

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

Application Note

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

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

Application Note

Document Introduction

This document describes a number of possible application scenarios using the T60xDFH-4 and T60xDFH-4+PIR Series Thermostat Controllers. Each application scenario includes a table that lists the setup and configuration parameters required for that specific application. Refer to the *T60xDFH-4 and T60xDFH-4+PIR Series Thermostat Controllers with Dehumidification and Occupancy Sensing Capability Installation Instructions (Part No. 24-9890-951)* for more information on adjusting the configuration parameters.

For those application scenarios that include a door switch, a Normally Closed (N.C.) door switch is required. With a N.C. door switch, the contact is closed only when the door is closed. In these application scenarios, the term **door toggle** means the door is initially closed, then opened and closed again.

Application Scenarios

Table 1: Applications

| Scenario | With Door Switch | Passive Infrared (PIR) Levels of Occupancy | PIR Cover Used | Remote PIR Used |
|----------|------------------|--|----------------|-----------------|
| 1 | No | 3 | Yes | No |
| 2 | No | 2 | Yes | No |
| 3 | No | 3 | No | Yes |
| 4 | No | 2 | No | Yes |
| 5 | No | 3 | Yes | Yes |
| 6 | No | 2 | Yes | Yes |
| 7 | Yes | 3 | Yes | No |
| 8 | Yes | 2 | Yes | No |
| 9 | Yes | 3 | No | Yes |
| 10 | Yes | 2 | No | Yes |
| 11 | Yes | 3 | Yes | Yes |
| 12 | Yes | 2 | Yes | Yes |

Scenario 1: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with a PIR Accessory Cover

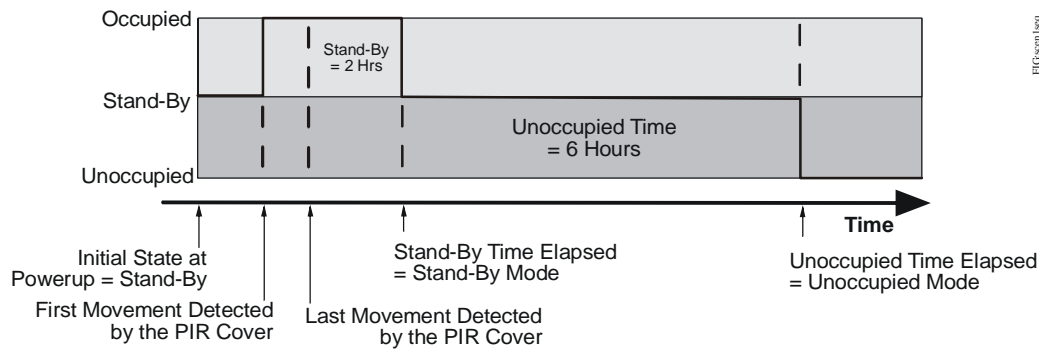


Figure 1: Scenario 1 Sequence of Operation

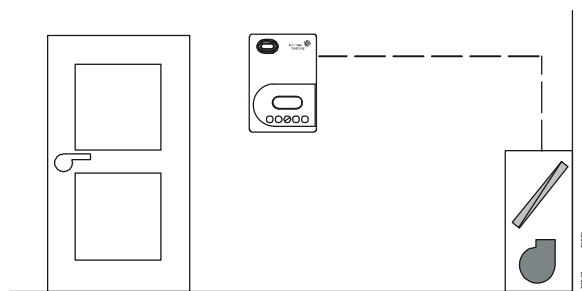


Figure 2: Stand-Alone Fan Coil Application with PIR Accessory Cover

Table 2: Scenario 1 Setup and Configuration

| | |
|-------------------------------|---|
| B11 Configuration | Selection Not Set to MotionNO or MotionNC |
| B12 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time the PIR device detects local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration, the room switches to stand-by mode and the stand-by setpoints are used. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If the PIR device senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 2: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with a PIR Accessory Cover

