

TEC2647Z-2 and TEC2647Z-2+PIR BACnet® MS/TP Zone Controllers for Stand-Alone and Networked Zoning Systems

Installation Instructions

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Applications

The TEC2647Z-2 and TEC2647Z-2+PIR Zone Controllers are BACnet® Master-Slave/Token-Passing (MS/TP) devices that operate with a Johnson Controls® TEC2664Z-2 Rooftop Controller to provide efficient space temperature control in constant volume zoning systems. These technologically advanced zone controllers provide proportional 0 to 10 VDC control of pressure dependent Variable Air Volume (VAV) equipment with or without local reheat.

The TEC2647Z-2, TEC2647Z-2+PIR, and TEC2664Z-2 controller combination can operate as a stand-alone zoning system, or it can operate with a Building Automation System (BAS) that enables remote monitoring and programmability in networked zoning systems.

The TEC2647Z-2+PIR Zone Controller has the occupancy sensing capability built into the device. This built-in feature promotes energy savings using conservative setpoint strategies.

The TEC2647Z-2 and TEC2647Z-2+PIR Zone Controllers feature an intuitive user interface with backlit display that makes setup and operation quick and easy. The zone controllers also employ a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based zone controllers.

IMPORTANT: The TEC2647Z-2 and TEC2647Z-2+PIR Zone Controllers are intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the zone 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 zone controller.

North American Emissions Compliance

United States

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.

Canada

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.

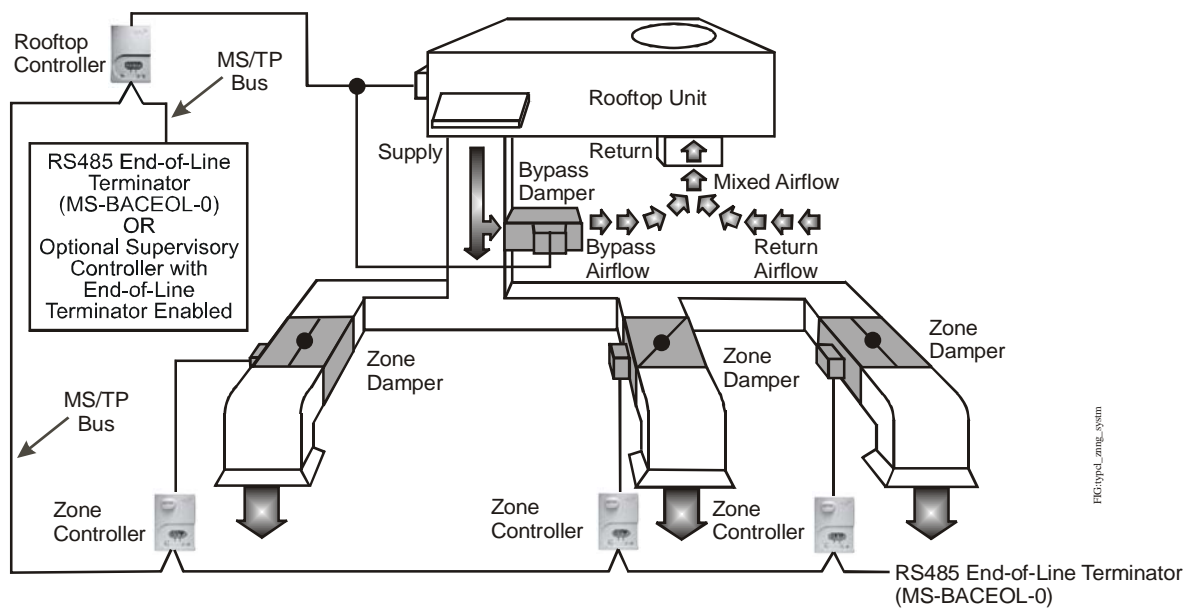


Figure 1: Typical Zoning Control System Installed on a Single MS/TP Bus

Mounting

Figure 1 illustrates a typical zoning control system installed on a single MS/TP Bus. This installation consists of multiple TEC2647Z-2 and TEC2647Z-2+PIR Zone Controllers, each controlling a single zone damper; and a TEC2664Z-2 Rooftop Controller controlling a rooftop unit. The TEC2664Z-2 Rooftop Controller can be wired to an optional supervisory controller.

Location Considerations

Locate the zone controller:

- on a partitioning wall, approximately 5 ft (1.5 m) above the floor in a location of average temperature
- away from direct sunlight, radiant heat, outside walls, outside doors, air discharge grills, or stairwells; and from behind doors
- away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference

For Integrated Passive Infrared (PIR) models, be sure that the zone controller is located centrally, where occupant movement is abundant.

Note: Allow for vertical air circulation to the zone controller.

To install the zone controller:

1. Pull the bottom edge of the zone controller cover and open the zone controller as illustrated in Figure 2.

IMPORTANT: PIR models have a wiring connection between the cover and the Printed Circuit Board (PCB). This connection allows for proper wiring of the occupancy sensor. Carefully remove the wiring connection from the PCB.

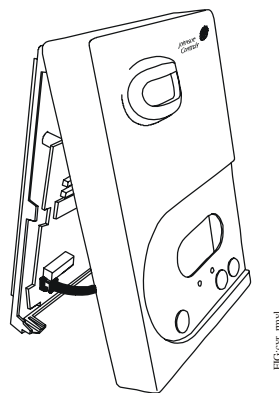


Figure 2: Removing the Zone Controller Cover

2. Carefully pull the locking tabs on the right side of the zone controller mounting base, and unlock the PCB. Open the PCB to the left as illustrated in Figure 3.

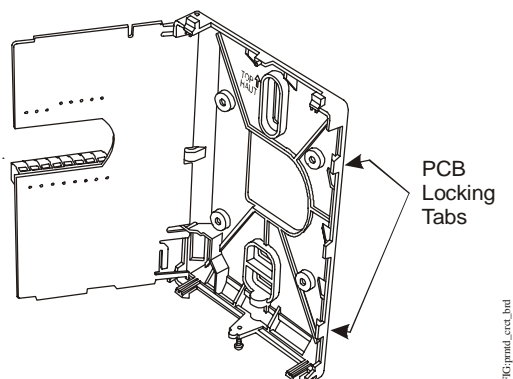


Figure 3: Opening the Zone Controller PCB

3. Pull approximately 6 in. (152 mm) of wire from the wall, and insert the wire through the hole in the zone controller mounting base.
4. Align the zone controller mounting base on the wall, and use the base as a template to mark the two mounting hole locations.

Note: Be sure to position the zone controller mounting base so that the arrow on the base points upward to indicate the top of the zone controller.

5. Drill a 3/16 in. (5 mm) hole at each of the two marked locations, and tap nylon anchors (included with the zone controller) flush to the wall surface.

Note: Other means of anchoring the device may be desired, depending on the wall medium.

6. Position the zone controller mounting base on the wall, and use the two mounting screws (included with the zone controller) to secure the base to the wall surface as illustrated in Figure 4.

Note: Be careful not to overtighten the mounting screws.

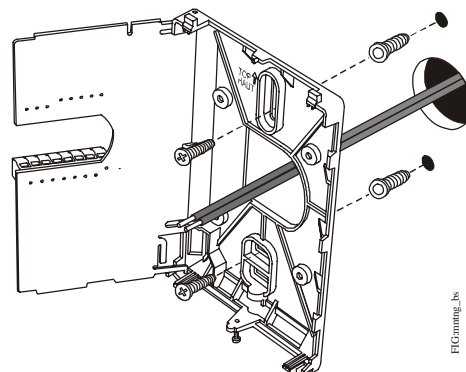


Figure 4: Securing the Zone Controller Mounting Base to the Wall

7. Swing the PCB back to the right and carefully snap it into the locking tabs on the zone controller mounting base.
8. Remove the screw terminal blocks that are attached to a disposable adhesive to the display. Figure 5 illustrates the locations of the screw terminal blocks on the zone controller.

