Part No. MAI60025

Parts included

- Thermostat with integral mounting base
- One installation instructions sheet

Location considerations

- 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 thermostat.
- 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

Installing the thermostat

1. Use a 1/16 in. (1.5 mm) Allen wrench to remove the security screw if
   it is installed on the top of the thermostat cover as illustrated in Figure 2.
   Pull the top edge of the cover and open the
2. thermostat as illustrated in Figure 2.

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

   ► **Important:** If you install 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.
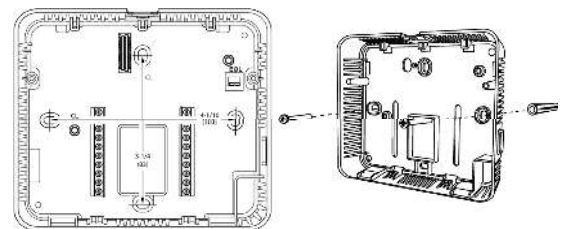
3. Align the thermostat mounting base on the wall with the security screw on the top and use the
   base as a template to mark the two mounting hole locations. See Figure 3.

Figure 1: Thermostat shown with occupancy sensor, dimensions, in. (mm)
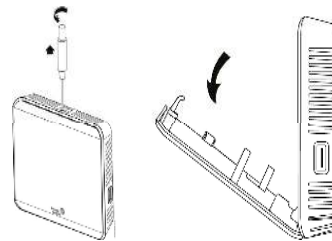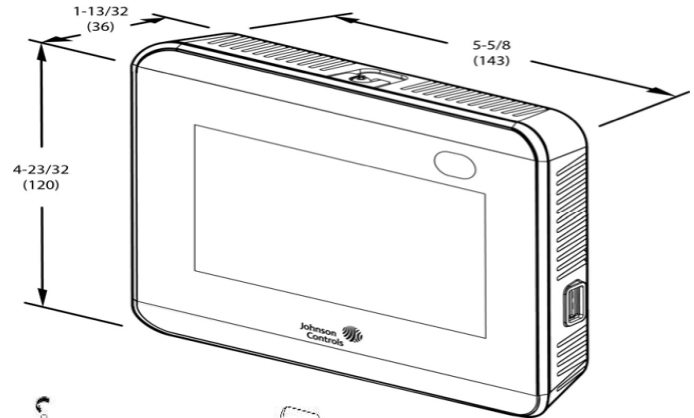
Figure 2: Removing the security screw and the thermostat cover

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

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.

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 3.

2. Attach the communication wires to the terminal block.

   Note: If multiple wires are inserted into the terminals, make sure to correctly twist the wires together before inserting 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 3.

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.

6. Use a 1/16 in. (1.5 mm) Allen wrench) to reinstall the security screw on the top of the thermostat cover. See Figure 2 for security screw placement.

   Remove the protective plastic cover sheet from the display.

7. ▶ **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.

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

Terminal identification

Table 3: Terminal identification (See Wiring diagrams for details)

Terminal label	Function		
24 V	24 VAC hot from transformer		
FAN H	Fan high		
FAN M	Fan medium		
FAN L	Fan on: single-speed, variable-speed, Fan low: multi-speed		
AUX	Auxiliary binary output		
AUX	Auxiliary power input		
HC/TRI[2]	Cool or heat valve output common		
COM	24 VAC common from transformer		
CLG O	Cool open (Floating), Cooling NC (On/Off), Triac		
CLG C	Cool close (Floating), Cooling NO (On/Off), Triac		
HTG O	Heat open (Floating), Heating NC (On/Off), Triac		
HTG C	Heat close (Floating), Heating NO (On/Off), Triac		
RSEN	Configurable analog input 1		
COS	Configurable analog input 2/Changeover binary switch input		
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   There is no support for an On and Off VAV.
2   HC/TRI on TB1 must be jumpered to COM on TB2 for low-side switching or to 24 VAC on TB2 for high-side switching.

Wiring diagrams

See Table 3 for terminal identification.