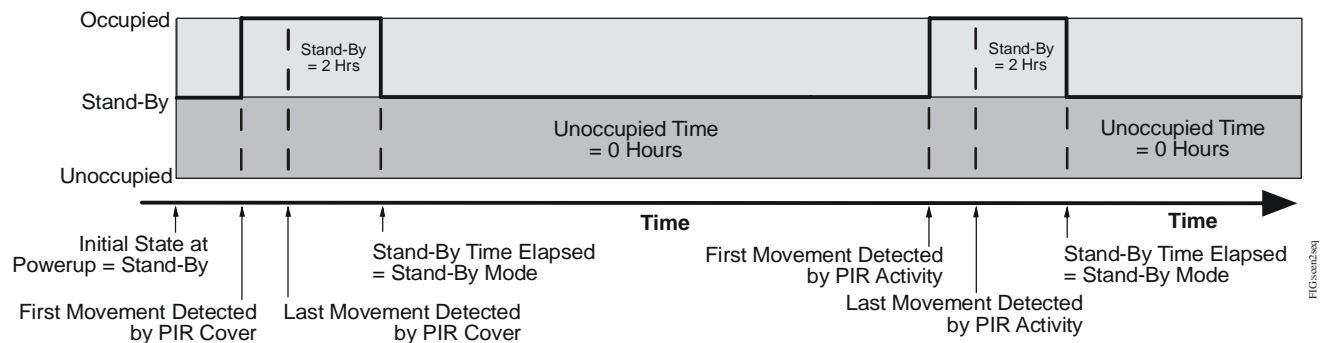


Figure 3: Scenario 2 Sequence of Operation

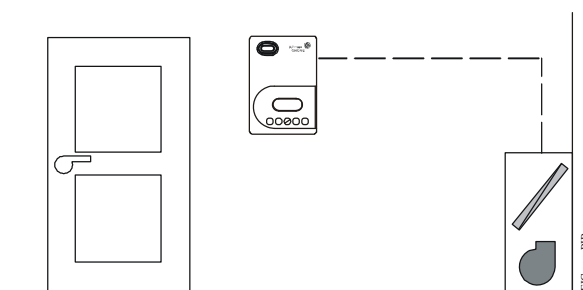


Figure 4: Stand-Alone Fan Coil Application with PIR Accessory Cover

Table 3: Scenario 2 Setup and Configuration

| | |
|-------------------------------|---|
| B1 Configuration | Selection Not Set to MotionNO or MotionNC |
| B12 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time the PIR device senses local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration, the room switches to stand-by mode and the stand-by setpoints are used. If the PIR device senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Scenario 3: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with a Remote PIR Sensor

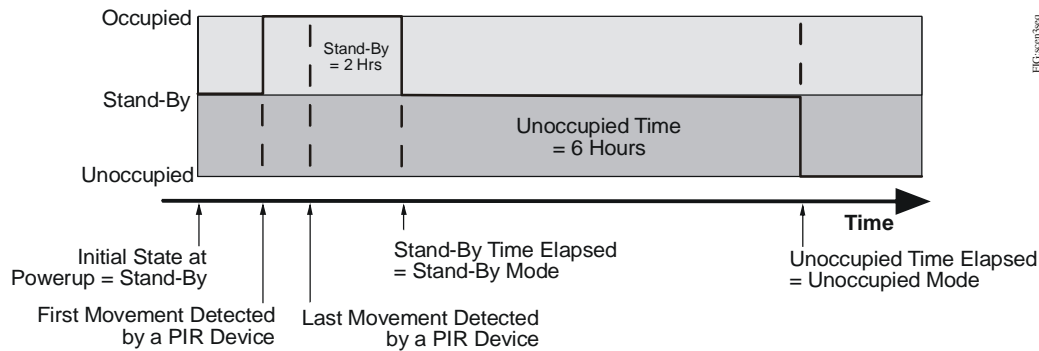


Figure 5: Scenario 3 Sequence of Operation

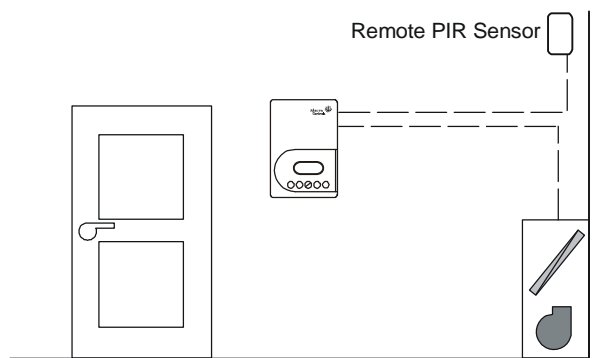


Figure 6: Stand-Alone Fan Coil Application with Remote PIR Sensor

Table 4: Scenario 3 Setup and Configuration

| | |
|-------------------------------|--------------------------------------|
| BI1 Configuration | Configured for Remote PIR Sensor |
| BI2 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time the PIR device detects local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration, the room switches to stand-by mode and the stand-by setpoints are used. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If the PIR device senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 4: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with a Remote PIR Sensor

