

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

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

## Product Bulletin

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
<b>Onboard Occupancy Sensor (Passive Infrared [PIR] Models)</b>	Provides energy savings without additional installation time/cost.
<b>Diagnostic Light-Emitting Diode (LED) in PIR Models</b>	Provides visual confirmation of motion detection during installation for a period of up to 30 minutes.
<b>Dehumidification Capability (Dehumidification Models)</b>	Increases occupancy comfort by providing dehumidification.
<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>On/Off, Floating, or Proportional 0 to 10 VDC Control</b>	Offers additional application flexibility by providing more advanced control signals.
<b>Three Speeds of Fan Control</b>	Provide easy <b>FAN</b> speed selection, via the interface key, to meet the application requirements.
<b>Temperature Scale Selector Key</b>	Offers guests the ability to select a Fahrenheit (°F) or Celsius (°C) temperature scale display.

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

<b>Feature</b>	<b>Benefit</b>
<b>Simplified Setpoint Adjustment</b>	Enables the user to change the setpoint by simply pressing the <b>UP/DOWN</b> arrow keys.
<b>Two Configurable Binary Inputs</b>	Provide additional inputs for advanced functions such as remote night setback, service or filter alarms, motion detector, and window status.
<b>Over 20 Configurable Parameters</b>	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 <sup>1</sup>	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

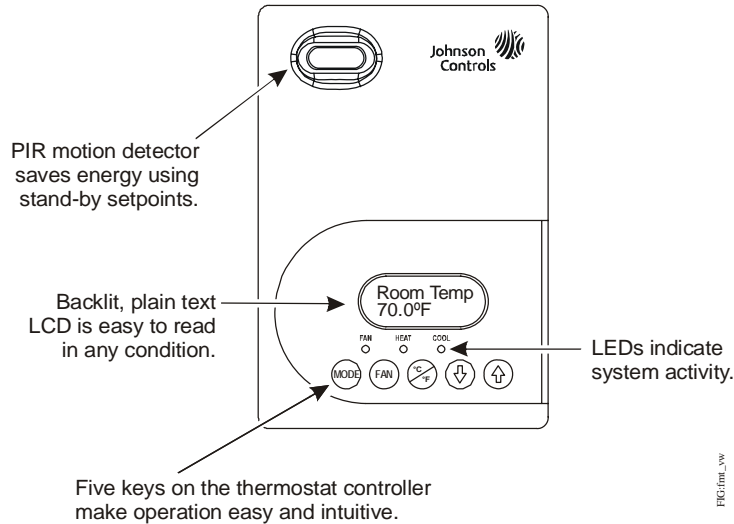
The T60xDFH-3 and T60xDFH-3+PIR Series Thermostat Controllers user interface consists of five keys on the front cover (as illustrated in Figure 2). The function of each key is as follows:

- **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).

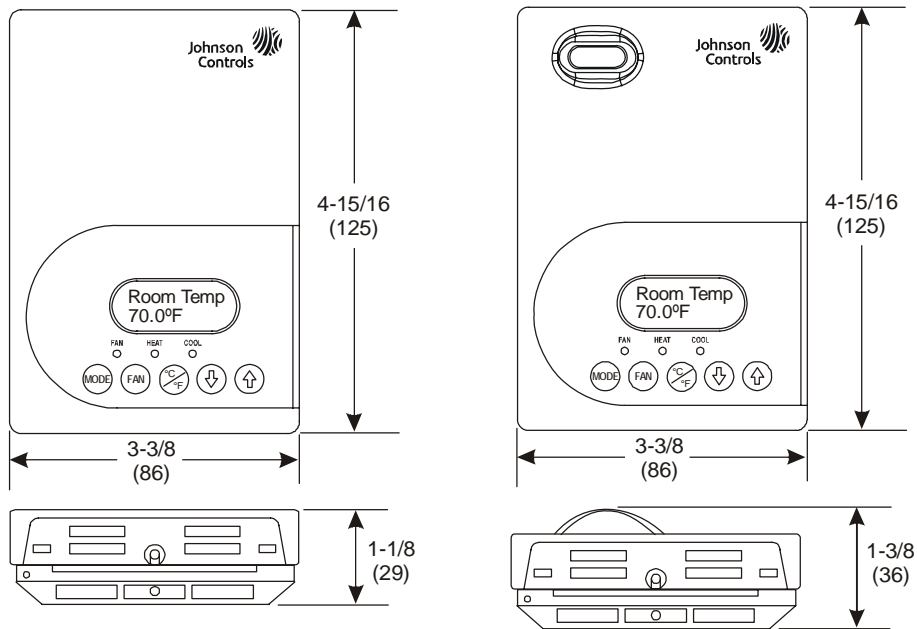
- °C/°F key changes the temperature scale to either Celsius or Fahrenheit and allows access to the Installer Configuration Menu. (See the *Installer Configuration Menu* section.)
- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

### 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)*

<b>Power Requirements</b>		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)
<b>Relay/Triac Contact Rating</b>	<b>On/Off and Floating Control</b>	30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
<b>Analog Output Rating</b>	<b>Proportional Control</b>	0 to 10 VDC into 2k ohm Resistance (Minimum)
<b>Fan Relay Output Rating</b>		19 to 30 VAC, 1.0 A Maximum, 3.0 A In-Rush
<b>Auxiliary Output Rating</b>	<b>Triac Output</b>	19 to 30 VAC, 1.0 A Maximum, 3.0 A In-Rush
<b>Digital Inputs</b>		Voltage-Free Contacts across Terminal Scom to Terminals BI1, BI2, or UI3
<b>Analog Inputs</b>		Resistive Inputs (RS and UI3) for 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensors
<b>Temperature Sensor Type</b>		Local 10k ohm NTC Thermistor
<b>Wire Size</b>		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
<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>	±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
	<b>Humidity</b>	±5% RH from 20 to 80% RH at 50 to 90°F (10 to 32°C)
<b>Minimum Deadband</b>		2F°/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
<b>Compliance</b>	<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, EMC Directive 89/336/EEC
<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant	

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

<b>Shipping Weight</b>	<b>T60xDFH-3 Models</b>	0.75 lb (0.34 kg)
	<b>T60xDFH-3+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.*



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