TEC3000 Series Proportional Fan Coil Thermostats Installation Guide

LIT-12013162

2021-12-14

Applications

The networked TEC3000 Series Thermostats are stand-alone and field-selectable BACnet® MS/TP or N2 networked devices. Wireless networked models of the TEC3000 Series Thermostat are also available. Proportional Fan Coil and Individual Zone Thermostats provide control of the following:

- Local hydronic reheat valves
- Pressure-dependent variable air volume (VAV) equipment with or without local reheat
- Two- or four-pipe fan coils
- Cabinet unit heaters
- Other individual zone equipment using an on/off or floating control input

The networked models feature a field-selectable Building Automation System (BAS) BACnet MS/TP or N2 communication capability that enables remote monitoring and programming for efficient space temperature control. The wireless models (TEC30xx-xx-000) are compatible only with the WNC1800/ZFR182x Pro Series Wireless Field Bus System that enables communication with a building automation system (BAS). The new wireless models (TEC31xx-14-000) are compatible only with WRG1830/ ZFR183x Pro Series Wireless Field Bus System. All models include a USB port configuration that reduces installation time to allow simple backup and restore features from a USB drive, which enables rapid cloning of configuration between similar units.

Some models have occupancy sensing capability built into the device. These thermostats maximize up to 30% energy savings in high-energy usage commercial buildings, such as schools and hotels, during occupied times by using additional standby setpoints.

All models feature an intuitive onboard touchscreen UI with backlit display that makes setup and operation quick and easy. For Single-or Two-Stage Economizer Thermostat models, only the single-speed fan configuration is supported. For TEC3x1x and TEC3x2x models, multiple fan configurations are supported for fan coil equipment types, as follows:

- Single-speed
- Multi-speed (two or three discrete speeds)
- Variable-speed/EC motors (0 to 10 VDC control)

Some models support dehumidification on two-pipe fan coil units with reheat, and four-pipe fan coil units with or without reheat. When no heating is required, the thermostat monitors space humidity and activates dehumidification control as necessary. Heat and/or reheat is used as required to maintain the space temperature. For optimal dehumidification performance, use a fan coil unit that has a multi-speed or variable-speed fan (VSF).

Important: The TEC3000 Series Thermostat is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the 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 thermostat.

Important: Le TEC3000 Series Thermostat est destiné à transmettre des données entrantes à un équipement dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du thermostat 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 thermostat.

North American emissions compliance

Installation

Parts included

- One TEC3000 Series thermostat with integral mounting base
- One installation instructions sheet

Location considerations

For networked models, locate the TEC3000 Series thermostat:

- On a partitioning wall, approximately 5 ft (1.5 m) above the floor in a location of average temperature, to allow for vertical air circulation to the TEC
- Away from direct sunlight, radiant heat, outside walls, outside doors, air discharge grills, stairwells, and from behind doors
- Away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference
- In a clear path between the integrated passive infrared (PIR) occupancy sensor, if equipped, and the space it monitors

For wireless models, also locate the thermostat:

- Outside of a recessed area, metal enclosure, or shelving unit
- On the same building level as the other wireless devices on the same personal area network (PAN)
- At least 2 in. (51 mm) away from any metal obstruction
- In the direct line of sight to other wireless devices on the same PAN. Signal transmission is best if the path between the TEC3000 and other wireless devices is direct as possible. Line of sight is desirable but not required. See Table 1 and Table 2 for the recommended and maximum distances.
- Away from metal and large solid obstructions, that includes equipment rooms and elevator shafts and concrete or brick walls, between the TEC3000 and the ZFR182x or ZFR183x Router/Repeater or ZFR Pro Coordinator Radio
- Within range of two or more wireless devices on the same PAN. Redundancy in the layout provides the best reliability in wireless installations
- At least 20 ft (6 m) from a microwave oven

For integrated passive infrared (PIR) models, make sure that the thermostat is located centrally, where occupant movement is frequent. Ensure that the unit is not blocked by a plastic tamper resistant enclosure (such as the GRD10A-608). The plastic enclosure blocks the occupancy sensing capability.

The use of insulating foam pads is necessary for installations where wiring passes through the wall to the thermostat.

For wireless models, the effective transmission range and distance for indoor applications vary because of wireless signal absorption and reflection due to metal obstructions, walls or floors, and furniture that is found in building interiors.

Note: Allow for sufficient clearance to insert a USB drive into the USB port

Important: Only connect memory devices to the USB port. Do not use it for charging external devices.

Table 1: Indoor line-of-sight transmission ranges ZFR182x

Range type	Transmission distance	
	WNC Coordinator Router, ZFR Pro Router/Repeater	**TEC3000 Wireless Thermostat**
Recommended	50 ft (15.2 m)	50 ft (15.2 m)
Line of Sight, Maximum	250 ft (76.2 m)	100 ft (30 m)

Note: For more details about using ZFR Pro Series communication devices, refer to the *WNC1800/ ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356).*

Table 2: Indoor line-of-sight transmission ranges ZFR183x

Range type	Transmission distance	
	WRG Coordinator Router, ZFR Pro Router/Repeater	**TEC3000 Wireless Thermostat**
Recommended	250 ft (76.2 m)	250 ft (76.2 m)
Line of Sight, Maximum	1000 ft (308.4 m)	1000 ft (308.4 m)

Note:

- Actual range depends on the site and installation conditions. See *Technical Documentation* for more information.
- For more details about using ZFR Pro Series communication devices, refer to the *WRG1800/ ZFR183x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12013553).*

Important: ZFR182x Pro Series Wireless System compatible TEC30xx-1x-000 models and ZFR183x Pro Series Wireless System compatible TEC31xx-1x-000 models are not compatible with each other and cannot be used under the same PAN ID (network address).

Figure 1: thermostat shown with occupancy sensor, dimensions, in. (mm)

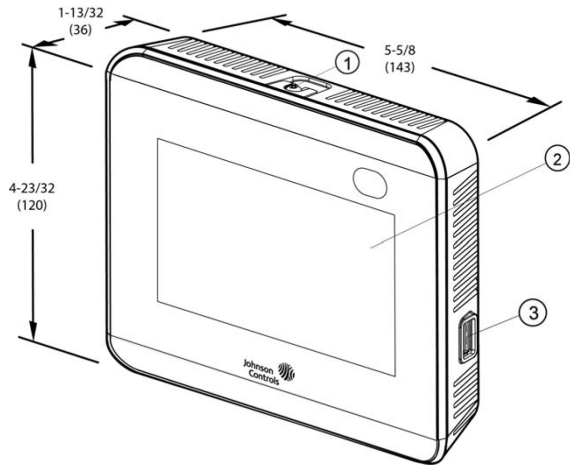


Table 3: thermostat features

Callout	Description
1	Security screw
2	Display
3	USB port

Installing the thermostat

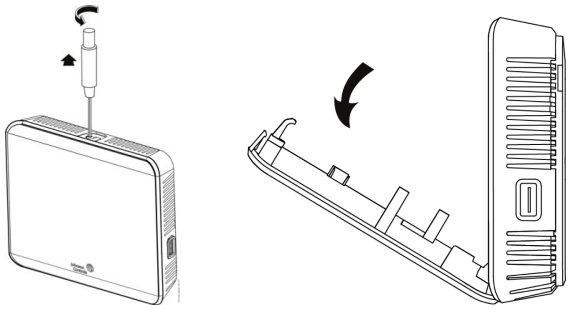
1. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls® T-4000-119 Allen-Head Adjustment Tool (order separately) to remove the security screw if it is installed on the top of the thermostat cover as illustrated in Figure 2.
2. Pull the top edge of the cover and open the thermostat as illustrated in Figure 2.

   Important: The cover is not secured on the bottom. Do not drop the cover.

   Important: If you are installing more than one thermostat, keep track of which cover attaches to which base. The thermostat version and the base version must match to ensure correct operation.

   Important: Use correct Electrostatic Discharge (ESD) precautions during installation and servicing to avoid damage to the electronic circuits of the thermostat.

Figure 2: Removing the security screw and the thermostat cover

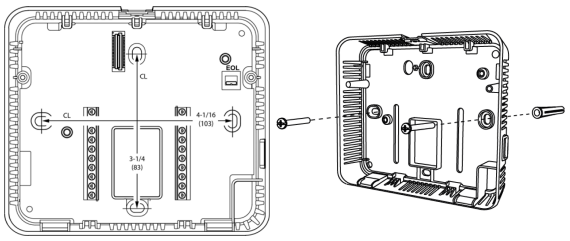


3. Align the thermostat mounting base on the wall with the security screw on the top and use the base as a template to mark the two mounting hole locations. See Figure 3.

   Note:
   - If you need to install the thermostat on an electrical junction box, use 2-1/2 in. x 4 in. (63 mm x 101 mm) square boxes with mud ring covers and avoid smaller 1-1/2 in. x 4 in.(38 mm x 101 mm) square or 3 in. x 2 in. (76 mm x 51 mm) boxes. This procedure ensures that you have enough space for cabling, if needed.
   - For surface-mounted applications, use durable mounting hardware, such as wall anchors, that cannot be easily pulled out of the mounting surface.
4. Pull approximately 6 in. (152 mm) of wire from the wall and insert the wire through the center hole in the thermostat mounting base. See Figure 3.
5. Secure the mounting base to the wall surface using two mounting screws (user supplied) as illustrated in Figure 3.

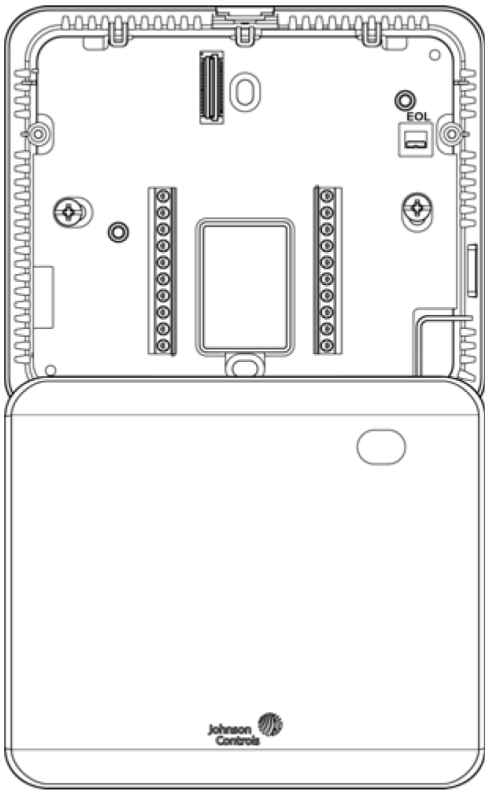
   Note: Do not overtighten the mounting screws.

Figure 3: Mounting hole locations, dimensions, in. (mm) and securing the thermostat mounting base to the wall



Note: When you mount the unit on the wall, you can hang the front cover on the end of the back cover as illustrated in Figure 4.

Figure 4: Hanging the thermostat front cover



Wiring

About this task:
When you replace an existing thermostat, remove and label the wires to identify the terminal functions.

WARNING

Risk of Electric Shock

Disconnect the power supply before making electrical connections to avoid electric shock.

⚠ AVERTISSEMENT

Risque de décharge électrique

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

⚠ CAUTION

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.

⚠ ATTENTION

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: Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the electrical ratings of the TEC3000 Series thermostat.

Important: Use correct ESD precautions during installation and servicing to avoid damage to the electronic circuits of the thermostat.

To wire the thermostat, complete the following steps:

1. Strip the ends of each wire 1/4 in. (6 mm) and connect them to the appropriate screw terminals as indicated in Table 5.

   Note: For more details on wiring the MS/TP Communications Bus, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034).*

2. Attach the communication wires to the terminal block.

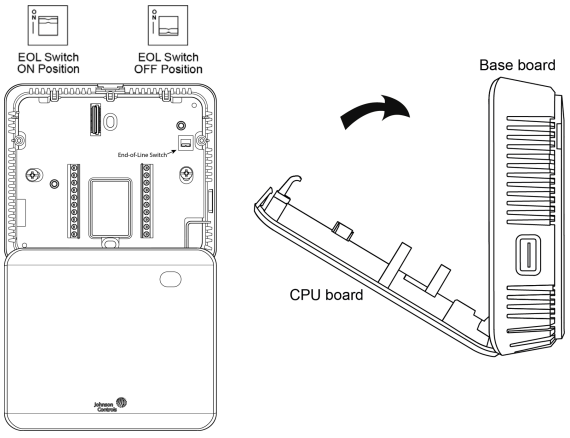
   Note: If multiple wires are inserted into the terminals, make sure to twist the wires together before you insert them into the terminal connectors.

3. Carefully push any excess wire back into the wall.

   Note: Seal the hole in the wall with fireproof material to prevent drafts from affecting the ambient temperature readings.

4. For networked models, set the bus end-of-line (EOL) termination switch to the desired location. You can designate the thermostat as the end of the Field Controller (FC) Bus and N2 Bus through the bus EOL termination switch. The default position is OFF. If the thermostat is at the end of a daisy chain of devices on the FC Bus and N2 Bus, set the EOL switch to the ON position. See Figure 5.

