Wall Mount Energy Recovery Ventilator with Exhaust and Outdoor Air Shut-Off Damper

Models:
CHERV-A5  CHERV-A5A  CHERV-C5

For Use with Bard 3 Through 5 Ton Wall Mount CH Heat Pumps
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Model Nomenclature Legend

CH = Wall Mount
ERV = Energy Recovery Ventilator

Electrical
A = 230/208 volt
C = 460 volt

Wall-Mount™ Cabinet Size
5 = CH3S, 4S, 5S

Electrical Specifications

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<th>Amps</th>
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General Description

The Wall Mount Energy Recovery Ventilator (ERV) is designed to provide energy efficient, cost effective ventilation to meet IAQ (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 CO₂, smoke, radon, formaldehyde, excess moisture, virus and bacteria.

The ventilator incorporates rotary heat exchanger technology 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 Bard CH series wall mounted units. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. The CHERV-*5 has two 15” diameter heat transfer wheels for efficient heat transfer. The heat transfer wheels use a permanently bonded dry desiccant coating for total heat recovery. An outdoor air shutoff damper is an integral feature of the CHERV and prevents infiltration when the ERV is turned off.

Ventilation is accomplished with two 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 8A on page 13 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°F outdoor temperature, freezing of moisture in the heat transfer wheel can occur. Consult the factory if this possibility exists.

General Information

NOTE: This manual covers both factory- and field-installed CHERV assemblies. For factory-installed CHERV, skip information pertaining to installation of the CHERV system.

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 to be 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:

- Energy Recovery Ventilator
- Service Door
- Rain Hood and Mist Eliminator
- 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 – CHERV.*5*

### Summer Cooling Performance
(Indoor Design Conditions 75°F/62°F WB)

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### Winter Heating Performance
(Indoor Design Conditions 70°F DB)

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**LEGEND:**

- **VLT** = Ventilation Load – Total
- **VLS** = Ventilation Load – Sensible
- **VLL** = Ventilation Load – Latent
- **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.

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**NOTE:** Sensible performance only is shown for winter application.
Basic Installation (Field Installation)

1. Unpack the ventilator assembly which includes the integral ventilator with attached electrical harness and miscellaneous hardware.

**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.

**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.

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<th>Model</th>
<th>For Use with the Following Units</th>
<th>Electrical</th>
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**IMPORTANT NOTE:** Position front lip of ventilator over front grille and on top of condenser partition as shown in Figure 5 inset. This is important to ensure proper drainage of any water entering damper assembly.

7. Remove access panel and plug in exhaust blower. Replace access panel.

8. Open control panel to gain access to unit low voltage terminal block. **Confirm all power is OFF prior to opening the control panel.**

9. Route electrical harness leads through the 7/8” bushing in control panel (Figure 5) into low voltage box.

10. Connect black lead with fork terminal to terminal strip terminal C, orange lead to terminal G and brown with white stripe to terminal “01”. Connect yellow jumper from “01” to G if the thermostat does not have an “A1” terminal or other terminal for occupied mode. Connect red lead to R. (See Figure 6 on page 11 and wiring diagram.)

**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 **CONTROL WIRING** on page 14 for suggested control schemes.

11. Remove female plug of high voltage wiring harness from the heat recover assembly and snap into unit control panel. Wire to terminal block (see Figure 6 and wiring diagram).

12. Plug male plug from female at side of control panel (see Figure 5).

13. Close control panel cover.

14. Replace filter and one (1) screw in condenser grille (see Figure 3).

15. 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 (see Figure 8).
   D. De-energize the evaporator blower. Energy recovery wheels and fresh air and exhaust air blowers should stop.
   E. This completes ventilator checkout.

16. See Recommended Control Sequences section for permanent connection of the orange control wire that was connected to G for checkout.

17. Re-install the blower access panel at top of unit and secure with sheet metal screws (see Figure 2).
18. Replace the lower service access panel with the new panel provided. Attach air intake hood with screws provided (see Figure 7 on page 12). 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.

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

20. Ventilator is now ready for operation.
FIGURE 2
Remove Access Panels

Remove and Save Filter Access Door

Circuit Breaker Door

Remove and Discard Service Access Door

Control Panel Door

MIS-2235
FIGURE 3
Remove Air Filter and Exhaust Cover Plate

- Remove and Save Unit Air Filter
- Remove and Discard Exhaust Cover Plate
- Remove and Save Center Grille Screw
FIGURE 4
Install Exhaust Blower Assembly

Fasten box to partition using (4) screws

Insert lower blower box with 45° mitered corner facing condenser coil (front of unit)

Exhaust hoods face left side of unit

MIS-2236
FIGURE 5
Plug Exhaust Blower into Control Panel

- Remove access panel and plug in exhaust blower. Replace access panel.

