INSTALLATION INSTRUCTIONS

Wall Mount
Energy Recovery Ventilator
with Exhaust

Models:

ERVF-A2

ERVF-C2

For Use with Bard
1-1/2 through 2 Ton
Wall Mount™ Air Conditioners
and Heat Pumps

Bard®
SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2100-514B
Supersedes: 2100-514A
Date: 8-23-22

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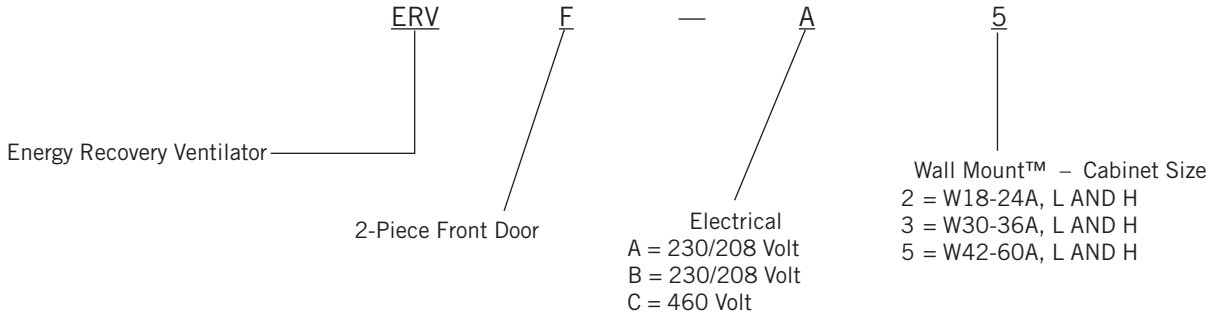

Electrical Specifications

Model	Voltage	Amps	Control Voltage
ERVF-A2	230/208	2.2	24V
ERVF-C2	460	1.2	24V

General Description

The wall mount energy recovery ventilator was 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 CO_2, 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 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-*2 has one 13" diameter heat transfer wheel for efficient heat transfer. The heat transfer wheel uses a permanently bonded dry desiccant coating for total heat recovery.

Ventilation is accomplished with two blower/motor assemblies each consisting of a drive motor and dual blowers for maximum ventilation at low sound levels. Air is exhausted at the same rate that fresh air is brought into the structure, thus not pressuring the building. 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

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-*2

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

Ambient O.D.		Ventilation Rate 250 CFM 62% Efficiency						Ventilation Rate 225 CFM 63% Efficiency						Ventilation Rate 200 CFM 63% Efficiency					
DB/WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
	75	11925	8100	1325	7394	5022	822	10727	7287	3441	6758	4591	2168	9540	6480	3060	6010	4082	1928
105	70	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082	4082	0
	65	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082	4082	0
	80	17550	6750	10800	10881	4185	6696	15788	6072	9716	9946	3826	6121	14040	5400	8640	8845	3402	5443
	75	11925	6750	5175	7394	4185	3209	10727	6072	4655	6758	3826	2933	9540	5400	4140	6010	3402	2608
100	70	6863	6750	113	4255	4185	70	6173	6072	101	3889	3826	64	5490	5400	90	3458	3402	56
	65	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402	0
	60	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402	0
	80	17550	5400	12150	10881	3348	7533	15788	4858	10930	9946	3060	6886	14040	4320	9720	8845	2722	6124
	75	11925	5400	6525	7394	3348	4046	10727	4858	5870	6758	3060	3698	9540	4320	5220	6010	2722	3289
95	70	6863	5400	1463	4255	3348	907	6173	4858	1315	3889	3060	829	5490	4320	1170	3458	2722	737
	65	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722	0
	60	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722	0
	80	17550	4050	13500	10881	2511	8370	15788	3643	12145	9946	2295	7651	14040	3240	10800	8845	2041	6801
	75	11925	4050	7875	7394	2511	4883	10727	3643	7084	6758	2295	4463	9540	3240	6300	6010	2041	3969
90	70	6863	4050	2813	4255	2511	1744	6173	3643	2530	3889	2295	1594	5490	3240	2250	3458	2041	1417
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	75	11925	2700	9225	7394	1674	5720	10727	2429	8298	6758	1530	5228	9540	2160	7380	6010	1361	4649
85	70	6863	2700	4163	4255	1674	2581	6173	2429	3744	3889	1530	2359	5490	2160	3300	3458	1361	2098
	65	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361	0
	60	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361	0
	75	11925	1350	10575	7394	837	6557	10727	1214	9513	6758	765	5993	9540	1080	8460	6010	680	5330
	70	6863	1350	5513	4255	837	3418	6173	1214	4959	3889	765	3124	5490	1080	4410	3458	680	2778
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	70	6863	0	6863	4255	0	4255	6173	0	6173	6889	0	3889	5490	0	5490	3458	0	3458
75	65	2363	0	2363	1465	0	1465	2125	0	2125	1339	0	1339	1890	0	1890	1190	0	1190
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

