RenewAire®
Energy Recovery Ventilation

PA SERIES ERV

Installation, Operation and Maintenance Manual

PA6X
PA8X
PA9X
PA12

PA6X shown

AHRI CERTIFIED®
www.ahridirectory.org
Globally Recognized. Industry Respected.

⚠ WARNING

RISK OF FIRE, ELECTRIC SHOCK, OR INJURY.

OBSERVE ALL CODES AND THE FOLLOWING:

1. Before servicing or cleaning the unit, switch power off at system disconnect switch or service panel and lock-out/tag-out to prevent power from being switched on accidentally. More than one disconnect switch may be required to de-energize the system for servicing.
2. This installation manual shows the suggested installation method. Additional measures may be required by local codes and standards.
3. Installation work and electrical wiring must be done by qualified professional(s) in accordance with all applicable codes, standards, and licensing requirements.
4. Any structural alterations necessary for installation must comply with all applicable building, health, and safety code requirements.
5. Electrical equipment connected to this unit must be properly grounded.
6. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment that might be installed in the area affected by this equipment. If this unit is exhausting air from a space in which chimney-vented fuel burning equipment is located, take steps to assure that combustion air supply requirements of applicable codes and standards.
7. Use the unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
8. This unit is intended for general ventilating only. Do not use to exhaust hazardous or explosive materials and vapors. Do not connect this unit to range hoods, fume hoods, or collection systems for toxics.
9. This unit must be properly ducted to the outdoors. Outside air inlets must not be located where air may be contaminated, for example by vehicle or appliance exhausts.

⚠ WARNING

Danger of carbon monoxide poisoning! Outside air intake should be 10' (minimum) away from sources of carbon monoxide or other toxic gases such as chimneys, furnace, or water heater exhausts.
Do not locate outside air intake where vehicles may be serviced or left idling. Do not locate the outside air intake inside an enclosed space.

⚠ CAUTION

Danger of Damage Due to Condensation in or on Ducts to Outside.

Both ducts connecting the unit to the outside must be insulated with sealed vapor barriers inside and out to prevent condensation and/or freezing inside the insulation or on the duct surface.

⚠ CAUTION

Maximum Differential Pressure

The maximum pressure differential between the two airstreams shound not exceed 4 inches (H_2O).

⚠ CAUTION

Filters must be used or the energy exchanger core will become blocked by dust and the unit will not do its job. In extreme cases components may be damaged.

⚠ CAUTION

Do Not Wash the Energy Exchange Core.

Keep it away from water or fire to avoid damaging it. Always handle the core carefully.

SAVE THIS MANUAL

UNIT INFORMATION

Record information as shown below.

In the unlikely event that factory assistance is ever required, information located on the unit label will be needed.

Locate the RenewAire unit label found on the outside of the unit.

NOTE: This information is for purposes of identifying the unit-specific option data from the Option Code.

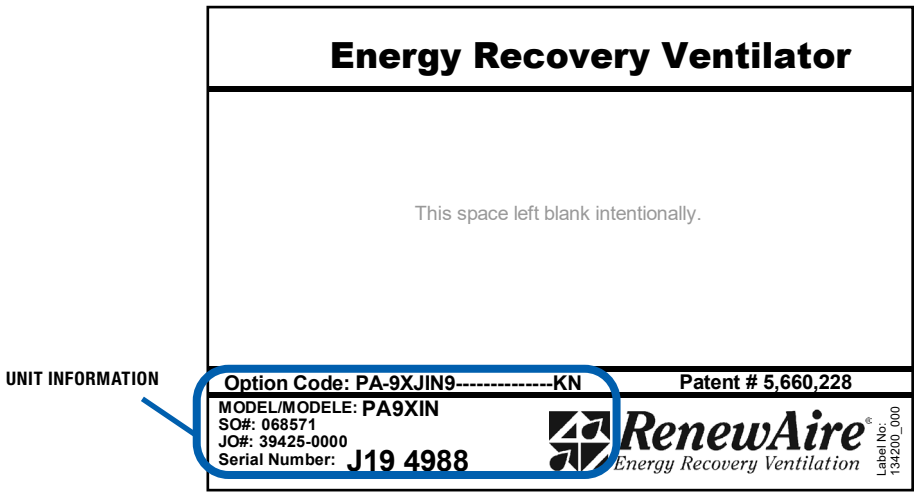
NOTE: This page is to be completed by the installing contractor. The completed document is to be turned over to the owner after start-up.

OPTION CODE:

P	A	-			J			9			-	-	-	-	-	-	-	-	-	-	-	-		N

SERIAL NUMBER:

SO #:



UNIT LABEL (TYPICAL)

PA SERIES

Energy Recovery Module

AHRI CERTIFIED® www.ahridirectory.org
Globally Recognized. Industry Respected.

INDOOR UNIT
Unlimited Modular Panels

Download specification at:
renewaire.com/specifications

SPECIFICATIONS

Ventilation Type:
Static plate, heat and humidity transfer

Standard Features:
Insulated sheet metal panels easily slide into receivers to enclose stacks of energy exchange cores using unique patented design, US Patent 5,660,228
Individual PA-Series units can be joined together to provide unlimited airflow capacities for larger air handling systems.
Blower not included and must be specified to meet job requirements.

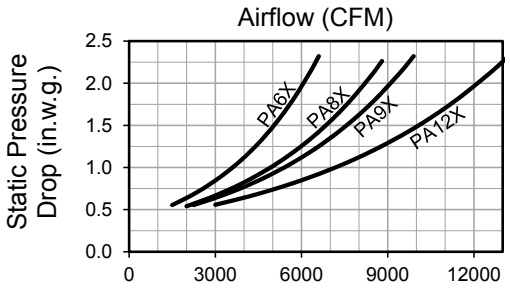
Insulation:
One inch, high density, FSK faced, fiberglass

Options:
Knockdown
Assembled on structural forklift base

Accessories:
Filters - MERV 13, 2" (shipped loose)

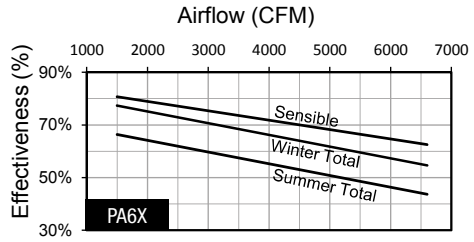
Description	PA6X	PA8X	PA9X	PA12X
Typical Airflow Range CFM	1,500-6,600	2,000-8,800	2,250-9,900	3,000-13,200
AHRI 1060 Certified Core	Six L125-G5	Eight L125-G5	Nine L125-G5	Twelve L125-G5
Unit Dimensions & Weight	73 1/2" L x 37 1/4" W x 66 1/4" H 522-565 lbs.	73 1/2" L x 37 1/4" W x 86" H 650-700 lbs.	109 1/2" L x 37 1/4" W x 66 1/4" H 740-910 lbs.	109 1/2" L x 37 1/4" W x 86" H 936-1,000 lbs.
Max. Shipping Dimensions & Weight (on pallet, assembled only)	96" L x 47" W x 75" H 700 lbs.	96" L x 47" W x 92" H 850 lbs.	124" L x 48" W x 75" H 1,100 lbs.	124" L x 48" W x 95" H 1,200 lbs.
Filters MERV 8: 20" x 20" x 2"	Total qty. 12	Total qty. 16	Total qty. 18	Total qty. 24

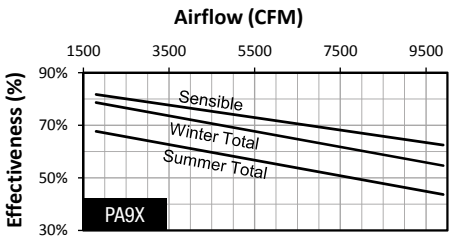
AIRFLOW PERFORMANCE

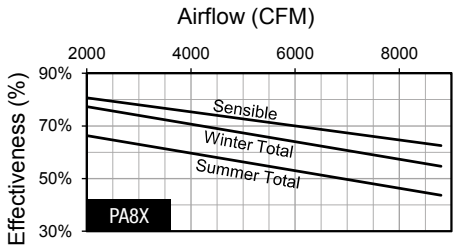


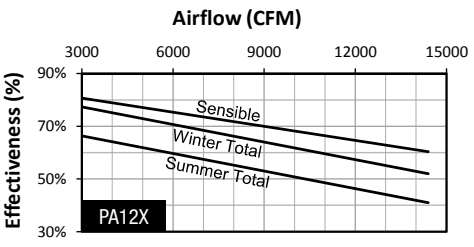
Note: Airflow performance includes effect of clean, standard filter supplied with unit.

CORE PERFORMANCE





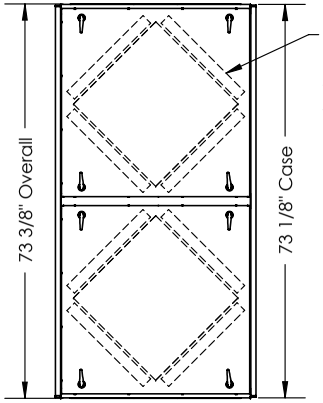




At AHRI 1060 standard conditions. See all AHRI certified ratings at www.ahrinet.org.

RenewAire® Energy Recovery Ventilation

PA6X Energy Recovery Module



Filters to be placed on the upstream side of the cores, depending on airflow arrangement chosen. Filters are 2" X 20" X 20" pleated disposable.

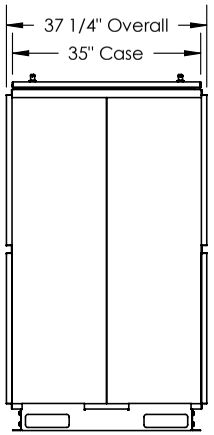
TOP VIEW

ABBREVIATION
EA: Exhaust Air to outside
OA: Outside Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

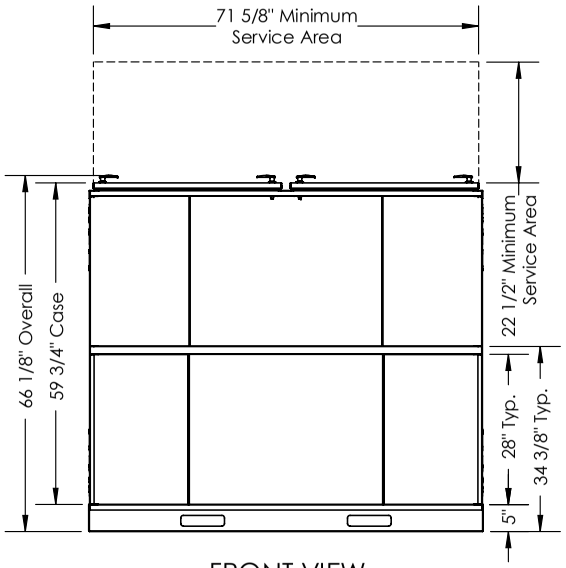
INSTALLATION ORIENTATION
Unit must be installed in orientation shown.

NOTE:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE ROUNDED TO THE NEAREST EIGHTH OF AN INCH.

2. SPECIFICATIONS MAY BE SUBJECT TO CHANGE WITHOUT NOTICE.

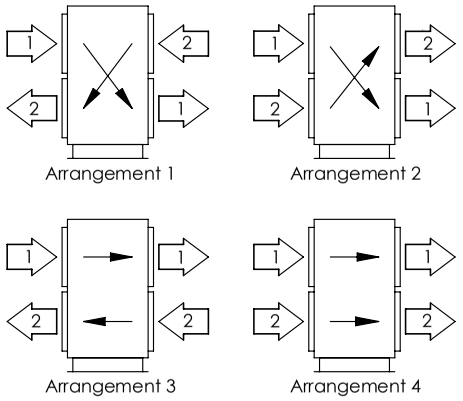


LEFT VIEW



FRONT VIEW

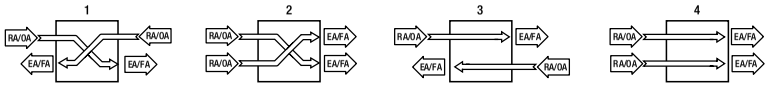
AVAILABLE AIRFLOW ARRANGEMENTS (SIDE VIEW)



Performance Derating:
Airflow Arrangements 3 & 4 result in lower energy transfer.
Reduce sensible effectiveness by 2 percentage points.
Reduce total effectiveness by 1 percentage point.

AIRFLOW CONFIGURATION

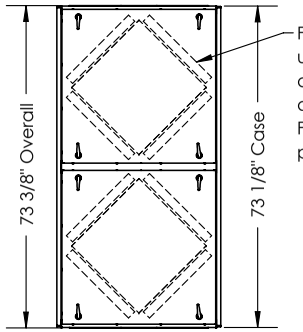
Available as shown:



UNIT MOUNTING & APPLICATION

Must be mounted as shown. RA/EA airstream can be switched with OA/FA airstream. Knockdown can be field assembled for multiple duct configurations. Multiple cabinets can be aligned for unlimited airflow.

PA8X Energy Recovery Module



Filters to be placed on the upstream side of the cores, depending on airflow arrangement chosen. Filters are 2" X 20" X 20" pleated disposable.

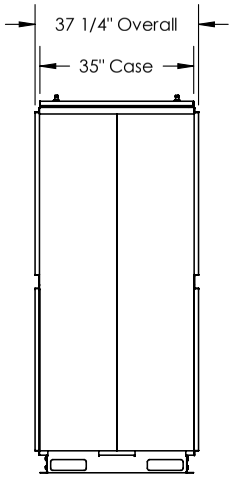
TOP VIEW

ABBREVIATION
EA: Exhaust Air to outside
OA: Outside Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

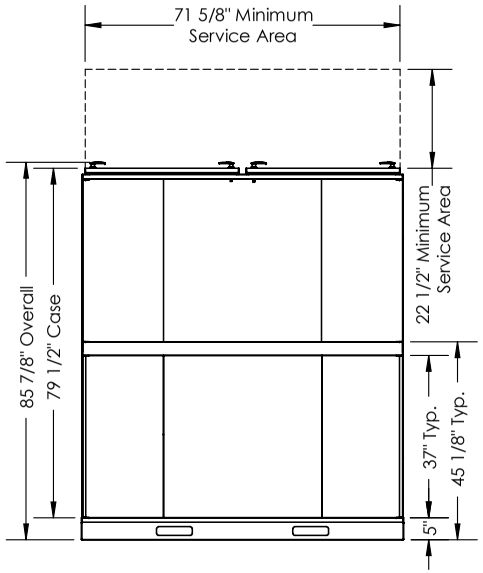
INSTALLATION ORIENTATION
Unit must be installed in orientation shown.

NOTE:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE ROUNDED TO THE NEAREST EIGHTH OF AN INCH.

