

T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers

Product Bulletin

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T600HCx-4, T600HPx-4, T600MSx-4, T600MEP-4,
T600HCx-4+PIR, T600HPx-4+PIR, T600MSx-4+PIR, T600MEP-4+PIR

The T600xxN-4 and T600xxN-4+PIR Series Non-programmable and T600xxP-4 and T600xxP-4+PIR Series Programmable Thermostat Controllers are specifically designed for control of single-stage, multi-stage, and heat pump commercial heating and cooling equipment. The T600xxP-4 and T600xxP-4+PIR Series Thermostat Controllers are also specifically designed for control of rooftop units (with and without economizers).

The T600xxx-4+PIR Series Thermostat Controllers have occupancy sensing capability built into the device. These are stand-alone devices that maximize up to 30% energy savings in high-energy usage light commercial buildings, such as schools and hotels, during occupied times by using additional setpoint strategies.

The T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers provide exceptional temperature control in an easy-to-use and flexible package. All models have over 20 configurable parameters, enabling the thermostat controllers to adapt to a variety of applications.



Figure 1: T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers

The T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers include several models: single-stage (T600HCx-4 and T600HCx-4+PIR Series), heat pump (T600HPx-4 and T600HPx-4+PIR Series), multi-stage (T600MSx-4 and T600MSx-4+PIR Series), and economizer (T600MEP-4 and T600MEP-4+PIR). All models employ a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based thermostat controllers.

Table 1: Features and Benefits (Part 1 of 2)

Feature	Benefit
Onboard Occupancy Sensor (Passive Infrared [PIR] Models)	Provides energy savings without additional installation time/cost.
Password Protection Option	Protects against undesired thermostat controller tampering.
Backlit Liquid Crystal Display (LCD)	Offers real-time control status of the environment in easy-to-read, English plain text messages with constant backlight that brightens during user interaction.
Simplified Setpoint Adjustment	Enables the user to change the setpoint by simply pressing the UP/DOWN arrow keys.
Five Easy-to-Use Interface Keys	Allow for easy commissioning and adjustment of the thermostat controller and eliminates the need for DIP switches.
Three Light-Emitting Diodes (LEDs)	Provide fan, heating, and cooling status at a glance.
Two Configurable Digital Inputs	Provide additional inputs for advanced functions such as remote night setback, occupancy override, and service or filter alarms.

Table 1: Features and Benefits (Part 2 of 2)

Feature	Benefit
Over 20 Configurable Parameters	Enable the thermostat controller to adapt to any application, allowing installer parameter access without opening the cover.
Configurable Auxiliary Output	Provides 24 VAC control for exhaust fans, lighting, and other auxiliary functions.
Economizer Output (T600MEP-4 and T600MEP-4+PIR Models)	Controls economizer operation for single- and multi-stage unitary rooftop equipment.

Product Overview

The T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers are specifically designed for control of the most common commercial heating and cooling equipment. A number of configurable parameters enable the thermostat controller to effectively and efficiently control various types of equipment in nearly any application. Configuration, setup, and operation of the thermostat controller is extremely intuitive and is accomplished through user interface.

The T600xxP-4 and T600xxP-4+PIR Series Programmable Thermostat Controllers feature a fully programmable 7-day, 2- or 4-event schedule, along with two programmable digital inputs and one configurable output, enabling effective and efficient control of equipment in nearly any application.

IMPORTANT: The T600xxx-4 and T600xxx-4+PIR 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.

