RRS ROOFTOP SYSTEMS

INSTALLATION INSTRUCTIONS

R20A-10GDW
SEPTEMBER 21, 2015

ENERGY RECOVERY VENTILATOR

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY VENTILATOR (FIXED) USED WITH GOODMAN ROOFTOP UNIT MODELS 7 ½ TO 12 ½ 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.

C ETL US LISTED Intertek

Patent# 5,548,970

ETL Certified per UL 1995 and CSA 22.2

I - SHIPPING AND PACKING LIST

Package 1 of 1 contains:

1 - Energy Recovery Wheel Assembly
- 1 - Transition (Installed)
- 1 - Balancing Damper Assembly

1 - Box Assembly
- 1 - Roll of ¾" x 1 ¼" gasket
- 1 - 160" of ⅛" x ½" gasket
- 1 - Wiring Harness
- Hardware for Attachment

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 the absence of local codes, with the current National Electric Code, ANSI/NFPA No. 70.

V - APPLICATION

Energy Recovery Ventilators **(ERV)** are used with 7 ½ to 12 ½ ton rooftop units **with field installed RRS internal balancing damper (supplied).** 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 - 425 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.

⚠ 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.

VII - INSTALLATION

1. Disconnect power to rooftops unit.
2. Remove the RTU return air access panels. Also remove any hoods and/or power exhaust equipment. Discard hoods, power exhaust equipment, and return air access panels.
3. Locate the provided low voltage field wiring harness. This field harness should plug into the 9 pin economizer jack on one end the 3 pin controls plug from the ERV on the other. **See Figure 1. Refer to System Wiring on Page 5.**

Note: If the 9 pin economizer jack has a jumper plug attached, save in the controls section for future testing.

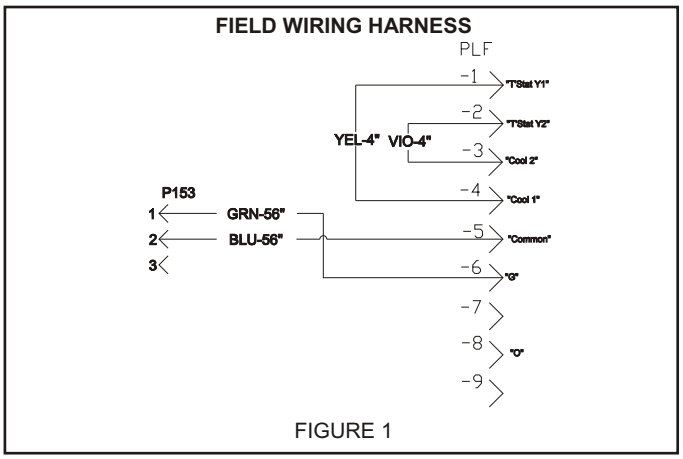


FIGURE 1

4. Install the provided balancing damper into the return air section of the rooftop unit.
5. Adjust the balancing damper for the minimum air flow requirements by loosening and tighten setscrew on the positioning rod, opening the return dampers.
6. 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.
7. Locate roll of provided ¾" and ⅛" gasket material. Apply ¾" gasket to the middle and bottom decks of the ERV.
8. 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.
9. Lift and move ERV unit into position with open end in-line with horizontal openings. Apply ⅛" gasket material to perimeter of ERV.
10. Position ERV in front of the balancing damper. Line up the ERV to the balancing damper assembly in the rooftop unit.

Note: To prevent roof penetration an equipment support or an equivalent such as pressure treated 2" x 6" x 48" piece of wood should be used and placed under feet of standoff legs.

11. Secure the ERV to the RTU with the provided screws.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.
17. 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.

18. Replace access panels onto the ERV unit and secure.
19. **Restore power to unit**
20. Cleanup once ERV is operating properly. Caulk any open joints, holes or seams to make the unit completely air and water tight.
21. 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 revolutionary concept in rotary air-to-air heat exchangers. Designed as a packaged unit for ease of installation and maintenance, only matching up to a rooftop unit with an internal balancing damper (included) and the connection of electrical power is required to make the system operational.

When slowly rotating through counter flowing exhaust and fresh air streams the ERW absorbs sensible heat AND latent heat from the warmer air stream in the first half of its rotation and transfers this total energy to the cooler air stream during the second half of this rotating cycle. Rotating at 50-60 RPM, the ERW provides a constant flow of energy from the warmer to the cooler air stream. The large energy transfer surface and laminar flow through the ERW 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 the winter, the ERW 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 ERW is always being cleaned by air, first in one direction and then the other. Because it is always dry, dust or other particles impinging on the surface during one half of the cycle are readily removed during the next half of the cycle.

