

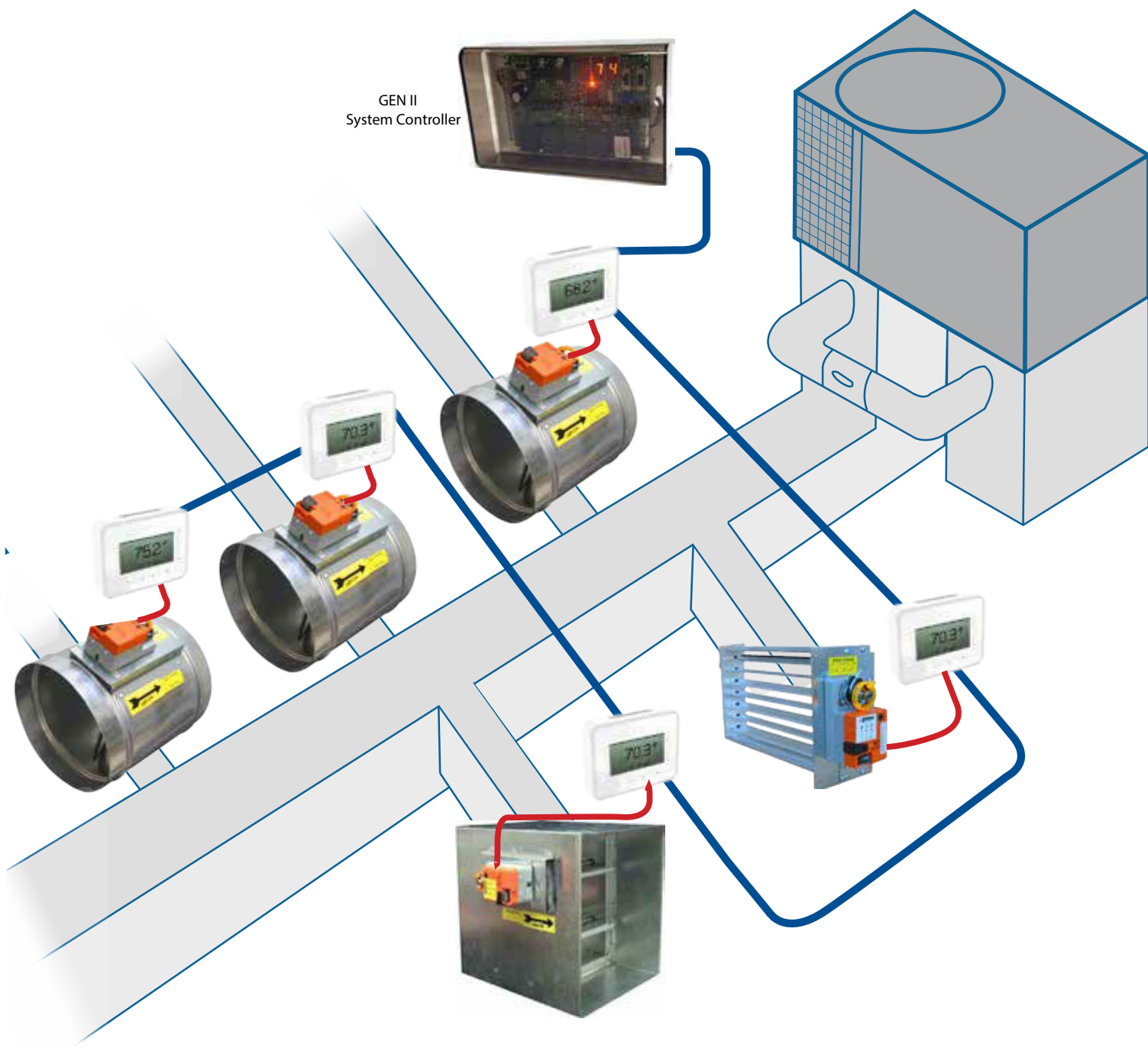
# GEN II-VVT

VOTE BASED AUTO CHANGEOVER VVT

A MODULATING SYSTEM

## COMMERCIAL ZONING - SIMPLIFIED

GEN II  
System Controller



## Installation and Applications Manual

## **GEN II**

### **QUICK START AND COMMISSIONING**

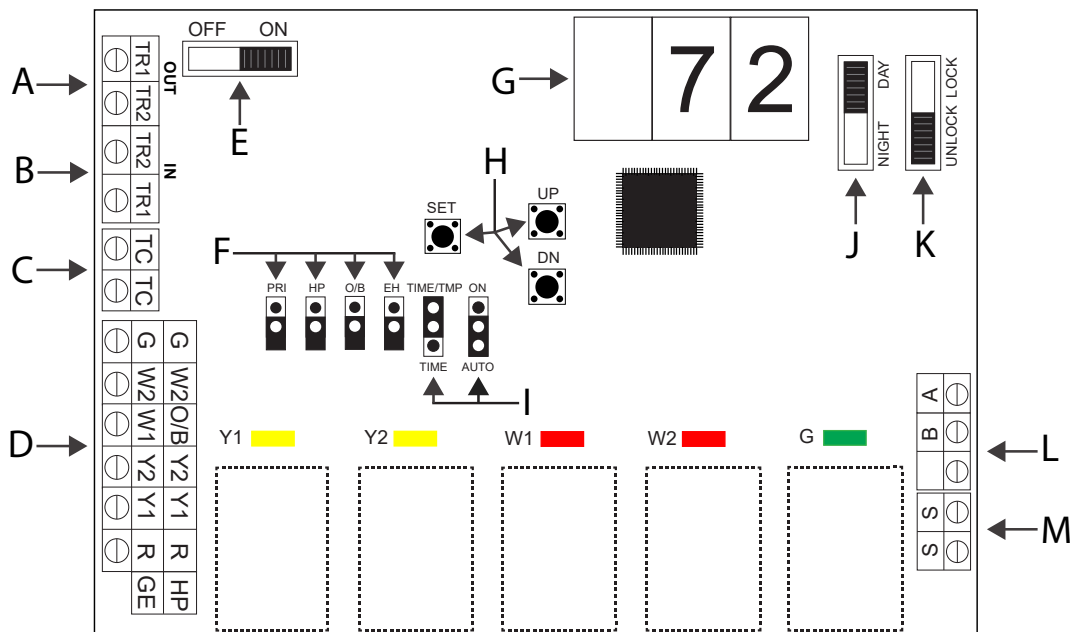
Follow these Quick steps for a successful job  
If you need additional information, please read the GEN II Manual

1. Install GEN II controller in an easily accessible location for your customer.
2. Install an independent 24 volt 40 VA transformer, and connect to the TR1 and TR2 terminals on the GEN II controller.
3. Install the LAT sensor in the supply air, ahead of any bypass takeoffs. Wire sensor to the S S terminals on the GEN II controller.
4. Install Dampers and Bypass Dampers.
5. Install all thermostat sub-bases.
6. Wire TR1 and TR2 terminals from the GEN II controller to the first sub-base TR1 and TR2 - only (18 ga thermostat wire).
7. Wire A & B terminals from GEN II controller using Belden 8740 twisted pair wire or Zonex supplied equal to the first thermostat sub-base A & B - only.
8. Damper wiring - connect RO, RC, MC wires from each thermostat to its damper using 18 ga thermostat wire.
9. Attach the first MODSTAT to it's sub-base.
10. Address the thermostat as #1- see page 11-12 for MODSTAT installation, addressing and operation.
11. Turn on GEN II controller switch "E". Power light should light up and look at the display "G" on the GEN II controller, and the #01 should appear on the display. This indicates you are communicating with the first thermostat.
12. If you don't see the #01 and 00 is displayed, check the address. If the address is #01, then check wires for TR1 & TR2 polarity and A & B for correct connections.
13. If #01 is displayed on the GEN II controller, then daisy chain wires from thermostat #1 to the next thermostat and address it #2; then repeat the ON-OFF switch operation and confirm the #02 shows up on the display indicating the system is now communicating with 2 thermostats.
14. Continue adding MODSTAT's; and confirm communication by repeating the ON-OFF switch operation until all thermostats are wired and the total number of thermostats on the job show up on the display on the GEN II controller.
15. Go to any MODSTAT and make a Cool Call. Look at the GEN II controller and confirm Y1 (yellow LED) and G (green LED) lights are on.
17. Turn OFF the Cool Call to be sure Y1 and G turn OFF at the GEN II controller.
18. Repeat with a Heat Call for W1 (red LED).
19. Wire GEN II controller to the A/C unit.
20. Set thermostat to call for cooling, and check register to be sure each damper opens and closes as you make and satisfy the call.

For Advanced Feature Configuration or additional operating information, review the attached GEN II manual.

## GEN II QUICK START AND COMMISSIONING

### GEN II-VVT



The **GEN II** is equipped with a **Digital Display (G)** that constantly displays **Leaving Air Temperature from the unit**. At startup, this display also reports the number of thermostats communicating with the **GEN II** controller. The display and 3 buttons (**H**) beneath the display provide the installing contractor the ability to tailor the system to your specific application.

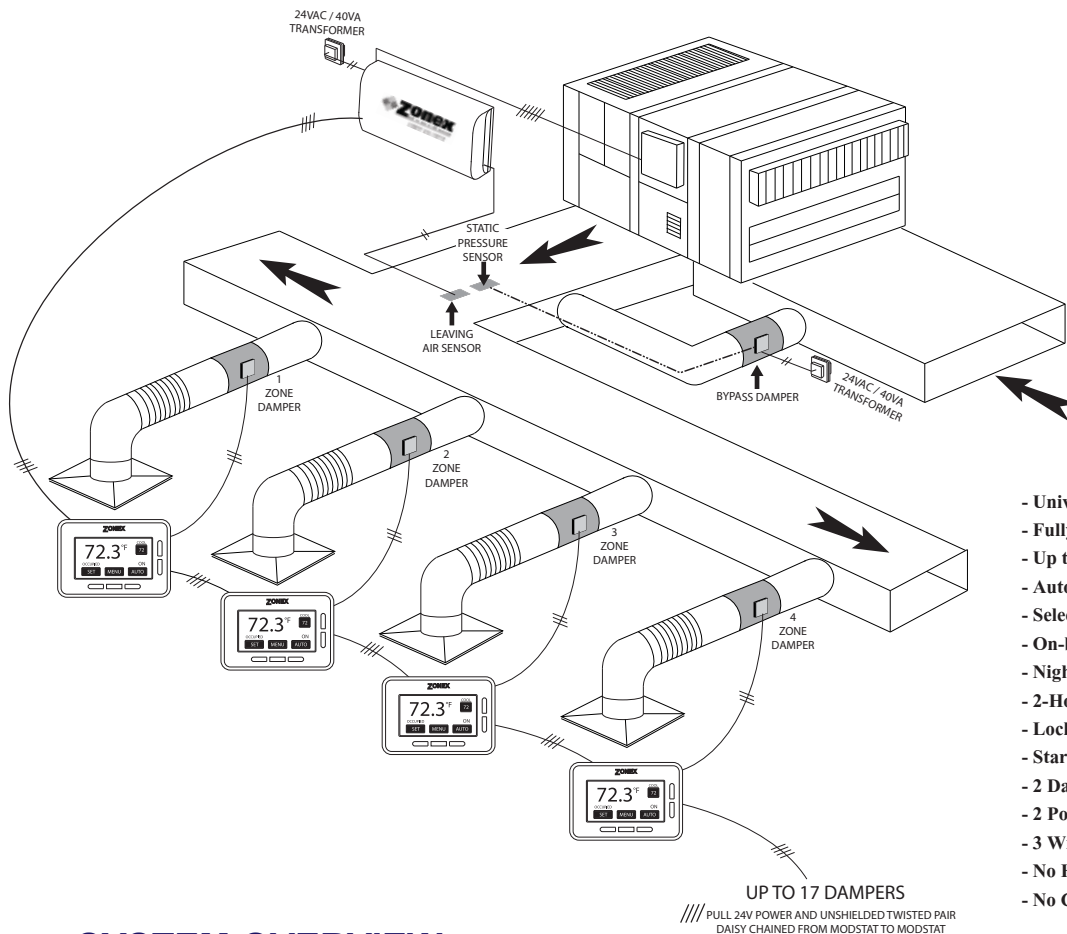
The **GEN II** controller is shipped from the factory configured for basic Gas/Electric operation. However, the following should be checked as part of the initial installation setup procedures:

1. **EH** jumper (**F**) is installed by the factory on one pin for normal gas heat operation where the fan is controlled by the HVAC system fan control. When a fan output is required from the GEN II controller on a call for heat, place the **EH** jumper over both pins for several seconds and then remove. Place the jumper tab on one pin.
2. **O/B** and **HP** jumpers (**F**) should both be on one pin or removed for GE operation.
3. **PRIORITY (PRI)** jumper (**F**) should be on one pin.  
Note: If the Priority opposing zone strategy is to be used, this jumper position will be changed after the initial system start-up is completed.  
See Advanced Feature Configuration on page 25.
4. Set the Power Switch (**E**) to **ON**.
5. Set the **NIGHT DAY** switch (**J**) to the **DAY** position.
6. Set the fan jumper (**I**) to **AUTO** for intermittent operation or **ON** for constant ON operation in the Occupied mode.
7. Place the **LOCK – UNLOCK** switch (**K**) in the UNLOCK position.
8. Place the **TIME/TEMP** jumper (**I**) on the middle and upper pins to control Y2 and W2 staging on run time and supply air temperature.

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## GEN II-VVT



### System Features

- Universal for G/E or H/P Units
- Fully Modulating Zone Dampers
- Up to 17 Zones Per Unit
- Auto- Changeover Operation
- Selectable Priority
- On-board Capacity Control
- Night Setback Included
- 2-Hour Override
- Lock Stats Remotely
- Start Up Diagnostic
- 2 Data Wires
- 2 Power Wires
- 3 Wire Stat to Damper
- No Home Run Wiring
- No Computer Required For Setup

## SYSTEM OVERVIEW

The **GEN II** is a commercial modulating zone control system controlling 2-17 independent zones per unit. The **GEN II** controller is designed for Auto Changeover, multi-stage Heat Pump (2C/3H) and Gas Electric (2C/2H) applications.

The **GEN II** system uses the Zonex ModStat, which modulates and controls the “ST” series, 3-wire, 24-volt, power open / power close round and rectangular dampers.

Sophisticated, integrated software allows for a wide range of system control and changeover strategies, allowing the contractor to tailor the **GEN II** system to your specific application.

Additional features include LED status indication of all system functions, digital LAT display, fully adjustable capacity control with on-board limit settings, and optional staging strategies. Night setback operation is standard, with selectable 2-hour override at each stat, along with a unique feature to remotely lock thermostats in the system.

The system provides the installing contractor with a simple startup diagnostic to minimize wiring errors and speed installation.

**GEN II** is recognized as the Industry’s easiest commercial zone control system to install and wire. The **GEN II** system operates over an unshielded two-wire data link, along with two 24v power wires all daisy chained from stat to stat with no home run wiring required. Three wires from the stat to actuator control a modulating damper in each zone.

The **GEN II** system does not require a computer to set up or operate.

**GEN II** offers the following additional control features:

1. *Set Cooling and Heating capacity cut-out set points*
2. *Adjustable timing to initiate 2<sup>nd</sup> stage operation*
3. *Adjustable opposing call changeover timing*
4. *Priority demand votes on a stat-by-stat basis*
5. *Provide default occupied and unoccupied set points on every stat*
6. *Automatically open all dampers for air balancing*

**GEN II** components:

- **GEN II** controller (includes integrated capacity control)
- Zone thermostats
- Modulating power open / power close 24vac supply dampers
- Modulating power open / power close 24vac bypass damper with static pressure control
- Communication cable (Belden 8740) twisted pair or Zonex supplied equal
- Time Clock
- 24vac 40va transformers: 1 to control system and all supply dampers  
1 for bypass damper and static pressure control

## GENERAL SEQUENCE OF OPERATION

When the GEN II controller is powered up, the total number of addressed thermostats (ModStats) are determined and verified on the display. This confirms the controller is communicating with all thermostats in the system. If there are no active heat or cool calls detected, the supply dampers will modulate to 40% open for ventilation mode. The system blower operation can be configured for constant ON or intermittent Auto. The controllers are shipped from the factory for Auto fan.

The GEN II systems can be field configured for adjustable time based opposing call changeover, vote based majority changeover, or priority vote changeover by thermostat assignment. The GEN II controller is shipped from the factory for 10-minute opposing call changeover. The GEN II controller “polls” the thermostats once per minute to determine the thermostat demand status for heat and cool. The heat and cool changeover functions will operate by the type of changeover selected on the controller. When the GEN II controller changes modes, a 5-minute purge cycle is initiated before the changeover is completed.

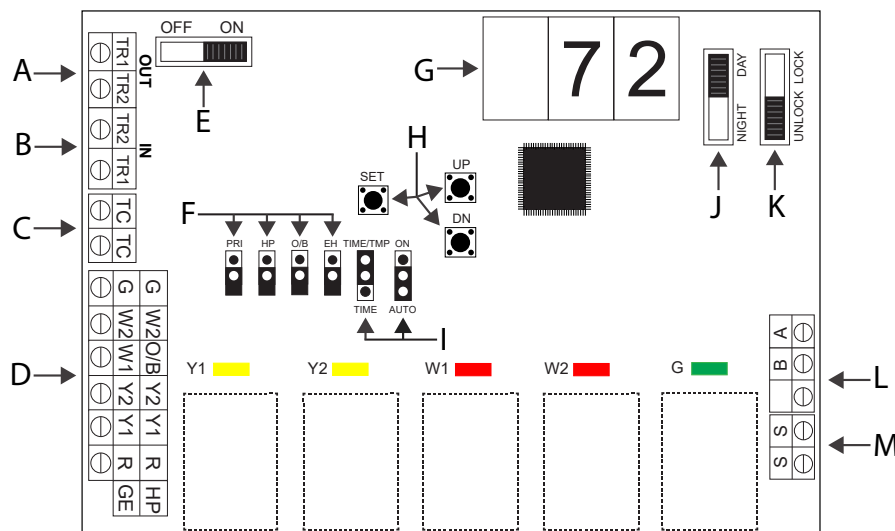
On active heat or cool calls, the non-calling zones will modulate to the closed position. When the last calling zone is satisfied in either heat or cool mode, the GEN II controller terminates the HVAC outputs after the next “poll” and the blower output will be de-energized (unless controller is configured for constant fan) for a 5-minute purge cycle. During the purge cycle no heat or cool calls are recognized.

