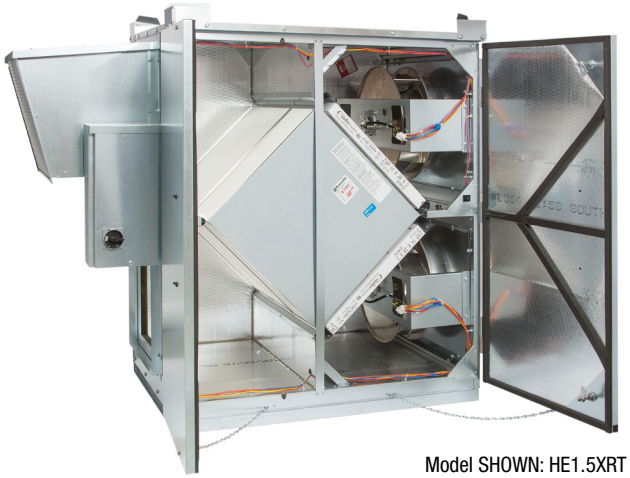
RenewAire
Energy Recovery Ventilation

EC Motor Supplemental Manual

Supplemental Manual for Options

EV450
HE1X
HE1.5X



Model SHOWN: HE1.5XRT

Model Shown: EV450IN

Model Shown: HE1XIN

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⚠ WARNING

RISK OF FIRE, ELECTRIC SHOCK, OR INJURY. OBSERVE ALL CODES AND THE FOLLOWING:

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

⚠ CAUTION

When an external 10 VDC source control is used, the maximum distance between the EC Motor and 10 VDC source control cannot exceed 33 ft (10 m).

⚠ CAUTION

Make sure clean filters are installed before balancing airflow. Dirty or clogged filters reduce airflow through the unit.

⚠ CAUTION

To avoid motor bearing damage and noisy and/or unbalanced impellers, keep drywall spray, construction dust, etc., out of unit.

⚠ CAUTION

Very low airflow rates may result in fouling of the energy exchanger core. Do not reduce airflow to below 250 cfm per core.

1.0 OVERVIEW

1.1 DESCRIPTION

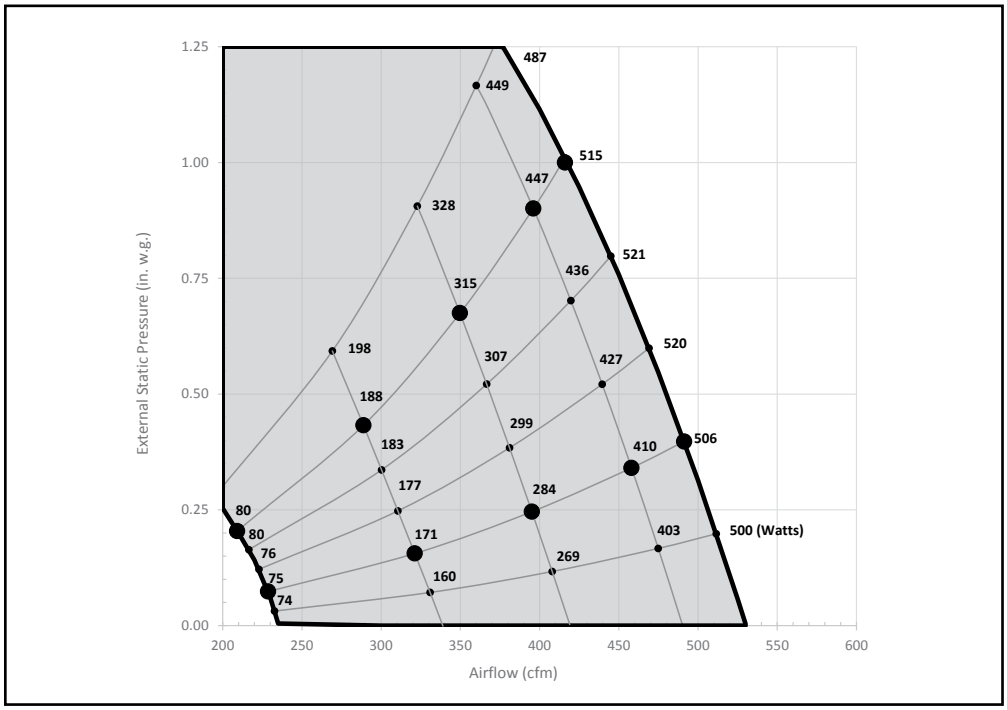
RenewAire's light commercial units are offered with optional electronically commutated motors (ECM). EC motors have higher efficiencies with considerable energy savings over a standard permanent split capacitor motor. The ECM offered in RenewAire energy recovery ventilators (ERVs) are constant torque with a variety of speed control options. The motors operate at fixed speed or variable speed with speed inputs from circuit board-mounted trimming potentiometer(s), panel-mounted potentiometer(s), or 0–10 Vdc analog signal.

1.2 OPERATING CONTROLS

A wide variety of low voltage (24 VAC) control schemes may be selected to meet the ventilation needs of the facility. These include time clock, occupancy sensor, carbon dioxide sensor, and others. Building Management Systems (BMS) may also control the unit with external control by others.

