



Supplement Installation Instructions

This document is a supplemental installation instruction for the EnergyX factory installed Energy Recovery Ventilator. It is to be used in conjunction with the base rooftop unit Installation Instructions and Start-Up/Operation Instructions.

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components.

Only trained and qualified service personnel should install, repair, or service air-conditioning equipment. Untrained personnel can perform the basic maintenance functions of replacing filters. Trained service personnel should perform all other operations.

When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply. Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol:  When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol.

DANGER identifies the most serious hazards which **will** result in severe personal injury or death.

WARNING signifies a hazard which **could** result in personal injury or death.

CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage.

NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

IMPORTANT: There are two different design revisions of EnergyX units. This manual covers EnergyX version-2 units, which can be identified by one of the following options in position #14 of the PG or PM model number: E, S, T, V, W, X, Y, Z or 1.

EnergyXv1 designs are identified by digit 14 options G, H, K, L, N, P and R. Refer to Installation Supplement EXCL-4si for EnergyXv1 models.

GENERAL

This publication contains Installation, Start-Up, Controls, Operation, Troubleshooting and Service information for the EnergyXv2 Energy Recovery system, factory installed on a 48/50PG or 48/50PM rooftop unit. This document is a supplemental installation instruction and is to be used in conjunction with the base rooftop unit Installation Instructions and Start-Up/Operation Instructions for ComfortLINK units only.

The EnergyXv2 Energy Recovery system is designed to precondition the outside air prior to it entering the rooftop unit evaporator using building exhaust air as a heat sink / source. The EnergyXv2 system provides latent and sensible energy exchange between the outside ventilation air and the building exhaust air. This preconditioning of air allows higher operating efficiencies, increased comfort control, potential downsizing of the base rooftop unit while still meeting the ASHRAE ventilation requirements. Operational cost savings are realized by the high efficiency Energy Recovery device meeting the cooling and heating call for a larger portion of the operating cycle than just a normal damper or economizer device. This is demonstrated by the EnergyXv2 AHRI Guideline-V Combined Efficiency Factor.

The EnergyXv2 is a factory integrated, single piece, fully tested and certified energy recovery system specifically designed for the Carrier Centurion rooftop units with ComfortLINK. It uses a single power supply and a single roofcurb.

The EnergyXv2 is shipped in the vertical supply and return duct configurations only. A horizontal adaptor curb can be purchased for horizontal return configuration. The unit supply configuration can be field converted from vertical to horizontal supply, however, the PM16-28 models require a separate horizontal supply-air conversion kit. See the base unit product data for indoor fan performance when unit is operating in the horizontal supply air configuration.

The EnergyXv2 Energy Recovery Wheel is rated in accordance with ARI 1060 and is ETL certified.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lockout tag. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may cause equipment damage.

This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.



WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

INSTALLATION

An EnergyX unit is installed as a single piece unit. To install an EnergyX unit, follow the base unit installation instructions with the following exceptions and additions:

Install roofcurb

Vertical Airflow Configurations

The EnergyXv2 unit uses the standard PG or PM base unit roofcurb. No extra curb support rails or extensions are required. See the unit nameplate for model number designation. Refer to the base rooftop installation manual for roofcurb instructions. Ductwork must be attached to the curb.

Horizontal Airflow Applications

EnergyXv2 units with a horizontal return air configuration require a horizontal adaptor curb. Refer to the base rooftop installation manual and the horizontal curb adaptor manual for roofcurb instructions. EnergyXv2 units can be field converted for horizontal supply configurations. 48/50PM 16-28 units require an accessory horizontal conversion kit to convert the supply air to horizontal configuration.

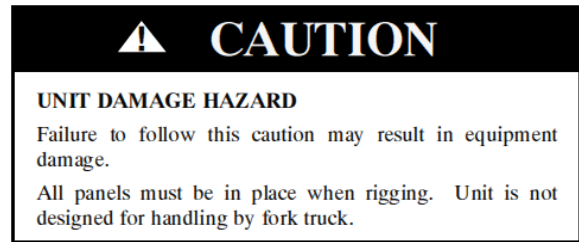
Rig and place unit on curb

Inspect the EnergyX system for damage. File a claim with the shipping company if shipment is incomplete or damaged.

See Table 1 & 2 for physical data.

For PG03-14 base units, see the rigging label on the exterior of the base unit and Figure 1A. This label is provided for guidance purposes ONLY. The unit's actual weight and center of gravity location will vary based on the specific combination of factory options included with the unit. Use prudent judgment when rigging and lifting the unit to account for weight variances and make adjustments for the actual center of gravity as necessary.

For PM16-28 base units, see the rigging label on exterior of base unit and Figure 1B. This label is provided for guidance purposes ONLY. The unit's actual weight and center of gravity location will vary based on the specific combination of factory options included with the unit. Use prudent judgment when rigging and lifting the unit to account for weight variances and make adjustments for the actual center of gravity as necessary.



Positioning

Maintain unit clearances as listed on EnergyX dimensional drawings (Appendix A) for minimum distance from combustible materials, proper airflow, and service access. Follow all local codes for proper clearances – the local code requirements take precedence over any clearance listed in this document. Contact your local Carrier representative for clearance obstructions and any potential resulting affect on unit warranty.

Follow all other curb, rigging, and positioning installation guidance in base rooftop unit installation instructions.

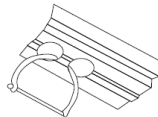


CAUTION - NOTICE TO RIGGERS: ALL PANELS MUST BE IN PLACE WHEN RIGGING.

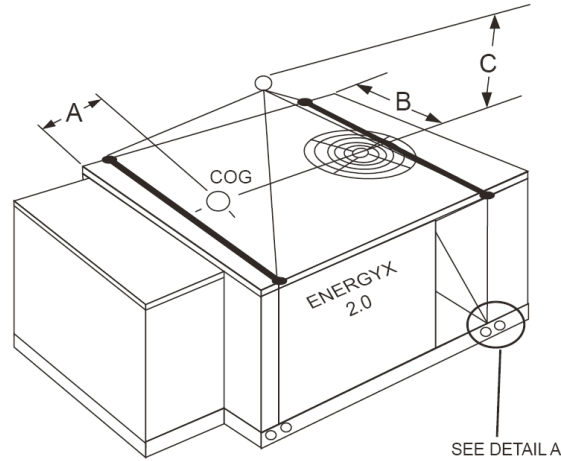
NOTICE TO RIGGERS: Hook rigging shackles through holes in base rails, as shown in Detail A. Use wooden top skid where applicable, when rigging to prevent rigging straps from damaging unit. On units without wooden top skid use spreader bars. Leave coil cover attached to unit while rigging to protect coil from damage.

CARRIER ENERGYX UNIT WEIGHTS				
	Max. Wt.	A	B	C
PG03	1094	26.1"	9.8"	36"-54"
PG04	1106	26.2"	9.7"	36"-54"
PG05	1221	27.7"	9.4"	36"-54"
PG06	1241	28.0"	9.3"	36"-54"
PG07	1281	28.4"	9.2"	36"-54"
PG08	1891	25.0"	15.1"	36"-54"
PG09	1898	25.1"	15.0"	36"-54"
PG12	1998	26.2"	14.7"	36"-54"
PG14	2074	27.0"	14.5"	36"-54"

*Dimensions and weights will vary depending on the specific EnergyX model number. Adjust lifting apparatus accordingly to maintain a level lift. Refer certified prints for specific weights and centers of gravity for each unit.



DETAIL A



Form No. 10688-1P

Figure 1A – EnergyX Rigging Details PG03-14 Units

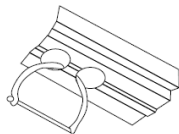


CAUTION - NOTICE TO RIGGERS: ALL PANELS MUST BE IN PLACE WHEN RIGGING.

NOTICE TO RIGGERS: Hook rigging shackles through holes in base rails, as shown in Detail A. **Note a 6-point rigging lift is required for these units.** Use wooden top skid where applicable, when rigging to prevent rigging straps from damaging unit. On units without wooden top skid use spreader bars. Leave coil cover attached to unit while rigging to protect coil from damage.

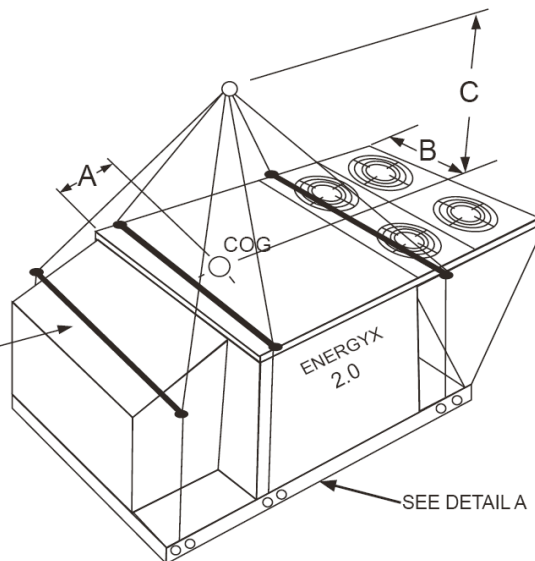
CARRIER ENERGYX UNIT WEIGHTS				
	Max. Wt.	A	B	C
PM16	4411	38"	67"	120"
PM20	4456	38"	67"	120"
PM24	4471	38"	67"	120"
PM28	4699	40"	68"	120"

*Dimensions and weights will vary depending on the specific EnergyX model number. Adjust lifting apparatus accordingly to maintain a level lift. Refer certified prints for specific weights and centers of gravity for each unit.



DETAIL A

Use spreader bar as required to eliminate unit damage



Form No. 9109-2P

Figure 1B – EnergyX Rigging Details PM16-28 Units

Make electrical connections

See the base unit name plate for the ETL certified singlepoint electrical values and component electrical information. See the base unit and EnergyX access doors for electrical wiring diagrams specific to each unit.

Main power

Follow all base unit installation instructions, using electrical values shown on unit nameplate. The EnergyX module designation is contained in the RTU model number position 14, and only one main power supply is required. The EnergyXv2 base rooftop unit and energy recovery module is ETL listed as a single point power supply only.

All constant volume units are 208/240v, a transformer is used on the main power of the ERV to step down from 460v or 575v as needed. Modulation ERVs can be 208/230v or 460v. On 575v applications a transformer is used to step it down to 460v.

All 208/230-v ERVs are factory wired for 230-v power supply. If the 208/230-v unit is to be connected to a 208-v power supply, the ERV transformer must be rewired. To do this, move the wire connection from the 240-volt orange wire connection to the 208-volt red wire connection on the primary side of the transformer. Refer to unit label diagram for additional information.

▲ CAUTION

Some electric heat modules require a dual-point electrical service connection independent from all other electrical circuits in the unit. Consult the unit installation instructions, unit wiring diagram and/or electric heater installation instructions for verification.

Control power

Follow all base unit installation instructions for low voltage wiring. The ERV control board is factory wired into the base unit communications via the protocol converter module. See Figure 3. All external control wires still connect to the RTU terminal strip as in the base unit installation instructions.

The EnergyXv2 modulating units can use an optional CO2 sensor for Demand Control Ventilation. If the optional CO2 sensor will be used, install and connect the sensor to the base unit ComfortLINK controller per CO2 sensor installation instructions. See the base unit ComfortLINK controls manual and the Configuration section of this manual for specific CO2 sensor configurations.

NOTE: CO2 operation is not supported on constant volume EnergyX models because typical CO2 economizer Demand Control Ventilation logic does not apply for this device.

Install Outdoor Air hoods

Install the EnergyXv2 supply and exhaust air hoods using supplied components. Hoods are shipped under the RTU condenser coil. **NOTE:** Outside Air hood may be factory installed on the ERV module.

1. Remove and discard the outside air opening covers on the end of the unit. See figure 1c.
2. Locate and remove the knocked down exhaust hood and the pre-assembled outside air hood from their shipping locations under the condenser coil. See figure 1c
3. Assemble the exhaust hood. See Figure 1d. Using screws provided in the hardware bag, screw the filter brackets to the side panels. Screw the side panels to the top panel. Screw the cross brace to the side panels. Screw the filter retaining clips to the top panel.
4. If 2-position motorized outdoor air damper kits were purchased, install the dampers per installation instructions in the accessory kit.
5. Apply the grey gasket from the hardware bag to the pre-assembled outside air hood and the assembled exhaust hood from step 3.
6. On 48/50PM 16-28 size units, connect the plastic airflow sensor tubing from the outside air opening to the corresponding labeled brass connection fittings on the hoods. The tubing should be coiled and tied inside the air opening of the unit and are marked for the high/low sensor port connections. See figures 1e and 1f. If a field installed 2-position damper is being used, the tubing must be routed thru the damper assembly and connected to the hood. See figure 1g.
IMPORTANT: The sensing tubes must be connected securely with air-tight connections to the fittings. The pressure sensing tubes provide data to the control module for CFM monitoring. Leaks in the tubing will result in inaccurate airflow readings.
IMPORTANT: The sensing tubes must be connected to the proper sensor high/low port for correct airflow measurement. If in doubt, follow the tubes back to the control box and determine which sensing module the tube is connected to. See Figure 3. When looking in the control box, the upper pressure sensor is for the supply air monitor and the lower is for the exhaust air monitor. On each hood sensor the fitting is labeled; the top barb is the high port and the bottom barb is the low port.
7. Using the seal tek screws provided, install the outside air hood to the ERV using pre-set holes. Install the aluminum water filter in the outside air hood held by the filter clips. See figure 1h.
8. Using seal tek screws provided, install the exhaust hood to the ERV using pre-set holes with the barometric damper completely within the hood. Remove shipping tape from damper blades. See figure 1h.

Base unit components

Follow the base unit installation instructions to install all other base unit components, including (but not limited to) flue hoods, condensate trap and other accessory devices.

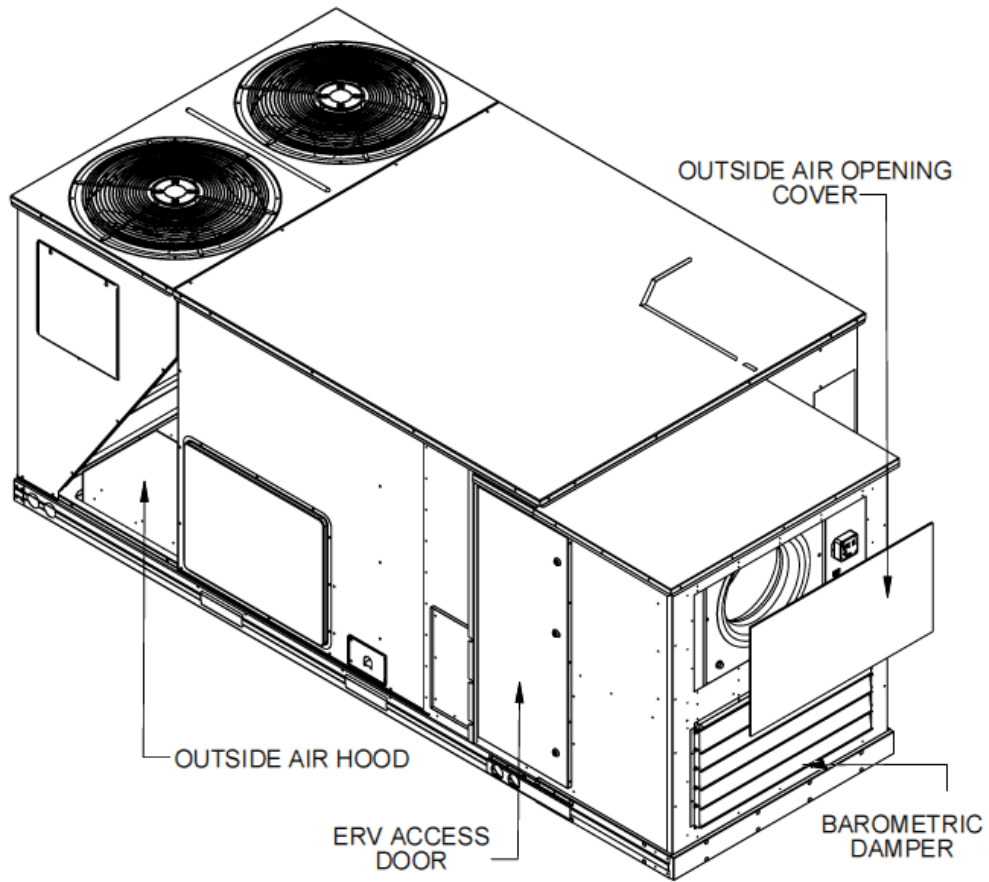


Figure 1c – Panel and shipping location

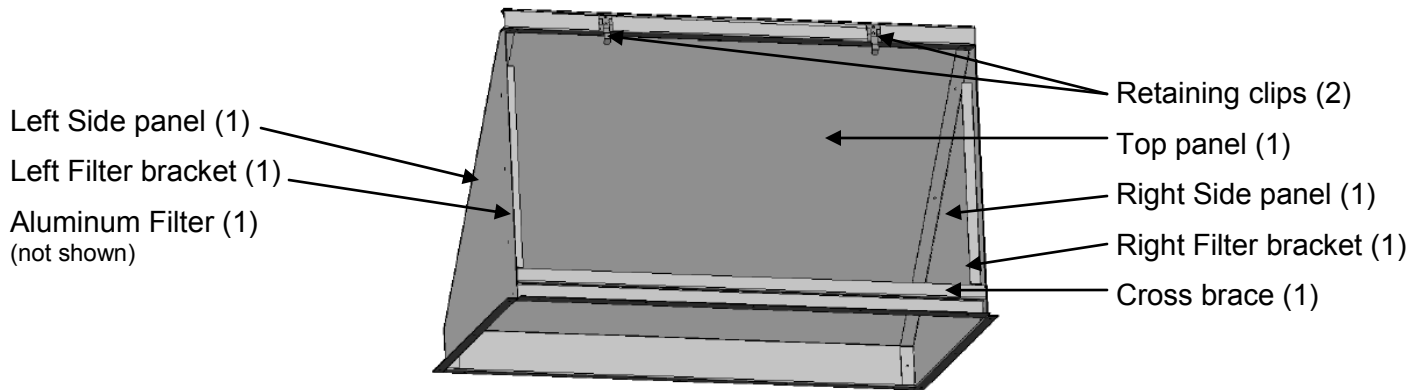


Figure 1d – Exhaust Hood Assembly
(view shown is from back of hood as it attaches to cabinet)

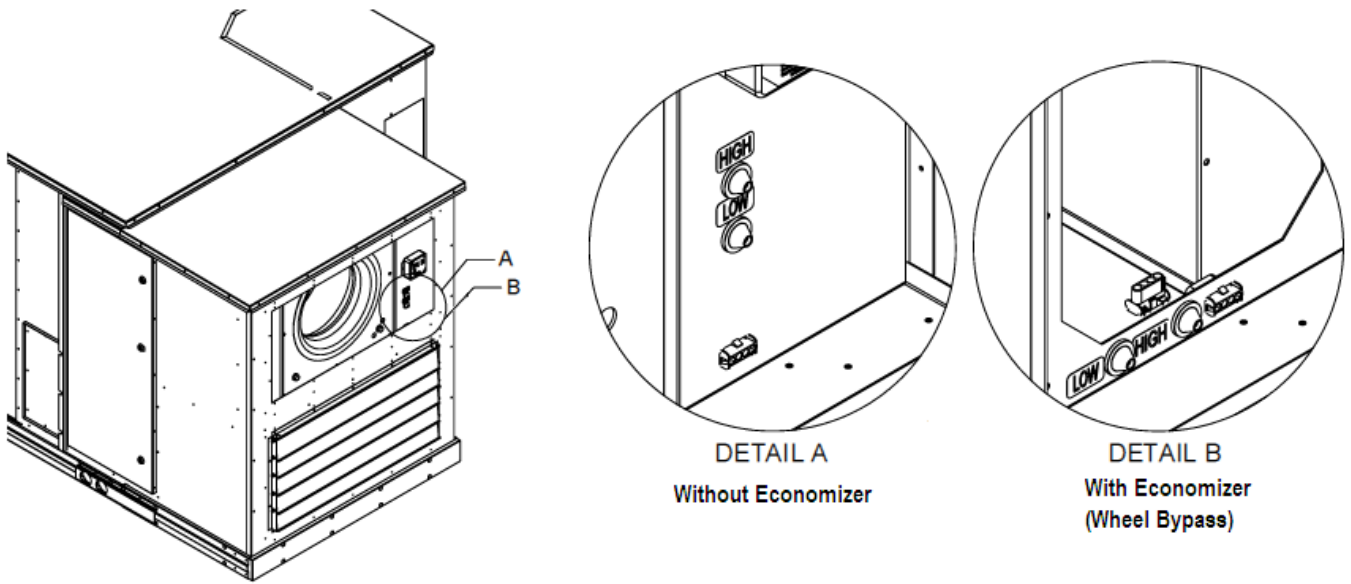


Figure 1e – Outside Air Tube Connections

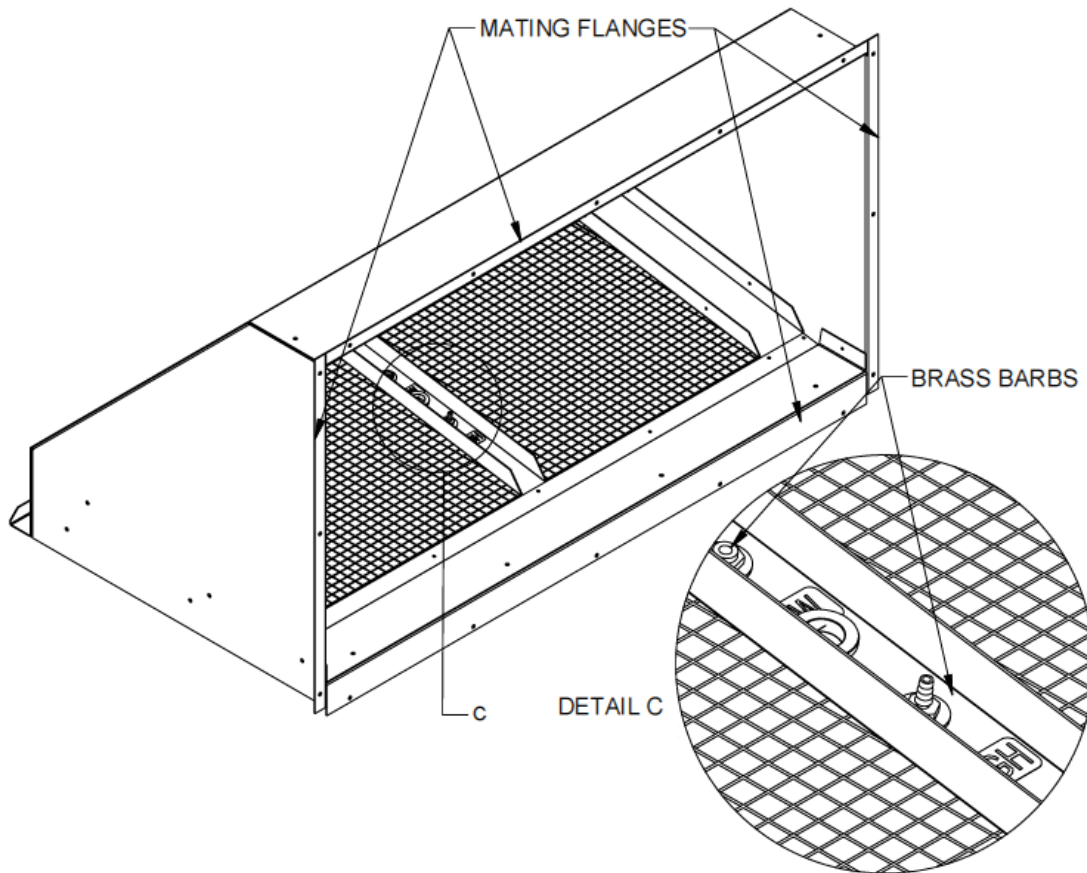


Figure 1f – Outside Air Hood

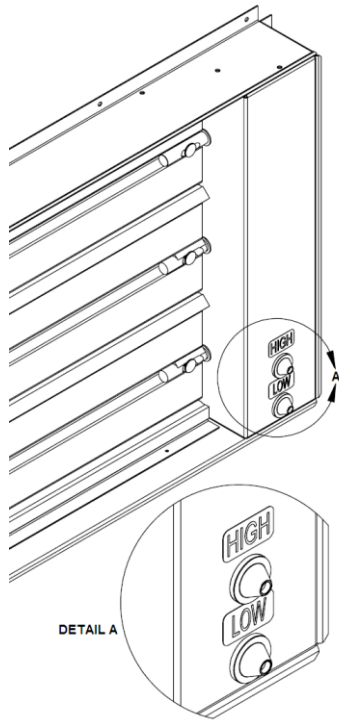


Figure 1g – 2 Position Damper Tube Connections

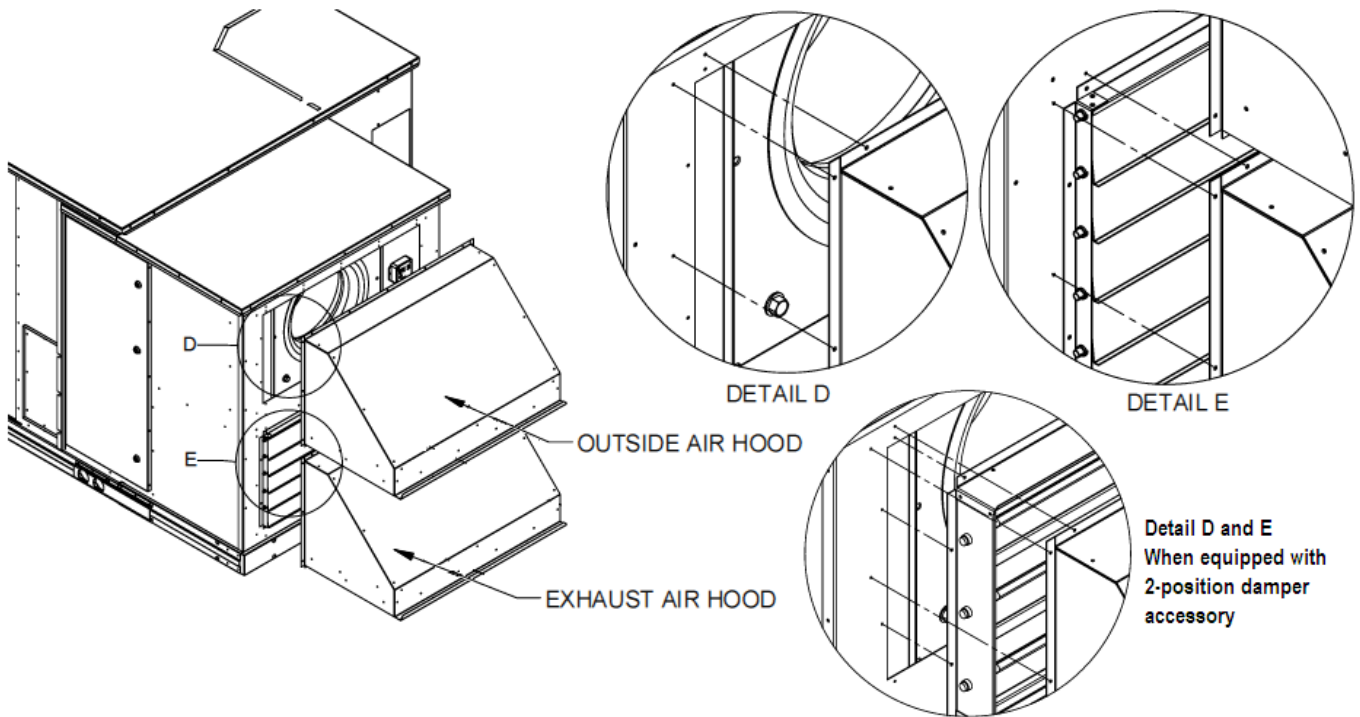


Figure 1h – Hood Installation

TABLE 1 - PHYSICAL DATA MODULATING CAPABLE ENERGYX UNITS

Model	PG 2 - 6 TON		PG 7.5 - 12.5 TON		PM 16-24 TON		PM 25 TON	
EnergyX SIZE	LOW CFM	HIGH CFM	LOW CFM	HIGH CFM	LOW CFM	HIGH CFM	LOW CFM	HIGH CFM
EnergyX UNIT TYPE	Modulating Air Flow Capability		Modulating Air Flow Capability		Modulating Air Flow Capability		Modulating Air Flow Capability	
ERV Wheel OA (CFM)	100 - 500	500 - 1400	500 - 1400	1400 - 3600	1400 - 3600	2000 - 6000	2000 - 3600	3000-8000
ERV WHEEL EA (CFM)	100 - 500	500 - 1400	500 - 1400	1400 - 3600	1400 - 3600	2000 - 6000	2000 - 3600	3000-8000
ECONOMIZER OPTION								
Max Economizer OA (CFM)	2,050	2,275	6,600	4,350	10,000	11,225	13,500	10,250
Max Economizer EA (CFM)	2,100	2,075	4,400	4,200	9,225	9,225	9,700	9,000
ENERGY RECOVERY WHEEL	Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating		Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating		Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating		Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating	
TYPE								
MODEL	ERC-1904	ERC-2513C	ERC-2513C	ERC-3628C	ERC-3628C	ERC-4646 C	ERC-3628C	ERC-5262C
SIZE (Dia. X Depth) (in.)	19 x 1	25 x 3	25 x 3	36 x 3	36 x 3	46 x 3	36 x 3	52 x 3
NOMINAL DRIVE MOTOR HP	N/A	N/A	N/A	1/20	1/20	1/6	1/20	1/6
SUPPLY FAN #1	1 - Backward Curved		1 - Backward Curved		1 - Backward Curved		1 - Backward Curved	
QTY - TYPE	1 - Backward Curved		1 - Backward Curved		1 - Backward Curved		1 - Backward Curved	
DRIVE TYPE	Direct		Direct		Direct		Direct	
BLOWER SIZE	400mm		400mm	500mm	500mm		500mm	
NOMINAL MOTOR HP	1.18		1.18	3.62	3.62		3.62	
SUPPLY FAN #2	N/A		N/A		N/A		Note 1	
QTY - TYPE	N/A		N/A		N/A		1 - Backward Curved	
DRIVE TYPE	N/A		N/A		N/A		Direct	
BLOWER SIZE	N/A		N/A		N/A		500mm	
NOMINAL MOTOR HP	N/A		N/A		N/A		3.62	
EXHAUST FAN #1	1 - Backward Curved		1 - Backward Curved		1 - Backward Curved		1 - Backward Curved	
QTY - TYPE	1 - Backward Curved		1 - Backward Curved		1 - Backward Curved		1 - Backward Curved	
DRIVE TYPE	Direct		Direct		Direct		Direct	
BLOWER SIZE	400mm		500mm		500mm		500mm	
NOMINAL MOTOR HP	1.18		3.62		3.62		3.62	
EXHAUST FAN #2	N/A		N/A		Note 2		Note 2	
QTY - TYPE	N/A		N/A		1 - Backward Curved		1 - Backward Curved	
DRIVE TYPE	N/A		N/A		Direct		Direct	
BLOWER SIZE	N/A		N/A		500mm		500mm	
NOMINAL MOTOR HP	N/A		N/A		3.62		3.62	
AIR FILTERS	2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency	
TYPE	2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency		2-in. Pleated, 30% Efficiency	
SUPPLY AIR (QTY) SIZE (in)	(2) 16 x 16 x 2	(2) 16 x 16 x 2	(2) 15 x 20 x 2	(2) 20 x 20 x 2	(2) 20 x 25 x 2	(3) 16 x 25 x 2	(2) 20 x 25 x 2	(3) 18 x 25 x 2
EXHAUST AIR (QTY) SIZE (in)	(2) 16 x 16 x 2	(2) 16 x 16 x 2	(2) 20 x 20 x 2	(2) 20 x 20 x 2	(4) 16 x 25 x 2	(4) 16 x 25 x 2	(4) 16 x 25 x 2	(4) 16 x 25 x 2
WATER ENTRAINMENT FILTER	Aluminum Mesh		Aluminum Mesh		Aluminum Mesh		Aluminum Mesh	
TYPE	Aluminum Mesh		Aluminum Mesh		Aluminum Mesh		Aluminum Mesh	
QUANTITY	1		1		1		1	
SIZE (L x W)(in)	30 x 13 1/8		34 7/8 x 17 1/2		60 1/2 x 18 1/8		60 1/2 x 20 1/4	

Notes

1. Second supply fan is standard and only applicable on PM 15-25 ton units with High-CFM EnergyXv2.
2. Second exhaust fan is standard on all PM 15-25 ton High-CFM EnergyXv2 units and only PM 15-25 ton Low-CFM EnergyXv2 with optional Economizer units.

