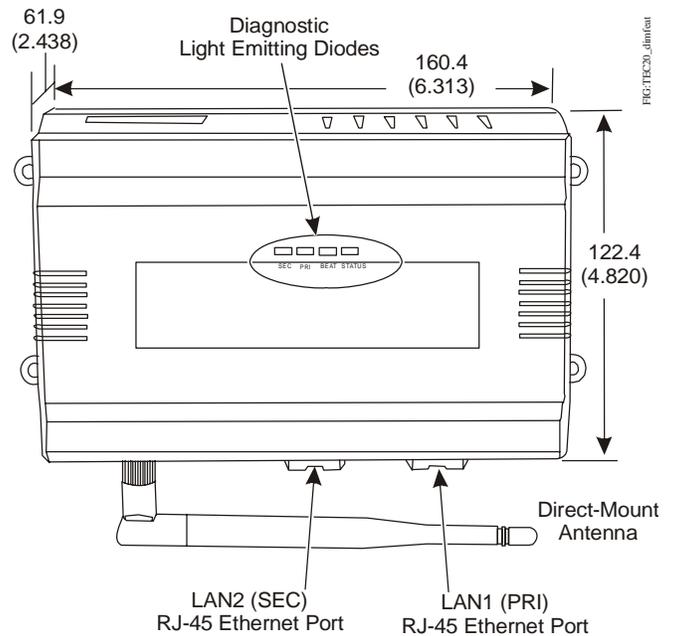


**Figure 3: TEC20 Wireless Coordinator, Physical Features and Dimensions, mm (in.)**
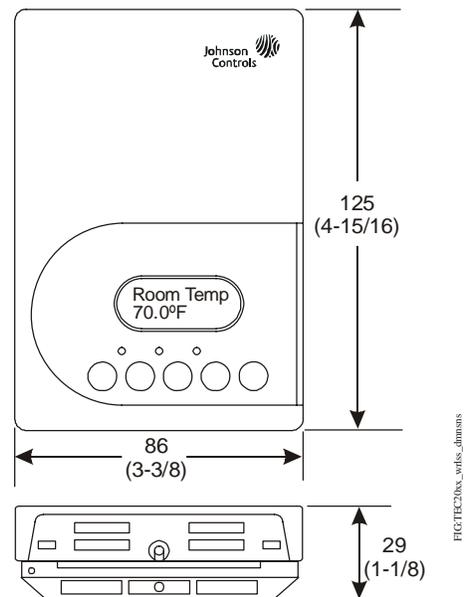


**Figure 4: TEC Wireless Thermostat Controller Dimensions, mm (in.)**

See the following list for features common to TEC Wireless Thermostat Controllers for staged equipment control:

- **Adjustable Heating/Cooling Deadband**
  Adjusts the minimum heating/cooling deadband from 2.0F°/1.0C° to 5.0F°/2.5C°.

- **Easy-to-Use Interface Keys**
  Allow for easy commissioning of the thermostat, and eliminate the need for DIP switches.

- **Levels of Keypad Lockout**
  Provide levels of keypad lockout that can be set up through the Installer Configuration Menu.

- **Accessible Configuration Parameters**
  Allow local access to all configurable parameters while limiting unwanted parameter tampering once the thermostat is set up.

- **Light-Emitting Diodes (LEDs)**
  Provide status at a glance.

- **Adjustable Temporary Occupancy Time**
  Adjusts the temporary occupancy time from 0 to 12 hours.

- **Auxiliary Contact**
  Provides 24 VAC control for reheat, lighting, and other auxiliary functions.

- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EEPROM)**
  Prevents loss of adjusted parameters during a power failure.

- **Remote Access**
  Allows the user to read/write and access the parameters of the thermostat via a supervisory controller.

- **Remote Indoor Sensing**
  Accommodates remote indoor sensors. Up to three indoor sensors can be averaged.

- **Adjustable Heating/Cooling Cycles per Hour (On/Off Control)**
  Allow configuration for 3 to 8 heating cycles and 3 or 4 cooling cycles in a 1-hour period, balancing temperature control and equipment cycling.

- **Adjustable Anti-Short Cycle Timer**
  Adjusts the minimum on/off times for heating and cooling stages from 0 to 5 minutes.

- **Frost Protection**
  Provides a minimum heating setpoint of 42.0°F/5.5°C to prevent freezing in the zone controlled by the thermostat, regardless of its mode.

- **Remote Outdoor Sensing**
  Accommodates remote outdoor sensors.

- **High and Low Balance Point Adjustments (TEC2002-3 Model)**
  Allows more precise control of heat pump operation based on the outdoor air temperature.

