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ENERGY RECOVERY WHEEL

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY VENTILATOR (PIVOTING) USED WITH GOODMAN ROOFTOP UNIT MODELS 2 TO 5 TON UNITS



Energy recovery COMPONENT certified to the AHRI Air-to-Air Energy Recovery Ventilation Equipment Certification Program in accordance with AHRI Standard 1060-2000. Actual performance in packaged equipment may vary.



ETL Certified per UL 1995 and CSA 22.2

I - Shipping And Packing List

Package contains:

- 1 Energy Recovery Wheel Assembly
 - 1 Transition
 - 1 Fresh Air Hood with Filter
 - 1 Exhaust Air Hood w/ Barometric Damper
 - 1 Balancing Damper Assembly
- 1 Box Assembly
 - 1 Roll of 3/4" x 1 1/4" gasket
 - 1 272" of " x ½" gasket
 - 1 Wiring Harness
 - Hardware for Attachment



II - Shipping Damage

Check the unit for shipping damage. Receiving party should contact last carrier immediately if shipping damage is found.

III - General

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

IV - Requirements

When installed, the unit must be electrically wired and grounded in accordance with local codes or, in absence of local codes, with the current National Electric Code, ANSI/NFPA No. 70.

V - Application

Unitary Energy Recovery Ventilator (UERV) are used with 2 to 5 ton rooftop units **equipped with a balancing damper assembly**. These wheels conserve energy by mixing warmer air with cooler air in the following manner:

Recovery Mode

The Recovery Mode is accomplished by two blowers providing continuous exhaust of stale indoor air and replacement by equal amount of outdoor air. Energy recovery is achieved by slowly rotating the Energy Recovery Wheel (ERW) within the cassette frame work. In winter, the ERW adsorbs heat and moisture from the exhaust air stream during one half of a complete rotation and gives them back to the cold, drier intake air supply during the other half rotation. In summer, the process is automatically reversed. Heat and moisture are absorbed from incoming fresh air supply and transferred to the exhaust air stream. This process allows outdoor air ventilation rates to be increased by factors of three or more without additional energy penalty or increase in size of heating or air conditioning systems

VI - Rigging Unit For Lifting

- 1. Maximum weight of unit is 300 Lbs (crated).
- 2. Remove crating and retrieve box assembly that is inside of ERV.
- 3. All panels must be in place for rigging.
- 4. Lifting straps are needed to lift the unit.

VIII - Installation

1. Disconnect all power to unit.

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

- Note: Ensure that no power source is connected to the unit. If the economizer is installed and power is applied, de-energize all power sources to the unit and use Lockout - Tag-out procedures. There may be multiple power inputs to unit, so validate that all power sources are de-energized and tagged.
- 2. Remove and discard the rooftop unit horizontal return air access panels, hoods and/or power exhaust equipment.
- 3. Remove carton from ERV and remove individual wrapped assemblies.
- 4. At the rooftop unit remove filter access panel and door below it (discard).
- 5. Then insert balancing damper over bottom return air opening. Attach adapter panel over balancing damper panel with removed screws.
- At the ERV, remove screws from side of adjustable leg supports. Then slide telescoping part of leg out of guide from the top. Tip ERV unit forward reinserting into bottom of guide having attached flat foot under unit.
- 7. Place screws back into side of adjustable leg supports, adjustment will need to be made later when unit is put into position.
- 8. Position with ERV open face pointed toward adapter panel.
- 9. Attach provided gasket material (1 ") to seal ERV divider deck to adapter panel.
- 10. Attach provided gasket material (") to face (perimeter) of ERV unit to prevent air leakage.
- 11. Pick up the ERV unit and lower onto base rail of rooftop unit aligning hole in the front edge of ³/₄" flange with holes in adapter panel.
- 12. Elevate the back end of ERV and fasten ERV to adapter plate with provided screws along both flanges.
- 13. After adapter panel is secured in place, lower legs to level unit and locked into place by resetting screws into adjustable hole locations.

Note: A treated 2" x 6" x 60" piece of wood or equivalent should be used under feet of standoff legs to prevent roof penetration.

- 14. Install one of the two filler panels (larger for higher tonnage units) by inserting filler panel under lip of rooftop unit and attach with screws.
- 15. Remove rooftop unit return air side access panel.
- 16. Take balancing damper assembly from removed assemblies and insert over return duct. With assembly laying flat over bottom duct opening and having hinge side pointing toward horizontal duct opening, pivot

until hinge connector is in line with metal deck of ERV at horizontal duct opening.

17. Route field wire harness (provided) from horizontal return air duct under balancing damper to rooftop unit economizer plug (PL-1).

Note: Complete low voltage field wiring as shown on page 7.