LEGEND

ERV – Energy Recovery Unit
 OA – Outside Air
 EA – Exhaust Air

TABLE 2 - PHYSICAL DATA – CONSTANT VOLUME ENERGYX UNITS

PG Model	2 - 6 TON
EnergyX size	LOW CFM
EnergyX UNIT TYPE	Constant Volume Airflow
ERV Wheel OA (CFM)	100 - 500
ERV WHEEL EA (CFM)	100 - 500
ECONOMIZER OPTION	
Max Economizer OA (CFM)	2000
Max Economizer EA (CFM)	2000
ENERGY RECOVERY WHEEL	
TYPE	Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating
MODEL (AirXchange)	ERC-1906
SIZE (Dia. X Depth) (in.)	22.5 X 2
NOMINAL DRIVE MOTOR HP	0.10
SUPPLY FAN	
QTY - TYPE	1 - Forward Curved
DRIVE TYPE	Direct
FAN ISOLATION	Neoprene Rubber Pads
BLOWER DIMENSIONS (in.)	5.5 x 5.5
NOMINAL MOTOR HP	0.54
EXHAUST FAN	
QTY – TYPE	1 - Forward Curved
DRIVE TYPE	Direct
FAN ISOLATION	Neoprene Rubber Pads
BLOWER DIMENSIONS (in.)	5.5 x 5.5
NOMINAL MOTOR HP	0.54
ECONOMIZER EXHAUST FAN *	
QTY - TYPE	2 - Forward Curved
DRIVE TYPE	Direct
FAN ISOLATION	Neoprene Rubber Pads
BLOWER DIMENSIONS	5.5 x 5.5
NOMINAL MOTOR HP	0.54
FILTERS	
TYPE	2-in. Pleated, 30% Efficiency
EXHAUST AIR (QTY) - SIZE	(2) 10 x 20 x 2
SUPPLY AIR (QTY) - SIZE	(1) 10 x 20 x 2
WATER ENTRAINMENT FILTER	
TYPE	Aluminum Mesh
QUANTITY	1
SIZE (L X W)(in)	37 13/16 x 8 1/2

* Economizer exhaust fan only applicable on units with the optional economizer

LEGEND

ERV – Energy Recovery Unit
 OA – Outside Air
 EA – Exhaust Air

START UP

The EnergyX unit is operated in coordination with the base rooftop unit. Follow the base unit instructions for proper start-up with addition of the following:

Start-Up Check List

Use the EnergyX Start-Up checklist (on last page) in conjunction with the base unit Start-Up checklist from the base unit installation instructions. Fill in all blank data entries that are applicable to the exact unit being installed. Save the checklist for future service and maintenance use. It is recommended that a copy of the checklist be left with the unit in the literature slot on the base unit control box access door.

Base unit Evaporator Fan

Perform base unit instructions while balancing the RTU indoor fan. The ERV fans should be off during base unit fan set-up. To disable the ERV, disconnect the communication cable (RJ12 plug plugged in the LEN port). Before start-up and testing the ERV, verify that the ComfortLINK minimum damper positions are set to 0 and if not change them to 0. **Configuration** → **AIR.Q** → **AQ.MN** = 0, and **Configuration** → **AIR.Q** → **EC.MN** = 0.

NOTE: When plugging the communication cable back in there could be a 1 minute communication initialization process before the ERV will communicate with the base rooftop unit.

2-6 TON Constant volume ERV

The 2 to 6 ton low CFM constant volume ERVs are not equipped with an LCD screen, therefore there is not a test mode or configuration settings. ERV performance has to be adjusted mechanically. To adjust the ERV's supply and exhaust airflows, adjust the supply and exhaust fan speeds by using the following procedures.

Outside air and exhaust fans

After the Base unit's fan is balanced, the ERV fans can be set up. Plug the communication cable back in the rooftop's LEN port. Make sure the ComfortLINK is Service test Mode.

1. Turn the rooftop fan on (**Service Test** → **FANS** → **IDF** = On). Wait 45 second and verify that the ERV wheel, supply air fan and exhaust fan are running.
2. Close all access doors on the ERV and locate the four pressure ports on the outside of the cabinet. Measure the static pressure across both the outside air and exhaust air sides of the wheel and use the differential pressures in Table 3A to determine the CFM flowing through the wheel.
3. Adjust the Outside air supply and exhaust air electronic control motors (ECM) speeds for specific air flow requirements. Rewire the motor Black wire to another for desired speed. See Table 3B.

NOTE: If an economizer is installed there are three exhaust fans. The second and third fans are only used during free cooling.

Table 3A – Pressure Drop Across Wheel (inH2O)

CFM	Δ inH2O	CFM	Δ inH2O
100	0.18	550	0.66
200	0.24	600	0.72
250	0.30	650	0.78
300	0.36	700	0.84
350	0.42	750	0.90
400	0.48	800	0.96
450	0.54	850	1.02
500	0.60	900	1.08

Table 3B – Direct Drive (ECM) Speed Wiring

PLUG PIN #	WIRE COLOR	DESCRIPTION
1	Blue	Speed 1 (min)
2	Gray	Speed 2
3	Red	Speed 3
4	Black	Speed 4 (max)*
5	White	Neutral
6	Green	Ground

*Default wiring from the factory

Economizer free cooling power exhaust

When an economizer is installed with the ERV, the exhaust fan must also be set up to handle free cooling.

1. Make sure ComfortLINK is in Service Test Mode
2. Turn the rooftop fan on (**Service Test** → **FANS** → **IDF** = On). Wait 45 second and verify that the ERV wheel, supply air fan and exhaust fan are running.
3. Open the economizer damper to 10% (**Service Test** → **INDP** → **ECON** = 10). Wait 45 second for the ERV to shutdown.
4. While measuring the building/exhaust duct static pressure, adjust the economizer % open to allow more outside air to come into the building/unit. When the building pressure reaches the design value, record the economizer damper open percentage.
5. Turn on the power exhaust 1 relay (**Service Test** → **INDP** → **PE.1** = On). Wait 45 second for the ERV exhaust fan 1 to come on.
6. Continue to open the economizer damper until the building pressure again reaches the design pressure value, and record the economizer damper percentage.
7. Turn on the power exhaust 2 relay (service test - **INDP** - **PE.2** = on) Wait 45 seconds for the ERV exhaust fans 2 and 3 to come on.
8. Continue to open the economizer damper to the 100% open position. If the building/exhaust design pressure is exceeded on the way to 100%, record that percent damper position.
9. The recorded economizer damper positions can now be set in ComfortLINK for PE1 and PE2 configurations. (**Configuration** → **ECON** → **PE.1** & **PE.2** = recorded values). Default values for these points are 30% and 60%.
10. If a value was recorded in step 8, change the Econ Cool Max Position (Configuration - **ECON** - **EC.MX**) configuration must be changed from 100% to the recorded value.

2-25 TON Modulating ERV

The modulating ERVs are equipped with an LCD screen to utilize a test mode and configuration of the ERV. The following sections explain their functions. It is important that these configurations be set correctly in order for the ERV module to properly control the air performance.

ERV Test Mode

ERV Test Mode should be used when starting up an EnergyX unit to verify proper ERV component operation. It can also be used for troubleshooting. To enter test mode on the ERV, use the Scrolling Marquee to put the ComfortLINK RTU into test mode. Then go to the ERV LCD screen. It will display Test Mode Active and current CFM values. There are four tests which can be performed separately or together while in test mode. Press the

push button to enter test points. Use the turn pot to change the value of the test point and press the pushbutton to lock in the change. Press the pushbutton again to move on to the next test point. See Table 3C. Test points are listed in the order that they appear in the menu.

NOTE: The RJ12 communication cable must be plugged into the base unit ComfortLINK LEN port for ERV test mode to work.

The 4 test mode points are 2POS Damper, Wheel, OA Fan Speed, and EX Fan Speed. The 2 position damper can be opened and closed with the 2POS Damper point; the 2-position damper accessory must be installed. The ERV wheel motor can be turned on and off with the Wheel test point. The ERV's outside air (OA) and building exhaust air (EX) motors can be ramped up and down during test mode with their corresponding fan speed test points. Table 3C shows the test mode test points in the order they appear during test mode. Communication failures will cause test mode to end. The EXCB board LEDs will show active alarms during test mode.

NOTE: If 2 position dampers are installed, they must be opened in test mode while operating the other tests.

Table 3C – ERV Test Mode Points

TEST POINT	VALUE
Test 2POS Damper	ON/OFF
Test ERV Wheel	ON/OFF
Test OA Fan Speed	0-100 %
Test EX Fan Speed	0-100 %

ERV Configuration

The ERV configuration menu can be accessed from the ERV LCD screen. The rooftop unit ComfortLINK cannot be in service test mode to access ERV configurations. While the LCD is cycling through status points, press and release the pushbutton. The screen will display “ERV Configurations”. Press the pushbutton again to access the configuration points.

There are five configurations which can be changed. Use the turn pot to change the value of the configuration and press the pushbutton to lock in the change. Press the pushbutton again to move on to the next configuration point. See Table 3D, the configuration points are listed in the order that they appear in the menu. See operation section for details on individual configurations, brief descriptions are listed below.

Table 3D – ERV LCD Configuration points

CONFIGURATION	DEFAULT	RANGE
DCV OA SP CFM	1000	0 to 32000
Min Outside Air CFM	1000	0 to 32000
EX Air Offset CFM	-200	-17000 to 17000
ERV Control Config	1	0 to 2
ERV Unocc Run	YES	YES/NO

DCV OA SP CFM – This sets the lowest setting for ventilation using outside air. This is only accessible if CO2 sensors are installed and Comfortlink is configured properly.

NOTE: ERV must be equipped with optional economizer to operate with CO2 sensors.

Min Outside Air CFM – This sets the outside air ventilation rate when not using a CO2 sensor. When using CO2 sensors this sets the max amount of outside air for ventilation.

EX Air Offset CFM – This sets the offset for exhausting building air based on outside air being brought in.

ERV Control Config – This sets the type of ERV operation required. Currently this is the only mode of operation available. Changing this setting is not recommended.

ERV Unocc Run – This allows the ERV to run during the unoccupied period when the rooftop fan is brought on.

ERV with Economizer Additional Configurations

There are seven important ComfortLINK configurations that impact the ERV operation when equipped with optional economizer. To change these configuration use the ComfortLINK Scrolling Marquee, Navigator, or a CCN communication tool. Refer to the base unit Controls, Start-up, Operation, Service, and Troubleshooting manual for more information on using these tools. Table 3E shows these Comfortlink points that impact ERV operation. See operation section for details on individual configurations, brief descriptions are listed below.

Table 3E – Comfortlink Configurations

DISPLAY ITEM	EXPANDED TEXT	DEFAULT	RANGE
EC.EN	Economizer Installed	No: no FIOP Yes: FIOP	Yes/No
EC.MN	Econo Minimum Position	0	0 to 100
AQ.MN	Econo Min IAQ Position	0	0 to 100
IA.CF	IAQ Analog Input Config	0: no FIOP 1: FIOP	0=No IAQ 1=DCV 2=Override 3=Ctl Min Pos
IA.FN	IAQ Analog Fan Config	0	0=Never 1=Occupied 2=Always
AQD.L	AQ Differential Low	100	0 to 5000
AQD.H	AQ Differential High	700	0 to 5000

EC.EN – This tells the ERV that an optional economizer is installed

EC.MN and AQ.MN – Must be set to 0 so the base rooftop does not use the economizer for ventilation, only free cooling.

IA.CF – This tells the ERV that a CO2 sensor is installed. Only a value of 1 or 2 will allow the ERV to use the CO2 sensor value.

IA.FN – This tells the ERV if it can activate DCV during the unoccupied period.

AQD.L and AQD.H – These set the indoor air quality (IAQ) CO2 DCV operating range. Differential is based off a 400PPM outside CO2 value.

Adjusting ERV Options

The ERV can come with factory installed filter status, fan status, and/or frost protection. These options are factory configured when installed, but can be adjusted if field required. Refer to the Major Component section of this manual for details on each.

OPERATING SEQUENCE

General

An EnergyXv2 unit is a Centurion rooftop unit an energy recovery ventilator (ERV). It operates the ERV module in an integrated manner with the base rooftop unit. The base rooftop unit functions per the base unit sequence of operation, for information regarding ComfortLINK controller operation see the base rooftop unit Controls, Start-Up, Operations, Service, and Troubleshooting manual. The ERV will operate based on communication from the ComfortLINK controller. The following section discusses the ERV operation in detail. In summary, the ERV operates to provide pre-conditioned outside air for ventilation requirements. If equipped with an optional economizer the ERV can provide free cooling when the outside air conditions are satisfactory.

In general the ERV monitors occupancy and indoor fan state of the base unit to determine when to activate. The outside air fan(s) bring in the outside air pass it through the enthalpy wheel and into the rooftop mixing box. The building return air is pulled through the enthalpy wheel by the exhaust fan(s) and released outside. During operation the enthalpy wheel is rotating to use the building air to pre-condition the outside air. When free cooling is required and allowed the wheel is not needed to pre-condition the air therefore a damper (wheel bypass) is used to bring in the outside air directly to the mixing box.

Communication

The ERV relies on communication with ComfortLINK to operate. The ERV monitors ComfortLINK points to determine operation. If communication is lost the ERV will shut down and remain in the Off mode until communication is established. Refer to the troubleshooting section for details on communication failures. Table 4a and 4b shows the ComfortLINK points that the ERV monitors for operation and a brief description of their functions.

2-6 ton Constant Volume ERV

The Constant volume ERV is a simple ERV, meaning that it is either on or off and there is not a user interface. The ERV is controlled through communication with the rooftop unit and will operate in one of three modes, Off, On, or Free Cooling. When the rooftop is occupied (**Run Status** → **MODE** → **OCC**) and it's indoor fan is on (**Outputs** → **FANS** → **IDF**), the ERV will run in the On mode. If the rooftop is unoccupied or if its indoor fan shuts down, the ERV will shutdown. In the On mode, the ERV wheel will rotate, the outside air fan will be on, and the exhaust fan 1 will be on. Table 4a shows the ComfortLINK communication points.

Free Cooling Operation

Free Cooling is only available if an optional economizer (wheel bypass) is installed in the ERV. Free Cooling will be activated when the rooftop unit starts to use the economizer damper for cooling operation. The ERV will see this when the economizer damper position (**Outputs** → **ECON** → **EC.AP**) is greater than 5%. The outside air fan will shut down and the ERV wheel will utilize a "Stop/Jog" operation to periodically rotate the wheel and minimize potential dirt build-up and excess wear on one section of the wheel. Stop/Jog will rotate the wheel for 5 seconds then stop it for 5 minutes. The exhaust fans will turn on and off based on the rooftop's power exhaust relays. When the damper position gets above the ComfortLINK configuration (**Configuration** → **ECON** → **PE.1**) the power exhaust 1 relay (**Outputs** → **ECON** → **PE.1**) will energize and the ERV will turn on its exhaust fan 1. When the damper position gets above the ComfortLINK configuration (**Configuration** → **ECON** → **PE.2**) the power exhaust 2 relay (**Outputs** → **ECON** → **PE.2**) will energize and the ERV will turn on its exhaust fans 2 and 3.

Defrost operation

Defrost is only available when the optional Frost Protection is installed. The ERV will be set to defrost any time the ERV wheel is running and frost is detected on the wheel. Defrost runs for at least 2 minutes but continues to run until the frost is removed. The frost protection device senses a pressure differential across the wheel and trips when that differential is greater than the setpoint (default 2.0 in wc). For information on the frost protection device, refer to the Major Component section. When in Defrost, the wheel will be rotating and the outside air fan will be off. The exhaust 1 fan will be on and if equipped the exhaust fans 2 and 3 will be off.

NOTE: CO2 Sensors

A CO2 sensor cannot be used with the 2-6 ton Constant Volume EnergyX unit because it serves no purpose for constant volume energy recovery. A typical CO2 system used for Demand Control Ventilation allows the rooftop unit economizer to close below the normal minimum ventilation position unless a high CO2 signal is received. This reduces operational cost by not allowing excess ventilation air unless required due to high occupancy load. The high CO2 signal indicates the presence of larger number of occupants and a need for higher volumes of ventilation air. In this situation, the economizer would then open to a position above the normal minimum ventilation position to bring in more outdoor air. However, in a constant volume EnergyX unit, the ERV constant volume outdoor air ventilation setting is already set at this higher volume of outdoor air. Use of a CO2 sensor would artificially reduce the ERV pre-conditioning affect and thus reduce the efficiency of the ERV operation.

2-25 ton Modulating ERV

The modulating ERV is an intelligent ERV. It has variable speed fan motors and a LCD screen user interface. The ERV can provide a variety of volumes of outside air and offset it with different exhaust speeds. CO2 sensors can also be tied into it for Demand control ventilation (DCV) operation. The modulating ERV will operate based on occupancy and the rooftop's operating mode, the following sections explain operation in detail. Refer to Figure 2a for the overview flow diagram of a modulating ERV operation. Table 4b shows the ComfortLINK communication points. Table 4c shows the ERV's LCD screen menus and points.

Occupancy

The ERV will not be allowed to run unless it is determined to be occupied. The ERV monitors the rooftop's occupancy point (**Run Status** → **MODE** → **OCC**) to determine when it is occupied. The ERV watches the rooftop's indoor fan point (**Outputs** → **FANS** → **IDF**) to know when its indoor fan has started. When the rooftop is occupied and its indoor fan is on, the ERV is considered to be occupied and allowed to run. The ERV can also operate during the rooftop's unoccupied period. If the ERV is configured for unoccupied run (**ERV Configurations** → **ERV Unocc Run** = **YES**), then it will ignore the occupancy of ComfortLINK and allow occupancy any time the rooftop fan is on. If not configured for unoccupied run but there is a CO2 sensor installed and ComfortLINK is configured to turn on its indoor fan for demand control ventilation at any time (**Configuration** → **AIR.Q** → **IA.FN** = 2), the ERV will be occupied any time the rooftop indoor fan is on.

Modes of Operation

The ERV will always operate in one of six modes (OFF, ERV Mode, Free Cooling, DCV ERV, Defrost, or Test), depending upon the ComfortLINK mode and outside conditions. The ERV monitors the ComfortLINK CCN point NVO_MODE to determine the rooftops operating mode.

The NVO_MODE values tell the ERV what the rooftop mode is based on the following: 7 is Test, 3 and 10 are cooling, and the rest are just ventilation. The following sections describe each ERV mode and ERV operation during that mode.

Off Mode (ERV Operation Mode = 0)

The ERV will be set to the Off mode whenever the rooftop indoor fan is turned off, ERV is unoccupied, or if communication fails. During Off Mode, the ERV 2 position dampers will be closed and the wheel, outside air fans(s), and exhaust fan(s) will be off.

Test Mode (ERV Operation Mode = 5)

If at any time during operation, the rooftop is put in Service Test mode the ERV will be set to Test Mode. Refer to Start-Up section for Test mode operation. NVO_MODE will equal 7.

ERV Mode (ERV Operation Mode = 1)

ERV Mode is the basic operating mode of the ERV. With no options installed on the ERV this will be the only operating mode besides off and test. ERV Mode will be active when the rooftop ComfortLINK mode is Heating, Cooling, Fan Only, or Dehumidification (NVO_MODE = 1, 3, 9, or 14) and the ERV is occupied.

When in ERV mode, the ERV 2 position damper will be open and the wheel will be rotating. The outside air fan(s) will run at a speed that produces a CFM equal to the minimum outside air CFM setpoint (ERV Configurations → *Min Outside Air CFM*). The exhaust fan(s) will run at a speed equal to the required offset CFM. Refer to Exhaust Control for details on determining offset CFM.

Free Cooling Mode (ERV Operation Mode = 2)

Free Cooling Mode is only available if an optional economizer is installed in the ERV (Configuration → *ECON* → *EC.EN* = Yes). Free Cooling Mode will be active when the rooftop unit is in Free Cooling Mode or in Cooling Mode and the economizer damper position (Outputs → *ECON* → *EC.CP*) is greater than 5 % (NVO_MODE = 10 or 3). ERV occupancy tells the control which speed to start the outside air fan(s) during free cooling, because the outside fan(s) are needed to assist the indoor fan in bringing in outside air.

When in Free Cooling Mode, the ERV 2 position damper will be open and the wheel will be set to stop/jog operation. The rooftop unit will modulate the economizer damper to provide free cooling as if an ERV was not installed. As the damper opens the ERV outside air fan(s) will maintain a speed that produces minimum outside air CFM. Once the damper position passes that percent fan speed of the outside air fan(s), the fan(s) speed will ramp up directly with the damper position, up to 100%. The exhaust fan(s) will run at a speed equal to the required offset CFM. Refer to Exhaust Control for details on determining offset CFM..

Defrost Mode (ERV Operation Mode = 4)

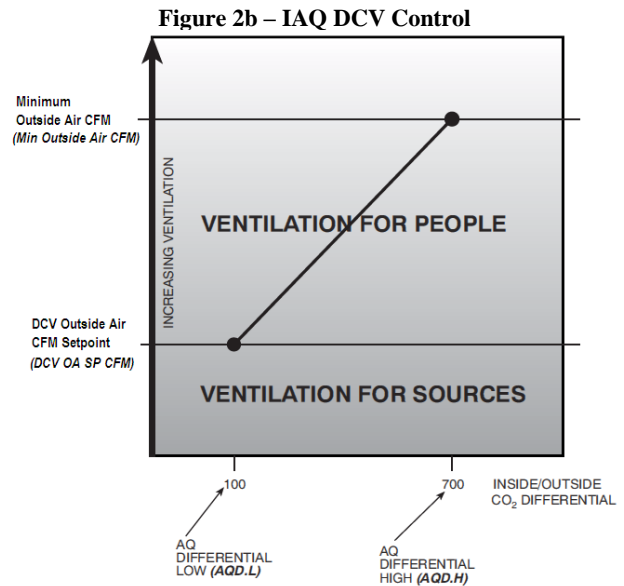
Defrost Mode is only available when the optional Frost Protection is installed. The ERV will be set to defrost mode any time the ERV wheel is running and frost is detected on the wheel. Defrost Mode runs for at least 2 minutes but continues to run until the frost is removed. The frost protection device senses a pressure differential across the wheel and trips when that differential is greater than the setpoint (default 2.0 in wc). For information on the frost protection device, refer to the Major Component section.

When in Defrost Mode, the ERV 2 position damper will be open and the wheel will be rotating. The outside air fan(s) will ramp down to 0% speed (shut-off). The exhaust fan(s) will run at a speed equal to the required offset CFM. Refer to Exhaust Control for details on determining offset CFM.

DCV ERV Mode (ERV Operation Mode = 3)

DCV ERV Mode takes the place of ERV mode if an optional economizer is installed in the ERV (Configuration → *ECON* → *EC.EN* = Yes) and when an optional CO2 sensor is installed on the rooftop unit (Configuration → *AIR.Q* → *IA.CF* = 1 or 2). DCV ERV Mode will be active when the rooftop ComfortLINK mode is Heating, Cooling, Fan Only, or Dehumidification (NVO_MODE = 1, 3, 9, or 14) and the ERV is occupied. When in DCV ERV mode, the ERV 2 position damper will be open and the wheel will be rotating. The outside air fan(s) will run at a speed that produces a CFM equal to the minimum outside air CFM determined by Demand Control Ventilation (DCV). The exhaust fan(s) will run at a speed equal to the required offset CFM. Refer to Exhaust Control for details on determining offset CFM.

Demand Control Ventilation (DCV) uses the indoor air quality levels (CO2 PPM) to determine how much outside air is required for ventilation. The ERV monitors the IAQ (Inputs → *AIR.Q* → *IAQ*) reading from the rooftop's installed CO2 sensor and compares it to a hard coded outside air value of 400PPM. The difference is then weighed on scale between AQ Differential Low (Configuration → *AIR.Q* → *AQD.L*) and AQ Differential High (Configuration → *AIR.Q* → *AQD.H*) to determine the minimum outside air CFM required for ventilation. The minimum outside air CFM can be equal to or between the DCV outside air CFM setpoint (*DCV OA SP CFM*) and the minimum outside air CFM setpoint (*Min Outside Air CFM*). As the CO2 differential rises from AQD.L to AQD.H, the ERV outside air CFM requirement will rise from DCV OA SP CFM to *Min Outside Air CFM*. The outside air fan(s) will ramp its speed % up or down to produce the required CFM. If at any time the CO2 sensor fails or IAQ reads 0ppm, the DCV minimum outside air requirement will be forced to the maximum value (*MIN Outside Air CFM*). Figure 2b shows the DCV minimum outside air CFM determination curve.



Exhaust Control

The ERV exhaust fan(s) operate to offset the outside air being introduced to the building. The required exhaust offset CFM is determined based on the exhaust offset setpoint (*ERV Configurations* → *EX Air Offset CFM*). The exhaust offset setpoint can be set as a negative or positive number to accommodate a requirement of positive or negative building pressure.

The ERV will determine the required amount of outside air CFM based on setpoints and current mode of operation. The exhaust air CFM is then calculated by the sum of the current required outside air CFM and the exhaust air offset setpoint. During defrost mode the exhaust will run the same as if the outside air fan(s) were still running.

Wheel Stop/Jog

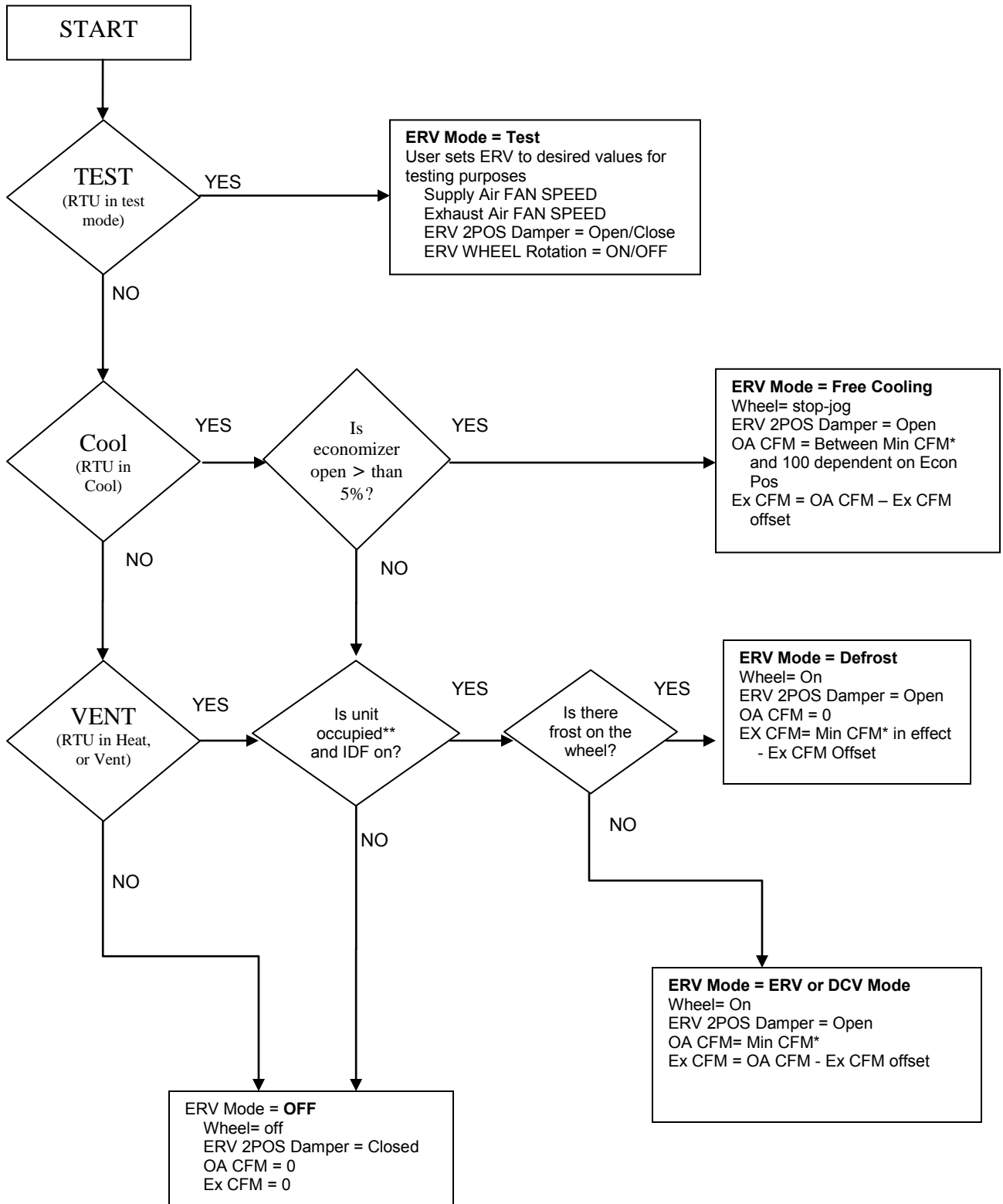
During free cooling the wheel utilizes a “stop-jog” operation to periodically rotate the wheel and minimize potential dirt build-up and excess wear on one section of the wheel. The wheel will rotate for 5 seconds then stop for 5 minutes.

Status Points

The ERV LCD screen will cycle through status points as the ERV is powered. These status points can be viewed at the ERV LCD screen and are explained below.

Status Point	Description
ERV Operation Mode	Displays the current operating mode of the ERV
C.OA CFM	Displays the commanded CFM for the outside air fan(s) to achieve.
A.OA CFM	Displays the actual CFM being achieved by the outside air fan(s).
C.EX CFM	Displays the commanded CFM for the exhaust air fan(s) to achieve.
A.EX CFM	Displays the actual CFM being achieved by the exhaust air fan(s).
OA Fan Speed	Displays the actual speed of the outside air fan(s).
EX Fan Speed	Displays the actual speed of the exhaust air fan(s).
Indoor Air CO2	Displays the communicated indoor air quality CO2 level.
UPC version	Displays the version of software installed on the UPC.
EXCB version	Displays the version of software installed on the EXCB.

Figure 2a – Modulating ERV Control & Operation Flow Chart



Notes:
 * Min CFM represents the minimum outside air CFM requirement based on CO2 values and setpoints.
 ** Occupied also means being in the unoccupied period but configured to run.

Table 4a – Constant Volume ERV Communication Points

CCN Table	CCN Point	Marquee Point	Expanded Text	Range	Read / Write	Function
MODEDISP	OCCUPIED	OCC	Currently Occupied	Yes/No	R	Determine if RTU occupied
UOUTPUT	IDF	IDF	Indoor Fan Relay	On/Off	R	Determine if RTU fan is on (ComfortLINK Version 3.x)
	IDFSTATE	IDF	Indoor Fan State	On/Off	R	Determine if RTU fan is on (ComfortLINK Version 4.x and up)
	ECONOPOS	EC.AP	Econo Actual Position	0 to 100 %	R	Monitor econ position
	PE_1	PE.1	Power Exhaust 1 Relay	On/Off	R	Determine when to turn on PE1 during free cooling
	PE_2	PE.2	Power Exhaust 2 Relay	On/Off	R	Determine when to turn on PE2 during free cooling
TESTFANS	S_IDF	IDF	Indoor Fan Power Test	On/Off	R	Determine if RTU fan is on in test mode
TESTINDP	S_PE_1	PE.1	Power Exhaust 1 Test	On/Off	R	Determine when to turn on PE1 during test mode
	S_PE_2	PE.2	Power Exhaust 2 Test	On/Off	R	Determine when to turn on PE2 during test mode
UINPUT	FILTSTAT	FIL.S	Filter Status Switch	Dirty/Clean	RW	Monitor RTU, and set ERV filter alarm
	FAN_STAT	FAN.S	Fan Status Switch	On/Off	RW	Monitor RTU, and set ERV motor alarm

Table 4b – Modulating ERV Communication Points

CCN Table	CCN Point	Marquee Point	Expanded Text	Range	Config Default	Read / Write	Function
LON_DATA	NVO_MODE		nvoUnitStatus.mode	xxxx		R	Determine RTU HVAC mode
MODEDISP	OCCUPIED	OCC	Currently Occupied	Yes/No		R	Determine if occupied
UOUTPUT	IDFSTATE	IDF	Indoor Fan State	On/Off		R	Determine if fan is on
	ECONOCMD	EC.CP	Econo Commanded Position	0 to 100 %		R	Monitor econ position
UINPUT	FILTSTAT	FIL.S	Filter Status Switch	Dirty/Clean		RW	Set ERV filter alarm
	FAN_STAT	FAN.S	Fan Status Switch	On/Off		RW	Set ERV motor alarm
	IAQ	IAQ	IAQ Level (sensor)	xxxx		R	Monitor CO2
ECON_CFG	ECONO	EC.EN	Economizer Installed	Yes/No	No: no FIOP Yes: FIOP	R	Determine if economizer is installed
IAQ_CFG	IAQANCFG	IA.CF	IAQ Analog Input Config	0=No IAQ 1=DCV 2=Override IAQ 3=Ctrl Min Pos	0: no FIOP 1: FIOP	R	Determine if CO2 sensor is installed
	IAQANFAN	IA.FN	IAQ Analog Fan Config	0=Never 1=Occupied 2=Always	0	R	Determine when to run ventilation in unoccupied mode
	DAQ_LOW	AQD.L	AQ Differential Low	0 to 5000	100	R	Determine CO2 Min
	DAQ_HIGH	AQD.H	AQ Differential High	0 to 5000	700	R	Determine CO2 Max

Table 4c – Modulating ERV LCD Screen Menus and Points

GENERAL				
1. Initialize LEN Communication – When first powered up				
2. Communication Failure-1: UPC_to_LEN_Fail – Results if device cannot communicate on the LEN bus				
3. Communication Failure-2: UPC_to_EXCB_Fail – Results if device cannot communicate				
MENU	POINT	RANGE	UNITS	DEFAULT
STANDBY	After 15 minute time out or during normal operation			
	ALARM - T418 ERV Wheel Status			Only available if alarm is active
	ALARM - T418 ERV Fan Status			
	ALARM - T418 ERV Filter Dirty			
	ERV Operation Mode	0=Off 1=ERV Mode 2=Free Cooling 3=DCV ERV 4=Defrost 5=Test		
	C.OA CFM	xxxxx		
	A.OA CFM	xxxxx		
	C.EX CFM	xxxxx		
	A.EX CFM	xxxxx		
	OA Fan Speed	xxx		%
	EX Fan Speed	xxx		%
	Indoor Air CO2	xxxx		PPM
	UPC ver	xxx		
EXCB ver	xxx			
ERV Configurations	Press Pushbutton during normal operation			
	DCV OA SP CFM	0 to 32000	CFM	15000
	Min Outside Air	0 to 32000	CFM	16000
	EX Air Offset	-17000 to 17000		0
	ERV Control Config	0=Constant Speed 1=Offset Exhaust 2=Building Pressure		1*This config should not be changed
	ERV Unocc Run	YES/NO		YES
Test Mode Active	When Rooftop is put in test mode			
	OA CFM	xxxx		
	EX CFM	xxxx		
	Test 2POS Damper	On/Off		Off
	Test ERV Wheel	On/Off		Off
	Test OA Fan Speed	0 to 100		%
	Test EX Fan Speed	0 to 100		%

TROUBLESHOOTING

EnergyX units are a combination of the base rooftop unit and an integrated ERV. The ERV requires communication from the rooftop for operation. This section covers ERV troubleshooting only. For rooftop troubleshooting refer to the base unit's Controls, Start-up, Operation, Service, and Troubleshooting manual. Figure 3 shows a cross section of the modulating ERV for troubleshooting.

