

ULTRA-ZONE[®] Forced Air Zone Controls

The model DAPC can monitor your HVAC system static pressure and the zone damper “Open & Close” commands from your EWC[®] Zone Controller. When the static pressure gets too high, the DAPC will modulate “Float” any Closed zone dampers towards the Open position, in order to control the static pressure. Use the DAPC’s default static pressure set-point (0.5”wc) or select your own static pressure set-point from the DAPC menu. Or let the DAPC “discover” the “non-zoned” static pressure of your HVAC system, and adopt that value as the static pressure set-point. If you want to design your zoned HVAC system without a bypass, the DAPC was made just for you!

Zone Capacity

Modulate 1, 2 or 3 large air zones with 24vac Power Open / Power Close “Floating Point” motor actuators. eg, MA-ND5 or MA-15S.

Compatible Zone Controllers

The DAPC is compatible with EWC[®] zone controllers and many Competitor’s zone controllers, **if** genuine Ultra-Zone[®] model ND, URD or SID dampers (MA-ND5 or MA-15S motor actuators) are installed.

Round and/or Rectangular Dampers by Zone

All zone dampers in a building are usually the same type, either round or rectangular. The DAPC can handle Round dampers on one zone and Rectangular dampers on another zone. If both damper types exist on a single zone, set that zone to “linear” rather than “round” or “rectangular”.

Static Pressure Set-Point

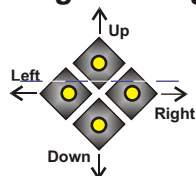
The DAPC default static pressure set-point is 0.5”wc. You can select your own set-point from a wide range (.20”wc to 1.20”wc). If you prefer, the DAPC can “discover” the non-zoned static pressure of your HVAC system and adopt that value as the operating static pressure set-point. *See page ? for details.*

Status LCD

System SP: 0.49”

The liquid crystal display scrolls to show the HVAC system *Static Pressure* versus the *Static Pressure Set-Point*. Real time damper position “Open, Closed or Floating” can be viewed by hitting the UP button. All DAPC programming is viewed on the LCD screen.

4 Button LCD Programming



Four buttons are provided below the LCD screen to access the DAPC menu, choose your settings and observe damper position. Non-volatile memory will retain your menu settings even after a prolonged power failure.

Damper LED’s

Three LED’s labeled Zone 1 thru Zone 3 provide a fast visual indication of which zone dampers are Open, Closed or Floating. *Green = Open, Red = Closed, Green/Redflash = Floating.*

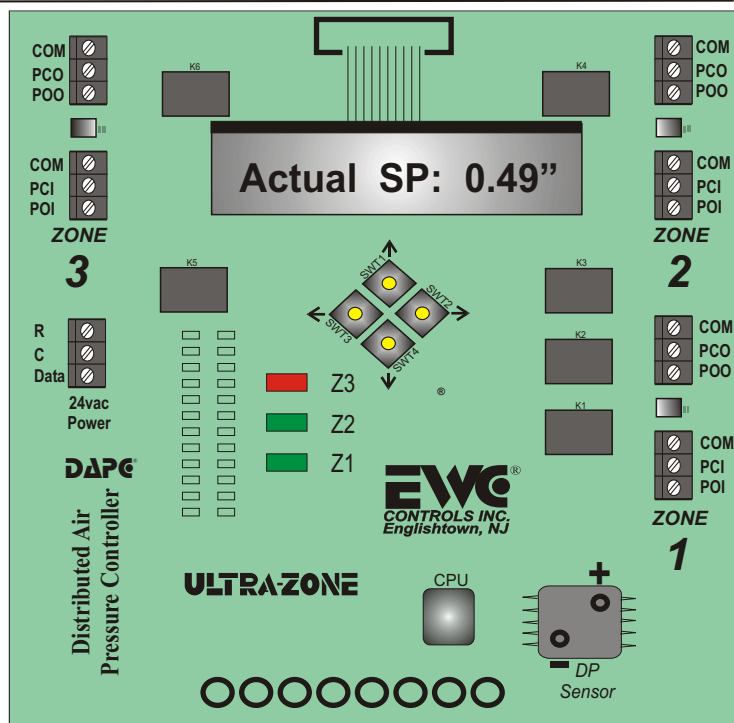


Figure 1. DAPC Distributed Air Pressure Controller

Digital Damper Position Feature

A communicating “Data Input” terminal is provided on the Ultra-Zone DAPC. The “Distributed Air Pressure Controller” can accept Conventional Damper Position input wiring *or* a Digital Damper Position signal from the *next generation* of Ultra-Zone products. This feature will save labor & material by decreasing the number of wires routed to the DAPC.

Intuitive Fault Free Programming

The DAPC comes pre-loaded with Default Operating Parameters (*See Page 2, Table 1*) for Zoned HVAC Systems. The Default Programming means less work for the Installer, but still allows fine tuning to optimize system performance and achieve personal preference. Simply decide which “large” zones you want the DAPC to over-ride and float, when the static pressure gets to high.

Float the largest zone(s) only

On average, the typical zoned home in America has 2 or 3 zones. The percentage of airflow (cfm) required for each of these zones can be roughly the same (50/50 or 60/40). Quite often the zone airflow ratios are quite different (80/20, 70/30, 60/30/10, etc). **Let the DAPC float the “largest cfm” zone(s) only**, because large zones can handle periodic overflow (excess air) without the risk of over-conditioning. Both zone dampers may be floated on a (50/50 or 60/40) two zone system, but only the largest zone on a (90/10 or 80/20) two zone system.

INSTALLATION INSTRUCTIONS

MOUNTING: Choose a suitable location to install the DAPC housing. Attics, basements and dry crawl space installations are allowed. Mount the DAPC in close proximity to the zone controller, on the return duct, a wall stud, sheet-rock or plywood. **Do Not** mount the DAPC directly to the Supply duct, Furnace, Air-Handler, Hydronic Coil Cabinet or Evaporator Cabinet. **Do Not** mount the DAPC in any "open" return air stream. Follow National and/or Local Mechanical & Building Codes.

