T600MSx-4 and T600MSx-4+PIR Series Multi-Stage Thermostat Controllers

Installation Instructions

T600MSN-4, T600MSP-4,
T600MSN-4+PIR, T600MSP-4+PIR

Part No. 24-9890-935, Rev. —
Issued September 17, 2009

Applications

The T600MSN-4 and T600MSN-4+PIR non-programmable and T600MSP-4 and T600MSP-4+PIR programmable thermostat controllers are specifically designed for control of multi-stage commercial heating and cooling equipment.

IMPORTANT: The T600MSx-4 and T600MSx-4+PIR Series Thermostat Controllers are intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat controller could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the thermostat controller.

North American Emissions Compliance

United States

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

Canada

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

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

Installation

Location Considerations

Locate the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller:

- on a partitioning wall, approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight, radiant heat, outside walls, outside doors, air discharge grills, or stairwells; or from behind doors
- away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference

For integrated Passive Infrared (PIR) models, be sure that the thermostat controller is located centrally, where occupant movement is abundant.

Note: Allow for vertical air circulation to the thermostat controller.

To install the thermostat controller:

1. Use a Phillips-head screwdriver to remove the security screw if it is installed on the bottom of the thermostat controller cover.

Note: Normally, the security screw comes packaged separately in a plastic bag with the thermostat controller. Skip this step if the screw is not installed on the bottom of the cover.

2. Pull the bottom edge of the thermostat controller cover and open the thermostat controller as illustrated in Figure 1.

Note: PIR models have a wiring connection between the cover and the Printed Circuit Board (PCB). This connection allows for proper wiring of the occupancy sensor. Carefully remove the wiring connection from the PCB by pulling up on the connector block. Do not attempt to remove the connector block by pulling on the wires.

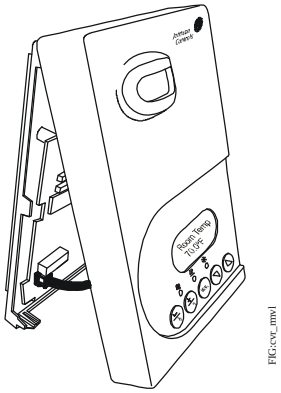

Figure 1: Removing the Thermostat Controller Cover (T600MSx-4+PIR Model Shown)

3. Carefully pull the locking tabs on the right side of the thermostat controller mounting base and unlock the PCB. Open the PCB to the left as illustrated in Figure 2.

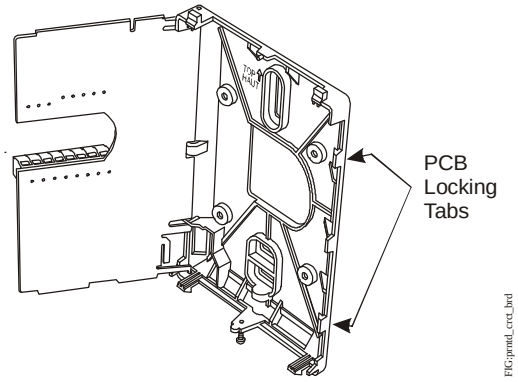

Figure 2: Opening the Thermostat Controller PCB

4. Pull approximately 6 in. (152 mm) of wire from the wall and insert the wire through the hole in the thermostat controller mounting base.
5. Align the thermostat controller mounting base on the wall and use the base as a template to mark the two mounting hole locations.

Note: Be sure to position the thermostat controller mounting base so that the arrow on the base points upward to indicate the top of the thermostat controller.

6. Drill a 3/16 in. (5 mm) hole at each of the two marked locations and tap nylon anchors (included with the thermostat controller) flush to the wall surface.

Note: Other means of anchoring the device may be desired, depending on the wall medium.

7. Position the thermostat controller mounting base on the wall and use the two mounting screws (included with the thermostat controller) to secure the base to the wall surface as illustrated in Figure 3.

Note: Be careful not to overtighten the mounting screws.

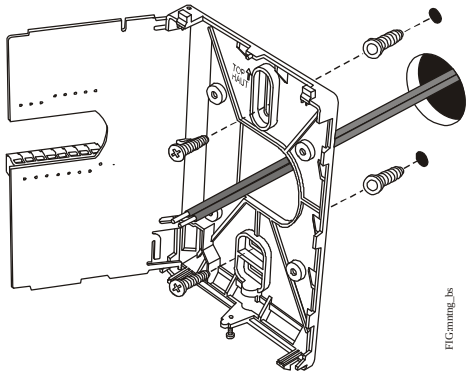

Figure 3: Securing the Thermostat Controller Mounting Base to the Wall

8. Swing the PCB back to the right and carefully snap it into the locking tabs on the thermostat controller mounting base.
9. Remove the screw terminal blocks that are attached to a disposable adhesive. Figure 4 illustrates the locations of the screw terminal blocks on the thermostat controller.

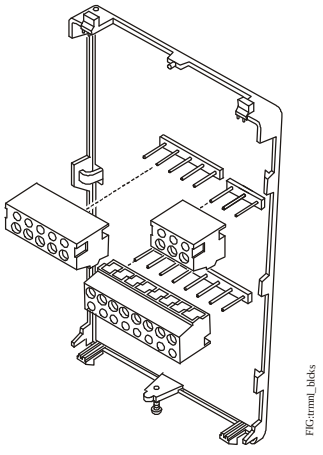

Figure 4: Removing the Screw Terminal Blocks

Wiring

When an existing thermostat controller is replaced, remove and label the wires to identify the terminal functions. When a T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller is replaced, simply remove the old screw terminal blocks and reinsert them onto the PCB of the replacement thermostat controller.

CAUTION: Risk of Electric Shock. Disconnect power supply before making electrical connections to avoid electric shock.

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.

IMPORTANT: Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the electrical ratings of the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller.

To wire the thermostat controller:

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

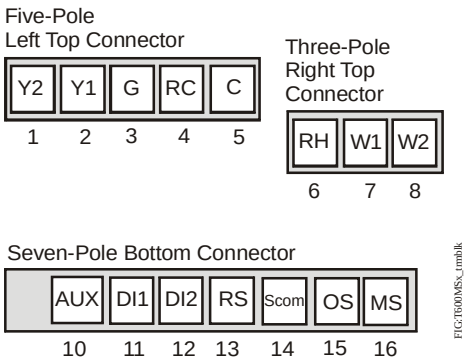

Figure 5: Terminal Blocks

2. 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.

