R06AL-44LDW

October 22, 2026
Supersedes: 02-20-23

50R0644xH ENERGY RECOVERY SYSTEM

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY SYSTEMS (ERS) USED WITH KGA/KCA 024S-090S KHA 024S-072S UNITS

Patent# 5,548,970

ETL Certified per UL 1995 and CSA 22.2

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

SHIPPING AND PACKING LIST

Package 1 of 1 contains: **See Illustration 1 and 2.**
1 - Energy Recovery System Assembly
1 - Outdoor Fresh Air Hood with Filter
1 - Outdoor Exhaust Air Hood with Barometric Damper
1 - ERS Support Rail
1 - Adaptor Panel
1 - Balancing Damper Assembly
1 - Door Panel
1 - Hardware Bag:
- 14' - Gasket ¾" x 1 ¼"
- 7' - Gasket ⅛" x ½"
- 1 - Field Harness
- 4 - Wire Ties
- 12 - Self-tapping Screw(s) 10-16 x ½"
- 8 - Gold Screw(s) 10-16 x ½"
- 1 - Installation Instruction
- 2 - Wiring Labels

PRINCIPLE OF OPERATION

The ERS enthalpy wheel contains parallel layers of a polymeric material that are impregnated with silica gel (desiccant). The wheel is located in the entering (intake) air and exhaust air streams of the ventilation equipment. As the wheel rotates through each air stream, the wheel surface adsorbs sensible and latent energy. In the heating mode, the wheel rotates to provide a constant transfer of heat from the exhaust air stream to the colder intake air stream. During the cooling season, the process is reversed.

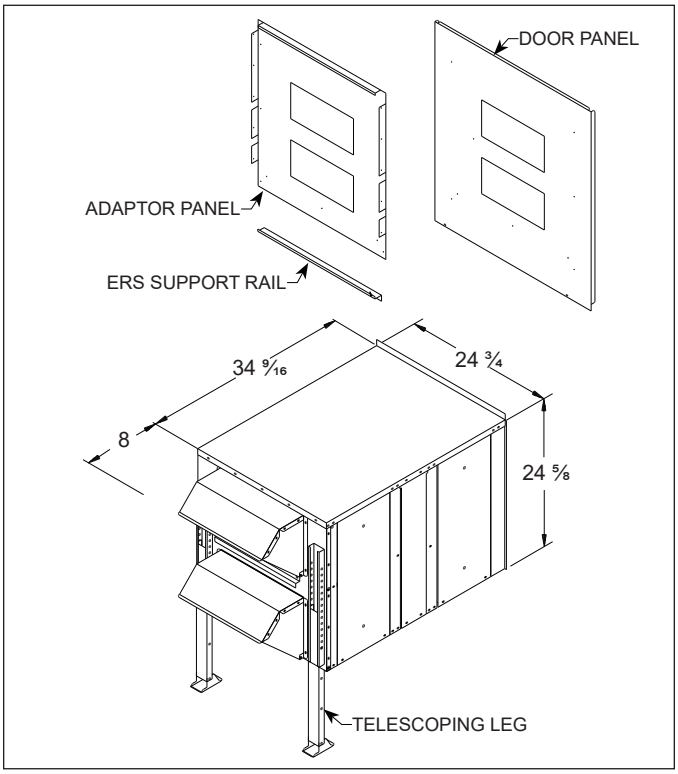


Illustration 1. Unit Dimensions

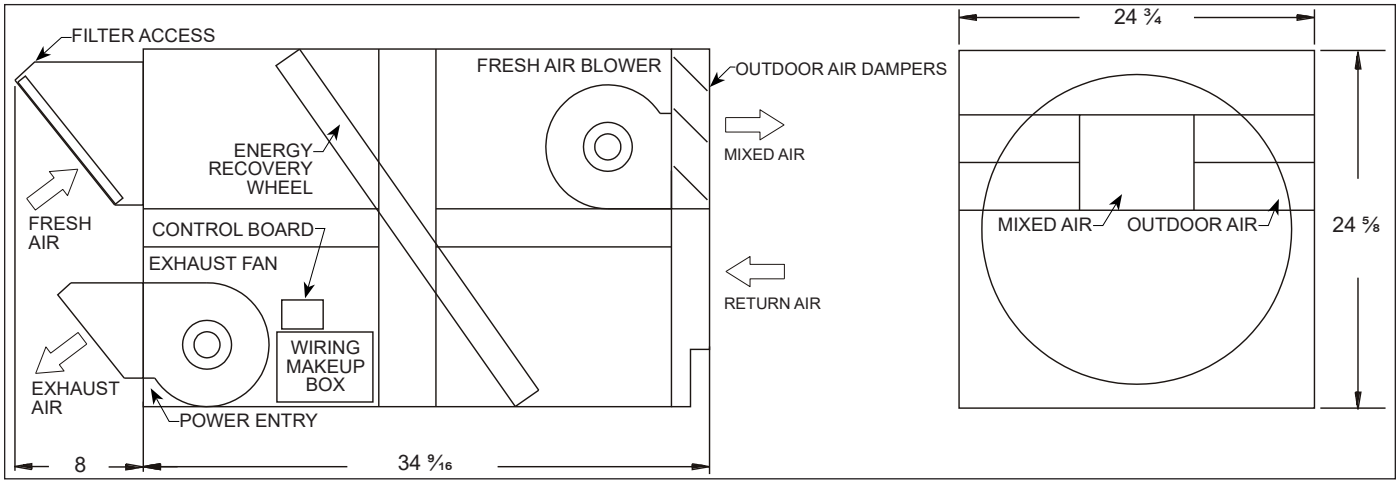


Illustration 2. Unit Layout

⚠ CAUTION

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.