POWER SUPPLY: The DAPC requires 24vac power, which ideally should come from the new or existing zone controller. All Ultra-Zone controllers require a dedicated transformer (40va minimum) which can be used to power the DAPC as well. If the zone controller does not have a dedicated UL listed transformer (40va minimum - 60va maximum) then you must install one! Do Not steal 24vac power from the HVAC system! Follow National and/or Local Electrical Code.

WIRING: Use standard 18awg solid copper multi-conductor cable. Plenum rated where applicable. Connect the dedicated 24vac Power Supply to the DAPC and wire-up the dampers. Use the side or rear openings provided on the housing as the wire entry-way. Strip the cable's jacket back to the point where the cable enters the housing. This reduces bulk and allows easier routing & termination of the individual wires for a professional looking installation. Follow National and/or Local Electrical Code.

Plug & play: The DAPC default factory settings work fine for most applications. All zones are set for "linear" damper operation, although you may decide to select Round, Rectangular or a mix instead. The Response Delay and Hysteresis settings are already optimized for you and the default static pressure set-point is 0.5"wc. If you need to change these settings, access the program menu and select your desired settings. The DAPC will save them automatically. If you want to start over from scratch, you can default the DAPC back to the factory settings at any time.

FINISH: Run the system thru it's paces and confirm that the DAPC is controlling the system static pressure (at the desired set-point) in every zoned mode of operation. Check all Zone Dampers for proper floating operation. Adjust the menu settings if needed.

Model DAPC Version 1.5 SPECIFICATIONS and MENU ITEMS:

Zone Capacity: Maximum 3 "floating" zones on a single DAPC. Two, three or more DAPC's can be installed to "float" six, nine or more large zones.

Power Supply: Powered from a new or existing zone controller's "dedicated" 24vac Transformer. (Min. 40va Max. 60Va 50/60 Hz)

DAPC Current Draw & Wattage: 150mA (0.15A) / 4va (watt) power requirement.

Compatible Dampers: Ultra-Zone® URD, ND, and SID dampers, with MA-ND5 or MA-15S Floating Point motors.

NOTE: 2 or 3 WIRE SPRING TYPE DAMPERS ARE NOT COMPATIBLE.

Maximum Number of Dampers @ 40va power supply: Up to 5 ND, URD, or SID Dampers Per Zone @ 1.5va per motor. **Total 15.**

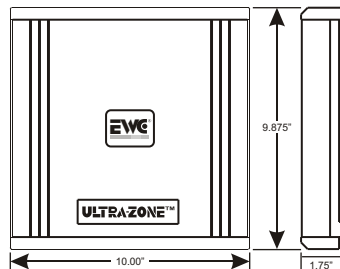
Maximum Damper Motors per Zone @ 60va power supply: Up to 6 ND, URD, or SID Dampers Per Zone @ 1.5va per motor. **Total 18.**

Over-Current (Auto-Reset) Protection: 200mA Over Current protection for DAPC logic circuit. 500mA Over Current protection per Zone Damper output.

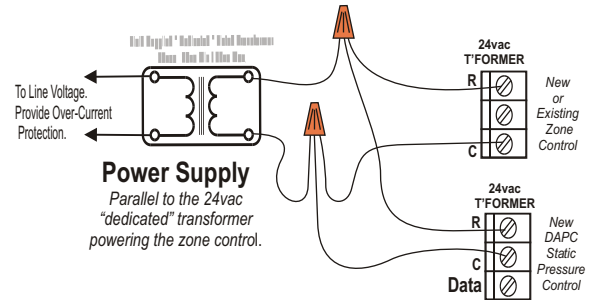
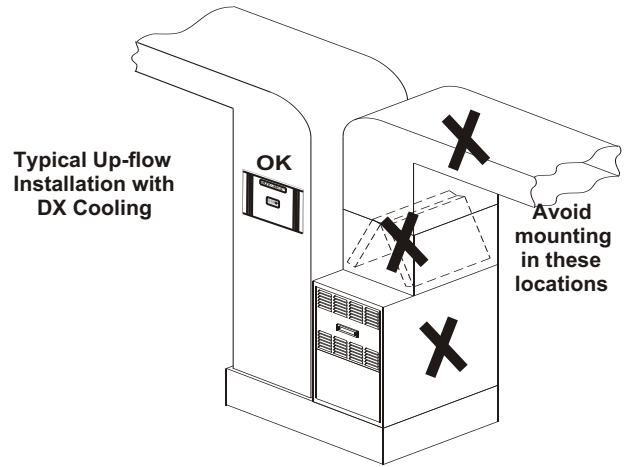
Ambient Operating Conditions:
TEMPERATURE: 0°F to 150°F (-18° to 65°C).
HUMIDITY: 0% - 95% Rh Non-Condensing.
Not rated for wet conditions.

Housing Specifications:
Flame retardant ABS Plastic.
High Strength Impact & UV resistant.

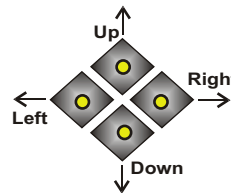
Accessories Included:
2 - duct mount pitot tubes 1/4"OD
1 - 16ft length pressure hose clear 3/8"OD x 1/4"ID
2 - barb fittings reducer type 1/4" x 5/32" (pre-installed)
2 - 10in lengths pressure hose (black & white) 1/4"OD x 5/32"ID (pre-installed)



NOMINAL DIMENSIONS
10" x 10" x 1.75"



Default Loaded If desired, you can reset the DAPC back to factory settings!