Complete ERV Stoppage

There are several conditions that can cause the ERV to shutdown or appear to be shutdown:

- General power failure.
- Transformer's circuit breaker tripped.
- ERV main power fuses blown.
- Communication failures.
- Active alarm on the base rooftop unit or the ERV preventing operation. Review alarms.
- Programmed occupancy schedule. Rooftop Unoccupied
- Rooftop indoor fan is off.
- On modulating ERVs, the airflow sensor tubing connected to the incorrect high/low sensor ports in the outside air.
- On constant volume ERV, when economizer is open more than 5%.

Check Alarms

The ERV has 3 possible alarms based on options installed in the ERV. Modulating ERVs can display all 3 alarms on the LCD screen but will only force two alarms in ComfortLINK. Constant volume ERVs can only trip two of the alarms and force them in ComfortLINK. Table 5 is a quick reference alarm table.

NOTE: Constant volume ERVs cannot be ordered with factory installed motor status or filter status.

T408 Dirty Filter / T418 ERV Filter Dirty

The ERV's dirty filter alarm should only occur if the optional Filter Maintenance Switch is installed on the ERV. It is used in combination with the rooftop units filter alarm, and can be seen on the ComfortLINK system as a T408. This requires the ComfortLINK's Filter Status Switch configuration point to be set to normally open (FILSTCFG = 1), factory default if filter status is factory ordered. There can be filter status switches on both the base rooftop and the ERV module or only one and either one (or both) can cause the alarm. If both switches are being used when the alarm is tripped, inspect both sets of filters to determine which filter caused the alarm.

When the ERV's dirty filter alarm activates due to an increase in differential pressure across the filter, it will then force the ComfortLINK's Filter Status Switch point to dirty (FILSTAT = Dirty). This will cause the ComfortLINK's Dirty Filter alarm (T408) to become active. On modulating ERVs the T418 ERV Filter Dirty alarm will also be shown on the LCD screen. The alarm does not affect unit operation but serves as a warning to replace the filters. It will automatically reset when the pressure differential falls below setpoint. Verify proper operation by partially blocking airflow through the ERV filters and confirming that the alarm does trip.

T409 Fan Status / T418 ERV Fan Status or Wheel Status

The ERV's fan and wheel status alarms should only occur if the motor status option is installed on the ERV. It is used in combination with the rooftop units fan status alarm, and can be seen on the ComfortLINK system as a T409. This requires the ComfortLINK's Filter Status Switch configuration point to be set to normally open (FANSTCFG = 1), factory default if fan status

is factory ordered. There can be fan status switches on both the base rooftop and the ERV module or only one, and either one (or both) can cause the alarm. If all switches are being used and the alarm is tripped, inspect all fans to determine which motor caused the alarm. If there is not a base unit fan status switch but there is EnergyX motor status, the ComfortLINK's Shut Down on IDF Failure point will be set to No (FATALFAN = No). This setting means the rooftop and ERV will continue to run upon alarm. The ERV's LCD screen will display which motor failure has occurred and are explained below. If the 409 alarm is active and the ERV is not in alarm then the rooftop fan should be inspected.

T418 ERV Fan Status

This alarm occurs if any one of the ERV's outside or exhaust motors detect a problem. It will close its built-in normally open alarm contact, which will be seen as 24vac at EXCB J8-3. The ERV LCD will display T418 ERV Fan Status, and the D18 LED will be on. The ERV will force the fan status point (*INPUTS* → *GEN.I* → *FAN.S*) to the opposite of what is current in ComfortLINK. The ERV will only shutdown if ComfortLINK is set to shutdown on fan failure (*Configuration* → *UNIT* → *IDF.F* = Yes). This alarm will automatically reset when the motor opens its alarm relay. This alarm is tripped by one of the following: phase loss, locked rotor, thermal overload, communication error, incorrect signal, or a fan failure.

T418 ERV Wheel Status

This alarm will occur when the ERV wheel is turned on and the wheel proxy sensor does not detect wheel motion within the set time. It will open its contact which energizes the normally closed rotation monitor relay (RMR). This is seen as 24vac at EXCB J5-3 and causes the alarm. The ERV LCD will display T418 ERV Wheel Status, and the D12 LED will be on. The ERV will force the fan status point (*INPUTS* → *GEN.I* → *FAN.S*) to the opposite of what is current in ComfortLINK. The ERV will only shutdown if ComfortLINK is set to shutdown on fan failure (*Configuration* → *UNIT* → *IDF.F* = Yes). This alarm will automatically reset when motion is detected. Possible causes of this alarm are: the wheel belt breaking or slipping, wheel motor failure, proxy sensor failure or incorrect setting, or wiring error.

Constant volume ERVs

Motor Status is not available on the constant volume ERVs. However, the alarm can occur if 24vac is seen at EXCB J7-2. The D18 LED will be on and the ERV will force the fan status point (*INPUTS* → *GEN.I* → *FAN.S*) to the opposite of what is current in ComfortLINK. The ERV will only shutdown if ComfortLINK is set to shutdown on fan failure (*Configuration* → *UNIT* → *IDF.F* = Yes). This alarm will automatically reset when 24vac is lost at EXCB J7-2. Remove any wires on EXCB J7 to prevent this alarm from occurring.

Check Diagnostic LEDs

Use the on board LEDs to assist in troubleshooting the EnergyX system. The EnergyX Control Board (EXCB) and the Universal Protocol Converter (UPC) each have LEDs that can help in the troubleshooting process. See Tables 6a to 6c.

The EXCB has five green LEDs and one red LED. The red LED is for power indication and the green LEDs are status indicators. The UPC has seven LEDs. There are four communication LEDs and three status LEDs. The communication LEDs indicate if the translator is speaking to the devices on the network and should reflect communication traffic based on the baud rate set. The higher the baud rate, the LEDs would become more solid.

Communication Failures

Communication is critical for ERV operation. It can fail on two different paths; between the UPC and the rooftop (LEN), or between the UPC and the EXCB. This makes the UPC critical to ERV operation. Make sure the UPC DIP switches and rotary switches are set correctly. Make sure the board hardware jumpers are set on EIA 485 and 2W. During normal operation the 4 communication LEDs will flash interchangeably. If all 4 LEDs are not flashing then there is a communication problem. Check connections between Port 1a and rooftop LEN (plugged into the ECB or small connection board in its place), and Port 2 and the EXCB J23.

On modulating ERVs, the LCD screen will show specific communication failure when they occur.

Comm Failure1 – UPC to LEN Fail

This will be displayed if the EXCB can communicate with the UPC but does not receive information from ComfortLINK. This will occur if the cable is connected to the CCN port instead of the LEN port, or if the cable is pinched or disconnected.

Comm Failure2 – UPC to EXCB Fail

This will be displayed if the EXCB cannot communicate with the UPC. This will occur if the connection between them is disconnected or pinched. This will also occur if the UPC does not have power or software, or if it has an error or configured wrong.

On-board Pressure Transducers

NOTE: Pressure Transducers are only used on modulating ERVs. The EXCB uses on-board pressure transducers to measure the air pressure of the incoming outside air and the building exhaust air. The CFM values are then calculated based on these readings and the fan speed. There is a pressure transducer for the outside air and one for the exhaust air. These are screwed into the EXCB board to J24 and J25 respectively. They have three pins: IN, GND, and OUT. The IN pin is 5vdc input power and GND is the common or ground pin. The OUT pin will be 0.26 to 4.5vdc based on the pressure reading. There are two different transducers used, one inch of water column (inWC) and 5 inWC. Table 7 shows the voltage/pressure characteristics of each.

Table 5 – Alarms

ComfortLINK ALARM	LCD DISPLAY*	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T408	ALARM - T418 ERV Filter Dirty	Dirty Filter	Generate Alarm	Automatic	Dirty Outside Air and/or Exhaust Filter
T409	ALARM - T418 ERV Fan Status	Motor Status	ERV shutdown (if comfortlink IDF.F = yes)	Automatic	Phase loss, motor failure, wrong wiring
T409	ALARM - T418 ERV Wheel Status	Wheel Rotation	ERV shutdown (if comfortlink IDF.F = yes)	Automatic	Wheel belt broken, wheel motor failed, wrong wiring
-	Comm Failure1 UPC_to_LEN_Fail	LEN Comm Failure*	ERV shutdown	Automatic	LEN communication cable pinched or disconnected, UPC failure
-	Comm Failure2 UPC_to_EXCB_Fail	UPC Comm Failure*	ERV shutdown	Automatic	No program in the UPC or DIP switches set wrong, UPC failure

*Only available on Modulating ERVs

Table 6a – EXCB LED Indicators

LED	COLOR	DESCRIPTION	STATUS IF LIGHT IS LIT
D9	Red	24vAC board power	Board has power
D2	Green	Factory test/bootloader	Unit in Factory test or Bootloader
D12	Green	ERV Wheel Frost Protection (2-6 ton constant volume ERVs) ERV Wheel Status Alarm (2-25 ton modulating ERVs)	ERV detects frost on the wheel and running in Frost Mode ERV Wheel not rotating when it should be.
D14	Green	ERV Wheel Frost Protection (2-25 ton modulating ERVs)	ERV detects frost on the wheel and running in Frost Mode
D16	Green	ERV Dirty Filter Alarm	Dirty Filter
D18	Green	ERV Blower Status Alarm	Fan Failure

Table 6b – EXUPC LED Indicators

LED	COLOR	DESCRIPTION	STATUS
Power	Green	Power Indicator	Lights when power is being supplied to the translator.
Rx1	Green	Port 1 Receiving Data	Lights when the translator receives data from the ComfortLINK MBB via LEN
Rx2	Green	Port 2 Receiving Data	Lights when the translator receives data from the Modbus EXCB
Tx1	Green	Port 1 Transmitting Data	Lights when the translator transmits data to the ComfortLINK MBB via LEN
Tx2	Green	Port 2 Transmitting Data	Lights when the translator transmits data to the Modbus EXCB
Run	Green	Run indicator	Lights based on translator health. See table below.
Error	Red	Internal Error indicator	Lights based on translator health. See table below.

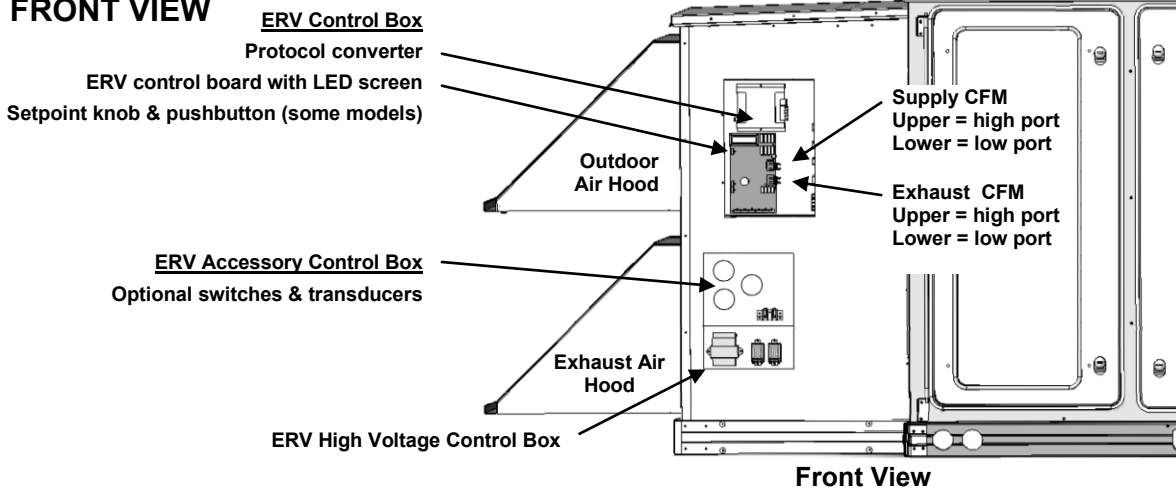
Table 6c – EXUPC LED Flash Code Diagnostics

Run LED Status	Error LED Status	ERV Module Status
2 flashes per second	Off	Normal
2 flashes per second	2 flashes, alternating with Run LED	5 minute auto-restart delay after system error
2 flashes per second	3 flashes then off	Module has just been formatted
2 flashes per second	4 flashes then pause	Two or more devices on this network have the same ARC156 network address
2 flashes per second	1 flash per second	Module is alone on the network
2 flashes per second	On	Operation halted after frequent system errors or control programs halted
5 flashes per second	On	Operation start-up aborted. Boot is running
5 flashes per second	Off	Firmware transfer in progress. Boot is running
7 flashes per second	7 flashes per second, alternating with Run LED	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating with Run LED	Brownout

Table 7 – Pressure Transducer Voltage

Voltage (vDC)	Pressure (inWC)	
	1" transducer	5" transducer
<= 0.26	0	0
0.5	0.06	0.28
1	0.17	0.87
1.5	0.29	1.46
2	0.41	2.05
2.5	0.53	2.64
3	0.65	3.23
3.5	0.76	3.82
4	0.88	4.41
4.5	1.00	5.00

FRONT VIEW



REAR VIEW

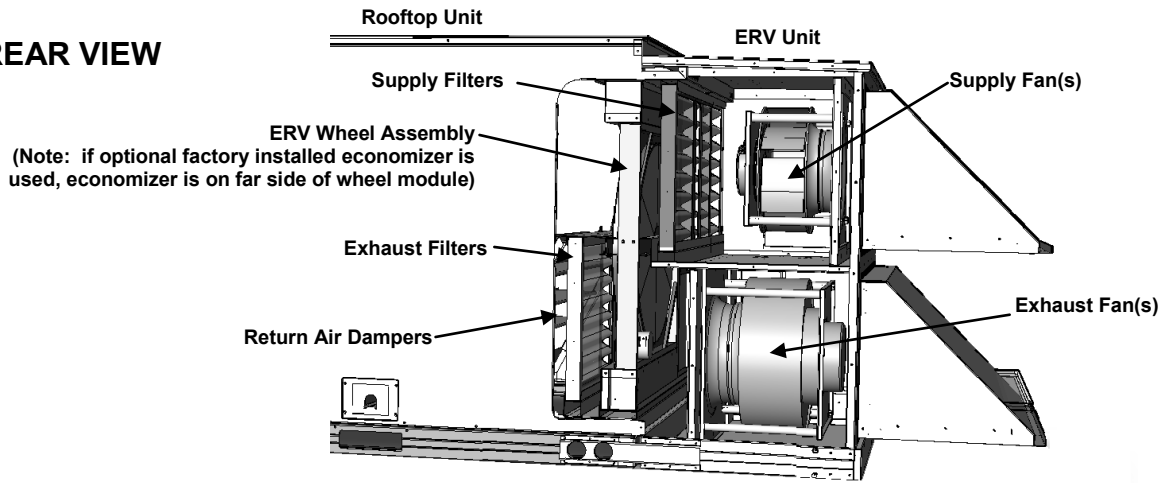


Figure 3 – EnergyXv2 Component Layout, Modulating Airflow Units
Drawings shown with panels removed for demonstration purposes only.
(7.5 – 12.5 ton unit shown)

MAJOR SYSTEM COMPONENTS

An EnergyXv2 unit has a factory installed energy recovery (ERV) device on a 48/50PG or 48/50PM rooftop unit. The EnergyXv2 energy recovery unit is integrated into the base rooftop unit construction and is factory wired. The energy recovery unit contains a control box, supply fan(s), exhaust fan(s) and an enthalpy wheel assembly. All control operations of the ERV are based on the rooftop units operation through communication with ComfortLINK. Some ERV models contain a user interface. See Figure 4a-4e for ERV wiring schematics and component arrangements.

EnergyX Control Board (EXCB)

See Figure 5 and Table 8.

The EXCB board is the center of the ERV control system. It contains the major portion of the operating software and controls the operation of the unit. The EXCB continuously monitors input/output channel information received from its inputs and from the Universal Protocol Converter (UPC). The EXCB receives inputs from transducers and discrete inputs. See Options and Accessories section. The EXCB has relay and analog outputs. Modulating ERVs are also equipped with a user interface. The EXCB communicates with a Modbus protocol and is not a CCN device. The EXCB is a reset button that is used to force all the outputs and reset communication.

NOTE: There are hardware jumpers set throughout the. **Do not change these jumpers.** There are 2 different software versions for the EXCB, one for the constant volume ERV and one for the modulating ERVs.

Universal Protocol Converter (UPC)

See Figure 6 and Table 9.

The UPC board is required to convert CCN into Modbus to allow the EXCB to monitor the rooftops operation. The UPC is connected to the ComfortLINK LEN bus on the rooftop unit (ECB or small connection board when not equipped with ECB). **NOTE:** The DIP switches should be set as follows: 1=off, 2=off, 3=on, 4=on, 5=off, 6=off, 7=on, and 8=off. The address rotary switches should be set to 01 (10's=0 and 1's=1). **Do not change these settings.** There are 2 different software versions for the UPC, one for the constant volume ERV and one for the modulating ERVs.

User Interface

Modulating ERVs are equipped with a user interface. It can be used to monitor, test, and configure the ERV. The user interface consists of an LCD screen, an access door, a pushbutton, and a turn pot. The pushbutton and turn pot are behind the access door. See Figure 4e. The LCD will display test points during test mode, configuration points during configuration, and status points during standby. The pushbutton is used to lock in settings changed to points, and pressed again will advance the screen to the next point. The turn pot is used to change settings of the currently displayed point. Turn the pot to the right to advance the setting and turn the pot to the left to change back or decrease the setting. The status points are displayed during standby and provide insight to the ERV operation. The standby screens will cycle every three seconds. The configuration screens will timeout after 15minutes of inactivity.

Enthalpy Wheel

The enthalpy wheel is the “heat exchangers” of the ERV. It consists of several wheel segments aligned in a cassette assembly. These are not “filters” but made of a desiccant material. The wheel is rotated by a motor and belt, no adjustments required. When the wheel rotates it uses the building exhaust air to pre-conditions the outside air as it passes through the wheel.

Modulating Fan

The modulating ERV is equipped with direct drive variable speed plenum fans for outside air intake and exhaust air. The motors have built in VFDs that accept a 2-10vdc signal from the EXCB. This 2-10vdc signal is used by the VFD to determine the speed to run the motor at (0-100%). Some ERV models are equipped with multiple outside air and/or exhaust air fans. The additional motor's signal is parallel off the first motor through the coupling signal plug. Motor status switches are also paralleled for additional motors.

Economizer Damper

The economizer damper is a factory installed option that provides a wheel bypass damper. This damper is controlled by the base unit rooftop as an economizer for the purpose of free cooling. The damper is installed adjacent to the ERV wheel to allow outside air to flow through it when opened instead of the wheel.

Options and Accessories

The modulating ERV has three optional factory installed options and one field installed accessory: Frost Protection, Motor Status, Filter Maintenance, and 2-position damper (field installed). Refer to Table 8 for where these options wire into the EXCB.

NOTE: Constant volume ERVs cannot be ordered with factory installed options.

Frost Protection

Frost protection is a factory installed pressure sensor device which senses a differential pressure across the wheel. This occurs if frost builds up on the wheel. The sensor closes its contact when the pressure differential is greater than the setpoint. When the EXCB reads the contact closer it will activate defrost mode. The setpoint is a dial on the sensor, is adjustable from 0.2 to 2.0 inwc, and is factory preset to 2.0 inwc. Changing this setting may cause false signal causing defrost mode when not needed.

NOTE: Constant volume ERVs Frost Protection is only field supplied, not available from the factory.

Motor Status

The motor status option includes outside and exhaust air fan status switches, and a wheel motion proxy sensor. The fan status switches are built into each motor and provide a feedback to the EXCB if a problem is detected. The feedback signal is a discrete input that is normally open, when closed the EXCB will initiate the motor status alarm. The wheel motion sensor is aimed at the wheel to detect rotation. If the wheel does not rotate at the appropriate speed the sensor will open causing the rotation monitor relay to close a contact to initiate the wheel status alarm. The motion sensor is factory set at the highest speed (clockwise until stop) and should not be changed. Refer to the troubleshooting section for details on the alarms.

Filter Maintenance

Filter maintenance consists of two factory installed pressure sensor devices which sense differential pressure across the ERV filters. This occurs if dirt builds up on the filters. There is a separate pressure sensor for each filter (outside air and exhaust air). The sensor closes its contact when the pressure differential is greater than the setpoint. The sensors are wired in parallel, so when the EXCB reads a contact closer from either sensor it will activate the filter alarm. The setpoint is a dial on the sensor, is adjustable from 0.2 to 2.0 inwc, and is factory preset to 2.0 inwc. Changing this setting may cause false signal causing false dirty filter alarms.

2-position Damper (field install only)

The 2-position damper accessory is only available for field installation. It is 2 separate damper assemblies that mount behind the outside air and exhaust air hoods. When closed the dampers will seal off the ERV outside openings and prevent unwanted air from being introduced to the rooftop unit. Refer to the 2 position damper accessory installation instructions for more information.

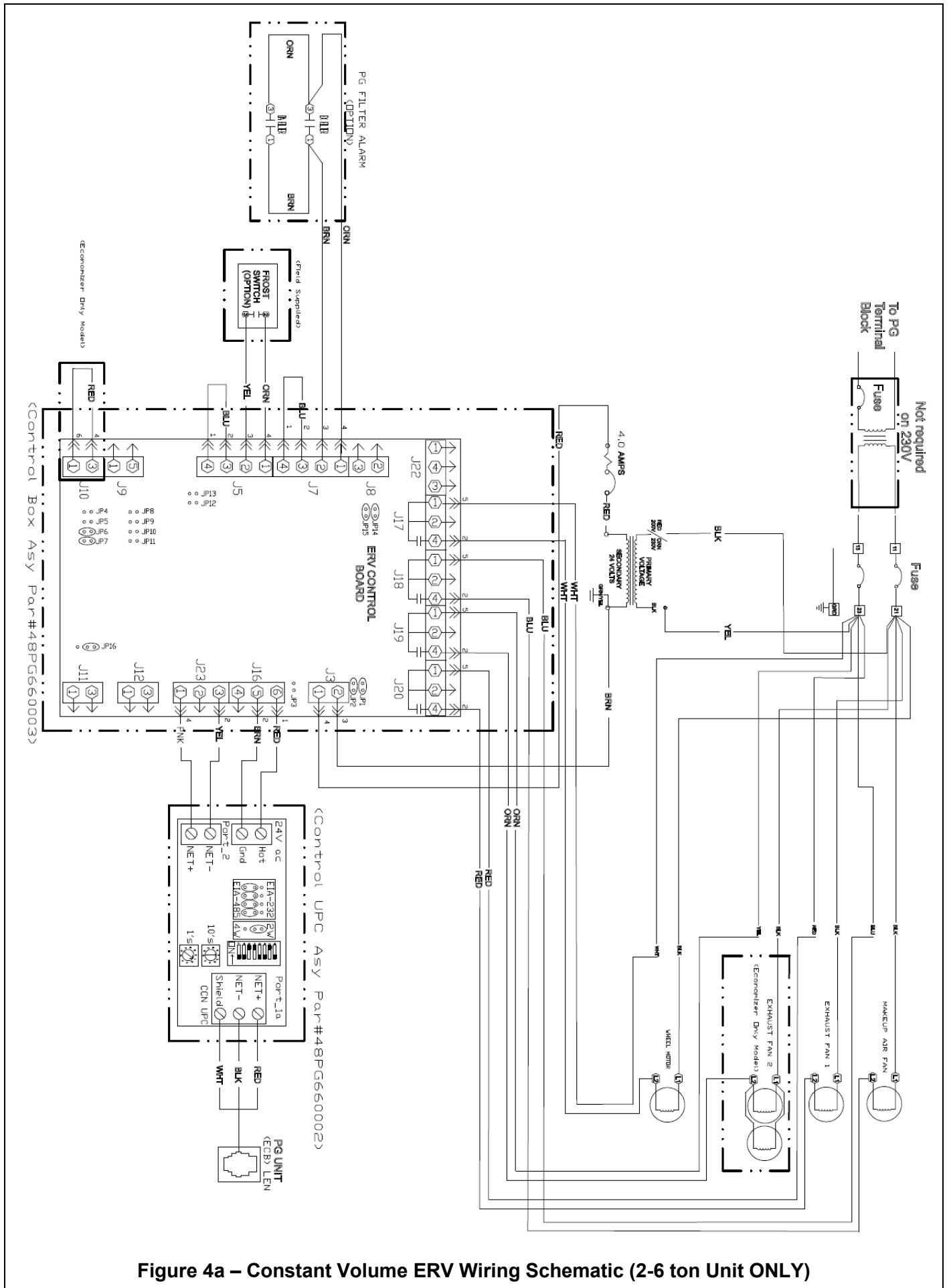
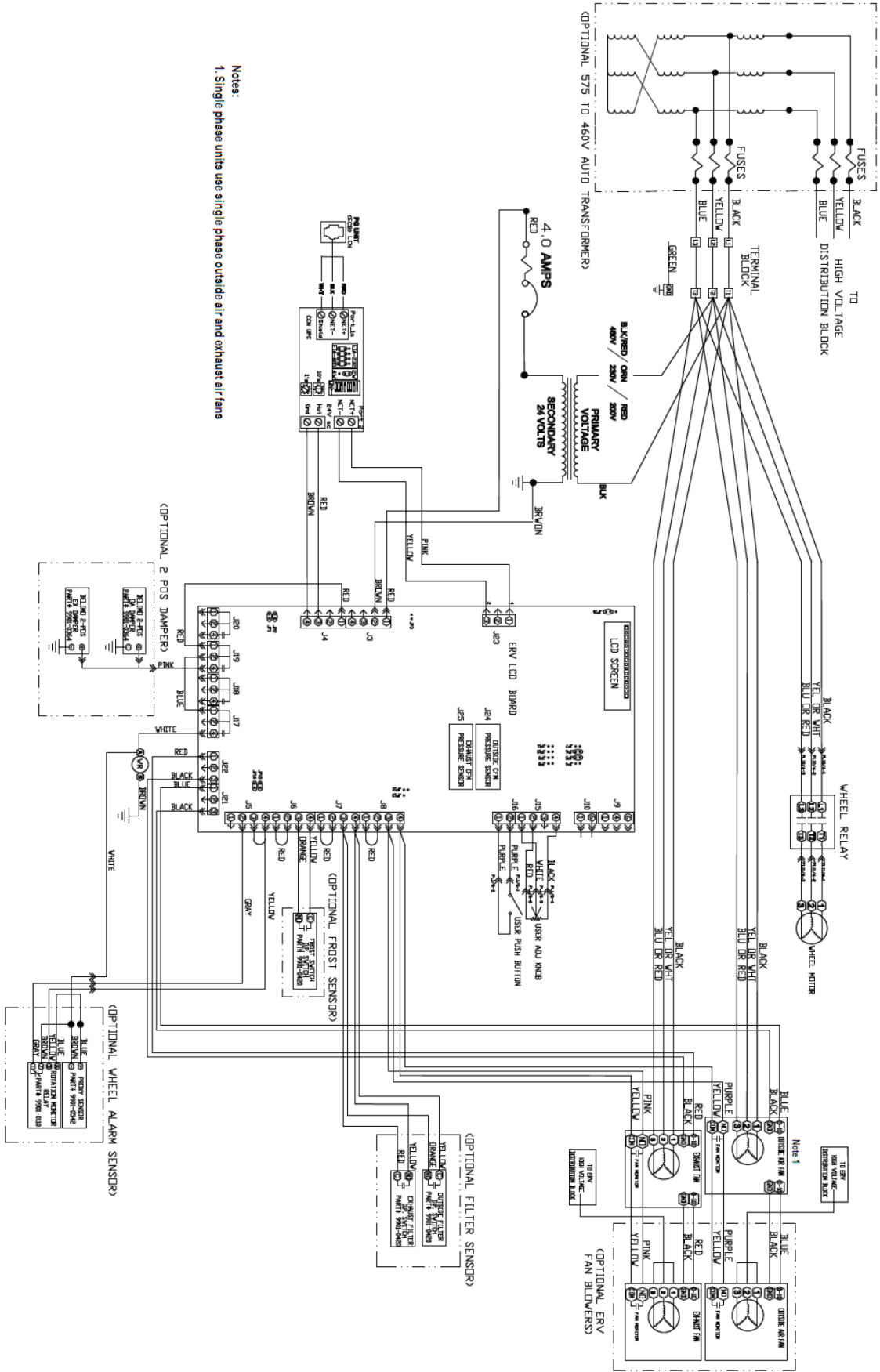
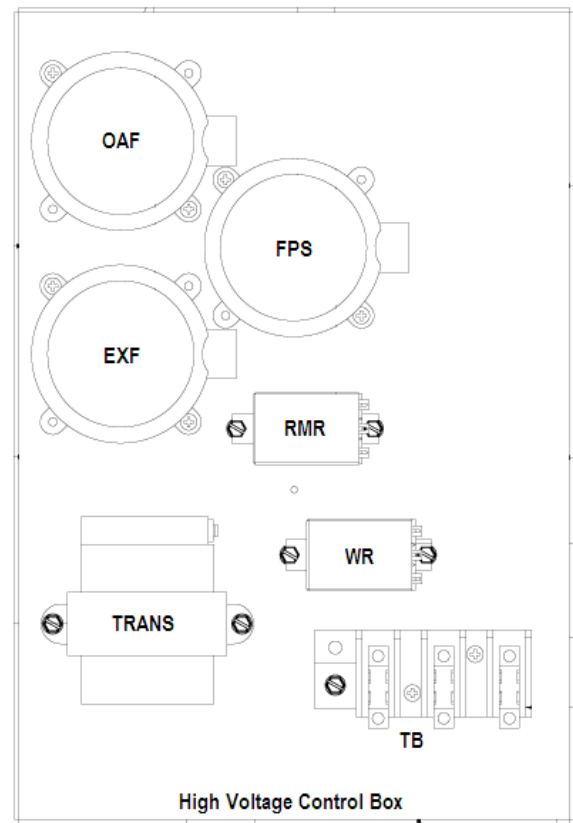
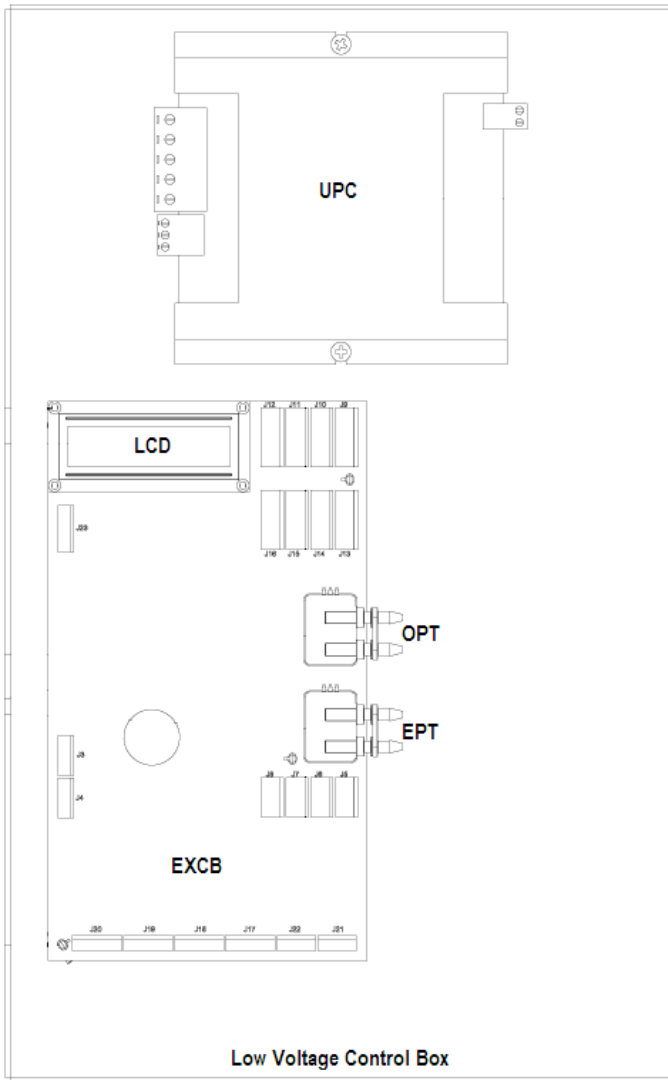