2. SPECIFICATIONS MAY BE SUBJECT TO CHANGE WITHOUT NOTICE.

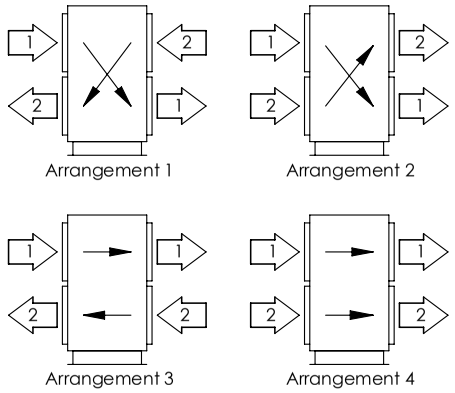


LEFT VIEW



FRONT VIEW

AVAILABLE AIRFLOW ARRANGEMENTS (SIDE VIEW)

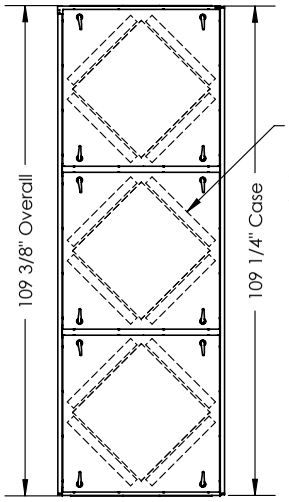


Performance Derating:
Airflow Arrangements 3 & 4 result in lower energy transfer.
Reduce sensible effectiveness by 2 percentage points.
Reduce total effectiveness by 1 percentage point.

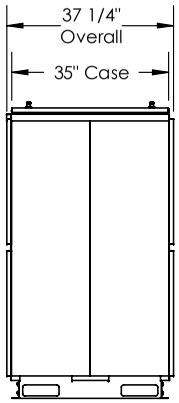
AIRFLOW CONFIGURATION
Available as shown:

UNIT MOUNTING & APPLICATION
Must be mounted as shown. RA/EA airstream can be switched with OA/FA airstream. Knockdown can be field assembled for multiple duct configurations. Multiple cabinets can be aligned for unlimited airflow.

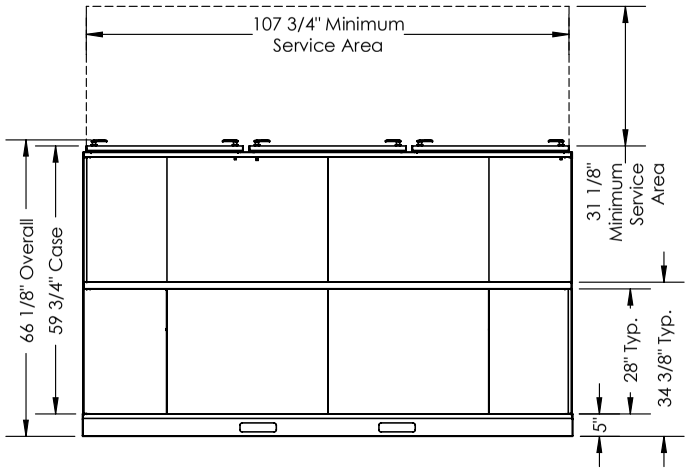
PA9X Energy Recovery Module



TOP VIEW



LEFT VIEW



FRONT VIEW

ABBREVIATION
EA: Exhaust Air to outside
OA: Outside Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

INSTALLATION ORIENTATION
Unit must be installed in orientation shown.

NOTE:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE ROUNDED TO THE NEAREST EIGHTH OF AN INCH.

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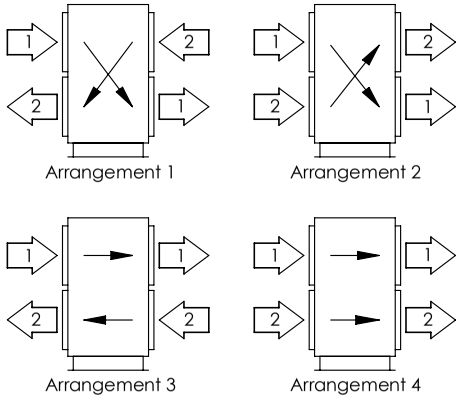
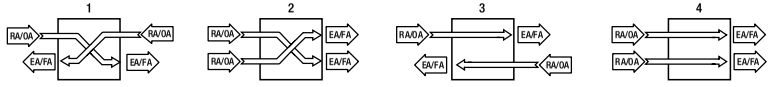
AVAILABLE AIRFLOW ARRANGEMENTS (SIDE VIEW)



Performance Derating:
Airflow Arrangements 3 & 4 result in lower energy transfer.
Reduce sensible effectiveness by 2 percentage points.
Reduce total effectiveness by 1 percentage point.

AIRFLOW CONFIGURATION

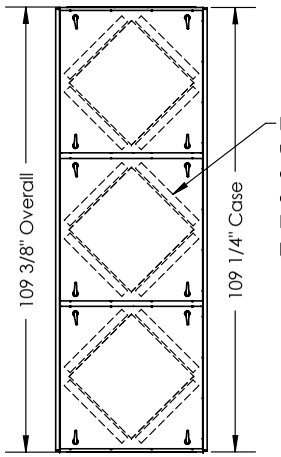
Available as shown:



UNIT MOUNTING & APPLICATION

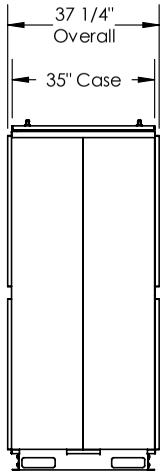
Must be mounted as shown. RA/EA airstream can be switched with OA/FA airstream. Knockdown can be field assembled for multiple duct configurations. Multiple cabinets can be aligned for unlimited airflow.

PA12X Energy Recovery Module

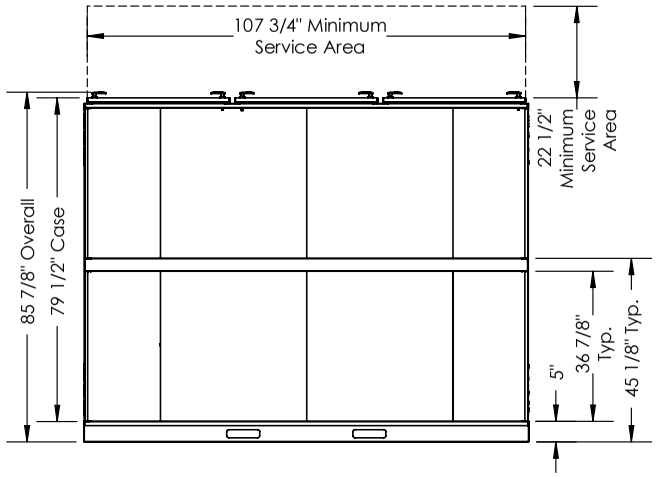


Filters to be placed on the upstream side of the cores, depending on airflow arrangement chosen. Filters are 2" X 20" X 20" pleated disposable.

TOP VIEW



LEFT VIEW



FRONT VIEW

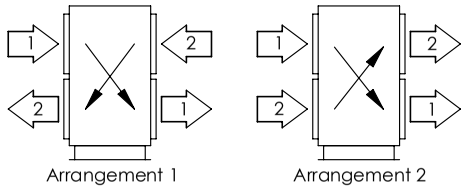
ABBREVIATION
EA: Exhaust Air to outside
OA: Outside Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside

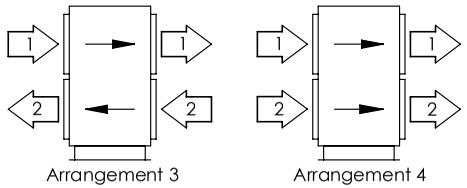
INSTALLATION ORIENTATION
Unit must be installed in orientation shown.

NOTE:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE ROUNDED TO THE NEAREST EIGHTH OF AN INCH.

2. SPECIFICATIONS MAY BE SUBJECT TO CHANGE WITHOUT NOTICE.

AVAILABLE AIRFLOW ARRANGEMENTS (SIDE VIEW)





Performance Derating:
Airflow Arrangements 3 & 4 result in lower energy transfer.
Reduce sensible effectiveness by 2 percentage points.
Reduce total effectiveness by 1 percentage point.

AIRFLOW CONFIGURATION

Available as shown:

UNIT MOUNTING & APPLICATION

Must be mounted as shown. RA/EA airstream can be switched with OA/FA airstream. Knockdown can be field assembled for multiple duct configurations. Multiple cabinets can be aligned for unlimited airflow.

TABLE OF ILLUSTRATIONS

1.0 OVERVIEW

1.1 PA-SERIES INSTALLER INFORMATION

The PA-Series Energy Recovery Ventilators (ERVs) are available either factory-assembled or knocked-down for on-site assembly.

If the unit is received pre-assembled, please be sure to:

- review the Forklift Information section;
- review the Warnings and Cautions at the front of the manual.

If you are assembling the unit please be sure to:

- review the Warnings and Cautions at the front of the manual;
- see the Airflow Direction and Filters Locations sections before starting;
- review the Forlift Information section.

Throughout the assembly instructions, we refer to the “two-stack” and “three-stack” models, and also to “three-high” and “four-high” models.

PA6X: Two-stack, three high
PA8X: Two-stack, four-high
PA9X: Three-stack, three-high
PA12X: Three-stack, four-high

1.2 SYSTEM DESIGN—GENERAL

1.2.1 Function

The patented RewAire PA-Series ERVs (Covered by US Patent 5,660,228) are used to transfer energy from exhaust air leaving a building, into fresh air being brought in from the outside for ventilation. By recovering energy from the exhaust airstream, the benefits of ventilation can be enjoyed without the full energy cost to condition the outside air.

1.2.2 For Indoor Use Only

The unit is designed for installation in a sheltered location, out of the weather.

1.2.3 Locate to Minimize Duct Length

The ideal location for the unit is:

- central to the inside duct runs;
- close to both the exhaust duct (to the outside) and the fresh air duct (from the outside).

1.2.4 Provide Service Access

The top of the unit must be accessible for cleaning and filter replacement. See dimension drawing at the front of the manual.

1.2.5 Specify and Provide Blowers

The PA-Series ERVs do not include blowers. Therefore, two blowers must be installed as part of the system. Several ducts must also be installed. See Blower Design Issues section below.

1.2.6 Provide System Shut-off Means for Safety

Provide a nearby disconnect switch so service people can shutoff the blowers connected to the system when changing filters.

1.2.7 Four Ducts are Required

- Outside Air Duct handles Supply Air entering the ERV.
- Fresh Air Duct handles Supply Air leaving the ERV.
- Return Air Duct handles Exhaust Air entering the ERV.
- Exhaust Air Duct carries the Exhaust Air from the ERV to the outside of the building.

1.2.8 Special Considerations for Outside Air and Exhaust Air Ducts

Proper location and construction of these ducts are critical to the safety and proper function of the sytem. The exhaust outlet and outside air inlet on the outside of the building should be separated to avoid cross-contamination.

NOTE: Some jurisdictions may allow less separation, or may require more. Check with your local code officials.

NOTE: The exhaust outlet should not dump air into an enclosed space or any other structure. The inlets and outlets should be screened against insects and vermin and shielded from the weather to prevent the entry of rain or snow.

⚠ WARNING

Danger of carbon monoxide poisoning! Outside air intake should be 10' (minimum) away from sources of carbon monoxide or other toxic gases such as chimneys, furnace, or water heater exhausts.
Do not locate outside air intake where vehicles may be serviced or left idling. Do not locate the outside air intake inside an enclosed space.

⚠ CAUTION

Danger of Damage Due to Condensation in or on Ducts to Outside.

Both ducts connecting the unit to the outside must be insulated with sealed vapor barriers inside and out to prevent condensation and/or freezing inside the insulation or on the duct surface.

1.2.9 Select the Airflow Path Configuration

Four basic airflow configurations are possible with the PA-Series. See Airstream and Filter Arrangements section on pages 18–19.

⚠ CAUTION

Some airflow arrangements result in lower energy-recovery performace and require derating.

1.2.10 Design the Plenums

Duct plenums will be required, equal to the face width of the PA unit. See dimension drawing at the begining of the manual. In some cases the plenums may reduce to the size of the unit inlet openings. Design the plenums for low velocity to minimize pressure drop and achieve good airflow distribution into the unit.

1.3 SYSTEM DESIGN—BLOWER DESIGN ISSUES

1.3.1 Blower Location

Two blowers will be required: one for the air to be exhausted from the building, another for the fresh air to be brought into the building. See Figures 1.3.0–1.3.3 on the following pages.

1.3.2 Push-Push and Pull-Pull Blower Layouts

These are the recommended blower layouts for virtually every application. In “Push-Push” applications, both blowers push into the ERV, see Figure 1.3.0. In “Pull-Pull” applications, both pull from the ERV, see Figure 1.3.1. These layouts minimize leakage between the airstreams due to pressure differences.

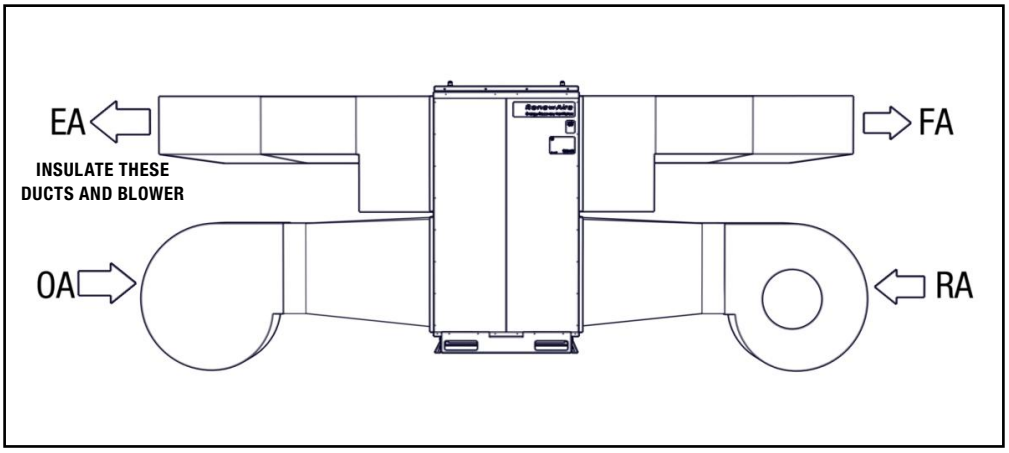


FIGURE 1.3.0 PUSH-PUSH BLOWER LAYOUT—RECOMMENDED

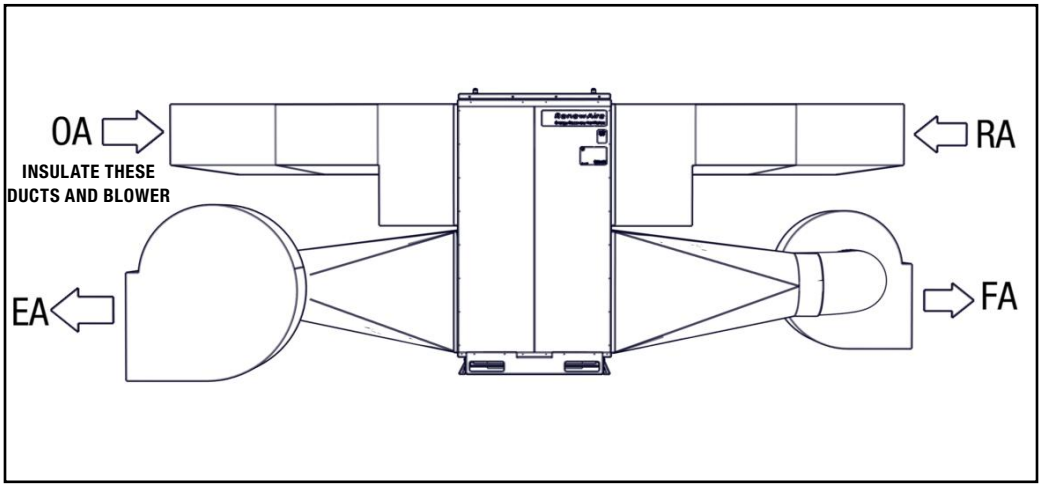


FIGURE 1.3.1 PULL-PULL BLOWER LAYOUT—RECOMMENDED

1.3.3 OA Push–EA Pull Blower Layouts

This blower layout, Figure 1.3.2, causes the supply airstream to be at a much higher static pressure than the exhaust airstream. This may result in air leakage, which must be evaluated in the design process. A benefit of this layout is that both blowers are isolated from the building's duct system by the ERV, which provides some acoustic attenuation.

