INSTALLATION INSTRUCTIONS

WALL MOUNT
ENERGY RECOVERY VENTILATOR
WITH EXHAUST

Models:
ERVF-A3
ERVF-C3

For Use With Bard
2-1/2 through 3 Ton
Wall Mount™ Air Conditioners
and Heat Pumps
MODEL NOMENCLATURE LEGEND

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Amps</th>
<th>Control Voltage</th>
</tr>
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<tbody>
<tr>
<td>ERVF-A3</td>
<td>230/208</td>
<td>2.2</td>
<td>24V</td>
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<td>ERVF-C3</td>
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GENERAL INFORMATION

The Wall Mount Energy Recovery Ventilator was designed to provide energy efficient, cost effective ventilation to meet I.A.Q. (Indoor Air Quality) requirements while still maintaining good indoor comfort and humidity control for a variety of applications such as schools, classrooms, lounges, conference rooms, beauty salons and others. It provides a constant supply of fresh air for control of airborne pollutants including CO$_2$, smoke, radon, formaldehyde, excess moisture, virus and bacteria.

The ventilator incorporates patented rotary heat exchanger to remove both heat and moisture.

It is designed as a single package which can be easily factory or field installed for new installations or retrofit to the new Bard W**A and W**H Series wall mounted units. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. The ERVF-*3 has two 13 inch diameter heat transfer wheels. The heat transfer wheels use a permanently bonded dry desiccant coating for total heat recovery.

Ventilation is accomplished with (2) blower/motor assemblies each consisting of a drive motor and dual blowers for maximum ventilation at low sound levels. The intake and exhaust blowers can be operated at the same speed (airflow rate) or different speeds to allow flexibility in maintaining desired building pressurization conditions. Factory shipped on medium intake and low exhaust. See Figure 6A to change speeds. The rotating energy wheels provide the heat transfer effectively during both summer and winter conditions. Provides required ventilation to meet the requirements of ASHRAE 62.1 standard.

NOTE: During operation below 5 degrees F outdoor temperature, freezing of moisture in the heat transfer wheel can occur. Consult the factory if this possibility exists.

GENERAL INFORMATION

The ventilator should only be installed by a trained heating and air conditioning technician. These instructions serve as a guide to the technician installing the ventilator package. They are not intended as a step-by-step procedure, with which the mechanically-inclined owner can install the package.

The ventilator housing is shipped in one carton, which contains the following:

1. Energy Recovery Ventilator
2. Service Door
3. Rain Hood and Mist Eliminator
4. Installation Instructions

UNPACKING

Upon receipt of the equipment, be sure to compare the model number found on the shipping label with the accessory identification information on the ordering and shipping document to verify that the correct accessory has been shipped.

Inspect the carton housing of each ventilator as it is received, and before signing the freight bill, verify that all items have been received and that there is no visible damage. Note any shortages or damage on all copies of the freight bill. The receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier’s agent. Concealed damage not discovered until after loading must be reported to the carrier within 15 days of its receipt.
## PERFORMANCE AND APPLICATION DATA – ERVF-*3

### SUMMER COOLING PERFORMANCE
(IINDOOR DESIGN CONDITIONS 75°F/62°FWB)

<table>
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<th>Ambient O.D.</th>
<th>VENTILATION RATE</th>
<th>400 CFM 63% Efficiency</th>
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<th>325 CFM 64% Efficiency</th>
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<th>250 CFM 65% Efficiency</th>
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<td>VLS</td>
<td>VLL</td>
<td>HRT</td>
<td>TRS</td>
<td>HRL</td>
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### WINTER HEATING PERFORMANCE
(IINDOOR DESIGN CONDITIONS 70°F DB)

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**LEGEND:**
- VLT = Ventilation Load – Total
- VLS = Ventilation Load – Latent
- VLL = Ventilation Load – Sensible
- HRT = Heat Recovery – Total
- HRS = Heat Recovery – Sensible
- HRL = Heat Recovery – Latent
- WVL = Winter Ventilation Load
- WHR = Winter Heat Recovery

Note: All performance data is based on operating intake and exhaust blower on the same speed.
1. Unpack the ventilator assembly, which includes the integral ventilator with attached electrical harness and miscellaneous hardware.

1. **WARNING**
   
   Open and lock unit disconnect switch before installing this accessory to prevent injury or death due to electrical shock or contact with moving parts. Turn thermostat to OFF.