During the heating season, when outdoor air temperatures are below 15^{o}F, it is recommended to use the (optional) low ambient kit.

Optional Kits

Motorized Intake Air Damper
This damper mounts inside the outdoor air intake hood, it opens when the ERV supply blower is energized and closes when de-energized.

Motorized Exhaust Air Damper
Damper mounts inside the exhaust air hood, it opens when the ERV is energize and closes when the ERV is de-energized.

Pressure Sensors
Measurement devices (Magnahelics) on ERV that measure pressure across the energy recovery wheel.

R*otation Sensor*
A magnetic sensor and logic board that measure pulses from a magnet on the spinning energy recovery wheel. A lack of measured pulses after initial start up results in an alarm. The alarm can be wired into building management hardware or to a thermostat with alarm switch terminals, it will warn that the wheel has stopped spinning, but does not otherwise effect operation.

Stop, Start, Jog [Climate Smart]
This option ads an Economizer or free cooling mode to the ERV. The wheel stops spinning to allow air to pass without energy transfer, starting and spinning intermittently in order to keep the wheel clean.

Low Ambient Kit
Prevents frost buildup on energy recovery wheel by terminating intake air when the discharge air temperature falls to a set level. Intake blower operation resumes after a 16°F rise above the field adjustable set point.

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 10°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.

Filter Racks/ Filter Options
ERVs can have fresh and exhaust air filter racks and filters added as an option to keep the ERW clean, MERV 8, 11, or 13 filters can be ordered with the unit.

Dirty Filter Switches
Pressure differential switches that can be hooked up to an alarm to alert when pressure drops across a filter bank indicating dirty or clogged filter, they do not otherwise effect operation.

Wheel Type
While the standard energy recovery wheel absorbs both sensible and latent heat a sensible only wheel can be ordered for applications where the sensible portion of the heat load needs to be removed from a space without returning the humidity.

Smoke Detector
Smoke detectors can be factory ordered with the ERV, a qualified technician needs to field wire the smoke detector into the controls to break common in case of alarm.

IX - SYSTEM CHECK

1. Disconnect main power.
2. Set thermostat Fan switch to “On” or jumper G to R in RTU.
3. Restore power to unit, observe system. Energy recovery wheel should start spinning, motorized outside air dampers should power open within 20-30 seconds, blowers should turn on when dampers are open.
4. Verify the ERV three phase blower motors are phased sequentially ensuring correct rotation and operation. If both blower are running backwards:
   A. Disconnect Power.
   B. Reverse two of the high voltage line in wires on the ERVs fuse block.
   C. Reapply Power.

Note: Blower Motor rotation is checked in factory, do not switch wires at contactors or on motors if blowers are spinning backwards at startup.

5. Verify that both blower motors are operating under their full load Amp rating (FLA). The FLA rating can be found on each motor and on the units name plate.
6. Verify that the fresh air and exhaust air motorized dampers are opening and closing when unit turns on/off.

Note: If unit is not operating properly refer to the troubleshooting guide.

7. Static test ports are provided to verify intake and exhaust CFM, these ports can also be used with a temperature probe to verify temperature transfer through the wheel.
8. Set thermostat to normal operating position.
9. Restore power to unit.

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.

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.

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, loosing 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 - Sequence of Operation

1. The thermostat or Building Management System (BMS), sends a 24 Volt AC signal to the rooftop unit for cooling, heating, fan only or ventilation operation.
2. The ERV is activated simultaneously with the blower of the rooftop unit. The fresh air blower, the exhaust blower and the enthalpy wheel motor of the ERV are activated, these motors will remain energized as long as the blower in the rooftop unit is energized and the outdoor conditions are adequate for energy recovery.
3. If the optional motorized fresh air damper in the outside air intake of the ERV is present, the damper must open causing a proving switch to close in order to energize the fresh air blower (10-20 seconds after the exhaust blower and enthalpy wheel have started).
4. If the optional low ambient kit is present, and the temperature leaving the exhaust side of the enthalpy wheel is lower than the field adjusted set point on the temperature sensor, the optional motorized fresh air damper will close and the intake blower will de-energize. The exhaust blower and enthalpy wheel motor will continue to operate until the temperature sensor has a 16F rise, at this point the enthalpy wheel should be defrosted and the optional motorized damper will open and the fresh air blower will reactivate.
5. If the Climate Smart (start, stop, jog) option is present and outside conditions are adequate for free cooling the enthalpy wheel motor will stop for 10 minutes to allow for cool air to enter the building. It will then start or jog the wheel for 1 minute to keep dirt from building up on the wheel.