When the system is in the heating mode and calls for cooling are received, an opposing call timer strategy operates. This timer is adjustable from 10 - 30 minutes. The factory default is 10 minutes. At the end of the selected time period, if the opposing call is 3° away from set point, heating is turned off. After a 5-minute purge mode, Cooling is turned on until the cool call is satisfied. If necessary, GEN II will return to the heating mode. If all calls have been satisfied, dampers will modulate to the 40% open position for ventilation. If the opposing zone strategy is not desired, this feature may be disabled.

This mode may be enhanced by adding Priority votes to each thermostat in the system, thereby weighting certain zones more than others. This Priority mode allows you to select 0, 1, or 2 additional votes for a thermostat that has unusual loads, like a conference room.

Minimum / Maximum damper positions can be set to provide ventilation. Each thermostat has Auxiliary contacts support and control a supplemental heat source i.e., baseboard, reheat, or hot water coil, to meet the temperature requirements of any commercial application.

## GEN II-VVT



### LEGEND

- A** TR1 & TR2 Power out to Modstat TR1 & TR2 (18 ga thermostat wire)
- B** TR1 & TR2 24-Volt Transformer
- C** TC – TC Time Clock Terminals
- D** Unit Terminals
- E** On / Off Switch
- F** *Priority Jumper* (Allows for Priority Vote Setup)  
*H/P Jumper* (Jump for Heat Pump Operation)  
*O/B Jumper* (Heat Pump Only – Reversing Valve Operation)  
*EH Jumper* (Set Up Fan Operation for Electric Heat)
- G** Digital Display (Leaving Air Temperature and configuration)
- H** Up / Down / Set Buttons (High Limit, Low Limit, Set)
- I** *Fan Jumper* (Continuous or Auto)  
*Staging Strategy* (Time / Temperature or Time Only)
- J** Day / Night Switch
- K** Lock / Unlock (Lock Thermostats)
- L** A / B Communications Wire
- M** S S Terminals – Leaving Air Sensor (LAT)

### TERMINAL FUNCTIONS / CONNECTIONS

- TX-A / RX-B** - Data Transmit / Receive
- S S** – Leaving / Supply Air Sensor Input
- G** – Fan Output
- W2** – Stage 2 Heat Output
- W1** – Stage 1 Heat Output
- Y2** – Stage 2 Cool Output
- Y1** – Stage 1 Cool Output
- R** – 24vac from Unit Transformer
- TC / TC** – Time Clock Input for Occupied / Unoccupied Operation
- TR1 / TR2** – 24vac Power Input / Common
- TR1 / TR2** - Stat Power Daisy Chain Stat to Stat (18GA Thermostat wire)

## General Installation Instructions

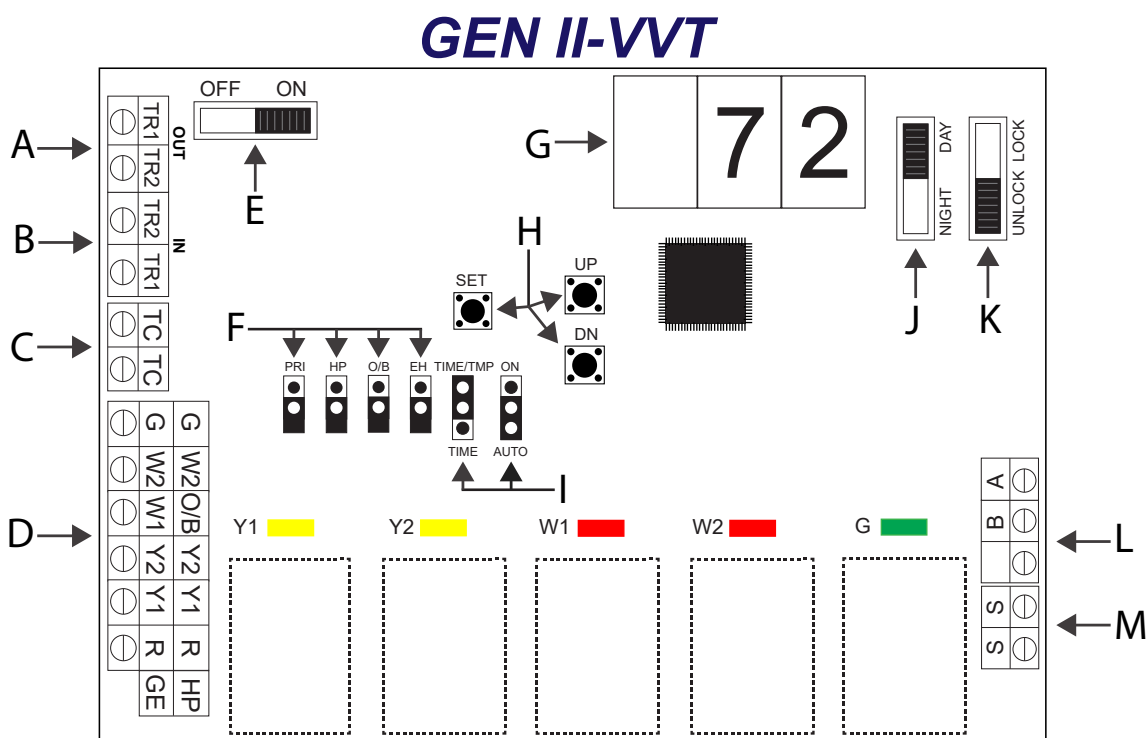
### GEN II Controller

1. Install the **GEN II** controller on an interior wall where the ambient temperature is between 32°-120°F (0°- 48°C) non-condensing. This controller is to be installed in an accessible interior area; not in attics or above ceilings.
2. The controller is to be powered by a **dedicated** 24vac 40va transformer. The transformer secondary is wired to **TR1 TR2** on the controller (**B**). The secondary voltage to the controller must be 24 to 28vac.

3. Install the leaving air sensor (LAT) in the supply air, ahead of the bypass take-off. Sensor wires are connected to the **S S** terminals on the controller (**M**). The LAT sensor leads may be extended using standard 18/2 thermostat wire.
4. The leaving air sensor (LAT) is calibrated to the controller at the factory. However, the calibration should be checked as part of the system setup procedure. If adjustments are required, use the Blue potentiometer labeled R44 located in the upper right hand corner of the **GEN II** controller. Screw the pot clockwise to lower the display temperature and counter - clockwise to raise the temperature. **NOTE:** The display will update every 10 seconds.
5. Confirm you have connected the **A** and **B** communication wires and **TR1** and **TR2** from the thermostats to the Gen II controller (**A & L**, A=(TR1, TR2), L=(A, B). (Communication wire maximum is 4,000 ft. from the Gen II controller to the farthest Modstat).
6. Connect the output wires from the controller to the HVAC system using standard 18 GA thermostat wire.

The LAT sensor leads may be extended using standard 18/2 thermostat wire.

## Gas Electric - Basic GEN II Controller Configuration



The **GEN II** is equipped with a **Digital Display (G)** that **constantly displays Leaving Air Temperature from the unit**. The display and 3 buttons beneath the display provide the installing contractor the ability to tailor the system to your specific application.

The **GEN II** controller is shipped from the factory configured for basic Gas/Electric operation. However, the following should be checked as part of the initial installation setup procedures:

1. **EH jumper (F)** is installed by the factory on one pin for normal gas heat operation where the fan is controlled by the HVAC system fan control. When a fan output is required from the GEN II controller on a call for heat, place the **EH** jumper over both pins for several seconds and then remove. Place the jumper tab on one pin.

2. **O/B** and **HP** jumpers (**F**) should both be on one pin or removed, for GE operation.
3. **PRIORITY** jumper (**F**) should be on one pin.  
Note: If the Priority opposing call strategy is to be used, this jumper position will be changed after the initial system start-up is completed.  
See Advanced Feature Configuration.
4. Set the power switch (**E**) to **ON**.
5. Set the **NIGHT DAY** switch (**J**) to the **DAY** position.
6. Set the fan jumper (**I**) to **AUTO** for intermittent operation or **ON** for constant ON operation in the Occupied mode.
7. Place the **LOCK – UNLOCK** switch (**K**) in the UNLOCK position.
8. Place the **TIME/TEMP** jumper (**I**) on the middle and upper pins to control Y2 and W2 staging on run time and supply air temperature.

## GEN II Gas Electric Advanced Feature Configuration

### Gas Electric Capacity Control - Cool and Heat cut-out temperature adjust

The factory setting for the Cool and Heat cut-out temperatures is 45° - 145°F (7° - 62°C). This can be easily changed with the following procedure:

1. **Cool cut-out temp** – Press the DN button (**H**); “C” will be displayed and then the cut-out temperature.
2. **LOWER** – Press the DN button; after the “C” is displayed, continue to hold the DN button until the desired temperature is displayed; then release.  
NOTE: The controller will not change the Cool cut-out lower than 40°F (4°C).
3. **RAISE** – Press the DN button; after “C” is displayed, immediately release the DN button and press the UP button. Hold until the desired temperature reading is displayed and release.
4. Press the DN button to verify the new cool cut-out temperature.

**Heat cut-out temperature** - Press and hold the UP button; after the “H” is displayed, use the same procedure as above to raise or lower the displayed temperature.

### Electric Heat - Fan Configuration

**EH** jumper (**F**) is installed by the factory on one pin for normal gas heat operation where the fan is controlled by the HVAC system fan control. When a fan output is required from the **GEN II** controller on a call for heat, place the **EH** jumper over both pins for several seconds and then remove. Place the jumper tab on one pin.

### 2nd Stage Heat and Cool Cut-in / Cut-out Configuration

The GEN II controller is set up at the factory to stage Y2 and W2 cut-in operation based on a 3-minute time delay and supply air temperature. This is done using the TIME/TEMP (I) jumper. Time may be field configured from 3-20 minutes by the contractor during system configuration. The cut-in temperatures are fixed in the controller program at 58°F (14°C) and higher for Y2 and 120°F (48°C) and lower for W2. The GEN II controller second stage cut-out temperature is fixed in the controller program at 50°F (10°C). Y2 will de-energize when it drops below 50°F and re-energize when it rises above 58°F. If the air temperature drops below the low cut-out (45°F) Y1 and Y2 are de-energized and the controller will go into a 5 minute purge mode. After 5 minute purge, if the temperature has risen above the low cut-out Y1 is re-energized. Heat W1 and W2 will de-energize if leaving air temperature rises above heat cutout and will be locked out for 5 minutes. After 5 minute lockout, if a heat call remains and leaving air temperature is lower than heat cutout, W1 will re-energize. By placing jumper on bottom two pins, a time only strategy may be configured into the system. ( see below);

### Adjust 2<sup>nd</sup> Stage Cut-in Time Delay

1. To increase the Y2 and W2 cut-in delay, press and hold the SET and DN buttons (**H**) simultaneously. When 03 appears in the display, release the buttons and immediately press the UP button and hold until the desired delay time is displayed, and release. The time delay is fully adjustable from 3 - 20 minutes. To verify the change, press and hold the SET and DN buttons simultaneously until the delay time is shown, and release.

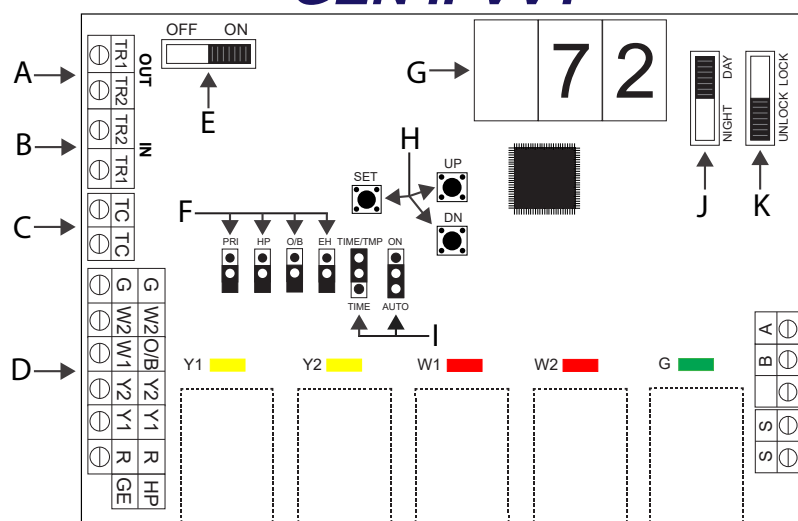
2. To decrease the Y2 and W2 cut-in delay, press and hold the SET and DN buttons (**H**) simultaneously. When delay time appears in the display, release the buttons and immediately press the DN button and hold until the desired delay time is displayed, and release. To verify the change, press and hold the SET and DN buttons until the delay time is shown, and release.

## Configure 2<sup>nd</sup> Stage Cut-in for Time Delay and Thermostat Demand Only

1. Place the 2<sup>nd</sup> stage configuration jumper (**I**) on the middle and lower pins - TIME.
2. If the cut-in time delay must be changed from the factory setting of 03 (3 min), follow the above procedures to raise or lower the time delay value.
3. Verify time delay value by pressing the SET and DN buttons simultaneously.

## HEAT PUMP OPERATION

### GEN II-VVT



### LEGEND

- A** TR1 & TR2 Power out to Modstat TR1 & TR2 (18 ga thermostat wire)
- B** TR1 & TR2 24-Volt Transformer
- C** TC – TC Time Clock Terminals
- D** Unit Terminals
- E** On / Off Switch
- F** *Priority Jumper* (Allows for Priority Vote Setup)  
*H/P Jumper* (Jump for Heat Pump Operation)  
*O/B Jumper* (Heat Pump Only – Reversing Valve Operation)  
*EH Jumper* (Set Up Fan Operation for Electric Heat)
- G** Digital Display (Leaving Air Temperature and configuration)
- H** Up / Down / Set Buttons (High Limit, Low Limit, Set)
- I** *Fan Jumper* (Continuous or Auto)  
*Staging Strategy* (Time / Temperature or Time Only)
- J** Day / Night Switch
- K** Lock / Unlock (Lock Thermostats)
- L** A / B Communications Wire
- M** S S Terminals – Leaving Air Sensor (LAT)

### TERMINAL FUNCTIONS / CONNECTIONS

- TX-A / RX-B - Data Transmit / Receive
- S S – Leaving / Supply Air Sensor Input
- G – Fan Output
- W2 – Auxiliary / Emergency Heat
- O/B – Reversing Valve Output
- Y2 – Stage 2 Cool Output
- Y1 – Stage 1 Cool Output
- R – 24vac from Unit Transformer
- TC / TC – Time Clock Input for Occupied / Unoccupied Operation
- TR1 / TR2 – 24vac Power Input / Common
- TR1 / TR2 - Stat Power Daisy Chain Stat to Stat (18GA Thermostat wire)

## General Installation Instructions

### **GEN II Controller**

1. Install the **GEN II** controller on an interior wall where the ambient temperature is between 32°-120°F (0°- 48°C) non-condensing. This controller is to be installed in an accessible interior area; not in attics or above ceilings.
2. The controller is to be powered by a **dedicated** 24vac 40va transformer.  
The transformer secondary is wired to **TR1 TR2** on the controller (**B**).  
The secondary voltage to the controller must be 24 to 28vac.
3. Install the LAT air sensor in the supply air between the indoor coil and electric strip heat elements.
4. The leaving air sensor (LAT) is calibrated to the controller at the factory. However, the calibration should be checked as part of the system setup procedures. If adjustments are required, use the Blue potentiometer labeled R44 located in the upper left hand corner of the **GEN II** controller. Screw the pot clockwise to lower the display temperature and counter - clockwise to raise the temperature. **NOTE:** The display will update every 10 seconds.
5. Confirm you have connected the **A** and **B** communication wires and **TR1** and **TR2** from the thermostats to the Gen II controller (**A & L**), A=(TR1, TR2), L=(A, B). (Communication wire maximum is 4,000 ft. from the Gen II controller to the farthest Modstat).
6. Connect the output wires from the controller to the HVAC system using standard 18 GA thermostat wire.

The LAT sensor leads may be extended using standard 18/2 thermostat wire.

### Heat Pump operation “O” reversing valve

Cool Call – When a majority active cool call is received by the **GEN II** controller, Y1, O/B and G LEDs are illuminated; and the outputs are energized (within 1.5 to 3 minutes). After 3 minutes, if the leaving air temperature is 58°F (14°C) or above, Y2 will energize for 2-stage systems. Y2 will de-energize when it drops below 50°F and re-energize when it rises above 58°F. If the supply air temperature drops one degree below the Cool cut-out temperature, Y1 and Y2 will de-energize for 5 minutes.

“B” reversing valve – Sequence of operation is the same: O/B is energized in the heat mode.