Figure 2: 24 vac On/Off cooling only diagram

24 VAC CONTROL ON/OFF. NORMALLY
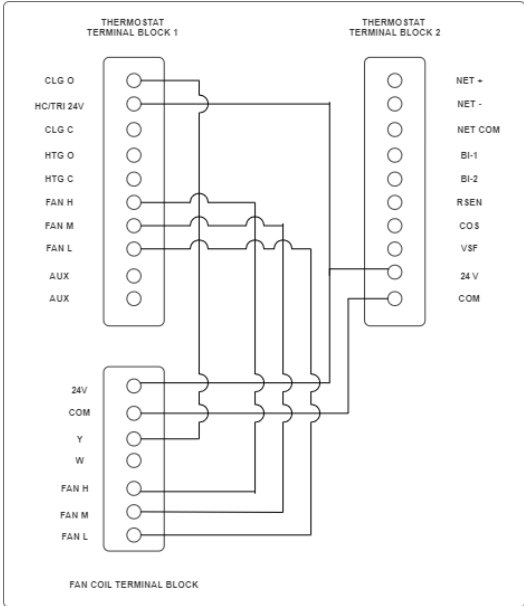CLOSED VALVE. TWO PIPE SYSTEM
COOLING ONLY

Figure 3: 24 vac On/Off Heating only diagram

24 VAC CONTROL ON/OFF. NORMALLY
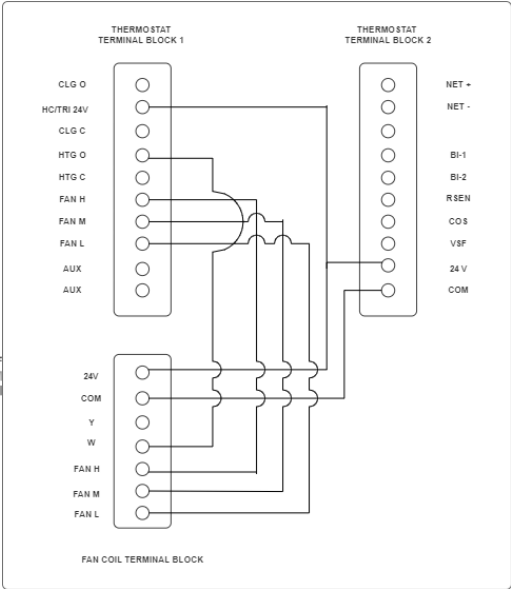CLOSED VALVE. TWO PIPE SYSTEM
HEATING ONLY

Figure 4: 24 vac On/Off 2-pipe Heating and cooling diagram

24 VAC CONTROL ON/OFF. NORMALLY
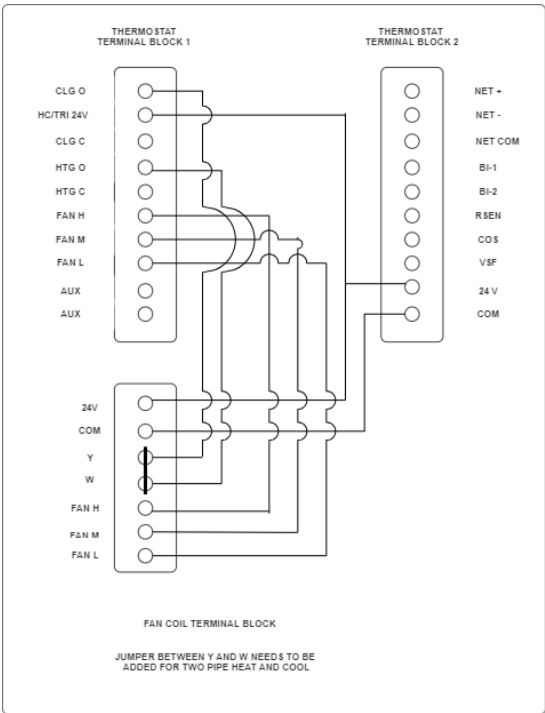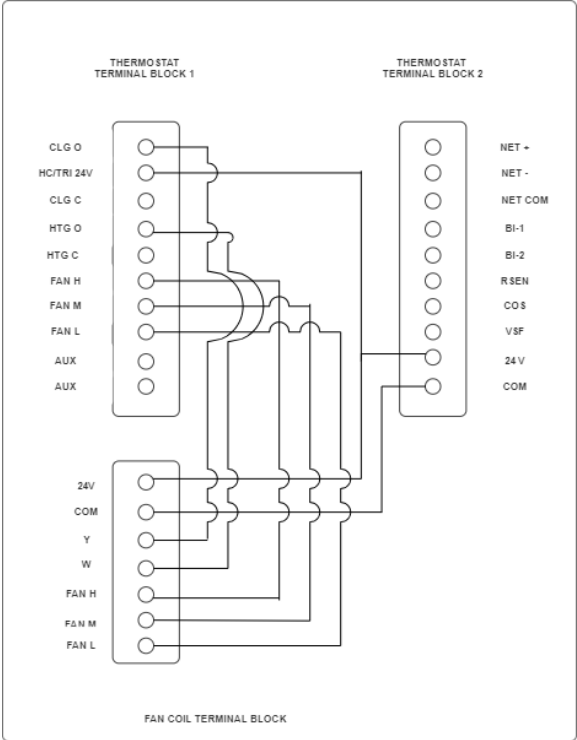CLOSED VALVE. TWO PIPE SYSTEM
HEATING AND COOLING