2. **CAUTION**
   
   Be sure the correct model and voltage Energy Recovery Ventilator is used with the correct air conditioner or heat pump to ensure correct voltage compatibility.

3. Remove the existing exterior blower access, filter access and vent access panels on the Bard Wall Mount unit. Save the blower access and filter access panels and discard vent option access panel. (See Figure 1.)

4. Remove and save existing unit return air filter and left side filter support bracket by removing two screws from left side of unit. Remove and save top four (4) screws from front grille. (See Figure 2.)

5. Remove and discard the exhaust cover plate. (See Figure 2.)

6. Install ventilator by inserting the ventilator into the unit to the far left side clearing the right filter bracket. Once the ventilator is fully inserted, slide the ventilator to the right until it is tight against the back of the control panel. (See Figure 3.)

   **IMPORTANT NOTE:** Position front lip of ventilator under front grille and on top of condenser partition. (See Figure 3 inset.) This is important to insure proper drainage of any water entering damper assembly.

6. Open control panel to gain access to unit low voltage terminal block. (Insure all power is OFF prior to opening the control panel.)

7. Route four (4) low voltage electrical leads through the 7/8" bushing in control panel (Figure 3) into low voltage box.

8. Temporarily connect leads with fork terminal to corresponding points on terminal strip to terminals C, R, G and A or O1 depending whether a heat pump or air conditioner. (See Figure 4.)

   **NOTE:** These 24 volt control wires control the starting and stopping of the Energy Recovery Ventilator and can be independently controlled by an energy management control or timer. See separate section on Control Wiring.

9. Remove female plug of high voltage wiring harness from the heat recover assembly and snap into unit control panel from the inside of the control panel in the hole provided. Wire to terminal block. (See Figure 4 and wiring diagram.)

10. Plug male plug from ERVF assembly into female connector at back of control panel. (See Figures 3 & 4.)

11. Replace inner and outer control panel cover.

12. **Ventilator checkout**
   
   A. Resupply power to unit.
   
   B. Energize the evaporator blower by switching thermostat to the manual fan position with Heat/Cool in OFF position.
   
   C. Ventilator heat transfer wheels should rotate slowly (49 RPM). Intake and exhaust blowers should run.
   
   D. De-energize the evaporator blower. Energy recovery heat transfer wheels and fresh air and exhaust air blowers should stop.
   
   E. This completes ventilator checkout.

14. Disconnect the wires temporarily connected in Step 8.

15. Reinstall the blower access and filter access panels at top of unit and secure with sheet metal screws.

16. Replace the vent option access panel with the new panel provided. Attach air intake hood with screws provided. (See Figure 5.) Be sure to insert the top flange of the air intake hood into and through the slot in the service door and between the door and insulation to prevent bowing of the door.

17. Apply Certification label, included with Installation Instructions, next to unit Serial Plate.

18. Ventilator is now ready for operation.
BASIC INSTALLATION
(FACTORY INSTALLED MODELS)

1. Remove blower access, filter access and vent option panels. Remove filter bracket from shipping location and install on left side. Remove filter located above air circulation blowers. Install filter.

2. Remove air intake hood from shipping location and install air intake hood on vent option panel. Refer to the Control Wiring Section for suggested control schemes. After wiring, replace all panels.

FIGURE 1
REMOVING ACCESS PANELS
FIGURE 2
REMOVING FILTER AND GRILLE

REMOVE & DISCARD
EXHAUST COVER PLATE

4 SCREWS

LEFT FILTER BRACKET

FILTER

THERMISTOR LOCATION

M15-345
INSTALL 1-480701-0 CAP AS SHOWN AND WIRE PER WIRING DIAGRAM.

TEMPORARY CONNECTION FOR TESTING. SEE RECOMMENDED CONTROL SEQUENCES.

LOW VOLTAGE WIRES FROM HEAT RECOVERY ASSEMBLY.
FIGURE 6

TO ADJUST INTAKE AND EXHAUST BLOWER SPEEDS
1. DISCONNECT POWER TO UNIT
2. REMOVE ERY CONTROL PANEL COVER
3. MOVE BLACK INSULATOR TO DESIRED SPEED ON TERMINAL CONNECTOR
CONTROL WIRING

The ERVF comes from the factory with the low voltage control wires not wired into the wall mount low voltage terminal strip. Care must be taken when deciding how to control the operation of the ventilator. When designing the control circuit for the ventilator the following requirements must be met.