2.0 PERFORMANCE DATA

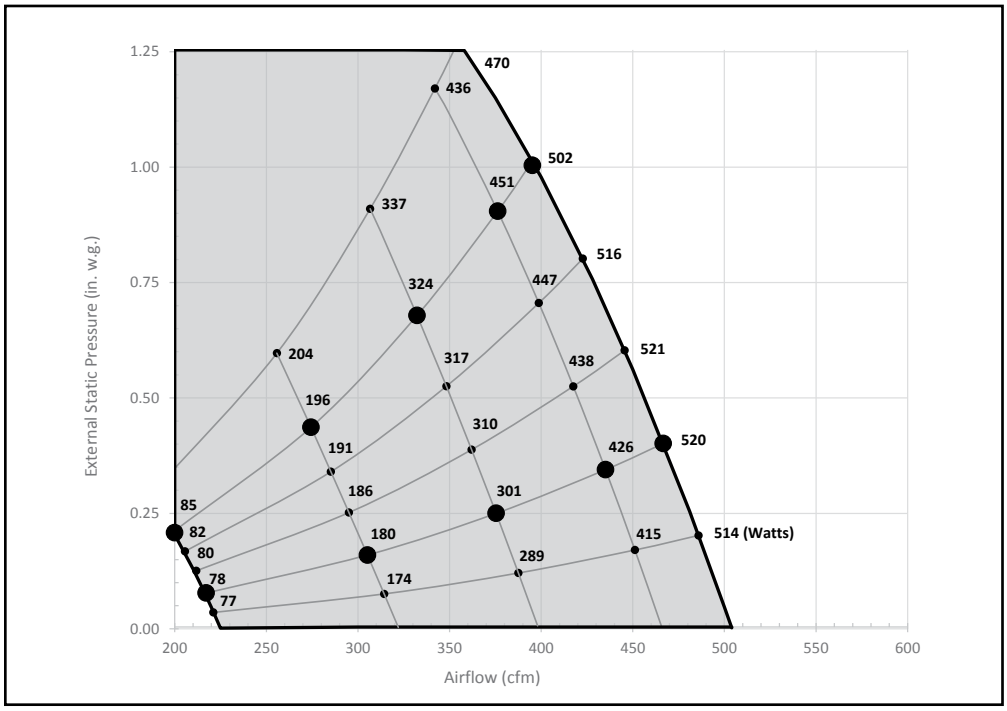
2.1 EV450IN ECM OPERATING RANGE



EV450-IN ECM		
Sample Points		
CFM	ESP*	Watts
229	0.07	75
321	0.16	171
395	0.25	284
458	0.34	410
491	0.40	506
209	0.20	80
289	0.43	188
350	0.67	315
396	0.90	447
416	1.00	515

Note: Watts is for the entire unit.
*Inches Water Column

2.2 EV450RT ECM OPERATING RANGE



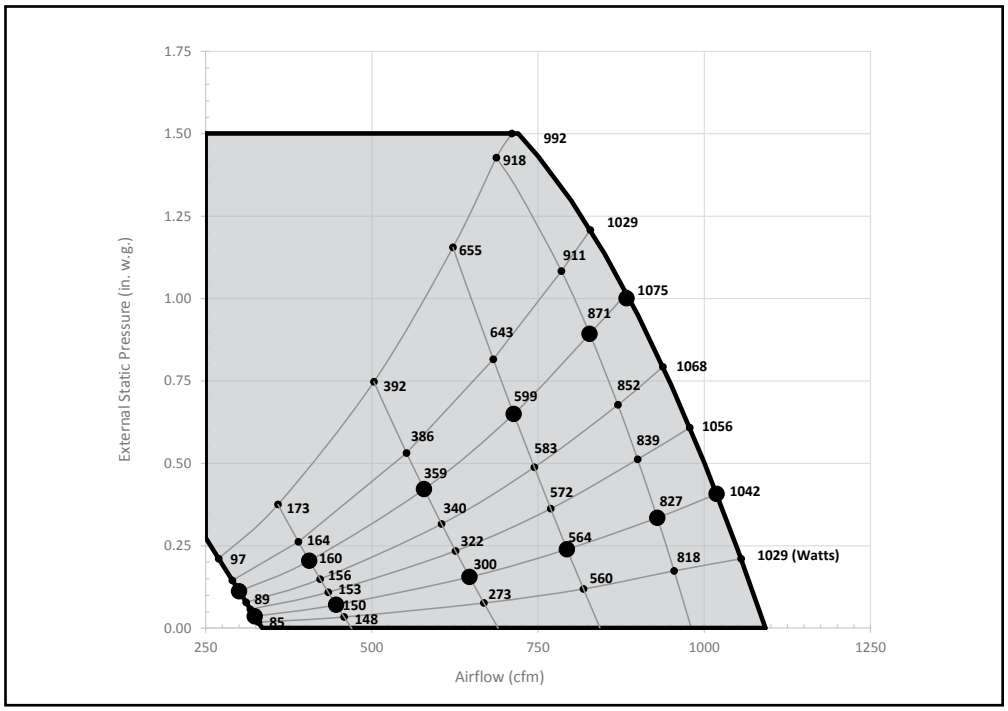
EV450-RT ECM		
Sample Points		
CFM	ESP*	Watts
217	0.07	78
305	0.16	180
375	0.25	301
435	0.34	426
467	0.40	520
200	0.20	85
274	0.43	196
332	0.67	324
376	0.90	451
395	1.00	502

Note: Watts is for the entire unit.
*Inches Water Column

2.3 HE1XIN (H OR V) ECM OPERATING RANGE

HE1X-IN ECM		
Sample Points		
CFM	ESP*	Watts
324	0.04	86
446	0.07	150
647	0.15	300
794	0.24	564
929	0.33	827
1019	0.41	1042
300	0.11	91
406	0.20	160
579	0.42	359
713	0.65	599
828	0.89	871
883	1.00	1075