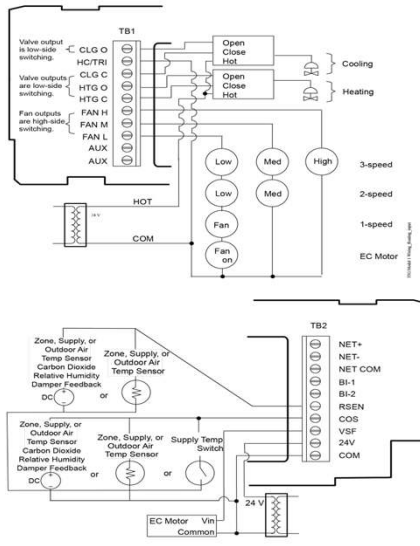**Figure 5: 24 vac On/Off 4-pipe Heating and cooling diagram**

24 VAC CONTROL ON/OFF. NORMALLY
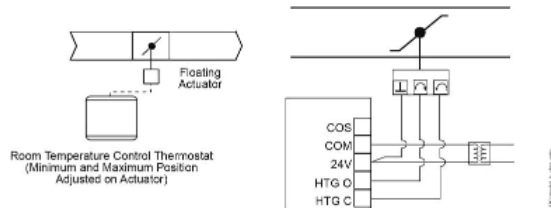CLOSED VALVE. FOUR PIPE SYSTEM
HEATING AND COOLING

Wiring diagrams

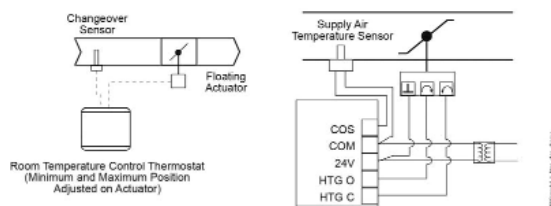See Table 3 for terminal identification.
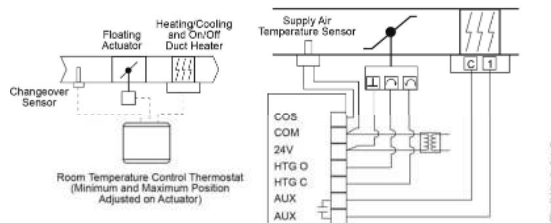
Figure 6: Floating wiring diagram

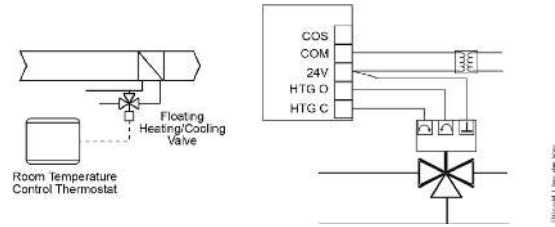**Figure 7: Floating control (pressure-dependent VAV)**

**Figure 8: Floating control (pressure-dependent VAV with changeover sensor/switch)**

Figure 9: Floating control (pressure-dependent VAV with changeover sensor/switch and reheat)
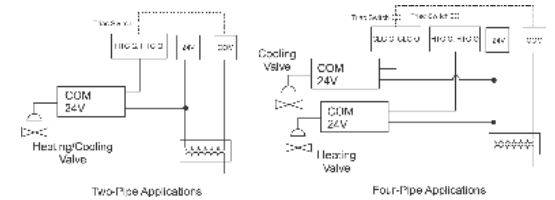

Figure 10: Floating control two-pipe heating and cooling hydronic valve control fan coil application
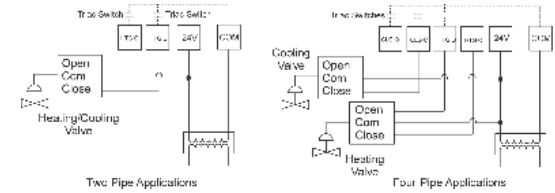