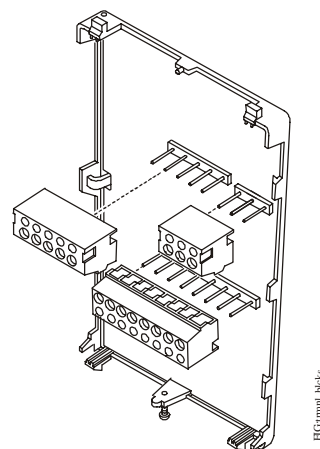


Figure 5: Screw Terminal Blocks

Wiring

When an existing zone controller is replaced, remove and label the wires to identify the terminal functions.

When a TEC2647Z-2 or TEC2647Z-2+PIR Zone Controller is replaced, simply remove the old screw terminal blocks and reinsert them onto the PCB of the replacement zone controller.



CAUTION: Risk of Electric Shock.

Disconnect power supply before making electrical connections to avoid electric shock.



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

IMPORTANT: Make all wiring connections in accordance with the National Electrical Code and local regulations. Use proper Electrostatic Discharge (ESD) precautions during installation and servicing to avoid damaging the electronic circuits.

To wire the zone controller:

1. Strip the ends of each wire 1/4 in. (6 mm), and connect them to the appropriate screw terminals as indicated in Table 1 and Figure 6 through Figure 9.

Note: For more details on wiring the MS/TP Communications Bus, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

2. Carefully push any excess wire back into the wall. Seal the hole in the wall with fireproof material to prevent drafts from affecting the ambient temperature readings.
3. Reinsert the screw terminal blocks onto the PCB.

4. Attach the MS/TP communication wires to the terminal block.

Note: If multiple wires are inserted into the terminals, be sure to properly twist the wires together prior to inserting them into the terminal connectors.

5. For PIR models, carefully reattach the PIR connector to the PCB.
6. Reattach the zone controller cover to the mounting base (top side first).
7. Use a Phillips-head screwdriver to install the security screw on the bottom of the zone controller cover if desired. The screw comes packaged separately in a plastic bag with the controller.

Table 1: Terminal Identification (See Figure 6.)

Terminal Number	Terminal Label	Function
4	24 V~ Hot	24 VAC from Transformer
5	24 V~ Com	24 VAC (Common) from Transformer
6	BO5 Aux	Aux BO (Auxiliary Output), On/Off Reheat
7	BO5 Aux	Aux BO (Auxiliary Output), On/Off Reheat
9	AO2	Analog Reheat
10	AO1	Damper (Zone)
11	Blank	N/A
12	BI1	Binary Input 1
13	RS	Remote Sensor
14	Scom	Sensor Common
15	BI2	Binary Input 2
16	UI3	Temperature Sensor Monitoring via Supervisory Controller
Blank	+, -, REF	MS/TP Bus

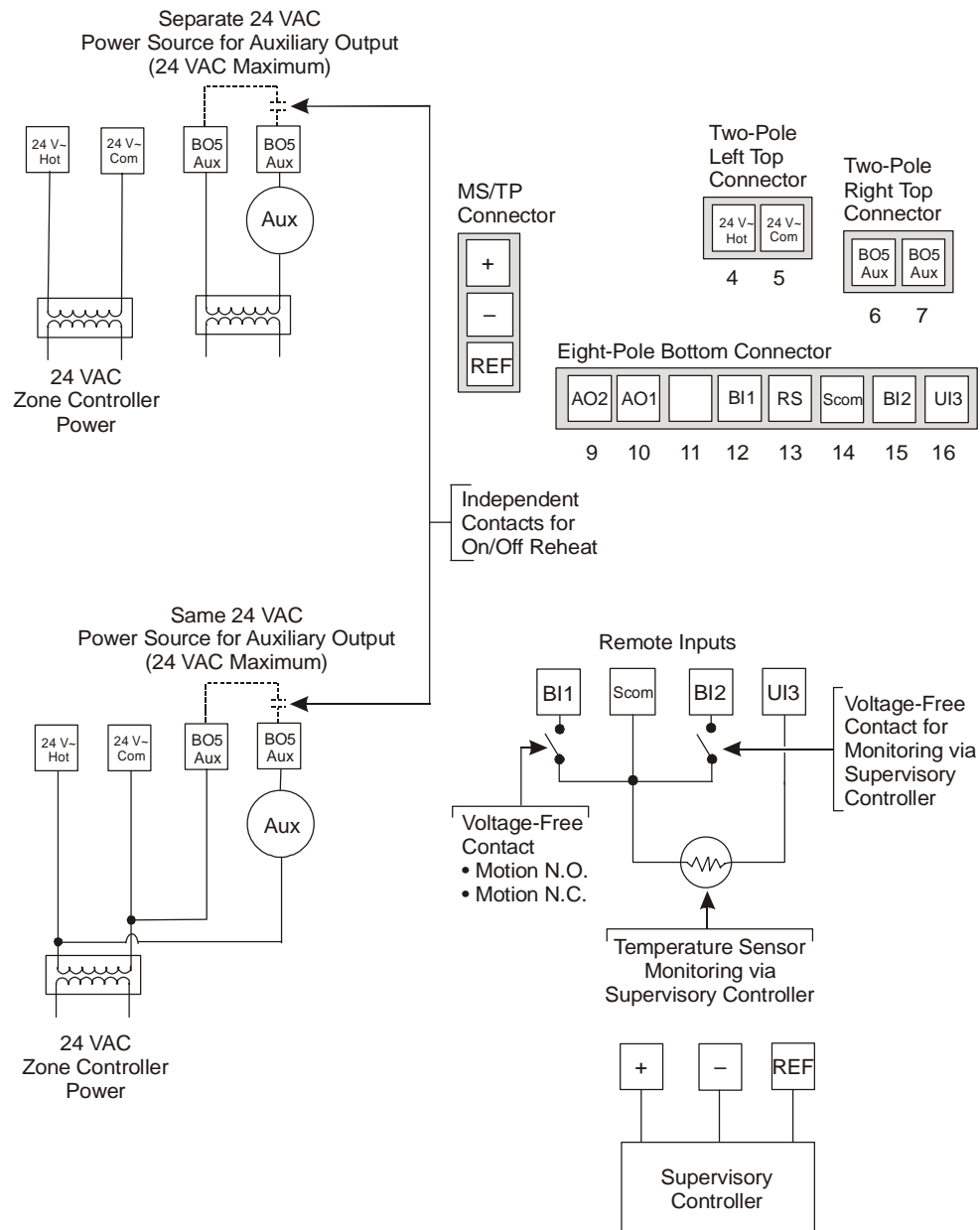


Figure 6: Wiring the TEC2647Z-2 or TEC2647Z-2+PIR Zone Controller (See Table 1.)

