COOK

ERV

ENERGY RECOVERY VENTILATOR

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

This publication contains the installation, operation and maintenance instructions for standard units of the *ERV-Energy Recovery Ventilators*.

For ERV with coils refer to DX & Fluid Supplements. For cooling coil units, refer to Page 8 of this manual for guidelines on the installation of condensate drain traps.

Carefully read this publication prior to any installation or maintenance procedure.

Loren Cook catalog, *ERV*, provides additional information describing the equipment, fan performance, available accessories, and specification data.

For additional safety information, refer to AMCA Publication 410-96, *Safety Practices for Users and Installers of Industrial and Commercial Fans*.

All of the publications listed above can be obtained from Loren Cook Company by phoning (417)869-6474, extension 166; by FAX at (417)832-9431; or by e-mail at info@lorencook.com.

For information on special equipment, contact Loren Cook Company Customer Service Department at (417)869-6474.

Receiving and Inspection

Carefully inspect the ERV and ERV accessories for any damage and any shortage of accessories immediately upon receipt of the fan.

- Turn each blower wheel by hand to ensure it turns freely and does not bind.
- Inspect dampers (if supplied) for free operation of all moving parts.
- Record on the *Delivery Receipt* any visible sign of damage.

Storage

If the ERV is stored for any length of time prior to installation, store the ERV in its original crate and protect it from dust, debris and the weather.

WARNING

This unit has rotating parts. Safety precautions should be exercised at all times during installation, operation, and maintenance.
Unit must be grounded to electrical service panel.
ALWAYS disconnect power prior to working on fan.
Failure to comply with these safety precautions could result in property damage, serious injury or death.

ERV Installation

Before installing, turn the energy wheel by hand in the direction of rotation to insure that the wheel alignment was not altered in shipping.

The ERV seals were preadjusted before leaving the factory. If upon inspection excessive clearance between seals and sealing surfaces is found, adjust the seals according to the procedure.

Inspect the drive belt and make sure that it is around the drive sheaves and wheel. If possible, test run the wheel before installation.

ERV 1500 - 10,000

ERV 500 - 1,000

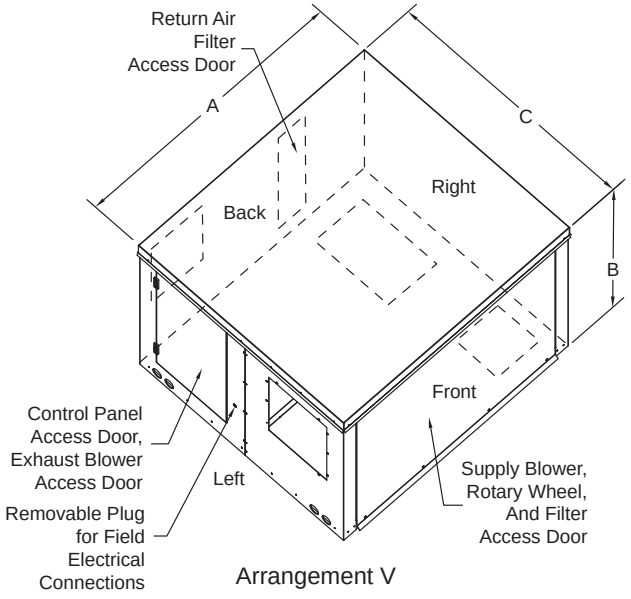
Dimensions - Arrangement V

Unit	A	A (Coil Units)	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
ERV 1500	54-3/16	90-3/16	40-13/32	49-9/32	10-1/4	11-13/16	18	14	19	13	6-1/8	21-1/8	6-1/16	6-11/16	3-5/8	3-1/4
ERV 2500	52-1/8	88-1/8	50-1/8	52-1/8	11-3/8	13-1/8	28	20	21	11-3/4	5-1/16	29-5/16	7-5/16	7-1/16	3-1/2	3-3/8
ERV 3500	64-1/2	100-1/2	59	60-1/2	13-7/16	15-5/8	34	20	23	16-1/2	5-7/8	33-13/16	8-13/16	7-13/16	4-3/4	4-1/8
ERV 4500	69-1/2	105-1/2	64-1/2	66-1/2	13-7/16	15-5/8	34	24	26	18-3/4	7-5/16	38-5/8	10	8-1/8	4-3/4	4-1/8
ERV 5500	69-1/2	105-1/2	71	66-1/2	15-7/8	18-5/8	44	24	26	18-3/4	5-7/16	41	8-13/16	9-3/8	4-3/4	4-1/8
ERV 7000	79-1/2	115-1/2	76-1/2	80	18-7/8	21-7/8	44	29	32	24	6-3/16	14-3/16	8-15/16	11-1/8	4-3/4	4-1/8
ERV 8500	79-1/2	115-1/2	83	80	18-7/8	21-7/8	53	29	32	24	6-3/16	14-3/16	8-15/16	11-1/8	4-3/4	4-1/8
ERV 10000	100	136	90	84-1/2	24-3/4	24-3/4	50	37	34-1/2	33	9-1/8	15-1/4	8	12-3/4	4-3/4	4-1/8

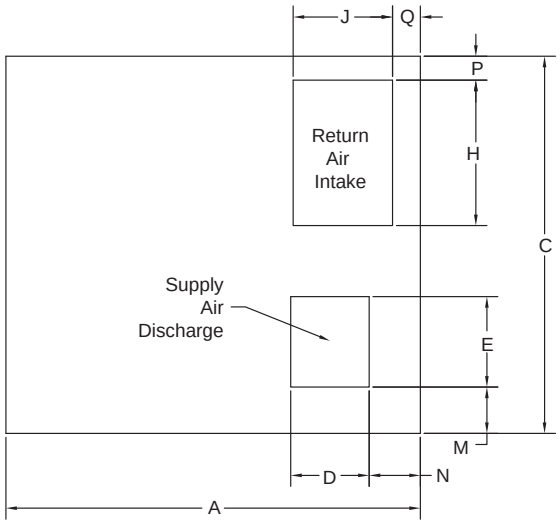
All dimensions in inches.

Unit	R	S
ERV 1500	4-1/16	15-5/8
ERV 2500	2-7/8	18-1/4
ERV 3500	6-1/4	18-1/16
ERV 4500	5-1/4	23-7/8
ERV 5500	5-1/4	20-1/8
ERV 7000	6-15/16	25-15/16
ERV 8500	6-15/16	22-15/16
ERV 10000	3-1/4	31-15/16

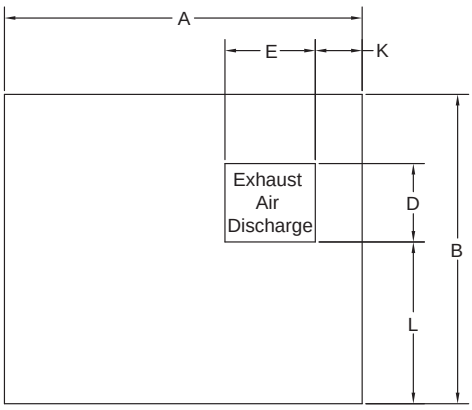
All dimensions in inches.



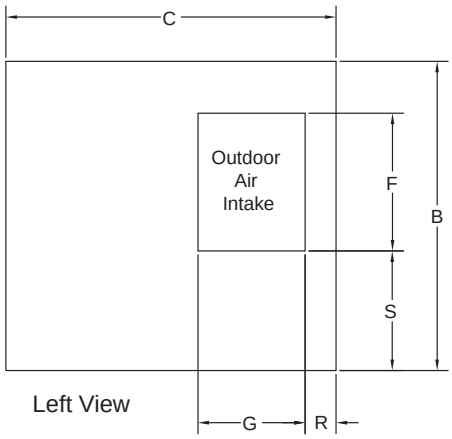
Arrangement V



Top View



Back View



Left View

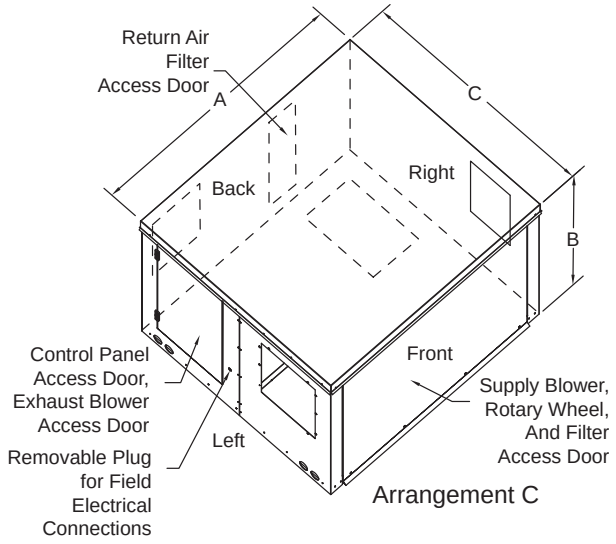
Dimensions - Arrangement C

Unit	A	A (Coil Units)	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
ERV 1500	54-3/16	90-3/16	40-13/32	49-9/32	10-1/4	11-13/16	18	14	19	13	5-9/32	6	6-1/8	21-1/8	3-5/8	3-1/4
ERV 2500	52-1/8	88-1/8	50-1/8	52-1/8	11-3/8	13-1/8	28	20	21	11-3/4	9-7/8	7-3/8	5-1/16	29-5/16	3-1/2	3-3/8
ERV 3500	64-1/2	100-1/2	59	60-1/2	13-7/16	15-5/8	34	20	23	16-1/2	10-7/8	8-13/16	5-7/8	33-13/16	4-3/4	4-1/8
ERV 4500	69-1/2	105-1/2	64-1/2	66-1/2	13-7/16	15-5/8	34	24	26	18-3/4	10-13/16	7-3/16	7-5/16	38-9/16	4-3/4	4-1/8
ERV 5500	69-1/2	105-1/2	71	66-1/2	15-7/8	18-5/8	44	24	26	18-3/4	12-1/4	8-7/8	5-7/16	41	4-3/4	4-1/8
ERV 7000	79-1/2	115-1/2	76-1/2	80	18-7/8	21-7/8	44	29	32	24	14-1/4	9-1/16	6-3/16	14-3/16	4-3/4	4-1/8
ERV 8500	79-1/2	115-1/2	83	80	18-7/8	21-7/8	53	29	32	24	14-1/4	9-3/16	6-3/16	14-3/16	4-3/4	4-1/8
ERV 10000	100	136	90	84-1/2	24-3/4	24-3/4	50	37	34-1/2	33	15-7/16	8-1/4	9-1/8	15-1/4	4-3/4	4-1/8