XI - Trouble Shooting guide

ERV will not operate:

1. Quick check items.
   A. Verify that the door switch is closed, the switch must be in the closed position in order to power the control board.
   B. Verify 24V power to the control board at terminals Xformer + & -. If voltage is low check high voltage into the unit (sec 2-A) and check that the T-1 wire from the high voltage into the step down transformer is on the correct terminal (208v-230v-460V) for the units voltage.
   C. Verify 24V to the control board's terminal strip at T-1 (G) and T-2 (Com) when rooftop unit's blower is on. These terminals must be powered by the RTUs controls to operate the ERV.

A jumper from R to G on the RTU controls can be used to test operation of the ERV if a thermostat is not available.

1. Verify high voltage to ERV
   A. Verify that the unit has the proper voltage in at terminals L1, L2 and/or L3 at the fused high voltage connection terminal block. Voltage specifications are on the units name plate.
   B. Verify that the fuses are good, (check voltage across fuses with power on, voltage should be 0) replace any bad fuses.

ERV Has Power, But Motors Are Spinning Backwards

1. Motors are checked for proper rotation at the factory, if the motors are spinning backwards after install reverse the phase by switching two wires on the high voltage IN terminals.
2. If the motor is spinning backwards after replacement switch the L1 & L2 wires connected inside the motors access panel. Do no rewire unit.

*Many of motors used in production of the ERVs are multi voltage (230/460V) motors. When replacing motors or diagnosing a motor that won't start. Care should be taken to make sure the wires inside the motors access panel are connected securely and in the proper configuration.

ERV Has Power, But the Enthalpy Wheel Does Not Spin (Start Stop Jog #1)

1. If the unit has the Start, Stop, Jog (climate smart) option installed the enthalpy wheel motor will turn off for 10 minute intervals when outside conditions are optimal for free cooling, the fresh air and exhaust blowers will continue running. The Start, Stop, Jog control board has a white test button that when pressed will bypass the boards logic and turn the enthalpy wheel on. See Start, Stop, Jog in Options/Accessories troubleshooting for further information.
2. With the power off, check that the wheel belt is in place and tight.
3. Check for 24 volts between terminals Exhaust (K163) A&B, if the unit doesn't have Start, Stop, Jog the relay is connected directly to the Exhaust A and B terminals on the control board. If terminals 1&2 are energized with 24V, there is 24V in to Xformer + & - , and there is no voltage to Exhaust A&B the board is bad.
4. If there is 24 Volts at Exhaust A&B trace wires to the enthalpy wheel relay, check terminals A&B on the Relay for 24 Volts, check for high voltage power into and out of the relay. If the relay is energized/closed and no power is passing from terminals 7 to 4 or 9 to 6 the relay is bad.
5. You can jump the enthalpy wheel relay to test its operation by running a jumper from the 24v out on the transformer (blue wire) to the A terminal on the relay after removing the pink wire.
6. If the relay is closing and there is proper voltage between terminals 4&6 on the relay check the wheel's motor for proper voltage by using a multi-meter at Plug P-150 next to the enthalpy wheel motor.
   A. If voltage is present and this is a single phase motor (most units) check the motor's capacitor.

B. If the capacitor is bad replace the capacitor, continue testing the motor

C. If proper voltage is present and the capacitor is good check the wires into the motor for continuity, if there is no continuity through the windings a wire connection is loose or the motor is bad, check wire connections between harness and windings, if connections are good the motor is bad, replace motor.

ERV Has Power But the Exhaust Blower Does Not Operate

1. With power off. On units with belts, check that the blower's belt is tight and in place, if it is loose adjust the motor or sheave to tighten it, if it is broken replace it.
2. Check the contactor (K-163) to see if the issue is with high voltage or low voltage, if the contactor is closed check the motor. If it is open, push closed to check that the motor starts then check controls
3. Check for 24 Volts between Exhaust A&B terminals on the control board.
   A. If the controls are calling for operation but there are not 24 Volts between Exhaust A&B the board is bad.
   B. If the controls are calling for operation and there are 24 Volts between Exhaust A&B check the yellow wire for direct connection to the proper contactor (K-136), then check the pink wire for continuity through the field installed exhaust damper motor (if option was chosen) or the factory installed plug (PK-3) at the Jack (J-161) located in the exhaust blower section.
3. If contactor is closed check voltage to the motor by testing wires at Plug P-151, proper voltage is listed on the unit's information tag. If there is proper voltage to the motor and the motor is not spinning the motor is bad. With single phase units check the capacitor, if capacitor is bad replace it then continue checking the motor.

