

DIYer Lessons from Install of a Flexzone System

Below are my observations concerning the install of a three zone Flexzone system. I would like to thank Jerry Tartaglino from Retrozone, Inc. for all his assistance. It is rare today to receive personalized service, particularly in a complicated trade like HVAC. Jerry went well above and beyond - patiently and expertly answering several phone calls and emails from a DIYer (sometimes with some stupid questions). I would also like to compliment Retrozone on the quality of its components, they are clearly well-made and built to last a long time.

Personal Background - I am an avid DIYer and have built, three decks, one small add-on and finished three basements. I have pretty strong knowledge and experience with framing, plumbing, electric, whole home automation/networking/audio and security systems installation and appliance repair. This was my second Retrozone Flexdamper install, having helped my son install a three-zone system in 2015.

My existing system:

- American Standard Conventional 3.5-ton electric heat pump with electric emergency heat backup
- Single stage cooling/Two stage heating
- Variable speed fan
- Single zone

My planned zoned system:

- Three zones - First floor, second floor and basement
- Each zone has a Wi-Fi, heat pump capable thermostat (two Nests and one Honeywell)
- Basement and first floor share trunk lines, thus each of fifteen registers required individual round Flexdampers
- Basement was partially finished - easy access to eight of the ducts, while the remaining seven had to be run inside the ducting
- Second Floor serviced by two rectangular trunks
- All Flexdampers were "homerunned" per Retrozone's recommendation
- Fresh Air motorized damper

What I purchased from Retrozone:

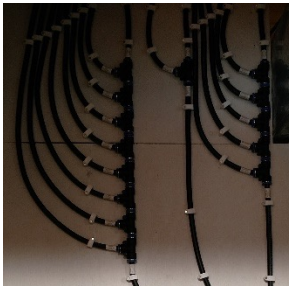
- Solenoid Panel and Pump: SPP-SD with EP-2 Pump, 3-Zone unit
- Twelve - 6", two - 5" and one - 4" round and two 14"x8" rectangular Flexdampers
- Durozone RED-4 Control Panel
- Fresh Air Damper: Durozone NSPRD 6", motorized spring return
- Dwyer TE-DFN-BO648 Supply Air Sensor (SAS)

- Dwyer TE-DFW-B0644-00 Outside Air Sensor (OAS)
- 370' Plenum Rated Tubing
- NO Static Pressure Relief System

1) Installation lessons learned:

- Round Flexdampers: Web page install instructions are sufficient - I found it to be a good practice to have a short section (6-8 inches long) of round duct to test fit each round Flexdamper after taping to ensure proper fit. All of them were in horizontal ducting except for one which was vertical. For this one I used silicone adhesive caulk to secure it per the web page instructions.
- Rectangular Flexdampers: Web page install instruction are sufficient, but I have the following observations:
 - Figure 2-2 shows a foam seal on the bottom of the rectangular Flexdamper - mine did not have this seal so I added one using some standard foam seal I had left-over from a previous front door installation.
 - I found it difficult to determine the proper setting for the height adjustment strap - I tried pulling on the two blades to determine which hole to use, but was unsure so I manually blew up the damper and found this method required a different hole? Recommend providing a table with the instructions that shows which hole to used based on the duct height.

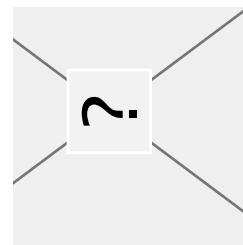
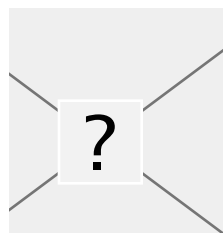
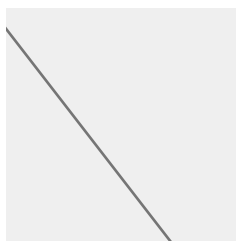
- Push-Pull Connectors - Great improvement over the original barbed connectors. They go on (and off if needed) the tubing with no effort. Getting them on the Flexdamper elbow connector was a little more trying. I found that putting the Flexdamper elbow on the edge of a table and then pushing down with the heel of my hand was the best method to get full seating. I also recommend that you install them on the round Flexdampers prior to taping the damper together. Making the manifold with these connectors was very easy due to the built in mounting holes. Note the Web page install instructions do not discuss how to make a manifold. While I guess it is fairly obvious, I think it would be a good idea to add a few sentences and a picture to describe this. Also, the Web page install instructions do not discuss the push-pull connectors, again recommend you add a few sentences on these.

