



Installation Guide

DIGI3U

Three-Zone, Universal Controller for
Gas/Electric or Heat Pump Applications

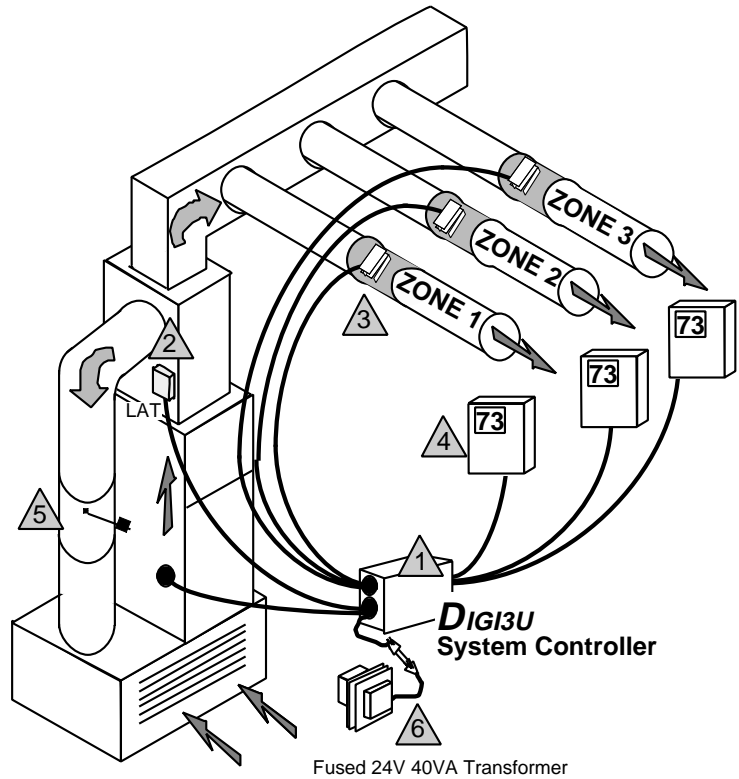
**3-Zone
Controller
for the "RNC"
Market**

Zoning Systems
That's all we do.

INTRODUCTION

DIGI3U is an economical auto-changeover 2 or 3 zone controller, perfect for residential RNC construction or smaller zoning systems. The DIGI3U is a universal board that is field configurable for Gas/Electric or Heat Pump applications. The DIGI3U provides Emergency Heat control and an optional LAT providing capacity control while protecting the coil from freezing or the heat exchanger from premature failure.

- 1** DIGI3U – universal GE/HP controller
- 2** LAT – capacity control
- 3** Zone Dampers
- 4** Thermostats – compatible with most gas/electric thermostats
- 5** Barometric Bypass
- 6** Fused 24V 40VA transformer – to power dampers



SYSTEM DESCRIPTION

The DIGI3U is an auto-changeover device, which provides the HVAC unit with the ability to cycle from heat to cool or from cool to heat on demand of opposing thermostats in system (changeover) making this system ideal for homes desiring constant comfort in all areas of the home. The DIGI3U is a field configurable, gas/electric or heat pump, auto-changeover control for up to 3 zones. Applications can be made for either single stage Gas/Electric systems or Heat Pump systems with Auxiliary/Emergency heat. Both applications require standard Gas/Electric thermostats (heat pumps with auxiliary heat will need 2-stage gas/electric thermostats to call for auxiliary heat). Emergency heat can be controlled by either moving the S2 switch on controller

or by wiring a SPST switch in home and wiring back to controller terminals EM EM.

The LAT capacity control supply air sensor can be wired into the system to provide high and low temperature limits for equipment protection. Controller is shipped with a 1k ohm resistor across the S S terminals of controller. If LAT is not applied to system, this resistor must remain connected to S S terminals; and field supplied low and high limit devices must be added to system. If LAT is applied, remove 1k ohm resistor and install LAT wires to S S terminals. No calibration of sensor is needed.

NOTE: For homes with greater than 3 zones, 2-stage equipment, or fossil fuel, use Zonex Systems DigiTract 4 controller.

DIGI3U DESIGN INFORMATION

DESIGN INSTRUCTIONS

2-3 Zone Application with Bypass Damper and LAT Capacity Control – Use this method if your application is for 2 or 3 zones using a bypass damper and LAT capacity controller. Zonex Systems recommends that all systems use a bypass damper and LAT to maximize system efficiency and comfort. Ductwork design should follow typical duct design procedures: use ductulator to verify airflow requirements, and follow bypass-sizing calculations found in bypass guidelines of this manual.

2-Zone Applications *without* a Bypass Damper or LAT Capacity Control – When designing a system without a bypass damper or LAT, it is necessary to oversize the ductwork and supply registers in order to reduce noise caused by excessive static in HVAC system. Duct runs and dampers must be oversized by 70%, and supply grills must be increased in size to move twice the volume of air at 700 FPM; e.g., if zone calls for 250 CFM and a 12x8 register were sized for non-zoned application, double the volume of air to 500 CFM, and size register for 700 FPM, or a 14x8-supply register. If the Zonex Systems LAT capacity control is not applied, a field supplied freeze protection and high limit device must be installed to protect equipment. This should only be applied to designs in which both zones are approximately the same size.

THERMOSTAT INFORMATION

Each zone requires a zone thermostat. The DIGI3U zone controller is designed to work with standard Gas/Electric thermostats.

For Gas/Electric units and single stage Heat Pump units without Auxiliary or Emergency heat, a single stage G/E thermostat is required.

If application is for Heat Pump with Auxiliary/Emergency Heat, a 2-stage G/E thermostat is required to call for 2nd stage heat.

LAT CAPACITY CONTROL INSTALLATION INSTRUCTIONS

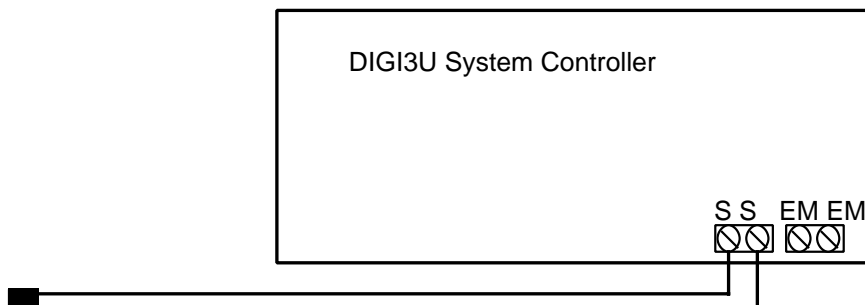
Capacity Control Installation, LAT: Drill a 3/8" hole in the supply air duct, ahead of the bypass tap.