ERV Has Power But The Fresh Air Blower Does Not Operate

1. With power off. On units with belts, check that the blower's belt is tight and in place, if it is loose adjust the motor or sheave to tighten it, if it is broken replace it.
2. Check the contactor (K-164) to see if the issue is with high voltage or low voltage. If the contactor is closed check the motor. If it is open, push closed to check that the motor starts, then check controls.
3. If the contactor is open check for 24 Volts between Fresh A&B terminals on the control board.
   A. If the controls are calling for operation and there is no voltage between Fresh A&B check terminals 5&6 to see if low ambient kit is installed (blue and yellow wires installed instead of a jumper), jumping terminals 5&6 will bypass the low ambient sensor and energize terminals Fresh A&B. See Low Ambient Kit in Options/Accessories troubleshooting for further information.
   B. If the controls are calling for operation and there is no voltage between Fresh A&B and there is continuity between terminals 5&6 then the board is bad.
   C. If the controls are calling for operation and terminals Fresh A&B are energized but the contactor is not energizing, check the yellow wire from terminal Fresh B to contactor (K-164), check the orange wire for continuity from terminal Fresh A through factory installed fresh air damper plug (P-160) to contactor. In models without a fresh air damper option there should be an orange jumper between pins 3&4 on the P-160 plug, when the fresh air damper option is chosen these wires connect to an end switch that is closed by a cam when the fresh air damper opens. See Sequence of Operations.
1. If contactor is closed check voltage to the motor by testing wires at plug P-148, proper voltage is listed on the unit's information tag. If there is proper voltage to the motor and the motor is not spinning the motor is bad. With single phase units check the capacitor, if capacitor is bad replace it then check the motor.

ERV Has Power But The Motorized Fresh Air Damper Does Not open

1. Verify 24V in between terminals 1&2
2. Check voltage at junction J-56 on the ERV control board, there should be 24V between J-56 1&2 during normal operation, If the unit has a low ambient kit installed and temperatures are low the controls de-energize J-56 and Fresh K-164 terminals on the control board, jump Terminals 5&6 on the Terminal strip to bypass see Low Ambient Kit in Options/Accessories Troubleshooting for further information.
3. If there is voltage at the control board check for 24V at plug P-160 between pins 1&2
4. If there is voltage at P-160 make sure the damper linkage isn't binding and that the wires are attached to the actuator firmly. If the actuator still doesn't move when 24V is applied replace the actuator.

ERV Has Power But The Motorized Exhaust Air Damper Does Not Open

1. Verify 24V In between terminals 1&2
2. Check voltage at Exhaust A&B on control board
3. If there is voltage at Exhaust A&B on the control board, trace wires to the exhaust blower compartment and plug P-161, Check for 24V between Pins 1&3.
4. If there is 24V at plug P-161 make sure the field connected P-161 plug for the damper is inserted firmly into J-161, that the damper linkage isn't binding and that the wires are connected firmly to the actuator. If the damper actuator still does not move the actuator is bad.

Options and Accessories Troubleshooting

Climate Smart - Start, Stop, Jog

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 40F-70F, 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).

Low Ambient Kit
The low ambient kit is an optional temperature probe on a normally closed switch that closes the fresh air damper and turns off the fresh air blower when temperatures in the blower compartment suggest a frosted enthalpy wheel. The adjustable sensor is factory set for 20F. The sensor is mounted in the blower compartment with its probe near the blower's inlet, it is wired into the terminal strip 5&6 terminals.

It can be tested in hot weather by turning the dial up to a higher temperature and checking to see if the normally closed relay opens. In cold weather if the "R" terminal and "W" terminal in the sensor show an open circuit the bulb can be warmed above the set-point at which point the relay should close.

Dirty Filter Switch
Dirty filter switches are an optional kit that put an adjustable pressure switch with the Low inlet on the blower side of the filter and the High inlet connected to the far side of the filter via tubing. A dirty filter moves less air lowering the pressure on the fan side Low inlet closing the normally open sensor switch and allowing an alarm. The sensor(s) are prewired into their own terminal strip and can be field wired in series (normally closed), in parallel (normally open) or individually to an alarm device.