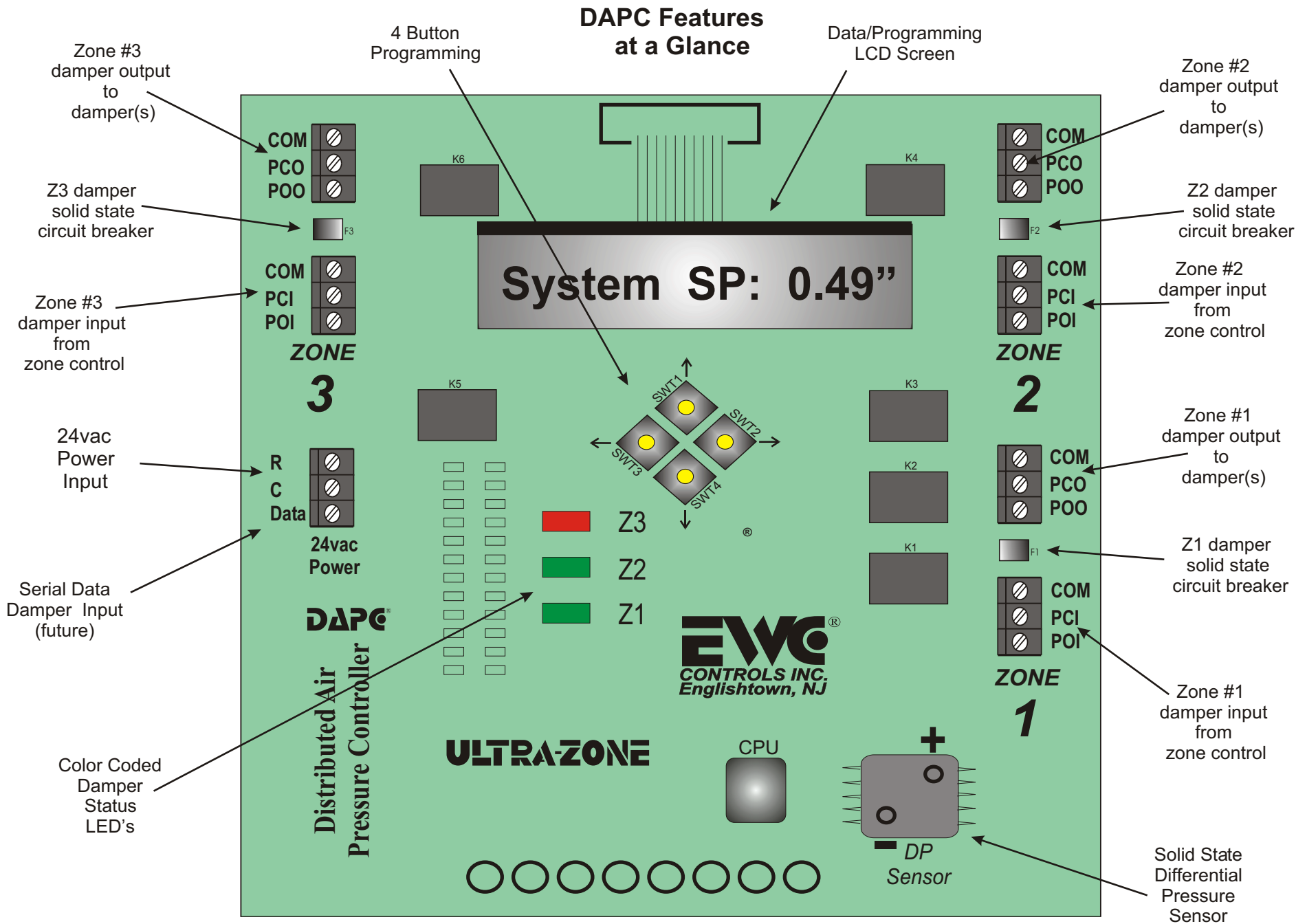
Upon Power Up, Press and Hold the Left & Right buttons to Load the Factory Default Values, then Release.

Use the Left and Right buttons to navigate through the DAPC menu and find the "function" you want to change. Then use the Up or Down buttons to change the value of that function. Your changes will be saved automatically.

Distributed Air Pressure Controller Menu

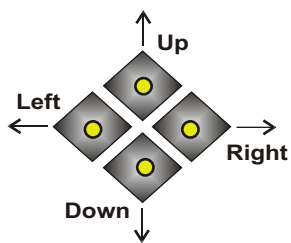
FUNCTION	DEFAULT	RANGE TO SELECT
LCD Contrast	22	15 - 30
Target Set-Point	0.5"wc	0.20"wc - 1.20"wc
Close Delay	30 seconds	0 seconds - 240 seconds
Response Delay	1 second	1 second - 10 seconds
Z1 Damper	Linear	Linear or Square or Round
Z2 Damper	Linear	Linear or Square or Round
Z3 Damper	Linear	Linear or Square or Round
Z1 Stroke	35 seconds	15 seconds to 60 seconds
Z2 Stroke	35 seconds	15 seconds to 60 seconds
Z3 Stroke	35 seconds	15 seconds to 60 seconds
Hysteresis +/-	5%	2% - 10%
Performance Test	None	Use left or right button and find the "Performance Test", then push the UP button once, to test all connected zone dampers.

DAPC Features at a Glance



LCD Screen Programming

Use the *Left & Right* buttons to navigate thru the Menu Functions. Use the *Up & Down* buttons to change or adjust the options available in that function. Select only the functions you want or need. ***For future reference, write the selected value in the box.*** Your changes will take effect in real time and the DAPC will remember your settings even after a power failure.



4 Button LCD Programming

LCD Contrast 22

The LCD contrast is already set for you at the factory. If you need to adjust the contrast, use the Up or Down buttons.

TRGT SP: 0.50"wc

The Target Static Pressure set-point is factory set at 0.5"wc. This is an industry standard for residential HVAC systems. If you need to adjust the set-point, use the Up or Down buttons.

CLOSE DLY 30s

When the zone controller commands a zone damper to close, the DAPC will comply and start closing that zone immediately, or you can set a "close delay" up to 4 minutes.

Some zone controllers can force a multi-stage HVAC system to "stage down", as zones satisfy, which reduces BTU capacity and airflow.

However, certain HVAC systems can take awhile (up to 3min) before staging down and reducing airflow. So, if you impose a sufficient time delay *before* closing the zone damper (*give the indoor fan a chance to slow down*) the airflow and static pressure will decrease *before* that damper is commanded to close. This means the DAPC might be able to fully close that zone damper, rather than "float it" back open again.