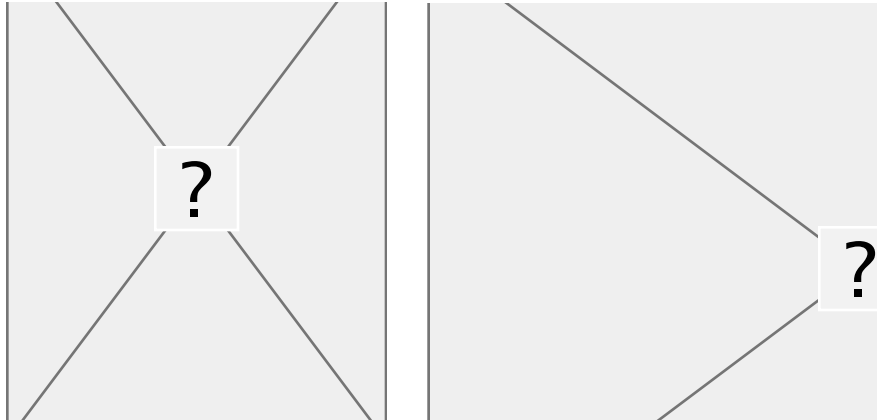


- Tubing runs - as recommended by Retrozone I did a homerun install for each flex damper. I don't feel doing this added much, if any, additional install time. While this does require some additional tubing (another 120' roll in my case), it think homeruns are the only way to go. They have two distinct advantages: 1) The only connections (and thus potential points of failure) are at the manifold and the flex damper. 2) Trouble shooting is easy - if the den's north flex damper is not operating correctly, the problem is at the manifold, that flex damper or (unlikely) it's tubing. If you tee off within a run then if you have a problem, each tee is a potential failure point and is likely in an unknown, inaccessible location. Open runs are easy - I did find that a 3/8" hole is really tight in the ducting so I rounded out the hole a little by "wobbling" the drill. Probably over kill but I did put duct mastic around each tubing hole. Hidden runs took a lot more time - I used standard metal and nylon fish tape as well as fiberglass fish rods. I had one tight S-curve in one trunk that I could not get through, so I cut a hole in the sheetrock and the trunk to hand pull the fish tape around the S-curve - it was the only dry wall hole I needed for my install. I also found that an endoscope camera was helpful in making the runs - I found a Wi-Fi one on Amazon that connects to an Android or I-phone for less than \$40: <https://>

www.amazon.com/gp/product/B074DS6DXS/ref=oh_aui_detailpage_o06_s00?ie=UTF8&psc=1, it worked great!

- e. Motorized fresh air damper - this was easy to install, connecting it to the round fresh air ducts like you would any other duct fitting. Wiring was also easy, simply connecting two conductor HVAC cable to the damper motor and zone controller.
- f. Solenoid/Pump install. I bought a three-solenoid unit and the new EP-2 pump. Install of the solenoid and its enclosure was straight forward. The zone tubing from the solenoid uses the old barb connectors - I used a heat gun to slightly warm the zone tubing to make it easier to slip on these connectors. Wiring was also straight forward based on the wiring diagrams provided with the unit. They do imply that the control wires need to go back to the air handler, but I connected them to the appropriate terminals of the zone controller and only ran the common wire back to the air handler. Again, probably overkill, but I added a plastic grommet in the enclosure hole that the wiring went through. I did not care for the "look" of the EP-2 bag enclosure, so I made several modifications.
 - i. First, I removed the bag and installed the pump in the solenoid enclosure. To do this I made a template of the pump anti-vibration feet locations and drill $\frac{1}{4}$ " holes in the bottom left of the enclosure. These holes were a little tight for pulling the feet through so I redrilled them with a 17/64s drill bit which worked great, I suspect a 9/32's bit would have been fine as well. Precise front/back location is critical as too far forward will kink the tubing and too far backwards will allow the pump to touch the back of the can and cause vibration noise. I also removed the label from the bag enclosure and put in on the front of the pump. The install is working great and I have had no noticeable vibration noise.
 - ii. I also did not like the way the relay control circuit hung off the back of the pump wires. Electronics is one of my hobbies, so I made a small circuit card for the relay, two diodes and capacitor used in the pump circuit. I also added a green LED with appropriate current resistor to provide a visual indication of when the pump was running and screw lock connectors for ease in wiring. I drilled and tapped the back of the enclosure and attached the circuit card below the center solenoid using standard 3mm standoffs.
 - iii. So I could see the pump running indicator LED when the enclosure cover was closed I drilled a hole in the cover and added a label similar in look to the solenoid indicator label, A few pictures of the result:



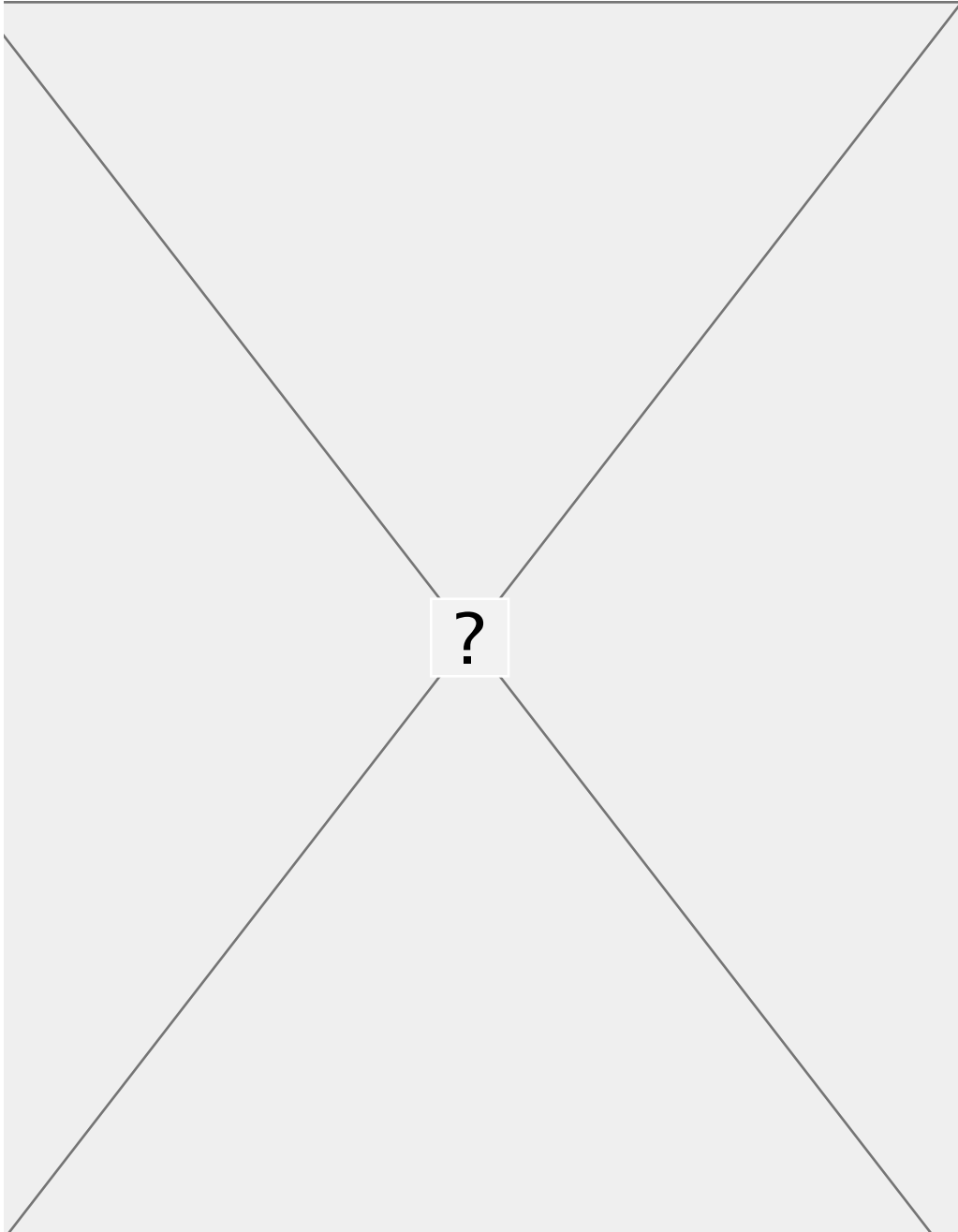


Note these modifications were purely cosmetic and made no changes to the functioning of the pump or its relay circuit.

Finally, the web page instructions for this section were in SECTION 4 Airzone Controllers - General Information, but were minimal. Recommend a separate section for solenoid/pump installation, including appropriate wiring diagrams.

- g. RED-4 Controller Install: Physically, this is a very easy install, basically attaching the correct wire to a screw terminal in the controller and its appropriate connection on the other end (air handler, thermostat, etc.). But, mentally, I found this part the most challenging. The HVAC industry does not seem to be standardized on the color codes for wiring - for example my common wire at the HVAC was blue, but most on-line descriptions call it black. There are multiple Y and W connections, based on HVAC "stages" and several different heat pump configurations. Most thermostats can be wired as "heat pump" or "heat-cool" and the RED-4 uses both types when connecting to a heat pump system. Additionally, the RED-4 has nine configuration dip switches and 5 configuration potentiometers. I did finally figure it all out based on review of my HVAC wiring diagram, the RED-4 installation manual, a lot of internet research and a couple emails to Jerry and two conversations with a tech rep from Durozone. I should note that this install was much more complicated than my son's install (standard gas furnace and electric AC), having a heat pump greatly complicated the wiring and settings. One note on the RED-4 manual: the thermostat diagrams show the common (C) terminal on the controller but DOES NOT show it connected to the thermostat; most modern thermostats required a common connection, this was one of my emails with Jerry and he confirmed that it was fine to hook the C terminal on the RED-4 with the C terminal on the thermostat. Note: The zone controller includes a 110 to 24 VAC transformer. In my son's install his system had 110 VAC outlet servicing the air handler. My heat pump only had 220 VAC so I had to run a new 110 VAC outlet for the transformer.
