

T60xDFH-4 and T60xDFH-4+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability

Product Bulletin

Code No. LIT-12011582
Issued November 13, 2009

T601DFH-4, T602DFH-4, T603DFH-4, T604DFH-4, T605DFH-4,
T601DFH-4+PIR, T602DFH-4+PIR, T603DFH-4+PIR, T604DFH-4+PIR, T605DFH-4+PIR

The T60xDFH-4 and T60xDFH-4+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-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 Stand-By 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-4 and T60xDFH-4+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)

Features	Benefits
Onboard Occupancy Sensor (Passive Infrared [PIR] Models)	Provides energy savings without additional installation time/cost.
Password Protection Option	Protects against undesired thermostat controller tampering.
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.
Single and Dual Setpoint Adjustments	Enable user setpoint options to accommodate the specific application.
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)

Features	Benefits
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-4 and T60xDFH-4+PIR Series Thermostat Controllers are specifically designed for 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. A number of configurable parameters enable the T60x Series Thermostat Controllers to effectively and efficiently control various types of equipment in nearly any application. Configuration, setup, and operation of the T60x Series Thermostat Controllers is extremely intuitive and is accomplished through user interface.

IMPORTANT: The T60xDFH-4 and T60xDFH-4+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-4 and T60xDFH-4+PIR Series Thermostat Controllers offer many other features, including:

- **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 Inside Air Temperature Sensing**
Accommodates remote inside air temperature sensors. Up to three inside air temperature 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.
- **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 the time delay before unoccupied setpoints are enabled, to maintain comfort while conserving energy.

- **Nonvolatile Electrically Erasable Programmable Read-Only Memory (EPROM)**
Prevents loss of adjusted parameters during a power failure.

Table 2: Thermostat Controller Models

Code Number	Control Outputs	Fan Control	Dehumidification Capability	Onboard Occupancy Sensor
T601DFH-4	Two On/Off	Up to Three Speeds	No	No
T601DFH-4+PIR	Two On/Off	Up to Three Speeds	No	Yes
T602DFH-4	Two On/Off or Floating	Up to Three Speeds	No	No
T602DFH-4+PIR	Two On/Off or Floating	Up to Three Speeds	No	Yes
T603DFH-4	Two On/Off or Floating	Up to Three Speeds	Yes	No
T603DFH-4+PIR	Two On/Off or Floating	Up to Three Speeds	Yes	Yes
T604DFH-4	Two Proportional 0 to 10 VDC	Up to Three Speeds	No	No
T604DFH-4+PIR	Two Proportional 0 to 10 VDC	Up to Three Speeds	No	Yes
T605DFH-4	Two Proportional 0 to 10 VDC	Up to Three Speeds	Yes	No
T605DFH-4+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 Inside Air Temperature Sensor
TE-6361M-1 ¹	Duct Mount Air Temperature Sensor
TE-636S-1 ¹	Strap-Mount Temperature Sensor
TEC-6H-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-6H-PIR Accessory Cover can be used to replace the existing cover on a non-PIR T60xDFH-4 Series Thermostat Controller to provide occupancy sensing capability.

Thermostat Controller User Interface Keys

The T60xDFH-4 and T60xDFH-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 **MODE** key to toggle among the system modes available, as defined by selecting the appropriate operation sequence in the Installer Configuration Menu (for example, Off, Heat, Cool, Auto).
- Use the **FAN** key to toggle 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).

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

Backlit LCD

The T60xDFH-4 and T60xDFH-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.

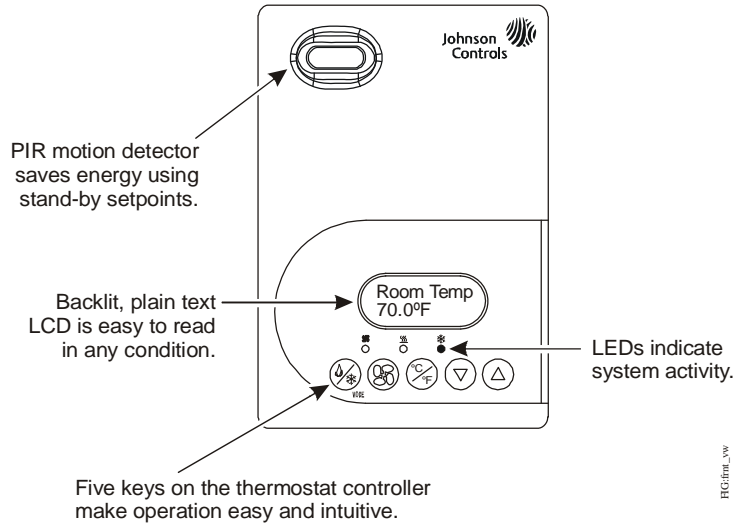


Figure 2: Front Cover of Thermostat Controller (T60xDFH-4+PIR Model Shown)

