

ENERGY RECOVERY VENTILATOR

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY VENTILATOR (FIXED) USED WITH TRANE ROOFTOP UNIT MODELS 2 TO 10 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 1 of 2 contains:

- 1 - Energy Recovery Wheel Assembly
- 1 - Box Assembly
 - a. Back Door Panel
 - b. Adapter Panel
 - c. Gasketings
 - d. Wiring Harness
 - e. Hardware for Attachment

Package 2 of 2

- 1 - Return Damper Assembly
 - a. Divider
 - b. Damper Assembly
 - c. Horizontal Support

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

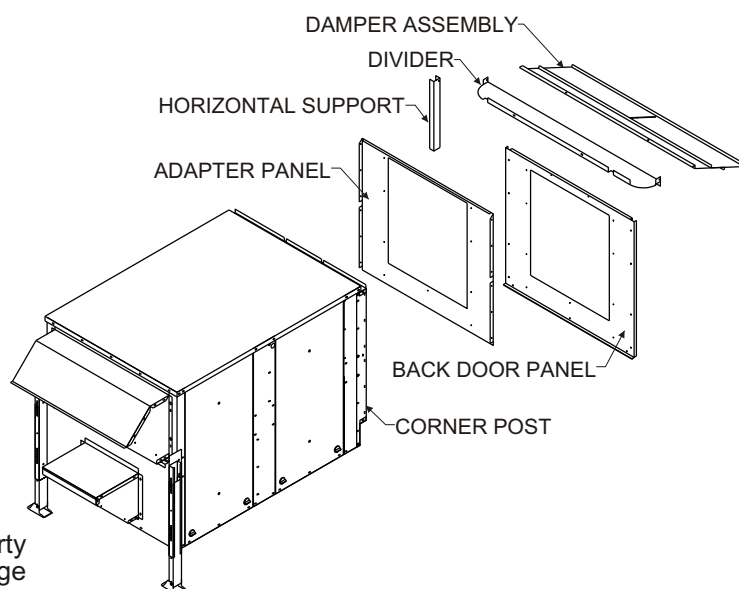
When installed, the unit must be electrically wired and grounded in accordance with local codes or, in the absence of local codes, with the current National Electric Code, ANSI/NFPA No. 70.

VI - APPLICATION

Energy Recovery Ventilators (**ERV**) are used with 2 to 10 ton rooftop units. 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.

V - RIGGING UNIT FOR LIFTING

1. Maximum weight of unit is — 300 Lbs.[Crated].
2. Remove crating and retrieve bag assembly that is inside of ERV.
3. All panels must be in place for rigging.
4. Lifting straps are needed to lift the unit.

VII - INSTALLATION

1. Disconnect all power to rooftop unit.

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.

CAUTION

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

2. Remove end access panel on the rooftop unit return air end. Also remove any hoods and or power exhaust equipment. Discard hoods, power exhaust equipment and access panels.
3. Install provided new back panel. Attach adapter panel to new back panel with flanges pointing outward on sides and top.
4. Now remove horizontal return duct cover from rooftop unit and open filter access door.
5. Insert divider panel through filter access area with flanges pointing upward. Secure with two (2) provided screws to new back panel. Then secure to corner post at filter access.
6. Now insert horizontal support horizontal return opening with flanges pointing to cabinet and bottom setting on rooftop unit base pan. Secure divider to horizontal support with provided screw.
7. Next install damper assembly, securing hinge to divider with provided screws.
8. Adjust return dampers to minimum air flow requirements.
9. Attach field wire harness using hardware provided in bag assembly. Route wires through rooftop and connect in parallel at thermostat connects. Refer to **field wiring harness diagram**. Route wiring through damper assembly to be connected to plug of ERV.
10. Raise ERV unit approximately three (3) feet. Adjust telescoping leg assembly to rear of ERV by inserting into guide with foot pad to the bottom. Insert bolt through holes to hold in place temporary and finger tighten with supplied nuts. Adjustment will need to be made when unit is in position.
11. Attach provided gasketing material to face of ERV unit to prevent air leakage. Use 1 1/4" on divider deck of ERV and 1/8" on top flange of ERV.
12. Lift and move ERV unit into position with open end in-line with adapter panel horizontal openings.

Note - A treated 2" x 6" x 48" piece of treated wood or equipment support is recommended to be placed under feet of standoff legs to prevent roof penetration.

