

### 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.

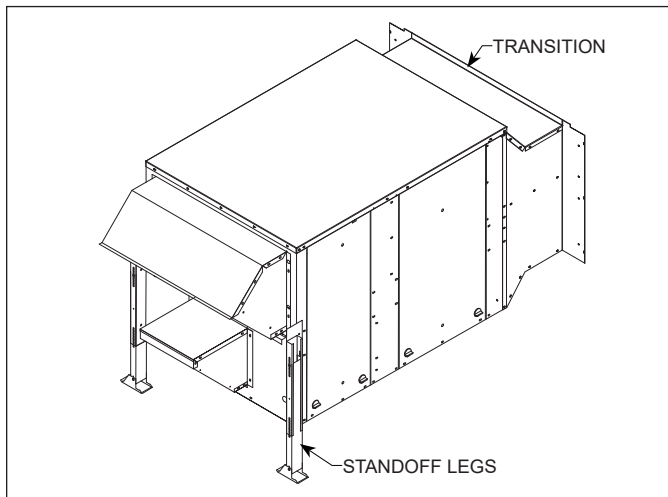


ETL Certified per UL 1995 and CSA 22.2

### I - Shipping And Packing List

Package contains:

- 1 - Energy Recovery Wheel Assembly
  - 1 - Transition (Installed)
- 1 - Box Assembly
  - 1 - Roll of  $\frac{3}{4}$ " x  $1\frac{1}{4}$ " gasket
  - 1 - 272" of " x  $\frac{1}{2}$ " 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.

### 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

Energy Recovery Ventilators (ERV) are used with 2 to 5 ton rooftop units **equipped with RRS internal economizer**. 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



## WARNING



**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.**

### 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.

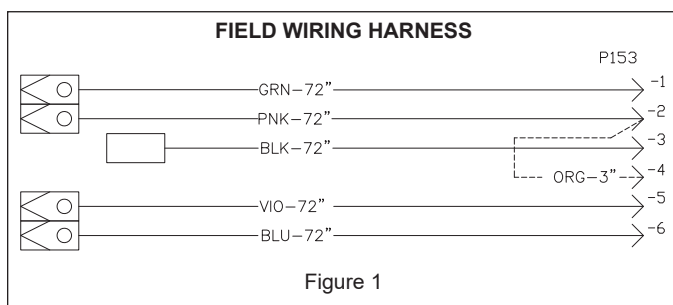


## CAUTION

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

## VIII - Installation

1. Disconnect all power to unit.
2. Remove the rooftop return air access panels. Also remove any hoods and/or power exhaust equipment. Discard hoods, power exhaust equipment, and return air access panels.
3. Verify and/or install an economizer. The ERV will **ONLY** work with RRS economizers:
4. Remove the enthalpy control sensor from the economizer. Keep enthalpy control sensor. It will be reinstalled in the ERV.
5. Locate the provided low voltage field wiring harness. Wire the field harness to the economizer controls per the field wiring harness diagram provided in the installation instructions. The economizer wiring should be plugged into the factory installed RTU plug. **See Figure 1. Refer to System Wiring on page 6.**



6. Use the two provided connectors to connect the field wiring harness to economizer logic module and use provided splice connector to tap on blue wire ("C" common-24V).
7. Remove the wires that were connecting the enthalpy control to the economizer and replace them with the connector having purple and blue wires of the field wiring harness. Then attach the connector with green and pink to AUX1-0 and EXH1 on Honeywell W7220 (JADE) economizer logic module control.
8. Adjust the minimum position control on logic module to position blades at 20% open or greater.
9. Clean up wiring around the economizer and neatly route the wires to clear any moving parts.
10. Route the excess wire of the field wiring harness out the return air. Coil the excess wire inside the rooftop unit to clear installation of the ERV.
11. Locate roll of provided  $\frac{3}{4}$ " and  $\frac{1}{8}$ " gasket material. Apply  $\frac{3}{4}$ " gasket to the middle and bottom decks of the ERV.
12. Lift ERV at least three feet (3'). Remove four screws holding telescoping leg to guide and pull out leg. Reinsert the leg from the bottom with the flat foot under the unit and reinsert one of the screws to hold leg into place. The leg will need to be adjusted later when unit is in position.

13. Lift and move ERV unit into position with open end in-line with economizer horizontal openings.
14. Position ERV in front of the economizer assembly. Line up the ERV to the economizer assembly on the rooftop unit.