- 18. Replace filters.
- 19. Seal, if required, along face (top and sides) of ERV unit where it meets rooftop unit to ensure no air leakage.
- 20. All electrical connections must conform to any local codes and the current National Electric Codes (NEC) and Canadian Electric Code (CEC). Refer closely to unit wiring diagram in unit and/or in these instructions for proper wiring connections. Refer to the unit nameplate for minimum circuit ampacity and maximum over current protection size. Electrical data is listed on unit rating plate and motor nameplates.
- 21. Run high voltage conduit from safety switch (field provided) to knockout in corner panel.
- Note: Unit voltage entries must be sealed weather tight after wiring is complete.
- 22. Then run wires from switch to control box through conduit.
- 23. Open control box on ERV and identify high voltage terminal blocks or pigtails.
- 24. Connect line voltage wiring to the right side terminal strip or pigtails inside control box as shown in wiring diagram from safety switch.
- 25. Ground unit with a suitable ground connection either through unit supply wiring or an earth ground.
- 26. Close control box in ERV and turn power switch to "on" position at control relay circuit board.
- 27. Connect low voltage plug wiring (24 volt) from field wiring harness [P153] routed in Step 16 to low voltage cap wiring [J153] routed from left side terminal strip on control relay circuit board.
- 28. Replace access panels onto the ERV unit and secure.
- 29. Close access panel on the rooftop unit and secure.
- 30. Restore power to rooftop unit.
- 31. Start system up to verify operation.
- 32. Cleanup once ERV is operating properly. Caulk any open joints, holes or seams to make the units completely air and water tight.
- 33. Leave this instruction manual with owner or in an envelope to be kept near the unit.

VIII - Operation

How It Works

The unit contains an Energy Recovery Wheel (ERW) that is a new concept in rotary air-to-air heat exchanger. Designed as a packaged unit for ease of installation and maintenance, only matching up to rooftop unit with an internal balancing damper and connection of electrical power is required to make the system operational. The concept consists of a unique rotary energy recovery wheel that rotates in and out of fresh air streams within a heavy duty, permanently installed blower cabinet that provides ready access to all internal components. The media is

polymeric material that is coated and permanently bonded with a dry desiccant for total enthalpy recovery. The wheel is belt driven by PSC motor and drive belt.

When slowly rotating through counter flowing exhaust and fresh air streams the UERV adsorbs sensible heat and latent heat from the warmer air stream and transfer this total energy to the cooler air stream during the second half of its rotating cycle. Rotating at 60 revolutions per minute, the wheel provides constant flow of energy from warmer to cooler air stream. The large energy transfer surface and laminar flow through the wheel causes this constant flow of recovered energy to represent up to 85% of the difference in total energy contained within the two air streams.

Sensible and latent heat are the two components of total heat. Sensible heat is energy contained in dry air and latent heat is the energy contained within the moisture of the air. The latent heat load from the outdoor fresh air on an air conditioning system can often be two to three times that of the sensible heat load and in the winter it is a significant part of a humidification heat load.

During both the summer and winter, the UERV transfers moisture entirely in the vapor phase. This eliminates wet surfaces that retain dust and promote fungal growth as well as the need for a condensate pan and drain to carry water.

Because it is constantly rotating when in the air stream, the UERV is always being cleared by air, first in one direction then the other. Because it is always dry, dust or other particles impinging on the surface during one half cycle, are readily removed during the next half cycle.

Additional Information for Options are provided in Options Manual.

Recovery Mode

On a thermostat call for blower operation in heating, cooling or continuous blower, the ERW will rotate between fresh air and exhaust air streams. Both the fresh air and exhaust air blowers will also be operating to overcome the air resistance of the UERV.

Free Cooling Mode (optional)

The Start, Stop, Jog kit is an optional control board with temperature and/or enthalpy sensor(s) that stops the enthalpy wheel from spinning (and transferring heat) when temperature conditions are conducive for free cooling. The board will spin the wheel intermittently in 10 min off 1 min on intervals to keep dust from building up on the surface.

All units shipped with the Start, Stop, Jog option installed have the temperature and enthalpy sensors installed, and the jumper (J9) set to T(emp). A qualified tech can adjust the setting to E(nthalpy) only or Temp and Enthalpy by adjusting the jumper (J9).

The factory set points to allow for free cooling during ventilation are 40° F-70°F, but they can be field adjusted to narrow the band by adjusting two potentiometers while

measuring VDC between the Com & High or Com & Low terminals (0 VDC = 40 degrees, low set point, 5 VDC = 70 degrees, high set point).

IX - System Check

- 1. Disconnect main power.
- Remove control access panel and apply 24 volts to low voltage terminal strip at "TB37-1(+) and TB37-2 (-)".
- Restore power to unit. Observe UERV wheel rotation and both fresh air and exhaust air blower are operating.