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.

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.

SHIPPING DAMAGE

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

RIGGING UNIT FOR LIFTING

1. Maximum weight of unit is — 300 Lbs (crated).
2. Remove crating and retrieve hardware bag that is inside of ERS.
3. All ERS door panels must be in place for rigging.
4. Use straps to lift unit.

ROOFTOP UNIT PREPARATION

1. Disconnect all power to rooftop unit.
2. Open filter access door.
3. Remove the rooftop unit horizontal return air access panels. Also remove any hoods and/or power exhaust equipment. **If economizer is installed it MUST BE removed.** Discard hoods, power exhaust equipment, and horizontal return air panels. **See Figure 1.**

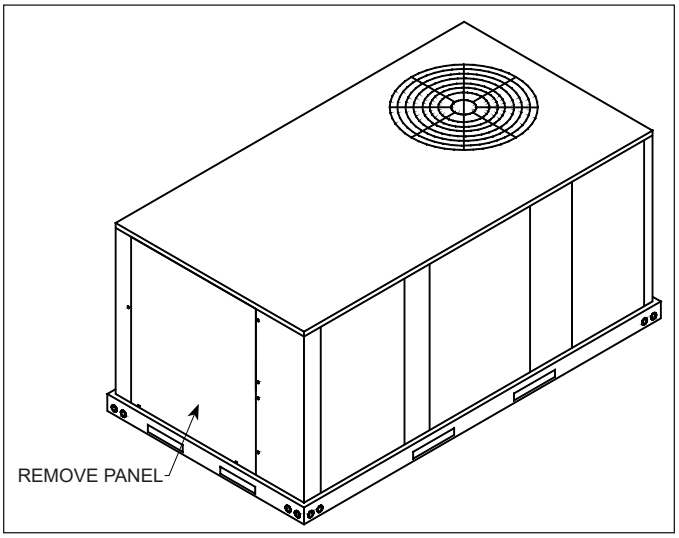


Figure 1 . Remove RTU Return Air Access Panel

4. Slide in balancing damper on economizer rails. Put Slide in balancing damper on economizer rails. Put balancing damper in place with the damper blade at the bottom. Balancing damper mounts in place of the economizer shown in **Figure 2**. Loosen wing nut on adjustable quadrant, rotate arm to set blades to 50% open and retighten wing nut. **See Figure 3.**

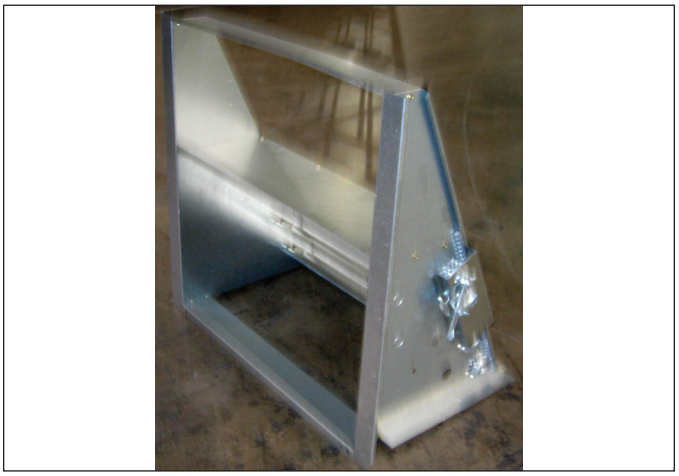


Figure 2. Balancing Damper

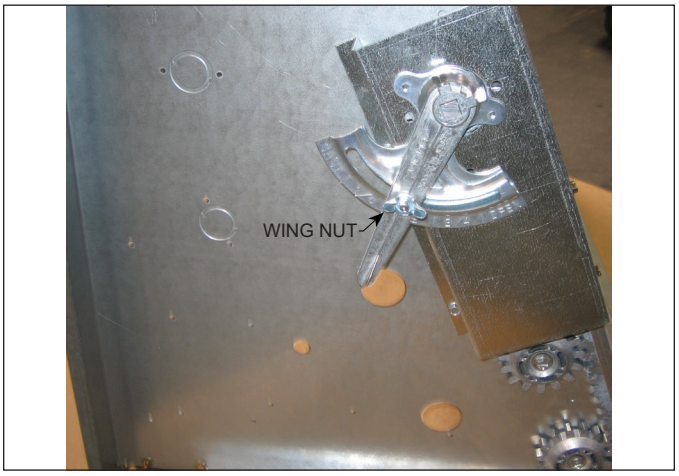


Figure 3. Loosen Wing Nut

5. Plug field harness P27 into economizer plug J4. **See Figure 4.**

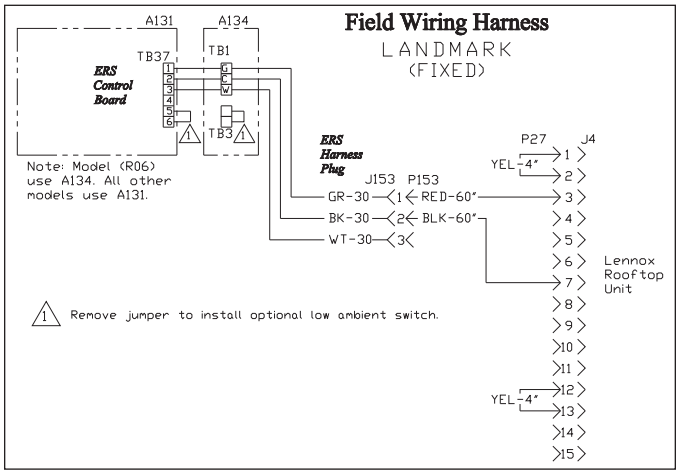


Figure 4. Wire Harness Wiring (Fixed) Diagram

6. Using wire ties neatly route the wires to clear any moving parts.
7. Route the 3-pin connector P153 and wiring harness under the balancing damper and out the return air. Coil excess wire and route into return air of the rooftop unit. **See Figure 5.**



