RRS ROOFTOP SYSTEMS
A Ruskin Company

INSTALLATION INSTRUCTIONS

R20A-11TDW
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SUPERCEDES 06-23-03

ENERGY RECOVERY VENTILATOR

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY VENTILATOR (FIXED) USED WITH TRANE ROOFTOP UNIT MODELS YCD/TCD 15 TO 25 TON UNITS

AHRI CERTIFIED™ www.ahridirectory.org

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.

INTERTEK ETL CM C US LISTED

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 - Outdoor Fresh Air Hood with Filter
- 1 - Outdoor Exhaust Hood with Filter
- 1 - Platform Support Rail
- 1 - Bag Assembly
  - a) Gasketing.
  - b) Foot pads
  - c) Hardware for standoff legs.
  - d) Wiring harness
  - e) Hardware for attachment to economizer.

Package 2 of 2 contains:
- 1 - Balancing Damper Assembly
- 4 - Filler Panels

II - SHIPPING DAMAGE

Check 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 units equipped **with a return 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 — 600 Lbs. (Crated)
2. Remove crating. Then remove access panel (**See Figure 1**) to retrieve bag assembly. Replace access panel.
3. All panels must be in place for rigging.
4. Lifting lugs are supplied with the unit. Loosen machine bolts and rotate lifting lug as shown in **Figure 1**.

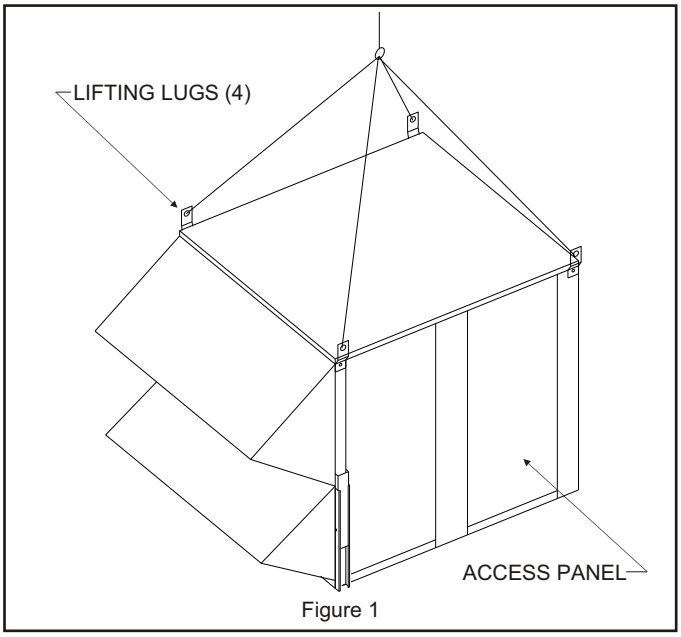


Figure 1

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.

2. Remove the rooftop unit horizontal return air access panels. Also remove any hoods and/or power exhaust equipment. Discard hoods, power exhaust equipment horizontal supply and return air access panels.

⚠ CAUTION

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

3. Install an internal balancing damper assembly.
4. Adjust return dampers to minimum air flow requirements.
5. Attach wire harness using hardware provided in bag assembly. **Refer field wiring diagram**. Route wiring through return damper assembly.
6. Locate wire harness plug in exhaust air stream so connection can be made with ERV after unit is set place.
7. Insert and attach hat sections between bottom and middle deck of balancing damper (qty 2) 16 3/16" from center on center line.
8. Insert and attach hat sections between middle deck and top of balancing damper (qty 2) 19 3/16" from center on center line.
9. Then install filler panels 2, 3, and 4.
10. Position platform support rail with flange pointing away from rooftop unit. Secure rail to rooftop unit base rail using provided #14 and position using existing screw holes.
11. Using lifting lugs, raise ERV unit approximately three (3) feet. Remove nut and bolt assembly to slide telescoping part of leg half way out of guide and attach flat foot with hardware provided in bag assembly. Position standoff legs so that flat foot is on bottom of stand and reinstall nut and bolt assembly. **DO NOT** fasten tightly, adjustment will need to be made when unit is put into position. **See Figure 2.**
12. Attach provided gasketing material to face of ERV unit to prevent air leakage.
13. Lift and move ERV unit into position in front of horizontal exhaust air opening.
14. Lower ERV into platform support rail catching the front edge of the ERV bottom into the flange. With the ERV in place, adjust the standoff legs to level and support ERV against rooftop unit filler panels. Use screws to securely fasten ERV to rooftop unit. Tighten securely. Rotate lifting lug to original position and tighten machine bolts
15. Insert and secure top filler panel #4 under top flange of rooftop unit and against top flange of ERV.