- **Gas/Electric applications** – install sensor as far as possible from the FAU heat exchanger but still before the bypass tap.
- **Heat Pump application** – install the sensor after the indoor coil but before the electric strip heat assembly.

Secure the sensor-mounting base to the duct or AHU cabinet (HP) with the self-tapping screws provided.

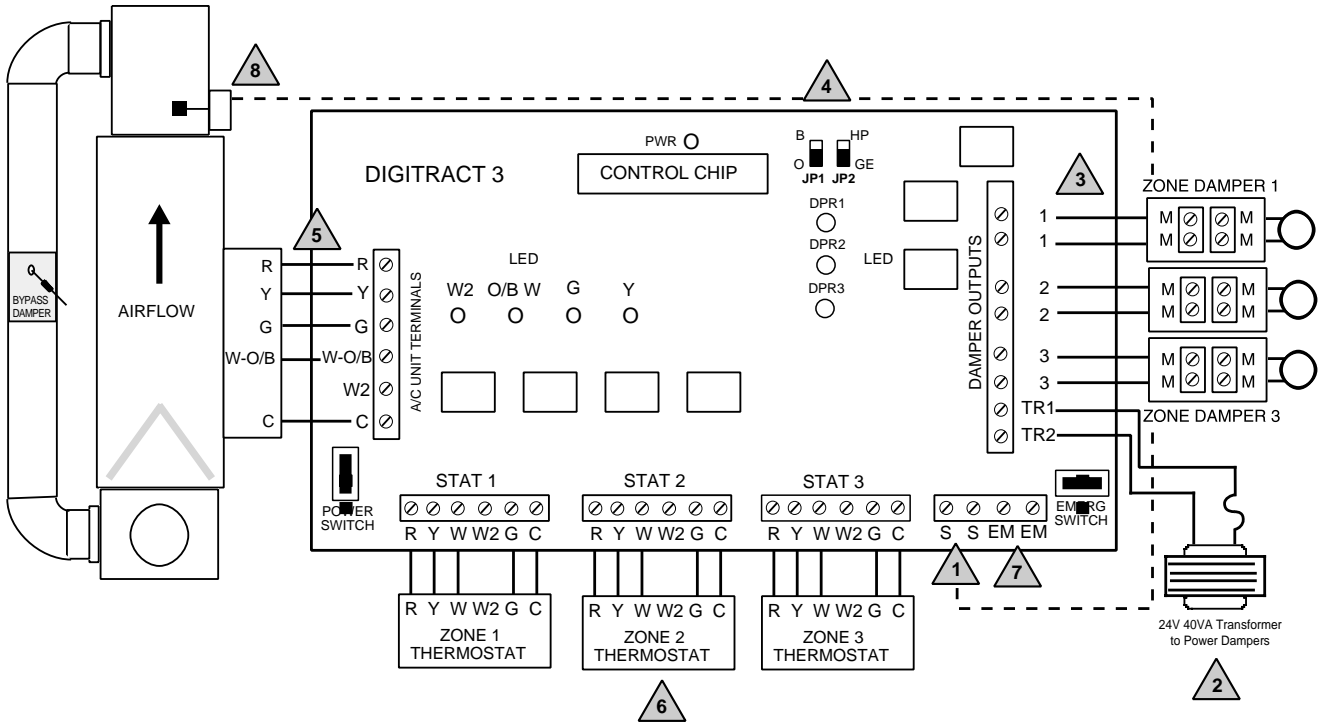
Run wire from the LAT sensor to S S terminals on DIGI3U controller. Insert one wire under each S terminal, and tighten terminal screw.

LAT does not require calibration.



WIRING – GAS/ELECTRIC DIGI3U

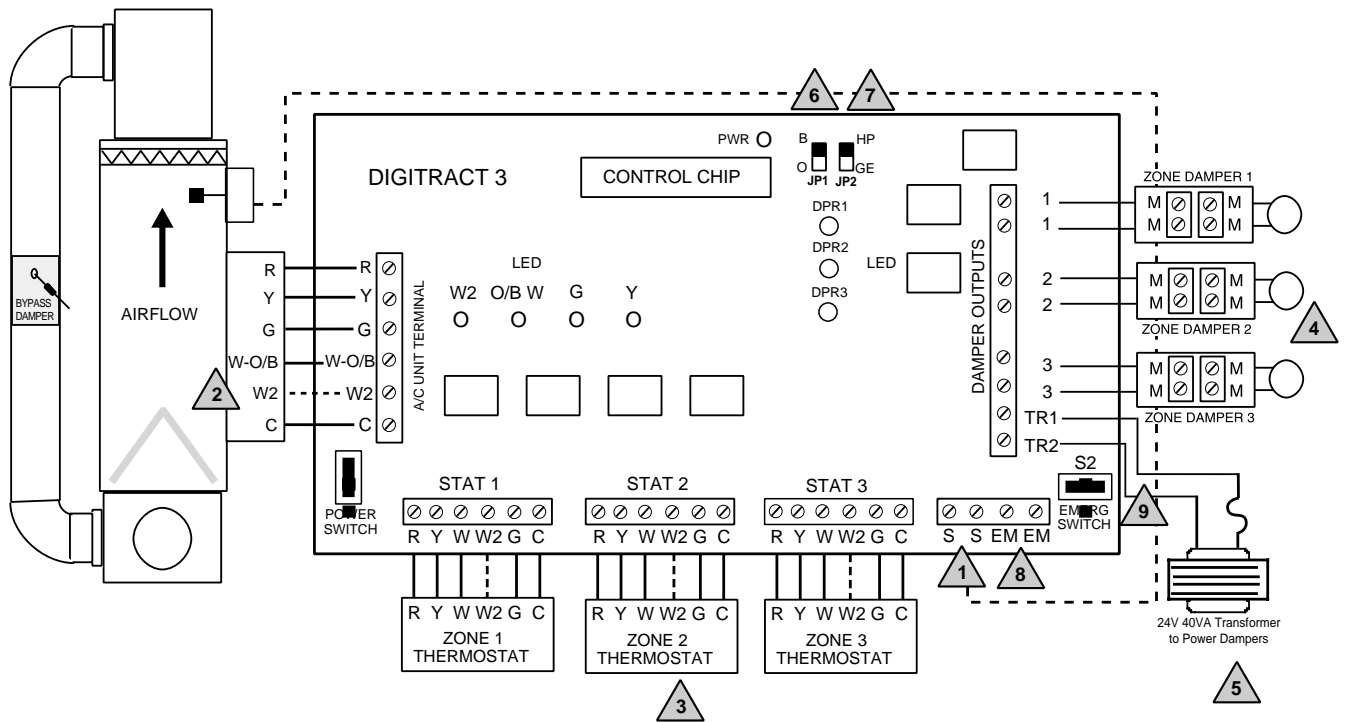
Follow this diagram for Gas/Electric applications.