3. Reinsert the screw terminal blocks onto the PCB.

Note: If multiple wires are inserted into the terminals, be sure to properly twist the wires together prior to inserting them into the terminal connectors.

4. For PIR models, carefully reattach the PIR connector to the PCB.
5. Reattach the thermostat controller cover to the mounting base (top side first).
6. Use a Phillips-head screwdriver to install the security screw on the bottom of the thermostat controller cover if desired. The security screw comes packaged separately in a plastic bag with the thermostat controller.

Table 1: Terminal Identification (See Figure 5.)

Terminal Number	Terminal Label	Function
1	Y2[1]	Energizes on a Call for Second-Stage Cooling
2	Y1[1]	Energizes on a Call for First-Stage Cooling
3	G[1]	Energizes Fan in Accordance with Selected Fan Mode
4	RC	24 VAC from Equipment Transformer
5	C	24 VAC (Common) from Equipment Transformer
6	RH	24 VAC for Heating Stage
7	W1[2]	Energizes on a Call for First-Stage Heating
8	W2[2]	Energizes on a Call for Second-Stage Heating
10	AUX[1]	Auxiliary Output
11	DI1	Configurable Digital Input 1
12	DI2	Configurable Digital Input 2
13	RS	Remote Room Temperature Sensor
14	Scom	Sensor Common
15	OS	Outside Air Temperature Sensor
16	MS	Not Used

1. This terminal provides the voltage from RC through a relay contact.
2. This terminal provides the voltage from RH through a relay contact.

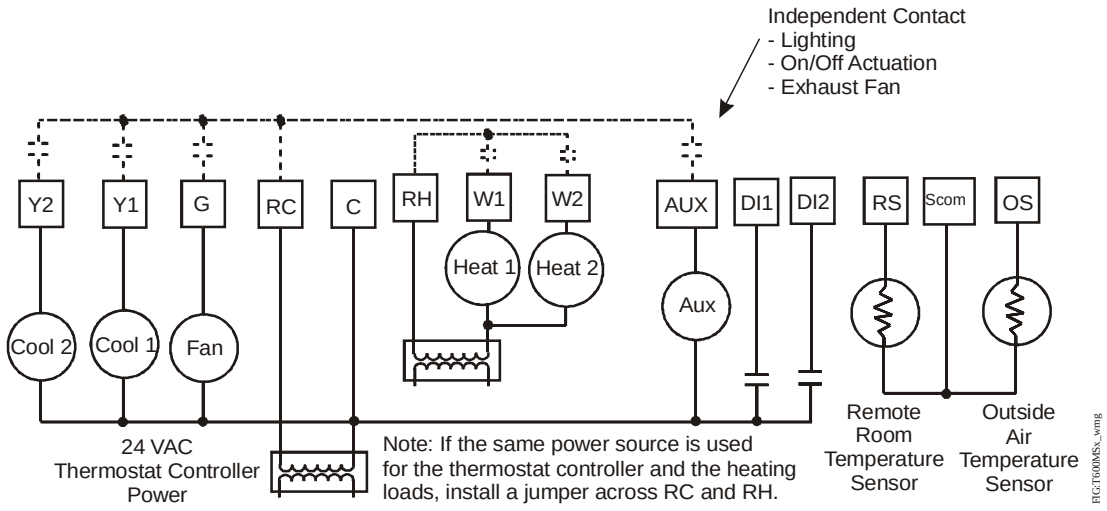

Figure 6: Wiring the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller

Setup and Adjustments

Thermostat Controller Operation Overview

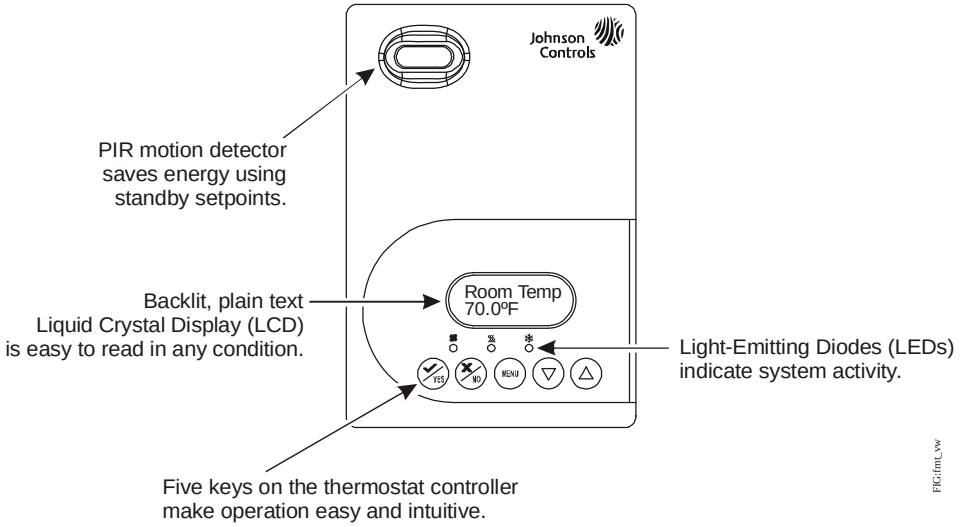

Figure 7: Front Cover of Thermostat Controller (T600MSx-4+PIR Model Shown)

Thermostat Controller User Interface Keys

The T600MSx-4 and T600MSx-4+PIR Series Thermostat Controller user interface consists of five keys on the front cover (as illustrated in Figure 7). The function of each key is as follows:

- Use the **YES** key to:
  - confirm menu selections and to advance to the next menu item.
  - stop the Status Display Menu from scrolling and to manually scroll to the next parameter on the menu.

Note: When the thermostat controller is left unattended for 45 seconds, the thermostat controller display resumes scrolling.

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

- Use the **MENU** key to:
  - access the Main User Menu or exit the menu
  - access the Installer Configuration Menu or to exit the menu (See *Configuring the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller* on page 6.)
- Use the **UP/DOWN** arrow keys to change the configuration parameters and to activate a setpoint adjustment.

Backlit LCD

The T600MSx-4 and T600MSx-4+PIR Series Thermostat Controllers include a 2-line, 8-character backlit display. Low-level backlighting is present during normal operation, and it brightens when any user interface key is pressed. The backlight returns to low level when the thermostat controller is left unattended for 45 seconds.