- **System Mode Lockout**
  Allows the heating and cooling modes to be locked out based on the outdoor air temperature when an outdoor air sensor is connected.

- **Comm Addressing and Viewing**
  Allows communications addressing via the menu-driven user interface.

- **Heating and Cooling Stage Enable/Disable (TEC2002-3, TEC2003-3, and TEC2004-3 Models)**
  Reverts the operation of two-stage thermostats to a single-stage thermostat when the second heating or cooling stage is not needed.
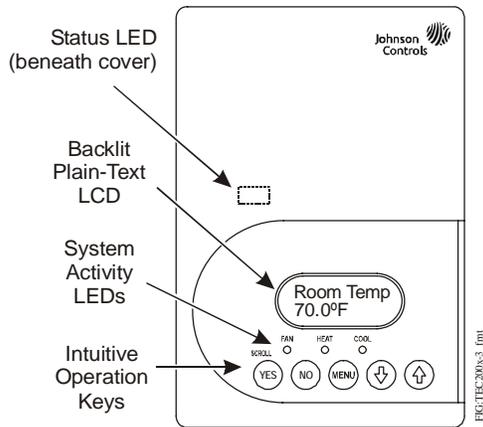
**Figure 5: Front Cover**

**User Interface Keys**

The user interface consists of five keys on the front cover as illustrated in Figure 5. The function of each key is as follows:

- Use the **YES/SCROLL** key to:

    - confirm menu selections and to advance to the next menu item

    - stop the Status Display Menu from scrolling and to manually scroll to the next parameter on the menu

    **Note:** When the device is left unattended for 45 seconds, the display resumes scrolling through the Status Display Menu.

- Use the **NO** key to decline a parameter change and to advance to the next menu item.

- Use the **MENU** key to:

    - access the Main User Menu or to exit the menu

    - access the Installer Configuration Menu or to exit the menu

- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

**LEDs**

Up to three LEDs are included to indicate the fan status, call for heat, call for cooling, call for auxiliary heat, or indicate heat pump compressor operation.

See Table 4 for information on the LEDs used on specific models.

**Table 4:   LED Status Indicators**

| LED | TEC2001-3, TEC2003-3, and TEC2004-3 Models | TEC2002-3 Model |
|-----|--------------------------------------------|-----------------|
| FAN | Yes | Yes |
| HEAT | Yes | No |
| COOL | Yes | No |
| AUX HEAT | No | Yes |
| HEAT PUMP | No | Yes |

- The **FAN** LED is on when the fan is on.

- The **HEAT** LED is on when heating or reheat is on.

- The **COOL** LED is on when cooling is on.

- The **AUX HEAT** LED is on when auxiliary heating is on.

- The **HEAT PUMP** LED is on when the heat pump compressor is on.

**LCD**

The TEC Wireless Thermostat Controllers include a 2-line, 8-character backlit display. Low-level backlighting is present during normal operation, and it brightens when any user interface key is pressed. The backlight returns to low level when the device is left unattended for 45 seconds.

**Status Display Menu**

The Status Display Menu is displayed on the LCD during normal operation. This menu continuously scrolls through these parameters:

- Room Temperature

- System Mode

- Schedule Status (Occupied/Unoccupied/Override)

- Outdoor Temperature – An outdoor air temperature sensor must be connected.

- Applicable Alarms – The backlight lights up as an alarm condition is displayed.

### Main User Menu

The Main User Menu allows the user to access and change the basic operating parameters:

- Temperature Setpoints
- System Mode
- Fan Mode

The Main User Menu uses Auto Help. Auto Help is displayed automatically in the Main User Menu when there is a pause in programming activity.

### Installer Configuration Menu

The Installer Configuration Menu allows the installer to set up the TEC Wireless Thermostat Controller for an application-specific operation. Table 5 shows the Installer Configuration Menu parameters by model.