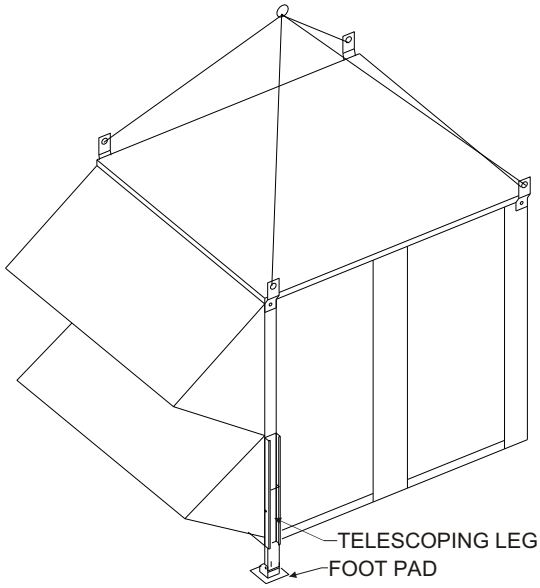


Figure 2

17. 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. Refer to the unit nameplate for minimum circuit ampacity and maximum overcurrent protection size. Electrical data is listed on unit rating plate and motor nameplates.
18. Remove ERV access panel to connect field wiring. Connect wire harness plug and jack of ERV control wiring together in exhaust air section.
19. Connect line voltage power supply to ERV unit from disconnect switch.
20. 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.

21. Replace access panel onto the ERV unit and secure.
22. Attach wiring diagram (supplied) to rooftop unit wiring diagrams.
23. Restore power to unit.
24. Cleanup once unit is operating properly, caulk any open joints, holes or seams to make the units completely air and water tight.
25. Leave this instruction manual with owner or in an envelope to be kept near 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 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 ERV. **See Figure 3.**

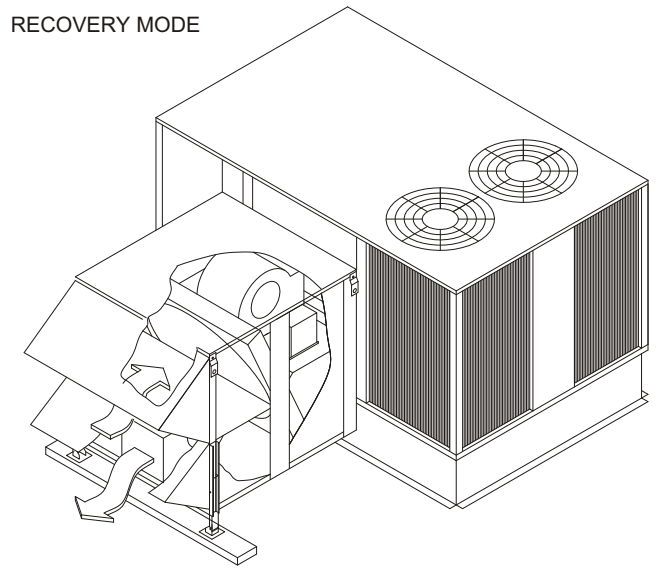


Figure 3

IX - SYSTEM CHECK

1. Disconnect main power.
2. Turn thermostat to "Cont" for blower operation.
3. Restore power to unit. Observe ERV wheel rotation and both fresh air and exhaust air blowers will operating.

