

# 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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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
<b>Embedded Humidification Sequence (0 to 10 VDC Output) and Dehumidification Sequence (Dry Contact)</b>	Simplifies installation and reduces installation costs.
<b>Onboard Occupancy Sensor (Passive Infrared [PIR] Models)</b>	Provides energy savings without additional installation time/cost.
<b>Password Protection Option</b>	Protects against undesired thermostat controller tampering.
<b>Backlit Liquid Crystal Display (LCD)</b>	Offers real-time control status of the environment in easy-to-read, English plain text messages with constant backlight that brightens during user interaction.
<b>Simplified Setpoint Adjustment</b>	Enables the user to change the setpoint by simply pressing the <b>UP/DOWN</b> arrow keys.
<b>Five Easy-to-Use Interface Keys</b>	Allow for easy commissioning and adjustment of the thermostat controller and eliminate the need for DIP switches.
<b>Three Light-Emitting Diodes (LEDs)</b>	Provide fan, heating, and cooling status at a glance.
<b>One Configurable Digital Input</b>	Provides additional input for advanced functions such as remote night setback, occupancy override, and service or filter alarms.
<b>Over 20 Configurable Parameters</b>	Enable the thermostat controller to adapt to any application, allowing installer parameter access without opening the cover.
<b>Configurable Auxiliary Output</b>	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  $\pm 15\%$  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.

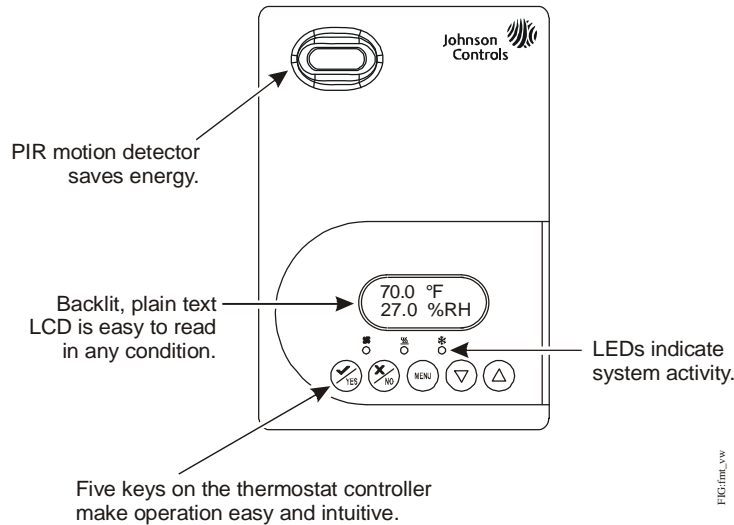
**Table 2: Multi-Stage Thermostat Controller Models**

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
<b>Hx-67 Series<sup>1</sup></b>	Duct- or Wall-Mount Humidity Sensor
<b>TE-6361M-1<sup>2</sup></b>	Duct-Mount Air Temperature Sensor
<b>TE-6363P-1<sup>2</sup></b>	Outside Air Temperature Sensor
<b>TEC-3-PIR<sup>3</sup></b>	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.

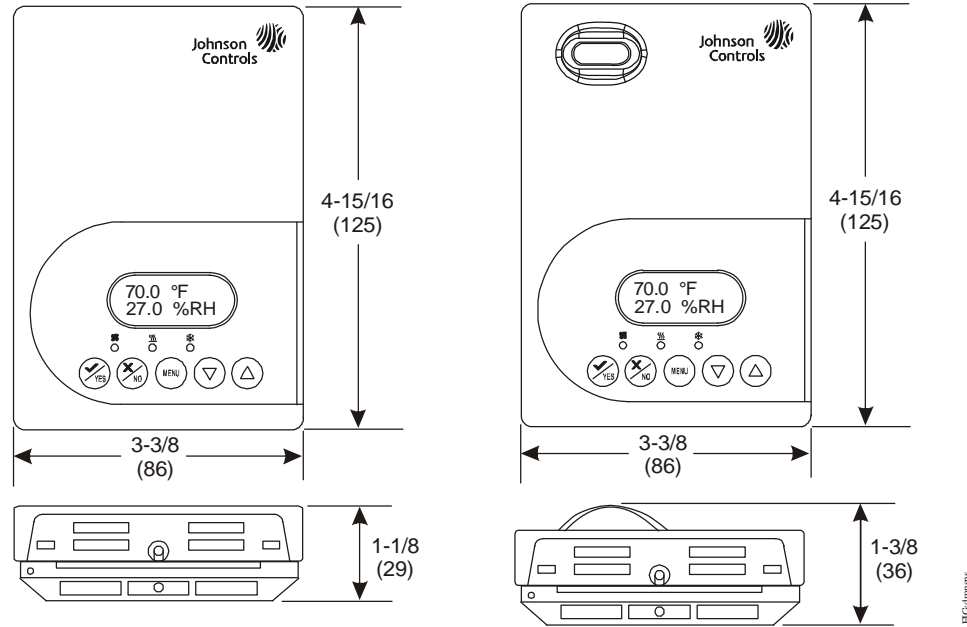
### LEDs

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)*

<b>Power Requirements</b>		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)
<b>Relay Contact Rating (Y2, Y1, G, W1, W2, and AUX)</b>		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum 3.0 A Inrush, Class 2 or SELV
<b>Digital Input</b>		Voltage-Free Contacts across Terminal C to Terminal DI
<b>Humidification Analog Output Rating</b>		0 to 10 VDC into 2k ohm Resistance Minimum
<b>Wire Size</b>		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
<b>Temperature Sensor Type</b>		Local 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensor
<b>Temperature Range</b>	<b>Backlit Display</b>	-40.0°F/-40.0°C to 122.0°F/ 50.0°C in 0.5° Increments
	<b>Heating Control</b>	40.0°F/4.5°C to 90.0°F/32.0°C
	<b>Cooling Control</b>	54.0°F/12.0°C to 100.0°F/38.0°C
<b>Accuracy</b>	<b>Temperature</b>	±0.9°F/±0.5°C at 70.0°F/21.0°C Typical Calibrated
	<b>Humidity</b>	±5% RH from 30 to 70% RH at 50 to 90°F (10 to 32°C)
<b>Minimum Deadband</b>		2°F/1C° between Heating and Cooling
<b>Ambient Conditions</b>	<b>Operating</b>	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	<b>Storage</b>	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing

## T606MSx-4 and T606MSx-4+PIR Series Controllers (Part 2 of 2)

	<b>United States</b>	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
	<b>Canada</b>	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment Industry Canada, ICES-003
	<b>Europe</b>	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.
	<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant
	<b>Shipping Weight</b>	<b>T606MSx-4 Models:</b> 0.75 lb (0.34 kg) <b>T606MSx-4+PIR Models:</b> 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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