RESPONSE DLY 2s

The Response Delay is a forced rest period in between commands to float (*modulate*) any inactive zone damper(s). The response delay is enforced when the system static pressure is within the selected hysteresis range. (See page 5), to reduce/eliminate over-shoot. If all zone damper settings are the same type and speed (*ie, round 35s*), the DAPC will stroke the damper(s) in a quick continuous movement (no delay) when the system static pressure is far out of the hysteresis range.

Z1 Damper Round

Set each zone for the type of damper(s) installed in that zone. The installed zone dampers are usually the same type, but zone damper types can differ depending on the duct-work configuration in the home or building. *The DAPC allows you to specify which damper type are installed in each zone.*

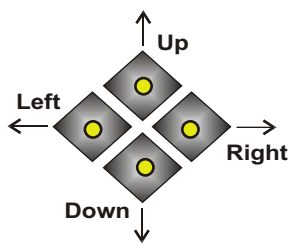
Z2 Damper Square

Square/Rectangular dampers have different airflow performance than round dampers. The DAPC knows this and will operate each damper type based on it's performance curve. The DAPC will operate zones incrementally (slower) when different damper types exist on different zones.

Z3 Damper Linear

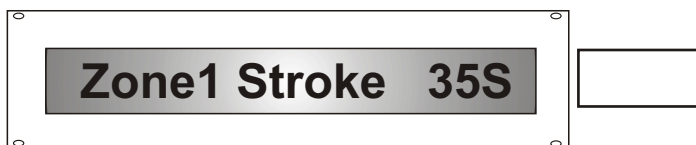
It's possible to have different damper types on the same zone. If so, set that zone to "linear" and the DAPC will operate that zone on a linear curve, rather than the performance curve of each damper type. Setting ALL zones to linear (rather than round or square) may provide the best damper performance for your system.

LCD Screen Programming

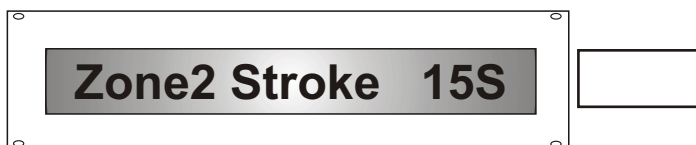


Use the *Left* & *Right* buttons to navigate thru the Menu Functions. Use the *Up* & *Down* buttons to change or adjust the options available in that function. Select only the functions you want or need. ***For future reference, write the selected value in the box.*** Your changes will take effect in real time and the DAPC will remember your settings even after a power failure.

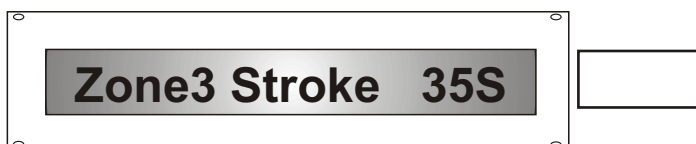
4 Button LCD Programming



You must select the speed of your damper motors, in the DAPC menu. The default setting is 35 seconds. Standard Ultra-Zone damper models are rated at 35 second stroke time, but 15 second actuators are not uncommon.

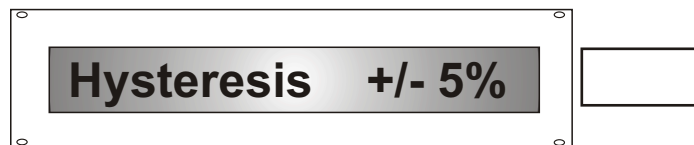


The DAPC can accommodate different speed damper motors on different zones. (*Zone 1 = 35s, Zone 2 = 15s & Zone 3 = 35s*). Although it would be very unusual because most damper motors on the job site will be the same type & speed.



Floating point damper motors are rated at a specific speed or travel time. (*35 seconds, 15 seconds, etc*). Just as most installations will have the same damper type (*round or square/rectangular*), most damper motors on the job site will be the same speed or travel time.

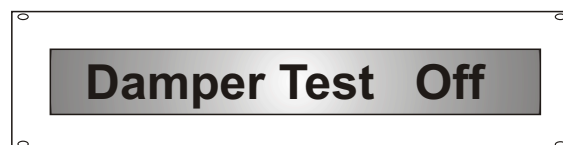
The DAPC cannot accommodate *different motor speeds on the same zone*. (*35s and 15s motors on the same zone*). It would be very rare to run across this type of installation in the field anyway. If you do, one or more of the existing damper motors will have to be replaced.



Select the hysteresis setting on the DAPC. The factory default is 5%. The hysteresis determines how tight the DAPC will regulate the HVAC system static pressure. For a fast to moderate response to static pressure changes, select 2% to 5%. Higher hysteresis settings will result in a slower response but less hunting.

If all damper settings are the same type (*ie, round, square, linear*) and the actual hysteresis is within the hysteresis range, the DAPC will stroke the dampers quite quickly and adhere to the Response Delay setting (rest period) in order to maintain the static pressure at the selected set-point.

If the damper settings are different types and/or different speeds (*ie, Z1 square, Z2 round, Z3 square*) or (*Z1 35s, Z2 15s, Z3 35s*), then the DAPC will stroke the dampers in 1 second intervals, if the actual hysteresis is far out of range (*hysteresis setting x2*), in order to quickly bring the static pressure back into regulation (*hysteresis range*).



You can perform a damper test on all floating zones!

- * Set all zone thermostats to heat or cool mode.
- * Confirm the HVAC system is at 100% capacity.
- * Navigate to this screen & press the UP button one time.
- * All damper(s) will increment 10 percent at a time, one zone at a time.

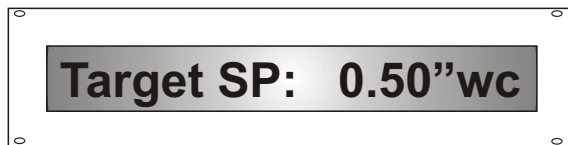
This useful test can help you confirm that a single damper or multiple dampers on a single zone, are wired correctly and functioning properly.