Figure 5: EOL switch position (left) and installing the thermostat cover (right)



5. Reattach the thermostat cover to the mounting base, bottom side first.

   Important: Make sure you reattach the cover that corresponds to its correct base. The CPU board number needs to match the base board number. Otherwise, an operation error occurs after you reattach a cover and base that do not belong together. The example in Figure 6 indicates that a TEC3612-16 CPU board is mounted on the base of a TEC3312-16. See the following table for TEC3000 model names and code numbers.

Figure 6: Error code indicating mismatched boards

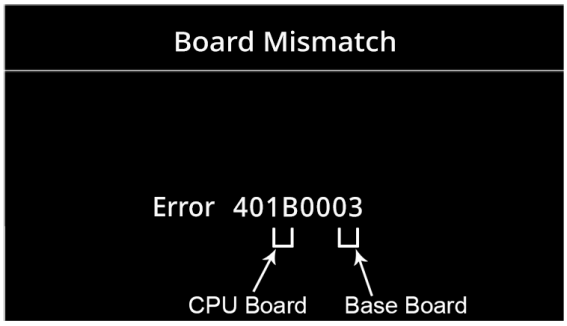


Table 4: TEC3000 model names and code numbers

Name	Code number	Name	Code number
TEC3012-13	30	TEC3313-14	05
TEC3012-14	31	TEC3322-13	08
TEC3012-16	33	TEC3322-14	09
TEC3013-14	35	TEC3322-16	0B
TEC3022-13	38	TEC3323-14	0D
TEC3022-14	39	TEC3330-13	10
TEC3022-16	3B	TEC3330-14	11
TEC3023-14	3D	TEC3330-16	13
TEC3030-13	40	TEC3331-14	15
TEC3030-14	41	TEC3612-13	18
TEC3030-16	43	TEC3612-14	19
TEC3031-14	45	TEC3612-16	1B
TEC3112-14	49	TEC3613-14	1D
TEC3113-14	4D	TEC3622-13	20
TEC3122-14	51	TEC3622-14	21
TEC3123-14	55	TEC3622-16	23
TEC3130-14	59	TEC3623-14	25
TEC3131-14	5D	TEC3630-13	28
TEC3312-13	00	TEC3630-14	29
TEC3312-14	01	TEC3630-16	2B
TEC3312-16	03	TEC3631-14	2D

ⓘ **Note:** The two-character code number is listed within the error code to indicate that the CPU board and base board do not belong together.

6. Use a 1/16 in. (1.5 mm) Allen wrench or Johnson Controls T-4000-119 Allen-Head Adjustment Tool (order separately) to reinstall the security screw on the top of the thermostat cover. See Figure 2 for security screw placement.
7. Remove the protective plastic cover sheet from the display.

➤ **Important:** If the display is dirty, gently wipe it clean with isopropyl alcohol or ethyl alcohol. Do not scrub hard as to avoid damaging the surface. Do not use other cleaners such as water, ketones, and aromatic solvents, since they may damage the polarizer.

ⓘ **Note:**

- For VAV and two-pipe systems, connect the valve to the heating output.
- Only one transformer is required for each TEC.
- Power to the AUX contact comes from the reheat coil.

See Wiring diagrams for wiring diagrams. See Table 5 for terminal identification.

Terminal identification

Table 5: Terminal identification

Terminal label	Function		
	TEC3022, TEC3023, TEC312x Proportional FC/ VAV	**TEC3322, TEC3323, Proportional FC/ VAV**	**TEC3622, TEC3623 Proportional FC/VAV**
24 V	24 VAC hot from transformer		
FAN H	Fan high		
FAN M	Fan medium		
FAN L	Fan low and fan on		
AUX	Auxiliary binary output		
AUX	Auxiliary power input		
COM[1]	24 VAC common from transformer		
CLG	Cooling command, configurable 0 VDC to 10 VDC range		
NC	No connection		
NC	No connection		
HTG	Heating command, configurable 0 VDC to 10 VDC range		
RSEN	Configurable analog input 1		
COS	Configurable analog input 2/Changeover binary switch		
COM	Common		
VSF	Variable speed fan command, configurable 0 VDC to 10 VDC range		
BI-2	Configurable binary input 2		
BI-1	Configurable binary input 1		
NET+	n/a	Not connected	Field bus+/N2+
NET-	n/a	Not connected	Field bus-/N2-
NET COM	n/a	Not connected	Isolated common for field bus

1 For the networked models, the common terminals, which do not include NET COM, are internally connected and can be used for all inputs and outputs. For the wireless models, the common terminals are connected and can be used for all inputs, outputs, and 24 VAC power.

Wiring diagrams

See Table 5 for terminal identification.

Figure 7: Proportional wiring diagram

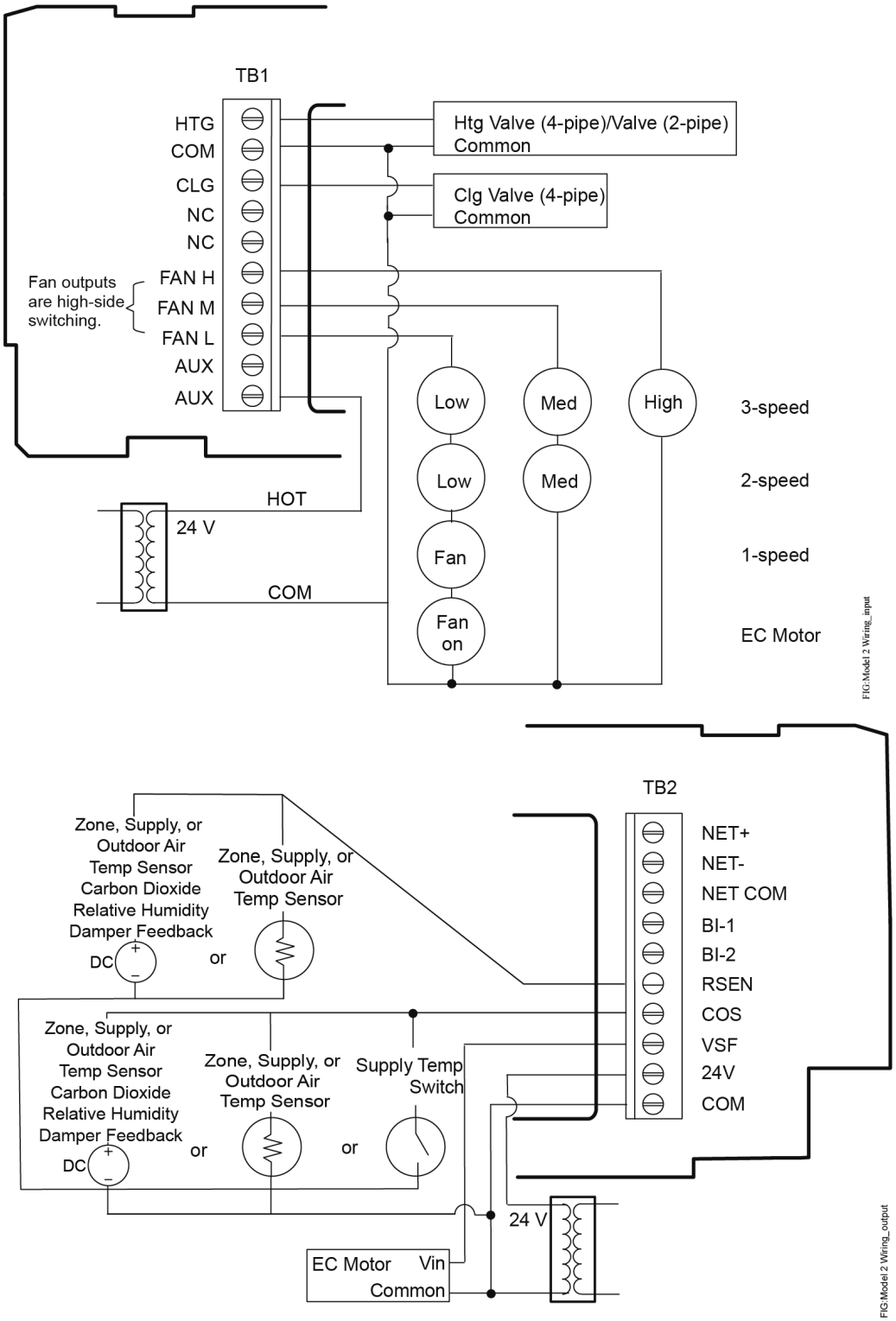


Figure 8: Proportional 0 to 10 VDC control (pressure-dependent VAV)

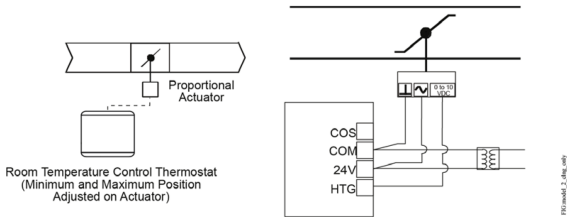


Figure 9: Proportional 0 to 10 VDC control (pressure-dependent VAV with changeover sensor/switch)

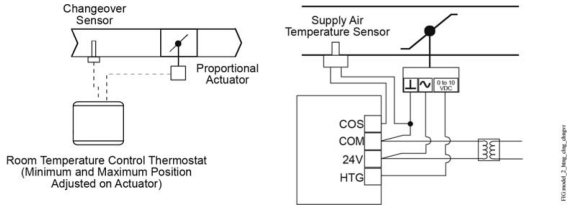


Figure 10: Proportional 0 to 10 VDC control (pressure-dependent VAV with changeover sensor/switch and reheat)

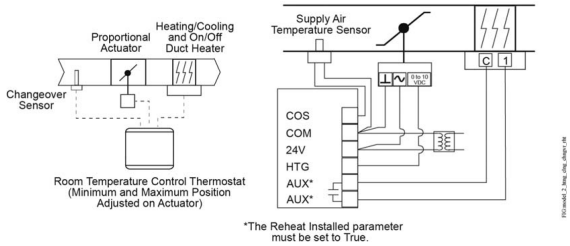


Figure 11: Floating control two-pipe heating and cooling hydronic valve control fan coil application

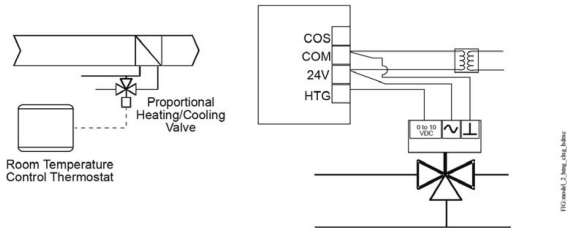


Figure 12: Floating control two-pipe heating and cooling hydronic valve control with changeover fan coil application

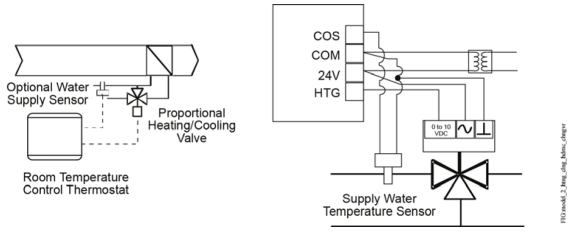


Figure 13: Proportional 0 to 10 VDC control (two-pipe and four-pipe fan coil applications)

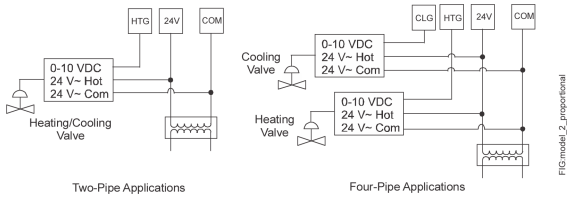


Figure 14: AUX contact wiring

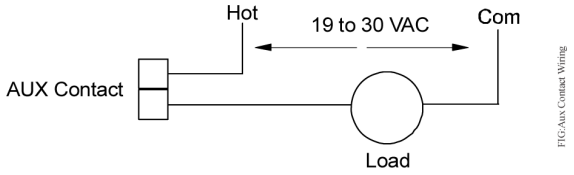
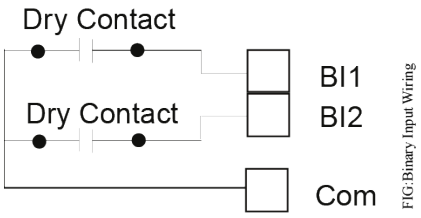


Figure 15: Binary input wiring



Setup and adjustments

Important: Table 14 provides a full list of TEC3000 menu settings. In the upcoming sections, step-by-step instructions are included on how to access and adjust the more commonly used menus.

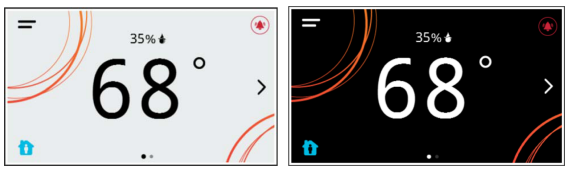
Overview

About this task:

Figure 16 shows the thermostat home screen in both the light and dark themes. You can customize it to show or hide various elements from the occupant. See Table 6 for a listing of the touchscreen icons and Table 14 to identify the home screen settings under the Display Settings. When screen customization is used in conjunction with a passcode, the building owner can control which options the occupant can access and adjust.

