Carrier Enterprise Mid-South Tech support











Zoned comfort with the Infinity System Control*





EVOLUTION™ ZONING SYSTEM

What is zoning?





1 system, multiple temperature sensors, automatic dampers to control airflow where required.



Allows areas with common heating/cooling requirements to be grouped together and unoccupied areas to be set with no heating/cooling demand.

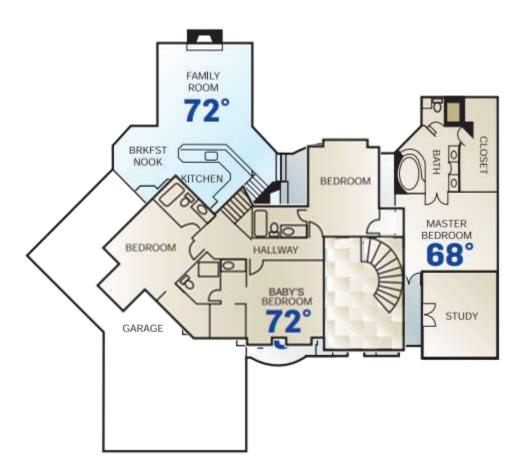


Zoning can...





Provide different temperatures, to different areas for maximum comfort, even to different levels.





Zoning cannot...





Provide more cooling than capable.



#

5 ton zoned system.

 $24,000 Ft^2$



Zoning cannot...





Overcome poor duct design or installation.













Zoning cannot...





Overcome customer malfunctions.



















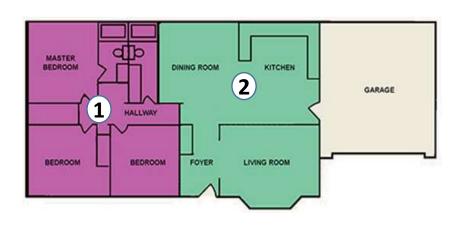








8 zone capability









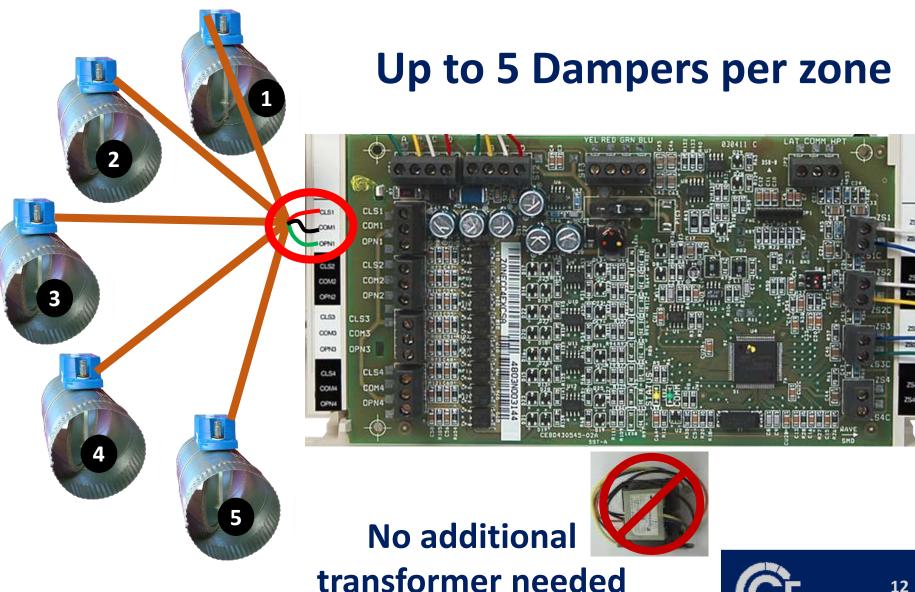
8 zone capability





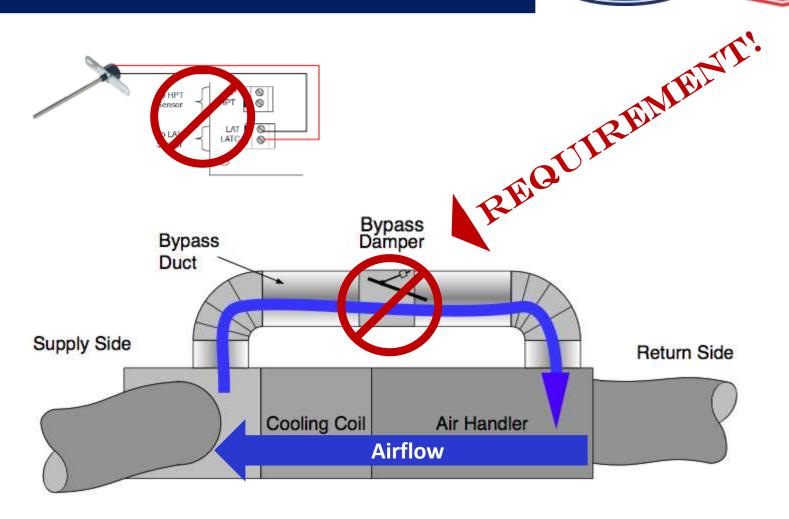








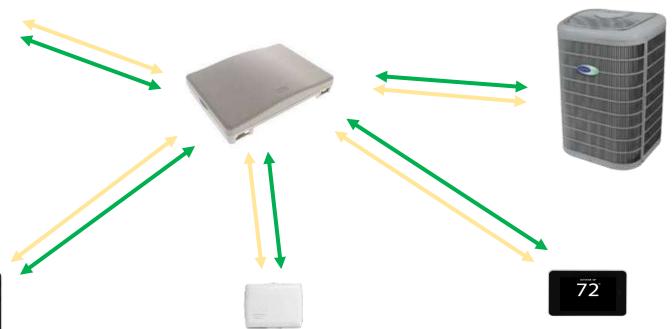








Automatic identification of all communicating equipment

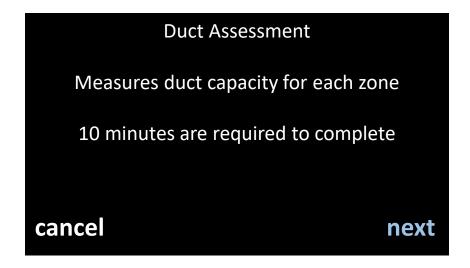








Duct assessment (patented automatic duct assessment)



Will occur on initial power up during the commissioning process.

Will automatically repeat at a set time each day. (default 1 pm)





Infinity/Evolution indoor equipment only!



58SB

Comfort™ 80 Gas Furnace



58SC

Comfort™ 80 Gas Furnace



58SP

Performance™ 80 Gas Furnace



58TN

Infinity® 80 Gas Furnace



58TP

Performance™ 80 Gas Furnace



800SA

Legacy™ 80 Line Fixed-Speeds 80% Efficiency Gas Furnace



810SA

Legacy™ 80 Line Fixed-Speeds 80% Efficiency Gas Furnace



820SA

Preferred™ 80 Series Variable-Stage Gas Furnace



820TA

Preferred™ 80 Series Variable-Speed Gas Furnace



880TA

Evolution™ Variable-Speed Gas Furnace



PG80ESA

Gas Furnace 80



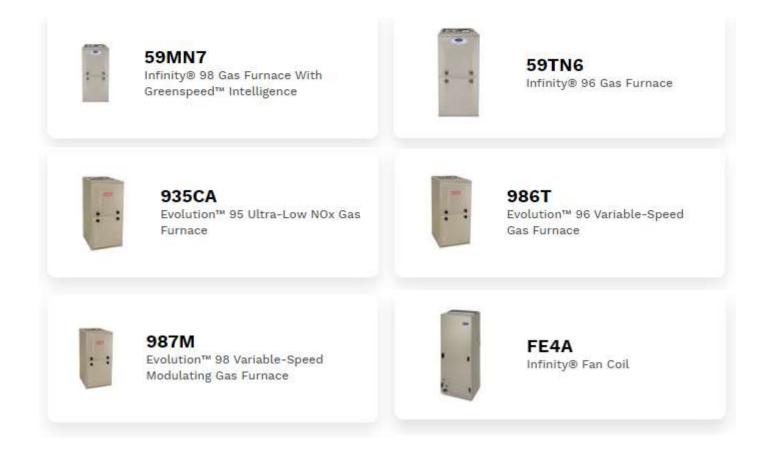
PG80VTL

2-Stage Variable Speed Gas Furnace 80





Infinity/Evolution indoor equipment only!









Touch Wall Control



Smart Sensor



OR



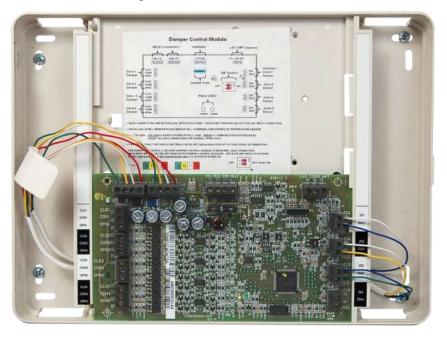
Remote Room Sensor







Damper Control Module





Modulating Dampers

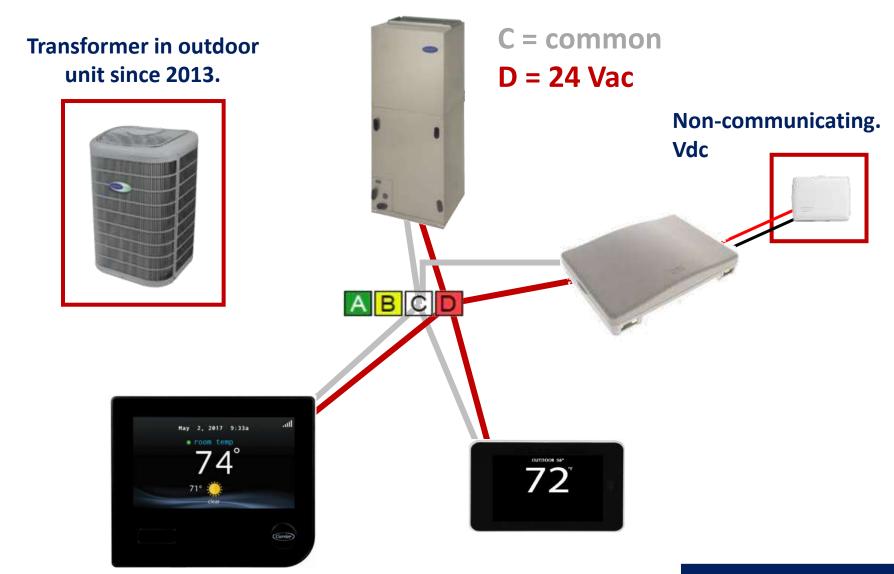




Communication



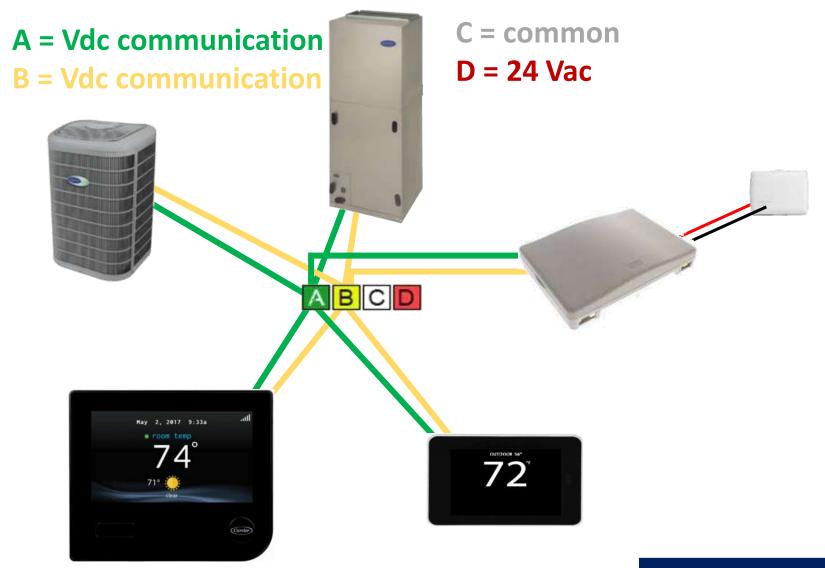




Communication



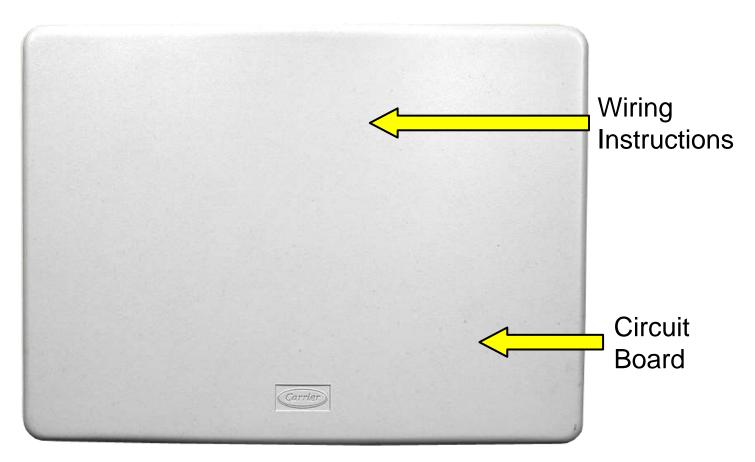








- Zone damper module cover removed
- Note wiring instructions and circuit board

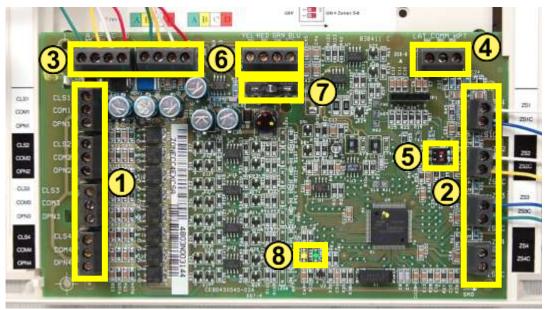






- Four, zone damper outputs (CLS, COM, OPN, 1-4).
- 2. Four "remote room sensor" connections.
- 3. Two, four-wire communication buses, (ABCD)
- 4. LAT and HPT sensor connections, (not required)
- 5. Dip-switches, (only used when a second ZDM is needed, 5 or more zones).
- 6. ERV connections built in to board, (eliminates the need for NIM module).
- 7. 1-amp fuse
- 8. Yellow and green LEDs

Zone Damper Module

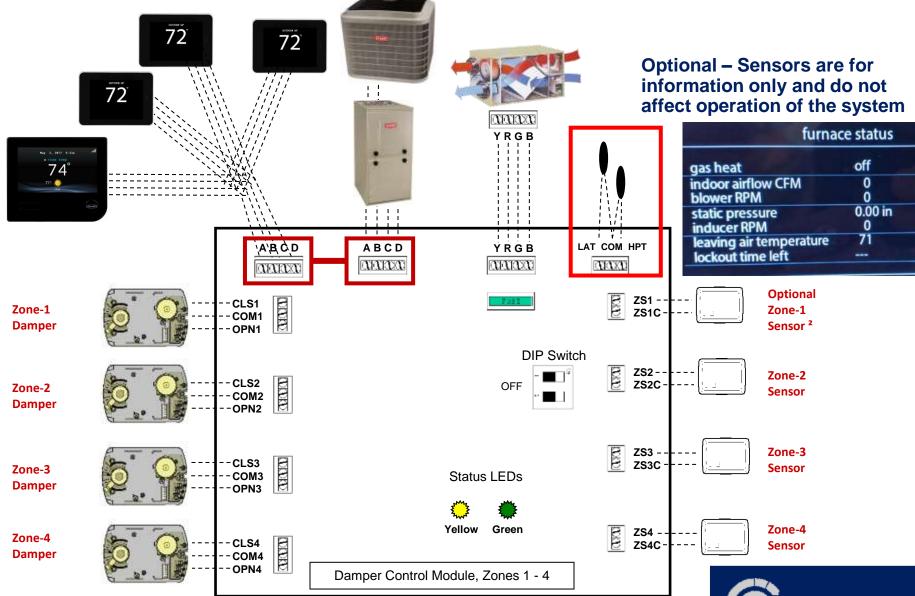




Remote Room Sensor







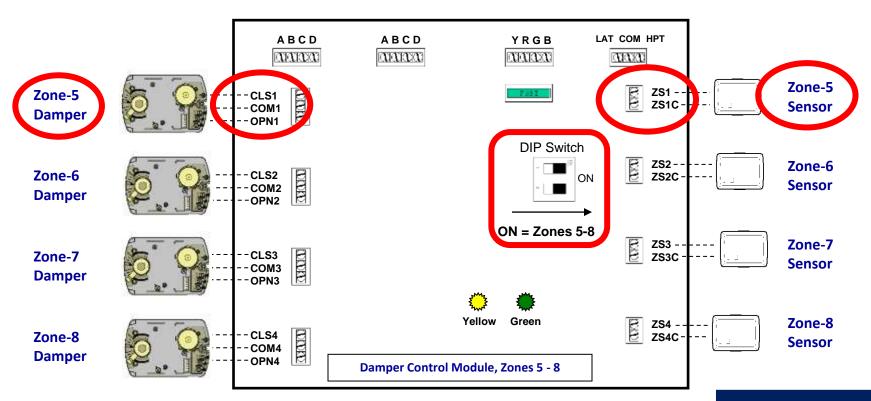




Connect to Zones 1-4
Damper Control Module

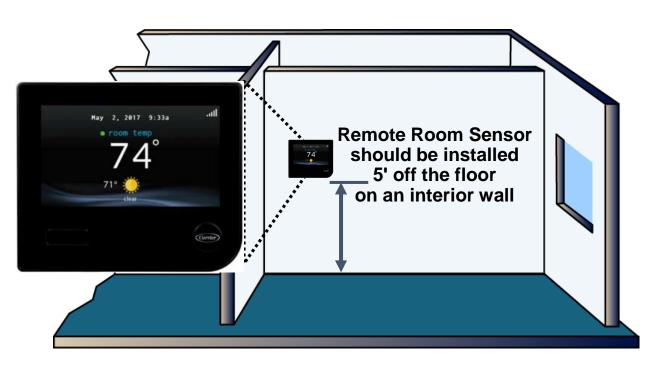
A B C D

Zones 5 - 8















Locate devices:

- Approximately 5 feet (1.5 m) from the floor
- Close to or in a frequently used room
- On an inside partition
- On a wall without pipes or ductwork

Do not locate devices:

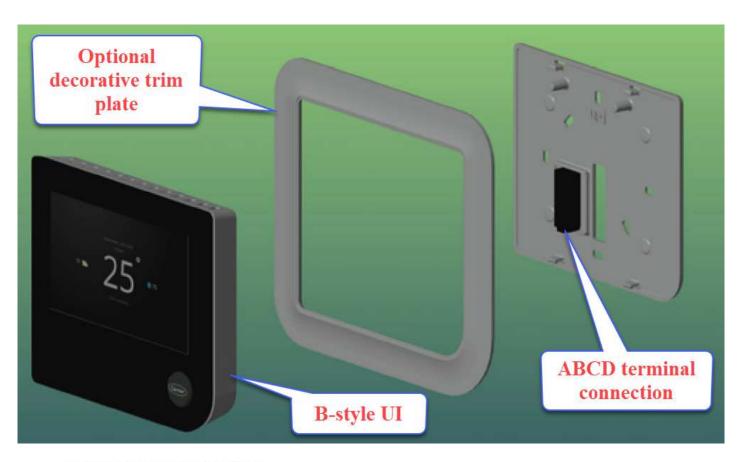
- Close to a window outside wall or a door to the outside
- Exposed to direct light, heat, sun, etc.
- Close to or in direct airflow from registers
- In alcoves, behind doors, or other areas of poor circulation











OPTIONAL ACCESSORIES

DESCRIPTION	PART NO.
Infinity® Remote Room Sensor – Wired (RRS)	SYSTXCCRRS01*
Decorative Trim Plate - Silver (six pack)	SYSTXNNSBP06†
Decorative Trim Plate - White (six pack)	SYSTXNNWBP06†
Decorative Trim Plate - Black (six pack)	SYSTXNNBBP06†
Decorative Trim Plate - Gray (six pack)	SYSTXNNGBP06†
ABCD Equipment Communication Connector (Green Plug; 10 pack)	SYSTXGRPLG10
Outdoor Air Temperature Sensor	TSTATXXSEN01-B







Touch Wall Control



operation

programming

setup

monitoring

troubleshooting

notifications

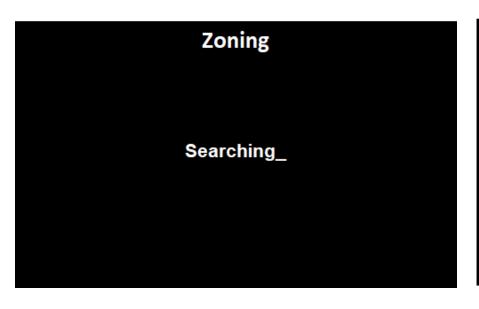
reminders

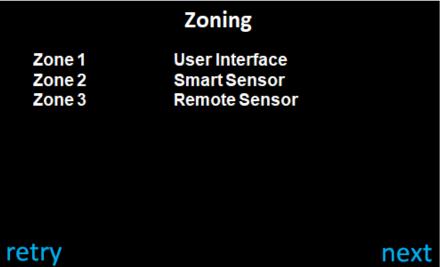




Commissioning the system (initial power up)

- 1. Searching for indoor equipment...
- 2. Searching for outdoor equipment...
- 3. Indoor evaporator selection...
- 4. Searching for SAM...
- 5. Searching for zones...









Commissioning the system (initial power up)

- 1. Searching for indoor equipment...
- 2. Searching for outdoor equipment...
- 3. Indoor evaporator selection, (when furnace is detected)...
- 4. Searching for SAM...
- 5. Searching for zones...
- 6. 'Filter type' selection, Humidifier, UV light...







Equipment summary

fan coil FE4ANF006L00ABAA

electric heat 3 stage 15 KW

HP variable 25VNA060

retry next

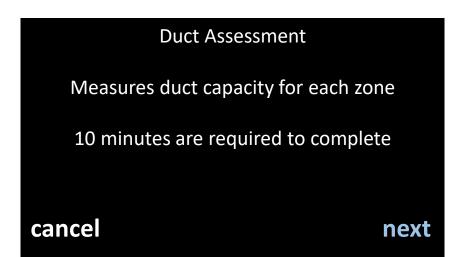


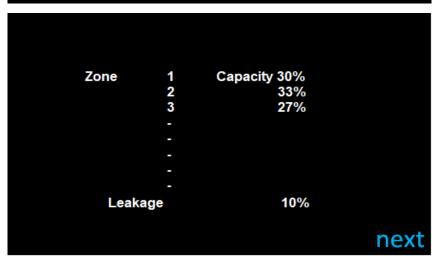


 If zoning is detected the UI will perform a duct assessment.

 The UI will calculate and display each zone's capacity as a percentage of total airflow.

 Look for potential issues such as; excessive leakage or undersized ductwork.











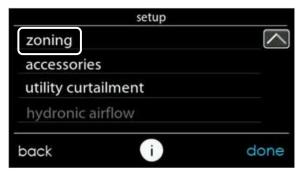
Disable zoning: zoning must be disabled for checking charge!



Touch and hold service cap for 10 seconds.



Select "setup".



Select "zoning".



Select "disable zoning".



Select "Yes" to disable zoning, then "SAVE"

All zoning functions are now off and dampers are opened 100%.









Zone Offsets allows adjustment of zone temperature sensors +/- 5 degrees.

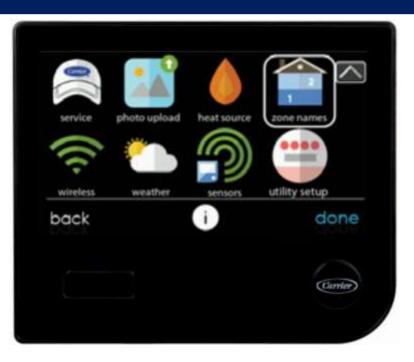
Airflow limits will be discussed later.

Duct assessment time can be adjusted to any time of day. (default 1 pm)

NOTE: Let the homeowner decide!

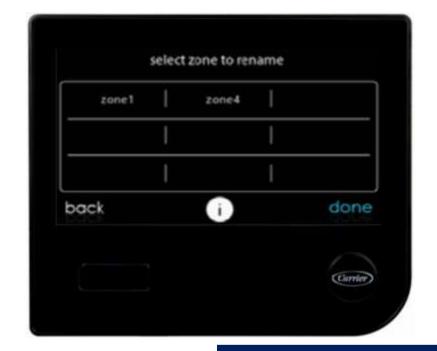






- From the main screen touch Menu, then the down arrow.
- Touch "Zone Names"

- Touch the zone in which you wish to change the name.
- Select between "Common Name" or "Custom Name"
- A keyboard will appear where the custom name can be input, touch save when complete.



Remote Room Sensors

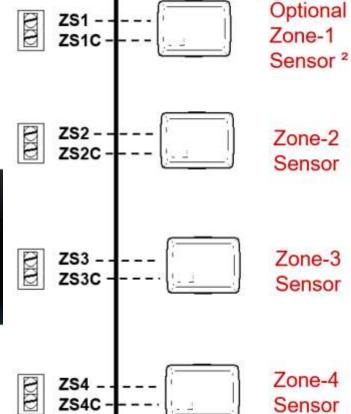










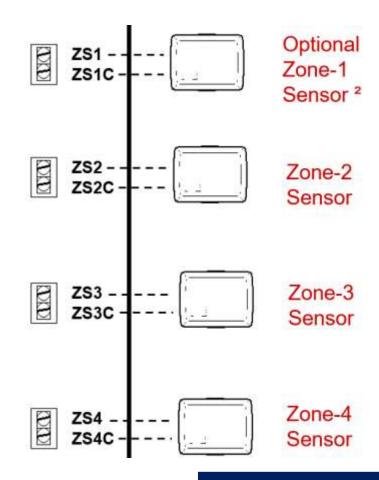


All programming, temperature selections, and displays are done through the UI













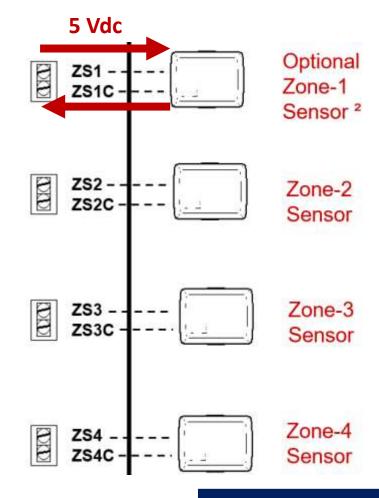


(Room Sensor) Wires to ZDM or UI

10 kOhm

Note: recommend running additional wires as spares.

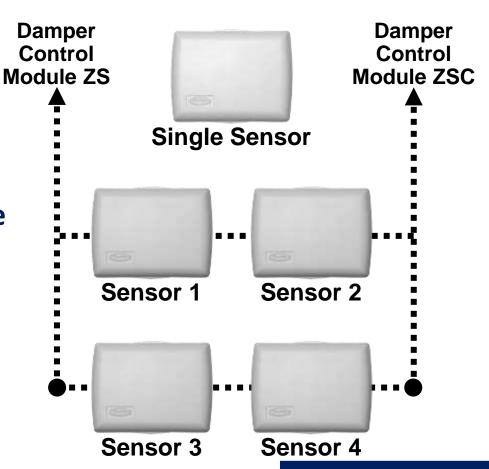
Does not communicate!







- Used in any zone
 - Wire to Zone Damper Module
- For use with remote location of User Interface
 - Wire to S1 and S2 on user interface back plate
- User Interface automatically detects remote sensor presence
- Remote sensor is temperature sensor only
- Must use 4 sensors together for zone temperature averaging



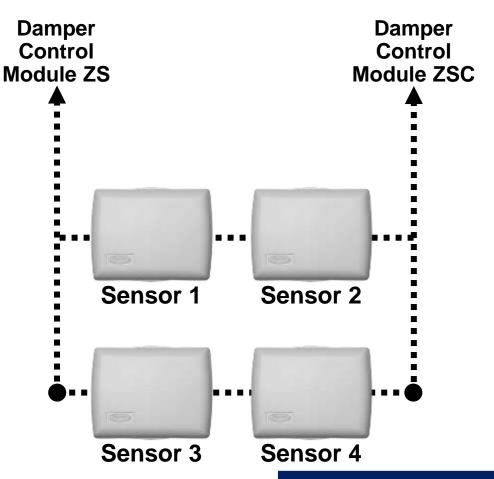




Why are 4 sensors required for sensor averaging?

 Series sensors add up, sensors in parallel require the addition of the reciprocals (see below)

Rseries = R1 + R2 1/Rparallel = 1/R1 + 1/R2 $R_1 \quad R_2$ $R_1 \quad R_2$



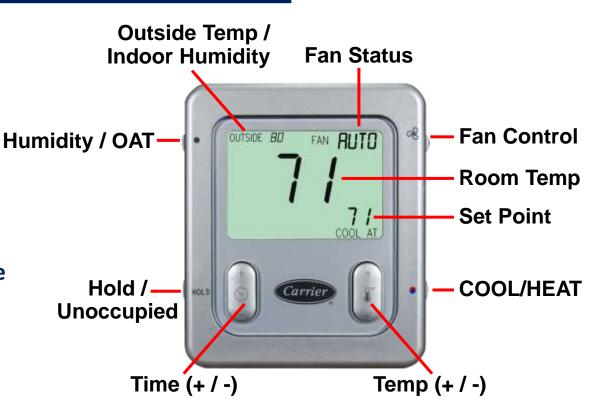




- Communicating
- Used in any zone
- Displays:
 - Zone temperature
 - Indoor fan setting
 - Outdoor air temperature
 - Indoor humidity
 - Vacation mode
 - Timed override status
 - System off when it is off

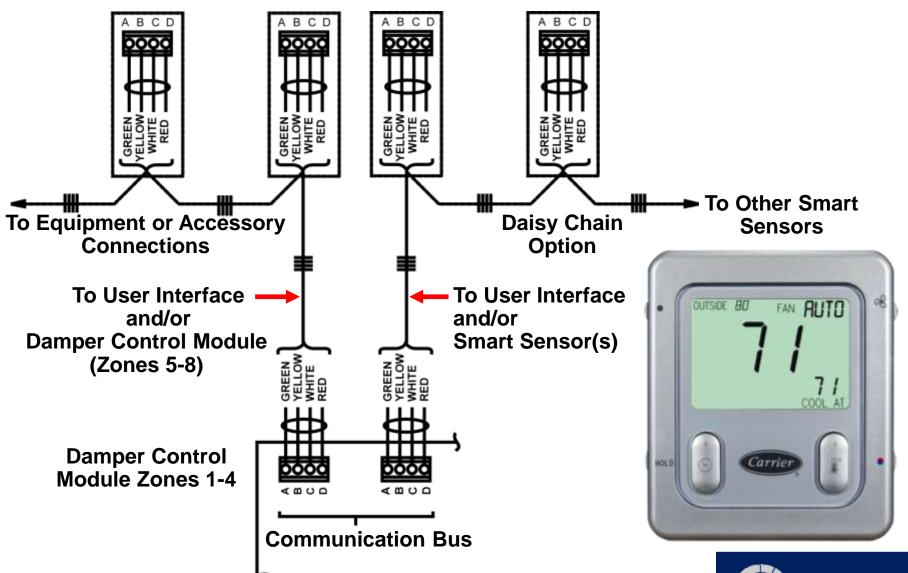
Buttons for adjusting:

- Zone cool/heat set point temperatures
- Timed override
- Humidity or OAT display







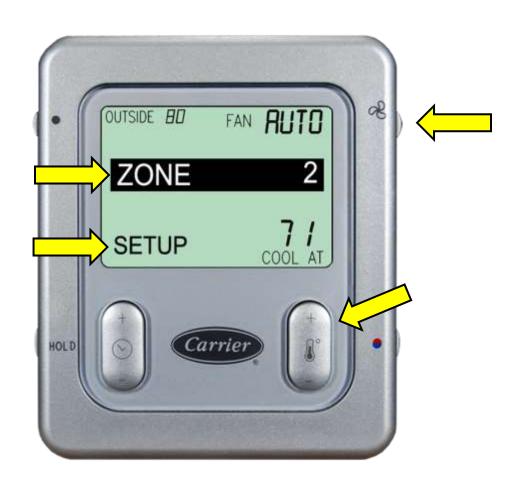






ZONE ADDRESS

- During power-up, ZONE 2 is displayed and SETUP also shows in lower left.
- Use TEMP +/- button to change the address (1-8).
- Press "FAN" button to store address and exit setup.
- After exiting setup mode, holding "FAN" down for 10 seconds, ZONE number appears and allows change.







New Infinity® Smart Sensor









OBSOLETE



This is the only Smart Sensor available. It will be used for all warranty replacements.





Backlighting adjustments.

Keypad lockout.

Individual constant fan control.



This is the only Smart Sensor available. It will be used for all warranty replacements.