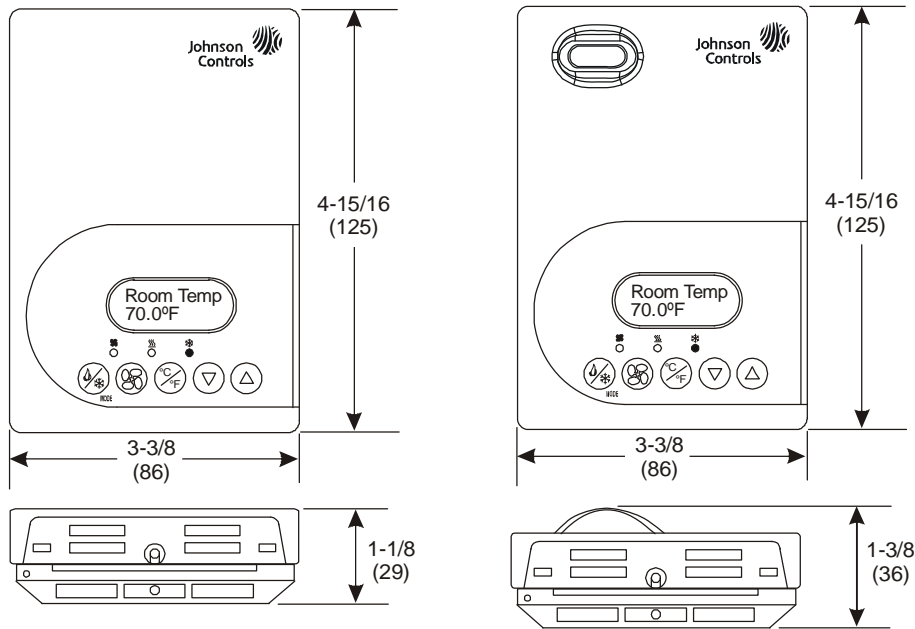





Figure 3: T60xDFH-4 Series Thermostat Controller (Left) and T60xDFH-4+PIR Series Thermostat Controller (Right) Dimensions, in. (mm)

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 – T60xDFH-4+PIR Series Thermostat Controllers

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

Menu Overview

Two menus are available to view and configure the T60xDFH-4 and T60xDFH-4+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 (T603DFH-4 and T605DFH-4 Models)

Note: For models with dehumidification capability, the default setting is no humidity reading on the display (%RH disp parameter is set to **off**). The %RH disp parameter must be set to **on** to display the current humidity reading.

- System Mode
- Schedule Status (Occupied/Unoccupied/Override/Stand-By [PIR Models])
- 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

Use the Installer Configuration Menu to set up the thermostat controller for an application-specific operation. To access the menu, press and hold the °C/°F key for approximately 8 seconds.

The Installer Configuration Menu includes the following parameters that are accessed by pressing the same °C/°F key:

- Password
- 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
- Proportional Band
- Setpoint Type
- Setpoint Function
- Temporary Occupancy Time
- Heating/Cooling Deadband
- Room Air Temperature Calibration
- Room Humidity Calibration (Dehumidification Models)
- Auxiliary Configuration
- Auto Fan Mode
- Floating Time (Floating Models)
- Cycles per Hour (On/Off Models)
- Reverse/Direct Acting (Proportional Models)
- Reheat Time
- Display UI3 Value

Repair Information

If either the T60xDFH-4 or T60xDFH-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

T60xDFH-4 and T60xDFH-4+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	19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A Inrush, 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, 15 mA Minimum, 3.0 A Inrush, Class 2 or SELV
Auxiliary Output Rating	Triac Output	19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A Inrush
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 Johnson Controls Type II NTC Thermistor Sensor
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 2004/108/EC
Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant	

T60xDFH-4 and T60xDFH-4+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability (Part 2 of 2)

Shipping Weight	T60xDFH-4 Models	0.75 lb (0.34 kg)
	T60xDFH-4+PIR Models	0.77 lb (0.35 kg)

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

United States Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Canadian Emissions Compliance

*This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*



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