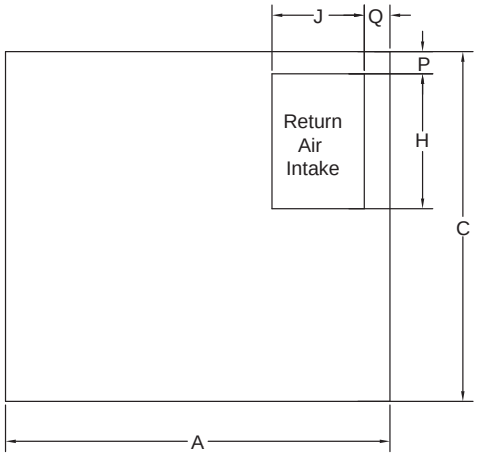
All dimensions in inches.

Unit	R	S
ERV 1500	4-1/16	15-5/8
ERV 2500	2-7/8	18-1/4
ERV 3500	6-1/4	18-1/16
ERV 4500	5-1/4	23-7/8
ERV 5500	5-1/4	20-1/8
ERV 7000	6-15/16	25-15/16
ERV 8500	6-15/16	22-15/16
ERV 10000	3-1/4	31-15/16

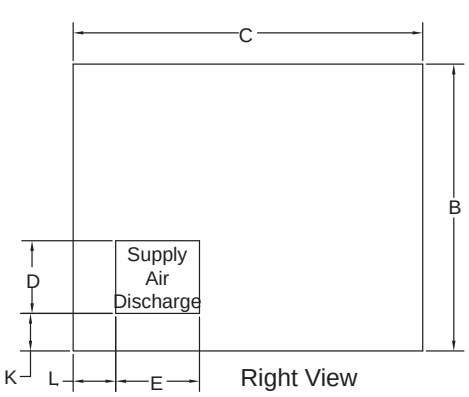
All dimensions in inches.



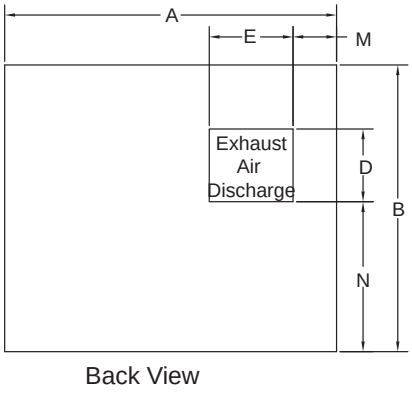
Arrangement C



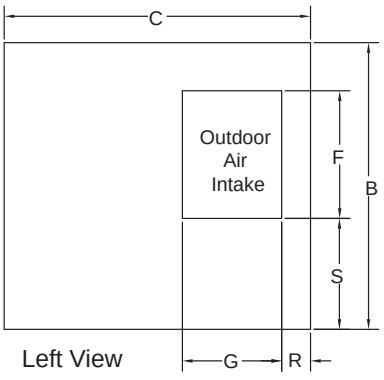
Top View



Right View



Back View



Left View

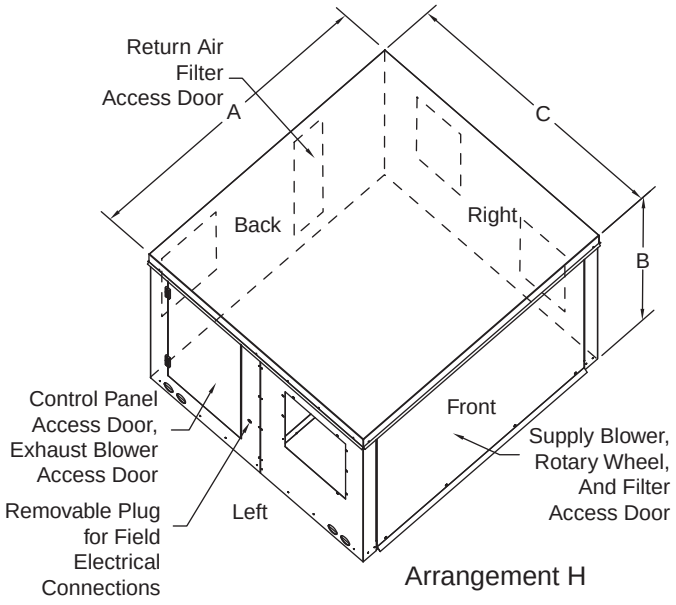
Dimensions - Arrangement H

Unit	A	A (Coil Units)	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
ERV 1500	54-3/16	90-3/16	40-13/32	49-9/32	10-1/4	11-13/16	18	14	14	18	5-9/32	6	5-1/8	18-5/8	6-1/8	21-1/8
ERV 2500	52-1/8	88-1/8	50-1/8	52-1/8	11-3/8	13-1/8	28	20	20	28	9-7/8	7-3/8	5-9/16	13-1/4	5-1/16	29-5/16
ERV 3500	64-1/2	100-1/2	59	60-1/2	13-7/16	15-5/8	34	20	20	34	10-7/8	8-13/16	5-5/16	18	5-7/8	33-13/16
ERV 4500	69-1/2	105-1/2	64-1/2	66-1/2	13-7/16	15-5/8	34	24	24	34	10-13/16	7-3/16	4-5/16	23-13/16	7-5/16	38-5/8
ERV 5500	69-1/2	105-1/2	71	66-1/2	15-7/8	18-5/8	44	24	23	42	12-1/4	8-7/8	4-5/16	22	5-7/16	41
ERV 7000	79-1/2	115-1/2	76-1/2	80	18-7/8	21-7/8	44	29	27	42	14-1/4	9-1/16	7-1/8	27-7/8	6-3/16	14-3/16
ERV 8500	79-1/2	115-1/2	83	80	18-7/8	21-7/8	53	29	27	46	14-1/4	9-3/16	7-1/8	29-7/8	6-3/16	14-3/16
ERV 10000	100	136	90	84-1/2	24-3/4	24-3/4	50	37	32	48	15-7/16	8-1/4	4-3/8	33-7/8	9-1/8	15-1/4

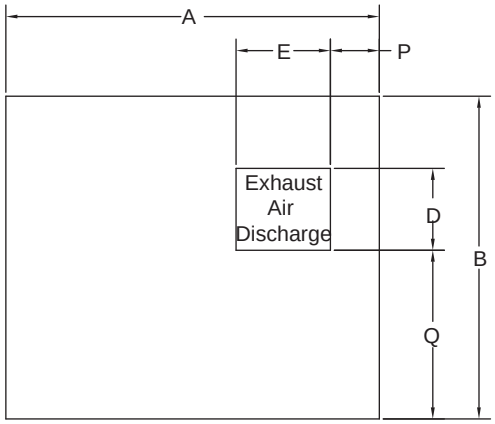
All dimensions in inches.

Unit	R	S
ERV 1500	4-1/16	15-5/8
ERV 2500	2-7/8	18-1/4
ERV 3500	6-1/4	18-1/16
ERV 4500	5-1/4	23-7/8
ERV 5500	5-1/4	20-1/8
ERV 7000	6-15/16	25-15/16
ERV 8500	6-15/16	22-15/16
ERV 10000	3-1/4	31-15/16

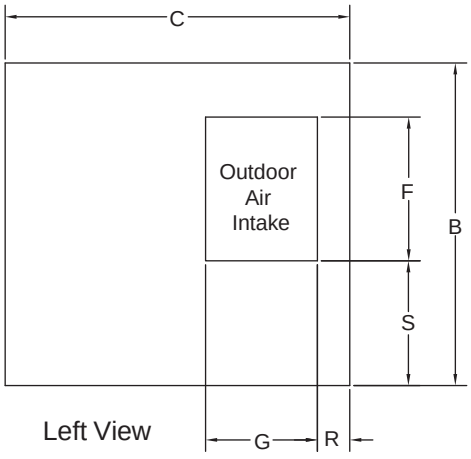
All dimensions in inches.