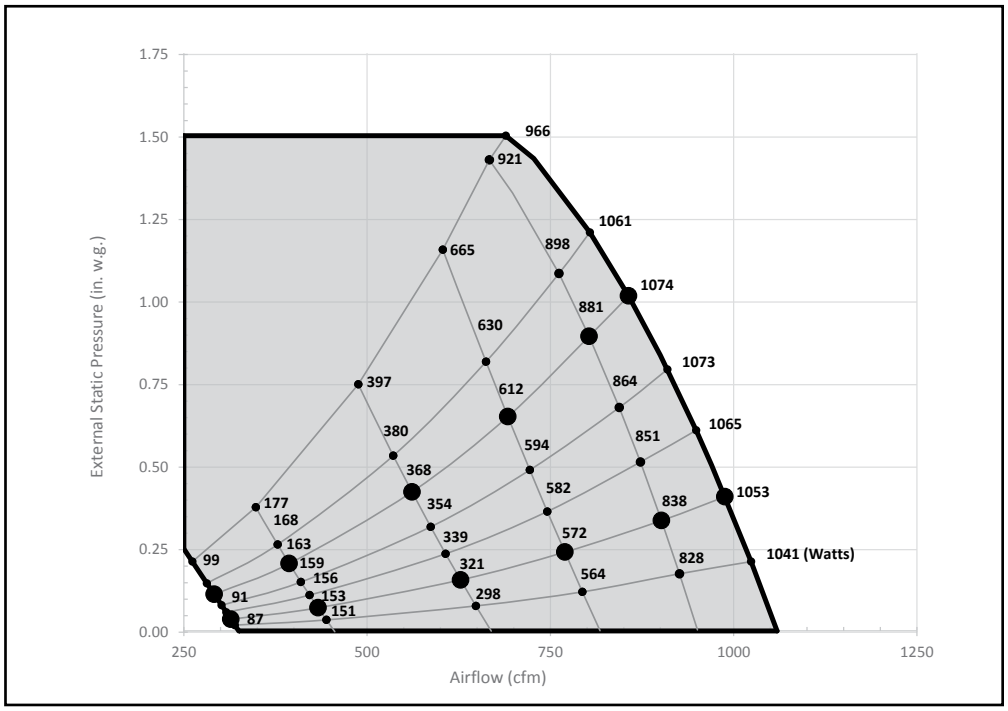
Note: Watts is for the entire unit.
*Inches Water Column



2.4 HE1XRT ECM OPERATING RANGE

HE1X-RT ECM		
Sample Points		
CFM	ESP*	Watts
314	0.04	88
433	0.07	153
627	0.15	321
770	0.24	572
901	0.33	838
988	0.41	1053
291	0.11	93
394	0.20	163
561	0.42	368
692	0.65	612
803	0.89	881
857	1.01	1074

Note: Watts is for the entire unit.
*Inches Water Column



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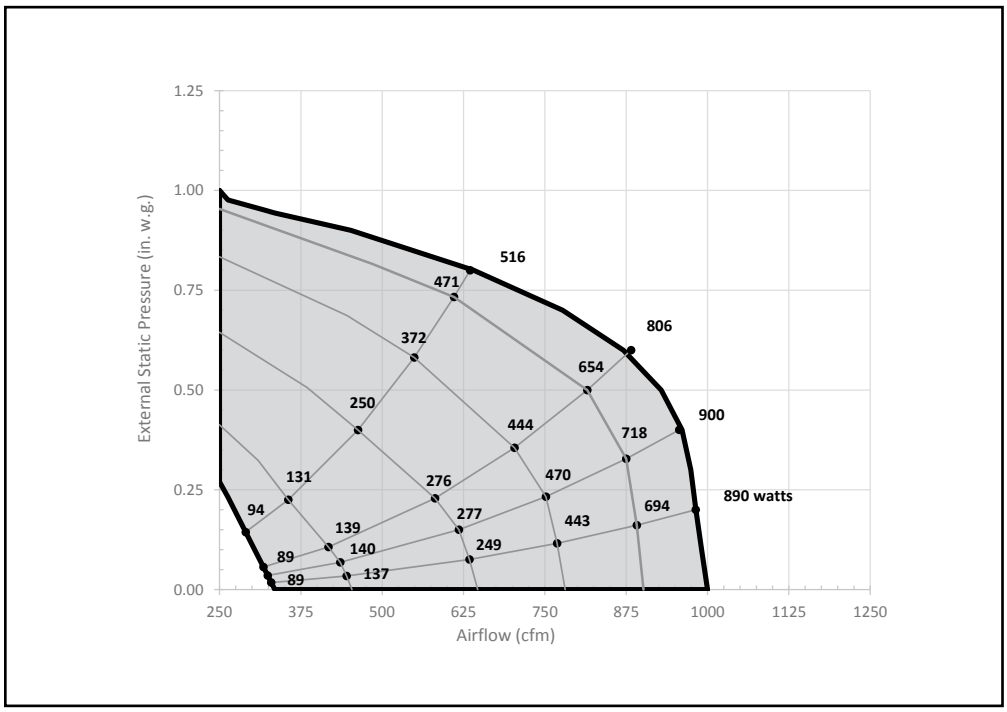
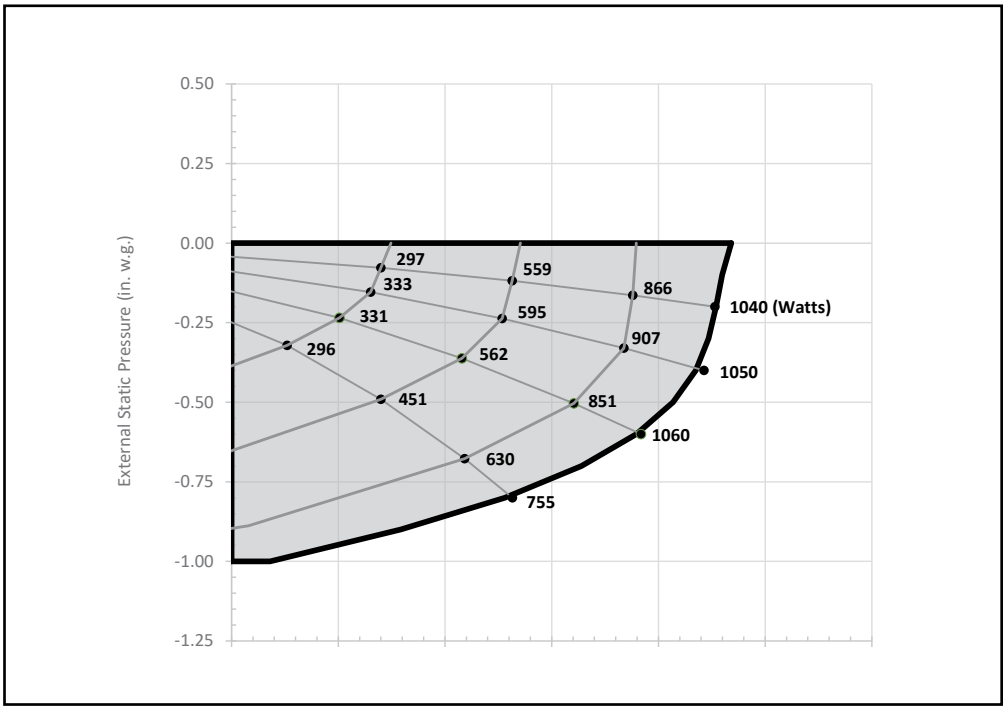
2.5 HE1XRTC ECM OPERATING RANGE

