



## Installation Guide

# DigiTract 4

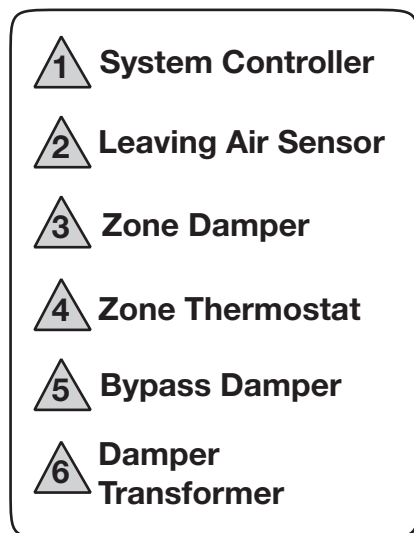
Two Stage Heat/Cool  
Comfort Control System

Zoning Systems  
That's all we do.

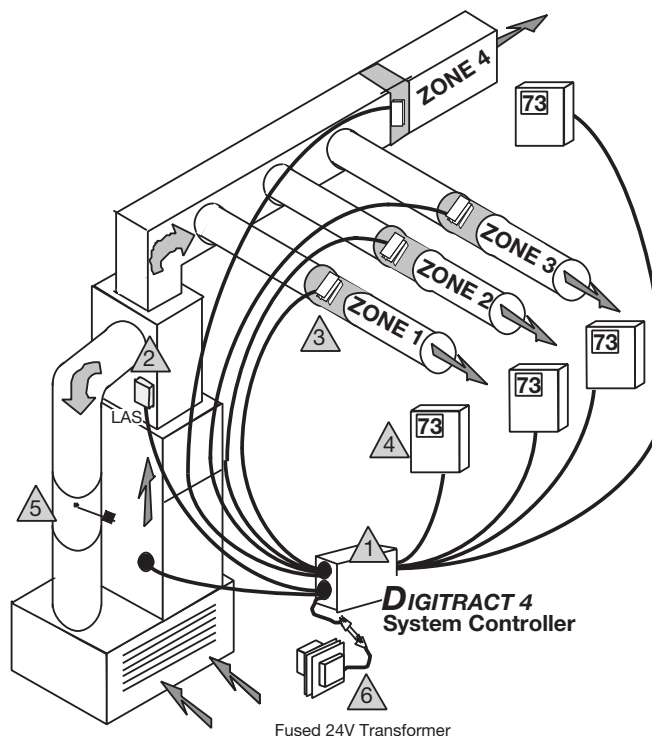
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# INTRODUCTION

The Digitract 4 zoning system enables up to four room thermostats to control a single HVAC system. This permits superior building temperature control over a standard single thermostat. Any generic thermostat may be used on this control system. When using digital thermostats, they must have “C” terminal for common or be battery powered. Both Programmable and Non-Programmable thermostats can be used. This system is designed to be installed and serviced by qualified licensed professionals.



\*The Digitract 4 was designed for both residential and commercial applications of 4 or less zones. The full spectrum of supply dampers can be applied, from low pressure; medium pressure; and heavy duty; round and rectangular.



## SYSTEM DESCRIPTION

The Digitract 4 zoning system consists of a 2-stage System Controller with built-in Capacity Control (leaving air sensor), Zone Dampers, Zone Thermostats, Bypass Damper and Damper Transformer.

The **System Controller** is the heart of the Digitract 4 zoning system. It monitors the leaving air temperature, zone thermostats and controls the HVAC System and zone dampers. See pages 6 to 10 for further information.

The **Leaving Air Sensor (HDLAS)** is part of the staging and capacity control feature of the System Controller. It is a sensor placed in the supply air of the HVAC system. The sensor monitors the supply air temperature of the HVAC system and sends this information to the System Controller. The System Controller uses this information to stage and temporarily cycle the HVAC system off if the leaving air gets too hot in heat mode or too cold in cool mode. For heat pumps, this input is also used to control the auxiliary heat. See Capacity Controller section, page 12, for further information.

**Balance Point** is used for fossil fuel applications when an FOAS is applied. The balance point feature will lock out compressor and enable gas furnace when outside air temperature drops below BP (balance point) setting.

The **Zone Dampers** are air valves placed in the forced air duct work for each zone. They are controlled by the System Controller. While the

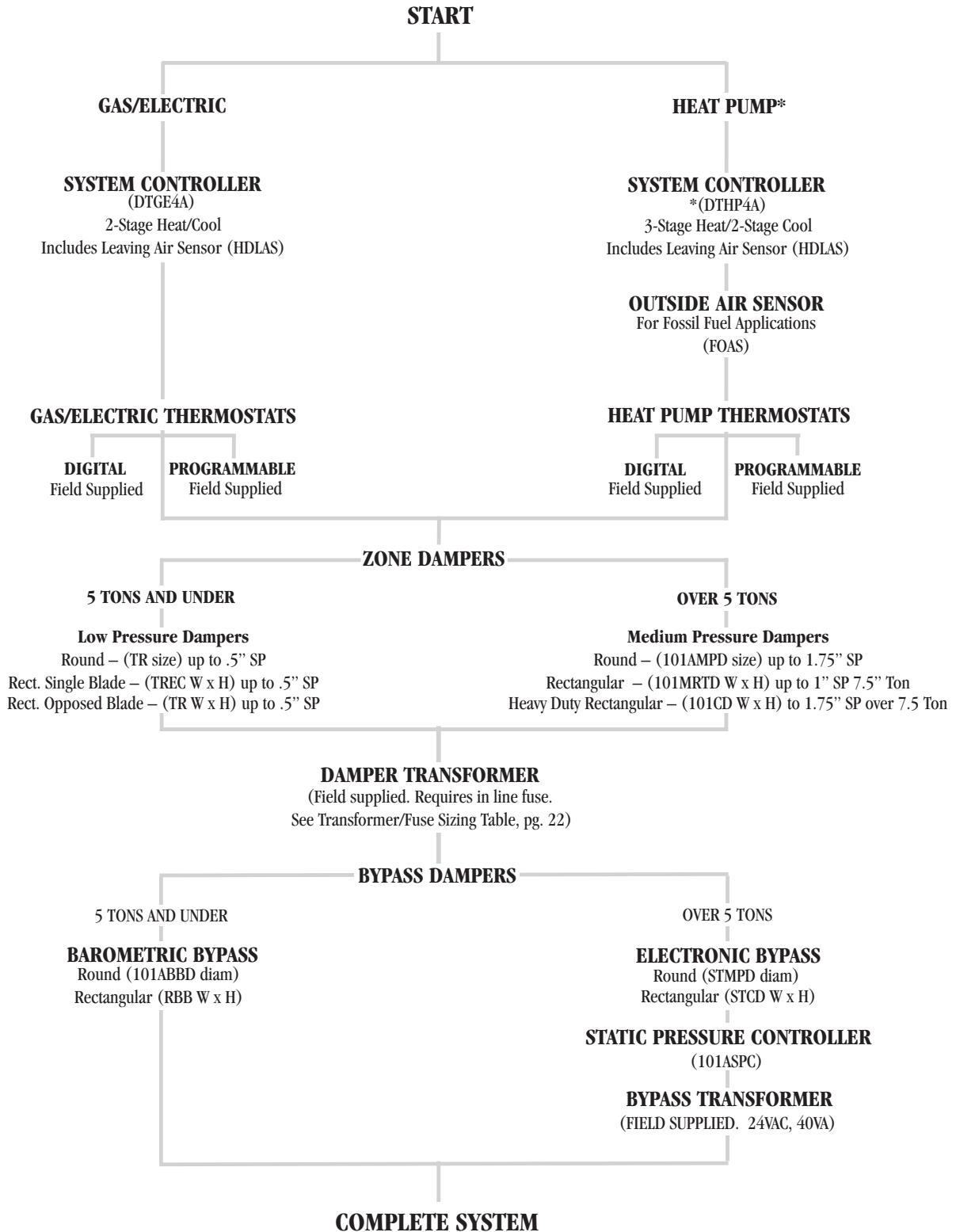
HVAC system is running, the zone dampers for any zone thermostats not calling will close and zone dampers for the zones calling will remain open. Conditioned air is only directed to the zones needing it. See pages 13 to 17 for further information.

The **Zone Thermostats** monitor the room temperature of each zone and compare it to the heat and cool setpoints stored in them. If the room temperature drops below the heat setpoint, the zone thermostat makes a heat call telling the System Controller that zone needs heating. If the room temperature rises above the cool setpoint, that thermostat makes a cool call telling the System Controller that zone needs cooling. Two-stage thermostats are not required with the Digitract 4 System. The System Controller will cycle staging and auxiliary strip heat based on leaving air temperature.

The **Bypass Damper** is a pressure relief valve placed between the supply and return ducts of the forced air duct work. As zone dampers start closing, the bypass damper will open and divert some of the supply air to the return. This prevents a pressure buildup in the supply duct which can cause fan cavitation, excessive air velocities, and excessive zone damper blow-by. See pages 17 to 21 for further information.

**Damper Transformer.** Wired to TR1 and TR2 on the System Controller. Powers the zone dampers only. Requires an in-line fuse. See Damper Transformer section, page 22.

# Digitract 4 COMPONENT SELECTION GUIDE



\*NOTE: For Heat Pump systems using gas electric inputs (no "O" or "B" reversing valve circuits) use the DTGE4A controller.

# WIRING – GAS/ELECTRIC DTGE4A

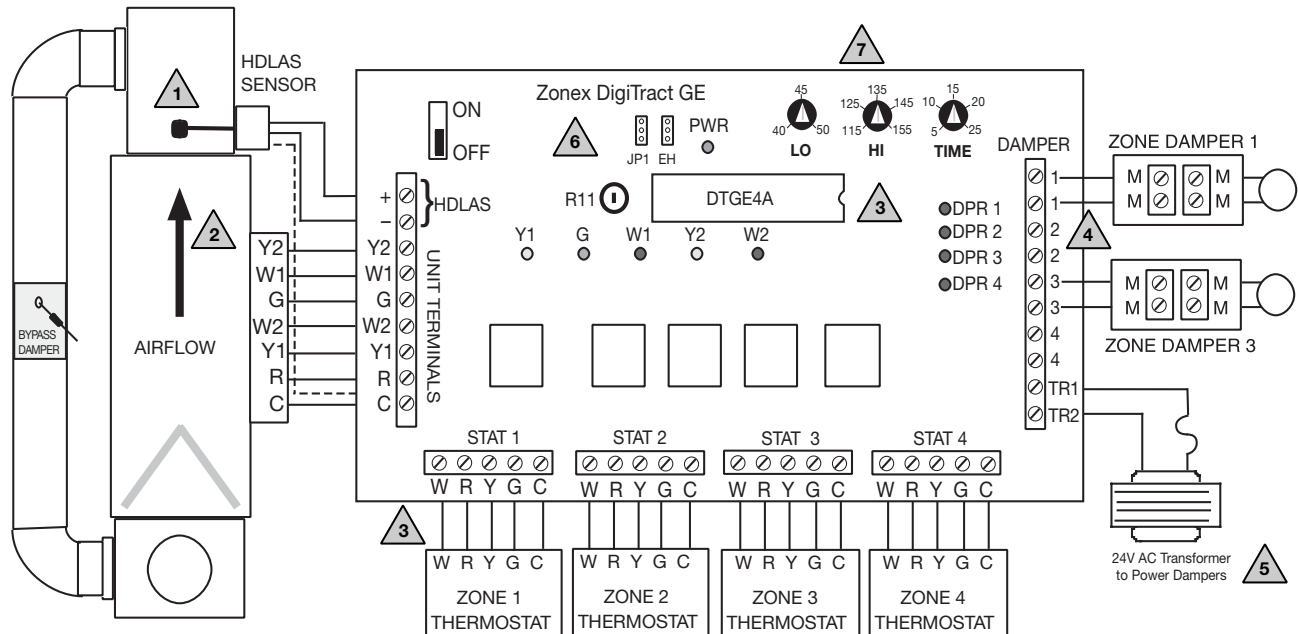
## Digitract 4 Gas/Electric 2-Stage Heat/Cool

HVAC unit and HDLAS terminals. Do not connect Y2 or W2 for single stage heat/cool systems.