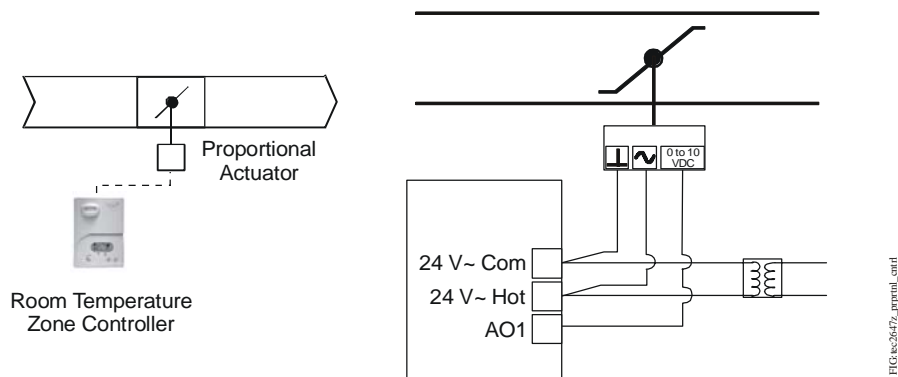


Figure 7: Wiring the Zone Controller for Proportional 0 to 10 VDC Control

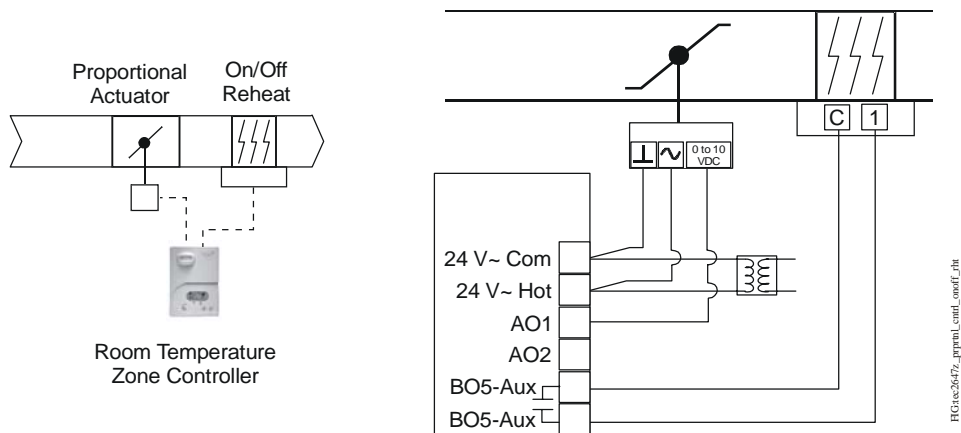


Figure 8: Wiring the Zone Controller for Proportional 0 to 10 VDC Control and On/Off Reheat

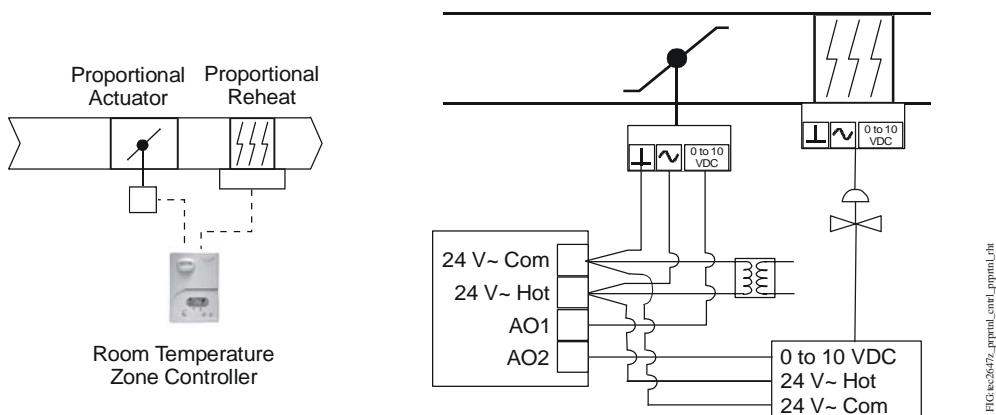


Figure 9: Wiring the Zone Controller for Proportional 0 to 10 VDC Control and Proportional Reheat

Connecting the MS/TP Bus

To connect the MS/TP Bus:

1. Set the device address of the TEC2647Z-2 or TEC2647Z-2+PIR Zone Controller per the engineering drawings; and test for bus voltage, polarity, and isolation prior to wiring the MS/TP Bus. (See the **Zone MAC** parameter in Table 2 to set the device address for the zone controller.)

Note: Pressing and holding the **UP/DOWN** arrow keys simultaneously displays the device address that is assigned.

Note: The wiring rules for the MS/TP Bus differ from the wiring rules for the N2 Bus. For more details on wiring the MS/TP Communications Bus, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

2. Observe the polarity when connecting the bus wires to the zone controller.
3. After the bus wires are connected to the first zone controller, continue in a daisy-chained fashion to the next device on the MS/TP Bus.

Note: The bus wiring must be twisted-pair lines. Do not run the bus wiring in the same conduit as line voltage wiring (30 VAC or above) or other wiring that switches power to highly inductive loads (such as contactors, coils, motors, or generators).

The MS/TP Bus requires proper termination and biasing at each end of a segment (a segment is a physically continuous length of wire). Because the zone controller is not equipped with end-of-line termination, a Johnson Controls MS-BACEOL-0 End-of-Line Terminator (see Table 4; ordered separately) or similar device is recommended to provide this end-of-line termination. An end-of-line terminator is required if a supervisory controller is not at the end of the segment. If a supervisory controller is at the end of the segment, then the end-of-line terminator switch on the supervisory controller must be set in the ON position.

Note: See Table 4 for end-of-line terminator ordering information.

For applications with a supervisory controller on the MS/TP Bus, set the supervisory controller to establish the baud rate, and set the rooftop controller for automatic baud rate detection.

For stand-alone applications where a supervisory controller is not present, at least one device on the MS/TP Bus must be set to establish the baud rate. It is recommended that the baud rate be set at only one rooftop controller, and all other devices be set for automatic baud rate detection. Doing so prevents duplicate devices from having mismatched baud rates. After the baud rate is set, recycle the power to the device that was used to set the baud rate.

Do not exceed the maximum number of devices allowed on a Field Bus. Be sure that the wiring terminations are set correctly, and that all communication wiring is daisy-chained with no taps.

A small green light under the zone controller cover (on the left edge, when facing the zone controller) indicates the communications mode when the zone controller is operating. The following blink codes may be seen:

- Short-Short-Long: Indicates that the baud rate is known and communication is active.
- Short-Short: Indicates that the zone controller is scanning for the correct baud rate and there is no communication.
- Off: Indicates that there is no power to the zone controller or the MS/TP wiring polarity is reversed.
- Long: Indicates that the MS/TP communication daughter board is the wrong type for the main board.

Setup and Adjustments

Zone Controller Operation Overview

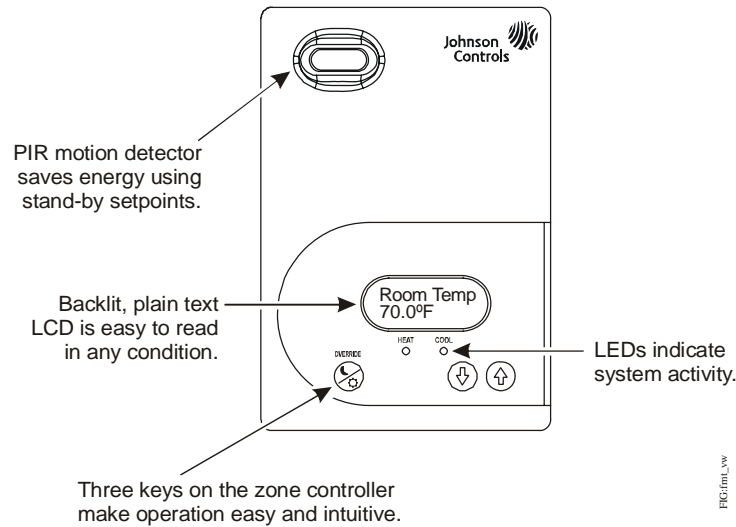


Figure 10: Front Cover of Zone Controller

Zone Controller User Interface Keys

The zone controller user interface consists of three keys on the front cover (as illustrated in Figure 10). The function of each key is as follows:

- **OVERRIDE** key overrides the unoccupied mode to occupied at the local user interface for the specified TOccTime. (TOccTime is defined by selecting the appropriate time period in the Installer Configuration Menu.) The **OVERRIDE** key also allows access to the Installer Configuration Menu. See [Configuring the TEC2647Z-2 and TEC2647Z-2+PIR Zone Controller](#) on page 9.