Figure 5. Wire Harness (P153)

8. Verify the provided adaptor panel is secured to the new door panel. Also verify the platform support rail is secured to the adaptor panel. **See Figure 6.**
9. Install new door panel over balancing damper and secure. **See Figure 6.**

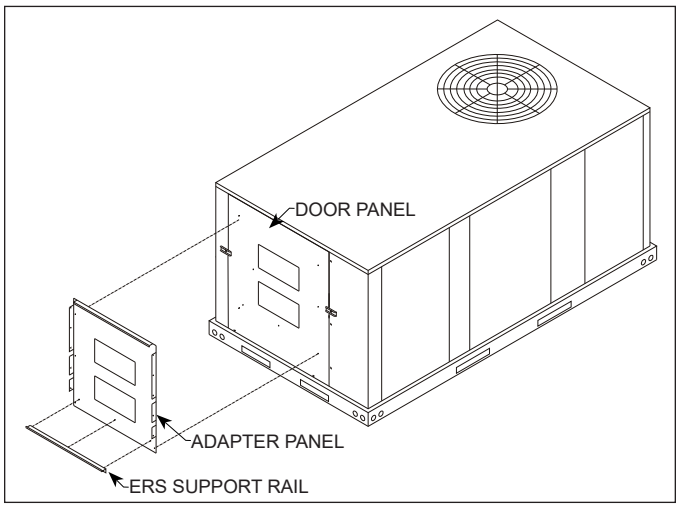


Figure 6. Installation Adapter Panel, Support Rail and Door Panel

INSTALL ENERGY RECOVERY SYSTEM

1. Lift ERS 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. **See Figure 7.**
2. Apply ¾" x 1 ¼" gasket to top and bottom decks of ERS as shown in the figure. **See Figure 8.**
3. Position ERS in front of horizontal exhaust air opening. Line up the ERS to the rooftop unit. Ensure that there are not any screws on the rooftop unit that will interfere with the mounting flanges of the ERS and if so remove them.

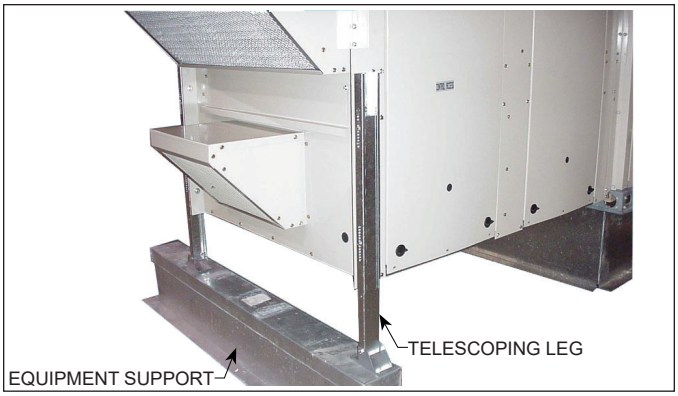


Figure 7. Equipment Support

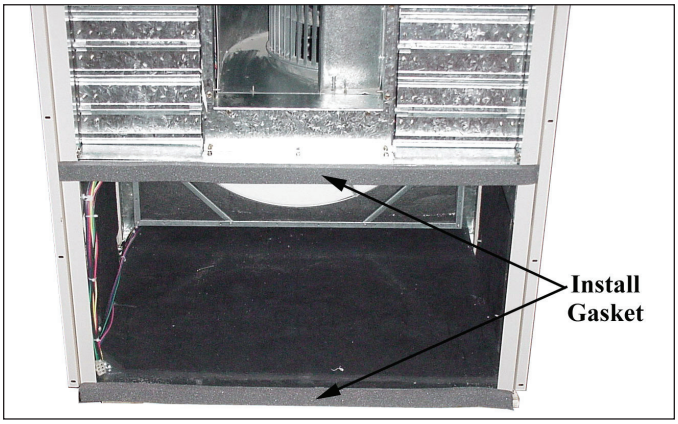


Figure 8. Gasket Location

Note: Equipment support kit or equivalent should be used under feet of standoff legs to prevent roof penetration. See Figure 7.

4. Set ERS on platform support rail slide ERS up against adaptor panel. The side flanges of adaptor panel should fit inside the posts of ERS. Secure ERS to adaptor panel using the provided 10-16 x ½" screws. **See Figure 9.**
5. Tuck the top flange of the ERS under the rooftop unit top panel and secure with the existing rooftop unit screws. **See Figure 9.**

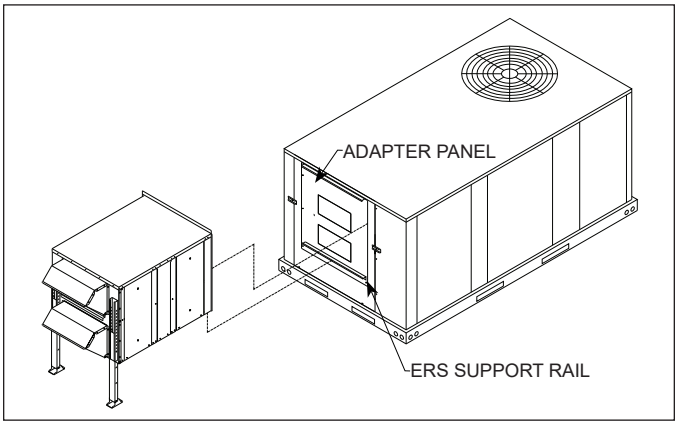


Figure 9. ERS Positioning

6. Remove the screws placed in the telescoping legs and adjust the legs on the ERS until it is level. Replace all four screws in each leg to secure the ERS in the leveled position. **See Figure 7.**
7. Check and seal, if necessary, along the edges where the ERS meets the rooftop unit to ensure there is no air leakage. Final assembly should resemble **Figure 10.**