Use minimum 18 gauge for all wiring.

All wiring must meet state and local codes.

Zone damper terminals. Refer to “Wiring – Zone Dampers” section, page 5.



**1 HDLAS.** Locate the leaving air sensor in the supply air stream, as far from the coil/heat exchanger as possible before the bypass takeoff. Do not locate the HDLAS downstream of the bypass takeoff. Ensure wire polarity is correct, Red to +, Black and shield to –. Refer to “CAPACITY CONTROLLER-HDLAS INSTALLATION” on page 12 for further information.

**2** Connect W2 and Y2 of the DTGE4A only if there are two heat and/or two cool stages.

**3** Most thermostats are compatible with the DigiTract 4.

**4** Zone damper terminals. Refer to “WIRING – ZONE DAMPERS” on page 5.

**5** Install one 24V AC transformer, sized and fused for the total number of zone dampers. See “DAMPER TRANSFORMER” on page 22.

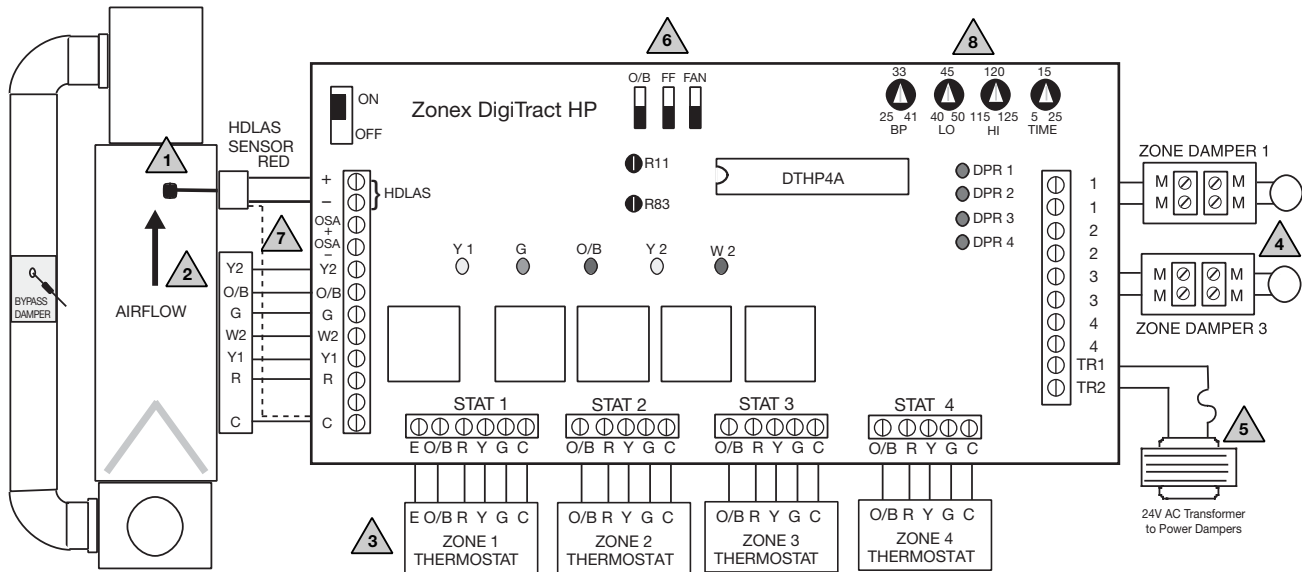
**6** Fan cycling jumper: Bottom position = FAU fan control; Upper position = energized fan on heat call (JPI not used)

**7** Adjustable potentiometers:

- HI – To establish HI cutout for furnace protection and staging temperatures – must be field adjusted to 120° for HP applications.
- LO – To establish LO cutout, to protect freezing of coil, to set up staging for compressors
- TIME – To establish changeover time when opposite calls will be recognized by controller

# WIRING – HEAT PUMP DTHP4A

## Digitract 4 HP 3-Stage Heat/2-Stage Cool



HDLAS. Locate the leaving air sensor between the refrigerant coil and the electric heat coil(s) or other auxiliary heat source. Verify that the polarity is correct, Red to +, Black and shield to -. Refer to “CAPACITY CONTROLLER – HDLAS INSTALLATION” page 12, for further information.



Connect W2 from the controller to the unit's electric heat stage terminal designation. It is recommended to install an outdoor thermostat for non-fossil fuel applications.



Most heat pump thermostats are compatible; 1C/2H.

**NOTE:** Some combination thermostats do not have an E terminal. Connect W2 of the thermostat to the E terminal of STAT 1 terminal block.



Zone damper terminals. Refer to “WIRING – ZONE DAMPERS” on page 5.



Install one 24V AC transformer, sized and fused for the total number of zone dampers. See “DAMPER TRANSFORMER” on page 22.



Reversing valve jumper:		B-Mode – energize for heat		O Mode – energize for cool
Fossil fuel jumper:		Fossil Fuel Application		Normal HP Operation
Fan jumper:		Not Used		



FOAS – Outdoor Air Sensor used to sense Balance Point temperature for auto-changeover, fossil fuel application only. Use FOAS only; not HP outdoor thermostat.



Adjustable potentiometers:

- BP – To establish temperature that locks out heat pump and energizes fossil fuel furnace
- HI – To establish HI cutout for furnace protection and staging temperatures
- LO – To establish LO cutout, to protect freezing of coil, to set up staging for compressors
- TIME – To establish changeover time when opposite calls will be recognized by controller

## WIRING – ZONE DAMPERS

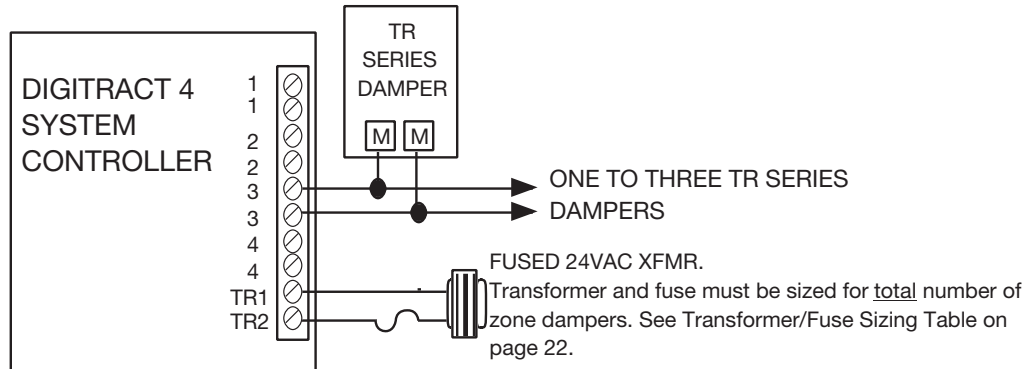
There are three methods of wiring the zone dampers. If necessary, you can mix wiring methods on different zones to suit your application.

**Method 1:** When wiring one to three TR/TREC series dampers to a zone.

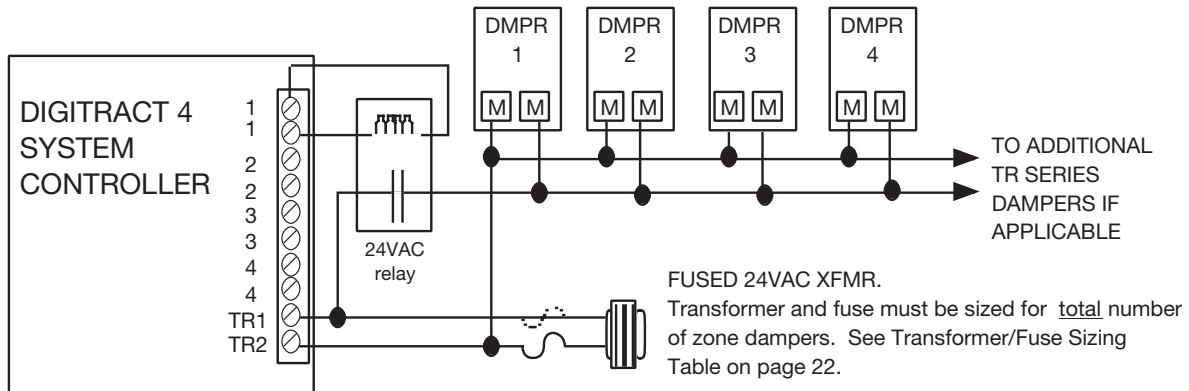
**Method 2:** When wiring more than three TR/TREC series dampers to a zone, use a 24V ac, SPNO relay.

**Method 3:** When using 101AMPD or 101CD series dampers with a DigiTract controller. Note: 101 series medium pressure dampers are required for all systems over 5 tons. Refer to Parts Selection Table, page 13.

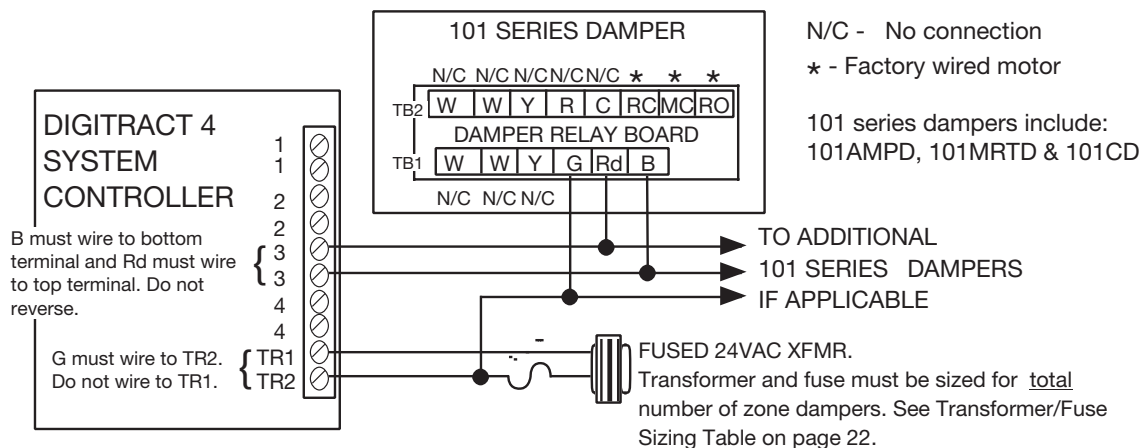
### Method 1: Wiring Up to Three TR Series Dampers to a Zone



### Method 2: Wiring More than Three TR Series Dampers to a Zone



### Method 3: Wiring 101 Series Medium/Heavy Duty Dampers to a Zone



## SYSTEM CONTROLLERS

The DigiTract Controller is the heart of the DigiTract zoning system. It is an auto changeover, home run system with a built in staging and capacity controller. The function of the system controller is to receive calls from the zone thermostats, operate the HVAC system in either heat or cool mode and close the damper(s) of zones not calling for the operating mode. The mode of operation is determined by the first call received. If the thermostats are calling for opposite modes, a changeover sequence will start. Based on the Time Setpoint setting, a changeover will occur after time delay. Changeover will continue as long as there are opposing calls. The built in Capacity Controller maintains the supply air temperature within an operation range to prevent freeze ups and overheating. For Heat Pumps, the DTHP4A System Controller will also control the auxiliary heat.