13. Insert ERV unit until top and sides of adapter panel slide inside corner post of ERV.

14. Align openings, top and side with back door panel and secure into place along side of corner post.
15. With ERV in place, adjust standoff legs to level and support ERV against rooftop unit. Tighten securely.
16. Attach ERV directly to back door panel using provided screws.
17. Top panel flange of ERV will need to be tucked under top of rooftop unit.
18. Seal, if required, along face (top and sides) of ERV unit where it meets rooftop unit to insure no air leakage.
19. All electrical connections must conform to any local codes and current National Electric Codes (NEC) and Canadian Electric Codes (CEC). Refer closely to unit wiring diagram in unit and / or in these instructions for proper wiring connections.
20. Refer to the unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.
21. Electrical data is listed on unit rating plate and motor nameplates.
22. Remove ERV access panel to connect field wiring.
23. Connect line voltage power supply to ERV unit from disconnect switch.
24. Ground unit with a suitable ground connection either through unit supply wiring or an earth ground.

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

25. Replace access panel onto ERV unit and secure.
26. Restore power to unit.
27. Balancing is done by removing the plastic plugs in door panels (4 total).
28. With a manometer measure pressure drop [inches of water column] across the top half of ERV (top holes in door panel). Unit CFM is determined by referring to **Table #1**. If CFM values are not per design, adjust internal damper setting inside rooftop unit. This accomplished by loosening set screw on damper frame of positioning rod or slide damper. The repeat measurement method.
29. Place plastic plugs back into door panels
30. Cleanup once ERV is operating properly. Caulk any open joints, holes or seams to make the unit completely air and water tight.
31. 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 threshold 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. Where outdoor temperatures may drop below the frost threshold during the ERV operational hours, exhaust only frost control option is available.

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 ERV 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 ERV.

IX - SYSTEM CHECK

1. Disconnect main power.
2. Remove control access panel and apply 24 volts to low voltage terminal strip at "TB37-1(+)" and "TB37-2(-)".
3. Restore power to unit. Observe ERV drive motor for wheel and blowers.
4. Verify that the ERV blower motors are wire to high speed (BLK wire at control relay in control box) for correct speed and operation.
 - Disconnect power.
 - Change speed tap at relay on unit power leads to the ERV blower motors.
 - Reapply power.

A - Blower Speed Adjustment

Blower speed selection is accomplished by changing the speed tap wire (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 ERV. **Reference Table 1.**

1. Disconnect main power to unit before making adjustment to balancing dampers and / or ERV unit.
2. Replace ERV control access cover.
3. Set thermostat to normal operating position.
4. Restore power to unit.

B - 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 1.** 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 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.

XI - WARRANTY

RSI Manufactured Parts

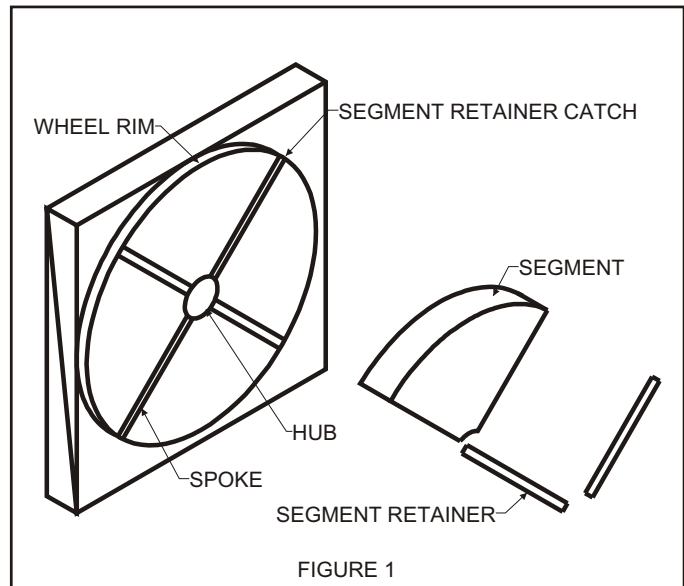
In the event that defects in workmanship or materials originate in any part manufactured by RSI, FOB point of manufactured, we guarantee to repair or replace that part, within three (3) months of the shipment date.