*The Dirty Filter switch is not wired into the logic of the ERV, it will not stop the ERV if filters are dirty, it will only set off a field installed alarm or warning that the filters are dirty and need to be changed.

Pressure Gauge
An optional Magnahelic pressure gauge can be ordered as an option to check pressure in In W.C., the Magnahelics are factory installed in the doors of the ERV to give pressure readings in the different quadrants of the unit. Occasional re-zeroing of the gauge is required.

Rotation Sensor
The rotation sensor is an optional missing pulse detector powered off of the exhaust and wheel 24v signal. A sensor is mounted in the exhaust compartment near the wheel and senses rotation via a magnet on the outside frame of the wheel. Its output is wired to a terminal strip and an alarm can be connected to alert when rotation of the wheel has stopped.

If an alarm is going off and the wheel is rotating properly check that the rotation sensor is mounted and adjusted to properly sense the sensor magnet in the wheel. Check wire connections to make sure they are secure.

If an alarm is tripped and the wheel is not rotating check the wheels belt, it's motor, and capacitor for proper operation.

XII - 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
Eight pie-shaped ERW segments, are seated on stops between the segment retainer which pivots on the wheel rim and 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 and P150] **(Refer to wiring diagrams in this instruction manual).** Remove segment and wash with water and/or mild detergent.

To install wheel segments follow steps A through E. **See Figure 2.** Reverse procedure for segment removal.

A. Unlock two segment retainers (one on each side of the selected segment opening.

B. With the embedded stiffener facing the motor side, insert the nose of the segment between the hub plates.

C. Holding segment by the two outer corners, press the segment towards the center of the wheel and inwards against the spoke flanges. If hand pressure does not fully seat the segment, insert the flat tip of a screw driver between the wheel rim and outer corners of the segment and apply downward force while guiding the segment into place.

D. Close and latch each segment retainer under segment retaining catch.

E. Slowly rotate the wheel 180°. Install the second segment opposite the first for counterbalance. Rotate the two installed segment 90° to balance the wheel while the third segment is installed. Rotate the wheel 180° again to install the fourth segment. Repeat this sequence with the remaining four segments.

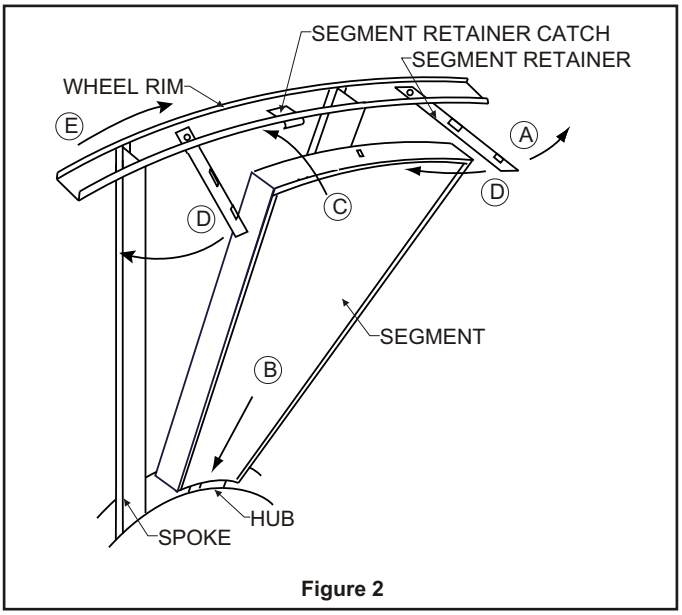
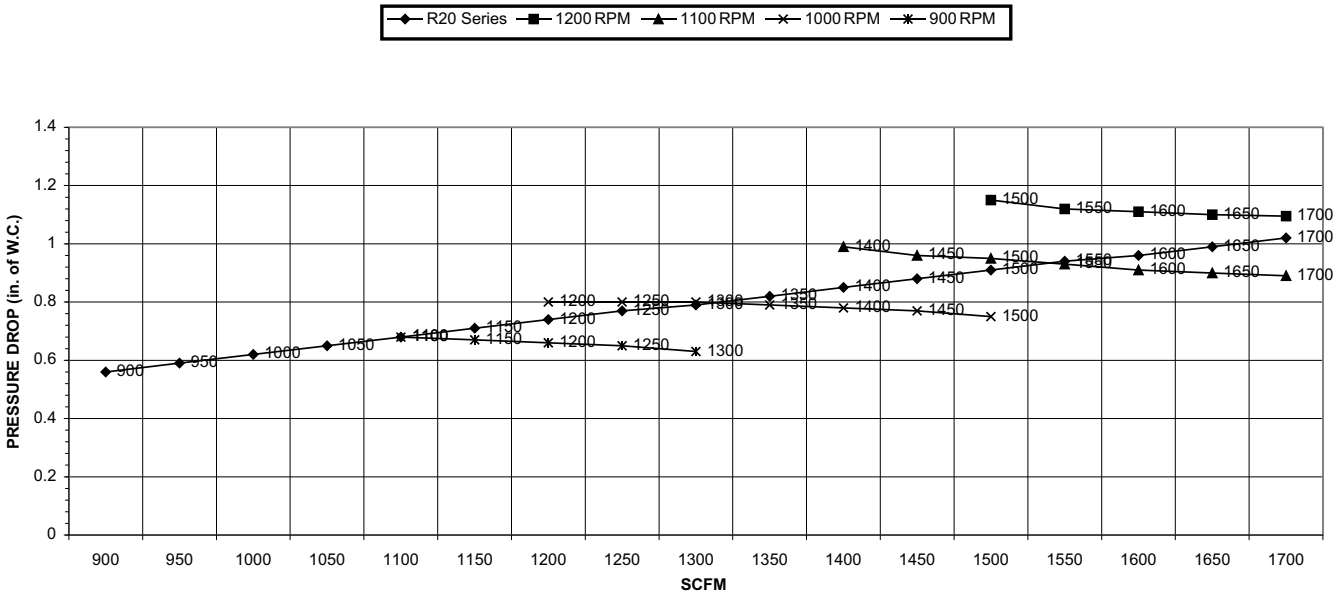