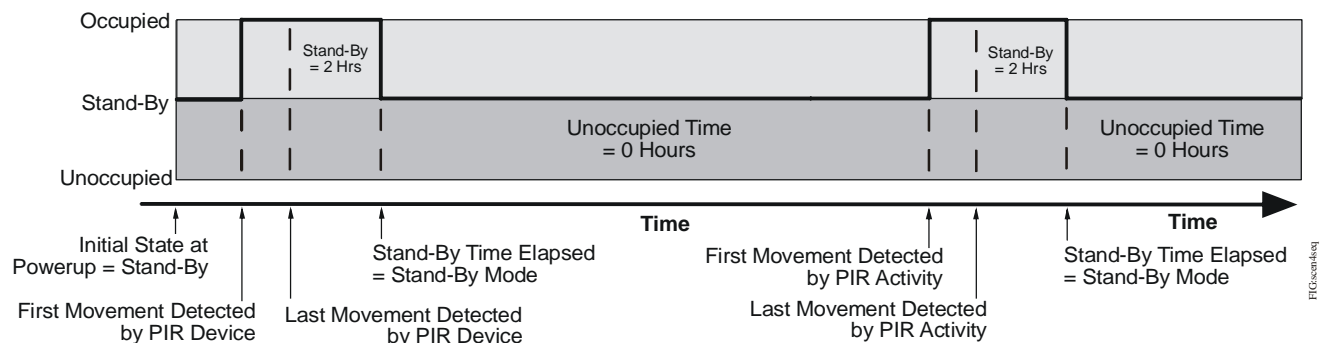


Figure 7: Scenario 4 Sequence of Operation

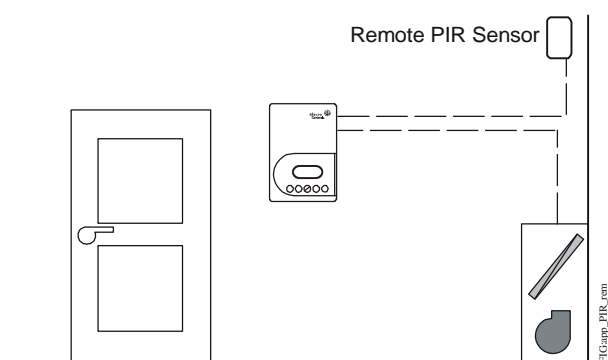


Figure 8: Stand-Alone Fan Coil Application with Remote PIR Sensor

Table 5: Scenario 4 Setup and Configuration

| | |
|-------------------------------|--------------------------------------|
| B1 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time the PIR device senses local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration, the room switches to stand-by mode and the stand-by setpoints are used. If the PIR device senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Scenario 5: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with Dual PIR Sensors