Note: If the **Lockout** parameter is set to **(2): Level 3** or **(3): Level 4**, then this **OVERRIDE** key is disabled.

- **UP/DOWN** arrow keys change the configuration parameters and activate a setpoint adjustment.

Backlit Liquid Crystal Display (LCD)

The zone controller includes a two-line, eight-character backlit display. Low-level backlighting is present during normal operation and brightens when any user interface key is pressed. The backlight returns to low level when the zone controller is left unattended for 45 seconds.

Light-Emitting Diodes (LEDs)

Two LEDs are included to show a call for heating or a call for cooling:

- The **HEAT** LED is on when heating or reheat is on.
- The **COOL** LED is on when cooling is on.

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 unoccupied.

Status Display Menu

The Status Display Menu is displayed during normal zone controller operation. This menu continuously scrolls through the following parameters:

- Room Temperature
- Occupancy Status (Occupied/Unoccupied/Standby/Override)
- Outside Temperature (An outside air temperature sensor is recommended to allow the **H lock** and **C lock** parameters of the rooftop controller to discontinue heating or cooling operation in response to the outside air temperature. If an outside air temperature sensor is not installed, an ambiguous outside air temperature displays on the zone controller unless its **MenuScro** parameter is set to **off**.)

Note: An option is available within the Installer Configuration Menu to lock out the scrolling display and show only the **Room Temperature** parameter.

Occupancy Sensor Operation – TEC2647Z-2+PIR Zone Controller

A TEC2647Z-2+PIR Zone Controller provides advanced occupancy logic when equipped with a PIR accessory cover or a remote PIR sensor attached to one of the binary inputs.

Note: The **PIR Func** parameter must be set to **on** as described in Table 2 for the occupancy sensor to function.

The zone controller automatically switches occupancy levels from occupied to standby as required, when local movements are sensed.

Occupancy sensing is enabled only if a PIR cover is installed on the zone controller (PIR models) or if a remote input is configured as a remote PIR sensor (Motion NO or Motion NC) and the PIR Func parameter is set to **on** as described in Table 2.

PIR Diagnostic LEDs

The diagnostic LEDs inside the PIR models brighten when movement is detected within the first 30 minutes after powerup. The LEDs do not light up or brighten after the initial 30-minute period.

Setpoints

The standby setpoints are under the same limitations and restrictions as the occupied and unoccupied setpoints. Standby setpoints reside between the corresponding occupied and unoccupied setpoint values.

The installer must make sure that the difference between the standby and occupied value can be recovered in a timely fashion when movement is detected in the zone and large enough to warrant maximum energy savings.

Configuring the TEC2647Z-2 and TEC2647Z-2+PIR Zone Controller

The TEC2647Z-2 and TEC2647Z-2+PIR Zone Controllers come from the factory with default settings for all configurable parameters. The default settings are shown in Table 2. To reconfigure the parameters via the zone controller, follow the steps in this section.

To access the Installer Configuration Menu, press and hold the **OVERRIDE** key for approximately 8 seconds. Once the Installer Configuration Menu begins, release and press the **OVERRIDE** key to scroll through the parameters listed in Table 2. When the desired parameter is displayed, use the **UP/DOWN** arrow keys to choose the desired selection option. Then press and release the **OVERRIDE** key to continue scrolling through the parameters.

When the zone controller is in the Installer Configuration Menu and left unattended for approximately 8 seconds, the zone controller reverts to the Status Display Menu.

Refer to the *TEC Zoning Control System for Stand-Alone and BACnet MS/TP Networked Applications Technical Bulletin (LIT-12011398)* for additional configuring and commissioning details.

Monitoring Inputs BI2 and UI3

BI2 provides voltage-free contact status via the supervisory controller only. Examples of monitoring include airflow proving and filter status.

The UI3 input provides temperature sensor monitoring via the supervisory controller.

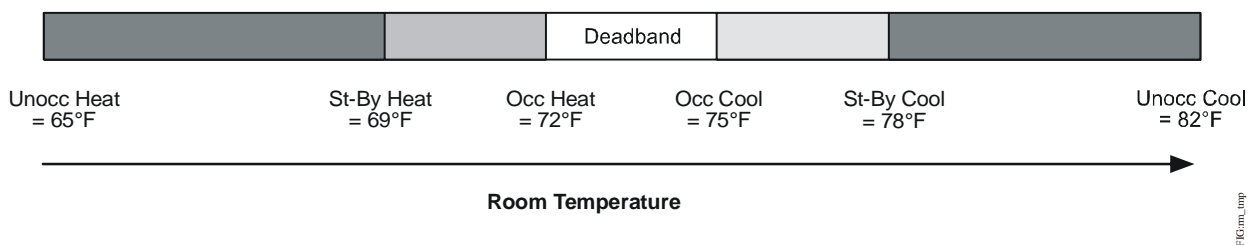


Figure 11: Increasing Room Temperature Setpoints

Table 2: Installer Configuration Menu (Part 1 of 5)

Parameter Appearing on Display	Description and Default	Selection Options
Zone MAC¹	Sets a unique device address for the zone controller on the MS/TP network. Default: 255	Range: 004 to 127 Note: When setting the device address, press the UP/DOWN arrow keys to change the device address in increments of 1; press and hold the UP/DOWN arrow keys to change the device address in increments of 10.
ZoneBaud	Sets the baud rate of the zone controller on the MS/TP network. Default: Auto	(9600): 9600 bps (19200): 19200 bps (38400): 38400 bps (76800): 76800 bps (Auto): Auto Baud
Get From	Gets all of the installer configuration menu parameter values except Zone MAC , ZoneBaud , RTC MAC , BO5 cont , Set Type , and Cal RS of another zone controller. Also copies the GUI Occupied Heat Spt , GUI Occupied Cool Spt , and Cfg Network Handle MS/TP Bus objects. Default: 255 Note: This parameter requires that communication on the MS/TP Bus be functioning. If communication is not functioning, the installer configuration menu does not scroll past this parameter.	Range: 001 to 255 Note: Entering a zone controller address begins a routine to get the parameter values of that zone controller, and imports those values to the zone controller from which the Get From parameter is being set. After getting the parameters, this value reverts back to 255. When getting the parameter value, press the UP/DOWN arrow keys to change the device address in increments of 1; press and hold the UP/DOWN arrow keys to change the device address in increments of 10.
RTC MAC²	Sets a unique device address for the rooftop controller to which the zone controller communicates. Default: 4 Note: All zone controllers associated with the same rooftop controller must have the same RTC MAC parameter setting as the rooftop controller.	Range: 004 to 127 Note: When setting the device address, press the UP/DOWN arrow keys to change the device address in increments of 1; press and hold the UP/DOWN arrow keys to change the device address in increments of 10.
MenuScro	Gives the option of having the display continuously scroll the parameters. Note: If an outside air temperature sensor is not installed at the rooftop controller, set the MenuScro parameter of the zone controller to off to prevent an ambiguous outside air temperature from displaying. Default: on	(off): The scroll is inactive. (on): The scroll is active.
C or F	Provides temperature scale options for display. Default: °F	(°C): Celsius Scale (°F): Fahrenheit Scale

Table 2: Installer Configuration Menu (Part 2 of 5)