The DigiTract 4 controller is not to be subjected to temperatures below 33°F or above 160°F. The controllers must not be installed in atmospheres that could create condensation or corrosion. Warranty is voided on controllers that fail due to moisture or corrosion evidenced on the circuit board. The operating voltage range on the DigiTract 4 controllers is 24 vac to 28 vac.

The DigiTract 4 is available in two models, Gas Electric 2-Stage Heat/Cool and Heat Pump 3 stage Heat/2 Stage Cool with integrated fossil fuel control.

NOTE: For Heat Pump systems using gas electric inputs (no "O" or "B" reversing valve circuits) use the DTGE4A controller.

## SYSTEM CONTROLLER – GAS/ELECTRIC DTGE4A

### OPERATION

The System Controller will initially run in the mode requested by the first calling zone thermostat.

**Cool mode** – When running in the cool mode, the System Controller energizes the compressor(s) and indoor blower. This is indicated by the corresponding Y and G LEDs illuminating. Dampers for the zones not calling for cool are powered closed and the dampers for the zones calling for cool are left open. This is indicated by the DPR LEDs. If the DPR LED is illuminated on the damper terminal strip and damper terminal board, the corresponding damper is closed. The system will continue to run in the cool mode until all calls are satisfied or changeover occurs. When all calls are satisfied or prior to changeover, the system will go into a purge mode.

**Heat mode** – When running in the heat mode, the System Controller energizes the heat stage (s), indicated by the W LEDs illuminating. If the Fan Control Jumper is in the EH position, the blower will energize with a call for heat, indicated by the G LED illuminating. Dampers for the zones not calling for heat are powered closed and the dampers for the zones calling for heat are left open. This is indicated by the DPR LEDs. If a DPR LED is on, the corresponding damper to the LED is being powered closed. The system will continue to run in the heat mode until all calls are satisfied or changeover occurs. When all calls are satisfied or prior to changeover, the system will go into purge mode.

**Changeover** – While the system is operating in one mode, and the System Controller receives a call for the opposite mode, the System

Controller will continue to run in the current mode until the changeover TIME limit has been reached, or all current calls have been satisfied. Then the System Controller will go into a purge mode for 4 minutes, then change over to the new mode

**Purge mode** – Purge mode is initiated after the last calling zone is satisfied, or when the controller goes into a forced changeover. All HVAC output LEDs on the controller go off during this cycle. When the last calling zone thermostat satisfies, the DigiTract controller goes into a four-minute purge cycle. During this time delay all controller outputs to the HVAC system and dampers are terminated. All dampers go to a full open position and the HVAC system fan delay control runs the blower for a time. This time delay with no control outputs allows the supply duct to return to ambient temperature before the next call is initiated.

When the controller goes into a force mode changeover, and the initial call drops out to the purge cycle, the HVAC outputs are terminated, and the initial zone damper remains open for a 4-minute delay with the other dampers closing. The HVAC system fan control allows the blower to run for a time, and the initial calling zone supply duct returns to ambient temperature.

**Ventilation** – When no zones are calling, all zone dampers are open. During this time, if any thermostat has the fan switch ON then the indoor blower is energized (G made to R) and the G LED is on. This provides ventilation to all zones.

### STATUS LED LEGEND

Y1	Y2	G	W1	W2	PWR	DPR	MODE	FUNCTION
OFF	OFF	OFF	OFF	OFF	OFF	OFF	Off	Power off.
OFF	OFF	OFF	OFF	OFF	ON	OFF	On	Power on, blower, off, all zone dampers open.
OFF	OFF	ON	OFF	OFF	ON	0	Vent	Blower on, compressor(s) off, all zone dampers open.
OFF	OFF	OFF	OFF	OFF	ON	1	Purge	All outputs off.
ON	OFF	ON	OFF	OFF	ON	1	Y1 Cool	1st stage cool, blower on. Dampers with LED on are closed.
ON	ON	ON	OFF	OFF	ON	1	Y2 Cool	2nd stage cool, blower on. Dampers with LED on are closed.
OFF	OFF	EH	ON	OFF	ON	1	W1 Heat	1st stage heat, blower on. Dampers with LED on are closed.
OFF	OFF	EH	ON	ON	ON	1	W2 Heat	2nd stage heat, blower on. Dampers with LED on are closed.
OFF	OFF	ON	OFF	OFF	SFL	1	Cap cut out	Blower on, all compressors off. Dampers w/LED on are closed.
ON	OFF	ON	OFF	OFF	FFL	1	Stage 2 cut out	Compressor 1 on, blower on, damper w/LED on are closed.

FFL = Fast Flash SFL = Slow Flash EH = On when jumper is in the UP position Off when jumper is in the DOWN position

1 = One or more damper LEDs on 0 = All damper LEDs are off



# SYSTEM CONTROLLER – GAS/ELECTRIC DTGE4A

## COMPONENTS

### A. HVAC Unit/HDLAS Terminals – Connects to HVAC unit and Leaving Air Sensor (HDLAS).

±: HDLAS terminals. The HDLAS monitors the leaving air temperature. Red wire from sensor is connected to the + terminal, Black and shield wired to –.

W1: First stage heat. When energized (W1 made to R), energizes first-stage heat.

W2: Second stage heat. When energized (W2 made to R), energizes second-stage heat.

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

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

Y2: Second stage cool. When energized (Y2 made to R), energizes second stage cooling.

R: HVAC unit 24V power. Powers the DigiTract 4 board and zone thermostats.

C: HVAC unit 24V power return.

### B. Thermostat Terminals – Connects up to four zone thermostats.

W: Heat call. When energized (W made to R), requests the DigiTract 4 to run in heat mode.

R: HVAC unit 24V power.

Y: Cool call. When energized (Y made to R), requests the DigiTract 4 to run in cool mode.

G: Blower Fan- When energized (G made to R), requests the DigiTract 4 to turn on the indoor blower fan.

C: HVAC unit 24V common.

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

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

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.

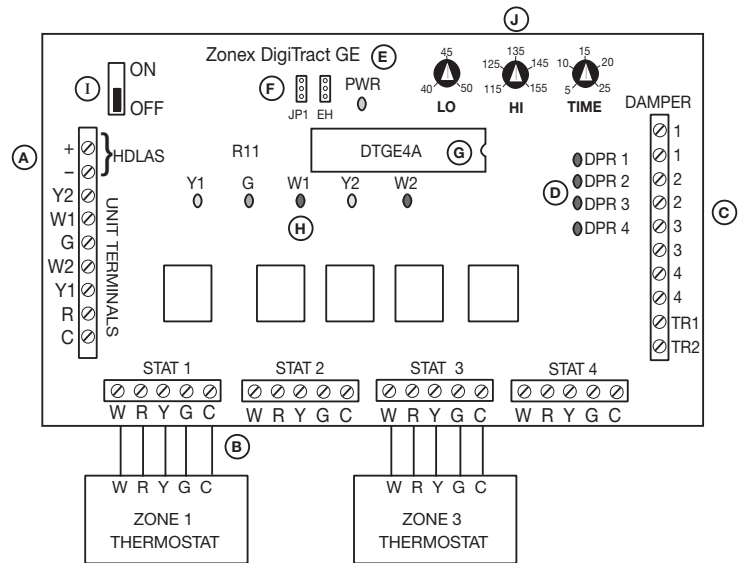
When energized, powers zone damper 3 closed.

4 4: Zone damper 4.

When energized, powers zone damper 4 closed.

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

### E. Board Number – This number indicates the circuit board number and revision. You must know this number if conferring with technical support.



### F. Special Function Jumpers

JP1 – Not used.

EH – Electric Heat – To energize the system blower on a call for heat, place the jumper over the top and middle jumper pins. Controller is shipped with the jumper on the middle and lower pin for furnace fan control.

### G. Microcontroller – Responsible for activation and control of the unit based upon thermostat input.

### H. HVAC System Status LEDs – Indicates what the DTGE4A is energizing on the HVAC system.

Y1: Compressor, yellow. On when the first-stage cool is energized.

Y2: Compressor, yellow. On when the second-stage cool is energized.

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

W1: Heat, red. On when first stage heat is energized.

W2: Heat, red. On when second stage heat is energized.

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, page 6, for further information.

### I. Power Switch – When OFF, power from the HVAC unit transformer is disconnected from the DigiTract 4 and thermostats. When ON, power from the HVAC unit transformer is supplied to the DigiTract 4 and the zone thermostats.

### J. Adjustable Potentiometers – For HIGH limit, LO limit and TIME changeover. Use these potentiometers to adjust limits for a customized job. From factory the settings are 145° high, 45° low and 15-minute changeover.

# SYSTEM CONTROLLER – HEAT PUMP DTHP4A

## OPERATION

The System Controller will initially run in the mode requested by the first calling zone thermostat.

**Cool mode** – When running in the cool mode, the System Controller energizes the compressor(s), indoor blower and energizes the reversing valve (O made to R) if the reversing valve selection jumper is in the O position. This is indicated by the corresponding Y, G and O/B (if jumper in O position) LEDs illuminating. Also, the dampers for the zones not calling for cool are closed and the dampers for the zones calling for cool are left open. This is indicated by the DPR LEDs. If the DPR LED is illuminated, the damper terminal strip and damper terminal board, the corresponding damper is closed. The system will continue to run in the cool mode until all calls are satisfied or changeover occurs. When all calls are satisfied or prior to changeover, the system will go into a purge mode.

**Heat mode** – When running in the heat mode, the System Controller energizes the compressor(s), indoor blower and energizes the reversing valve if the reversing valve selection jumper is in the B position. This is indicated by the corresponding Y, G and O/B (if jumper in B position) LEDs illuminating. Also, the dampers for the zones not calling for heat are closed and the dampers for the zones calling for heat are left open. This is indicated by the DPR LEDs. If the DPR LED is on the damper terminal strip and damper terminal board, the corresponding damper is closed. After running in heat mode for 8 minutes, the System Controller will energize the auxiliary heat if the coil leaving air temperature drops below 90° and will de-energize when the coil leaving air temperature rises above 100°. The W2 LED is on when the auxiliary heat is energized. The system will continue to run in the heat mode until all calls are satisfied or changeover occurs. When all calls are satisfied or prior to changeover, the system will go into a purge mode.

**Changeover** – While the system is operating in one mode, if the System Controller receives a call for the opposite mode, the System Controller will continue to run in the current mode until the changeover time has been reached or all current calls are satisfied. The System controller will then go into a 4-minute purge, then change over to the opposite mode.

**Purge mode** – Purge mode is initiated after the last calling zone is satisfied, or when the controller goes into a forced changeover. All HVAC output LEDs on the controller go off during this cycle. When the last calling zone thermostat satisfies, the Digtact controller goes into a four minute purge cycle. During this time delay all controller outputs to the HVAC system and dampers are terminated. All dampers go to a full open position and the HVAC system fan delay control runs the blower for a time. This time delay with no control outputs allows the supply duct to return to ambient temperature before the next call is initiated.

When the controller goes into a force mode changeover, and the initial call drops out to the purge cycle, the HVAC outputs are terminated, and the initial zone damper remains open for 4 minute delay with the other

dampers closing. The HVAC system fan control allows the blower to run for a time, and the initial calling zone supply duct returns to ambient temperature.