Note: If 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.

4. Verify that the ERV (3) three phase blower motors are phased sequentially ensuring correct rotation and operation.
   a) Disconnect power.
   b) Reverse any two field power leads to the ERV.
   c) Reapply power.

A - Return Damper Settings

Manually adjust position of dampers. This is accomplished by loosing and tightening set screw on positioning rod.

B - Blower Speed Adjustment

Blower speed selection is accomplished by changing the sheave setting on both fresh air and exhaust air blowers. Both blowers are factory set at "closed" for maximum airflow. To determine air flow setting, external static pressure readings will need to be read across the ERV. **See Figure 4** for location to take pressure readings.

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

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.

Belt Alignment
Proper alignment is essential to maintain long V-Belt life. Belt alignment should be checked every time belt maintenance is performed, each time the belt is replaced, and whenever sheaves are removed or installed.

Belt Installation
Always move the drive unit forward so the belt can be easily slipped into the groove without forcing them. Never force the belt into a sheave with a screw driver or wedge. You will damage the fabric and break the cords. It is recommended that the pulley center distances be offset by ¾" for proper length. This will allow the motor assembly to slide forward to remove belt and backward for belt tension.

Belt Tension
Measure the span length (center distance between pulleys when belt is snug). Mark center of span, then apply a force (6 to 9 Lbs on new belts) perpendicular to the span large enough to deflect the belt $\frac{1}{64}$" for every inch in span length.

Energy Recovery 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 5.** 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.