Parameter Appearing on Display	Description and Default	Selection Options		
PIR Func³	Enables the onboard Passive Infrared Sensor. Default: off Note: PIR is an option for occupancy detection. Set the PIR Func parameter to off unless this PIR is installed. The PIR Func parameter is not automatically set when the PIR cover is plugged in. You must change the setting to on to enable the function.	(on): Onboard PIR is installed. The BI1 parameter should be set to None . (off): Onboard PIR is disabled or not installed. The BI1 parameter can be set to MotionNO or MotionNC .		
Lockout	Selectable Lockout Levels for limiting end user keypad interaction. Default: 0	Lockout Level	Function	
			Occupied Temperature Setpoints	Local Override
				Rooftop Controller Demand Override
		(0): Level 1	Access	Access
		(1): Level 2	Access	Access
		(2): Level 3	Access	No Access
		(3): Level 4	No Access	No Access
			No Access	No Access
BI1³	Configuration of Binary Input 1. Default: None Note: BI1 can be used for remote mounted occupancy sensing.	(None): No function is associated with an input. (MotionNO*): Used in the occupied mode only to toggle from the occupied setpoint to the standby setpoint when no motion is detected in the zone for 30 minutes. As soon as motion is detected in the zone, the occupied setpoint resumes. Contact open = no motion detected; contact closed = motion detected. (MotionNC*): Used in the occupied mode only to toggle from the occupied setpoint to the standby setpoint when no motion is detected in the zone for 30 minutes. As soon as motion is detected in the zone, the occupied setpoint resumes. Contact open = motion detected; contact closed = no motion detected. * These settings disable any local override function. For PIR models, see the <u>Occupancy Sensor Operation – TEC2647Z-2+PIR Zone Controller</u> section. Advanced PIR occupancy can function with either a Normally Open (N.O.) or Normally Closed (N.C.) remote PIR motion sensor.		
RehtConf	Sets the number and type of reheat stages controlled by the zone controller. Default: 1	(0): None (1): Analog Duct Reheat Only (2): On/Off Duct Reheat Only (3): On/Off Peripheral Reheat Only (4): Analog Duct Reheat and On/Off Peripheral Reheat		
AO2RA/DA⁴	Choice of reverse or direct acting analog reheat output signal. Default: DA	(RA): Reverse Acting, 0 to 100% = 10 to 0 VDC (DA): Direct Acting, 0 to 100% = 0 to 10 VDC		
AO2 OALK⁵	Sets the maximum outside air sensor temperature at which the first stage of zone reheat (analog reheat stage) can be used. Default: 55.0°F/13.0°C	Range: -40.0°F/-40.0°C to 122.0°F/50.0°C Note: When setting the maximum outside air sensor temperature, press the UP/DOWN arrow keys to change the temperature in 5.0°F/2.5°C° increments; press and hold the UP/DOWN arrow keys to change the temperature in 50.0°F/25°C° increments.		

Table 2: Installer Configuration Menu (Part 3 of 5)

Parameter Appearing on Display	Description and Default	Selection Options	
BO5 OALK⁵	Sets the maximum outside air sensor temperature at which the second stage of zone reheat (on/off reheat stage) can be used. Default: 32.0°F/0.0°C	Range: -40.0°F/-40.0°C to 122.0°F/50.0°C Note: When setting the maximum outside air sensor temperature, press the UP/DOWN arrow keys to change the temperature in 5.0°F/2.5°C increments; press and hold the UP/DOWN arrow keys to change the temperature in 50.0°F/25°C increments.	
BO5 Time⁴	Sets the time base for the reheat output (if used). Default: 0	(1): 10 seconds (six cycles per minute), for various equipment with solid-state relays that withstand short duty cycles such as electric heat. (0): 15 minutes (four cycles per hour), for various equipment with mechanical relays or contactors controlling mechanical reheat systems.	
BO5 cont	Sets the BO5 contact function. Default: N.O.	(N.C.): Energized = Contact Opened; De-Energized = Contact Closed (N.O): Energized = Contact Closed; De-Energized = Contact Opened	
Unocc HT	Sets the Unoccupied Heating setpoint value. Default: 62.0°F/16.5°C	Range: 40.0°F/4.5°C to 90.0°F/32.0°C	Note: When adjusting the temperature, press the UP/DOWN arrow keys to change the temperature in 0.5°F/0.5°C increments; press and hold the UP/DOWN arrow keys to change the temperature in 5.0°F/5.0°C increments.
Unocc CL	Sets the Unoccupied Cooling setpoint value. Default: 80.0°F/26.5°C	Range: 54.0°F/12.0°C to 100.0°F/37.5°C	
St-By HT³	Sets the Standby Heating setpoint value. The value of this parameter should reside between the occupied and unoccupied heating setpoints and ensure that the difference between the standby and occupied value can be recovered in a timely fashion when movement is detected in the zone. Default: 65.0°F/18.5°C Note: This setpoint is used when a motion detector is connected and configured on BI1 or when a PIR sensor cover is used.	Range: 40.0°F/4.5°C to 90.0°F/32.0°C	
St-By CL³	Sets the Standby Cooling setpoint value. The value of this parameter should reside between the occupied and unoccupied cooling setpoints and ensure that the difference between the standby and occupied value can be recovered in a timely fashion when movement is detected in the zone. Default: 75.0°F/24.0°C Note: This setpoint is used when a motion detector is connected and configured on BI1 or when a PIR sensor cover is used.	Range: 54.0°F/12.0°C to 100.0°F/37.5°C	

Table 2: Installer Configuration Menu (Part 4 of 5)

Parameter Appearing on Display	Description and Default	Selection Options	
Set Type	Provides the option of temporarily changing the heating or cooling setpoint by pressing the UP/DOWN arrow keys. Default: permnent	(temporar): Local changes to the heating or cooling setpoints are temporary and remain effective for the specified TOccTime. (permnent): Local changes to the heating or cooling setpoints are permanently stored in the zone controller memory.	
TOccTime	Sets the duration of the Temporary Occupancy Time when the heating or cooling setpoints in the Occupied mode are established by: <ul style="list-style-type: none"> an Override Function enabled in the Main User Menu (when the zone controller is in the Unoccupied mode) a temporary heating or cooling setpoint Default: 2.0 hrs	Range: 0.0 to 12.0 hrs Note: When adjusting the TOccTime, press the UP/DOWN arrow keys to change the time in 1-hour increments; press and hold the UP/DOWN arrow keys to change the time in 10-hour increments.	
Cal RS	Sets the desired room air temperature sensor calibration (offset). The offset can be added to or subtracted from the actual displayed room temperature. Default: 0.0F°/0.0C°	Range: -5.0F°/-2.5C° to 5.0F°/2.5C° adjustable in 1.0F°/0.5C° increments	
Deadband	Sets the minimum deadband between heating and cooling setpoints. Default: 2.0F°/1.0C°	Range: 2.0F°/1.0C° to 5.0F°/2.5C° adjustable in 1.0F°/0.5C° increments	
Heat max	Sets the Occupied, Standby, and Unoccupied maximum Heating setpoint values. Default: 90.0°F/32.0°C	Range: 40.0°F/4.5°C to 90.0°F/32.0°C	Note: When adjusting the temperature, press the UP/DOWN arrow keys to change the temperature in 0.5F°/0.5C° increments; press and hold the UP/DOWN arrow keys to change the temperature in 5.0F°/5.0C° increments.
Cool min	Sets the Occupied, Standby, and Unoccupied minimum Cooling setpoint values. Default: 54.0°F/12.0°C	Range: 54.0°F/12.0°C to 100.0°F/37.5°C	
Min Pos	Sets the minimum position of the zone damper. Default: 10%	Range: 0 to 100%	Note: When adjusting the damper position, press the UP/DOWN arrow keys to change the position in 1% increments; press and hold the UP/DOWN arrow keys to change the position in 10% increments.
Max Pos	Sets the maximum position of the zone damper. Default: 100%	Range: 0 to 100%	
MaxHTPos⁶	Sets the minimum heating position of the zone damper to maximize hot airflow on a call for reheat with cold supply air. Default: 30%	Range: 0 to 100%	