Ambient O.D.	Ventilation Rate					
	250 CFM 74% Efficiency		225 CFM 75% Efficiency		200 CFM 75% Efficiency	
DB/°F	WVL	WHR	WVL	WHR	WVL	WHR
65	1350	999	1214	911	1080	810
60	2700	1998	2429	1822	2160	1620
55	4050	2997	3643	2733	3240	2430
50	5400	3996	4858	3643	4320	3240
45	6750	4995	6072	4554	5400	4050
40	8100	5994	7287	5465	6480	4860
35	9450	6993	8501	6376	7560	5670
30	10800	7992	9716	7287	8640	6480
25	12150	8991	10930	8198	9720	7290
20	13500	9990	12145	9108	10800	8100
15	14850	10989	13359	10019	11880	8910

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

Basic Installation (Field Installation)

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

⚠ 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.

Model	For Use with the Following Units		Electrical
ERVF-A2	W18A*-A W24A*-A,-B	W18H*-A W24H*-A,-B	230/208 - 1 or 3 phase
ERVF-C2	W24A*-C	W24H*-C	460 - 3 phase

⚠ 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.

2. 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).
3. Remove and save existing unit return air filter and left side filter support bracket by removing two (2) screws from left side of unit. Remove and save top four (4) screws from front grille (see Figure 2).
4. Remove and discard the exhaust cover plate (see Figure 2).
5. 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 ensure proper drainage of any water entering damper assembly.*

6. Open control panel to gain access to unit low voltage terminal block. (Ensure 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* **Control Wiring** *on page 12.*

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 and 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. Re-install 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 Versions)

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** on page 12 for suggested control schemes. After wiring, replace all panels.