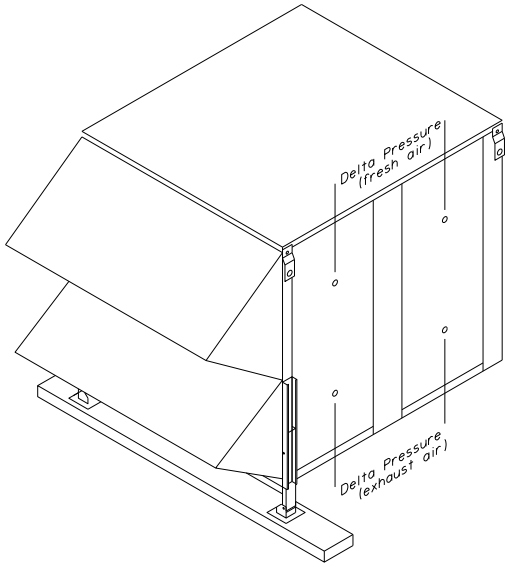


Figure 4

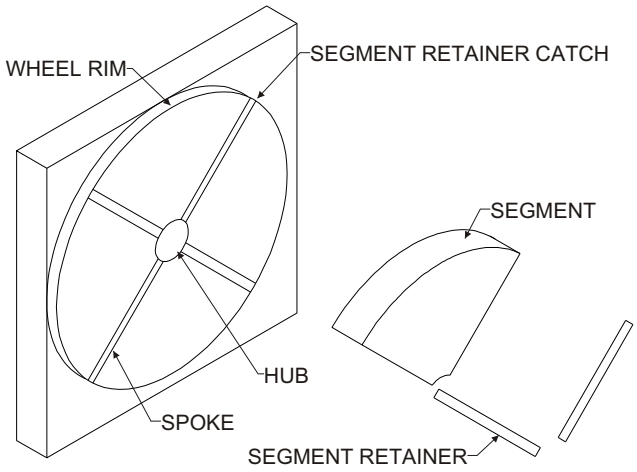


Figure 5

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

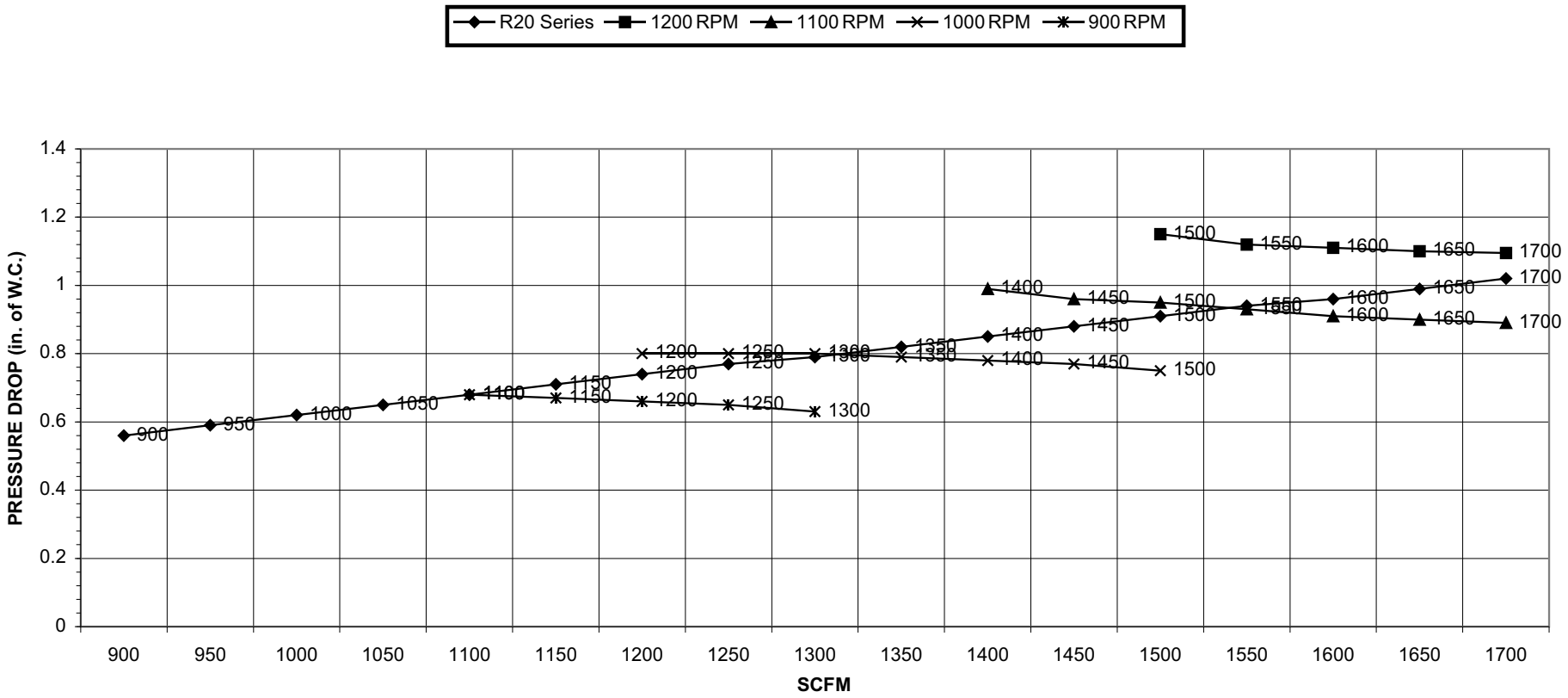
Additionally, RSI guarantees to replace standard components purchased new from a RSI vendor, (motors, controls, etc.) that may be found defective, within twelve (12) months of the installation date. The components warranty, however, excludes service call charges and labor cost for replacing or adjusting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