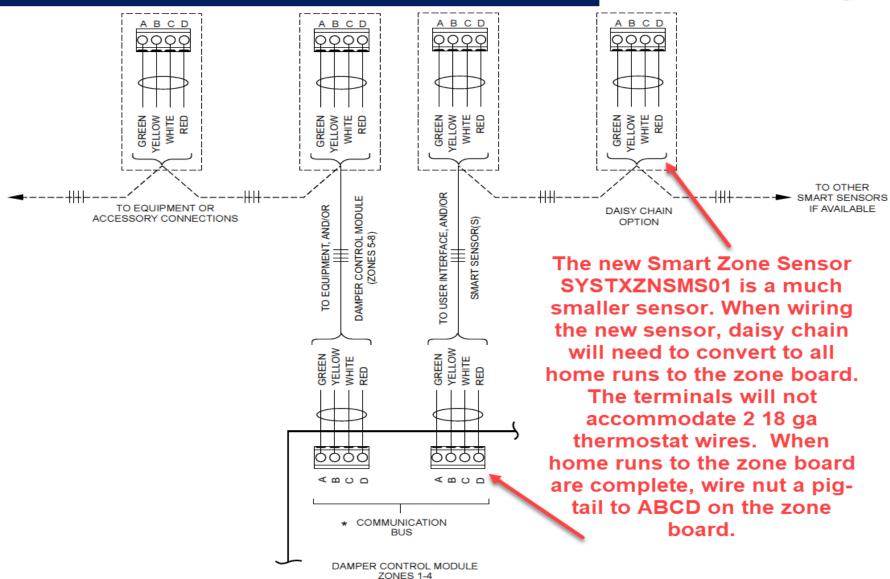


Fan settings: Auto, Low, Medium, and High.

Note: Dampers will modulate to provide different CF airflow to different zones as requested.

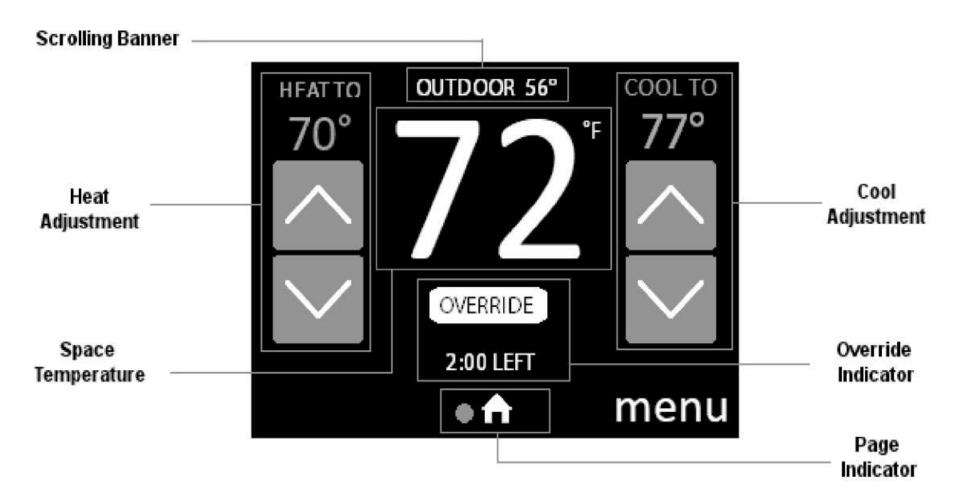
















- Know the address of each zone prior to system power up.
- On power up the smart sensors, for zones 3-8, will need to be addressed correctly.
- When replacing a smart sensor, set the address upon power up.
- Select save after any changes or to exit setup.







Round Dampers

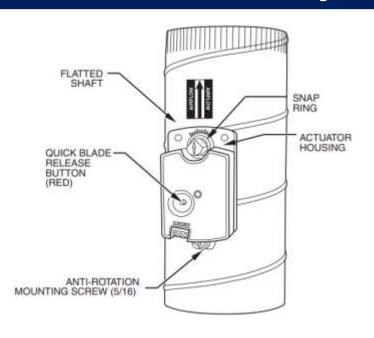


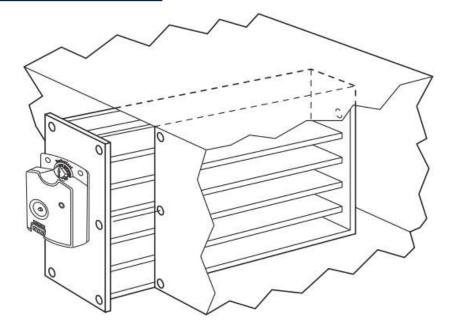
Rectangular Dampers

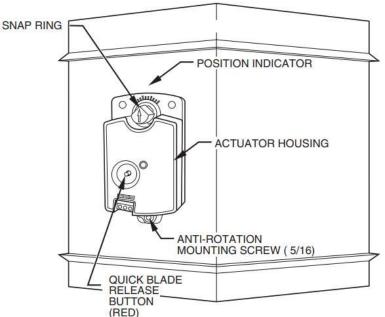










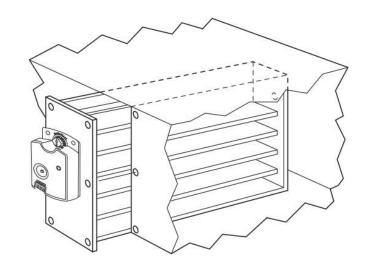


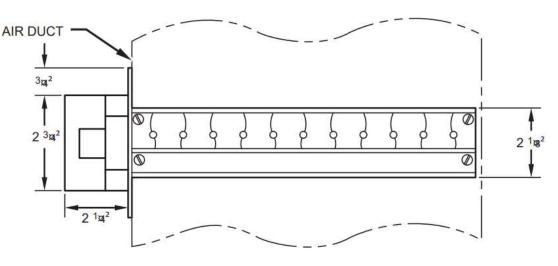






- Slip-in dampers can accommodate up to 24" duct and use a 90° actuator
- Rated @ 400, 600, & 800
 FPM
- Pressure drops range from 0.02" – 0.08" (consult your damper product data)
- Actuator rotation is 6° per second one-way operation in 15 seconds

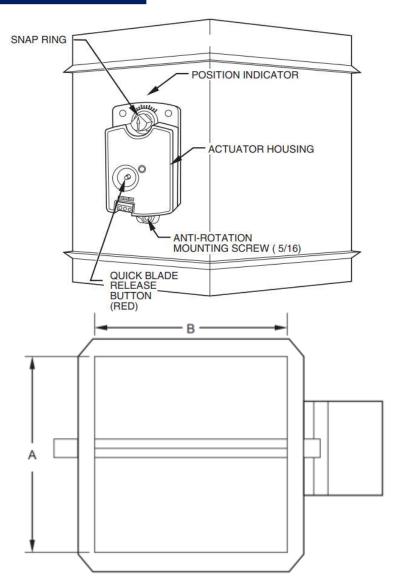








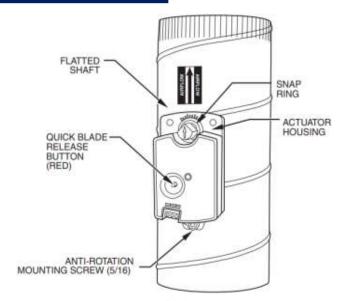
- Rectangular dampers range in size from 8x10" –
 10x24" with a 90° actuator
- Rated @ 400, 600, & 800
 FPM
- Pressure drops range from 0.02" 0.04" (consult your damper product data)
- Actuator rotation is 6° per second







- Round dampers range in size from 6" – 16" with a 45° actuator
- Rated @ 400, 600, & 800
 FPM
- Pressure drops range from 0.02" – 0.06" (consult your damper product data)
- Actuator rotation is 3° per second

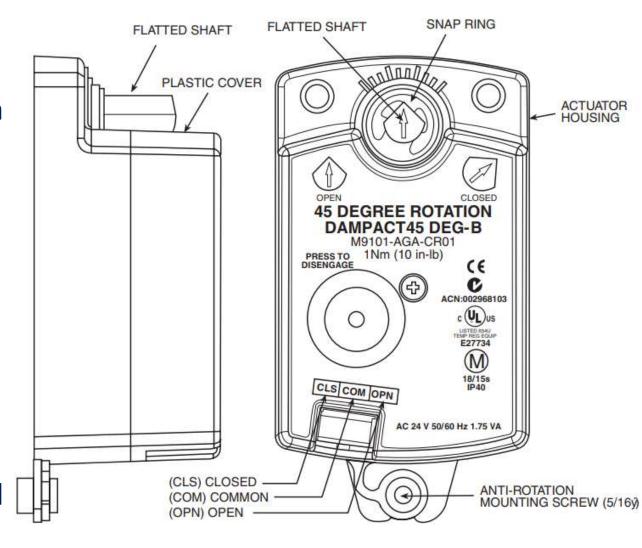








- All Infinity /
 Evolution dampers
 are powered with a
 24 vac signal Open
 or close
- All Infinity /
 Evolution dampers
 use 2 va power
- All Infinity /
 Evolution dampers
 have a 15 sec travel
 time using a 24 v
 pulse per sec.







DAMPER FEATURES & INSTALLATION

- Self-aligning shaft and actuator hub requires no adjustment.
- Spring-loaded disengagement (quick blade release button) for momentary release of main gear and damper blade.
- Terminals recessed in plastic. No cover removal for wiring.
- Plastic hub protects actuator from condensation.
- Refer to the zoning kit Installation Instructions for application information. All dampers must be properly installed and supported according to local codes or SMACNA standards. Seal duct joints using duct tape, mastic, or other approved methods. Do not allow mastic to come in contact with actuator.







DAMPER FEATURES & INSTALLATION

- Install damper so actuator is visible for inspection and accessible in the event it would ever need servicing. The arrow on end of damper shaft represents damper blade position.
- To wire damper, connect to OPN, COM, and CLS terminals as indicated. It is good practice to provide a wiring strain relief to protect the connections from wire movement.
- If the damper is in an unconditioned space, insulate the damper using 1-1/2 inches insulation.* In areas where excessive condensation may occur, a transparent plastic cover is available which will eliminate the possibility of actuator condensation. Make sure insulation does not interfere with operation of actuator





DAMPER TESTING AND TROUBLESHOOTING

- After installation is complete, check dampers and verify they are all operating properly. When 24-vac is applied between common and open, the damper should go full open in approximately 15 sec. Power damper and cycle open/closed several times.
- Residential dampers are designed in such a way that if the damper jams or stalls it will not damage the damper or motor. Jamming will usually be related to twisting or bending of the damper body during installation, or tension on the damper shaft. After you correct the issue, the damper should operate properly. If in an emergency it becomes necessary to force a damper open manually, press the quick blade release with 1 hand and turn mounting hub to reposition damper shaft. Release disengagement button to hold damper shaft in new position.

Variable Speed ECM







In many circumstances the ECM variable speed motor may provide better airflow in marginal duct systems.

Warning! If proper techniques are not used, especially with zoning, problems <u>WILL</u> be created that are not easily corrected.





Infinity® System Zoning Design Guide



Design Guide

INTRODUCTION

The Infinity® Zoning System provides the ability to control 2, 4, or 8 zones in a residential or light commercial application. Each constructed zone should support the minimum airflow of the equipment selected. Consult the Infinity® System HVAC Equipment Product Guide to determine minimum airflow requirements.

The Infinity® Zoning System can only be used with compatible Infinity® System indoor equipment. See the equipment Product Data Sheets for details. To achieve the best operating and comfort it is recommended that the Infinity® System compatible variable-speed and multi-stage compressor units be selected in the design of the zoning system. See the Infinity® System equipment Product Data sheets for more information. The multiple stage, and especially modulating Infinity® System HVAC equipment, provide some leeway in the system minimum airflow requirements, allowing more effective zoning operation.

Infinity® Zoning incorporates cutting edge technology that sets it apart from any other zoning system on the market today, making it the easiest system on the market to install and use with confidence:

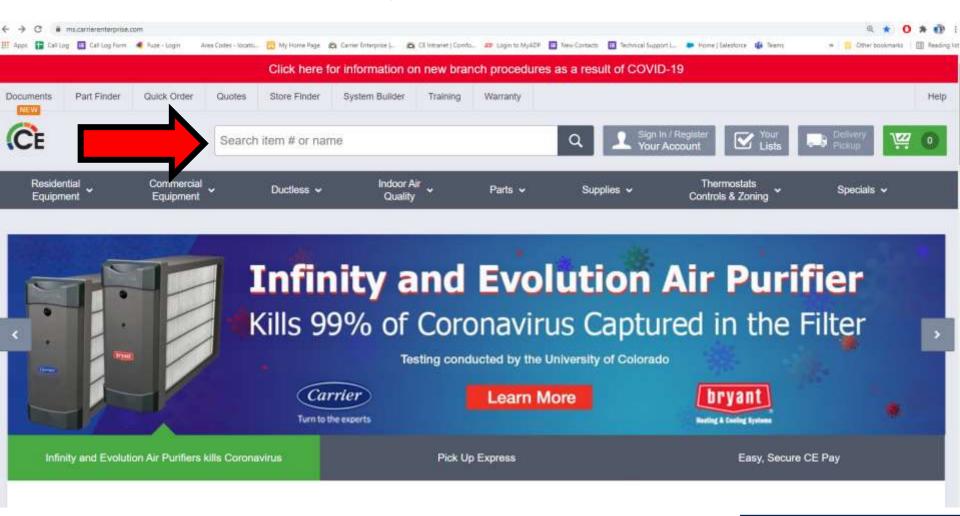
- It does not require a bypass damper or leaving air temperature sensor, yet the HVAC equipment is always protected from limit trips and coil freezing.
- It does not require a separate field installed power transformer.
- System can handle up to five dampers per zone.
- Infinity® Zoning automatically identifies all communicating installed equipment.
- Patented Automatic Duct Assessment ensures that Infinity[®] Zoning delivers superior and quiet comfort with any reasonable duct system.







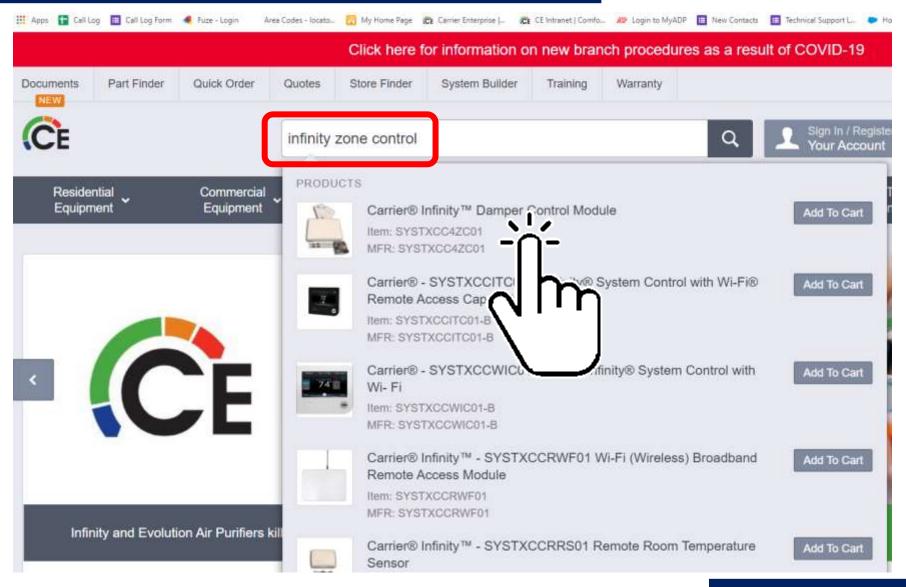
ms.carrierenterprise.com



63

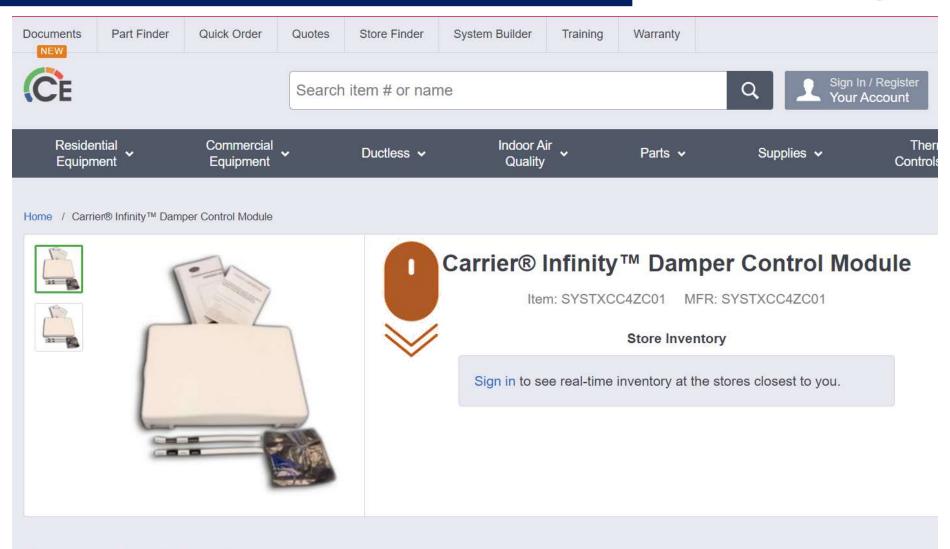












Frequently Bought Together





About This Product





Warning: this product contains a chemical known to the State of California to cause cancer. P65Warnings.ca.gov

