



## Installation Guide

# DIGI3U

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

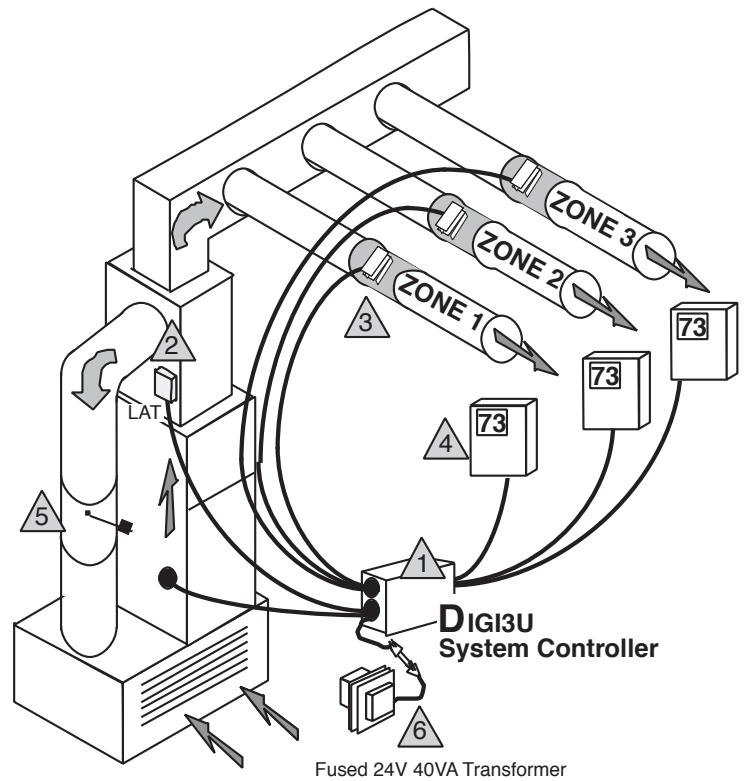
**3-Zone  
Controller  
for the "RNC"  
Market**

**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 thermostats
- 5** Barometric Bypass
- 6** Fused 24V 40VA transformer – to power dampers



## SYSTEM DESCRIPTION

The DIGI3U is a 3-zone, auto-changeover zone controller, which can be field configured for single stage Gas Electric or Heat Pump with auxiliary heat applications. The DIGI3U is designed to be economically priced, easy to install and yet full featured for the residential new construction market. The controller offers integrated capacity control when the optional LAT is connected, and any zone thermostat can make a heat or cool call.

**Gas Electric configuration** – use standard single stage Gas Electric thermostats. The LAT leaving air sensor can be wired into the system to provide high and low temperature limits for compressor and heat exchanger protection. The controller is shipped configured for Gas Electric operation and has a 1K ohm resistor installed in the S S (sensor) terminals of the controller. The resistor is used in place of the LAT for 2-zone Gas Electric installations that do not have a bypass. When bypass

is used, the optional LAT leaving air sensor must be connected in place of the resistor to enable the capacity control to function in the controller. **NOTE:** 3-zone installations must have bypass.

**Heat Pump configuration** – use a standard Heat Pump thermostat (1 stage cool, 2 stage heat) for the STAT 1 position. Standard single stage Gas Electric thermostats are used for STAT 2 and STAT 3 positions on the controller. Emergency Heat operation is initiated from the Heat Pump thermostat on STAT 1.

The LAT supply air sensor must be used when the DIGI3U controller is configured for Heat Pump operation. The controller will then provide high and low limit control to protect the compressor and also control the auxiliary heat operation, based on the supply air temperature.

**NOTE:** Prior to June 1, 2005 the DIGI3U controllers with software versions V1.4 through V1.7 were designed to use only Gas Electric thermostats when configured for Heat Pump operation. If you are replacing an older controller, utilized on a heat pump with this new version, simply replace the existing Gas Electric thermostat on the STAT 1 position with a standard Heat Pump thermostat, and follow the wiring diagram on page 4 in this *Installation Guide*.

# DIGI3U DESIGN INFORMATION

## DESIGN INSTRUCTIONS

**2-3 Zone Application with Bypass Damper and LAT Sensor** – Use this method if your application is for 2 or 3 zones using a bypass damper and LAT sensor. 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 Gas/Electric Applications *without* a Bypass Damper or LAT Sensor** – 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.  
**NOTE:** All Heat Pump installations require the LAT sensor.

