System 2000

GEN II

A MODULATING SYSTEM

Vote Based Auto Changeover VAV

Installation and Applications Manual

Zonex SYSTEMS
comfort you control

Part #GENIIMAN
June 2014

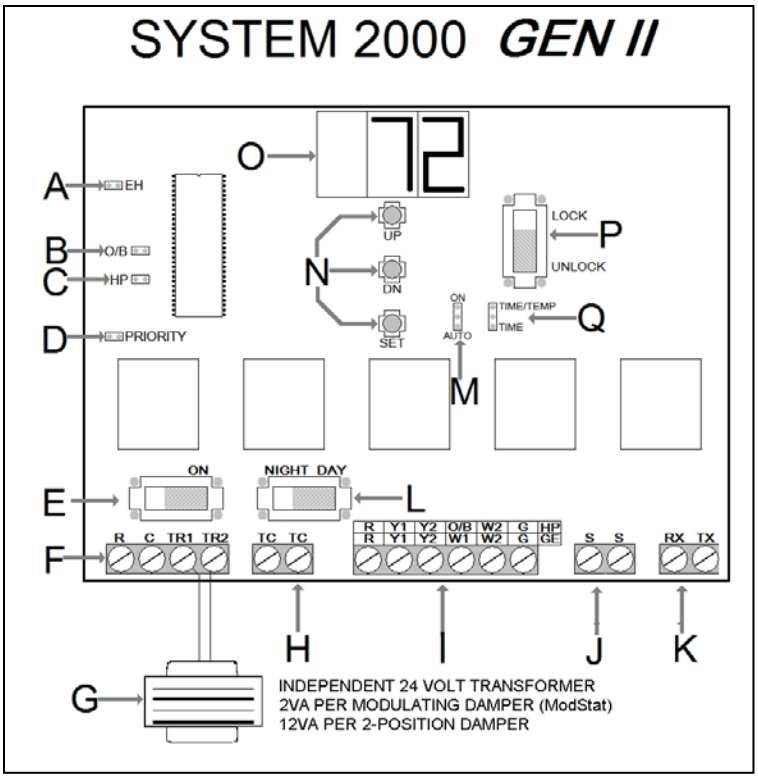
GEN II
QUICK START AND COMMISSIONING

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 R & C Terminals from the ***GEN II*** Controller to the ***first sub-base – only*** (18 ga. Thermostat wire).
7. Wire RX & TX Terminals from the ***GEN II*** Controller using **Belden 8740 twisted pair wire** to the ***first thermostat sub-base – only***.
8. Damper wiring – connect RO, RC, MC wires from each thermostat to its damper with 18 GA thermostat wire.
9. Plug 1 **MODSTAT** into that sub-base.
10. Address that thermostat to #1 – see Pages 10-13 for **MODSTAT** installation, addressing and operation.
11. Turn on ***GEN II*** Controller switch “E”. Power light should light up and then look at the Display "O" on the ***GEN II*** Controller, and the number 01 appears on the Display. This indicates you are communicating with the first thermostat.
12. If you don’t see the #1 and a 0 is displayed, check the address. If the address is #01, then check wires for R&C polarity and RX TX for correct connections.
13. If #1 is displayed on the ***GEN II*** Controller, then daisy chain wires from Stat 01 to the next stat and address it #2; then repeat the ON – Off switch operation and confirm the #2 shows up on the display indicating the system is now communicating with 2 thermostats.
14. Continue adding **MODSTATS**, and confirm communication by repeating the ON – Off switch operation until all stats are wired and the total number of thermostats on your job shows up on the display on the ***GEN II*** Controller. (If you are adding stand-alone units to the GEN II Controller, see #15. If not, skip to #16)
15. If there are any stand-alone units that are going to be managed by the ***GEN II*** Controller, install **DIGICOM / DIGIHP** stats at this time. Continue the RX & TX daisy chain from the last **MODSTAT** to the **DIGICOM / DIGIHP** and wire in the stand-alone unit at this time and address the **DIGICOM / DIGIHP** (see Pages 14-17 for installation, addressing and operation). Confirm communication by repeating the On – Off switch operation until all stats are wired and the total number of thermostats on your job shows up on the display on the ***GEN II*** Controller.
16. 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 ***GEN II*** Controller.
18. Repeat with Heat Call for W1 (red LED).
19. Wire ***GEN II*** Controller to A/C unit.
20. Set stat to call for cool, and check register to be sure each damper opens and closes as you make and satisfy calls.

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

GEN II
QUICK START AND COMMISSIONING

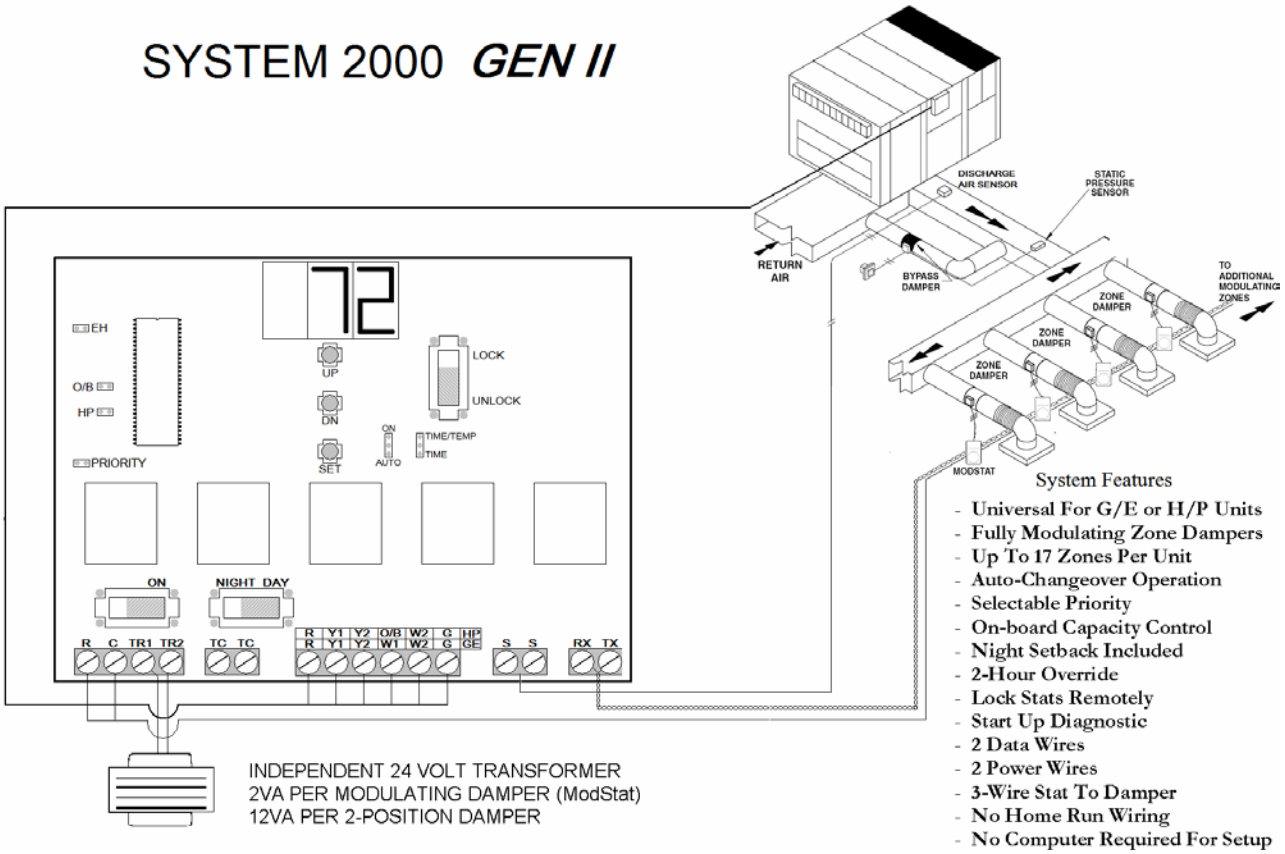


The ***GEN II*** is equipped with a ***Digital Display (O) on the GEN II controller that constantly displays Leaving Air Temperature from the unit***. At startup, this display also reports the number of thermostats communicating with the ***GEN II*** controller. The display and 3 buttons (**N**) beneath 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 **(A)** 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 **(B&C)** should both be on one pin or removed for GE operation.
3. **PRIORITY** jumper **(D)** 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.
4. Set the power switch **(E)** to **ON**.
5. Set the **NIGHT DAY** switch **(L)** to the **DAY** position.
6. Set the fan jumper **(M)** to **AUTO** for intermittent operation or **ON** for constant ON operation in the Occupied mode.
7. Place the **LOCK** – **UNLOCK** switch **(P)** in the UNLOCK position.
8. Place the **TIME/TEMP** jumper **(Q)** on the middle and upper pins to control Y2 and W2 staging on run time and supply air temperature.