Specifications

Weight

Width

Height

Country of Origin

Length

Brand

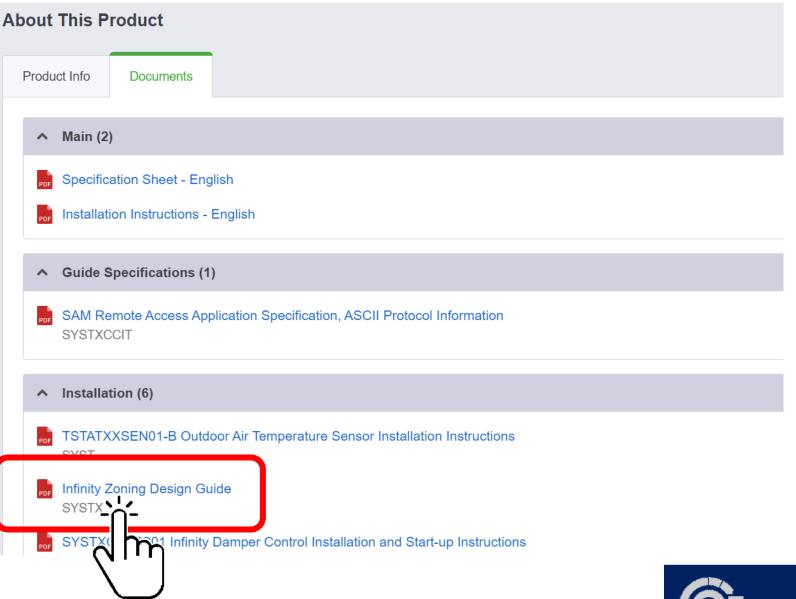
Color

Display

Display Options











Infinity® System Zoning Design Guide ZONE-3DG September 2015



Design Guide

INTRODUCTION

The Infinity® Zoning System provides the ability to control 2, 4, or 8 zones in a residential or light commercial application. Each constructed zone should support the minimum airflow of the equipment selected. Consult the Infinity® System HVAC Equipment Product Guide to determine minimum airflow requirements.

The Infinity® Zoning System can only be used with compatible Infinity® System indoor equipment. See the equipment Product Data Sheets for details. To achieve the best operating and comfort it is recommended that the Infinity® System compatible variable-speed and multi-stage compressor units be selected in the design of the zoning system. See the Infinity® System equipment Product Data sheets for more information. The multiple stage, and especially modulating Infinity® System HVAC equipment, provide some leeway in the system minimum airflow requirements, allowing more effective zoning operation.

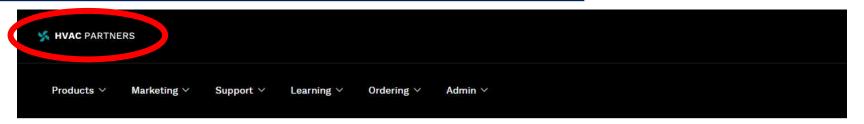
Infinity® Zoning incorporates cutting edge technology that sets it apart from any other zoning system on the market today, making it the easiest system on the market to install and use with confidence:

- It does not require a bypass damper or leaving air temperature sensor, yet the HVAC equipment is always protected from limit trips and coil freezing.
- · It does not require a separate field installed power transformer.
- System can handle up to five dampers per zone.
- Infinity® Zoning automatically identifies all communicating installed equipment.
- Patented Automatic Duct Assessment ensures that Infinity[®] Zoning delivers superior and quiet comfort with any reasonable duct system.

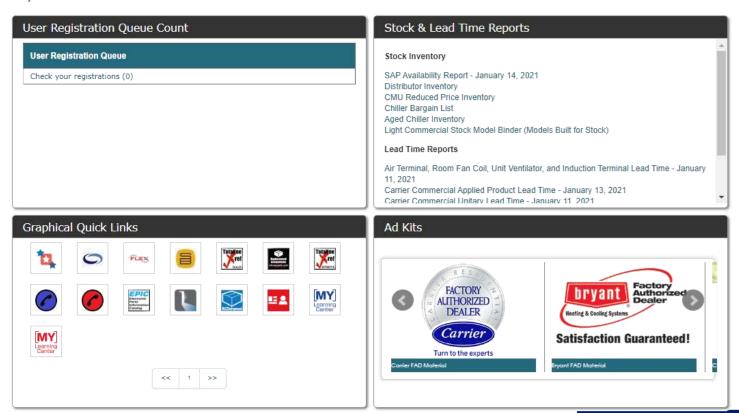






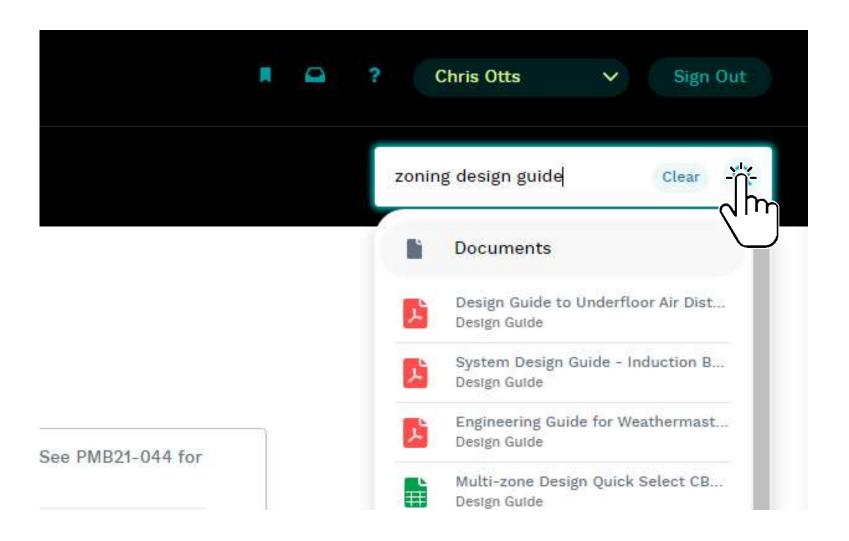


My Dashboard



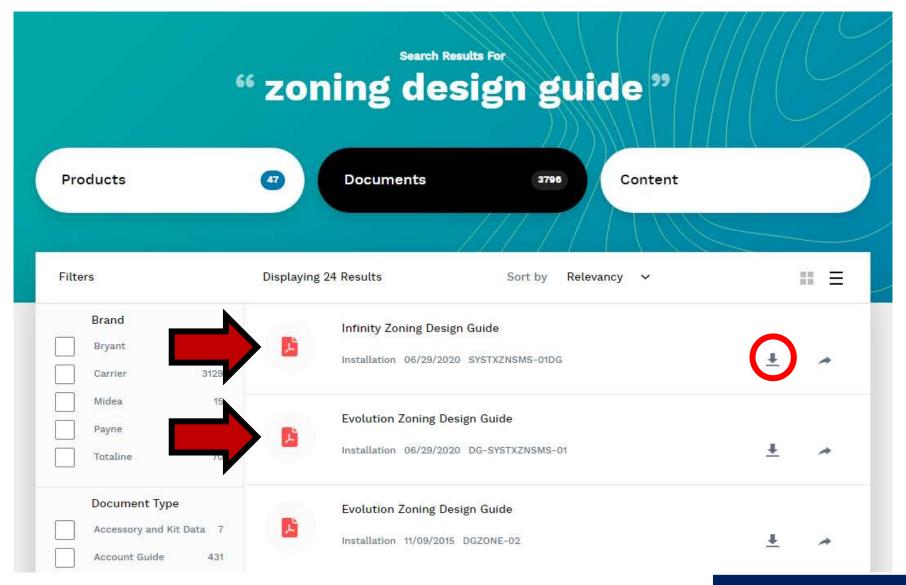
















Infinity Zoning

SYSTXZNSMS-01DG July, 2020



Design Guide

Introduction

The Infinity® Zoning System provides the ability to control 2, 4, or 8 zones in a residential or light commercial application. Each constructed zone should support the minimum airflow of the equipment selected. Consult the Infinity® System Product Guide to determine minimum airflow requirements.

The Infinity Zoning System can only be used with compatible Infinity System indoor equipment. See the Infinity equipment Product Data sheets for more information. To achieve the best operating and comfort it is recommended that the Infinity System compatible variable-speed and multi-stage compessor units be selected in the design of the zoning system. The multiple stage, and especially modulating Infinity System HVAC equipment, provide some leeway in the system minimum airflow requirements, allowing more effective zoning operation Infinity Zoning incorporates cutting edge technology that sets it apart from any other zoning system on the market today, making it the easiest system on the market to install and use with confidence:

- It does not require a bypass damper or leaving air temperature sensor, yet the HVAC equipment is always protected from limit trips and coil freezing.
- It does not require a separate field installed power transformer.
- · System can handle up to five dampers per zone.
- Infinity Zoning automatically identifies all communicating installed equipment.

Infinity System gas furnaces, fan coils, small package products, and geothermal package units are acceptable indoor units that work with the Infinity Zoning System; see the Infinity System equipment Product Data sheets for details. Communication takes place over a four-wire ABCD communication bus.

The Infinity System fan coils will operate with any Infinity System or Performance Series AC or HP or any conventional single-stage AC or HP. The Infinity System gas furnaces will operate with any Infinity System, or Performance Series AC or HP, or any conventional single-stage AC.

NOTE: A Network Interface Module (NIM) may be required to connect Infinity Series indoor units to non-communicating outdoor and compressor units, especially multi-stage or heat pump versions.

Infinity Touch:

If the Infinity System compatible gas furnace, or fan coil could be considered the heart of the system then the Infinity Touch could be considered the brain. It is the user access into the Infinity Zone System. It allows the user to operate, program, setup, monitor, and troubleshoot the system.

From the Infinity Touch control, the program schedules and desired setpoints, fan speeds, and a number of other selections can be set for each individual zone. It will also notify the homeowner of any maintenance reminders or problems in the system.

Infinity Damper Control Module:







- 1. Heat Load Calculation.
- 2. CFM requirements.
- 3. Select Equipment.
- 4. Design Ductwork.

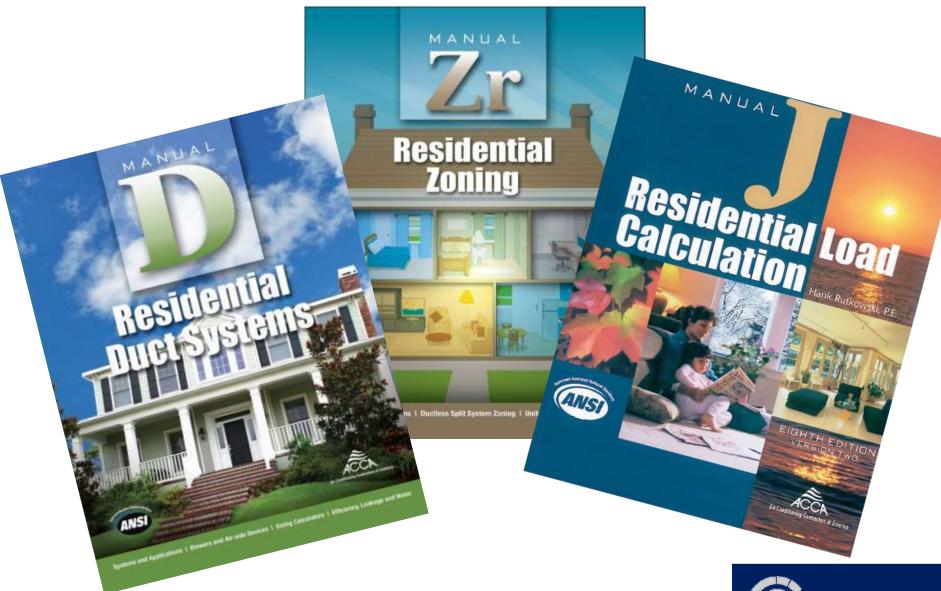
1. Heat loss/gain
2. cfm per room
3. Select equipment
Calculate equivalent length of longest duct runs
Calculate duct system Friction Rate
Design Duct System using the Friction Rate calculated in step 5.

<u>ALWAYS</u> use industry-standard design tools for determining proper system design.

























Heat load calculation



The English phrase "<u>rule of thumb"</u> refers to a principle with broad application that is not intended to be strictly accurate or reliable for every situation.





Heat load calculation





Similar sizes and floor plans...

...can have very different heat loads!







Heat load calculation



 $1748 Ft^2$



 $1736 Ft^2$

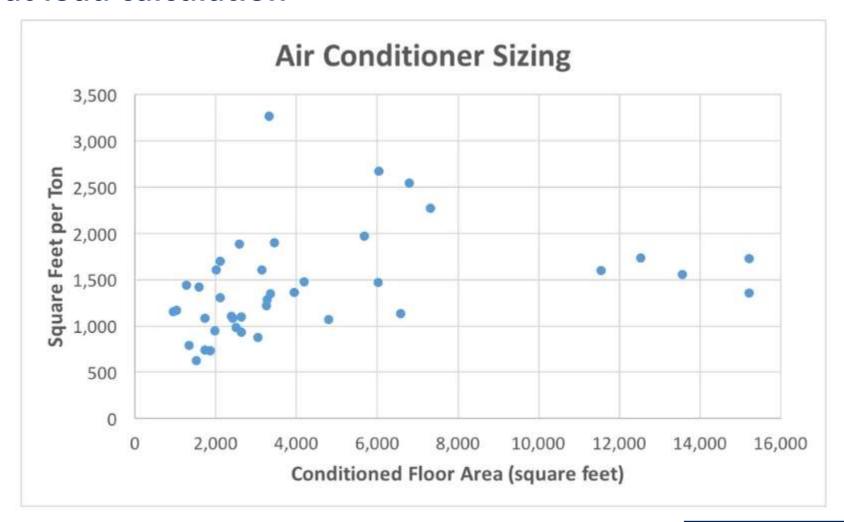
What size system?







Heat load calculation







Heat load calculation



...not accurate or reliable!





Heat load calculation

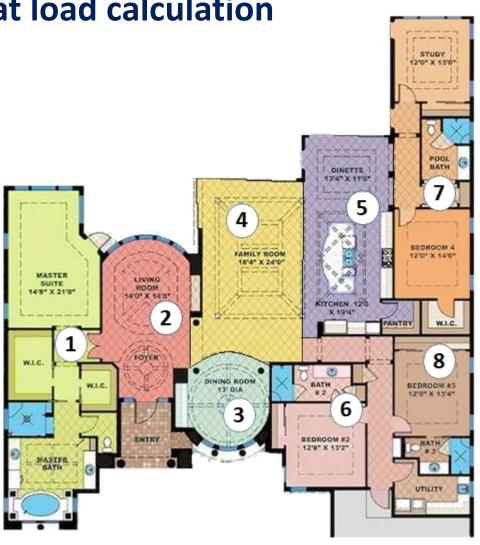


Must have an accurate heat load calculation for the structure...









Must have an accurate heat load calculation for the structure...

...and for each individual conditioned space of the structure.

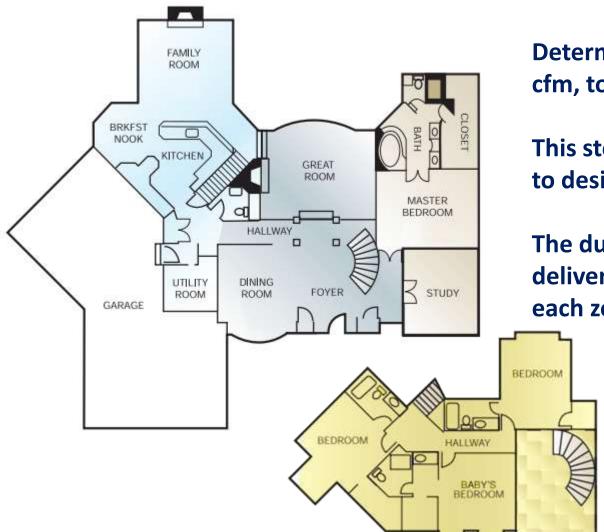






CFM requirements

After heat load calculation:



Determine the required airflow, in cfm, to each living space.