Heat Call - When a majority active heat call is received by the **GEN II** controller, Y1 and G LEDs are illuminated; and the outputs are energized (within 1.5 to 3 minutes). If after 3 minutes the leaving air temperature is 94°F (34°C) or less, Y2 will energize. If after 6 minutes of run time the leaving air temperature is 91°F (32°C) or less, W2 will energize. If the supply air temperature exceeds 126°F (52°C), Y1, Y2 and W2 (if energized) will drop out; and Y1 can then energize after a 5-minute time delay. **NOTE:** If the system fan is configured for “AUTO” on the **GEN II** controller, the “G” output will be de-energized in the temperature cut-out mode.

When the last active call satisfies, the **GEN II** controller goes into a 5-minute purge cycle with all supply dampers closing; then all dampers modulate open for ventilation.

### Heat Pump operation “B” reversing valve

By placing the O/B jumper (B) on both pins, the **GEN II** controller is configured for “B” reversing valve operation. The operation and setup procedures are the same as with “O” mode reversing valve, except the reversing valve will be energized for heat operation.



## GEN II Heat Pump Basic Configuration

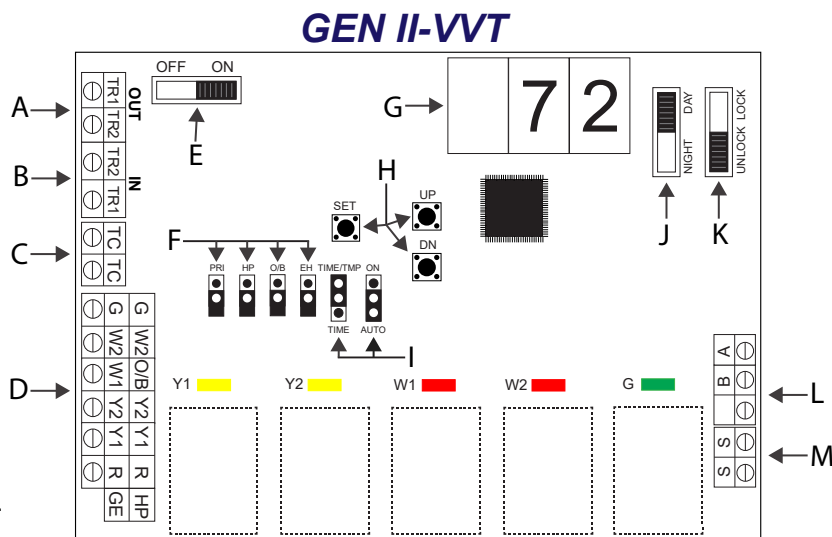
The **GEN II** controller is shipped from the factory for Gas Electric operation.

The controller must be field configured for Heat Pump operation.

Heat Pump configuration:

1. Switch controller to OFF (**E**).
2. Set the O/B jumper (**F**) on one pin for "O" reversing valve (energizes for cool) *or* Set the O/B jumper (**F**) on both pins for "B" reversing valve (energizes for heat).
3. Set the HP jumper (**F**) on both pins for Heat Pump operation.
4. Set the Priority jumper (**F**) on one pin.
5. Set the TIME / TEMP jumper (**I**) on the middle and upper pins.
6. Set NIGHT / DAY switch (**J**) for DAY position.
7. Set LOCK / UNLOCK switch (**K**) to UNLOCK.
8. Switch the controller to ON (**E**).
9. Press the UP button (**H**), and verify the "H" (cut-out) temperature reads 126°F (52°C) on the controller display (**G**).

NOTE: The heat cut-out temperature must not be changed from the factory setting.



## GEN II Heat Pump Advanced Feature Configuration

### Heat Pump Capacity Control - Cool and Heat cut-out temperature adjustment

When the **GEN II** controller is configured for Heat Pump (HP jumper **(F)** on both pins), the Cool and Heat cut-out temperatures are 45°- 126°F (7°- 52°C). The cut-out temperatures can be changed with the following procedure:

**Heat cut-out temp** – To eliminate the possibility of the Heat Pump tripping out on high head pressure or short cycling in the heat mode, the heat cut-out temperature should never be changed from the factory setting of 126°F (52°C).

1. **Cool cut-out temp** – Press the DN button **(H)**; “C” will be displayed, then the cut-out temperature.
2. **LOWER** – Press the DN button. After the “C” is displayed, continue to hold the DN button until the desired temperature is displayed; then release.  
 NOTE: The controller will not change the Cool cut-out lower than 40°F (4°C).
3. **RAISE** – Press the DN button. After “C” is displayed, immediately release the DN button, and press the UP button. Hold until the desired temperature reading is displayed; then release.
4. Press the DN button to verify the new cool cut-out temperature.

### 2nd Stage Heat and Cool Cut-in / Cut-out Configuration

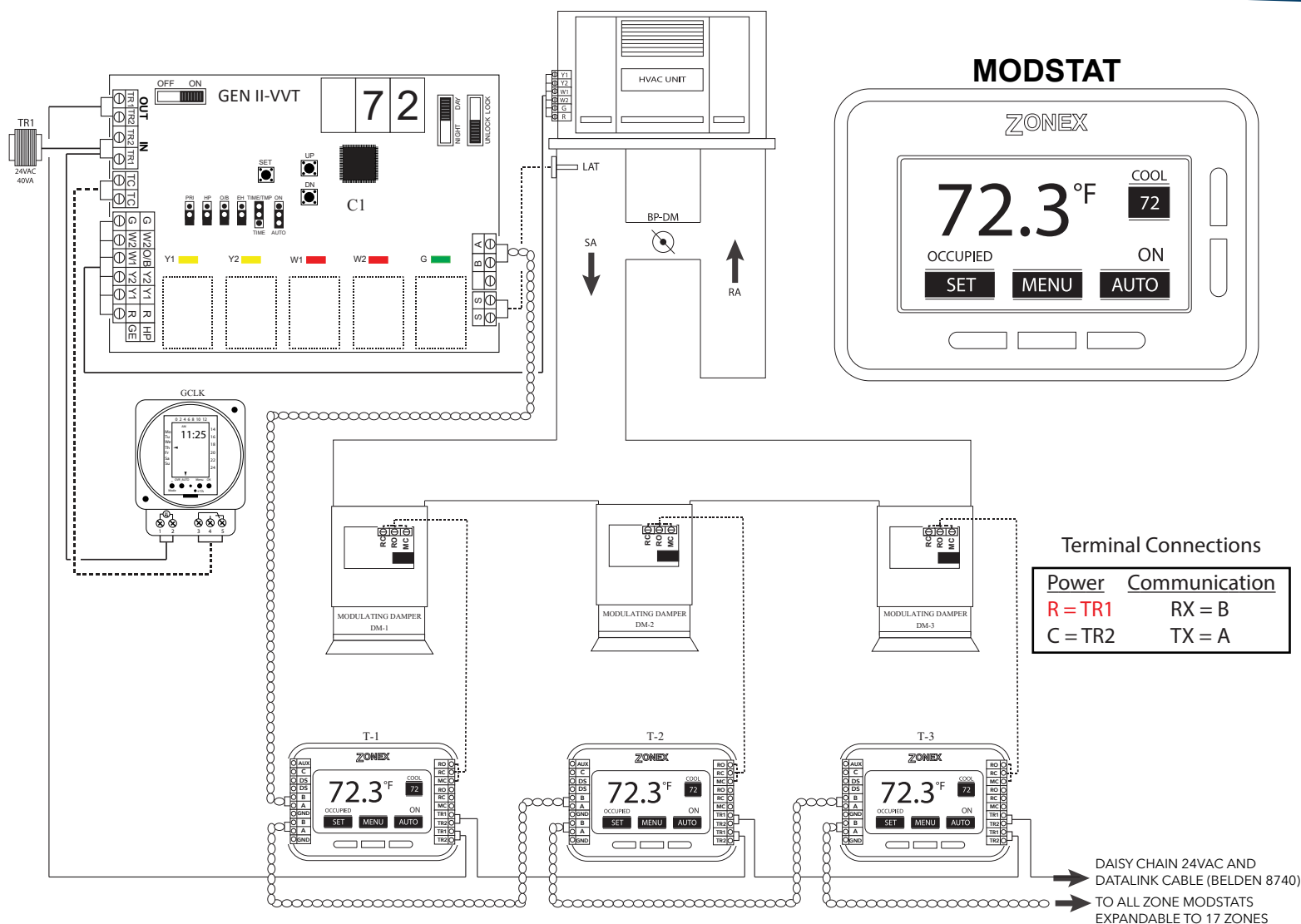
The GEN II controller is set up at the factory to stage Y2 and W2 cut-in operation based on a 3-minute time delay and supply air temperature. This is done using the TIME/TEMP (I) jumper. Time may be field configured from 3-20 minutes by the contractor during system configuration. The cut-in temperatures are fixed in the controller program at 58°F (14°C) and higher for Y2 and 120°F (48°C) and lower for W2. The GEN II controller second stage cut-out temperature is fixed in the controller program at 50°F (10°C). Y2 will de-energize when it drops below 50°F and re-energize when it rises above 58°F. If the air temperature drops below the low cut-out (45°F) Y1 and Y2 are de-energized and the controller will go into a 5 minute purge mode. After 5 minute purge, if the temperature has risen above the low cut-out Y1 is re-energized. Heat W1 and W2 will de-energize if leaving air temperature rises above heat cutout and will be locked out for 5 minutes. After 5 minute lockout, if a heat call remains and leaving air temperature is lower than heat cutout, W1 will re-energize. By placing jumper on bottom two pins, a time only strategy may be configured into the system. ( see below);

### Adjust 2<sup>nd</sup> Stage Cut-in Time Delay

1. To increase the Y2 and W2 cut-in delay, press and hold the SET and DN buttons **(H)** simultaneously. When 03 appears in the display, release the buttons and immediately press the UP button and hold until the desired delay time is displayed, and release. The time delay is fully adjustable from 3 - 20 minutes. To verify the change, press and hold the SET and DN buttons simultaneously until the delay time is shown, and release.
2. To decrease the Y2 and W2 cut-in delay, press and hold the SET and DN buttons **(H)** simultaneously. When delay time appears in the display, release the buttons and immediately press the DN button and hold until the desired delay time is displayed, and release. To verify the change, press and hold the SET and DN buttons until the delay time is shown, and release.

### Configure Y2 and W2 Cut-in for Time Delay and Thermostat Demand Only

1. Place the 2<sup>nd</sup> stage configuration jumper **(I)** on the middle and lower pins - **TIME**.
2. If the Y2 cut-in time delay must be changed from the factory setting of 03 (3 min), follow the above procedures to raise or lower the time delay value.  
**NOTE:** The cut-in delay timing for W2 (Aux Heat) is set for approximately 3 minutes in the control program and cannot be manually changed.
3. Verify time delay value by pressing the SET and DN buttons simultaneously.



## Installation

### Wiring

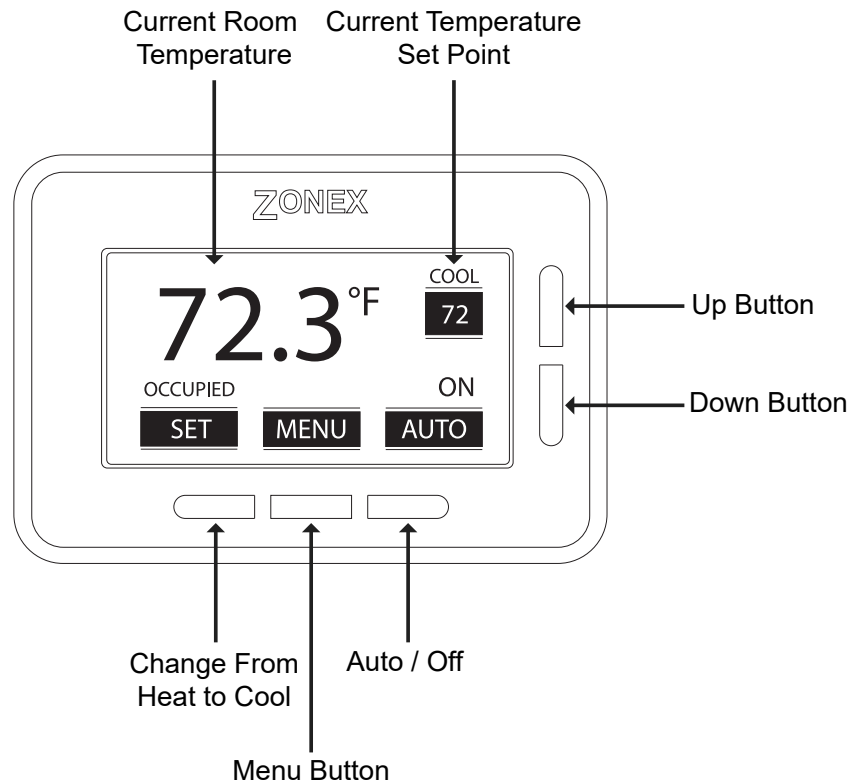
All 24-volt and communication wiring connections are made to terminal blocks on the thermostat sub-base. The communication terminal block (A/B / A/B) is designed as a junction for two sets of 22 ga tinned copper, twisted pair communications cable. The cable should be daisy chained from thermostat to thermostat (use Belden 8740 or Zonex supplied equal).

1. Install the thermostat sub-base on an interior wall away from direct sunlight, supply air currents, or any heat generating source. Mounting screws and anchors are provided. The sub-base may be installed on a horizontal 2x4 electrical box.
2. Connect the control wires from the Modstat's TR1 & TR2, to the **GEN II** controller TR1 & TR2 (A). Verify TR1 & TR2 polarity is the same on each thermostat (18 ga Thermostat wire)
3. On the ModStat, connect the damper output wires from MC, RC and RO to the actuator motor terminals.
4. Connect the A / B communication wires on the left hand terminal block; there are 2 sets of A / B terminals to make the daisy chain wiring easier.  
**NOTE: The communication wire must be twisted pair Belden 8740, 8450 (shielded), 82442 (plenum rated) or Zonex supplied equal.**

## Addressing Zone Thermostats

Every thermostat in the system needs a unique ID ranging from 1-17. They must be in numerical order the way the communication wire is daisy chained. Confirm no duplicate addresses.

1. To access the **Thermostat Configuration Menu**, hold “**MENU**” button followed by the “**AUTO**” button.
2. Once in the Thermostat Configuration Menu, press **SELECT** on **A. SET STAT ID**.
3. Use the **UP** and **DOWN** buttons to give the zone thermostat an ID ranging from 1-17.
4. Press **SAVE** to save ID setting.



## Display Temperature Calibration

Thermostats are calibrated at the factory and should require no further adjustment. However, the display space temperature may be field calibrated by the following procedure:

1. Access the **Thermostat Configuration Menu**, hold “**MENU**” button followed by the “**AUTO**” button.
2. Once in the Thermostat Configuration Menu, press **SELECT** on **B. CALIBRATE**.
3. Use the **UP** and **DOWN** buttons to adjust the temperature.
4. Press **EXIT** to save the temperature changes.

## Adjusting Set Points

The Heat or Cool set points can be displayed by pressing the **SET** button; the set point will be indicated on the upper right of the display.

The Heat and Cool set points can be individually set for the Occupied and Unoccupied modes.

**Occupied Mode:** Heat and Cool settings - Functions with (J) in the DAY position, or time clock in Occupied.

**Unoccupied Mode:** Heat and Cool settings - Functions with (J) in the NIGHT position, or time clock in Unoccupied.

**Heat** - If "Heat Setting" is displayed on the top right of the display, simply press the UP or DOWN button to change the heat set point. If "Cool Setting" is displayed and you want to change the Heat set point, press the SET button to change from "Cool Setting" to "Heat Setting". Then press the UP or DOWN button to change the set point.

**Cool** - If "Cool Setting" is displayed on the top right of the display, simply press the UP or DOWN button to change the cool set point. If "Heat Setting" is displayed and you want to change the Cool set point, press the SET button to change from "Heat Setting" to "Cool Setting". Then press the UP or DOWN button to change the set point.

## **Changing Mode**

The thermostats are auto changeover, but specific modes may be selected. Auto mode is the default.

**System Off** - Press and hold the Auto button for 10 seconds the **AUTO** will change to **OFF**.

**System Auto** - Press and hold the Off button for 10 seconds the **OFF** will change to **AUTO**.

### **Override Operation**

When the thermostat displays "**UNOCCUPIED**", a 2-hour temporary override may be initiated by pressing the **AUTO** button. When additional override time is required, press the **AUTO** button again.

### **Auxiliary Heat / Reheat**

The zone thermostat provides Auxiliary Heat options; Baseboard, Baseboard W1 and Reheat options are configured using the menu screen on the thermostat. When zone temperature drops 2 degrees below heat set point, auxiliary heat operations are energized. If configured for Reheat operation when zone temperature drops 2 degrees below thermostat set point, damper will modulate to approximately 40% open providing air flow over electric heat strips, the AUX terminal will energize and strip heat will provide reheat.

**Note: When using electric strip heater, an airflow switch is required to prove airflow for safe operation.**

If the Thermostat is configured for Baseboard heat operation, auxiliary output will energize at 2 degrees below heat set point. Auxiliary operations will remain energized until heat call is satisfied.

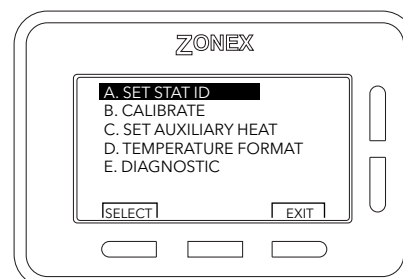
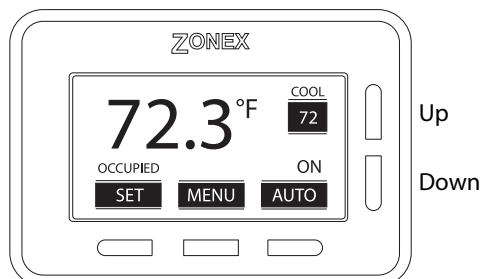
If you desire the Auxiliary heat to energize before the unit heat, you will want to configure the thermostat for Baseboard W1 heat operation auxiliary output energizes first at 1 degree below set point and at 2 degrees below set point, the unit heater will energize and remain energized until the heat call is satisfied.