The designer should always evaluate static pressure differentials between the airstreams if this layout is used. See section 1.5 Static Pressure Differentials on page 16.

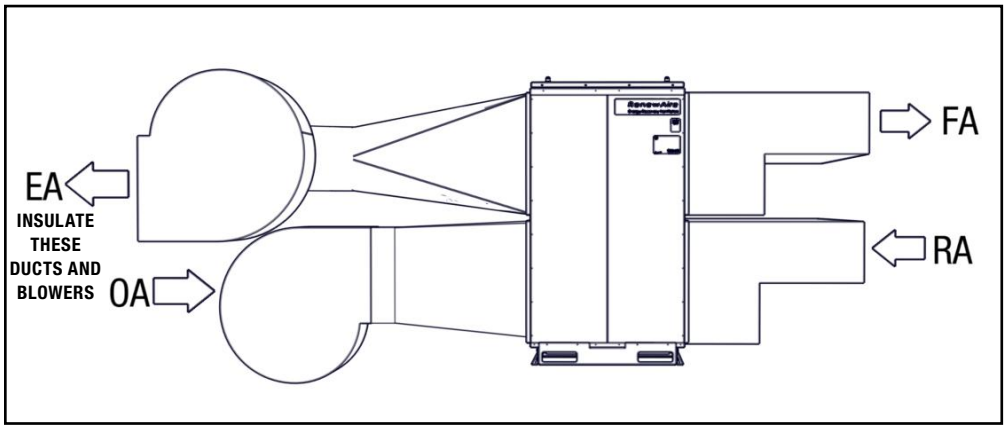


FIGURE 1.3.2 OA PUSH–EA PULL BLOWER LAYOUT (CAN BE USED WITH CAUTIONS)

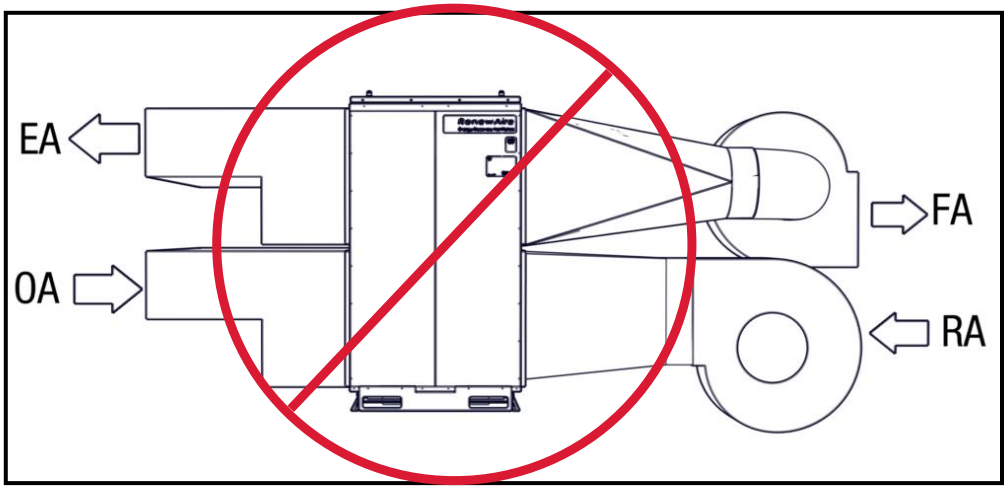


FIGURE 1.3.3 RA PUSH–FA PULL BLOWER LAYOUT, NOT RECOMMENDED

1.4 SYSTEM DESIGN—BLOWER SIZING

1.4.1 Blower Sizing

See Figure 1.4.0 below for pressure drop through the PA ERVs. The chart does not include allowances for inlet/outlet plenums, which are not included with the unit. The chart includes pressure drop through clean filters.

In general, ventilation systems with energy-recovery components use blowers operating at relatively high static pressure. Thus, parts of the duct system will be at higher-than-ordinary static pressures, and greater duct leakage may result.

It is good practice to select blowers and motors that can be operated at higher total static pressures than required by the nominal design. This provides a solution in the event that total system pressure drop is higher than expected. Note that this means proper system balancing and commissioning becomes even more important, in order to prevent operation at higher-than-requried airflows.

⚠ CAUTION

Maximum Differential Pressure

The maximum pressure differential between the two airstreams shound not exceed 4 inches (H_2O).

1.4.2 Blower Inlet and Outlet Conditions

As in all applications of blowers in air-handling systems, imporper duct design at the inlet and outlet of the blower can greatly reduce blower performace compared to its published ratings.

Complete guidelines on blower applications are beyond the scope of this document. The most basic guidlines are:

AT THE BLOWER OUTLET:

- Design a gradual transition to the final duct size.
- Included angle between the transition elements should not exceed 7˚.
- Transition length shoul be at least 2.5 times the equivalent duct diameters of the blower outlet.

AT THE BLOWER INLET:

- Design for no bends in the duct for at least 5 equivalent duct diameters of the blower inlet.
- If a transition is needed at the duct connection to the blower, included angle between the transition elements should not exceed 15˚.

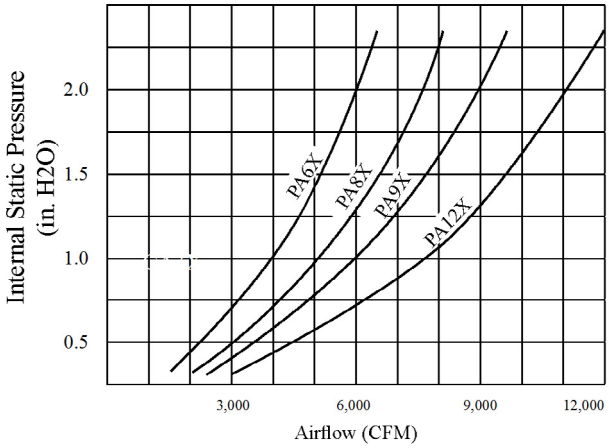


FIGURE 1.4.0 PRESSURE DROP THROUGH PA-SERIES UNITS

NOTE: The leakage volume is shown here as a function strictly of static pressure differenece, not overall airflow volume.

1.5 SYSTEM DESIGN—STATIC PRESSURE DIFFERENTIAL

Strong static pressure differences can result in air leakage from one airstream to the other within the energy-recovery assembly.

When the Average Static Pressure Difference between the two airstreams is greater than 1", you may need to account for leakage airflow in your blower selection.

1.5.1 Determining Average Static Pressure Difference

1. Lay out the design of the system specifying ducts, blowers, and all other components that create static pressure differences.
2. Determine the static pressure conditions at the inlet and outlets of the ERV.
3. Calculate the Average Static Pressure Difference using the following formula:

Average Static Pressure Difference = [(SPoa + SPfa)/2] - [(SPra + SPea)/2]
where:
SPoa is the static pressure at the outside air inlet to the cabinet;
SPfa is the static pressure at the fresh air outlet from the cabinet;
SPra is the static pressure at the return air inlet to the cabinet;
SPea is the static pressure at the exhaust air outlet from the cabinet.

1.5.2 Evaluating Leakage Volume

Determine leakage volume from Figure 1.5.0 below. Leakage will be from the airstream at higher static pressure to the airstream at lower static pressure.

In Push-Push and Pull-Pull blower layouts, leakage volume is almost always negligible. It should be considered in other blower layouts and may require adjustment of the designed blower operation points.

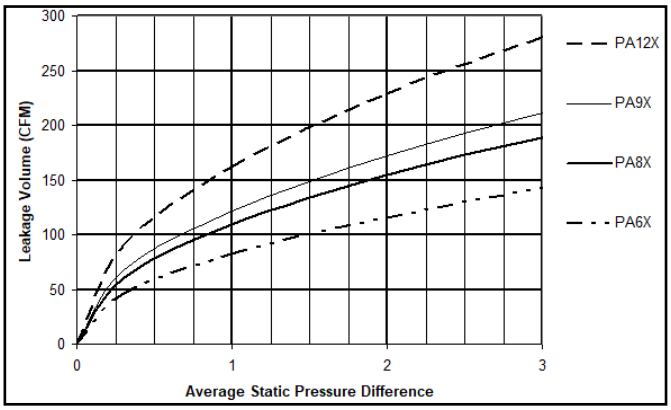


FIGURE 1.5.0 LEAKAGE VOLUMES

1.5.3 Comparison of Leakage Volume and EATR Ratings

Leakage volumes presented here are application ratings for the complete PA-Series energy-recovery unit. EATR is a certified rating point used in ARI's 1060 program for the energy-recovery component in the PA-Series unit. The two are related but not identical.

EATR, or Exhaust Air Transfer Ratio, is leakage through the component only, expressed as a ratio of fresh air volume.

The driving force for leakage in the PA-Series ERV is pressure differential between the two airstreams, which is not directly a function of airflow volume. Leakage occurs at a low rate in the component itself, as verified by our ARI ratings, and also at about the same volume in the case. Thus, the leakage volumes presented here are both easier to apply and more accurate when considering the entire system.

NOTE: Determine how many "twinned filters" you will need to assemble for your job.

2.0 INSTALLATION

2.1 AIRSTREAM AND FILTER ARRANGEMENTS

⚠ CAUTION

Read and understand this section before beginning assembly!

This ERV can be assembling in many different configurations. Only one of them is correct for your job! Check your ductwork design, then determine which Assembly Arrangement to use.

1. Determine the Airflow Paths for your job.
   The two airstreams are the SUPPLY (air from the outside) and the RETURN (air from the conditioned space).

   If Supply and Return enter the exchanger on OPPOSITE sides, use Arrangements 1 or 3, Figure 2.1.0.

   If Supply and Return enter the exchanger on the SAME side, use Arrangements 2 or 4, Figure 2.1.1.

   If the airstreams enter the exchanger low, and leave the exchanger high (or the other way around), this is called "cross airflow". Use Arrangements 1 or 2.

   If one airstream enters the exchanger high and leaves high and the other enters low and leaves low, this is called "parallel airflow". Use Arrangements 3 or 4. This airflow configuration requires a performance derate.

2. Determine the resulting FILTER CONFIGURATION for your job.
   Remember that the filters must be installed to cover the inlet faces of the core stacks.

⚠ CAUTION

Derate performance if using Parallel Airflow (Arrangements 3 and 4).

Reduce sensible effectiveness by 2 percentage points.

Reduce total effectiveness by 1 percentage point.

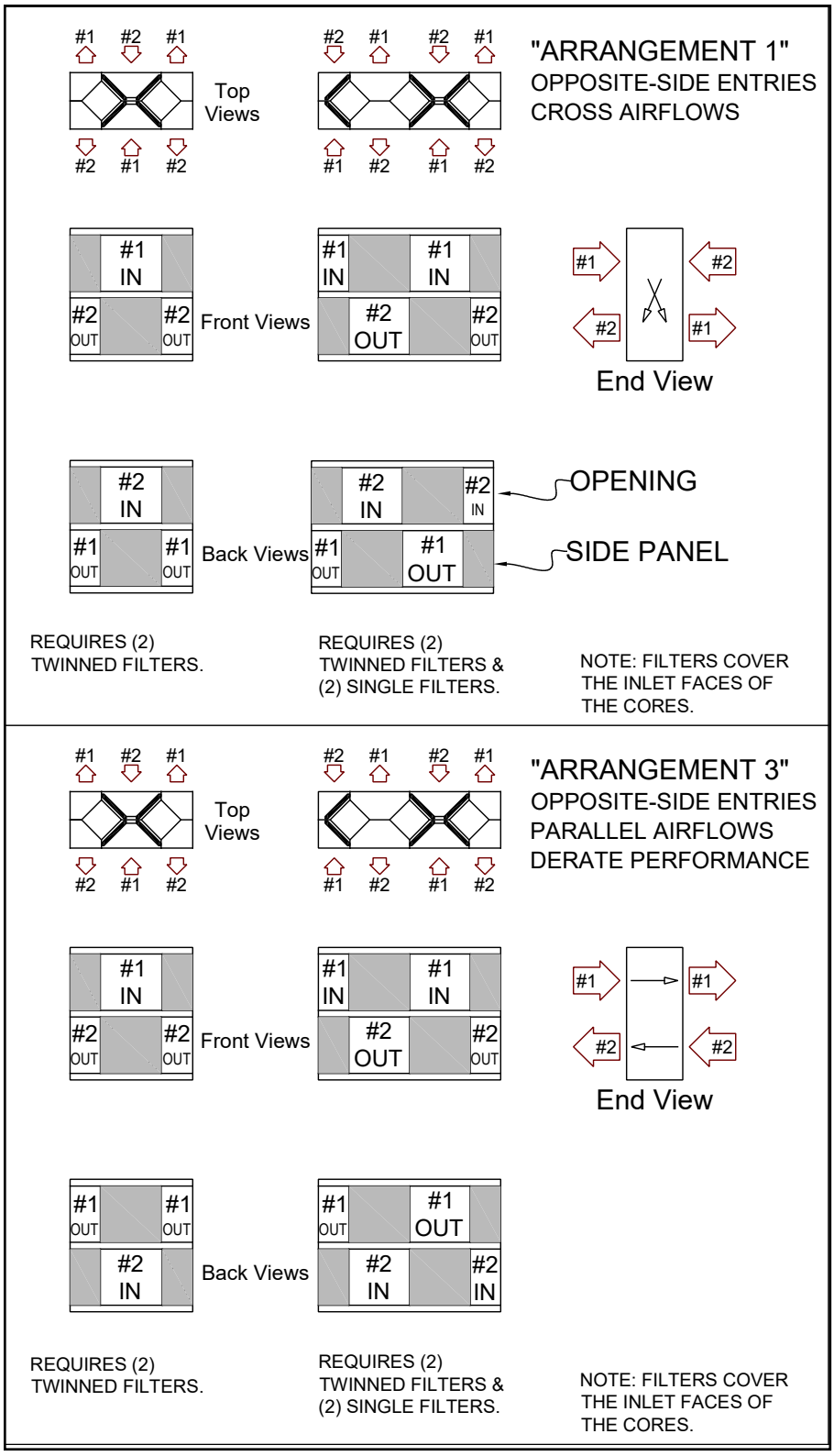


FIGURE 2.1.0 ARRANGEMENTS 1 AND 3 (OPPOSITE-SIDE ENTRIES)