FIGURE 1
Removing Access Panels

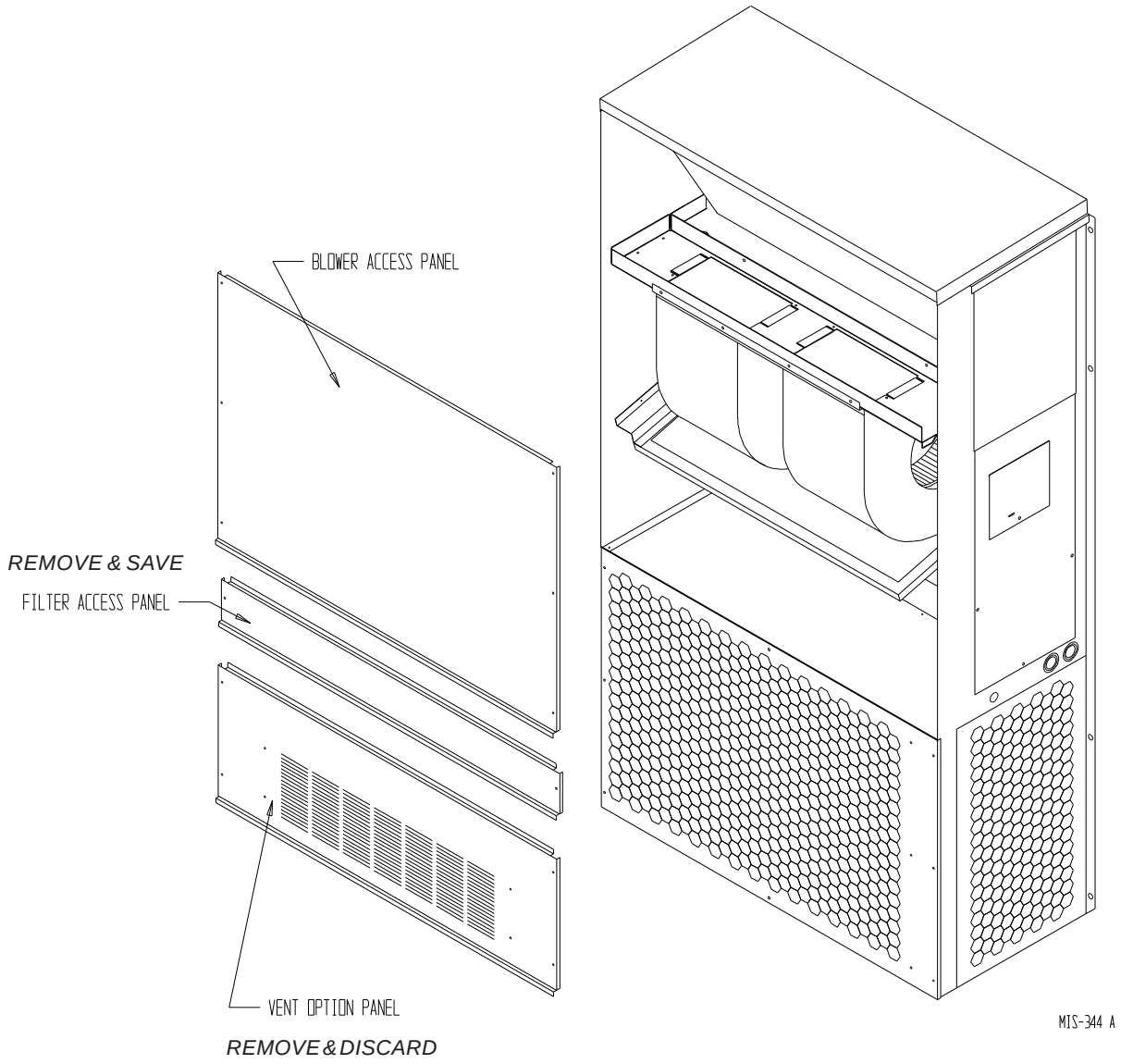

FIGURE 2
Removing Filter and Grille