- 1 SS – terminals for IAT capacity control. If not applied, leave 1k ohm resistor in place; and field supplied high and low limits should be added.
- 2 Transformer – damper transformer
- 3 Damper Terminals
- 4 JP1 – not used in Gas/Electric applications
JP2 – configuration jumper for Gas/Electric or Heat Pump operation
- 5 Unit Terminals – outputs to air handler and condenser
- 6 Thermostats – standard single stage heat/cool thermostats
- 7 EM EM – not used for Gas/Electric applications
- 8 IAT Sensor location – mount sensor in supply plenum before bypass

WIRING – HEAT PUMP DIGI3U

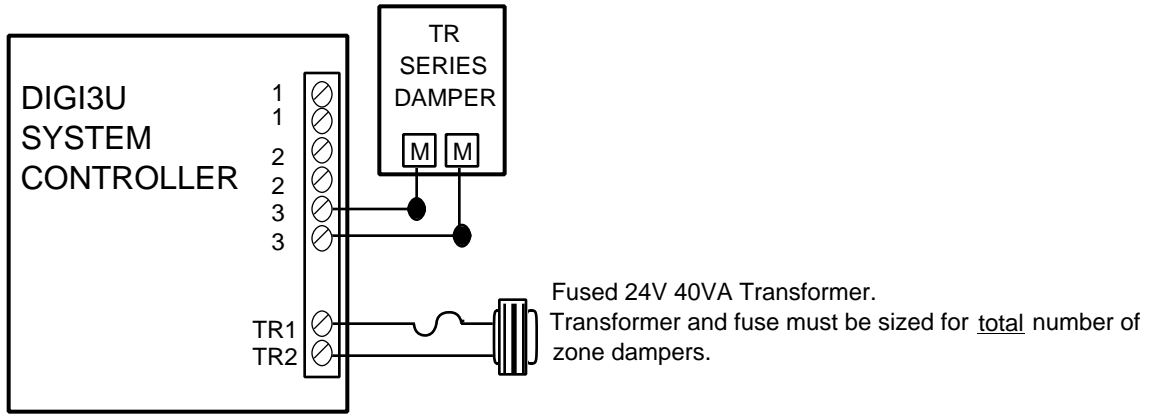
Follow this diagram for Heat Pump applications.



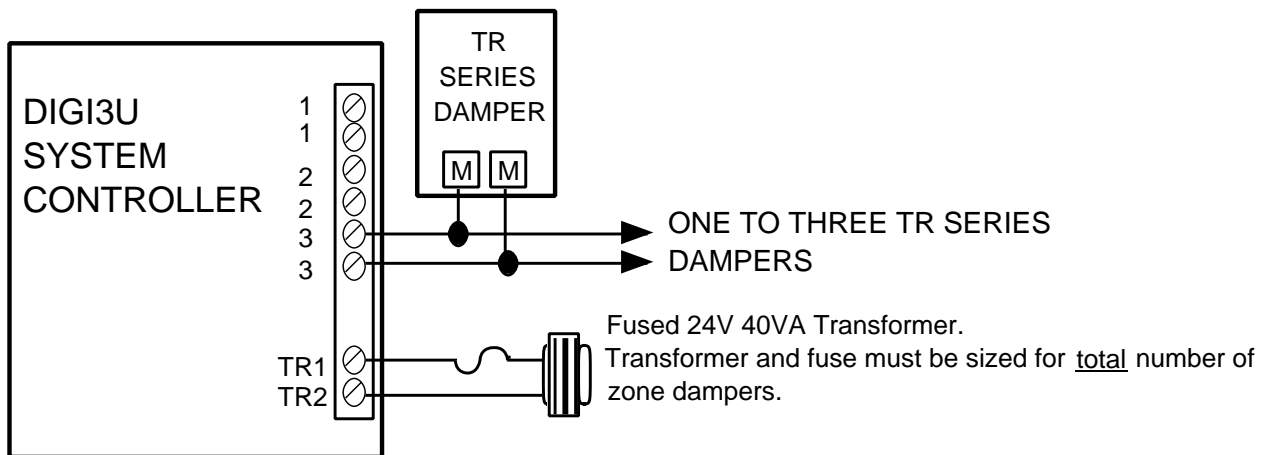
- 1 S S – terminals for LAT capacity control. If not applied, leave 1k ohm resistor in place; and field supplied high and low limits should be applied.
- 2 Connect W2 from controller to electric heat terminal of air handler for units with electric heat. Installing an outdoor air thermostat in series with any electric heat stage is recommended.
- 3 Thermostats – Gas/Electric thermostats are required. For Heat Pumps with Electric heat, 2-stage heat Gas/Electric thermostats are required.
- 4 Zone Damper Terminals – refer to “Wiring – Zone Dampers” on page 5.
- 5 Transformer – 24V 40VA transformer to power dampers.
- 6 JP1 – Place in “B” position for unit energizing reversing valve for heat; place in “O” position for unit energizing reversing valve in cooling.
- 7 JP2 – Heat Pump or Gas/Electric jumper is used to configure controller and jumps HP for heat pump application.
- 8 EM EM – Terminals for remote emergency heat switch.
- 9 S2 – On board emergency heat switch.

WIRING – ZONE DAMPERS

Wiring One TR Series Damper to a Zone



Wiring Up to Three TR Series Dampers to a Zone



If system requires more than 3 dampers, size transformer for 12VA per damper.

SYSTEM CONTROLLER OPERATIONS – DIGI3U

GAS/ELECTRIC OPERATION

Configure the DIGI3U for GE operation. Jumper JP2 must be placed in GE position on controller. This will allow controller to control gas furnaces and electric heat air handlers and cooling condensers.

FOR APPLICATIONS USING THE LAT CAPACITY CONTROLLER

Gas Electric Operation Cool with LAT capacity control: Install LAT sensor wired to SS terminals of DIGI3U controller.