Figure 4a – Constant Volume ERV Wiring Schematic (2-6 ton Unit ONLY)



Notes:
 1. Single phase units use single phase outside air and exhaust air fans

Figure 4b – Modulating ERV Wiring Schematic
 (Note: Three-phase unit configuration shown)



- LEGEND:**
- EPT - Exhaust Pressure Transducer
 - EXCB - EnergyX Control Board
 - EXF - Exhaust Filter Pressure Sensor
 - FPS - Frost Protection Pressure Sensor
 - LCD - LCD Screen
 - OAF - Outside Air Filter Pressure Sensor
 - OPT - Outside Air Pressure Transducer
 - RMR - Rotation Monitor Relay
 - TB - Terminal Board
 - TRANS - Transformer
 - WR - Wheel Relay
 - UPC - Universal Protocol Converter

Figure 4c – Modulating ERV Control Box Component Arrangement

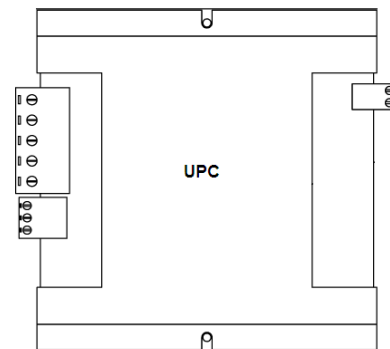
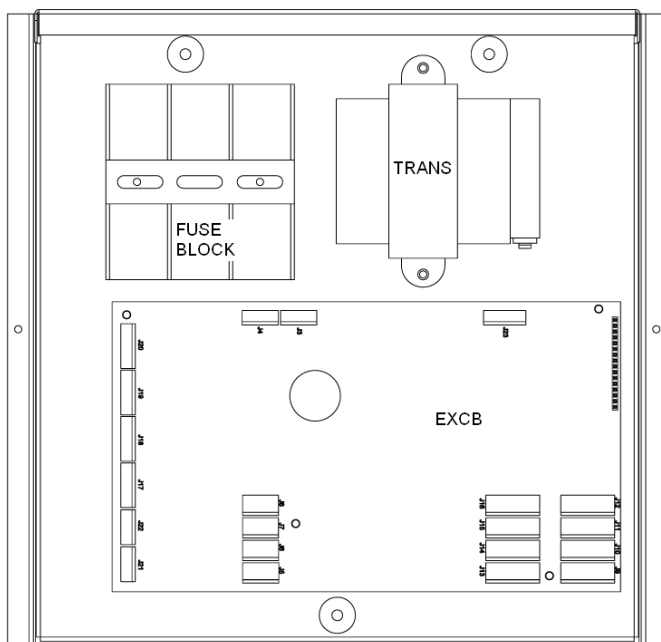


Figure 4d – Constant Volume ERV Control Box Component Arrangement

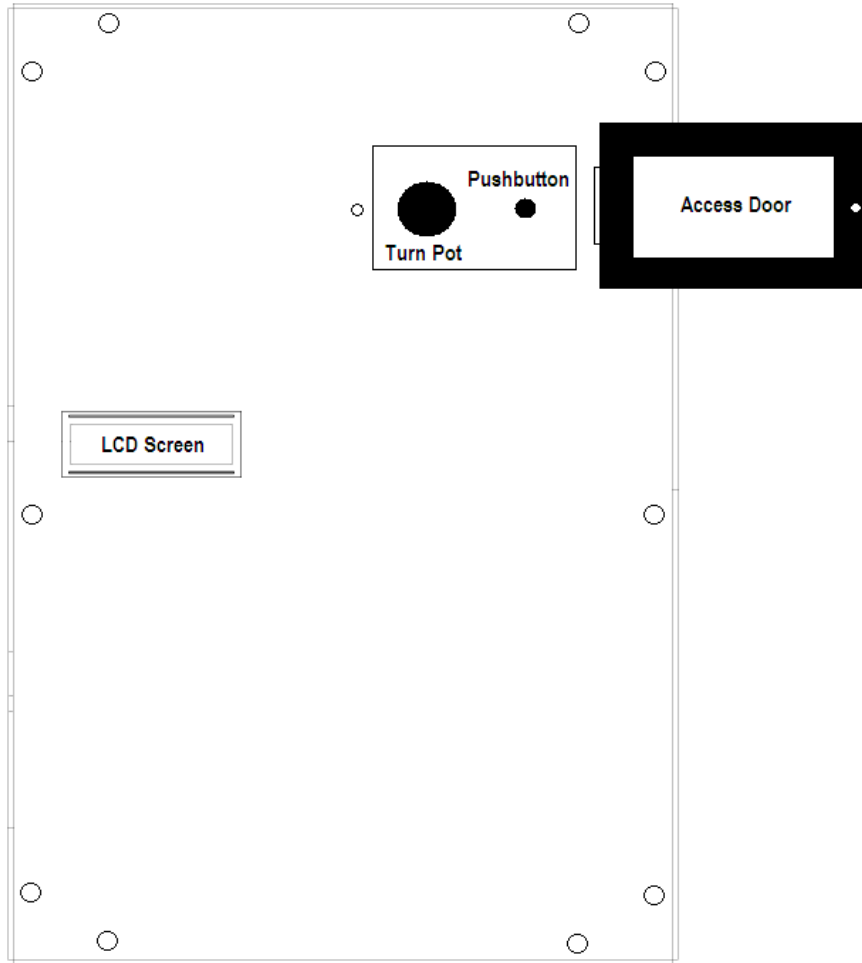


Figure 4e – Low Voltage Control Box Cover – User Interface

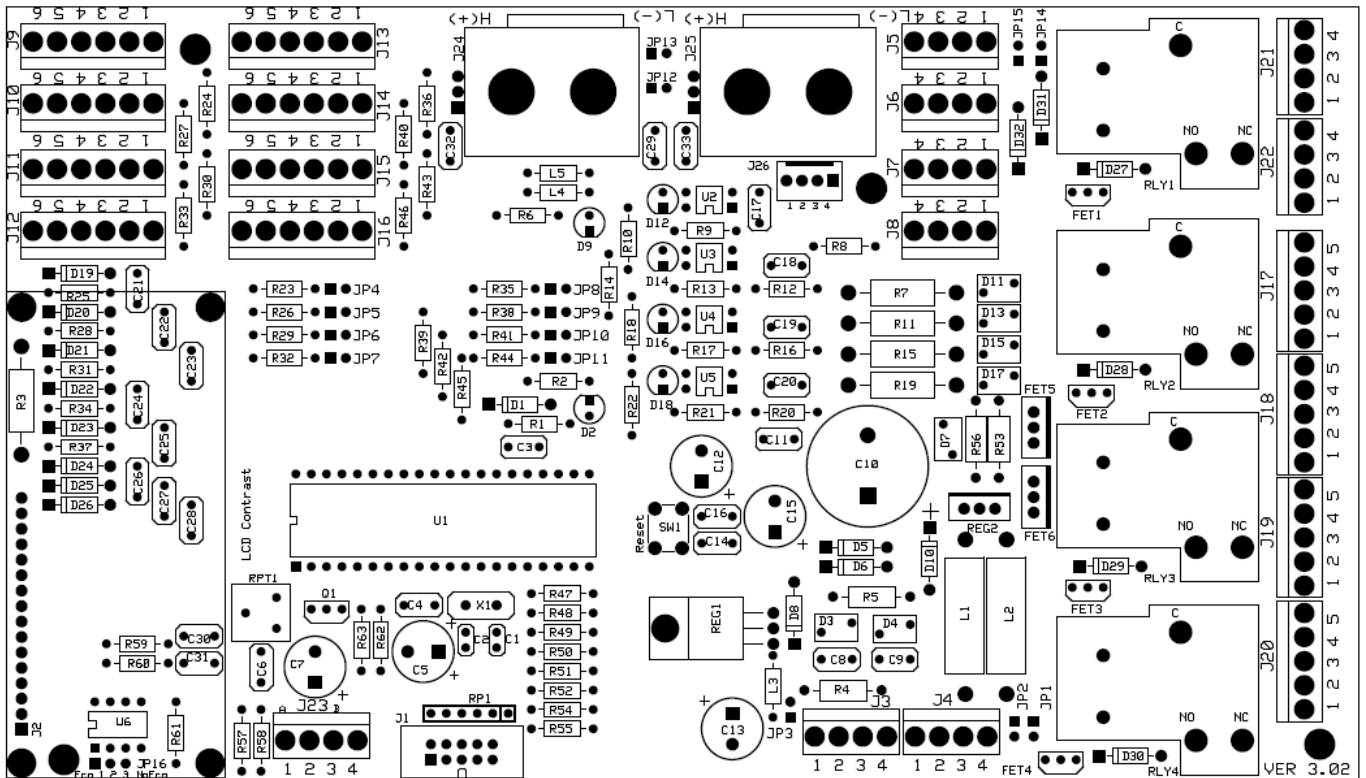


Fig. 5 – EnergyX Control Board (EXCB)

Table 8 – EXCB Input / Output Connections

DISPLAY NAME *	POINT DESCRIPTION	SENSOR LOCATION	Input/Output	TYPE OF Input/Output	CONNECTION PIN NUMBER
-	Download	N/A	Both	Communication	J1
-	LCD	Low voltage control box	Both	Communication	J2
-	Power from TRANS	Control box	Input	24VAC	J3, 1-2
-	Power to J19	Low voltage control box	Output	24VAC	J4, 1
-	Power to UPC	Low voltage control box	Output	33VDC	J4, 3-4
-	Frost switch**	Cabinet	Input	Switch	J5, 1-2
ERV Wheel Status	Wheel Rotation Relay	High voltage control box	Input	Switch	J5, 2-4
Defrost	Frost Switch	High voltage control box	Input	Switch	J6, 3-4
ERV Filter Dirty	Filter Status Switches	High voltage control Box	Input	Switch	J7, 3-4
ERV Fan Status	Motor Status Switches	Low voltage control box	Input	Switch	J8, 3-4
-	Economizer logic enable switch**	N/A	Input	Switch	J10, 1-3
-	Turn Pot	Low voltage control box cover	Input	0-5v	J15, 1-4
-	Pushbutton	Low voltage control box cover	Input	Switch	J16, 1-2
-	Power to UPC**	Cabinet	Output	33VDC	J16, 5-6
ERV Wheel	Wheel Relay or Wheel Motor**	High voltage control box	Output	Relay	J17, 4
	Outside Air Motor**	N/A	Output	Relay	J18, 4
2 Pos Damper	2-position damper relay or Power exhaust 2 Motors**	Damper assembly	Output	Relay	J19, 4
	Power exhaust 1 Motor**	N/A	Output	Relay	J20, 4
Outside Air Fan(s)	OA fan speed signal	N/A	Output	2-10vdc	J21, 1-3
Exhaust Air Fan(s)	EX fan speed signal	N/A	Output	2-10vdc	J22, 1-3
-	Modbus with UPC	Control box	both	Communication	J23, 1-3
-	Outside Air pressure Transducer	Low voltage control box	Input	Digital 0-5vdc	J24
-	Exhaust Air pressure Transducer	Low voltage control box	Input	Digital 0-5vdc	J25

* Display name only available with the LCD screen

**Only on Constant Volume ERV units

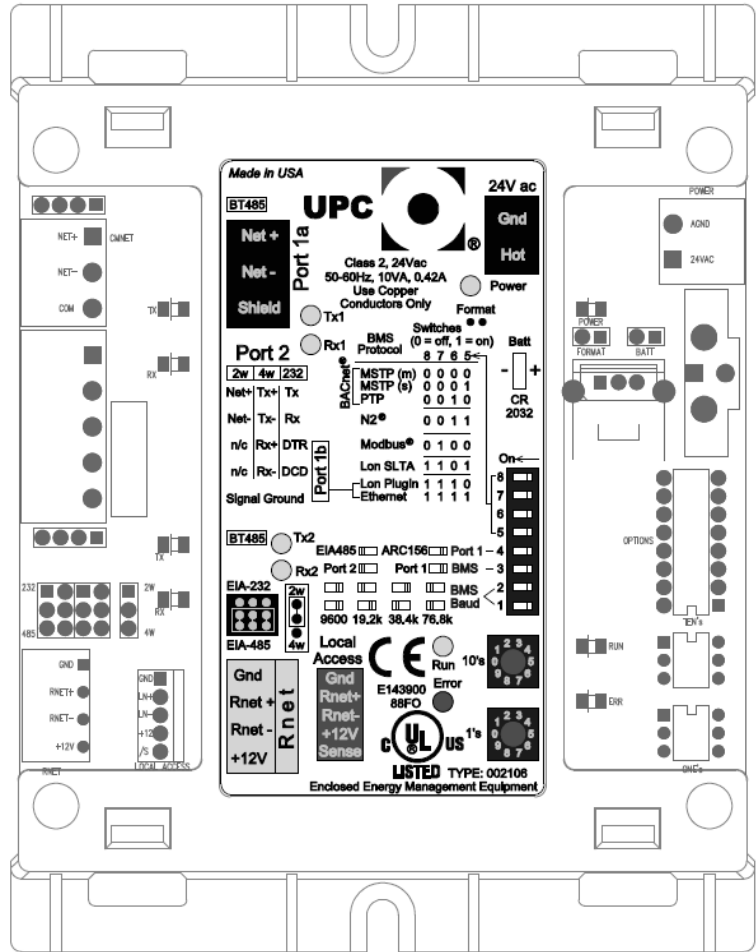


Fig. 6 – Universal Protocol Converter (UPC)

Table 9 – UPC Input / Output Connections

TERMINAL NAME	DESCRIPTION	Input/Output	TYPE OF Input/Output	CONNECTION PIN NUMBER
24V ac	Supply power to UPC	Input	33VDC	1-2
Port 2	UPC Modbus	both	Communication	1-2
Port 1a	UPC LEN	both	Communication	1-3
Port 1b	Not used	N/A	N/A	N/A
Rnet	BACview User Interface or Download Connection	both	Communication	1-4
Local Access		both	Communication	1-5

SERVICE & MAINTENANCE

Refer to base unit Controls, Startup, Operation, Service, and Troubleshooting manual for base unit service and maintenance. This section contains service and maintenance for just the ERV unit.

Cleaning

Wheel and Segment Cleaning

Wheel cleaning periodicity is application dependent. Field experience shows that offices, schools and other 'clean' environments will often go 10 years before any build up of dust and dirt is noticed. Other applications such as restaurants, casinos and factory environments may experience fairly rapid build-up of contaminants and may require multiple cleanings per year to maintain airflow and recovery efficiencies.

All air-to-air energy recovery devices will become dirty over time, even with well-maintained filtration. Proper filtration usage and changes will improve the life of the wheel transfer segments. Once the wheel is exposed to oils, tars or greases in either the supply or exhaust air streams, these pollutants deposit on the rotary surface which they become 'sticky' and begin to attract and hold the dust particles that previously passed thru the wheel. Over time this particle build up can lead to blocked airflow passages, loss of recovery, excessive pressure drop through the wheel and loss of energy savings.

1. Follow steps for wheel and segment removal to remove the affected energy transfer matrix segments. (For one-piece wheels 25 inches in diameter and smaller, remove the entire wheel from the cassette.)
2. Gently brush the wheel face to remove loose accumulated dirt.
3. Wash the segments or small wheels with a non-acid based (evaporator) coil cleaner or alkaline detergent solution. Non-acid based coil cleaner such as KMP Acti-Clean AK-1 concentrate in a 5% solution has been demonstrated to provide excellent results. **DO NOT** use acid based cleaners, aromatic solvents, temperatures in excess of 170°F or steam! Damage to the wheel will result.
4. Soak the wheel and/or segments in the cleaning solution until all grease and tar deposits are loosened. An overnight soak may be required to adequately loosen heavy deposits of tar and oil based contaminants.
5. Internal heat exchange surfaces may be examined by separating the polymer strips by hand. (Note: some staining of the desiccant may remain and is not harmful to performance.)
6. After soaking, rinse the dirty solution from the wheel until the water runs clear.
7. Allow excess water to drain prior to replacing segments in the wheel or reinstalling the wheel in the cassette. A small amount of water remaining in the wheel will be dried out by the airflow.

Filters

Clean or replace at start of each heating and cooling seasons, or more often if operating conditions require (based on filter manufacture recommendation or filter status alarm indication). Refer to Tables 1 and 2 for type and size of filters.

Outdoor-Air Inlet Screens

Clean screens with steam or hot water and a mild detergent at the beginning of each heating and cooling season. Do not use throwaway filters in place of screens.

Lubrication

All component bearings are sealed and do not require lubrication.

Wheel Drive Adjustment

The wheel motor and drives do not require adjustment. The wheel drive pulley is secured to the drive motor shaft by a set screw. The set screw is secured with removable locktite to prevent loosening. Annually confirm set screw is secure. The wheel drive belt is a urethane stretch belt designed to provide constant tension throughout the life of the belt. Inspect the drive belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up.

Wheel Air Seal Adjustment

Diameter seals are provided on each wheel cassette to minimize transfer of air between the counter flowing airstreams. Follow below instructions if adjustment is needed.

1. Loosen diameter seal adjusting screws and back seals away from the wheel surface. See figure 7.
2. Rotate the wheel clockwise until two opposing spokes are hidden behind the bearing support beam.
3. Using a folded piece of paper as a feeder gauge, position the paper between the seal and wheel surface.
4. Adjust the seal towards wheel surface until a slight friction on the feeder gauge (paper) is detected while moving the gauge along the length of the spoke.
5. Retighten adjustment screws and re-check clearance with the feeder gauge.

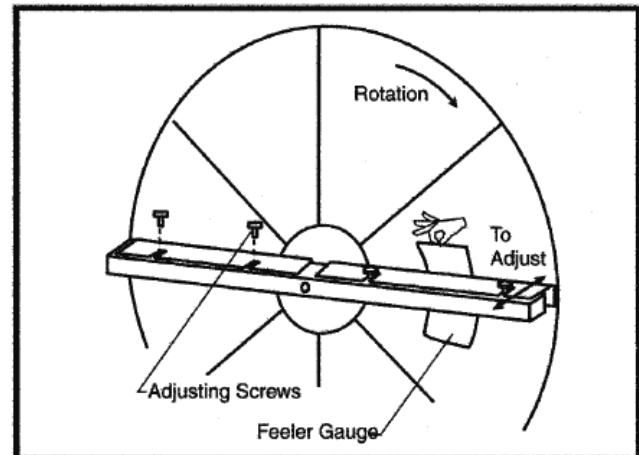


Figure 7 – Diameter Seal Adjustment

Wheel and Segment Removal / Installation

The wheel and segments represent a substantial portion of the value of the cassette therefore must be handled with care and never be dropped. Use a suitable crate or harness to lift wheel and segments to a roof surface, never use the shipping cartons for this purpose. Wheel and segments may require "slight" persuasion during installation and removal but never forced or impacted with a hammer or similar tool. The wheel assembly can be removed and installed or the wheel or segments can be removed from the assembly.

CAUTION

The weight of the wheel assembly must be supported when assembly is extended from the unit chassis to avoid damage to wheel or unit.

ERV wheels can be a whole wheel assembly or a segmented wheel assembly. Constant volume ERVs and the 2 to 6 ton low CFM modulating ERV have a 19 inch whole wheel assembly. Modulating 2 to 6 ton High CFM and 7.5 to 12.5 ton Low CFM ERVs have a 25 inch whole wheel assembly. All other ERVs are segmented wheel assemblies. Follow the correct section below for removing and installing specific wheels from their assemblies. To remove or installed the whole assembly, simple slide in or out the assembly noting the motor power plug.

Wheel Segment Removal / Installation

1. Turn off, lockout and tag-out electrical power to unit.
2. Open access door to the EnergyX module on back side of the unit.

⚠ CAUTION

Weight of the installed segment will cause the wheel to accelerate in rotation as segments are removed. Failure to maintain control of the wheel rotation while installing all segments could cause severe injury to fingers or hand caught between revolving spokes and the bearing support beam. The handle of a tool such as a hammer, should be inserted through spokes and above or below bearing support beams to limit rotation of unbalanced wheel. See Figure 8.

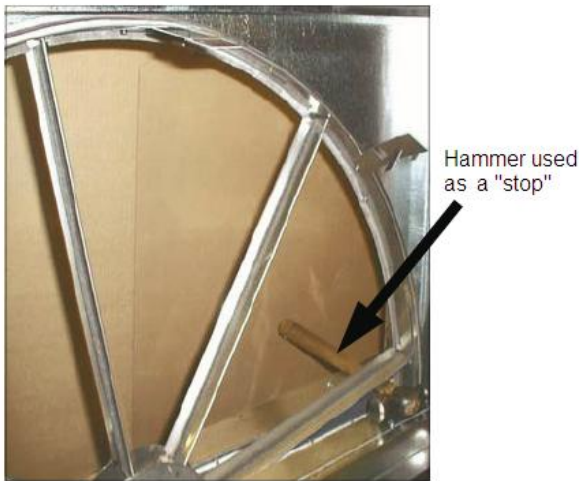


Figure 8 – Wheel Stop

3. Slide the entire wheel assembly out until the necessary segment(s) of the wheel can be accessed. Support the weight of the wheel assembly as necessary to avoid damage to wheel or unit.
4. Position one segment opening at the top of the cassette.
5. Unlock and open the segment retaining brackets on both sides of the selected segment opening. See Figure 9.

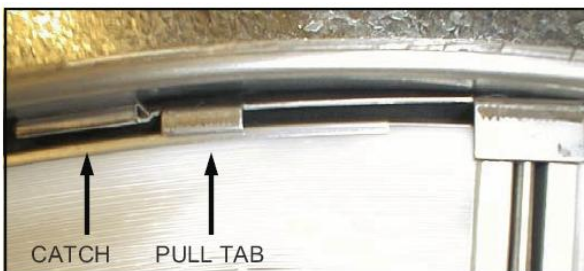


Figure 9 – Segment Retaining Brackets

6. Gently lift segment outward.
7. Close segment retaining latches and rotate wheel 180° to remove next segment. Follow this pattern to remove all segments and keep wheel balanced.
8. To install the wheel segments, hold the segment as vertically as possible and centered between spokes, insert nose of segment downward between the hub plates. See Figure 10. **NOTE:** The face of the segment, with the imbedded stiffener (vertical support between nose and rim end of segment) must face the motor side of the cassette. See Figure 11.
9. Ease the segment downward until its outer rim clears the inside of the wheel rim. Press the segment inward against the spoke flanges.
10. Close and latch segment retaining brackets to the position shown in Figure 9. Make certain the retaining bracket is fully engaged under the catch.
11. Slowly rotate, by hand, the first installed segment to the bottom of the cassette, and then install the second segment opposite the first. Repeat this sequence with the two installed segments rotated to the horizontal position to balance the weight of installed segments.
12. Continue this sequence with the remaining segments as necessary.
13. When complete, close access door and remove lockout and tagout to apply power to unit.



Figure 10 – Segment Removal

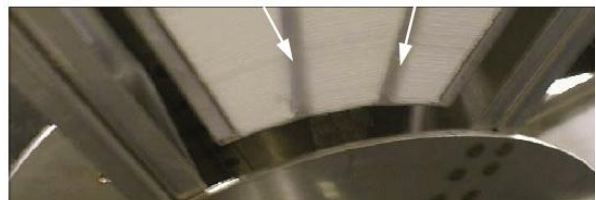


Figure 11 – Imbedded Wheel Stiffeners
(shown from motor side of wheel assembly)

Whole Wheel Removal / Installation

19" wheel

These wheels are secured to the shaft and bearing support beam by a Philips head screw and hub cover. Follow the steps below for removal and reverse for installation. See Figure 12.

1. Turn off, lockout and tag-out electrical power to unit.
2. Open access door to the EnergyX module on back side of the unit.
3. Remove front seal assembly (pulley side of the cassette) if present.
4. Remove belt from pulley and position temporarily around wheel rim
5. Remove the hub cover from the wheel NOTE: The wheel to shaft alignment pin under the hub cover. Insure this pin engages the notch at the end of the shaft when reinstalling the wheel.
6. Pull the wheel straight off the shaft. Handle with care.

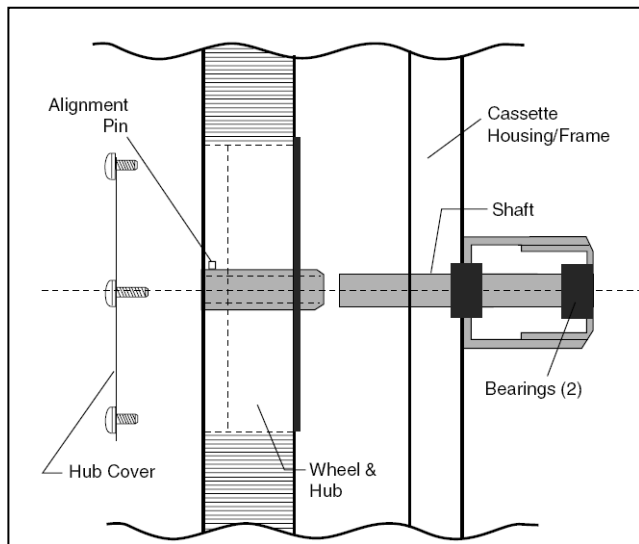


Figure 12 – 19" Wheel Mount

Whole Wheel Removal / Installation

19" wheel

These wheels include the shaft and are secured to two wheel support beams by two flange bearings with locking collars. Follow the steps below for removal and reverse for installation. See Figure 13.

1. Loosen the two set screws on each of the two wheel bearings.
2. Remove belt from pulley and position temporarily around wheel rim
3. Remove pulley side wheel support beam with bearing, by removing four support beam screws.
4. Pull the wheel with shaft straight out of the motor side wheel support beam and bearing. Handle wheel with care.
5. When replacing wheel be certain to tighten four bearing set screws. Premature bearing failure can occur if not set tightly.

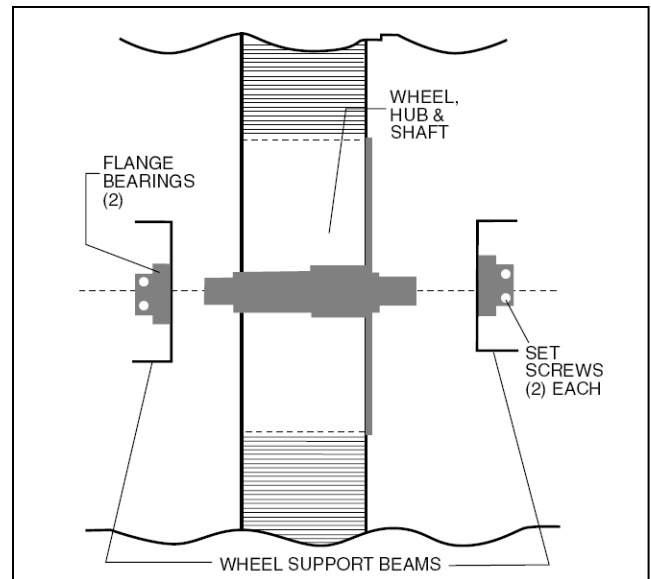


Figure 13 – 25" Wheel Mount

Outside Air and Exhaust Hood Removal

1. Turn off, lockout and tag-out electrical power to unit.
2. Remove the hood by removing the seal-tek screws along the perimeter of the hood. Note: even after all screws have been removed from entire perimeter of hood, it will still be difficult to remove due to the gasket applied from original installation. See Figure 1h and 14.
3. Do not damage plastic tubing running from high and low labeled grommets inside the EnergyX unit to high and low labeled brass connectors in the outside air hood. Cut the tubing directly at the end of the brass connector. See Figures 1e – 1g.

Motorized 2-Position Damper Removal

1. Turn off, lockout and tag-out electrical power to unit.
2. Remove the outdoor air and exhaust hoods per instructions above.
3. Remove the 2-position motorized dampers by removing seal-tek screws from the perimeter mating flange of the damper. Support the weight of the damper assembly while removing screws. Note: even after all screws have been removed from entire perimeter of hood, it will still be difficult to remove due to the gasket applied from original installation. See Figures 1h and 14.
4. Disconnect the two 4-pin electrical plugs for the damper actuator from the wiring harness inside the air chambers of the EnergyX unit. See figure 15
5. Remove the plastic tubing from the grommets in the damper assembly. See figure 1g.

