T606MSx-4 and T606MSx-4+PIR Series Multi-Stage Temperature and Humidity Controllers

Product Bulletin

T606MSN-4, T606MSN-4+PIR,
T606MSP-4, T606MSP-4+PIR

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Refer to the QuickLIT Web site for the most up-to-date version of this document.

The T606MSN-4 and T606MSN-4+PIR Series Non-programmable and T606MSP-4 and T606MSP-4+PIR Series Programmable Temperature and Humidity Controllers are specifically designed for control of multi-stage heating and cooling equipment, such as rooftop or self-contained units with a humidifier and/or dehumidifier.

The T606MSx-4+PIR Series 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 T606MSx-4 and T606MSx-4+PIR Series Controllers provide exceptional temperature control in an easy-to-use and flexible package. All models have over 20 configurable parameters, enabling the controllers to adapt to a variety of applications.

Figure 1: T606MSx-4 and T606MSx-4+PIR Series Temperature and Humidity Controllers

The T606MSx-4 and T606MSx-4+PIR Series Controller models employ an embedded complete humidity solution with a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based controllers.

Table 1: Features and Benefits

Features	Benefits
Embedded Humidification Sequence (0 to 10 VDC Output) and Dehumidification Sequence (Dry Contact)	Simplifies installation and reduces installation costs.
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 eliminate the need for DIP switches.
Three Light-Emitting Diodes (LEDs)	Provide fan, heating, and cooling status at a glance.
One Configurable Digital Input	Provides additional input for advanced functions such as remote night setback, occupancy override, and service or filter alarms.
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.

Product Overview

The T606MSx-4 and T606MSx-4+PIR Series Controllers are specifically designed for control of the most common commercial heating and cooling equipment with humidifiers and/or dehumidifiers. 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 accomplished through the user interface.

The T606MSP-4 and T606MSP-4+PIR Series Programmable Controllers feature a fully programmable 7-day, 2- or 4-event schedule, along with one programmable digital input and one configurable output, enabling effective and efficient control of equipment in nearly any application.

IMPORTANT: The T606MSx-4 and T606MSx-4+PIR Controllers are intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the 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 controller.

Additional Features

The T606MSx-4 and T606MSx-4+PIR Series Controllers offer many other features, including:

- **Local Relative Humidity (RH) Display**
  Enables display of humidity below the room temperature on the thermostat controller display.
- **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 of 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 Proportional Band**
  Adjusts the proportional band used by the thermostat controller PI control loop from 2.0F°/1.1C° to 8.0F°/4.4C°.
- **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**
  Balance temperature control and equipment cycling through configurable 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.
- **Adjustable Heating/Cooling Deadband**
  Adjusts the minimum heating/cooling deadband from 2.0F°/1.1C° 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**
  Set 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 (T606MSx-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.
- **Minimum/Maximum Outdoor Air Temperature for RH Setpoint Reset**
  Sets the outdoor air temperature setpoints for when the humidity setpoint is reset (an outdoor air sensor must be connected).
- **Dehumidification Outdoor Air Temperature Lockout**
  Sets the outside air temperature setpoint under which dehumidification operation is disabled (an outdoor air sensor must be connected).
- **Dehumidification Lockout Functions**
  Enable or disable the lockout functions for dehumidification control output.
- **Dehumidification Hysteresis**
  Sets the dehumidification control hysteresis used during dehumidification operation.
- **Reset Humidity Setpoint**
  Serves as setpoint value when the minimum outdoor air temperature for RH Setpoint reset is reached.
- **Room Humidity Calibration**
  Functions as offset that is added to or subtracted from the actual displayed humidity by ±15% RH.
- **High Limit Sensor Value Display**
  Serves as diagnostic to help troubleshoot sensor/humidifier operation.
- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EEPROM)**
  Prevents loss of adjusted parameters during power failure.

Table 2: Multi-Stage Thermostat Controller Models

Code Number	Onboard Occupancy Sensor	Application
Non-programmable		
T606MSN-4	No	Multi-Stage Packaged Heating/Cooling Equipment with Humidifier and/or Dehumidifier
T606MSN-4+PIR	Yes	
Programmable		
T606MSP-4	No	Multi-Stage Packaged Heating/Cooling Equipment with Humidifier and/or Dehumidifier
T606MSP-4+PIR	Yes	

Table 3: Accessories (Order Separately)

Code Number	Description
Hx-67 Series[1]	Duct- or Wall-Mount Humidity Sensor
SEN-600-1	Remote Inside Air Temperature Sensor
SEN-600-4	Remote Inside Air Temperature Sensor with Occupancy Override and LED
TE-6361M-1[2]	Duct-Mount Air Temperature Sensor
TE-6363P-1[2]	Outside Air Temperature Sensor
TEC-3-PIR[3]	Cover with Occupancy Sensor

1. The humidity sensor must have a 0 to 10 VDC output. Remote wall-mounted version can be used for remote return or room air humidity sensing with the sensor mounted on the wall. Remote duct-mounted humidity sensor can be used for remote return air humidity sensing with the sensor mounted on the return air duct or as a supply air humidity sensor used as a high limit protection.
2. 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.
3. The TEC-3-PIR Accessory Cover can be used to replace the existing cover on a non-PIR T606MSx-4 Series Thermostat Controller to provide occupancy sensing capability.