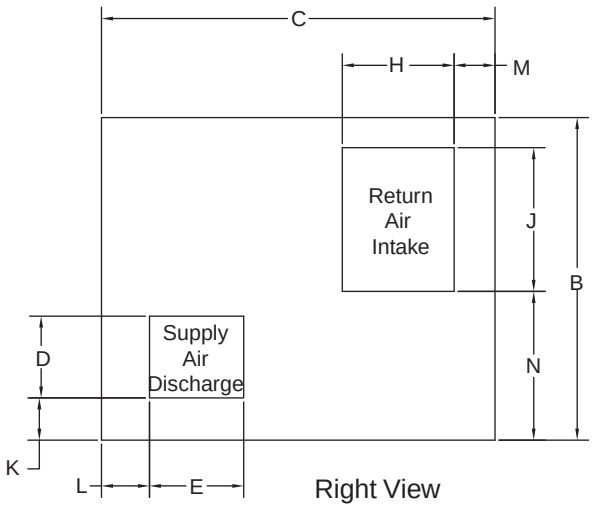
Arrangement H



Back View



Left View

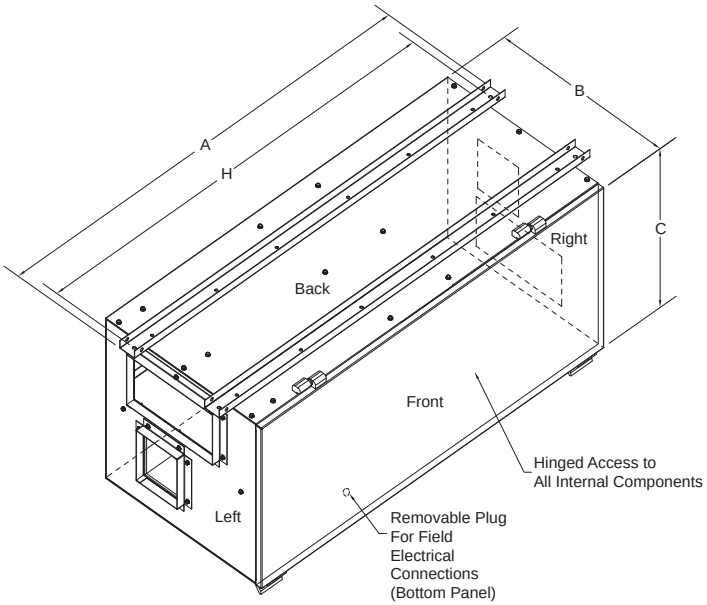


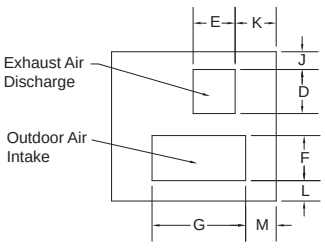
Right View

Dimensions - Direct Drive

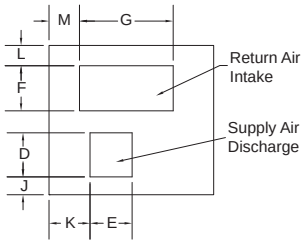
Unit	Mounting Rail Length	Housing Width	Housing Height	Exhaust Opening		Intake Opening		Mounting Holes	J	K	L	M
	A	B	C	D	E	F	G	H				
ERV 500	52	22	23-13/16	7	5-11/16	7	12	50	4	5-5/16	1-1/2	4
ERV 1000	52	26	28-13/16	10-3/8	6-7/8	7	20	50	6-11/16	11-7/16	1-1/2	4

All dimensions in inches.





Right View

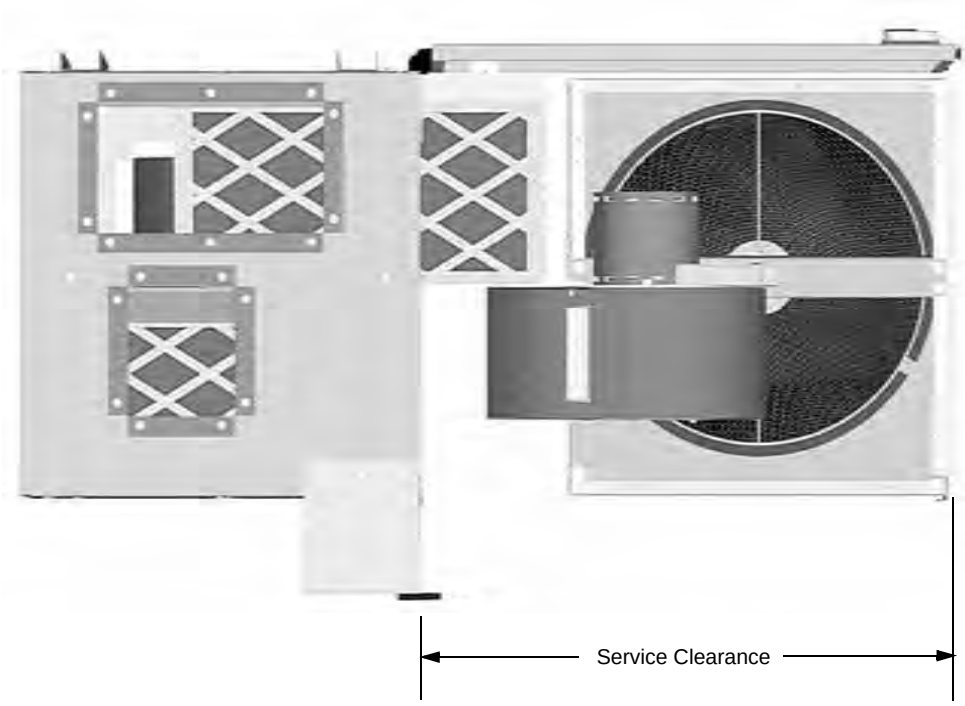


Left View

Service Clearance- Direct Drive

Unit	Service Clearance
500	30
1000	35

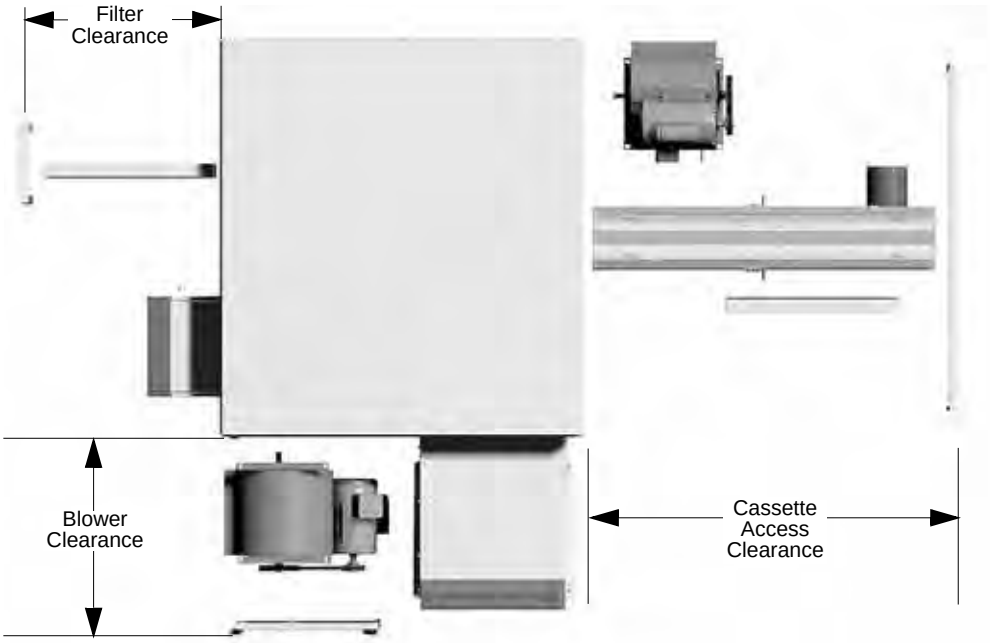
All dimensions in inches.



Service Clearance - Belt Drive

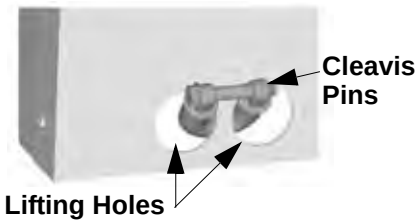
Unit Size	Filter Clearance	Blower Clearance	Cassette Clearance
1500	30	29	61
2500	31	31	64
3500	31	35	73
4500	26	41	79
5500	26	47	79
7000	30	52	92
8500	30	60	92
10000	30	60	96

All dimensions in inches.



Handling

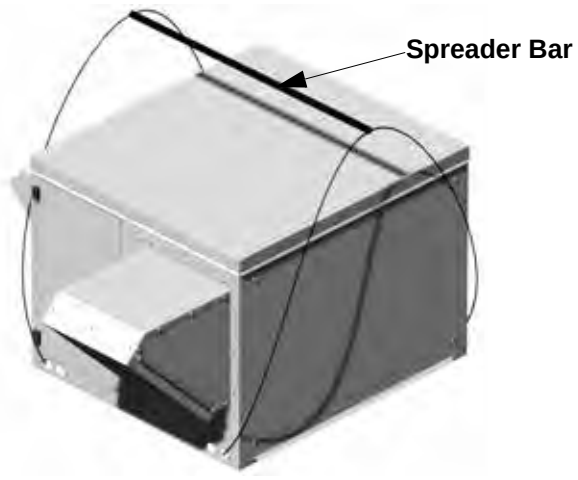
Lift the ERV by the base lifting holes. Never lift by the weatherhood. To avoid structural damage, only lift the unit with all service panels installed.