Table of Contents



SYSTEM OVERVIEW

The SYSTEM 2000 ***GEN II*** is a commercial modulating or 2-position zone control system controlling 2-17 independent zones per unit. The ***GEN II*** controller is designed for Auto Change- over, multi-stage Heat Pump (2C/3H) and Gas Electric (2C/2H) applications.

For modulating applications, the ***GEN II*** system uses the Zonex ModStat, which controls the “ST” series, 3-wire, 24-volt, power open / power close round and rectangular dampers. For 2-position damper applications, the ***GEN II*** system uses the Zonex MODS2 thermostat. The MODS2 thermostats control the TR round or TREC rectangular series, 2-wire, power close / spring open, low pressure dampers. The TR / TREC series dampers are designed for systems 5 tons or less (2000 CFM).

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 zone control system to install and wire. The ***GEN II*** System operates over an unshielded two-wire data link, along with two 24 V 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.

System 2000 ***GEN II*** offers the following additional control features:

1. *Set Cooling and Heating capacity cut-out set points*
2. *Adjustable timing to initiate 2nd 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. *Open all dampers for air balancing*

System 2000 ***GEN II*** components:

- ***GEN II*** controller (includes integrated capacity control)
- Zone thermostats
- Power open / power close 24vac supply dampers
- Power open / power close 24vac bypass damper with static pressure control
- Communication cable (Belden 8740) twisted pair
- Time Clock (optional)
- 24vac 40va transformers: 1 to control system and dampers
  1 for bypass damper and static pressure control
- Stand-alone thermostat – non-zoned system

GENERAL SEQUENCE OF OPERATION

When the ***GEN II*** controllers are powered up, the total number of addressed thermostats (ModStat, MODS2, DIGICOM, DIGIHP) 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 50% open (ModStat) or full open (MODS2) for ventilation mode. Additional thermostats may be utilized to control stand-alone rooftop units with **DIGICOM / DIGIHP** thermostats. The system blower operation can be configured for constant ON or intermittent Auto. The controllers are shipped from the factory for Auto fan.

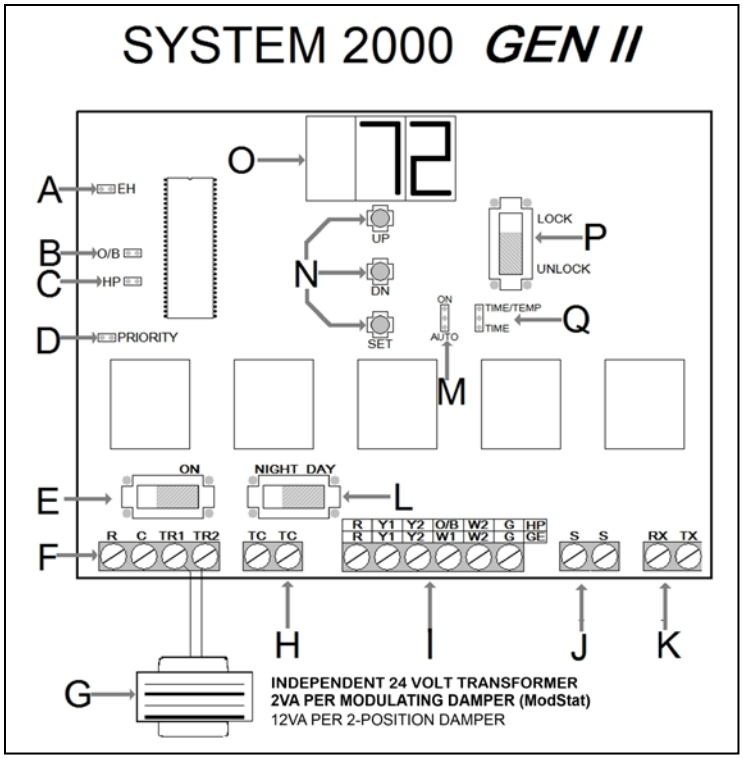
The System 2000 ***GEN II*** systems can be field configured for adjustable time based opposite call changeover, vote based majority changeover, or priority vote changeover by thermostat assignment. The ***GEN II*** controllers are shipped from the factory for 10-minute opposing call changeover. The ***GEN II*** controllers "poll" 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*** controllers change 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 close position, or close 100% depending on the thermostat being used. When the last calling zone is satisfied in either heat or cool mode, the ***GEN II*** controllers will terminate 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 5–30 minutes. The factory default is 10 minutes. At the end of the selected time period, if the opposing call is 3 degrees away from set point, heating is turned off. After a 5-minute purge cycle, 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 50% 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.

GAS ELECTRIC OPERATION



LEGEND

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

TERMINAL FUNCTIONS / CONNECTIONS

TX / RX – 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
R / C – Stat Power Daisy Chain Stat to Stat (18 ga. Thermostat wire)

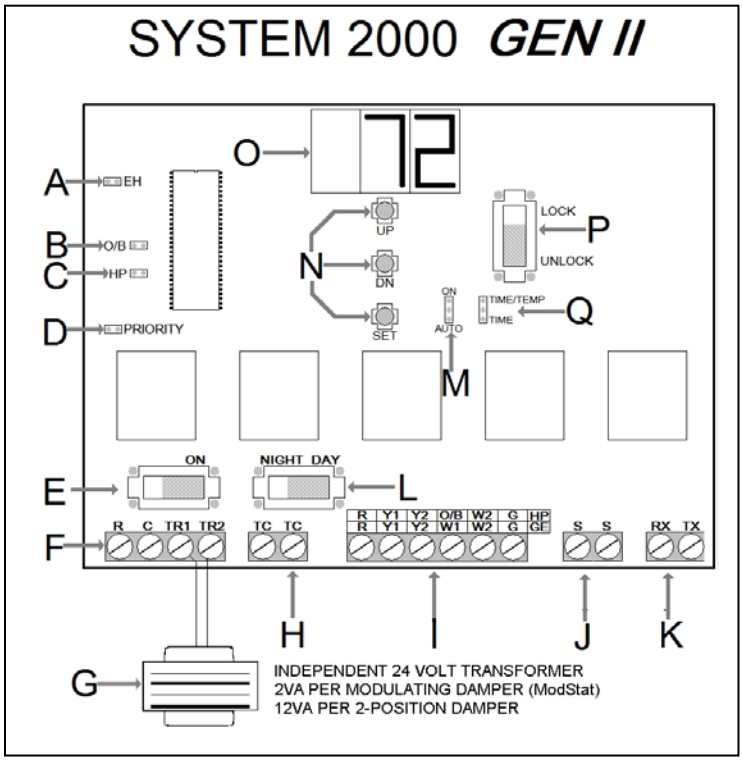
General Installation Instructions

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 **(G).**
   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 **(J).** 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 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 **RX TX** communication wires and **R** and **C** from the thermostats to the controller (**F&K**), F = (R C), K = (TX RX). (Communication wire maximum is 4,000 ft. from the Command Center to the farthest **ModStat**, **DIGICOM** or **DIGIHP**.)
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 (O) on the GEN II controller 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 **(A)** 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 **(B&C)** should both be on one pin or removed, for GE operation.
3. **PRIORITY** jumper **(D)** 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.
4. Set the power switch **(E)** to **ON**.
5. Set the **NIGHT DAY** switch **(L)** to the **DAY** position.
6. Set the fan jumper **(M)** to **AUTO** for intermittent operation or **ON** for constant ON operation in the Occupied mode.
7. Place the **LOCK** – **UNLOCK** switch **(P)** in the UNLOCK position.
8. Place the **TIME/TEMP** jumper **(Q)** 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 **(N)**; "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 **(A)** 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 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 with a jumper which is placed on the middle and upper pins on TIME/TEMP **(Q),** and the cut-in delay set at 03 (3 min) in the controller program. The cut-in temperatures are fixed in the controller program at 57°F (13°C) and higher for Y2 and 120°F (48°C) and lower for W2. The Y2 and W2 cut-in delay sequence can be field adjusted (see below).

Adjust 2nd Stage Cut-in Time Delay

1. To increase the Y2 and W2 cut-in delay, press and hold the SET and DN buttons **(N)** 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 **(N)** 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.