**Note - A treated 2" x 6" x 48" piece of wood or equivalent equipment support should be used under feet of standoff legs to prevent roof penetration.**

15. Secure the ERV to the RTU with the provided screws.
16. Unscrew the screw placed in the standoff legs and adjust the legs on the ERV until it is level. Then replace all four screws in each leg to secure the ERV in the leveled position.
17. Check and seal, if necessary, along the edges where the ERV meets the adapter panel assembly and where the adapter panel assembly meets the rooftop unit to ensure there is no air leakage.
18. Remove the right front access panel and locate the field wiring harness that was previously tucked into the return air of the rooftop unit. Plug the field wiring harness into the connector located at the bottom of the access door inside the ERV.
19. Locate the enthalpy control sensor removed earlier from the rooftop unit. Remove the connectors and wires from its terminals.
20. Remove the screws to the top panel of the fresh air hood on the ERV labeled "filter access". Push up the top panel and remove the air filter. Reinstall the enthalpy control sensor with self-tapping screws on the right side panel of the fresh air intake hood.
21. Remove the right front door panel. Locate the bundle of wires on the top deck. Route the blue and purple wires to the enthalpy control sensor. Connect the purple wire to the "+" terminal on the enthalpy control and the blue wire to the "S" terminal. See field wiring diagram.
22. All electrical connections must conform to any local codes and the current National Electric Codes (NEC) and Canadian Electric Code (CEC). Refer closely to wiring diagram in unit and/or in these instructions for proper connections. Refer to the unit nameplate for the minimum circuit ampacity and maximum over current protection size. Electrical data is listed on unit rating plate and motor nameplates.
23. Connect line voltage power to ERV unit from rooftop unit disconnect switch through the knock out. Connect the line voltage to the ERV control box per the wiring diagram.
24. Ground unit with a suitable ground connection either through unit supply wiring or earth ground.

**Note - Unit voltage entries must be sealed weather tight after wiring is complete.**

25. Replace access panels onto the ERV unit and secure.

26. Restore power to unit.
27. Cleanup once ERV is operating properly. Caulk any open joints, holes or seams to make the unit completely air and water tight.
28. 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 economizer 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 ERV 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 ERV 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 ERV 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.

Low Ambient Kit is appropriate for climates with limited HVAC system operation when outdoor temperatures are below 15°F.

The frost threshold is the outdoor temperature at which frost will begin to form on the ERV wheel. For energy recovery ventilators, the frost is typically below 15°F. Frost threshold is dependent on indoor temperature and humidity. The table shows how the frost threshold temperatures vary depending on indoor conditions.

FROST THRESHOLD TEMPERATURE	
INDOOR RH AT 70°F	FROST THRESHOLD TEMPERATURE
20%	0°F
30%	5°F
40%	10°F

Because energy recovery ventilators have a low frost threshold, frost control options are not necessary in many climates. The Low Ambient Kit is available for units installed where outdoor temperatures may drop below the frost threshold during the ERV operational hours.

### Low Ambient Kit

Low Ambient Kit turns off the supply blower when outdoor temperatures fall below the frost threshold. Exhaust Only set points are field adjustable with a factory supplied thermostat. Supply fan operation is automatically restored when the exhaust air temperature rises above the thermostat set point. Provisions for introducing make-up air into the building when the supply blower is off to avoid depressurization should be considered.

### 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.

### Economizer/Power Exhaust Mode

On the activation of the economizer mode [closure of damper switch], the ERV unit will shutdown for approximately 60 seconds to allow the ERV media to pivot out of the air stream. After the delay timer has been satisfied, the exhaust air blower will operate. The ERV unit will act as a power exhaust unit.

This mode will continue until economizer has been deactivated. The exhaust air blower will shut down and the delay timer will be activated. During this time period the ERV media will pivot back into the air stream. When timing is complete the unit will operate in the Recovery Wheel Mode.

## IX - System Check

1. Disconnect ERV main power.
2. Remove ERV control access panel and install jumper at low voltage terminal strip between "TB37-1 and TB37-2". Wheel should pivot out of air stream.