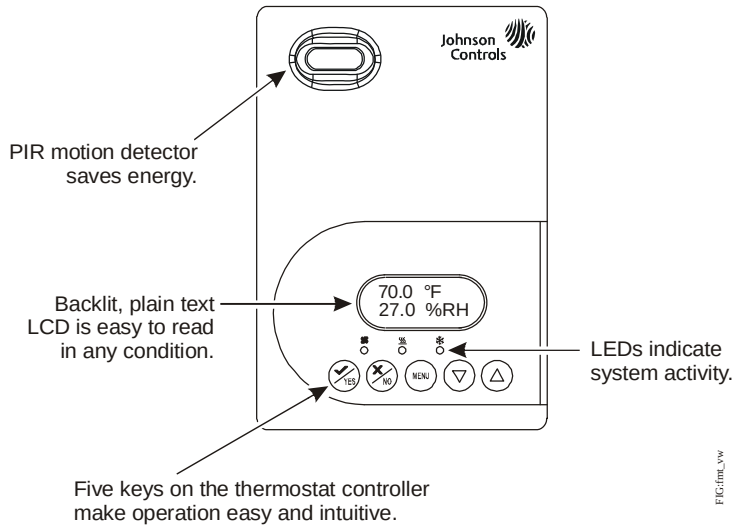

Figure 2: Front Cover of Thermostat Controller (T606MSx-4+PIR Model Shown)

Thermostat Controller User Interface Keys

The T606MSx-4 and T606MSx-4+PIR Series Thermostat Controller user interface consists of five keys on the front cover (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.

Note: Scrolling resumes when the thermostat controller is left unattended for 45 seconds.

- 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.

Backlit LCD

The T606MSx-4 and T606MSx-4+PIR Series Controllers include a 2-line, 8-character backlit display. Low-level backlighting is present during normal operation, and the display 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 – T606MSx-4+PIR Series 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.

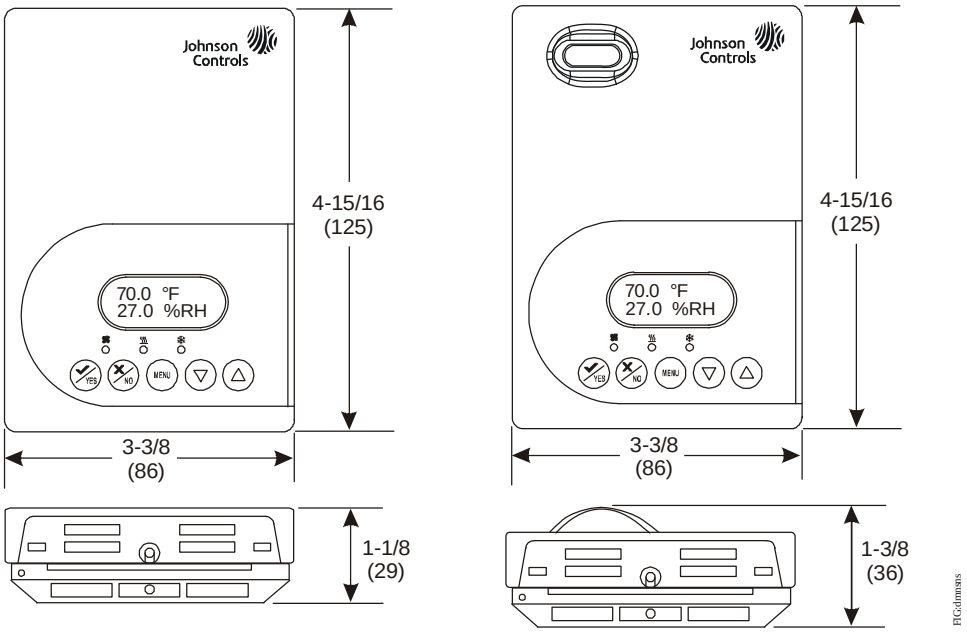

Figure 3: T606MSx-4 Series (Left) and T606MSx-4+PIR Series (Right) Thermostat Controller Dimensions, in. (mm)

Menu Overview

Three menus are available to view and configure the T606MSx-4 and T606MSx-4-+PIR Series 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 (T606MSP-4 and T606MSP-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
- %RH Display
- Digital Input (DI) 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
- Heating Operation Lockout Based on Outside Air Temperature
- Cooling Operation Lockout Based on Outside Air Temperature
- Unoccupied Timer Value (T606MSx-4+PIR Series)
- Two or Four Events per Day Configuration (T606MSP-4 and T606MSP-4+PIR Series)
- Auxiliary Output Configuration
- Enable/Disable Progressive Recovery
- Minimum/Maximum Outdoor Air Temperature for RH Setpoint Reset
- High RH Limit Setpoint
- Dehumidification Outdoor Air Temperature Lockout
- Dehumidification Lockout Functions
- Dehumidification Hysteresis
- Reset Humidity Setpoint
- Room Humidity Calibration
- Display High Limit Sensor Value