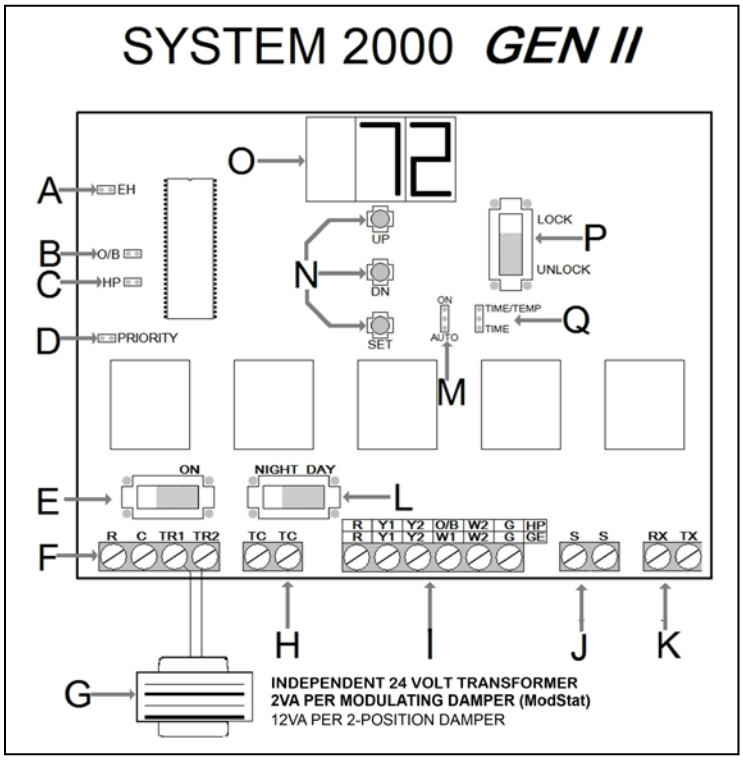
Configure 2nd Stage Cut-in For Time Delay and Thermostat Demand Only

1. Place the 2nd stage configuration jumper **(Q)** 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



LEGEND

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R – 24vac from Unit Transformer

TC / TC – Time Clock Input for Occupied / Unoccupied Operation

TR1 / TR2 – 24vac Power Input / Common
R / C – Stat Power Daisy Chain Stat to Stat (18 ga. 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 **(G).**
   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 **RX TX** communication wires and **R** and **C** from the thermostats to the controller (**F&K**), F = (R C), K = (TX RX). (Communication wire maximum is 4,000 ft. from the Command Center to the farthest **ModStat**, **DIGICOM** or **DIGIHP**.)
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. If the supply air temperature drops one degree below the Cool cut-out temperature, Y1 and Y2 will de-energize for 4 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 4-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.

Emergency Heat - The ***GEN II*** emergency heat operation can be selected from any ModStat for the entire control system. When the system operation mode is changed to Emergency Heat on a given ModStat, the ***GEN II*** controller will recognize the mode change on the next system poll. The thermostat which was used to select Emergency Heat does not have to make a heat call for the ***GEN II*** controller to respond to the change. Once the ***GEN II*** controller changes the mode to Emergency Heat, any ModStat in the system can make an emergency heat call. When the controller receives a heat call in this mode, the compressor(s) are locked out and W2 is energized. The ***GEN II*** controller will continue to make consecutive Emergency Heat calls until the ModStat(s) have been changed back to the AUTO or HEAT mode.

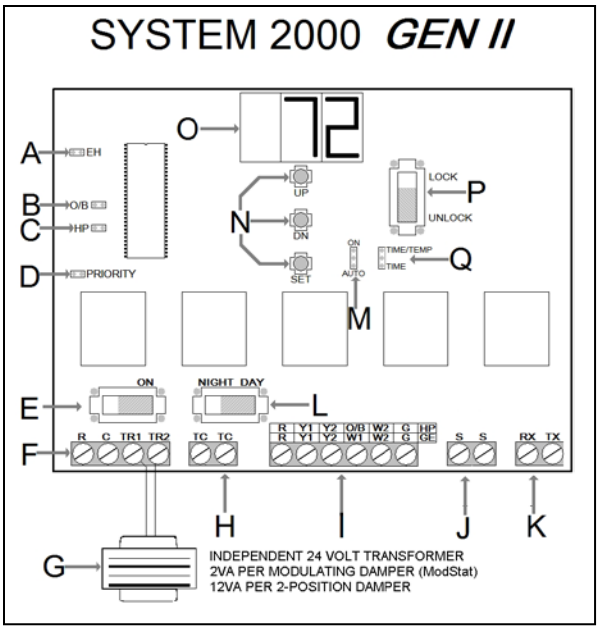
To select Emergency Heat on any ModStat:

1. Press and hold the ModStat *Menu* button
2. When the mode display indicates *Emg*, release the *Menu* button; and immediately press and hold the *Select* button to set the mode.

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

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 **(C)** 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 **(N)**; "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 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 with a jumper which is placed on the middle and upper pins on TIME/TEMP **(Q),** and the cut-in delay set at 03 (3 min) in the controller program. The cut-in temperatures are fixed in the controller program at 57°F (13°C) and higher for Y2 and 120°F (48°C) and lower for W2. The Y2 and W2 cut-in delay sequence can be field adjusted (see below).

Adjust 2nd Stage Cut-in Time Delay

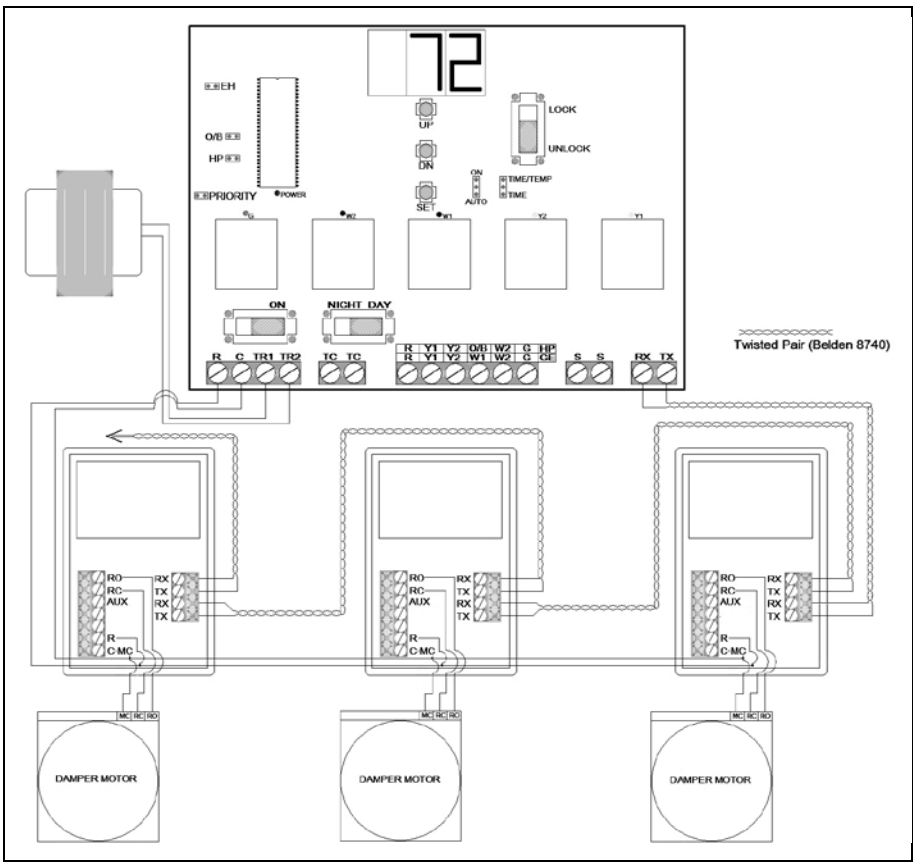
1. To increase the Y2 and W2 cut-in delay, press and hold the SET and DN buttons **(N)** simultaneously. When 03 appears in the display, release the buttons and immediately press the UP button and hold until the desired delay time is displayed, and release. The time delay is fully adjustable from 3 - 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 **(N)** 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 2nd stage configuration jumper **(Q)** 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.

Zone Thermostat - ModStat



Installation

Wiring

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

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 vertical 2x4 electrical box.

2. Connect the control wires from the ModStat's R & C, to the ***GEN II*** controller (**F**). Verify R & C polarity is the same on each thermostat (18 ga. Thermostat wire).

3. On the ModStat, connect the damper output wires from C-MC, RC and RO to the actuator motor terminals. NOTE: For MODS2, terminal RO is not used.

4. Connect the RX TX communication wires on the right hand terminal block; there are 2 sets of RX TX terminals to make the daisy chain wiring easier.
   NOTE: The communication wire must be twisted pair Belden 8740, 8450 (shielded) or 82442 (plenum rated).