LEDs

Three LEDs are included to indicate the fan status, call for heat, or call for cooling:

- The fan LED is on when the fan is on.
- The heat LED is on when heating is on.
- The cool LED is on when cooling is on.

Integrated PIR Sensor – T600MSx-4+PIR Series Thermostat Controllers

The integrated PIR sensor allows for automatic switching between fully adjustable Occupied and Unoccupied temperature setpoints without user interaction. This feature generates incremental energy savings during scheduled occupied periods while the space is unoccupied.

Programming Overview

Three menus are used to view, program, and configure the T600MSx-4 and T600MSx-4+PIR Series Thermostat Controllers: the Status Display Menu, the Main User Menu, and the Installer Configuration Menu.

Status Display Menu

The Status Display Menu is displayed during normal thermostat controller operation, and continuously scrolls through the following parameters:

- Room Temperature
- Day and Time (T600MSP-4 and T600MSP-4+PIR Models)
- System Mode
- Schedule Status (Occupied/Unoccupied/Override [PIR Models])
- Outside Temperature – An outside air temperature sensor must be installed and connected.
- Applicable Alarms – The backlight lights up as an alarm condition is displayed.

Note: Press the **YES** key to temporarily stop this menu from scrolling.

Note: An option is available within the Installer Configuration Menu to lock out the scrolling display and show only the Room Temperature parameter.

Main User Menu

Use the Main User Menu to access and change the basic operating parameters of the thermostat controller. Access the menu by pressing the **MENU** key during normal thermostat controller operation.

Installer Configuration Menu

Use the Installer Configuration Menu to set up the thermostat controller for application-specific operation. To access the menu, press and hold the **MENU** key for approximately 8 seconds.

Occupancy Sensor Operation – T600MSx-4+PIR Series Thermostat Controllers

A T600MSx-4+PIR Series Thermostat Controller (or a T600MSx-4 Series Thermostat Controller equipped with a PIR accessory cover) provides advanced occupancy logic.

Note: The PIR strategy is an occupied strategy. If the thermostat controller is programmed to be Unoccupied, the PIR function does not have an affect on the occupancy strategy.

The thermostat controller automatically switches the occupancy level between Occupied and Unoccupied as required, when local movement is sensed. In the Occupied mode, if no movement is detected beyond the **Unocc TM** parameter setting, the mode changes to Unoccupied. Once movement is detected, the mode changes back to Occupied.

Occupancy sensing is enabled only if a PIR cover is installed. The PIR cover, when installed, is auto detected.

PIR Diagnostic LEDs

The diagnostic LEDs inside the PIR lens brighten when movement is detected within the first 30 minutes after powerup. The LEDs do not light up or brighten after the initial 30-minute period.

Setpoints

The installer must be certain that the difference between the Occupied and Unoccupied setpoints can be recovered within a timely fashion to ensure occupancy comfort. In addition, the difference between the two setpoints must be large enough to warrant maximum energy savings.

These setpoints and Unoccupied timers are adjustable to allow for customization, as dictated by the individual space requirements. See Figure 8 for an example of increasing room temperature setpoints.

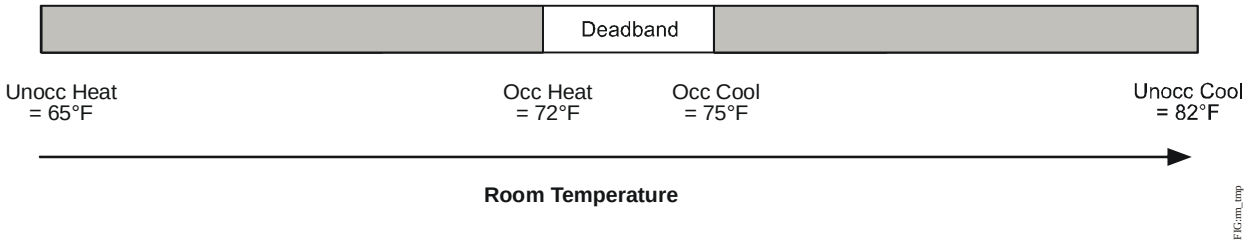

Figure 8: Increasing Room Temperature Setpoints

Configuring the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller

The T600MSx-4 and T600MSx-4+PIR Series Thermostat Controllers come from the factory with default settings for all configurable parameters. The default settings are shown in Table 2. To reconfigure the parameters via the thermostat controller, follow the steps in this section.

1. To access the Installer Configuration Menu, press and hold the **MENU** key for approximately 8 seconds.

Note: If the **Password** parameter is configured, Password 0 appears on the thermostat controller display indicating that the configured password is required to proceed. Use the **UP/DOWN** arrow keys to indicate the configured password, then press the **YES** key to proceed through the Installer Configuration Menu parameters.

2. Once the Installer Configuration Menu begins, press the **NO** key to scroll through the parameters listed in Table 2.
3. When the desired parameter is displayed, use the **YES** key to choose the desired selection option.
4. Press the **YES** key and then the **NO** key to continue scrolling through the parameters.

To exit the Installer Configuration Menu at any time, press the **MENU** key, then at the exit prompt, press the **YES** key. To pass over a parameter without changing it, press the **NO** key.

When the thermostat controller is in the Installer Configuration Menu and left unattended for approximately 8 seconds, the thermostat controller reverts to the Status Display Menu.

Configuring Inputs DI1 and DI2

When DI1 and DI2 are configured for an alarm condition, an alarm condition is displayed locally when the input is closed. An alarm message is included on the scrolling Status Display Menu and when the message is displayed, the backlight momentarily lights up.

Each input can be configured to the Selection Options included in Table 2.