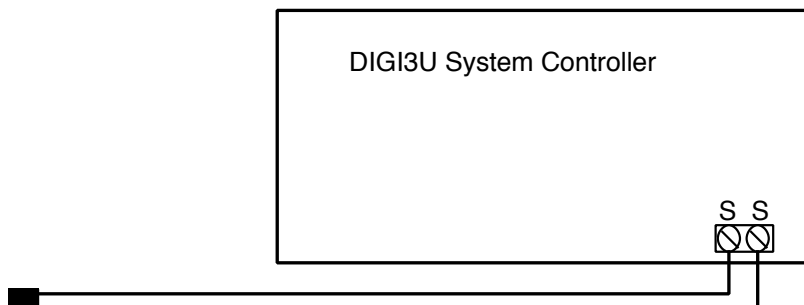
## THERMOSTAT INFORMATION

For **Gas Electric** applications use standard single stage Gas Electric, auto changeover thermostats.

For **Heat Pump** applications use a standard Heat Pump thermostat (1 stage cool / 2 stage heat) for STAT 1 position only. Use standard single stage Gas Electric, auto changeover thermostats on STAT 2 and STAT 3 positions.

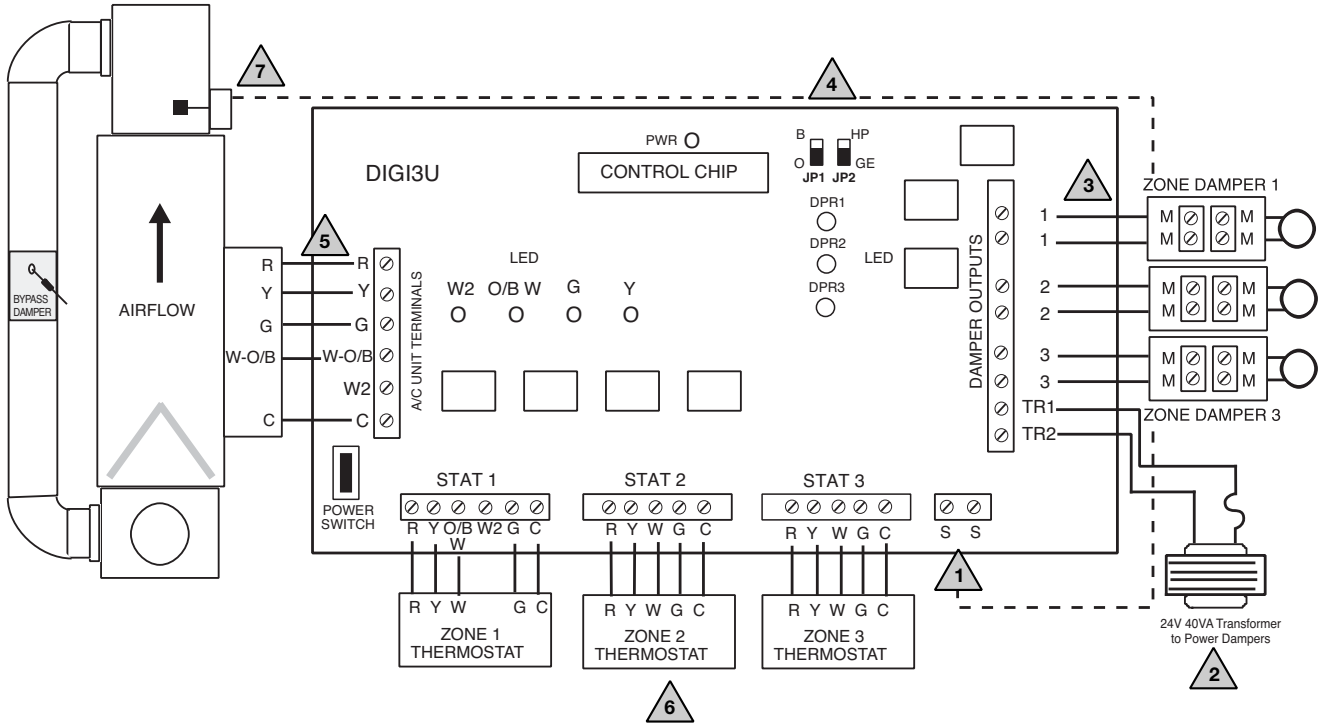
## LAT CAPACITY CONTROL INSTALLATION INSTRUCTIONS