Table 2: Installer Configuration Menu (Part 5 of 5)

Parameter Appearing on Display	Description and Default	Selection Options
PIHT Wei⁷	Sets the weight of the Proportional-Integral (PI) heating demand of a zone, used in the PI heating calculation of the zone controller. Default: 100%	(0%): PI Heating Weight of 0% (25%): PI Heating Weight of 25% (50%): PI Heating Weight of 50% (75%): PI Heating Weight of 75% (100%): PI Heating Weight of 100% Note: A zone that includes a special application (such as a server room, mechanical room, or cafeteria) may affect the average heating demand at the rooftop controller level, resulting in discomfort in other zones. Setting the PI heating weight to 0% eliminates this problem.
PICL Wei⁷	Sets the weight of the PI cooling demand of a zone, used in the PI cooling calculation of the zone controller. Default: 100%	(0%): PI Cooling Weight of 0% (25%): PI Cooling Weight of 25% (50%): PI Cooling Weight of 50% (75%): PI Cooling Weight of 75% (100%): PI Cooling Weight of 100% Note: A zone that includes a special application (such as a server room, mechanical room, or cafeteria) may affect the average cooling demand at the rooftop controller level, resulting in discomfort in other zones. Setting the PI cooling weight to 0% eliminates this problem.

1. **Zone MAC** is the unique device address of the zone controller (from **004** to **127**) on the MS/TP network.
2. **RTC MAC** is the unique device address of the rooftop controller (from **004** to **127**) on the MS/TP network.
3. The standby setpoints are used in the standby mode. The **PIR Func** parameter must be set to **on**, or the **BI1** parameter must be set to either **MotionNO** or **MotionNC** to enable the standby mode.
4. The settings for this parameter are valid only if the analog reheat sequences are enabled.
5. The settings for this parameter can only be enabled if an outside air temperature sensor is connected and ready for operation.
6. The **MaxHTPos** value should never be lower than the **Min Pos** value; likewise, the **MaxHTPos** value should never be higher than the **Max Pos** value.
7. The setting for this parameter does not change the PI demand used locally at the zone controller to maintain the setpoint; instead, it only adjusts the PI demand transferred to the rooftop controller for its highest/average demand calculations.

Sequence of Operation

The sequence of operation is determined by the Johnson Controls TEC2664Z-2 Rooftop Controller mode and the configuration parameters preselected for the zone controller; refer to the *TEC2664Z-2 BACnet MS/TP Rooftop Controller for Stand-Alone and Networked Zoning Systems Installation Instructions* (Part No. 24-9890-684) for more information. See Figure 12 through Figure 21 for sequence of operation examples.

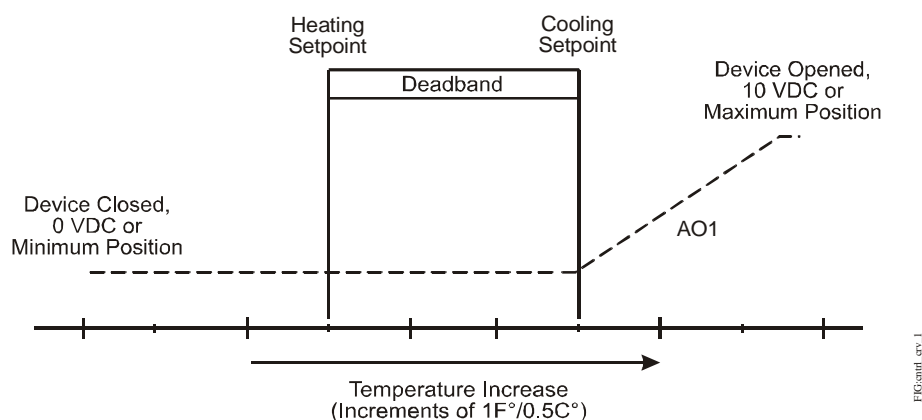


Figure 12: Zone Controller Set for No Reheat, AO2 = 0 VDC and BO5 = Off (Rooftop Controller in Cooling Mode)

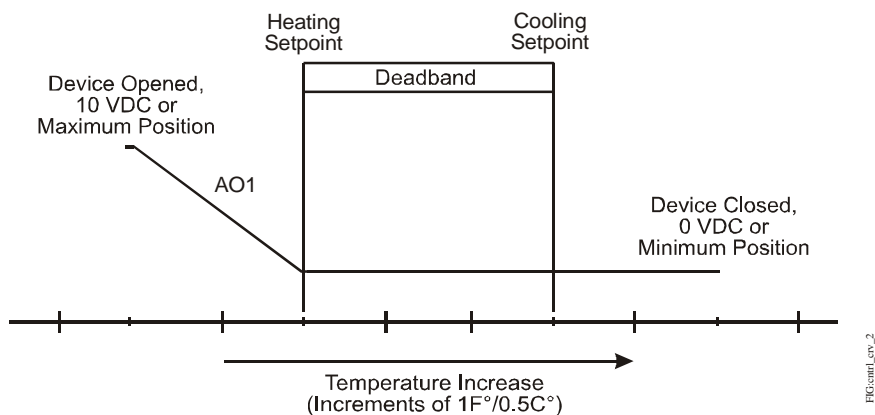
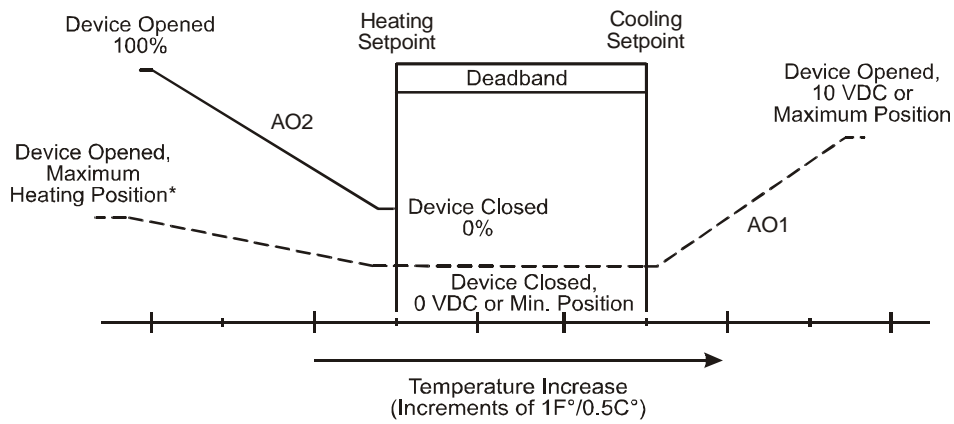


Figure 13: Zone Controller Set for No Reheat, AO2 = 0 VDC and BO5 = Off (Rooftop Controller in Heating Mode)



* If AO2 stage is locked, then AO1 = minimum position.