Table 2: Installer Configuration Menu (Part 1 of 6)

Parameter Appearing on Display	Description and Default	Selection Options
Pswrd	Sets the protective access password to prevent unauthorized access to the Installer Configuration Menu. Default: **0** **Note:** The default setting does not lock out access to the Installer Configuration Menu.	Range: **0** to **1,000**

Table 2: Installer Configuration Menu (Part 2 of 6)

Parameter Appearing on Display	Description and Default	Selection Options
DI1[1]	Configuration of Digital Input 1. Default: **None**	**(None):** No function is associated with an input. **(Service):** A Service alarm is displayed on the thermostat controller when the input is energized. Tie this input into the air conditioning unit control card, which provides an alarm if a malfunction occurs. **(Filter):** A Filter alarm is displayed. This alarm can be connected to a differential pressure switch that monitors a filter. **(RemOVR):** Temporary occupancy request via a remote input. This override function is controlled by a manual remote occupancy override. When enabled, this condition disables the override capability of the thermostat controller. **(RemNSB):** Remote Night Setback (NSB) via a time clock input, an occupancy sensor, or from a voltage-free contact. Contact open = Occupied; contact closed = Unoccupied. **(Fan lock):** A backlit flashing Fan lock alarm is displayed on the thermostat controller when the input is not energized. This alarm is used in conjunction with a local airflow sensor connected to the input. The thermostat controller heating or cooling action is locked out if no airflow is detected 10 seconds after the fan (Terminal G) is energized. Contact open = no airflow; contact closed = airflow present.
DI2[1]	Configuration of Digital Input 2. Default: **None**	**(None):** No function is associated with an input. **(Service):** A Service alarm is displayed on the thermostat controller when the input is energized. Tie this input into the air conditioning unit control card, which provides an alarm if a malfunction occurs. **(Filter):** A Filter alarm is displayed. This alarm can be connected to a differential pressure switch that monitors a filter. **(RemOVR):** Temporary occupancy request via a remote input. This override function is controlled by a manual remote occupancy override. When enabled, this condition disables the override capability of the thermostat controller. **(RemNSB):** Remote Night Setback (NSB) via a time clock input, an occupancy sensor, or from a voltage-free contact. Contact open = Occupied; contact closed = Unoccupied. **(Fan lock):** A backlit flashing Fan lock alarm is displayed on the thermostat controller when the input is not energized. This alarm is used in conjunction with a local airflow sensor connected to the input. The thermostat controller heating or cooling action is locked out if no airflow is detected 10 seconds after the fan (Terminal G) is energized. Contact open = no airflow; contact closed = airflow present.
MenuScro	Gives the option of having the display continuously scroll the parameters. Default: **on**	**(off):** The scroll is inactive. **(on):** The scroll is active.

Table 2: Installer Configuration Menu (Part 3 of 6)

Parameter Appearing on Display	Description and Default	Selection Options			
Lockout	Selectable Lockout Levels for limiting end-user keypad interaction. Default: **0**	**Function**	**Lockout Level**		
			(0)	**(1)**	**(2)**
		Occupancy Override	Access	Access	No Access
		Permanent Temperature Setpoints	Access	No Access	No Access
		Temporary Temperature Setpoints	Access	Access	No Access
		System Mode Setting	Access	No Access	No Access
		Fan Mode Setting	Access	No Access	No Access
		Schedules Setting[2]	Access	No Access	No Access
		Clock Setting[2]	Access	Access	Access
		Permanent Hold[2]	Access	No Access	No Access
Pwr del[3]	Sets the delay time period at thermostat controller powerup, or each time power is removed and reapplied, before any operation (fan, heating, or cooling) is authorized. Also can be used to sequence the startup of multiple units in one location. Default: **10.0 sec**	Range: **10.0** to **120.0 sec**			
Frost pr	Provides a minimum heating setpoint of 42.0°F/5.5°C to prevent freezing in the zone controlled by the thermostat controller. Default: **off**	**(on):** Enabled **(off):** Disabled			
Heat max[4]	Sets the Occupied and Unoccupied maximum Heating setpoint values. Default: **90.0°F/32.0°C**	Range: **40.0°F/4.5°C** to **90.0°F/32.0°C**			
Cool min[4]	Sets the Occupied and Unoccupied minimum Cooling setpoint values. Default: **54.0°F/12.2°C**	Range: **54.0°F/12.2°C** to **100.0°F/37.7°C**			

Table 2: Installer Configuration Menu (Part 4 of 6)

Parameter Appearing on Display	Description and Default	Selection Options
Pband	Sets the proportional band used by the thermostat controller Proportional-Integral (PI) control loop. Default: **2.0F°/1.1C°** **Note:** The proportional band default setting of 2.0F°/1.1C° provides satisfactory thermostat controller operation in most instances. A proportional band setting other than the default is normally used in installations where the location of the thermostat controller is problematic, leading to unwanted cycling. An example of a problematic installation is a wall-mounted thermostat controller installed between the return and supply air feeds, that is directly influenced by the supply air stream.	**(2):** 2.0F°/1.1C° **(3):** 3.0F°/1.7C° **(4):** 4.0F°/2.2C° **(5):** 5.0F°/2.8C° **(6):** 6.0F°/3.3C° **(7):** 7.0F°/3.9C° **(8):** 8.0F°/4.4C°
Anticycl	Anti-Short Cycle timer sets the minimum on/off times for heating and cooling. Default: **2.0 min** **Note:** Set the anti-short cycle timer to 0.0 min for equipment that already has its own anti-short cycle timer.	Range: **0.0** to **5.0 min** adjustable in 1-minute increments
Heat cph	Sets the maximum number of Heating cycles per hour. Default: **4.0**	Range: **3.0** to **8.0** cycles per hour
Cool cph	Sets the maximum number of Cooling cycles per hour. Default: **4.0**	Range: **3.0** or **4.0** cycles per hour
Deadband	Sets the minimum deadband between the heating and cooling setpoints. Default: **2.0F°/1.0C°**	Range: **2.0F°/1.0C°** to **4.0F°/2.0C°** adjustable in 1.0F°/0.5C° increments
Fan cont	Determines how the fan is activated in response to a call for heating. Default: **on** **Note:** The **Fan cont** parameter applies to W1 and W2 when the fan is in the Auto mode only. The **Fan cont** parameter does not affect fan operation on a call for cooling (Y1 and Y2).	**(off):** The thermostat controller does not activate the fan in response to a call for heating. The fan is activated by the equipment fan and limit control. **(on):** Enables the thermostat controller to activate the fan in response to a call for heating.
Fan del	Fan delay extends fan operation after a heating or cooling cycle has ended. Default **off** **Note:** The fan delay is only active when the fan is in the Auto mode.	**(on):** Extends fan operation by 60 seconds after a heating or cooling cycle has ended. **(off):** No extension of fan operation after a heating or cooling cycle has ended.