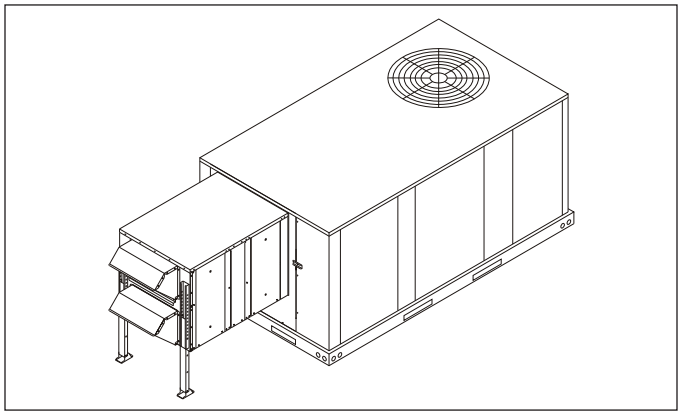


Figure 10. ERS Final Assembly

8. Remove the right front (rooftop unit side) access panel and locate the field wiring harness that was previously routed 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 ERS. **See Figure 11.**



Figure 11. Connecting Wire Harness

9. 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.
10. Connect line voltage power to ERS unit from ERS field provided or rooftop unit disconnect switch(disconnect must be properly sized). Then connect line voltage from disconnect switch through ERS knockout on back panel to control box per the wiring diagram. **See Figure 12.**

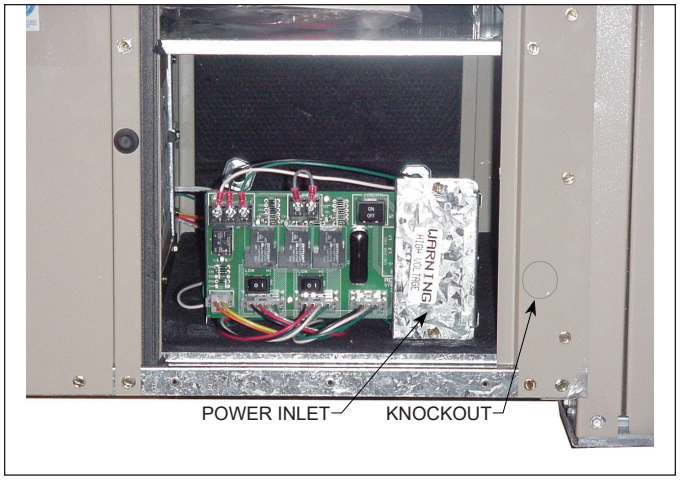


Figure 12. Control Box

11. 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.

12. Replace access panels onto the ERS unit and secure.

ROOFTOP UNIT WIRING (See Field Wiring Diagram)

1. Open access panel to rooftop unit controls.
2. The minimum damper blade position must be adjusted on the economizer logic module to the correct amount of outside air specified by the customer. Refer to Lennox rooftop unit manual for setting.
3. Close access panels on the rooftop unit and secure.
4. Restore power to unit.
5. Once ERS is working properly, caulk any open joints, holes, or seams to make the units completely air and water tight.
6. Leave this instruction manual with owner or in an envelope to be kept near unit.

OPTIONAL KITS (Factory Installed)

Low Ambient Control Kit (S26)

Prevents frost formation on energy wheel heat transfer surfaces by terminating the intake blower operation when discharge air temperature falls below a field selectable temperature setting. Intake blower operation resumes operation after temperature rises above the adjustable temperature differential.

The frost threshold is the outdoor temperature at which frost will begin to form on the ERS wheel. For energy recovery systems, the frost threshold 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 Systems 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 ERS operational hours, exhaust only frost control option is available.

Motorized Outside Air Damper
Damper mounts behind the outdoor air intake hood. It opens when the ERS is energized and closes when de-energized. Powered by B30 damper motor.

Motorized Exhaust Air Damper
Damper mounts in the barometric relief hood. Damper opens when the ERS is energized and closes when de-energized.

Stop-Start-Jog
Control option that allows intermittent operation of the enthalpy wheel during mild outdoor conditions to provide cycling and cleaning of the wheel.

Pressure Sensor
Measurement device on the ERS to determine airflow across the Enthalpy Wheel.

Rotation Sensor
Verifies the rotation of the enthalpy wheel.

Disconnect
Optional field device used to provide easy ability to switching the power on and off to the ERS.

VFD Blower Control
Variable frequency drives are available to control the speed of the blowers only. These VFD's can be integrated with a building automation system to deliver precisely the amount of air needed to maximize efficiencies. ***ERS shipped with VFD will have the VFD manufacturer's manual included in the hardware bag and a supplemental wiring diagram will be added to this installation.***

Dirty Filter Sensor
The dirty filter sensor sends a signal to field wired alarm when filters need to be cleaned or changed.

Filter Rack
Filter racks filter air in both the intake and exhaust sections of ERS.

Hinged Door with Handles
Hinged panel access doors with quarter turn latches that allow for easy access to the energy recovery wheel, filters and blowers.

Energy Recovery Wheel - Sensible Type
Sensible Wheel type is used for sensible heat recovery.