CONTROL REQUIREMENTS

1. Indoor blower motor must be run whenever the ERVF is run.

2. Select the correct motor speed tap in the ERVF. Using Table 1 of the ERVF Installation Instructions determine the motor speed needed to get the desired amount of ventilation air needed. For instance, do not use the high speed tap on an ERVF-A3 if only 250 CFM of ventilation air is needed. Use the low speed tap. Using the high speed tap would serve no useful purpose and significantly affect the overall efficiency of the air conditioning system. System operating cost would also increase.

3. Run the ERVF only during periods when the conditioned space is occupied. Running the ERVF during unoccupied periods wastes energy, decreases the expected life of the ERVF, and can result in a large moisture buildup in the structure. The ERVF removes 60 to 70% of the moisture in the incoming air, not 100% of it. Running the ERVF when the structure is unoccupied allows moisture to build up in the structure because there is little or no cooling load. Thus, the air conditioner is not running enough to remove the excess moisture being brought in. Use a control system that in some way can control the system based on occupancy.

RECOMMENDED CONTROL SEQUENCES

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the ERVF based on daily programmed occupancy periods. Bard markets and recommends the Bard Part No. 8403-060 programmable electronic thermostat for air conditioner and heat pump applications. (See Figures 7 & 8.)

2. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the structure. Bard markets the CS2000A for this use. (See Figure 9 and Figure 10.)

3. Use a DDC control system to control the ERVF based on a room occupancy schedule to control the ERVF.

4. Tie the operation of the ERVF into the light switch. The lights in a room are usually on only when occupied.

5. Use a manual timer that the occupants turn to energize the ERVF for a specific number of hours.

6. Use a programmable mechanical timer to energize the ERVF and indoor blower during occupied periods of the day.

VENTILATION AIRFLOW

The ERVF-A3 and ERVF-C3 are equipped with a 3-speed motor to provide the capability of adjusting the ventilation rates to the requirements of the specific application by simply changing motor speeds.

<table>
<thead>
<tr>
<th>VENTILATION AIR (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>ERVF-A3</td>
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</table>

The units are set from the factory with the exhaust blower on the low speed and the intake blower on medium speed. Moving the speed taps located in the control panel can change the blower speed of the intake and exhaust. See Figure 6A.

* * * IMPORTANT * * *

Operating the ERVF during unoccupied periods can result in a build up of moisture in the structure.

** WARNING **

Open disconnect to shut all power OFF before doing this. Failure to do so could result in injury or death due to electrical shock.
FIGURE 7
AIR CONDITIONER CONNECTION

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. DO NOT CONNECT "A" FROM 8403-060 IF OPTIONAL CO2 CONTROLLER IS USED

3. CONNECT ORANGE WIRE TO "C" ONLY IF OPTIONAL CO2 CONTROLLER IS USED

4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL

MIS-2479 A
Optional CO₂ Controller
(C7232A1008) Bard part #8403-056
Not Used

Do not connect "A" from tstat #8403-060 if optional CO₂ controller is used.

Connect orange wire to "G" only if optional CO₂ controller is used.

Low Voltage Wiring Diagram

MIS-2633
FIGURE 9

AIRC CONDITRION WITH CS2000

Temperature/Humidity Controller
BARD P/N 8403-060

Thermostat THS200D1151
BARD P/N 8403-054

NOTE: MUST BE CONFIGURED FOR HEAT/COOL

If optional vent package is installed, the "G" wire must be connected to assure continuous blower during occupied periods when vent system is "on". The "G" wire must also be connected for pre-purge operation (see Step 2, Function Switch Settings).

BARD ventilation package (optional)

NOTE: If factory installed disconnect and tape red and orange wires

Optional Lighting Control

Manual Switch Field Supplied

Lights

Lighting Control Circuit Is Optional and Field Supplied.

Lighting Control Relay Requires Normally Closed Contacts and Must Be Sized According To Controlled Load.

REQUIRED FOR 2 STAGES OF ELECTRIC HEAT ARE REQUIRED.

REQUIRED FOR 2 STAGE COOLING UNITS OR UNITS WITH ECONOMIZERS.

JUMPER IS FACTORY INSTALLED.