This step is crucial and is necessary to design the duct system correctly.

The duct system must be able to deliver the calculated airflows to each zone.

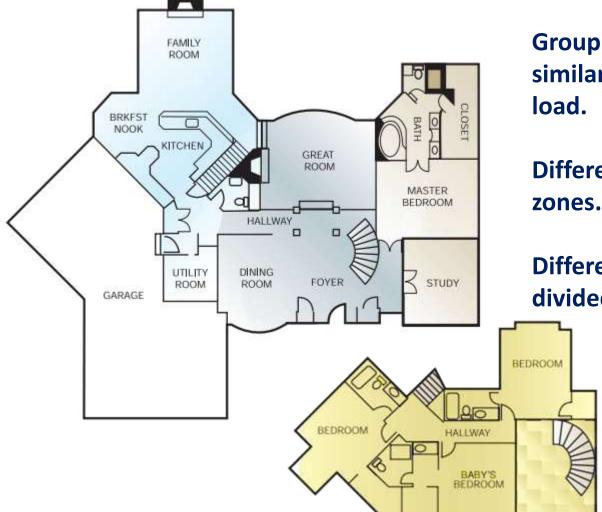






Selecting zones

After CFM is calculated:



Group together rooms that have similar usage, occupancy, and heat load.

Different levels should be separate zones.

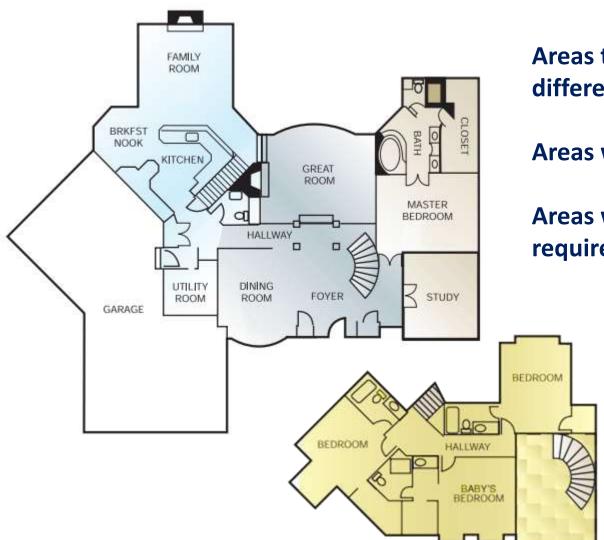
Different levels may be further divided.





Selecting zones

Separate zones:



Areas that will be unoccupied at different times. (allows setback)

Areas with different heat loss/gain.

Areas with different temperature requirements.

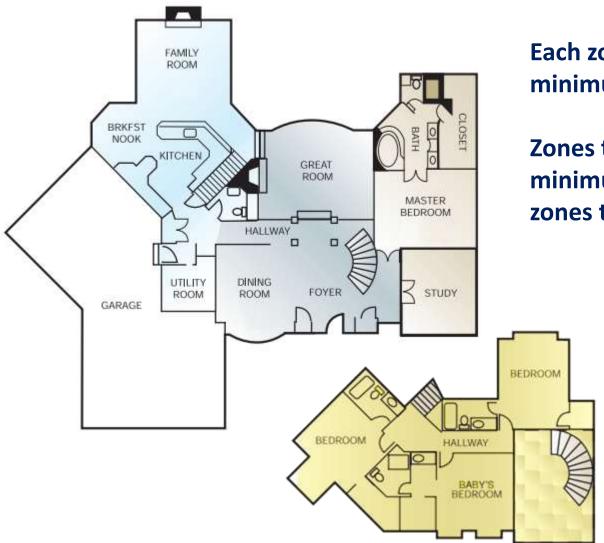






Selecting zones

Separate zones:



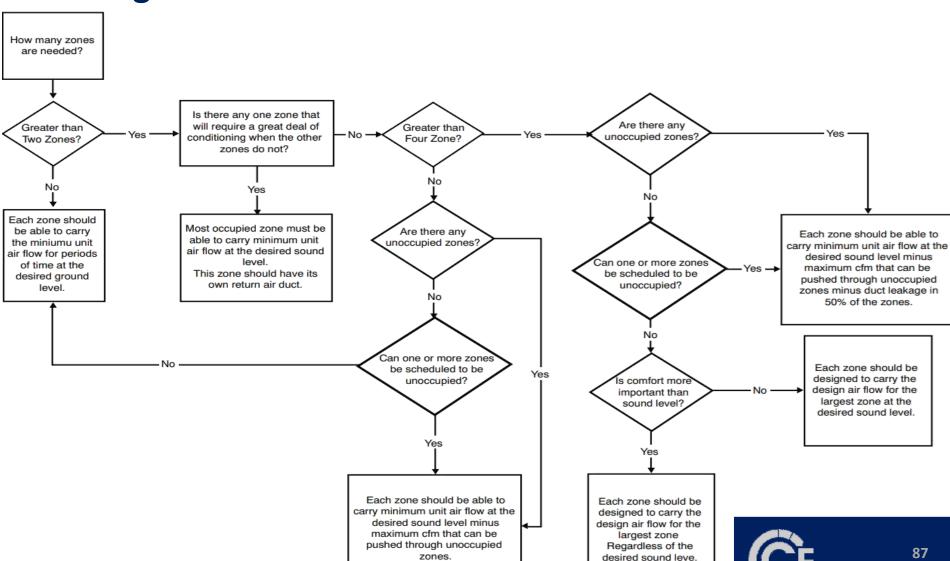
Each zone should support the minimum airflow. (product data)

Zones that cannot handle the minimum airflow will cause other zones to be over-conditioned.





Selecting zones







Equipment selection





The variable speed equipment is very flexible in match-ups.









NOTE: System designer must pay close attention to equipment airflow requirements.







Equipment selection

Example

59MN7-80-20: can be matched with a 2, 3, 4, or 5 ton outdoor unit.

	Low	High
	595	1345
59MN7- 08020	595	1345
	595	lo t o
	595	1345

	High	Low
24VNA624	650	500
24VNA636	1150	600
24VNA648	1450	715
24VNA660	1500	700

The duct system, for this match up, must be able to handle 1345 CFM. If the duct work were sized for 1150 CFM, for the cooling requirement, then the furnace would likely experience high limit trips and lock out.





Equipment selection

Furnace	Low	High
58TN0-110C21- -20	1295	1465
	1295	1465
	1295	1465

5-Stage	High	Low
25VNA824	850	585
25VNA836	1200	700
25VNA848	1600	1000

NOTE: System designer must pay close attention to equipment airflow requirements.





Equipment selection

25HNB6 Infinity® 2-Stage Heat Pump with Puron® Refrigerant 2 to 5 Nominal Tons



286B (2 - 5 Ton) EVOLUTION® 2-STAGE HEAT PUMP WITH PURON® REFRIGERANT



Product Data

		Cod	ooling			
Cooling	EER SEER		ID CFM			
Capacity		High	Low			
24,000	13.0	17.0	700	560		
36,400	13.3	17.0	1050	840		
47,000	12.5	16.0	1400	1120		
56,500	12.5	16.0	1750	1400		





Equipment selection



	Minim	num Cool	ling		
Size	Cooling - Comfor Mode Size Max Stage 5 Airflow Max Stage 1 Airflow			ım or Zon	ing)
1-Ton	420	300		300	
2–Ton	739	300		300	
3-Ton	990	300		300	
4–Ton	1389	542		457	
5-Ton	1600	700		600	·

Each zone should support the minimum airflow. (product data)

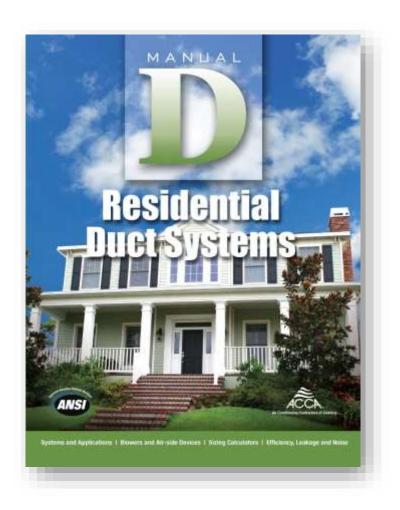
Zones that cannot handle the minimum airflow will cause other zones to be over-conditioned.

		Cod	oling	
Cooling				FM
Capacity	EER	SEER	High	Low
24,000	13.0	17.0	700	560
36,400	13.3	17.0	1050	840
47,000	12.5	16.0	1400	1120
56,500	12.5 16.0 1750		1400	















Duct design



...not accurate or reliable!





Duct design

Ductwork should be designed at .1 ESP for 100 ft.

This is a common "rule of thumb" used throughout the industry. It is a very misleading assumption.



Duct systems should be sized based on calculated friction loss. (this accounts for all pressure drops)

ACCA manual D provides a table to help calculate the correct friction rate for duct design.





Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
	Available Total External Static Pressure	PD from PPD	Sum of Component PD	Pressure Difference	(Pd)	
Step 3)	Available Static Pressure		1			
	ASP=(ESP-DPL)=	0.6	0.36	0.24		IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction R	ate = Press	ure differ	rence*100/TEL





Duct design

Example:

Step	1)

Manufacturer's Blower Data

OCP 17	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
	Available Total External Static Pressure	PD from PPD	Sum of Component PD	Pressure Difference	-	
Step 3)	Available Static Pressure					•
	ASP=(ESP-DPL)=	0.6	0.36	0.2	.4	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction F	Rate = Pres	sure diffe	erence*100/TEL





Duct design

Example:

Step 1)

Manufacturer's Blower Data

External Static Pressure (ESP) =



0.6

IWC

MAXIMUM STATIC TABLE

MODEL	AIRFLOW DELIVERY	AVAILABLE STATIC PRESSURE	
	525 CFM	1.00 in wc	
	700 CFM	1.00 in wc	
FE4ANF002	875 CFM	1.00 in wc	
_	1050 CFM	0.80 in wc	
	1200 CFM	0.60 in wc	
	700 CFM	1.00 in wc	
	875 CFM	1.00 in wc	
FE4AN(B,F)003	1050 CFM	1.00 in wc	
	1225 CFM	1.00 in wc	
	1400 CFM	0.80 in wc	•
	875 CFM	1.00 in wc	
	1050 CFM	1.00 in wc	
FE4AN(B,F)005	1225 CFM	1.00 in wc	
Ī	1400 CFM	1.00 in wc	•
	1600 CFM	0.50 in wc	
	1050 CFM	1.00 in wc	
	1225 CFM	1.00 in wc	
FE4ANB006	1400 CFM	1.00 in wc	_
	1750 CFM	1.00 in wc	
	2000 CFM	0.60 in wc	
	700 CFM	1.00 in wc	
	875 CFM	1.00 in wc	
FE5ANB004	1050 CFM	1.00 in wc	
	1225 CFM	1.00 in wc	
	1400 CFM	1.00 in wc	

From equipment selection process.



During the equipment selection process, why would you choose the 002 with .6 ASP when the 003 has 1.0 ASP





Duct design

Example:

Step 1)

Manufacturer's Blower Data

External Static Pressure (ESP) =

MAXIMUM STATIC TABLE

	MODEL	AIRFLOW DELIVERY	AVAILABLE STATIC PRESSURE	
		525 CFM	1.00 in wc	
		700 CFM	1.00 in wc	
	FE4ANF002	875 CFM	1.00 in wc	
		1050 CFM	0.80 in wc	1
		1200 CFM	0.60 in wc	
		700 CFM	1.00 in wc	
		875 CFM	1.00 in wc	
	FE4AN(B,F)003	1050 CFM	1.00 in wc	
		1225 CFM	1.00 in wc	
	_	1400 CFM	0.80 in wc	
		875 CFM	1.00 in wc	
		1050 CFM	1.00 in wc	
	FE4AN(B,F)005	1225 CFM	1.00 in wc	
		1400 CFM	1.00 in wc	
		1600 CFM	0.50 in wc	
		1050 CFM	1.00 in wc	
		1225 CFM	1.00 in wc	
	FE4ANB006	1400 CFM	1.00 in wc	
		1750 CFM	1.00 in wc	
		2000 CFM	0.60 in wc	
		700 CFM	1.00 in wc	
		875 CFM	1.00 in wc	
	FE5ANB004	1050 CFM	1.00 in wc	
		1225 CFM	1.00 in wc	
		1400 CFM	1.00 in wc	

From equipment selection process.

0.6

IWC



If the 003 is chosen with 1.0 ASP; do not use 1.0 on the worksheet, use .8 ESP.



1200



Duct design

Example:

Step 1)

Manufacturer's Blower Data

External Static Pressure (ESP) =

Do not use 1.0 on the worksheet, use .8 ESP.



IWC

cfm=

From Product Data (PDD)

59MN7A

Unit Size	Clg/	CF Switch Se	ettings	External Static Pressure (ESP)									
3	SWx-3	SWx-2	SWx-1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
080-20	ſ												
Clg Default:	OFF	OFF	OFF	1745	1755	1755	1760	1755	1750	1745	1725	1705	1685
CF Default:	OFF	OFF	OFF	700	710	750	725	750	See note 4				
	OFF	OFF	ON	700	710	750	725	750	in-		See note 4		
	OFF	ON	OFF	830	860	870	890	960	See note 4				
Cooling (SW2)	OFF	ON	ON	1045	1045	1060	1070	1070	1070	1095	1090	1080	1070
Cont Fan (SW3)	ON	OFF	OFF	1215	1220	1245	1240	1235	1235	1225	1220	1235	1235
STATISTICAL ACTIONS	ON	OFF	ON	1370	1370	1390	1390	1400	1395	1400	1390	1390	1365
	ON	ON	OFF	1745	1755	1755	1760	1755	1750	1745	1725	1705	1685
	ON	ON	ON	1745	1755	1755	1760	1755	1750	1745	1725	1705	1685
Clg SW2:	Max	kimum Clg Air	flow ²	1920	1920	1945	1945	1945	1960	1950	1940	1915	1900
	Maximum Heat Airflow ³			I 1340	I 1355	1370	1385	1380	1 1385	I 1400	1400	I 1385	1380
Heating	20000000	nediate Heat A		780	810	835	840	845	(7:705)70 (1	93375	See note 4	025 7. TW	13555
(SW1)	Mini	mum Heat Air	flow 3	595	595	600	595	605	See note 4				





Duct design

Example:

0.00

Manufacturer's Blower Data

External Static Pressure (ESP)=

Device Pressure Losses

Direct expansion refrigerant coil Electric resistance heating coil

Hot water coil Heat Exchanger Low efficiency filter

Step 2) High or mid-efficiency filter

Electronic filter

Humidifier

Supply outlet Return grille

Balancing damper

Other device

Available Total External Static Pressure

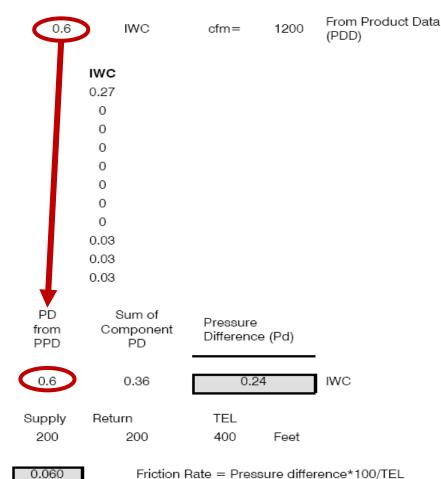
Step 3) Available Static Pressure

ASP=(ESP-DPL)=

Step 4) Total Effective Length (TEL)

Supply-side TEL + Return-side TEL=

Step 5) FR=Pd*100/TEL







Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
		PD	D			
	Available Total External Static Pressure	from	Component	Pressure Differenc		
		PPD	PD	Dinorono	o (. u)	_
Step 3)	Available Static Pressure					_
	ASP=(ESP-DPL)=	0.6	0.36	0.2	.4	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction F	Rate = Pres	sure diffe	rence*100/TEL





Duct design

Example:

Manufacturer's Blower Data

Step 1)

External Static Pressure (ESP) = 0.6 IWC cfm= 1200 From Product Data (PDD)

Device Pressure Losses

Direct expansion refrigerant coil

COIL STATIC PRESSURE DROP (in. w.c.) R-41

0.27
And R-22 REFRIGERANTS

CNPVP

Step 2)