Figure 14: Zone Controller Set for Analog Duct Reheat Only, BO5 = Off (Rooftop Controller in Cooling Mode)

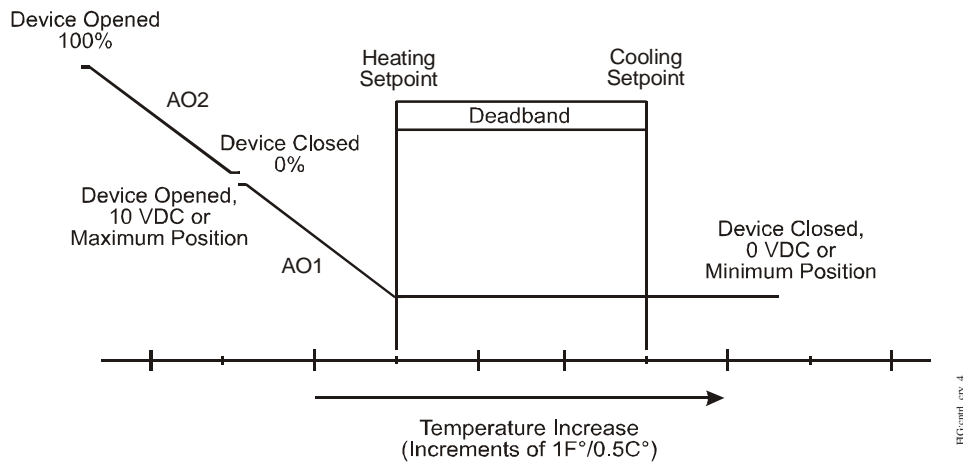
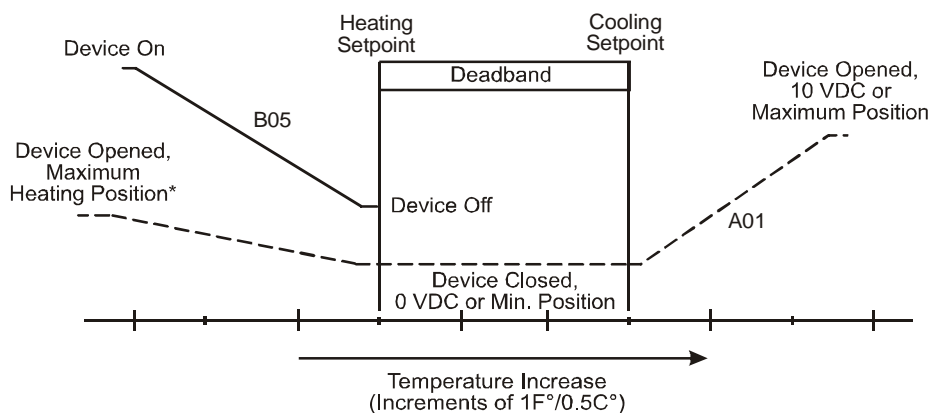
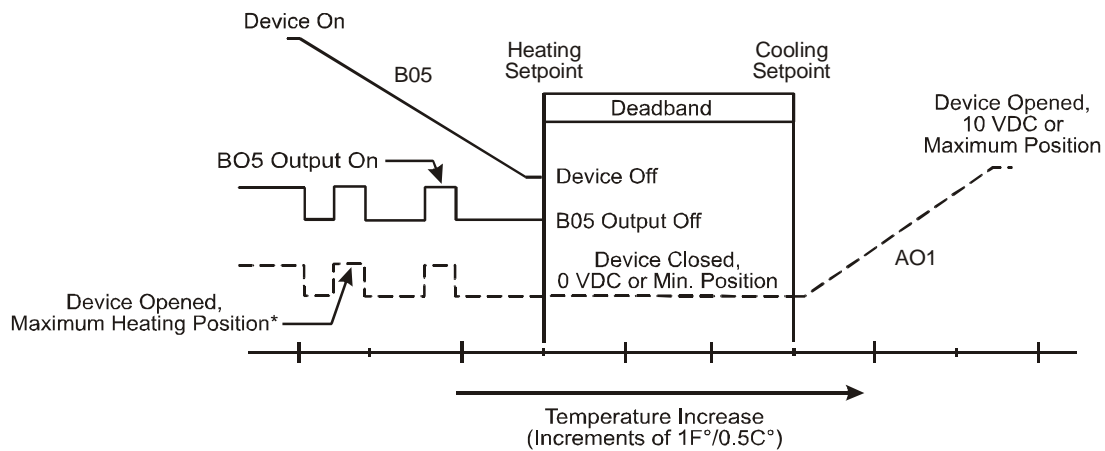


Figure 15: Zone Controller Set for Analog Duct Reheat Only, BO5 = Off (Rooftop Controller in Heating Mode)



* If BO5 stage is locked, then AO1 = minimum position. When BO5 = 0%, AO1 = minimum position; when BO5 = 100%, AO1 = maximum position. Otherwise, AO1 output is proportional to BO5 output.

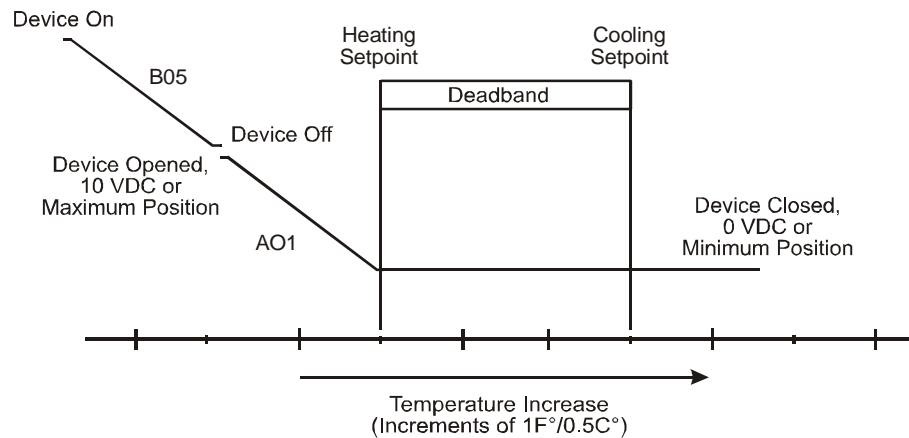
Figure 16: Zone Controller Set for On/Off Duct Reheat Only, AO2 = 0% and On/Off Reheat Time Base = 10 Seconds (Rooftop Controller in Cooling Mode)



* If B05 stage is locked, then AO1 = minimum position. When B05 = off, AO1 = minimum position; when B05 = on, AO1 = maximum position.

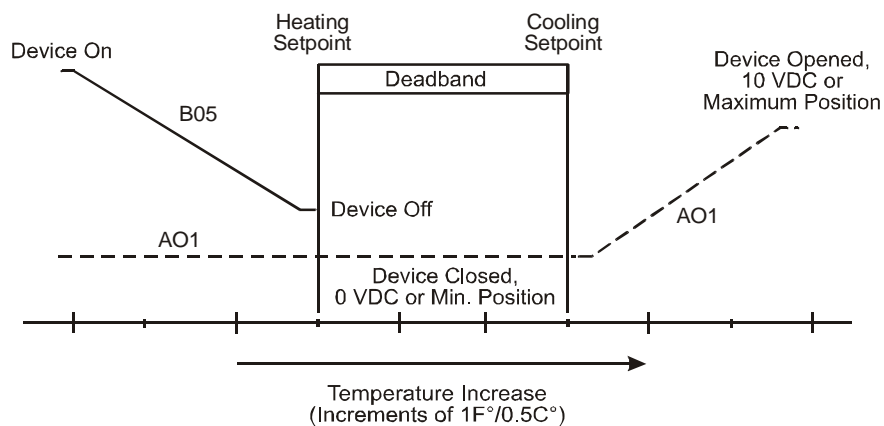
FIGcontLrv_6

**Figure 17: Zone Controller Set for On/Off Duct Reheat Only,
AO2 = 0% and On/Off Reheat Time Base = 15 Minutes
(Rooftop Controller in Cooling Mode)**