**Auxiliary heat** – 8 minutes after the System Controller has run in heat mode, if the coil leaving air temperature is below 90°, the auxiliary heat is energized and the W2 LED illuminates. When the coil leaving air temperature rises above 100°, the auxiliary heat is de-energized and the W2 LED cycles off.

**Ventilation** – When no zones are calling, all zone dampers are open. During this time, if any thermostat has the fan switch ON then the indoor blower is energized and the G LED is on. This provides ventilation to all zones.

**Emergency heat** – Emergency Mode is selected from STAT1 position only. To make an emergency heat call, STAT1 must be in the emergency heat mode and make a heat call. When STAT1 places the call for heat, all thermostats will then be able to place a call for emergency heat independently. Compressors will be locked out of operation until STAT1 places a cool or heat call. When a call for emergency heat is placed the blower and electric strip heat will energize. Zones that are not calling for heat will close their dampers; those that are calling will remain open.

**Fossil Fuel Operation** – The DTHP4A provides a selectable integrated Fossil Fuel operation. Applying this controller to Fossil Fuel systems eliminates the need for a “Fossil Fuel Kit,” additional capacity control, auxiliary relays and complicated control wiring. The controller offers balance point control when the optional FOAS outdoor air sensor is used. This enables the heat pump compressor to be locked out and the Furnace to be energized on a call for heat, when the outdoor temperature is below the BP setpoint on the DTHP4A controller. When the FOAS is not used, the controller will stage up to the furnace based on time and temperature.

By placing the controller jumper in the FF position the controller is configured for Fossil Fuel operation. When there is no Outside Air Sensor applied, a call for heat from any zone energizes Y1 compressor output and G blower output (“B” mode energizes rev valve also). With the factory POT settings: LO 45° and HI 120°, the controller will stage up from Y1 to Y2 after four minutes, if the supply air temperature is below 95°. After 8 minutes run time if the supply air temperature is 90° or below, W2 LED will illuminate energizing the furnace; Y1 and Y2 will drop out leaving the fan circuit energized. When the controller energizes W2 for the furnace, the capacity control automatically implements a fixed cutout temperature of approximately 135°. When this temperature is exceeded, W2 drops out and the system goes into a 4-minute purge cycle to reduce supply air temperature.

When using the optional FOAS Outdoor Air Sensor, the Balance Point “BP” POT should be checked and adjusted as required; factory setting is 33°. On call for heat, if the OA temp is above the BP setting, Y1 will be energized on the Heat Pump. When the OA is below the BP, call for heat will energize W2 gas furnace directly.

## SYSTEM CONTROLLER – HEAT PUMP DTHP4A

## STATUS LED LEGEND

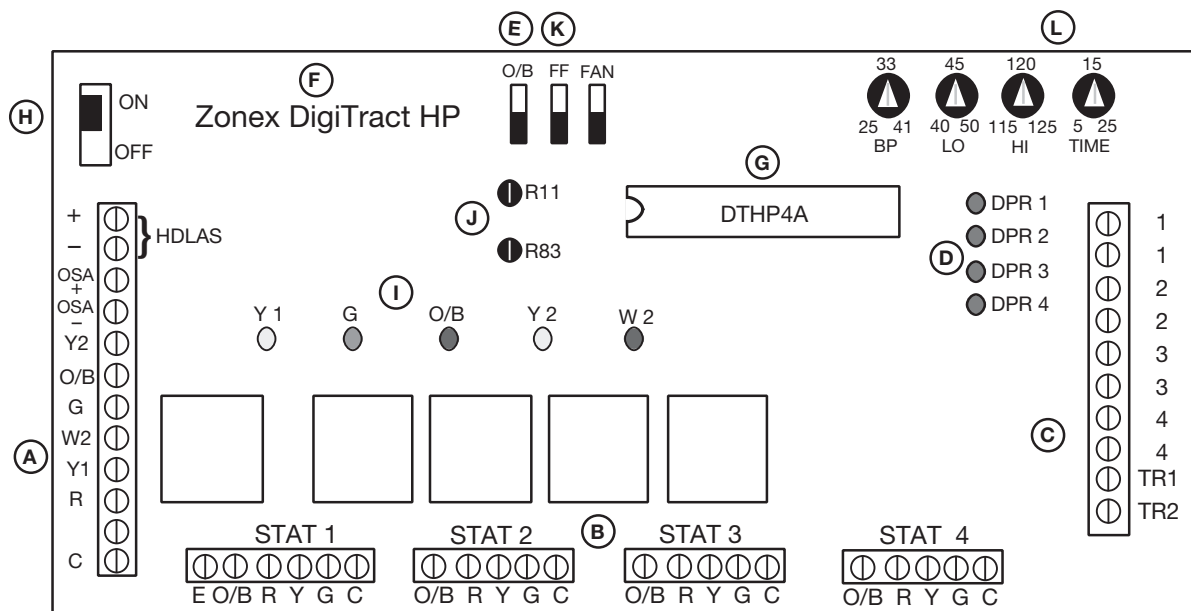
O/B	Reversing valve LED, yellow. On when the reversing valve is energized.
Y1	Compressor LED, yellow. On when the first compressor stage is energized.
Y2	Compressor LED, yellow. On when the second compressor stage is energized.
G	Indoor blower LED, green. On when the indoor blower is energized by the 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							MODE	FUNCTION
O/B	Y1	Y2	G	W2	PWR	DPR		
OFF	OFF	OFF	OFF	OFF	OFF	OFF	Off	Power off.
OFF	OFF	OFF	OFF	OFF	ON	OFF	On	Power on, blower off, all zones satisfied.
ON/OFF	OFF	OFF	ON	OFF	ON	0	Vent	Blower on, compressor(s) off, all zone dampers open.
ON/OFF	OFF	OFF	OFF	OFF	ON	1	Purge	Blower off, compressor(s) off. Dampers with LED on are closed.
A	ON	OFF	ON	OFF	ON	1	Y1 Cool	1st stage cool, blower on. Dampers with LED on are closed.
A	ON	ON	ON	OFF	ON	1	Y2 Cool	2nd stage cool, blower on. Dampers with LED on are closed.
B	ON	OFF	ON	OFF	ON	1	Y1 Heat	1st stage heat, blower on. Dampers with LED on are closed.
B	ON	ON	ON	C	ON	1	Y2 Heat	2nd stage heat, blower on. Dampers with LED on are closed.
ON/OFF	OFF	OFF	ON	ON	ON	1	Em. Heat	Auxiliary and emergency heat on.
OFF	OFF	OFF	ON	OFF	FL	1	Cap Cut out	Blower on, all compressors off. Dampers with LED on are closed.
ON/OFF	ON	ON	ON	ON	ON	1	Em. Heat	If below 90°, stages up to Y1, Y2 and W2
ON/OFF	OFF	OFF	ON	ON	ON	1	Em. Heat	Fossil fuel mode, stages up to W2 only

**FL** = Flashing    **A** = On when reversing valve jumper is in O position    **B** = On when reversing valve jumper is in B position

**C** = On when auxiliary heat is energized      **1** = One or more damper LEDs on      **0** = All damper LEDs are off

## COMPONENTS DTHP4A



# SYSTEM CONTROLLER – HEAT PUMP DTHP4A

## COMPONENTS

### A. Heat Pump Unit/HDLAS Terminals – Connects to Heat Pump and Leaving Air Sensor (HDLAS).

- ±: HDLAS terminals. The HDLAS monitors the heat pump coil leaving air temperature.
- ±: OAS Optional Outside Air Sensor for use in Fossil Fuel / Dual Fuel applications
- W2: Auxiliary Heat. When energized (W2 made to R), turns on the heat pump auxiliary heat.
- G: Blower. When energized (G made to R), turns on the indoor blower.
- Y1: Compressor. When energized (Y1 made to R), turns on the heat pump first stage compressor.
- Y2: Compressor. When energized, (Y2 made to R), turns on the heat pump second stage compressor.
- O/B: Reversing Valve. When energized (O/B made to R), engages the heat pump reversing valve.
- R: Heat pump unit 24V power. Powers Digitract 4 and thermostats.
- C: Heat pump unit 24V common.

### B. Thermostat Terminals – Connects up to four zone heat pump thermostats.

- E: Emergency Heat. On STAT 1 only. Connected to E terminal on STAT 1.
- O/B: Reversing valve signal. “O” energizes reversing valve in the Cool mode. “B” energizes reversing valve in the Heat mode.
- R: Heat pump unit 24V power. See A.
- Y: Compressor.
- G: Blower.
- C: Heat pump unit 24V common.

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

- TR1/TR2: 24V AC transformer terminals. This transformer powers only the zone dampers.
- 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.
- 4 4: Zone damper 4. When energized, powers zone damper 4 closed.

### D. Damper Status Lights – Light on when corresponding zone damper is closed.

### E. Reversing Valve Selection Jumper – Configures Digitract 4 to energize reversing valve in cool mode or heat mode. Place on O and center pin to energize reversing valve in cool mode. Place on B and center pin to energize in heat mode.

### F. Microcontroller – Responsible for activation and control of the unit and dampers based upon thermostat input.

### G. Power Switch – When OFF, power from the heat pump transformer is disconnected from the Digitract 4 and thermostats. When ON, power from the heat pump transformer is supplied to the Digitract 4 and the zone thermostats.

### H. Heat Pump Status LEDs – Indicates what the DTHP4A is energizing on the heat pump.

- O/B: Reversing valve, yellow. On when the reversing valve is energized.
- Y1: Compressor, yellow. On when the first stage compressor is energized.
- Y2: Compressor, yellow. On when the second stage compressor is energized.
- G: Blower, green. On when the indoor blower is energized.
- W2: Auxiliary heat, red. On when the auxiliary heat is energized.
- 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, page 9, for further information.

### I. FF fossil fuel jumper – Place jumper in FF position to use fossil fuel features.

### J. Adjustable potentiometer for balance point (BP), LO limit, HI limit and changeover time.

## CAPACITY CONTROL AND STAGING

The HVAC system is sized to handle the load of the entire home or building. Because of this, when all the zones are not calling, the load to the HVAC system can diminish below its designed capacity. Left unchecked, the HVAC unit could freeze up or overheat. To compensate for this, the DigiTract 4 is furnished with a built in Capacity Controller.

The basic function of the Capacity Controller is to monitor the leaving air temperature and cycle the unit off when the air is out of operating range and, after a minimum four minute time delay, turn the unit back on when the air temperature has returned within operating range. Additionally, for heat pumps the Capacity Controller will turn on the heat pump auxiliary heat if the coil leaving air temperature is not hot enough in heat mode.

### COOLING OPERATION – DTGE4A AND DTHP4A

**Y1 Cool Operation** – Upon a cool call, the controller will energize Y1 and G. If the leaving air temperature drops below the low limit setpoint, Y1 will be de-energized, the PWR led will flash indicating a stage 1 capacity cutout. After 4 minutes the leaving air temperature will be checked again; if the leaving air temperature has risen above the cutout set point, then Y1 will reenergize and PWR LED will stop flashing. If controller is for a Heat Pump, and the reversing valve is in the O position, the O/B output will be energized simultaneously with the Y1, indicated by the O/B LED.

After 8 minutes of continuous Y1 run time, LAT (leaving air temperature) will be checked. If LAT is greater than low limit (LO) plus 12° (LO of 45° + 12° = 57°), then Y2 will energize and Y2 LED will illuminate. Y2 will cycle off when LAT drops below 5° plus low limit (45° + 5° = 50°). Y2 and G will de-energize when all calls are satisfied, and the controller will go into a 4-minute purge cycle.