Additional Features

The T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers offer many other features, including:

- **Stationary or Scrolling Display**
Provides the option of having the display continuously scroll the parameters.
- **Three Levels of Keypad Lockout**
Provide three levels of keypad lockout that can be set up through the Installer Configuration Menu.
- **Adjustable Power Delay on Startup**
Enables a delay before any operation is authorized upon powerup of the thermostat controller. Can be used for equipment protection or to sequence startup of multiple units in one location.
- **Frost Protection Enable/Disable**
Turns the heat on when the zone temperature drops below 42°F (6°C) regardless of the mode the thermostat controller.
- **Adjustable Maximum Heating/Minimum Cooling Setpoints**
Establish the maximum heating setpoint and minimum cooling setpoint that can be entered through the user interface.
- **Adjustable Anti-Short Cycling Timer**
Adjusts the minimum on and off times for the equipment from 0 to 5 minutes.
- **Adjustable Heating/Cooling Cycles per Hour**
Configurable for the maximum number of heating and cooling cycles (3 to 8 heating cycles maximum and 3 or 4 cooling cycles maximum) in a 1-hour period, balancing temperature control and equipment cycling.
- **Adjustable Heating/Cooling Deadband**
Adjusts the minimum heating/cooling deadband from 2.0F°/1.0C° to 4.0F°/2.0C°.
- **Fan Control**
Provides the option for equipment fan control.
- **Fan Delay Control**
Enables the user to select how the fan operates on a call for heating and the delay at the end of the heating or cooling cycle.
- **Adjustable Temporary Occupancy Time**
Adjusts the temporary occupancy time from 0 to 12 hours.
- **Sensor Offset Adjustments**
Sets the desired room or outside air temperature calibration (offset).

- **System Mode Lockout**
Allows the heating and cooling modes to be locked out based on the outside air temperature when an outside air temperature sensor is connected.
- **Unoccupied Timer (T600xxx-4+PIR Series)**
Sets the time delay between the occupied and unoccupied modes after motion is detected.
- **Progressive Recovery**
Ensures the correct temperature is reached at the programmed occupied time.
- **Smart Fan**
Enables the fan to operate continuously during the occupied times and cycle with the equipment during the unoccupied times.
- **Remote Inside and Outside Air Temperature Sensing**
Accommodates remote inside and outside air temperature sensors. Up to three inside air temperature sensors can be averaged.
- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EEPROM)**
Prevents loss of adjusted parameters during power failure.
- **Heating and Cooling Stage Enable/Disable (T600MEP-4, T600MEP-4+PIR, and T600MSx-4 and T600MSx-4+PIR Series)**
Allows operation of the second-stage heating and cooling to be disabled, reverting the thermostat controller to single-stage operation on multi-stage thermostat controllers.
- **Power Loss Backup for Clock (T600xxP-4 and T600xxP-4+PIR Series)**
Retains clock setting for up to 6 hours in the event of a power loss.
- **High and Low Balance Point Adjustments**
Enable more precise control of heat pump operation based on the outside air temperature (T600HPx-4 and T600HPx-4+PIR Series).
- **Heat Pump Compressor Stage Enable/Disable (T600HPx-4 and T600HPx-4+PIR Series)**
Allows operation of the second-stage compressor to be disabled, reverting the thermostat controller to single-stage compressor operation on heat pump thermostat controllers.

Table 2: Thermostat Controller Models (Part 1 of 2)

Code Number	Description	Onboard Occupancy Sensor	Applications
Non-programmable			
T600HCN-4	Single-Stage	No	Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
T600HCN-4+PIR	Single-Stage	Yes	Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
T600HPN-4	Heat Pump	No	Heat Pump with Up to Three Heating Stages and Two Cooling Stages
T600HPN-4+PIR	Heat Pump	Yes	Heat Pump with Up to Three Heating Stages and Two Cooling Stages
T600MSN-4	Multi-Stage	No	Multi-Stage Packaged Heating/Cooling Equipment
T600MSN-4+PIR	Multi-Stage	Yes	Multi-Stage Packaged Heating/Cooling Equipment

Table 2: Thermostat Controller Models (Part 2 of 2)

Code Number	Description	Onboard Occupancy Sensor	Applications
Programmable			
T600HCP-4	Single-Stage	No	Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
T600HCP-4+PIR	Single-Stage	Yes	Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment
T600HPP-4	Heat Pump	No	Heat Pump with Up to Three Heating Stages and Two Cooling Stages
T600HPP-4+PIR	Heat Pump	Yes	Heat Pump with Up to Three Heating Stages and Two Cooling Stages
T600MEP-4	Economizer	No	Packaged Rooftop Units with Economizers
T600MEP-4+PIR	Economizer	Yes	Packaged Rooftop Units with Economizers
T600MSP-4	Multi-Stage	No	Multi-Stage Packaged Heating/Cooling Equipment
T600MSP-4+PIR	Multi-Stage	Yes	Multi-Stage Packaged Heating/Cooling Equipment