Table 2: Installer Configuration Menu (Part 5 of 6)

Parameter Appearing on Display	Description and Default	Selection Options
TOccTime	Sets the duration of the Temporary Occupancy Time (when the thermostat controller is in the Unoccupied mode) when a Schedule Override Function is enabled using either the Main User Menu or DI1 or DI2 configured as a temporary override remote contact (RemOVR). Sets the effective duration of the Temporary heating or cooling setpoints set using the **UP/DOWN** arrow keys. Default: **3.0 hrs**	Range: **0.0** to **12.0 hrs** adjustable in 1-hour increments
Cal RS	Sets the desired room air temperature sensor calibration (offset). The offset can be added to or subtracted from the actual displayed room temperature. Default: **0.0F°/0.0C°C**	Range: **-5.0F°/-2.5C°** to **5.0F°/2.5C°** adjustable in 1.0F°/0.5C° increments
Cal OS	Sets the desired outside air temperature sensor calibration (offset). The offset can be added to or subtracted from the actual displayed room temperature. Default: **0.0F°/0.0C°**	Range: **-5.0F°/-2.5C°** to **5.0F°2.5C°** adjustable in 1.0F°/0.5C° increments
H stage	Reverts the operation of a two-stage thermostat controller to a single-stage thermostat controller when the second heating stage is not needed. Default: **2.0**	**(1.0):** One Stage **(2.0):** Two Stages
C stage	Reverts the operation of a two-stage thermostat controller to a single-stage thermostat controller when the second cooling stage is not needed. Default: **2.0**	**(1.0):** One Stage **(2.0):** Two Stages
H lock	Disables heating stage(s) operation when the outside air temperature is greater than the configured value. If the fan mode is set to Auto or Smart, the fan output is also disabled. Requires that an outside air temperature sensor be installed and connected. Default: **120°F/49°C**	Range: **-15°F/-26°C** to **120°F/49°C** adjustable in 5F°/5C° increments
C lock	Disables cooling stage(s) operation when the outside air temperature is less than the configured value. If the fan mode is set to Auto or Smart, the fan output is also disabled. Requires that an outside air temperature sensor be installed and connected. Default: **-40°F/-40°C**	Range: **-40°F/-40°C** to **95°F/35°C** adjustable in 5F°/5C° increments

Table 2: Installer Configuration Menu (Part 6 of 6)

Parameter Appearing on Display	Description and Default	Selection Options
Unocc TM	Sets the time delay between the moment when the thermostat controller toggles from the Occupied mode to the Unoccupied mode after the last motion is detected by the occupancy sensor. Default: **0.5 hours**	Range: **0.5 hours** to **24.0 hours** adjustable in 0.5 hour increments
2/4event[2]	Sets the number of events within a 24-hour period. Default: **2.0**	**(4.0):** Four events (two Occupied and two Unoccupied) within a 24-hour period **(2.0):** Two events (one Occupied and one Unoccupied) within a 24-hour period
Aux cont	Energizes peripheral devices (lighting equipment, exhaust fans, and economizers). Default: **n.o.** **Note:** The contact toggles with the internal Occupied/Unoccupied schedule (or the NSB contact on one of the digital inputs, if used).	**(n.c.):** Contact open = Occupied; contact closed = Unoccupied **(n.o.):** Contact closed = Occupied; contact open = Unoccupied
Prog rec[2]	Provides the desired occupied temperature either at the start of the Occupied schedule or after the Occupied schedule begins. Default: **off** **Note:** Progressive recovery is disabled if either DI1 or DI2 is configured as remote NSB.	**(on):** Enabled (provides the desired occupied temperature at the start of the Occupied schedule) **(off):** Disabled (provides the desired occupied temperature after the Occupied schedule begins)

1. Setting DI1 or DI2 to RemNSB disables schedules and stops the Schedule menu display. Any other setting enables schedules and the Schedule menu (T600MSP-4 and T600MSP-4+PIR models).
2. T600MSP-4 and T600MSP-4+PIR models.
3. When adjusting the numeric value, press the **UP/DOWN** arrow key to change the value by single increments; press and hold the **UP/DOWN** arrow key to change the numeric value in increments of ten.
4. When adjusting the temperature, press the **UP/DOWN** arrow key to change the value in 0.5F°/0.5C° increments; press and hold the **UP/DOWN** arrow key to change the value in 5.0F°/5.0C° increments.

Operation

Setup/Operation of the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller

Once the thermostat controller is configured via the Installer Configuration Menu, set up its operating parameters via the Main User Menu. Access this menu by pressing the **MENU** key during normal thermostat controller operation. The Main User Menu contains the basic operating features of the thermostat controller.

The Main User Menu also uses Auto Help, which is displayed automatically in the menu when there is a pause in setup activity. To exit Auto Help, continue with the setup selection. When the thermostat controller is in the Main User Menu and is left unattended for 45 seconds, the menu reverts to the Status Display Menu.

Follow the steps in Table 3 to set up the thermostat controller.

Table 3: Setting Up the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller (Part 1 of 2)

Thermostat Controller Display	Description
RoomTemp 75.0 °F	Press the **MENU** key while in the Status Display Menu to enter the Main User Menu.
Override schd Y/N	Overrides Unoccupied Setpoints Only Appears if Thermostat Controller is in Unoccupied State See *Enabling Temporary Override Schedule* on page 12.
Cancel ovrd Y/N	Cancels Override Mode
Temperat set? Y/N	Sets the Temperature Setpoints See *Entering Permanent Temperature Setpoints* on page 13.
Sys mode set? Y/N	Selects the System Mode Default: Automatic (auto) See *Selecting the System Mode* on page 14.

Table 3: Setting Up the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller (Part 2 of 2)

Thermostat Controller Display	Description
Fan mode set? Y/N	Selects the Fan Mode Default: Automatic (auto) for T600MSN-4 and T600MSN-4+PIR Models Smart (smart) for T600MSP-4 and T600MSP-4+PIR Models See *Selecting the Fan Mode* on page 14.
Schedule set? Y/N	Sets the Occupied and Unoccupied Time Periods See *Programming the Daily Schedule – Two-Event (T600MSP-4 and T600MSP-4+PIR Models)* on page 15 and *Programming the Daily Schedule – Four-Event (T600MSP-4 and T600MSP-4+PIR Models)* on page 16.
Clock set? Y/N	Sets the Day and Time See *Setting the Day and Time (T600MSP-4 and T600MSP-4+PIR Models)* on page 17.
Schedule hold? Y/N	Sets a Permanent Hold on the Schedule or Resumes the Schedule See *Setting Schedule Hold* on page 17.