LIGHTING CONTROL CIRCUIT IS OPTIONAL AND FIELD SUPPLIED. LIGHTING CONTROL RELAY REQUIRES NORMALLY CLOSED CONTACTS AND MUST BE SIZED ACCORDING TO CONTROLLED LOAD.

Recommended Switch Settings Shown Below

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<tr>
<th>FUNCTION SWITCHES</th>
<th>TEMPERATURE SWITCHES</th>
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4093-150 A
FIGURE 10

HP WITH CS2000
WHISH HEAT PUMP CONNECTION DIAGRAM

TEMPERATURE/HUMIDITY CONTROLLER BARD P/N 8403-060

THERMOSTAT TH52201151 BARD P/N 8403-058

IF OPTIONAL VENT PACKAGE IS INSTALLED, THE "G" WIRE MUST BE CONNECTED TO ASURE CONTINUOUS BLOWER DURING OCCUPIED PERIODS WHEN VENT SYSTEM IS "ON". THE "G" WIRE MUST ALSO BE CONNECTED FOR PRE-FURGE OPERATION (SEE STEP 2, FUNCTION SWITCH SETTINGS).

BARD VENTILATION PACKAGE (OPTIONAL)
NOTE: IF FACTORY INSTALLED DISCONNECT AND TAPE RED AND ORANGE WIRES

REM MOTION DETECTOR (OPTIONAL) NORMALLY OPEN CONTACTS

OPTIONAL LIGHTING CONTROL

LIGHTING CONTROL RELAY NORMALLY CLOSED CONTACTS
MANUAL SWITCH FIELD SUPPLIED

REMOTE AREA OCCUP. REM NO C NC
MODE PWR 1 NO C NC
RATE NO C NC
SEARCH-TIME NO C NC
STAGE
AUX NO C NC
DEMAND 2 NO C NC
DEMAND 1 NO C NC

CS2000A2 ENERGY MONITOR

RECOMMENDED SWITCH SETTINGS SHOWN BELOW

FUNCTION SWITCHES

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TEMPERATURE SWITCHES

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DO NOT CONNECT "L" UNTIL AFTER 8403-080 CONTROLLER IS CONFIGURED TO CS2000 = YES

FACTORY JUMPER - SEE SEARCH TIME DETAIL ON PAGE 3

NOTE: IF FACTORY INSTALLED ORANGE WIRES CONNECTIONS USED ONLY

FOR PRE-PURGE OPERATION INSTALLED IN HEAT PUMP

HEAT PUMP CONNECTION DIAGRAM

UNIT 24V TERMINALS

HUMIDITY CONTROLLER CONNECTIONS USED ONLY FOR OPTIONAL DEHUMIDIFICATION CIRCUIT THAT MUST BE FACTORY INSTALLED IN HEAT PUMP

FACTORY JUMPER - SEE SEARCH TIME DETAIL ON PAGE 3

LIGHTING CONTROL CIRCUIT IS OPTIONAL AND FIELD SUPPLIED. LIGHTING CONTROL RELAY REQUIRES NORMALLY CLOSED CONTACTS AND MUST BE SIZED ACCORDING TO CONTROLLED LOAD.

4093-140 K
ENERGY RECOVERY VENTILATOR MAINTENANCE

GENERAL INFORMATION

The ability to clean exposed surfaces within air moving systems is an important design consideration for the maintenance of system performance and air quality. The need for periodic cleaning will be a function of operating schedule, climate, and contaminants in the indoor air being exhausted and in the outdoor air being supplied to the building. All components exposed to the airstream, including energy recovery wheels, may require cleaning in most applications.

Rotary counterflow heat exchanges (heat wheels) with laminar airflow are “self-cleaning” with respect to dry particles. Smaller particles pass through; larger particles land on the surface and are blown clear as the flow direction is reversed. For this reason, the primary need for cleaning is to remove films of oil-based aerosols that have condensed on energy transfer surfaces. Buildup of material over time may eventually reduce airflow. Most importantly, in the case of desiccant coated (enthalpy) wheels, such films can close off micron sized pores at the surface of the desiccant material, reducing the efficiency, with which the desiccant can absorb and desorb moisture.