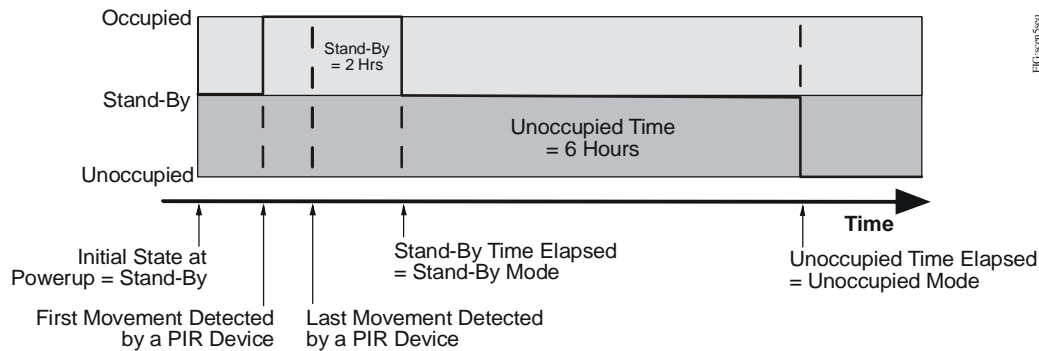


Figure 9: Scenario 5 Sequence of Operation

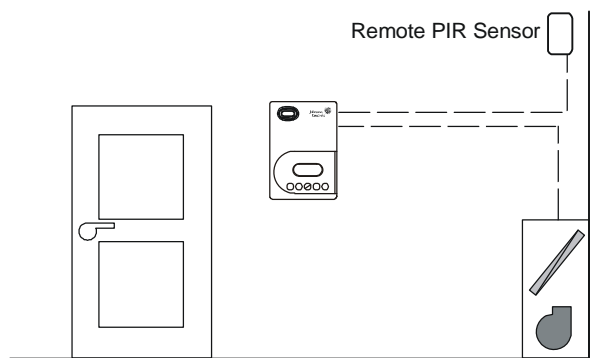


Figure 10: Stand-Alone Fan Coil Application with Dual PIR Sensors

Table 6: Scenario 5 Setup and Configuration

| | |
|-------------------------------|--------------------------------------|
| B11 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR devices do not detect any movement. As soon as either of the PIR devices detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time a PIR device senses local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration by either PIR device, the room switches to stand-by mode and the stand-by setpoints are used. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If one of the PIR devices senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 6: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with Dual PIR Sensors

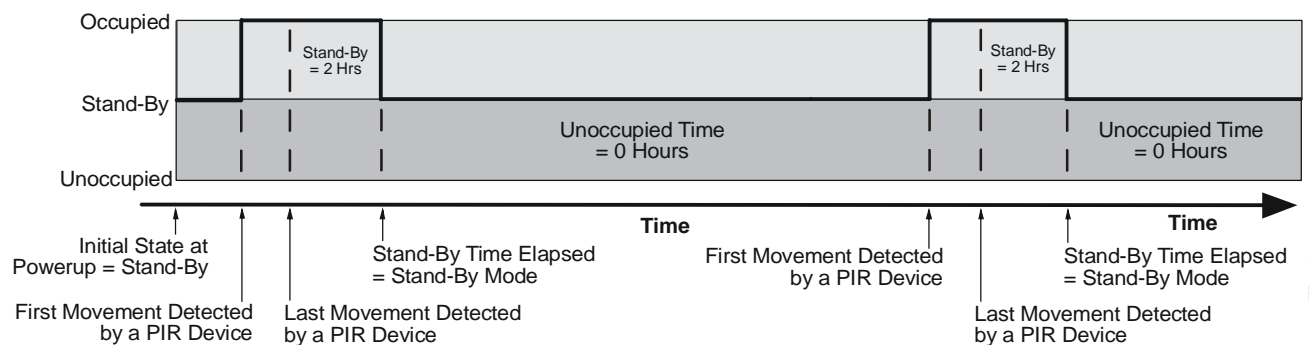


Figure 11: Scenario 6 Sequence of Operation

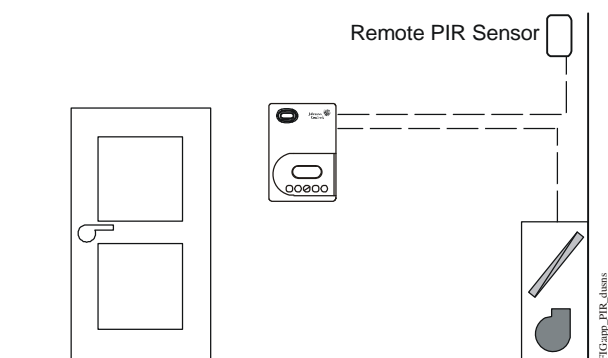


Figure 12: Stand-Alone Fan Coil Application with Dual PIR Sensors

Table 7: Scenario 6 Setup and Configuration

| | |
|-------------------------------|--------------------------------------|
| B1 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Not Set to Door Dry |
| Stand-By Timer Value | Selection Set to 2.0 Hours |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR devices do not detect any movement. As soon as either of the PIR devices detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. Any time a PIR device senses local motion, the elapsed stand-by timer value is reset.