**Note - If optional Low ambient kit is used the jumper between TB37-5 & TB37-6 should be removed. Also if system check out is being conducted at low ambient temperatures, technician should be aware that this kit can cause system not to operate.**

3. Turn thermostat to "Cont" for blower operation.
4. Restore power to unit. Observe ERV drive motors (damper motor) for wheel and dampers, it should pivot wheel out of air stream, opening fresh air dampers and a delayed exhaust blower will operate.
5. Remove jumper(s) from low voltage terminal block (TB37). View pivoting of media back into air stream and closing of fresh air dampers. After delay timer has cycled then both fresh air blower and one exhaust air blower will operate.
6. Disconnect main power to unit before making adjustment to economizer and/or ERV unit.
7. Replace ERV control access cover.
8. Set thermostat to normal operating position.
9. Restore power to unit

#### A - Economizer Settings

Refer to economizer instructions for minimum air flow requirement. The damper end switch setting on the internal economizer damper assembly is field adjustable to any position above minimum air flow for fresh air requirements at the customers specified conditions.

#### B - Blower Speed Adjustment

Blower speed selection is accomplished by changing the speed taps at control relay in control box. Both fresh air and exhaust air blowers are direct dive multi-tap motors. Both blowers are factory set at "high" speed for minimum airflow. To determine air flow setting, external static pressure readings will need to be read across the ERV. **See Figure 2** for location to take pressure readings.

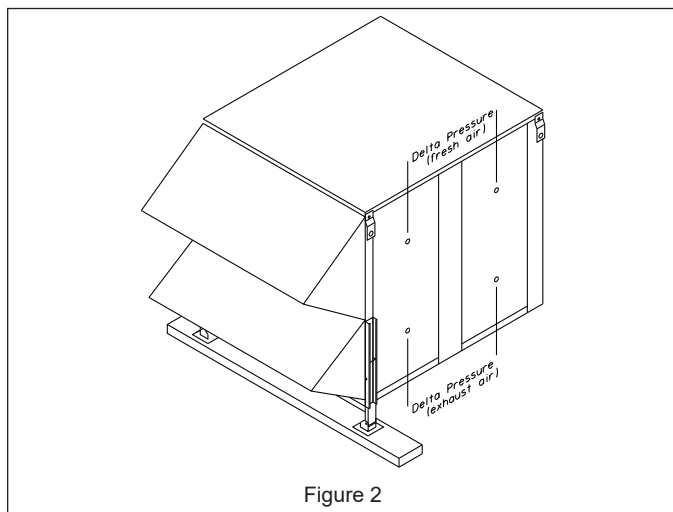


Figure 2

#### C - Air Balancing Adjustment

1. Remove plastic plugs in door panels (4 total).
2. With a manometer measure pressure drop [inches of water column] across top half of ERV (top holes in door panel). Unit CFM is determined then by referring to Table #1. If CFM values are not per design, adjust damper in fresh air hood and repeat measure method.
3. Repeat the same process for the bottom half of ERV. If CFM values are not per design, adjust internal dampers inside the ERV. This is accomplished by removing door panel at the return air opening, loosening screw in center of damper, then slide damper rod up or down in the return airstream and re-tighten screw. Replace door panel and repeat measurement method.
4. Place plastic plugs back in to door panels