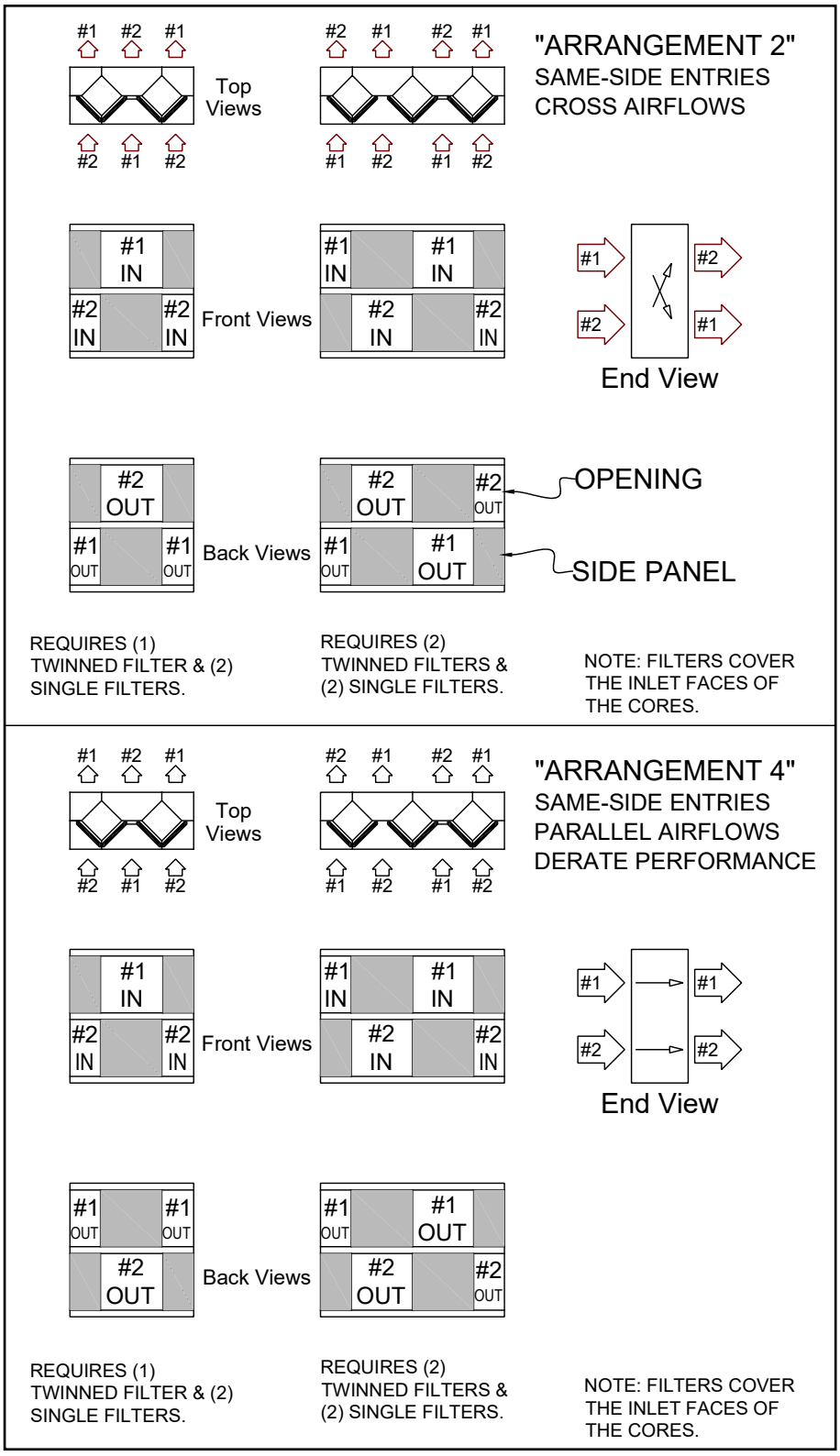


FIGURE 2.1.1 ARRANGEMENTS 2 AND 4 (SAME-SIDE ENTRIES)

⚠ CAUTION

Derate performance if using Parallel Airflow (Arrangements 3 and 4).

Reduce sensible effectiveness by 2 percentage points.

Reduce total effectiveness by 1 percentage point.

2.2 ASSEMBLY

2.2.1 Tools Required

- Cordless Driver/Drill with the following bits:
  Nut Driver 5/16"
  #2 Philips or Square Driver
  1/8" Drill Bit
- Tape Measure
- 1/8" Allen Wrench
- Caulk Gun
- Rubber Mallet

2.2.2 Parts Lists

PARTS LIST FOR PA-6X		
Quantity	Part Number	Description
2	100030	Door
6	100040	S-Slip 59"
1	104199	Filter Removal Hook
1	101006	Top Cross Bar
8	140771	Side Duct Flange
2	101015	Filter Rack Flange
4	140775	End Panel
2	101031	Top Duct Flange
2	101033	U-Duct Flange
2	101034	L-Duct Flange
2	101038	End Cross Bar
2	101060	Filter Spacer
2	101072	Left Hand Filter Rack
2	101074	Right Hand Filter Rack
1	134722	Silicone Caulk
120	104832	#8 x 1/2" combo screw
40	135336	#12 x 3/4" screw
6		Energy Recovery Core
1	136078	Literature Bag
2	140773	Full Width Side Panel
4	140598	Half Width Side Panel
1	135827	Core Center Spacer
1	142070	Base

PARTS LIST FOR PA-8X		
Quantity	Part Number	Description
2	100030	Door
6	100040	S-Slip 79"
1	104198	Filter Removal Hook
1	101006	Top Cross Bar
8	140778	Side Duct Flange
2	101041	Filter Rack Flange
4	140777	End Panel
2	101031	Top Duct Flange
2	138067	U-Duct Flange
2	101034	L-Duct Flange
2	101038	End Cross Bar
2	101044	Filter Spacer
2	101076	Left Hand Filter Rack
2	101078	Right Hand Filter Rack
1	134722	Silicone Caulk
130	104832	#8 x 1/2" combo screw
50	135336	#12 x 3/4" screw
8		Energy Recovery Core
1	136078	Literature Bag
2	140770	Full Width Side Panel
4	140768	Half Width Side Panel
1	135828	Core Center Spacer
1	142070	Base

PARTS LIST FOR PA-9X		
Quantity	Part Number	Description
3	100030	Door
8	100040	S-Slip 59"
1	104199	Filter Removal Hook
2	101006	Top Cross Bar
8	140771	Side Duct Flange
4	140775	End Panel
2	101004	Top Duct Flange
2	101007	U-Duct Flange
2	101047	L-Duct Flange
2	101038	End Cross Bar
2	101060	Filter Spacer
2	101072	Left Hand Filter Rack
2	101074	Right Hand Filter Rack
1	134722	Silicone Caulk
160	104832	#8 x 1/2" combo screw
60	135336	#12 x 3/4" screw
9		Energy Recovery Core
1	136078	Literature Bag
4	140773	Full Width Side Panel
4	140598	Half Width Side Panel
2	135827	Core Center Spacer
1	142073	Base

PARTS LIST FOR PA-12X		
Quantity	Part Number	Description
3	100030	Door
8	135822	S-Slip 79"
1	104198	Filter Removal Hook
2	101006	Top Cross Bar
8	140778	Side Duct Flange
2	101048	Filter Rack End
4	140777	End Panel
2	101004	Top Duct Flange
2	101047	L-Duct Flange
2	101038	End Cross Bar
2	101044	Filter Spacer
2	101076	Left Hand Filter Rack
2	101078	Right Hand Filter Rack
1	134722	Silicone Caulk
170	104832	#8 x 1/2" combo screw
70	135336	#12 x 3/4" screw
12		Energy Recovery Core
1	136078	Literature Bag
4	140770	Full Width Side Panel
4	140768	Half Width Side Panel
2	135828	Core Center Spacer
1	142073	Base

NOTE: Orient each Energy Recovery Core with foam gasket facing DOWN.

2.2.3 Stack Energy Recovery Cores

Position BASE in appropriate location on a flat, level surface.

Place 1st RenewAire Energy Recovery Core on Base. Figure 2.2.1.
Check location of the core, see Figure 2.2.2. Core should be 2-5/16" from the end and 1-1/2" from the front of the base.

Install Core Center Spacer to 1st RenewAire Energy Recovery Core. Core Center Spacers come with (2) S-slips installed.
Insert flange of RenewAire ENERGY RECOVERY CORE into S-slip on Core Center Spacer, Figure 2.2.3.

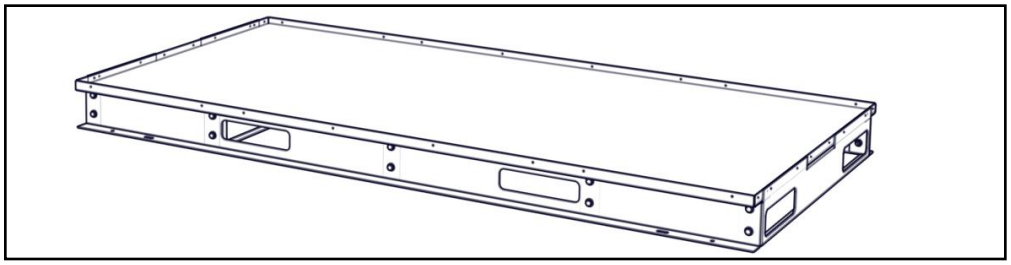


FIGURE 2.2.0 PLACE BASE

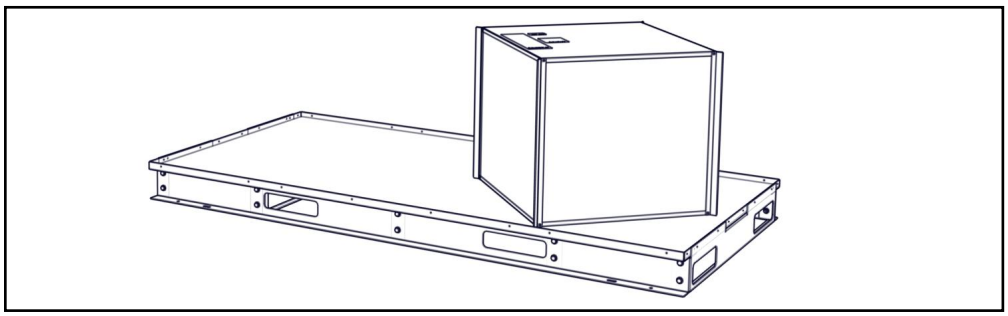


FIGURE 2.2.1 PLACE FIRST ENERGY RECOVERY CORE

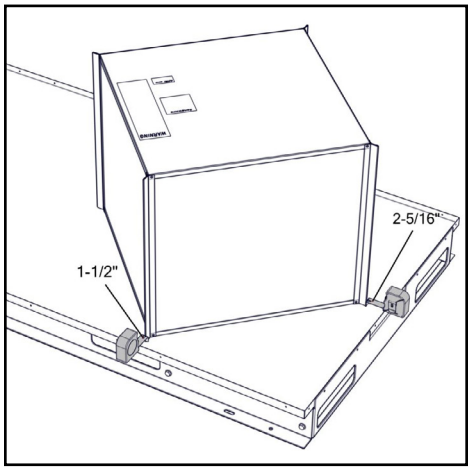


FIGURE 2.2.2 CHECK CORE PLACEMENT

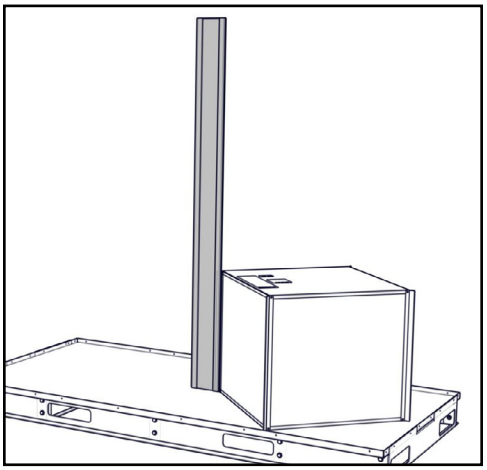


FIGURE 2.2.3 PLACE CENTER SPACER

Place 2nd ENERGY RECOVERY CORE on BASE. Figure 2.2.4
Slide one flange of core into Core Center Spacer.
Check locations of the second stack. Refer to Figure 2.2.2.