When any thermostat calls for cool, Y and G LEDs will illuminate, indicating outputs to unit are energized and unit is running. Damper LEDs for non-calling zones are illuminated, indicating that dampers are closed. When all calls are satisfied, Y, G and damper LEDs will go off, de-energizing unit and opening all dampers.

When using the LAT capacity control, if the leaving air drops below 45°, Y will de-energize and G will remain on for 3 minutes. After 3 minutes, if the leaving air temperature has risen above 45° cutout limit, Y will energize and cooling will restart.

After all calls are satisfied, a 3-minute purge will be initiated by controller. During this time the controller will not allow any calls for heat or cool.

Heat Operation with LAT capacity control: When any thermostat places a call for heat, W and G LEDs will illuminate and outputs to furnace will be energized. Damper LEDs for non-calling zones will illuminate, indicating that dampers are powered closed.

If leaving air rises above 145°, W will de-energize and gas valve/electric heat will shut off. After 3 minutes, if leaving air temperature is less than 145°, then W LED will illuminate and heat will restart. When all calls for heat are satisfied, W, G and damper LEDs will go off, de-energizing outputs to furnace and dampers.

After all calls are satisfied, controller will initiate a 3-minute purge. During this time controller will not allow any calls for heat or cool.

FOR APPLICATIONS *WITHOUT* LAT CAPACITY CONTROLLER

Cool Operation *without* LAT capacity control: If not using the LAT capacity control, a field supplied high and low limit device will need to be applied to system to protect equipment.

When any thermostat places a call for cooling, the G LED will illuminate and energize the fan; all dampers will remain open. After 3 minutes, Y LED will illuminate and energize condensing unit. Damper LEDs for non-calling zones will illuminate, indicating that dampers are closed.

After initial call for cooling or low limit cutout, all cooling calls will initiate a 3-minute fan purge cycle. When all calls are satisfied, Y, G and damper LEDs will go off and controller will initiate a 3-minute time delay. During this time delay, controller will not allow a call for heat or cool.

Heat Operation *without* LAT capacity control: When any thermostat places a call for heat, G LED will illuminate and energize fan for 3 minutes; all dampers will remain open. After delay, W LED will illuminate and outputs to furnace will be energized. Damper LEDs for non-calling zones will illuminate, indicating that dampers are powered closed.

After initial call for heat is satisfied or high limit cutout, G (fan) will run for 3 minutes with all dampers open prior to W energizing. When all calls for heat are satisfied, W, G and damper LEDs will go off, de-energizing outputs to furnace and dampers. Controller will initiate a 3-minute purge. During this time, controller will not allow any calls for heat or cool.

SYSTEM CONTROLLER OPERATIONS – DIGI3U

Changeover Gas/Electric: While controller is operating in heat or cool, if another thermostat places a call for the opposite mode, a changeover sequence will begin. The controller will continue running in its current mode for 15 minutes or until current call is satisfied, whichever occurs first.

After 15 minutes, or call satisfaction, a 3-minute purge will start. At the end of the 3-minute time delay, the opposite call will begin. If there is still an opposing call, changeover sequence will initiate and repeat changeover cycle until opposing calls are satisfied.

When all calls are satisfied, LEDs will go off and a 3-minute time delay will be initiated. During this time, controller will not allow any calls for heat or cool.

Purge Mode: When all calls are satisfied or a changeover occurs, a 3-minute recycle delay will be initiated. During this time, the controller will not process any calls for heat or cool; and the compressor or gas valve will shut down and blower will continue to run. All dampers go open during this time

STATUS LEDs/ GAS ELECTRIC MODE

| Y | WO/B | W2 | G | PWR | DPR | MODE | FUNCTION |
|-----|------|-----|-----|-----|-----|---------|--|
| OFF | OFF | OFF | OFF | OFF | OFF | OFF | Power off |
| OFF | OFF | OFF | OFF | ON | OFF | ON | Power on, blower off, all zones satisfied |
| OFF | OFF | OFF | ON | ON | 0 | Vent | Blower on, compressor off, all zones satisfied |
| OFF | OFF | OFF | ON | ON | 1 | Purge | Blower on, compressor off. DPR w/LED on are closed |
| ON | OFF | OFF | ON | ON | 1 | Cooling | Cooling stage, compressor on. DPR w/LED on are closed |
| OFF | ON | OFF | ON | ON | 1 | Heating | Heating stage, compressor off. DPR w/LED on are closed |
| OFF | OFF | OFF | ON | FL | 1 | LAT* | System in Low Temp cutout condition (Cooling) |
| OFF | OFF | OFF | ON | FL | 1 | LAT* | System in High Temp cutout condition (Heating) |

NOTE: The “O” and “B” jumpers have no effect on operation when the controller is set in GE mode.

1 = One or more damper LEDs on

0 = All damper LEDs off

* LAT Capacity Control. The factory optional thermistor is in place to function in this mode.

SYSTEM CONTROLLER OPERATIONS – DIGI3U

HEAT PUMP OPERATION

Configure DIGI3U for heat pump operations. Place jumpers JP1 and JP2 in desired position: JP1 “O,” reversing valve for cooling (“B” position will energize reversing valve in heating), **JP2 set in HP position.**

FOR APPLICATIONS USING LAT CAPACITY CONTROLLER

Cool Mode with LAT capacity controller: Install the LAT sensor and wire to SS terminals of controller.

When a thermostat makes a call for cool, Y, G, and W-O/B LEDs and outputs to unit are energized. Any non-calling zone dampers are energized to close. The cool call continues to operate unless the supply air temperature drops below 45°, at which time the controller will de-energize “Y” for approximately 3 minutes.

After 3 minutes, if the leaving air has risen above 45°, Y will energize, restarting cool operations. When the cool mode is satisfied from the last calling thermostat, W/OB remains energized until an opposite call for heat is made.

If this controller is configured for “B” reversing valve operation, W-O/B LED will not energize for cool mode; “B” energizes reversing valve in heating.

After all calls for cooling are satisfied Y, G and all damper LEDs will go off and controller will initiate a 3-minute purge. During this time controller will not allow a call for heat or cool.

Heat Mode with LAT capacity controller: When a thermostat makes a call for heat, Y & G LEDs and unit outputs are energized. Any non-calling zone damper LEDs and outputs are energized to close. The heat call will continue to operate unless the supply air temperature rises above 120°, at which time the controller will de-energize “Y” for approximately 3 minutes.