1. Remove factory installed 1K ohm resistor on S S.
2. **Gas/Electric applications** – install sensor as far as possible from the FAU heat exchanger but still before the bypass tap.
3. **Heat Pump application** – install the sensor after the indoor coil but before the electric strip heat assembly.
4. Secure the sensor-mounting base to the duct or AHU cabinet (HP) with the self-tapping screws provided.
5. Run wire from the LAT sensor to S S terminals on DIGI3U controller. Insert one wire under each S terminal, and tighten terminal screw.
6. LAT does not require calibration.



# WIRING – GAS/ELECTRIC DIGI3U

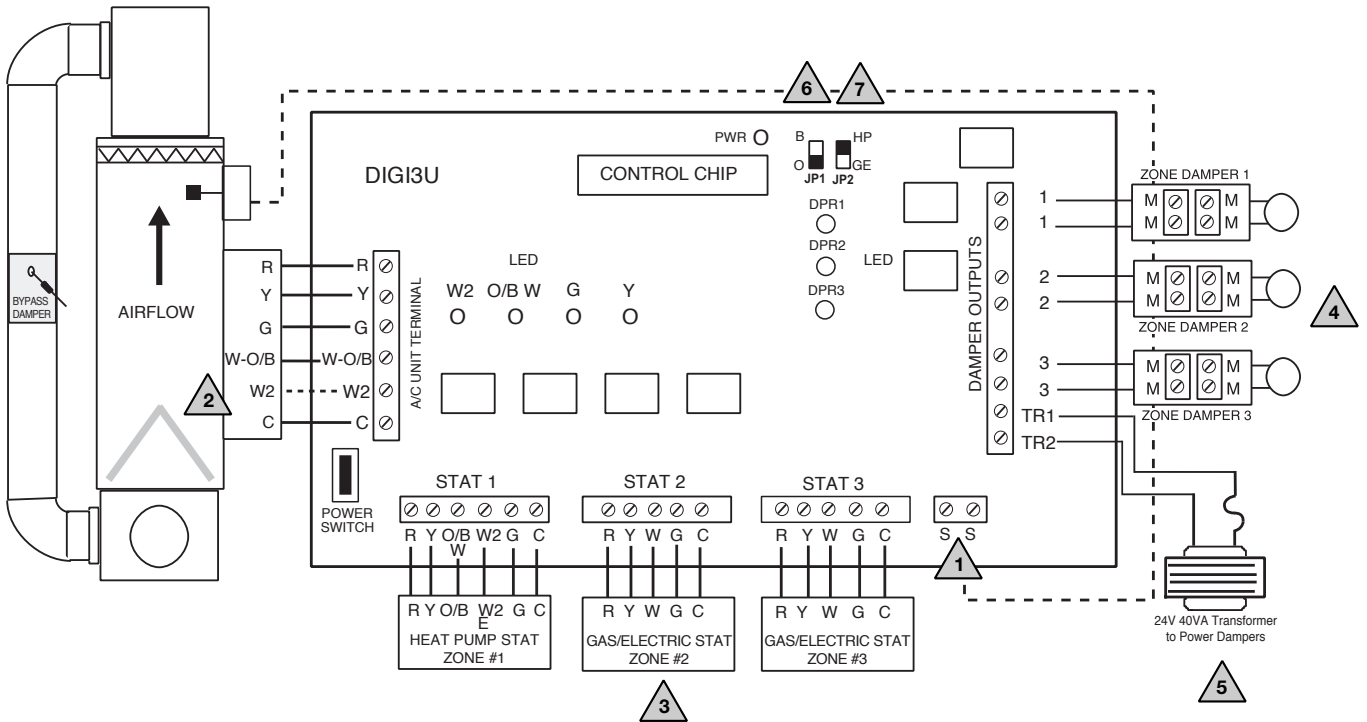
Follow this diagram for Gas/Electric applications.