#### X - Maintenance

##### Motor Maintenance

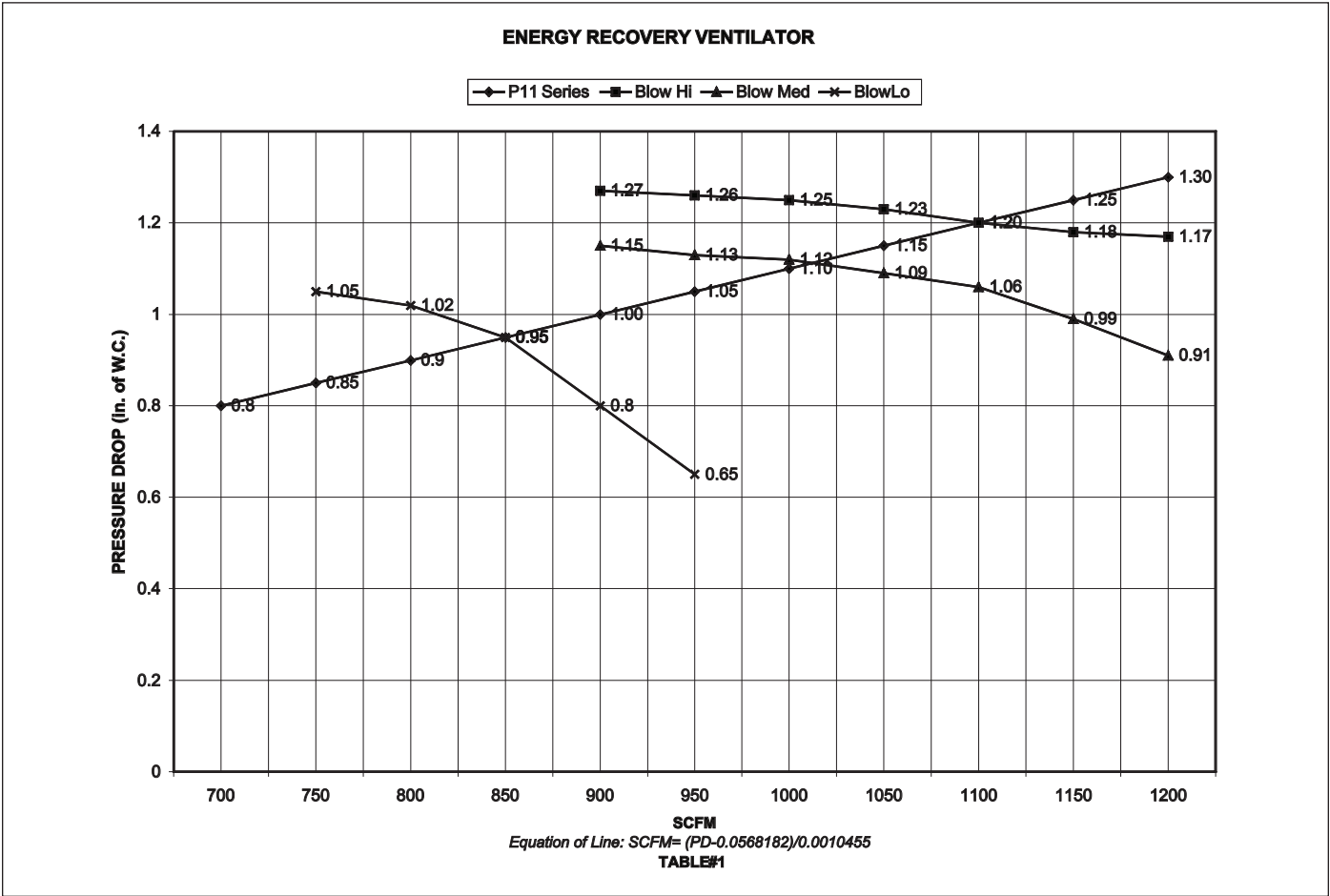
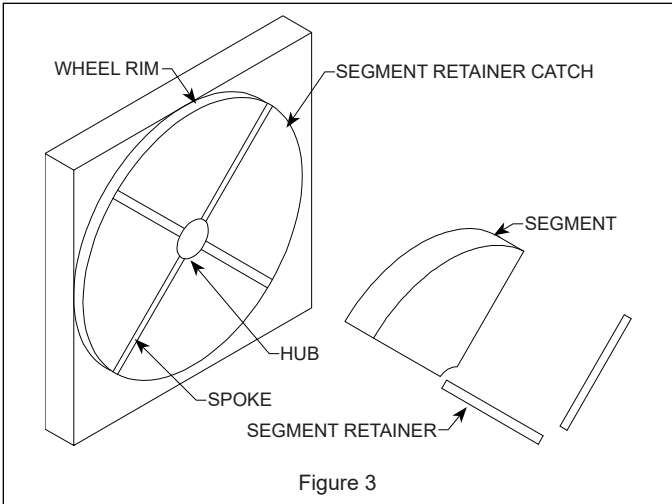
All motors use prelubricated sealed bearings; no further lubrication is necessary.