Repair Information

If either the T606MSx-4 or T606MSx-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

T606MSx-4 and T606MSx-4+PIR Series 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 (Y2, Y1, G, W1, W2, and AUX)		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum 3.0 A Inrush, Class 2 or SELV
Digital Input		Voltage-Free Contacts across Terminal C to Terminal DI
Humidification Analog Output Rating		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**	±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
	Humidity	±5% RH from 30 to 70% RH at 50 to 90°F (10 to 32°C)
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

T606MSx-4 and T606MSx-4+PIR Series 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
CE	**Europe**	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		**T606MSx-4 Models:** 0.75 lb (0.34 kg) **T606MSx-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.

Building Efficiency
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T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability

Product Bulletin

Code No. LIT-12011275
Issued November 26, 2008
Supersedes February 21, 2007

The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers provide control of two- or four-pipe fan coils, cabinet unit heaters, or other equipment. These thermostat controllers provide on/off, floating, or proportional 0 to 10 VDC control outputs; three speeds of fan control; and dehumidification capability. The T60xDFH-3+PIR Series Thermostat Controllers have occupancy sensing capability built into the device. They 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 standby setpoints.

The non-programmable T60x Series Thermostat Controllers provide the user access to parameters such as system mode, fan mode, and temperature setpoints. Additionally, the T60x Series has over 20 configurable parameters enabling the thermostat controllers to adapt to a variety of applications.

Figure 1: T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability

All T60x Series Thermostat Controllers use an intuitive, plain text, menu-driven backlit display that makes setup and operation quick and easy. The T60x Series also 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.
Diagnostic Light-Emitting Diode (LED) in PIR Models	Provides visual confirmation of motion detection during installation for a period of up to 30 minutes.
Dehumidification Capability (Dehumidification Models)	Increases occupancy comfort by providing dehumidification.
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.
On/Off, Floating, or Proportional 0 to 10 VDC Control	Offers additional application flexibility by providing more advanced control signals.
Three Speeds of Fan Control	Provide easy **FAN** speed selection, via the interface key, to meet the application requirements.
Temperature Scale Selector Key	Offers guests the ability to select a Fahrenheit (°F) or Celsius (°C) temperature scale display.

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

Feature	Benefit
Simplified Setpoint Adjustment	Enables the user to change the setpoint by simply pressing the **UP/DOWN** arrow keys.
Two Configurable Binary Inputs	Provide additional inputs for advanced functions such as remote night setback, service or filter alarms, motion detector, and window status.
Over 20 Configurable Parameters	Enable the thermostat controller to adapt to any application, allowing installer parameter access without opening the cover.

Product Overview

The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers provide control of two- or four-pipe fan coils, cabinet unit heaters, or other equipment using on/off, floating, or proportional 0 to 10 VDC control input. The T60xDFH-3+PIR Series Thermostat Controllers have occupancy sensing ability built into the device. These stand-alone devices maximize up to 30% energy savings in high-energy usage light commercial buildings, such as schools and hotels, during occupied times by using additional stand-by setpoints.

The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers also employ a unique, PI time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential based thermostat controllers.

IMPORTANT: The T60xDFH-3 and T60xDFH-3+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.

Additional Features

The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers offer many other features, including:

- **Adjustable Heating and Cooling Stand-By Setpoints (PIR Models)**
  Provides an adjustable range of setpoints that can be used to conserve energy.
- **Adjustable Time Delay for Activating Unoccupied Setpoints (PIR Models)**
  Allows the user to adjust time delay before unoccupied setpoints are enabled to maintain comfort temperatures while conserving energy.
- **Occupancy Sensing in Conjunction with Door Switch Toggle (PIR Models)**
  Adds more efficiency by associating the door switch into the sequence of operation.
- **Adjustable Heating/Cooling Deadband**
  Adjusts the minimum heating/cooling deadband from 2.0F°/1.0C° to 5.0F°/2.5C°.
- **Remote Indoor Sensing**
  Accommodates remote indoor sensors. Up to three indoor sensors can be averaged.
- **Five Easy-to-Use Interface Keys**
  Allow for easy commissioning of the thermostat controller, and eliminate the need for DIP switches.
- **Six Levels of Keypad Lockout**
  Provide six levels of keypad lockout that can be set up through the Installer Configuration Menu.
- **Accessible Configuration Parameters**
  Allow local access to all configurable parameters while limiting unwanted parameter tampering once the thermostat controller is set up.
- **Three LEDs**
  Provide fan, heating, and cooling status at a glance.
- **Adjustable Temporary Occupancy Time**
  Adjusts the temporary occupancy time from 0 to 24 hours.
- **Auxiliary Contact**
  Provides 24 VAC control for reheat, lighting, and other auxiliary functions.