LCD System Messages

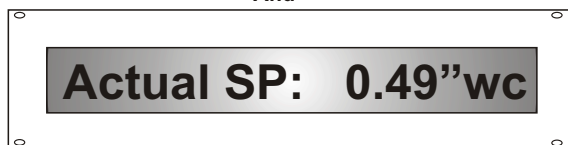
Once the programming is complete, the LCD screen will scroll to display the actual Static Pressure of the HVAC system versus the target (programmed) Static Pressure Set-point.

Other data screens shown below can be accessed by pressing the Up or Down button. You can observe each zone damper Input / Output status and the commanded damper position. *Note that zone damper Input status is displayed using lower case characters, while zone damper Output status is displayed using upper case characters.*

Below are typical LCD data screen examples:



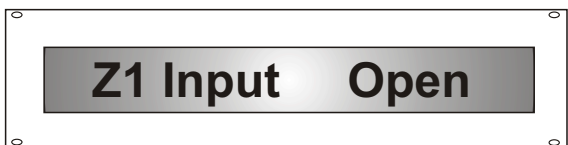
And



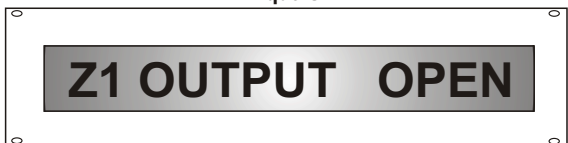
The LCD screen will automatically scroll to display the actual Static Pressure of the HVAC system versus the target (programmed) Static Pressure Set-point.

Controlling the system static pressure is the primary function of the DAPC, so it makes sense to display this data all of the time.

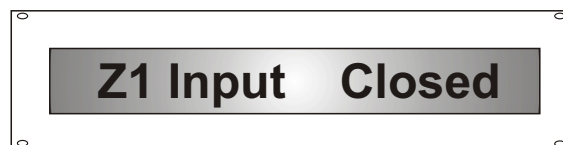
Other data screens (Zone Damper Status) can be accessed by pressing the Up or Down button. Zone damper status can also be quickly verified by observing the Damper LED's.



Equals



Any zone that is commanded to Open by the zone controller, will always be honored by the DAPC. The zone damper INPUT (*coming from the zone controller*) is displayed, as well as the OUTPUT to the zone.



Equals



Or

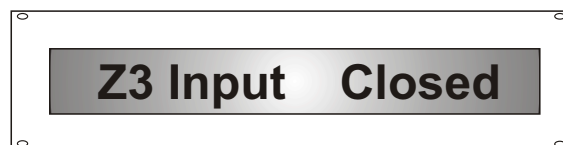


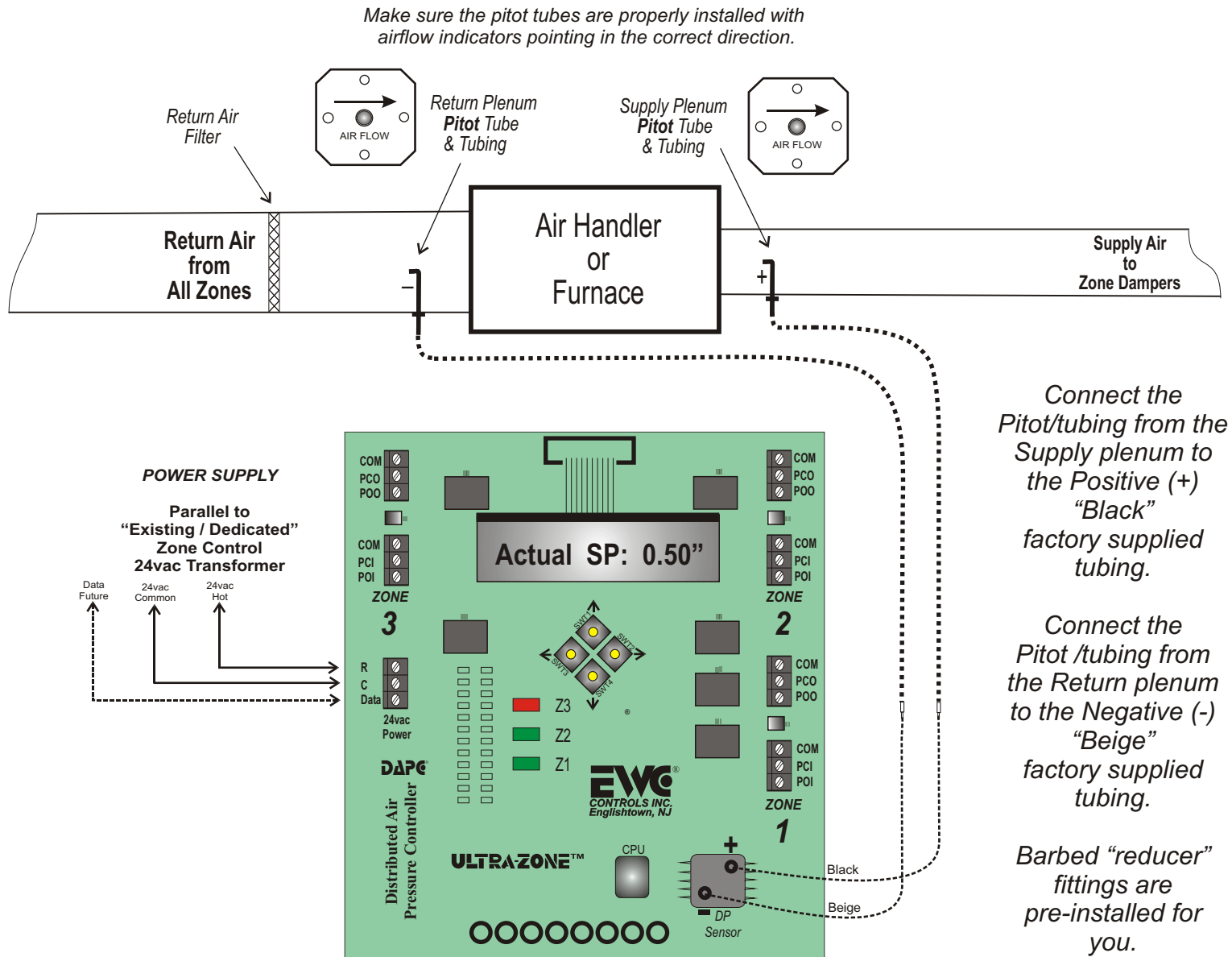
Any zone that is commanded to Close (*by the zone controller*), will be honored by the DAPC, so long as the actual static pressure does not exceed the target static pressure set-point.