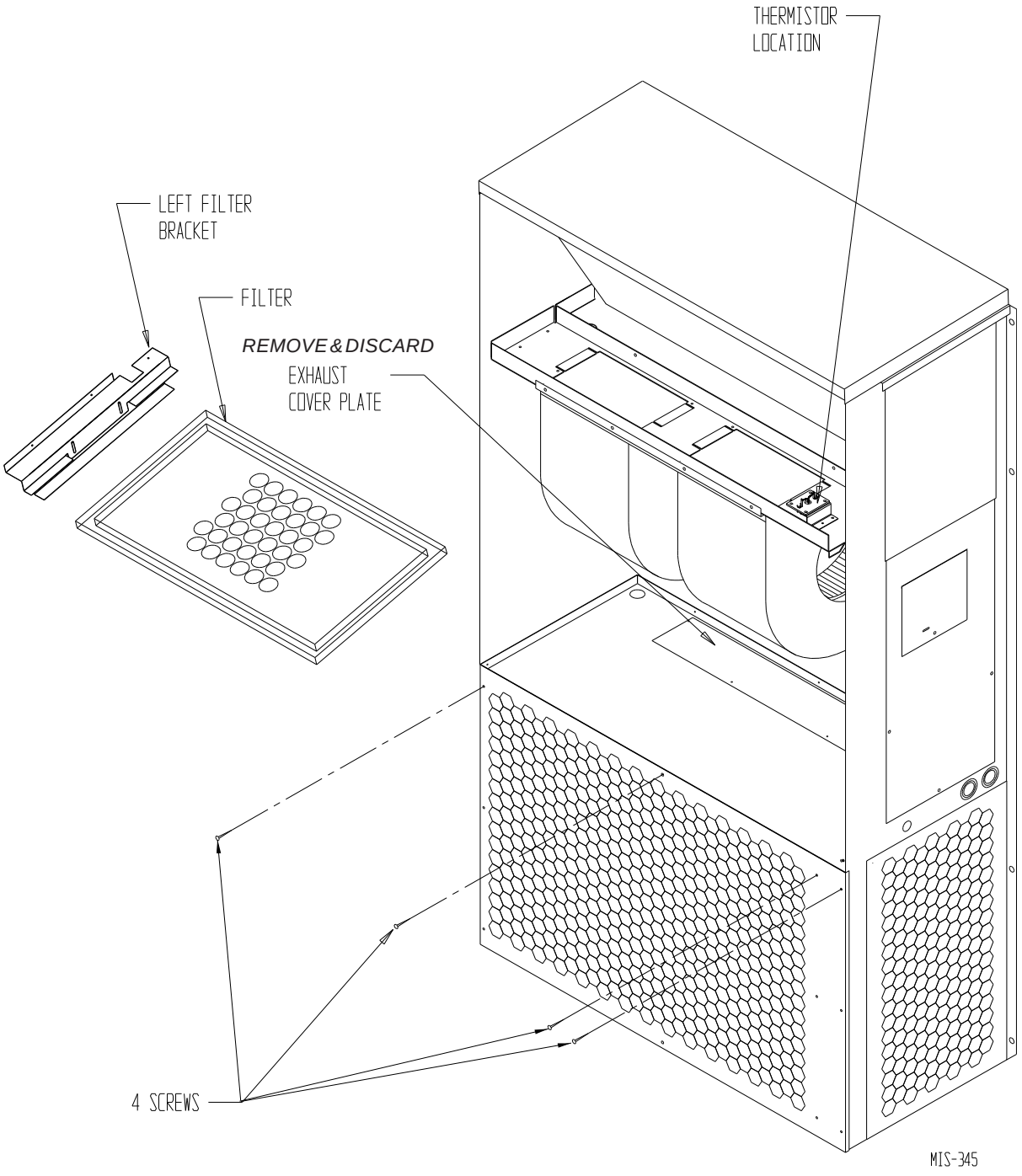

FIGURE 3
Running Wiring

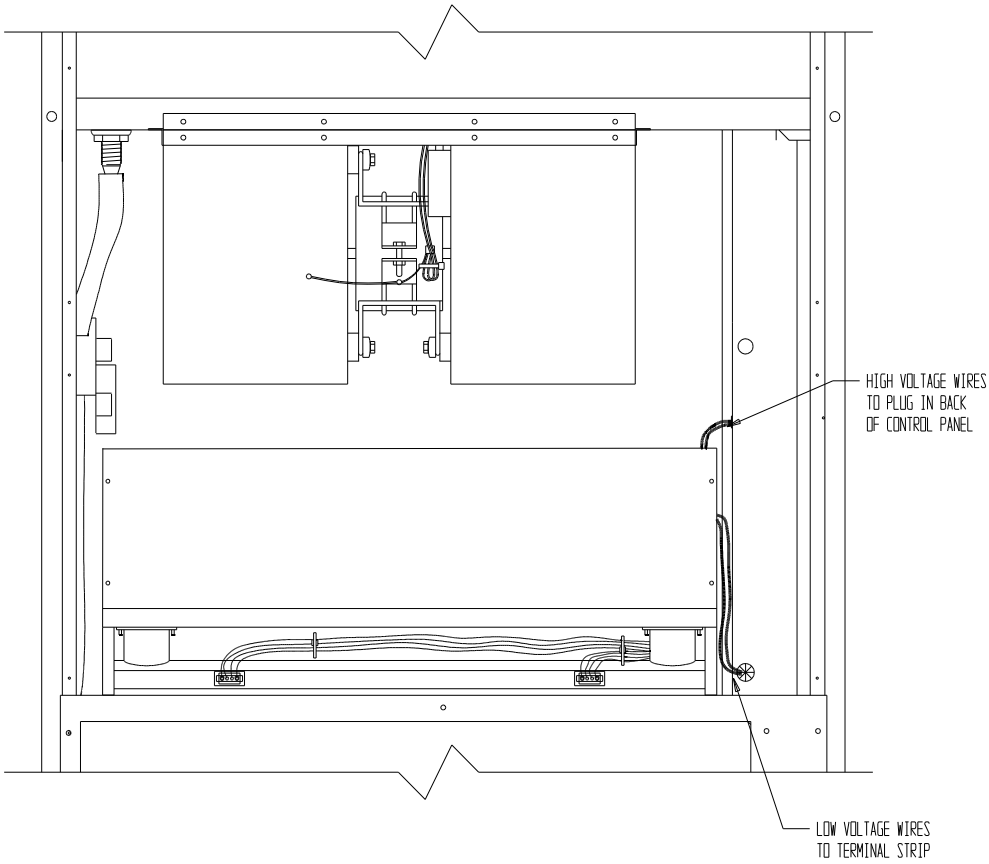

FIGURE 3 – INSET