After installing cleavis pins through all lifting holes, lift unit a few feet off the ground and check to make sure the unit is not tilted or twisted.

Spreader Bars

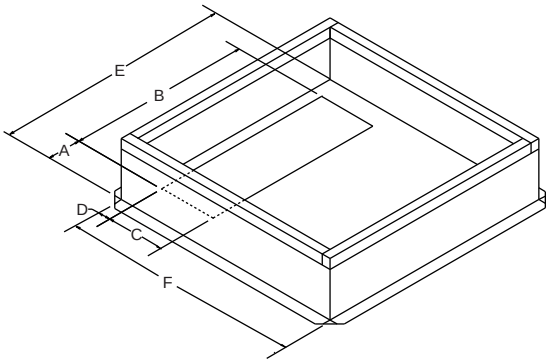
To protect unit from damage when lifting, the lifting straps and spreader bars should be utilized as shown in figure below. To prevent scratching of the exterior surface, pads should be placed between the cabinet and the cables.



Energy Recovery Ventilator Definitions

- **Bearing, external** - Flanged or pillow block bearing used with rotating shaft models.
- **Bearing, internal** - Sealed ball bearing used with fixed shaft models.
- **Bulb seal** - The seal used for both the circumferential seal and the inner seal in the cassettes. They are constructed of neoprene and configured to seal against the wheel band in the case of the circumferential seal, and against the wheel face in the case of the inner seal. These seals are noncontact in that there is a slight gap between seal and sealing face to allow the wheel to turn at high RPMs without overtorquing motor or causing seal damage. These seals have an integral clip and are clipped to the cassette face panel cutout (circumferential) or to the post (inner).
- **Cassette** - The steel structure that houses the wheel. Typically ERV cassettes are of punched sheet metal panelized construction.
- **Energy Enthalpy Wheel** - A generic name for an energy conservation wheel. The term enthalpy refers to an air stream's total energy (temperature and humidity level).
- **Exhaust Air** - The air stream leaving an ERV that is exhausted to the outside. Exhaust air is building return air that has been run through the wheel.
- **Heat Wheel** - Synonymous with enthalpy wheel, energy conservation wheel, or total energy recovery wheel. Some heat wheels are sensible only wheels and should not be confused with total energy recovery wheels.
- **Latent Energy** - Latent energy in the context of wheel discussions is the work done by the wheel to transfer moisture from one air stream to another. Latent work is accompanied by humidity changes in the air streams.
- **Media** - The chemical composite part of the wheel which actually performs the latent and sensible exchange.
- **Outdoor Air** - The air stream entering an ERV that is brought in from outside. Outdoor air becomes supply air after going through the wheel.
- **Purge** - A small segment of supply air defined by the gap between the inner seal on the outdoor air edge of the center post and the supply air edge of the center post. The purge angle is adjustable. The purge captures the small amount of supply air captive in the wheel when the wheel moves from return to supply and routes it to return to minimize cross contamination.
- **Return Air** - The air stream entering an ERV that is returned from the building. Return air becomes exhaust air after going through the wheel.
- **Sensible Heat** - Sensible energy in the context of wheel discussions is the work done by the wheel to transfer heat from one air stream to another. Sensible work is accompanied by temperature changes in the air streams.
- **Sensible Wheel** - A wheel that does only sensible work, i.e., where only heat is transferred from one air stream to another and the resultant moisture level remains unchanged.
- **Supply Air** - The air stream leaving an ERV that is supplied to the building space. Supply air is outdoor air that has been run through the wheel.

Recommended Roof Openings



Unit Size	Recommended Roof Openings Arrangement V & C							
	A	B (Arr. V)	B (Arr. C)	C	D	E	F	F (Coil Units)
1500	1-5/8	41	29	18	1-1/2	45-3/4	50-3/4	86-3/4
2500	1-3/4	43	29	20	1-5/8	48-1/2	48-1/2	84-1/2
3500	2-1/2	49	33	22	2	57	61	97
4500	2-1/2	49	35	22	2	63	66	102
5500	2-1/2	55	35	26	2	63	66	102
7000	2-1/2	68	42	31	2	76-1/2	76	112
8500	2-1/2	68	42	31	2	76-1/2	76	112
10000	2-1/2	74	45	38	2	81	96	132

All dimensions in inches.

Mounting

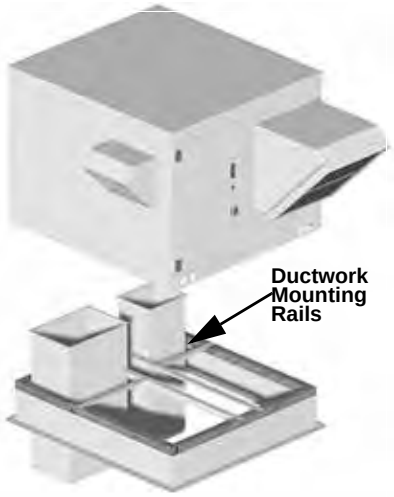
Foundation Mounting for Arrangement H

The ERV requires a strong, level foundation of reinforced poured concrete. A correctly designed concrete foundation provides the best means for mounting floor units. The size of the foundation is determined by unit size and the specific location of the installation. The use of rubber isolation pads between the unit base and the foundation is recommended.

Foundation Mounting for Arr. H

Use the following guidelines to calculate foundation size:

- The overall dimensions of the foundation should extend at least six inches beyond the outline of the unit.
- The weight of the foundation should be two to three times the weight of the unit and its motor.



Curb Mounting

Rail Mounting

Use the following recommendations when designing for rail mounting:

- Rails should be positioned six to twelve inches in from sides of the unit.
- Rails should extend a minimum of six inches beyond the sides of the unit.

Rail Mounting

Ductwork Connections

Discharge Duct Turns

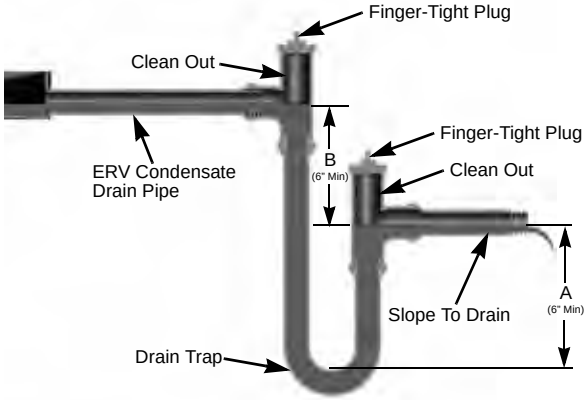
Where possible, allow 3 duct diameters between duct turns or elbows and the fan outlet. Refer to the figure below.

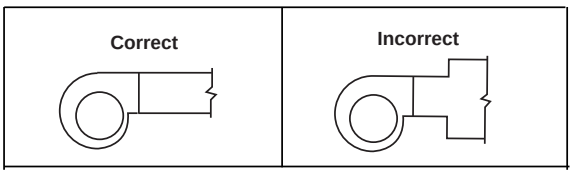
Free Discharge

Avoid a free discharge into the plenum. This will result in lost efficiency because it doesn't allow for a static regain. Refer to figure below.

Installation of Condensate Drain Pan Traps

All drain and trap piping should be sized to match the condensate drain pan pipe connection supplied on cooling coil equipped ERV's. The below figure shows the correct layout of a low maintenance, trouble-free condensate drain pan trap. Finger tight plugs allow easy access for inspection and cleaning. To prevent an air leak into the unit through the trap, dimensions "A" and "B" should be double the total static pressure "head" found in the drain pan compartment.





Motor Installation

To prevent damage to the unit during shipping, extremely heavy motors (cast iron or severe duty) are shipped loose and must be field mounted by bolting the motor on the motor mounting plate in the existing mounting slots.

The motor has been prewired to turn the proper direction. Follow the directions on the motor schematic accompanying the motor. Some motors can accommodate either 220V or 440V operation. Once the motors are wired, test run the ERV and check for proper rotation.

Wiring Installation

All wiring should be in accordance with local ordinances and the National Electrical Code, NFPA 70. Ensure the power supply (voltage, frequency, and current carrying capacity of wires) is in accordance with the motor nameplate.

Lock off all power sources before unit is wired to power source.

Leave enough slack in the wiring to allow for motor movement when adjusting belt tension. Some fractional motors have to be removed in order to make the connection with the terminal box at the end of the motor. To remove motor, remove bolts securing motor base to power assembly. Do not remove motor mounting bolts.

Follow the wiring diagram in the disconnect switch and the wiring diagram provided with the motor. Correctly label the circuit on the main power box and always identify a closed switch to promote safety (i.e., red tape over a closed switch).

Do not allow the fan to run in the wrong direction. This will overheat the motor and cause serious damage. For 3-phase motors, if the fan is running in the wrong direction, check the control switch. It is possible to interchange two leads at this location so that the fan is operating in the correct direction.

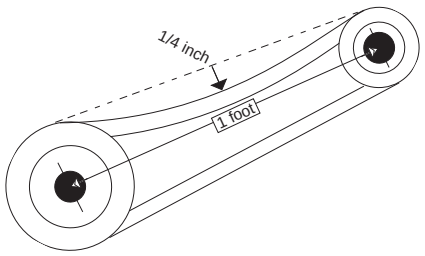


Figure 1

Belt and Pulley Installation

Belt tension is determined by the sound the belts make when the fan is first started. Belts will produce a loud squeal which dissipates after the fan is operating at full capacity. If the belt tension is too tight or too loose, lost efficiency and possible damage can occur.