## THERMOSTAT CONFIGURATION MENU

To access the Thermostat Configuration Menu, hold "MENU" button followed by the "AUTO" button.

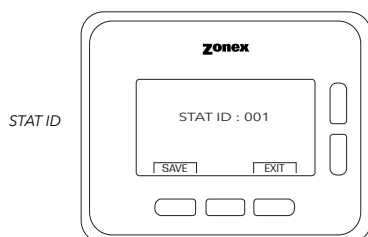
The **THERMOSTAT CONFIGURATION MENU** allows you to:

- A. Set stat ID
- B. Calibrate
- C. Set Auxiliary Heat
- D. Temperature Format
- E. Diagnostic



### A SET STAT ID

Every thermostat in the system needs a unique ID. They must be in numerical order the way the communication wire is daisy chained. Confirm no duplicate addresses.



While in the Thermostat Configuration Menu, press **Select** on **A. SET STAT ID**.

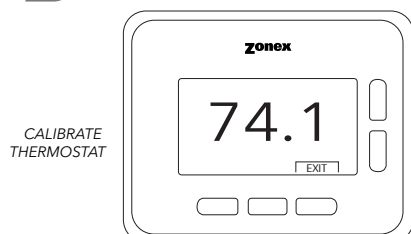
Use the **Up** and **Down** buttons to give the thermostat an ID ranging from 1-17.

Press **Exit** to return to the Thermostat Configuration Menu.

Press **Save** to save settings.

### B CALIBRATE

Thermostat is equipped with an accurate temperature sensor. If you require field calibration, follow the steps below.



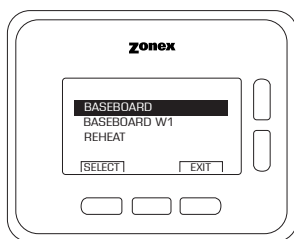
While in the Thermostat Configuration Menu, press **Down** and press **Select** on **B. CALIBRATE**





Use the **Up** and **Down** buttons to calibrate the temperature display with your external temperature probe; press **EXIT** to save changes.

Confirm temperature display now reports the updated room temperature you provided.

## C SET AUXILIARY HEAT

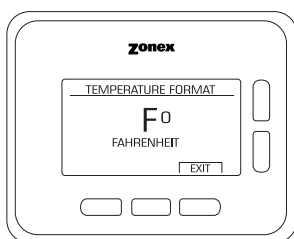
SET AUXILIARY HEAT





Access the **Zone Setup Menu** select item **C. SET AUXILIARY HEAT** press  **Select**. Select BASEBOARD, BASEBOARD W1 or REHEAT using the  **Up** and  **Down** buttons. Then press  **Select** and enter the temperature range you would like to energize base board or reheat.

## D TEMPERATURE FORMAT



TEMPERATURE FORMAT  
SAVE SETTINGS



The MODSTAT may be configured for F° or C° operation. From the Thermostat Configuration menu toggle the UP or DOWN button to highlight TEMPERATURE FORMAT. When desired temperature format is displayed press SAVE.

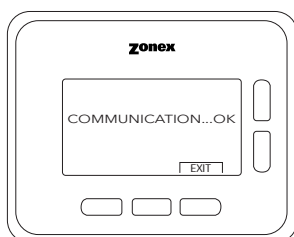
While in Thermostat Configuration Menu, press  **Down** and press  **Select** on **D. TEMPERATURE FORMAT** menu item.

Toggle  **Up** and  **Down** to set the desired Temperature Format.



Press  **Exit** to return to the Thermostat Configuration Menu. Press  **Save** to save the settings.

## E DIAGNOSTIC

DIAGNOSTIC



The MODSTAT Diagnostic screen will allow you to confirm communication with the GEN II controller.

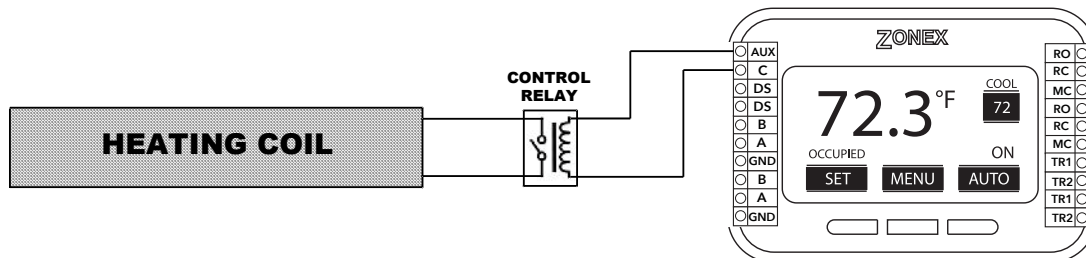
While in Thermostat Configuration Menu, press  **Down** and press  **Select** on **E. DIAGNOSTIC** menu item.

Press  **Exit** to return to the Thermostat Configuration Menu.



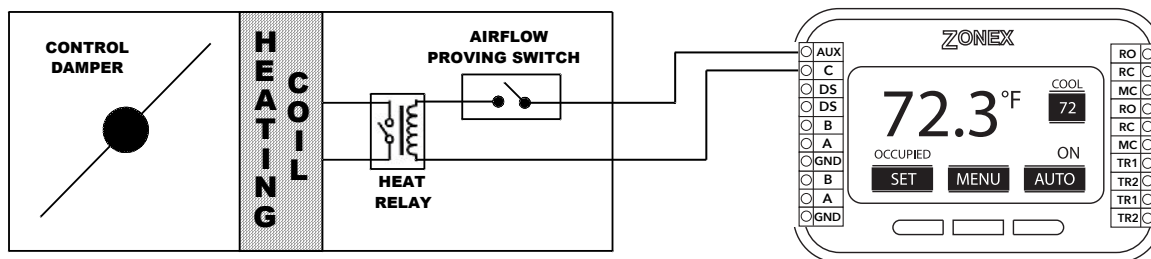
## BASEBOARD ELECTRIC HEAT

Wire from AUX/C terminals to the 24v coil on a field supplied SPDT relay.  
Wire baseboard heat to the load side of the relay to the baseboard heater.



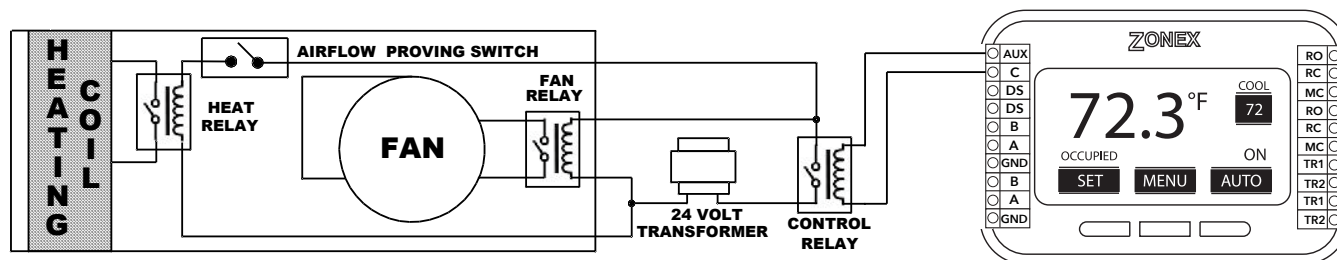
## VAV DUCT REHEAT

Wire one AUX terminal to the air proving switch from the air proving switch complete wiring to the terminal on the 24v coil relay. Wire the C terminal to the 24v coil on the relay.  
Isolated control power should be provided to power baseboard heater.



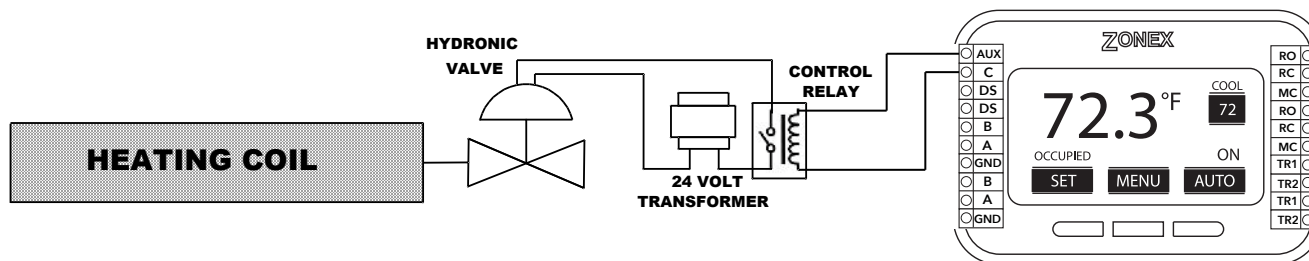
## DUCT FAN REHEAT

Wire from the AUX/C to the 24v coil on a field supplied SPDT relay.  
Wire from one contact terminal to the 24v coil of the fan relay and to the air proving switch then wire the leaving side of the air proving switch to the 24v coil relay on the Elect. Strip heater.  
Now wire the other contact to the transformer. Wire the other transformer leg to the fan and and Elect. Strip heater 24v coil terminals to complete the circuit. Isolated control power should be provided to power the fan and Elect. Strip heater.

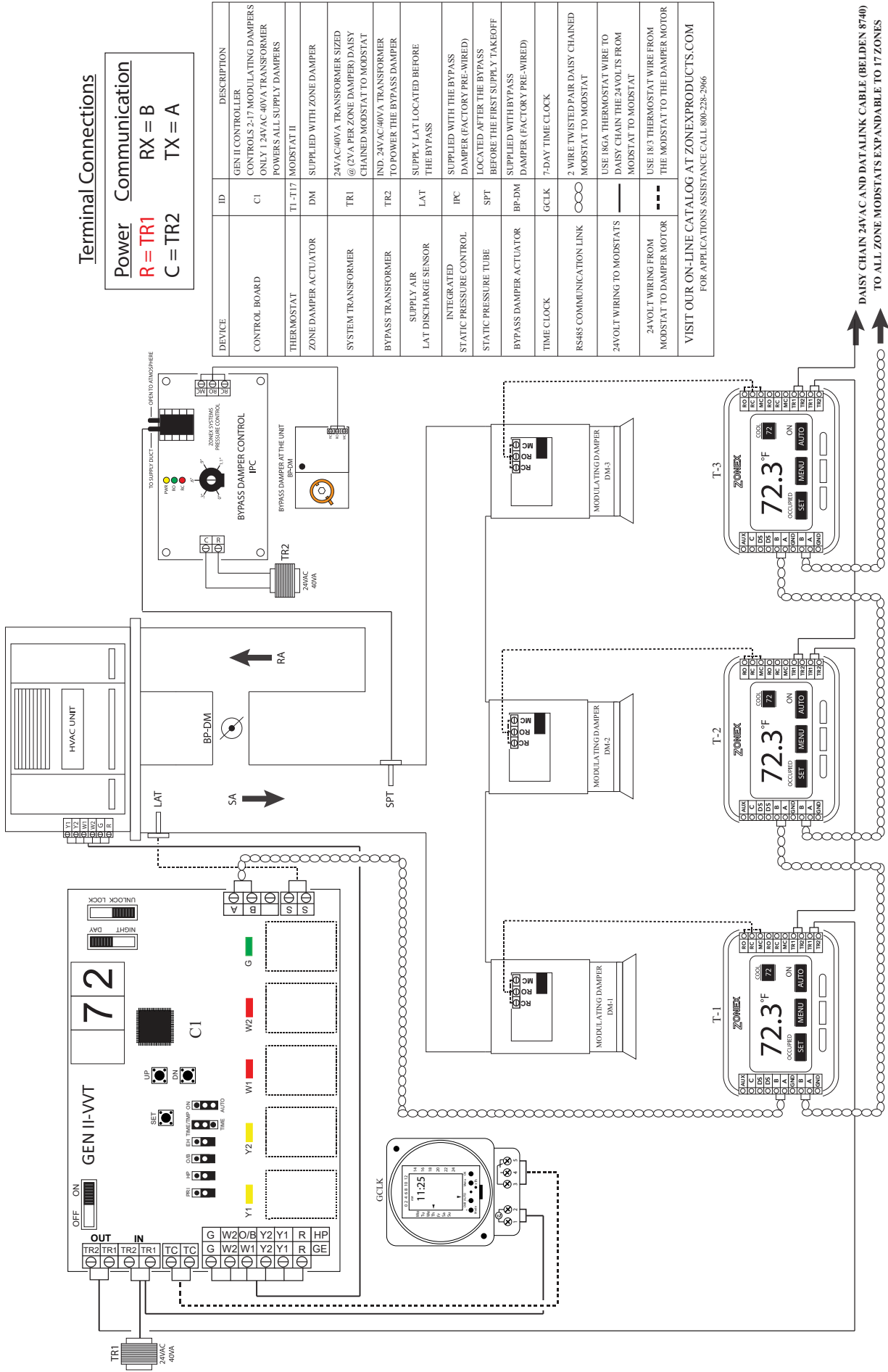


## BASEBOARD HYDRONIC HEAT

Wire from AUX/C to 24v coil on SPDT relay then wire from one contact terminal to the transformer and from the other transformer leg to the valve. On the other relay contact terminal wire to the valve to complete the circuit. Isolated control power should be provided to power the valve.



ZONEX GEN II-VVT  
VOTE BASED AUTO CHANGEOVER BYPASS VAV



## DESCRIPTION

The G-STAT (Part# G-STAT) is a universal programmable G/E or H/P thermostat, microprocessor based, auto changeover, stand alone thermostat used to control stand alone units in the GEN II system. The G-STAT is configured for Gas/Electric (2H, 2C) or Heat Pump (3H, 2C) with selectable fan operation. The G-STAT reports the supply and return air temperatures and has a large, easy to read LCD display.

The G-STAT is very easy to configure by manually adjusting settings at the thermostat.

The G-STAT features an on board thermistor for precise temperature measurement. In the event of power loss, the Heat and Cool set points are stored in non-volatile memory, without the need for battery backup.

Space ambient temperature is continually displayed with large, easy-to-read numbers. G-STAT temperature display range is 47° - 95°F. Heat and Cool set points and operation modes are all indicated on the display.

Programmed set points can be manually adjusted at the thermostat or electronically locked through the mobile app to provide limited manual set point adjustment. During unoccupied hours, temporary operation can be overridden with a touch of a button.

## INSTALLATION

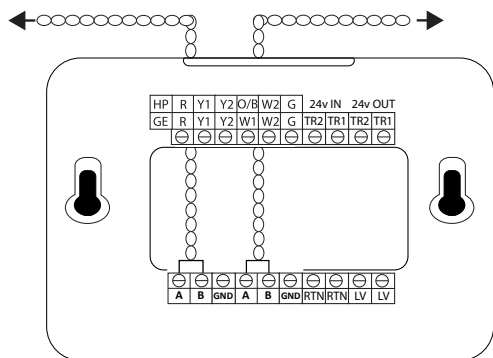
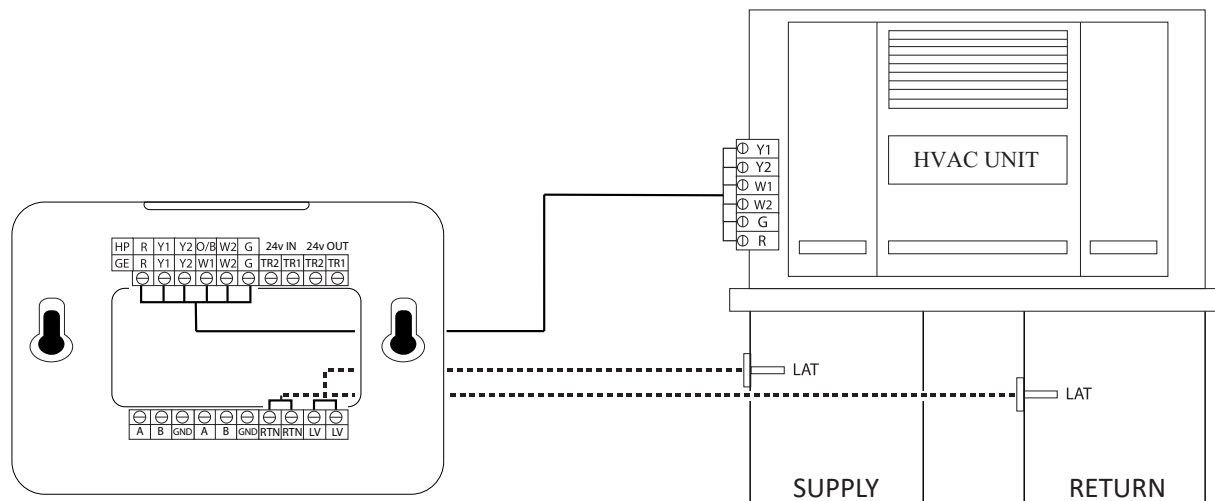
Thermostat and Terminal base

1. Install the thermostat on an interior wall, away from drafts, supply air currents and direct sunlight or any heat generating source.
2. Screw in retaining screw at the bottom center of the G-STAT
3. To remove the thermostat from its sub-base, grasp the cover at the top and bottom and pull straight off; do not pivot the cover from the base.
- 4.. Install the thermostat sub-base to the wall using the provided anchors and screws.