A - Return Damper Settings

Manually adjust position of dampers. This is accomplished by loosing and tightening screws on damper frame of positioning rod to slide damper.

B - Blower Speed Adjustment

Blower speed selection is accomplished by changing the selector switch (refer to wiring diagram) on both fresh air and exhaust air blowers. All blowers are factory set at "high" for maximum airflow. To determine air flow setting, external static pressure readings will need to be read across the UERV. **See Figure 2** for location to take pressure readings. **Reference Table 1.**



C - Air Balancing Adjustment

- 1. Remove plastic plugs in door panels (4 total).
- 2. With a manometer measure the pressure drop [Inches Of water column] across the wheel on the supply airflow side of the unit (Top). The unit's CFM is determined by referring to **Table #1**. If the Cfm value is not per design adjust the motor sheave until the desired CFM is reached.

- 3. To adjust the exhaust airflow check the pressure on the exhaust side of the unit (Bottom), then remove the door panel to access the return air dampers installed inside the RTUs return air section. Adjustment of the damper is made by loosening the wingnut, adjusting the damper blades and then tightening the wingnut before closing the panel and measuring again.
- 4. Once desired the CFM is reached replace the plastic plugs in the access holes in the doors.

X - Maintenance

Motor Maintenance

All motors use prelubricated sealed bearings; no further lubrication is necessary.

Mechanical Inspection

Make visual inspection of dampers, linkage assemblies and ERV rotating bearings during routine maintenance. Filters should be checked periodically and cleaned when necessary. Filter is located in fresh air hoods. **DO NOT** replace permanent filters with throwaway type filters.

Energy Wheel Maintenance

Four pie-shaped ERW segments are seated on stops between the stainless steel spring retainers, secured to the hub and rim of wheel. Annual inspection of the self cleaning wheel is recommended. With power disconnected, remove UERV access panels (rear) and unplug (J150 & P150). Refer to wiring diagram in this instruction manual. Each segment is secured in place by a stainless steel spring retainer located on wheel rim. Remove one end of the stainless steel spring retainer from the slot in the wheel rim and remove. Do the same on the next retainer. Remove segment and wash with water and/or mild detergent. Replace segment by reversing the above procedure. See Figure 3. Discoloration and staining of UERV segment does not affect its performance. Only excessive buildup of foreign material need be removed. If the segment appears excessively dirty, it should be cleaned to ensure maximum operating efficiency. Thoroughly spray plastic surface with household cleaner such as Fantastic® or equivalent middle detergent and gently rinse with warm water using a soft brush to remove heavier accumulation. Shake excess water from segment and replace in reverse of removal instructions.









	START UP INFORMA VOLTAGE - ERV	
Incoming Voltage L1-L2	L1-L3	L2-L3
Running Voltage L1-L2	L 1-L3	L2-L3
Secondary Voltage	C (black) to G (green) Ve	olts*
	C (black) to W (white) Vo	olts*
* With thermostat calling.		
AMPERAGE - UERV MOTORS	Rated Amps	Running Amps
Exhaust Motor: Nominal HP	Rated Amps	Running Amps
Wheel Motor: Nominal HP	Rated Amps	Running Amps
	AIRFLOW	
Intake Design CFM	Pressure Drop	Calculated CFM
Exhaust Design CFM	Pressure Drop	Calculated CFM
Amb. db Temp Return Air db Temp*		Tempered Air db Temp*
Amb. wb Temp Return Air wb Temp*		Tempered Air wbTemp*
* Measure after 15 minutes of run time		

INSTALLATION CHECK LIST

Model #	Serial #	
Owner	Owner Phone #	
Owner Address		
Installing Contractor	Start Up Mechanic	

- □ Inspect the unit for transit damage and report any damage on the carrier's freight bill.
- Check model number to insure it matches the job requirements.
- □ Install field accessories and unit adapter panels as required. Follow accessory and unit installation manuals.
- □ Verify field wiring, including the wiring to any accessories.
- Check all multi-tap transformers, to insure they are set to the proper incoming voltage.
- □ Verify correct belt tension, as well as the belt/pulley alignment. Tighten if needed.
- □ Prior to energizing the unit, inspect all the electrical connections.
- Power the unit. Bump the motor contactor to check rotation. Three phase motors are synchronized at the factory. If blower motor fans are running backwards, de-energize power to the unit, then swap two of the three incoming electrical lines to obtain proper phasing. Re-check.
- Perform all start up procedures outlined in the installation manual shipped with the unit.
- □ Fill in the Start Up Information as outlined on the opposite side of this sheet.
- □ Provide owner with information packet. Explain the thermostat and unit operation.