Configuration

Addressing

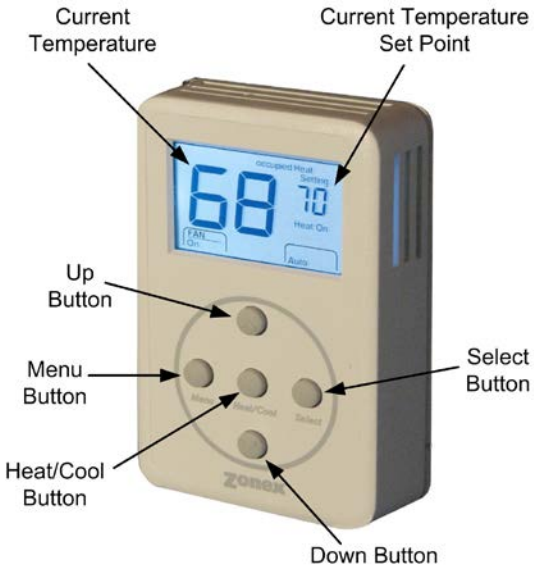
Each thermostat must have a unique address from 1-17.

1. Press and hold the *Menu* button until you see the system mode display on the lower right begin to change modes; then press and hold the *Heat/Cool* button with the *Menu* button.
2. When the display shows “address,” release the *Menu* and *Heat/Cool* buttons, and press the UP or DN button until the correct address is displayed in the upper right of the display.
3. After setting the address, the thermostat will automatically go back to normal operation; and the set point temperature will replace the address number just programmed.

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. Press and hold the *Heat/Cool* and *Select* buttons together; then press and release the UP button to increase the display temperature by one degree.
2. To lower the temperature display, press the DN button once, after pressing the *Heat/Cool* and *Select* buttons. This makes a 1-degree change.



Adjusting Set Points

The Heat or Cool set points can be displayed by pressing the *Heat/Cool* 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: H & C settings - Function switch (L) in the DAY position, or time clock in Occupied.

Unoccupied Mode: H & C settings – Function switch (L) 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 DN button to change the heat set point. If “Cool Setting” is displayed and you want to change the Heat set point, press the *Heat/Cool* button twice to change from “Cool Setting” to “Heat Setting”. Then press the UP or DN button to change the set point.

Cool - If “Cool Setting” is displayed on the top right of the display, simply press the UP or DN button to change the cool set point. If “Heat Setting” is displayed and you want to change the Cool set point, press the *Heat/Cool* button twice to change from “Heat Setting” to “Cool Setting”. Then press the UP or DN button to change the set point.

Changing Mode

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

Heat only – Press and hold the *Menu* button and note the mode display begin to change. Press the *Select* button when Heat is displayed.

Emergency Heat - Press and hold the *Menu* button and note the mode display begin to change. Press the *Select* button when Emg is displayed.

Cool only - Press and hold the *Menu* button and note the mode display begin to change. Press the *Select* button when Cool is displayed.

System Off - Press and hold the *Menu* button and note the mode display begin to change. Press the *Select* button when Off is displayed.

Auto mode – Press and release the *Menu* button.

Override
When the thermostat displays “Unoccupied” (top of display), a 2-hour temporary override may be initiated by pressing the Override/*Select* button. When additional override time is required, press the Override/*Select* button again.

Reheat
The **ModStat** can be field configured for reheat operation, including Fan Powered Boxes. To set the ModStat for Reheat, press and hold the *Heat/Cool* and *Select* buttons together and then press the Menu button; release all three buttons and the **°** symbol will appear next to the heat and cool set point temperature display.
NOTE: An air proving switch must be wired into the AUX output to protect the electric heating devices.

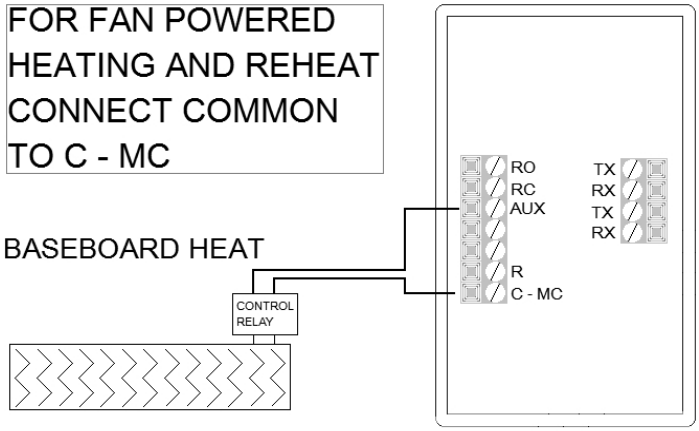
Heat Call – The **ModStat** will send a signal for demand heating when the space temperature drops 1**°** below the heat set point temperature. If the temperature drops 2° below the heat set point temperature, the AUX output will energize for auxiliary heat. The thermostat will end the active call when the space temperature meets the heat set point.

When configured for Reheat, if the space temperature drops below the heat set point, the **ModStat** will modulate the damper to 40% open. When the temperature drops one more degree, the AUX terminal energizes the duct heat strip. The heat call will terminate when the space temperature reaches the heat set point temperature. The “AUX” output will de-energize, and the damper will modulate closed. If the system goes into the ventilation mode, the damper will then modulate open.

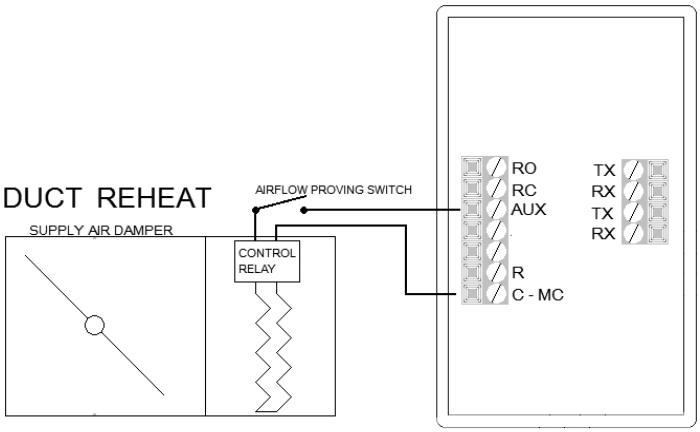
SUPPLEMENTAL HEAT APPLICATIONS

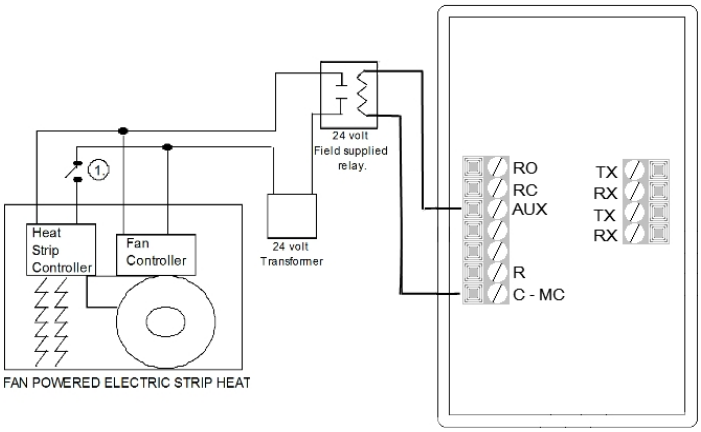
FOR FAN POWERED HEATING AND REHEAT CONNECT COMMON TO C - MC

BASEBOARD HEAT



DUCT REHEAT





FAN POWERED ELECTRIC STRIP HEAT

MODSTAT

SUBBASE

ModStat Terminal Designations

TX – Data transmit {twisted pair}
RX – Data receive
AUX – Reheat/AUX Heat Fan

RO – Run Open, damper
RC – Run Closed, damper {18 ga. stat wire}
R – 24vac power input
C-MC – 24vac power common

NOTE: A larger transformer may be needed to power fan relay and/or heat strip relay.

DIGICOM / DIGIHP THERMOSTATS

DESCRIPTION

The Zonex Systems **DIGICOM** (2H, 2C) and **DIGIHP** (3H, 2C) are microprocessor based, auto changeover, stand-alone thermostats used to control stand alone units with no dampers in the system. The DIGICOM is the Gas Electric version and has two-stage heat / cool outputs with selectable fan operation. The DIGIHP Heat Pump thermostats have two-stage cool and three-stage heat outputs with selectable fan. The DIGICOM and DIGIHP thermostats have a large, easy-to-read LCD display with a distinctive grey backlight. The display backlight is continuously illuminated in the Occupied mode and goes off in the Unoccupied mode.

The **DIGICOM** and **DIGIHP** are very easy to configure through the system program or to make manual adjustments using the buttons located on the front cover.

These thermostats feature an onboard thermistor for precise temperature measurement. In the event of power loss, the Heat and Cool set points are stored in a non-volatile memory, without the need for battery backup.