- **Adjustable Heating/Cooling Cycles per Hour (On/Off Control)**
  Configurable for the maximum number of heating and cooling cycles (3 to 8 cycles maximum) in a 1-hour period, balancing temperature control and equipment cycling.
- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EPROM)**
  Prevents loss of adjusted parameters during a power failure.
- **Remote Access**
  Allows the user to read/write and access the parameters of the thermostat controller via a supervisory controller.

Table 2: Thermostat Controller Models

Code Number	Control Outputs	Fan Control	Dehumidification Capability	Onboard Occupancy Sensor
T601DFH-3	Two On/Off	Up to Three Speeds	No	No
T601DFH-3+PIR	Two On/Off	Up to Three Speeds	No	Yes
T602DFH-3	Two On/Off or Floating	Up to Three Speeds	No	No
T602DFH-3+PIR	Two On/Off or Floating	Up to Three Speeds	No	Yes
T603DFH-3	Two On/Off or Floating	Up to Three Speeds	Yes	No
T603DFH-3+PIR	Two On/Off or Floating	Up to Three Speeds	Yes	Yes
T604DFH-3	Two Proportional 0 to 10 VDC	Up to Three Speeds	No	No
T604DFH-3+PIR	Two Proportional 0 to 10 VDC	Up to Three Speeds	No	Yes
T605DFH-3	Two Proportional 0 to 10 VDC	Up to Three Speeds	Yes	No
T605DFH-3+PIR	Two Proportional 0 to 10 VDC	Up to Three Speeds	Yes	Yes

Table 3: Accessories (Order Separately)

Code Number	Description
SEN-600-1	Remote Indoor Air Temperature Sensor
TE-6361M-1[1]	Duct Mount Air Temperature Sensor
TE-636S-1	Strap-Mount Temperature 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.

Thermostat Controller User Interface Keys

The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers user interface consists of five keys on the front cover (as illustrated in Figure 2). The function of each key is as follows:

- **MODE** key toggles among the system modes available, as defined by selecting the appropriate operation sequence in the Installer Configuration Menu (for example, Off, Heat, Cool, Auto).
- **FAN** key toggles among the fan modes available, as defined by selecting the appropriate fan menu options defined in the Installer Configuration Menu (for example, Low, Med, High, Auto).
- **°C/°F** key changes the temperature scale to either Celsius or Fahrenheit and allows access to the Installer Configuration Menu. (See the *Installer Configuration Menu* section.)
- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

Backlit LCD

The T60xDFH-3 and T60xDFH-3+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.

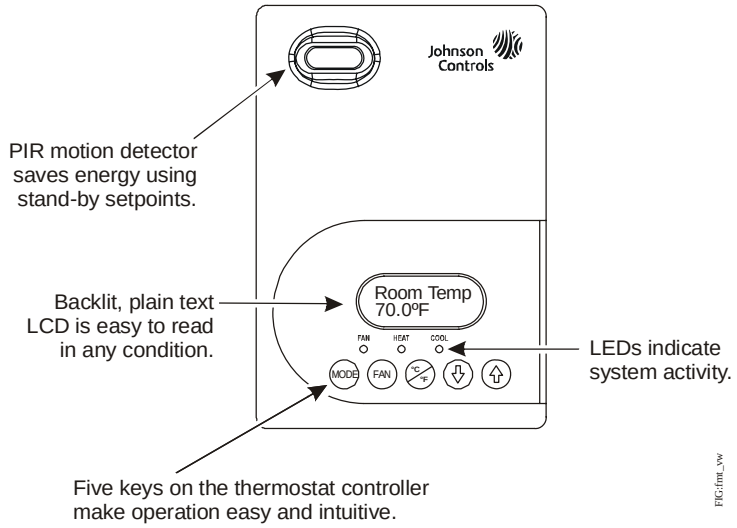

Figure 2: Front Cover of Thermostat Controller (T60xDFH-3+PIR Model Shown)