- 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 added.
- 2** Transformer – damper transformer 24vac 40va 2 amp fuse
- 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 furnace and condenser
- 6** Thermostats – standard single stage heat/cool thermostats
- 7** LAT Sensor location – mount sensor in supply before bypass takeoff

# WIRING – HEAT PUMP DIGI3U

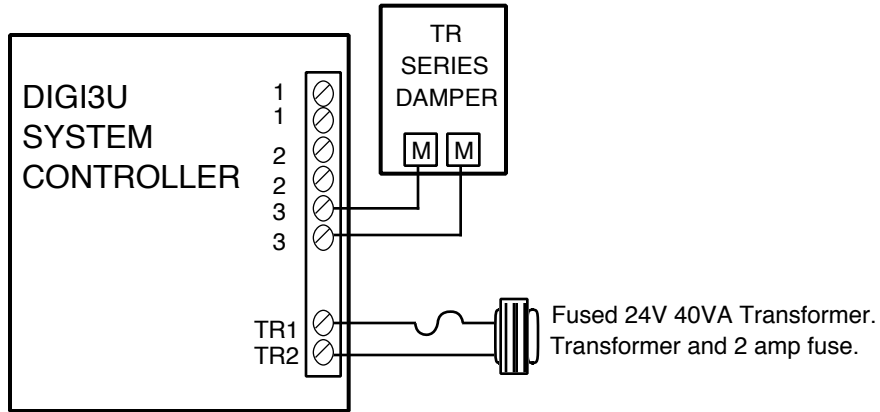
Follow this diagram for Heat Pump applications.



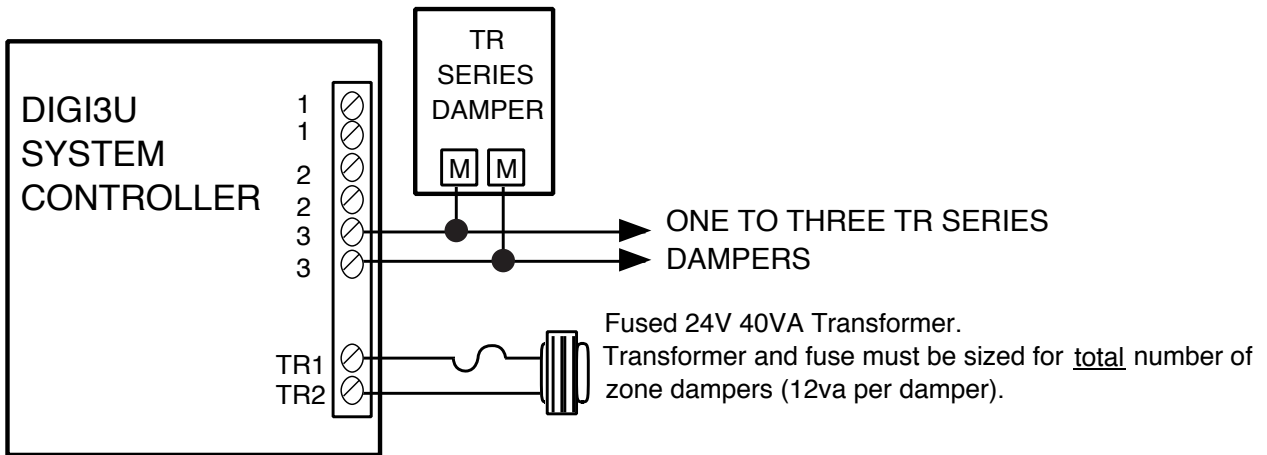
- 1** S S – terminals for LAT capacity control. Heat Pump application requires the LAT
- 2** Connect W2 from controller to electric heat terminal of air handler for units with electric heat. The LAT sensor must be installed in the supply air stream, between the indoor coil and electric strip heat elements.
- 3** Thermostats – Standard Heat Pump thermostat is required for STAT 1.  
Gas/Electric thermostats are required for STAT 2 and STAT 3.
- 4** Zone Damper Terminals – refer to “Wiring – Zone Dampers” on page 5.
- 5** Transformer – Damper Transformer 24vac 40va 2 amp fuse.
- 6** JP1 – Place in “O” position for unit energizing reversing valve for cool; place in “B” position for unit energizing reversing valve in heat.
- 7** JP2 – Heat Pump or Gas/Electric jumper is used to configure controller. Factory set for Gas/Electric operation.