## WIRING THE UNIT, SUPPLY AND RETURN AIR SENSORS TO THE G-STAT

Using 18/6 thermostat wire, wire from RTU to G-STAT. Make sure to match up unit terminals R, Y1, Y2, W1/O/B, W2, G to the G-STAT terminals R, Y1, Y2, W1/O/B, W2, G. Wire in the Supply and Return air sensors using 18/4 thermostat wire.

Install the Supply and Return air sensors 18 to 24" downstream of the unit.



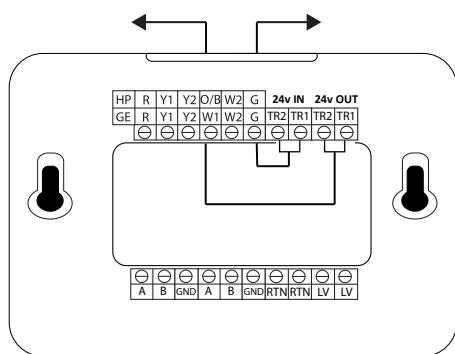
### DAISY CHAIN THE COMMUNICATION WIRE

Using Zonex 2 wire communication wire. Wire to A, B, **IN** and A, B, **OUT**, to and from G-STAT's in a daisy chain configuration.

Wiring to Communication Terminals

**Red-A = TX**

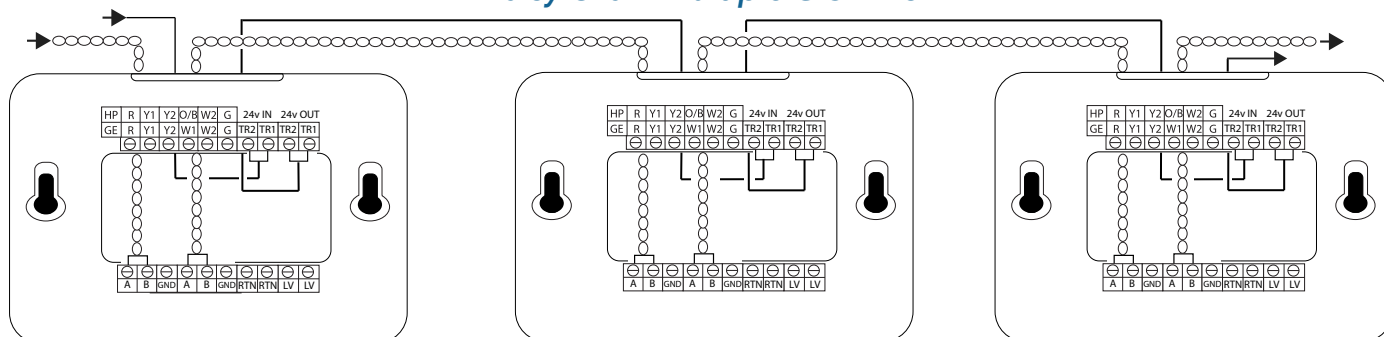
**Black-B = RX**



### DAISY CHAIN 24V POWER FROM GEN II

G-STAT is powered by the independent transformer connected to the GEN II. Using 18/2 wire for the 24vac power, daisy chain from TR1, TR2 **IN** and **OUT** to and from the G-STAT's.

### Daisy Chain Multiple G-STAT's



## Thermostat Configuration

1. Set a unique ID for each thermostat ranging from 01-17  
(See Thermostat Configuration Menu on the next page on how to set)
2. Configure the thermostat for the type of unit operation you would like. Gas, Heat Pump or Electric. (Factory set for Gas)
3. Configure Fan mode for Auto or On operation. (Factory set for Auto)
4. Configure 2nd stage delay. Temperature range is 2°- 8°F. ( Factory set 2°F)

## Manual Adjustments

Heat and Cool set point Display

Press the "SET" button to toggle between the Heat or Cool set points.

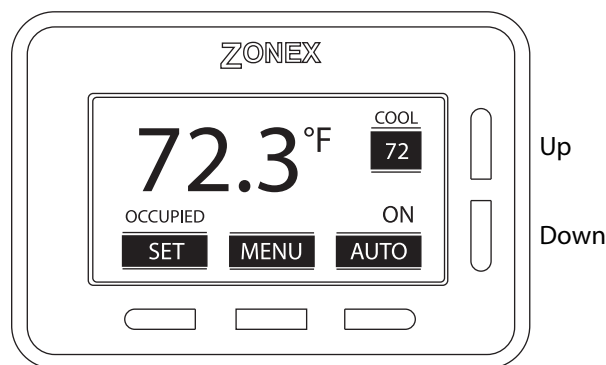
## Temperature Set Points

### COOL SET POINT

1. Press the "SET" button to display the Cool set point in the upper right.
2. Press the "UP or DN" buttons to change the Cool set points.

### HEAT SET POINT

1. Press the "SET" button to display the Heat set point in the upper right.
2. Press the "UP or DN" buttons to change the Heat set points.



## Thermostat Operation

**COOL** - The thermostat will make a Y1 cool call when the space temperature rises 1° above set point. Y2 will energize when the space temperature rises 2° above the cool set point or whatever the 2nd stage temperature is set for. When the room temperature reaches set point Y1 and Y2 will de-energize. O or B energize for the reversing valve circuit, depending on configuration. The G circuit is energized for fan.

**HEAT** - Gas / Electric - The thermostat will make a W1 heat call when the space temperature is 1° below the heat set point. W2 will energize when the space temperature is 2° below the heat set point or whatever the 2nd stage temperature is set for. When the room temperature reaches set point W1 and W2 will de-energize.

**Note:** When the thermostat is configured for GAS operation the fan circuit is not energized in heat mode.

**Note:** When the thermostat is configured for ELECTRIC operation the fan circuit is energized in heat mode.

**HEAT** - Heat Pump - The thermostat will make a Y1 heat call when the space temperature is 1° below the heat set point. Y2 will energize when the space temperature is 2° below the heat set point or whatever the 2nd stage temperature is set for. W2 (Aux Heat) will energize when the space temperature is 1° below what the 2nd stage temperature is set for. When the room temperature reaches set point Y1, Y2 and W2 will de-energize.

**EMERGENCY HEAT** - When Emergency Heat is selected in the configuration menu on the thermostat on a call for heat, there is an output signal on "W2" for backup heat and "G" for the fan. The compressor circuits Y1 and Y2 are locked out during heat calls, until the emergency heat function has been turned off in the configuration menu.

**FAN MODE** - Factory set for "AUTO", to configure the thermostat to run the fan constant "ON" you will need to go into the configuration menu and select fan mode and change it from "AUTO" to "ON".

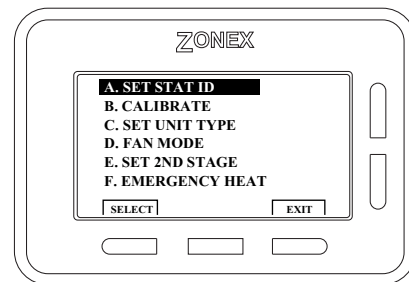
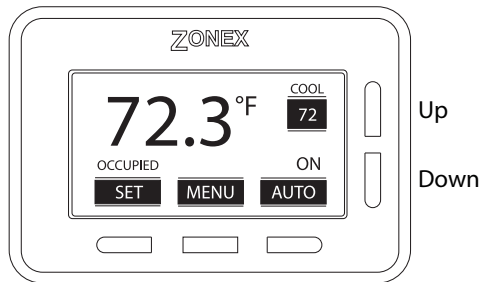
**OVERRIDE** - When the system is in the Unoccupied mode, the thermostat provides a 2 hour override for after-hours system operation. To select the override function, press the Auto button and note "Override" is indicated on the display. When additional override is required, press the Auto button again. To disable override push AUTO button again to return to unoccupied mode.

## THERMOSTAT CONFIGURATION MENU

To access the System Configuration Menu, Hold "MENU" and "AUTO" at the same time.

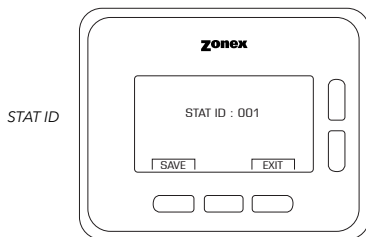
The **THERMOSTAT CONFIGURATION MENU** allows you to:

- |                  |                   |                       |
|------------------|-------------------|-----------------------|
| A. Set stat ID   | D. Fan Mode       | G. Temperature Format |
| B. Calibrate     | E. Set 2nd Stage  | H. Diagnostic         |
| C. Set Unit Type | F. Emergency Heat |                       |



### A SET STAT ID

*Every thermostat in the system needs a unique ID. Must be in numerical order the way the communication wire is daisy chained. Confirm no duplicate addresses.*



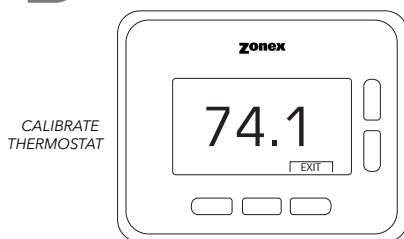
While in the Thermostat Configuration Menu, press **Select** on **A. Set Stat ID**.

Use the **Up** and **Down** buttons to give the thermostat an ID ranging from 1-20.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save settings.

### B CALIBRATE

*Thermostat is equipped with an accurate temperature sensor. If you require field calibration follow the steps below.*



While in the Thermostat Configuration Menu, press **Down** and press **Select** on **B. Calibrate**

Use the **Up** and **Down** buttons to calibrate the temperature display with your external thermostat, press **EXIT** to save changes.

*Confirm temperature display now reports the updated room temperature you provided.*

### C SET UNIT TYPE

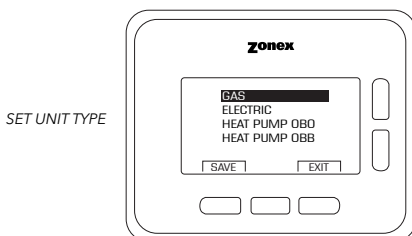
*The G- STAT is designed as a universal GAS/ELECTRIC/HEAT PUMP thermostat. Factory default is set for GAS operations, and may require field configuration when applying this product to Electric or Heat Pump applications.*

While in Thermostat Configuration Menu, press **Down** and press **Select** on **C. Unit Type** menu item.

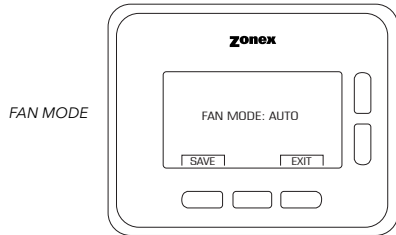
Use the **Up** or **Down** to set the desired Unit Type for each thermostat. Select Gas, Heat Pump OBO, Heat Pump OBB, Electric.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save settings.

Note: Some heat pump units use GAS/ELECTRIC inputs - confirm your unit's operation to ensure proper configuration.



## D FAN MODE



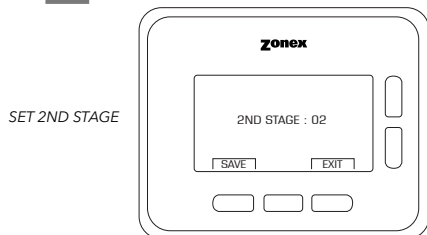
Fan operation is configured for either Fan ON or AUTO. When system is configured for ON operation, the Fan will run during Occupied schedule and will revert to Auto operations during Unoccupied schedule. When thermostat is configured for Auto operation, Fan will only run when there is a call for heating or cooling.

While in Thermostat Configuration Menu, press **Down** and press **Select** on **D. FAN MODE** menu item.

Use the **Up** or **Down** to set the Fan mode to AUTO or ON.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save settings.

## E SET 2ND STAGE



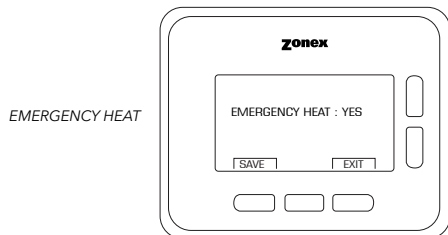
The G-STAT's 2nd stage operation is based on room temperature. Staging is adjustable from 2°- 8° from thermostat room temperature.

While in Thermostat Configuration Menu, press **Down** and press **Select** on **E. Set 2nd Stage** menu item.

Use the **Up** and **Down** buttons to select the desired staging temperature range.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save settings.

## F EMERGENCY HEAT



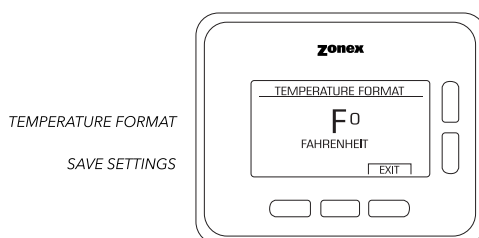
The G-STAT has an emergency heat function that will lock out the compressor, and energize the Aux heat in the unit.

While in Thermostat Configuration Menu, press **Down** and press **Select** on **F. Emergency Heat** menu item.

Use the **Up** and **Down** buttons to select Yes or No for Emergency Heat operation.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save settings.

## G TEMPERATURE FORMAT



The G-STAT may be configured for F° or C° operation. From the Thermostat Configuration menu toggle the UP or DOWN button to highlight TEMPERATURE FORMAT. When desired temperature format is displayed press SAVE.

While in Thermostat Configuration Menu, press **Down** and press **Select** on **G. TEMPERATURE FORMAT** menu item.

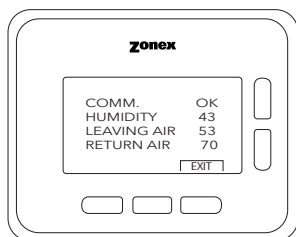
Toggle **Up** and **Down** to set the desired Temperature Format.

Press **Exit** to return to the Thermostat Configuration Menu.  
Press **Save** to save the settings.



## H DIAGNOSTIC

DIAGNOSTIC



The G-STAT Diagnostic screen will allow you to confirm communication with the GEN II controller. And display the RH, Supply Air, and Return Air temperatures.

While in Thermostat Configuration Menu, press **Down** and press **Select** on **H. DIAGNOSTIC** menu item.

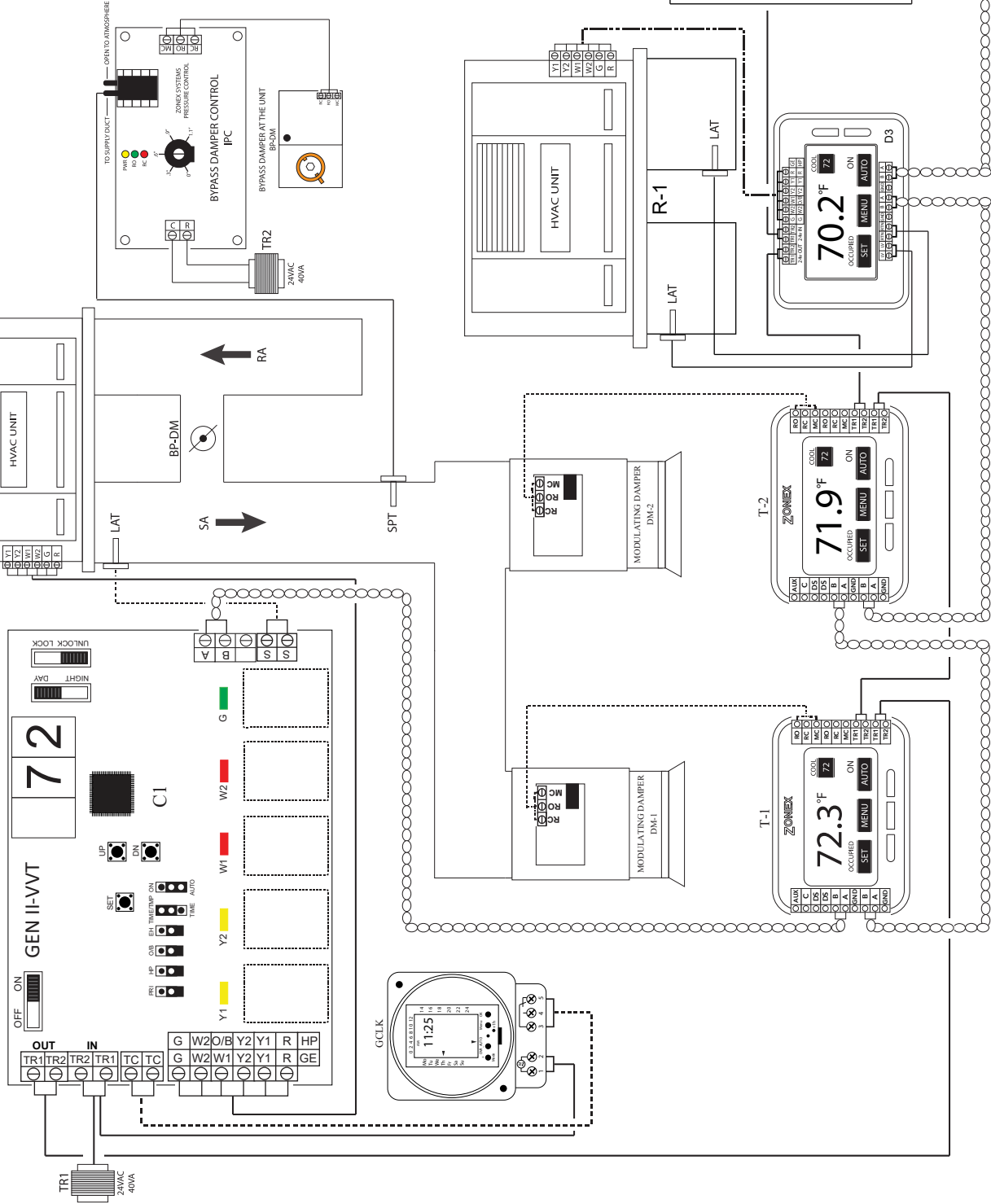
Press **Exit** to return to the Thermostat Configuration Menu.