Do not change the pulley pitch diameter to change tension. This will result in a different fan speed than desired.

a. Loosen motor plate adjustment screw and move motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
b. Slide the motor plate back until proper tension is reached. For proper tension a deflection of approximately 1/4" per foot of center distance should be obtained by firmly pressing the belt. Refer to Figure 1.
c. Lock the motor plate adjustment nuts in place.
d. Ensure pulleys are properly aligned. Refer to Figure 2.

Tolerance

Center Distance	Maximum Gap
Up thru 12"	1/16"
12" up through 48	1/8"
Over 48"	1/4"

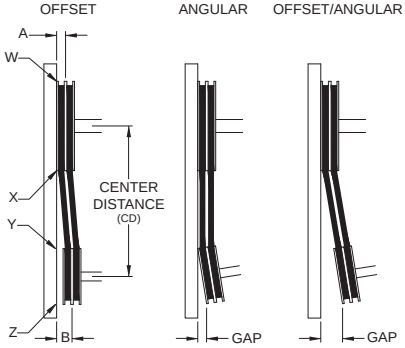


Figure 2

Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft.

Figure 2 indicates where to measure the allowable gap for the drive alignment tolerance. All contact points (indicated by WXYZ) are to have a gap less than the tolerance shown in the table. When the pulleys are not the same width, the allowable gap must be adjusted by half of the difference in width (As shown in A & B of Figure 2). *Figure 3* illustrates using a carpenter's square to adjust the position of the motor pulley until the belt is parallel to the longer leg of the square.

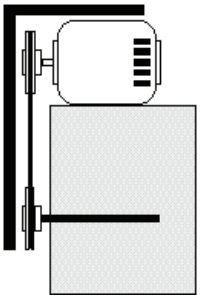


Figure 3

Final Installation Steps

a. Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table *Recommended Torque for Setscrews/Bolts*.
b. Inspect for correct voltage with voltmeter.
c. Ensure all accessories are installed.
d. If applicable, ensure fan is secured to ductwork.

Operation

Pre-Start Checks

a. Lock out all the primary and secondary power sources.
b. Ensure fasteners and setscrews, particularly those used for mounting the fan, are tightened.
c. Inspect belt tension and pulley alignment on blowers.
d. Inspect belt tension on energy wheel drive belt.
e. Inspect motor wiring.
f. Ensure belt touches only the pulleys.
g. Ensure fan and ductwork are clean and free of debris.
h. Ensure rotor moves freely by hand. If not, recheck the seal to determine whether or not it is binding and if so adjust seals following the sealcheck instructions.
i. Ensure motor rotation is correct by detaching the belts from the drive sheave and bumping the motor. The sheave should be rotating in the direction such that the belt will result in rotation per the exterior markings. If not, rewire the motor.
j. Ensure the air flow orientation matches up to design by looking at the identification markings on the cassette and/or refer to the general arrangement drawing to check the four duct connections to the unit.
k. Close and secure all access doors.
l. Restore power to the fan.

Changing Fan Speed

The motor/blower combinations on ERV sizes 1500 and up are equipped with variable pitch pulleys. To change the fan speed, perform the following:

a. Loosen setscrew on driver (motor) pulley and remove key, if equipped.
b. Turn the pulley rim to open or close the groove facing. If the pulley has multiple grooves, all must be adjusted to the same width.
c. After adjustment, inspect for proper belt tension.

Speed Reduction

Open the pulley in order that the belt rides deeper in the groove (smaller pitch diameter).

Speed Increase

Close the pulley in order that the belt rides higher in the groove (larger pitch diameter). Ensure that the RPM limits of the fan and the horsepower limits of the motor are maintained.

Recommended Torque for Setscrews/Bolts (IN/Lb)

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque			
		Min.	Max.	Size	Wrench Torque
No.10	3/32"	28	33	3/8"-16	240
1/4"	1/8"	66	80	1/2"-13	600
5/16"	5/32"	126	156	5/8"-11	1200
3/8"	3/16"	228	275	3/4"-10	2100
7/16"	7/32"	348	384	7/8"- 9	2040
1/2"	1/4"	504	600	1"- 8	3000

System Start-Up

Start Up

Turn the fan on, and inspect for the following:

- Direction of rotation.
- Excessive vibration.
- Unusual noise.
- Bearing noise.
- Improper belt alignment or tension (listen for squealing).
- Improper motor amperage or voltage.

If a problem is discovered, immediately shut the fan off. Lock out all electrical power and check for the cause of the trouble. See Troubleshooting.

Inspection

Inspection of the fan should be conducted at the first **30 minute, 8 hour** and **24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect as per the *Conditions Chart*.

30 Minute Interval

Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.

8 Hour Interval

Inspect belt alignment and tension. Adjust and tighten as necessary.

24 Hour Interval

Inspect belt tension on both blowers and energy wheel drive belt. Adjust and tighten as necessary.

Unit Maintenance

Intake Hood Filters

Filter inspection and cleaning intervals can vary from once a week to twice per year depending on contaminants present and acceptable pressure drops across the filter. Under most conditions filters may be cleaned with hot water and a mild soap solution (such as dish washing liquid) or steam. Some caustic cleaners will damage the filter. If in doubt, please consult the factory for a compatibility list.

High pressure spray washers should be limited to 2,000 psi operating pressure. Every attempt should be made to remove the contaminants from the filter in a “backwash” flow (note airflow arrow on the filter frame). Once the filter is dry, it may be returned to the appropriate filter racks in the same orientation (airflow direction) as they were removed.

Return Air/Intake Air Disposable Filters

If filters are excessively dirty, replace.

Routine Maintenance

Establish a schedule for inspecting all parts of the fan. The frequency of inspection depends on the operating conditions and location of the fan.

It is recommended the following inspection be conducted twice per year.

- Inspect bolts and setscrews for tightness. Tighten as necessary.
- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. Refer to *Belt and Pulley Installation*, page 9.
- Bearings should be inspected as recommended in the *Conditions Chart*.
- Inspect filters by removing filter access door.
- Inspect springs and rubber isolators for deterioration and replace as needed.
- Inspect for cleanliness. Clean exterior surfaces only. Removing dust and grease on motor housing assures proper motor cooling. Removing dirt from the wheel and housing prevent imbalance and damage.

Motor Bearings

Motor bearings are pre-lubricated and sealed. Under normal conditions they will not require further maintenance for a period of ten years. However, it is advisable to have your maintenance department remove and disassemble the motor, and lubricate the bearings after three years of operation in excessive heat and or in a contaminated airstream consisting of airborne abrasives.

Lubrication - Fan Bearings

Vane Axial bearings are lubricated through a grease fitting on the exterior of the fan housing and should be lubricated by the schedule, *Lubrication Conditions Chart*.

Before lubricating, the grease nipple and immediate vicinity should be thoroughly cleaned without the use of high pressure equipment. The grease should be supplied slowly as the bearing rotates until fresh grease slips past the seal. Excessive pressure should be avoided to prevent seal damage.

Use no more than three injections with a hand-operated grease gun.

Exceptions to the greasing interval chart:

- ***Periodic Applications (any break of one week or more):*** it is recommended that full lubrication be performed prior to each break in operation.
- ***Higher Temperature:*** it is recommended to halve the intervals for every 30°F increase in operating temperature above 120°F not to exceed 230°F for standard bearings; High Temperature bearings (optional) can operate up to 400°F.
- ***Vertical Shaft:*** it is recommended that the intervals should be halved.

Conditions Chart

RPM	Temperature	Fan Status	Greasing Interval
100	Up to 120°F	Clean	6 to 12 months
500	Up to 150°F	Clean	2 to 6 months
1000	Up to 210°F	Clean	2 weeks to 2 months
1500	Over 210°F	Clean	Weekly
Any Speed	Up to 150°F	Dirty	1 week to 1 month
Any Speed	Over 150°F	Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Very Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Extreme Conditions	Daily to 2 weeks

Loren Cook Company uses petroleum lubricant in a lithium base. Other types of grease should not be used unless the bearings and lines have been flushed clean. If another type of grease is used, it should be a lithium-based grease conforming to NLGI grade 2 consistency.

A NLGI grade 2 grease is a light viscosity, low-torque, rust-inhibiting lubricant that is water resistant. Its temperature range is from -30°F to +200°F and capable of intermittent highs of +250°F. For temperatures above 250° Mobiltemp SHC 32 is recommended.

Lubrication - Motor Bearings

Motors are provided with prelubricated bearings. Any lubrication instructions shown on the motor nameplate supersede instructions below.

Motor bearings without provisions for relubrication will operate up to 10 years under normal conditions with no maintenance. In severe applications, high temperatures or excessive contaminates, it is advisable to have the maintenance department disassemble and lubricate the bearings after 3 years of operation to prevent interruption of service.

For motors with provisions for relubrication, follow intervals of the table below.