If no motion is detected in the zone for the entire stand-by timer duration by either PIR device, the room switches to stand-by mode and the stand-by setpoints are used. If one of the PIR devices senses local movement at any time, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Scenario 7: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with a PIR Accessory Cover and Door Switch

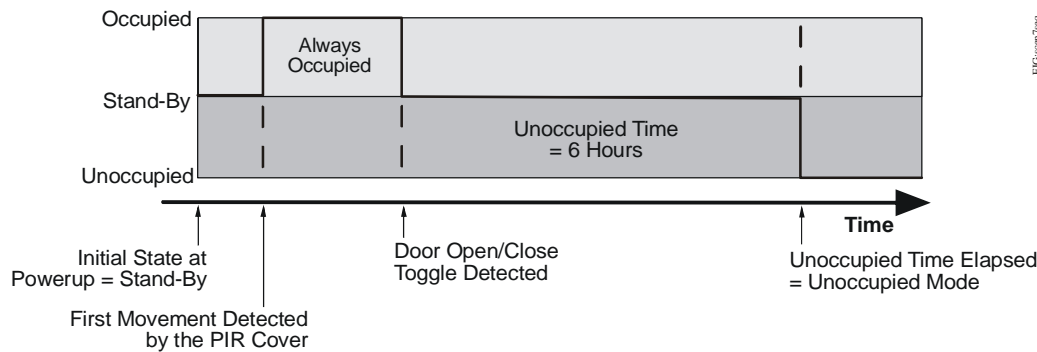


Figure 13: Scenario 7 Sequence of Operation

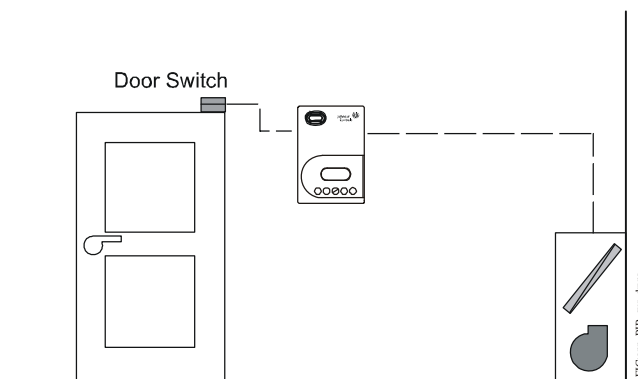


Figure 14: Stand-Alone Fan Coil Application with PIR Accessory Cover and Door Switch

Table 8: Scenario 7 Setup and Configuration

| | |
|-------------------------------|---|
| B1 Configuration | Selection Not Set to MotionNO or MotionNC |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If the PIR device senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 8: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with a PIR Accessory Cover and Door Switch

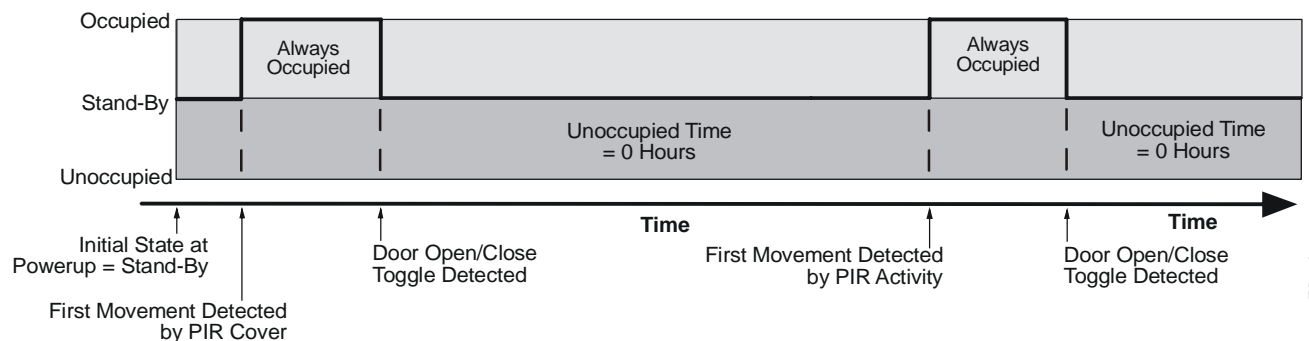


Figure 15: Scenario 8 Sequence of Operation

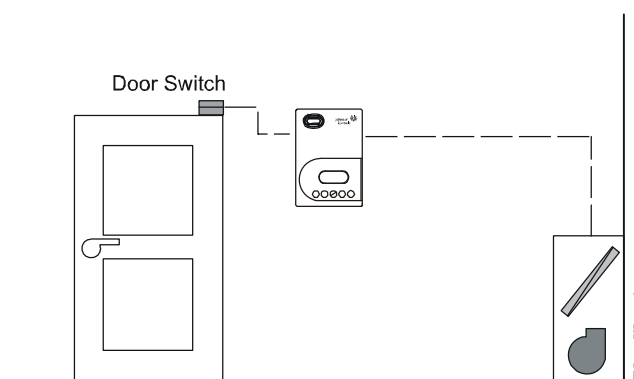


Figure 16: Stand-Alone Fan Coil Application with PIR Accessory Cover and Door Switch