2.5.1 Unit Tied into Separate Ducts



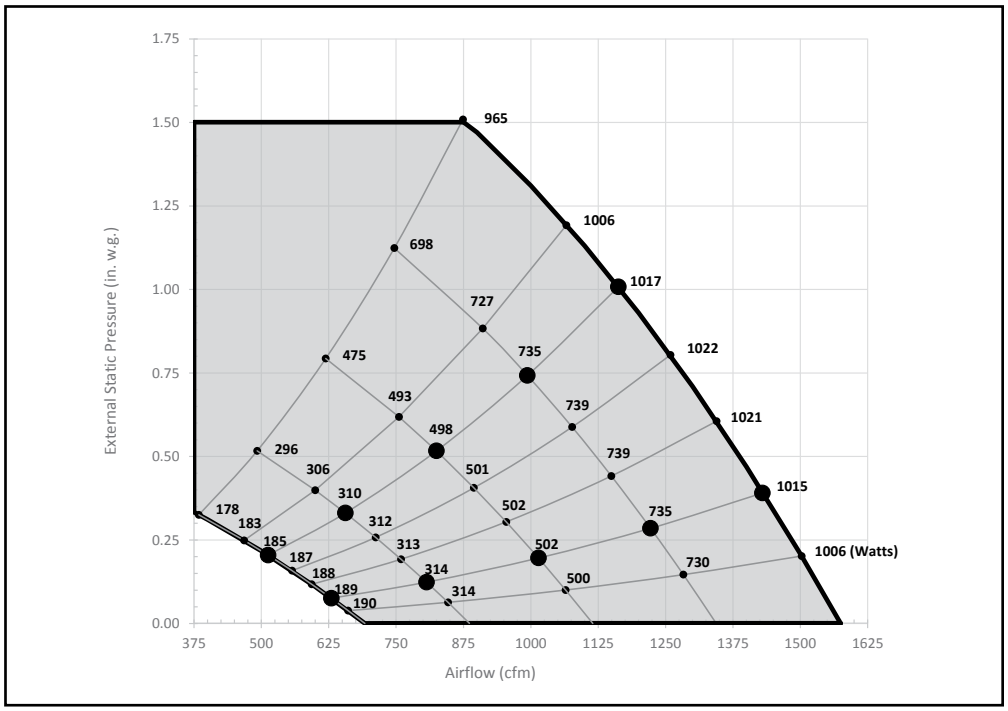
2.5.2 Unit Tied into Air-Handler



2.6 HE1.5XIN (H OR V) ECM OPERATING RANGE

HE1.5X-IN ECM		
Sample Points		
CFM	ESP*	Watts
630	0.07	189
807	0.12	314
1014	0.20	502
1222	0.28	735
1430	0.39	1015
513	0.20	185
656	0.33	310
825	0.52	498
994	0.74	735
1163	1.01	1017

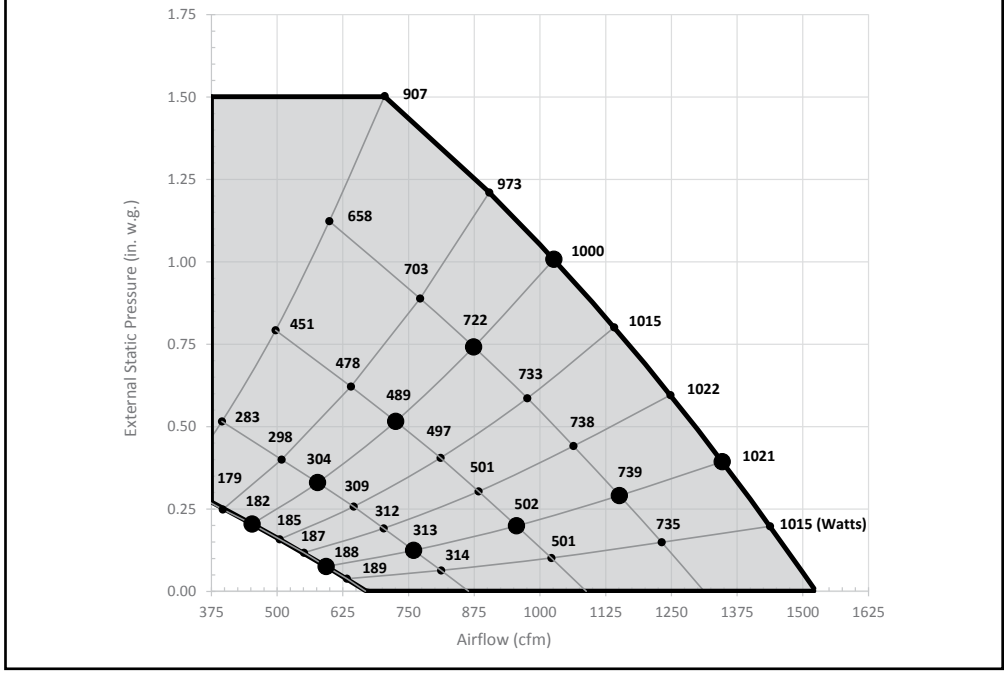
Note: Watts is for the entire unit.
*Inches Water Column