While closing that zone the DAPC is also monitoring the actual static pressure. If the static pressure exceeds the static pressure set-point, the DAPC will begin to float (modulate) that zone rather than close it, in order to maintain the static pressure at the target set-point.

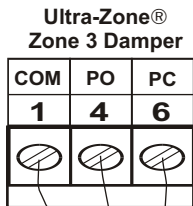
The screen above shows the DAPC is floating zone 1 at 30% open.

The screens below depict a different zone being commanded to close (*by the zone controller*) but the DAPC is floating that zone at 70% open.



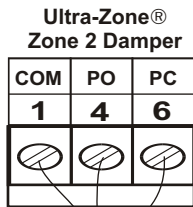


The image above reflects the typical pitot and pressure reference tubing setup. Try to keep the reference tubing short as possible, avoiding sharp objects and areas that might cut or pinch the tubing.

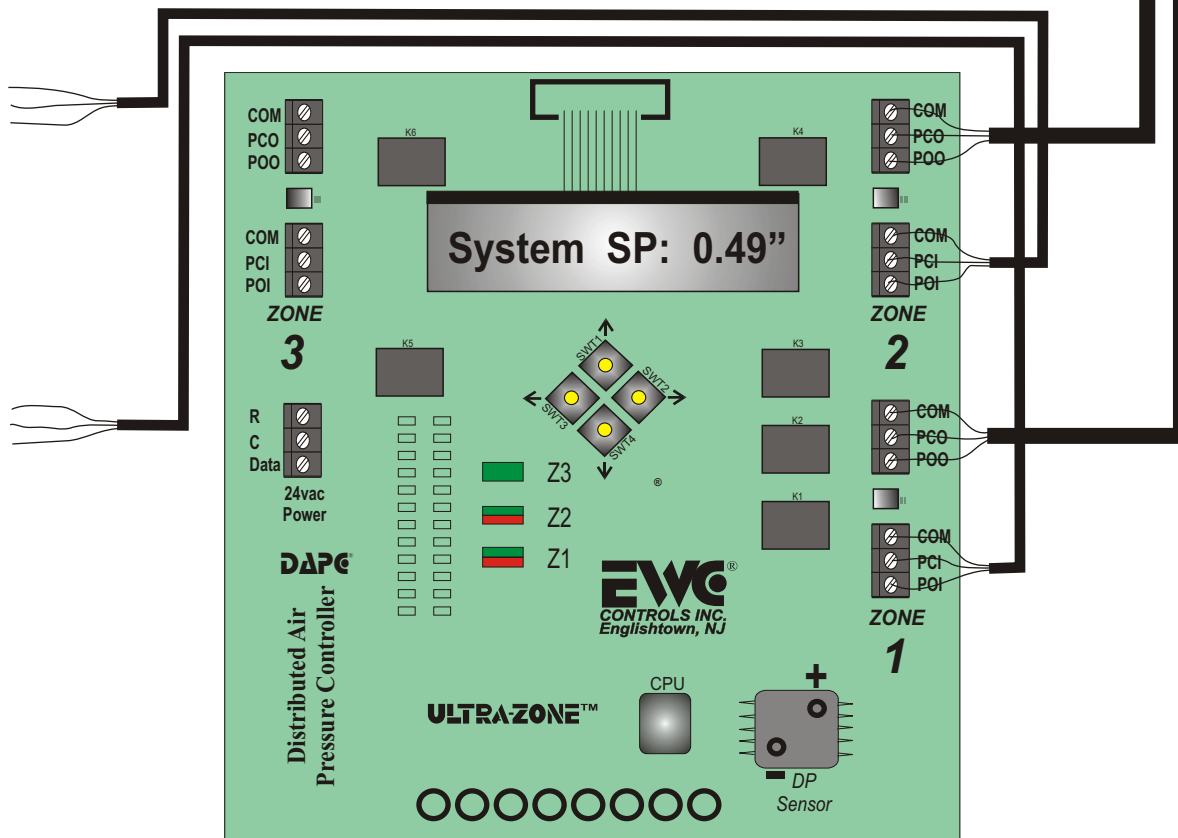
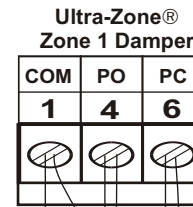
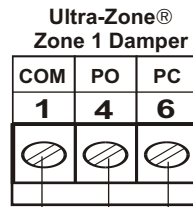


Zone 3 does not route thru the DAPC because it's a small zone. ($= < 240\text{cfm}$)

Although if the HVAC system is low tonnage ($= < 2\text{ ton}$) this zone could be floated if needed.