- h. SAS and OAS sensor install - not much to it. Drill a hole, secure the sensor and run two-conductor HVAC cable back to the controller. The SAS included a built-in cable, but it was not quite long enough to reach my controller, so I added a few feet of cable to it using heat-shrink butt connectors.
- i. Static Pressure Relief System - Jerry suspected that it was probably not needed based on my overall design, so I chose not to install one for now. My RED-4 controller has both a temperature limit settings which will prevent any HVAC system damage should there be a static pressure issue. I will add a relief system later, if needed, based on system performance. The Web page install instructions on this subject are excellent and include symptoms to look for concerning potential static pressure issues.

2) System complete (and working perfectly):



3) Random thoughts:

- a. The webpage instructions are pretty good, but could use some improvement, see specific comments above. Also, some folks (especially old folks like me) still like to have a paper manual when installing stuff - recommend you make the instructions available as a single PDF for download/printing.
- b. This is a pretty complicated task for a DIYer - but I think most could do the job because Jerry is so helpful. The Retrozone site says it has never had an unsuccessful DIY installation, I believe that, again due to Jerry's knowledge and help!

- c. Add a short video to the site showing how to connect the push-pull connectors to the flex dampers.
- d. I really like my changes to the pump setup - I'm available to discuss this further if you are interested. I know it would add some cost to the system, but mass production of circuit boards is pretty cheap now days and I think the install labor would probably be about the same, or potentially less than what you currently require to get the pump production ready.
- e. Retrozone and Jerry ROCK!

Tom from Virginia