Table 3: 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-1¹	Duct Mount Air Temperature Sensor
TE-6363P-1¹	Outside Air Temperature Sensor
TEC-3-PIR²	Cover with Occupancy Sensor

1. Additional TE-63xx-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. When a TE-63xx-x Series Sensor is installed according to remote sensing wiring, the thermostat controller controls based off the temperature sensed by the TE-63xx-x Series Sensor.
2. The TEC-3-PIR Accessory Cover can be used to replace the existing cover on a non-PIR T600xxx-4 Series Thermostat Controller to provide occupancy sensing capability.

Thermostat Controller User Interface Keys

The T600xxx-4 and T600xxx-4+PIR Series Thermostat Controller user interface consists of five keys on the front cover (as illustrated in Figure 2). 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.
- 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.
- Use the **UP/DOWN** arrow keys to change the configuration parameters and to activate a setpoint adjustment.

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

Backlit LCD

The T600xxx-4 and T600xxx-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.

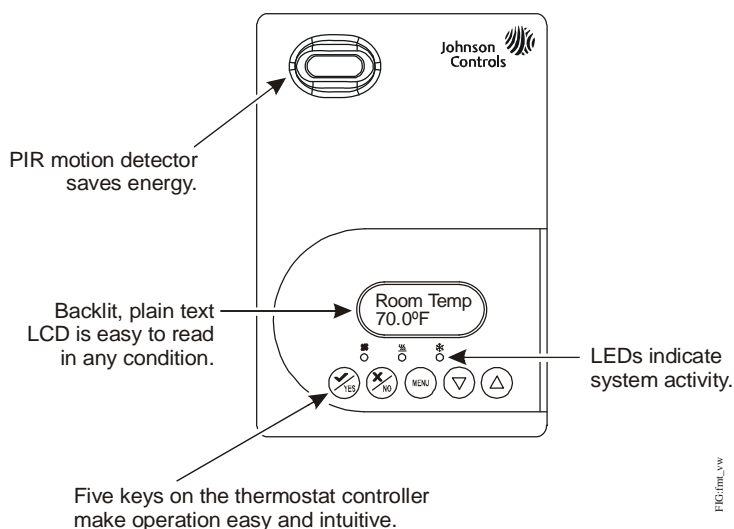


Figure 2: Front Cover of Thermostat Controller (T600xxx-4+PIR Model Shown)