### HEAT OPERATION – GAS/ELECTRIC DTGE4A

Upon a heat call, the controller will energize W1 LED if the leaving air temperature is less than High Limit Setpoint. This setpoint is determined by adjusting the potentiometer located in the upper right corner of the controller, HI. W1 will de-energize if LAT exceeds the HI setpoint, W1 LED will de-energize and the PWR LED will flash slowly indicating a stage 1 capacity cutout. If the LAT is below the High limit, W1 will energize, W1 LED will illuminate.

**W2 Heat operations** – After W1 has operated continuously for 4 minutes and LAT is less than High Limit minus 25° (if HI of 145° – 25° = 120°), then W2 will energize indicated by the W2 LED. If LAT rises to High Limit minus 5°, then W2 will de-energize indicated by W2 LED off and PWR LED flashing quickly. If all heat calls are satisfied both W1 and W2 will de-energize and controller will go into a 4-minute purge cycle.

### HEAT OPERATION – HEAT PUMP DTHP4A

**Y1 Heat Operation** – Upon a call for heat, the controller will energize Y1 LED, if the LAT rises above the High Limit (potentiometer located on controller top right corner, marked HI), then Y1 LED will de-energize and PWR LED will flash indicating a stage 1 capacity cutout. After a 4-minute time delay the LAT will be checked; if LAT is less than HI cutout, then Y1 LED will reenergize and PWR LED will stop flashing. If the O/B jumper is in the B position, the O/B LED will illuminate with Y1.

**Y2 Heat Operation** – After 4 minutes of continuous Y1 operation, the leaving air temperature will be checked. If the LAT is less than High Limit (HI) minus 25° (HI of 120-25 = 95°), then Y2 will energize, indicated by the Y2 LED. Y2 will cycle off when LAT is HI minus 5° (120 – 5 = 115) or when all heat calls are satisfied.

**Fossil Fuel Operation** – For Fossil Fuel operation, FF jumper must be placed in the FF position.

- For greater efficiency and comfort, an Outdoor Air Sensor, Part # FOAS, should be used in the Fossil Fuel application. The FOAS is used to lock out compressor operation when outside air temperature has dropped below Balance Point setpoint, the temperature at which that heat pump is no longer efficient. When the outside temperature is less than Balance Point setpoint and there is a call for heat, Y1 and

Y2 will be locked out; and W2 will energize indicated by W2 LED illuminating. The HI limit will be reset automatically to 135° to provide HI limit protection for furnace. Calls for heat are recognized from all thermostats; dampers for zones calling for heat will open, indicated by DPR LEDs off, while zones not calling will close, indicated by illuminated DPR LEDs. The Balance Point setpoint is adjustable from 25° to 41° by moving Balance Point potentiometer to desired setpoint. Refer to page 9 for potentiometer location on DTHP4A.

- Applications without FOAS will stage on time and temperature. With the Fossil Fuel jumper in the FF position, after 8 minutes of continuous heat operation, if leaving air is less than 90°, then W2 will energize. Y1 and Y2 will de-energize indicated by LEDs off; W2 LED will illuminate and furnace will start. The HI limit will be reset automatically to 135° to protect furnace heat exchanger. DPR LED for calling zones will be off, while DPR LEDs for non-calling zones will illuminate. All thermostats are able to make calls for heat.

**Auxiliary Heat (Electric Strip Heat)** – After 8 minutes of continuous operation the leaving air temperature is checked. If LAT is below 90°, W2 will energize and W2 LED will illuminate. W2 will cycle off above 100°, or when all calls are satisfied.

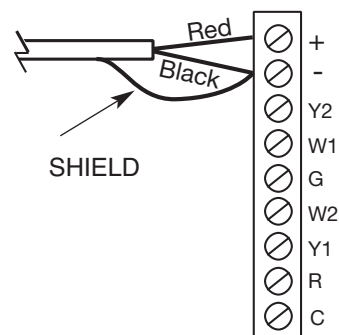


# HDLAS AND OAS INSTALLATION

## CAPACITY CONTROLLER – HDLAS INSTALLATION

### Capacity control installation, HDLAS installation

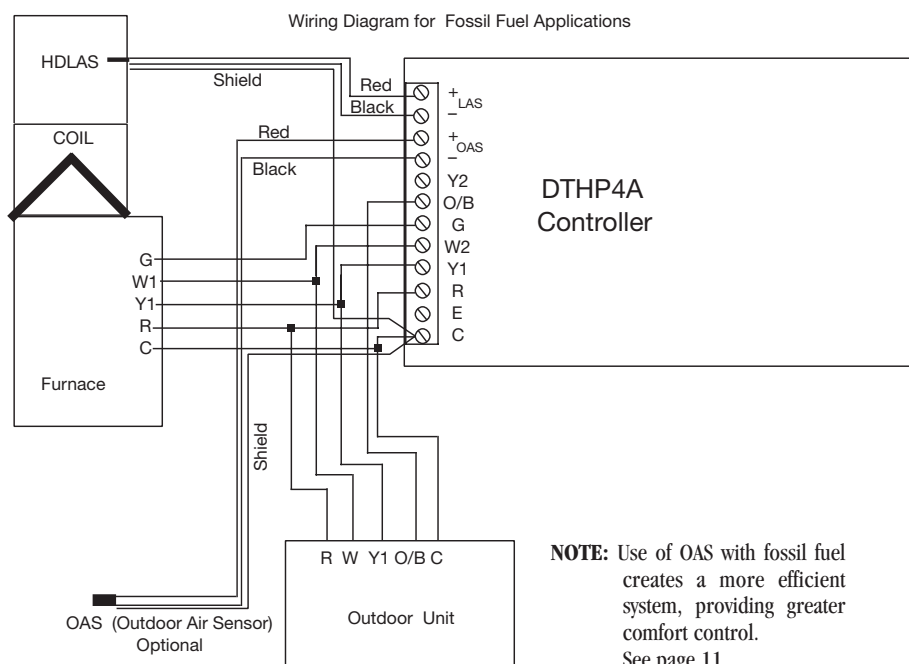
1. Drill a 3/8" hole in the supply air, ahead of the bypass tap.
  - A. **GAS/Electric** application – install sensor as far as possible from the FAU heat exchanger but still before the bypass tap.
  - B. **Heat Pump** application – install the sensor after the indoor coil but before the electric strip heat assembly.
2. Secure the sensor-mounting base to the duct or AHU cabinet (HP) with the self-tapping screws provided.
3. Run the shielded sensor cable back to the controller location; trim off any excess cable.
4. Connect the RED wire to the + terminal; BLACK and shield to the – terminal. *Note:* Insure that sensor shield conductor is not connected to or touching any chassis ground or metal. This conductor must be connected to the "C" terminal on the controller only.
5. The HDLAS requires no calibration.



## OAS INSTALLATION FOR FOSSIL FUEL

### OAS, outdoor air sensor (Optional for Fossil Fuel applications), Sensor Installation

1. Install the OAS outside of the building, away from direct sun exposure, and above the snow line.
2. Run the sensor cable to the Dignitrac controller location; trim off any excess cable.
3. Connect the RED wire to the OAS + terminal; the BLACK wire to the OAS – terminal, and the shield to the "C" terminal on controller. Insure that the shield conductors are not connected to or touching any chassis ground or metal.
4. The OAS does not require calibration.
5. Check the Balance Point (BP) POT on the controller. It is factory set at 33°.



## ZONE DAMPERS

Use the table below to determine which zone dampers to use.

SYSTEM SIZE	MAXIMUM DIFFERENTIAL PRESSURE	ROUND DAMPER	RECTANGULAR DAMPER
5 TONS OR UNDER	0.5"	LOW PRESSURE	LOW PRESSURE
UNDER 7.5 TONS	1"	MEDIUM PRESSURE	MEDIUM PRESSURE
7.5 TONS OF LARGER	1.75"	MEDIUM PRESSURE	HEAVY DUTY

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 ZONE DAMPERS

There are two styles of round zone dampers, low pressure or medium pressure. For systems 5 tons or under with a maximum differential static

pressure of 0.5", use low pressure dampers. Otherwise use medium pressure for up to 1.75" differential pressure on any system over 5 tons.

#### 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. Round damper sizes 9 inches and under are manufactured from 24 gauge galvanized steel. Sizes 10", 12", 14" and 16" are made from 20 - 22 gauge steel. 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. Motor drive time from full open to full close is 30 seconds. 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)

#### ROUND MEDIUM PRESSURE ZONE DAMPERS (101AMPD series)

The *Zonex Systems* round medium pressure zone dampers are recommended for any size system above 5 ton, 2000 CFM, and are rated for a maximum of 1.75" SP. These dampers are constructed from 20-22 gauge galvanized steel, with an elliptical damper disc. The damper shell is manufactured with the supply end crimped and an air flow direction arrow. The damper is driven by a 24-volt power open / power close, direct coupled actuator rated at 2VA. The actuator assembly includes manual open and close stop adjustments and mechanical drive release. The actuator is designed for full stall operation in the open and close positions and requires no end switches.



MEDIUM PRESSURE (101AMPD diam)

## ZONE DAMPERS

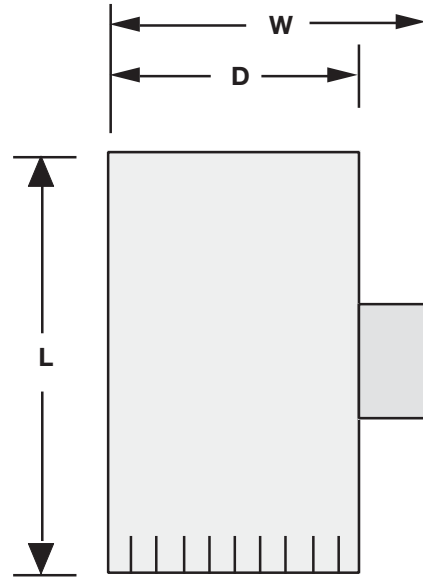
### ROUND LOW & MEDIUM PRESSURE DAMPER SIZES

#### ROUND LOW PRESSURE DAMPER

PART #	SIZE	DIAMETER (D)	LENGTH (L)	WIDTH (W)
TR06	6"	6"	10"	9"
TR07	7"	7"	10"	10"
TR08	8"	8"	10"	11"
TR09	9"	9"	11"	12"
TR10	10"	10"	12"	13"
TR12	12"	12"	14"	15"
TR14	14"	14"	16"	17"
TR16	16"	16"	18"	18 1/2"

#### ROUND MEDIUM PRESSURE DAMPER

PART #	SIZE	DIAMETER (D)	LENGTH (L)	WIDTH (W)
101AMPD06	6"	6"	10"	9"
101AMPD08	8"	8"	10"	11"
101AMPD10	10"	10"	12"	13"
101AMPD12	12"	12"	14"	15"
101AMPD14	14"	14"	16"	17"
101AMPD16	16"	16"	18"	19"
101AMPD18	18"	18"	20"	21"



### TYPICAL ROUND CAPACITIES\*

Duct Diameter	Nominal CFM	Duct Velocity FPM	Damper $\Delta P$ " WC
6"	110	540	.014
7"	160	600	.014
8"	250	700	.015
9"	320	725	.015
10"	410	750	.015
12"	660	850	.022
14"	1000	925	.035
16"	1450	1070	.036
18"	2000	1100	.036

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



## ZONE DAMPERS

### RECTANGULAR ZONE DAMPERS

Rectangular zone dampers are available for the DigiTract 4 controllers in three (3) styles:

TREC WxH for low pressure applications (5 tons or less) rated at .5" SP;

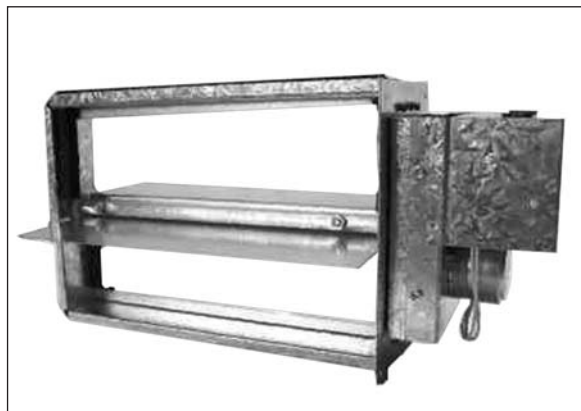
101MRTD WxH for medium pressure application up to 7.5 tons, rated at 1" SP;

101CD WxH for heavy duty applications over 7.5 tons, rated at 1.75" SP.