Important: If lockout levels are used, some icons are hidden. Table 7 provides details of these levels.

Figure 16: thermostat home screen (shown with light and dark themes)



To switch between the modern, classic, light, and dark themes, complete the following steps:

1. Press the **Menu** icon.
2. Press **Settings**.
3. Press **Display Settings**.
4. Press **Change Color Theme**.
5. Select one of the four options available.

Result
Multiple pages are available on the display. The page that you currently view is emphasized with a filled dot. The other available page displays as an empty dot.

In the modern theme, the cooling, or blue, and heating, or orange, circles show whether the cooling or heating mode is active.

Figure 17: thermostat home screen in cooling mode (left) and heating mode (right)



Customizing the home screen

About this task:
Customizing the Home screen settings include:

- Brightness
- Enable Backlight
- Units
- Time
- Time Zone
- Time Format
- Date
- Date Format

You can also show or hide these items on the Home screen:

- Fan Button
- Temperature
- Humidity
- Off Button
- Hold Button
- Setpoint
- Alarms
- Occupancy Status
- Unit Status
- Date/Time

To customize the Home screen, complete the following steps:

1. Press the **Menu** icon.
2. Press **Display Settings**.
3. Enable or disable elements of the home screen as appropriate for the building owner and occupants.
4. Set the passcode on the thermostat to prevent the occupants from changing settings that they should not have access to change.

Touchscreen icons

The following table describes the touchscreen icons on the home screen. Press and release a touchscreen icon to activate the TEC. Additional touchscreen icons appear based on the menu, and those icons are also described in the table.

Table 6: Touchscreen icons

Icon	Icon name	Description
	Menu	Displays the configuration screens where various settings may be adjusted.
	Alarm	Indicates that the thermostat has triggered an alarm.
 On  Standby	Unit Power	Powers the thermostat on or off. ⓘ **Note:** • This icon disables all equipment control but does not physically power down the unit. • On the modern home screen, if the Unit Power icon is in standby mode, the temperature and humidity also display in standby mode to indicate that control off or standby mode is active.
 On  Standby	Humidity	Indicates the humidity reading.
 On  Standby	Degree	Indicates that the unit is set to degrees.
	Network Communication (for Networked Models) No Signal	Indicates that the thermostat detected a supervisory controller and both are online. Indicates that the thermostat did not detect a supervisory controller.
 No Signal  Low Signal  Medium Signal  High Signal	Radio Signal (for Wireless Models)	Indicates the strength of the radio signal.
	Arrow Up Arrow Down	Increases or decreases the cooling value on the home screen.
	Arrow Up Arrow Down	Increases or decreases the heating value on the home screen.
	Cooling Hold	Indicates that cooling hold mode is enabled. To disable Hold mode, press the button.
	Heating Hold	Indicates that heating hold mode is enabled. To disable Hold mode, press the button.

Table 6: Touchscreen icons

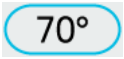
Icon	Icon name	Description
	Cooling Setpoint	Displays the current cooling setpoint. Indicates that Hold mode is disabled. To enable Hold mode, press the button.
	Heating Setpoint	Displays the current heating setpoint. Indicates that Hold mode is disabled. To enable Hold mode, press the button.
	Setpoint Temperature	Displays the current setpoint temperature. Indicates that the **Show Hold** button is set to **No**.
	Heating Mode	Indicates that heating mode is selected.
	Cooling Mode	Indicates that cooling mode is selected.
	Auto Mode	Indicates that Auto mode is selected.
 On  Auto  Quiet	Fan Overrides for Single-speed Fans	Adjusts the fan override between On, Auto, and Quiet for single-speed fans.
 On  Auto  Quiet	Fan Overrides for Variable-speed Fans	Adjusts the fan override between On, Auto, and Quiet for variable-speed fans.
 Low  Medium  High  Auto  Quiet	Fan Overrides for Multi-speed Fans	Adjusts the fan override between Low, Medium, High, Auto, and Quiet for multi-speed fans.

Table 6: Touchscreen icons

Icon	Icon name	Description
 Unoccupied  Occupied  Temporarily Occupied  Standby  Override - Occupied  Override - Unnoccupied	Occupancy Status	Adjusts the occupancy between Unoccupied, Occupied, Temporarily Occupied, Standby, Occupancy Override, Unoccupancy Override.
	Back	Moves the display to the previous screen.
	Forward	Moves the display to the next screen.
	Home	Returns the display to the main home screen.
	Save	Saves the current configuration and parameter settings.
	Delete	Deletes the scheduled event.
	Clear	Clears the password entry on the keypad screen.
	Exclamation point	Indicates that an error has occurred.

User lockout

You can select from three different levels of access at the local display to manage functionality through the supervisory controller. This lockout is independent of any display or passcode settings. The existing temporary occupancy capability is unaffected by this feature. User lockout hides the icons that are not operable. The following table describes the lockout levels.

Table 7: User lockout levels

Lockout level	Capability
State 0	Provides full access to Home Screen Display Adjustments and icons (default).
State 1	Hides the **Menu** icon.
State 2	Only allows the screen to trigger temporary occupancy. Menu, Unit Power, the Up and Down arrows, and Run/Hold are hidden.

Using the USB port

Use the USB port to quickly and easily load firmware upgrades, back up the current settings, and restore

settings to the TEC3000 by using a USB drive. The TEC3000 can recognize eight configuration files or firmware package files. The USB drive format must be FAT or FAT32. The drive cannot be NTFS format or USB 3.0. If you are upgrading firmware or copying configuration files, you need the passcode if one has been set up. Do not remove the USB drive until the firmware upgrade is complete. The TEC3000 may restart and go offline to the network engine after a firmware upgrade. The upgrade takes approximately three minutes.

Configurations are copied, except for the Communication mode. See Choosing the Communication mode (TEC3622 and TEC3623 Models) to configure the networked devices.

Note: TEC3000 Series Thermostats are not compatible with Sandisk USB drives.

Loading the firmware

1. Ensure that the TEC screen is on.
2. Insert the USB drive into the right side of the TEC. See Figure 1 for the USB port location.
3. Press the **Menu** icon.
4. Scroll down the menu and press **Update**.
5. Press **Load Firmware**.
6. Select the correct firmware version. The correct file name has the .pkg extension.
7. Press **Confirm** if you have the correct firmware version.
   The firmware is loaded from the USB drive into the TEC3000 operating system. The TEC3000 locates the new firmware only if the new firmware is on the root drive of the USB drive. See Table 16 if the firmware is not loaded correctly.
8. Remove the USB drive from the TEC3000 thermostat when the update is complete.
   The TEC3000 firmware update is complete when the TEC3000 restarts and returns to the home screen.

Backing up the settings

About this task:

Note: When you back up the settings, the network settings are not backed up or restored.

1. Ensure that the TEC screen is on.
2. Insert the USB drive into the right side of the TEC. See Figure 1 for the USB port location.
3. Press the **Menu** icon.
4. Scroll down the menu and press **Update**.
5. Press **Backup**.
   A message appears stating that the file is saved locally and on a USB drive.
6. Press **Confirm to save locally and on USB**.
   The setting files are named based on the TEC3000 model name, date, and time stamp. For example, TEC3xx1-00_2018-07-01T1. The files are saved locally and on the USB drive's root directory. See Table 16 if the settings are not backed up correctly.
7. After the settings are saved onto the USB drive, remove the USB drive from the TEC3000.

Restoring the settings

About this task:

If the TEC3000 is connected to a network (for example, MSTP or wireless), you must manually set or verify the BACnet® Instance ID and BACnet Address, or both, in the Network Setup page after the restore so they do not conflict with other devices on the same network.

1. Ensure that the TEC screen is on.
2. Insert the USB drive into the right side of the TEC. See Figure 1 for the USB port location.
3. Press the **Menu** icon.
4. Press **Update**.
5. Press **Restore**.
6. Select Local Storage or the correct configuration file created from a previous backup operation.
   The setting files are named based on the TEC3000 model name, date, and time stamp (for example, TEC3xx1-00_2018-07-01T1). The files are saved locally and on the USB drive's root directory.
7. Press **Confirm** if you have the correct file name.
   The settings are loaded from the USB drive.
8. After the settings are loaded from the USB drive, remove the USB drive from the TEC3000.

Choosing the Communication mode (TEC3622 and TEC3623 Models)

1. Ensure the TEC screen is on.
2. Press the **Menu** icon.
3. Press **Setup**.
4. Press **Network Setup**.
5. Press **FC Comm Mode**.
6. Select BACnet or N2 by pressing the up and down arrows.
   Proceed to Step 7 to perform BACnet communication and Step 15 to perform N2 communication.
7. Press the back arrow to return to the previous screen.
8. Press **BACnet Instance ID**.
9. Enter the unique BACnet® instance ID using the keypad. This value should be different to the other thermostats on the site.
10. Press **Save**.
11. Press the back arrow to return to the previous screen.
12. Press **BACnet Address**.
13. Enter the BACnet MS/TP address through the keypad.
14. Press **Save**.
15. After selecting N2 in Step 6, press **Save**.
16. Press the back arrow to return to the previous screen.
17. Press **N2 Address**.

18. Enter the N2 address through the keypad.
19. Press **Save**.

Configuring the network settings for wireless models

1. Ensure the TEC screen is on.
2. Press the **Menu** icon.
3. Press **Setup**.
4. Press **Network Setup**.
5. Press **FC Comm Mode** and the Wireless Field Bus appears. This setting cannot be changed.
6. Press the back arrow to return to the previous screen.
7. Press **BACnet Instance ID**.
8. Enter the BACnet® instance ID using the keypad. This value should be different to the other thermostats on the site.
9. Press **Save**.
10. Press the back arrow to return to the previous screen.
11. Press **BACnet Address**.
12. Enter the BACnet address using the keypad. This value should be different to the other thermostats on the PAN.
13. Press **Save**.
14. Press the back arrow to return to the previous screen.
15. Press **PAN ID**.
16. Enter the PAN ID using the keypad. This value needs to be the same as set in the associated ZFR182x or ZFR183x Coordinator Radio.
17. Press **Save**.
    Once the PAN is set, the TEC attempts to connect to the wireless network. Provided that other devices on the PAN are in radio range, the connection should occur within one minute. It can then take up to 10 minutes for the WNC gateway to display that the device is online.

Configuring the thermostat

Use the Menu icon on the home screen to access and change the basic operating parameters of the thermostat. During normal operation, press the **Menu** icon once to access the following parameters:

- Fault Status
- Setpoints
- Schedule
- Display Settings
- Setup
- Trend
- Status
- Update

Installer configuration menu

The thermostat comes from the factory with default settings for all configuration parameters. The UI menu navigation and default settings are shown in Table 14.

Before any outputs turn on, the thermostat must be configured for the equipment connected. You need to start from the home screen to perform any of the following tasks.

Screen reset

The current screen returns to the home screen and turns off if the current screen is not touched for 3 minutes. Touch the screen to turn it on again. To disable the screensaving option, press **Display Settings** and set **Enable Display Timeout** to **No**.

Selecting the unit type

About this task:
There are three unit types. They are:

- Four-pipe—This unit type has both heating and cooling coils plus a supply fan. This configuration can also be used on configurations that are heating or cooling only.
- Two-pipe—This unit type has a single set of pipes that can serve hot or chilled water plus a supply fan. The Supply Temp Type allows for the connection of an analog sensor or an aquastat to a binary input. Based on the water temperature or aquastat state, the unit controls heating or cooling.
- VAV—This unit type is designed for a pressure-dependent zone damper and the supply fan outputs are disabled. The TEC senses the supply air temperature coming from the unit. The Supply Temp Type setting allows for the connection of an analog sensor or binary duct thermostat. Based on the air temperature or duct thermostat state, the zone damper controls for heating or cooling. The TEC does not control the unit delivering the air. The logic needs to be part of another thermostat.

By default, the thermostat is configured for four-pipe fan coil mode. To change to a two-pipe or Pressure-Dependent VAV mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup**.
4. Press **General**.
5. Press **Unit Type** and select **2-pipe**, **4-pipe**, or **VAV**.
6. Press **Save** and the back arrow to return to the previous screen.

   Note: When you select VAV, the thermostat reboots in order to apply the change.

Configuring the supply fan - fan coil only

About this task:
On two-pipe or four-pipe fan coil units, three different types of supply fans are supported. These are single-speed fans, multi-speed fans up to three discrete speeds, and VSF using a 0 VDC to 10 VDC control signal and an optional binary on/off command.

Note: Fan control is not available in VAV mode.

To select the fan type, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup**.
4. Press **Supply Fan**.
5. Press **Supply Fan Type** and select **Single Speed**, **Multi-Speed**, or **Variable Speed**.
6. Press **Save** and the back arrow to return to the previous screen.