UNII	l								Star	idard C	:FM								
SIZE	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
										Dry									
3014	0.065	0.097	0.135	0.173	0.223	0.278	0.339	0.405	0.478										
3014										Wet									
	0.078	0.114	0.160	0.206	0.260	0.321	0.388	0.461	0.540										
										Dry									
3017	0.042	0.060	0.080	0.102	0.128	0.157	0.188	0.222	0.259										
3017										Wet									
	0.055	0.076	0.104	0.127	0.158	0.190	0.225	0.266	0.309										
										Dry									
3117	0.031	0.046	0.063	0.083	0.105	0.130	0.156	0.193	0.230										
0117										Wet									
	0.039	0.056	0.075	0.097	0.121	0.149	0.179	0.212	0.249										
										Dry									
3617	0.043	0.061	0.082	0.103	0.128	0.157	0.189	0.221	0.259	0.299	0.341								
T3617										Wet									
	0.056	0.079	0.107	0.133	0.166	0.200	0.236	0.276	0.315	0.361	0./ 13								
										Dry	\leq								
3621	0.035	0.048	0.062	0.076	0.093	0.111	0.132	0.153	0.177		0. 28								
0021										Wet	<u> </u>								
	0.049	0.066	0.085	0.100	0.122	0.144	0.171	0.192	0.217	0 245	0. 10								
										DIY									
3717	0.025	0.038	0.054	0.072	0.093	0.117	0.143	0.171	0.205	0.233	0.273								
0, .,										Wet									
	0.030	0.044	0.061	0.079	0.103	0.125	0.154	0.182	0.216	0.251	0.288								
										Dry									
4217			0.072	0.093	0.118	0.145	0.175	0.206	0.243		0.322	0.366	0.413					\bot	
										Wet									
			0.079	0.102	0.130	0.159	0.192	0.228	0.26	0.303	0.348	0.396	0.446						

Step 4)

Step 5)

00/TEL





Duct	d	esi	ign
_ 0.00			0

Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
						(, 55)
	Device Pressure Losses	_	IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
		PD	Sum of	Pressure		
	Available Total External Static Pressure	from PPD	Component PD	Differenc		
Step 3)	Available Static Pressure	FFD	FD			
0.0000)	ASP=(ESP-DPL)=	0.6	0.36	0.2	04	IWC
	701 - (ESI BI E) -	0.0	0.00	0.2		
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction F	Rate = Pres	sure diffe	rence*100/TEL

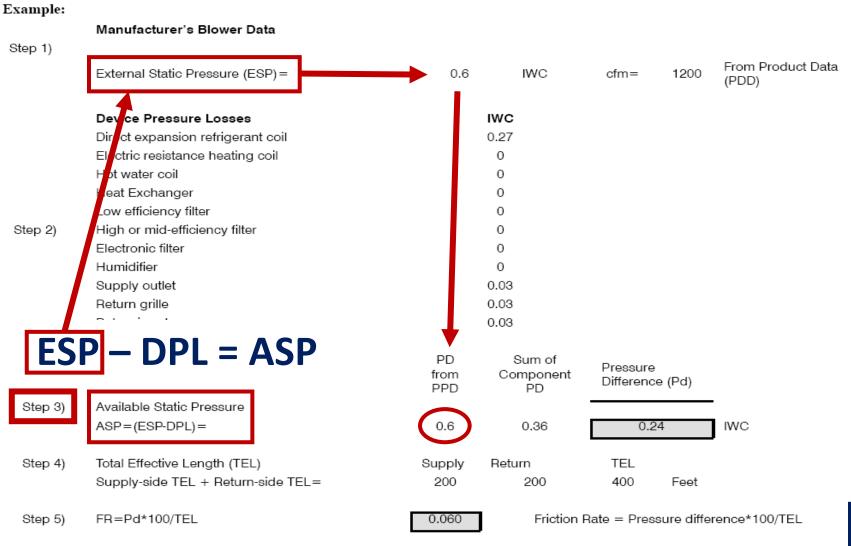




Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
	Available Total External Static Pressure	PD from PPD	Sum of Component PD	Pressure Differenc		
Step 3)	Available Static Pressure					•
	ASP=(ESP-DPL)=	0.6	0.36	0.2	24	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction I	Rate = Pres	sure diffe	rence*100/TEL

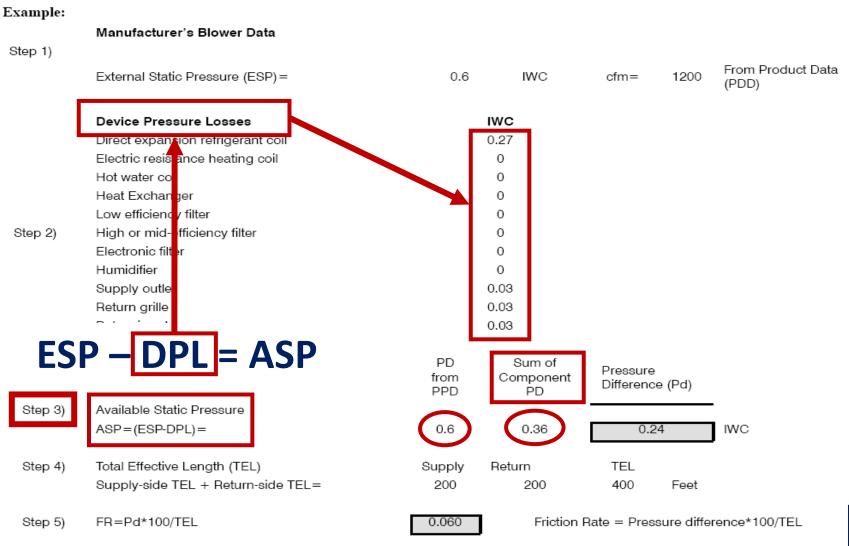
















Example:						
Step 1)	Manufacturer's Blower Data					
Step 1)				_		From Product Data
	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	(PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	E resistance heating coil		0			
	Her coil		0			
	H Changer		0			
	L ciency filter		0			
Step 2)	H P mid-efficiency filter		0			
	Enic filter		0			
	Herier		0			
	Soutlet		0.03			
	ifle		0.03			
			0.03			
FSI	P - DPL = ASP					
LJ	DIL-ASI	PD from	Sum of Component	Pressure		
		PPD	PD	Differenc	e (Pd)	
Step 3)	Available Static Pressure					<u> </u>
	ASP=(ESP-DPL)=	0.6	0.36	0.2	.4	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
O:	ED . D . I . 400 EEE			5		
Step 5)	FR=Pd*100/TEL	0.060	Friction	Rate = Pres	sure diffe	rence*100/TEL





Duct design

Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	From Product Data (PDD)
						, ,
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
		PD	Sum of	Pressure		
	Available Total External Static Pressure	from PPD	Component PD	Difference	(Pd)	
Step 3)	Available Static Pressure	FFD	PU			
Otep 0)	ASP=(ESP-DPL)=	0.6	0.36	0.3	1	IWC
	AGE = (LGF-DFL)=		0.50	0.2	†	1000
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
. ,	Supply-side TEL + Return side TEL=	200	200	400	Feet	
					1	
Step 5)	FR FPd* 00/TEL	0.060	Friction	Rate = Press	ure differ	ence* 00/TEL
. ,			ı			



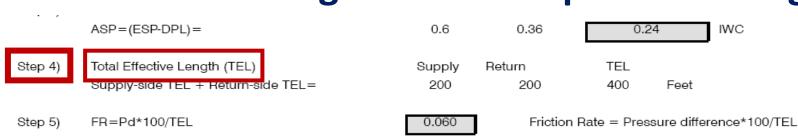


Duct design

Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP) =	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses	IW	С			
	Direct expansion refrigerant coil	0.2	7			
	Electric resistance heating coil	0				
	Hot water coil	0				
	Heat Exchanger	0				
	Low efficiency filter	0				
Step 2)	High or mid-efficiency filter	0				
	Electronic filter	0				
	Humidifier	0				
	Supply outlet	0.0	3			

(TEL)

Total Effective Length or Total Equivalent Length







Duct design

Understanding and utilizing equivalent length is critical to ensure proper duct sizing and airflow.

Actual linear distance is measured between the register and the system for each duct run.

The "equivalent length" of all fittings is then calculated and added to this measured amount.

Only the longest "equivalent" supply run and the longest return are used.

These two amounts are added together to provide a "Total Equivalent Length" (TEL).





Duct design

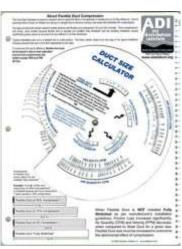
The Airflow killer: Equivalent length

Duct calculators size to an equivalent length of 100 feet. This does not take actual equivalent length into account causing undersized ductwork and poor airflow.



"equivalent length."





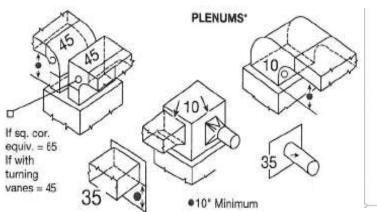
DUCT FITTINGS EQUIVALENT LENGTHS

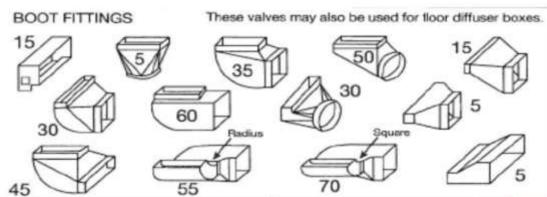




COMMONLY USED FITTINGS-CONNECTIONS ETC. AS INDICATED

NUMERALS INDICATE EQUIVALENT FEET OF STRAIGHT DUCT.





ROUND TRUNK DUCT FITTINGS





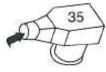












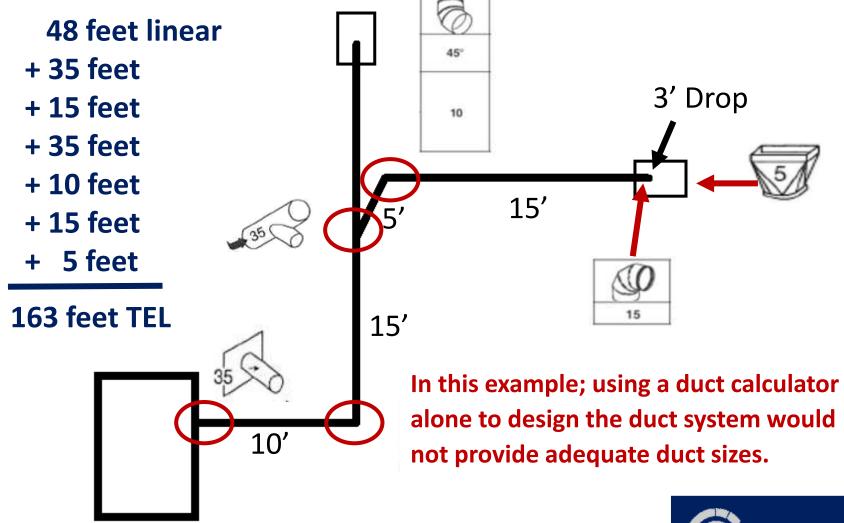


		Round and Oval Elbow EL Values									
(%	00	@	0	000	9	1	0	0			
R/D 8A	Smooth	4 or 5 Piece	3 Piece	Smooth Mitered	Easy Bend	Hard Bend	3-Piece 45°	2-Piece 45°			
Mitered (R = 0)	-	1-1	1-0	75	4-Piece	4-Piece					
0.75	20	30	35	-	25	30	40	45			
1.0	15	20	25	-	3-Piece	3-Piece	10	15			
1.5 or Larger	10	15	20	_	30	35					





Duct design





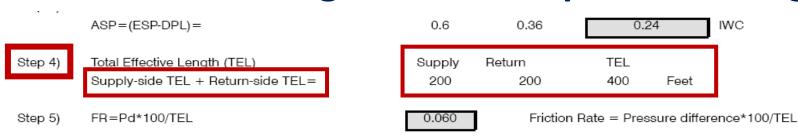


Duct design

Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses	IW	С			
	Direct expansion refrigerant coil	0.2	7			
	Electric resistance heating coil	0				
	Hot water coil	0				
	Heat Exchanger	0				
	Low efficiency filter	0				
Step 2)	High or mid-efficiency filter	0				
	Electronic filter	0				
	Humidifier	0				
	Supply outlet	0.0	3			

(TEL)

Total Effective Length or Total Equivalent Length







Duct design

Example:						
	Manufacturer's Blower Data					
Step 1)						
	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses		IWC			
	Direct expansion refrigerant coil		0.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			
Step 2)	High or mid-efficiency filter		0			
	Electronic filter		0			
	Humidifier		0			
	Supply outlet		0.03			
	Return grille		0.03			
	Balancing damper		0.03			
	Other device					
	Available Total External Static Pressure	PD from PPD	Sum of Component PD	Pressure Difference	(Pd)	
Step 3)	Available Static Pressure		r			,
	ASP=(ESP-DPL)=	0.6	0.36	0.24	1	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction F	≀ate = Press	ure diffe	rence*100/TEL

High or mid-efficiency filter





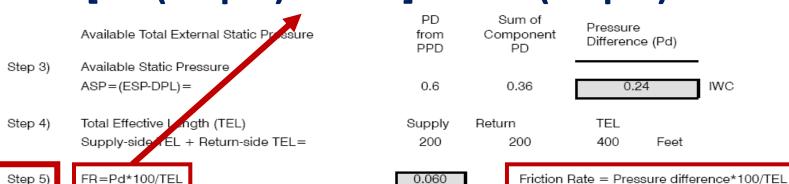
Duct design

Step 2)

Example:						
	Manufacturer's Blower Data					
Step 1)	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses	IV	vc			
	Direct expansion refrigerant coil	0.	.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			

Friction Rate is our target for this process! [Pd (step 3) \times 100] \div TEL (step 4) = FR

0







Duct design

Exam	ple:

Manufacturer's Blower Data

Step 1)

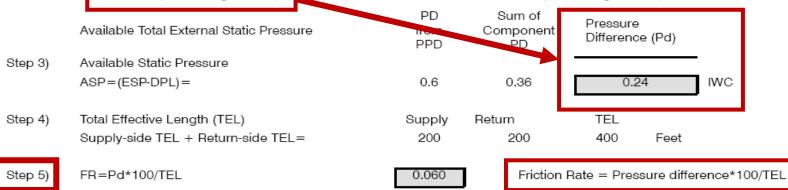
Step 2)

External Statio Proceure (ESD) -	0.6	IWC	ofm -	1200	From Product Data
External Static Pressure (ESP)=	0.0	IVVC	cfm=	1200	(PDD)

Device Pressure Losses	IWC
Direct expansion refrigerant coil	0.27
Electric resistance heating coil	0
Hot water coil	0
Heat Exchanger	0
Low efficiency filter	0
High or mid-efficiency filter	0

Friction Rate is our target for this process!

[Pd (step 3) \times 100] \div TEL (step 4) = FR







Duct design

Exam	ple:

Manufacturer's Blower Data

Step 1)

Step 2)

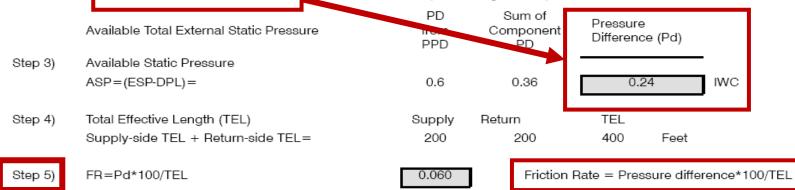
External Statio Proceure (ESD) -	0.6	IWC	ofm -	1200	From Product Data
External Static Pressure (ESP)=	0.0	IVVC	cfm=	1200	(PDD)

Device Pressure Losses	IWC
Direct expansion refrigerant coil	0.27
Electric resistance heating coil	0
Hot water coil	0
Heat Exchanger	0
Low efficiency filter	0
High or mid-efficiency filter	0

Friction Rate is our target for this process!

 $.24 \times 100$









Duct design

Manufacturer's Blower Data

Step 1)

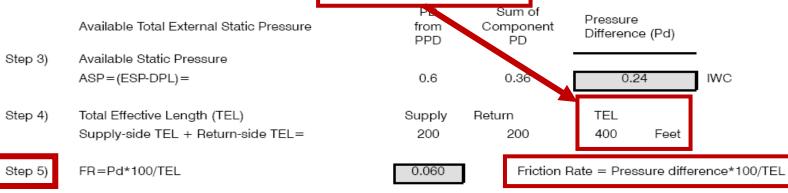
Step 2)

External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
---------------------------------	-----	-----	------	------	----------------------------

Device Pressure Losses	IWC
Direct expansion refrigerant coil	0.27
Electric resistance heating coil	0
Hot water coil	0
Heat Exchanger	0
Low efficiency filter	0
High or mid-efficiency filter	0

Friction Rate is our target for this process!