SCFM vs. PRESSURE DROP

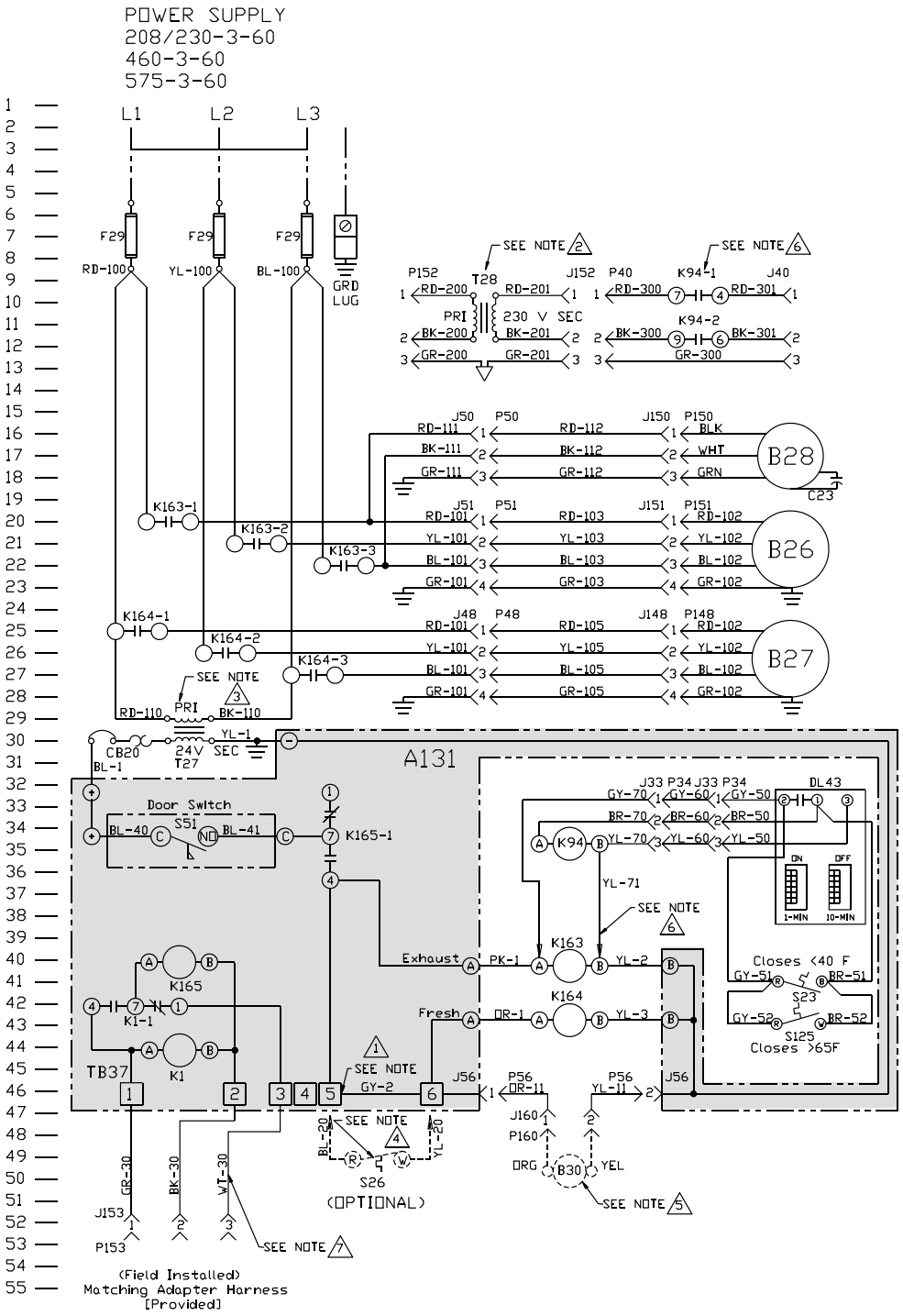


Equation of line: SCFM=(PD -0.0492647)/0.0005721)

TABLE #1

ERV UNIT SCHEMATIC DIAGRAM

COMPONENT CODE	
A131	Fixed Relay Board
B26	Motor, Exhaust Air
B27	Motor, Fresh Air
B28	Motor, Desiccant Wheel



Notes:

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

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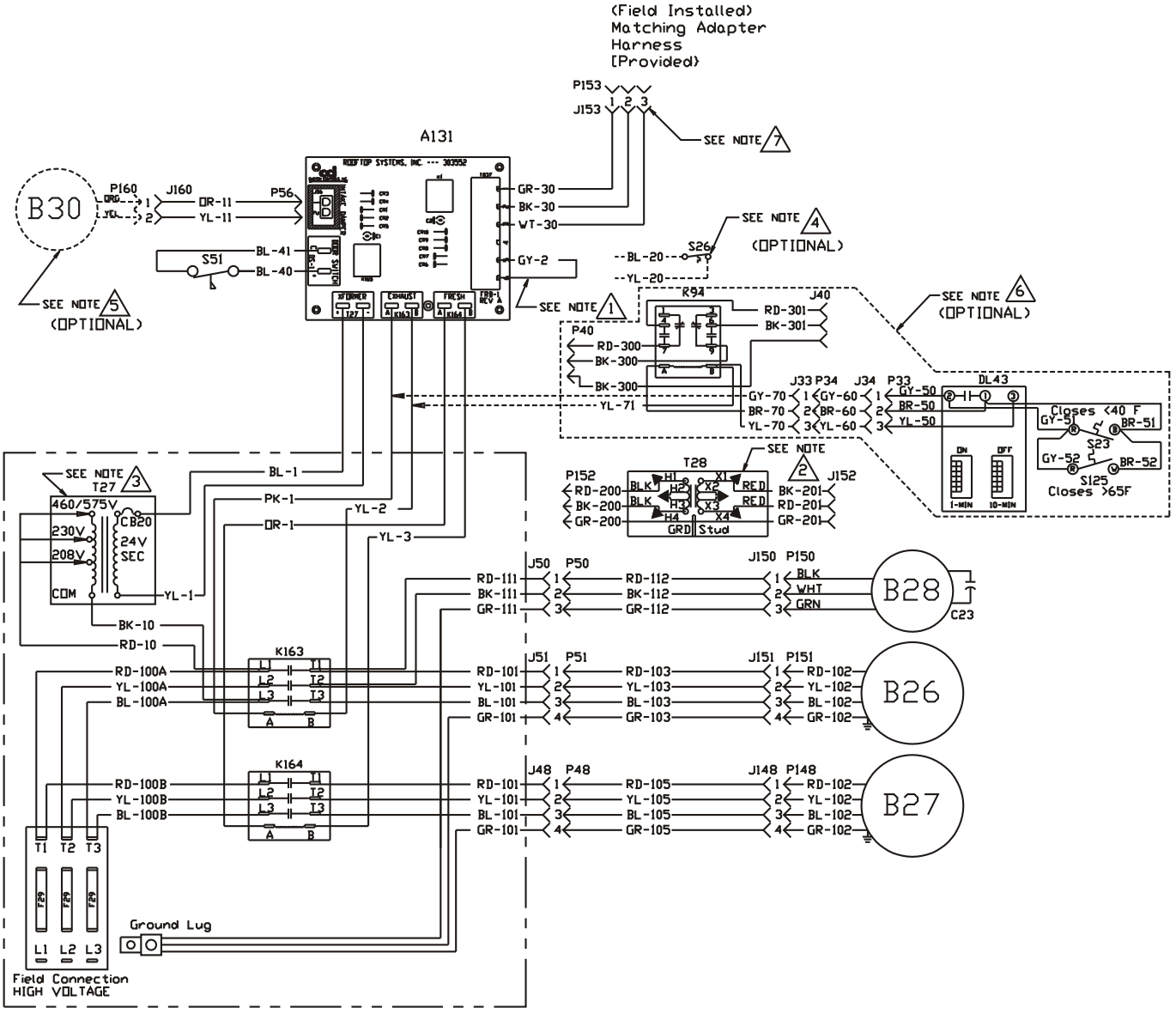
ERV UNIT WIRING DIAGRAM



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

Unit#: 01-R20-01XX-23/-33/-43

Field Wiring Harness