#### 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. Motor drive time from full open to full close is 30 seconds. 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

#### RECTANGULAR MEDIUM PRESSURE ZONE DAMPERS (101MRTD W x H)

*Zonex Systems* rectangular medium pressure dampers are recommended for systems under 7.5 tons with a maximum differential static pressure of 1". These are 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 3-1/4" wide cutout in the existing duct and attaches with screws via a duct mounting plate. The duct mounting plate is 5" wide. Power consumption is 6VA. The motors are designed for continuous full stall operation. Special winding and heavy duty gearing provide for long motor life.

#### RECTANGULAR HEAVY DUTY ZONE DAMPERS

##### (101CD W x H)

*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 power open, power close dampers made of 20 gauge "snap-lock" steel frame with S and 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 and a relay board control the damper position.



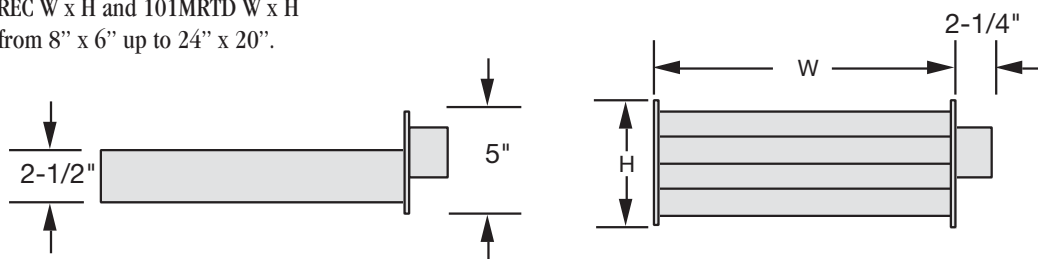
MEDIUM PRESSURE (101MRTD W x H) AND  
HEAVY DUTY (101CD W x H) RECTANGULAR DAMPERS

## ZONE DAMPERS

### LOW AND MEDIUM PRESSURE RECTANGULAR DAMPER DIMENSIONS

Part Number TREC W x H and 101MRTD W x H

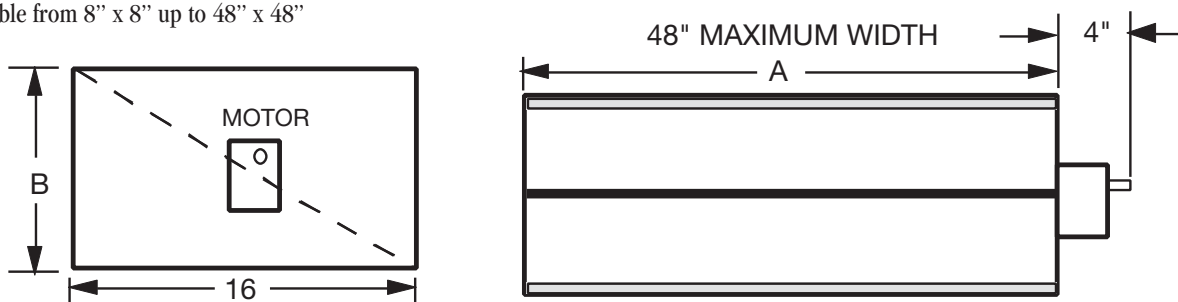
Sizes available from 8" x 6" up to 24" x 20".



### HEAVY DUTY RECTANGULAR DAMPER DIMENSIONS

Part Number 101CD W x H

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



WIDTH	HEIGHT	DEPTH
A	B	16"

Rectangular heavy duty dampers should operate at 1500 FPM.

E.G. A 24" x 12" damper = 2 square feet.

2 square feet X 1500FPM = 3000 CFM.

### RECTANGULAR DAMPER CAPACITIES\*

Dampers listed below are standard sizes. For larger sizes and capacities, contact the factory.

		WIDTH IN INCHES								
		8	10	12	14	16	18	20	22	24
HEIGHT IN INCHES	6	200	250	310	390	440	500	570	630	700
	8	280	390	490	590	680	770	900	960	1090
	10	390	510	650	800	950	1100	1220	1400	1500
	12	490	650	850	1000	1200	1400	1600	1850	2000
	14			1000	1250	1500	1750	2000	2250	2500
	16			1200	1500	1800	2100	2450	2300	3000
	18			1400	1750	2100	2500	2850	3080	3600
	20									4000

Motors on low and medium pressure dampers will be mounted on the Height (H) side. **Bottom mount motors will be located on the Width (W) side.** \*These air quantities were derived from a duct sizing chart .1" friction loss per 100' of duct. All CFMs listed are approximate. For accurate selection use duct sizing table or device.

# ZONE DAMPERS

## 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 be butted against the hat section, (do not insulate the motor terminal board or relay board). Both motor and the relay board generate enough heat so no condensation will develop on the hat section.
5. Remember to allow a 16" gap in the duct for Heavy Duty rectangular CD 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

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.

Zonex Systems offers two types of bypass dampers, Barometric and Electronic. Each is available in round or rectangular configuration.

Barometric bypass dampers are limited to systems of 5 tons. Electronic dampers can be used on any size system. For residential HVAC systems with variable speed blowers, the barometric or electric bypass dampers can be used. NOTE: When using the electric bypass (STMPD/STCD), the actuator motor must be de-energized or powered to full open when the system blower cycles off. See Page 21 or contact Technical Support.

## 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. The RBB rectangular damper must be installed with horizontal air flow only.

**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.

$$(A - B = C)$$

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

**BAROMETRIC BYPASS SELECTION TABLE**

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

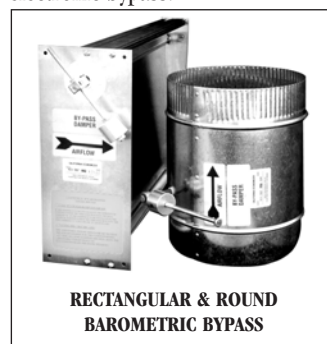
bypass damper with the CFM rating equal to or greater than the value calculated in Step 1. For rectangular barometric dampers, use a ductulator to convert from round to rectangular.

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

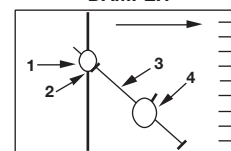
**Example:** You have a 4 ton system. Your smallest zone will use 500 CFM. The total CFM is 1600 CFM (400 \* 4). Your bypass CFM is 1100 (1600 - 500). From the table, you determine that a 12" bypass damper is needed.

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**



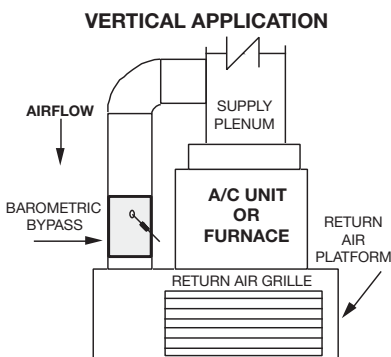
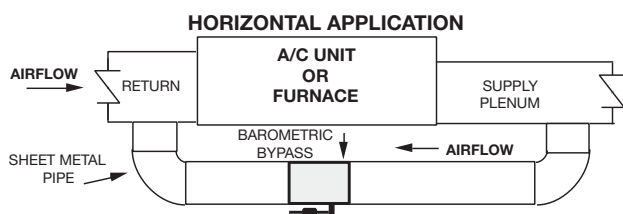
1. Damper Shaft
2. Lock Nut
3. Lever Arm
4. Counter Weight

# BYPASS DAMPERS – BAROMETRIC

## 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.

- Install the bypass damper between the supply and return plenums of the unit. It must be the first tap off the supply plenum.
- 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.
- Loosen counter weight with allen wrench.
- Loosen lever arm from damper shaft and allow to hang straight down.
- Fully close damper by grabbing damper shaft on side attached to lever arm and turning clockwise until it stops.
- 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.
- Be sure the damper is being held closed by the counter weight. Proceed to setup.

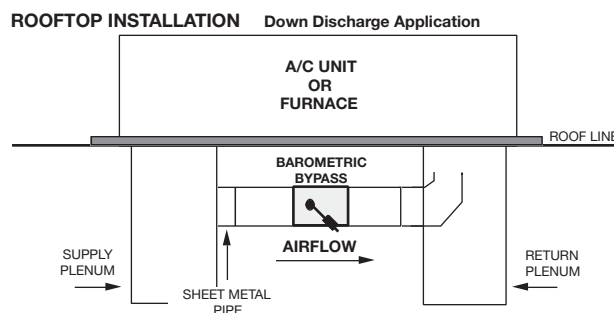


## BAROMETRIC BYPASS SETUP

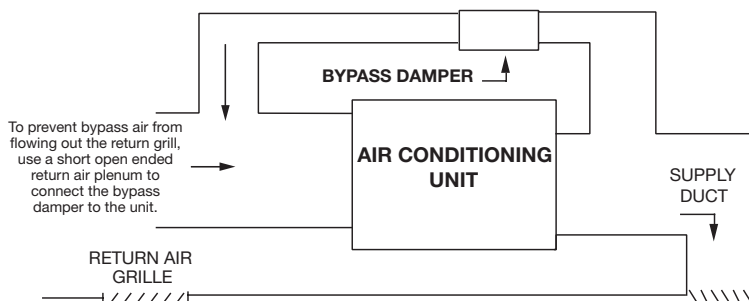
- Turn off all thermostats.
- Turn on Switching Center/Controller and set fan switch to “ON” position. Allow fan to run for 5 minutes to equalize pressure. Then make sure all dampers are open by checking for air flow out of each damper.
- By moving counter weight up or down the lever arm, adjust it so that the damper just wants to start opening.
- 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.
- The barometric bypass damper is now calibrated.

## BAROMETRIC BYPASS STARTUP TEST

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



## OPEN RETURN PLENUM BYPASS APPLICATION



# 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 can be used on any size system. The damper can be round or rectangular and multiple dampers can be slaved together. The Electronic Bypass Damper consists of a medium pressure round (STMPD) or a heavy duty rectangular (STCD) damper and a static pressure sensor.

## SIZING ELECTRONIC BYPASS DAMPERS

When only the smallest zone is calling, the maximum amount of excess supply air will flow through the bypass damper.