2.7 HE1.5XRT ECM OPERATING RANGE

HE1.5X-RT ECM		
Sample Points		
CFM	ESP*	Watts
593	0.07	188
760	0.12	313
955	0.20	502
1151	0.29	739
1347	0.39	1021
453	0.20	182
577	0.33	304
725	0.51	489
874	0.74	722
1026	1.01	1000

Note: Watts is for the entire unit.
*Inches Water Column



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3.0 INSTALLATION

3.1 PRINCIPLES OF EXTERNAL CONTROL

The light commercial units with EC motors are designed for control by a wide variety of low voltage (24 VAC) controls to meet the ventilation needs of the facility. These include time clock, occupancy sensor, carbon dioxide sensor, BMS, and others. These devices are commonly known as 2-wire, 3-wire, and 4-wire devices. RenewAire offers separately the following for standalone control of the ERV:

- Digital Time Clocks TC7D-W and TC7D-E
- Occupancy Sensors MC-C and MC-W
- Carbon Dioxide Sensor/Controllers CO2-W and CO2-D
- Indoor Air Quality Sensor/Controllers IAQ-W and IAQ-D

3.2 ELECTRICAL SPECIFICATIONS

Electrical Ratings for ECM Units					
	Phase (unit)	Input Voltage	FLA (motor)	MCA (unit)	MOPD (unit)
EV450	1	115 VAC	8.1	10.1	15
		208-230 VAC	4.8	6.0	15
HE1X	1	115 VAC	8.1	18.2	25
		208-230 VAC	4.8	10.8	15
HE1.5X	1	115 VAC	8.0	18.0	20
		208-230 VAC	4.4	9.9	15
		277 VAC	4.4	9.9	15

3.3 WIRING SCHEMATICS

3.3.1 EV450

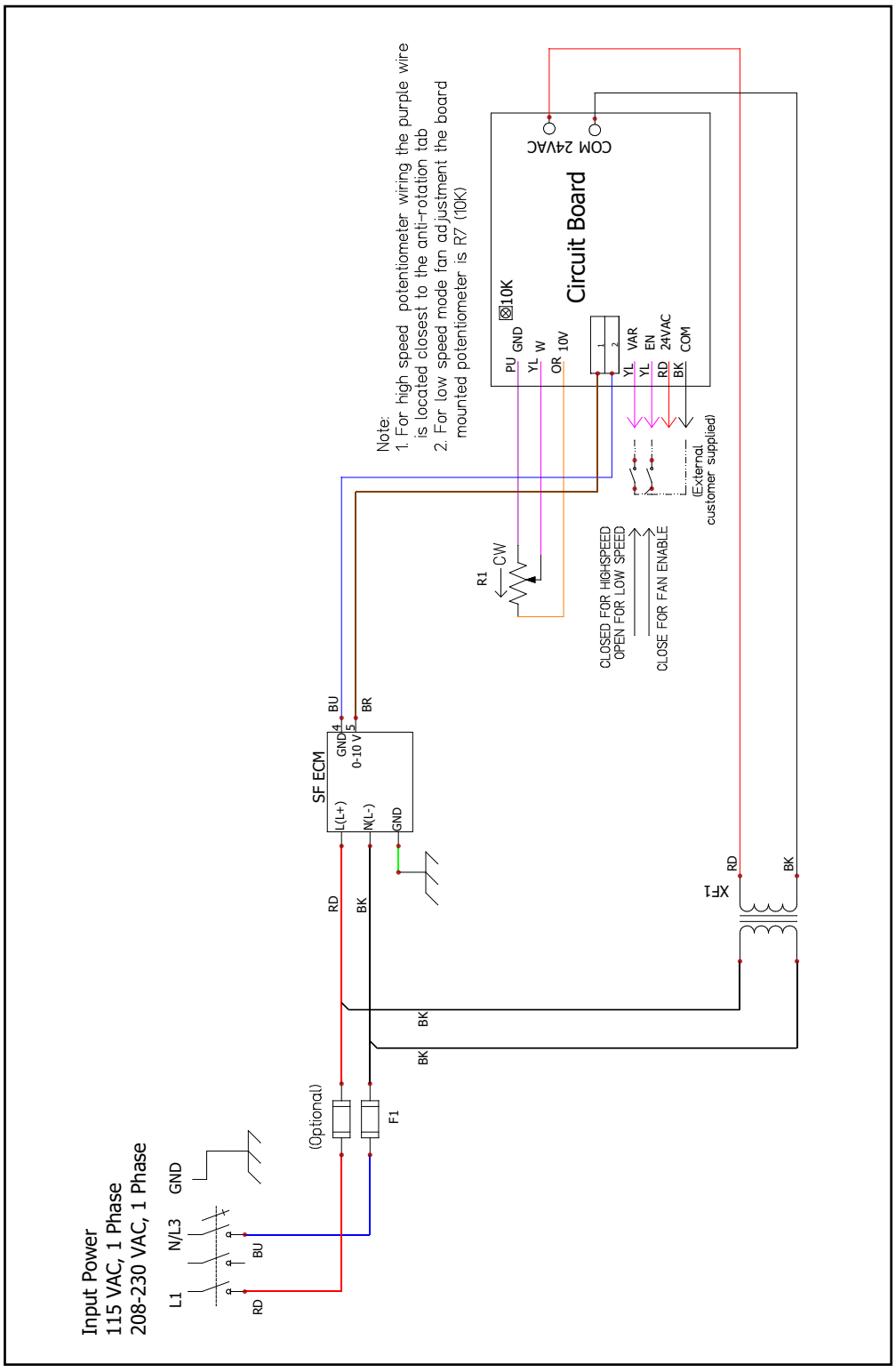
NOTE: Connect the yellow EN wire to the black COM wire to enable the unit.