For multi-speed fan control, you can adjust the point when the medium or high speed turns on. The fan speed is based on the load of the cooling or heating device, and is a percentage between 0 and 100. By default, the Med Speed On Cmd is 33% and the High Speed On Cmd is 66%. When you only use two fan speeds, set the High Speed On Cmd to 100% to disable the third speed. To adjust these values, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup.**
4. Press **Supply Fan**.
5. Press **Medium Speed On Cmd** and adjust accordingly.
6. Press **High Speed On Cmd** and adjust accordingly.
7. Press **Save** and the back arrow to return to the previous screen.

For VSF control, you can configure the output for any range between 0 VDC and 10 VDC. The parameters are Start Voltage, Full Speed Voltage, and Minimum Command. Start Voltage is the voltage output that the fan begins to run at, and Full Speed Voltage is the voltage output that the fan reaches full speed at. Minimum Command is the percentage of the range between the Start Voltage and the Full Speed Voltage. The fan does not go below the minimum command when the fan is turned on. By default, the Start Voltage is 2 V, the Full Speed Voltage is 10 VDC, and the Minimum Command is 20%.

When the variable speed fan is off, the FAN binary output is off and the voltage at the VSF output is 0 VDC. When the fan turns on, the FAN binary output turns on and the voltage at the VSF output begins controlling the fan. When the VSF is configured for reverse acting mode, when the Start Voltage is above Full Speed Voltage, the VSF output is set to 10 VDC or the Start Voltage minus 1 VDC, whichever value is the lesser, when the fan is turned off.

To configure the variable speed parameters, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup**.
4. Press **Supply Fan**.
5. Press **Start Voltage** and adjust accordingly.
6. Press **Full Speed Voltage** and adjust accordingly.
7. Press **Minimum Command** and adjust accordingly.
8. Press **Save** and the back arrow to return to the previous screen.

Setting the Control mode

About this task:
The Control Mode informs the thermostat to run in Cooling only, Heating only, or Automatic mode, based on the temperature in the zone relative to the heating and cooling setpoints. Control Mode does not override equipment lockouts or changeover. To set the Control Mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Control Mode** and select **Cooling**, **Heating**, or **Auto** as preferred.
5. Press **Save** and the back arrow to return to the previous screen.

Setting the Fan mode - fan coil only

About this task:
The Fan Mode informs the thermostat how to handle the fan. There are two options for fan configuration: a Fan Mode available to the installer through the menu system, and a fan override available as an option to the end user from the Fan icon on the home screen. See Customizing the home screen for information on enabling and disabling end-user controls. The Fan Mode available to the installer depends on the fan type. The following options are provided for single- and variable-speed fans:

- On—For single-speed fan configurations, the fan is continuously on at a fixed speed. For variable-speed fan configurations, the fan is on at minimum speed when there is no heating or cooling demand. The fan speed increases or decreases proportionately with any variance in heating or cooling demand. The fan never stops in this mode.
- Auto—Fan cycles on demand with the thermostat entering cooling, heating, or dehumidification modes. The fan stays off if there is no demand for heating, cooling, or dehumidification.
- Smart—Fan cycles on demand with the thermostat entering cooling or heating modes during unoccupied periods, but is continuously running during occupied and standby periods.

The following Fan Mode options are provided for multi-speed fans:

- Low—Fan is continuously on low.
- Medium—Fan is continuously on medium.
- High—Fan is continuously on high.
- Auto—Fan cycles on demand with the thermostat entering cooling, heating, or dehumidification modes. The fan stays off if there is no demand of heating, cooling, or dehumidification. The fan adjusts its speed according to the user configurable value of temperature differential from setpoint.
- Smart—Fan cycles on demand with the thermostat entering cooling or heating modes during unoccupied periods but is continuously running during occupied and standby periods.

To set the Fan Mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Fan Mode** and select **On**, **Auto**, or **Smart**.
5. Press **Save** and the back arrow to return to the previous screen.

Fan override

The Fan Override icon on the home screen depends on the fan type. The following options are provided for single- and variable-speed fans:

- On—For single-speed fan configurations, the fan is continuously on at a fixed speed. For variable-speed fan configurations, the fan is on at minimum speed when there is no heating or cooling demand. The fan speed increases or decreases proportionately with any variance in heating or cooling demand. The fan never stops in this mode.
- Auto—Follows the behavior set as Fan Mode.
- Quiet—Follows the behavior set as Fan Mode, but prevents the fan from ever going above minimum speed. The Quiet option has no effect on equipment with single-speed fans.

The following Fan Override options are provided for multispeed fans:

- Low—Fan is continuously on low.
- Medium—Fan is continuously on medium.
- High—Fan is continuously on high.
- Auto—Follows the behavior set as Fan Mode.
- Quiet—Follows the behavior set as Fan Mode, but prevents the fan from ever going above minimum speed.

Configuring the zone space or equipment size

About this task:
With non-binary outputs, the TEC3000 default configuration is to have a slower temperature response for larger zones with normal-sized equipment. In installations with small zones and oversized equipment, set the Equipment Size parameter to Oversized.

To set the Equipment Size parameter, complete the following steps:

1. Press the **Menu** icon.
2. Press **Control Setup**.
3. Press **Tuning**.
4. Use the up and down arrows to navigate to **Equipment Size**.
5. Press **Equipment Setup** and select **Oversized**.
6. Press **Save** and the back arrow to return to the previous screen.

Changeover

About this task:
Pressure-Dependent VAV systems and two-pipe fan coils require changeover detection in order to switch seasonal operation between heating and cooling modes. The TEC supports the following methods for changeover: automatic changeover using an analog sensor (thermistor), automatic changeover using a binary switch, or remote changeover from a BAS and manual changeover.

For automatic changeover, a supply temperature sensor or switch must be connected to the Changeover Sensor (COS) input of the TEC. Changeover Mode must be set to Auto, and Supply Temp Type must be set for Analog Sensor, Cooling N.C. (cooling when switch is closed), or Heating N.C. (heating when switch is closed). When you use an analog sensor, you can adjust the changeover setpoint. The changeover logic applies a 10°F differential to the setpoint. The system switches to cooling mode when the temperature drops below the changeover setpoint and remains in cooling mode until the measured temperature has risen 10 degrees above the changeover setpoint.

To configure automatic changeover, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup**.
4. Press **Changeover**.
5. Press **Changeover Mode** and select **Auto**.
6. Press **Supply Temp Type** and select **Analog Sensor**, **Cooling N.C.**, or **Heating N.C.**
7. If using an Analog Supply Temp Sensor, press **Supply Temp Type** and adjust accordingly.
8. Press **Save** and the back arrow to return to the previous screen.

Additionally, the thermostat supports manual changeover. To configure manual changeover, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **Equipment Setup**.
4. Press **Changeover**.

5. Press **Changeover Mode** and select **Heating** or **Cooling**.
6. Press **Save** and the back arrow to return to the previous screen.

Ensure that the Supply Temp type is set to Analog Sensor. The Changeover Mode is also exposed to the BAS through the CGOVR-MODE and can be commanded from the BAS.

On two-pipe or VAV systems without an automatic changeover, or on four-pipe systems, you can use RSEN or COS as a monitor-only point for reading an analog sensor. By setting the thermostat in four-pipe mode, or selecting Heating or Cooling for Changeover Mode, the thermostat defaults to monitor-only mode for RSEN or COS and exposes the value to the network as the supply temperature.

Dehumidification control

About this task:
The TEC3000 thermostat supports dehumidification control on fan coil devices under three configurations:

- Four-pipe fan coil
- Four-pipe fan coil with reheat
- Two-pipe fan coil with reheat and changeover valve that allows cooling

Dehumidification operates when the zone humidity increases above the humidity setpoint and the thermostat is in a satisfied state with no active call for cooling or heating and when the chilled water temperature is low enough to provide dehumidification. When dehumidification is active, the cooling device controls to the humidity setpoint, and the heating device reheats the zone in order to keep the temperature at setpoint. When in dehumidification mode, the multi-speed or variable-speed fan operates at the appropriate speed to maintain balance between maximizing condensation and moisture removal and keeping the zone from overcooling.

To enable dehumidification control, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Dehum Enable** and select **Yes**.
5. Press **Save** and the back arrow to return to the previous screen.
6. Press **Dehumidification Sequence Mode** and select the applicable dehumidification sequence option based on the type of equipment.

Dehumidification Sequence Modes:

- Individual Coils – select this option if Unit Type is 4-pipe fan coil with separate heating and cooling coils and both the heating and cooling valve installed.
- Single Coil – select this option if Unit Type is 4-pipe fan coil with a single sheet of fins for both the heating coil and cooling coil with separate heating and cooling valves installed.
- 2-Pipe with Reheat – select this option is Unit Type is 2-pipe fan coil with reheat installed and changeover able to be set up as Cooling.

If Dehumidification Sequence Mode is set to Individual Coils, complete the following steps to finalize the configuration:

1. In the Dehumidification Sequence Menu, press **Cooling Valve Minimum Position** and use the up and down arrows to set the value for the minimum position the cooling valve can go to during active dehumidification.
2. Press **Cooling Valve Starting Position** and use the up and down arrows to set the value for the position the cooling valve can open to, at the start of dehumidification.
3. Press **Heating Valve Starting Position** and use the up and down arrows to set the value for the position the heating valve can open to at the start of dehumidification.
4. Press **Chilled Water Supply Temperature** setpoint and use the up and down arrows to enter the setpoint for the chilled water supply to the fan coil. This option is available only if there is no chilled water supply temperature sensor connected to the TEC or there is no value written using NET-CHWST.

If Dehumidification Sequence Mode is set to Single Coil, complete the following steps to finalize the configuration:

1. In the Dehumidification Sequence Menu, press **Coil Tempering Time** and use the up and down arrows to setup the value for the amount of time to wait before transitioning from opening cooling or heating valve to opening heating or cooling valve.
2. Press **Dehumidification Overcool Limit** and use the up and down arrows to set the value of the zone temperature overcool limit applicable during active dehumidification.
3. Press **Chilled Water Supply Temperature** setpoint and use the up and down arrows to enter the setpoint for the chilled water supply to the fan coil. This option is available only if there is no chilled water supply temperature sensor connected to the TEC or there is no value written using NET-CHWST.

If Dehumidification Sequence Mode is set to 2-Pipe with Reheat, complete the following steps to finalize the configuration:

1. In the Dehumidification Sequence Menu, press **Cooling Valve Minimum Position** and use the up and down arrows to set the value for the minimum position the cooling valve can go to during active dehumidification.
2. Press **Cooling Valve Starting Position** and use the up and down arrows to set the value for the position the cooling valve can open to, at the start of dehumidification.
3. Press **Chilled Water Supply Temperature** setpoint and use the up and down arrows to enter the setpoint for the chilled water supply to the fan coil. This option is only shown if there is no chilled water supply temperature sensor connected to the TEC or there is no value being written using NET-CHWST.

To adjust the dehumidification setpoint, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setpoints**.
3. Press **Dehumidification**
4. Press **Dehumidification** and use the up and down arrows to set the Humidity Value setpoint.
5. Press **Save** and the back arrow to return to the previous screen.

These options are also exposed to the BAS through the point names DEHUM-ENABLE, UNOCC DEHUM ENABLE, 4PIPE-DEHUM-SEQ-MODE, 2PIPE-DEHUM-SEQ-MODE, ZNH-SP, CLGVLV-MIN-POS, CLGVLV-START-POS, HTGVLV-START-POS, COIL-TPR-TIME, DEHUM-OVRGLG-LIM, and CHWST-SP.

Temperature setpoints

About this task:
The thermostat provides a flexible setpoint configuration to give power to the building owner while being easy to use by the occupant. In addition to a simple up/down offset adjustment on the home screen for the occupant, there are six temperature setpoints on the TEC. The six temperature setpoints are Cooling and Heating setpoints for Occupied, Unoccupied, and Standby modes. To set these setpoints, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setpoints** and then **Temperature**.
3. Select the setpoint to adjust and change as preferred.
4. Press **Save** and the back arrow to return to the previous screen.

   Note: The TEC enforces a 2-degree deadband between heating and cooling setpoints. If a setpoint violates this standard (for example, cooling setpoint is set to 70 with a heating setpoint already set to 70), the opposing setpoint is modified to comply with this deadband (in the previous example, the heating setpoint would automatically change to 68).

Result
The occupant has access to an up/down adjustment from the home screen. This adjustment applies a fixed offset (+/-) to the currently active setpoint, and this offset holds until the occupancy state of the thermostat changes. If the user taps the setpoint on the home screen, the icon inverts and displays white text on a black icon. The offset is held throughout all occupancy periods. For example, if the TEC is cooling in Occupied mode to an occupied cooling setpoint of 72 and you raise the setpoint 2 degrees to 74 from the home screen and then select **Hold**, then the +2 degree offset persists through an occupancy change. If the occupancy then changes to unoccupied, with a setpoint of 80 degrees, the effective setpoint is 82 degrees. This allows the occupant to have a small amount of control over raising or lowering the temperature, but the building owner can still set back setpoints during standby and unoccupied periods. When the setpoint is in Hold mode, pressing the icon again releases the hold and immediately sets the setpoint offset back to 0.