Other Supplied Parts

Additionally, RSI guarantees to replace standard components purchased new from a RSI vendor, (motors, controls, etc.) that may be found defective, within twelve (12) months of the installation date. The components warranty, however, excludes service call charges and labor cost for replacing or adjusting the defective part.

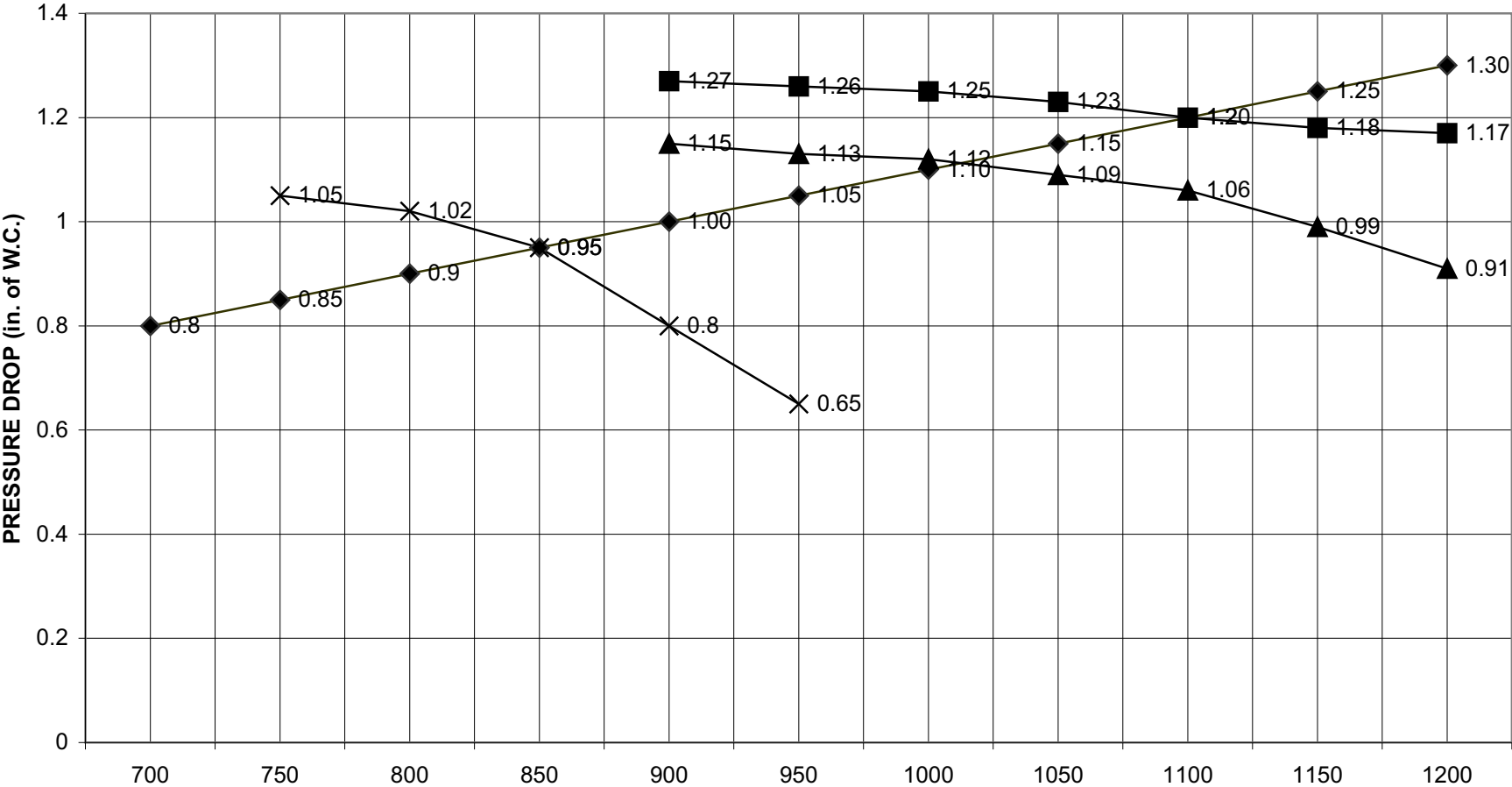
Limitation of Warranties

Misapplication, destruction, negligence or alteration constitute the warranty and/or the components warranty of RSI products and/or parts, null and void. This warranty is provided in lieu of all other written, stated or implied warranties.