NOTE: By default the trimming potentiometer on the board sets SPEED 1. A small phillips head screwdriver can be used to adjust SPEED 1 on the trimming potentiometer.

NOTE: Connect the yellow VAR wire to the black COM wire to enable SPEED 2. SPEED 2 is set by the panel mounted potentiometer.

NOTE: To utilize an external 0–10 VDC analog signal for SPEED 2:

1. Remove the panel mounted potentiometer by cutting the wires at the potentiometer.
2. Connect the remote analog signal to the yellow wire from the potentiometer.
3. Connect the remote signal ground to the purple wire from the potentiometer.
4. Cap the orange wire from the potentiometer with a wire nut.



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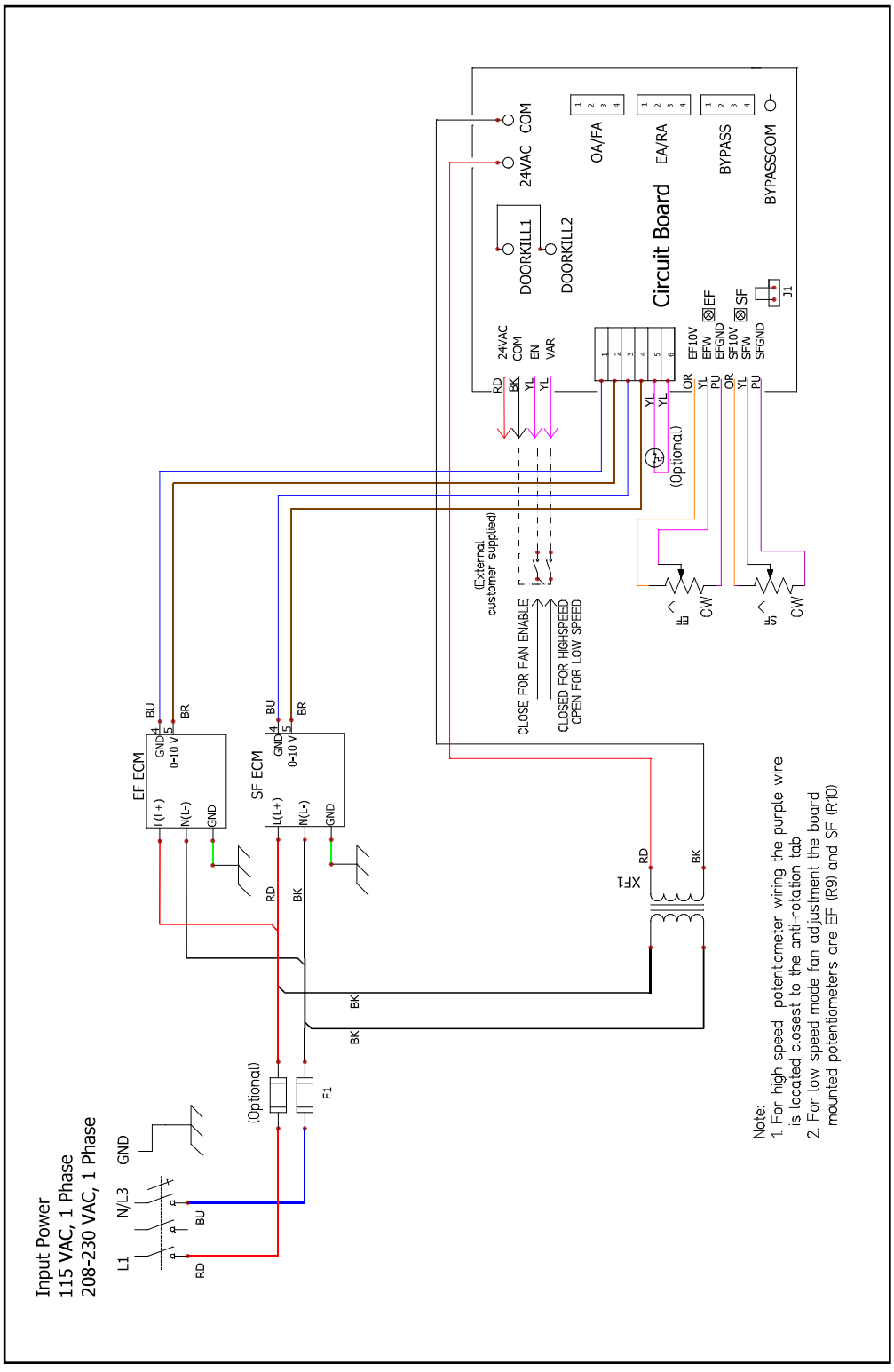
3.3.2 HE-1X (shown without dampers)



NOTE: Connect the yellow EN wire to the black COM wire to enable the unit.

NOTE: By default the trimming potentiometers on the board set SPEED 1. A small phillips head screwdriver can be used to adjust SPEED 1 on the trimming potentiometers.

NOTE: Connect the yellow VAR wire to the black COM wire to enable SPEED 2. SPEED 2 is set by the panel mounted potentiometers.