FREQUENCY

In a reasonably clean indoor environment such as a school, office building, or home, experience shows that reductions of airflow or loss of sensible (temperature) effectiveness may not occur for ten or more years. However, experience also shows that measurable changes in latent energy (water vapor) transfer can occur in shorter periods of time in commercial, institutional and residential applications experiencing moderate occupant smoking or with cooking facilities. In applications experiencing unusually high levels of occupant smoking, such as smoking lounges, nightclubs, bars and restaurants, washing of energy transfer surfaces, as frequently as every six months, may be necessary to maintain latent transfer efficiency. Similar washing cycles may also be appropriate for industrial applications involving the ventilation of high levels of smoke or oil-based aerosols such as those found in welding or machining operations, for example. In these applications, latent efficiency losses of as much as 40% or more may develop over a period of one to three years.

CLEANABILITY AND PERFORMANCE

In order to maintain energy recovery ventilation systems, energy transfer surfaces must be accessible for washing to remove oils, grease, tars and dirt that can impede performance or generate odors. Washing of the desiccant surfaces is required to remove contaminates buildups that can reduce adsorption of water molecules. The continued ability of an enthalpy wheel to transfer latent energy depends upon the permanence of the bond between the desiccant and the energy transfer surfaces.

Bard wheels feature silica gel desiccant permanently bonded to the heat exchange surface without adhesives; the desiccant will not be lost in the washing process. Proper cleaning of the Bard energy recovery wheel will restore latent effectiveness to near original performance.

MAINTENANCE PROCEDURES

NOTE: Local conditions can vary and affect the required time between routine maintenance procedures, therefore all sites (or specific units at a site) may not have the same schedule to maintain acceptable performance. The following timetables are recommended and can be altered based on local experience.

QUARTERLY MAINTENANCE

1. Inspect mist eliminator/prefilter and clean if necessary. This filter is located in the fresh air intake hood on the front of the unit. This is an aluminum mesh filter and can be cleaned with water and any detergent not harmful to aluminum.

2. Inspect wall mount unit filter and clean or replace as necessary. This filter is located either in the unit, in a return air filter grille assembly, or both. If in the unit it can be accessed by removing the lower service door on the front of the unit. If in a return air filter grille, by hinging the grille open to gain access.

3. Inspect energy recovery ventilator for proper wheel rotation and dirt buildup. This can be done in conjunction with Item 2 above. Energize the energy recovery ventilator after inspecting the filter and observe for proper rotation and/or dirt buildup.

4. Recommended energy recovery wheel cleaning procedures follow Steps 5 through 8.

5. Disconnect all power to unit. Remove the lower service door of the wall mount unit to gain access to the energy recovery ventilator.
6. Remove the front access panel on the ventilator. Unplug amp connectors to cassette motors. Slide energy recovery cassette out of ventilator.

7. Use a shop vacuum with brush attachment to clean both sides of the energy recovery wheels.

8. Reverse shop vacuum to use as a blower and blow out any residual dry debris from the wheel.

**NOTE:** Discoloration and staining of the wheel does not affect its performance. Only excessive buildup of foreign material needs to be removed.

9. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

**ANNUAL MAINTENANCE**

1. Inspect and conduct the same procedures as outlined under Quarterly Maintenance.

2. To maintain peak latent (moisture) removal capacity, it is recommended that the energy recovery wheels be sprayed with a diluted nonacid based evaporator coil cleaner or alkaline detergent solution such as 409.

**NOTE:** Do not use acid based cleaners, aromatic solvents, temperatures in excess of 170°F or steam. Damage to the wheel may result.

**NOTE:** Do not disassemble and immerse the entire heat wheel in a soaking solution, as bearing and other damage may result.

3. Rinse wheel thoroughly after application of the cleaning solution, and allow to drain before reinstalling.

4. No re-lubrication is required to heat wheel bearings of the drive motor, or to the intake and exhaust blower motors.

5. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

**FIGURE 11**

**BELT REPLACEMENT INSTRUCTIONS**

(2 WHEEL CASSETTE ONLY)
FIGURE 12
HUB ASSEMBLY WITH BALL BEARINGS

- SCREW #6 x 32 x 3/4
- DUST COVER
- SCREW #10 x 32
- WASHER
- NUT #10 x 24
- BEARING
- SPACERS
- HUB PLATE
- HEAT EXCHANGER WHEEL
- HUB PLATE WITH BOLTS
- BEARING
- SHAFT (OIL WITH 20 WT.
NON DETERGENT OIL)
- LOCK WASHER
- NUT 1/4 x 20

MIS-1679