When the TEC is in Min/Max mode (Setpoints/Occ Setpoint Select are equal to Min and Max Setpoint), the TEC rejects any attempts to change the present value outside of the valid range. If the present value is outside of the valid range (for example, if the Occ Setpoint Select is switched from Setpoint Offset to Min and Max Setpoint), the present value is reset to be in the center of the valid range.

The four modes of setpoint operation are described in the following table.

Table 8: Setpoint operation

Mode of setpoint operation	Details
Occ Setpoint Select = Setpoint Offset and Heat Cool Setpoint Mode = Individual Setpoints	This is the default mode and the original mode of operation that the TEC was released with (the next three modes are new). In this mode, the TEC has a heating setpoint and a cooling setpoint. There is a common Setpoint Offset (warmer/cooler adjust) that applies to each setpoint simultaneously. The range of setpoint adjustment is two-fold: • There are large constant ranges bounding the individual heating and cooling setpoints. • There is also a smaller configurable range limit set to the Setpoint Offset point (**Control Setup** > **General** > **Max Setpoint Offset**).
Occ Setpoint Select = Min and Max Setpoints and Heat Cool Setpoint Mode = Individual Setpoints	In this mode, the TEC has a heating setpoint and a cooling setpoint. Each setpoint has a configurable range (**Setpoints** > **Temperature** > **Min Cooling Setpoint**, **Max Cooling Setpoint**, **Min Heating Setpoint**, and **Max Heating Setpoint**). The configurable range values are bounded by the larger constant bounds used in Setpoint Offset mode and are constrained in the following manner: Min must be below Max and Heating must be below Cooling, so in order from least to greatest, the values are: Min Heating Setpoint, Max Heating Setpoint, Min Cooling Setpoint, and Max Cooling Setpoint.

Table 8: Setpoint operation

Mode of setpoint operation	Details
Occ Setpoint Select = Setpoint Offset and Heat Cool Setpoint Mode = Common Setpoint	In this mode, the TEC has one setpoint, Common Setpoint, for heating and cooling. There is also a common Setpoint Offset (warmer/cooler adjust) that only applies to Common Setpoint. Otherwise, this setting works the same as when Occ Setpoint Select = Setpoint Offset and Heat Cool Setpoint Mode = Individual Setpoints.
Occ Setpoint Select = Min and Max Setpoints and Heat Cool Setpoint Mode = Common Setpoint	In this mode, the TEC has one setpoint, Common Setpoint, for heating and cooling. There is a configurable range for Common Setpoint, Min Setpoint, and Max Setpoint.

Configuring occupancy

To adapt to nearly any application, the TEC3000 thermostat supports a wide variety of occupancy sources, such as:

- Local stand-alone weekly scheduler
- Remote schedule from BAS
- Occupancy sensor (internal or remote)
- Occupancy binary input (configurable)
- Manual occupancy override
- Temporary occupancy (by interacting with the screen while in unoccupied mode)
- Temporary occupancy binary input

Occupancy is determined using a top-down decision matrix as shown in Table 9.

Enumerations may not match the *TEC3000 Series Networked and Wireless Proportional Fan Coil and Individual Zone Thermostats with Dehumidification Capability Installation Instructions (LIT-12013162)*and the *TEC3000 Series Field-Selectable BACnet MS/TP or N2 Networked Thermostats Technical Bulletin (LIT-12011956)*for network engine releases prior to 7.x.

Table 9: Occupancy determination

Sequence of operation (highest to lowest priority)					**Status indicated**	
Manual Occupancy Mode (OCCOVRD-MODE)	**Occupancy BI (BI1-S, BI2-S)** [1]	**Temporary Occupancy**[2,3]	**Occupancy Schedule (External or Schedule) (OCC- CONFIG, NET- OCC)**	**Motion Sensor**[4]	**Effective Occupancy (EFF- OCC)**	**Occupancy Source (OCCSOURCE- S)**
Occupied	–	–	–	–	Occupied-Override	Occ Override
Unoccupied					Unoccupied-Override	
No Override	Closed[1]				Occupied	Occupancy BI
	Open[1]				Unoccupied	
	Not Configured[1]	True[2]	NOT Occupied		Temp Occupancy	Temp Occ
		True[3]	NOT Occupied		Temp Occupancy	Temp Occ BI
		False	Occupied	True	Occupied	Occupancy Sensor
				False	Standby	
				Disabled	Occupied	Occupancy Schedule
			Unoccupied	–	Unoccupied	
			Standby		Standby	
			Not Set[5]	True	Occupied	Occupancy Sensor
				False	Unoccupied	
				Disabled	Occupied	Occupancy Schedule

1 Not Configured means that neither BI1 Config nor BI2 Config is set to Occupancy BI. Open and Closed refer to the current state of the BI when configured as Occupancy.
2 True is triggered by interacting with the screen during a scheduled unoccupied period. A value of True can only occur when the schedule is not Occupied.
3 When triggered by a BI configured for Temp Occ, the input is ignored when the schedule is Occupied, the Manual Occupancy Mode is **not**No Override, or an Occupancy BI is configured.
4 Built-in occupancy sensing (PIR) or BI configured for Motion NO or Motion NC.
5 Not Set occurs when no events are scheduled through the local scheduler, or the schedule source is set to Schedule and the Schedule is writing Not Set as the schedule.

Selecting schedule source

Scheduling (for networked models)

The TEC3000 thermostat can operate as a stand-alone unit with an internal schedule or scheduled with an external schedule. The OCC-CONFIG object sets the method used for scheduling.

If the OCC-CONFIG is set to External, the NET-OCC object is used to control the unit externally.

If the OCC-CONFIG is set to Schedule, the internal schedule commands the LOCAL-OCC object, which sets the Occupancy Schedule command.

Note: If you do not have a schedule in the Schedule object and you have the OCC-CONFIG set to Schedule, you can control the unit with the LOCAL-OCC object externally; however, we do not recommend this method. See Table 10 for scheduling information.

Once the Occupancy Schedule command is set, the settings shown in the occupancy determination table determine the effective occupancy. See Table 9.

Table 10: BAS objects for scheduling

OCC-CONFIG	LOCAL-OCC (Commanded by internal schedule)	NET-OCC	Occupancy schedule command[1]
External	Any State (Internal Schedule in Control)	Occupied	Occupied
		Unoccupied	Unoccupied
		Standby	Standby
		Not Set	Not Set
Schedule	Occupied	Not Applicable	Occupied
	Unoccupied		Unoccupied
	Standby		Standby
	Not Set		Not Set

1 The effective occupancy can be affected by other factors listed in Table 9.

Scheduling (for all models)

About this task:

The occupancy schedule comes from either the weekly scheduler built into the TEC or as an input from the BAS. The Schedule Source must be selected to tell the thermostat where to read the occupancy source from. To select the schedule source, complete the following steps:

1. Press the **Menu** icon.
2. Press **Scheduling**.
3. Press **Schedule Options**.
4. Press **Schedule Source** and select **Schedule** (Local) or **External** (BAS).
5. Press **Save** and the back arrow to return to the previous screen.

This option is also exposed to the BAS through the point OCC-CONFIG. If BAS is configured as the occupancy source, map the point NET-OCC in and write to that point to control the schedule remotely. If the supervisor goes offline (as identified by the network icon going away on the home screen of the TEC), the control logic automatically falls back to the local schedule as the occupancy source. If that schedule is not set, the default occupancy is continuously occupied.

Setting the local schedule

About this task:

A weekly occupancy schedule with up to four occupancy events for each day can be set locally on the TEC and operate independently of a supervisor. To set the schedule, complete the following steps:

1. See Selecting schedule source to ensure the schedule source is set to Local.
2. Press the **Menu** icon.
3. Press **Scheduling**.
4. Press **Set Schedule**.
5. Select the days to which the schedule should apply.

   Note: If events are already set for the selected days, they appear in the corresponding event box. If any events conflict between selected days, an asterisk appears in the event box. See Figure 18.
6. Select the Occupancy Status icon for the event. See Figure 19.

   Important: Internally, the TEC3000 uses a BACnet schedule where daily schedules are independent of the previous and next days. The default occupancy of the TEC3000 from the factory is set to Occupied. As a result, a daily event at 12:00 AM must be scheduled if you do not want the thermostat to transition to Occupied Mode at midnight.

Figure 18: Selecting the days

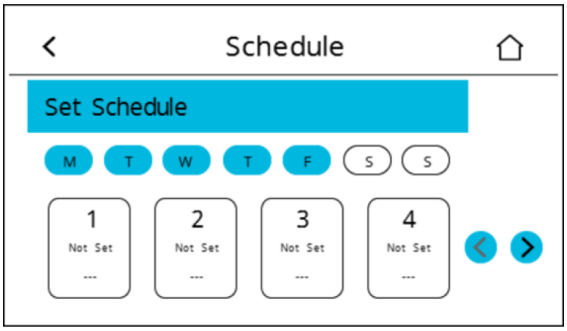
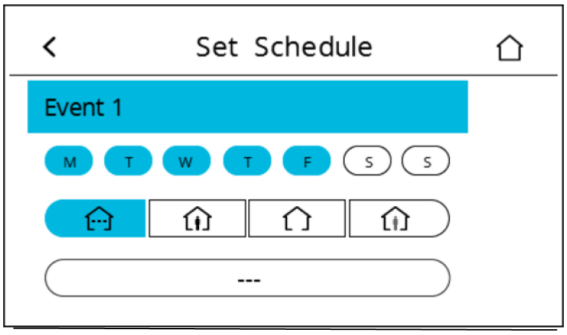
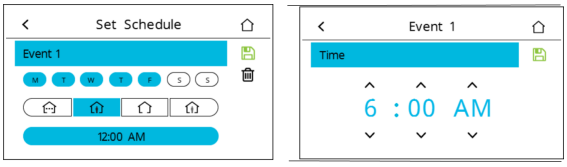


Figure 19: Setting the Room Occupancy mode



7. Select the **Time Set** button. See Figure 20.
8. Set the time to the time at which the event will occur and press **Save**. The screen resets to the **Event Set Schedule** screen.

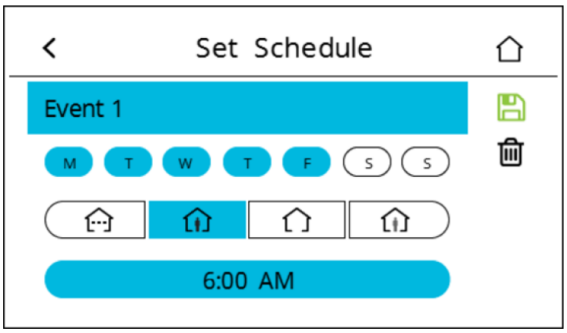
Figure 20: Selecting the Time Set button (left) and setting the event time (right)



9. Press **Save** to save the completed event or **Trash** to delete the completed event. See Figure 21. The screen resets to the **Event 1 Set Schedule** screen.

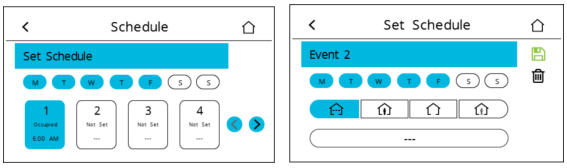
   Note: If you do not select **Save** at this point, the event is not saved and you must repeat the event selection sequence.

Figure 21: Saving the event



10. Select **Event 2**. See Figure 22. The screen resets to the **Event 2 Set Schedule** screen. The days are preselected to match Event 1.
11. Select the **Occupancy Status** button for Event 2.

Figure 22: Selecting event 2 (left) and setting the occupancy status (right)



12. Select the **Time Set** button.
13. Set the time for Event 2 and press **Save**.
14. Press the back arrow to return to the **Scheduling** screen.

Overriding the Occupancy mode

About this task:
The TEC supports a manual override of all other schedule sources (for example, Schedule, Occupancy BI, and temporary occupancy). To override the Occupancy Mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Scheduling**
3. Press **Schedule Options**.
4. Press **Manual Occ Mode** and select **Occupied**, **Unoccupied**, or **No Override**.
5. Press **Save** and the back arrow to return to the previous screen.

This option is also exposed to the BAS through the point OCCOVRD-MODE.

Enabling optimal start

About this task:
The TEC supports an advanced optimal start algorithm. The algorithm works in conjunction with a local schedule to pre-heat or pre-cool the zone before scheduled occupancy periods begin, in order to bring the zone to the required occupied setpoint when the scheduled occupancy period begins. Occupant comfort is ensured while automatically minimizing energy usage. This algorithm creates a model of the zone being controlled and automatically determines when to start the equipment before the scheduled transition to Occupied. The start time automatically adjusts daily to minimize the time between reaching setpoint and entering Occupied state.

Note: Optimal Start does not work when the schedule source is set to External.

To enable this feature, complete the following steps:

1. Press the **Menu** icon.
2. Press **Scheduling**.
3. Press **Schedule Options**.
4. Press **Optimal Start Enable** and select **Yes**.
5. Press **Save** and the back arrow to return to the previous screen.