**Table 5:   Installer Configuration Menu Parameters by Model**

| Installer Configuration Menu Parameters | TEC2001-3 | TEC2002-3 | TEC2003-3 | TEC2004-3 |
|---|---|---|---|---|
| **Comm Address** | Yes | Yes | Yes | Yes |
| **PAN ID** | Yes | Yes | Yes | Yes |
| **GET FROM** | Future Functionality - Not Available at This Release | | | |
| **CHANNEL** | Yes | Yes | Yes | Yes |
| **DI1 and DI2 Input Configuration** | Yes | Yes | Yes | Yes |
| **Three Keypad Lockout Levels** | Yes | Yes | Yes | Yes |
| **Power Delay on Power Up** | Yes | Yes | Yes | Yes |
| **Frost Protection** | Yes | Yes | Yes | Yes |
| **Maximum Heating Setpoint/Minimum Cooling Setpoint** | Yes | Yes | Yes | Yes |
| **Anti-Short Cycle Times** | Yes | Yes | Yes | Yes |
| **Heating Stage Cycles per Hour** | Yes | Yes | Yes | Yes |
| **Cooling Stage Cycles per Hour** | Yes | Yes | Yes | Yes |
| **Heating/Cooling Minimum Deadband** | Yes | Yes | Yes | Yes |
| **Heating/Cooling Fan Control** | Yes | Yes | Yes | Yes |
| **End-of-Cycle Fan Delay** | Yes | Yes | Yes | Yes |
| **Temporary Occupancy Time** | Yes | Yes | Yes | Yes |
| **Room Air Sensor Calibration** | Yes | Yes | Yes | Yes |
| **Outdoor Air Sensor Calibration** | Yes | Yes | Yes | Yes |
| **Number of Heating Stages** | No | No | Yes | Yes |
| **Number of Cooling Stages** | No | No | Yes | Yes |
| **Number of Heat Pump Compressor Stages** | No | Yes | No | No |
| **Outdoor Air Temperature Heating Lockout** | Yes | Yes | Yes | Yes |
| **Outdoor Air Temperature Cooling Lockout** | Yes | Yes | Yes | Yes |
| **High Balance Point** | No | Yes | No | No |
| **Low Balance Point** | No | Yes | No | No |
| **Comfort/Economy Auxiliary Heat** | No | Yes | No | No |
| **Reversing Valve Operation** | No | Yes | No | No |
| **Heat Pump Compressor/Auxiliary Heat Interlock** | No | Yes | No | No |
| **Outdoor Air Temperature Changeover Setpoint** | No | No | No | Yes |
| **Outdoor Air Damper Minimum Position** | No | No | No | Yes |
| **Mechanical Cooling On/Off during Economizer Operation** | No | No | No | Yes |
| **Mixed Air Temperature Setpoint** | No | No | No | Yes |
| **Mixed Air Temperature Display** | No | No | No | Yes |

## Ordering Information

Use the information in Table 6 to order a TEC200x-3 Wireless Thermostat Controller for Staged Equipment Control. Use the information in Table 7 to order a TEC20 Coordinator. Use the information in Table 8 to order accessories.

## Repair Information

If the TEC Wireless Thermostat Controller System for Staged Equipment fails to operate within its specifications, replace the unit. For a replacement, contact the nearest Johnson Controls representative.

**Table 6: TEC200x-3 Wireless Thermostat Controllers for Staged Equipment Control**

| Product Code Number | Description | Applications |
|---|---|---|
| TEC2001-3 | Single-Stage | Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment |
| TEC2002-3 | Heat Pump | Heat Pumps with Up to Three Heating and Two Cooling Stages |
| TEC2003-3 | Multi-Stage | Multi-Stage Packaged Heating/Cooling Equipment |
| TEC2004-3 | Multi-Stage Economizer | Economizer Operation for Single- and Multi-Stage Unitary Rooftop Equipment |

**Table 7: TEC20 Coordinators**

| Product Code Number | Description |
|---|---|
| TEC20-3C-2 | BACnet IP Wireless Coordinator; Requires 15 VDC Power Supply |
| TEC20-6C-2 | BACnet MS/TP Wireless Coordinator; Requires 15 VDC Power Supply |

**Table 8: TEC Wireless Accessories (Order Separately)**

| Code Number | Description |
|---|---|
| SEN-600-1 | Remote Indoor Air Temperature Sensor |
| SEN-600-4 | Remote Indoor Air Temperature Sensor with Occupancy Override and LED |
| TE-636S-1 | Strap-Mount Temperature Sensor |
| TE-6361M-1[1] | Duct-Mount Air Temperature Sensor |
| TEC20-A-1 | Replacement Antenna for TEC20 Coordinator |
| TEC20-RA-1 | Remote Antenna for TEC20 Coordinator when it is Installed Inside a Metal Cabinet or when Remote Antenna Mounting is Required by Physical Installation |
| TEC20-7X-1 | 24 VAC to 15 VDC Panel-Mounted Power Supply |
| TEC20-8X-1 | 120 VAC to 15 VDC Power Supply |
| TEC20-9B-1 | Replacement Battery Pack for TEC20 Coordinator |

1. Additional TE-636xx-x Series 10k ohm Johnson Controls Type II Thermistor Sensors are available; refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for more details.