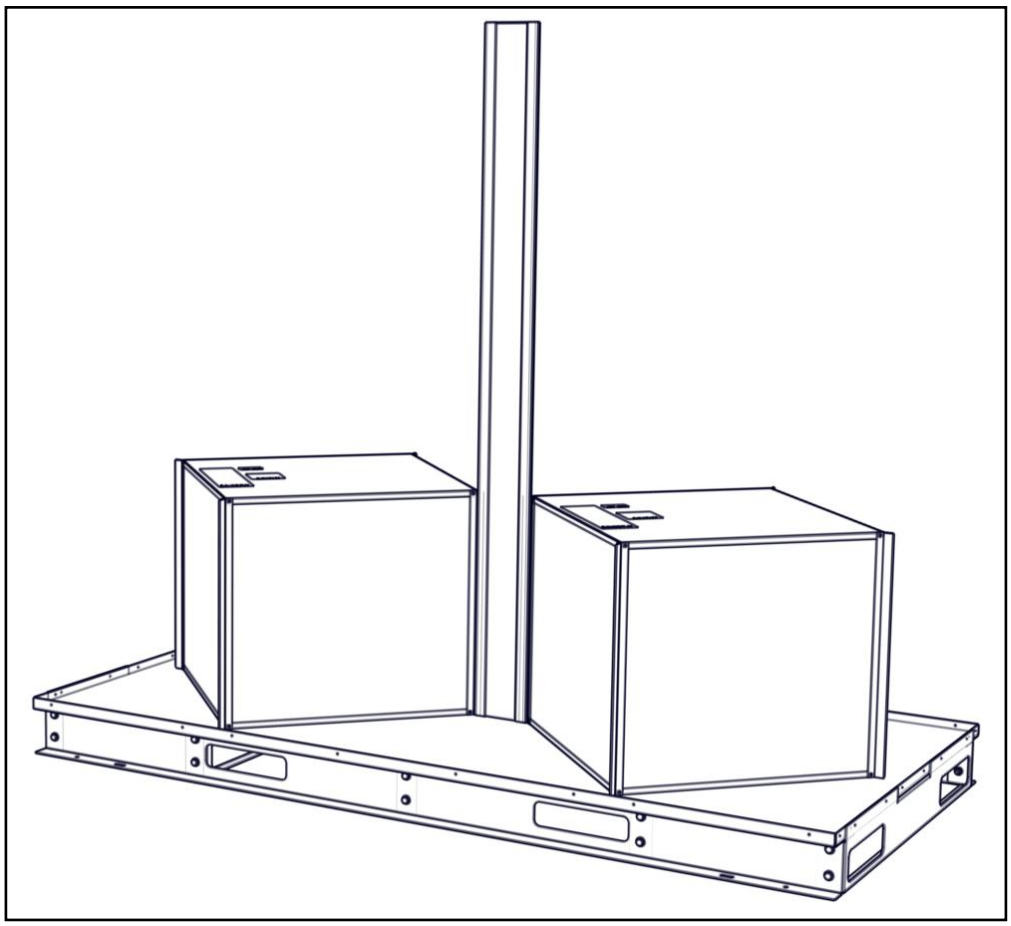


FIGURE 2.2.4 PLACE SECOND ENERGY RECOVERY CORE

THREE-STACK UNITS ONLY:
Place 2nd Core Center Spacer.
Place 3rd Core.
Check location of the stacks.

Complete the Core Stacks.
Double check stack placement by measuring.

2.2.4 Install End Panels

Place S-Slips on the RenewAire Core Flanges at both ends of the Array, so the End Panels can be installed, Figure 2.2.5.

Install End Panels, Figure 2.2.6.
Bottom edges of End Panels go inside the Base.
Insert long edges of End Panels into the S-Slip on each Core Stack.
Pull End Panels out at the bottom, tight to the Base.
Fasten End Panels by screwing through Base. Use (6) #12 self-drilling screws at each end.

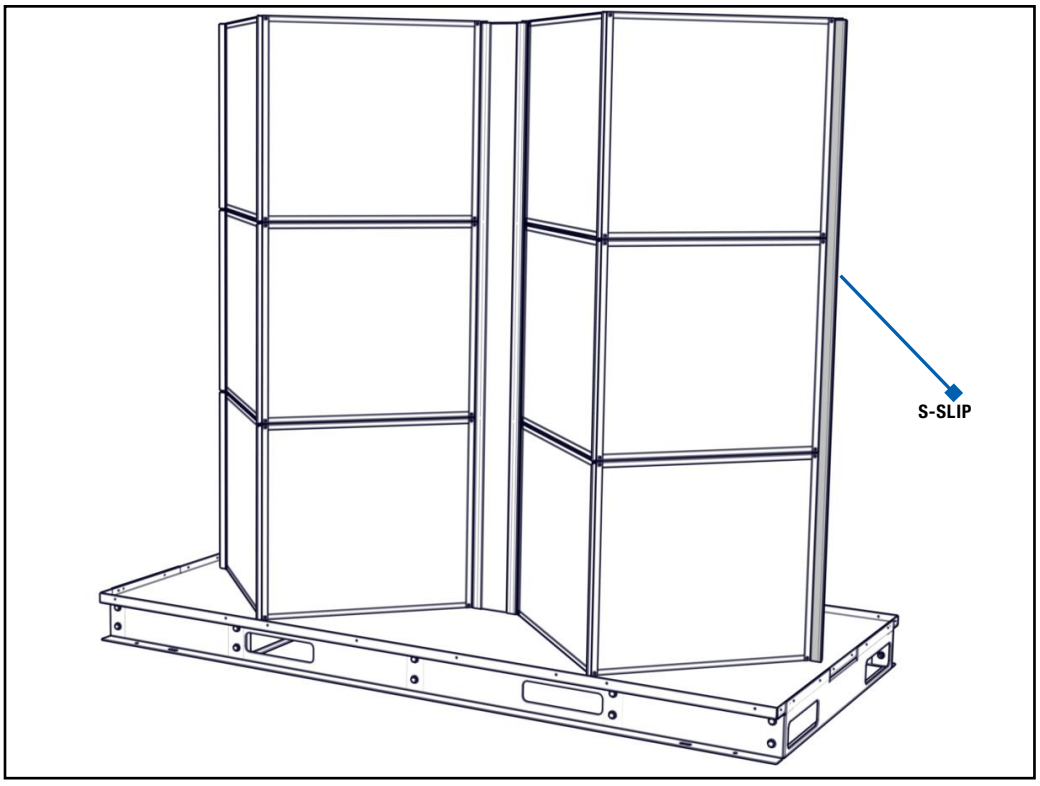


FIGURE 2.2.5 PLACE S-SLIPS ON END FLANGES

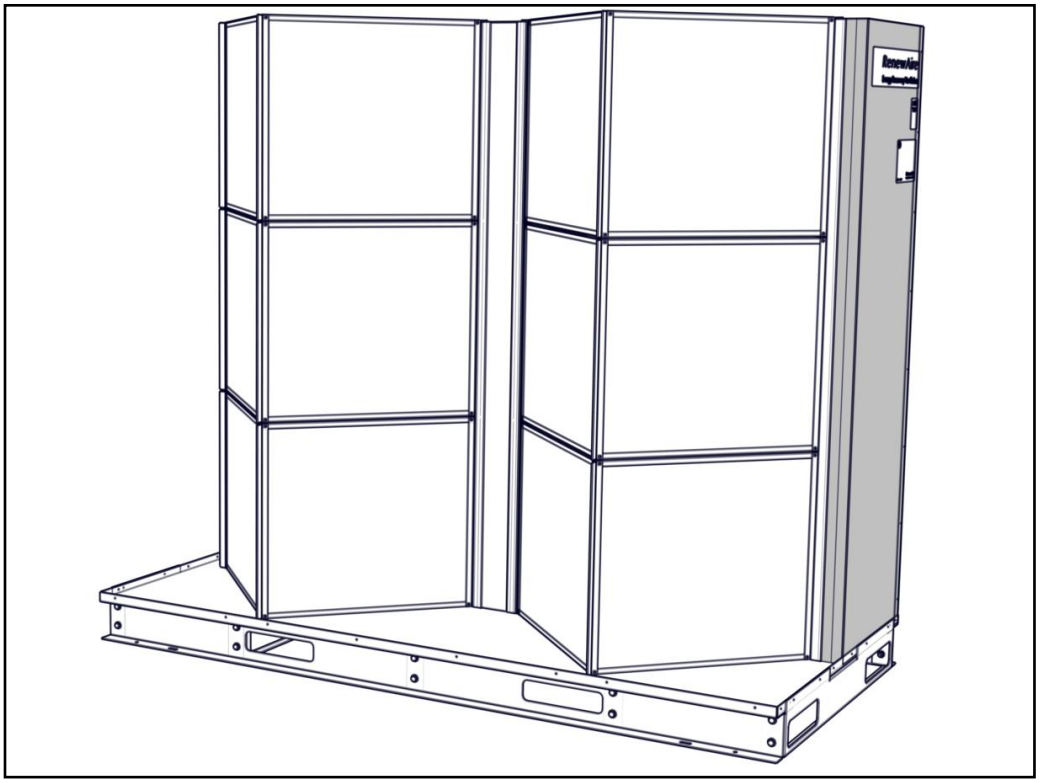


FIGURE 2.2.6 INSTALL END PANELS

2.2.5 Square Up and Connect Cores, Center Spacer, and Ends

Place S-Slips on all remaining Core Flanges.

Check that Core Stacks are plumb and level, see Figure 2.2.7.
Connect the End Panels to the Core Stacks: Drill 1/8" pilot holes through S-Slips on End Panels, then drive #12 self-drilling screws.

Fasten Core Stacks to Core Center Spacers.
Drill 1/8" pilot holes through S-Slips on Center Spacer(s), then drive #12 self-drilling screws:
(12) screws per Spacer for three-stack units;
(16) screws per Spacer for four-stack units.

Caulk gaps where corners of the Cores meet at the S-Slips to prevent air leakage between compartments.

⚠ CAUTION

Drive screws only into the s-slips connecting the cores to the end panels and center spacers!

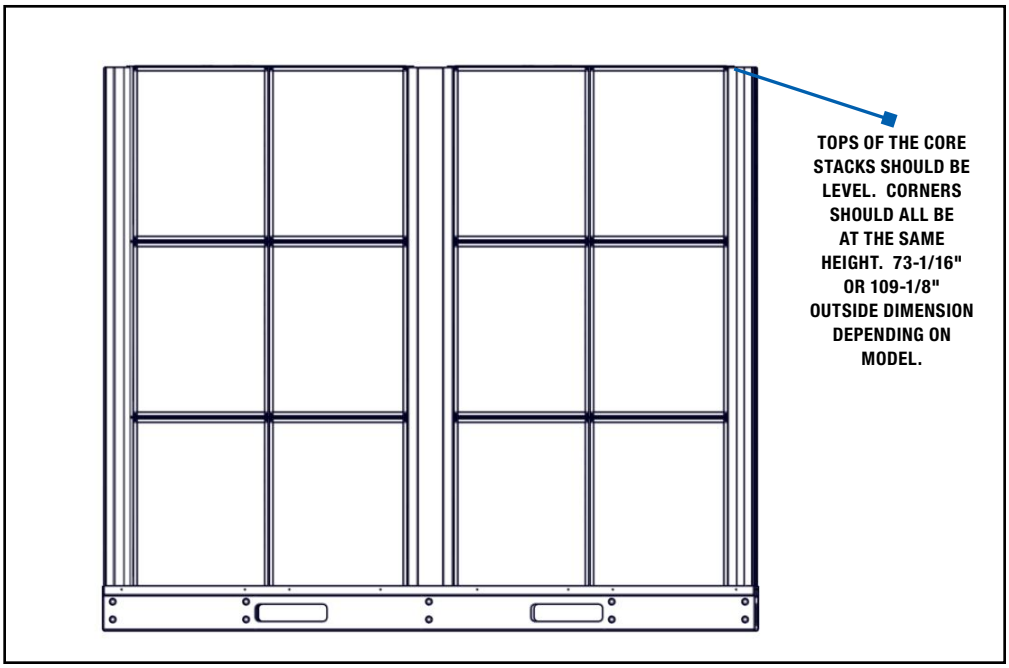


FIGURE 2.2.7 CORE STACKS AND END PANELS MUST BE PLUMB AND LEVEL

NOTE: See Section 2.1, Airstream and Filter Arrangements, to determine the proper number and location of Twinned Filter Racks for your job.

2.2.6 Assemble Twinned Filter Rack(s)

For each Twinned Filter Rack you will need:

(1) Right-hand Filter Rack,
(1) Center Spreader Bar, and
(1) Left-hand Filter Rack.

Remove Filters from Filter Racks. Connect the Twinned Filter Rack parts together. Make sure the flanges point forward, see Figure 2.2.8.

Screw the Filter Racks to the Center Spreader Bar, see Figure 2.2.9. Use #8 self-drilling screws for each of the two Filter Racks.

Replace Filters. Filters are marked for airflow direction: remember, the filters are on the inlet sides of the Energy Recovery Cores.

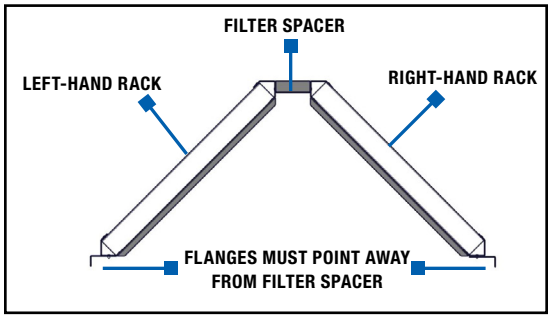


FIGURE 2.2.8 PARTS OF TWINNED FILTER RACKS (TOP VIEW)

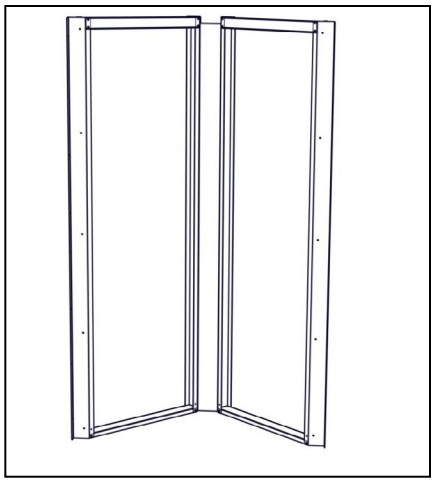


FIGURE 2.2.9 ASSEMBLE TWINNED FILTER RACKS

2.2.7 Install Filter Racks

Install Twinned Filter Rack(s), see Figure 2.2.10 on next page.

Set Filter Rack on Base between Core Stacks. Make sure racks are right side up (so filters can be pulled up and out of the racks).

Pull the Filter Racks towards the edges of the Base.

The flanges on the Filter Racks should be up very close to the S-slips on the Core Stacks, see Figure 2.2.12 on next page.

PA6X AND PA8X—ARRANGEMENT 2 AND 4 ONLY: Attach Flanges to each of the ramaining Single Filter Racks before installing them.

Place the Single Filter Racks (if any) against the Core Stacks. See Figure 2.2.11 on next page.

The back flange of the Filter Rack should tuck tight into the inner corner of the End Panel.

Align the flanges of the Filter Racks with the S-Slips on the Core Stacks, see Figure 2.2.12.