Table 9: Scenario 8 Setup and Configuration

| | |
|-------------------------------|---|
| B1 Configuration | Selection Not Set to MotionNO or MotionNC |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. If the PIR device senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Scenario 9: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with a Remote PIR Sensor and Door Switch

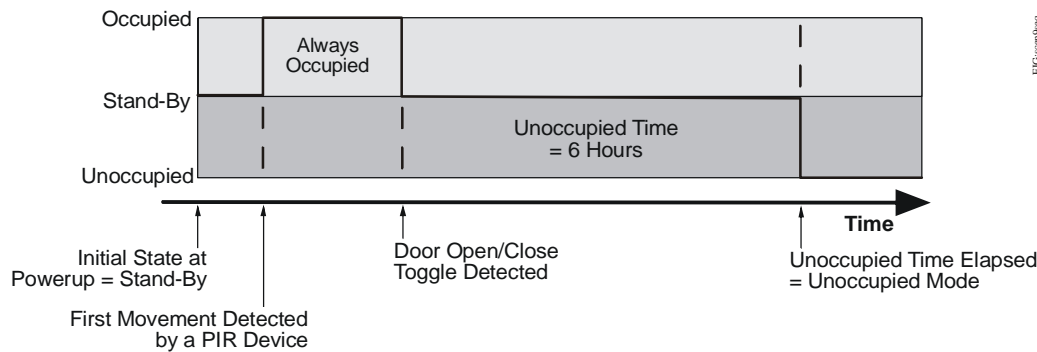


Figure 17: Scenario 9 Sequence of Operation

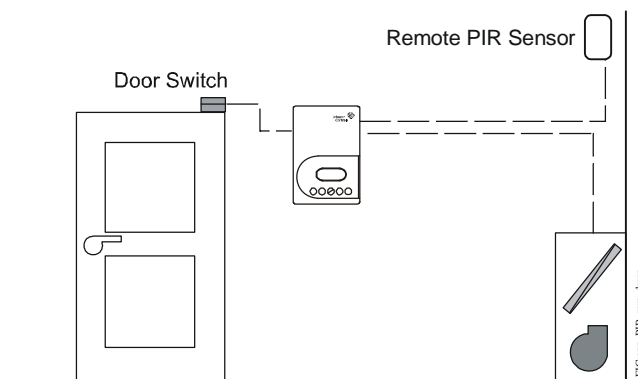


Figure 18: Stand-Alone Fan Coil Application with Remote PIR Sensor and Door Switch

Table 10: Scenario 9 Setup and Configuration

| | |
|-------------------------------|-----------------------------------|
| B1 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If the PIR device senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 10: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with a Remote PIR Sensor and Door Switch