24 \div TEL (step 4) = FR







Duct design

Exam	ple:

Manufacturer's Blower Data

Step 1)

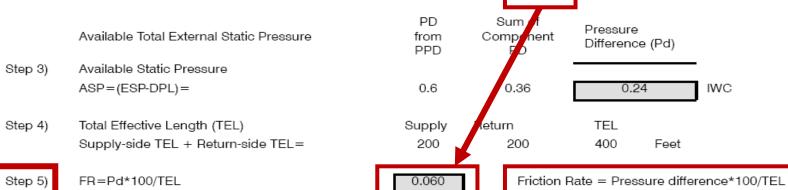
Step 2)

External Static Pressure (ESP)=	0.6	IWC	ofm -	1200	From Product Data
External Static Pressure (ESP) =	0.6	IVVC	cfm=	1200	(PDD)

Device Pressure Losses	IWO
Direct expansion refrigerant coil	0.27
Electric resistance heating coil	0
Hot water coil	0
Heat Exchanger	0
Low efficiency filter	0
High or mid-efficiency filter	0

Friction Rate is our target for this process!





IWC

High or mid-efficiency filter





Duct design

Step 2)

Example:						
	Manufacturer's Blower Data					
Step 1)	External Static Pressure (ESP)=	0.6	IWC	cfm=	1200	From Product Data (PDD)
	Device Pressure Losses	IN	wc			
	Direct expansion refrigerant coil	0	.27			
	Electric resistance heating coil		0			
	Hot water coil		0			
	Heat Exchanger		0			
	Low efficiency filter		0			

Friction Rate is our target for this process! This is the friction rate for our duct design!

	Available Total External Static Pressure	PD from PPD	Sum of Component PD	Pressure Differenc		
Step 3)	Available Static Pressure					•
	ASP=(ESP-DPL)=	0.6	0.36	0.2	24	IWC
Step 4)	Total Effective Length (TEL)	Supply	Return	TEL		
	Supply-side TEL + Return-side TEL=	200	200	400	Feet	
Step 5)	FR=Pd*100/TEL	0.060	Friction F	Rate = Pres	sure diffe	rence*1

*100/TEL

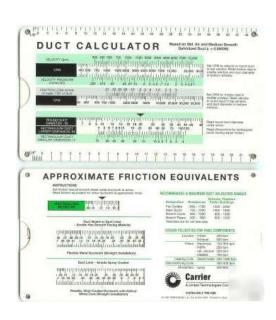


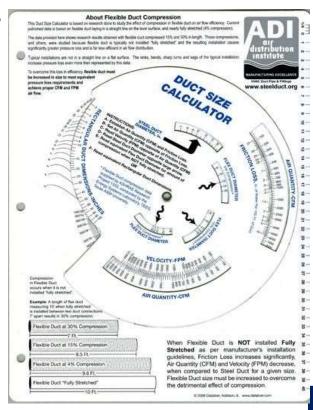


Duct design

The previously calculated friction rate, and the required airflow (CFM) are now used with a duct calculator to determine the size

of all supply and return ducts.









Brief summary / Check List

1. Heat loss/gain
2. cfm per room
3. Select equipment
a. With variable speed pay close attention to high heat cfm vs. high cooling cfm
b. Use the equipment Product Data to determine cfm
Calculate equivalent length of longest duct runs
a. Use duct fittings that have low equivalent lengths
5. Calculate duct system Friction Rate
a. Pressure drops
- Wet evaporator coils
- Supply outlet
- Return grille
- Balancing dampers
 Any accessories
(a) Humidifiers
(b) Electronic air cleaner
(c) Pleated filters
(d) High efficiency filters
6. Design Duct System using the Friction Rate calculated in step 5.





Duct assessment

Separate from "Airflow Verification Test".

Performed only when zoning is detected.

Performed during initial system power up.

Performed every 24 hours. (time is adjustable)

Normally takes 90 seconds per zone to complete.

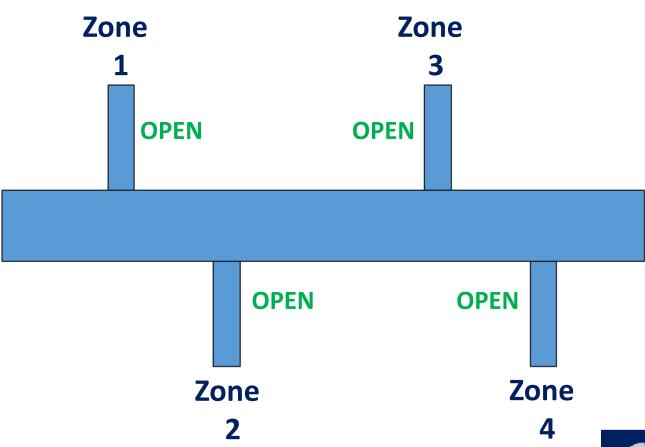






Duct assessment

1. All dampers are opened 100%.

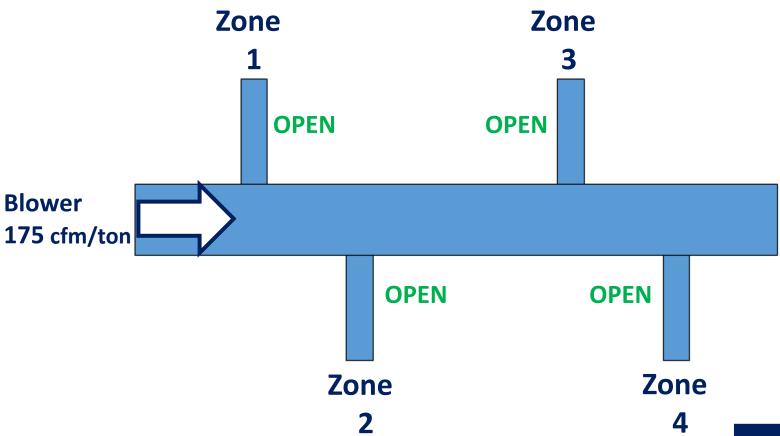






Duct assessment

2. Blower on 175 cfm/ton

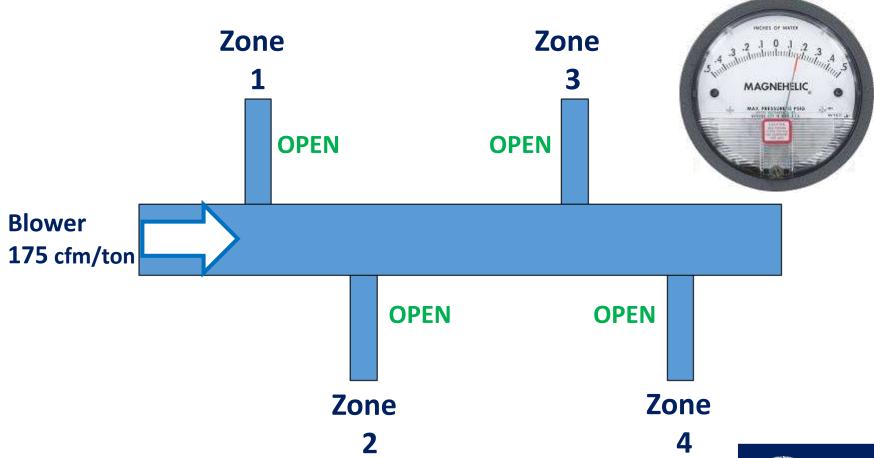






Duct assessment

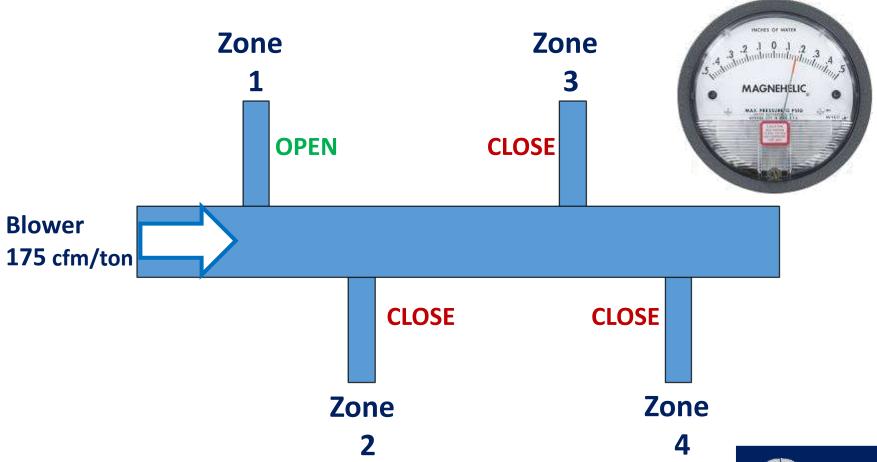
3. Static pressure is measured.







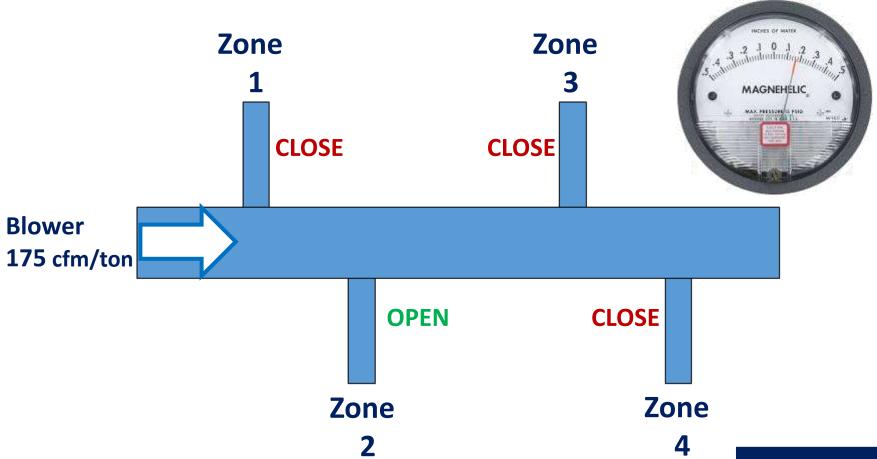
Duct assessment







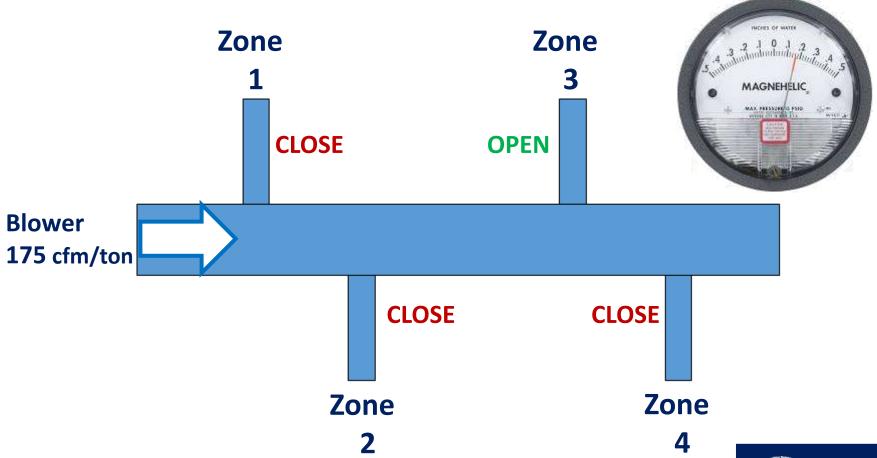
Duct assessment







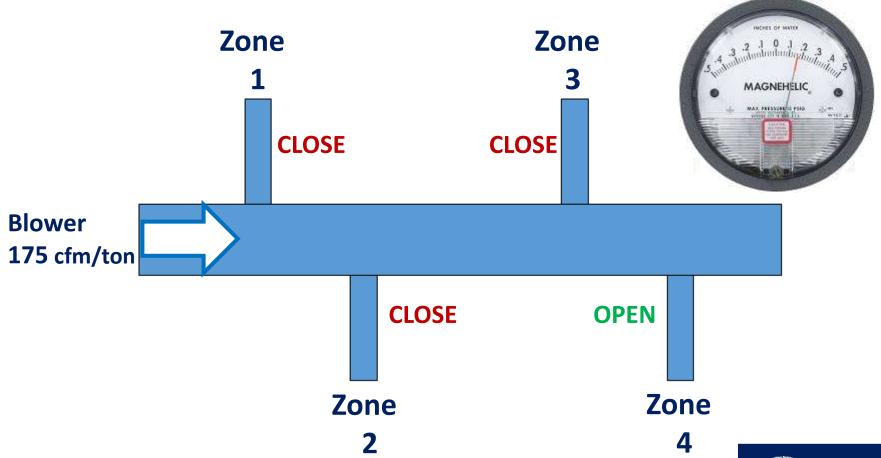
Duct assessment







Duct assessment

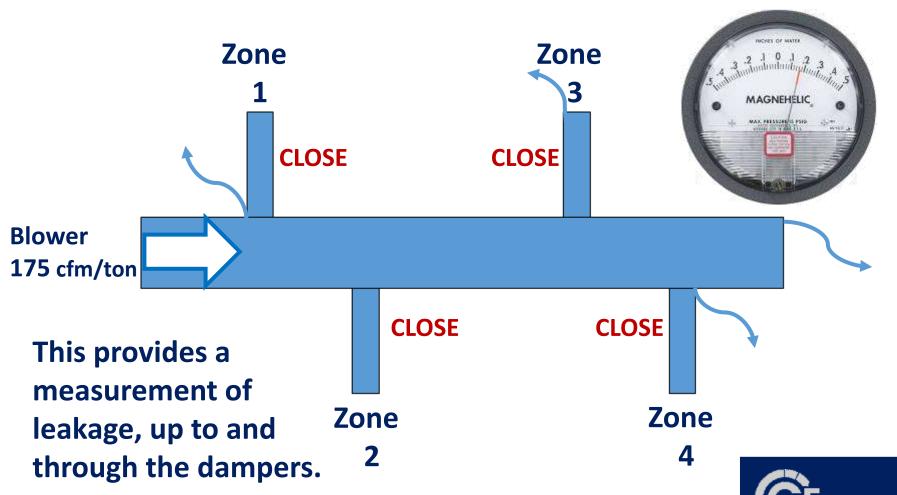






Duct assessment

3. Close all zones and measure ESP.

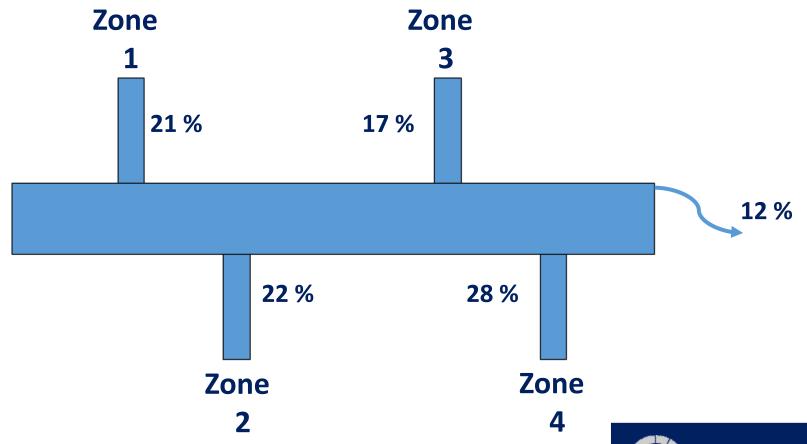






Duct assessment

3. The system calculates "relative size" of each zone as well as leakage.

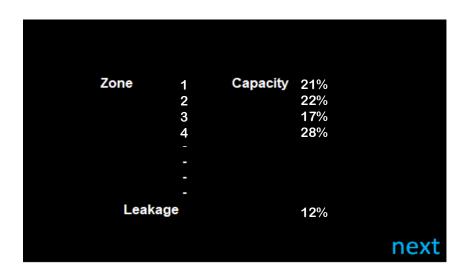






Duct assessment

At the end of duct assessment, the UI will show the relative size of each zone as a percentage.



If the system detects an error (ie: a zone not opening), it will perform the test again. If the problem is still detected, the UI will display all measurements as equal sizes and a 10% leakage then display the suspected zone number.

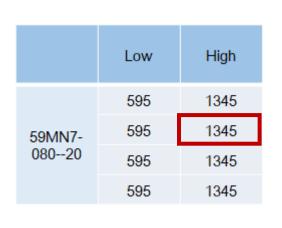


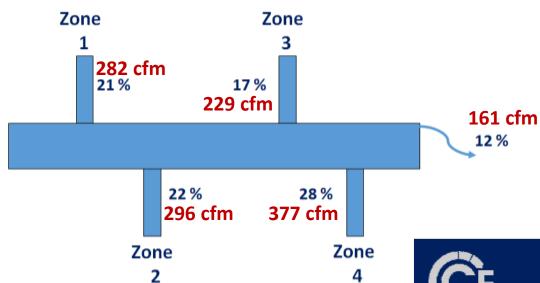


Duct assessment

The Duct Assessment does NOT figure out how much air (CFM) the duct can handle!