##### Mechanical Inspection

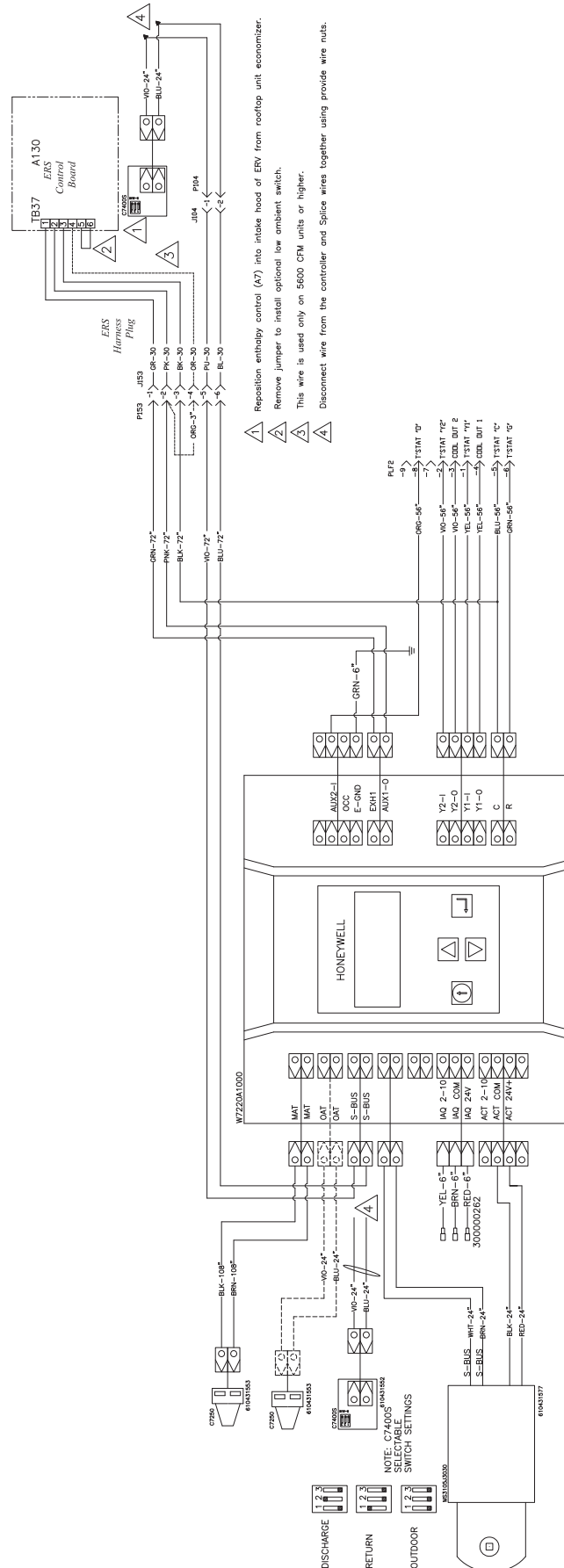
Make visual inspection of dampers, linkage assemblies and ERV rotating bearings during routine maintenance. Filters should be checked periodically and cleaned when necessary. Filter is located in fresh air hoods. **DO NOT** replace permanent filters with throwaway type filters.

##### 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 ERV 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 ERV 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 Fantastice 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.