# GEN II

CONTROLLING ONE ZONED UNIT WITH ONE OR MORE STAND-ALONE UNITS

## Terminal Connections

Power	Communication
R = TR1	RX = B
C = TR2	TX = A



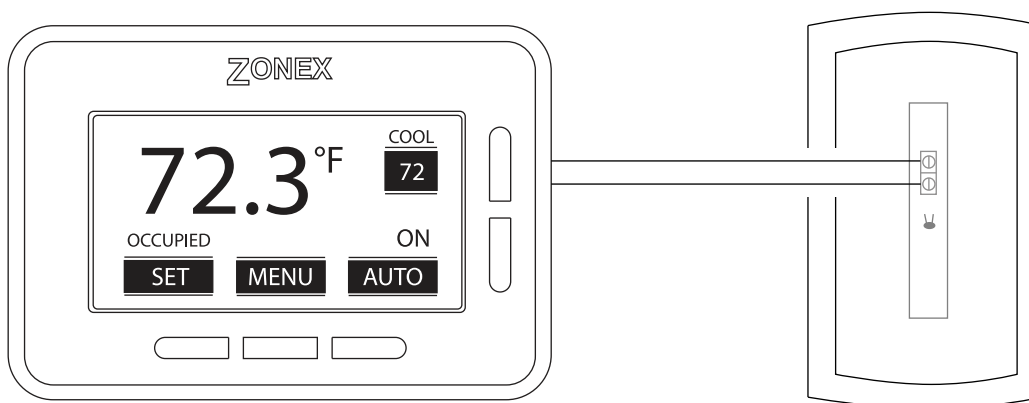
DEVICE	ID	DESCRIPTION
CONTROL BOARD	C1	GEN II CONTROLLER CONTROLS 2-17 MODULATING DAMPERS ONLY 1 24V AC 40VA TRANSFORMER POWERS ALL SUPPLY DAMPERS
ZONE THERMOSTAT	T1 - T17	MODSTAT
CONTROL STAND-ALONE UNIT	D3 - D4	G-STAT
ZONE DAMPER ACTUATOR	DM	SUPPLIED WITH ZONE DAMPER
SYSTEM TRANSFORMER	TR1	24VAC/40VA TRANSFORMER SIZED @ (2VA PER ZONE DAMPER) DAISY CHAINED MODSTAT TO MODSTAT
BYPASS TRANSFORMER	TR2	IND. 24VAC/40VA TRANSFORMER TO POWER THE BYPASS DAMPER
SUPPLY AIR LAT DISCHARGE SENSOR	LAT	SUPPLY LAT LOCATED BEFORE THE BYPASS
INTEGRATED STATIC PRESSURE CONTROL	IPC	SUPPLIED WITH THE BYPASS DAMPER (FACTORY PRE-WIRED)
STATIC PRESSURE TUBE	SPT	LOCATED AFTER THE BYPASS BEFORE THE FIRST SUPPLY TAKEOFF
BYPASS DAMPER ACTUATOR	BP-DM	SUPPLIED WITH BYPASS DAMPER (FACTORY PRE-WIRED)
TIME CLOCK	GCLK	7-DAY TIME CLOCK
RS485 COMMUNICATION LINK		2 WIRE TWISTED PAIR DAISY CHAINED MODSTAT TO MODSTAT TO G-STAT
24VOLT WIRING TO MODSTATS		USE 18GA THERMOSTAT WIRE TO DAISY CHAIN THE 24VOLTS FROM MODSTAT TO MODSTAT AND G-STAT'S
24VOLT WIRING FROM MODSTAT TO DAMPER MOTOR		USE 18/3 THERMOSTAT WIRE FROM THE MODSTAT TO THE DAMPER MOTOR

VISIT OUR ON-LINE CATALOG AT [ZONEXPRODUCTS.COM](http://ZONEXPRODUCTS.COM)  
FOR APPLICATIONS ASSISTANCE CALL 800-228-2966

DAISY CHAIN 24VAC AND  
DATALINK CABLE (BELDEN 8740)  
TO ALL THERMOSTATS  
EXPANDABLE TO 17 ZONES

## REMOTE SENSOR

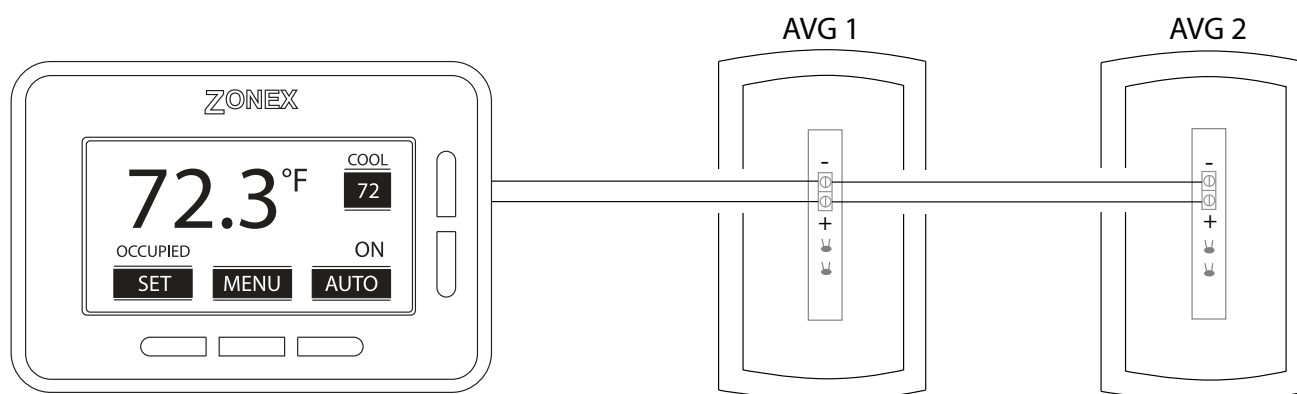
The following wiring diagram is used when remote temperature sensing is desired on a job. A Zonex Systems MODSTAT-RS or GSTAT-RS is required, as is a remote sensor (part # RS). Thermostats and sensors are wired in parallel.



Install thermostat per installation instructions. All remote sensors include a wiring harness. Plug wiring harness into the J4 plug on the back of the thermostat, this will provide two wires to connect the remote sensor to the thermostat. Per the drawing above, wire the remote sensor in parallel, one wire from the thermostat will connect to + terminal on the sensor, the second wire will connect to - terminal using 18AWG thermostat wire. Verify sensor operations.

## TEMPERATURE AVERAGING

The following wiring diagram is used when temperature averaging is desired on a job. This wiring diagram is to average two areas of a building for one thermostat. A Zonex Systems MODSTAT-RS or GSTAT-RS is required, as are two AVG averaging sensors (part # AVG). Thermostats and sensors are wired in parallel.



Install thermostat per installation instructions. All averaging sensors include a wiring harness. Plug wiring harness into the J4 plug on the back of the thermostat, this will provide two wires to connect the averaging sensor to the thermostat. Per the drawing above, wire the AVG averaging sensor in parallel, one wire from the thermostat will connect to + terminal on the sensor, the second wire will connect to - terminal using 18AWG thermostat wire. Extend these wires to + and - terminals on the second AVG sensor. Verify sensor operations.

## System Start Up and Test

1. Plug all thermostats into sub-bases. Turn **GEN II** power switch (**E**) to ON.
2. Find the first Thermostat in the Daisy chain and change its address from 20 to 001.  
(See ModStat installation instructions – Configuration – Addressing).
3. Turn **GEN II** power switch OFF and then ON. The Display should flash 01 and then show the leaving air temperature. This confirms your successful wiring and communication with that thermostat.
4. If 01 is displayed, change the next thermostat's address from 20 to 002. Turn the **GEN II** power switch OFF and then ON. The display should flash 02 and then show the temperature. Re-address thermostats one at a time.
5. After each stat is re-addressed, turn the power switch off and then on. This will verify that the re-addressed stat has been found by the **GEN II** Controller.

This procedure will simplify your installation and will confirm your wiring is correct and that the **GEN II** controller can communicate over the 2-wire twisted pair data link with every thermostat in your system.

## Troubleshooting

### When stat #1 is not found:

1. Check thermostat to verify that it is addressed as 01.
2. Check all TR1 and TR2 wiring for proper color-to-color connections. Even if the stats are lighted, all TR1 wires at the thermostat must be connected to the GEN II TR1 terminal. All TR2 wires must be connected to the GEN II TR2 terminal. Confirm the daisy chain wiring is correct at this time.
3. Check A, B wires for proper color code and connections; polarity is imperative. All A connections must land on A terminal on the following thermostat, and all B connections must connect to B terminal on each thermostat.
4. Check TR1 and TR2 wires for opens or shorts.

### Checking the Daisy Chain for opens or shorts:

Start from the GEN II board, and follow A, B wires to the first sub-base. Remove the A, B wires going to the next sub-base in the link. Plug a stat into the first sub-base, and address it as #1. Turn the GEN II power switch Off, then On, to see if the display flashes 01, at the GEN II controller.

1. If 01 is displayed, the first link of the daisy chain is OK. Reconnect the wires going to sub-base.
2. Repeat these steps with a stat numbered 02. If the number 02 is displayed, then communication is confirmed.

When the correct number does not appear for a link, that link is either shorted or open. **A link of the daisy chain, which is open or shorted, must be repaired before the next thermostat is checked.**

When the thermostats are correctly addressed, wired and linked, the total number of stats on your job connected to the GEN II control board will be displayed when the board is turned on.

After the correct number of connected thermostats is displayed, complete the wiring of the AC unit or heat pump connections, next make heat and cool calls to the GEN II controller.

## Occupied / Unoccupied fan operation

The factory setting for FAN operation is AUTO, with the FAN jumper (I) on the middle and lower pins. In this setting, the fan circuit on “G” is only energized on an active cool call in Gas/Electric mode or on an active heat call or cool call in Heat Pump mode. This applies to both Occupied and Unoccupied modes. When the FAN jumper is in AUTO, there is no output on “G” with an active heat call in Gas/Electric mode.

- Constant Fan in the Occupied (DAY) mode – Place the FAN jumper (I) on the center and upper pins on ON. The fan output on “G” will be constant in the Occupied (DAY) mode and will revert to auto in the Unoccupied (NIGHT) mode.

## Opposing Call Changeover

The **GEN II** controllers are configured at the factory for Opposing Call Changeover with a time delay setting of 10 minutes. With this configuration, any number of thermostats can make a like active call (heat or cool). During this time, if a single thermostat makes an opposite call, a timer is started at the next poll. This timer starts a time delay operation to allow the initial calling thermostats to satisfy. If the initial active thermostats do not completely satisfy after 10 minutes, the dampers all close and the controller drops out the HVAC outputs and goes into a 5 minute purge cycle. When the purge cycle times out, the opposing thermostat call is initiated; and the appropriate HVAC outputs are energized, and the supply damper opens. The thermostat with the opposing call must now satisfy before the GEN II controller will recognize any of the initially calling thermostats.

The opposing call timer is factory adjusted for 10 minutes. However, the delay time can be field adjusted from 5 to 30 minutes, or disabled.

To increase the opposing call time delay:

1. Press the SET and UP buttons.
2. Release the SET button when the display changes, and continue to hold down the UP button.
3. Release the UP button when the desired time is displayed.

To lower the time delay:

4. Press the SET and UP buttons.
5. Release the SET button, and immediately press and hold the DN (down) button until the desired time is indicated; then release.

The Opposing Call feature can be disabled by performing steps 1 through 3 and then releasing the UP button when the display indicates 32. With this feature disabled, the **GEN II** controller will operate changeover by majority vote from the zone thermostats.

## Priority active Heat and Cool call operation

The **GEN II** controller may be configured in the field for majority vote changeover but also assign multiple votes for selected thermostats to enhance the changeover operation for special requirements. Each thermostat represents one vote for heat or cool operation; a majority of active calls will determine which mode the controller will operate in. With the Priority feature, any thermostat may be assigned one or more additional votes to allow it to have priority to bring a mode changeover more quickly. To keep proper overall temperature control, this priority vote change should be limited to as few zones as possible. Follow the procedure to implement Priority vote operation:

1. Determine which thermostat address is to have an additional one or two votes.
2. Place the **PRIORITY** jumper (**F**) on both pins.
3. Press and hold the **SET** and **UP** buttons (**H**), and the LED display will scroll through the number of zones starting with 01.
4. When the display indicates the address (01 to 17) of the thermostat you want to add votes to, release both buttons and press the **DN** button. The display will scroll through 00, 01, 02. To add one additional vote, release the **DN** button when the display indicates 01 (this assigns a total of 2 votes). To increase the votes by two, press the **DN** button and wait until the display indicates 02 and then release the **DN** button (this assigns a total of 3 votes maximum).
5. To change the votes back to a single vote, press the **DN** button on the selected address and release when the display indicates 00.
6. To review the vote status of all of the thermostats in the system, press the **UP** button; and the display will first indicate the address number starting with 01 and then the vote status for that address. 00 = 1 vote 01 = 2 votes 02 = 3 votes. Upon review, if stat #1 has 2 votes, the display will show Stat 01 followed by 02 signifying the number of Priority votes assigned to Stat 1. Stat 02 will appear followed by a blank display, indicating only 1 vote; and Stat 03 will appear followed by a blank screen, indicating no priority votes have been added to Stats 02 or 03.
7. Be certain to **Place the PRIORITY jumper on one pin** to put the controller back into normal operation with the changes that were made.

## Thermostat security - Set Point LOCK

The **GEN II** system provides the ability to electronically lock all of the zone thermostats (global). When the thermostats are in the LOCK mode, there will be a padlock icon on each thermostat display. The LOCK mode limits the manual changing of the heat and cool set points to a maximum of 2° above or below the initial heat and cool set point temperatures.

To set the thermostats for the LOCK mode, simply change the switch position (**K**) from UNLOCK to LOCK. All of the thermostats will change to LOCK on the next system poll. To unlock, set the switch to the UNLOCK position; and the thermostats will drop the icon after the next system poll and revert to normal operation.

## Air Balance - Force Dampers Open

When performing an air balance on the supply air outlets, the **GEN II** controller provides a unique feature to simplify this procedure. The **GEN II** controller will put all thermostats in a cool call which will open the dampers 100% and bring on the system blower.

1. Place the **EH** jumper (**F**) over both pins
2. Press the **SET** and **UP** buttons (**H**) simultaneously – This puts a global cool set point of 58°F (14°C) on all of the zone thermostats, and the controller energizes the “G” fan output only; Y1 is not energized.
3. When the air balance procedure is completed, press the **SET** and **DN** buttons simultaneously, which will assign 70°F (21°C) Heat and 75°F (23°C) Cool set points on all of the zone thermostats.
4. Press and hold the **SET** and **DN** buttons; and while holding these buttons, remove the **EH** jumper tab and place it on one pin. Release the **SET** and **DN** buttons. This procedure returns the **GEN II** controller to normal operation. For Electric Heat fan configuration, see Page 5.

## **Default Thermostat Set Point Programming**

Global default set points can be established from the **GEN II** controller.

The following procedure will provide a 75°F (23°C) Cool and 70°F (21°C) Heat occupied set point along with Unoccupied 58°F (14°C) Heat and 85°F (29°C) Cool set point for every thermostat in the system. This handy feature minimizes visits to the thermostats. To establish these default set points:

1. **EH** jumper (F) - place the jumper over both pins.
2. Press the **SET** and **DN** button (H) simultaneously to engage default set points.
3. Remove the EH jumper, and place on one pin to put controller back into normal operation.
4. To view the unoccupied set points place the Night / Day switch (L) to the NIGHT position. Following a poll, the thermostat backlights will turn off; and the unoccupied set points will be displayed.

## **Time Clock**

The GCLK is a 24vac 7-Day programmable time clock offered by Zonex Systems, exclusively for the GEN II control system. This digital time clock will enable the control system to operate with "Global" Occupied and Unoccupied schedules in a 7-day format. The GCLK is powered from the **GEN II** controller power supply, and there is a backup battery to protect the time clock program for up to 100 hours.

## **Installation**

The GCLK must be installed on an interior wall next to the **GEN II** controller. Both the **GEN II** controller and GCLK time clock must be easily accessible to monitor status and to make program and function changes.

1. Remove the clear dust cover lens and loosen two screws on opposite corners of the clock module.
2. Remove the housing that surrounds the time clock and the wire terminal cover.
3. Remove the clock module by pulling straight out from the base. Install the backing plate to the wall with 3 screws (provided).
4. The GCLK is powered from TR1 and TR2 on the **GEN II** controller to terminals 1 and 2 on the time clock terminal base.
5. The Normally Open switch contacts on the time clock 3 and 5 are wired to the TC terminals on the **GEN II** controller.
6. Press the clock module back into place in the base, making certain that it is seated correctly.
7. Install the wire terminal cover and the clock housing with the 2 screws.
8. Install the clear dust cover lens in place.

## **Programming**

See Programming and Configuration included with the GCLK.



Zonex Systems zone dampers are used in cooling/heating systems to provide room by room zone control. The damper is provided with a factory mounted actuator. Each zone damper is controlled by a zone thermostat. More than one damper can be controlled by one zone thermostat. Use this table to determine which zone dampers to use.