NOTE: To utilize an external 0–10 VDC analog signal for SPEED 2:

1. Remove each panel mounted potentiometer by cutting the wires at the potentiometer.
2. Connect the remote analog signal to the yellow wire from the potentiometer.
3. Connect the remote signal ground to the purple wire from the potentiometer.
4. Cap the orange wire from the potentiometer with a wire nut.

3.3.3 HE1.5X (shown without dampers)

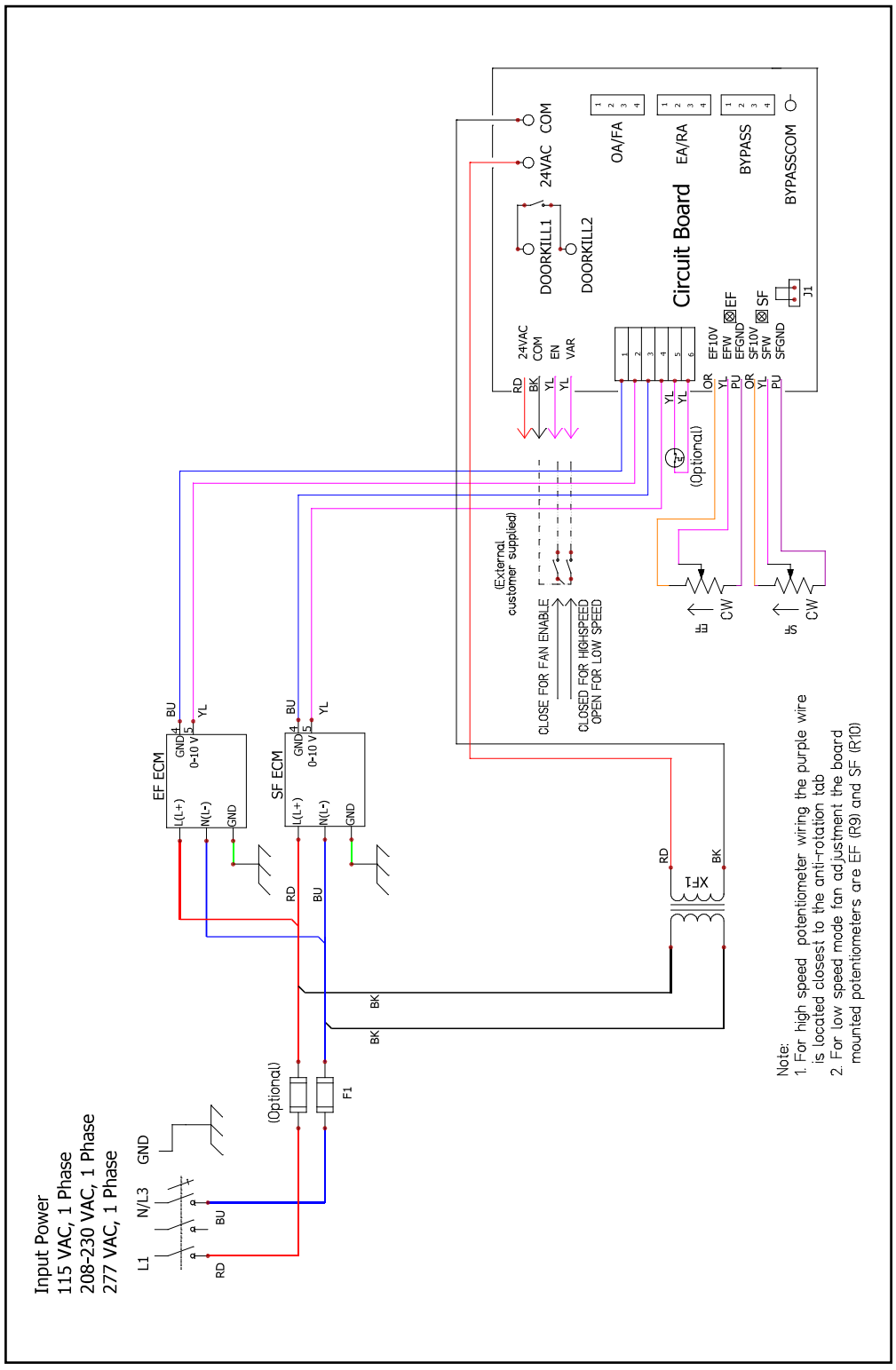
NOTE: Connect the yellow EN wire to the black COM wire to enable the unit.

NOTE: By default the trimming potentiometers on the board set SPEED 1. A small phillips head screwdriver can be used to adjust SPEED 1 on the trimming potentiometers.

NOTE: Connect the yellow VAR wire to the black COM wire to enable SPEED 2. SPEED 2 is set by the panel mounted potentiometers.

NOTE: To utilize an external 0–10 VDC analog signal for SPEED 2:

1. Remove each panel mounted potentiometer by cutting the wires at the potentiometer.
2. Connect the remote analog signal to the yellow wire from the potentiometer.
3. Connect the remote signal ground to the purple wire from the potentiometer.
4. Cap the orange wire from the potentiometer with a wire nut.