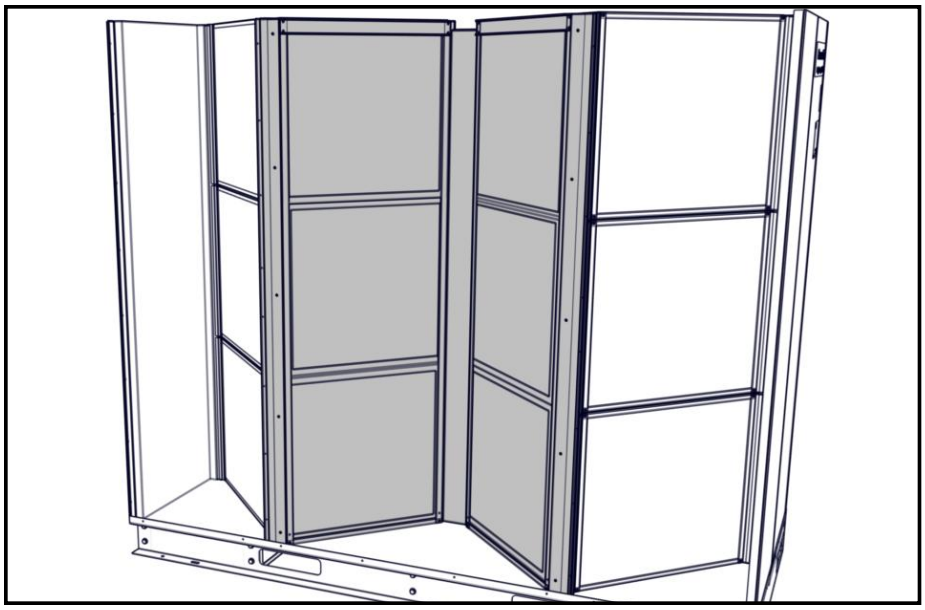


FIGURE 2.2.10 PLACE TWINNED FILTER RACKS AGAINST ENERGY RECOVERY CORES (TWO-STACK UNITS)

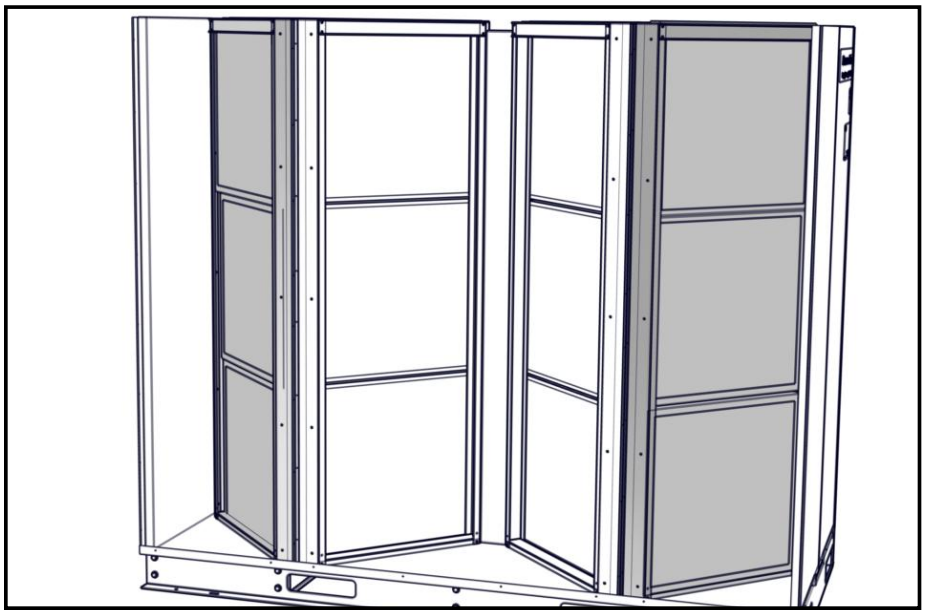


FIGURE 2.2.11 PLACE SINGLE FILTER RACKS AGAINST APPROPRIATE CORE STACK FACES

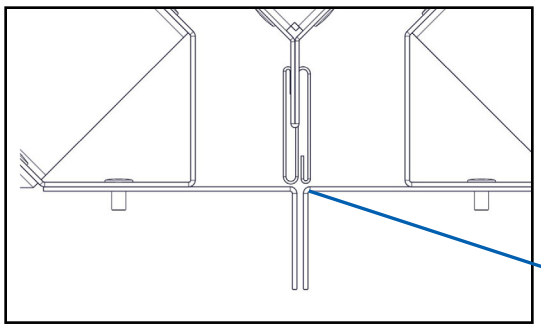


FIGURE 2.2.12 ALIGNMENT OF FILTER RACK FLANGES AND CORE STACKS

⚠ CAUTION

It is extremely important that the panels and filter racks are placed correctly for the airflow configuration used in this job.

See Drawing on pages 18 and 19 for layout of panels as viewed from each side of the Array.

⚠ CAUTION

It is extremely important that the panels and filter racks are placed correctly for the airflow configuration used in this job.

See Drawing on pages 18 and 19 for layout of panels as viewed from each side of the Array.

⚠ CAUTION

Do not install any screws at this time!

2.2.8 Install Side Panels

Slide Flanges of Side Panels into S-Slips on Energy Recovery Cores, see Figure 2.2.13.

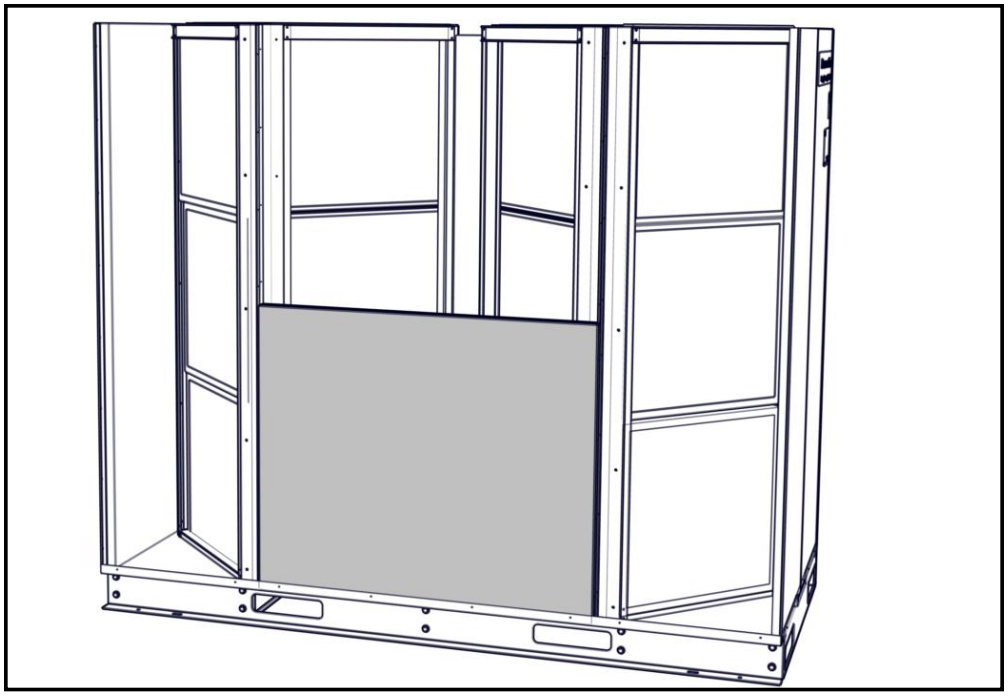


FIGURE 2.2.13 PLACE LARGE SIDE PANELS

Align Flanges of Filter Racks with edges of Side Panels. Flanges on Filter Racks tuck into the inside corner of the Side Panels that covers the compartment in which the Filter Rack is installed. See Figure 2.2.14.

⚠ CAUTION

Do not drive side panels all the way home yet—you will adjust them to final size in the next step.

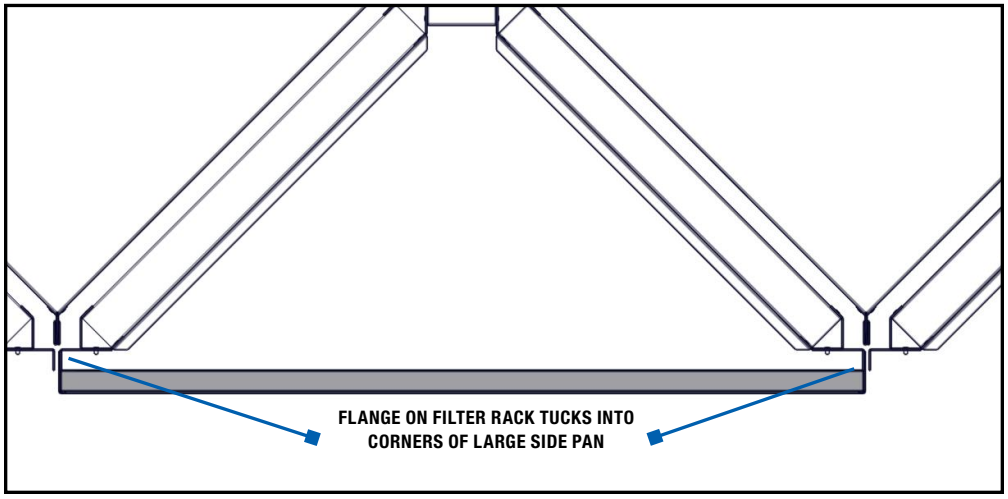


FIGURE 2.2.14 SIDE PANEL FIT

Continue with adding the small side panels. See Figure 2.2.15.

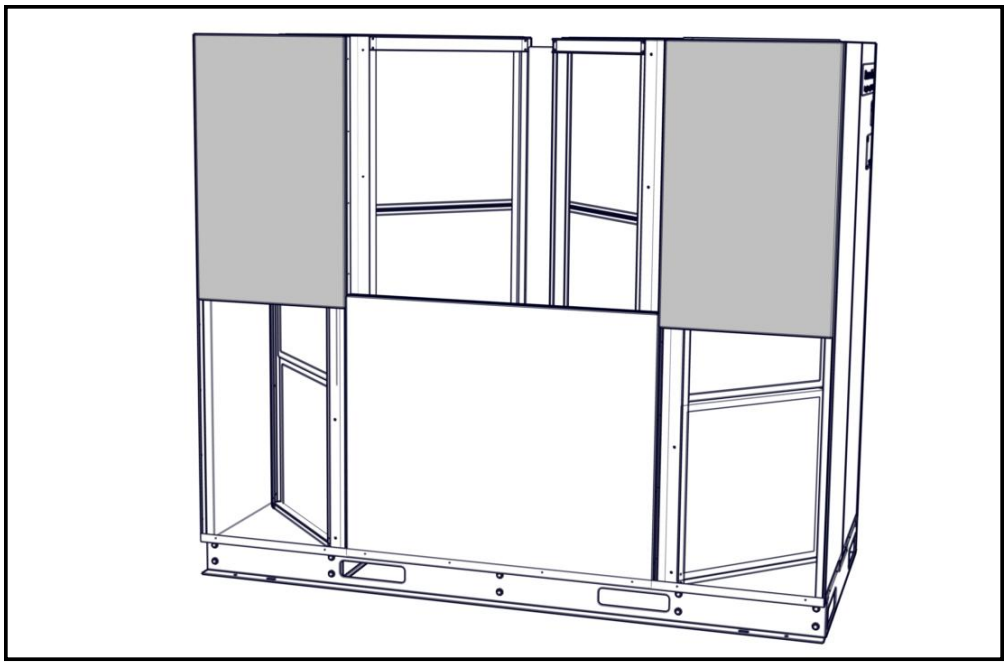


FIGURE 2.2.15 PLACE SMALL SIDE PANELS

2.2.9 Install Top Duct Flange

Install Long Top Duct Flange, Figure 2.2.16.

Attach each Top Duct Flange to Side Panels with #8 self-drilling screws. The Top Duct Flange should end just flush with each End Panel

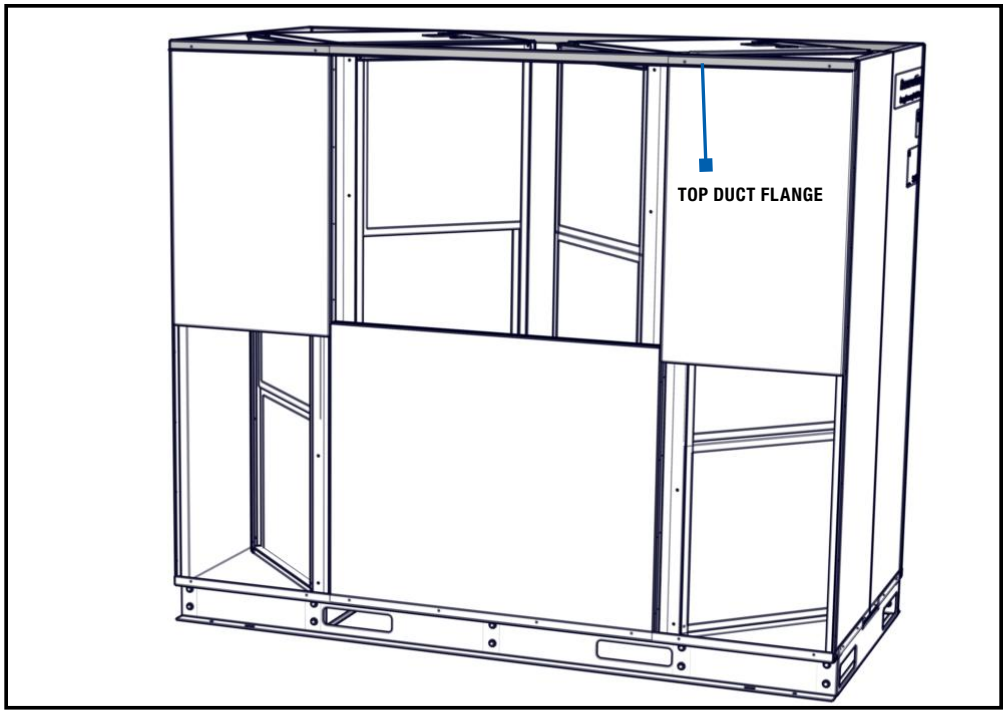


FIGURE 2.2.16 INSTALL TOP DUCT FLANGE

The Top Duct Flanges have notches that fit around the S-Slips and Core Flanges. The inside leg of the Top Duct Flange should fit between the Filter Racks and the Side Panels, see Figure 2.2.17.