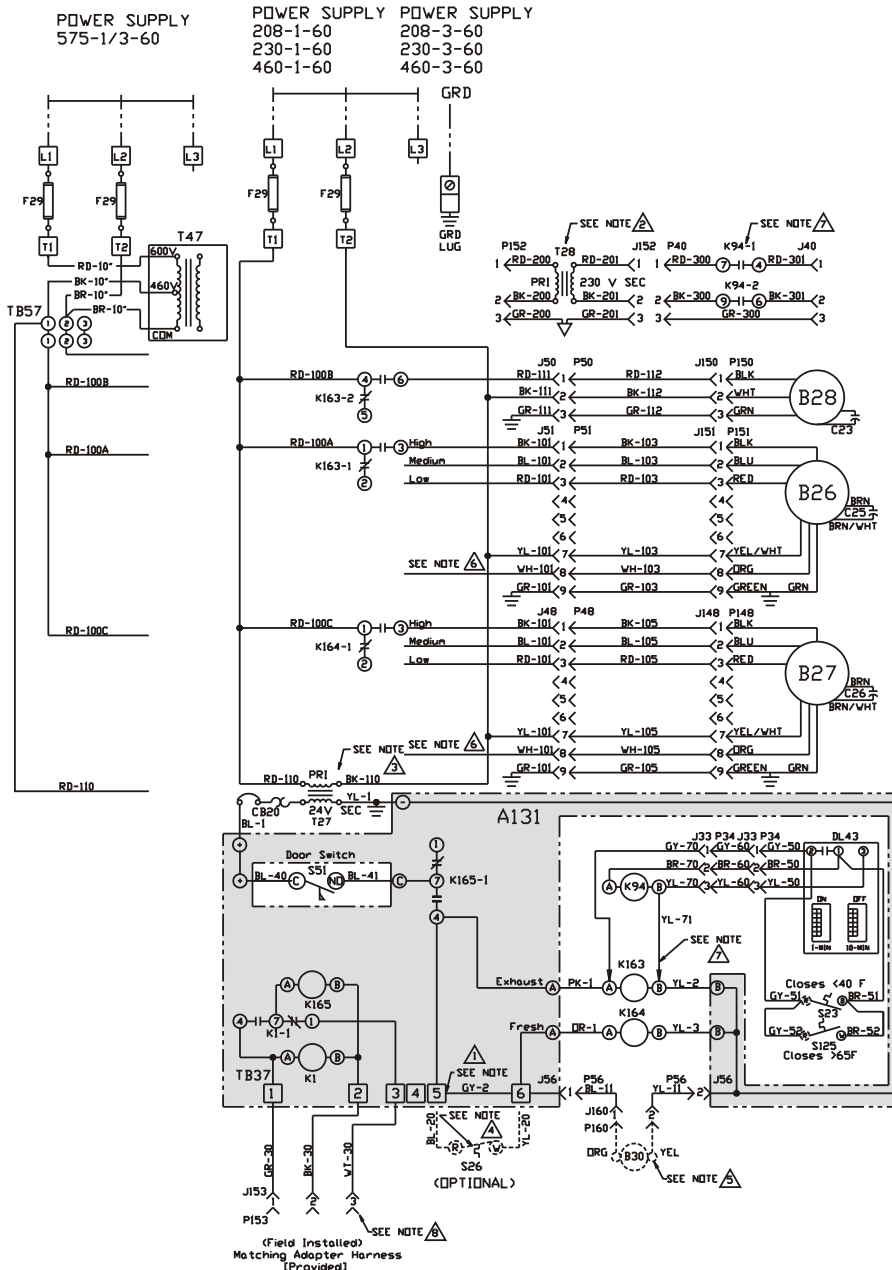
ENERGY RECOVERY VENTILATOR

◆ R11 Series ■ Blow Hi ▲ Blow Med ✕ Blow Lo



SCFM
Equation of Line: $SCFM = (PD - 0.0568182) / 0.0010455$
TABLE #1

ERV UNIT SCHEMATIC DIAGRAM



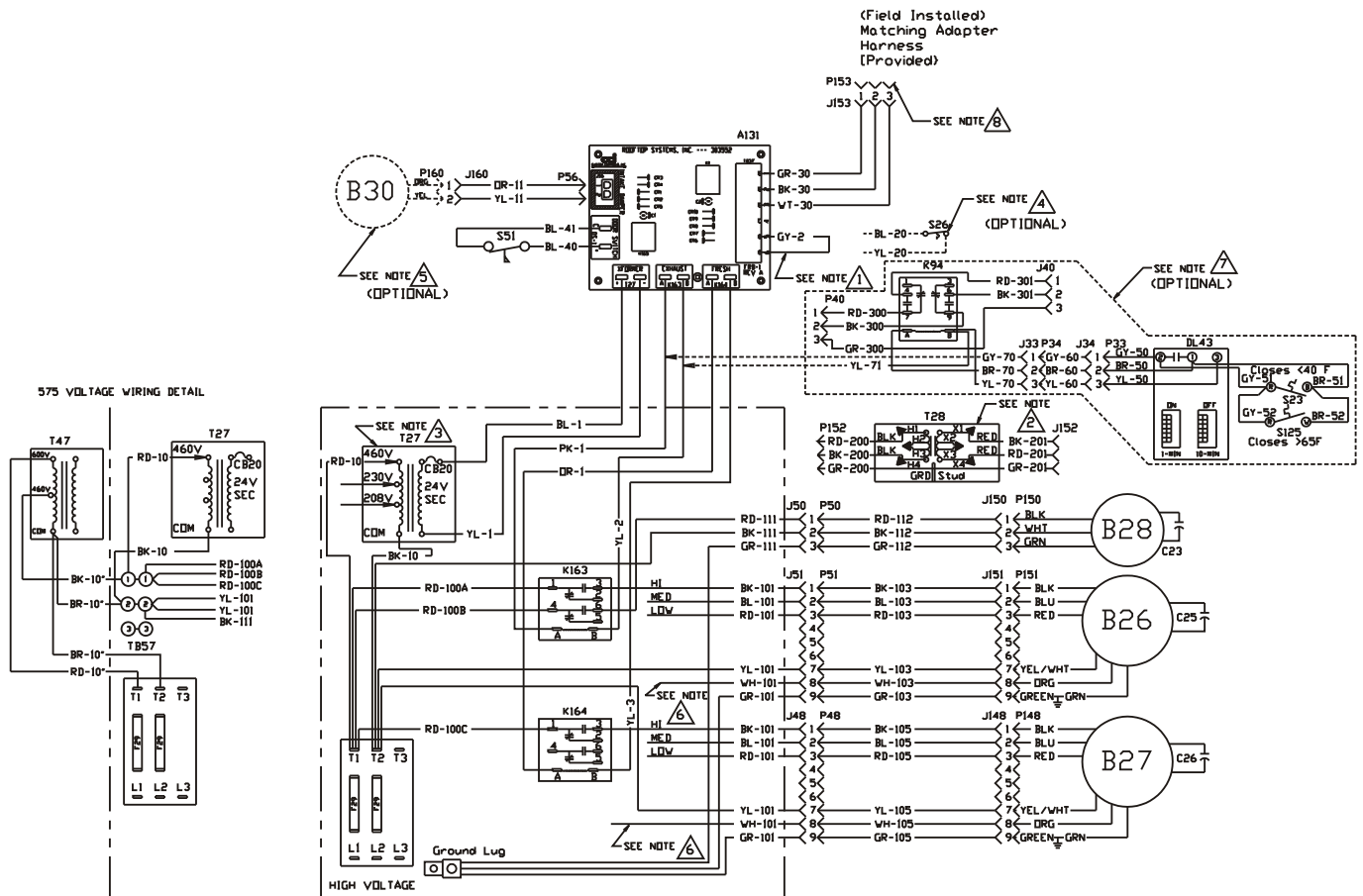
COMPONENT CODE	
A131	Fixed Relay Board
B26	Motor, Exhaust Air
B27	Motor, Fresh Air
B28	Motor, Desiccant Wheel
B30	Motor, Damper (Optional)
C23	Capacitor, Wheel Motor
C25	Capacitor, Motor Exhaust Air
C26	Capacitor, Motor Fresh Air
DL43	Delay, Cycle Timer (Optional)
F29	Fuse
J33	Jack, Cycle Control (Optional)
J34	Jack, Cycle Control Harness (Optional)
J40	Jack, Cycle (Optional)
J48	Jack, Control Box (Fresh Air)
J50	Jack, Control Box (Wheel)
J51	Jack, Control Box (Exhaust Air)
J56	Jack, Control Box (Damper)
J148	Jack, Fresh Air Motor Harness
J150	Jack, Wheel Motor Harness
J151	Jack, Exhaust Air Motor Harness
J152	Jack, Transformer (High Voltage)