After 3 minutes, if leaving air is less than 120°, Y will reenergize and heat will restart. Auxiliary heat is energized after 5 minutes of Y (heat) run time with a W2 signal from any calling thermostat.

When the controller energizes W2 to the heat pump strip heater, the W2 LED is illuminated. When all calls for heat are satisfied, W, W2, G and damper LEDs will go off and controller will initiate a 3-minute purge. During this time, controller will not allow a call for heat or cool.

FOR APPLICATIONS *WITHOUT* LAT CAPACITY CONTROLLER

Cool mode without LAT capacity control: Field supplied high and low limit devices should be applied when not using LAT capacity control to protect equipment.

When a thermostat makes a call for cooling, “G” (fan) is energized with all dampers open for 3 minutes. After a 3-minute timeout, Y, G, & W-O/B LEDs (W-O/B LED indicates reversing valve energized) and unit outputs are energized, any non-calling zone dampers are energized to close. The closed zones are indicated by the “DPR” LEDs being illuminated. The W-O/B LED and output continue to be energized after the last cool call is satisfied, until an opposite call for heat is made.

After the initial call is satisfied, all consecutive calls will energize “G” for the first 3 minutes. If controller is configured for “B” reversing valve operation, W-O/B LED does not illuminate with call for cool; reversing valve is energized for heating on these systems.

After all calls for cooling are satisfied, Y and damper LEDs will go off and controller will initiate a 3-minute purge. During this time, controller will not allow any calls for heat or cool.

Heat mode without LAT capacity control: When a thermostat makes a call for heat, “G” (fan) is energized with all dampers open for 3 minutes. After a 3-minute timeout, Y & G LEDs and outputs are energized. Any non-calling zones are energized to close. The closed zones are indicated by the “DPR” LEDs being illuminated.

After the initial call is satisfied, all consecutive calls will energize “G” for the first 3 minutes. Auxiliary heat is energized after 5 minutes Y run time with a W2 signal from any calling thermostat in the heat mode.

When the controller energizes W2 to the heat pump strip heater, the W2 LED is illuminated. After the initial call is satisfied, all consecutive calls will energize “G” for the first 3 minutes.

When all calls are satisfied, Y, G and damper LEDs will go off, controller will initiate a 3-minute purge. During this time, controller will not allow any calls for heat or cool.

SYSTEM CONTROLLER OPERATIONS – DIGI3U

Emergency Heat Operation: As Gas/Electric thermostats are used for Heat Pump operation, Emergency heat operation is selected at the DIGI3U controller and not at the thermostats.

The controller selects Emergency Heat operation from the S2 “EM” switch, or by using a remote SPST switch wired to terminals “EM” & “EM” on the DIGI3U controller.

When the “S2” switch is set for Emergency Heat, or the remote switch is closed, a heat call from any thermostat energizes “G” & “W2”. The Y

Changeover Heat Pump: While controller is operating in heat or cool, if another thermostat places a call for the opposite mode, a changeover sequence will begin. The controller will continue running in its current mode for 15 minutes or until current call is satisfied, whichever occurs first.

After 15 minutes, or call satisfaction, a 3-minute purge will start. At the end of the 3-minute time delay, the opposite call will begin. If there is

signal for the compressor is locked out, and the electric strip heater is energized through the W2 output from the controller.

Purge Mode: When all calls are satisfied or a changeover occurs, a 3-minute recycle delay will be initiated. During this time, the controller will not process any calls for heat or cool; and the compressor or gas valve will shut down and blower will continue to run. All dampers go open during this time

still an opposing call, changeover sequence will initiate and repeat changeover cycle until opposing calls are satisfied.

When all calls are satisfied, LEDs will go off and a 3-minute time delay will be initiated. During this time, controller will not allow any calls for heat or cool.

STATUS LED LEGEND

| | |
|-------|--|
| W-O/B | Reversing valve LED, yellow. On when the reversing valve is energized. |
| Y1 | Compressor LED, yellow. On when the first compressor stage is energized. |
| G | Indoor blower LED, green. On when the indoor blower is energized by the DTHP4A Controller. |
| W2 | Auxiliary heat LED, red. On when the auxiliary heat is energized. |
| PWR | Power LED, orange. On when DTHP4A is powered. Flashing during capacity control cutout. |
| DPR | Damper status LED, red. One per damper. On when damper is closed. |

STATUS LEDS/ HEAT PUMP MODE

| Jumper | Y | W-O/B | W2 | G | PWR | DPR | MODE | FUNCTION |
|--------|-----|-------|-----|-----|-----|-----|----------|---|
| | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Power off |
| | OFF | OFF | OFF | OFF | ON | OFF | ON | Power on, blower off, all zones satisfied |
| | OFF | OFF | OFF | ON | ON | 0 | Vent | Blower on, compressor off, all zones satisfied |
| | OFF | OFF | OFF | ON | ON | 1 | Purge | Blower on, compressor off. DPR w/LED on are closed |
| O | ON | ON | OFF | ON | ON | 1 | Cooling | Cool stage, compressor on. DPR w/LED on are closed |
| B | ON | OFF | OFF | ON | ON | 1 | Cooling | Cool stage, compressor on. DPR w/LED on are closed |
| O | ON | OFF | OFF | ON | ON | 1 | Heating | Heat, 1st stage, compressor on. DPR w/LED on are closed |
| B | ON | ON | OFF | ON | ON | 1 | Heating | Heat, 1st stage, compressor on. DPR w/LED on are closed |
| O | ON | OFF | ON | ON | ON | 1 | Heating | Heat, 2nd stage, compressor on. DPR w/LED on are closed |
| B | ON | ON | ON | ON | ON | 1 | Heating | Heat, 2nd stage, compressor on. DPR w/LED on are closed |
| O | OFF | ON | ON | ON | ON | 1 | Heating* | Em Heat, compressor off. DPR w/LED on are closed |
| B | OFF | OFF | ON | ON | ON | 1 | Heating* | Em Heat, compressor off. DPR w/LED on are closed |
| O | OFF | ON | OFF | ON | FL | 1 | LAT** | System in Low Temp cutout condition (Cooling) |
| B | OFF | OFF | OFF | ON | FL | 1 | LAT** | System in Low Temp cutout condition (Cooling) |
| O | OFF | OFF | OFF | ON | FL | 1 | LAT** | System in High Temp cutout condition (Heating) |
| B | OFF | ON | OFF | ON | FL | 1 | LAT** | System in High Temp cutout condition (Heating) |

A = On when reversing valve jumper is in O position. **B** = ON when reversing valve jumper is in B position

C = On when emergency heat is on. **1** = One or more damper LEDs on **0** = All damper LEDs off

*2 – Stage Gas/Electric Thermostat is required.