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 ERS. **Reference Table 1 on Page 9**. For location to take pressure readings. **See Figure 13.**

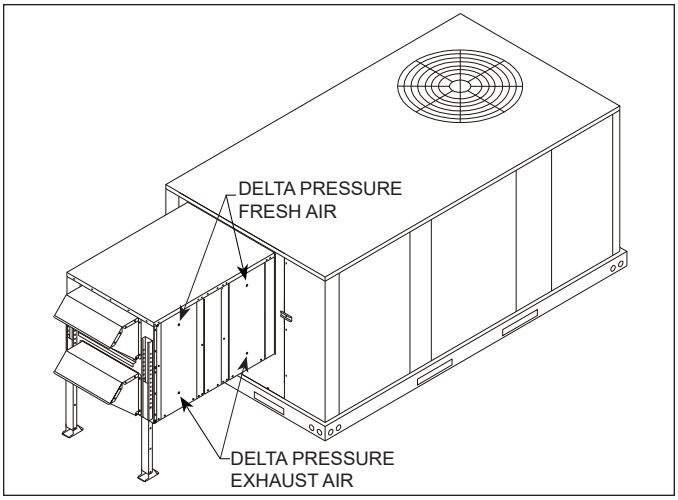


Figure 13. Delta Pressure Locations

OPERATION

Recovery Wheel Mode
On a thermostat call for blower operation in heating, cooling or continuous blower, the ERS media will rotate between fresh air and exhaust air streams. Both the fresh air blower and exhaust air blower will be operating.

SYSTEM CHECK

1. Disconnect ERS main power.

Note: If Low ambient kit S26 is used the jumper between TB37-5 and TB37-6 should be removed. Also if system check out is being conducted at low ambient temperatures, jumper low ambient switch.

2. Open rooftop unit blower access panel and locate TB1. Jumper between "R" (24v) and "G" to energize rooftop unit blower. Refer to manufacturers instructions when an electronic thermostat or other energy management system is used.
3. Restore power to ERS unit. The recovery wheel will rotate in the air stream, fresh air dampers will open, and the blowers will operate.
4. Disconnect main power to unit before making adjustment to balancing damper and/or ERS unit.
5. Remove all jumpers and replace ERS control access cover.
6. Set thermostat to normal operating position.
7. Restore power to unit.

MAINTENANCE

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

Mechanical Inspection
Make visual inspection of dampers, linkage assemblies and ERS 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

ERW segment, is positioned on a shaft extended from middle support bar with a block ball bearing assembly. Annual inspection of the self cleaning wheel is recommended. With power disconnected, remove UERV access panels (rear and center) and unplug **[J150 & P150] (Refer to wiring diagram in this instruction manual).** Discoloration and staining of UERV segment does not affect its performance. Only excessive buildup of foreign material need be removed. If the segment appears excessively dirty, it should be cleaned to ensure maximum operating efficiency. To clean the wheel remove belts, screw from center hub, grasp segment by rim and remove. 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.

ERV/ERS Configuration and Commissioning

Use the applicable procedure below for units equipped with a Prodigy, CORE, or CORE Lite controller. Always verify accessory wiring against the unit-specific wiring diagram before applying power.

Prodigy 2.0 Configuration

Controller Setup

1. Navigate to **Setup > Install > Configuration ID**.
2. Set Configuration ID 1 as follows:
   - **Position 2: T** — Temperature economizer
   - **Position 3: S** — Single-stage power exhaust
   - **Position 4: A** — Damper-position control
3. Navigate to **Settings > RTU Options**.
4. Set Parameter 186 to 10.
5. Navigate to **Setup > Test and Balance > Damper**.
6. Complete the damper setup:
   - Calibrate the outdoor-air damper.
   - Set the minimum damper position for each available blower speed.
   - Select Temperature Setpoint as the economizer control option.
   - Set the free-cooling outdoor-air temperature setpoint.
   - Set the free-cooling supply-air temperature setpoint.
   - Select the applicable ventilation option:
     - Select **Demand Control Ventilation** only when a configured indoor-air-quality or CO_2 input will control ventilation.
     - Otherwise, select None.
   - Set the power-exhaust mode to Blower On.
   - Set the power-exhaust damper-position setpoint for the ERV wheel pivot command. As a starting point, set it approximately 10 percentage points above the applicable minimum damper position, and confirm operation during commissioning.
   - Confirm that fresh-air heating and fresh-air cooling are disabled unless those functions are specifically required by the application.

Parameter Adjustments

After completing Test and Balance, use **Settings > RTU Options** for subsequent adjustments:

- **Parameter 9** — Minimum damper position during low-speed blower operation
- **Parameter 132** — Minimum damper position during high-speed blower operation
- **Parameter 215** — Stage 1 power-exhaust damper-position setpoint; used as the ERV wheel pivot point
- **Parameter 216** — Stage 1 power-exhaust damper-position deadband
- **Parameter 401** — Power-exhaust enable mode:
  - **0** — On when the blower is energized
  - **1** — Always on
  - **2** — On during the occupied period

Wiring and Operation

Verify all terminations against the unit-specific wiring diagram. On the main Prodigy 2.0 M3 board, use the terminals labeled **OUTPUTS — DO1 and DO2**, located on the right side of connector P298 at the bottom of the controller beneath the display.

- **DO1 — ERV** wheel run: When the blower is on, DO1 is active and outputs 24 VAC to start the ERV wheel.
- **DO2 — ERV** wheel pivot: When the outdoor-air damper travels above the Power Exhaust Damper percentage setpoint, DO2 is active and outputs 24 VAC to pivot the wheel out of the airstream.
- The pivot output de-energizes after the damper position falls below the setpoint by the configured deadband or when the blower is de-energized.