J153	Jack, Field Harness
J160	Jack, Damper Motor Harness
K94	Relay, On/Off (Optional)
K163	Relay, Exhaust Air Motor
K164	Relay, Fresh Air Motor
P33	Plug, Cycle Control (Optional)
P34	Plug, Cycle Control Harness (Optional)
P40	Plug, Wheel Cycle (Optional)
P48	Plug, Fresh Air Motor Harness
P50	Plug, Wheel Motor Harness
P51	Plug, Exhaust Air Motor Harness
P56	Plug, Damper Motor Harness
P148	Plug, Fresh Air Motor
P150	Plug, Wheel Motor
P151	Plug, Exhaust Air Motor
P152	Plug, Transformer (High Voltage)
P153	Plug, Field Harness
P160	Plug, Damper Motor
S23	Thermostat - Low Ambient (Optional)
S26	Switch, Low Ambient (Optional)
S51	Switch, Door
S125	Switch, Ambient Override (Optional)
T27	Transformer, Control
T28	Transformer, Step-down (Optional)
T47	Transformer, Step-down (Optional)
TB57	Terminal Block - High Voltage
WIRE COLOR	
BK	Black
BL	Blue
GR	Green
GY	Gray
OR	Orange
PK	Pink
RD	Red
WH	White
YL	Yellow