- When installing, make sure that hole in front lip is centered over hole in condenser grille to insert a self-drilling screw.

- Route the wire wires through hole and into control panel.

- High voltage wires to plug in side of control panel.

CAUTION: Hole in VEP must be used to ensure clearance from condenser coil tubing.

FIGURE 5 (INSET)

- Service door
- Condenser partition
- Front grill
- Heat recovery ventilator
- LIP OF VEP IS TO BE BETWEEN THE CONDENSER GRILLE AND SERVICE DOOR

MIS-527
FIGURE 6
Connect Leads to Terminals

[Diagram showing electrical connections and labels]

- 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 7
Attach Hood and Replace Access Panel

- Install Energy Recovery
- Replace filter
- Replace filter access door
- Attach fresh air intake hood to service door
- Align hole with top grille hole
- Attach service door to unit
- Remove access panel to plug in exhaust. blower
FIGURE 8
Airflow Diagram

Evaporator coil

Fresh air and room air enters evaporator section

Energy recovery wheel

Fresh outside air enters unit

Outside air enters condenser section

Condenser Coil

Conditioned air enters room (Supply Air)

Room air enters unit (Return Air)

Condenser air and exhaust air leave side grille.

FIGURE 8A

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
Basic Installation
(Factory-Installed Versions)

1. Remove blower access door and service door. Room filter located above air circulation blower. Install filter.
2. Remove and install air intake hood. Refer to Item 16 of Basic Installation (Field Installation).
3. Refer to Control Wiring for suggested control schemes for the CHERV.
4. After wiring, replace all panels.

Control Wiring

The CHERV comes from the factory with the low voltage control wires 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 CHERV is run.
2. Select the correct motor speed tap in the CHERV. Using Table 1, determine the motor speed needed to get the desired amount of ventilation air needed. For instance, do not use the high speed tap on a CHERV-A5 if only 300 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 CHERV only during periods when the conditioned space is occupied. Running the CHERV during unoccupied periods wastes energy, decreases the expected life of the CHERV and can result in a large moisture buildup in the structure. The CHERV removes 60 to 70% of the moisture in the incoming air, not 100% of it. Running the CHERV when the structure is unoccupied allows moisture to build up in the structure because there is little or now 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.

* * * IMPORTANT * * *

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

Recommended Control Sequences

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the CHERV based on daily programmed occupancy periods. Bard markets and recommends the Bard P/N 8403-060 programmable electronic thermostat for air conditioner and heat pump applications (see Figure 9).
2. Use a CO₂ sensor in conjunction with a mechanical thermostat to keep CO₂ at required levels. Bard recommends using Bard CO₂ controller 8403-056 (see Figure 10 on page 16).
3. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the structure. Bard markets the CS2000A1 for this use.
4. Use a DDC control system to control the CHERV based on a room occupancy schedule to control the CHERV.
5. Tie the operation of the CHERV into the light switch. The lights in a room are usually on only when occupied.
6. Use a manual timer that the occupants turn to energize the CHERV for a specific number of hours.
7. Use a programmable mechanical timer to energize the CHERV and indoor blower during occupied periods of the day.

Ventilation Airflow

The CHERV-A5 and CHERV-C5 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.

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TABLE 1
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 8A).

**FIGURE 9**
Heat Pump Wiring

**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.

1. PROGRAM THERMOSTAT FOR CONTINUOUS BLOWER DURING OCCUPIED PERIODS
2. ONLY NEEDED IF DEHUMIDIFICATION IS USED
FIGURE 10
Heat Pump Wiring with CO₂ Controller

Thermostat
Part #8403-052, 8403-053, 8403-055

Thermostat With
Humidity
Part #8403-060

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

Wall Mount
Heat Pump

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ONLY NEEDED IF DEHUMIDIFICATION IS USED

MIS-2793 A
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 10 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 6 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.

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 contaminate 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, hinge 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: Disconnect all power to unit. Remove the lower service door of the wall mount unit to gain access to the energy recovery ventilator.
5. Remove the front access panel on the ventilator. Unplug amp connectors to cassette motors. Slide energy recovery cassette out of ventilator.
6. Use a shop vacuum with brush attachment to clean both sides of the energy recovery wheels.
7. 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.

8. 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.

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 re-installing.

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.