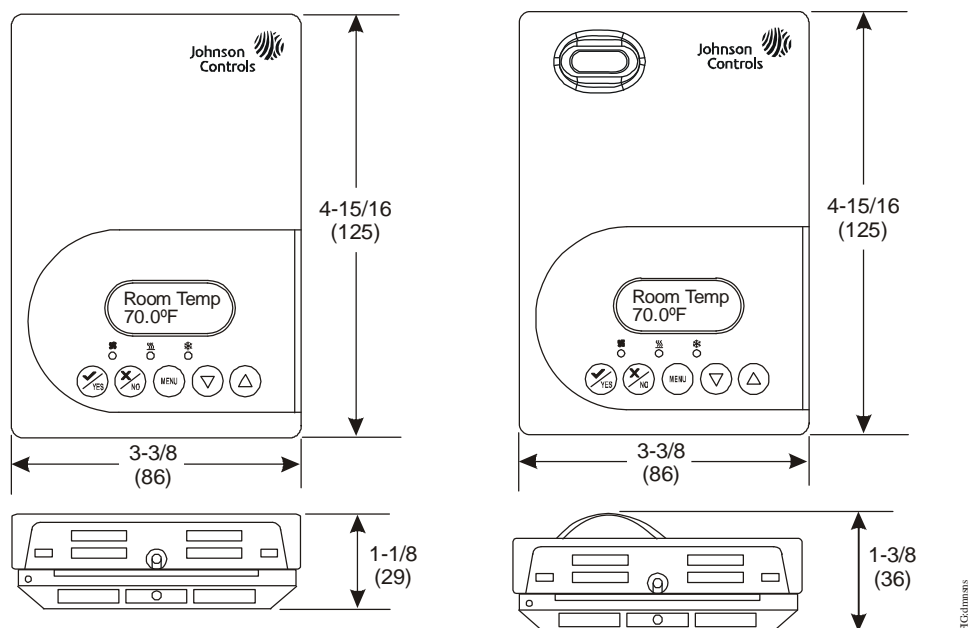





Figure 3: T600xxx-4 Series Thermostat Controller (Left) and T600xxx-4+PIR Series Thermostat Controller (Right) Dimensions, in. (mm)

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 – T600xxx-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.

Menu Overview

Three menus are available to view and configure the T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers:

- Status Display Menu
- Main User Menu
- Installer Configuration Menu

The following sections outline the functions and contents of each 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 (T600xxP-4 and T600xxP-4+PIR Series)
- 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.

The Installer Configuration Menu includes the following parameters that are accessed by pressing the same **MENU** key:

- Password
- DI1 and DI2 Input Configuration
- Menu Scroll
- Three Keypad Lockout Levels
- Power Delay on Power-Up
- Frost Protection
- Maximum Heating Setpoint/Minimum Cooling Setpoint
- Proportional Band
- Anti-Short Cycle Timer
- Heating Stages Cycles per Hour
- Cooling Stages Cycles per Hour
- Minimum Deadband
- Fan Control
- End of Cycle Fan Delay
- Temporary Occupancy Time
- Room Air Temperature Sensor Calibration
- Outside Air Temperature Sensor Calibration
- Number of Heating Stages (T600MEP-4, T600MEP-4+PIR, and T600MSx-4 and T600MSx-4+PIR Series)
- Number of Cooling Stages (T600MEP-4, T600MEP-4+PIR, and T600MSx-4 and T600MSx-4+PIR Series)
- Number of Heat Pump Stages (T600HPx-4 and T600HPx-4+PIR Series)

- Heating Operation Lockout Based on Outside Air Temperature
- Cooling Operation Lockout Based on Outside Air Temperature
- Unoccupied Timer Value (T600xxx-4+PIR Series)
- Two or Four Events per Day Configuration (T600xxP-4 and T600xxP-4+PIR Series)
- Auxiliary Output Configuration
- Enable/Disable Progressive Recovery

The following parameters are for the T600HPx-4 and T600HPx-4+PIR Series Thermostat Controllers:

- High Balance Point
- Low Balance Point
- Comfort/Economy Heat Pump Operation

- Reversing Valve Operation
- Compressor/Auxiliary Interlock

The following parameters are for the T600MEP-4 and T600MEP-4+PIR Thermostat Controllers:

- Economizer Changeover Setpoint
- Outside Air Dampers Minimum Position
- Mechanical Cooling Operation with Economizer
- Mixed Air Temperature Setpoint
- Displaying the Mixed Air Temperature

Repair Information

If either the T600xxx-4 or T600xxx-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.

Technical Specifications

T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers (Part 1 of 2)

Power Requirements		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Relay Contact Rating		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A Inrush, Class 2 or SELV
Digital Inputs		Voltage-Free Contacts across Terminal C to Terminals DI1 or DI2
Economizer Output (T600MEP-4 and T600MEP-4+PIR Models)		0 to 10 VDC into 2k ohm Resistance Minimum
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	±0.9°F/±0.5°C at 70.0°F/21.0°C Typical Calibrated
Minimum Deadband		2°F/1°C 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

T600xxx-4 and T600xxx-4+PIR Series Thermostat Controllers (Part 2 of 2)

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	T600xxx-4 Models	0.75 lb (0.34 kg)
	T600xxx-4+PIR Models	0.77 lb (0.35 kg)

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

United States Emissions Compliance

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.

Canadian Emissions Compliance

*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.*



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