Figure 11: Floating control two-pipe heating and cooling hydronic valve control with changeover fan coil application
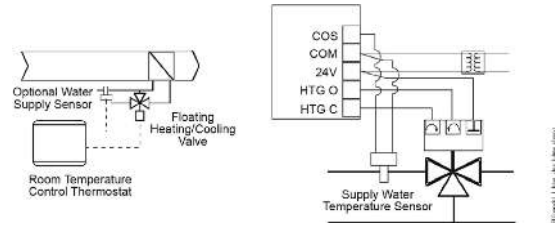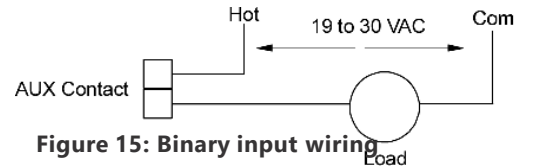

Figure 12: Floating control (on/off two-pipe and four-pipe fan coil applications)
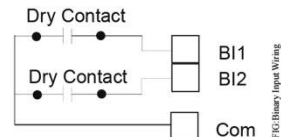

Figure 13: Floating control (floating two-pipe and four-pipe fan coil applications)
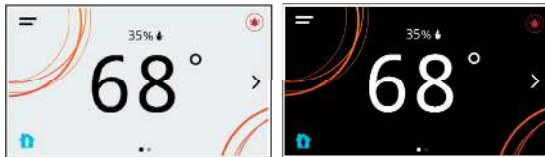

Figure 14: AUX contact wiring

Figure 15: Binary input wiring

Figure 18: 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 display 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 19: 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

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Table 4: Touchscreen icons

Icon and icon name	Description
Menu	Displays the configuration screens where various settings may be adjusted.
Alarm	Indicates that the thermostat has triggered an alarm.
Unit Power On Standby	Powers the thermostat on or off. Notes: • 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.
Humidity On Standby	Indicates the humidity reading.
Degree On Standby	Indicates that the unit is set to degrees.

Table 4: Touchscreen icons

Icon and icon name	Description
Network Communication (for Networked Models) Network communication No Signal	Network Communication icon indicates that the thermostat detected a supervisory controller and both are online. No icon indicates that the thermostat did not detect a supervisory controller.
Radio Signal (For Wireless Models) No signal Low signal Medium signal High signal	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 70°	Indicates that cooling hold mode is enabled. To disable Hold mode, press the button.
Heating Hold 70°	Indicates that heating hold mode is enabled. To disable Hold mode, press the button.
Cooling Setpoint 70°	Displays the current cooling setpoint. Indicates that Hold mode is disabled. To enable Hold mode, press the button.
Heating Setpoint 70°	Displays the current heating setpoint. Indicates that Hold mode is disabled. To enable Hold mode, press the button.
Setpoint Temperature 70°	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.

Table 4: Touchscreen icons

Icon and icon name	Description
Auto Mode	Indicates that Auto mode is selected.
Fan Overrides for Single-speed Fans On Auto Quiet	Adjusts the fan override between On, Auto, and Quiet for single-speed fans.
Fan Overrides for Variable-speed Fans On Auto Quiet	Adjusts the fan override between On, Auto, and Quiet for variable-speed fans.
Fan Overrides for Multi-speed Fans Low Medium High Auto Quiet	Adjusts the fan override between Low, Medium, High, Auto, and Quiet for multi-speed fans.

Table 4: Touchscreen icons

Icon and icon name	Description
Occupancy Status Unoccupied Occupied Temporarily occupied Standby Override-occupied Override-unnoccupied	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.

lockout hides the icons that are not operable. The lockout levels are described in Table 5.

Table 5: 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.

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

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. 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**.

Thermostat Setup:

Press the menu icon on the top left-hand side of the thermostat. ▬

To enter each category, press the appropriate selection. After the selection has been made for that category, press the save icon to store the selection. 💾

Fault Status: Shows the active faults for the thermostat.