SEGMENT RETAINER CATCH
SEGMENT RETAINER
WHEEL RIM
E
A
D
C
D
SEGMENT
B
HUB
SPOKE

Figure 2

ENERGY RECOVERY VENTILATOR

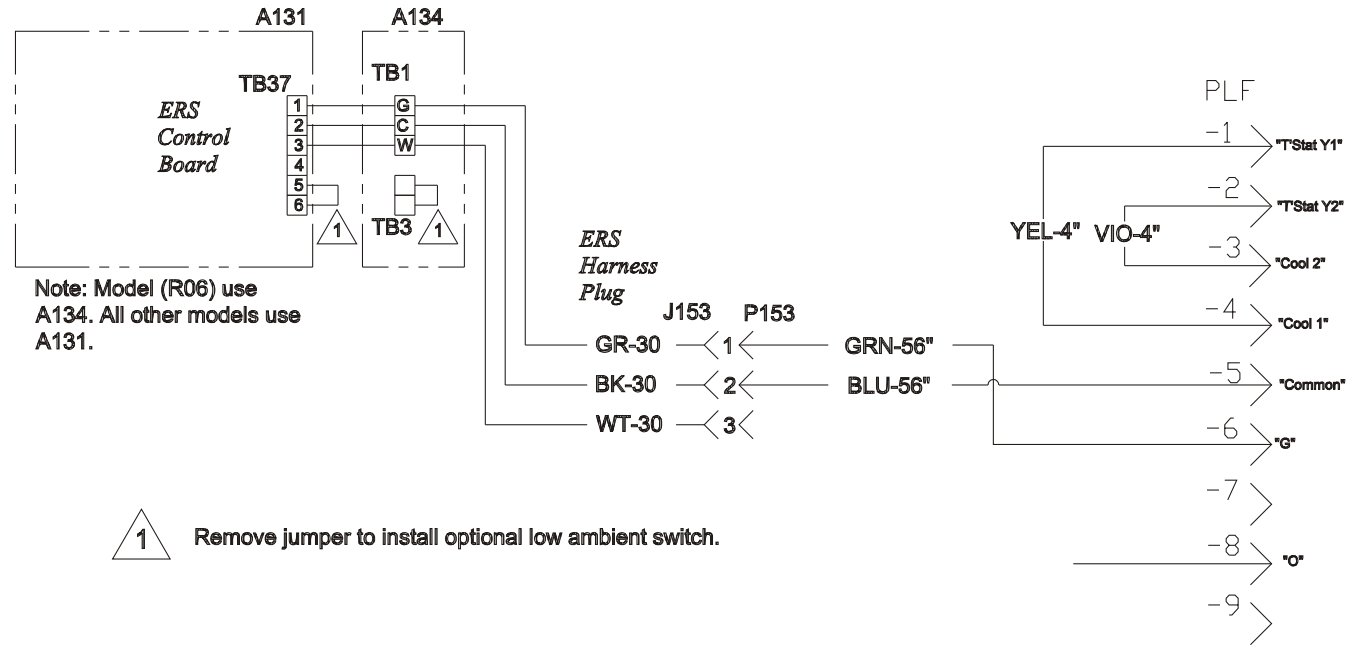
SCFM vs. PRESSURE DROP



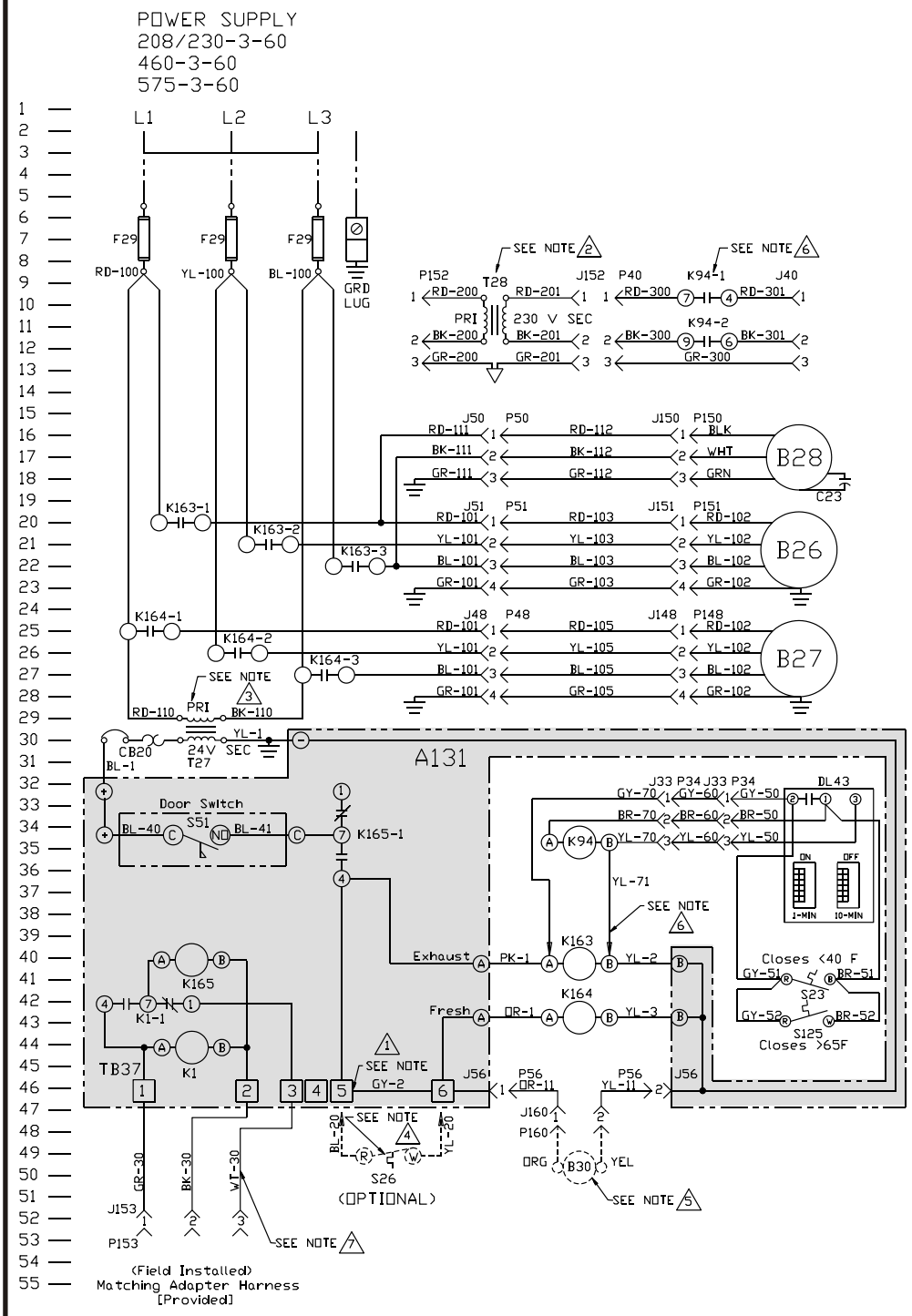
Equation of line: SCFM=(PD -0.0492647)/0.0005721)