Note: Schedule Set and Clock Set are available on the T600MSP-4 and T600MSP-4+PIR models only.

Enabling Temporary Override Schedule

Note: The Override Schedule function is available on the T600MSN-4 and T600MSN-4+PIR models only when DI1 or DI2 is configured as remote NSB.

Note: The Override Schedule prompt only appears when in the Unoccupied (Unoccup) or Unoccupied Hold (Unoccup hold) mode.

The override schedule prompt only appears when the thermostat controller is in the Unoccupied state. This menu selection gives the user the option of overriding the Unoccupied setpoints with the Occupied setpoints for the amount of time specified under the **TOccTime** parameter. See *Configuring the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller* on page 6.

Note: If DI1 or DI2 is configured to operate as a remote override contact, this menu is disabled.

To override the Unoccupied state while in the Main User Menu:

1. Press the **NO** key for all prompts until the Override Schedule prompt appears. If the thermostat controller is in the Unoccupied state, this is the first prompt.
2. Press the **YES** key to enable the temporary override. The thermostat controller returns to the Status Display Menu.

When scrolling through the Status Display Menu, Override now appears for the schedule status parameter.

Canceling the Temporary Override

The Cancel Override (Cancel ovrd) prompt only appears when the thermostat controller is in the Unoccupied override mode.

To resume the schedule while in the Main User Menu:

1. Press the **NO** key for all prompts until the Cancel ovrd prompt appears. If the thermostat controller is in the override state, this is the first prompt.
2. Press the **YES** key to resume the programmed schedule.

The thermostat controller returns to the Status Display Menu.

Entering Permanent Temperature Setpoints

The first prompt appearing in the Main User Menu of the thermostat controller when in the Occupied state sets the permanent temperature setpoint.

To enter the permanent heating and cooling setpoints for the Occupied and Unoccupied modes, follow the steps in Table 4. When changing the temperatures, press and release the keys to change the temperature in 0.5F°/0.5C° increments; press and hold down the keys to change the temperature in 5.0F°/5.0C° increments.

Table 4: Entering Permanent Temperature Setpoints (Part 1 of 2)

Thermostat Controller Display	Description
RoomTemp 75.0°F	Press the **MENU** key while in the Status Display Menu to enter the Main User Menu.
Temperat set? Y/N	Press the **NO** key for all prompts until the temperature setpoint prompt appears on the display (it may be the first prompt). Press the **YES** key to enter the temperature setting menu.
Cooling set? Y/N	Press the **YES** key to change the Occupied cooling setpoint. Press the **NO** key to advance to the Occupied heating setpoint menu.
Cooling 75.0°F	Press the **UP/DOWN** arrow keys to set the temperature. Press the **YES** key to store the value and advance to the next menu.
Heating set? Y/N	Press the **YES** key to change the Occupied heating setpoint. Press the **NO** key to advance to the Unoccupied cooling setpoint menu.
Heating 68.0°F	Press the **UP/DOWN** arrow keys to set the temperature. Press the **YES** key to store the value and advance to the next menu.
Unocc CL set? Y/N	Press the **YES** key to change the Unoccupied cooling setpoint. Press the **NO** key to advance to the Unoccupied heating setpoint.
Unocc CL 80.0°F	Press the **UP/DOWN** arrow keys to set the temperature. Press the **YES** key to store the value and advance to the next menu.

Table 4: Entering Permanent Temperature Setpoints (Part 2 of 2)

Thermostat Controller Display	Description
Unocc HT set? Y/N	Press the **YES** key to change the Unoccupied heating setpoint. Press the **NO** key to advance to the temperature display units.
Unocc HT 62.0°F	Press the **UP/DOWN** arrow keys to set the temperature. Press the **YES** key to store the value and advance to the next menu.
°F/°C set? Y/N	Press the **YES** key to set the display units to °F or °C. Press the **NO** key to advance to the temperature setpoint type menu.
Exit? Y/N	Press the **YES** key to return to the Status Display Menu or press the **NO** key to re-enter the temperature setting menu.

Entering Temporary Temperature Setpoints

The user can temporarily change the temperature setpoints for the Occupied and Unoccupied heating and cooling modes. To temporarily change the setpoint, press the **UP/DOWN** arrow keys to change the temporary setpoint for the current mode of operation.

Note: Whether the thermostat controller is heating or cooling, the respective setpoint is temporarily adjusted. To toggle between the temporary heating and cooling setpoints, press the **NO** key while changing the temporary setpoints.

Ending Temporary Temperature Setpoints

The temporary setpoints remain in effect for the duration set in the **TOccTime** parameter or until manually released.

Note: Setting the **TOccTime** parameter to 0.0 hrs prevents the temporary setpoints from taking effect.

To manually release the temporary setpoint, while in the Main User Menu:

1. Press the **NO** key for all prompts until the Temperat set prompt appears. If the thermostat controller is in the Occupied state, this is the first prompt.
2. Press the **YES** key to cancel all temporary setpoints.
3. Press the **MENU** key again and press the **YES** key to exit the Main User Menu.

The setpoint reverts to the Permanent Temperature Setpoint.

Selecting the System Mode

The thermostat controller has four system modes:

- **Automatic Mode (auto):** Automatic changeover between heating and cooling. This is the default setting.
- **Cooling Mode (cool):** Cooling operation only.
- **Heating Mode (heat):** Heating operation only.
- **Off Mode (off):** The thermostat controller is off; however, when the frost protection (**Frost pr** parameter) is enabled, the thermostat controller still calls for heat if the temperature falls below 42°F/5.5°C.

To set the system mode while in the Main User Menu:

1. Press the **NO** key for all prompts until the system mode prompt appears on the display. Press the **YES** key to select the desired system mode.
2. Press the **UP/DOWN** arrow keys to locate the desired system mode. Press the **YES** key to select the desired system mode.
3. Press the **YES** key to return to the Status Display Menu or press the **NO** key to return to the system mode selection menu.

Selecting the Fan Mode

The thermostat controller has three fan mode settings:

- **On Fan Mode (on):** Energizes the fan all the time for both Occupied and Unoccupied states, even if the system mode is set to off.
- **Automatic Fan Mode (auto):** Energizes the fan only on a call for heating or cooling, for both Occupied and Unoccupied states. This is the default setting for the T600MSN-4 and T600MSN-4+PIR models.