Setpoints:
Dehumidification:
Dehumanization
Cooling Valve Minimum Position
Cooling Valve Starting Position
Heating Valve Starting Position
Coil Temperature Time
Dehumidification Overcool Limit
Chilled Water Supply Temperature Setpoint

Temperature:
On this screen you can choose the following for the appropriate set-up for the system.
Occupied Cooling
Occupied Heating
Unoccupied Cooing
Unoccupied Heating
Standby Cooling
Standby Heating
Occupied Setpoint Select
Heat Cool Setpoint Mode
Minimum Heating Setpoint
Maximum Cooling Setpoint
Maximum Setpoint
Minimum Setpoint

Schedule:
Set Schedule: If no schedule is required, ensure no days are selected.

Schedule Options:
Optimal Start Enabled
Temporary Occupancy Duration
Motion Sensor Timeout
Manual Occupancy Mode
Schedule Source

Display Settings:
Passcode Enable
Passcode
Brightness Setting
Enable Backlight Timeout
Enable Display Timeout
Language
Units
Time
Time Zone
Set Time Format
Date
Set Date Format
Change Color Theme
Show Fan Button On Home Screen

Show Temperature on Home Screen
Show Humidity on Home Screen
Show Off Button on Home Screen
Show Hold Button on Home Screen
Show Setpoint on Home Screen
Show Alarms on Home Screen
Show Control Mode
Show Occupancy Status
Show Unit Status
Shaw Date/Time
Show Damper Position on Home Screen
Show Co2 on Home Screen

Setup:
General Setup:
Control Mode
Unit Enabled
Fan Mode
Maximum Setpoint Offset
Fan on Delay
Fan off delay
Frost Protection
Dehumidification Enabled
Unoccupied Dehumidification Enable
Dehumidification Sequence Mode
Auxiliary Mode
Load Shed Rate Limit
Load Shed Adjustment
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
Unoccupied Low Speed Fan
Scheduled Circulation Enabled
Scheduled Circulation Only When Occupied
Minimum Hourly Fan Runtime
Variable Speed Fan Circulation Setpoint
Multi-speed Fan Circulation Setpoint

Setup
Input Setup:
BI1 Configuration
BI2 Configuration
AI1 Input selection
AI1 Setup In
AI1 Offset
AI2 Input Selection
AI2 Setup In
AI2 Offset
Humidity Offset
Zone Temperature Offset
Reset Sensors
Zone Temperature Alarm Enabled

Setup
Tuning Setup:
Temperature 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 Band
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

Setup
Network Setup:
FC Comm Mode
BACnet Instance ID
For Network Models: N2 Address
BACnet Address
For Network Models: MSTP Baud Rate
BACnet Encoding Type
BACnet/MSTP Comm Mode
For Wireless Models: Pan ID

Equipment Setup
General:
Unit Type
Htg/Clg Devise Type
Actuator Stroke Time
Cooling Min On Time
Cooling Min Off Time
Heating Min On Time
Heating Min Off Time
Unoccupied Off Delay
Reheat Min On Time
Reheat Min Off Time

Equipment Setup
Supply Fan:
Supply Fan Type
Start Voltage
Full Speed Voltage
Minimum Command
Medium Speed On Cmd
High Speed On Cmd
Medium Fan On Diff SP
Medium Fan Off Diff SP
High Fan On Diff SP
High Fan Off Diff SP

Equipment Setup
Reheat:
Reheat Installed
Reheat Min Damper Position
Reheat Fan Required

Equipment Setup
Changeover:
Changeover Mode
Supply Temperature Type
Changeover Setpoint
Supply Temperature Sensor
Supply Temperature Offset

Trend:
EEF-ZNT
EFF-SETPOINT
EFF-ZNH
B1 Status
B2 Status
EFF-OAT
EFF-SAT
FANSPD-S
CLG1-C
CLG2-C
HTG1-C
HTG2-C
OAD-O
HTG=O
CLG-O

System Status:
Occupancy Source
Unit Status
Supply Air Temperature
Changeover State
Zone Temperature Source

Control Status:
Cooling % Command
Heating % Command
Reheat % Command
Cool Stage 1
Heat Stage 1
Reheat Stage 1
Fan % Command
Fan

Thermostat Information:
Model Name
Software Version
Unit Name
Devise Name
Devise Description

Commissioning:
Supply Air Temperature
Heat Command
Cool Command
Supply Fan
Aux

Selecting the unit type
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 TSTAT 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 TSTAT 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.

Selecting the heating and cooling device type

By default, the thermostat is configured for On-Off (2-position) control. This can be changed to Floating (Incremental) mode when the Unit Type is not set to VAV. For VAV mode, only floating actuators are supported and this option is unavailable.