CORE and CORE Lite Configuration

The CORE and CORE Lite controllers use the CORE Service App and the same basic commissioning sequence for this application.

Pair the CORE Service App

1. Initiate pairing at the unit controller.
2. Open the CORE Service App and select the unit from the list.

3. Confirm that the displayed model number, serial number, controller identification, and firmware version match the unit being commissioned.

Configuration ID Setup

1. In the CORE Service App, navigate to **RTU Menu > Setup > Install**.
2. Verify the unit information and enter **Configuration ID 1**.
3. For a temperature-economizer ERV/ERS application with a single pivot output, set:
    - **Position 2: T** — Economizer, temperature control
    - **Position 3: S** — Single-stage power exhaust
    - **Position 4: A** — Power exhaust controlled by damper position
4. Complete the Install wizard and save the configuration.

Important: A configured economizer is required for single-stage or dual-stage power-exhaust operation. The controller disables power exhaust if the economizer is set to **Not Installed** or **Unconfigured**.

Damper and Economizer Setup

1. Navigate to **RTU Menu > Setup > Test and Balance > Damper**.
2. Select Damper Calibration and follow the guided sequence:
    - Drive the damper fully closed.
    - Visually confirm that the damper has stopped at the closed position.
    - Drive the damper fully open.
    - Visually confirm that the damper has stopped at the open position.
3. Allow the app to start the blower when prompted.
4. Set the minimum damper position for each available blower speed:
    - Low-speed minimum damper position, when applicable
    - High-speed minimum damper position, when applicable
5. Select the economizer option Temperature Setpoint.
6. Set the free-cooling outdoor-air temperature setpoint.
7. Set the free-cooling supply-air temperature setpoint.
8. Select the applicable ventilation option:
    - **Demand Control Ventilation** when a configured indoor-air-quality or CO_2 input is used
    - **Building Pressure Control** only when the required pressure sensor and configuration are present
    - None when neither function is used
9. Set Power Exhaust Mode to Blower On.
10. Set the power-exhaust economizer travel setpoint. For this ERV application, **Parameter 215** is used as the wheel-pivot command point.
11. Review the summary screen and save the settings.

Parameter Reference

Use **RTU Menu > Settings > RTU Options > Edit Parameter** when a direct parameter adjustment is required.

- **Parameter 9** — Minimum damper position during low-speed blower operation
- **Parameter 132** — Minimum damper position during high-speed blower operation
- **Parameter 159** — Free-cooling supply-air setpoint
- **Parameter 160** — Economizer free-cooling temperature setpoint
- **Parameter 215** — Stage 1 power-exhaust damper-position setpoint; range 0% to 100%, with a 50% default
- **Parameter 216** — Stage 1 power-exhaust damper-position deadband; range 0% to 100%, with a 10% default
- **Parameter 401** — Power-exhaust enable mode:
    - **0** — On when the blower is energized
    - **1** — Always on
    - **2** — On during the occupied period

For the ERV wheel-pivot application, establish the final **Parameter 215** value during commissioning. A practical starting point is approximately 10 percentage points above the applicable minimum damper position. Confirm that the wheel remains in the airstream at minimum ventilation and pivots out at the intended outdoor-air damper position.

CORE and CORE Lite Wiring

Verify all terminations against the unit-specific wiring diagram and controller layout. On the main CORE control board, connector **J297** is to the right of the thermostat inputs and includes the **DO1** terminals. The **DO2 circuit** is available at **J390 Pin 3**, with **J390 Pin 6** serving as 24 VAC common. J390 is toward the upper middle-right of the controller. This circuit normally operates the **K65 power-exhaust relay**, in ERV applications it is repurposed as the wheel-pivot output.

- **DO1 — ERV wheel run:** When the blower is on, DO1 is active and outputs 24 VAC to start the ERV wheel.
- **DO2 — J390 Pin 3, ERV wheel pivot:** The switched DO2 output is available at J390 Pin 3 (24 VAC), with J390 Pin 6 serving as 24 VAC common. When the outdoor-air damper travels above the Power Exhaust Damper percentage

setpoint, DO2 energizes. Although this circuit normally operates the K65 power-exhaust relay, it is repurposed here to pivot the ERV wheel out of the airstream.

- Do not rely on connector position alone; confirm the terminal label, pin number, and output function for the specific unit and controller revision.

Sequence of Operation

- When the blower is energized and **Parameter 401** is set to 0, the ERV run output energizes and the wheel rotates in the airstream.
- When the outdoor-air damper reaches the **Parameter 215** setpoint, the single-stage power exhaust output energizes and commands the ERV wheel to pivot out of the airstream.
- The pivot output de-energizes when the damper position falls below the **Parameter 215** setpoint by the **Parameter 216** deadband.
- The power-exhaust output also de-energizes when the blower is de-energized in Blower On mode.