**LAT Capacity Control. The factory optional thermistor is in place to function in this mode.

SYSTEM CONTROLLER – UNIVERSAL GE/HP

COMPONENTS

A. HVAC Unit/LAS Terminals – Connects to HVAC unit.

W-O/B: First stage heat. When energized (W1 made to R), energizes first-stage heat or reversing valve for HP.

G: Blower. When energized (G made to R), energizes the indoor blower.

Y: First stage cool. When energized (Y1 made to R), energizes first stage cooling.

R: HVAC unit 24V power. Powers the DIGI3U board and zone thermostats.

C: HVAC unit 24V power return.

B. Thermostat Terminals – Connects up to three zone thermostats.

W: Heat call. When energized (W made to R), requests the DIGI3U to run in heat mode.

W2: Used in HP to energize auxiliary heat. Not used in G/E.

R: HVAC unit 24V power.

Y: Cool call. When energized (Y made to R), requests the DIGI3U to run in cool mode.

G: Blower Fan – When energized (G made to R), requests the DIGI3U to turn on the indoor blower fan.

C: HVAC unit 24V common.

C. Damper Terminals – Connects dampers for up to three zones and damper power supply.

TR1/TR2: 24V AC transformer terminals. This transformer powers only the zone dampers and size properly.

1 1: Zone damper 1.

When energized, powers zone damper 1 closed.

2 2: Zone damper 2.

When energized, powers zone damper 2 closed.

3 3: Zone damper 3.

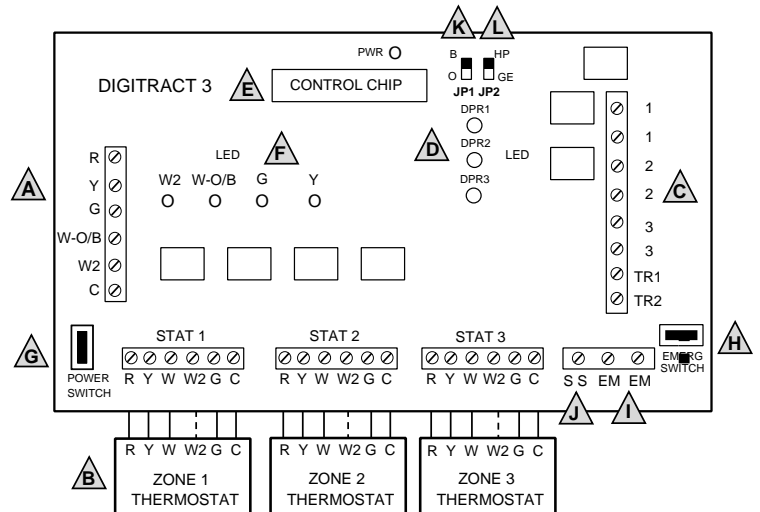
When energized, powers zone damper 3 closed.

D. Damper Status LEDs – On when corresponding zone damper is being powered closed.

E. Microcontroller – Responsible for activation and control of the unit based upon thermostat input. Occasionally software upgrades may become available. If so, the DIGI3U software can be field upgraded by changing this microcontroller.

F. HVAC System Status LEDs – Indicates what the DIGI3U is energizing on the HVAC system.

Y: Compressor, yellow. On when the first-stage cool is energized.



G: Blower, green. On when the indoor blower is energized.

W-O/B: Heat or reversing valve, red. On when first stage heat or reversing valve is energized.

W2: Heat, red. Auxiliary heat is energized for heat pump operation.
PWR: Power, orange. On when power at R and C and the Power Switch is on. Flashing when in Capacity Control cut out mode. See Status Lights section for further information.

G. Power Switch – When OFF power from the HVAC unit transformer is disconnected from the DIGI3U and thermostats. When ON, power from the HVAC unit transformer is supplied to the DIGI3U and the zone thermostats.

H. Emergency Heat Switch – Manual switch for emergency heat.

I. EMEM – Emergency terminals for remote emergency heat operation.

J. SS – Terminals for capacity control.

K. JP1 O/B Jumper – For heat pump application only. Place in O or B position for proper reversing valve action.

L. JP2 HP/GE Jumper – Place on proper pins for desired application.

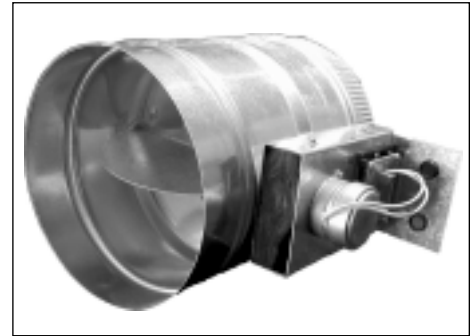
ZONE DAMPERS

Zonex Systems zone dampers are used in cooling/heating systems to provide room by room zone control. The damper is provided with a

zone actuator. Each zone damper is controlled by a zone thermostat. More than one damper can be controlled by one zone thermostat.

ROUND LOW PRESSURE ZONE DAMPERS (TR diam)

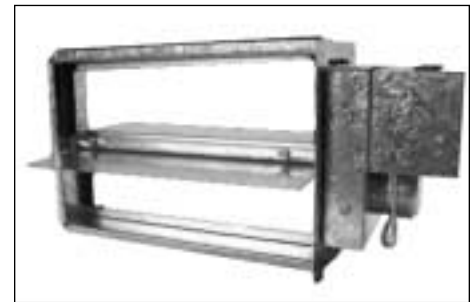
Zonex Systems round low pressure zone dampers can be used for systems up to 5 tons with a maximum differential static pressure of 0.5". These are two position, spring open, power close dampers for very simple operation. All sizes are designed with rolled-in stiffening beads for superior rigidity. The damper pipe is furnished with one crimped end and one straight end for easy installation. A hat section supports a synchronous 24V AC 60Hz 12VA motor and terminal board. The motor is designed for continuous full stall operation. Special winding and heavy duty gearing provide for long motor life and easy spring open operation. A cross pin on the motor shaft provides positive direct drive to the damper blade shaft without a coupling or set screws, allowing for a quick and easy motor change if required. A red LED will be illuminated on the damper terminal board to indicate when the damper is being powered closed. The LED will remain on when the damper is fully closed and cycle off when the damper is opening or in the full opened position. Since this is a spring open damper, in the event of power failure, the damper fails to the full open position.