Enabling the motion sensor (TEC3x22, TEC3x23 Models)

About this task:
On models with integral motion sensing capability, the motion sensor is enabled with a default timeout of 15 minutes from the last detection of motion in the zone. On models without an integrated sensor, the default timeout is still 15 minutes, but it only is applied when one of the two configurable binary inputs is set to be a motion sensor. See Configurable binary inputs for information on configuring the binary inputs. To disable motion sensing capabilities, set the Motion Sensor Timeout to 0 minutes. See Table 9 to view the available setpoints. See Table 14 to view the setpoint values. To adjust the motion sensor timeout, complete the following steps:

1. Press the **Menu** icon.
2. Press **Scheduling**
3. Press **Schedule Options**.
4. Press **Motion Sensor Timeout** and adjust accordingly.
5. Press **Save** and the back arrow to return to the previous screen.

PID/PRAC+ automatic control tuning

About this task:
The TEC3000 features advanced proportional-integral-derivative (PID) control algorithms to maximize control performance while minimizing excessive cycling and wear on the equipment. PID is used in conjunction with a

Multi-Stage Controller (MSC) for all occupied and standby control.

Additionally, the PID features Johnson Controls proprietary Pattern Recognition Adaptive Control (PRAC +) automatic tuning, which continuously tunes the thermostat parameters to automatically optimize the control performance to match the equipment and zone. By default, PRAC+ is enabled and immediately begins to tune. To reset tuning at any time to the factory defaults, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Tuning**.
5. Press **Reset PID Tuning** and select **Yes**.
6. Press **Save** and the back arrow to return to the previous screen.

PRAC+ automatic tuning can also be disabled. When disabled, the thermostat parameters remain at their last values until automatic tuning is re-enabled. To disable automatic tuning, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Tuning**.
5. Press **Temp Control Setup**.
6. Select **Manual PID Tuning** (or any option listed in Table 11).
7. Press **Save** and the back arrow to return to the previous screen.

Result

As a result of disabling PRAC+ Automatic Tuning, you get access to different types of manual tuning that you can modify. These tuning parameters are listed under **Control Setup** > **General** in Table 14.

Table 11: TEC3000 tuning types

Tuning type	Description
Automatic PID Tuning	Automatic tuning in an existing TEC3000
Deadband Override	There is no deadband in use with proportional devices. This operates in the same way as Automatic PID tuning.
Manual PID Tuning	Manual tuning of Heating and Cooling PIDs. The manual tuning parameters are listed under **Setup** > **General Setup** > **Tuning** in Table 14.

Note: For more details on PID/PRAC+ Automatic Control Tuning, refer to the *Controller Tool Help (LIT-12011147)*.

Configurable binary inputs

The thermostat supports up to two configurable binary inputs (BIs) that can be used to add additional features to the system. Configurable Binary Inputs are accessed through **Setup** > **Inputs**. Both BIs can be configured to support the following options:

- Disabled—Sets the binary input to an unused state. When disabled, you can use the binary input for monitoring-only without affecting the thermostat functionality.
- Open Window—Sensor to shut down control if a window is opened. The thermostat disables control 60 seconds after detecting an opened window.
- Open Door—Works in conjunction with the Motion NO/Motion NC sensor to control occupancy
- Fan Lock—Air Proof switch input to shut down control if no airflow is detected within 10 seconds of turning the fan on. Fan Lock must be manually reset from the Faults menu.
- Service—Input from the equipment to display a service warning on the thermostat
- Dirty Filter—Input from the equipment to display a dirty filter fault on the thermostat
- Motion NC—External motion sensor with a closed contact output when no motion is detected
- Motion NO—External motion sensor with an open contact output when no motion is detected
- Temp Occ—Trigger to place thermostat into Temporary Occupancy mode
- Occupancy—Direct override of Occupied and Unoccupied
- Supply Fan Status—Input from the equipment to display a Supply Fan Fault. When Fan Alarm Action is set to Shutdown and the Supply Fan Fault is active, the TEC3000 disables the fan, heating, and cooling. When the Fan Alarm Action is set to Enable and the Supply Fan Fault is active, the TEC3000 allows the fan, heating, and cooling to operate during the Supply Fan Fault.

Setting both BIs to the same function is not supported for Occupancy, Fan Lock, Open Door, and Open Window. If both BIs are set the same for those four, BI2 is ignored and only BI1 is used.

The Open Door option works in conjunction with a motion sensor, either built into the TEC or connected to another BI configured for Motion NO/NC mode. When the door is open, the sensor ignores detected motion. Opening the door does not stop an Occupied period started by the motion sensor prior to opening the door.

The polarity of the inputs are provided in the following table.

Table 12: Input polarities

BI configuration	Contact open	Contact closed
Occupancy	Unoccupied	Occupied
Temp Occ	No Trigger Active	Temporary Occupancy Trigger[1]
Motion NO	No Motion Detected, Standby	Motion Detected, Occupied[1]

Table 12: Input polarities

BI configuration	Contact open	Contact closed
Motion NC	Motion Detected, Occupied[1]	No Motion Detected, Standby
Dirty Filter	Dirty Filter Alarm Inactive	Dirty Filter Alarm[1]
Service	Service Alarm Inactive	Service Alarm[1]
Fan Lock	No Airflow	Airflow
Open Door	Door Open, Unoccupied	Door Closed, Occupied
Open Window	Window Open, Control Shut Down	Window Closed, Control Running
Supply Fan Status	Supply Fan Off	Supply Fan On

1 Configurations that support both BIs configured for the same feature of the action that occurs when either of the BIs enter that state.

Aux control

About this task:
The TEC has an auxiliary output that can be configured to operate in a few different ways. The Aux Mode supports the following options:

- Not Used—Output is always off
- Occupied NO—Output is normally open, but closes when occupied
- Occupied NC—Output is normally closed, but opens when occupied
- Occupied Fan NO—Output is normally open, but is closed when occupied with the fan running
- Occupied Fan NC—Output is normally closed, but is open when occupied with the fan running
- On—Output is turned on (relay closed), used by a BAS to directly control the AUX output
- Off—Output is turned off (relay open), used by a BAS to directly control the AUX output

To set the Aux Mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup**.
4. Press **Aux Mode** and set accordingly.
5. Press **Save** and the back arrow to return to the previous screen.

This option is also exposed to the BAS through the point AUX-MODE.

When the Reheat installed parameter is set to True, the Aux output is used for Reheat Output. The setting for the Aux Mode is ignored when reheat is enabled.

Commissioning mode

About this task:
You can quickly test equipment wiring and functionality with the thermostat's built-in commissioning mode. The commissioning mode temporarily disables the control logic and you can then manually command any individual output. Commissioning is designed as the last step of the installation process after configuring the thermostat for the equipment being controlled, and the available options in commissioning mode are dependent on the thermostat configuration. To enter commissioning mode, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Select **Commissioning**.
4. Confirm that the selection was intentional. (The control is overridden upon selecting **Confirm**).

Individual outputs can be commanded through this interface. For binary outputs, the options are Off or On; for analog outputs, they can be commanded from 0 to 100%. Whenever a control output is turned on, the fan is engaged for safety purposes. To command an output from the Commissioning menu, complete the following steps:

1. Select the output to command. Adjust the value to the preferred output and press **Save**. The output immediately changes to that value.
2. Restore the value to the original setting and press **Save** once again to complete testing that output.

Pressing the back icon from the main commissioning menu or allowing the menu system to time out and return to the home screen ends commissioning and puts the control logic back in control of the outputs.

Scheduled circulation

About this task:
You can schedule to run your fan for a minimum duration per hour in order to maintain circulation in a space. If the minimum hourly fan runtime is not exceeded as part of normal HVAC operation, the fan turns on at the end of the hour for the length of time required to fulfill the minimum hourly run time. The fan runtime calculation includes runtime initiated when the Fan Mode is set to On and other overrides. The fan does not turn on if the fan runtime is already longer than the minimum hourly fan runtime. When you enabled the Scheduled Circulation Only When Occupied setting, the fan does not turn on at the end of the hour to fulfill the minimum runtime unless the occupancy state is set to Occupied.

To set the Scheduled circulation, complete the following steps:

1. Press the **Menu** icon.
2. Press **Setup**.
3. Press **General Setup.**
4. Press **Scheduled Circulation** and select **Enable**
5. Press **Minimum Hourly Fan Runtime** and set the time in a range of 5 to 30 minutes.

6. Press **Scheduled Circulation Only When Occupied** and select **Disable** or **Enable** as required.
7. Press **Save** and the back arrow to return to the previous screen.

If the fan type is variable speed or multi speed, you can select the speed at which the fan runs to satisfy the minimum hourly runtime.

- In case of variable speed fan, select **Variable Speed Fan Circulation Setpoint** and set the fan speed for circulation in the range of 0% to 100%.
- In case of multi speed fan, select **Multi-Speed Fan Circulation Setpoint** and set the fan speed for circulation as Low, Med, or High.

This option is also exposed to the BAS through the points SCH-CIR-EN, SCH-CIR-ONLYOCC, and MIN-HR-FAN. If Scheduled Circulation is disabled, the other two objects show `unreliable`.

Configurable analog inputs (AIs)

The thermostat supports up to three configurable AIs that can be used to add different features to the system. The configuration menu can be accessed through **Setup** > **Input Setup**. All AIs can be configured to support the following options:

- Relative Humidity—Sets up the AI to accept a 0 VDC-10 VDC input when connected to a humidity sensor.
- Remote Zone Temperature—Sets up the AI to accept a resistive input when connected to one of the six supported types of temperature sensors.
- Carbon Dioxide—Sets up the AI to accept a 0 VDC-10 VDC input when connected to a CO_2 sensor.
- Damper Feedback—Sets up the AI to accept a 0 VDC-10 VDC input when connected.
- Outdoor Air Temperature—Sets up the AI to accept a resistive input when connected to one of the six supported types of temperature sensors.
- Supply Air Temperature—Sets up the AI to accept a resistive input when connected to one of the six supported types of temperature sensors.

Configuring the AIs

1. Connect the required sensors to the analog inputs.
2. Press the **Menu** icon.
3. Press **Setup**.
4. Press **Input Setup**.
5. Press **AI1 Input Selection** and select the sensor that is connected to RSEN. If the selected sensor is a Remote Zone Temperature, Outdoor Air Temperature, or Supply Air Temperature sensor, the thermostat restarts.
6. Do one of the following after the restart based on the type of sensor you are configuring:
   - If the selected sensor is a temperature sensor, do the following:
     - a. Press **Menu** > **Setup** > **Input Setup** > **AI1 Input Setup** and select the temperature sensor that is connected to RSEN.
     - b. Press **Menu** > **Setup** > **Input Setup** > **AI1 Offset** and select the temperature offset as needed for the sensor connected to RSEN. The options are -5°F to 5°F or -2.8°C to 2.8°C.
   - If the selected sensor is a Relative Humidity, Carbon Dioxide, or Damper feedback sensor, the Input Setup is automatically set to 0 VDC-10 VDC. Press **Menu** > **Setup** > **Input Setup** > **AI1 Offset** and select the offset needed for the sensor connected to RSEN. The options are -15% to 15% for Relative Humidity, -200 ppm to 200 ppm for Carbon Dioxide, and -15% to 15% for Damper Feedback.
7. Configure the analog inputs RSEN and COS by following the same steps to set up AI1 Input Selection, AI1 Input Setup, AI1 Offset, AI2 Input Selection, AI2 Setup, and AI2 Offset.
8. Complete steps 1 -7 to re-configure the respective AI if you have to change the sensor connected to any of the AIs. When the setup of AI1 Input Selection and AI2 Input Selection changes from resistive type (Remote Zone Temperature and Outdoor Air Temperature) to 0 VDC-10 VDC type (Relative Humidity and Carbon Dioxide) or the other way around, the thermostat restarts.

Networked sensors

The TEC3000 supports sensor values supplied over a network connection. For the TEC3000 to consider the value as reliable, the value must be written to the NET-Override network point at least every 15 minutes. The following table provides a list of point descriptions and the suggested write interval ranges.

Table 13: Point descriptions and suggested write interval ranges

Name	Description	Suggested write interval range
NET-OAT	Network Override Outdoor Air Temperature	15 minutes at maximum
NET-OAH	Network Override Outdoor Air Humidity	15 minutes at maximum
NET-SAT	Network Override Supply Air Temperature	30 seconds to 2 minutes
NET-ZNH	Network Override Zone Humidity	5 minutes to 15 minutes at maximum
NET-ZNT	Network Override Zone Temperature	15 seconds to 2 minutes
NET-OCC	Network Override Zone Occupancy	15 minutes at maximum

Availability of AIs

For TEC3x2x-1x-xxxx models, only the RSEN and COS inputs are available for connection.

Priority for configurable AIs

You cannot set any two AIs to the same function or sensor type for any of the inputs. If two or more AIs are configured as the same, the first configured input is used and the others are ignored. For example, if RSEN and COS are both configured as Relative Humidity, only RSEN is used and COS is ignored.