Relubrication Intervals						
Service Conditions	NEMA Frame Size					
	Up to and including 184T		213T-365T		404T and larger	
	1800 RPM and less	Over 1800 RPM	1800 RPM and less	Over 1800 RPM	1800 RPM and less	Over 1800 RPM
Standard	3 yrs.	6 months	2 yrs.	6 months	1 yr.	3 months
Severe	1 yr.	3 months	1 yr.	3 months	6 months	1 months

Motors are provided with a polyurea mineral oil NGLI #2 grease. All additions to the motor bearings are to be with a compatable grease such as Exxon Mobil Polyrex EM and Chevron SRI.

The above intervals should be reduced to half for vertical shaft installations.

Motor Services

Should the motor prove defective within a one-year period, contact your local Loren Cook representative or your nearest authorized electric motor service representative.

Replacing Fan Pulleys and Belts

a. Remove pulleys from their respective shafts.
b. Clean the motor and fan shafts.
c. Clean bores of pulleys and coat the bores with heavy oil.
d. Remove grease, rust, or burrs from the pulleys and shafts.
e. Remove burrs from shaft by sanding.
f. Place fan pulley on fan shaft and motor pulley on its shaft. Damage to the pulleys can occur when excessive force is used in placing the pulleys on their respective shafts.
g. Tighten in place.
h. Install belts on pulleys and align as described in the *Belt and Pulley Installation* section.

Fan Bearing Replacement

The fan bearings for the ERV - 10000 are pillow block ball bearings. Bearings should be replaced individually from each side of fan.

An emery cloth or file may be needed to remove imperfections in the shaft left by the setscrews.

a. Remove blower access door.
b. Loosen motor plate adjustment bolts, then move the motor plate so the belt will easily slip off. Remove driven pulley by loosening the setscrews.
c. Remove the bearings from shaft.
d. Slide new bearings onto shaft to desired location and mount bearings loosely onto support base. Bearing bolts and setscrews should be loose to allow shaft positioning.
e. Position the wheel properly and tighten the bearing bolts securely to the support base.
f. Align setscrews bearing to bearing and tighten against the shaft securely.

Never tighten both pairs of setscrews before securing bearing mounting bolts. This may damage the shaft.

g. Check wheel position again. If necessary, readjust by loosening the bearing bolts and setscrew and repeat step e.

Energy Recovery Wheel Maintenance

Energy Recovery Wheel Bearings

All ERVs (except ERV-10000) are provided with no maintenance inboard bearings. These bearings should require no maintenance during the life of the equipment. ERV-10000 comes equipped with an external flanged bearing which should be greased annually. Use a petroleum based lubricant.

Energy Recovery Wheel Cleaning

The wheel is designed to last the life of the equipment. It is important to routinely change the filters to keep dust and dirt from the heat transfer wheel surface. The wheel is somewhat self cleaning through its normal action of rotating in and out of countercurrent air flow streams. If the wheel becomes dirty, it may be cleaned by blowing out the unit with compressed air (20 psig maximum). In cases of severe uncleanliness, the wheel cassette can be washed with water following removal of the wheel cassette drive motor. It is also permissible to steam clean the wheel.

1. Remove wheel access door and slide out cassette.
2. Remove wheel drive motor.
3. Wash the media carefully with water, once clean, allow the media to dry out for several hours or days if necessary.
4. Reinstall using the reverse procedure. Run the unit. It may take several hours for the desiccant to dry out and for the wheel to perform normally.

NOTE: A damp wheel must be dried out as soon as possible. Mold and mildew can and will form on the wet wheel media. Failure to dry wheel media completely can ruin the wheel and will **void** the wheel warranty. Use of a wheel that has a mold/mildew condition can result in occupant complaints and sickness.

Energy Wheel Drive Belt

Proper energy wheel operation depends on the tightnes of the wheel drive belt. For proper tension, a deflection of approximately 1/4” per foot of belt distance from where belt contacts energy wheel to the sheave.

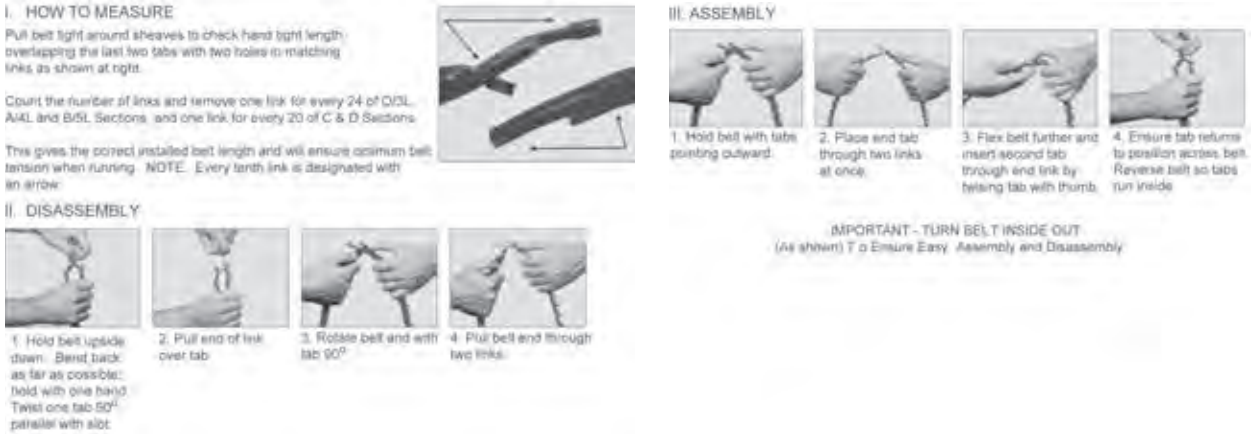
Troubleshooting

Problem and Potential Cause	
Low Capacity or Pressure •Incorrect direction of rotation. Make sure the blower wheels rotate in same direction as the arrows on the motor or belt drive assembly. •Poor fan inlet conditions. There should be a straight clear duct at the inlet. •Improper wheel alignment.	**Overheated Bearings** • Improper bearing lubrication • Excessive belt tension.
High Pressure Drop • Check air flow compared to design. • Check filters and clean/replace as necessary. • Check energy recovery wheel media for pluggage and clean per cleaning instructions.	**Inadequate Energy Recovery Wheel Performance** • Check wheel rotation speed. • Check for wheel integrity and adjust seals or replace worn seals. • Check entering air conditions and compare design. • Check ducting for leakage and fix any leaks. • Check media for dirt and clean per cleaning instructions.
Excessive Vibration and Noise • Damaged or unbalanced blower wheel. • Belts too loose; worn or oily belts. • Speed too high. • Incorrect direction of rotation. Make sure the blower wheels rotate in same direction as the arrows on the motor or belt drive assembly. • Bearings need lubrication or replacement. • Fan surge. • Check seals and adjust as necessary. • Check the bearings for source of noise. • Check the belts for slippage.	**Overheated Motor** • Motor improperly wired. • Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly. • Cooling air diverted or blocked. • Improper inlet clearance. • Incorrect fan RPMs. • Incorrect voltage.
Improper Blower Wheel Rotation • Check drive belts for engagement with sheave. • Check drive motor. • Check drive motor wiring for proper voltage.	**Supply and/or exhaust blower motors turned off** • Motor overloads could be tripping. • If the unit is equipped with an on/off or exhaust only frost protection, then check frost temperature set point and adjust if required.
Energy Recovery Wheel Is Not Turning — or runs intermittently • Check for loose or broken wheel drive belt. • Bulb seals could be too tight against sealing surfaces. • If unit is equipped with an economizer control, then check temperature or enthalpy set points and adjust if required.	

Link Belt Information

Dirty Filter Sensor Calibration

Dirty Filter Sensor - Senses fan compartment suction increase, which then actuates a dirty filter warning light. Sensor requires field calibration after initial system start up. This is accomplished by shutting off the unit, placing a cardboard block-off in front of the filters to simulate dirty air filter condition. The filter sensor is then adjusted until it actuates the warning light after the unit is restarted with block-off in place. The unit is then shut off and the block-off is removed. Access panels are reinstalled and the unit is restarted. The actuator light should remain off until the filters become dirty.