LOW PRESSURE (TR diam)

RECTANGULAR LOW PRESSURE ZONE DAMPERS (TREC W x H)

Zonex Systems rectangular low pressure dampers can be used for systems up to 5 tons with a maximum differential static pressure of 0.5". These are two position, spring open, power close dampers. They are constructed from heavy duty galvanized steel. The damper is a single blade type that slips into a 2-1/2" wide cutout in the existing duct and attaches with screws via a duct mounting plate. The duct mounting plate is 5" wide. The drive assembly supports a synchronous 24V AC 60Hz 12VA motor and terminal board. The motor is designed for continuous full stall operation. Special winding and heavy duty gearing provide for long motor life and easy spring open operation. A cross pin on the motor shaft provides positive direct drive to the damper shaft without a coupling or set screws. A red LED will be illuminated on the damper terminal board to indicate when the damper is being powered closed. The LED will remain on when the damper is fully closed and cycle off when the damper is opening or in the full opened position. Since this is a spring open damper, in the event of power failure the damper fails to the full open position.



LOW PRESSURE (TREC W x H) RECTANGULAR DAMPER

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 by using a duct sizing table or calculator.
- c) Select a Zonex Systems damper to fit the duct size selected for that zone.

DAMPER INSTALLATION NOTES

1. Do not exceed 700 FPM in a register/diffuser branch duct.
2. If a damper is installed within 3 feet of 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 damper is delivered with insulation between the hat section and pipe. Therefore, insulation should be applied to the round pipe and butted against the hat section (do not insulate the motor or relay board). Both motor and the relay board generate enough heat so that no condensation will develop on the hat section.
5. Remember to allow a 16" gap in the duct for Heavy Duty rectangular dampers.
6. Low and medium pressure rectangular dampers slide into a 3" wide cutout in the ductwork.
7. Install TR round dampers to the motor in the 9 to 3 o'clock position. Do not install damper so the motor is in the 4 to 8 o'clock position.

BYPASS DAMPERS – BAROMETRIC

The barometric bypass damper is for systems 5 tons or under. It utilizes a weighted damper blade to maintain constant duct pressure. This allows for easy installation without the need for electrical power or wiring. The round barometric damper can be installed in any position. It is an efficient solution for small system fan capacity control.

SIZING: When only the smallest zone is calling, the maximum amount of excess supply air will flow through the bypass damper. To determine the proper size bypass damper to use, do the following steps:

Step 1: Calculate bypass air volume as follows.

- A) Calculate total air volume at 400 CFM per ton.
- B) Calculate air volume of smallest zone in CFM.
- C) Calculate bypass air volume by subtracting the smallest zone air volume from the total.
(A - B = C)

BAROMETRIC BYPASS SELECTION TABLE

| Diameter | CFM |
|----------|------|
| 9" | 650 |
| 10" | 800 |
| 12" | 1200 |
| 14" | 1600 |
| 16" | 2000 |

Step 2: Select damper from sizing table.

Once you have calculated the bypass air volume from Step 1, use the **BAROMETRIC BYPASS SELECTION TABLE**. From the table, select the bypass damper with the CFM rating equal to or greater than the value

calculated in Step 1. For rectangular barometric dampers, use a ductulator to convert from round to rectangular.

If bypassing more than 2000 CFM, use electronic bypass damper.

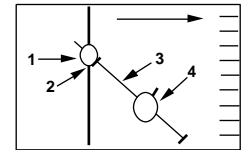
Example: You have a 4 ton system. Your smallest zone will use 500 CFM. The total CFM is 1600 CFM (400 * 4). Your bypass CFM is 1100 (1600 - 500). From the table, you determine that a 12" bypass damper is needed.

Do not use the barometric bypass in any system over 5 tons.

For systems over 5 tons, or to bypass more than 2000 CFM, use the electronic bypass.



BAROMETRIC BYPASS DAMPER



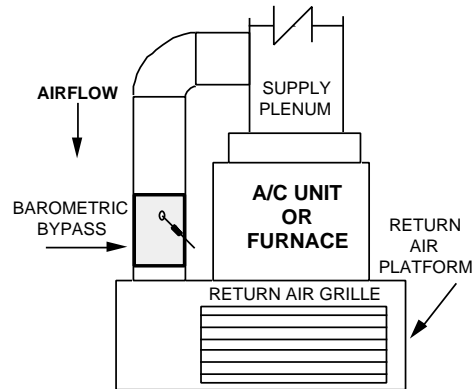
1. Damper Shaft
2. Lock Nut
3. Lever Arm
4. Counter Weight

INSTALLATION

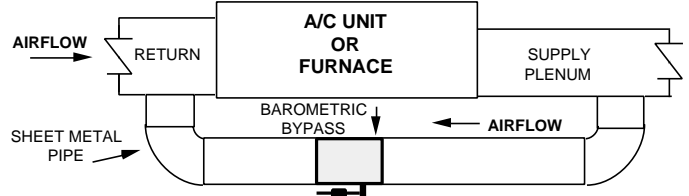
The round barometric bypass damper can be installed in any position. This damper is factory set for horizontal installation and can be field modified for vertical installation. Do not run speed screws into damper housing. Screws may interfere with damper travel. Make sure counter weight is not obstructed in any way.

- a) Install the bypass damper between the supply and return plenums of the unit. It must be the first tap off the supply plenum.
- b) 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. Be certain the damper shaft is horizontal.
- c) Loosen counter weight with Allen wrench.
- d) Loosen lever arm from damper shaft and allow to hang straight down.
- e) Fully close damper by grabbing damper shaft on side attached to lever arm and turning clockwise until it stops.
- f) While holding the damper fully closed, rotate the lever arm a little to the right (facing the damper) and then screw in to tighten to the damper shaft. Then tighten lock nut.
- g) Be sure the damper is being held closed by the counter weight. Proceed to setup.

VERTICAL APPLICATION



HORIZONTAL APPLICATION



BYPASS DAMPERS – BAROMETRIC

BAROMETRIC BYPASS SETUP

- a) Turn off all thermostats.
- b) Turn on Switching Center/Controller and set fan switch to “ON” position. Allow fan to run for 5 minutes to equalize pressure. Then make sure all dampers are open by checking for air flow out of each damper.
- c) By moving counter weight up or down the lever arm, adjust it so that the damper just wants to start opening.
- d) If the damper cannot be held closed with the counter weight all the way to the bottom of the lever arm, then hold the damper shaft, loosen the lever arm from the damper shaft, and rotate the lever arm farther to the right and retighten. Repeat Step C.
- e) The barometric bypass damper is now calibrated.