When in Floating mode, the Actuator Stroke Time must also be set to match the equipment.

Configuring the supply fan - fan coil only

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.

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 user configurable value of temperature differential from setpoint. By default, the Medium Fan On Diff Sp is set to 1.5, the Medium Fan Off Diff Sp is set to 0.5, the High Fan On Diff Sp is set to 2, and the High Fan Off Diff Sp is set to 1.

For VSF control, the output is configurable 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 at which the fan begins running, and Full Speed Voltage is the voltage output at which the fan reaches full speed. 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 VDC, the Full Speed Voltage is 10 VDC, and the Minimum Command is 20%.

When the variable speed fan is off, the FAN L binary output is off and the voltage at the VSF output is 0 VDC. When the fan turns on, the FAN L 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.

Setting the Control mode

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.

Setting the Fan mode - fan coil only

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 about 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 for 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.

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 - units configured with floating actuators, multi-speed fans, and variable-speed fans only

With non-binary outputs, the MAI60025 is configured by default 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.

Changeover

Pressure-Dependent VAV systems and two-pipe fan coils require changeover detection in order to switch seasonal operation between heating and cooling modes. The TSTAT 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 TSTAT. 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.
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

The MAI60025 thermostat support dehumidification control on fan coil devices under three configurations:

- Four-pipe fan coil
- Four-pipe fan coil with reheat
- Two-pipe fan coil (with changeover in cooling mode) with reheat

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.

Temperature setpoints

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 TSTAT. The six temperature setpoints are Cooling and Heating setpoints for Occupied, Unoccupied, and Standby modes.

ⓘ **Note:** The TSTAT 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).

The four modes of setpoint operation are described in Table 6.

Table 6: 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 TSTAT was released with (the next three modes are new). In this mode, the TSTAT has a heating setpoint and a cooling setpoint. There is a common Sp Offset (warmer/ cooler adjust) that is applied 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 TSTAT has a heating sp and a cooling sp. Each setpoint has a configurable range (**Setpoint** > **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 Sp 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.
Occ Setpoint Select = Setpoint Offset and Heat Cool Setpoint Mode = Common Setpoint	In this mode, the TSTAT has one setpoint, Common Setpoint, for heating and cooling. There is also a common Setpoint Offset (warmer/ cooler adjust) that is only applied 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 TSTAT has one setpoint, Common Setpoint, for heating and cooling. There is a configurable range for Common Setpoint, Min Setpoint, and Max Setpoint.

Scheduling (for all models)

The occupancy schedule comes from either the weekly scheduler built into the TSTAT or as an input from the BAS. The Schedule Source must be selected to tell the thermostat where to read the occupancy source from.

Setting the local schedule

A weekly occupancy schedule with up to four occupancy events for each day can be set locally on the TSTAT and operate independently of a supervisor. See Scheduling (for all models) to ensure the schedule source is set to Local.

➤ **Important:** Internally, the MAI60025 uses a BACnet schedule where daily schedules are independent of the previous and next days. The default occupancy of the MAI60025 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.

Overriding the occupancy mode

The TSTAT supports a manual override of all other schedule sources (for example, Schedule, Occupancy BI, and temporary occupancy).

Enabling optimal start

The TSTAT 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.

Scheduled circulation

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.

Menus and submenus

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

Troubleshooting

Table 8: 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

Table 8: Fault list

Faults	Probable causes	Solutions
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.
Internal Sensor Fail	An internal sensor has failed on the TSTAT	Order replacement units
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 TSTAT 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
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
Changeover Fail	The Supply Temperature Sensor is not installed, has failed, or has been disconnected and the TSTAT 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
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 ohm, and verify the wiring to the TSTAT. 3. Order replacement units
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 ohm, and verify wiring to the TSTAT. 3. Reset fault by entering the menu, selecting Fault Status, and selecting the Fan Lock. 4. Order replacement

Table 8: Fault list

Faults	Probable causes	Solutions
Humidity Unreliable	The zone humidity reading was reliable and has now failed.	1 Order replacement units 2. If the source of zone humidity was a BAS, check the BAS to ensure that it is still online and providing the TSTAT with the humidity reading. If removal of the BAS mapping was intentional, reset sensors through the menu.
Controller Fault	The thermostat has detected an internal fault that it cannot recover.	Order replacement
	An unknown error has prevented the thermostat from turning on.	Order replacement units
Touchscreen Unavailable	The touchscreen components fail to initialize.	1. Reboot the thermostat. 2. If problems persist, order replacement.
Board Mismatch	The baseboard and CPU board are paired incorrectly. An error message appears on the TSTAT indicating the model number of the baseboard and CPU board.	Match the baseboard to its corresponding CPU board.
Firmware Mismatch	The previous upgrade did not complete.	1. Upgrade the MAI60025 to the latest released version. 2. Upgrade the MAI60025 to the current version again.
	The previous downgrade has not completed because the previous version is no longer supported.	Reboot the MAI60025 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
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.