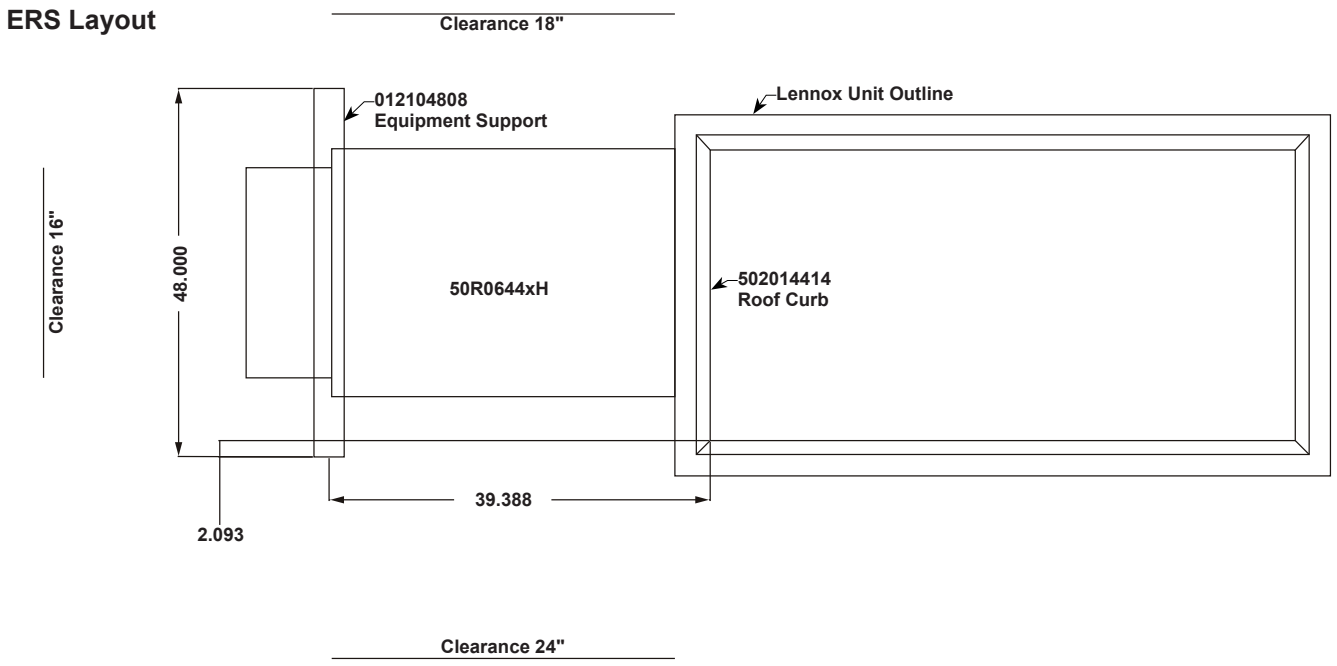
Commissioning Verification

Before returning the unit to normal operation, verify the following:

- Configuration ID 1 matches the installed economizer and ERV/ERS arrangement.
- The economizer is configured and no configuration alarms are active.
- Damper calibration completes successfully at both the fully closed and fully open positions.
- Minimum damper positions are set for all available blower speeds.
- The selected ventilation option matches the installed sensors and control strategy.
- The ERV wheel starts when the blower is energized.
- The wheel pivots out of the airstream at the intended damper position.
- The wheel returns to the operating position after the damper falls below the setpoint by the configured deadband.
- Free-cooling operation uses the intended outdoor-air and supply-air setpoints.
- Fresh-air heating and cooling remain disabled unless required by the application.
- All wiring, output voltages, and connector assignments match the unit-specific wiring

Lennox Model No.	Req'd Curb Height	CFM Range	Voltage	Phase
50R0644xH21	14"	300-550	208-230	1
50R0644xH23	14"	300-550	208-230	3
50R0644xH33	14"	300-550	460	3
50R0644xH43	14"	300-550	575	3