BAROMETRIC BYPASS STARTUP TEST

- a) Have at least half of the zones call for either heating or cooling.
- b) Check to be sure the calling zone dampers are open (air is flowing).
- c) Verify the bypass damper is open. Note, the damper may not fully open.
- d) If the open zones are not noisy, the bypass damper is set.

DIGI3U TROUBLESHOOTING/SERVICE CHECKS

| Malfunction | Probable Cause | Corrective Action |
|---------------------------------|--|--|
| All thermostats will not call | Loss of 24V ac on R and C | Repair power source |
| Will not initiate cooling cycle | Controller in Heat mode | Delay prior to changeover |
| | Emergency Heat switch turned on in Gas mode | Turn off switch and recycle the controller |
| | Check to verify O and B jumpers in Heat Pump mode | Correct as needed |
| | Controller in changeover from heat mode | 4-minute purge cycle must complete |
| Cooling calls short cycle | If LAT is installed, going off on low temp indicating flashing power LED light | Check bypass operation/adjust |
| | Air flow too low over evaporator | Check filter and/or correct air flow |
| Will not initiate a heat call | Controller in Cooling mode | Check bypass operation |
| | Emergency Heat switch turned on in Gas mode | Turn off switch and recycle the controller |
| | Check to verify O and B jumpers in Heat Pump mode | Correct as needed |
| | Controller in changeover from cooling mode | 4-minute purge cycle must complete |
| Heating calls short cycle | If LAT is installed, flashing power LED indicates high limit cutout | Check bypass operation/adjust |
| | Air flow too low over heat exchanger | Check filter and/or correct air flow |
| Zone damper will not close | Loss of 24 volts to the dampers, TR1 and TR2 | Repair power source |
| | No output to damper terminal(s) | Verify thermostats are making a call |
| | Damper incorrectly wired | Correct damper wiring |
| | Transformer VA to low | Replace and correct VA problem |
| Emergency Heat does not Work | Switch or EM EM terminal is not closed | Verify remote switch is on |
| | A W2 terminal is not present on thermostat | Use 2-Stage Gas/Electric thermostats |
| Blower Runs Continually | Fan operation selected on any thermostat | Verify fan switch on all thermostats |
| | Fan relay contacts in controller seized | Replace controller, check 24V AC |

STARTUP TEST, GAS/ELECTRIC MODE DIGI3U

(Verify Jumper JP2 is in the G/E mode on the Controller)

1. If no heating system, go to step 12.
 2. At System Controller:
 - a. Turn power switch on.
 - b. Verify at this time the PWR light is on only.
 3. Turn off all thermostats except zone 1.
 4. At zone 1 thermostat
 - a. Set power switch on.
 - b. Set to Heat mode.
 - c. Set Fan switch Auto mode.
 - d. Set Heat set point several degrees above room temperature.
 5. At System Controller:
 - a. Verify W, G and PWR lights are on.
 - b. Verify DPR1 light is off and DPR2 and 3 LEDs are on.
 6. At HVAC unit, verify furnace is on and blower fan is running. If the G light on System Controller is not on, the blower fan is controlled by the furnace; and there will be a delay before it turns on.
 7. At zone 1, verify air is coming out of register/diffuser.
 8. At next zone:
 - a. Verify air is not coming out of register/diffuser
 - b. At thermostat:
 - b-1 Set power switch on.
 - b-2 Set to Heat mode.
 - b-3 Set Fan switch to Auto mode
 - b-4 Set heat setpoint several degrees above room temperature.
 - c. Verify air is now coming out the register/diffuser.
 9. At the previous zone, turn thermostat off and verify air stops coming out of the register/diffuser
 10. Repeat steps 8 and 9 for the last zone 3.
 11. Turn off all thermostats except zone 1.
 12. At zone 1 thermostat:
 - a. Set power switch on.
 - b. Set to Cool mode
 - c. Set Fan switch to Auto mode.
 - d. Set cool setpoint several degrees below room temperature.
 13. At System Controller:
 - a. Verify Y, G and PWR lights are on. If not, cycle the System Controller power switch OFF and then ON; then recheck.
 - b. Verify DPR 1 light is off and DPR 2 through DPR 3 lights are on.
 14. At HVAC unit, verify air conditioner is on and blower fan is running.
 15. Verify air is being delivered to zone 1 and not to any of the other zones.
 16. At zone 1, verify air is coming out of the register/diffuser.
 17. At next zone:
 - a. Verify air is not coming out of the register/diffuser.
 - b. At thermostat:
 - b-1 Set power switch on.
 - b-2 Set to Cool mode.
 - b-3 Set Fan switch to Auto mode.
 - b-4 Set cool setpoint several degrees below room temperature.
 - c. Verify air is now coming out of the register/diffuser.
 18. At previous zone, turn thermostat off and verify that air stops coming out of the diffuser.
 19. Repeat steps 17 and 18 for the remaining 2 zones.
- Test Complete.

STARTUP TEST, HEAT PUMP MODE DIGI3U

(Verify Jumper JP2 is in the HP mode on the Controller)

1. Turn off all thermostats except zone 1.
2. At zone 1 thermostat:
 - a. Set power switch on.
 - b. Set to Heat mode.
 - c. Set Fan switch to Auto mode.
 - d. Set heat setpoint several degrees above room temperature.
3. At the System Controller:
 - a. Verify Y, G and PWR lights are on. If not, cycle System Controller power switch OFF and then ON; then recheck.
 - b. If jumper O/B is on B, verify W-O/B light is ON; otherwise, verify W-O/B light is off.
 - c. Verify DPR1 light is off and DPR2 and DPR3 are ON.
4. Verify heat pump is running in Heat mode and the blower fan is running.
5. At zone 1, verify air is coming out of register/diffuser.
6. At next zone:
 - a. Verify air is not coming out of the register/diffuser.
 - b. At thermostat:
 - b-1 Set power switch on.
 - b-2 Set to Heat mode.
 - b-3 Set Fan switch to Auto mode.
 - b-4 Set heat setpoint several degrees above room temperature.
 - c. Verify air is not coming out of the register/diffuser.
7. At previous zone, turn thermostat off and verify air stops coming out of the register/diffuser.
8. Repeat steps 6 and 7 for remaining zones.

DIGI3U

Three-Zone, Universal
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