The space ambient temperature is continually displayed with large, easy-to-read numbers. The **DIGICOM** temperature display range is 45° - 95°F (7°- 35°C) and the **DIGIHP** temperature display range is 55°- 95°F (12°- 35°C). Fan Mode, Heat or 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 system program to provide limited manual set point adjustment. Two-hour override is provided for after-hours temporary operation with a touch of a button.

INSTALLATION

Thermostat and terminal base

1. The thermostat is to be installed on the interior wall, away from drafts, supply air currents and direct sunlight or any heat generating source.
2. To remove the thermostat cover, grasp the cover at the top and pull straight off; do not pivot the cover from the base.
3. Install the thermostat terminal base to the wall using the provided anchors and screws. The thermostat can also be mounted on a 2x4 electrical box using two #6-32” screws.

Wiring

The Zonex Systems **DIGICOM** and **DIGIHP** thermostats have been specifically designed to make wall mounting and wire connections very easy. The thermostat terminal base has two separate terminal blocks: the left side terminal block is for the 24vac control circuits, and the right side terminal block is for the RX TX communication circuits. There are two sets of RX TX terminals on the base to make daisy chain wiring from device to device straightforward and simple.

Wiring (Continued)

1. Use minimum 18-gauge AWG thermostat wire for the 24vac control circuits. The load on these circuits must not exceed 1 amp. The voltage range on R and C must not exceed 28vac. Check Polarity before applying the transformer wire to R and C. Refer to the Polarity Check diagram on Page 17.
2. Connect the communication wires to the RX TX terminals. There are 2 sets of RX TX terminals for "daisy chain" installation of this circuit. The communication wire specification is twisted pair (**Belden 8740**) or shielded twisted pair wire (**Belden 8450**).

NOTE: When using shielded twisted pair wire (**Belden 8450**), just connect the shield conductors together, as there is no electrical connection on the thermostat base terminals. The shield will be landed on the ***GEN II*** controller on the G or TR2 terminal.

DIGICOM

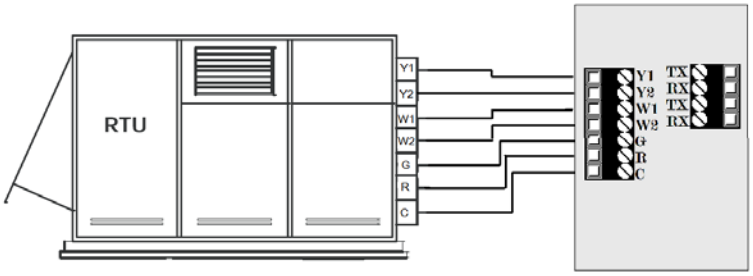


Fig. 1

DIGIHP

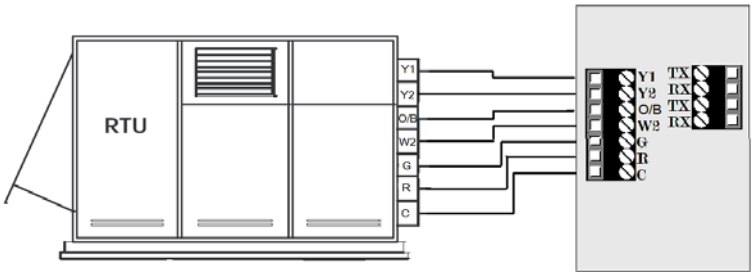


Fig. 2

Blower Fan Relay

For electrical heat applications, which require a fan output on a call for heat, see *Fig. 3.*

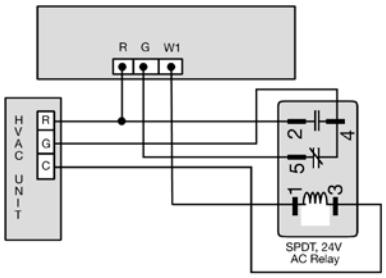


Fig. 3

Configuration

1. Set the unique address for each thermostat from 01 to 20.
2. Press and hold the **Menu** button until you see the system mode display on the lower right begin to scroll and change modes; then press and hold the **Heat/Cool** button with the **Menu button.**
3. When the display shows "address" and the set point temperature changes to the address number, press the **UP** or **DN** button to raise or lower the number.

MANUAL ADJUSTMENTS

Heat and Cool Set point Display

Press the **Heat/Cool** button to display the Heat or Cool set point temperatures.

Temperature Set points

COOL Set point

1. Press the **Heat/Cool** button to display the Cool set point on the upper right.
2. Press the **UP** or **DN** buttons to change the Cool set point.

HEAT Set point

1. Press the **Heat/Cool** button to display the Heat set point on the upper right.
2. Press the **UP** or **DN** buttons to change the Heat set point temperature.

FAN Mode

To change the FAN operation to AUTO or On, press the **UP** and **DN** buttons together once to toggle fan operation.

HVAC System Mode

To select Heat, Cool, Auto, Emergency Heat (HP only) or OFF, press and hold the Menu button; and when the desired mode is displayed, press and hold the **Select** button; then release both to confirm mode.

Override

When the system is in the Unoccupied mode, the thermostat provides a 2-hour override for after-hours system operation. To select the 2-hour override, press the **Select** button and note "Override" indicated on the display, along with the backlight coming on. When additional override is required, press the **Select** button again.

Calibration

When re-calibration is required, press and hold the **Heat/Cool** and **Select** buttons simultaneously (the screen will flash). Then press the **UP** button once to increase temperature 1°, or press the **DN** button once to decrease the temperature 1°. If additional calibration is required, repeat this step.

Reversing Valve Mode – Heating

DIGIHP (O&B) is factory set at "**O**" and can be field configured for "**B**" reversing valve operation. For "**B**" mode reversing valve (reversing valve energized in the heat mode), press and hold the **Heat/Cool** and **Select** buttons; then press and release the **Menu** button once. Release the **Heat/Cool** and **Select** buttons. The **°** symbol next to the set point display should disappear.
(To set from "**B**" to "**O**", reverse the procedure.)

THERMOSTAT OPERATION

Display

The grey display backlight is constantly illuminated in the Occupied mode. The display backlight goes off when in the Unoccupied mode. When in the Unoccupied mode, if any button is pressed, the backlight will illuminate for 5 seconds. If the thermostat is placed in the override mode, the backlight will illuminate until the 2 hours times out. To terminate override, press the **Select** button again.

COOL – DIGICOM / DIGIHP: The thermostat will make a Y1 cool call when the space temperature rises 1° above the cool set point. Y2 will energize when the space temperature rises 2° above the cool set point. When the room temperature is less than 2° above the cool set point, Y2 de-

energizes. Y1 de-energizes at set point. O or B is energized for the reversing valve circuit, depending on configuration. The G circuit is energized for fan.

HEAT – DIGICOM: The thermostat will make a W1 heat call when the space temperature is 1 degree below the heat set point. W2 will energize when the space temperature is 2 degrees below the heat set point. When the room temperature rises to within 2 degrees of the heat set point, W2 de-energizes. W1 de-energizes at set point.

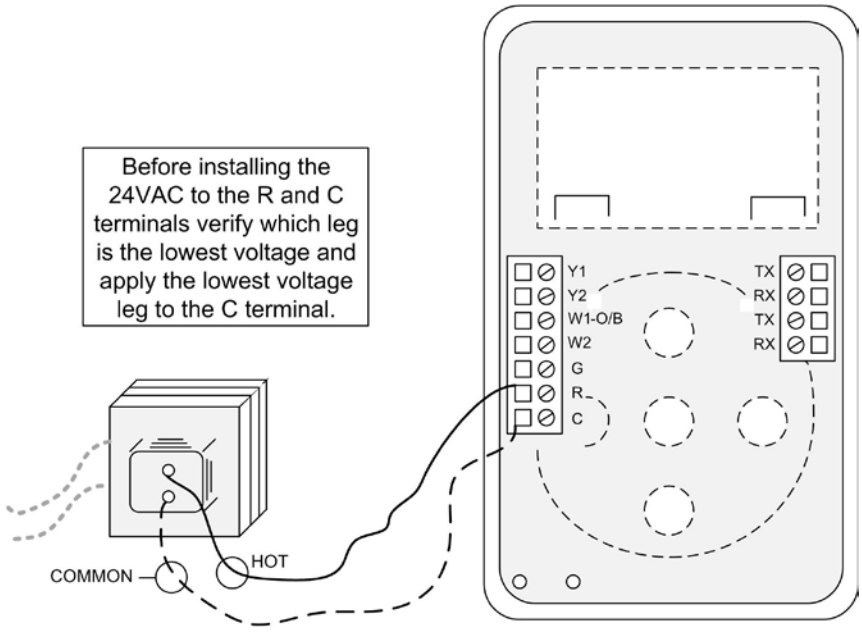
NOTE: The "G" fan circuit on the DIGICOM thermostat is not energized in the Heat mode unless the fan is set for ON operation.