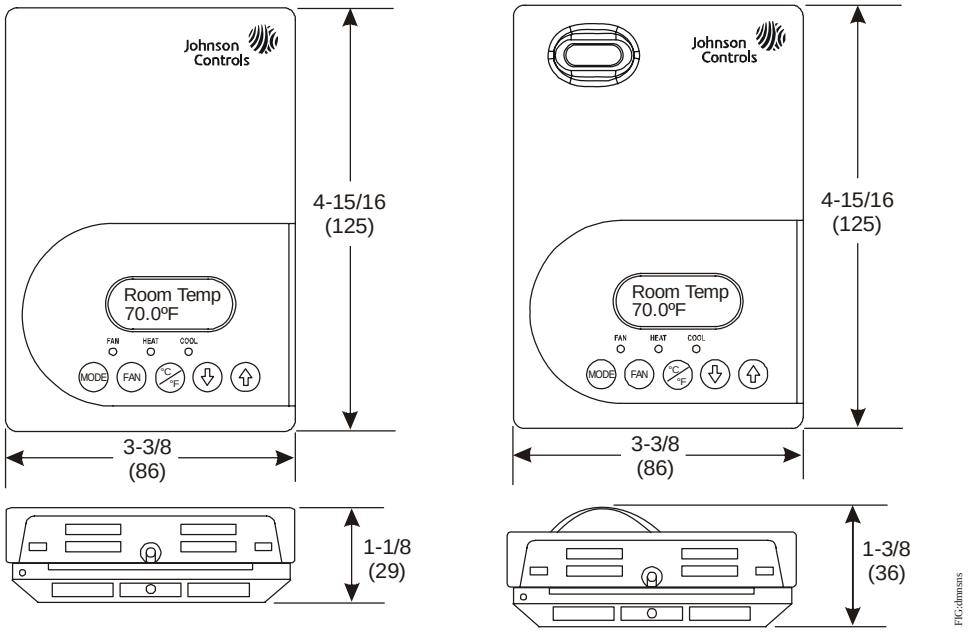

Figure 3: T60xDFH-3 Series Thermostat Controller (Left) and T60xDFH-3+PIR Series Thermostat Controller (Right) Dimensions, in. (mm)

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

Integrated PIR Sensor

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

Menu Overview

Two menus are available to view and configure the T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers:

- Status Display 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. This menu continuously scrolls through the following parameters:

- Room Temperature (All Models) and Humidity (T603 and T605 Series Models)
- System Mode
- Occupancy Status (Occupied/Stand-By [PIR Models] Unoccupied/Override)
- Applicable Alarms (The backlight lights up as an alarm condition is displayed.)

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

Installer Configuration Menu

The Installer Configuration Menu is used to set up the thermostat controller for an application-specific operation. To access the menu, press and hold the center key for approximately 8 seconds.

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

- BI1 and BI2 Input Configuration
- UI3 Input Configuration to Locally Monitor Supply Air Temperature or Hot/Cold Water Changeover Switching
- Menu Scroll
- Auto Mode
- % RH Display (Dehumidification Models)
- Six Keypad Lockout Levels
- Pipe No.
- Control Type (On/Off or Floating Models)
- Sequence of Operation
- Fan Menu
- Dehumidification Lockout (Dehumidification Models)
- Dehumidification Setpoint (Dehumidification Models)
- Dehumidification Hysteresis (Dehumidification Models)
- Maximum Dehumidification Cooling Output (Dehumidification Models)
- Stand-By Setpoint Timer Value (PIR Models)
- Unoccupied Timer Value (PIR Models)
- Stand-By Heating Setpoint/Stand-By Cooling Setpoint (PIR Models)
- Unoccupied Heating Setpoint/Unoccupied Cooling Setpoint
- Maximum Heating Setpoint/Minimum Cooling Setpoint
- Setpoint Type
- Temporary Occupancy Time
- Door Open Time
- Heating/Cooling Deadband
- Room Air Temperature Calibration
- Room Humidity Calibration (Dehumidification Models)
- Auxiliary Configuration
- Floating Time (Floating Models)
- Cycles per Hour (On/Off Models)
- Direct/Reverse Acting (Proportional Models)
- Reheat Time
- Display UI3 Value

Repair Information

If either the T60xDFH-3 or T60xDFH-3+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

T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability (Part 1 of 2)

Power Requirements		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals 4 and 5) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Relay/Triac Contact Rating	**On/Off and Floating Control**	30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
Analog Output Rating	**Proportional Control**	0 to 10 VDC into 2k ohm Resistance (Minimum)
Fan Relay Output Rating		19 to 30 VAC, 1.0 A Maximum, 3.0 A In-Rush
Auxiliary Output Rating	**Triac Output**	19 to 30 VAC, 1.0 A Maximum, 3.0 A In-Rush
Digital Inputs		Voltage-Free Contacts across Terminal Scom to Terminals BI1, BI2, or UI3
Analog Inputs		Resistive Inputs (RS and UI3) for 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensors
Temperature Sensor Type		Local 10k ohm NTC Thermistor
Wire Size		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
Temperature Range	**Backlit Display**	-40.0°F/-40.0°C to 122.0°F/50.0°C in 0.5° Increments
	Heating Control	40.0°F/4.5°C to 90.0°F/32.0°C
	Cooling Control	54.0°F/12.0°C to 100.0°F/38.0°C
Accuracy	**Temperature**	±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
	Humidity	±5% RH from 20 to 80% RH at 50 to 90°F (10 to 32°C)
Minimum Deadband		2F°/1C° between Heating and Cooling
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 89/336/EEC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant

Shipping Weight	**T60xDFH-3 Models**	0.75 lb (0.34 kg)
	T60xDFH-3+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.

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202

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

Product Bulletin

Code No. LIT-12011583
Issued November 13, 2009

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.

Johnson Controls

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-1[1]	Duct Mount Air Temperature Sensor
TE-6363P-1[1]	Outside Air Temperature Sensor
TEC-3-PIR[2]	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.