# WIRING – ZONE DAMPERS

## Wiring One TR Series Damper to a Zone



## Wiring Up to Three TR Series Dampers to a Zone



# 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 SENSOR

**Gas Electric Operation Cool with LAT:** Remove the factory installed 1K ohm resistor and 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 the leaving air temperature 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:** When any thermostat places a call for heat, the W LED will illuminate and output 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 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:** 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 power LED will flash and all dampers will remain open. After 3 minutes, Y and G LEDs will illuminate and energize condensing unit and fan. 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:** When a call for Heat is sent to the controller, a 3-minute time delay is initiated. This time delay is indicated by a flashing power LED.

When the 3-minute time delay is complete, the power LED is illuminated constant and the controller will then energize the Heat output including the corresponding damper signals.

A field supplied high and low limit device is required to provide HVAC system protection.

# 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	W-OB	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.**

### HEAT PUMP CONFIGURATION REQUIRES USING THE LAT SENSOR

The **DIGI3U** controller, when configured for Heat Pump operation, allows the use of a standard Heat Pump thermostat (1 stage cool / 2 stage heat) to be connected to the **STAT 1** position on the controller. Emergency Heat control is selected from the Heat Pump thermostat wired to the **STAT 1** position. Standard Gas/Electric thermostats are used for **STAT 2** and **STAT 3** positions.

**Cool Mode with LAT:** 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:** 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 3 minutes of run time and if the leaving air temperature is 88° or less. The auxiliary heat will cycle off when the leaving air temperature reaches 100°. 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.

# SYSTEM CONTROLLER OPERATIONS – DIGI3U

**Emergency Heat Operation:** To put the Heat Pump system into Emergency Heat, the mode selector switch on the Heat Pump thermostat (STAT 1), must be placed in the Emergency Heat position and must then make a call for heat in that mode. This “latches” the controller in the Emergency Heat mode. After STAT 1 makes a call and then satisfies, any consecutive heat calls from STAT 2 and STAT 3 will bring on Emergency Heat independently. The supply dampers will actuate independently according to the individual zone demand.

To “unlatch” the controller from Emergency Heat, the Heat Pump thermostat (STAT 1) mode switch must be placed in the normal Heat mode, and make a heat call on Y (“O” mode) or Y and O (“B” mode). After the Heat Pump thermostat makes a standard heat call, the Emergency Heat will be “unlatched” and all consecutive heat calls from any thermostat will bring on the compressor.

**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

**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 the call is satisfied, 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.

## 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/LAT 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, requests the DIGI3U to run in heat mode.

W2: Used in HP STAT 1 only to energize emergency heat. Not used in G/E.

R: HVAC unit 24V power.

Y: Compressor input.

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.

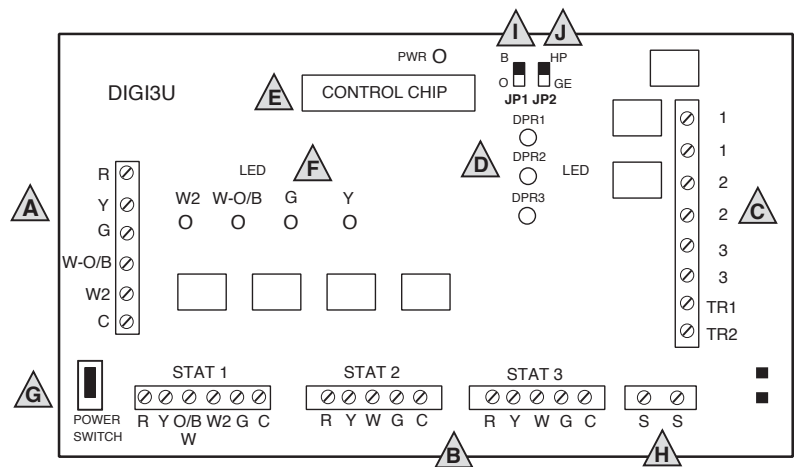
When energized, powers zone damper 2 closed.

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.



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

Y: Compressor, yellow.

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. Emergency 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. SS – Terminals for capacity control.