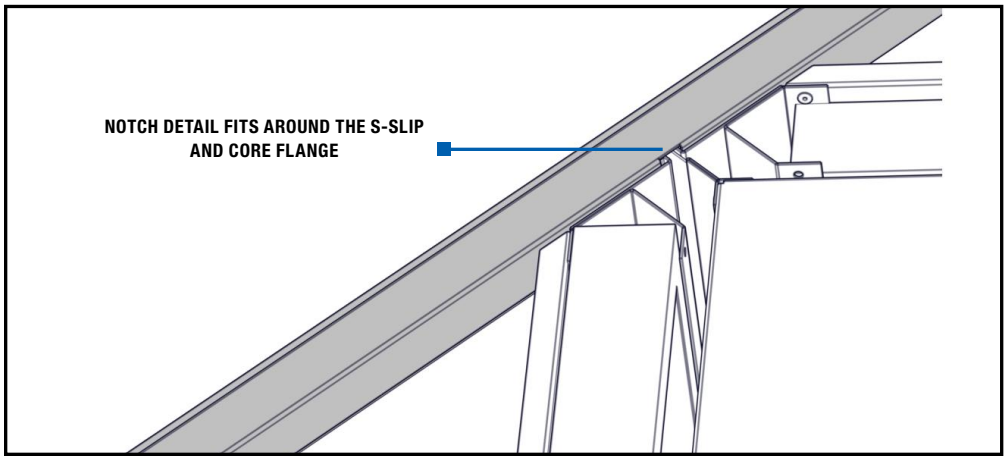


FIGURE 2.2.17 INTERSECTION OF CORE STACKS, FILTER RACKS, AND TOP DUCT FLANGE

2.2.10 Install End Cross Bars

Attach End Cross Bars to End Panels with (4) #8 self-drilling screws, See Figure 2.2.18.

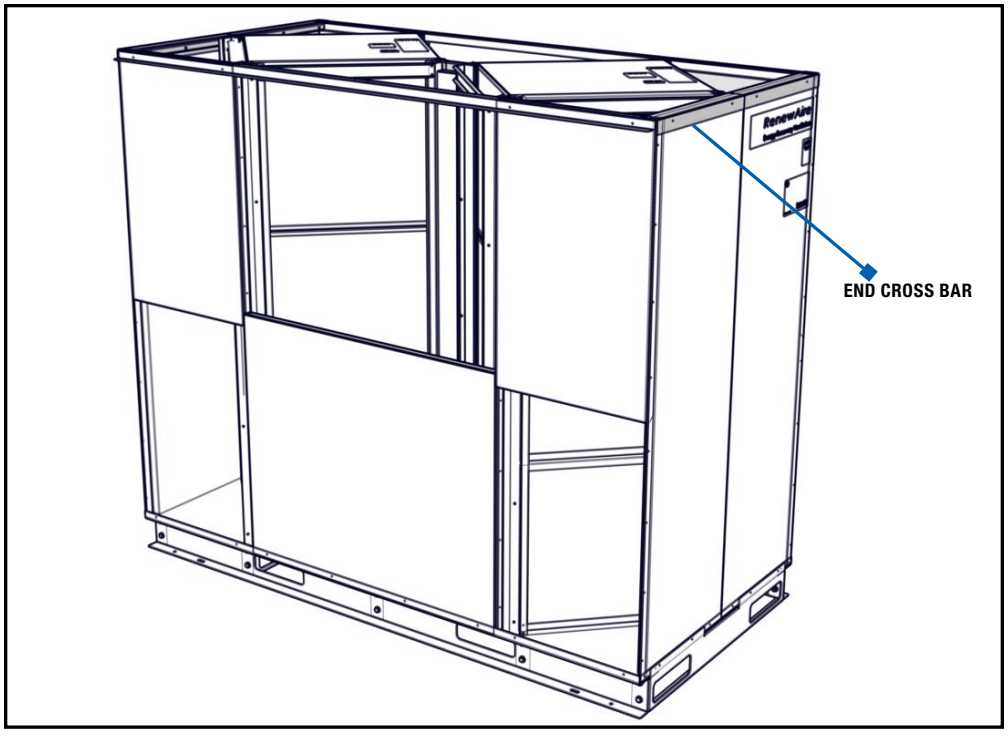


FIGURE 2.2.18 END CROSS BAR INSTALLATION

2.2.11 Install Duct Flanges

Install (2) L-Duct Flanges, one on each side of the unit, see Figure 2.2.19.

L-Duct Flange slips between the Side Panels and the Base. Do not screw these in place at this time.

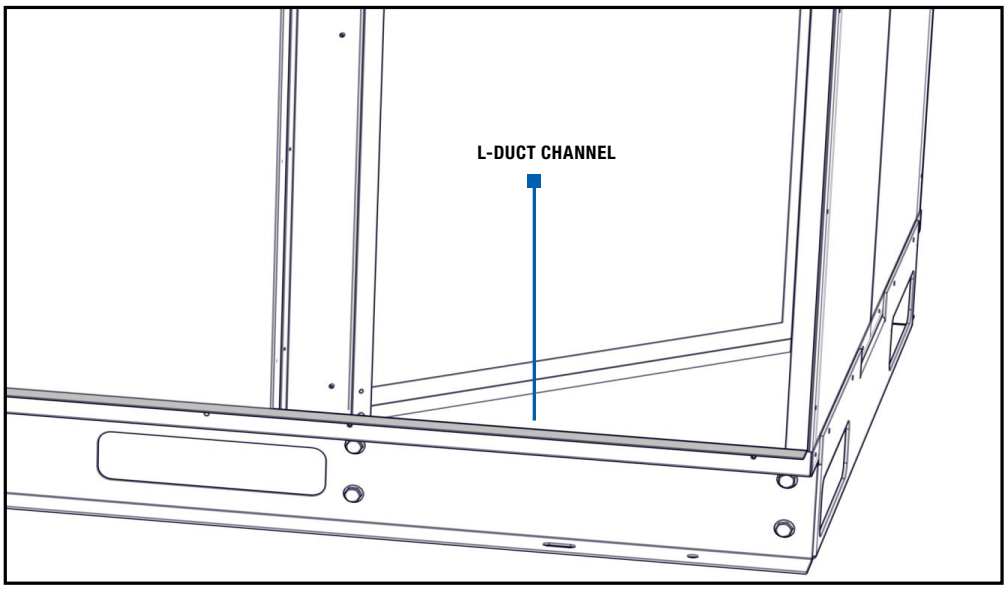


FIGURE 2.2.19 INSTALL L-DUCT CHANNELS

⚠ CAUTION

Do not install any screws at this time!

Install (8) Side Duct Flanges next, (4) on each side, see Figure 2.2.20.

Slide Side Duct Flanges into the slot in End Panels. Do not screw these in place at this time.

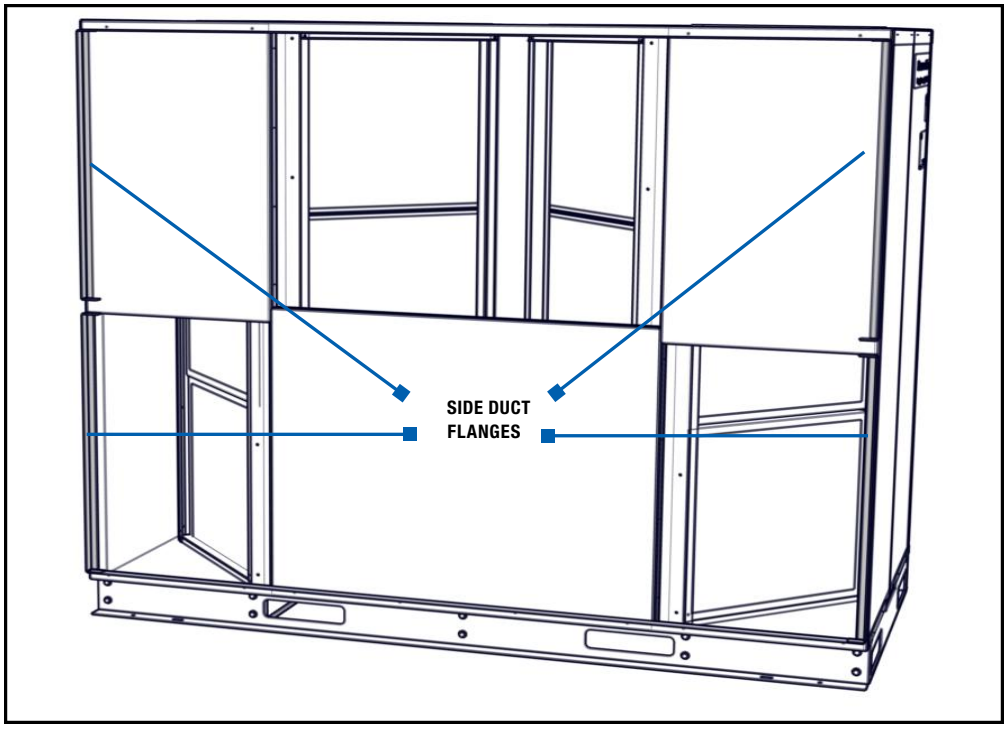


FIGURE 2.2.20 INSTALL SIDE DUCT FLANGES

⚠ CAUTION

Do not install any screws at this time!

Put U-Duct Flange in position, Figure 2.2.21. It should fit snugly between the Side Duct Flanges.

Attach U-Duct Flange to Side Panels using #8 self-drilling screws.

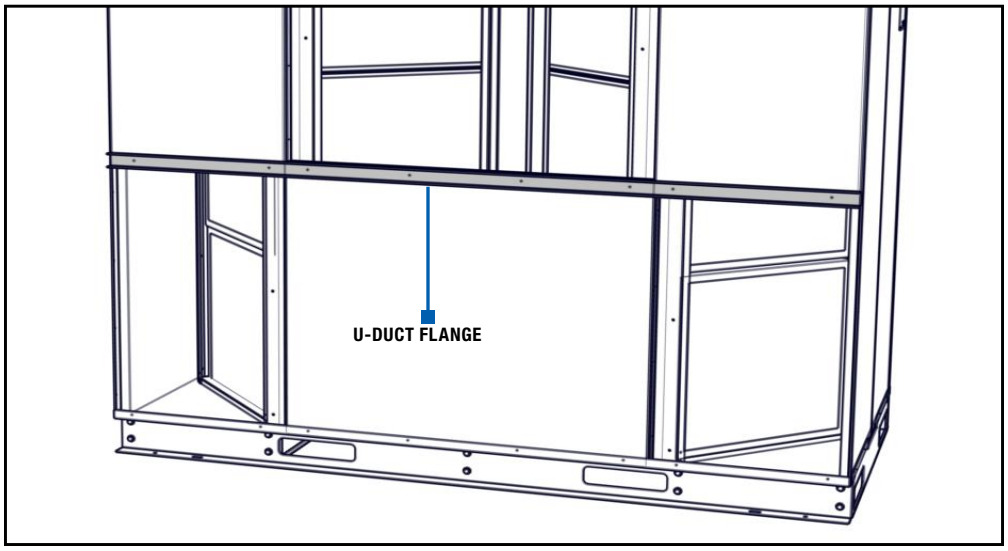


FIGURE 2.2.21 INSTALL U-DUCT FLANGE

Once the U-Duct Flange is attached, use (4) #8 self-drilling screws on each Duct Flange to attach them to the end panels and attach each L-Duct Flange using #12 self-drilling screws.

2.2.12 Install Top Cross Bar(s)

First, check spacing between the two Long Top Bars.

Attach each Top Cross Bar with (6) #8 self-drilling screws.

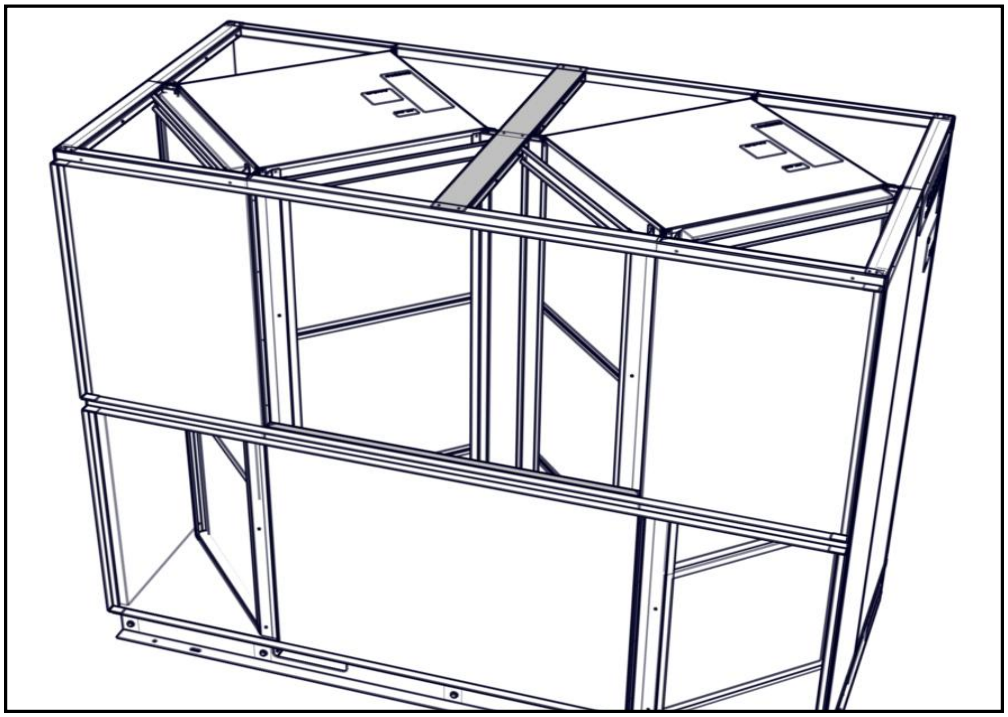


FIGURE 2.2.22 CENTER TOP CROSS BAR BETWEEN CORE STACKS

2.2.13 Screw Side Panels to Core Stacks and Filter Racks

Check that Side Panels form a flat plane.

Adjust panels in and out with a rubber mallet as needed.

Fasten all the Panels to the Core Stacks by screwing through the S-Slips, Figure 2.2.23.

Install screws through Filter Rack Flanges or S-Slips on Core Stacks to connect all pieces together. Use #12 self-drilling screws. Drill 1/8" pilot holes.

Caulk all accessible joints to prevent air leakage between compartments.