## CFM CALCULATION

To determine the proper size bypass damper:

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

## ROUND BYPASS DAMPER SELECTION

When you know the bypass CFM requirement as determined in the "CFM calculation" section, use the ROUND BYPASS SELECTION TABLE. From the table, select the bypass damper with the CFM rating equal to or greater than the value calculated in step C of CFM Calculation.

ROUND BYPASS SELECTION TABLE

Diameter	CFM
8"	560
10"	900
12"	1250
14"	1700
16"	2200

**Example:** We know the smallest zone air volume is 400 CFM and we have a four ton system. Thus the air volume we need to bypass is  $(400 \times 4) - 400$  which equals 1200 CFM. Using the ROUND BYPASS SELECTION TABLE, we would select a 12 inch bypass since it can handle up to 1250 CFM of air.

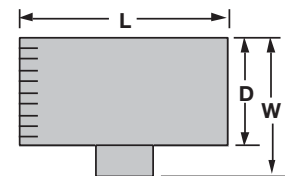
Never exceed 16 inches for the round bypass damper. If you need to bypass more than 2200 CFM, either use a rectangular bypass or slave multiple round bypass dampers.



RECTANGULAR & ROUND BYPASS DAMPER WITH THE STATIC PRESSURE CONTROL

ROUND DIMENSIONAL DATA

PART #	SIZE	D	L	W
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"



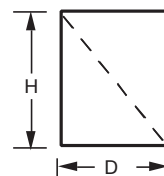
## RECTANGULAR BYPASS DAMPER SELECTION

When you know the bypass CFM requirement as determined in the "CFM calculation" section, use the RECTANGULAR BYPASS SELECTION TABLE. From the table, select the bypass damper with the CFM rating equal to or greater than the value calculated in step C of CFM Calculation.

**Example:** We know the smallest zone air volume is 250 CFM and we have a 7-1/2 ton system. Thus the air volume we need to bypass is  $(400 \times 7.5) - 250$  which equals 2750 CFM. Using the RECTANGULAR BYPASS SELECTION TABLE, we see the smallest damper we can use is a 12" x 22" or a 22" x 12".

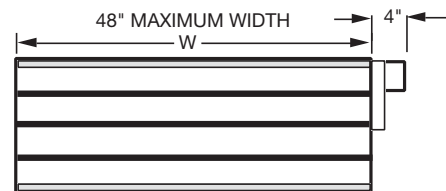
## RECTANGULAR BYPASS DAMPERS

SELECT FROM 8 X 8 THRU 48 X 48



WIDTH	HEIGHT	DEPTH
W	H	16"

Part Number STCD W X H



Rectangular bypass dampers should operate at 1500 FPM\*  
E.G. A 24" x 12" damper = 2 square feet.  
2 square feet X 1500FPM = 3000 CFM.

\* FPM = Feet Per Minute

# BYPASS DAMPERS – ELECTRONIC

**RECTANGULAR BYPASS SELECTION TABLE**

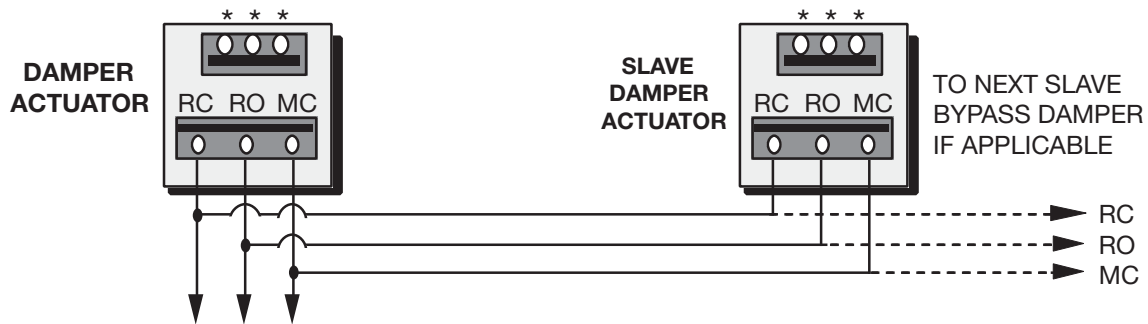
		WIDTH IN INCHES														
		8	10	12	14	16	18	20	22	24	28	32	36	40	44	48
HEIGHT IN INCHES	8	667	833	1000	1167	1333	1500	1667	1833	2000	2333	2667	3000	3333	3667	4000
	10	833	1042	1250	1458	1667	1875	2083	2292	2500	2917	3333	3750	4167	4583	5000
	12	1000	1250	1500	1750	2000	2250	2500	2750	3000	3500	4000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

Bypass air in CFM. Calculated at 1500 FPM.

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

## 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 Controller As Shown On The Bypass Wiring Diagram On The Next Page.



# BYPASS DAMPER – STATIC PRESSURE CONTROLLER

The 101ASPC static pressure switch is used to control the STMPD (round) or STCD (HD rectangular) dampers for bypass operation. The ASPC modulates these power open, power close bypass dampers to maintain proper static pressure as the zone dampers open and close. The bypass system also eliminates air noise from the supply outlets caused by excessive air velocity as the zone dampers close off. The ASPC must be field calibrated to properly control the bypass damper.

## STATIC PRESSURE CONTROLLER DESCRIPTION

- A: Mounting tabs.
- B: Supply air barb.
- C: Reference air, "LOW", barb.
- D: Diaphragm must be mounted vertically.
- E: Pressure adjusting screw.
- F: Normally closed, N/C, terminal.
- G: Normally open, N/O, terminal.
- H: Common, COM, terminal.

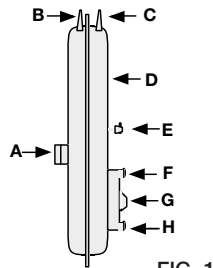
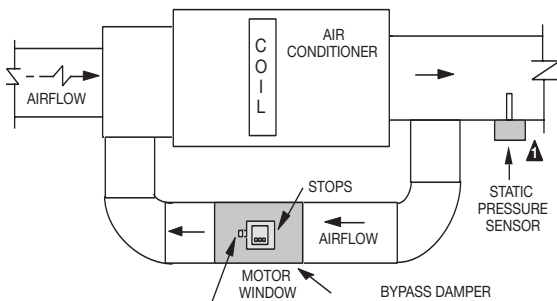


FIG. 1

## STATIC PRESSURE SWITCH INSTALLATION

**Tools required:** Screwdriver, Drill, 5/16" drill bit, VOM set to continuity function.

- a) Bypass damper and control must be powered by a field provided, dedicated 24vac 40va transformer.
- b) Install the air tube on the inside barb fitting on the ASPC; not the barb labeled LOW.
- c) Locate the ASPC pressure switch and air tube on the supply duct between the bypass and 1st supply damper take-offs. See Fig. 2
- d) The ASPC switch is not to be installed outside of building conditioned air space.
- e) Drill a 5/16" hole in the supply duct for the air tube, with the ASPC in the vertical position.
- f) Remove the wire terminal cover and connect wires to **COM** (constant 24 volts hot), **NC** (RC damper close) and **NO** (RO damper open) on the micro switch terminals. See Fig 3
- g) Set up control wiring to the ASPC **COM** terminal so that, when the system blower is off, the bypass damper is de-energized. See Fig. 3 and Fig. 4. This allows the bypass damper to stay partially open when the blower shuts off, to reduce air noise when the blower starts up from stop.



▲ Insert the tube into the side of the duct, approximately 3". Make sure the tube is perpendicular to the air flow.

FIG. 2

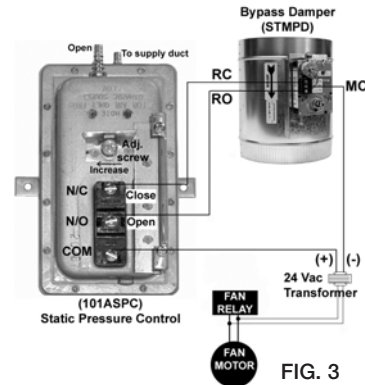


FIG. 3

## STATIC PRESSURE SWITCH CALIBRATION

- a) Run all supply dampers to full open position and system blower in high speed.
- b) De-energize the bypass damper by disconnecting **COM** at the pressure switch.
- c) Manually close the bypass damper by using 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. NOTE: Do not install the bypass damper with the motor in the 6:00 position. This will cause the release mechanism to lock up.
- d) Remove the wire connected to the switch terminal **NO**, and set meter to continuity.
- e) When the blower is running full speed and all supply dampers open, place meter probes on the ASPC **COM** and **NC** terminals.
- f) Carefully rotate the adjustment screw CW until the meter indicates no continuity, and then rotate the setscrew CCW until the meter just indicates continuity.
- g) Reconnect the wires to the switch, and verify bypass damper control system is energized from the dedicated transformer.
- h) Calibration is complete; proceed to the bypass checkout procedures.

## BYPASS CHECKOUT FOR STATIC PRESSURE CONTROLLER

- a) Do not use voltmeter readings to verify bypass actuator operation, as a signal will be measured on both **RO** and **RC** at the same time.
- b) Make a cool call at the zone thermostat of the smallest (damper size) zone.
- c) Verify all zone dampers are closed except for calling zone.
- d) Verify noise at zone register is not excessive. Adjust static pressure controller CCW to lower noise (airflow) or CW to increase airflow until too noisy.

## DAMPER TRANSFORMER

The 24V transformer connected to TR1 and TR2 of the Digitract 4 System Controller powers the zone dampers. The power rating of the transformer must be sufficient to power the number of dampers used. Also, a properly rated in line fuse must be used on the secondary of the transformer. To determine the power rating of the transformer and

the amperage rating of the fuse, use the table below. If using a combination of spring open and power open dampers, size as if all dampers are spring open.

**Note:** The System Controller and thermostats are powered by the HVAC unit transformer via terminals R and C.

### TRANSFORMER/FUSE SIZING

NUMBER OF DAMPERS	TR SERIES (SPRING OPEN) DAMPERS		MED. PRESSURE/HEAVY DUTY (POWER OPEN) DAMPERS	
	XFMR PWR	FUSE SIZE	XFMR PWR	FUSE SIZE
1	40 VA	1 AMP	40 VA	1 AMP
2	40 VA	2 AMP	40 VA	1 AMP
3	40 VA	2 AMP	40 VA	1 AMP
4	40 VA	3 AMP	40 VA	2 AMP
5	48 VA	3 AMP	40 VA	2 AMP
6	60 VA	4 AMP	40 VA	2 AMP
7	72 VA	5 AMP	40 VA	3 AMP
8	84 VA	5 AMP	42 VA	3 AMP
9	96 VA	6 AMP	48 VA	3 AMP
10	108 VA	6 AMP	54 VA	3 AMP
11	120 VA	7 AMP	60 VA	4 AMP
12	132 VA	7 AMP	66 VA	4 AMP

**Notice:** All wiring must meet state and local codes.

## STARTUP TEST, GAS/ELECTRIC DTGE4A

- If there is no heating system, go to step 12
- At System Controller:
  - Turn power switch to ON. Verify power LED is illuminated.
- Turn off all thermostats except thermostat 1.
- At zone 1 thermostat:
  - Set power switch to ON, if applicable.
  - Set to Heat mode.
  - Set fan switch to AUTO mode.
  - Set heat setpoint 4° above room temperature.
- At System Controller:
  - Verify W1 and PWR LEDs are ON. If not, cycle System Controller power switch OFF and then ON and recheck.
  - If fan jumper is across middle and top pin, verify that G is energized for fan operation in Heat mode.
  - Verify that DPR 1 LED is OFF and DPR 2 through DPR 4 are ON.
- At furnace, verify that furnace is on and blower fan is running. If the G LED on System Controller is not on, the blower fan is controlled by the furnace and there will be a delay before it turns on.
- At zone 1, verify that air is coming out of register.
- After 4 minutes of W1 run time, check HDLAS. If HDLAS is less than HI limit minus 25°, then W2 will energize. If HDLAS is greater than HI limit minus 25°, remove HDLAS from supply plenum and verify that W2 LED energizes and, if 2nd stage heat is available, 2nd stage starts.
- At next zone:
  - Verify that no air is coming out of register.
  - At thermostat:
    - Set power switch to ON, if applicable.
    - Set to Heat mode.
    - Set fan switch to AUTO mode
    - Set heat setpoint 4° above room temperature.
  - Verify that air is now coming out of register.
- At previous zone, turn off thermostat, and verify there is no airflow. Verify that DPR 2 is OFF and DPR 1, 3 and 4 are ON.
- Repeat steps 9 and 10 for remaining zones.
- Turn off all thermostats except zone 1.
- At zone 1 thermostat:
  - Set power to ON, if applicable.
  - Set to Cool mode.
  - Set fan switch to AUTO mode.
  - Set cool setpoint 4° below room temperature.
- At System Controller:
  - Verify Y1, G and PWR LEDs are on. If not, cycle System Controller power switch OFF and ON and recheck.
  - Verify that DPR 1 LED is OFF and DPR 2 through 4 are ON.
- At HVAC unit, verify air conditioner and blower are running.
- Verify that air is coming out of registers.
- After 8 minutes, check HDLAS. If HDLAS is above LO cutout plus 12°, verify that Y2 energizes. If HDLAS is less than LO cutout plus 12°, remove HDLAS from supply plenum and verify Y2 operation.