TABLE #1

SYSTEM WIRING



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
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	Contactor, Exhaust Air Motor
K164	Contactor, 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)

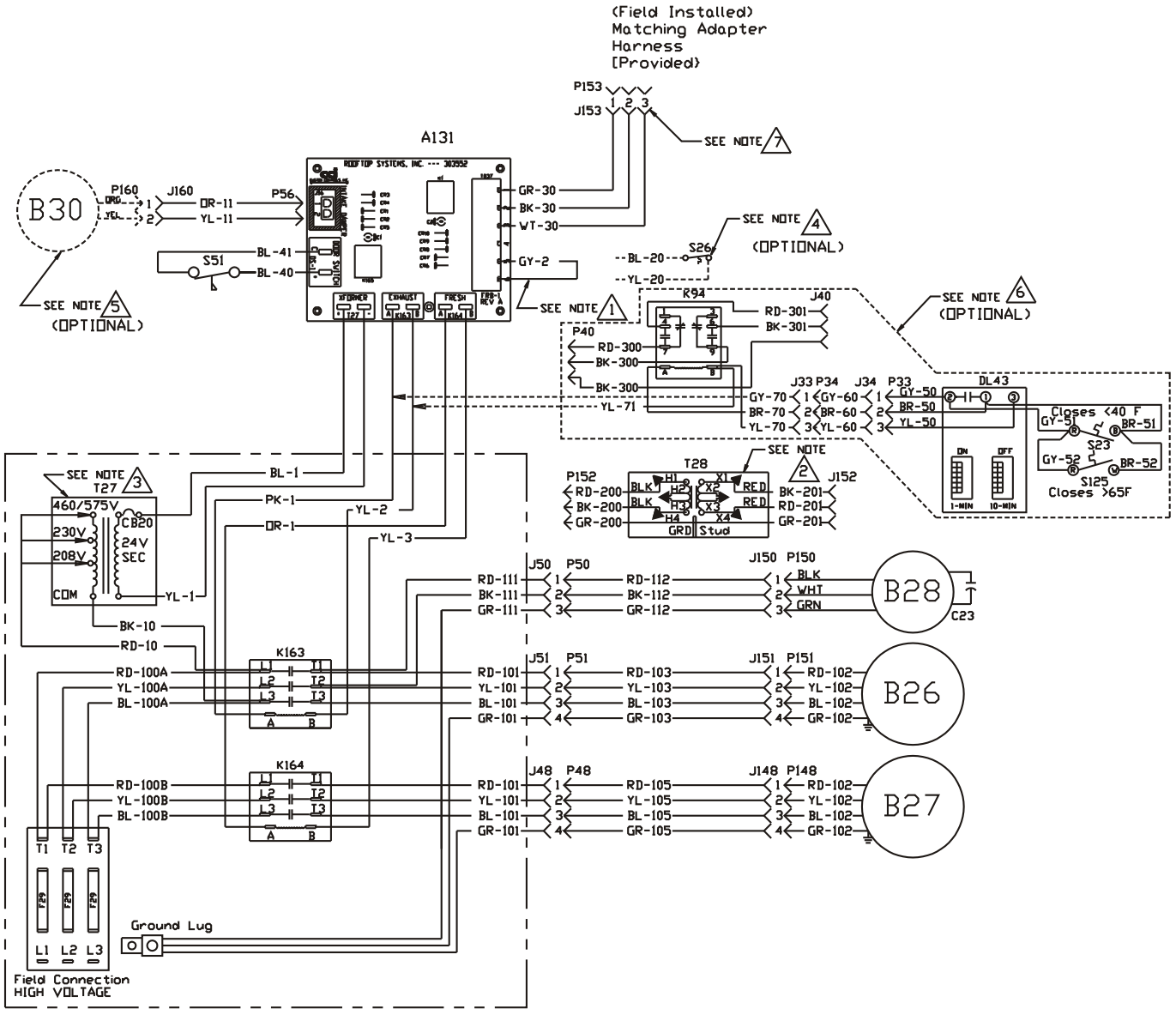
WIRE COLOR	
BK	Black
BL	Blue
GR	Green
GY	Gray
OR	Orange
PK	Pink
RD	Red
WH	White
YL	Yellow

Notes:

1. Remove jumper to install field optional low ambient switch.
2. Step-down transformer assembly for 460 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.

R20A-10GDW

ERV UNIT WIRING DIAGRAM



Notes:

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

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

Notes

START UP INFORMATION SHEET

VOLTAGE - ERS 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 - ERS 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.