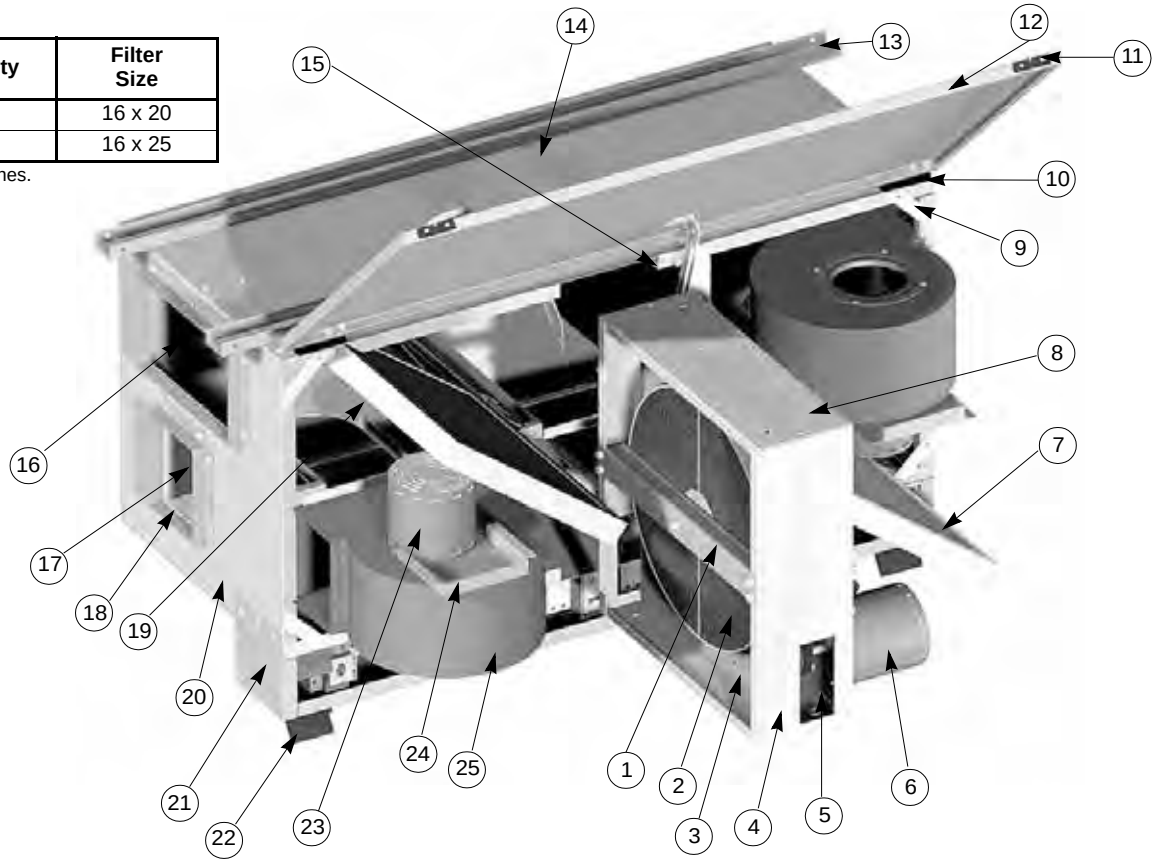
Direct Drive Parts List - ERV-500, ERV-1000

Part Number	Description	Quantity		Part Number	Description	Quantity
1	Bearing Support	2		14	Outer Housing	1
2	Energy Recovery Wheel	1		15	Insulation Cover	4
3	Cassette Face	1		16	Intake Duct Flange	4
4	Cassette Assembly Top/Bottom Panel	2		17	Discharge Duct Flange	2
5	Wheel Drive Belt	1		18	Discharge Duct Flange	4
6	Energy Recovery Wheel Motor	1		19	Blockoff Panel	2
7	Filter	2		20	End Panel	2
8	Cassette Side Panel	2		21	Optional Low Voltage Control Panel	1
9	Gusset	4		22	Door Latch	2
10	Hinge	2		23	Blower Motor	2
11	Door Latch Keeper	2		24	Blower Housing Mounting Bracket	2
12	Access Door	1		25	Blower Housing	1
13	Hanging Channel	2				

Filter Size

Size	Quantity	Filter Size
500	2	16 x 20
1000	2	16 x 25

All dimensions in inches.



Belt Drive Parts List - ERV 1500 through ERV- 10000

Part Number	Description	Quantity
1	Cassette Access Door	1
2	Filters	See Table Below
3	Filter Rack	2
4	Base	1 - ERV 1500, ERV 2500 2 - ERV 3500 - 10000
5	Intake Panel	1
6	Intake Weather Hood	1
7	Blower Mounting Rails	2
8	Discharge Blower/Electrical Panel Access Door	1
9	Electrical Panel Compartment	1
10	Discharge Panel	1
11	Discharge Motor	1
12	Discharge Blower	1
13	Discharge Hood	1
14	Filter Access Door	1
15	Base Blockoff Arr. H & I	1

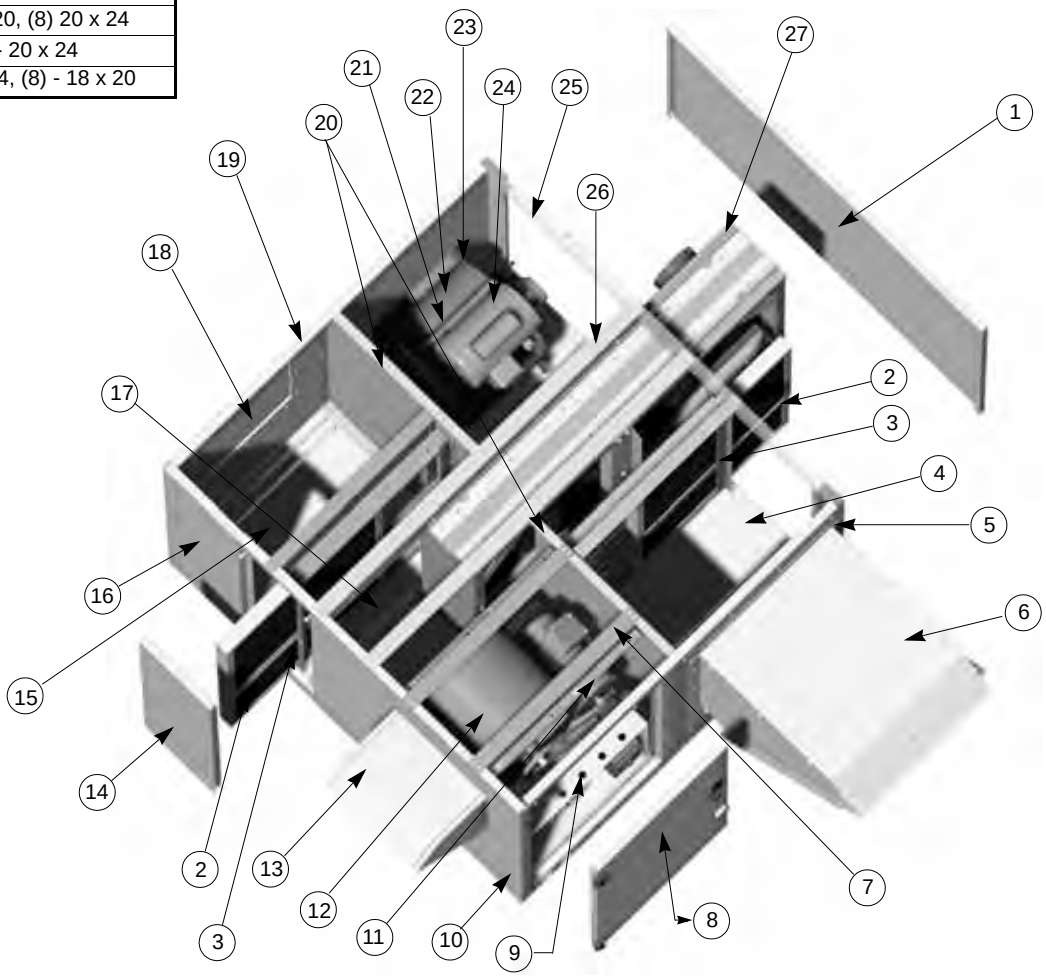
Part Number	Description	Quantity
16	Filter Access Panel	1
17	Lower Cassette Guide	2
18	Return Air Cover Arr. H & I	1
19	Outlet Panel	1
20	Blockoff Panel	2
21	Blower Blockoff Arr. H & I	1
22	Intake Blower	1
23	Blower Cover Arr. V	1
24	Intake Motor	1
25	Upper Door Channel	1
26	Upper Cassette Guide	2
27	*Cassette Assembly	1
28	Top Cap (Not Shown)	1 - ERV 1500, ERV 2500 2 - ERV 3500 - 10000

* Parts list for cassette assembly on page 16.

Filter Size

Size	Filter Size
1500	(2) - 12 x 24, (2) - 20 x 24
2500	(4) - 20 x 25
3500	(4) - 14 x 25, (4) - 16 x 25
4500	(10) - 16 x 20
5500	(12) - 16 x 20
7000	(4) - 20 x 20, (8) 20 x 24
8500	(12) - 20 x 24
10000	(8) - 20 x 24, (8) - 18 x 20

All dimensions in inches.



Belt Drive with Coil Option Parts List - ERV 1500 through ERV- 10000

Part Number	Description	Quantity
1	Supply Blower Access Door	1
2	Coil Cover Panel	1
3	Fluid Coil Cover	Varies
4	Fluid Coil Grommet - 1-7/8 I.D.	Varies
5	DX Coil Access Door	1
6	Condensate Drain Pipe	1
7	DX Coil Cover	Varies
8	DX Coil Grommet - 1-5/8 I.D.	Varies
9	Cassette Access Door	1
10	Front Panel (Not Shown)	1
11	Preheater (Optional)	1
12	Filter Access Door	1
13	Cooling Coil (DX or CW) - Optional	(1) Size 1500-3500, (2) Size 4500 & Up
14	Heating Coil (HW or Electric) - Optional	(1) Size 1500-3500, (2) Size 4500 & Up, (1) Electric
15	Secondary Block Off Panel	1
16	Drain Pan (Not Shown)	1 (Supplied with Cooling Coil)
17	Topcap (Not Shown)	2