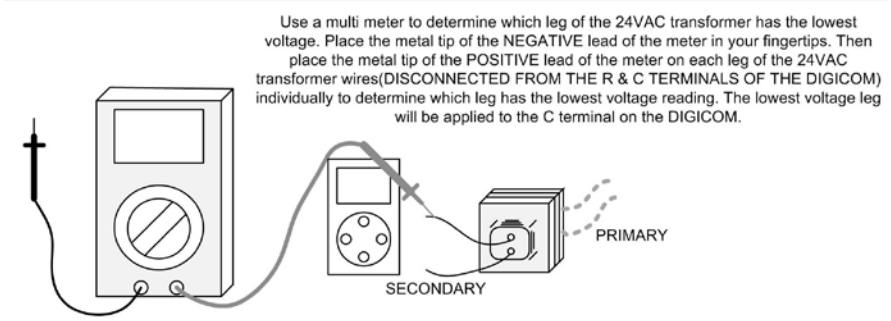
HEAT − DIGIHP: The thermostat will make a Y1 heat call when the space temperature is 1 degree below the heat set point. Y2 will energize when the space temperature is 2 degrees below the heat set point. E (aux heat) will energize when the space temperature is 3 degrees below set point. When the room temperature rises to within 2 degrees of the heat set point, E (aux heat) de-energizes. When the room temperature rises to within 1 degree , Y2 de-energizes. Y1 de-energizes at set point.

Emergency Heat – DIGIHP: When Emergency Heat is selected on the DIGIHP thermostat on a call for heat, there is an output signal on "E" for backup heat and "G" for the fan. The compressor circuits "Y1" and "Y2" are locked out during heat calls until Auto, Heat or Cool mode is selected. The thermostat display will indicate when Emergency Heat has been selected.

DIGICOM – FAN operation for electric heat applications: A pilot relay may be required to energize the fan for heat operation on electric heat applications. This relay is a 24vac coil – SPST and is field supplied. The coil is energized from W1 and C from the **DIGICOM** thermostat terminal base.

VOLTAGE POLARITY CHECK ON DIGICOM / DIGIHP





System Start and Test

1. Plug all thermostats into sub-bases. Turn ***GEN II*** power switch **(E**) to ON.
2. Choose any Thermostat and change its address from 25 to 1.
   (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 25 to 2. 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 remaining stats to verify that all addresses are 25.
2. Check all R & C wiring for proper color-to-color connections. Even if the stats lighted, all R wires at the thermostat must be connected to the ***GEN II*** R terminal. All C wires must be connected to the ***GEN II*** C terminal. Confirm the daisy chain wiring is correct at this time.
3. Check RX & TX wires for proper color code and connections; polarity is imperative. All RX connections must land on RX terminal on the following thermostat, and all TX connections must connect to TX terminal on each thermostat.
4. Check R & C wires for opens or shorts.

Checking the Daisy Chain for opens or shorts:

Start from the ***GEN II*** board, and follow RX & TX wires to the first sub-base. Remove the RX & TX 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.

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 AC unit or heat pump connections; then make heat and cool calls to the ***GEN II*** Controller.

Advanced Feature Configuration - Gas Electric and Heat Pump

Occupied / Unoccupied fan operation

The factory setting for FAN operation is AUTO, with the FAN jumper **(M)** 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 **(M)** 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 3-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.

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*** controllers will operate changeover by majority vote from the zone thermostats.

Priority active Heat and Cool call operation

The ***GEN II*** controllers 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 **(D)** on both pins.

3. Press and hold the SET and UP buttons **(N)**, 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 01and 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 **(P)** 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 **(A)** over both pins
2. Press the **SET** and **UP** buttons **(N)** 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 (A) - place the jumper over both pins.
2. Press the **SET** and **DN** button (N) 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.

ZONE DAMPERS

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
STMPD Round Med. Pressure	1.75”	Any Size	18”
STMRTD Rect. Med. Pressure	1”	7.5 Tons	24”W x 20”H
STCD Rect. Heavy Duty	1.75”	Any Size	48”W x 48”H
D-FUSER	0.1”	Any Size	10”

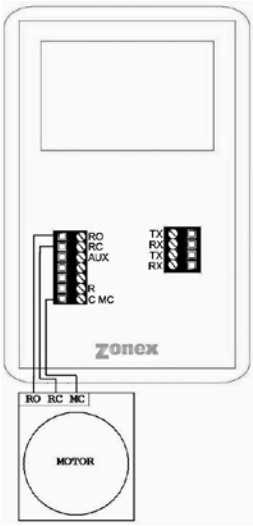
Maximum Differential Pressure refers to the maximum static pressure drop in inches of water column between the input (upstream) of the zone damper and the output (downstream) when the damper is closed.

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.

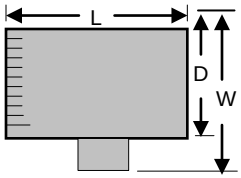
MEDIUM PRESSURE (STMPD)

MODSTAT



DAMPER TO MODSTAT WIRING

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”

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 ∆P “ 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

RECTANGULAR ZONE DAMPERS

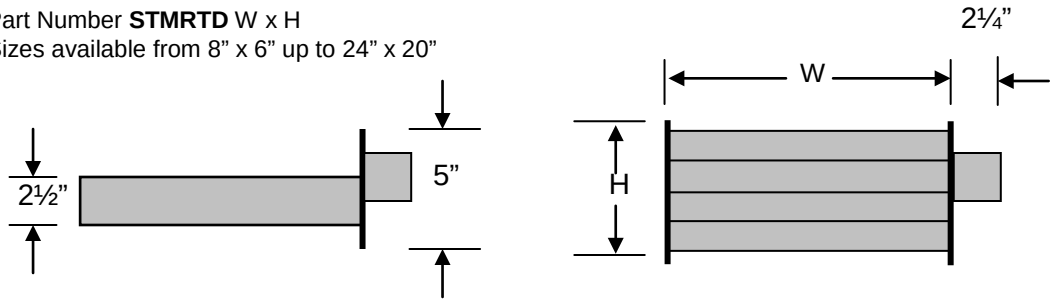
The rectangular zone dampers are available in either medium pressure or heavy duty. For systems under 7.5 tons, use medium pressure dampers. For systems 7.5 tons or over, use heavy duty dampers. Motor drive time open and close is 90 seconds.

RECTANGULAR MEDIUM PRESSURE ZONE DAMPERS (STMRTD)

Zonex Systems rectangular medium pressure dampers are recommended for systems under 7.5 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.

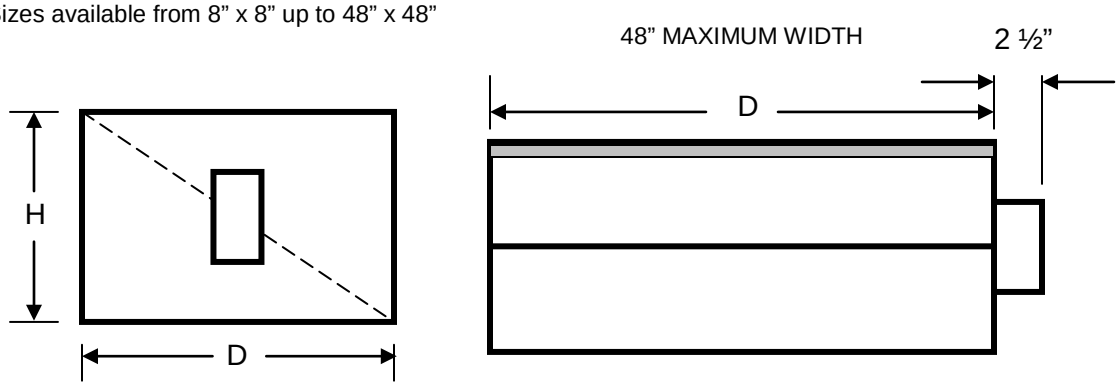
MEDIUM PRESSURE RECTANGULAR DIMENSIONAL DATA

Part Number **STMRTD** W x H
Sizes available from 8" x 6" up to 24" x 20"

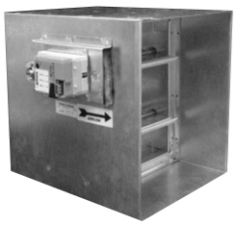


HEAVY DUTY RECTANGULAR DIMENSIONAL DATA

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 7.5 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 SELECTION