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

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

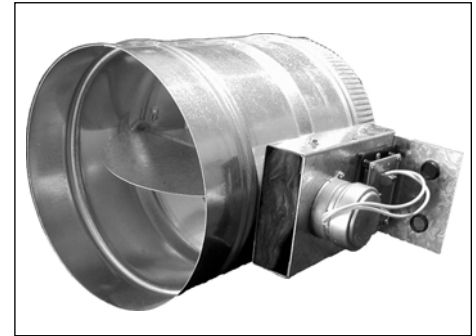
# ZONE DAMPERS

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)

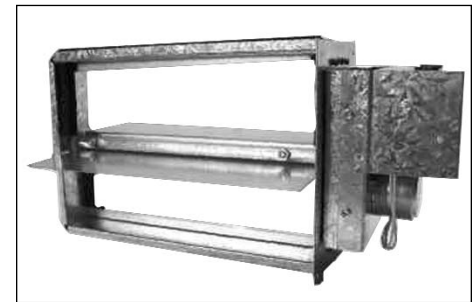
Zonex Systems round low pressure zone dampers can be used for systems up to 5 tons with a maximum differential static pressure of 0.5". These are two position, spring open, power close dampers for very simple operation. All sizes are designed with rolled-in stiffening beads for superior rigidity. The 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.

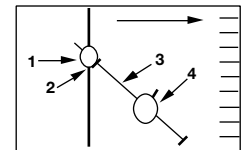
**Example:** You have a 4 ton system. Your smallest zone will use 500 CFM. The total CFM is 1600 CFM (400 \* 4). Your bypass CFM is 1100 (1600 - 500). From the table, you determine that a 12" bypass damper is needed.

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**



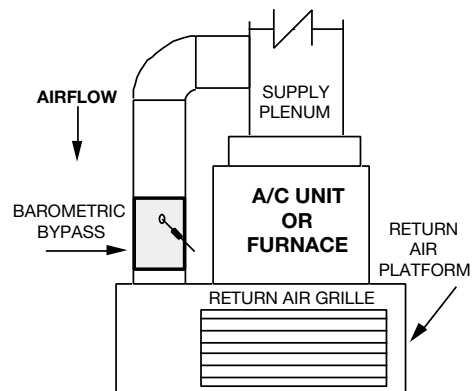
1. Damper Shaft
2. Lock Nut
3. Lever Arm
4. Counter Weight

## INSTALLATION

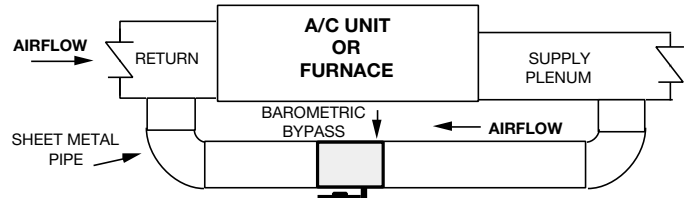
The round barometric bypass damper can be installed in any position. This damper is factory set for horizontal installation and can be field modified for vertical installation. Do not run speed screws into damper housing. Screws may interfere with damper travel. Make sure counter weight is not obstructed 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
	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
	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
Emergency Heat does not Work	STAT 1 must make heat call in Emergency Heat	Verify heat call
	STAT 2 and STAT 3 can make Emergency heat call after STAT 1	Verify STAT 1
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 position on the controller and the LAT sensor is connected to the S S terminals.)*

1. Temporarily remove the LAT from the supply air stream.
2. Make a Heat call from STAT 1 only.
3. Verify DPR1 LED is off and DPR2 & DPR3 LEDs are illuminated.
4. Check dampers for proper open and close position.
5. Verify controller energizes the compressor and indoor fan.  
Y and G LEDs are illuminated for "O" mode.  
Y, G and O/B LEDs are illuminated for "B" mode.
6. Verify after 4 minutes of run time, Y, G, and W2 LEDs are illuminated and the auxiliary heat is energized on the controller.
7. Repeat this process for zones 2 and 3.
8. Make a Cool call on STAT1.
9. Verify DPR1 LED is off and DPR2 & DPR3 LEDs are illuminated.
10. Check dampers for proper open and close position.
11. Verify controller energizes the compressor, rev valve ("O" mode) and indoor fan.  
Y, G and O/B LEDs are illuminated for "O" mode.  
Y and G LEDs are illuminated for "B" mode.
12. Repeat this process for zones 2 and 3.
13. Re-install the LAT into the supply air stream.



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