Table 8: Fault list

Faults	Probable causes	Solutions
Zone Temperature Too Cold	The Zone Temperature decreased below the configured Zone Temp Low Limit.	Verify that the TSTAT 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 TSTAT and the RTU cooling are enabled and functioning.

Table 9: 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 is sensing 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 TSAT. 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 is sensing 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 staged equipment shuts off above the cooling setpoint or below the heating setpoint when the PID is running on the TSTAT. If the unit is in On/Off Control mode, this does not apply.	The PID control algorithm minimizes overshoot and energy usage for the particular equipment and zone, and may cycle the equipment prior to reaching setpoint.	Expected behavior.

Table 9: Troubleshooting details

Symptom	Probable causes	Solutions
The staged equipment cycles too rapidly or too slowly when the PID is running on the TSTAT.	The control band around the setpoint is determined by the minimum on/off times and is set incorrectly for the equipment, zone, or user preference. There is a tradeoff between reduced control band size and increased energy usage and equipment wear from increased cycling.	1. Verify that equipment minimum on/off times are set correctly. 2. If the default deadband around the setpoint does not provide the required temperature control, set Temp Control Setup to Deadband Override and set the Deadband parameter to the preferred value.
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 MAI60025 zone temperature does not change fast enough compared to the measured zone temperature from a verification device, such as a calibrated sensor.	The MAI60025 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 TSTAT.	Ensure that the backup file being restored was from the same model TSTAT.
The thermostat is unable to access a USB drive.	The drive is formatted as NTFS or another unsupported format. The TSTAT 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
The thermostat displays `Controller Fault`.	An internal fault was detected and the thermostat was unable to recover.	Order replacement units
The Bell icon is displayed on the TSTAT home page.	The fault has been detected on the TSTAT.	See Table 8 for TSTAT fault causes and resolution.

Table 9: Troubleshooting details

Symptom	Probable causes	Solutions
`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 TSTAT device.	1. Create a Backup file on a USB drive for the TSTAT 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 TSTAT.
The temperature displayed is lower than the actual room temperature.	Cold air drafts enter the back of the TSTAT.	Seal any holes behind the TSTAT to reduce drafts.
	Air is being forced through the TSTAT from a nearby vent.	Move the location of the TSTAT or change the venting to prevent air from being forced through the TSTAT.
For wireless models, Supervisory Status = Offline	The supervisory controller is not communicating with the TSTAT.	1. Map the TSTAT into a 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 5 for lockout levels and access details.
The touchscreen is unresponsive.	You tap the display or touch the thermostat within 5 mm of the display when power is applied to the thermostat.	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.		

MAI60025 Series On/off or Floating Fan Coil Thermostats technical specifications

Table 10: MAI60025 Series Networked and Wireless On/off or Floating 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
Relay contact rating	On/off or floating control	19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush, Class 2 or SELV
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

Table 10: MAI60025 Series Networked and Wireless On/off or Floating Fan Coil and Individual Zone Thermostats with Dehumidification Capability technical specifications

Specification		Description
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..
		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
Temperature range	Backlit display	-40.0°F to 122.0°F (-40.0°C to 50.0°C) in 0.5° increments
	Heating control	40.0°F to 90.0°F (4.5°C to 32.0°C)
	Cooling control	54.0°F to 100.0°F (12.0°C to 38.0°C)
Accuracy	Temperature	±0.9F° at 70.0°F (±0.5C° at 21.0°C) typical calibrated
	Humidity	±5% RH from 20% to 80% RH at 50°F to 90°F (10°C 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

Table 10: MAI60025 Series Networked and Wireless On/off or Floating Fan Coil and Individual Zone Thermostats with Dehumidification Capability technical specifications

Specification		Description
Ambient conditions	Operating	32°F to 122°F (0°C to 50°C); 95% RH maximum, noncondensing
	Storage	-4°F to 122°F (-20°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 –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)