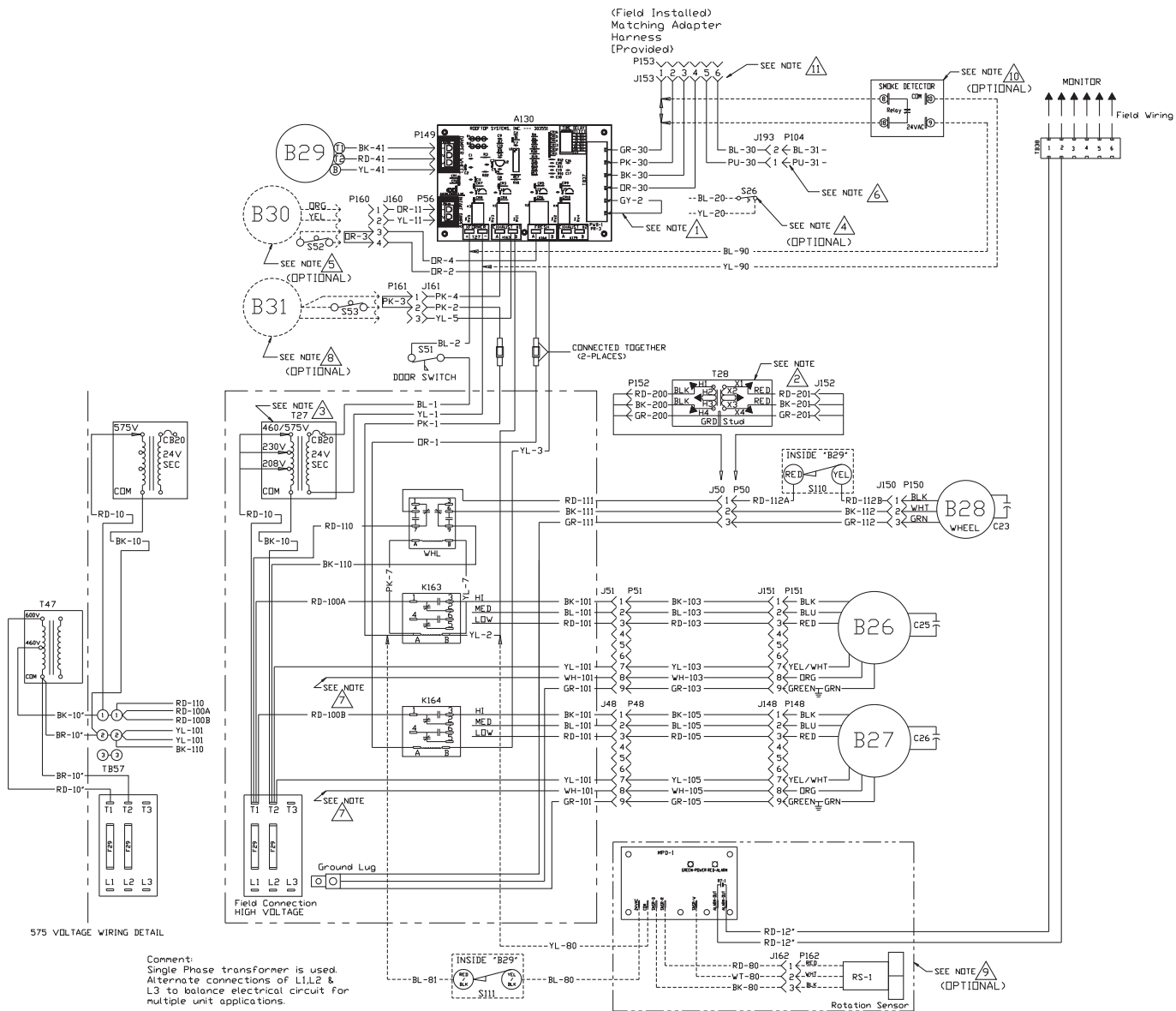
## SYSTEM WIRING



- 1 Reposition enthalpy control (A7) into intake hood of ERV from rooftop unit economizer.
- 2 Remove jumper to install optional low ambient switch.
- 3 This wire is used only on 5600 CFM units or higher.
- 4 Disconnect wire from the controller and Splice wires together using provide wire nuts.



# UERV UNIT WIRING DIAGRAM



Notes:

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Remove jumper to install field optional low ambient switch.</li> <li>2. Step-down transformer assembly for 460/575 volt units (only) connect between J50 and P50.</li> <li>3. Selective voltage terminal for proper unit voltage.</li> <li>4. Optional low ambient switch.</li> <li>5. Optional motorized intake damper.</li> <li>6. Reposition enthalpy control into intake hood of ERV from rooftop unit economizer.</li> <li>7. Unit may be wired for HI, MED, or LO speeds. Diagram shows the HI speed setup, to rewire for MED or LO speed, disconnect BK-101 from relays and connect BL-101 for MED, or RD-101 for LO. Also connect WH-101 to BK-101.</li> <li>8. Optional motorized exhaust damper.</li> <li>9. Optional wheel rotation sensor.</li> <li>10. Optional smoke detector</li> <li>11. Matching adapter harness (provided) to connect with rooftop unit.</li> </ol> | <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Desiccant Wheel for Rooftop Unit<br/>208-230/460V/575V (1PH/3 PH)</p> </div> |
|---|---|

Desiccant Wheel for Rooftop Unit  
208-230/460V/575V (1PH/3 PH)

Unit#: 01-P11-01xx-21 thru -43

# START UP INFORMATION SHEET

## VOLTAGE - ERV UNIT

Incoming Voltage L1-L2\_\_\_\_\_ L1-L3\_\_\_\_\_ L2-L3\_\_\_\_\_  
Running Voltage L1-L2\_\_\_\_\_ L 1-L3\_\_\_\_\_ L2-L3\_\_\_\_\_  
Secondary Voltage\_\_\_\_\_ C (black) to G (green) Volts\*\_\_\_\_\_  
C (black) to W (white) Volts\*\_\_\_\_\_

\* With thermostat calling.

## AMPERAGE - UERV MOTORS

Intake Motor: Nominal HP\_\_\_\_\_ 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.