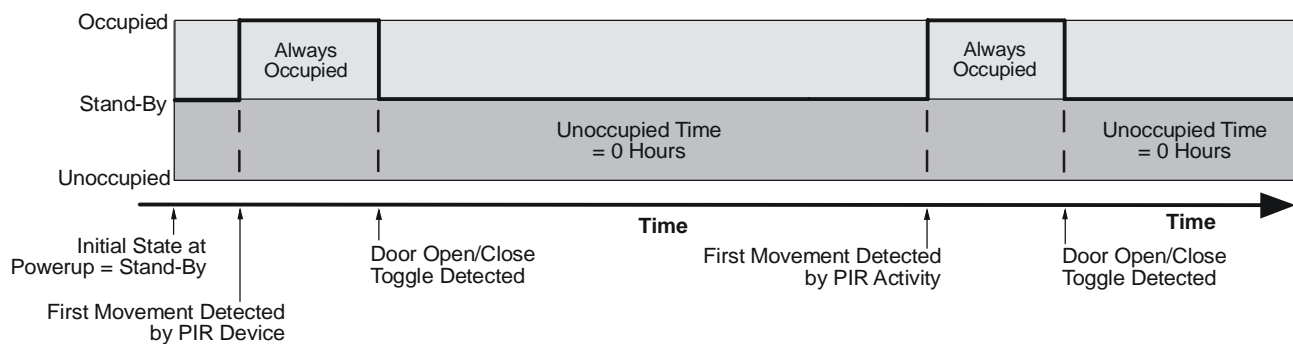


Figure 19: Scenario 10 Sequence of Operation

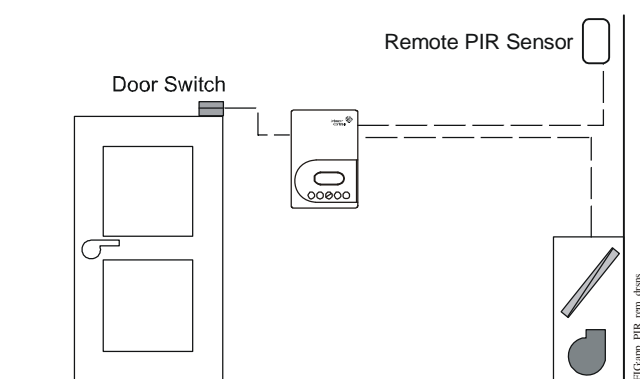


Figure 20: Stand-Alone Fan Coil Application with Remote PIR Sensor and Door Switch

Table 11: Scenario 10 Setup and Configuration

| | |
|-------------------------------|-----------------------------------|
| B1 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR device does not detect any movement. As soon as the PIR device detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. If the PIR device senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Scenario 11: Stand-Alone Fan Coil Application Using 3 Occupancy Levels with Dual PIR Sensors and Door Switch

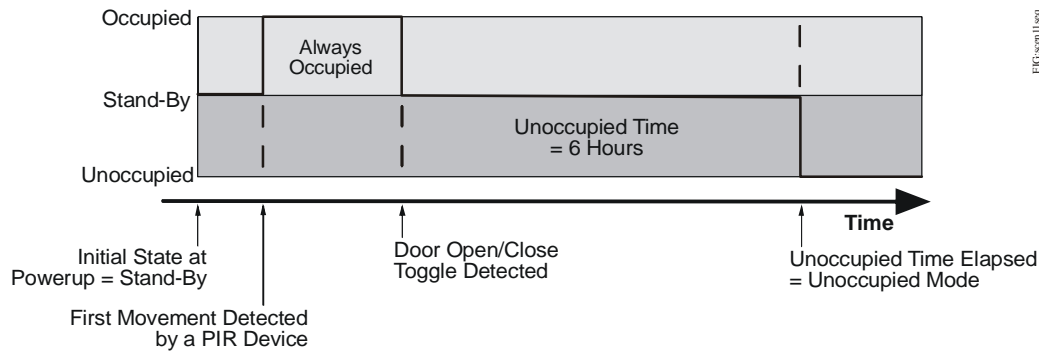


Figure 21: Scenario 11 Sequence of Operation

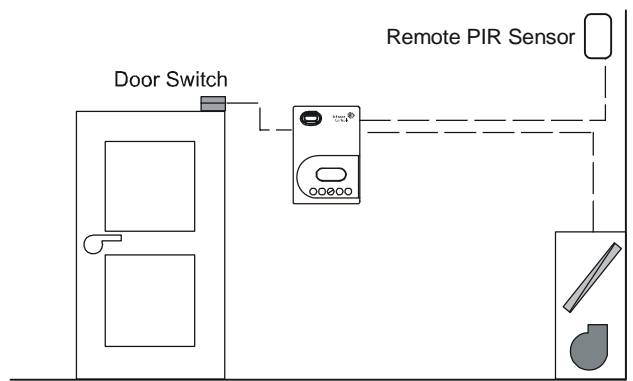


Figure 22: Stand-Alone Fan Coil Application with Dual PIR Sensors and Door Switch

Table 12: Scenario 11 Setup and Configuration

| | |
|-------------------------------|-----------------------------------|
| B11 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 6.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR devices do not detect any movement. As soon as either of the PIR devices detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. While in stand-by mode, if no motion is detected in the zone for the entire unoccupied timer duration, the room switches to unoccupied mode and the unoccupied setpoints are used. If one of the PIR devices senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used.