Notes:

1. Remove jumper to install field optional low ambient switch.
2. Step-down transformer assembly for 460/575 volt units.
3. Selective voltage terminal for proper unit voltage
4. Optional low ambient switch.
5. Optional motorized intake damper.
6. 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.
7. Optional stop, start and jog control.
8. Matching adapter harness (provided) to connect with rooftop unit. For energy management systems connect +24v to green and common 24v to black.

R11A-24TDW

ERV UNIT WIRING DIAGRAM



Notes:

1. Remove jumper to install field optional low ambient switch.
2. Step-down transformer assembly for 460/575 volt units.
3. Selective voltage terminal for proper unit voltage
4. Optional low ambient switch.
5. Optional motorized intake damper.
6. 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.
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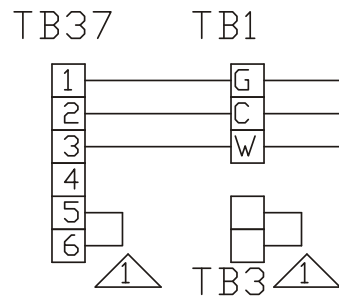
Desiccant Wheel for Rooftop Unit
208-230/460/575V (1 ph & 3ph)

Unit#: 01-R11-01XX-11 thru -43

Field Wiring Harness

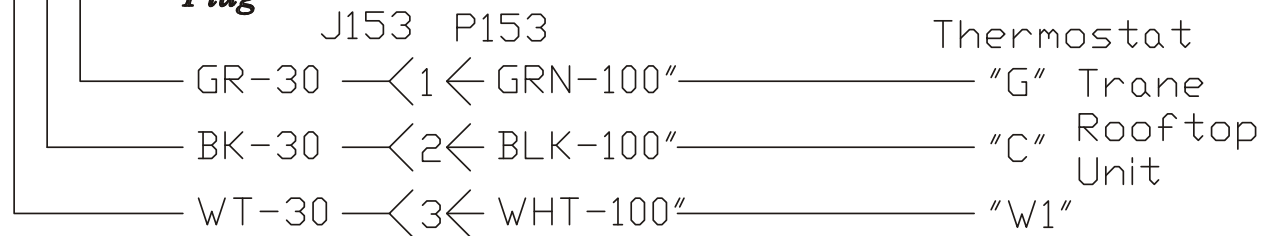
TRANE
ROOFTOP
UNITS
YCC/YSC/YHC

**ERV
Control
Board**



Note: Model
(R05/R06) use TB1 &
TB3. All other
models use TB37.

**ERV
Harness
Plug**



Note: Connect in
parallel @ terminal
strip.