SIDE VIEW - SEE STEP 5 OF INSTRUCTIONS

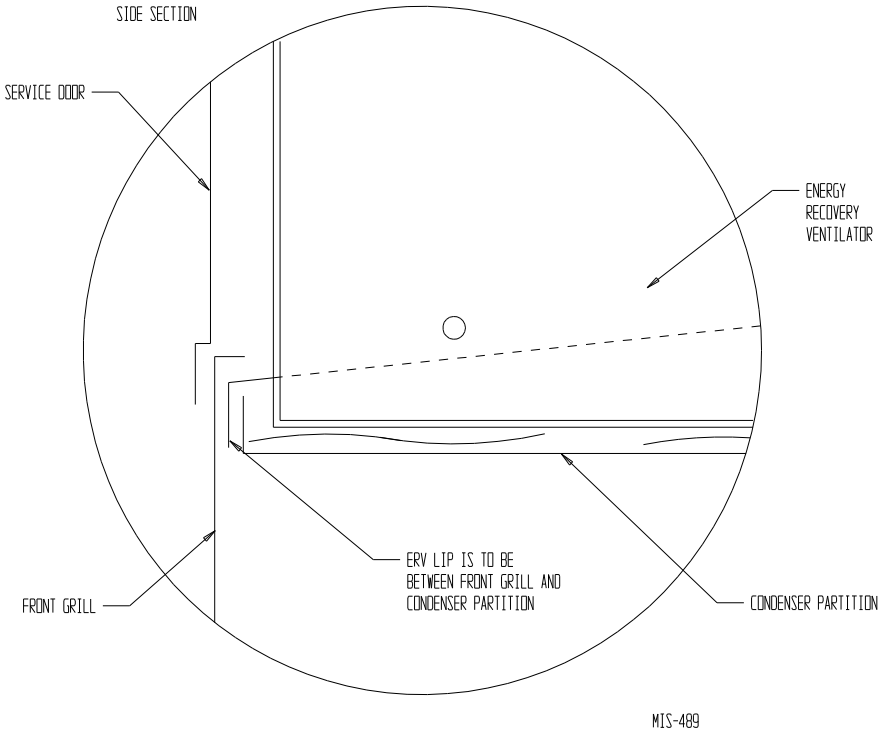

FIGURE 4
Control Panel