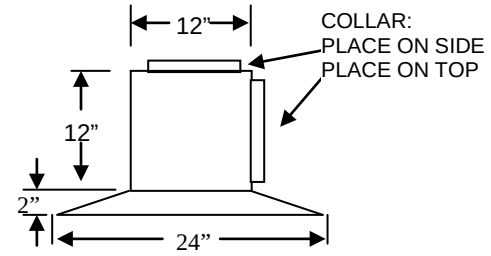
Rectangular Damper Capacities*

HEIGHT IN INCHES \ WIDTH IN INCHES	8	10	12	14	16	18	20	22	24	26	28	30	32
8	300	400	500	610	710	820	925	1050	1175	1250	1400	1500	1600
10	400	540	680	825	975	1125	1300	1400	1590	1750	1975	2100	2175
12	500	680	850	1000	1200	1400	1600	1850	2000	2300	2550	2700	2850
14	610	825	1000	1250	1500	1750	2000	2250	2500	2900	3150	3425	3625
16	710	975	1200	1500	1800	2100	2450	2700	3000	3600	3950	4200	4425
18	820	1125	1400	1750	2100	2500	2850	3080	3600	4400	4600	4950	5100
20	925	1300	1600	2000	2450	2850	3400	3775	4000	4800	5500	5700	6000
22	1050	1400	1850	2250	2700	3080	3775	4300	4800	5100	6000	6350	6800
24	1175	1590	2000	2500	3000	3600	4000	4800	5400	6100	7000	7150	7600
26	1250	1750	2300	2900	3600	4400	4800	5100	6100	6700	7800	8400	8900
28	1400	1975	2550	3150	3950	4600	5500	6000	7000	7800	8400	9150	10000
30	1500	2100	2700	3425	4200	4950	5700	6350	7150	8400	9150	10000	11000
32	1600	2175	2850	3625	4425	5100	6000	6800	7600	8900	10000	11000	11250

* 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 device.

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.



AT NECK VELOCITIES UP TO 700 FPM
NC LESS THAN 30

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:

A. Determine CFM from heat gain or loss calculations.
B. Select damper size using either the round capacities chart, the rectangular capacities chart or by using a duct sizing table or calculator.
C. 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.

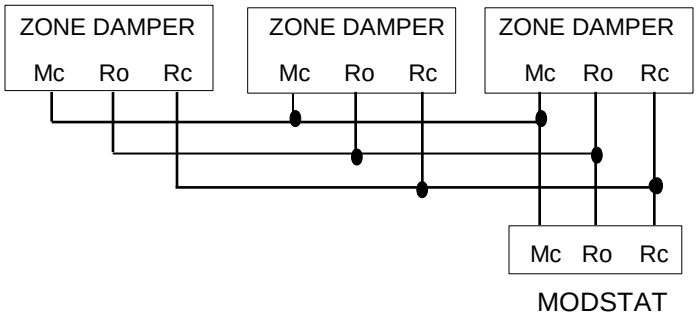
INSTALLATION NOTES

1. Do not exceed 700 FPM in a register/diffuser branch duct.
2. If a damper is installed within 3 feet of a register/diffuser, install sound attenuating flex duct between damper and outlet.
3. Zone dampers should be preceded by 2' − 4' of straight pipe where possible.
4. 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.
5. Remember to allow a 16" gap in the duct for heavy duty rectangular dampers.
6. Medium pressure rectangular dampers slide into a 3¼" wide cutout in the side of the preexisting ductwork.
7. 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.

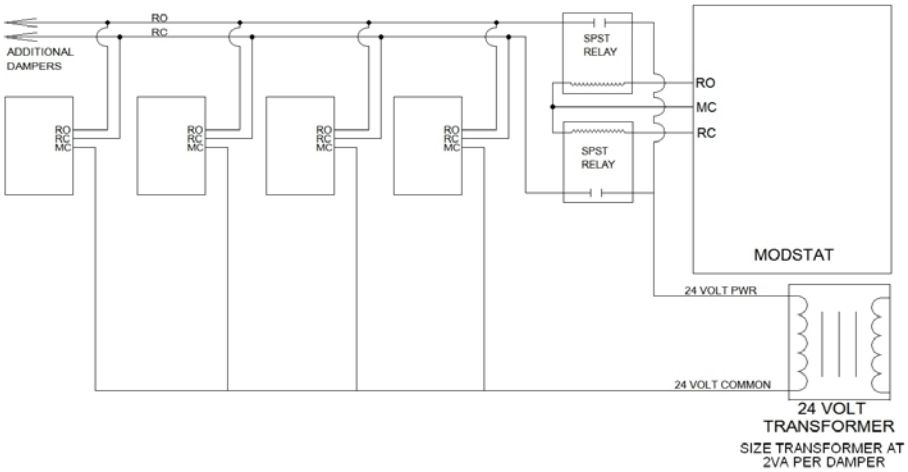
SLAVING UP TO THREE ZONE DAMPERS

Up to three dampers can be directly controlled by one thermostat. To wire two to three zone dampers to one thermostat, use the following diagram shown. Remember to size the damper power transformer for the total number of zone dampers. Each actuator draws 2 VA.



SLAVING MORE THAN THREE ZONE DAMPERS

Use the following diagram when a thermostat will be controlling more than three zone dampers. Use an additional 24V transformer sized at 2VA per damper to power the slaved dampers.

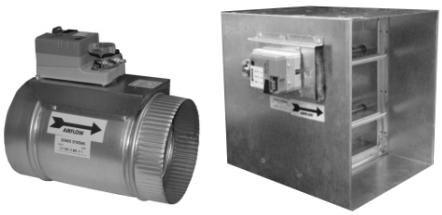


BYPASS DAMPERS – ELECTRONIC

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.

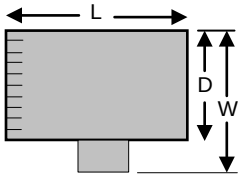
ROUND BYPASS SELECTION TABLE

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"

ROUND BYPASS DAMPER SELECTION

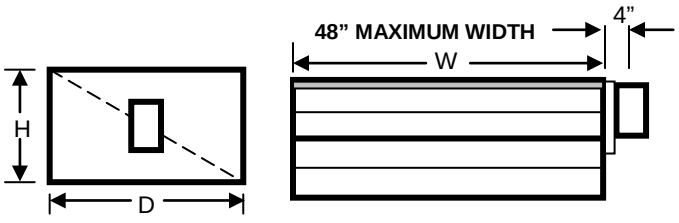
The Zonex Systems **STBP** damper is used for round bypass applications. When you know the bypass CFM requirements, use the ROUND BYPASS SELECTION TABLE to confirm the round damper size.

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

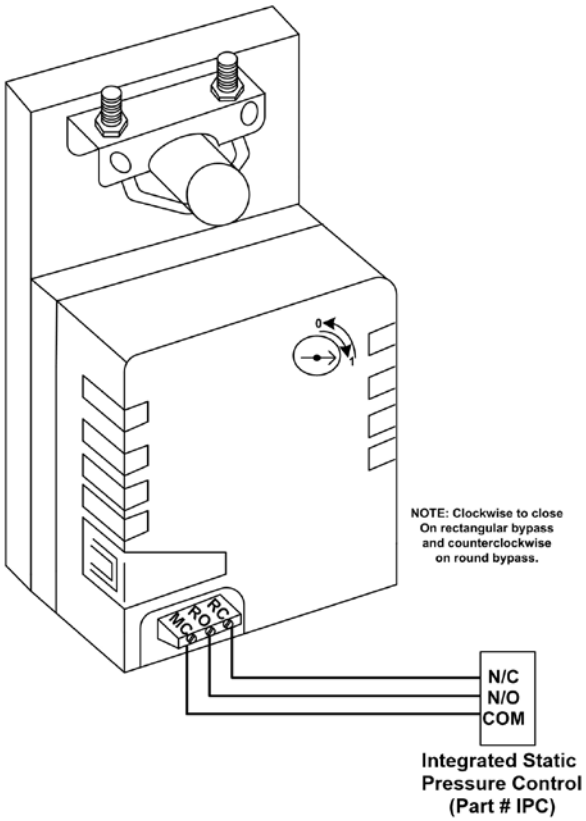
RECTANGULAR BYPASS SELECTION TABLE

WIDTH IN INCHES

HEIGHT IN INCHES	8	10	12	14	16	18	20	22	24	28	32	36	40	44	48
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

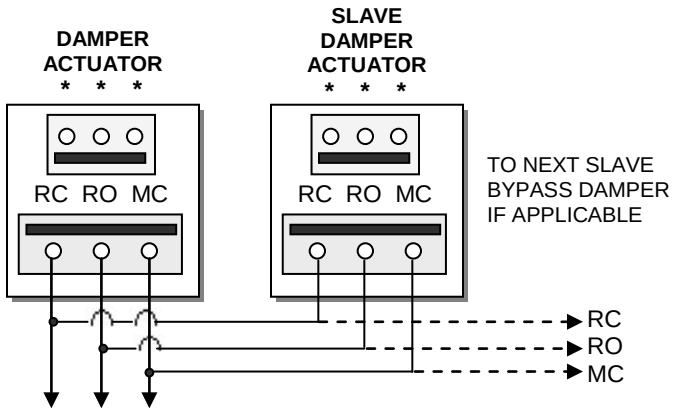
Bypass air in CFM. Calculated at 1500 FPM.
Formula used: B = W x H / 144 x 1500, where B = Bypass air in CFM, W = damper width in inches, H = damper height in inches, 144 = 144 sq. inches per sq. ft., 1500 = 1500 FPM.