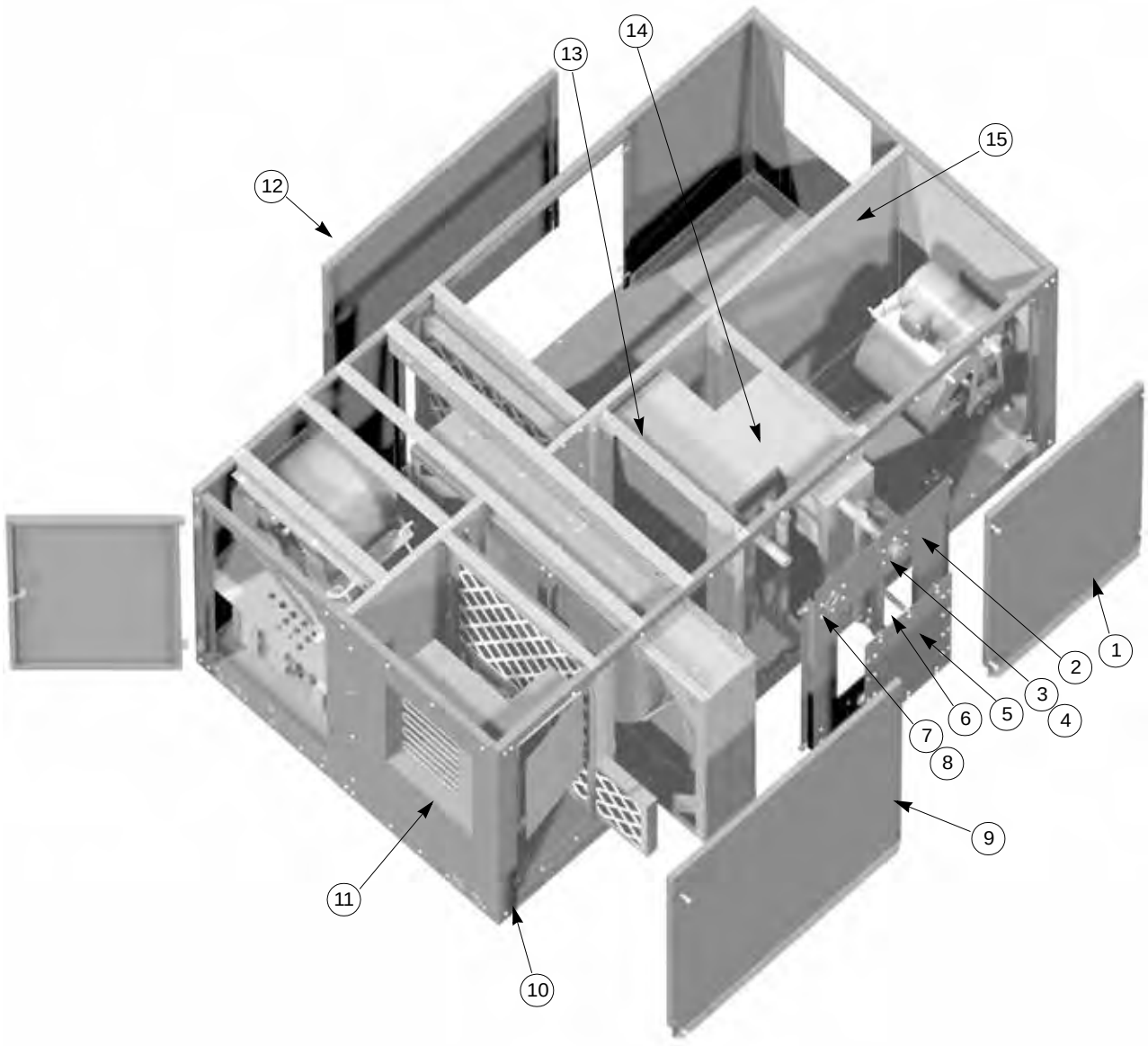
Notes:

Parts List

The ERV and the ERV with Coils Option share many of the same parts. If the part is not called out here, then refer to the Belt Drive Parts List on the preceding page.

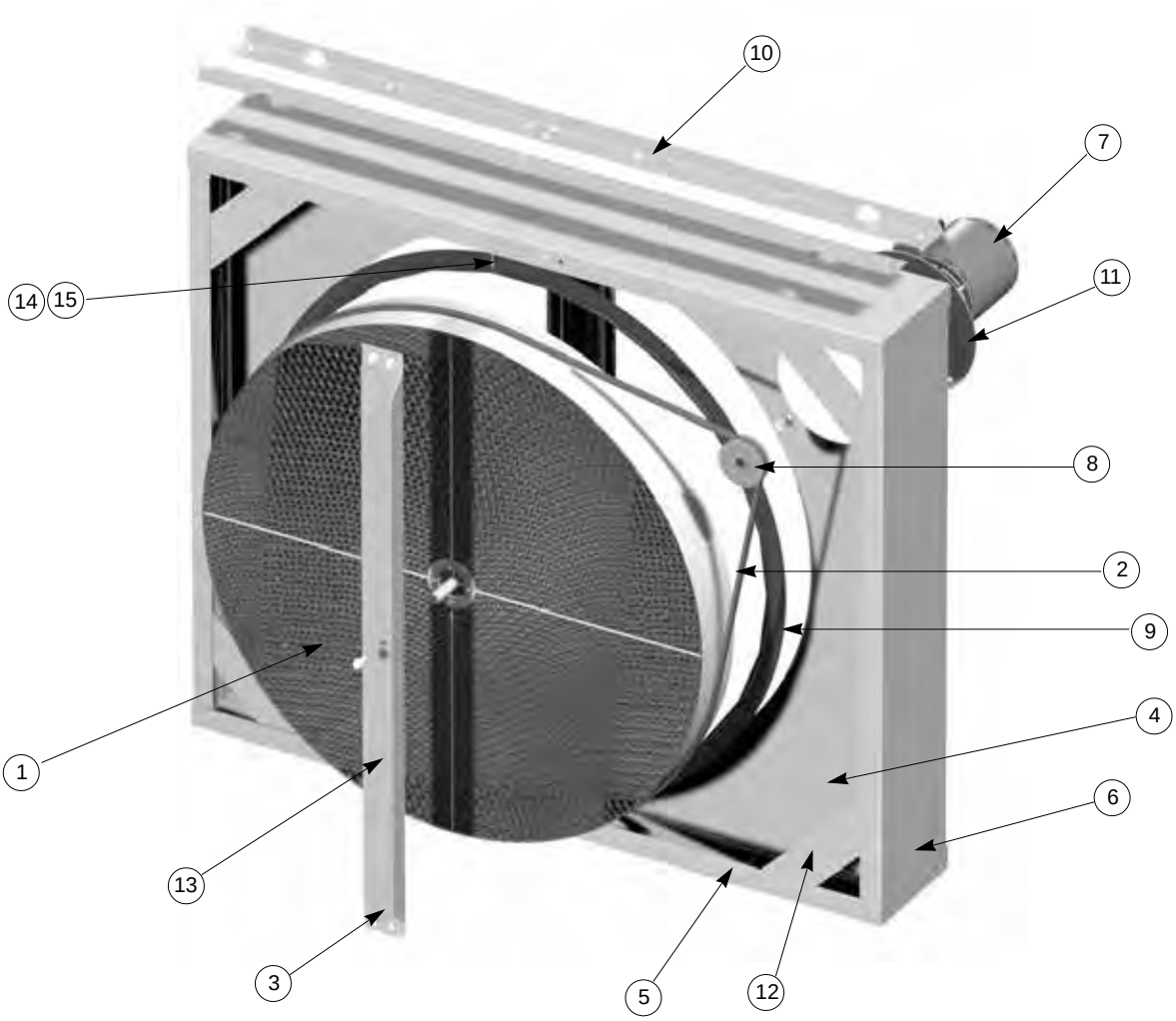
Filters

The ERV and the ERV with Coils Option use the same filters. For filter sizes refer to the filter size table on the preceding page.



Cassette Assembly Parts List - ERV 1500 through ERV- 10000

Part Number	Description	Quantity
1	Energy Recovery Wheel	1
2	Wheel Drive Belt	1
3	Bearing Support	2
4	Cassette Face	1
5	Top and Bottom Panel	2
6	Side Panel	2
7	Wheel Motor	1
8	Drive Sheave	1
9	Bulb Seal	
10	Cassette Top Rails	2
11	Cassette Motorplate	1
12	Gusset	7
13	Face Bulb Seal	2
14	Small Cassette Flange	2
15	Large Cassette Flange	2



ERV Limited Warranty

Loren Cook Company warrants that your Loren Cook Energy Recovery Ventilator (ERV) was manufactured free of defects in materials and workmanship, to the extent stated herein. For a period of one (1) year after date of shipment, we will replace any parts found to be defective and for a period of seven (7) years after date of shipment, we will replace the energy recovery wheel if found to be defective. These parts will be replaced without charge, except for shipping costs, which will be paid by you. This warranty is granted only to the original purchaser placing the fan in service. This warranty is void if the ERV or any part thereof has been altered or modified from its original design or has been abused, misused, damaged or is in worn condition or if the ERV has been used other than for the uses described in the company manual. This warranty does not cover defects resulting from normal wear and tear. To make a warranty claim, notify Loren Cook Company, General Offices, 2015 East Dale Street, Springfield, Missouri 65803-4637, explaining in writing, in detail, your complaint and referring to the specific model and serial numbers of your ERV. Upon receipt by Loren Cook Company of your written complaint, you will be notified, within thirty (30) days of our receipt of your complaint, in writing, as to the manner in which your claim will be handled. If you are entitled to warranty relief, a warranty adjustment will be completed within sixty (60) business days of the receipt of your written complaint by Loren Cook Company. This warranty gives only the original purchaser placing the ERV in service specifically the right. You may have other legal rights which vary from state to state.