## Technical Specifications

### TEC20 Wireless Coordinator

| | |
|---|---|
| **Product Code Numbers** | **TEC20-3C-2:** BACnet IP Version<br>**TEC20-6C-2:** BACnet MS/TP Version |
| **Power Requirements** | 15 VDC, 6 W Maximum |
| **Platform** | IBM® PowerPC® 405EP 250 MHz Processor<br>64 MB SDRAM and 64 MB Serial Flash<br>Battery Backup - Shutdown Begins within 10 Seconds<br>Real-Time Clock - 3 Month Backup Maximum with Battery |
| **Operating System** | Niagra$^{AX}$ |
| **Communications** | **Ethernet:** Two 10/100 Mbps Ports (RJ-45 Connection)<br>**RS-232:** 9-Pin D-Shell Connection<br>**RS-485:** 3-Pin Non-Isolated Port |
| **Transmission Range** | **Through Walls:** 10 m (30 ft)<br>**Line-of-Sight (Open Space):** 30 m (100 ft) |
| **RF Band** | Direct-Sequence, Spread-Spectrum Transmission; 2.4 Ghz Unlicensed Band |
| **Transmission Power** | 10 mW Maximum |
| **Wire Size** | 18 AWG Maximum, 22 AWG Recommended |
| **Ambient Conditions** | **Operating:** 0 to 50°C (32 to 122°F); 95% RH Maximum, Noncondensing<br>**Storage:** -20 to 60°C (-4 to 140°F); 95% RH Maximum, Noncondensing |
| **Compliance** | **United States:**<br>UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment<br>FCC Compliant to CFR 47, Part 15, Subpart B and Part 15 Class A |
| | **Canada:**<br>C-UL Listed, File E207782, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment, and C22.2 No. 205-M1983 Signal Equipment<br>Industry Canada, ICES-003 |
| **Dimensions (H x W x D)** | 122.4 x 160.4 x 61.9 mm (4.820 x 6.313 x 2.438 in.) |
| **Shipping Weight** | 1.1 lb (0.499 kg) |

### TEC200x-3 Wireless Thermostat Controllers (Part 1 of 2)

| | |
|---|---|
| **Power Requirements** | 19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV) |
| **Economizer Output Rating** | **TEC2004-3 Model:** 0 to 10 VDC into 2k ohm Resistance (Minimum) |
| **Relay/Triac Contact Rating** | 30 VAC, 1.0 A Maximum, 3.0 A In-Rush, Class 2 or SELV |
| **Digital Inputs** | Voltage-Free Contacts across Terminal C to Terminals DI1 and DI2 |
| **Transmission Range** | **Through Walls:** 10 m (30 ft)<br>**Line-of-Sight (Open Space):** 30 m (100 ft) |
| **RF Band** | Direct-Sequence, Spread-Spectrum Transmission; 2.4 Ghz Unlicensed Band |
| **Transmission Power** | 10 mW Maximum |
| **Wire Size** | 18 AWG Maximum, 22 AWG Recommended |
| **Temperature Sensor Type** | Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor |
| **Resolution** | ±0.1C°/±0.2F° |
| **Accuracy** | **Temperature:** ±0.5C°/±0.9F° at 21.0°C/70.0°F Typical Calibrated |
| **Temperature Range** | **Backlit Display:** -40.0°C/ -40.0°F to 50.0°C/122.0°F<br>**Heating Control:** 40.0°F/4.5°C to 32.0°C/ 90.0°F in 0.5° Increments<br>**Cooling Control:** 54.0°F/12.0°C to 38.0°C/100.0°F in 0.5° Increments |

### TEC200x-3 Wireless Thermostat Controllers (Part 2 of 2)

| | |
|---|---|
| **Auxiliary/Outdoor Air Temperature Indication Range** | -40.0°C/-40.0°F to 50.0°C/122.0°F |
| **Minimum Deadband** | 1C°/2F° between Heating and Cooling |
| **Ambient Conditions** | **Operating:** 0 to 50°C (32 to 122°F); 95% RH Maximum, Noncondensing |
| | **Storage:** -30 to 50°C (-22 to 122°F); 95% RH Maximum, Noncondensing |
| **Compliance** | **United States:**<br>UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment<br>FCC Compliant to Part 15.247 Regulations for Low Power Unlicensed Transmitters |
| | **Canada:**<br>UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment<br>Industry Canada, ICES-003 |
| **Dimensions (H x W x D)** | 125 x 86 x 29 mm (4-15/16 x 3-3/8 x 1-1/8 in.) |
| **Shipping Weight** | 0.34 kg (0.75 lb) |

*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.*

**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 20cm separation distance between the antenna and all persons.*

### 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.*

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

*Cet appareil a été conçu pour fonctionner avec une antenne d'un gain maximum de [x] 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 [y] ohms.*

**Section 5.11 of RSS-210**

*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.*

*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.*