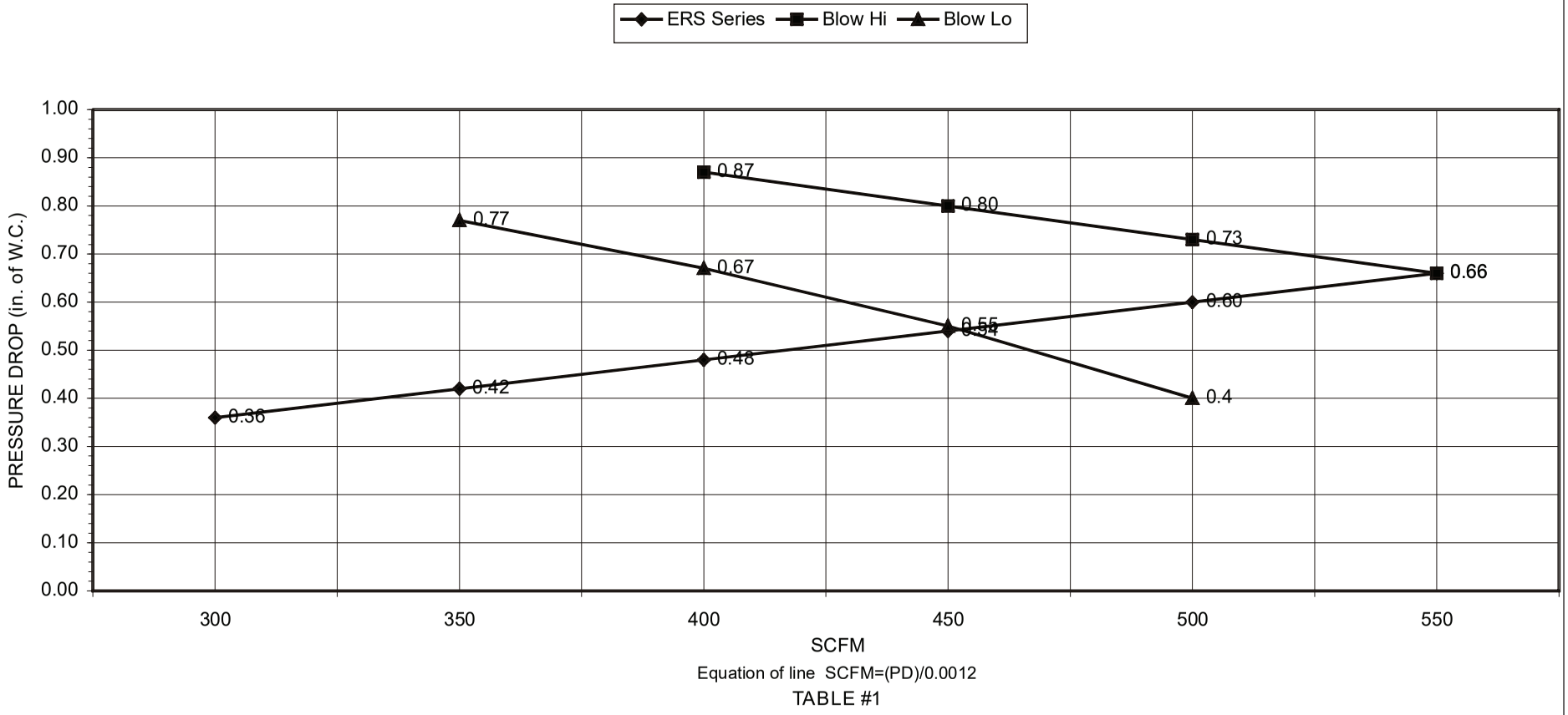
ERS Layout



50R0649xH Series

ENERGY RECOVERY SYSTEM

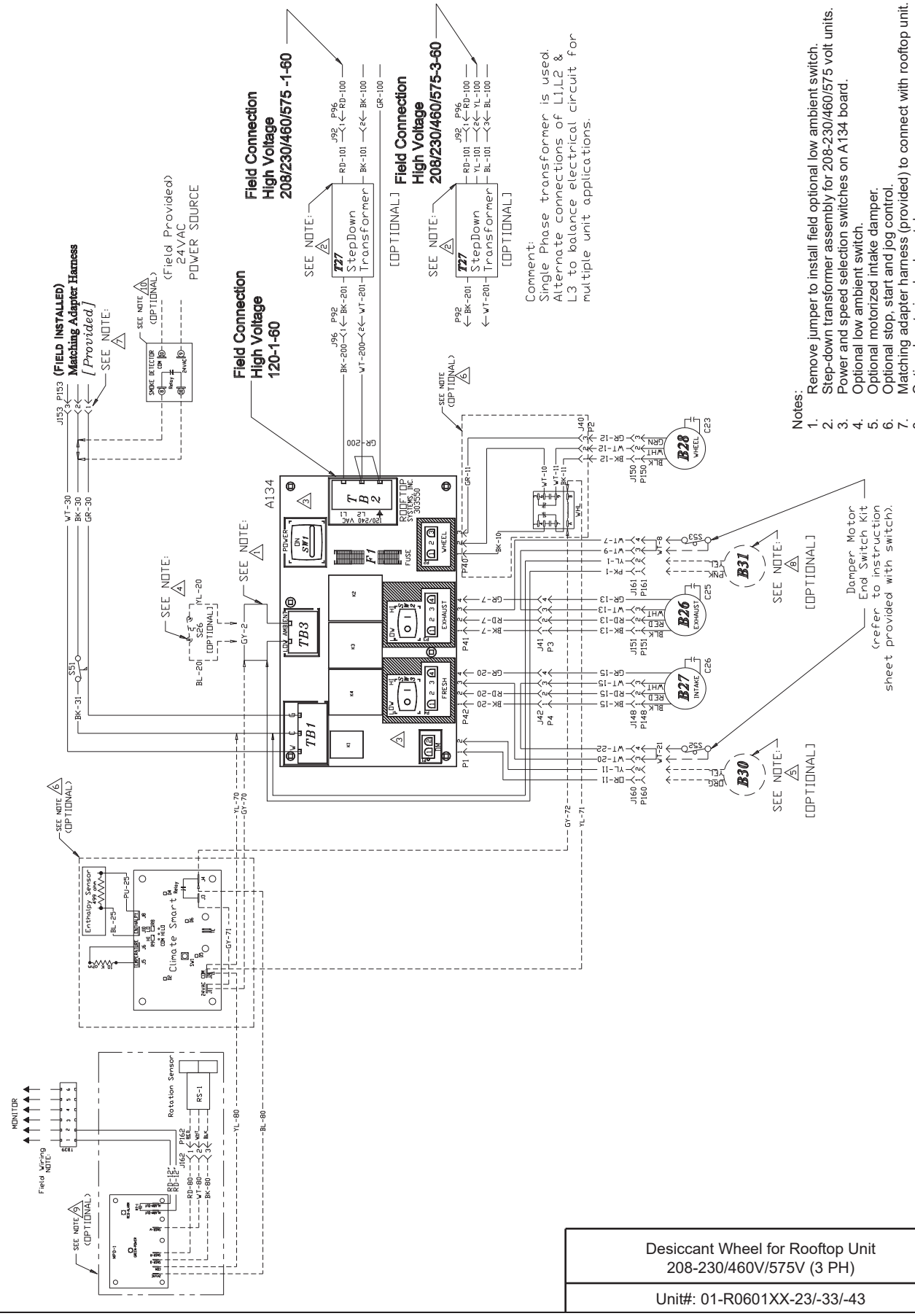
SCFM vs. PRESSURE DROP



Equation of line SCFM=(PD)/0.0012

TABLE #1

ERS UNIT WIRING DIAGRAM



Notes:

1. Remove jumper to install field optional low ambient switch.
2. Step-down transformer assembly for 208-230/460/575 volt units.
3. Power and speed selection switches on A134 board.
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.
8. Optional motorized exhaust damper.
9. Optional wheel rotation sensor.
10. Optional smoke detector.

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

Unit#: 01-R0601XX-23/-33/-43

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.