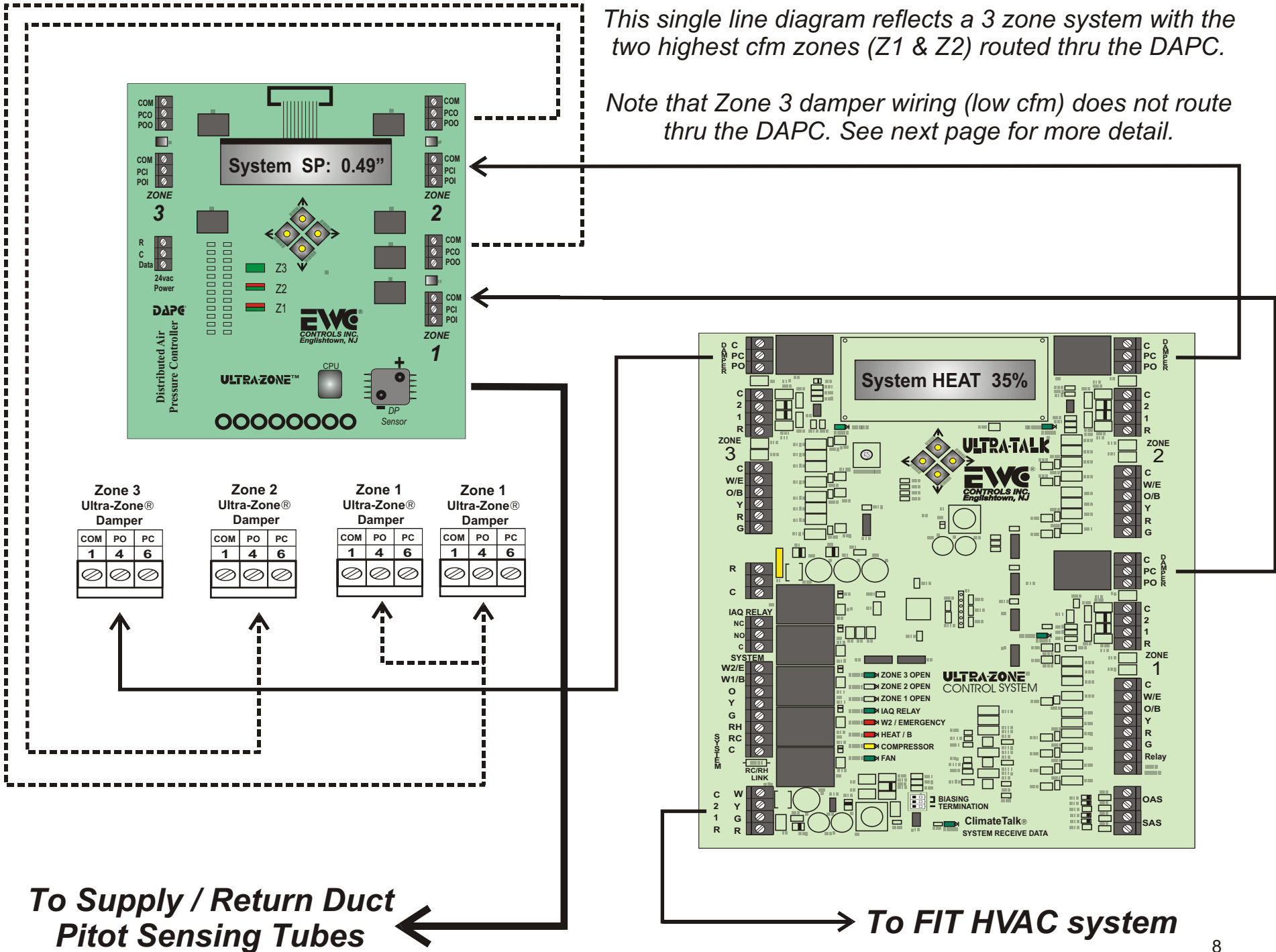
Zones 1 & 2 route thru the DAPC because they are large zones. ($= > 400\text{cfm}$)

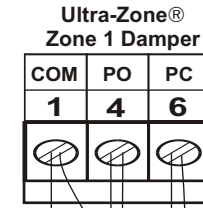
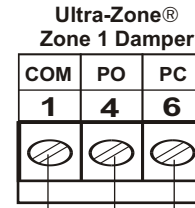
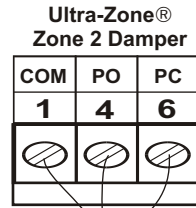
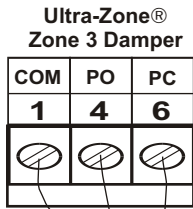


→ To FIT HVAC system

This single line diagram reflects a 3 zone system with the two highest cfm zones (Z1 & Z2) routed thru the DAPC.

Note that Zone 3 damper wiring (low cfm) does not route thru the DAPC. See next page for more detail.

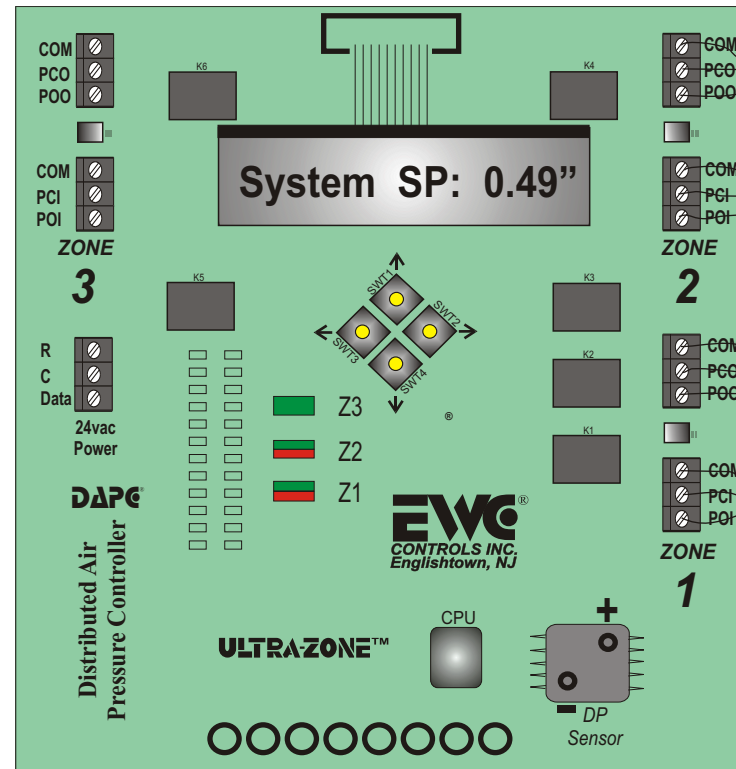
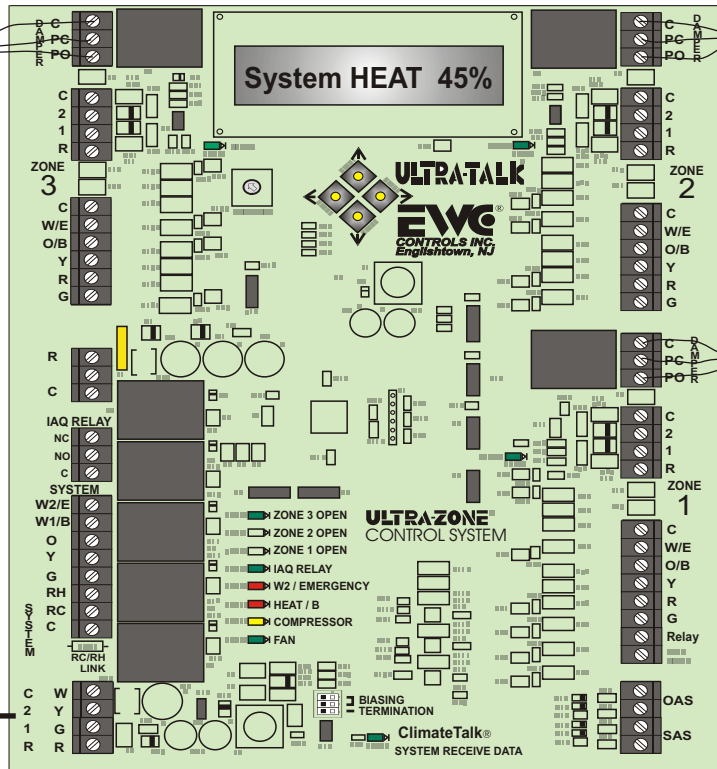