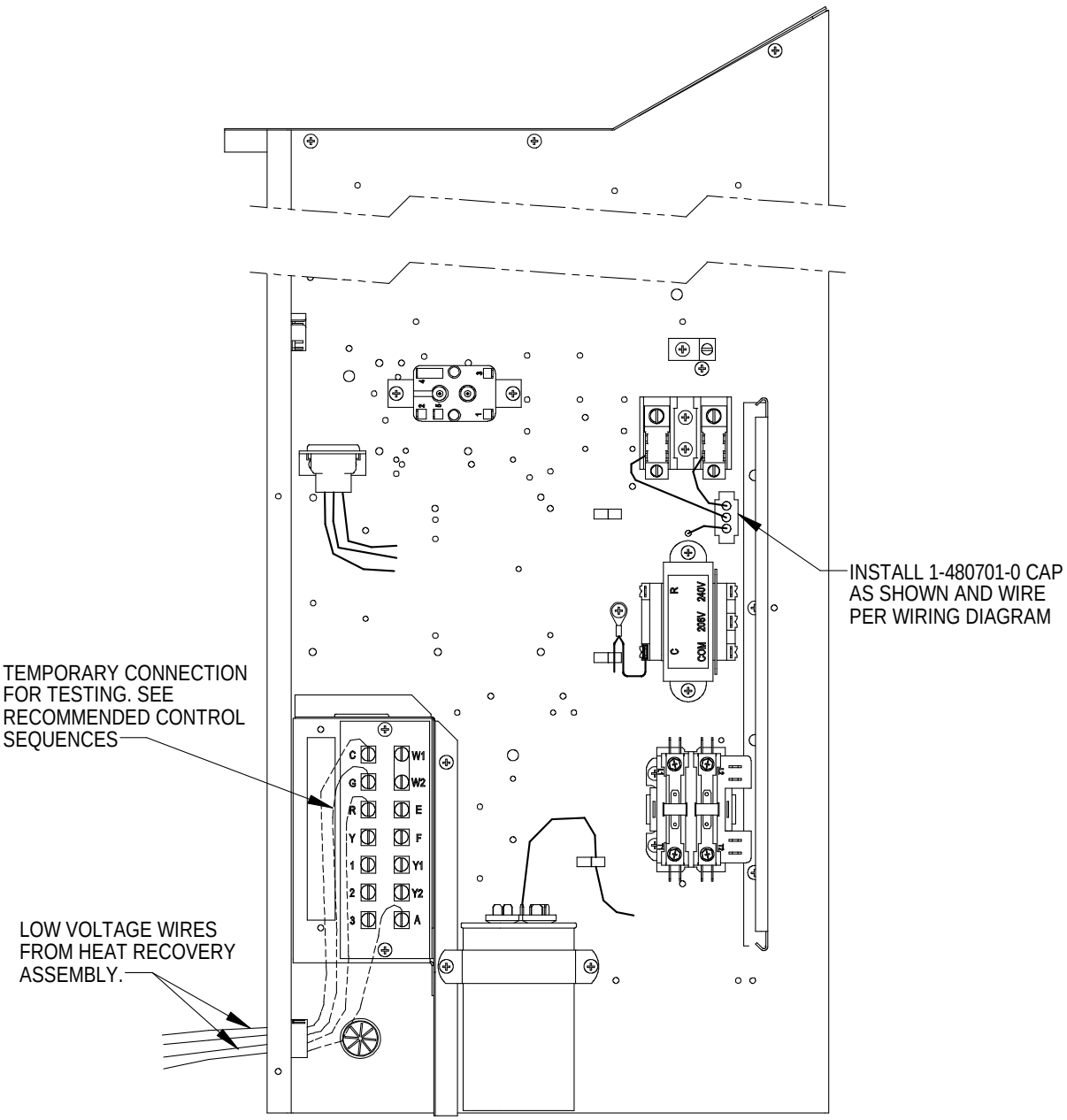

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FIGURE 5
Replacing Access Panel