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

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.

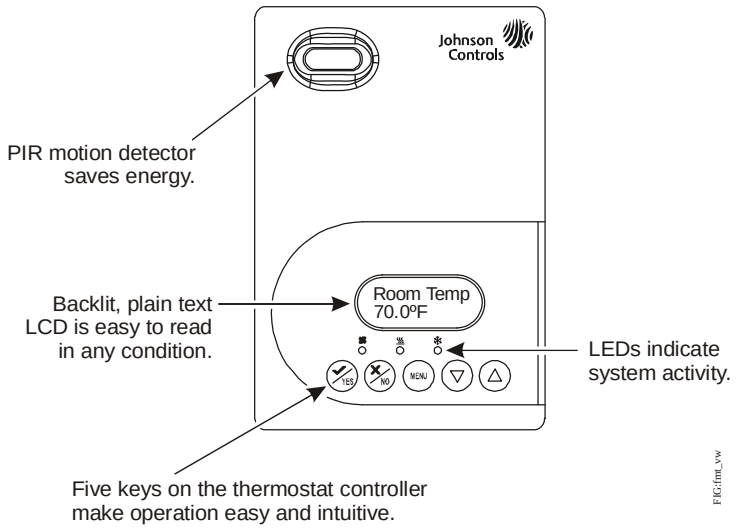

Figure 2: Front Cover of Thermostat Controller (T600xxx-4+PIR Model Shown)

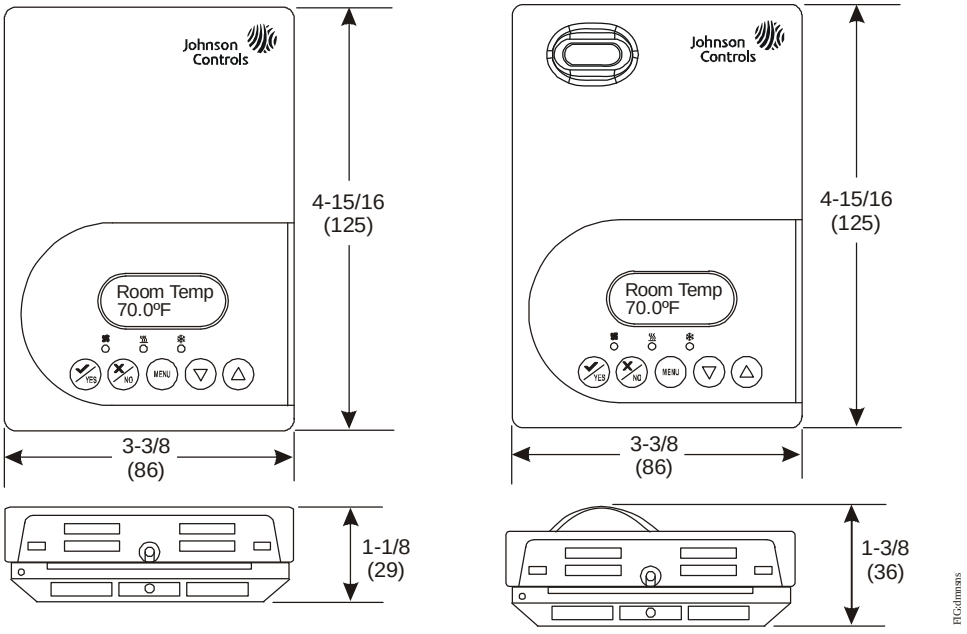

Figure 3: T600xxx-4 Series Thermostat Controller (Left) and T600xxx-4+PIR Series Thermostat Controller (Right) Dimensions, in. (mm)

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**	±0.9F°/±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

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.

Building Efficiency
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T600xxx-3 Series Thermostats

Product Bulletin

Code No. LIT-12011193
Issued September 6, 2006

The T600xxN-3 Series non-programmable and T600xxP-3 Series programmable thermostats are specifically designed for control of single-stage, multi-stage, and heat pump commercial heating and cooling equipment. The T600xxP-3 Series thermostats are also specifically designed for control of rooftop units (with and without economizers).

The T600xxx-3 Series thermostats provide exceptional temperature control in an easy-to-use, yet flexible, package. The T600xxx-3 Series thermostats have over 20 configurable parameters, enabling the thermostats to adapt to a variety of applications.

The T600xxx-3 Series thermostats include several models: Single-stage (T600HCx-3), Heat Pump (T600HPx-3), Multi-stage (T600MSx-3), and Economizer (T600MEP-3). All thermostats use a unique Proportional-Integral (PI) proportional control algorithm that virtually eliminates temperature offset associated with traditional differential based thermostats.

Figure 1: T600xxx-3 Series Thermostat

Table 1: Features and Benefits

Features	Benefits
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 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 and eliminates the need for Dual Inline Package (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.
Over 20 Configurable Parameters	Enable the thermostat to adapt to any application, allowing installer parameter access without opening the thermostat cover.
Configurable Auxiliary Output	Provides 24 VAC control for exhaust fans, lighting, and other auxiliary functions.
Economizer Output (T600MEP-3)	Controls economizer operation for single- and multi-stage unitary rooftop equipment.