Priority for overall sensors data sources

The TEC3000 supports various sources of sensor data for use in control or display, including internal sensors, remote sensors that connect using an analog input, or network commanded sensors. The TEC uses the highest priority connected input, which consists of network commands followed by remote sensors and then internal sensors, for control and display. Not all sources are available for all sensors.

Network commands operate on a timeout basis. When a network point is written to by a supervisor, the point becomes the highest priority for 15 minutes. If the supervisor writes a new update within 15 minutes, the timer restarts for another 15 minutes.

Available fault diagnostics

- Supply Fan Faults—The TEC3000 supports a configurable Supply Fan Status feedback input that turns on when the Supply Fan Status does not match the Supply Fan Command, and that you can configure to disable heating, cooling, and fan commands. You can adjust the alarm delay with the Fan Alarm delay setting. If the delay is set to 0 or if you do not define the binary input, this feature becomes disabled.
- Supply Fan Runtime—The TEC3000 supports setting runtime limits on the supply fan command. When the supply fan exeeds the runtime limit, an alarm turns on. This feature acts as a maintenance reminder. Setting the runtime limit to 0 disables this feature.
- Supply Air Temperature Diagnostics—The TEC3000 supports diagnostics when you have a Supply Air Temperature installed. The TEC3000 monitors the supply air. If you call for cooling or heating and the temperature does not fall or rise by at least the supply air temperature alarm offset value within the supply air temperature alarm delay, an alarm generates. If the monitoring occurs while cooling, a cooling ineffective alarm generates. If the monitoring occurs while heating, a heating ineffective alarm generates. If you set the supply air temperature offset value set to 0, this alarm disables.
- Zone Temperature Alarm—When enabled, the user can set a low and high temperature alarm; and if the zone temperature rises or falls below those limits, an alarm generates.
- Trends—Built-in trends exist for many of the inputs and outputs for the TEC3000. These trends are viewable at the TEC. The analog graph displays data in 15-minute increments over the previous 24 hours or a table with the last 25 data points. Binary trends display 25 samples taken at every change of state.

Menus and submenus

In the following table, the * indicates that the menus depend on your configuration.

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Setpoints	Dehumidification	Dehumidification
		Cooling Valve Minimum Position*
		Cooling Valve Starting Position*
		Heating Valve Starting Position*
		Coil Tempering Time*
		Dehumidification Overcool Limit*
		Chilled Water Supply Temperature Setpoint*
	Temperature	Occupied Cooling
		Occupied Heating
		Unoccupied Cooling
		Unoccupied Heating
		Standby Cooling
		Standby Heating
		Occ Setpoint Select
		Heat Cool Setpoint Mode
		Max Heating Setpoint*
		Min Heating Setpoint*
		Max Cooling Setpoint*
		Min Cooling Setpoint*
		Max Setpoint*
		Min Setpoint*
Scheduling	Schedule Options	Set Schedule
		Optimal Start Enable
		Temp Occ Duration
		Motion Sensor Timeout
		Manual Occupancy Mode
		Schedule Source

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Display Settings	Passcode Enabled	
	Passcode*	
	Brightness Setting	
	Enable Backlight Timeout	
	Units	
	Time	
	Time Zone	
	Set Time Format	
	Date	
	Set Date Format	
	Language	
	Show Fan Button on Home	
	Show Temp on Home	
	Show Humidity on Home	
	Show Off Button on Home	
	Show Hold Button	
	Show Setpoint on Home	
	Show Alarms on Home	
	Show Occ Status	
	Show Unit Status	
	Show Date/Time	

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Setup	General Setup	Control Mode
		Unit Enable
		Fan Mode*
		Max Setpoint Offset
		Fan On Delay*
		Fan Off Delay*
		Frost Protection
		Dehum Enable*
		Unocc Dehum Enable
		Dehumidification Sequence Mode*
		Aux Mode
		Load Shed Rate Limit
		Load Shed Adjust
		Fan Alarm Delay
		Fan Alarm Action*
		Fan Alarm Reset*
		Fan Runtime Limit
		Fan Runtime Reset*
		Supply Air Temperature Alarm Offset
		Supply Air Temperature Alarm Delay*
		Unocc Low Speed Fan
		Scheduled Circulation Enable
		Scheduled Circulation Only when Occupied
		Mininum Hourly Fan Runtime
		Variable Speed Fan Circulation Setpoint*
		Multi-speed Fan Circulation Setpoint*
	Input Setup	BI1 Config
		BI2 Config
		Supply Temp Sensor*
		Supply Temp Offset*
		Zone Temp Sensor
		Zone Temp Offset
		Humidity Offset
		Reset Sensors
		For networked models: Zone Temp Alarm Enabled
		For networked models: Zone Temp Low Limit
		For networked models: Zone Temp High Limit

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Setup (continued)	Tuning Setup	Temp Control Setup
		Reset PID Tuning
		Deadband*
		Auto Economizer Tuning
		Heat Prop Band*
		Heat Integral Time*
		Heat Process Range*
		Heat Saturation Time*
		Heat Time Constant*
		Heat Process Dead Time*
		Heat Period*
		Cool Prop Band*
		Cool Integral Time*
		Cool Process Range*
		Cool Saturation Time*
		Cool Time Constant*
		Cool Process Dead Time*
		Cool Period*
		Equipment Size
	Network Setup	FC Comm Mode
		BACnet Instance ID*
		For networked models: N2 Address*
		BACnet Address*
		For networked models: MSTP Baud Rate*
		BACnet Encoding Type
		BACnet/MSTP Communication Mode
		For wireless models: Pan ID

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Equipment Setup	General	Unit Type
		Valve Open Voltage
		Valve Closed Voltage
		Unoccupied Off Delay
	Supply Fan	Supply Fan Type*
		Start Voltage*
		Full Speed Voltage*
		Minimum Command*
		Medium Speed On Cmd*
		High Speed On Cmd*
	Reheat	Reheat Installed
		Reheat Min Damper Pos*
		Reheat Fan Required*
	Changeover	Changeover Mode*
		Supply Temp Type*
		Changeover Setpoint*
		Supply Temp Sensor*
		Supply Temp Offset*
Trend	EFF-ZNT	
	EFF-SETPOINT	
	EFF-ZNH	
	B1 Status	
	B2 Status	
	EFF-OAT	
	EFF-SAT	
	FANSPD-S	
	HTG-O	
	CLG-O	
System Status	Occupancy Source	
	Unit Status	
	Supply Air Temperature	
	Changeover State	
	Zone Temp Source	
Control Status	Cooling % Command	
	Heating % Command	
	Reheat % Command	
	Cool Stage 1	
	Heat Stage 1	
	Reheat Stage 1	
	Fan % Command	
	Fan	

Table 14: Menus and submenus

Level 1	Level 2	Level 3
Controller Info (Thermostat Info)	Model Name	
	Software Version	
	Unit Name	
	Device Name	
	Device Description	
Commissioning	Supply Air Temperature	
	Heat Command	
	Cool Command	
	Supply Fan	
	Aux	
Update	View Version	
	Load Firmware	
	Restore*	
	Backup*	
For wireless models: Network Status	Radio Code Version	
	Radio PAN ID	
	Active Channel	
	Signal Strength	
	Connection Status	
	Network State	
	IEEE Address	
	Short Address	

Table 15: TE-6300 Series Temperature Sensors (order separately)

Sensor type	Mounting style	Probe length	Product code number
Nickel (1k ohm)	Adjustable[1]	8 in. (203 mm)	TE-6311A-1
	Averaging	8 ft (2.4 m)	TE-6315M-1
			TE-6315V-2[1]
		17 ft (5.2 m)	TE-6316M-1
			TE-6316V-2[1]
	Duct	4 in. (102 mm)	TE-631GM-1
		8 in. (203 mm)	TE-6311M-1
			TE-6311P-1
		18 in. (457 mm)	TE-631JM-1
	Flange	4 in. (102 mm)	TE-631GV-2
		8 in. (203 mm)	TE-6311V-2
	Flush	n/a	TE-6310F-0
			TE-6310F-1
	Outside air	3 in. (76 mm)	TE-6313P-1
	Strap-mount	3 in. (76 mm)	TE-631S-1
	Wall[2]	n/a	TE-6314P-1
	Well	6 in. (152 mm)	TE-631AM-2
		8 in. (203 mm)	TE-6312M-1
Platinum (1k ohm)	Adjustable	8 in. (203 mm)	TE-6351-A
	Duct	4 in. (102 mm)	TE-635GM-1
		8 in. (203 mm)	TE-6351M-1
			TE-6351P-1
		18 in. (457 mm)	TE-635JM-1
	Flange	4 in. (102 mm)	TE-635GV-2
		8 in. (203 mm)	TE-6351V-2
	Flush	n/a	TE-6350F-0
			TE-6350F-1
	Strap-mount	3 in. (76 mm)	TE-635S-1
	Outside air	3 in. (76 mm)	TE-6353P-1
	Wall[2]	n/a	TE-6324P-1
	Well	6 in. (152 mm)	TE-635AM-2
		8 in. (203 mm)	TE-6352M-1
Platinum equivalent	1k ohm averaging[1]	10 ft (3 m)	TE-6327P-1
		20 ft (6.1 m)	TE-6328P-1
	100 ohm averaging[1]	10 ft (3 m)	TE-6337P-1
		20 ft (6.1 m)	TE-6338P-1

Table 15: TE-6300 Series Temperature Sensors (order separately)

Sensor type	Mounting style	Probe length	Product code number
Thermistor (2.2k ohm)	Adjustable	8 in. (203 mm)	TE-6341A-1
	Duct	8 in. (203 mm)	TE-6341P-1
	Flange	4 in. (102 mm)	TE-634GV-2
		8 in. (203 mm)	TE-6341V-2
	Outside air	3 in. (76 mm)	TE-6343P-1
	Wall[2]	n/a	TE-6344P-1
	Well	8 in. (203 mm)	TE-6342M-1
		6 in. (152 mm)	TE-634AM-2
Thermistor (10k ohm) Type II	Adjustable	8 in. (203 mm)	TE-6361A-1
	Duct	4 in. (102 mm)	TE-636GM-1
		8 in. (203 mm)	TE-6361M-1
			TE-6361P-1
		18 in. (457 mm)	TE-636JM-1
	Flange	4 in. (102 mm)	TE-636GV-2
		8 in. (203 mm)	TE-6361V-2
	Flush	n/a	TE-6360F-0
			TE-6360F-1
	Outside air	3 in. (76 mm)	TE-6363P-1
	Strap-mount	3 in. (76 mm)	TE-636S-1
	Well	6 in. (152 mm)	TE-636AM-2
		8 in. (203 mm)	TE-6362M-1

1 Two TE-6001-8 Element Holders come with the platinum-equivalent averaging sensors. Order separately to use with a nickel averaging sensor.
2 Order the TE-1800-9600 Mounting Hardware separately to mount the wall unit to a wallbox.

Troubleshooting

Table 16: Fault list

Faults	Probable causes	Solutions
Remote Zone Temp Fail	The External Zone Temperature sensor has been disconnected or has failed.	1. Check the wiring of the sensor. 2. If intentionally disconnected, reset sensors through the menu. 3. If the problem persists, order replacement units and return the affected devices to Johnson Controls under the RMA program.
Supply Temp Fail	The External Supply Temperature sensor has been disconnected or has failed.	1. Check the wiring of the sensor. 2. If intentionally disconnected, result fault by entering the menu, enter Control Setup, and select Inputs to reset the sensors. 3. If the problem persists, order replacement units and return the affected devices to Johnson Controls under the RMA program.
Internal Sensor Fail	An internal sensor has failed on the TEC.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.

Table 16: Fault list

Faults	Probable causes	Solutions
Dehum Unavailable	Dehumidification is unavailable because the zone humidity sensor has failed or the humidity reading is not reliable.	1. If the source of zone humidity was a BAS, check the BAS to ensure that it is still online and is providing the TEC with the humidity reading. If removal of the BAS mapping was intentional, reset the sensors through the menu. 2. (For all models) If the problem persists, order replacement units and return the affected devices to Johnson Controls under the RMA program.
Service	Equipment connected to the BI configured for a Service alarm triggers the alarm.	Service the equipment by way of the manufacturer's recommendation.
Dirty Filter	Equipment connected to the BI configured for a Dirty Filter alarm triggers the alarm.	Replace the filter in the equipment as explained in the manufacturer's instructions.
Calibration Corrupt	Factory calibration data is lost or is not installed.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.
Changeover Fail	The Supply Temperature Sensor is not installed, has failed, or has been disconnected and the TEC can no longer detect changeover mode to cool or heat.	Follow the same steps as Supply Temp Fail alarm.
Zone Temp Unreliable	All sources of zone temperature are unreliable, including the onboard sensor.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.
Open Window	The switch connected to the BI configured for Open Window senses that the window is opened, and control has shut down.	1. Close the window to resume control. 2. Check sensor functionality with an ohmmeter, and verify the wiring to the TEC. 3. Order replacement units and return the affected devices to Johnson Controls under the RMA program.
Fan Lock	The switch connected to the BI configured for Fan Lock did not sense airflow within 10 seconds of starting the fan, and control has been shut down.	1. Inspect equipment to ensure fan functions. 2. Check sensor functionality with an ohmmeter, and verify wiring to the TEC. 3. Reset fault by entering the menu, selecting Fault Status, and selecting the Fan Lock. 4. Order replacement units and return the affected devices to Johnson Controls under the RMA program.
Humidity Unreliable	The zone humidity reading was reliable and has now failed.	1. If the source of zone humidity was the onboard sensor, contact Johnson Controls product sales and support. 2. If the source of zone humidity was a BAS, check the BAS to ensure that it is still online and providing the TEC with the humidity reading. If removal of the BAS mapping was intentional, reset sensors through the menu.
Controller Fault (Thermostat Fault)	The thermostat has detected an internal fault that it cannot recover.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.
	An unknown error has prevented the thermostat from turning on.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.