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.

BYPASS DAMPER with INTEGRATED PRESSURE CONTROL
(Part # STBP or STCDBP)

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

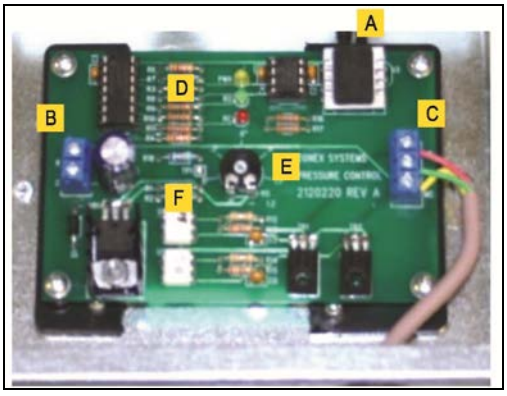
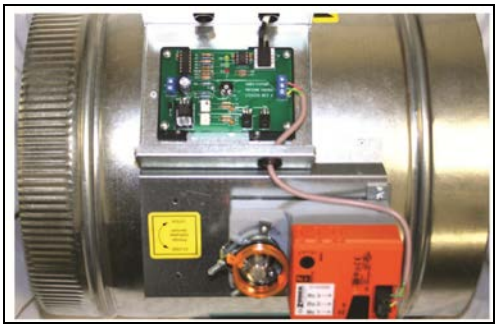


Fig. 1

BYPASS DAMPER INSTALLATION



1. Verify the bypass damper is sized properly to the system and not undersized. (Bypass damper sizing is recommended for 100% of system CFM.)
2. Bypass damper and controller are powered by a dedicated 24vac 40VA transformer.
3. Do not install the bypass damper outside.
4. Locate the Integrated Pressure Control (**IPC**) and air tube on the bypass damper.
5. Drill ¼" hole into the side of the supply duct 2' after the bypass and before the 1st supply take-off. Mount pressure supporting block over ¼" hole, align hole in block with hole in duct. Use provided sheet metal screws.
6. 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.
7. Connect pressure tube from static air pickup to Integrated Pressure Control.

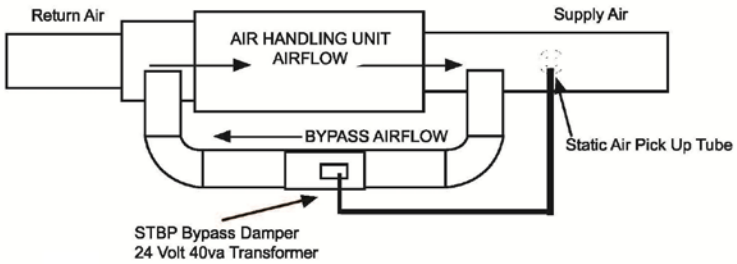


Fig. 2

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		

Exhibit A

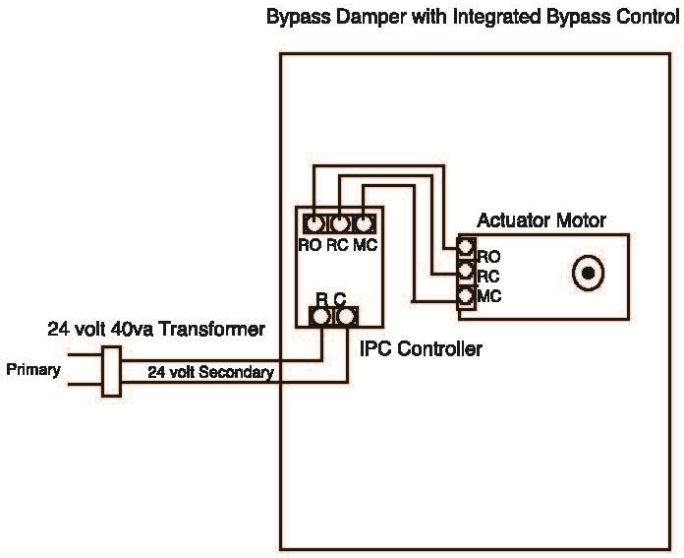
Note # 1: To open all dampers, it may be necessary to remove Y outputs to unit on the zone control board and to make full cool calls on all thermostats. This will modulate dampers fully open and lock out compressor.

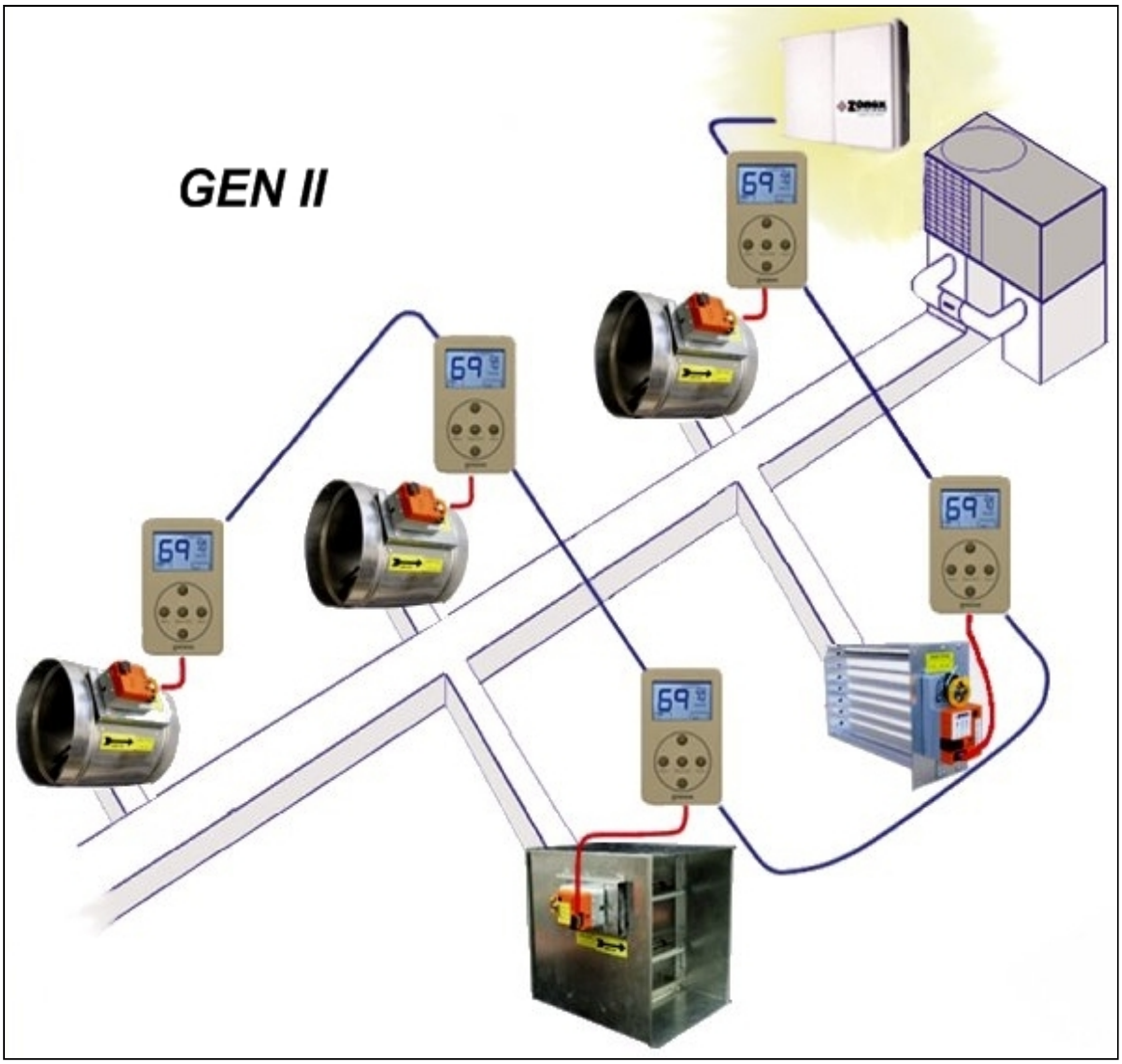
On Zonex Systems ***GEN II*** and ***ModCom II***, use air balance modes for simplified bypass setup.

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

System 2000

GEN II

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Part #GENIIMAN
June 2014