Scenario 12: Stand-Alone Fan Coil Application Using 2 Occupancy Levels with Dual PIR Sensors and Door Switch

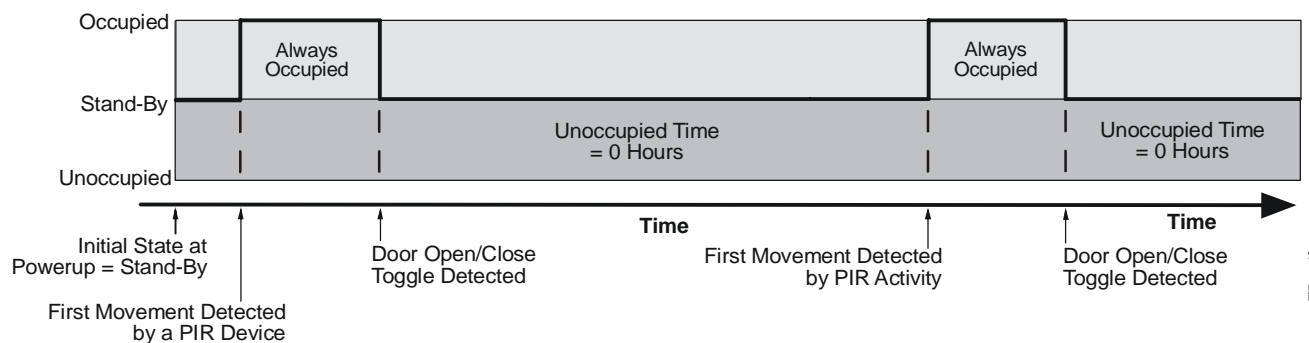


Figure 23: Scenario 12 Sequence of Operation

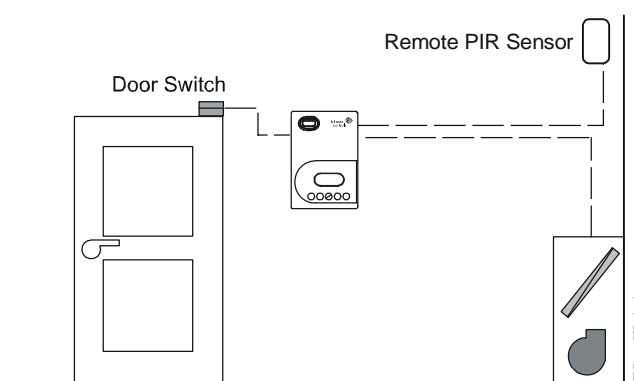


Figure 24: Stand-Alone Fan Coil Application with Dual PIR Sensors and Door Switch

Table 13: Scenario 12 Setup and Configuration

| | |
|-------------------------------|-----------------------------------|
| B11 Configuration | Configured for Remote PIR Sensor |
| B12 Configuration | Selection Set to Door Dry |
| Stand-By Timer Value | Not Used |
| Unoccupied Timer Value | Selection Set to 0.0 Hours |
| Network Interface Used | None, Stand-Alone |

At initial powerup, when the thermostat controller 24 VAC power supply is applied, the initial occupancy of the zone is in stand-by mode if the PIR devices do not detect any movement. As soon as either of the PIR devices detects a movement, the occupancy status switches to occupied and the occupied setpoints are used. The room is in occupied mode until a door toggle is detected.

If a door toggle is detected, the room switches to stand-by mode and the stand-by setpoints are used. If any occupants remain in the room, local movements must be seen to resume the occupied mode. If one of the PIR devices senses local movement any time the door is closed, the occupancy status switches to occupied and the occupied setpoints are used. The local zone never goes into unoccupied mode and the unoccupied setpoints are never used.

Troubleshooting a T60xDFH-4 or T60xDFH-4+PIR Series Thermostat Controller

Table 14: Troubleshooting Tips

| Topic | Explanation |
|-----------------------------------|--|
| PIR Connector | The polarized PIR connector is located at the bottom left corner of the thermostat controller base. |
| Security Screw | A security screw is provided in the thermostat controller box. This screw should be carefully installed in the intended mounting position, located in the bottom center of the thermostat controller cover. |
| PIR Warm-Up Period | The PIR sensor may take up to 60 seconds after the warm-up period to detect movement consistent with the typical detection pattern. |
| Visual Indication (Status of PIR) | Visual indication of PIR activity for commissioning is provided via blinking Light-Emitting Diodes (LEDs) located on the thermostat controller cover under the PIR lens. The LEDs are active while the occupant is in the field of detection pattern for a period of 30 minutes after initial powerup. |



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