Table 16: Fault list

Faults	Probable causes	Solutions
Touchscreen Unavailable	The touchscreen components have failed to initialize.	1. Reboot the thermostat. 2. If problems persist, order replacement units and return the affected devices to Johnson Controls under the RMA program.
Board Mismatch	The baseboard and CPU board are paired incorrectly. An error message appears on the TEC indicating the model number of the baseboard and CPU board.	Match the baseboard to its corresponding CPU board. See Figure 6 and Table 4 for information on ensuring that you have the CPU board and base board paired correctly.
Firmware Mismatch	The previous upgrade did not complete.	1. Upgrade the TEC3000 to the latest released version. 2. Upgrade the TEC3000 to the current version again.
	The previous downgrade has not completed because the previous version is no longer supported.	Reboot the TEC3000 to clear the fault.
USB Malfunction	A USB drive has malfunctioned and drawn more than the maximum allowed current.	1. Attempt to insert and use the USB drive again. 2. Try a new USB drive. 3. If problems persist, order replacement units and return the affected devices to Johnson Controls under the RMA program.
Supply Fan Runtime Limit Extended	The Supply Fan Runtime exceeds the configured Supply Fan Runtime Limit.	1. Service the Supply Fan. 2. Reset the Supply Fan runtime.
Heating Ineffective	The Supply Air Temperature has not increased above the configured Supply Air Temperature Alarm Offset while heating has been active for at least the Supply Air Temperature Alarm Delay.	Verify that the heating elements on the rooftop are functioning correctly.
Cooling Ineffective	The Supply Air Temperature has not decreased below the configured Supply Air Temperature Alarm Offset while cooling has been active for at least the Supply Air Temperature Alarm Delay.	Verify that the cooling elements on the rooftop are functioning correctly.
Supply Fan Fault	The Supply Fan Status configured for either BI1 or BI2 has not proved within the configured Fan Alarm Delay.	1. Verify that the Supply Fan is operating when turned on. 2. Verify that the Supply Fan Status wiring is connected correctly.
Zone Temperature Too Cold	The Zone Temperature decreased below the configured Zone Temp Low Limit.	Verify that the TEC and the RTU heating are enabled and functioning.
Zone Temperature Too Hot	The Zone Temperature increased above the configured Zone Temp High Limit.	Verify that the TEC and the RTU cooling are enabled and functioning.

Table 17: Troubleshooting details

Symptom	Probable causes	Solutions
The thermostat displays `Idle` with a Unit Status of `Cooling Unavailable due to Changeover` despite being above cooling setpoint, or with a status of `Heating Unavailable due to Changeover` despite being below the setpoint.	The two-pipe fan coil/VAV system does not have a changeover sensor and switch connected, or the sensor/switch has failed.	1. Check the wiring of the supply temperature sensor/switch. 2. Verify that the changeover is set up correctly for the type of sensor attached (sensor or switch).
	The changeover temperature senses a hot supply, but the thermostat requests cooling.	1. Verify that the supply is not in heating mode. If it is, nothing can be done from the TEC. 2. Check the wiring of the supply temperature sensor or switch. 3. Check the placement of the supply temperature sensor or switch. 4. Verify that the changeover is set up correctly for the type of sensor attached (sensor or switch).
	Changeover temperature senses a cold supply, but the thermostat requests heating.	1. Verify that the supply is not in cooling mode. If it is, nothing can be done from the TEC. 2. Check the wiring of the supply temperature sensor or switch. 3. Check the placement of supply temperature sensor or switch. 4. Verify that the changeover is set up correctly for the type of sensor attached (sensor or switch).
The thermostat displays `Idle` with a Unit Status of `Cooling Unavailable due to Control Mode` despite being above cooling setpoint, or with a status of `Heating Unavailable due to Control Mode` despite being below the setpoint.	The Control Mode is set to Cooling Mode, but the thermostat requests heating.	Change the Control Mode to Auto or Heating.
	The Control Mode is set to Heating Mode, but the thermostat requests cooling.	Change the Control Mode to Auto or Cooling.
The thermostat provides an error when trying to upgrade firmware.	The firmware on the USB drive is below the minimum required version. Error code 1025.	Please use firmware version 3.0.2.xxxx (for networked models) or 2.0.2.xxxx (for wireless models) or higher. A reboot is required to clear the Firmware Mismatch fault that occurs.
The TEC3000 zone temperature does not change fast enough compared to the measured zone temperature from a verification device, such as a calibrated sensor.	The TEC3000 is configured by default for larger spaces with normal-sized equipment when a proportional device is active.	Select **Control Setup** > **Tuning** > **Equipment Size** > **Oversized**.
The zone space temperature increases or decreases too much when the unit is active in unoccupied mode.	The heating and cooling equipment are too big for the unoccupied space.	Decrease the Unoccupied Off Delay parameter from 10 minutes to a more appropriate time for the equipment configuration.
The thermostat provides an error when trying to back up settings.	The USB drive is defective.	Try a different USB drive.
The thermostat provides an error when trying to restore settings from a backup.	The USB drive is defective.	Try a different USB drive.
	The Restore file is corrupt.	Try restoring a different backup file.
	The Restore file is from an incompatible model TEC.	Ensure that the backup file being restored was from the same model TEC.

Table 17: Troubleshooting details

Symptom	Probable causes	Solutions
The thermostat is unable to access a USB drive.	The drive is formatted as NTFS or another unsupported format. The TEC supports file allocation table (FAT) (**for networked models**), FAT16 (**for wireless models**), and FAT32 (**for all models**) formats only.	Reformat the USB drive, or try a different USB drive with a supported format.
	The USB drive is defective.	Try a different USB drive.
The thermostat displays `Board Mismatch`.	The I/O board that the display board is currently attached to does not match the one that initially shipped with the display board.	Attach the display board to the correct I/O board.
	A hardware failure causes the two boards to incorrectly identify themselves.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.
The thermostat displays `Controller Fault` (Thermostat Fault).	An internal fault was detected and the thermostat was unable to recover.	Order replacement units and return the affected devices to Johnson Controls under the RMA program.
The Bell icon displays on the TEC home page.	The fault has been detected on the TEC.	See Table 16 for TEC fault causes and resolution.
`Partial Restore Complete` is displayed when trying to restore settings from a backup file.	Not all of the items in the backup file have been restored. This error can occur when a value is out of the minimum or maximum range in the backup file. It may also occur if there are inconsistencies in the reliability of a setting in the backup file and on the TEC device.	1. Create a Backup file on a USB drive for the TEC that is showing the issue. 2. Edit the backup file created in the previous step on a PC to reflect the preferred settings. 3. Verify that the modified values are within minimum and maximum range in the backup file. 4. Restore the settings from the newly edited backup file on the TEC.
The temperature displayed is lower than the actual room temperature.	Cold air drafts enter the back of the TEC.	Seal any holes behind the TEC to reduce drafts.
	Air is being forced through the TEC from a nearby vent.	Move the location of the TEC or change the venting to prevent air from being forced through the TEC.
For networked models, the Online icon does not appear for a networked thermostat.	There is incorrect field bus wiring.	Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034).*
For wireless models, Supervisory Status = Offline	The supervisory controller is not communicating with the TEC. The TEC is not mapped to a JCI Supervisory System. The WNC or WRG Gateway is not communicating with the TEC.	1. Map the TEC into a JCI Supervisory system. 2. Verify that the PAN's WNC or WRG Gateway is online. 3. Add ZFR182x or ZFR183x Routers/Repeaters into the wireless system.
Some icons are hidden.	Lockout levels are used or the icons are hidden due to the display settings.	See Table 7 for lockout levels and access details.

Table 17: Troubleshooting details

Symptom	Probable causes	Solutions
The touchscreen is unresponsive.	You tap the display or touch the thermostat within 5 mm of the display when power is applied to the controller.	Reboot the thermostat. Do not interact with the thermostat until the home screen displays.
You do not tap the touchscreen, but the display acts as if it is tapped, which causes the display to blink or toggle between screens.		
You need to tap the display at an offset from a touch point to activate the display.		

Note: For common MS/TP troubleshooting information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034).*

TEC3000 Series Proportional Fan Coil Thermostats technical specifications

Table 18: TEC3000 Series Networked and Wireless Proportional Fan Coil and Individual Zone Thermostats with Dehumidification Capability technical specifications

Specification		Description
Power requirements		19 VAC to 30 VAC, 50/60 Hz, 4 VA at 24 VAC nominal, Class 2 or safety extra-low voltage (SELV)
USB port power rating		120 mA to 250 mA current draw supported
Analog output rating		0 VDC to 10 VDC into 2k ohm resistance (minimum)
Fan relay output rating		19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush
Auxiliary output rating/triac output		19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush
Binary inputs		Dry contact across terminal COM to terminals BI1, BI2, or COS
Analog inputs		Nickel, platinum, A99B, 2.25k ohm NTC, 10k ohm NTC, 10k ohm NTC Type 3 across terminal COM to terminals R SEN or COS
Temperature sensor type		Local digital sensor
Wire size		18 AWG (1.0 mm diameter) maximum, 22 AWG (0.6 mm diameter) recommended
MS/TP network guidelines		For wired models: Up to 100 devices maximum for each Metasys Supervisory Engine; 4,000 ft (1,219 m) maximum cable length. Refer to the *MS/TP Technical Bulletin* for the Metasys, FX, or Verasys® system installed.
		For wireless models: Up to 100 devices maximum for each Metasys Supervisory Engine
Wireless band (for wireless models)		Direct-sequence spread-spectrum 2.4 GHz ISM bands
Transmission power (for wireless models)	TEC30xx-1x-000 compatible with ZFR182x Pro Series	10 mW maximum
	TEC31xx-1x-000 compatible with ZFR183x Pro Series	100 mW maximum
Transmission range (for wireless models)	TEC30xx-1x-000 compatible with ZFR182x Pro Series	50 ft (15.2 m) recommended indoor 250 ft (76.2 m) line of sight, maximum
	TEC31xx-1x-000 compatible with ZFR183x Pro Series	250 ft (76.2 m) recommended indoor 1000 ft (304.8 m) line of sight, maximum

Table 18: TEC3000 Series Networked and Wireless Proportional Fan Coil and Individual Zone Thermostats with Dehumidification Capability technical specifications

Specification		Description
Temperature range	Backlit display	-40.0°F/-40.0°C to 122.0°F/50.0°C in 0.5° increments
	Heating control	40.0°F/4.5°C to 90.0°F/32.0°C
	Cooling control	54.0°F/12.0°C to 100.0°F/38.0°C
Accuracy	Temperature	±0.9F°/±0.5C° at 70.0°F/21.0°C typical calibrated
	Humidity	±5% RH from 20 to 80% RH at 50 to 90°F (10 to 32°C)
Minimum Deadband		2F°/1C° between heating and cooling
Occupancy sensor motion detection (occupancy sensing models)		Minimum of 94 angular degrees up to a distance of 15 ft (4.6 m); based on a clear line of sight
Ambient conditions	Operating	32°F to 122°F (0°C to 50°C); 95% RH maximum, noncondensing
	Storage	-22°F to 122°F (-30°C to 50°C); 95% RH maximum, noncondensing
Compliance	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2001 Listed BACnet Advanced Application Controller (B-AAC)
	United States	UL Listed, File E27734, CCN XAPX, Under UL60730
		Networked models: FCC Compliant to CFR 47, Part 15, Subpart B, Class B
		Wireless models: Transmission complies with FCC Part 15.247 regulations for low power unlicensed transmitters; transmitter identification FCC ID: OEJ-WRZRADIO (ZFR182x), OEJ-ZFRRADIO (ZFR183x)
	Canada	UL Listed, File E27734, CCN XAPX7, Under E60730
		Networked models: Industry Canada, ICES-003
		Wireless models: Industry Canada (IC) RSS-210; Transmitter identification ZFR1810-1: IC ID: 279A-WRZRADIO (ZFR182x), 279A-ZFRRADIO (ZFR183x)
CE	Europe (for networked models only)	CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the RoHS Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant
Shipping Weight	Models without occupancy sensor	0.75 lb (0.34 kg)
	Models with occupancy sensor	0.77 lb (0.35 kg)

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Repair information

If the TEC3000 Series thermostat fails to operate within its specifications, replace the unit. For a replacement thermostat, contact the nearest Johnson Controls® representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

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