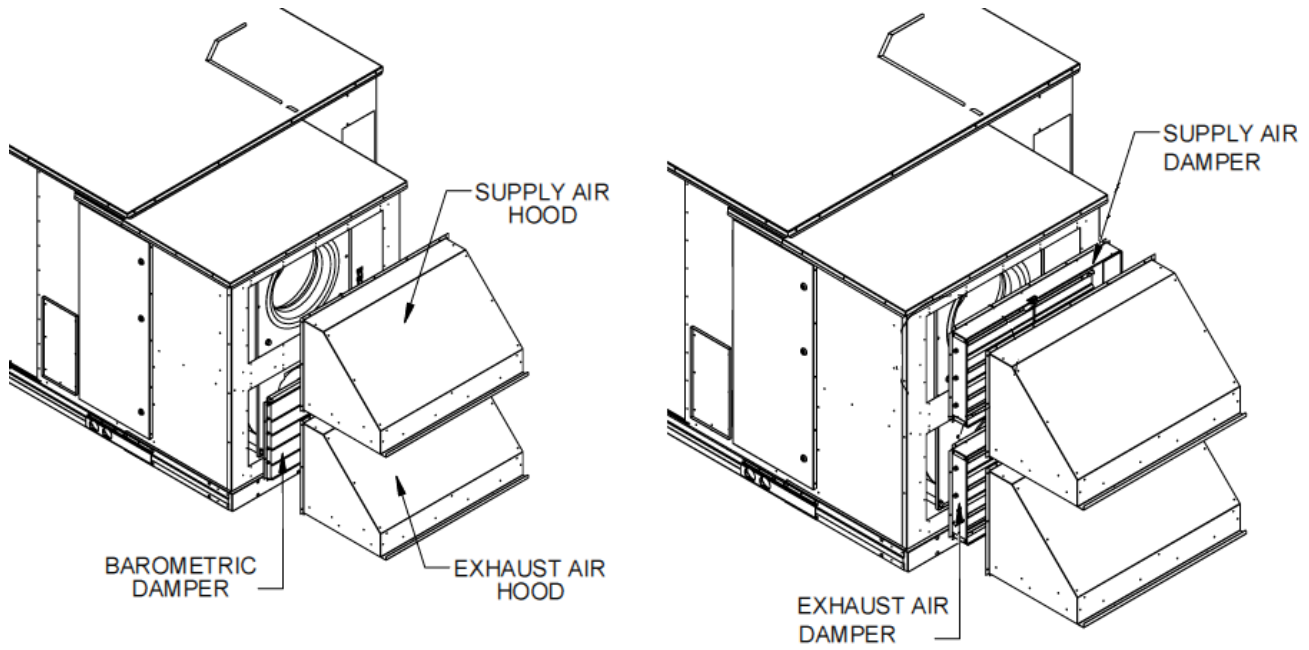


Figure 14 – Hoods and dampers

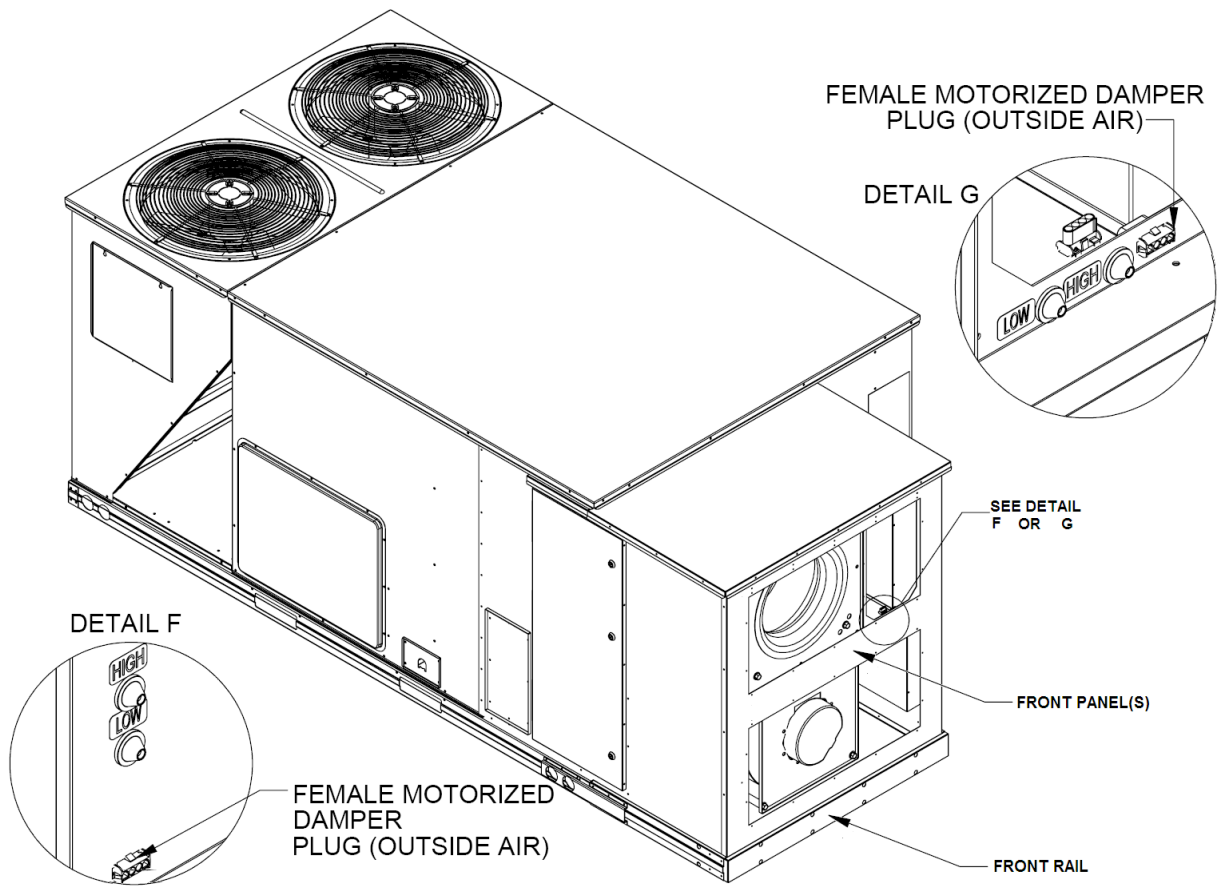


Figure 15 – Panel Removal and 2-Position Plug Connections

Outside Air and Exhaust Fans Replacement

1. Turn off, lockout and tag-out electrical power to unit.
2. Remove the exhaust and/or outside air hoods per instructions above.
3. Remove the damper assemblies as follows:
Units with Barometric Damper: - Remove the barometric damper from the front of the EnergyX unit. The damper is attached by seal-tek screws. Note: even after all screws have been removed from the perimeter of hood, it will still be difficult to remove due to the gasket applied from original installation. See Figure 14.
Units with 2-Position Motorized Dampers - Remove the 2-position motorized dampers per applicable section in this manual. See Figure 14.
4. PG models 03-14 only: Remove the front rail from the front panel and side rails of the EnergyX unit. The front rail is attached by seal-tek screws to the front panel and four seal-tek screws to each side rail. See Figure 15.
5. Remove the screws along the front edge and sides edges of the EnergyX module top panel. Lift up the front section of the top panel away from the EnergyX unit and place a spacer between the top panel and EnergyX unit. This will allow access to the screws across the top of the front panel.
6. Remove EnergyX module front panel(s) by removing seal-tek screws in each panel. See Figure 15. On PG 03-14 the front panel is one piece, and on PM 16-25 the front panel is two pieces.
7. Remove the Accessory control box cover. See Figure 3. Remove the high voltage control box cover. Locate the power distribution terminal block. This terminal block routes electrical power to all fans in the EnergyX module.
8. Locate the fan needing to be replaced and trace the power wire cable back to the high voltage control box.
9. Disconnect the corresponding power wires from distribution block. See Figure 3. The power wire cable consists of four legs (red, black, white, and green) in black insulation. Pull the red, black, and white wires from the distribution block and cut the green wire from the grounding wire group.
NOTE: Leave room for splicing new green wire (s) to the ground lug.
10. Disconnect the blower's control and maintenance plugs. The supply fan control wires are blue and black, and its maintenance wires are purple and yellow. The exhaust fan control wires are red and black, and its maintenance wires are pink and yellow.
NOTE: On multiple supply or exhaust fan systems the control and maintenance wires are daisy chained from the fan closest to the control box to the one furthest. The blower control wires will plug into the extra plug on the fan, and the blower maintenance wires will be spliced together via wire nuts.
13. Pull the power wires through the center divider and economizer panel (if applicable). Make sure all wires are free from the EnergyX unit and directly behind the fan being replaced. Relief panels are provided and can be removed to allow room for plugs to pass through center divider and economizer panel.
14. Remove the fan mounting bolts and discard. New bolts are provided with replacement fan. See Figure 16. Remove the fan assembly from EnergyX unit.

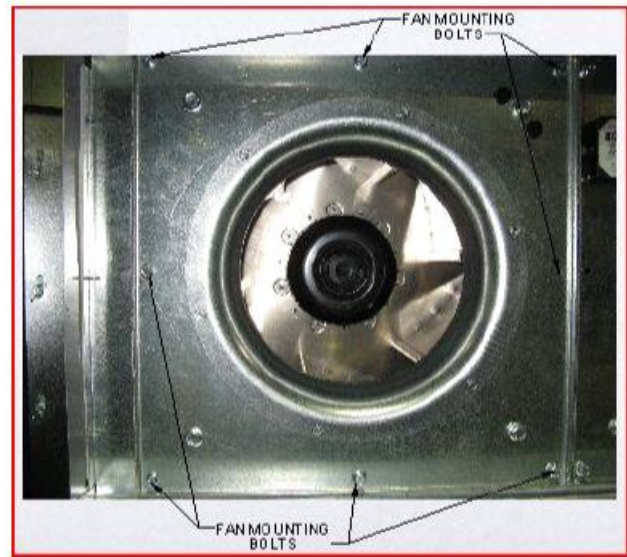


Figure 16 – Fan Mounting Bolts

15. Before installing the replacement fan(s), pre run as much of the power wire, blower control wires, and blower maintenance wires as possible. Be sure to run all three the exact same way that they were removed. The power wire will go to the distribution block. The control and maintenance wires will have plugs.
16. Attach the red, black, white power wires back into their corresponding lugs on the distribution block. Using a wire nut, splice the green wire back onto to wire that was cut during the fan removal process.
17. Connect the blower control and maintenance wire plugs to unit plug on single fan (closest to control box) or to the fan closest to the control box (on furthest fan replacement).
18. After all wiring is complete secure the replacement fan into place with the new fan mounting bolts provided with replacement fan. Installation of the new fan is complete.
19. Now all the chassis pieces that were removed must be attached back to the EnergyX chassis.
20. Reinstall the barometric relief dampers or 2-position dampers as applicable. Apply new gasket to all flanges and surfaces where gasketing was originally applied.
21. Reinstall the outside air and exhaust hood assemblies. Apply new gasket to all flanges and surfaces where gasketing was originally applied. Attach the plastic tubing to the correct brass connector inside the outside air hood.
22. Reinstall the aluminum water filter inside the outside air hood using the provided filter clips.

APPENDIX

APPENDIX – A: BASE UNIT DIMENSIONS

48PG 03-07 Low CFM – Constant Volume

48PG 03-07 Modulating

48PG 08-14 Modulating

48PM 16-24 Modulating

48PM 28 Modulating

50PG 03-07 Low CFM – Constant Volume

50PG 03-07 Modulating

50PG 08-14 Modulating

50PM 16-24 Modulating

50PM 28 Modulating

APPENDIX – B: EXHAUST FAN PERFORMANCE

PG 03-07 Low & High CFM Modulating Exhaust Fan Curves

PG 08-14 Low & High CFM Modulating Exhaust Fan Curves

PM 16-24 Low & High CFM Modulating Exhaust Fan Curves

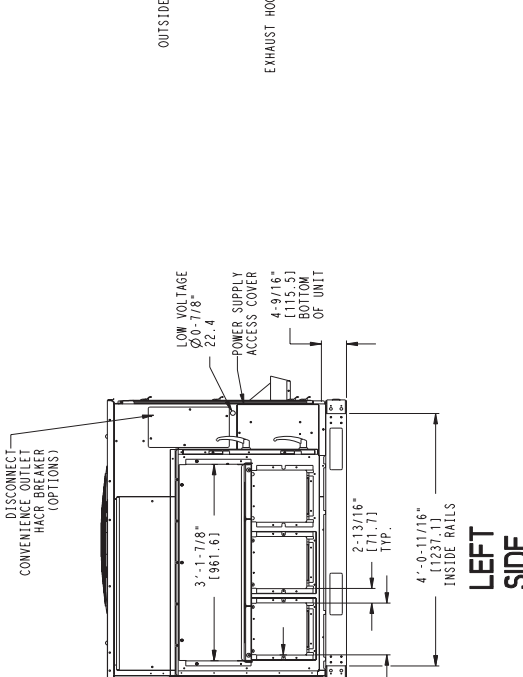
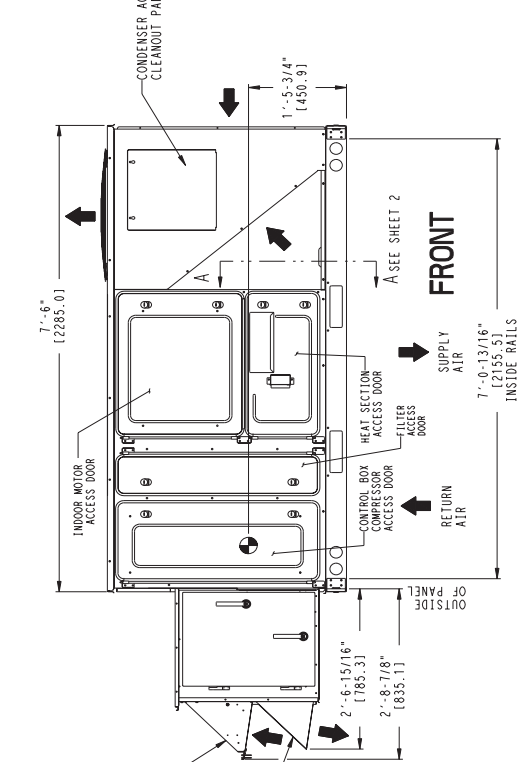
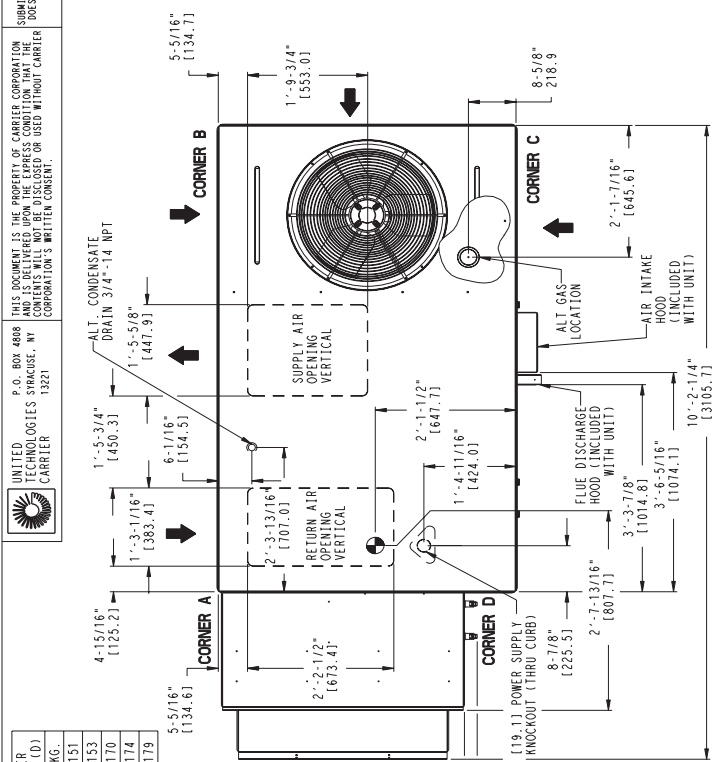
PM 28 Low & High CFM Modulating Exhaust Fan Curves

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UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.
48PG03	976	443	297	135	164	74	183	83	332	151
48PG04	988	448	301	137	166	75	185	84	336	153
48PG05	1103	500	336	153	185	84	207	94	375	170
48PG06	1123	509	342	155	189	86	210	95	382	174
48PG07	1163	528	354	161	195	89	218	99	395	179

- NOTES:
- WEIGHTS SHOWN ARE FOR 48PG (Ht HEAT) UNIT WITH ALUMINUM COILS AND STANDARD DRIVE FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT PRODUCT DATA BOOK.
 - DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ECONOMIZER INLET.
 - MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 - FRONT 48 INCHES TO COMBUSTIBLE SURFACES (18 INCHES WHEN USING ACCESSORY FLUE DISCHARGE DEFLECTOR).
 - REAR 48 INCHES TO COMBUSTIBLE SURFACES (18 INCHES WHEN NOT USING ROOF CURB (1 INCH) BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES).
 - RIGHT SIDE, FRONT AND BACK SIDES (36 INCHES) FOR PROPER CONDENSER AIRFLOW.
 - BETWEEN UNITS (36 INCHES) TO ASSURE PROPER CONDENSER AIRFLOW.
 - BETWEEN UNITS (36 INCHES) TO ASSURE PROPER CONDENSER AIRFLOW.
 - BETWEEN UNIT AND UNGROUND SURFACE CONTROL BOX SIDE (36 INCHES PER NEC).
 - BETWEEN UNIT AND BLOCK OF CONCRETE WALL AND OTHER GROUND SURFACES CONTROL BOX SIDE (42 INCHES) PER NEC.
 - REMOVANCE 4" IN FRONT OF INDOOR MOTOR ACCESS FOR BLOWER SLED CLEARANCE FOR COMPLETE CONDENSATE PAN REMOVAL 4" 6".
 - ON UNITS WITH ECONOMIZER ALLOW 3" 6" FROM LEFT SIDE FOR SERVICE ACCESS TO ECONOMIZER.
 - DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY.
 - DIMENSIONS IN () ARE IN MILLIMETERS OR KILOGRAMS.
 - WITH THE EXCEPTION OF CLEARANCE FOR THE CONDENSER COIL, COMBUSTIBLE SURFACES AND THE DAMPER/POWER EXHAUST AS STATED IN NOTE #2, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
 - DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL. ALLOW 0" 5/16 (18) ON EACH SIDE FOR TOP COVER DRIP EDGE.
 - UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B, C ROOF COVERING MATERIAL IF SET ON BASE RAILS.
- CENTER OF GRAVITY
 DIRECTION OF AIR FLOW



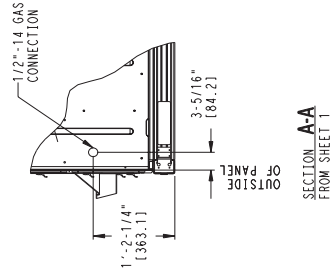
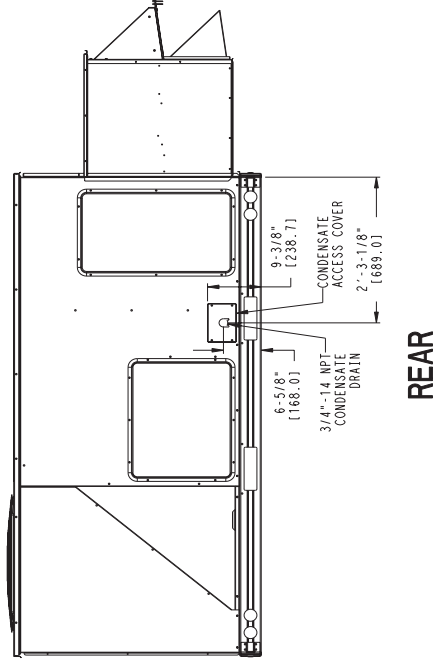
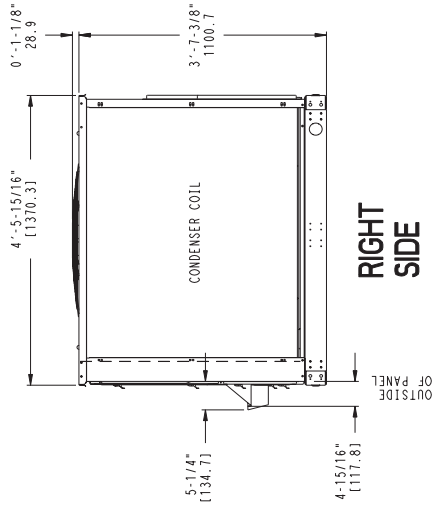


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SHEET
2 OF 2

DATE
02/21/08

SUPERSEDES
10/25/07

48PG 03-07 WITH LOW CFM ENERGY X

48HG503997

REV
3.0

DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS,
 STANDARD IFM DRIVE AND NO FACTORY OPTIONS

DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS,
 STANDARD IFM DRIVE AND NO FACTORY OPTIONS

RTU TYPE	ERV TYPE	Weight (lbs)			Center of Gravity (inches)			Center of Gravity (mm)				
		X	Y	Z	X	Y	Z	X	Y	Z		
48PG03	Low CFM	1089	494	26.4	18.6	9.9	689	473	250	662	471	248
48PG04	Low CFM	1101	559	26.5	18.6	9.8	674	470	249	666	471	247
48PG05	Low CFM	1216	552	28.0	18.5	9.5	711	472	240	704	469	238
48PG06	Low CFM	1236	561	28.2	18.5	9.4	717	470	239	710	469	236
48PG07	Low CFM	1276	579	28.6	18.5	9.3	728	469	236	721	468	234

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PG03-07 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 RIGHT SIDE: 36" CONDENSER AIR FLOW
 LEFT SIDE: 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
 FRONT SIDE: 36" CONDENSER AIR FLOW
 42" TO ANOTHER UNIT (PER NEC)
 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
 42" UNIT TO GROUND SURFACE (PER NEC)
 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF (18" WHEN USE ACCESSORY FLUE DISCHARGE DEFLECTOR)
 REAR SIDE: 72" CONDENSER AIR FLOW
 54" CONDENSATE PAN REMOVAL
 36" SERVICE ACCESS
 12" HORIZONTAL SUPPLY

- BOTTOM: 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- TOP: 0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

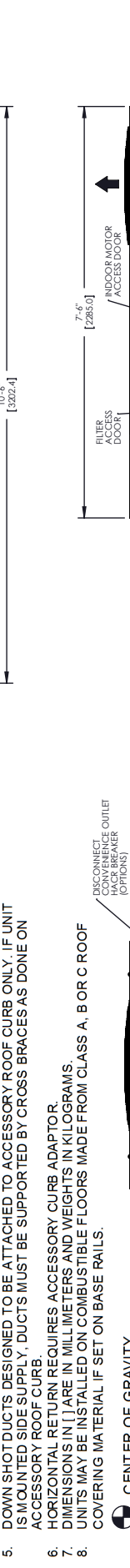
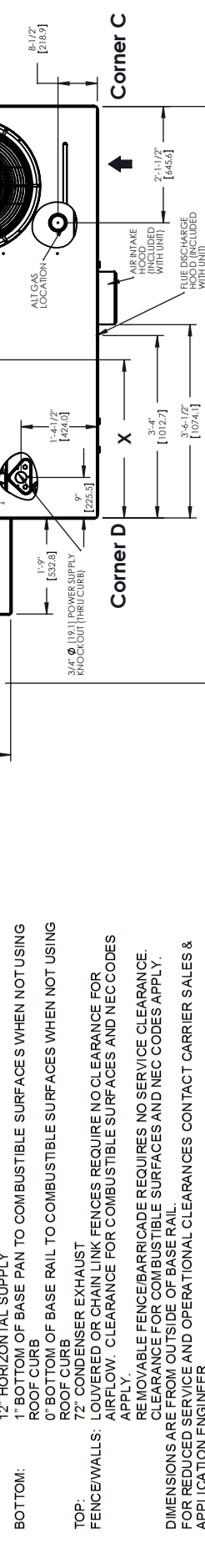
- FENCE/WALLS: LOUVERED OR CHAIN LINK FENCES, REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NECCODES APPLY.

- REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY. DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.

- FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.

- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.

- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
 DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
 UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



● CENTER OF GRAVITY
➔ DIRECTION OF AIRFLOW



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Data shown for standard unit with low heat, standard coils, standard IFM drive and no factory options.

RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Weight (lbs)	Center of Gravity (inches)			Center of Gravity (m m)							
			X	Y	Z		X	Y	Z	X	Y	Z					
48PG03	Low CFM	1089	494	26.4	18.6	9.9	689	473	250	1094	496	26.1	18.6	9.8	682	471	248
48PG04	Low CFM	1101	499	26.5	18.6	9.8	674	470	249	1106	502	26.2	18.5	9.7	666	471	247
48PG05	Low CFM	1216	552	28.0	18.5	9.5	711	472	240	1221	554	27.7	18.5	9.4	704	469	238
48PG06	Low CFM	1236	561	28.2	18.5	9.4	717	470	239	1241	563	28.0	18.5	9.3	710	469	236
48PG07	Low CFM	1276	579	28.6	18.5	9.3	728	469	236	1281	581	28.4	18.4	9.2	721	468	234

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PG03-07 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.

3. DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.

4. MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):

- 36" CONDENSER AIRFLOW
- 42" OUTDOOR AIRFLOW & EXHAUST
- 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")

- 36" CONDENSER AIRFLOW
- 42" TO ANOTHER UNIT (PER NEC)
- 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
- 42" UNIT TO GROUNDED SURFACE (PER NEC)
- 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF (18" WHEN USE ACCESSORY FLUE DISCHARGE DEFLECTOR)

- 72" CONDENSER AIRFLOW
- 54" CONDENSATE PAN REMOVAL
- 36" SERVICE ACCESS
- 12" HORIZONTAL SUPPLY

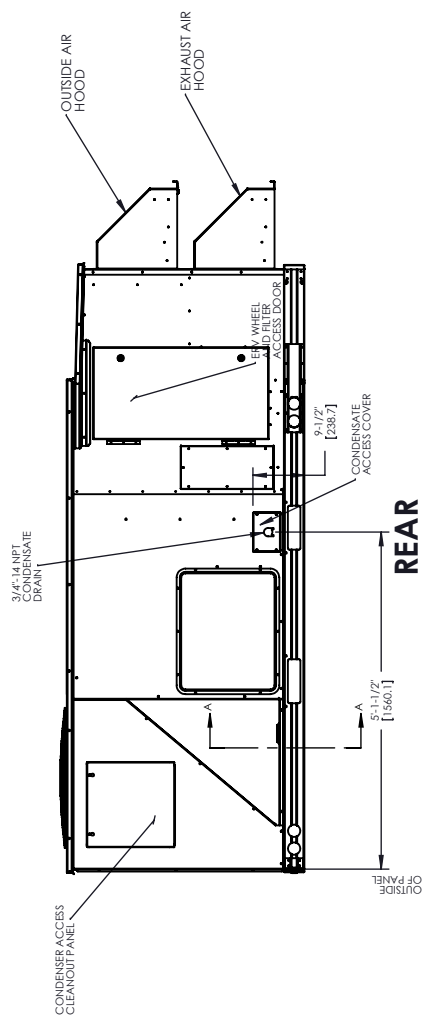
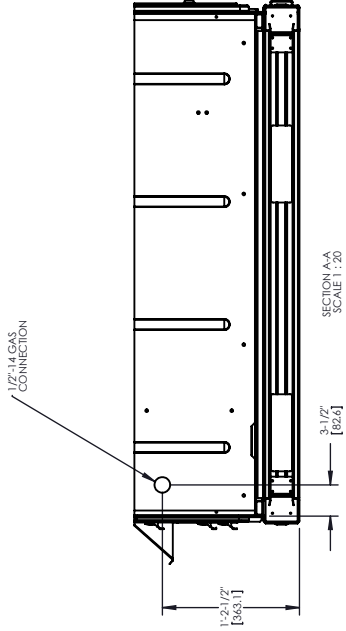
- 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- 0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

- 72" CONDENSER EXHAUST
- FENCE/WALLS: LOUVERED OR CHAIN LINK FENCES, REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NECCODES APPLY.

- REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY. DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.

- FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.

- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



Data shown for standard unit with low heat, standard coils, standard IFM drive and no factory options.

RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Weight (lbs)	Center of Gravity (inches)			Center of Gravity (mm)						
			X	Y	Z		X	Y	Z	X	Y	Z				
48PG08	Low CFM	1867	25.1	15.5	14.7	638	393	374	1891	858	25.0	15.4	15.1	635	391	383
48PG09	Low CFM	1874	25.2	15.5	14.7	640	399	374	1898	861	25.1	15.4	15.0	637	391	382
48PG12	Low CFM	1974	26.4	15.7	14.4	670	399	366	1998	906	26.2	15.6	14.7	666	397	374
48PG14	Low CFM	2050	27.2	15.9	14.2	690	403	360	2074	941	27.0	15.8	14.5	686	401	368

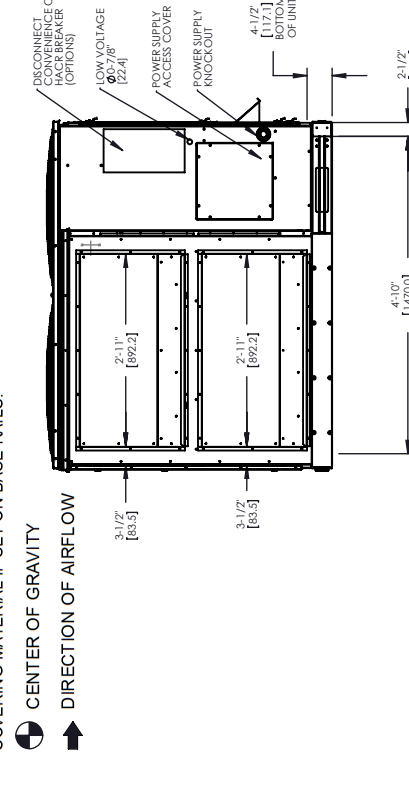
- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PG08-14 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 RIGHT SIDE:
 36" CONDENSER AIRFLOW
 LEFT SIDE:
 42" OUTDOOR AIRFLOW & EXHAUST
 FRONT SIDE:
 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
 36" CONDENSER AIRFLOW

- FLUE OUTLET:
 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF (18" WHEN USE ACCESSORY FLUE DISCHARGE DEFLECTOR)
- REAR SIDE:
 72" CONDENSER AIRFLOW
 54" CONDENSATE PAN REMOVAL
 36" SERVICE ACCESS

- BOTTOM:
 12" HORIZONTAL SUPPLY
 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 0" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

- TOP:
 FENCE:
 72" CONDENSER EXHAUST
 LOWERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE.
 CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

- DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL
 FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
 DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
 HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
 DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
 UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

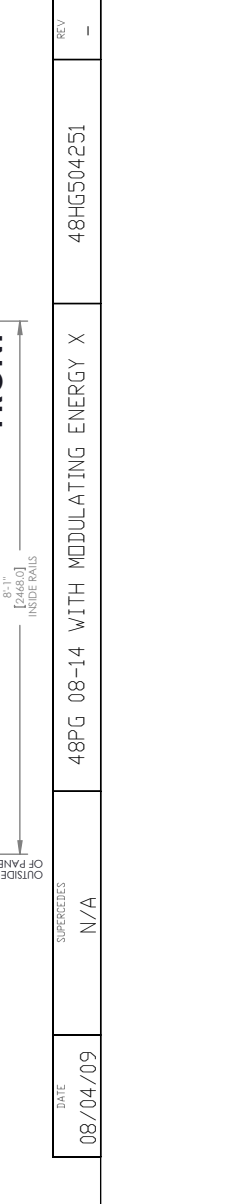
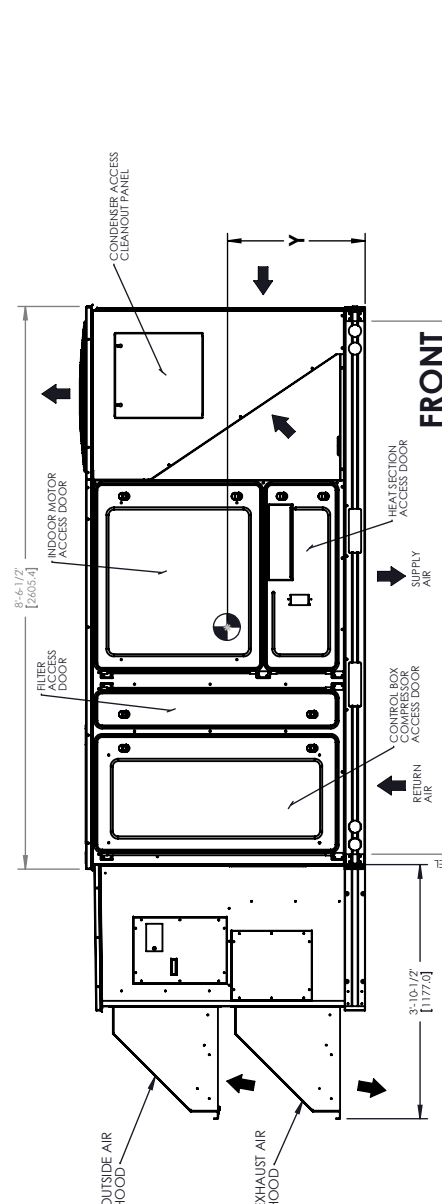
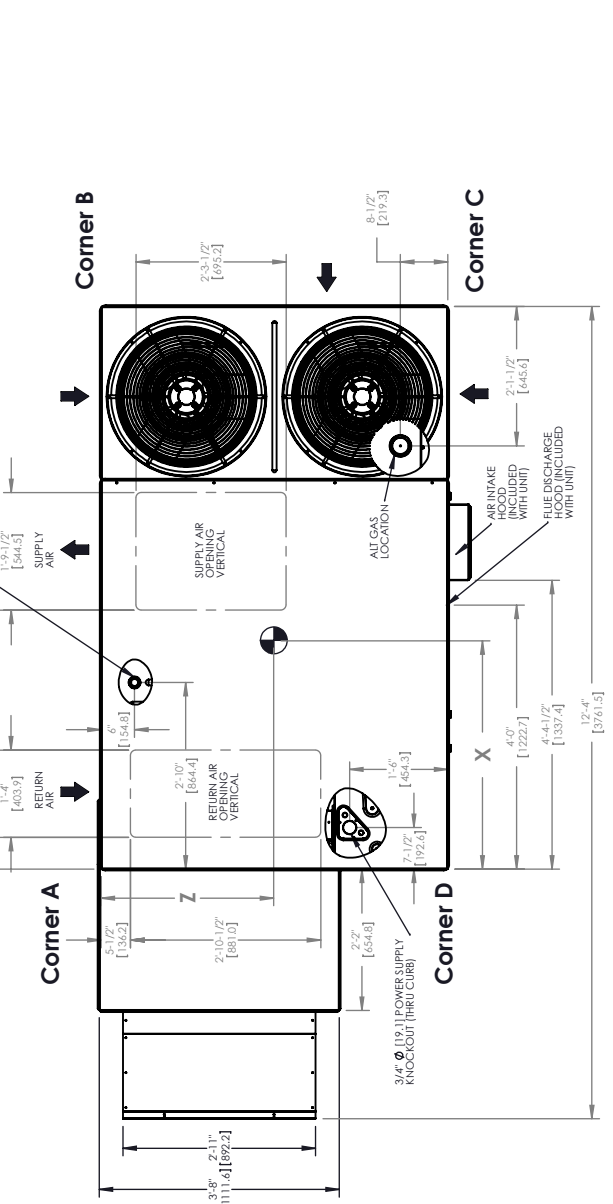


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- ➔ DIRECTION OF AIRFLOW

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DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS, STANDARD IFM DRIVE AND NO FACTORY OPTIONS





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DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS,
STANDARD IFM DRIVE AND NO FACTORY OPTIONS

RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Weight (lbs)	Center of Gravity (inches)			Center of Gravity (mm)							
			X	Y	Z		X	Y	Z	X	Y	Z					
48PG08	Low CFM	1867	25.1	15.5	14.7	638	393	374	1891	858	25.0	15.4	15.1	635	391	383	
48PG09	Low CFM	1874	850	25.2	15.5	14.7	640	394	374	1898	861	25.1	15.4	15.0	637	391	382
48PG12	Low CFM	1974	896	26.4	15.7	14.4	670	399	366	1998	906	26.2	15.6	14.7	666	397	374
48PG14	Low CFM	2050	930	27.2	15.9	14.2	690	403	360	2074	941	27.0	15.8	14.5	686	401	368

1. FOR OUTDOOR USE ONLY.
2. WEIGHTS SHOWN ARE FOR 48PG08-14 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
3. DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
4. MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
36" CONDENSER AIRFLOW
42" OUTDOOR AIRFLOW & EXHAUST
54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
36" CONDENSER AIRFLOW

42" TO ANOTHER UNIT (PER NEC)
36" UNIT TO UNGROUNDED SURFACE (PER NEC)
42" UNIT TO GROUNDED SURFACE (PER NEC)
FLUE OUTLET: 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF
18" WHEN USE ACCESSORY FLUE DISCHARGE DEFLECTOR

REAR SIDE:
72" CONDENSER AIRFLOW
54" CONDENSATE PAN REMOVAL
36" SERVICE ACCESS
12" HORIZONTAL SUPPLY

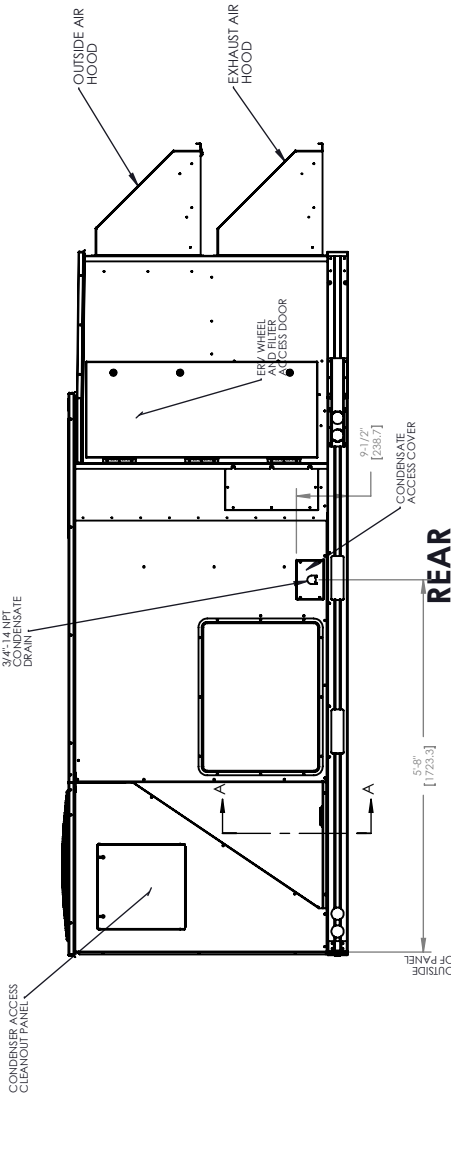
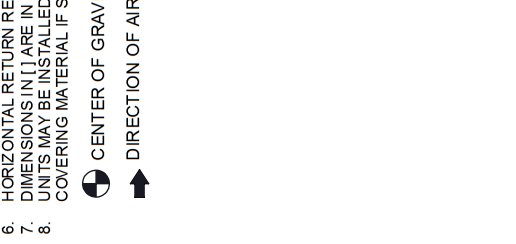
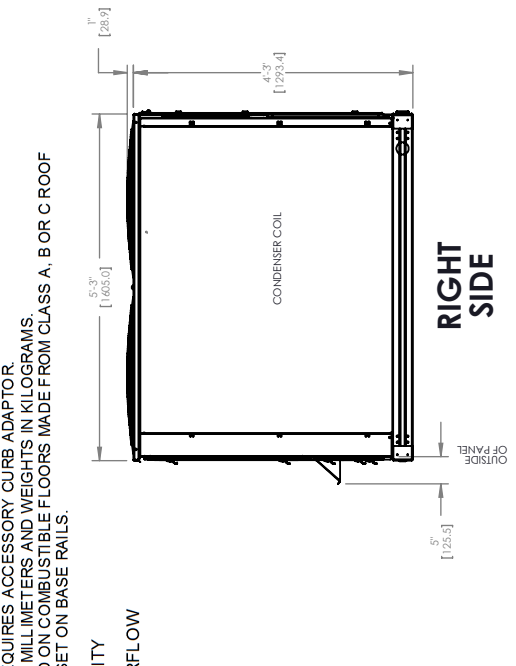
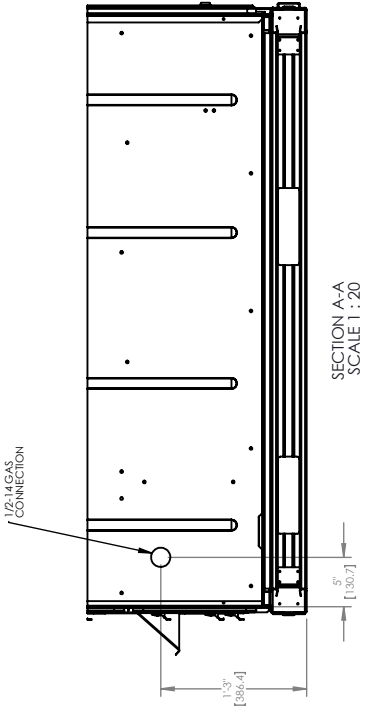
BOTTOM:
1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

TOP:
FENCE:
72" CONDENSER EXHAUST
LOWEDED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW.
CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE.
CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL
FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.

HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

● CENTER OF GRAVITY
➔ DIRECTION OF AIRFLOW

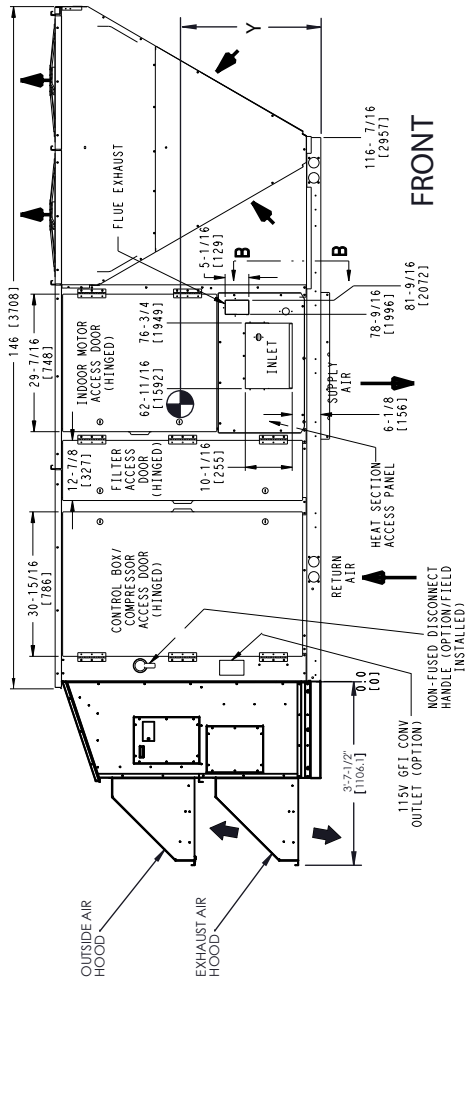
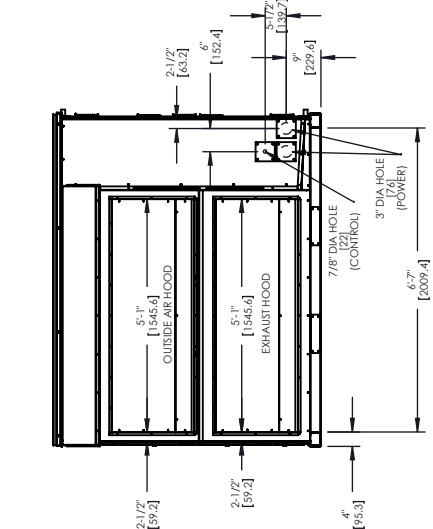
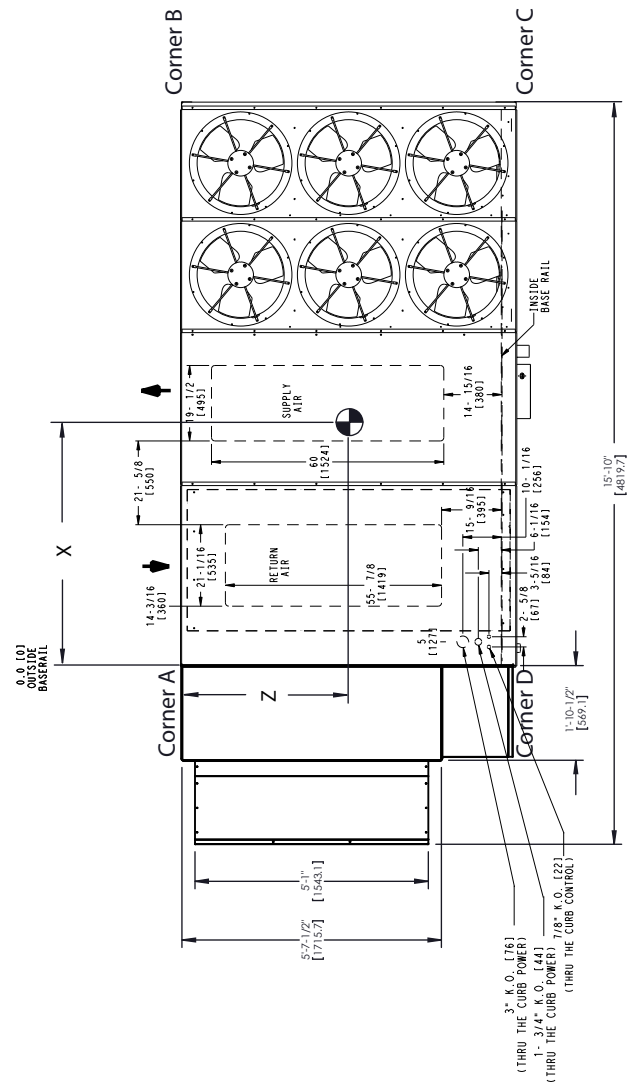




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RTU TYPE	ERV TYPE	Center of Gravity (inches)			Center of Gravity (m m)			Center of Gravity (inches)			Center of Gravity (m m)				
		X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z		
48RM16	Low CFM	3409	1546	40.0	28.6	68.6	1015	728	1742	38.4	28.9	67.5	735	735	1715
48RM20	Low CFM	3454	1566	40.3	28.7	68.8	1023	728	1748	38.7	28.9	67.8	735	735	1721
48RM24	Low CFM	3469	1573	40.4	28.7	68.9	1025	728	1750	38.8	28.9	67.8	735	735	1723

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PM16-24 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL:
 - 72" CONDENSER AIRFLOW
 - 120" OUTDOOR AIRFLOW & EXHAUST
 - 36" SERVICE
 - 72" CONDENSER AIRFLOW
 - 96" COIL REMOVAL
 - 42" TO ANOTHER UNIT (PER NEC)
 - 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
 - 42" UNIT TO GROUNDED SURFACE (PER NEC)
 - 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF
 - 72" CONDENSER AIRFLOW
 - 36" SERVICE ACCESS
 - 12" HORIZONTAL SUPPLY
 - 14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 72" CONDENSER EXHAUST
 - LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
- DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL. FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER. DOWN SHOT DUCT'S DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY IF UNIT IS MOUNTED SIDE SUPPLY DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.





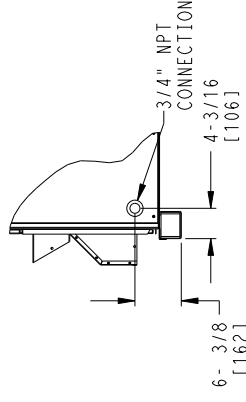
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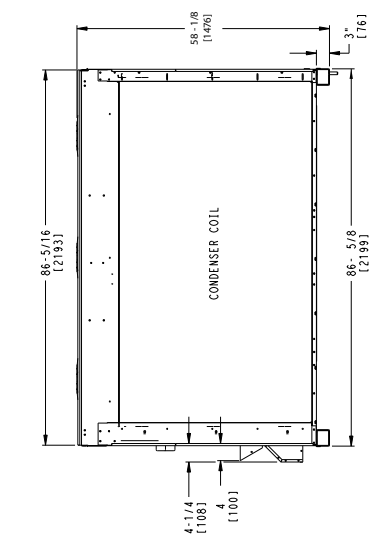
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RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Center of Gravity (mm)			ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Center of Gravity (mm)		
			X	Y	Z	X	Y	Z			X	Y	Z	X	Y	Z
48PM16	Low CFM	3409	40.0	28.6	68.6	1015	728	1742	High CFM	3535	38.4	28.9	67.5	975	735	1715
48PM20	Low CFM	3454	40.3	28.7	68.8	1023	728	1748	High CFM	3680	38.7	28.9	67.8	982	736	1721
48PM24	Low CFM	3469	40.4	28.7	68.9	1025	728	1750	High CFM	3895	38.8	28.9	67.8	985	735	1723

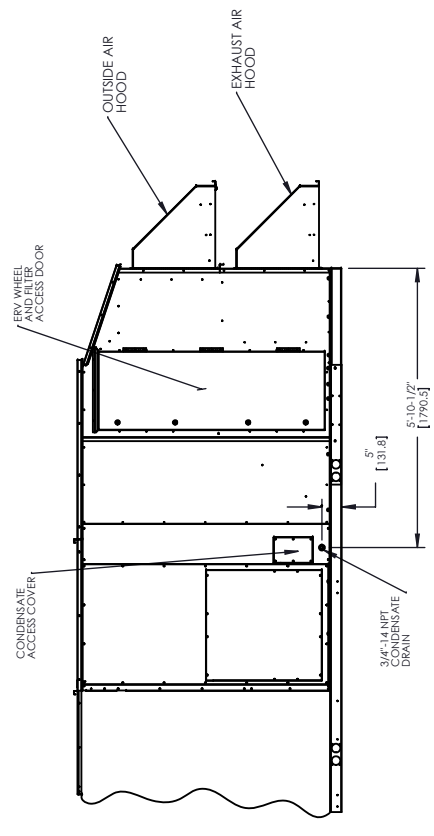
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- WEIGHTS SHOWN ARE FOR 48PM16-24 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 - RIGHT SIDE: 72" CONDENSER AIRFLOW
 - LEFT SIDE: 120" OUTDOOR AIRFLOW & EXHAUST
 - FRONT SIDE: 36" SERVICE
 - 96" COIL REMOVAL
 - 42" TO ANOTHER UNIT (PER NEC)
 - 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
 - 42" UNIT TO GROUNDED SURFACE (PER NEC)
 - 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF
- FLUE OUTLET: 72" CONDENSER AIRFLOW
- REAR SIDE: 36" SERVICE ACCESS
- 12" HORIZONTAL SUPPLY
- 14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- 10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- 72" CONDENSER EXHAUST
- LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
- REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
- DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL
- FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



FLUE DETAIL



RIGHT SIDE



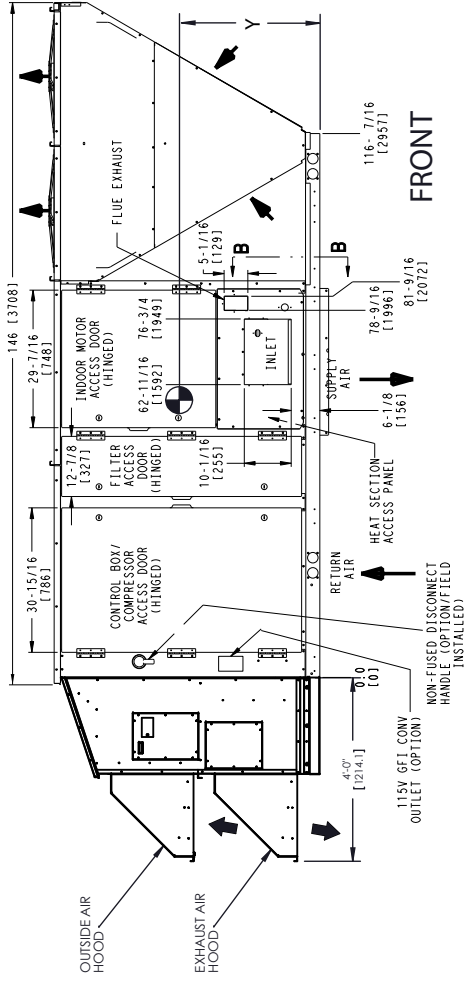
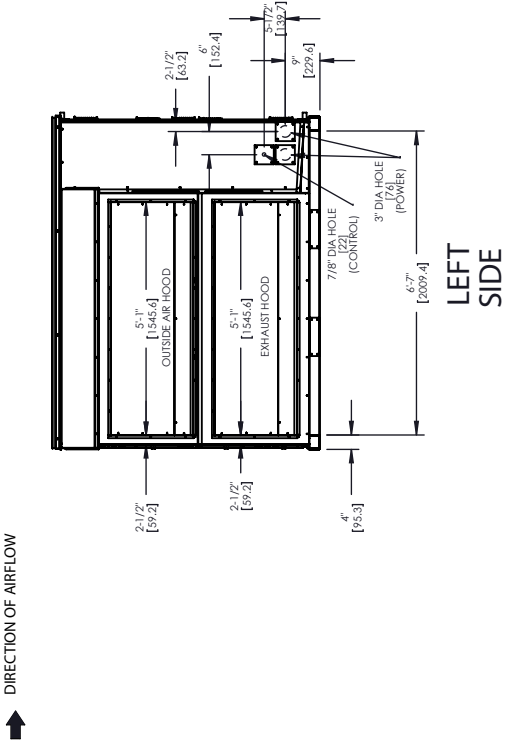
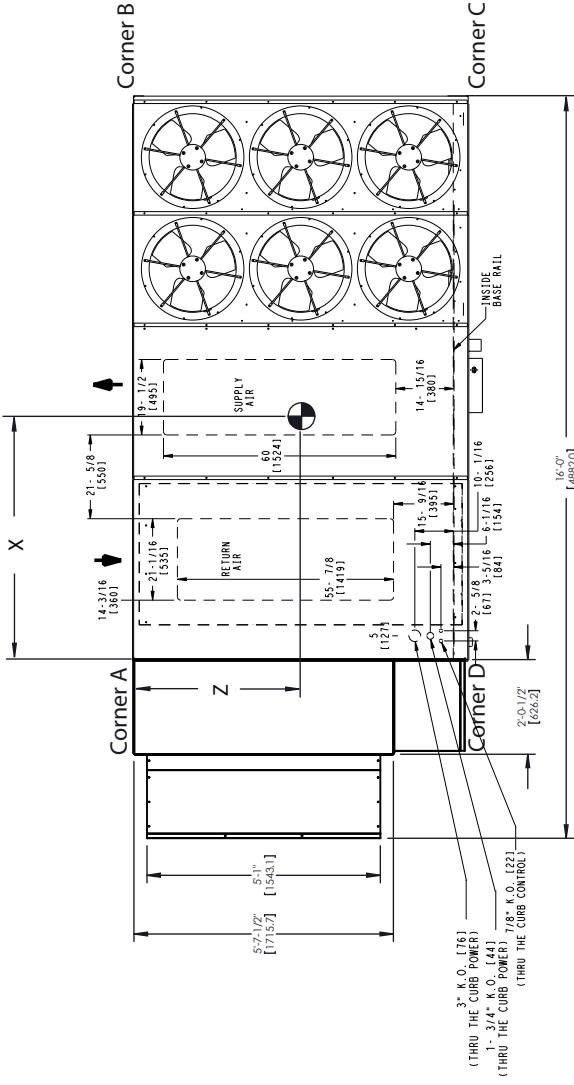
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0.4 1/16"
 OUTSIDE
 BASE RAIL

RTU TYPE	ERV TYPE	Weight (lbs)	Weight (kg)	Center of Gravity (inches)			Center of Gravity (mm)		
				X	Y	Z	X	Y	Z
48PM28	Low CFM	3691	1674	42.3	33.0	69.0	1075	839	1752
48PM28	High CFM	3823	1734	40.7	33.3	68.3	1034	846	1735

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PM28 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 LEFT SIDE:
 FRONT SIDE:
 REAR SIDE:
 BOTTOM:
 TOP:
 FENCE:
 FLUE OUTLET:
 REAR SIDE:
 BOTTOM:
 TOP:
 FENCE:
 DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
 FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
 DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
 HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
 DIMENSIONS IN \square ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
 8. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



DATE 08/04/09
 SUPERCEDES N/A
 48PM 28 W/ MODULATING ENERGYX
 50TGS06987
 REV -



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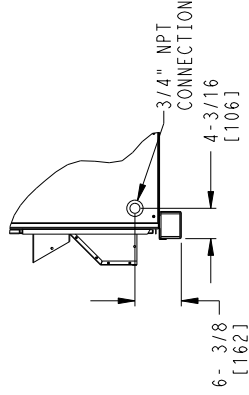
FOR 800-468-1322
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RTU TYPE	ERV TYPE	Weight (lbs)	Weight (kg)	Center of Gravity (inches)			Center of Gravity (mm)		
				X	Y	Z	X	Y	Z
48PM28	Low CFM	3691	1674	42.3	33.0	69.0	1075	839	1752
48PM28	High CFM	3823	1734	40.7	33.3	68.3	1034	846	1735

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 48PM28 LOW HEAT UNIT WITH ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):

- RIGHT SIDE: 72" CONDENSER AIRFLOW
- LEFT SIDE: 120" OUTDOOR AIRFLOW & EXHAUST
- FRONT SIDE: 36" SERVICE
- 72" CONDENSER AIRFLOW
- 96" COIL REMOVAL
- 42" TO ANOTHER UNIT (PER NEC)
- 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
- 42" UNIT TO GROUNDED SURFACE (PER NEC)
- 48" TO COMBUSTIBLE SURFACES, UTILITY METERS, REGULATORS OR RELIEF
- 72" CONDENSER AIRFLOW
- 36" SERVICE ACCESS
- 12" HORIZONTAL SUPPLY
- 14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- 10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
- 72" CONDENSER EXHAUST
- Louvered or chain link fences require no clearance for airflow. Clearance for combustible surfaces and NEC codes apply.
- Removable fence/barricade requires no service clearance. Clearance for combustible surfaces and NEC codes apply.

FLUE OUTLET:
REAR SIDE:

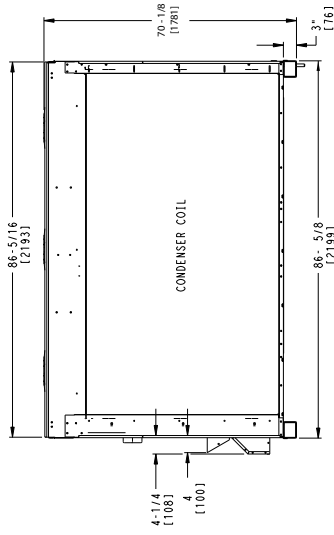


FLUE DETAIL

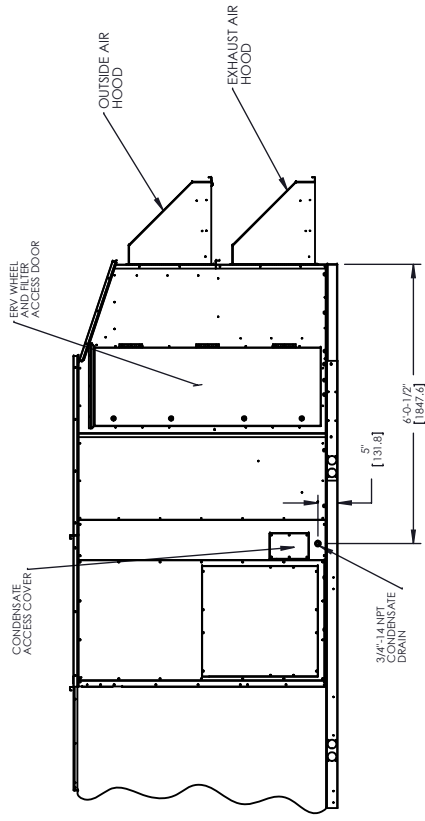
- DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
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- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

● CENTER OF GRAVITY

➔ DIRECTION OF AIRFLOW



RIGHT SIDE



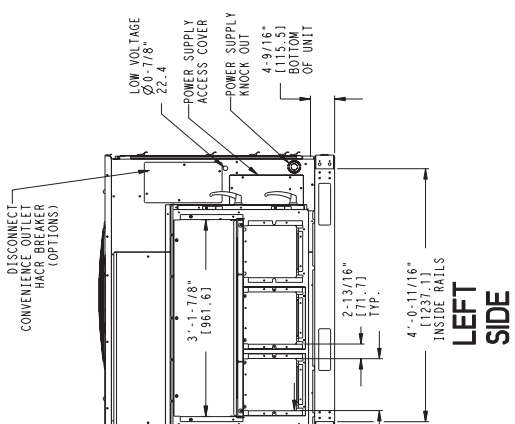
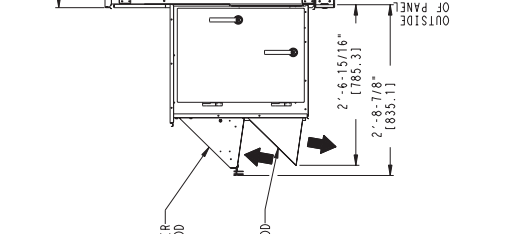
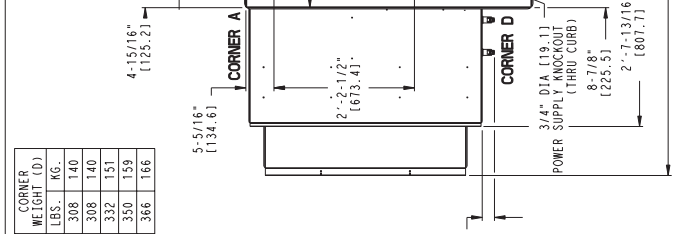
REAR

DATE	SUPERCEDES	REV
08/04/09	N/A	50TG506987
48PM 28 w/ MODULATING ENERGYX		—

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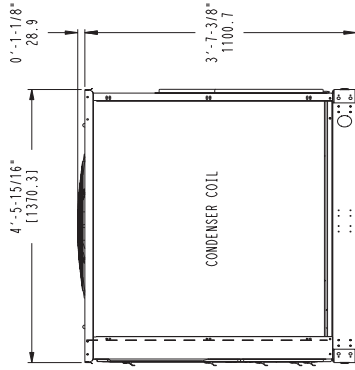
UNIT	STD. WEIGHT LBS. / KG.	CORNER WEIGHT (A) LBS. / KG.	CORNER WEIGHT (B) LBS. / KG.	CORNER WEIGHT (C) LBS. / KG.	CORNER WEIGHT (D) LBS. / KG.
50PG03	906	411	276	125	152
50PG04	906	411	276	125	152
50PG05	917	443	298	135	164
50PG06	1031	468	314	143	173
50PG07	1076	488	328	149	181
			82	202	92
			366	166	

- NOTES:
- DIMENSIONS IN () ARE IN MILLIMETERS.
 - CENTER OF GRAVITY.
 - DIRECTION OF AIR FLOW.
 - DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY.
 - MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL): TO COMBUSTIBLE FOR FIRST 12" OF DUCT TUBE 1" (25.4); TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH (25.4); TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES.
 - WHEN NOT USING ROOF CURB (0 INCHES) TO BOTTOM OF BASE RAIL RIGHT SIDE, FRONT AND BACK SIDES (36 INCHES) FOR PROPER OPERATION. 60 INCHES TO ASSURE PROPER CONDENSER FAN OPERATION.
 - BETWEEN UNITS, CONTROL BOX SIDE, 42 IN. PER NEC.
 - SIDE, 36 IN. PER NEC.
 - CONTROL BOX SIDE, CONCRETE WALLS AND OTHER GROUND SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.
 - CLEARANCE IN FRONT OF INDOOR MOTOR ACCESS FOR BLOWER SLED REMOVAL 4'-6".
 - CLEARANCE FOR COMPLETE CONDENSATE PAN REMOVAL 4'-6".
 - WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
 - UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASE RAIL.

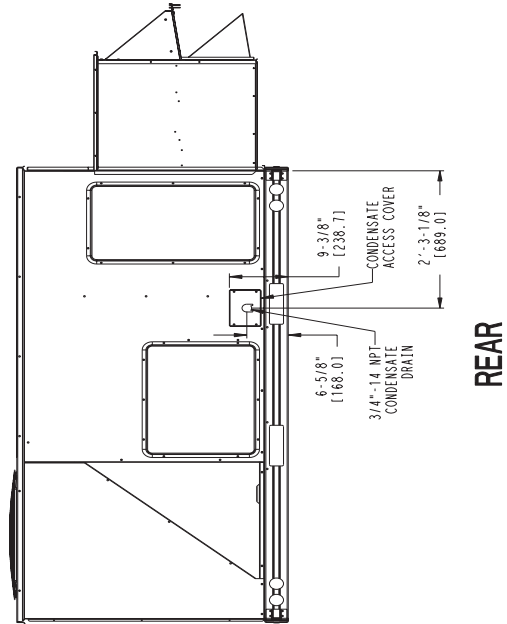


Appendix A - Base Unit Dimensions 50PG03-07 Low CFM - Constant Volume


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**RIGHT
SIDE**



SHEET 2 OF 2	DATE 02/21/08	SUPERSEDES 10/25/07	50PG 03-07 WITH LOW CFM ENERGY X	48HG503998	REV 3.0
-----------------	------------------	------------------------	----------------------------------	------------	------------

DATE 08/04/09
 SUPERCEDES N/A
 REV -

DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS, STANDARD IFM DRIVE AND NO FACTORY OPTIONS

RTU TYPE	ERV TYPE	Weight (lbs)			Center of Gravity (inches)			Center of Gravity (mm)			Weight (kg)			Center of Gravity (inches)			Center of Gravity (mm)								
		Low CFM	High CFM	High CFM	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z						
50PG03	Low CFM	1089	494	26.4	18.6	9.9	689	473	250	1094	496	26.1	18.6	9.8	682	471	248	1106	502	26.2	18.5	9.7	666	471	247
50PG04	Low CFM	1101	499	26.5	18.6	9.8	674	472	249	1106	502	26.2	18.5	9.7	666	471	247	1106	502	26.2	18.5	9.7	666	471	247
50PG05	Low CFM	1216	552	28.0	18.5	9.5	711	470	240	1221	554	27.7	18.5	9.4	704	469	238	1221	554	27.7	18.5	9.4	704	469	238
50PG06	Low CFM	1236	561	28.2	18.5	9.4	717	470	239	1241	563	28.0	18.5	9.3	710	469	236	1241	563	28.0	18.5	9.3	710	469	236
50PG07	Low CFM	1276	579	28.6	18.5	9.3	728	469	236	1281	581	28.4	18.4	9.2	721	468	234	1281	581	28.4	18.4	9.2	721	468	234

1. FOR OUTDOOR USE ONLY.

2. WEIGHTS SHOWN ARE FOR 50PG03-07 UNIT WITH NO ELECT HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.

3. MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):

RIGHT SIDE: 36" CONDENSER AIRFLOW

LEFT SIDE: 42" OUTDOOR AIRFLOW & EXHAUST

FRONT SIDE: 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")

REAR SIDE: 36" CONDENSER AIRFLOW

42" TO ANOTHER UNIT (PER NEC)

36" UNIT TO UNGROUNDED SURFACE (PER NEC)

42" UNIT TO GROUNDED SURFACE (PER NEC)

72" CONDENSER AIRFLOW

54" CONDENSATE PAN REMOVAL

36" SERVICE ACCESS

12" HORIZONTAL SUPPLY

1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

72" CONDENSER EXHAUST

VERTICAL DISCHARGE: 1" TO COMBUSTIBLE MATERIALS FOR FIRST 12" OF DUCT TUBE

FENCEWALLS: LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW.

CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE.

CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.

FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.

DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.

HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.

DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.

UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

DISCONNECT CONVENIENCE OUTLET (OPTIONAL)

LOW VOLTAGE POWER SUPPLY ACCESS COVER (24V)

POWER SUPPLY KNOCKOUT (115V)

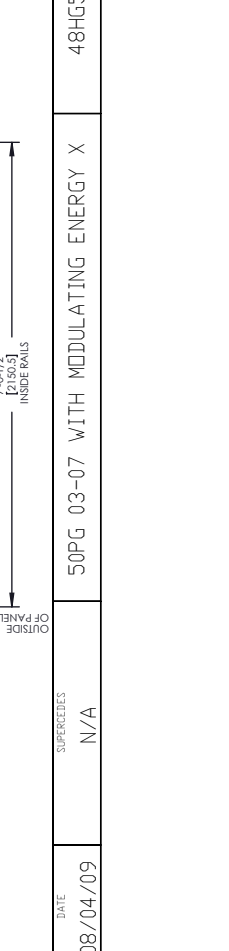
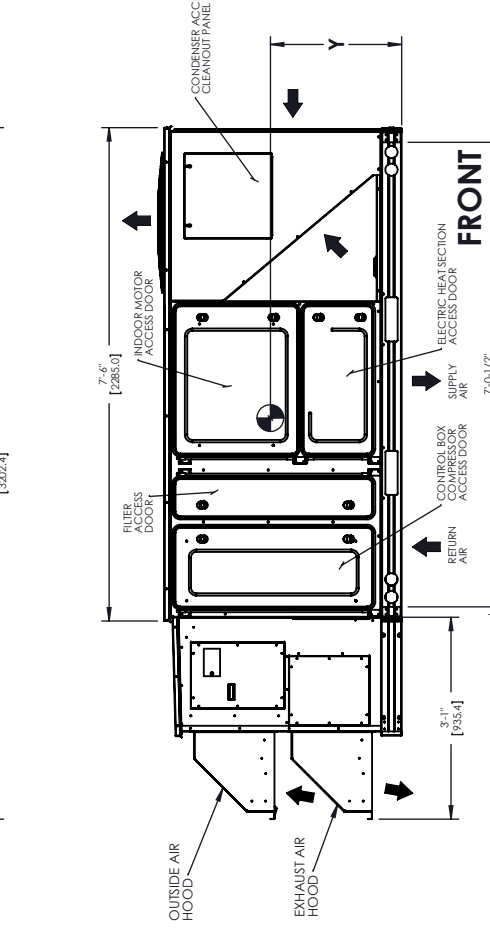
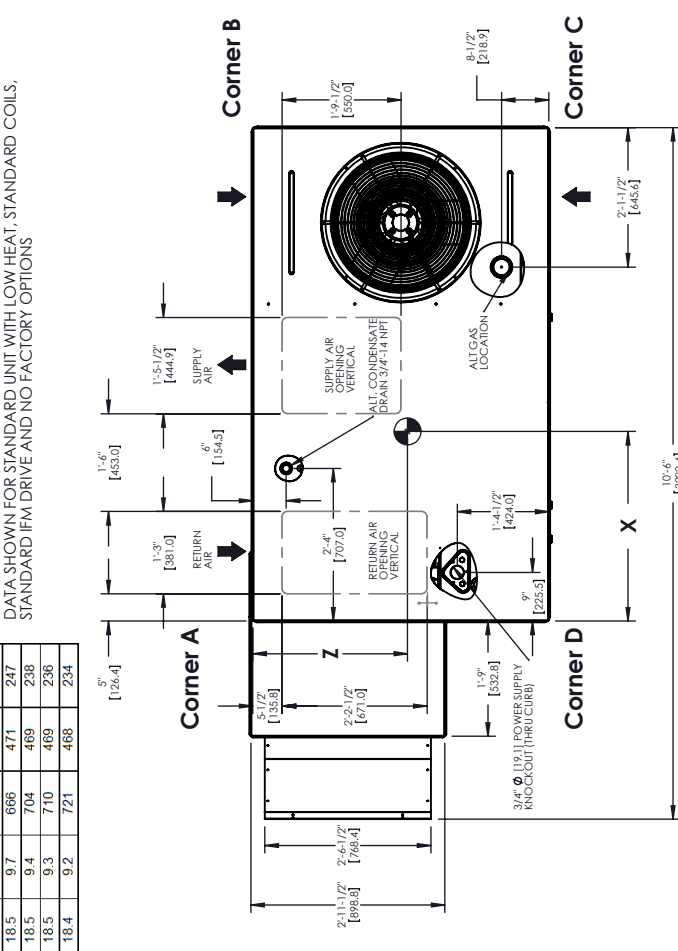
4-1/2" BOTTOM OF UNIT

2-1/2" INSIDE RAILS

LEFT SIDE

CENTER OF GRAVITY

DIRECTION OF AIRFLOW





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 ERV BOX 4698
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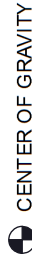
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Data shown for standard unit with no heat, standard coils, standard IFM drive and no factory options.

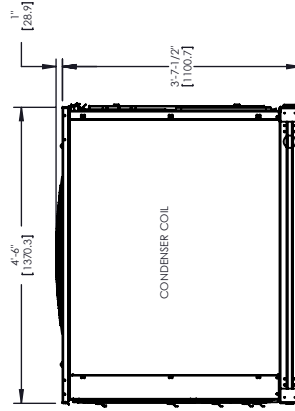
RTU TYPE	ERV TYPE	Weight (lbs)		Center of Gravity (inches)			Center of Gravity (mm)			Weight (kg)			Center of Gravity (inches)			Center of Gravity (mm)		
		High CFM	Low CFM	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
50PG03	Low CFM	1089	494	26.4	18.6	9.9	689	473	250	1094	496	26.1	18.6	9.8	662	471	248	
50PG04	Low CFM	1101	499	26.5	18.6	9.8	674	472	249	1106	502	26.2	18.5	9.7	666	471	247	
50PG05	Low CFM	1216	552	28.0	18.5	9.5	711	470	240	1221	554	27.7	18.5	9.4	704	469	238	
50PG06	Low CFM	1236	561	28.2	18.5	9.4	717	470	239	1241	563	28.0	18.5	9.3	710	469	236	
50PG07	Low CFM	1276	579	28.6	18.5	9.3	728	469	236	1281	581	28.4	18.4	9.2	721	468	234	

DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS, STANDARD IFM DRIVE AND NO FACTORY OPTIONS.

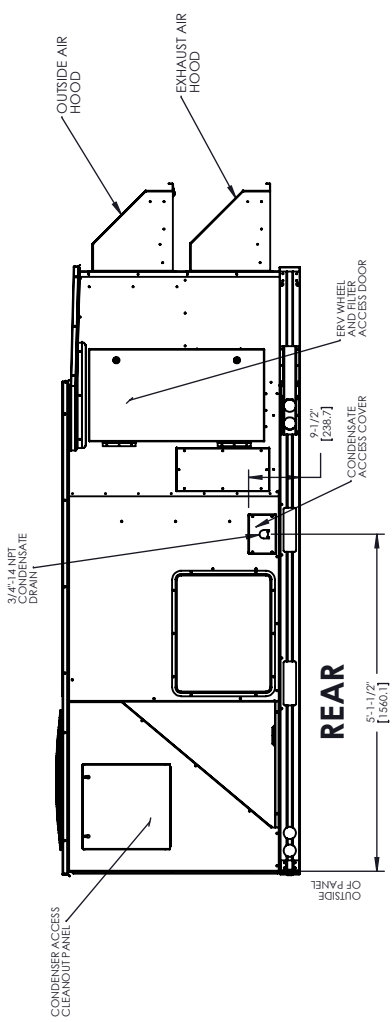
- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 50PG03-07 UNIT WITH NO ELECT HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 - RIGHT SIDE: 36" CONDENSER AIRFLOW
 - LEFT SIDE: 42" OUTDOOR AIRFLOW & EXHAUST
 - FRONT SIDE: 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
 - 36" CONDENSER AIRFLOW
 - 42" TO ANOTHER UNIT (PER NEC)
 - 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
 - 42" UNIT TO GROUNDED SURFACE (PER NEC)
 - 72" CONDENSER AIRFLOW
 - 54" CONDENSATE PAN REMOVAL
 - 36" SERVICE ACCESS
 - 12" HORIZONTAL SUPPLY
- BOTTOM:
 - 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 72" CONDENSER EXHAUST
- TOP:
 - VERTICAL DISCHARGE: 1" TO COMBUSTIBLE MATERIALS FOR FIRST 12" OF DUCT TUBE
 - FENCEWALLS: LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
 - FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



CENTER OF GRAVITY
 DIRECTION OF AIRFLOW



RIGHT SIDE



REAR

DATE: 08/04/09

SUPERCEDES: N/A

50PG 03-07 WITH MODULATING ENERGY X

REV: 48HG504252

Data shown for standard unit with low heat, standard coils, standard IFM drive and no factory options.

RTU TYPE	ERV			Center of Gravity (inches)			Weight (lbs)			Center of Gravity (inches)			Center of Gravity (mm)			
	TYPE	Weight	Height	X	Y	Z	(lbs)	X	Y	Z	X	Y	Z	X	Y	Z
50PG08	Low CFM	1773	604	23.9	15.2	15.1	17.97	815	15.4	15.4	604	385	391	604	385	391
50PG09	Low CFM	1780	808	24.0	15.3	15.0	1804	818	15.2	15.4	606	385	390	606	385	390
50PG12	Low CFM	1874	850	25.2	15.5	14.7	1898	861	15.4	15.0	637	391	382	637	391	382
50PG14	Low CFM	1885	900	26.5	15.7	14.4	2009	911	15.6	14.7	669	397	373	669	397	373

1. FOR OUTDOOR USE ONLY.
 2. WEIGHTS SHOWN ARE FOR 50PG08-14 UNIT WITH NO ELECT HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.

3. MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 RIGHT SIDE: 36" CONDENSER AIRFLOW
 LEFT SIDE: 42" OUTDOOR AIRFLOW & EXHAUST
 FRONT SIDE: 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
 REAR SIDE: 72" CONDENSER AIRFLOW

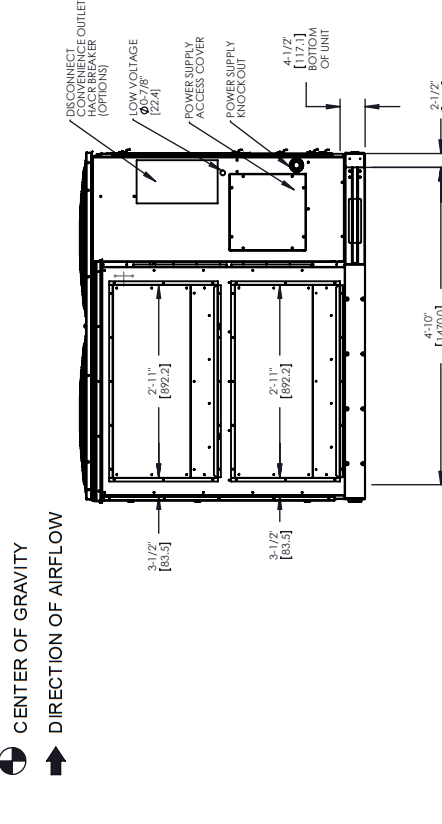
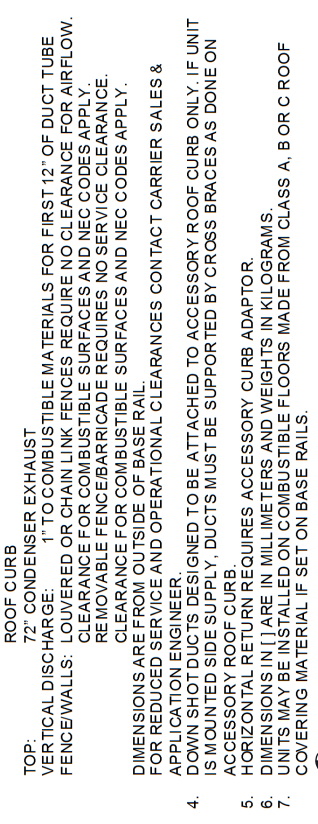
REAR SIDE:
 36" SERVICE ACCESS
 12" HORIZONTAL SUPPLY
 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB

BOTTOM:
 72" CONDENSER EXHAUST
 VERTICAL DISCHARGE: 1" TO COMBUSTIBLE MATERIALS FOR FIRST 12" OF DUCT TUBE
 FENCE/WALLS: LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE.
 CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL
 FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
 DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.

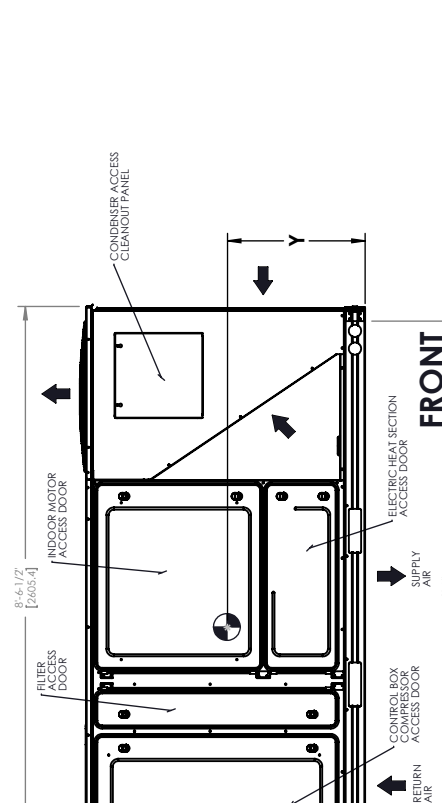
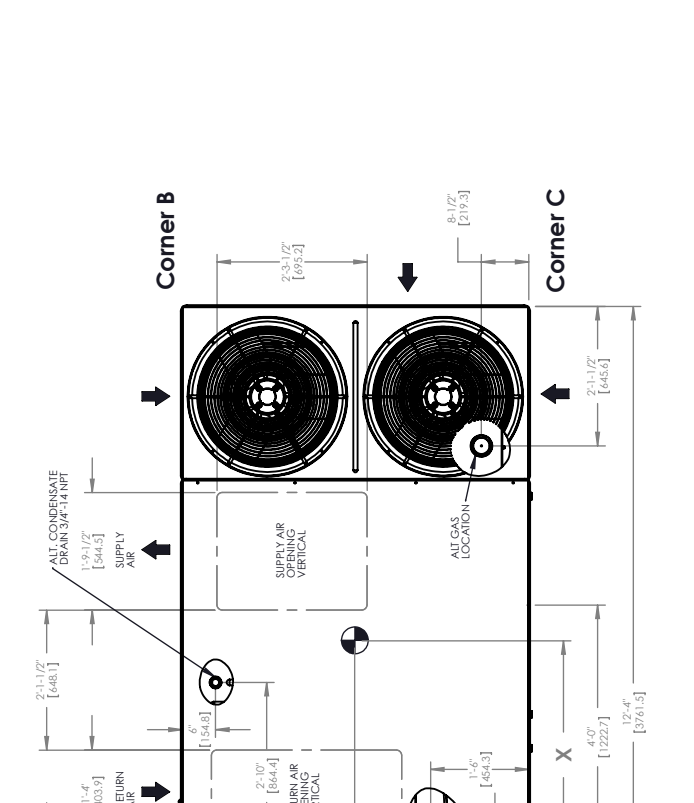
HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
 DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
 UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

➡ CENTER OF GRAVITY
 ➡ DIRECTION OF AIRFLOW



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DATA SHOWN FOR STANDARD UNIT WITH LOW HEAT, STANDARD COILS, STANDARD IFM DRIVE AND NO FACTORY OPTIONS





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Data shown for standard unit with low heat, standard coils, standard IFM drive and no factory options.

RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Center of Gravity (mm)			
			X	Y	Z			X	Y	Z	X	Y	Z	
50PG08	Low CFM	1773	604	23.9	15.2	High CFM	1797	815	23.8	15.1	15.4	604	365	391
50PG09	Low CFM	1780	808	24.0	15.3	High CFM	1804	818	23.9	15.2	15.4	606	385	390
50PG12	Low CFM	1874	850	25.2	15.5	High CFM	1898	861	25.1	15.4	15.0	637	391	382
50PG14	Low CFM	1985	900	26.5	15.7	High CFM	2009	911	26.3	15.6	14.7	669	397	373

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 50PG08-14 UNIT WITH NO ELECT HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.

3. MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):

- RIGHT SIDE:** 36" CONDENSER AIRFLOW
 42" OUTDOOR AIRFLOW & EXHAUST
LEFT SIDE: 54" SERVICE (INDOOR FAN SLED REMOVAL, ELSE 36")
FRONT SIDE: 36" CONDENSER AIRFLOW
 42" TO ANOTHER UNIT (PER NEC)
REAR SIDE: 42" UNIT TO GROUNDED SURFACE (PER NEC)
 72" CONDENSER AIRFLOW
 54" CONDENSATE PAN REMOVAL
 36" SERVICE ACCESS
 12" HORIZONTAL SUPPLY

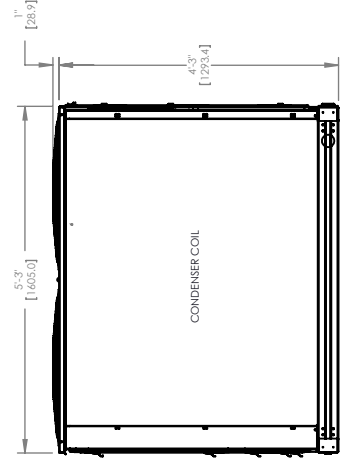
- BOTTOM:** 1" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 0" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 72" CONDENSER EXHAUST

- TOP:** VERTICAL DISCHARGE: 1" TO COMBUSTIBLE MATERIALS FOR FIRST 12" OF DUCT TUBE
 FENCE/WALLS: LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW.
 CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE.
 CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
 FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.

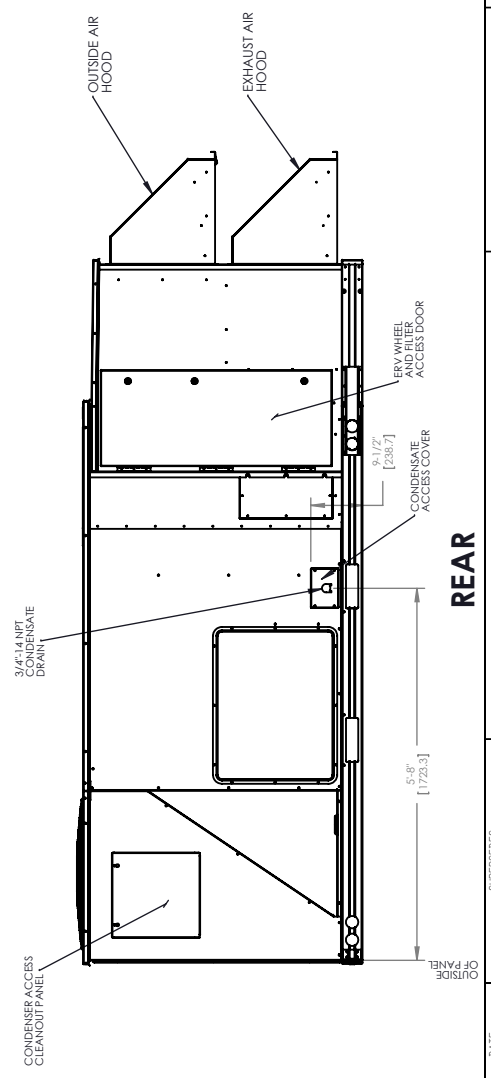
- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHTS IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.

➔ CENTER OF GRAVITY

➔ DIRECTION OF AIRFLOW



RIGHT SIDE



REAR

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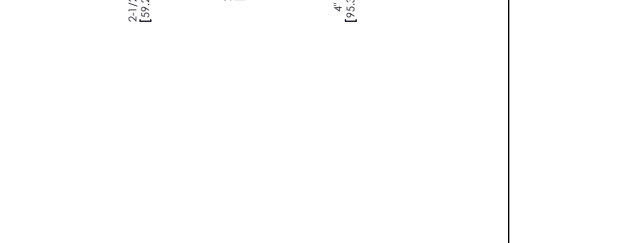
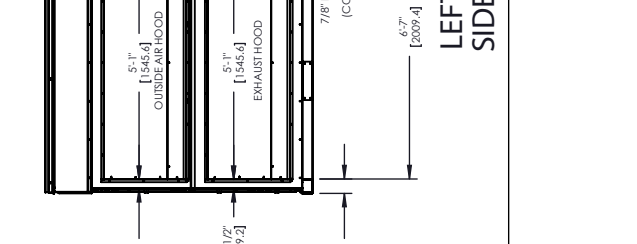
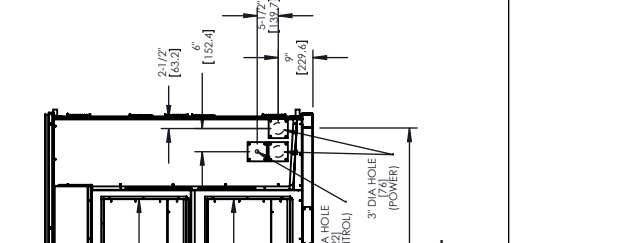
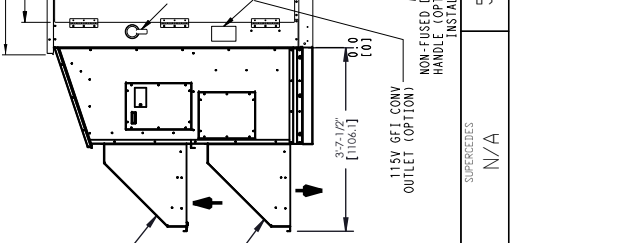
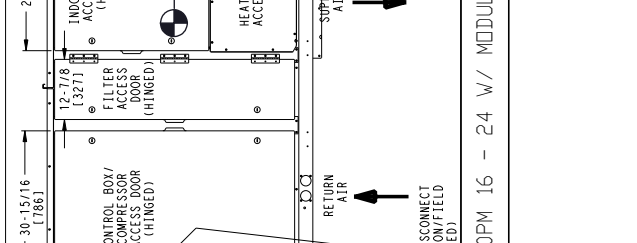
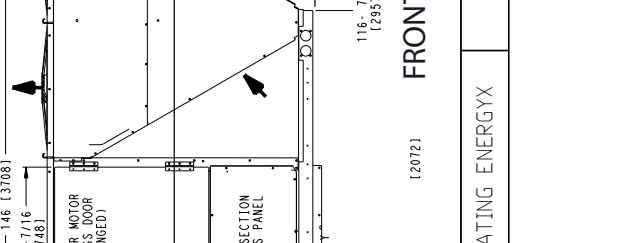
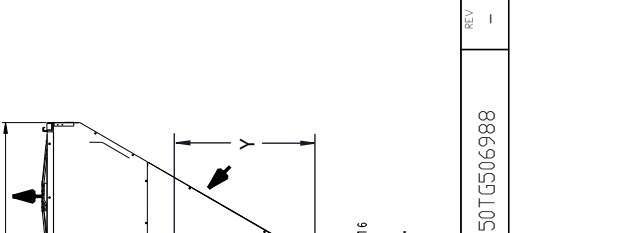
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RTU TYPE	ERV TYPE	Weight (lbs)	Weight (kg)	Center of Gravity (inches)			Center of Gravity (mm)		
				X	Y	Z	X	Y	Z
50PM16	Low CFM	3286	1485	39.2	28.9	68.0	996	735	1727
50PM20	Low CFM	3341	1515	39.5	29.0	68.2	1004	736	1733
50PM24	Low CFM	3394	1539	39.9	29.0	68.5	1013	736	1740

RTU TYPE	ERV UNIT	UNIT	STD. UNIT WEIGHT
			LBS.
			KG.

FOR OUTDOOR USE ONLY.
WEIGHTS SHOWN ARE FOR 50PM16-24 UNIT WITH NO ELECTRIC HEAT, ALUMINUM COILS, AND STANDARD DRIVE.
FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
RIGHT SIDE:
120" OUTDOOR AIRFLOW & EXHAUST
36" SERVICE
72" CONDENSER AIRFLOW
72" CONDENSER AIRFLOW
96" COIL REMOVAL
42" TO ANOTHER UNIT (PER NEC)
36" UNIT TO UNGROUNDED SURFACE (PER NEC)
42" UNIT TO GROUNDED SURFACE (PER NEC)
72" CONDENSER AIRFLOW
36" SERVICE ACCESS
12" HORIZONTAL SUPPLY
14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
72" CONDENSER EXHAUST
LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
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FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY IF UNIT IS MOUNTED SIDE SUPPLY. DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS
UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



CENTER OF GRAVITY
DIRECTION OF AIRFLOW



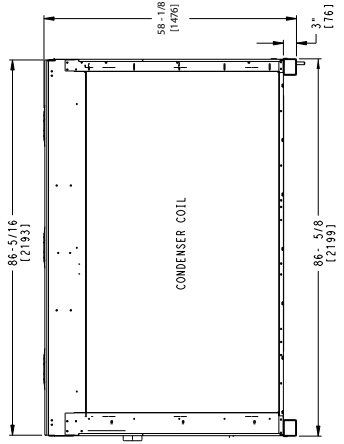
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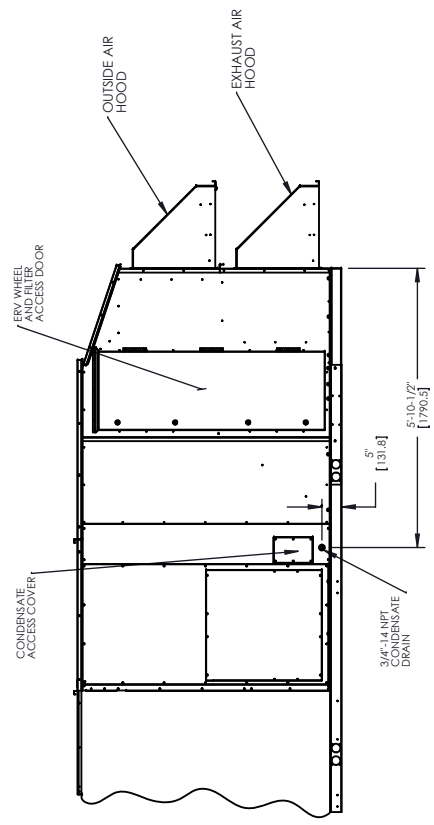
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RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)			Weight (kg)	Center of Gravity (mm)			Center of Gravity (inches)			Center of Gravity (mm)		
			X	Y	Z		X	Y	Z	X	Y	Z	X	Y	Z
50PM16	Low CFM	3296	39.2	28.9	68.0	996	735	1727	37.6	29.2	66.9	955	742	1689	
50PM20	Low CFM	3341	39.5	29.0	68.2	1004	736	1733	37.9	29.2	67.2	963	742	1706	
50PM24	Low CFM	3394	39.9	29.0	68.5	1013	736	1740	38.3	29.2	67.4	972	743	1713	

- FOR OUTDOOR USE ONLY.
- WEIGHTS SHOWN ARE FOR 50PM16-24 UNIT WITH NO ELECTRIC HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 - 72" CONDENSER AIRFLOW
 - 120" OUTDOOR AIRFLOW & EXHAUST
 - 36" SERVICE
 - 72" CONDENSER AIRFLOW
 - 96" COIL REMOVAL
 - 42" TO ANOTHER UNIT (PER NEC)
 - 36" UNIT TO UNGROUNDED SURFACE (PER NEC)
 - 42" UNIT TO GROUNDED SURFACE (PER NEC)
 - 72" CONDENSER AIRFLOW
 - 36" SERVICE ACCESS
 - 12" HORIZONTAL SUPPLY
 - 14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 72" CONDENSER EXHAUST
 - LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
 - FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
 - DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
 - HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
 - DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
 - UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.



RIGHT SIDE



REAR

UNITED TECHNOLOGIES CARRIER
 P.O. BOX 4888
 YORK, PA 17402-4888
 1-800-393-7322

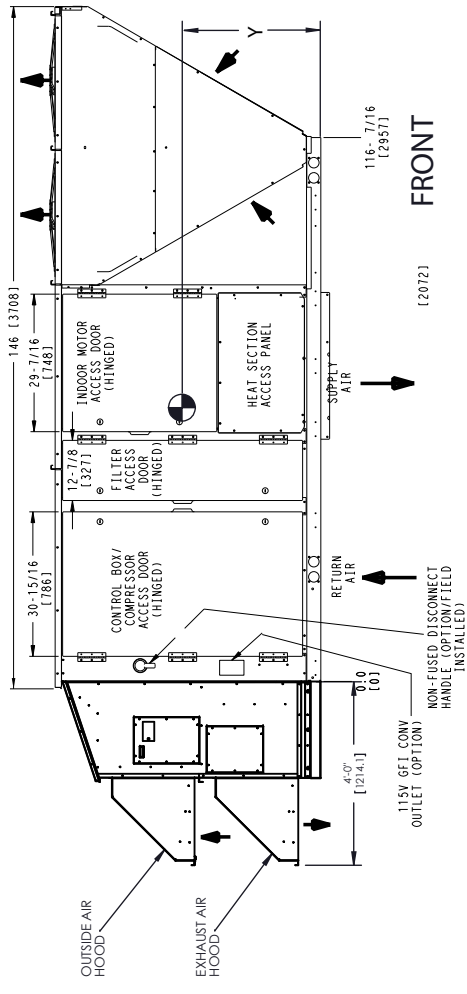
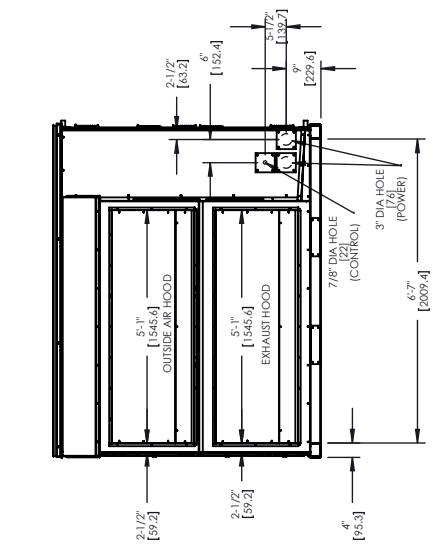
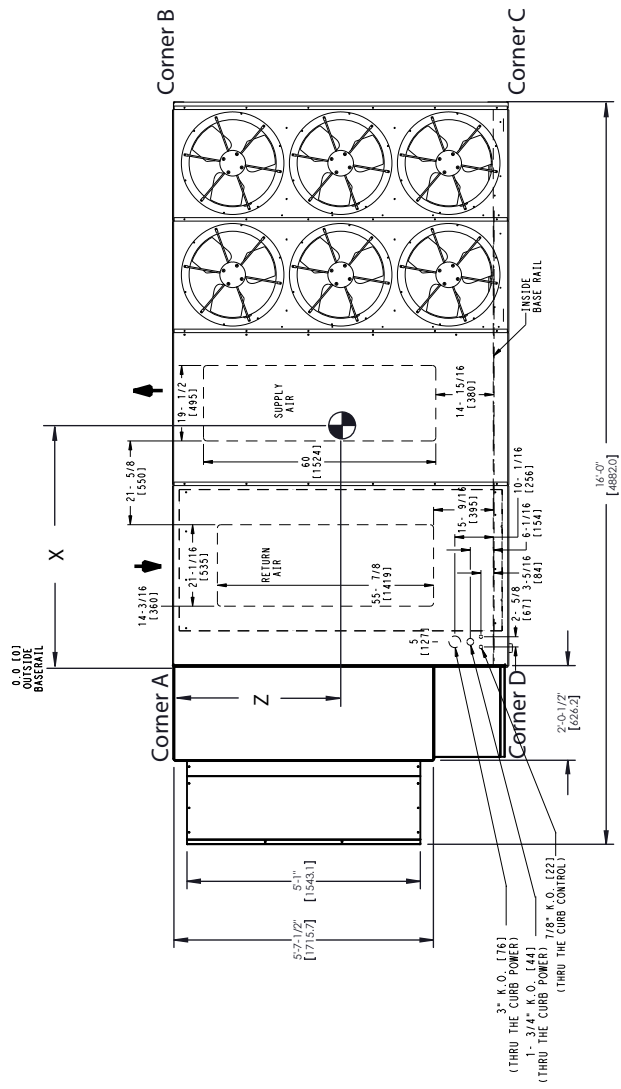
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RTU TYPE	ERV TYPE	Weight (lbs)	Center of Gravity (inches)	Center of Gravity (mm)
		(kg)	X Y Z	X Y Z
50PM28	Low CFM	3586	41.6 33.3 68.5	1057 846 1739
50PM28	High CFM	3718	40.0 33.6 67.8	1016 853 1722

- FOR OUTDOOR USE ONLY
- WEIGHTS SHOWN ARE FOR 50PM28 UNIT WITH NO ELECTRIC HEAT, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT THE PRODUCT DATA MANUAL.
- DO NOT LOCATE ADJACENT UNITS WITH FLUE DISCHARGE FACING ENERGY RECOVERY INLET.
- MINIMUM CLEARANCES (LOCAL CODES OR JURISDICTIONS MAY PREVAIL):
 - RIGHT SIDE: 72" CONDENSER AIRFLOW
 - LEFT SIDE: 120" OUTDOOR AIRFLOW & EXHAUST
 - FRONT SIDE: 36" SERVICE
 - REAR SIDE: 72" CONDENSER AIRFLOW
 - BOTTOM: 96" COIL REMOVAL
 - TOP: 42" TO ANOTHER UNIT (PER NEC)
 - FENCE: 36" UNITS TO UNGROUNDED SURFACE (PER NEC)
 - 36" UNITS TO GROUNDED SURFACE (PER NEC)
 - 72" CONDENSER AIRFLOW
 - 36" SERVICE ACCESS
 - 12" HORIZONTAL SUPPLY
 - 14" BOTTOM OF BASE PAN TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 10" BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES WHEN NOT USING ROOF CURB
 - 72" CONDENSER EXHAUST
 - LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
 - REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.

- DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL.
- FOR REDUCED SERVICE AND OPERATIONAL CLEARANCES CONTACT CARRIER SALES & APPLICATION ENGINEER.
- DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY IF UNIT IS MOUNTED SIDE.
- SUPPLY DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
- HORIZONTAL RETURN REQUIRES ACCESSORY CURB ADAPTOR.
- DIMENSIONS IN [] ARE IN MILLIMETERS AND WEIGHT IN KILOGRAMS.
- UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM CLASS A, B OR C ROOF COVERING MATERIAL IF SET ON BASE RAILS.





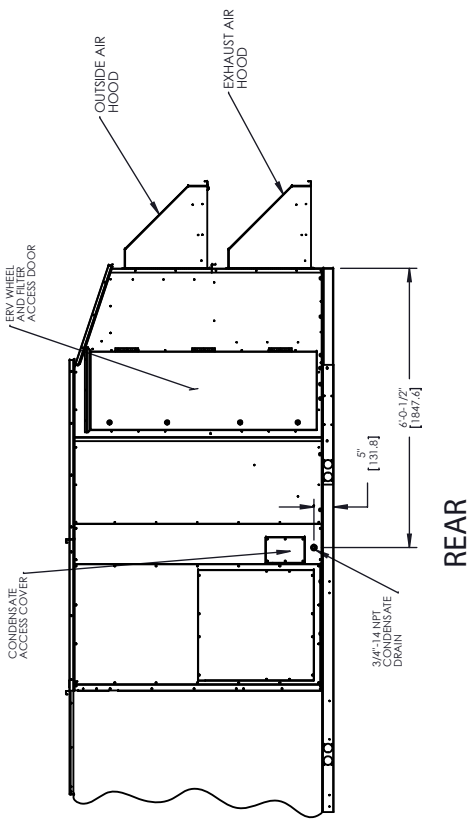
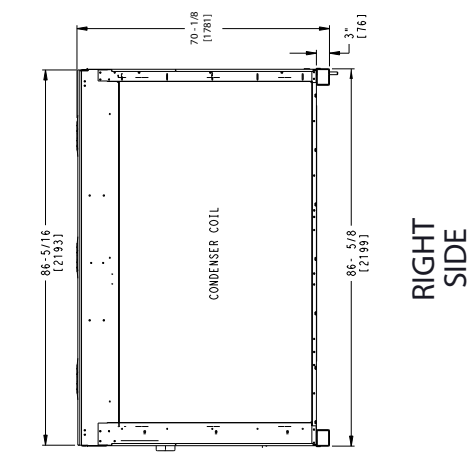
UNITED TECHNOLOGIES SYRACUSE, NY 13221
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 - FRONT SIDE: 36" SERVICE
 - REAR SIDE: 72" CONDENSER AIRFLOW
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 - TOP: 72" CONDENSER EXHAUST
 - FENCE: LOUVERED OR CHAIN LINK FENCES REQUIRE NO CLEARANCE FOR AIRFLOW. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY. REMOVABLE FENCE/BARRICADE REQUIRES NO SERVICE CLEARANCE. CLEARANCE FOR COMBUSTIBLE SURFACES AND NEC CODES APPLY.
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DATE	SUPERCEDES	REV
08/04/09	N/A	50PM 28 W/ MODULATING ENERGYX
		50TG506989

APPENDIX B – EXHAUST FAN PERFORMANCE

Many applications that utilize energy recovery incorporate ducted return/exhaust air paths. In these applications, it is important to consider the duct pressure of the return/exhaust just as a designer would consider the effects of the supply duct static pressure on the airflow of the rooftop unit itself.

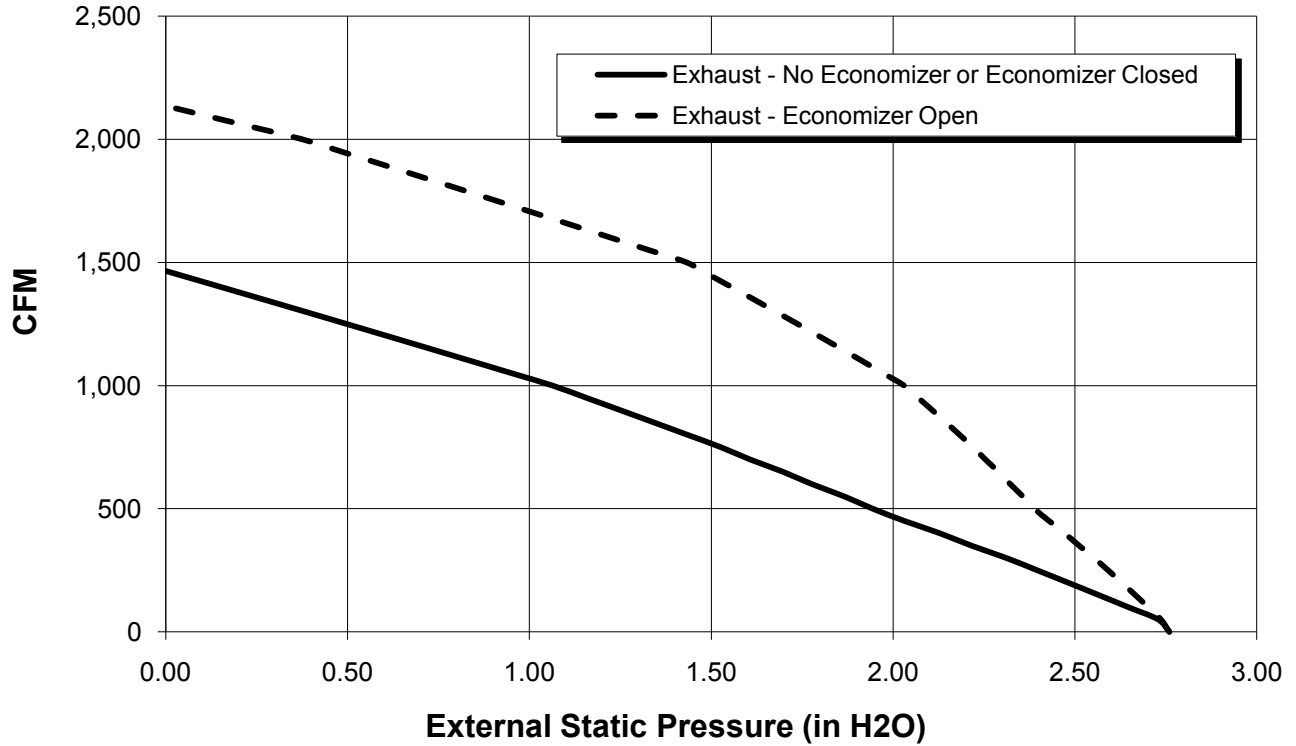
EnergyXv2 Constant Volume 2-6 ton Units – The 2-6 ton Constant Volume EnergyXv2 units use constant speed outdoor air and exhaust air fans for low return/exhaust static pressure applications. In this situation, the fans are designed to augment the base rooftop unit. Use the base rooftop unit fan curve(s) for these applications.

EnergyXv2 Modulating Volume 2-25 ton Units – The exhaust fan in the Modulating Volume EnergyXv2 unit will assist the rooftop unit fan in pulling air through the exhaust/return duct. These exhaust fans are backwards curved impeller designs which are capable of significant more static pressure operation than typical forward curved fan designs. The following exhaust fan performance curves are provided for additional guidance when considering return/exhaust duct design.

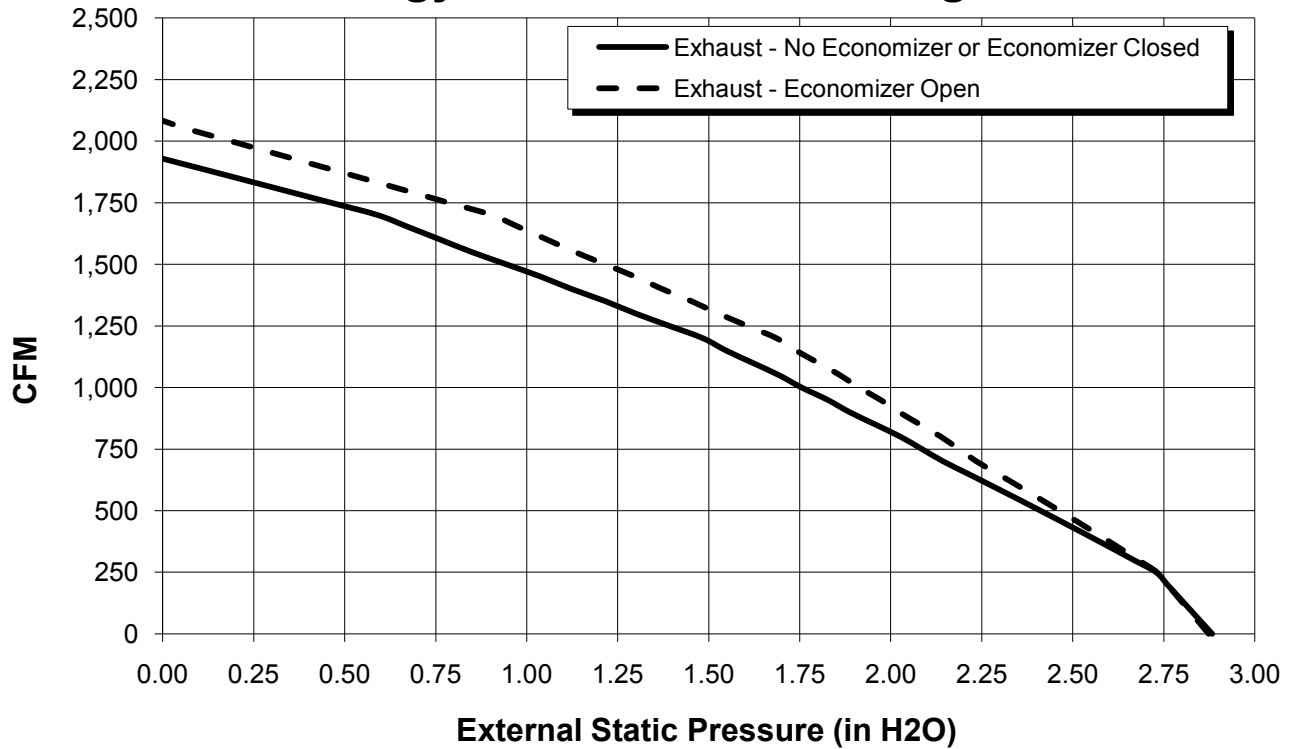
Note: if application designs require two separate ducts (one for exhaust air, one for return air) contact your Carrier Sales Engineer for additional guidance prior to specification or ordering.

APPENDIX B – EXHAUST FAN PERFORMANCE

Energy Xv2 PG 03-07 Low CFM

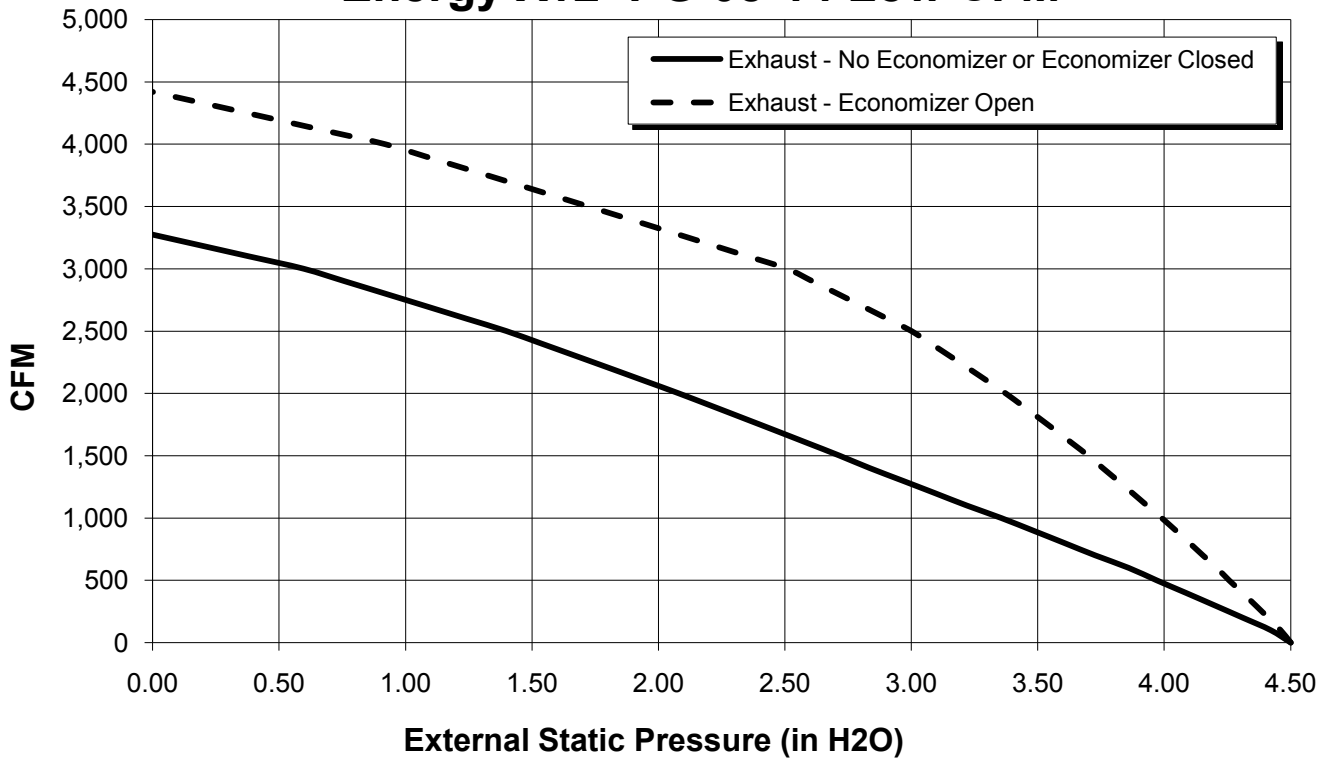


Energy Xv2 PG 03-07 ton High CFM

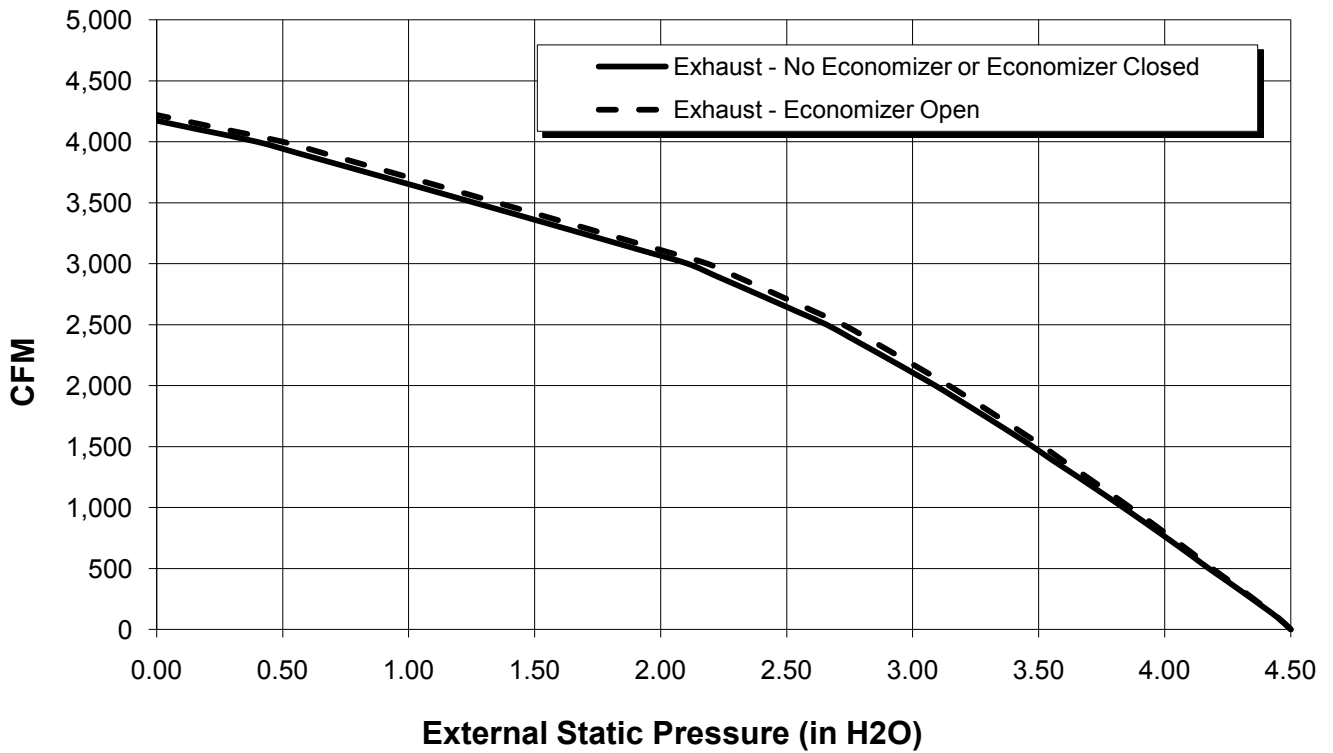


APPENDIX B – EXHAUST FAN PERFORMANCE

Energy Xv2 PG 08-14 Low CFM

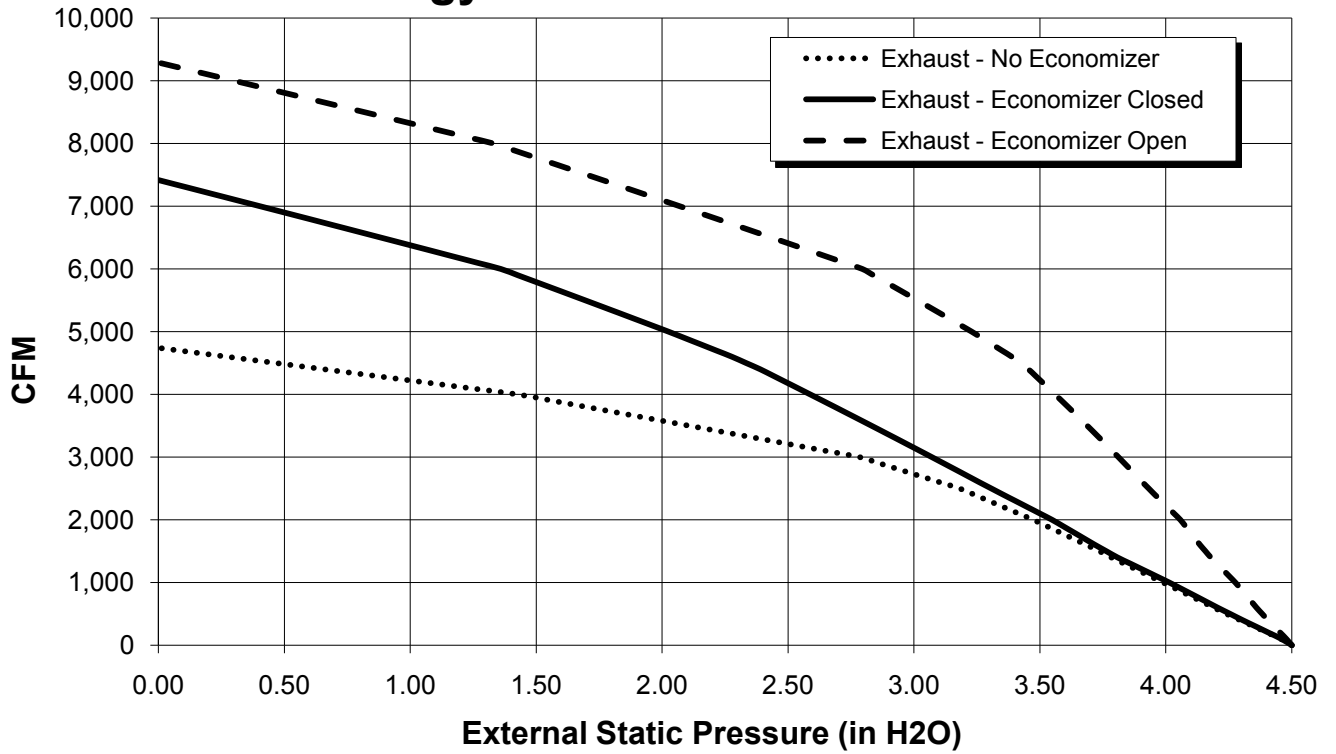


Energy Xv2 PG 08-14 High CFM

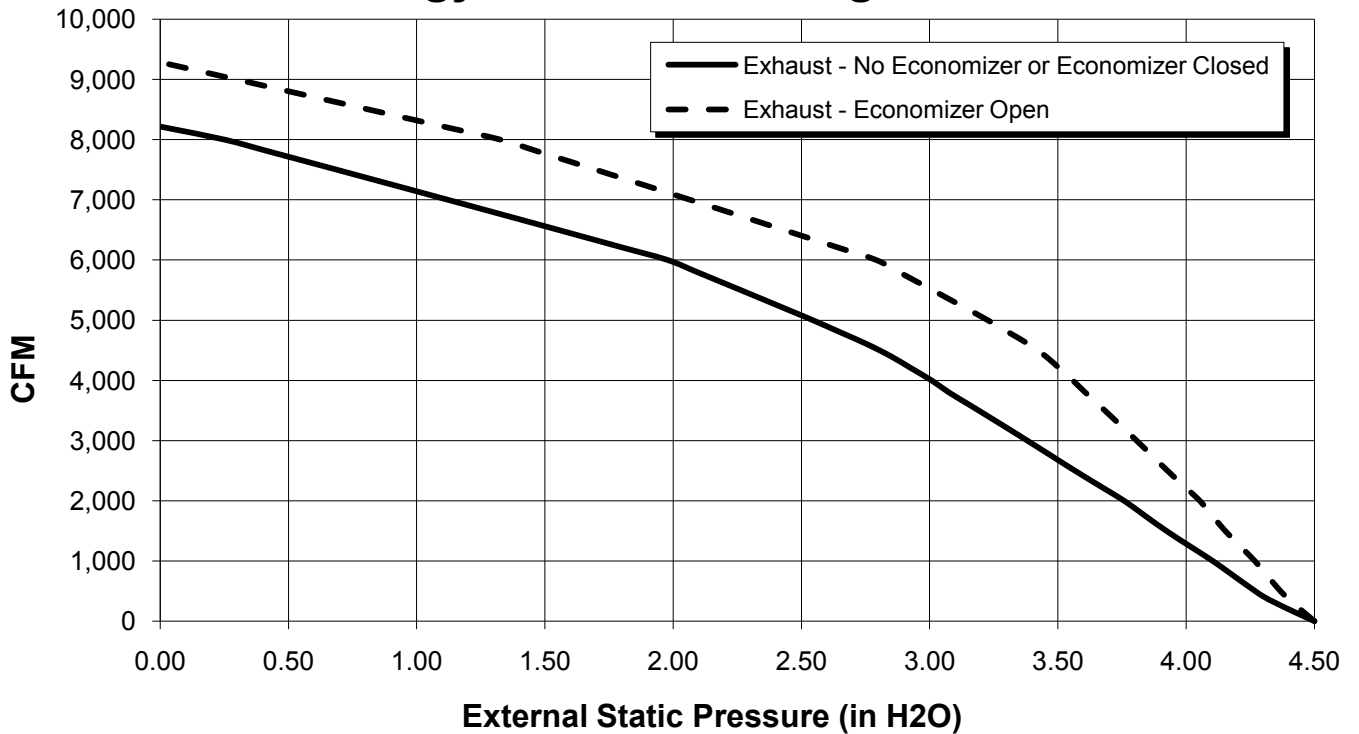


APPENDIX B – EXHAUST FAN PERFORMANCE

EnergyXv2 PM16-24 Low CFM

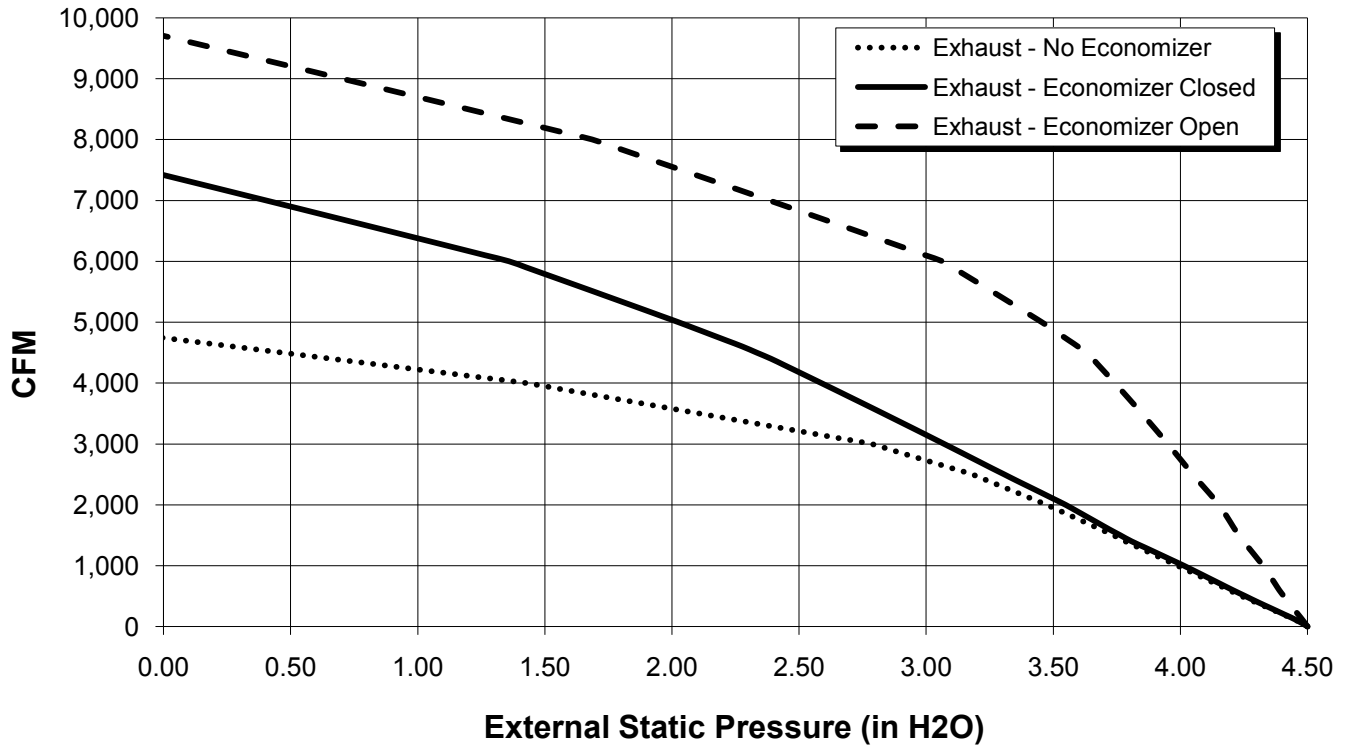


EnergyXv2 PM16-24 High CFM

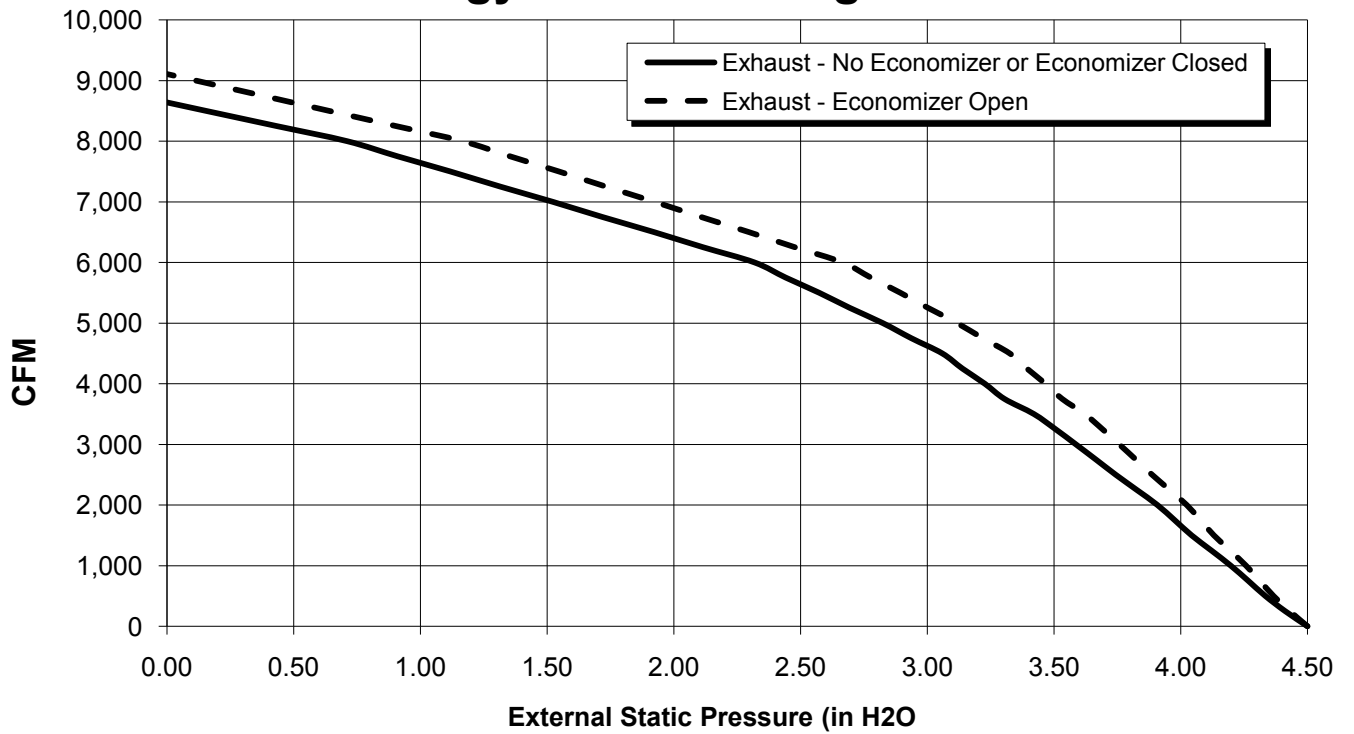


APPENDIX B – EXHAUST FAN PERFORMANCE

EnergyXv2 PM 28 Low CFM



EnergyXv2 PM 28 High CFM



ENERGYX UNIT START-UP CHECKLIST
(TO BE USED IN CONJUNCTION WITH BASE ROOFTOP UNIT START-UP CHECKLIST)

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

I. PRE-START-UP:

- VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT
- VERIFY INSTALLATION OF OUTDOOR AIR HOODS
- CHECK THAT AIR FILTERS ARE CLEAN AND IN PLACE ON SUPPLY AND EXHAUST OF ERV WHEEL
- CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- VERIFY CONFIGURATION VALUES FOR ELECTRONIC CONTROLS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2 _____	L2-L3 _____	L3-L1 _____
EX SUPPLY FAN AMPS	L1-L2 _____	L2-L3 _____	L3-L1 _____
EX EXHAUST FAN-1 AMPS	L1-L2 _____	L2-L3 _____	L3-L1 _____
EX EXHAUST FAN-2 AMPS	L1-L2 _____	L2-L3 _____	L3-L1 _____
EX EXHAUST FAN-3 AMPS	L1-L2 _____	L2-L3 _____	L3-L1 _____

(2-6 ton unit, Low CFM only)

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ F dB (Dry Bulb)

RETURN-AIR TEMPERATURE _____ F dB / F wB (Dry Bulb / Wet Bulb)

ENERGYX COOLING DISCHARGE AIR _____ F

ENERGYX HEATING DISCHARGE AIR _____ F

GENERAL

- COMFORTLINK MINIMUM DAMPER POSITIONS SET TO "0"
- ERV MINIMUM VENTILATION POSITION PER JOB REQUIREMENTS
- ERV AND COMFORTLINK POWER EXHAUST SETPOINTS PER JOB REQUIREMENTS
- VERIFY ENERGY RECOVERY WHEEL ROTATING IN PROPER DIRECTION
- VERIFY SUPPLY AND EXHAUST BLOWER FANS ROTATING IN PROPER DIRECTION
- VERIFY ALL EXTERNAL PANELS FULLY SHUT AND LATCHED

III. CONFIGURATION

DCV OA SP CFM _____

Minimum Outside Air CFM _____

Exhaust Air Offset CFM _____

ERV Control Configuration _____

ERV Unoccupied Run setpoint _____