Zone 3 does not route thru the DAPC because it's a small zone. (= < 240cfm)

Although if the HVAC system is low tonnage (= < 2 ton) this zone could be floated if needed.

Zones 1 & 2 route thru the DAPC because they are large zones. (= > 400cfm)



➔ To FIT HVAC system

TROUBLESHOOTING

SYMPTOM	SOLUTIONS
DAPC will not power up. No LCD display and Zone LED's do not illuminate.	Check 24vac transformer power supply input (<i>R & C terminals</i>) with a voltmeter. If power is absent determine root cause and repair. If power is present check F1 polyfuse. If hot, a logic circuit failure has occurred and the DAPC should be replaced. If cool, the CPU has failed. Replace the DAPC.
DAPC will not operate(float) any zone dampers at all. DAPC will not operate (float) damper(s) on a single zone.	Selected static pressure set-point is too high. No closed commands detected or incompatible zone dampers are installed. Zone damper wiring is incorrect or faulty. Inactive zone damper(s) are faulty and will not close/float. Check damper input and output wiring for shorts. Check F2, F3 & F4 polyfuses. If hot, disconnect damper "output" wiring from the DAPC and the damper(s). Perform continuity test on all damper wiring for open & shorted wires. Perform a zone damper performance test via the DAPC to confirm proper incremental damper movement.
System airflow is loud & noisy. Excessive airflow into inactive (floating) zones. Zone dampers float but do not track or maintain synch with the DAPC.	Selected static pressure set-point is too high. Active zone damper(s) are faulty and will not open. Zone damper wiring is incorrect or faulty. Selected zone damper Stroke Time (<i>35second or 15second</i>) is incorrect for one or more zones. Selected zone Damper Type (<i>round, square, linear</i>) is incorrect for one or more zones. Selected Response Delay (<i>1second to 10seconds</i>) is too high. Perform a zone damper performance test via the DAPC to confirm proper incremental damper movement. <i>See page 11.</i>

CHECK YOUR WIRING

DETECTING 24vac SHORTS	SYMPTOM: Entire Panel or a Single Zone appears to be dead!
HVAC system not responding and UT3000 LED's are off.	If 24vac short has occurred, 24vac will be present at the UT3000 24v Input terminals R & C, but 24vac will not be present at any thermostat R&C terminals.
One or more thermostats will not power up and/or show a display.	SOLUTIONS: Remove wires from thermostat terminal blocks and allow 140 or 350mA circuit breaker to cool! Find and repair short(s) in thermostat field wiring. Restore 24 vac power.
ISOLATING 24vac SHORTS <i>140mA, 350mA & 500mA circuit breakers protect the UT3000 and react to a short in the Thermostat or Damper Motor field wiring.</i>	SOLUTIONS: Disconnect the wire(s) from the 'R' terminals on the UT3000 thermostat terminal blocks, and the "G/PO/PC" terminals on the UT3000 damper motor terminal blocks. Restore power. If the short is no longer present, Ohm out the thermostat and damper field wiring for continuity, shorts to common and/or shorts to earth ground. Replace or repair wires as necessary. Restore power.

Detecting 24v shorts to common or shorts to earth ground

When the 2.5A (F1) breaker is tripped it will get hot to the touch! The LCD and the LED's will not illuminate!

To reset the breaker, locate the short by removing each hot wire connected to the panel, one at a time. When the shorted wire is removed, the panel will resume normal functions. Now you must repair or replace the shorted wire. If one or more 140mA, 350mA or 500mA breakers trip, only the device(s) connected to that block will be affected. Remove each hot wire connected to that block until the voltage is restored. Find and repair the shorted wires or device before re-connecting the wires. If there is a short between the Data 1 & 2 wires or if the Data wires are shorted to 24v or earth ground, the communicating thermostat on that zone will alert you by displaying "Call for Service". If a non-communicating thermostat is connected and a short occurs on the 24v wires, the thermostat will not power up and that zone will not function. Find and repair the short using the methods described above.

TECHNICAL SUPPORT

EWC® Controls provides superior toll free Troubleshooting Support for the UT3000 when you are on the job site!

Call 1-800-446-3110 Monday - Friday 8am to 5pm EST. Otherwise call 1-732-446-3110 for information on the UT3000 and other ULTRA-ZONE® products. Visit our web site to download this Technical Bulletin and other related information at www.ewcccontrols.com

When calling for Technical Support from the job-site, please have a good quality multi-meter, pocket screwdriver, and wire cutters/strippers on hand.

If you have questions pertaining to this product, contact EWC Technical Support at 800-446-3110. You can also Email us at *tech@ewccontrols.com*.