Note: The setting for the **Fan cont** parameter may affect the fan operation on a call for heating.

- **Smart Fan Mode (smart):** Energizes the fan all the time for Occupied states, and only on a call for heating or cooling in Unoccupied states. This is the default setting for the T600MSP-4 and T600MSP-4+PIR models.

To select the fan mode while in the Main User Menu:

1. Press the **NO** key for all prompts until the fan mode prompt appears on the display. Press the **YES** key to set the fan mode.
2. Press the **UP/DOWN** arrow keys to locate the desired fan mode. Press the **YES** key to select the desired fan mode.
3. Press the **YES** key to return to the Status Display Menu or press the **NO** key to return to the fan mode selection menu.

Programming the Daily Schedule – Two-Event (T600MSP-4 and T600MSP-4+PIR Models)

The schedule-setting menu is used to enter the Occupied or Unoccupied states for each day of the week. The schedule-setting menu reflects either a two- or a four-event schedule per day, based on what was selected in the **2/4event** parameter during the configuration process. If the schedule-setting menu does not reflect a two-event schedule, select two events in the **2/4event** parameter of the Installer Configuration Menu.

When changing the time, press and release the **UP/DOWN** arrow keys to change the time in 1-minute increments; press and hold down the keys to change the time in 30-minute increments.

Note: Programming one of the digital inputs to remote NSB disables the menu.

To set the time schedule for a two-event schedule, follow the steps in Table 5. See Table 7, Events 1 and 2, for an example of a two-event office schedule.

Table 5: Programming the Daily Schedule – Two-Event (Part 1 of 2)

Thermostat Controller Display	Description
RoomTemp 75.0°F	Press the **MENU** key while in the Status Display Menu to enter the Main User Menu.
Schedule set? Y/N	Press the **NO** key for all prompts until the schedule set prompt appears on the display. Press the **YES** key to enter the scheduling menu.

Table 5: Programming the Daily Schedule – Two-Event (Part 2 of 2)

Thermostat Controller Display	Description
Monday set? Y/N	Press the **YES** key to set the schedule for Monday or press the **NO** key to advance to Tuesday.
Occupied day? Y/N	Press the **YES** key to set the Occupied start time for Monday or press the **NO** key to advance to Tuesday. Selecting **NO** leaves the thermostat controller in the Unoccupied state for the entire day.
Occupied 12:00 AM	Press the **UP/DOWN** arrow keys to set the Occupied start time. Press the **YES** key to enter the time.
Unoccup 12:00 AM	Press the **UP/DOWN** arrow keys to set the Unoccupied start time. Press the **YES** key to enter the time.
Tuesday set? Y/N	Press the **YES** key to set the schedule for Tuesday or press the **NO** key to advance to Wednesday.
Copy Y/N previous	Press the **YES** key to copy the schedule from the previous day. Press the **NO** key to set a different schedule.
Wednesda set? Y/N	If the **YES** key was pressed, the next prompt is for Wednesday. Repeat the procedure for the rest of the days of the week.
Exit? Y/N	After setting the schedule for all the days of the week, following the last entry for Sunday, press the **YES** key to return to the Status Display Menu or press the **NO** key to start again at Monday.

Programming the Daily Schedule – Four-Event (T600MSP-4 and T600MSP-4+PIR Models)

The schedule-setting menu is used to enter the Occupied and Unoccupied states for each day of the week. The schedule-setting menu reflects either a two- or four-event schedule per day, based on what was selected in the **2/4event** parameter during the configuration process. If the schedule-setting menu does not reflect a four-event schedule, select four events in the **2/4event** parameter of the Installer Configuration Menu.

When changing the time, press and release the **UP/DOWN** arrow keys once to change the time in 1-minute increments; press and hold down the keys to change the time in 30-minute increments.

Note: Programming one of the digital inputs to remote NSB disables the menu.

To set the time schedule for a four-event schedule, follow the steps in Table 6. See Table 7 for an example of a four-event office schedule.

Table 6: Programming the Daily Schedule – Four-Event (Part 1 of 2)

Thermostat Controller Display	Description
RoomTemp 75.0°F	Press the **MENU** key from the Status Display Menu to enter the Main User Menu.
Schedule set? Y/N	Press the **NO** key for all prompts until the schedule set prompt appears on the display. Press the **YES** key to enter the scheduling menu.
Monday set? Y/N	Press the **YES** key to set the schedule for Monday or press the **NO** key to advance to Tuesday.
Occupied day? Y/N	Press the **YES** key to set the Occupied start time for Monday or press the **NO** key to advance to Tuesday. Selecting **NO** leaves the thermostat controller in the Unoccupied state for the entire day.
Occupied 12:00 AM	Press the **UP/DOWN** arrow keys to set the first Occupied start time. Press the **YES** key to enter the time.

Table 6: Programming the Daily Schedule – Four-Event (Part 2 of 2)

Thermostat Controller Display	Description
Unoccup 12:00 AM	Press the **UP/DOWN** arrow keys to set the first Unoccupied start time. Press the **YES** key to enter the time.
Occupie2 12:00 AM	Press the **UP/DOWN** arrow keys to set the second Occupied start time. Press the **YES** key to enter the time.
Unoccup2 12:00 AM	Press the **UP/DOWN** arrow keys to set the second Unoccupied start time. Press the **YES** key to enter the time.
Tuesday set? Y/N	Press the **YES** key to set the schedule for Tuesday or press the **NO** key to advance to Wednesday.
Copy Y/N previous	Press the **YES** key to copy the schedule from the previous day. Press the **NO** key to set a different schedule.
Wednesda set? Y/N	If the **YES** key was pressed, the next prompt is for Wednesday. Repeat the procedure for all days of the week.
Exit? Y/N	After setting the schedule for all the days of the week, following the last entry for Sunday, press the **YES** key to return to the Status Display Menu or press the **NO** key to start again at Monday.