FIGcontLrv_7

**Figure 18: Zone Controller Set for On/Off Duct Reheat Only, AO2 = Off
(Rooftop Controller in Heating Mode)**



FIGcontLrv_8

**Figure 19: Zone Controller Set for On/Off Peripheral Reheat Only, AO2 = 0%
(Rooftop Controller in Cooling Mode)**

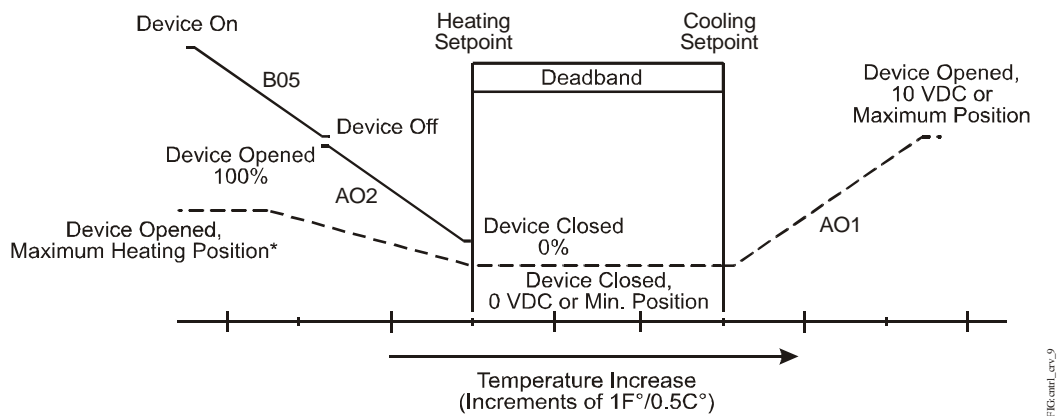


Figure 20: Zone Controller Set for Terminal Reheat on AO2 and Peripheral Heating on BO5 (Rooftop Controller in Cooling Mode)

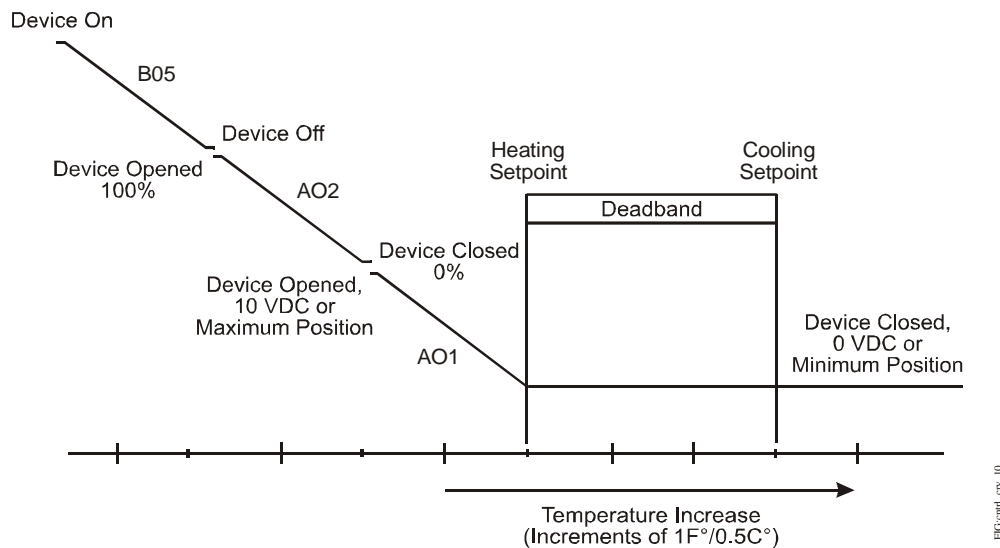


Figure 21: Zone Controller Set for Terminal Reheat on AO2 and Peripheral Heating on BO5 (Rooftop Controller in Heating Mode)

Occupancy Sensor Sequence of Operation

With the PIR cover installed and the PIR function enabled, the device uses the occupancy sensor functions to save energy. The device uses the occupied mode and occupied setpoints for a period of 60 minutes after detecting movement.

If the device detects no movement for more than 60 minutes, it uses the standby setpoints until the device detects new movement or the device receives a network occupancy command (for example, occupied or unoccupied). The network occupancy command has priority over the local PIR devices.

Zoning Control System Components

Table 3: TEC Zoning Control System

Code Number	Description
TEC2647Z-2	Zone Controller for Proportional Zone Damper, On/Off, or Proportional Reheat Control
TEC2647Z-2+PIR	Zone Controller with Occupancy Sensor for Proportional Zone Damper, On/Off, or Proportional Reheat Control
TEC2664Z-2	Rooftop Controller for Control of up to Two Stages of Heating and Two Stages of Cooling in Rooftop, Proportional Bypass Damper, Fan, and Zone Demand Strategies

Accessories

All the accessories in Table 4 include mounting hardware; contact the nearest Johnson Controls representative to order any of these parts.

Note: Review the technical specifications of the accessories prior to their use in an application.

Repair Information

If the TEC2647Z-2 or TEC2647Z-2+PIR Zone Controller fails to operate within its specifications, refer to the *TEC Zoning Control System for Stand-Alone and BACnet MS/TP Networked Applications Technical Bulletin (LIT-12011398)* for troubleshooting details. For a replacement zone controller, contact the nearest Johnson Controls representative.

Table 4: Accessories (Order Separately)

Code Number	Description
SEN-600-1	Remote Inside Air Temperature Sensor
TE-6361M-1¹	Duct Mount Air Temperature Sensor (Metal Enclosure)
TE-6363P-1^{1, 2}	Outside Air Temperature Sensor (Plastic Enclosure)
SEN-600-4	Remote Inside Air Temperature Sensor with Occupancy Override and LED
MS-BACEOL-0	RS485 End-of-Line Terminator
ZOVSD-wwwXhhh	Rectangular damper with a factory-installed Johnson Controls M9104-GGA-3 Electric Actuator for proportional zoning applications. Widths (www) are available from 8 in./20.3 cm (008) to 30 in./76.2 cm (030) in 1 in./2.5 cm increments. Heights (hhh) are available from 6 in./15.2 cm (006) to 30 in./76.2 cm (030) in 1 in./2.5 cm increments. Example: To order a rectangular damper assembly measuring 8 in./20.3 cm wide by 6 in./15.2 cm high, use code number ZOVSD-008X006 .
RZGddPNNO	Round damper with a factory-installed Johnson Controls M9104-GGA-3 Electric Actuator for proportional zoning applications. Diameters (dd) are available from 6 in./15.2 cm (06) to 18 in./45.7 cm (18) in 1 in./2.5 cm increments. Example: To order a round damper assembly measuring 6 in./15.2 cm in diameter, use code number RZG06PNNO .
TEC-7-PIR³	Zone Controller Cover with Occupancy Sensor

1. Additional TE-636xx-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.
2. An outside air temperature sensor is recommended to allow the **H lock** and **C lock** parameters of the rooftop controller to discontinue heating or cooling operation in response to the outside air temperature. If an outside air temperature sensor is not installed, an ambiguous outside air temperature displays on the zone controller unless its **MenuScro** parameter is set to **off**.
3. This cover may replace a non-PIR TEC2647Z-2 cover to use the occupancy sensor capabilities.

Technical Specifications

TEC2647Z-2 and TEC2647Z-2+PIR BACnet MS/TP Zone Controllers for Stand-Alone and Networked Zoning Systems

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)
Analog Output Rating		0 to 10 VDC into 2k ohm Resistance (Minimum)
Auxiliary Output Rating	Triac Output	19 to 30 VAC, 15 mA to 1 A Continuous Current, 3 A Peak In-Rush Current
Binary Inputs		Voltage-Free Contacts across Terminal Scom to Terminals BI1 and BI2
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 NTC Thermistor
Wire Size		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
TEC Zoning Control System Guidelines		31 Zones Maximum per 1 Rooftop Controller
MS/TP Network Guidelines		32 Devices Maximum; 4,000 ft (1,219 m) Maximum Cable Length
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/37.5°C
Accuracy		±0.9°F/±0.5°C at 70.0°F/21.0°C Typical Calibrated
Minimum Deadband		2°F/1°C 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
Shipping Weight	TEC2647Z-2 Models	0.75 lb (0.34 kg)
	TEC2647Z-2+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.



Building Efficiency

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