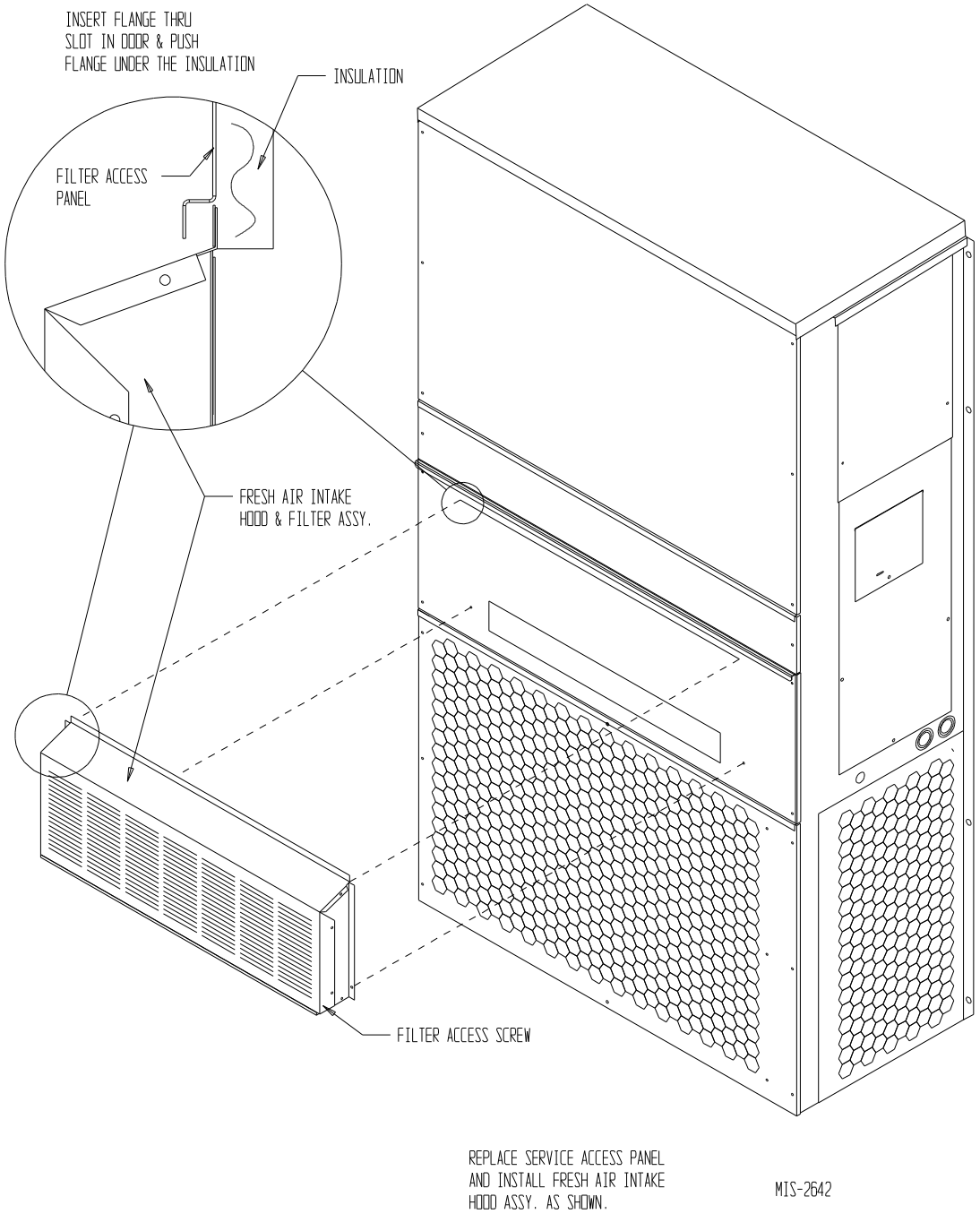


FIGURE 6
Airflow Diagram

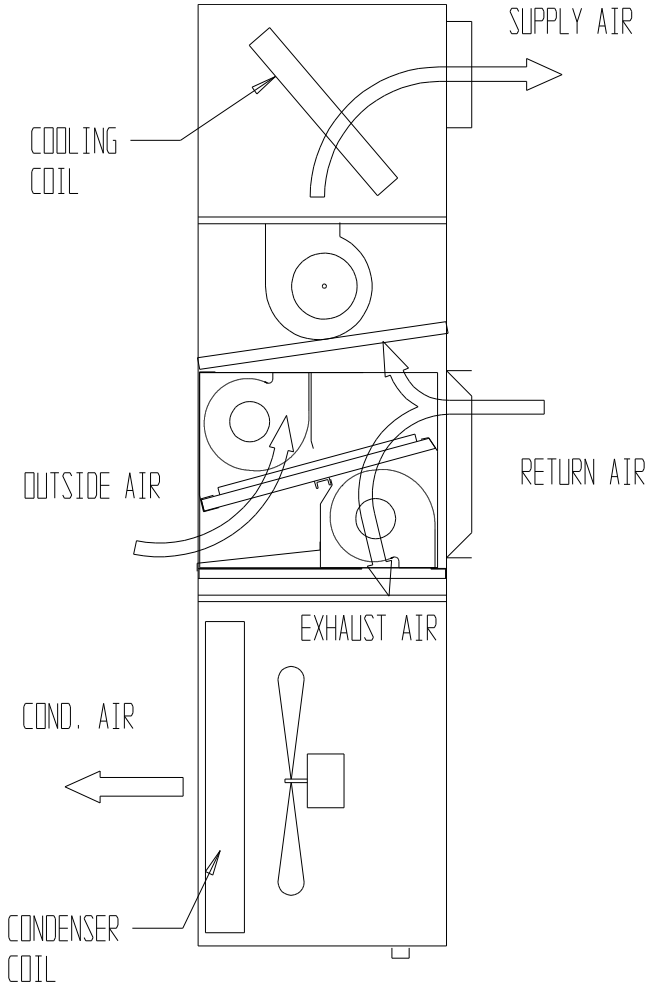
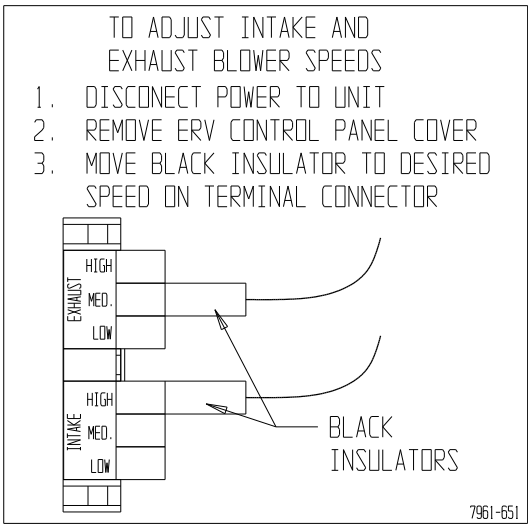


FIGURE 6A
Speed Tap Label



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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. Use Table 1 to 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 ERVF-A2 if only 200 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.