DAMPER MODEL	MAXIMUM DIFFERENTIAL PRESSURE	MAXIMUM SYSTEM SIZE	MAXIMUM DUCT SIZE
<b>STMPD</b> Round Med. Pressure	1.75"	Any Size	18"
<b>STMRTD</b> Rect. Med. Pressure	1"	5 Tons	24"W x 20"H
<b>STCD</b> Rect. Heavy Duty	1.75"	Any Size	48"W x 48"H
<b>STRD</b> Round Heavy Duty	1.75"	Any Size	24"
<b>D-FUSER</b>	0.1"	Any Size	10"

Maximum Differential Pressure refers to the maximum static pressure drop in inches of water column between the input (upstream) of the zone damper and the output (downstream) when the damper is closed.

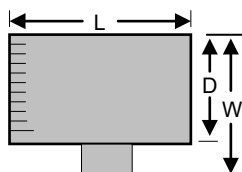
## ROUND MEDIUM PRESSURE ZONE DAMPERS

Zonex Systems round medium pressure zone dampers are recommended for systems with a maximum differential static pressure up to 1.75". This modulating power open/power close damper is manufactured from 20-22 gauge galvanized steel with rolled-in stiffening beads for superior rigidity. Mechanical minimum and maximum set stops are provided and are easily adjustable. The damper is elliptical, which allows the airflow to be tracked linearly. The damper pipe is furnished with one crimped end and one straight end for easy installation. Do not install damper in an inverted position. A hat section supports a reversing 24vac, 60Hz, 2 VA motor. A magnetic clutch allows for continuous power to the motor and longer motor life. Motor drive time from full open to full close is 90 seconds.



**MEDIUM PRESSURE (STMPD)**

## ROUND MEDIUM PRESSURE DAMPER PART NUMBERS AND SIZES



### ROUND DIMENSIONAL DATA

PART #	SIZE	D	L	W
STMPD06	6	6"	10"	9"
STMPD08	8	8"	10"	11"
STMPD10	10	10"	12"	13"
STMPD12	12	12"	14"	15"
STMPD14	14	14"	16"	17"
STMPD16	16	16"	18"	19"
STMPD18	18	18"	20"	21"
STRD20	20	20"	24"	27"
STRD22	22	22"	24"	27"
STRD24	24	24"	24"	27"

Note: Round dampers over 18" will be heavy duty style STRD dampers. Part # STRD size

## TYPICAL ROUND CAPACITIES

These air quantities were derived from a duct sizing chart 0.1" friction loss per 100' of duct. All CFMs listed are approximate. For accurate selection, use duct sizing table or device.

DUCT DIAMETER	NOMINAL CFM	DUCT VELOCITY FPM	DAMPER ΔP " WC
6"	110	540	.014
8"	250	700	.015
10"	410	750	.015
12"	660	850	.022
14"	1000	925	.035
16"	1450	1070	.036
18"	2000	1100	.036
20"	2600	1200	.039
22"	3250	1250	.039
24"	4100	1325	.041

## RECTANGULAR ZONE DAMPERS

The rectangular zone dampers are available in either medium pressure or heavy duty. For systems under 5 tons, use medium pressure dampers. For systems 5 tons or over, use heavy duty dampers. Motor drive time open and close is 90 seconds.

### RECTANGULAR MEDIUM PRESSURE ZONE DAMPERS (STMRTD)

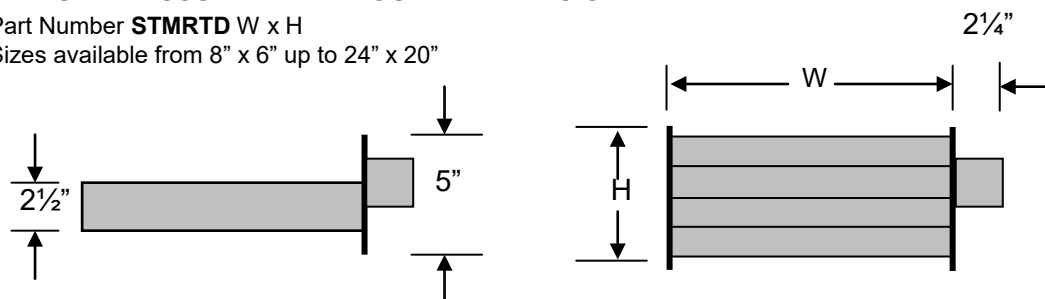
Zonex Systems rectangular medium pressure dampers are recommended for systems under 5 tons with a maximum differential static pressure of 1". These are fully modulating, power open, power close dampers. They are constructed from heavy duty aluminum and stainless steel. The damper is an opposed blade type that slips into a 3¼-inch wide cutout in the existing duct and attaches with screws via a duct mounting plate. The duct mounting plate is 5 inches wide. A hat section supports a reversing 24vac, 60Hz, 2 VA motor. A magnetic clutch allows for continuous power to the motor and longer motor life. Two set screws connect the motor to the damper shaft, allowing quick motor replacement if necessary. Motor drive time from full open to full close is 90 seconds.



### MEDIUM PRESSURE RECTANGULAR DIMENSIONAL DATA

Part Number **STMRTD** W x H

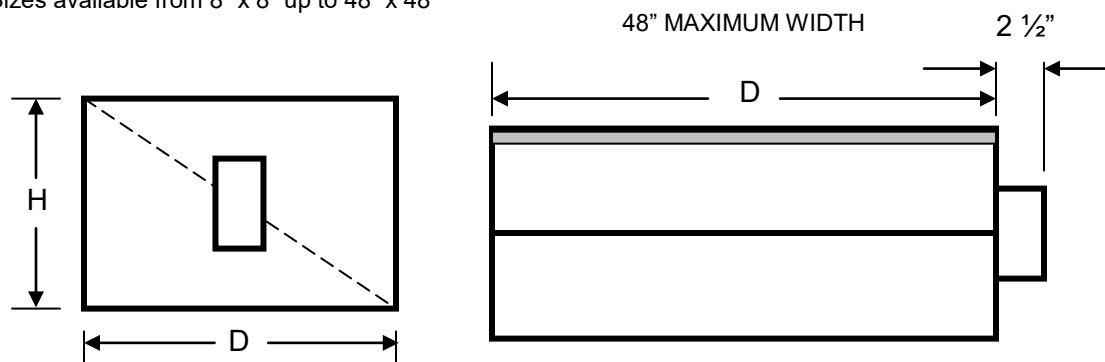
Sizes available from 8" x 6" up to 24" x 20"



### HEAVY DUTY RECTANGULAR DIMENSIONAL DATA

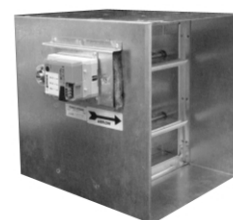
Part Number **STCD** W x H

Sizes available from 8" x 8" up to 48" x 48"



### RECTANGULAR HEAVY DUTY ZONE DAMPERS (STCD)

Zonex Systems rectangular heavy duty dampers are recommended for systems 5 tons or larger with a maximum differential static pressure of 1.75". These are fully modulating, power open / power close dampers made of 20 gauge "snaplock" steel frame with S & Drive duct connections. Allow a 16" gap in the duct for the damper. Formed steel blade stops incorporate a gasket for quiet operation and improved structural rigidity. Rectangular dampers under 10" in height incorporate a single blade design. Dampers 10" or over use opposed blade design. A full stall motor, drawing 2 VA, drives the motor from full open to full close in 90 seconds.



## Rectangular Damper Capacities\*

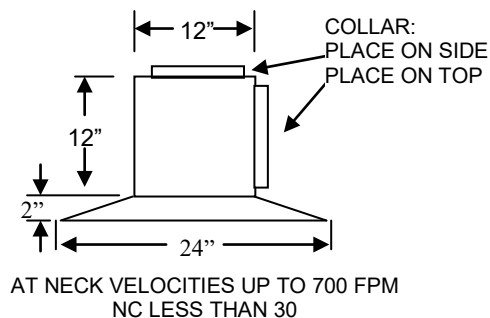
		WIDTH IN INCHES																	
HEIGHT IN INCHES		8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	8	300	400	500	610	710	820	925	1050	1175	1250	1400	1500	1600	1725	1825	2000	2100	2200
	10	400	540	680	825	975	1125	1300	1400	1590	1750	1975	2100	2175	2400	2600	2775	2900	3000
	12	500	680	850	1000	1200	1400	1600	1850	2000	2300	2550	2700	2850	3100	3400	3600	3800	3975
	14	610	825	1000	1250	1500	1750	2000	2250	2500	2900	3150	3425	3625	3825	4200	4600	4800	5000
	16	710	975	1200	1500	1800	2100	2450	2700	3000	3600	3950	4200	4425	4650	5100	5600	5780	6025
	18	820	1125	1400	1750	2100	2500	2850	3080	3600	4400	4600	4950	5100	5600	6000	6500	7000	7150
	20	925	1300	1600	2000	2450	2850	3400	3775	4000	4800	5500	5700	6000	6600	7100	7900	8025	8500
	22	1050	1400	1850	2250	2700	3080	3775	4300	4800	5100	6000	6350	6800	7200	7800	8600	9000	9600
	24	1175	1590	2000	2500	3000	3600	4000	4800	5400	6100	7000	7150	7600	8600	9100	10000	10700	11500
	26	1250	1750	2300	2900	3600	4400	4800	5100	6100	6700	7800	8400	8900	10000	10900	11075	12050	13000
	28	1400	1975	2550	3150	3950	4600	5500	6000	7000	7800	8400	9150	10000	10700	11900	13000	13800	14900
	30	1500	2100	2700	3425	4200	4950	5700	6350	7150	8400	9150	10000	11000	11800	12400	13800	14200	15000
	32	1600	2175	2850	3625	4425	5100	6000	6800	7600	8900	10000	11000	11250	12700	13900	14900	15200	16900
	34	1725	2400	3100	3825	4650	5600	6600	7200	8600	10000	10700	11800	12700	14100	15000	16500	17200	18100
	36	1825	2600	3400	4200	5100	6000	7100	7800	9100	10900	11900	12400	13900	15000	16100	17400	18500	20000
	38	2000	2775	3600	4600	5600	6500	7900	8600	10000	11075	13000	13800	14900	16500	17400	17800	20000	21900
	40	2100	2900	3800	4800	5780	7000	8025	9000	10700	12050	13800	14200	15200	17200	18500	20000	21000	22200
	42	2200	3000	3975	5000	6025	7150	8500	9600	11500	13000	14900	15000	16900	18100	20000	21900	22200	25100
	44	2275	3200	4200	5300	6500	7600	9000	10000	12000	14000	15200	16000	17300	19200	21500	22600	24900	25100
	46	2400	3400	4450	5750	7000	8100	9600	11500	13050	15000	16500	17400	19000	20500	22900	24000	25000	26900
	48	2525	3600	5775	6000	7400	8600	1075	12500	14700	15900	17500	18500	20500	21900	24200	25100	27000	30000

\* These air quantities were derived from duct sizing chart .1" friction loss per 100' of duct. All CFMs listed are approximate. For accurate selection use duct sizing table or

### D-FUSER ZONE DAMPER



Zonex Systems D-Fuser is a combination zone damper and diffuser. It mounts in a standard 2' x 2' T-bar ceiling opening, providing for simple installation and easy maintenance access. The D-Fuser is a cone shaped fluidic nozzle with a platen that modulates up and down to control air flow. As the platen moves up, the air volume is reduced; but the air velocity and throw remain constant. This keeps the air hugging the ceiling, which maximizes room air mixing and minimizes the "waterfall" effect. The D-Fuser is a fully modulating power open / power close damper using a 24vac 60Hz 2 VA motor. Motor drive time from full open to full close is 90 seconds. The D-Fuser connects to round duct either on the side or top. Collars are available for 6", 7", 8", 9" and 10" duct.



6"	Neck Vel	400	500	600	700	800	900
	ΔP	0.011	0.016	0.023	0.035	0.04	0.055
	CFM	80	98	120	135	157	176
	Throw 50 FPM	4'	4'	5'	6'	6'	7'
8"	Neck Vel	400	500	600	700	800	900
	ΔP	0.019	0.03	0.045	0.056	0.041	0.093
	CFM	140	170	207	247	280	315
	Throw 50 PM	5'	6'	7'	8'	9'	10'
10"	Neck Vel	400	500	600	700	800	900
	ΔP	0.029	0.045	0.066	0.09	0.12	0.146
	CFM	218	273	330	382	438	497
	Throw 50 FPM	6'	8'	9'	10'	11'	12'

## SIZING ZONE DAMPERS

If the ductwork already exists, simply size the damper to fit the ductwork. For new systems or retrofit jobs:

- Determine CFM from heat gain or loss calculations.
- Select damper size using either the round capacities chart, the rectangular capacities chart or by using a duct sizing table or calculator.
- Select a Zonex Systems damper to fit the duct size selected for that zone.

Make sure your zone dampers match the type specified in the table showing Maximum Differential Pressure.

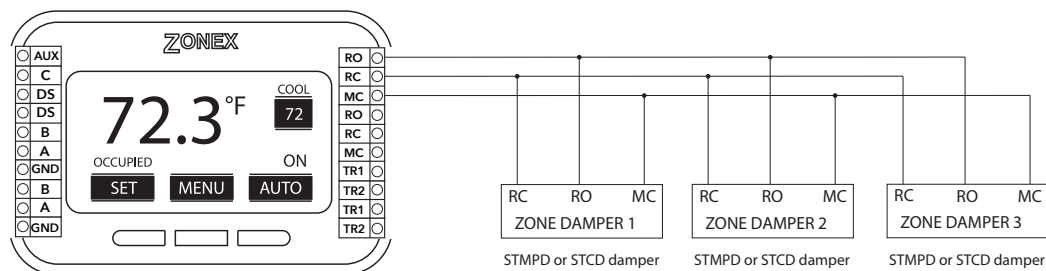
## INSTALLATION NOTES

- Do not exceed 700 FPM in a register/diffuser branch duct.
- If a damper is installed within 3 feet of a register/diffuser, install sound attenuating flex duct between damper and outlet.
- Zone dampers should be preceded by 2' – 4' of straight pipe where possible.
- In attic installations and high humidity areas, the Zonex Systems damper should be insulated along with the ductwork. The hat section on the round damper is delivered with insulation between the hat section and pipe. Therefore, insulation should be applied to the round pipe and be butted against the hat section (do not insulate the motor). The motor generates enough heat so that no condensation will develop on it.
- Remember to allow a 16" gap in the duct for heavy duty rectangular dampers.
- Medium pressure rectangular dampers slide into a 3 1/4" wide cutout in the side of the preexisting ductwork.
- Minimum open and close positioning is field adjustable on the actuator. The damper is shipped from the factory to close 100%.

NOTE: Dampers should not be installed with motor upside down in the 6:00 position.

## SLAVING UP TO THREE ZONE DAMPERS

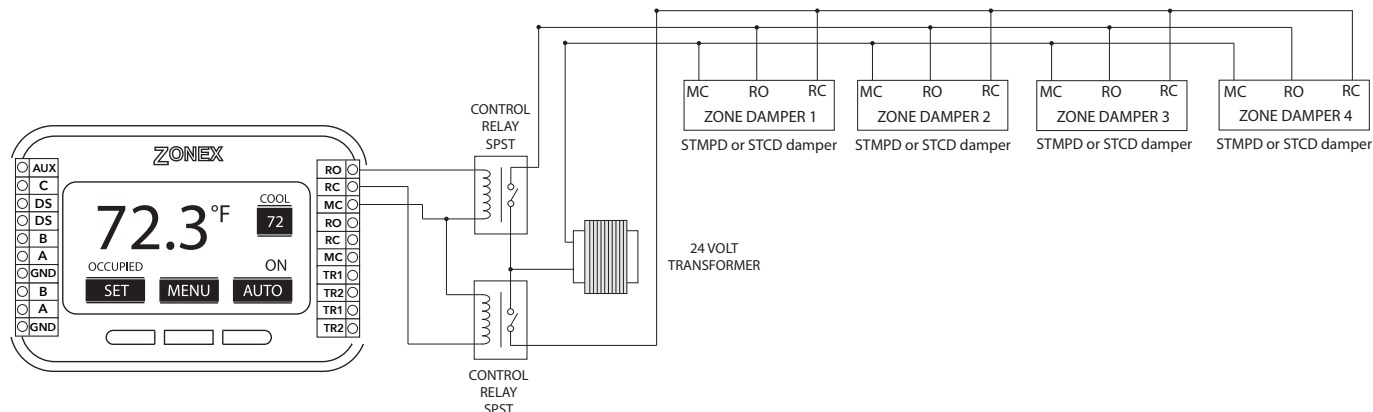
Up to three dampers can be directly controlled by one zone thermostat. To wire two or three dampers for a zone, use the following wiring diagram. Remember to size the power transformer for the total number of zone dampers in the system, 2va per damper.



## SLAVING MORE THAN THREE ZONE DAMPERS

When slaving more than three zone dampers, use the following diagram. An additional 24-volt transformer and control relays are needed for these applications.

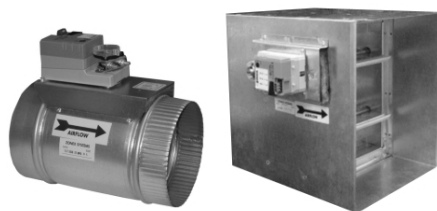
Note: All slave dampers need to be model STMPD / STCD



## ELECTRONIC BYPASS DAMPERS

Bypass dampers are used to provide constant air delivery through the air handling unit. This is done by bypassing excess air from the supply duct back to the return duct. As a zone is satisfied, its zone damper closes. When this happens, the bypass damper opens just enough to bypass the excess air. This will control static pressure and noise at the diffusers.