It determines the relative sizes of the zones as a % of the whole.









Airflow limits

Airflow limits simply determine the maximum airflow that the system will allow to each individual zone!

The default setting is "MAX", and should likely be changed.





Airflow limits

Discrepancy Alert!



User Interface:

Low = 100%

Low-Med = 138%

Med = 176%

Med-High = 214%

Max = 250%

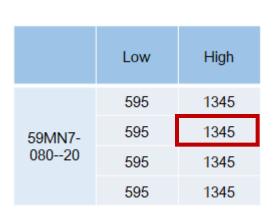
There is also a "no limit" setting.
This setting should never be used.

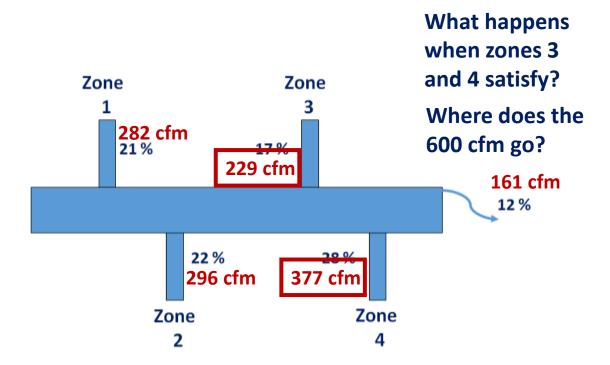




Airflow limits

Since a bypass damper is prohibited, airflow limit settings are used to select the maximum allowable airflow into each zone.









Airflow limits

The system will utilize the zone percentages, from the duct assessment, and the UI airflow limit set points, to determine the "maximum airflow per zone" allowed.

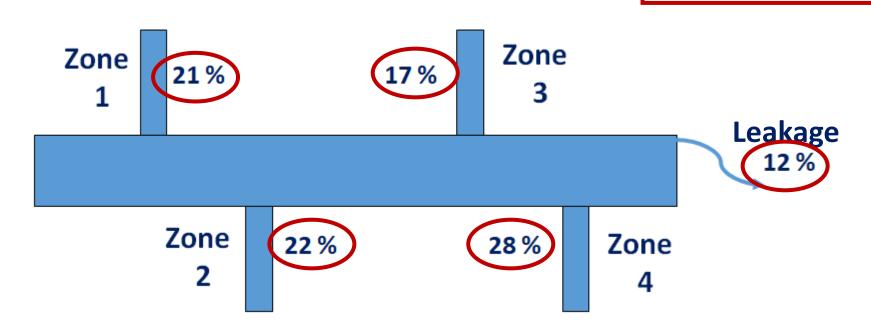
Low = 100%

Low-Med = 138%

Med = 176%

Med-High = 214%

Max = 250%







Airflow limits

(450 cfm) is a calculated constant. (tonnage) equipment cooling size. (airflow limit) selected setting from UI. (zone/leakage %) from duct assessment.

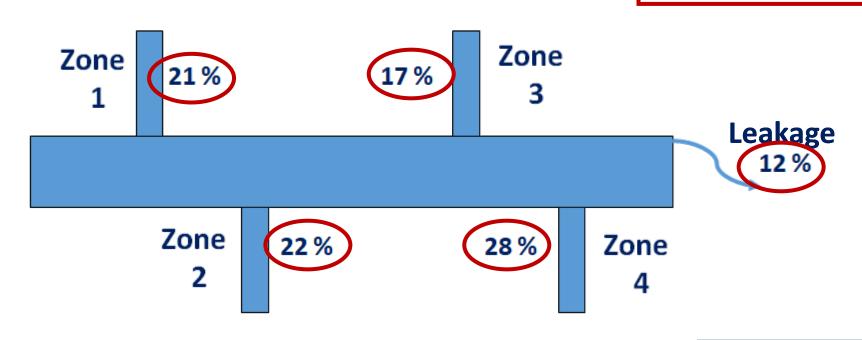
Low = 100%

Low-Med = 138%

Med = 176%

Med-High = 214%

Max = 250%



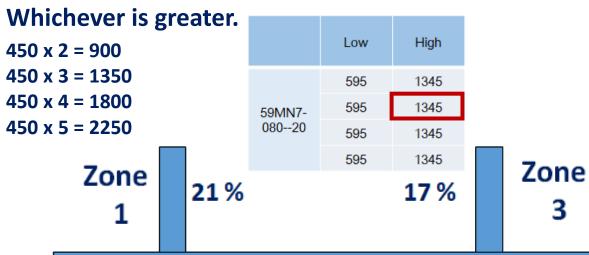






Airflow limits

 $(450 \text{ cfm}) \times (\text{tonnage})$ or High Heating Airflow.



= 100% Low

Low-Med = 138%

Med **= 176%**

Med-High = 214%

Max = 250%

Leakage

12 %

Example Zone 1

Zone

22 %

28 %

3

Zone

4







Airflow limits

(450 cfm)
$$\times$$
 (tonnage) \times (airflow limit) \times (zone % + leakage %)

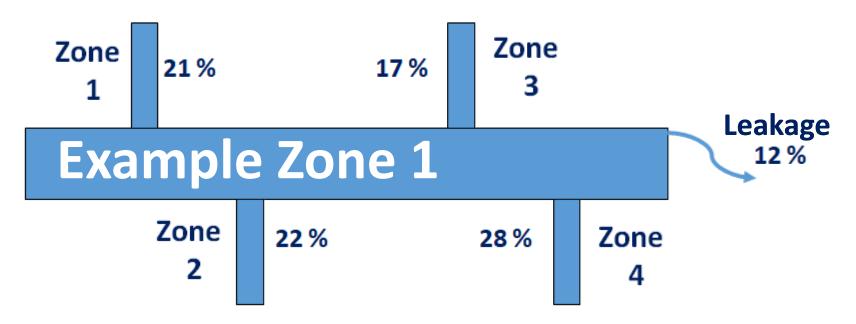
$$(450 \text{ cfm}) \times (3) \times (\text{Med } 176\%) \times (21\% + 12\%)$$

$$(450) \times (3) \times (1.76) \times (.21 + .12)$$

$$(450) \times (3) \times (1.76) \times (.33)$$

784 cfm maximum allowable airflow to zone 1







Max



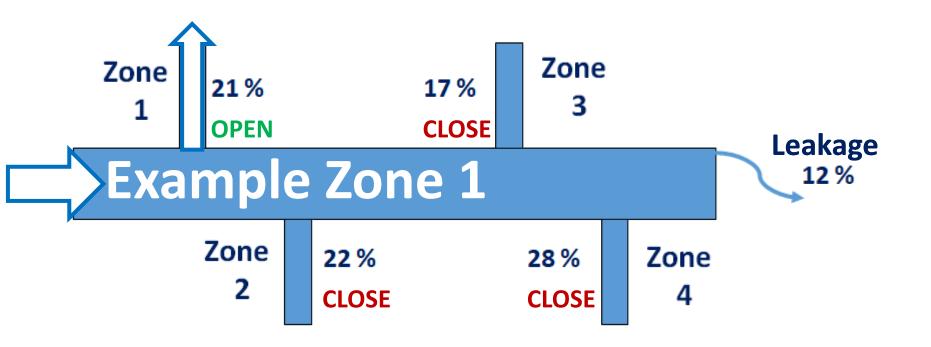
= 250%

Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

Low = 100% Low-Med = 138% Med = 176% Med-High = 214%





Max



= 250%

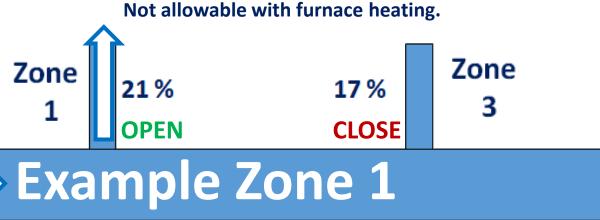
Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

Low = 100% Low-Med = 138% Med = 176% Med-High = 214%





Leakage 12 %

Zone

22 %

28 %

Zone

CLOSE

CLOSE

4

(450 cfm) \times (tonnage) \times (airflow limit) \times (zone % + leakage %)







Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

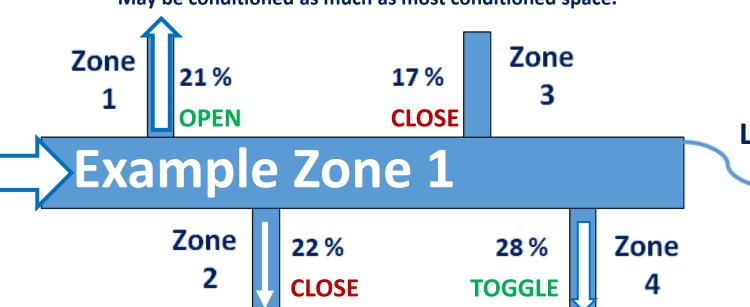
Low = 100% Low-Med = 138%

Med = **176**%

Med-High = 214%

Max = 250%

Action 2: Redirect Airflow to zones set as Unoccupied May be conditioned as much as most conditioned space.



Leakage 12 %

(CE





Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

Low = 100%

Low-Med = 138%

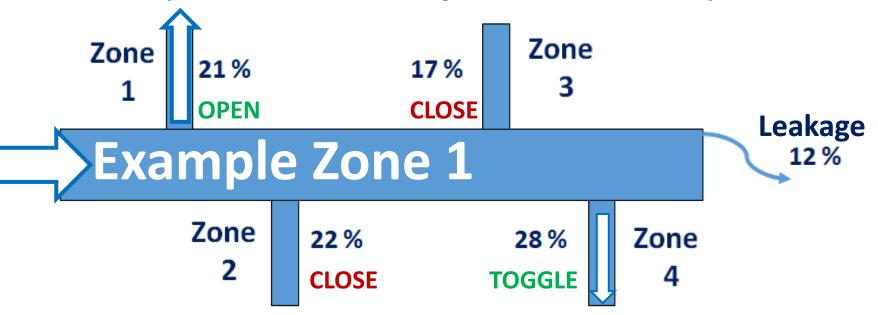
Med = 176%

Med-High = 214%

Max = 250%

Action 3: Redirect Airflow to zones with less conditioned set points

May be conditioned to within 3 degrees of most conditioned set point.







Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

Low = 100%

Low-Med = 138%

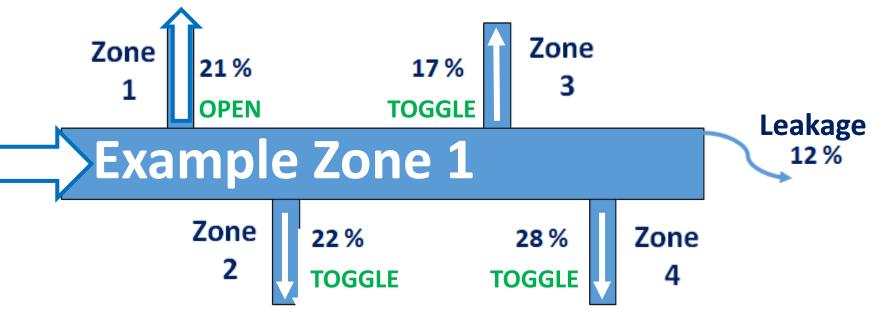
Med = 176%

Med-High = 214%

Max = 250%

Action 3: Redirect Airflow to zones with less conditioned set points

All zones may be conditioned an additional .75 degrees.







Airflow limits

Med = 784 cfm maximum allowable airflow to zone 1

Zone 1 only: If this airflow is not sufficient for the equipment to operate correctly, the system will take the following actions:

Low = 100%

Low-Med = 138%

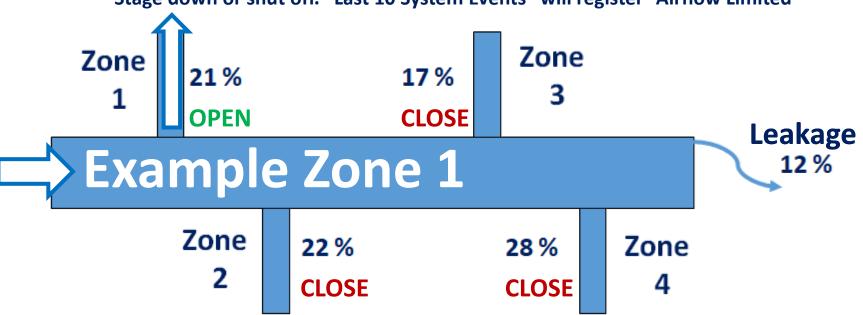
Med = 176%

Med-High = 214%

Max = 250%

Action 4: Equipment stage down

Stage down or shut off. "Last 10 System Events" will register "Airflow Limited"



(CE





Airflow limits

	Minimum Air flow per Zone to Keep System Running			
Application	COC	Heating		
	High Stage / Single Stage	Low Stage	neating	
Furnace + Air Conditioner	275 /325 cfm / ton	-	Low stage furnace airflow	
Hybrid Heat Dual Fuel	275 /325 cfm / ton	175 / 225 cfm / ton	Above heat pump lockout: Comfort heat pump heating airflow below heat pump lockout: Low stage furnace airflow	
Heat Pump + Fan Coil + Electric Heat	275 /325 cfm / ton	175 / 225 cfm / ton	Comfort heat pump heating airflow or efficiency heat pump airflow depending on airflow setting	
Furnace Only	-	-	Low stage furnace airflow	
Heat Pump + Fan Coil + Hot Water Coil	275 /325 cfm / ton	175 / 225 cfm / ton	Comfort heat pump heating airflow or efficiency heat pump airflow depending on airflow setting	
Fan Coil + Hot Water Coil	275 /325 cfm / ton	175 / 225 cfm / ton	Hot water heating selected airflow	

Cooling – Comfor Mode			Minimum Cooling
Size	Max Stage 5 Airflow	Max Stage 1 Airflow	(Dehum or Zoning)
1-Ton	420	300	300
2-Ton	739	300	300
3-Ton	990	300	300
4–Ton	1389	542	457
5-Ton	1600	700	600

	Cooling				
Cooling	- 1		ID CFM		
Capacity		High	Low		
24,000	13.0	17.0	700	560	
36,400	13.3	17.0	1050	840	
47,000	12.5	16.0	1400	1120	
56,500	12.5	16.0	1750	1400	







Blower stage down is a feature in the wall control that is designed to protect the indoor unit from extremely high static pressure situations.

When the indoor blower tells the system control that the RPM is at a maximum level then the stage down process begins. Around 1300 RPM.

The UI drops the airflow request in 50 cfm increments. This will be seen in the furnace or fan coil status screens.

This continues until RPM reach acceptable levels or the airflow request is at the minimum allowed.





If stage down is still required at minimum airflow, then the same actions as limited airflow will be taken. (redirect airflow, over condition unoccupied, etc.)

If stage down is still required after all attempts to correct, then the system will shut down and "Excess Static Pressure" is logged in "Last 10 System Events".

"Unknown" will be displayed on status screen during stage down process.

If one zone has two of these events, it can no longer be a "first call" for equipment operation in that mode.





Return ducts: Returns in each zone are desirable but not necessary if reasonable space exists under doors to allow supplied air to escape.







The use of Unoccupied zones can help the system run longer, and help satisfy demanding zones that are too small to run by themselves.

Unoccupied can be permanently set for a zone by pressing the Hold button for three seconds.

It can also be programmed for a period by pressing the Hold button while in the Program Schedule screen.





	mperature cont		
ZONE NAME		ACTUAL	COOL TO
zone1	59	74	81
zone2	58	73	58
zone3	63	65	83
zone4	64	84	84
zone5	65	70	85
zone6	58	74	58
zone7	67	65	87
zone8	68	87	88
back			done

- Individual zone temperature control status can be checked to determine what zone or zones are calling for either heating or cooling.
- An arrow pointing to the set point will indicate the calling zone.
- Heating in RED and cooling in BLUE







Each zone's temperature is continually measured to within 1/16 degree.

If a zone demand is greater than .8 degrees (A) or the average of all zones is greater than .5 (B), then the equipment is turned on or staged up.

When the average demand of all zones is 0, then the equipment turns off or stages down.

These systems are designed to simultaneously keep all zone temperatures within 1/2 degree Fahrenheit of their set points, for either the heating or cooling modes.





Issues that can allow zones to not maintain temperature set points:

When the equipment runs out of capacity to carry the total load.

Zones in close proximity to each other.

A setback temperature that is too high in cooling or too low in heating when the rest of the zones have comfort settings.

Zone air flow limit set too low in an effort to maintain very low noise levels. (Example: A zone set to low airflow may not be able to reach comfort set points.)