Product Overview

The T600xxx-3 Series thermostats are specifically designed for control of the most common commercial heating and cooling equipment. A number of configurable parameters enable the T600xxx-3 Series thermostat to effectively and efficiently control various types of equipment in nearly any application. Configuration, setup, and operation of the T600xxx-3 Series thermostat are extremely intuitive and are accomplished through the user interface.

The T600xxP-3 Series programmable thermostats 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: Use the T600xxx-3 thermostat only as an operating control. Where failure or malfunction of these thermostats could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the 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 thermostats.

Additional Features

The T600xxx-3 Series thermostats also offer many other features:

- **Adjustable Heating/Cooling Deadband**
  Adjusts the minimum heating/cooling deadband from 2 to 4F° (1 to 2C°).
- **Adjustable Maximum Heating/Minimum Cooling Setpoints**
  Establish the maximum heating setpoint and minimum cooling setpoint that can be entered through the user interface.
- **Progressive Recovery**
  Ensures the correct temperature is reached at the programmed occupied time.
- **Adjustable Heating/Cooling Cycles per Hour**
  Configurable for a maximum of 3 to 8 heating cycles and 3 or 4 cooling cycles in a 1-hour period, balancing temperature control and equipment cycling.
- **Smart Fan**
  Enables the fan to operate continuously during the occupied times and cycle with the equipment during the unoccupied times.
- **Adjustable Power Delay on Start-up**
  Enables a delay before any operation is authorized upon power up of the thermostat. Can be used for equipment protection or to sequence start-up of multiple units in one location.
- **Remote Indoor and Outdoor Sensing**
  Accommodates remote indoor and outdoor sensors. Up to three indoor sensors can be averaged.
- **Three Levels of Keypad Lockout**
  Provide three different levels of keypad lockout that can be set up through the menu and interface keys.
- **Adjustable Anti-Short Cycling Timer**
  Adjusts the minimum on and off times for the equipment from 0 to 5 minutes.
- **Frost Protection Enable/Disable**
  Turns the heat on when the zone temperature drops below 42°F (5.5°C) regardless of the thermostat's mode.
- **Adjustable Temporary Occupancy Time**
  Adjusts the occupancy override time from 0 to 12 hours.
- **High and Low Balance Point Adjustments**
  Enable more precise control of heat pump operation based on outdoor air temperature (T600HPx-3).
- **System Mode Lockout**
  Allows the heating and cooling modes to be locked out based on outdoor air temperature when an outdoor air sensor is connected.
- **Non-volatile EEPROM Memory**
  Prevents loss of adjusted parameters during power failure.
- **Power Loss Backup for Clock (T600xxP-3)**
  Retains clock setting for up to 6 hours in case of power loss.
- **Heating and Cooling Stage Enable/Disable (T600MEP-3, T600MSx-3)**
  Allows operation of the second-stage heating and cooling to be disabled, reverting the thermostat to single-stage operation on multi-stage thermostats.
- **Heat Pump Compressor Stage Enable/Disable (T600HPx-3)**
  Allows operation of the second-stage compressor to be disabled, reverting the thermostat to single-stage compressor operation on heat pump thermostats.

- **Fan Operation 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.

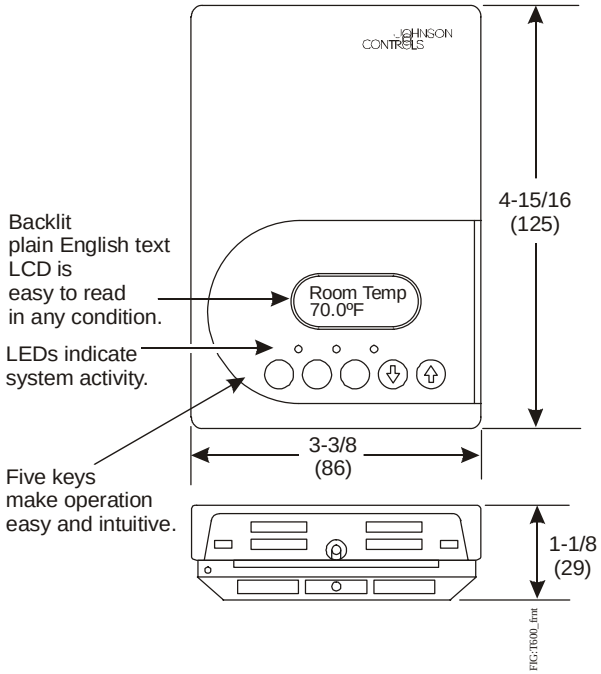

Figure 2: T600 Thermostat

Thermostat User Interface Keys

The T600xxx-3 Series thermostat 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/SCROLL** key to:
  - confirm menu selections and to advance to the next menu item
  - stop the Status Display Menu from scrolling and to manually scroll to the next parameter on the menu

  Note: When the thermostat is left unattended for 45 seconds, the thermostat 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
- Use the **UP/DOWN** arrow keys to change the configuration parameters and to activate a setpoint adjustment.