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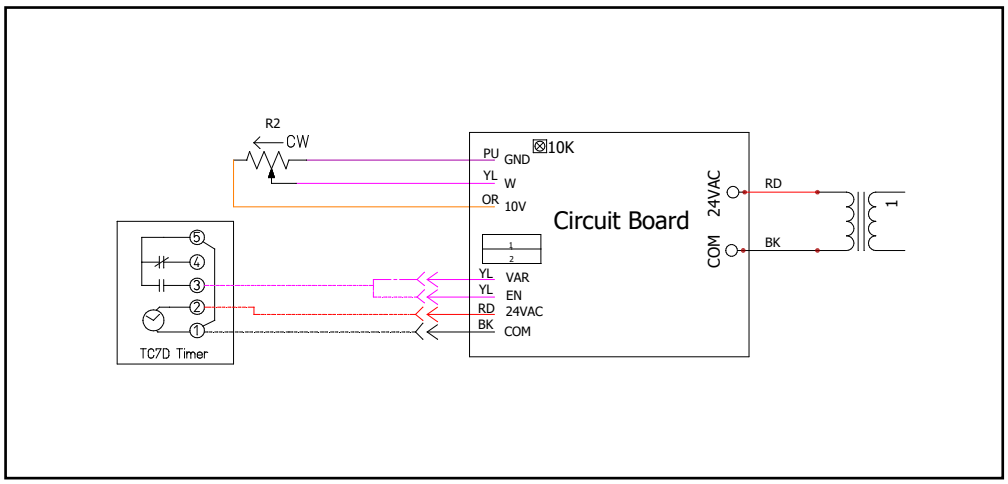
3.3.4 TC7D Timer High Speed Field Wiring (Optional Accessory)



4.0 OPERATION

4.1 AIRFLOW PERFORMANCE

The ERV is factory wired to operate at low adjustable SPEED 1 and variable SPEED 2.

Airflows must be measured and the unit's potentiometers adjusted so that it operates at the airflow volumes specified for the installation.

Use the pressure taps in the core and filter doors to determine the airflow. Section 4.3 translates the pressure drop across the energy recovery core to the actual airflow volume.

4.2 MEASURING AIRFLOW

4.2.1 Equipment Required

- Magnehelic gauge or other device capable of measuring 0–1.5 in. water of differential pressure.
- 2 pieces of flexible tubing, 1/8" ID, 1/16" wall works best.

4.2.2 Cross Core Static Pressure Measurement Instructions

- The individual differential pressures (DP) are measured using the installed pressure ports located in the front of the units core access doors.
- To read SCFM of Fresh Air (FA) install the "high" pressure side (+) of your measuring device to the Outside Air (OA) port and the "low" pressure side (-) to the Fresh Air (FA) port.
- To read SCFM of Room Air (RA) install the "high" pressure side (+) of your measuring device to the Room Air (RA) port and the "low" pressure side (-) to the Exhaust Air (EA) port.
- Use the reading displayed on your measurement device to cross reference the CFM output using the conversion chart.
- Adjust airflow by changing the potentiometer setting for the measured airstream.

NOTE: Be sure to remove cap from pressure port before inserting tubing. Ensure tubing is well seated in pressure ports.

NOTE: The tubing should extend in the pressure port approximately 1".

NOTE: These ports are carefully located on the unit to give the most accurate airflow measurement. Do not relocate ports.

NOTE: Be sure to replace cap into pressure port when airflow measuring is complete.

NOTE: For best performance the airflow rate for both the FA and EA should be roughly equal ("balanced"). In some facilities a slight positive or negative pressure in the building is desired. RenewAire energy recovery ventilators can generally operate with a flow imbalance of up to 20% without significant loss in energy recovery efficiency.

4.3 AIRFLOW VERSUS PRESSURE DROPS

AIRFLOW PREDICTED BY PRESSURE DROP ACROSS CORE (SCFM)														
DP ("H_2O)	EV450IN ECM		HE1XINV ECM		HE1XINH ECM		HE1.5XIN ECM		HE1XRT ECM		HE1XRTC ECM		HE1.5XRT ECM	
	FA	RA	FA	RA	FA	RA	FA	RA	FA	RA	FA	RA	FA	RA
0.10	--	--	--	--	--	--	--	--	--	--	--	--	335	--
0.15	--	--	--	--	--	--	380	320	--	--	--	--	450	--
0.20	200	200	280	--	260	--	500	440	--	--	--	--	555	--
0.25	225	225	330	270	310	290	620	565	--	--	--	--	650	--
0.30	245	245	380	320	360	340	740	695	280	250	--	--	745	--
0.35	265	265	425	375	415	390	860	825	325	290	--	--	835	300
0.40	285	285	470	430	470	440	980	960	370	330	--	--	920	380
0.45	305	305	520	480	520	490	1095	1095	415	370	--	--	1005	475
0.50	330	330	570	530	570	540	1215	1235	460	410	650	--	1085	575
0.55	350	350	620	580	620	590	1330	1375	515	455	688	--	1165	685
0.60	370	370	670	630	670	640	1450	1515	550	500	725	555	1240	805
0.65	390	390	720	680	720	690	1565	--	595	540	770	610	1315	935
0.70	410	410	770	730	770	740	--	--	640	580	815	665	1385	1070
0.75	430	430	815	785	820	790	--	--	690	620	853	720	1460	12220
0.80	455	455	860	840	870	840	--	--	740	660	890	775	1530	1375
0.85	475	475	910	890	920	890	--	--	785	700	933	828	--	1535
0.90	495	495	960	940	970	940	--	--	830	740	975	880	--	--
0.95	--	--	1010	990	1020	990	--	--	875	785	1018	938	--	--
1.00	--	--	1060	1040	1070	1040	--	--	920	830	1060	995	--	--
1.05	--	--	--	1090	--	1090	--	--	965	870	--	1048	--	--
1.10	--	--	--	--	--	--	--	--	1010	910	--	1100	--	--

5.0 FACTORY ASSISTANCE

In the unlikely event that you need assistance from the factory for a specific issue with the ERV or its ECM Option, make sure that you have the information called for in the Unit Records pages at the front of the ERV manual. The person you speak with at the factory will need that information to properly identify the unit and the installed options.

To contact RenewAire Customer Service:

Call 800-627-4499

Email: RenewAireSupport@RenewAire.com

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

About RenewAire

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

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

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

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RenewAire® Energy Recovery Ventilation