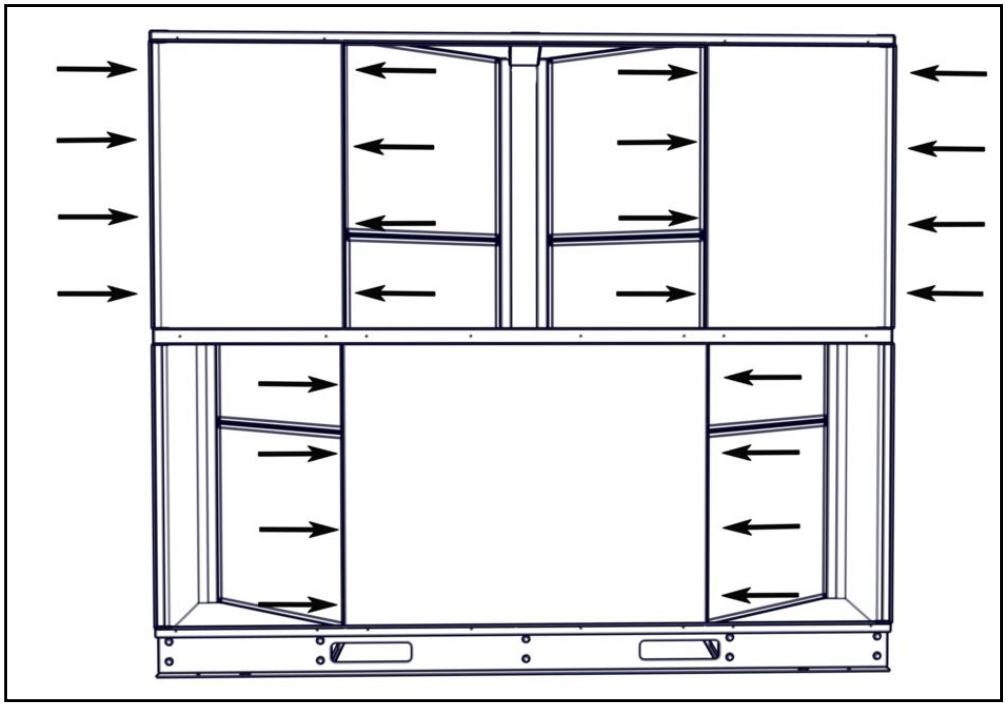


FIGURE 2.2.23 LOCATIONS FOR SCREWS

2.2.14 Install Doors

Install Doors, Figure 2.2.24. Each Door weighs 35 pounds.

Orient the Doors so their Latches grip the Cross Bars. Handles are closer to the End Panels and the Cross Bars than to the inlet/outlet faces.

Check for good compression of the DOOR gaskets. If necessary, adjust the inner latch to provide proper compression. Use a 1/8" allen wrench to loosen and re-tighten the set screw.

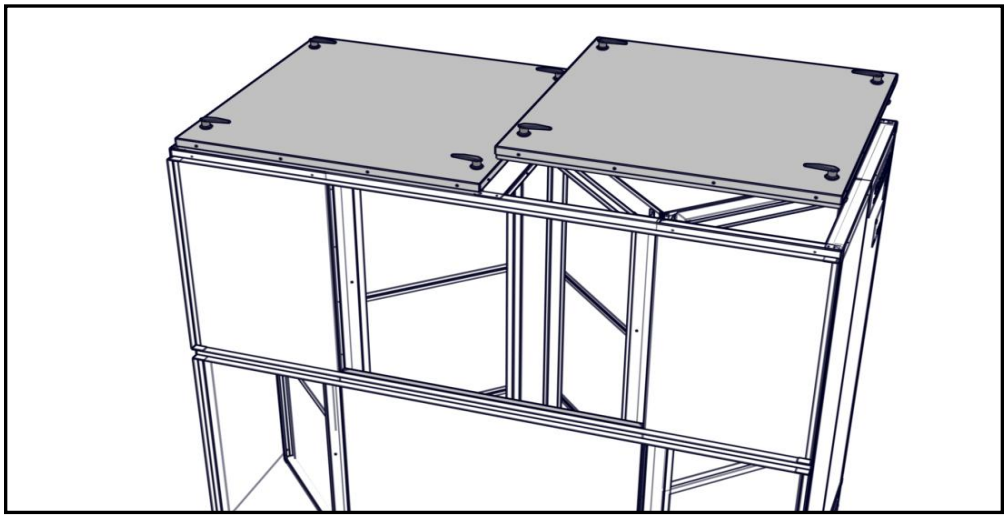


FIGURE 2.2.24 INSTALL DOORS

2.2.15 Final Caulking and Check-out

Apply final caulking, Figure 2.2.25. Purpose of caulking at this stage is to prevent leakage of air from ducts.

Assembly is complete!

Check the following:

- Panels and filter racks are placed correctly for the airflow paths required for the job.
- No air gaps between compartments.

Proceed with installation of plenums, ducts, and blowers.

NOTE: Duct flange sizes are show in unit dimensional drawings and the beginning of this manual.

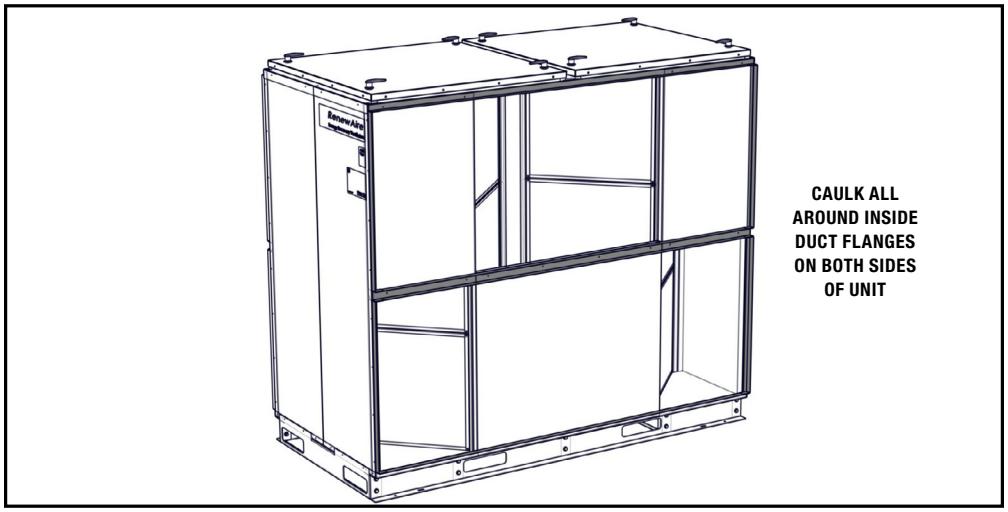


FIGURE 2.2.25 LOCATIONS FOR FINAL CAULKING

⚠ WARNING

Danger of carbon monoxide poisoning! Outside air intake should be 10' (minimum) away from sources of carbon monoxide or other toxic gases such as chimneys, furnace, or water heater exhausts.
Do not locate outside air intake where vehicles may be serviced or left idling. Do not locate the outside air intake inside an enclosed space.

⚠ CAUTION

Danger of Damage Due to Condensation in or on Ducts to Outside.

Both ducts connecting the unit to the outside must be insulated with sealed vapor barriers inside and out to prevent condensation and/or freezing inside the insulation or on the duct surface.

2.3 FORKLIFT INFORMATION

The assembled PA unit can be moved with a forklift for final positioning.
Minimum fork lengths are as follows:

PA6X and PA8X
- Side lift: 40"
- End lift: 40"

PA 9X and PA12X
- Side lift: 40"
- End lift: 66"

⚠ WARNING

Danger of injury to people when moving the unit! Observe the following:

1. Only properly trained, certified, and competent forklift operators may move the unit.
2. Units are large and will block forward vision. An assistant must be present to direct the operator.
3. Keep forks level while entering the unit base.
4. Keep unit level while moving.

⚠ CAUTION

Avoid damage to unit! Observe the following:

1. Unit weights are shown in dimension drawings at the front of the manual.
2. See drawing for maximum fork size and correct fork spacing.
3. See chart for mimum fork lengths.
4. Keep forks level while entering the unit base.
5. When lifting unit from sides, be careful not to crush the duct flanges.

NOTE: System blowers are not provided with the PA-Series and are provided by others.

3.0 OPERATION

3.1 BASIC FUNCTION OF PA-SERIES ERV

The PA-Series ERV transfers heating or cooling energy from an exhaust airstream to a fresh airstream.

The energy-recovery cores operate with no moving parts. The energy-recovery cores will transfer energy between the two airstreams as long as airflow is maintained.

Filters are provided with the unit so that the faces of the evergy-recovery cores need not be cleaned more often than annually. Filters must be maintained, see Section 4.0 Maintenance.

3.2 CHECKING OPERATION OF THE PA-SERIES

3.2.1 Airflow

Energy recovery will not occur unless airflow is occuring in both airstreams. One place to confirm that air is moving is at the weatherhoods where air is exhausted and brought in.

If close control of the airflow vollume is critical, it may be desirable to permanently install flow measuring stations in the ductwork connected to the unit. These also can be used to determine when filters should be cleaned or changed.

NOTE: The precise determination of energy exchange effectiveness in the field is quite difficult. Accurate determination of the supply and return mass airflow volumes is required. Also, temperatures must be very carefully measured. The leaving airstreams display significant temperature distribution

3.2.2 Energy Exchange

When there is significant temperature difference between the inside and outside air, it should be possible to measure a change in temperature (in either airstream) before it enters and after it leaves the unit.

The temperature increase or decrease in each airstream is a function of:
1. the number of cores in the system;
2. the flow rates of the two airstreams;
3. temperature difference between the two airstreams.

See the product specification sheets to determine the expected energy exchange effectiveness under specific conditions.

The accuracy of temperature exchange effectiveness calculations can be improved by calculating effectiveness separately for each airstream, then averaging the results. Accuracy is also better (uncertainty is lower) when the temperature difference between the entering airstreams is at least 20˚F. Nonetheless, it is generally impossible to measure effectiveness in the field with an uncertainty less than 10%.

3.2.3 Operating Controls

The operating controls are not supplied with the PA-Series. A wide variety of control schemes may be selected by the engineer, installer, or owner to meet the ventilation needs of the facility.

3.2.4 Continuous Operation

Continuous operation is acceptable in virtually all conditions. With continuous operation in very cold weather, some frost may accumulate on the outside of the case. If the system is cycled off periodically, this frost will re-evaporate. Frost on the outside of the case does not necessarily indicate any frost inside the Energy Recovery Core.

3.2.5 Operation in Extreme Cold Weather

The unit is capable of operating at outside temperatures down to -10˚F, with indoor humidities below 40%. Units can operate at more severe conditions occasionally with brief or no impact on its performance. At lower humidities, it can operate at lower outside temperatures without freezing the energy-exchange core.

4.0 MAINTENANCE

⚠ WARNING

Danger of eye injury from moving air when servicing energy exchanger! Always disconnec power source before servicing, to ensure no airflow in the system.

⚠ CAUTION

Maintenance procedures must be followed.
System will not perform as designed unless filters are changed and the energy recovery cores are cleaned as described below.

4.1 CHANGING THE FILTERS

Every 2–3 months when the unit is in regular use, or as needed to maintain flow.

To access the filters:

- Remove the Doors from the top of the PA-Series.
- Reach down into the Filter Racks to remove the top two filters. (A Filter Removal Hook is provided for removal of the bottom two filters in each rack).
- Replace the filters. Check filters for correct airflow direction (filters are upstream of Cores).

4.2 CLEAN ENERGY EXCHANGE CORES

Every 5,000 operating hours.

To clean the energy exchange cores:

- Remove the unit access panels and filters.
- Vacuum the exposed faces of the energy exchanges core with a soft brush.
- Vacuum out dust from the rest of the unit case.
- Install new filters.

⚠ CAUTION

Do Not Wash the Energy Exchange Core.

Keep it away from water or fire to avoid damaging it. Always handle the core carefully.

4.3 FILTER SPECIFICATIONS

Unit is shipped with MERV 8 filters (recommended). Do not replace with filters rated less than MERV 6.

20" x 20" x 2" (nominal) pleated filters
Actual size: 19.5" x 19.5" x 1.75"

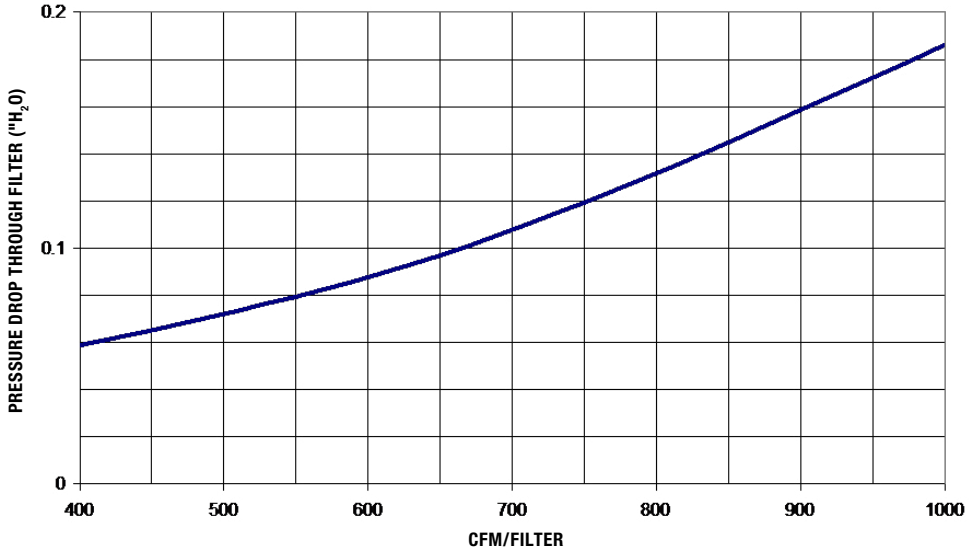


FIGURE 4.3.0 INITIAL RESISTANCE OF SUPPLIED MERV 8 FILTERS

5.0 FACTORY ASSISTANCE

In the unlikely event that you need assistance from the factory for a specific issue, make sure that you have the information called for in the Unit Records page in the Owner Information section of this manual. The person you speak with at the factory will need that information to properly identify the unit and the installed options.

To contact RenewAire Customer Service:

Call 800-627-4499

Email: RenewAireSupport@RenewAire.com

Remember that RenewAire Customer Service can only assist with the products sold by RenewAire, it cannot resolve engineering issues that result from air handling system design by others.

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About RenewAire

For over 30 years, **RenewAire has been a pioneer in enhancing indoor air quality (IAQ)** in commercial and residential buildings of every size.This is achieved while maximizing sustainability through our fifth-generation, static-plate, enthalpic-core **Energy Recovery Ventilators (ERVs) that optimize energy efficiency**, lower capital costs via load reduction and decrease operational expenses by minimizing equipment needs, resulting in significant energy savings. Our ERVs are competitively priced, simple to install, easy to use and maintain and have a quick payback. They also enjoy the industry's best warranty with the lowest claims due to long-term reliability derived from innovative design practices, expert workmanship and **Quick Response Manufacturing (QRM)**.

As the pioneer of static-plate core technology in North America, RenewAire is the largest ERV producer in the USA. We're **committed to sustainable manufacturing** and lessening our environmental footprint, and to that end our Waunakee, WI plant is 100% powered by wind turbines. The facility is also one of the few buildings worldwide to be LEED and Green Globes certified, as well as having achieved ENERGY STAR Building status. In 2010, RenewAire joined the Soler & Palau (S&P) Ventilation Group in order to provide direct access to the latest in energy-efficient air-moving technologies. For more information, visit: renewaire.com

201 Raemisch Road | Waunakee, WI | 53597 | 800.627.4499 | RenewAire.com

Soler&Palau Ventilation Group
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