Backlit Liquid Crystal Display (LCD)

The T600xxx-3 Series thermostat includes 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 is left unattended for 45 seconds.

Light-Emitting Diodes (LEDs)

Three LEDs are included to indicate the fan status, call for heat, or call for cooling on the T600HCx-3, T600MSx-3, and T600MEP-3 thermostats:

- 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.

On the T600HPx-3 thermostats, the three LEDs indicate heat pump operation.

- The **FAN** LED is on when the fan is on.
- The **AUX HEAT** LED is on when auxiliary heat is on
- The **HEAT-PUMP** LED is on when the heat-pump compressor is on.

Programming Overview

There are three menus used to view, program, and configure the T600xxx-3 Series thermostat:

The **Status Display Menu** is displayed during normal thermostat operation. This menu continuously scrolls through the following parameters:

- Room Temperature
- Day and Time (T600xxP-3)
- System Mode
- Occupancy Status – Occupied/Unoccupied/ Override
- Outdoor Temperature – An outdoor air temperature sensor must be connected.
- Applicable Alarms – The backlight lights up as an alarm condition is displayed.

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

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

The **Installer Configuration Menu** is used to set up the thermostat for application-specific operation. To access this 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:

- DI1 and DI2 Input Configuration
- Three Keypad Lockout Levels
- Power Delay on Power up
- Frost Protection
- Maximum Heating Setpoint/Minimum Cooling Setpoint
- 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 Sensor Calibration
- Outdoor Air Sensor Calibration
- Number of Heating Stages (T600MSx-3 and T600MEP-3)
- Number of Cooling Stages (T600MSx-3 and T600MEP-3)
- Number of Heat Pump Stages (T600HPx-3)
- Heating Operation Lockout Based on Outdoor Air Temperature
- Cooling Operation Lockout Based on Outdoor Air Temperature
- Two or Four Events per Day Configuration (T600xxP-3)
- Auxiliary Output Configuration
- Enable/Disable Progressive Recovery

The following parameters are for the T600HPx-3 thermostats:

- Low Balance Point
- High Balance Point
- Comfort/Economy Heat Pump Operation
- Reversing Valve Operation
- Compressor/Auxiliary Interlock

The following parameters are for the T600MEP-3 thermostat:

- Economizer Changeover Setpoint
- Outdoor Air Minimum Position
- Mechanical Cooling Operation w/ Economizer
- Mixed Air Temperature Setpoint
- Displaying the Mixed Air Temperature

Repair Information

If the T600xxx-3 Series thermostat fails to operate within its specifications, replace the unit. For a replacement T600xxx-3 Series thermostat, contact the nearest Johnson Controls® representative.

Ordering Information

Table 2: T600xxx-3 Series Thermostats (Part 1 of 2)

Code Number	Description	Applications
Non-Programmable		
T600HCN-3	Single-stage	Fan Coil Units, Unit Heaters, and Single-stage Packaged Heating/Cooling Equipment
T600HPN-3	Heat Pump	Heat Pump with up to 3 Heating/2 Cooling Stages
T600MSN-3	Multi-stage	Multi-stage Packaged Heating/Cooling Equipment

Table 2: T600xxx-3 Series Thermostats (Part 2 of 2)

Programmable		
T600HCP-3	Single-stage	Fan Coil Units, Unit Heaters, and Single-stage Packaged Heating/Cooling Equipment
T600HPP-3	Heat Pump	Heat Pump with up to 3 Heating/2 Cooling Stages
T600MEP-3	Economizer	Packaged Rooftop Units with Economizers
T600MSP-3	Multi-stage	Multi-stage Packaged Heating/Cooling Equipment

Table 3: Accessories (Order Separately)

Code Number	**Description**
SEN-600-1	Remote Indoor Air Temperature Sensor
SEN-600-4	Remote Indoor Air Temperature Sensor with Occupancy Override and LED
TE-6361P-1	8 in. (203 mm)[1] Duct Mount Air Temperature Sensor
TE-6363P-1	Outdoor Air Temperature Sensor

1. Other probe lengths available.

Technical Specifications

T600xxx-3 Series Thermostats

Power Requirements		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals 4 and 5) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
Relay Contact Rating Maximum Inductive		30 VAC, 1.0 A Maximum, 3.0 A In-Rush
Digital Inputs		Voltage-Free Contacts across Terminal C to Terminals DI1 or DI2
Economizer Output		0 to 10 VDC into 2k ohm resistance minimum (T600MEP-3 only)
Recommended Wire Size		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
Sensor Type		Local 10k ohm NTC thermistor
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
Dimensions (H x W x D)		4.94 x 3.38 x 1.13 in. (125 x 86 x 29 mm)
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 89/336/EEC
	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.

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 requirements of the Canadian Interference-Causing Equipment Regulations.

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

JOHNSON CONTROLS

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