## STARTUP TEST, GAS/ELECTRIC DTGE4A (Continued)

18. At next thermostat:
    - a. Verify that air is not coming out of register.
    - b. At thermostat:
      1. Set power switch to ON, if applicable
      2. Set to Cool mode.
      3. Set fan to AUTO mode.
      4. Set cool setpoint 4° below room temperature.
    - c. Verify that there is airflow from register.
  19. At previous zone, turn off thermostat and verify that there is no airflow from register.
  20. Repeat steps 18 and 19 for remaining zones.
  21. Reinstall HDLAS sensor, if removed for startup.
- Test complete.

## STARTUP TEST, HEAT PUMP DTHP4A

1. Disconnect Y1, Y2, O/B, W2 and G wires between controller and air handler. This will allow controller to cycle all stages of heat and cool without energizing compressors, fans or heat strips.
  2. Turn off all thermostats except zone 1.
  3. At zone 1 thermostat:
    - a. Set power switch to ON, if applicable.
    - b. Set to Heat mode.
    - c. Set fan to AUTO mode.
    - d. Set heat setpoint 4° above room temperature.
  4. At System Controller:
    - a. Verify Y1, G and PWR LEDs are ON. If not, cycle System Controller power switch OFF and then ON and recheck.
    - b. If jumper O/B is on B, verify O/B LED is ON. Otherwise, verify O/B LED is OFF.
    - c. Verify DPR 1 LED is OFF, and DPR 2 through DPR 4 LEDs are ON.
  5. At next zone thermostat:
    - a. Set power switch to ON, if applicable.
    - b. Set to Heat mode.
    - c. Set fan switch to AUTO mode.
    - d. Set Heat setpoint 4° above room temperature.
  6. Repeat steps 4 and 5 for all remaining zones. As a zone calls for heat, the corresponding DPR LED for that zone will de-energize and the damper will open. As each zone is satisfied, the associated DPR LED will illuminate and the damper will close.
  7. Verify a call for 2nd stage heat. Confirm that Y2 energizes after the heat pump has been running for 4 minutes. Y2 will energize if LAS (leaving air temperature) is less than Y2 cut-in temperature (LO cutout setpoint minus 25°; if HI limit is 120°, subtract 25° and cut-in will be 95°). After a total of 8 minutes of continuous call for heat, verify that W2 LED has illuminated, calling for electric strip heat. After 8 minutes of continuous heat call, if LAS is less than 90°, then W2 will energize and auxiliary heat is on.
  8. Turn off all thermostats except zone 1.
  9. At zone 1 thermostat:
    - a. Verify power switch is ON, if applicable.
    - b. Set to Cool mode.
    - c. Set fan to AUTO mode.
    - d. Set cool setpoint 4° below room temperature.
  10. At System Controller:
    - a. Verify Y1, G and Power LEDs are on. If not, cycle System Controller power switch OFF and ON and recheck.
    - b. If jumper O/B is in the O position, verify that O/B LED is ON. If O/B is in the B position, verify O/B LED is OFF.
    - c. Verify DPR 1 LED is OFF and DPR LEDs 2 through 4 are ON.
  11. At zone 2 thermostat:
    - a. Set power switch to ON, if applicable.
    - b. Set to Cool mode.
    - c. Set fan switch to ON.
    - d. Set cool setpoint 4° below room temperature.
  12. Verify Y1, G and Power LEDs are ON. O/B LED is ON for O mode or OFF for B mode. Verify damper LEDs for DPR 1 and 2 are OFF, and damper LEDs for 3 and 4 are ON.
  13. Turn zone 1 thermostat OFF. Verify damper 1, 3 and 4 LEDs are ON. Damper 2 LED is OFF.
  14. Repeat steps 11 through 13 at zone thermostats. Verify damper LEDs for 3 and 4 are OFF when calls from zones are made.
  15. Verify call for 2nd stage cool. Confirm that after the heat pump has been running in Y1 for 8 minutes that Y2 will then energize. As the heat pump outputs have been disconnected for this test, the LAS temp will be at ambient temperature, allowing the controller to stage up. With the heat pump outputs connected, after 8 minutes of continuous running, the Leaving Air Temperature must be a minimum of 12° above the LO cutout setting for Y2 to energize.
  16. Turn off all thermostats.
  17. Connect wires to System Controller terminals Y1, Y2, W2 and G.
  18. Place call on zone 1 for Heat. Verify heat pump startup and airflow on zone 1 registers.
  19. Place a call on zone 2 for Heat, and verify airflow. Switch off zone thermostat 1, and verify airflow.
  20. Repeat for zones 3 and 4.
  21. Turn off all thermostats.
  22. Place a call on zone 1 for Cool. Verify cool startup and airflow on zone 1 registers.
  23. Place a call on zone 2 for Cool, and verify airflow. Switch zone thermostat 1 to OFF, and verify airflow.
  24. Repeat for zones 3 and 4.
- Test complete.

## Digitract 4 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
	Controller in changeover from heat mode	4-minute purge cycle must complete
	HDLAS polarity incorrect	Red lead to + terminal, white to – terminal
Cooling calls short cycle	HDLAS shorted (0V dc on + and – w/ LAS installed)	Replace HDLAS
	HDLAS wiring shorted (0V dc on + and – w/ LAS installed)	Repair HDLAS wiring
	Controller failure (0V dc on + and – w/ LAS removed)	Replace controller
	Thermostat has cooling anticipator (compensator)	Remove anticipator
	Air flow too low over evaporator	Isolate and correct air flow problem
	Bypass damper opening prematurely	Adjust bypass damper closed w/ all zone dampers open
	HDLAS out of calibration	Recalibrate HDLAS
Will not initiate heat calls	Controller in cool mode	Delay prior to changeover
	Controller in changeover from cool mode	3-minute purge cycle must terminate
	HDLAS polarity incorrect	Red lead to + terminal, white to – terminal
	HDLAS electrical interference (Applicable to spark ignition)	Install shielded cable to HDLAS, terminate shield on C terminal ONLY
Heating calls short cycle	HDLAS open (5V dc on + and – w/ LAS installed)	Replace HDLAS
	HDLAS wiring open (5V dc on + and – w/ LAS installed)	Repair HDLAS wiring
	Heating anticipator incorrectly set	Set anticipator to lowest setting
	Bypass damper opening prematurely	Adjust bypass damper closed w/ all zone dampers open
	HDLAS out of calibration	Recalibrate HDLAS
Zone dampers will not close	Loss of 24V ac on TR1 And TR2	Repair power source
	Transformer VA too low	Replace w/ correct transformer
	Dampers incorrectly wired	Correct damper wiring
	No output on damper terminal(s)	Cycle power to controller. Verify thermostat inputs are correct. If problem persists, replace controller
Zone damper remains closed	Zone not calling while mode is active	Initiate thermostat call
	Triac shorted (Continuous 24V ac @ damper terminals)	Replace controller
W2 will not energize (DTHP4A only)	Discharge air temperature above 88° F.	Normal operation
	Relay contact failure (W2 LED on)	Replace controller
	Bypass damper opening prematurely	Adjust bypass damper closed w/ all zone dampers open
	Controller in cool mode	Verify jumper JU1 position
Blower runs continually	Fan operation selected on any thermostat	Verify fan switch on all thermostats
	Fan relay contacts in controller seized	Replace controller, check 24 V AC

## Digitract 4 HDLAS VOLTAGE – TEMPERATURE CONVERSION CHART

Using a digital volt-ohm meter, place the red lead on the + terminal and the black lead on the - terminal of the equipment terminal strip. Set the voltmeter to the 20VDC scale, and convert the measured voltage to its corresponding temperature.

°F	DC Volts	°F	DC Volts	°F	DC Volts	°F	DC Volts	°F	DC Volt	°F	DC Volt	°F	DC Volts	°F	DC Volts	°F	DC Volts	°F	DC Volts
30	2.718	45	2.803	60	2.887	75	2.970	90	3.053	105	3.137	120	3.220	135	3.303	150	3.392		
31	2.724	46	2.809	61	2.892	76	2.975	91	3.059	106	3.142	121	3.225	136	3.309	151	3.398		
32	2.729	47	2.814	62	2.898	77	2.981	92	3.064	107	3.148	122	3.231	137	3.314	152	3.403		
33	2.735	48	2.820	63	2.903	78	2.987	93	3.070	108	3.153	123	3.237	138	3.320	153	3.409		
34	2.741	49	2.825	64	2.909	79	2.992	94	3.075	109	3.159	124	3.242	139	3.325	154	3.409		
35	2.746	50	2.831	65	2.914	80	2.998	95	3.081	110	3.164	125	3.248	140	3.331	155	3.414		
36	2.752	51	2.837	66	2.920	81	3.003	96	3.087	111	3.170	126	3.253	141	3.337	156	3.420		
37	2.757	52	2.842	67	2.925	82	3.009	97	3.092	112	3.175	127	3.259	142	3.342	157	3.425		
38	2.765	53	2.848	68	2.931	83	3.014	98	3.098	113	3.181	128	3.264	143	3.348	158	3.431		
39	2.768	54	2.853	69	2.937	84	3.020	99	3.103	114	3.187	129	3.270	144	3.353	159	3.437		
40	2.775	55	2.859	70	2.942	85	3.025	100	3.109	115	3.192	130	3.275	145	3.359	160	3.442		
41	2.781	56	2.864	71	2.948	86	3.031	101	3.114	116	3.198	131	3.281	146	3.364				
42	2.787	57	2.870	72	2.953	87	3.037	102	3.120	117	3.203	132	3.287	147	3.375				
43	2.792	58	2.875	73	2.959	88	3.042	103	3.125	118	3.209	133	3.292	148	3.381				
44	2.798	59	2.881	74	2.964	89	3.048	104	3.131	119	3.214	134	3.298	149	3.387				





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Comfort Control System

# Zoning

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