Table 7: Four-Event Office Schedule

Event	Event 1		Event 2		Event 3		Event 4	
	Occupied		Unoccupied		Occupied 2		Unoccupied 2	
	Cool	Heat	Cool	Heat	Cool	Heat	Cool	Heat
	72°F (22°C)	70°F (21°C)	80°F (27°C)	62°F (17°C)	72°F (22°C)	70°F (21°C)	80°F (27°C)	62°F (17°C)
Monday	7:00 A.M.		5:00 P.M.		12:00 P.M.[1]		12:00 P.M.[1]	
Tuesday	7:00 A.M.		5:00 P.M.		12:00 P.M.[1]		12:00 P.M.[1]	
Wednesday	7:00 A.M.		5:00 P.M.		12:00 P.M.[1]		12:00 P.M.[1]	
Thursday	7:00 A.M.		5:00 P.M.		7:00 P.M.		10:30 P.M.	
Friday	7:00 A.M.		5:00 P.M.		7:00 P.M.		10:30 P.M.	
Saturday	12:00 P.M.[1]		12:00 P.M.[1]		12:00 P.M.[1]		12:00 P.M.[1]	
Sunday	12:00 P.M.[1]		12:00 P.M.[1]		12:00 P.M.[1]		12:00 P.M.[1]	

1. Programming different events to the same time for that day cancels those events and leaves the thermostat controller in the Unoccupied state.

Setting the Day and Time (T600MSP-4 and T600MSP-4+PIR Models)

Upon initial powerup (or after a power loss of greater than 6 hours), a SetClock alarm appears on the thermostat controller display. As the thermostat controller scrolls through the Status Display Menu, the SetClock alarm message causes the backlight to light up until the clock is set.

When changing the time, press and release the **UP/DOWN** arrow keys once to change the time in 1-minute increments; press and hold down the keys to change the time in 30-minute increments.

To set the clock while in the Main User Menu:

1. Press the **NO** key for all prompts until the clock set prompt appears on the display. Press the **YES** key to enter the clock set menu.
2. Press the **YES** key to set the time or press the **NO** key to advance to the day set menu.
3. Press the **UP/DOWN** arrow keys to adjust the time. When the correct time is displayed, press the **YES** key to store the time.
4. Press the **YES** key to enter the day set menu or press the **NO** key to enter the clock format menu.
5. Press the **UP/DOWN** arrow keys to adjust the day. When the correct day is displayed, press the **YES** key to store the day.
6. Press the **YES** key to choose the time format or press the **NO** key to access the Main User Menu exit prompt.
7. Press the **UP/DOWN** arrow keys to select the desired time format. Press the **YES** key to enter the format.
8. Press the **YES** key to return to the Status Display Menu or press the **NO** key to return to the time set menu.

When the thermostat controller scrolls through the day and time, the new day and time should show on the display and no alarm or backlight should be present. If the day or time is incorrect, repeat the *Setting the Day and Time (T600MSP-4 and T600MSP-4+PIR Models)* procedure.

Setting Schedule Hold

The schedule hold menu is used to set a permanent hold on the internal scheduling or resume the schedule. The permanent hold is typically used for non-scheduled events that extend for long periods of time.

Note: The Override Schedule function is available on the T600MSN-4 and T600MSN-4+PIR models only if DI1 or DI2 is configured for remote NSB.

Note: The Schedule Hold menu is also displayed if DI1 or DI2 is configured for remote NSB.

The following selections are available in the schedule hold menu:

- **Permanent Occupied Hold (occ hold):** This selection puts the thermostat controller into a permanent Occupied state via the Occupied setpoints. Occupied hold appears in the Status Display Menu when this selection is active.

- **Permanent Unoccupied Hold:** This selection puts the thermostat controller into a permanent Unoccupied state via the Unoccupied setpoints. Unoccup hold appears in the Status Display Menu when this selection is active.
- **Resume:** This selection cancels the permanent hold and enables the regular program schedule.

To enable or cancel the permanent hold feature while in the Main User Menu:

1. Press the **NO** key for all prompts until the schedule hold prompt appears on the display. Press the **YES** key to set the schedule hold type.
2. Press the **UP/DOWN** arrow keys to locate the desired permanent hold type (or resume schedule). Press the **YES** key to enter the selection.
3. Press the **YES** key to return to the Status Display Menu or press the **NO** key to change the schedule hold selection again.

Accessories

All the accessories in Table 8 include mounting hardware; contact the nearest Johnson Controls® representative to order any of these parts.

Note: Review the technical specifications of the accessories prior to their use in an application.

Repair Information

If the T600MSx-4 or T600MSx-4+PIR Series Thermostat Controller fails to operate within its specifications, replace the unit. For a replacement thermostat controller, contact the nearest Johnson Controls representative.

Table 8: Accessories (Order Separately)

Code Number	Description
SEN-600-1	Remote Inside Air Temperature Sensor
SEN-600-4	Remote Inside Air Temperature Sensor with Occupancy Override and LED
TE-6361M-1[1]	Duct Mount Air Temperature Sensor
TE-636S-1[1]	Strap-Mount Temperature Sensor
TE-6363P-1[1]	Outside Air Temperature Sensor
TEC-3-PIR[2]	Cover with Occupancy Sensor

1. Additional TE-636xx-x Series 10k ohm Johnson Controls Type II Thermistor Sensors are available; refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for more details.
2. The TEC-3-PIR Accessory Cover can be used to replace the existing cover on a non-PIR T600MSx-4 Series Thermostat Controller to provide occupancy sensing capability.

Table 9: Display Messages

Display	Function
Service	Indicates that there is a service alarm in accordance with the programmable Digital Inputs (DI1 or DI2).
Filter	Indicates that the filter(s) is dirty in accordance with the programmable Digital Inputs (DI1 or DI2).
Frost on	Indicates that the heating is energized by the low limit frost protection room temperature setpoint.
SetClock	Indicates that there has been a power failure greater than 6 hours and the clock needs to be reset (T600MSP-4 and T600MSP-4+PIR models).
Fan lock	Indicates that the thermostat controller heating or cooling action is locked out because no airflow was detected 10 seconds after the fan (Terminal G) was energized.

Technical Specifications

T600MSx-4 and T600MSx-4+PIR Series Thermostat Controllers

Power Requirements		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Relay Contact Rating (Y2, Y1, G, W1, W2, and AUX)		30 VAC, 1.0 A Maximum, 3.0 A Inrush, Class 2 or SELV
Digital Inputs		Voltage-Free Contacts across Terminal C to Terminals DI1 and DI2
Wire Size		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
Temperature Sensor Type		Local 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensor
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
Minimum Deadband		2F°/1C° between Heating and Cooling
Ambient Conditions	**Operating**	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	Storage	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
Compliance	**United States**	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment
		Industry Canada, ICES-003
	Europe	CE Mark, EMC Directive 2004/108/EC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		0.75 lb (0.34 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, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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