The Electronic Bypass Damper is used on any size system over 5 tons. The damper can be round (**STBP**) or rectangular (**STCDBP**) with integrated static pressure control; and multiple dampers can be slaved together.



## SIZING ELECTRONIC BYPASS DAMPERS

The bypass damper is to be sized for the total system CFM @ 1500 FPM. System CFM should be calculated at 400 CFM per ton.

**Example:** A 5-ton system is rated at 2000 CFM (5x400 = 2000). When calculated at 1500 FPM, the bypass damper should be 16". Never undersize the bypass damper.

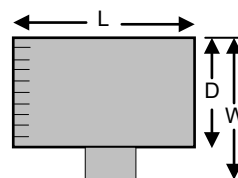
## ROUND BYPASS SELECTION TABLE

Diameter	CFM	PART #	SIZE	D	L	W
8"	560	STBP08	8	8"	10"	11"
10"	900	STBP10	10	10"	12"	13"
12"	1250	STBP12	12	12"	14"	15"
14"	1700	STBP14	14	14"	16"	17"
16"	2200	STBP16	16	16"	18"	19"
18"	2600	STBP18	18	18"	20"	21"
20"	3300	STRDBP20	20	20"	24"	27"
22"	4000	STRDBP22	22	22"	24"	27"
24"	4700	STRDBP24	24	24"	24"	27"

## ROUND BYPASS DAMPER SELECTION

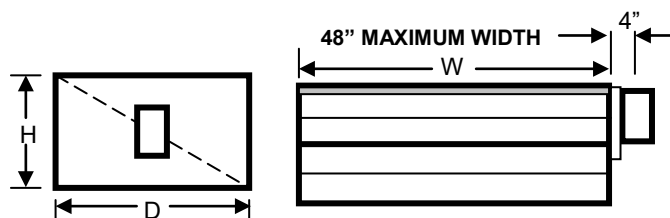
The Zonex Systems **STBP** damper is used for round bypass applications. When you know the bypass CFM requirements, use the ROUND BYPASS SELECTION TABLE to confirm the round damper size.

NOTE: Multiple round dampers can be slaved from one static pressure control to provide the correct capacity. One large rectangular bypass damper may be used instead of multiple round dampers. See below.



## RECTANGULAR BYPASS DAMPER SELECTION

The Zonex Systems **STCDBP WxH** damper is used for rectangular bypass applications. These dampers are also sized for the total system CFM rated at 1500 FPM. Multiple dampers can be slaved from a single static pressure control.



**RECTANGULAR BYPASS DAMPERS**  
SELECT FROM 8 x 8 thru 48 x 48

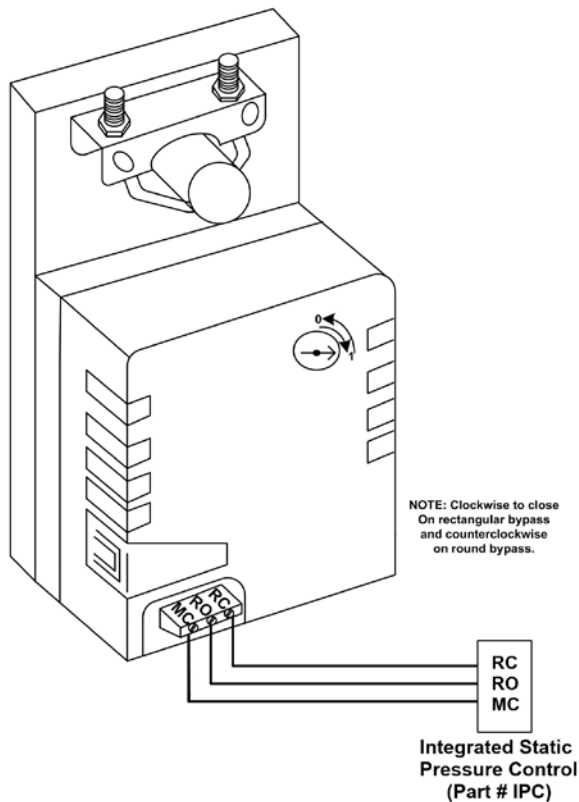
**RECTANGULAR BYPASS SELECTION TABLE**

		WIDTH IN INCHES														
		8	10	12	14	16	18	20	22	24	28	32	36	40	44	48
HEIGHT IN INCHES	8	667	833	1000	1167	1333	1500	1667	1833	2000	2333	2667	3000	3333	3667	4000
	10	833	1042	1250	1458	1667	1875	2083	2292	2500	2917	3333	3750	4167	4583	5000
	12	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000	4500	5000	5500	6000
	14	1167	1458	1750	2042	2333	2625	2917	3208	3500	4083	4667	5250	5833	6417	7000
	16	1333	1667	2000	2333	2667	3000	3333	3667	4000	4667	5333	6000	6667	7333	8000
	18	1500	1875	2250	2625	3000	3375	3750	4125	4500	5250	6000	6750	7500	8250	9000
	20	1667	2083	2500	2917	3333	3750	4167	4583	5000	5833	6667	7500	8333	9167	10000
	22	1833	2292	2750	3208	3667	4125	4583	5042	5500	6417	7333	8250	9167	10083	11000
	24	2000	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000	11000	12000
	28	2333	2917	3500	4083	4667	5250	5833	6417	7000	8167	9333	10500	11667	12833	14000
	32	2667	3333	4000	4667	5333	6000	6667	7333	8000	9333	10667	12000	13333	14667	16000
	36	3000	3750	4500	5250	6000	6750	7500	8250	9000	10500	12000	13500	15000	16500	18000
	40	3333	4167	5000	5833	6667	7500	8333	9167	10000	11667	13333	15000	16667	18333	20000
	44	3667	4583	5500	6417	7333	8250	9167	10083	11000	12833	14667	16500	18333	20167	22000
	48	4000	5000	6000	7000	8000	9000	10000	11000	12000	14000	16000	18000	20000	22000	24000

Bypass air in CFM. Calculated at 1500 FPM.

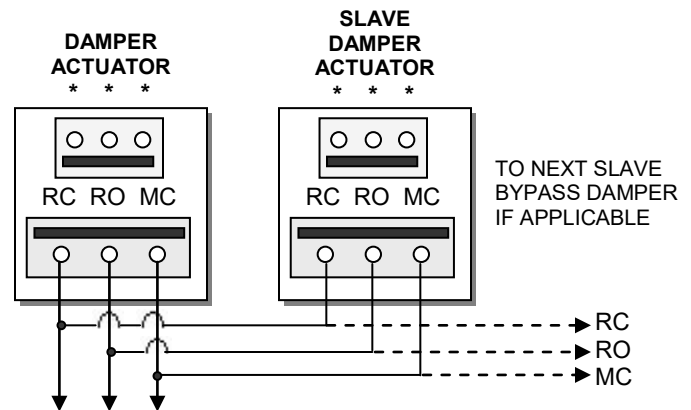
Formula used:  $B = W \times H / 144 \times 1500$ , where B = Bypass air in CFM, W = damper width in inches, H = damper height in inches, 144 = 144 sq. inches per sq. ft., 1500 = 1500 FPM.

## ROUND AND RECTANGULAR BYPASS DAMPER MOTORS



## SLAVING BYPASS DAMPERS

Use only one Pressure Sensor when slaving two or more Bypass Dampers together. Connect the Pressure Sensor to one damper as described above. Connect the slave dampers in parallel as shown. Up to 4 dampers can be slaved to one Sensor. The slaved dampers will self-synchronize each time the dampers reach full open or full close.



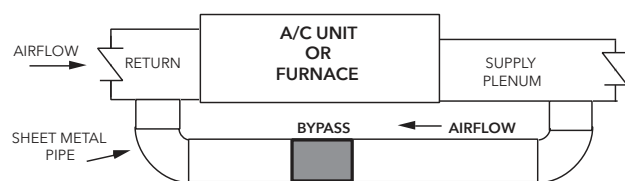
To Static Pressure Control, as shown on the Bypass Wiring Diagram on the next page.

## INSTALLATION

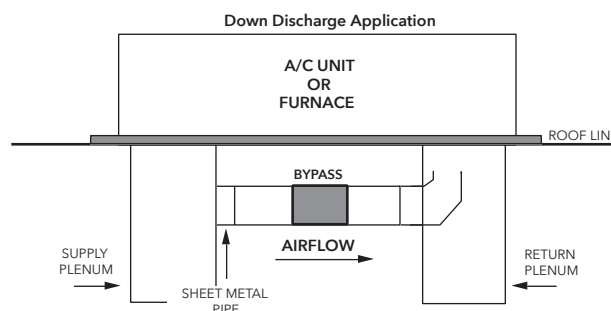
The round and rectangular bypass damper can be installed in any position. Do not run speed screws into damper housing. Screws may interfere with damper travel.

1. Install the bypass damper between the supply and return plenums of the unit. It must be the first tap off the supply plenum. (Bypass damper sizing is recommended for 100% of system CFM.)
2. Be sure the air flows through the damper in the proper direction as indicated by the arrow on the damper. Airflow is always from supply to return plenum.
3. Do not install the bypass damper outside.
4. Bypass damper and controller are powered by a dedicated 24vac 40VA transformer.
5. Follow the steps on the next page for Integrated Pressure Controller installation and set up.

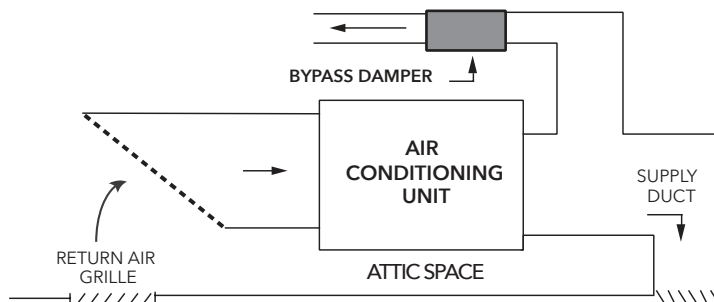
### HORIZONTAL APPLICATION



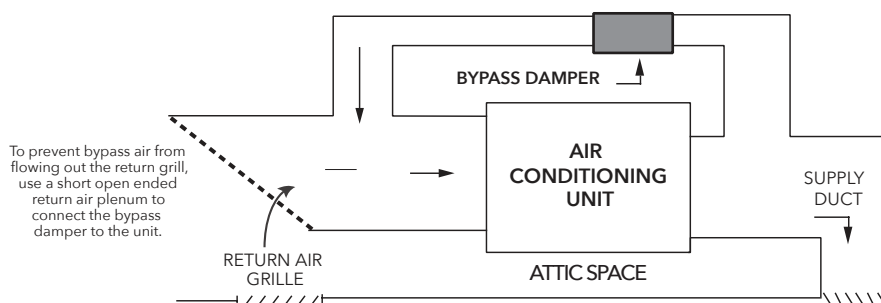
### ROOFTOP INSTALLATION



### OPEN RETURN PLENUM AND BYPASS APPLICATION



### OPEN RETURN PLENUM BYPASS APPLICATION





Bypass Damper with Integrated Pressure Control is used to control bypass operations. The bypass damper modulates to maintain static pressure as zone dampers open and close. The bypass system reduces air noise from the supply registers caused by excessive air velocity. If the system is configured for intermittent fan mode and the system satisfies, there will be a 3-minute delay to allow for system purge, after which the bypass damper will open to 25%, preventing noisy rush of air through supply registers when fan starts up on a call for heat or cool. If the system is configured for fan continuous operation, the **STBP** (Round) or **STCDBP** (Rectangular) Electronic Bypass will monitor static pressure continuously, providing constant control of system static.

## Integrated Pressure Control Description

- A. Supply air tube
- B. 24vac R and C
- C. Damper Terminal RO, RC, MC
- D. LED lights
- E. Adjustable Potentiometer
- F. TP1 Test Point

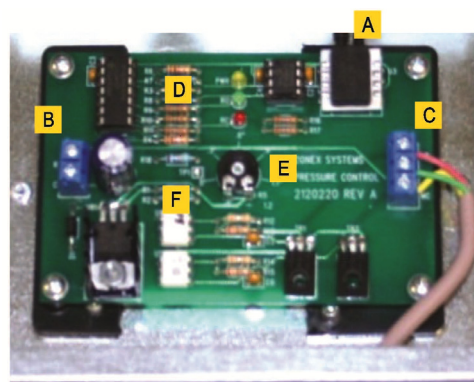


Fig. 1

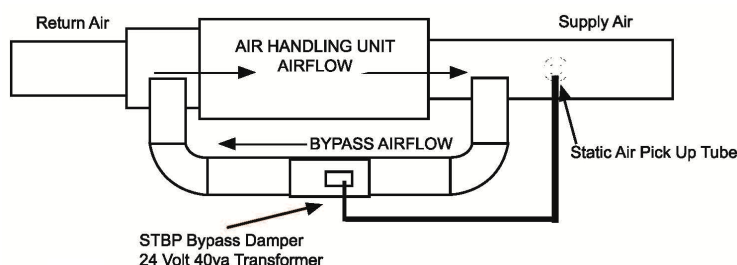
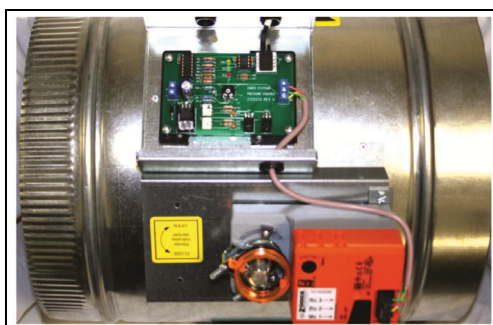


Fig. 2



1. Locate the Integrated Pressure Control (IPC) and air tube on the bypass damper. Drill hole into the side of the supply duct 2' after the bypass and before the 1st supply take-off.
2. Mount pressure supporting block over hole, align hole in block with hole in duct. Use provided sheet metal screws.
3. Install air tube into supply air duct by slipping supplied plastic tubing into holes in support block and duct. Slip tube 3" into the duct. Pickup tubing fits snugly into provided hole.
4. Connect pressure tube from static air pickup to Integrated Pressure Controller (port closest to you).

## Bypass Damper With Integrated Bypass Control Setup

1. Run all supply dampers to the full open position and have blower motor running at 100% fan speed. (See Note #1)
2. Manually close the bypass damper by pressing in the release lever on the motor side of the actuator. With the release lever pressed, rotate the damper actuator collar to close the damper and release the lever to lock the damper closed.
3. **Quick Set Option:** Turn the potentiometer on the damper control board to the full left position and slowly rotate RIGHT, until the "RC" RED LED turns on. Now rotate LEFT just slightly, until RC LED turns off. The **IPC** is ready for operation.

"RC" RED LED means damper closing.

"RO" GREEN LED means damper opening.

4. Static Pressure Option: The Integrated Pressure Control Board can be field configured for specified static pressure using a multi meter and the static pressure - voltage chart. (Exhibit A). This chart shows voltage (DC) to inches of W.C. (static pressure) relationship. Use a multi meter set on VDC and place the leads on the "C" terminal and "TP1" (test point one) next to the potentiometer. The Voltage reading translates to inches of W.C.

## Static Pressure Voltage Chart

STATIC PRESSURE	TP1	STATIC PRESSURE	TP1
INCH W.C.	VOLTAGE (DC)	INCH W.C.	VOLTAGE (DC)
0.1	1.49	0.5	2.22
0.15	1.62	0.55	2.27
0.2	1.69	0.6	2.42
0.25	1.81	0.65	2.48
0.3	1.85	0.7	2.6
0.35	1.91	0.75	2.68
0.4	1.94	0.8	2.81
0.45	2.06	N/A	N/A

EXHIBIT A

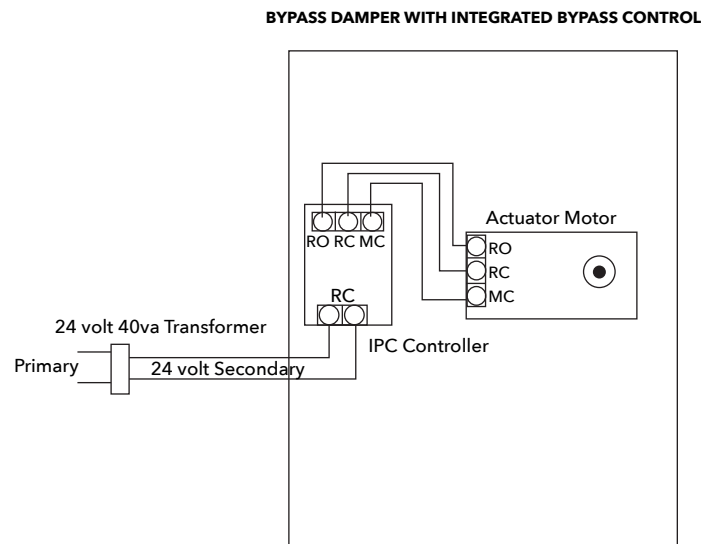
**Note # 1:** To open all dampers, it may be necessary to remove Y outputs to unit on the zone control board and to make full cool calls on all thermostats. This will modulate dampers fully open and lock out compressor.

On GEN II use air balance mode on the mobile App for simplified bypass setup.

## Bypass Checkout For Static Pressure Controller

1. Make cool call at the zone thermostat of the smallest zone.
2. Verify all zone dampers are closed except for calling zone.
3. Verify noise at zone registers is not excessive. Adjust the Integrated Pressure Control LEFT to lower noise (airflow) or RIGHT to increase airflow until too noisy.

## Bypass Damper Wiring Diagram With Integrated Bypass Control



# ***GEN II-VVT***

Hot Line: (800) 228-2966

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Huntington Beach, CA 92649

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