*** * * IMPORTANT * ****

Operating the ERVF 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 ERVF based on daily programmed occupance periods. Bard markets and recommends the Bard P/N 8403-060 programmable electronic thermostat for air conditioner and heat pump applications.
2. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the structure. Bard markets the CS2000A for this use.
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-A2 and ERVF-C2 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 1

Ventilation Air (CFM)			
Model	**High Speed (Black)**	**Medium Speed (Blue)**	**Low Speed (Red)**
ERVF-A2 ERVF-C2	250	225	200

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.

⚠ 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.

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. In these applications, latent efficiency losses of as much as 40% or more may develop over a period of 1 to 3 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 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 Step 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.*

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 7
Belt Replacement Instructions
(2 Wheel Cassette Only)

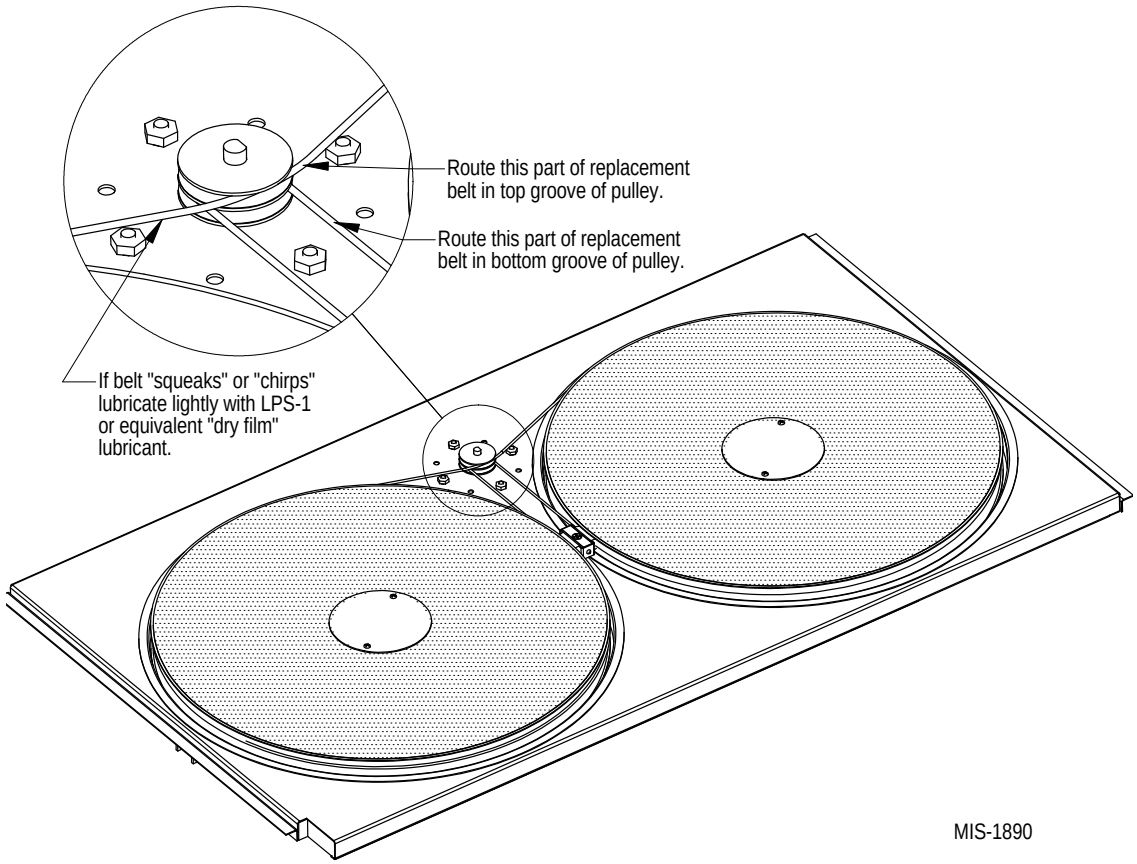

FIGURE 8
Hub Assembly with Ball Bearings