T600xxx-3 Series Thermostats

Product Bulletin

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.
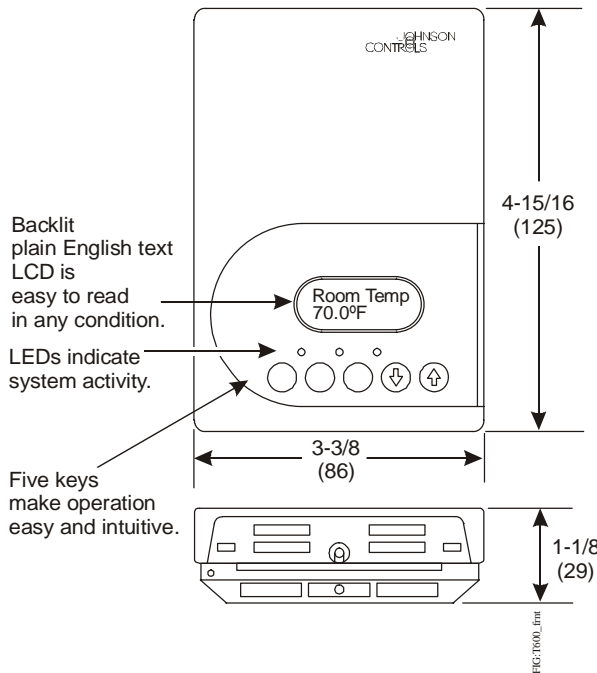
Figure 2: T600 Thermostat

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.