STAND ALONE ERV M-SERIES

INSTALLATION INSTRUCTIONS

MXX-2ERV
OCTOBER 6, 2015
SUPERCEDES 08-16-13

ENERGY RECOVERY VENTILATOR

SERIES M11, M20, M28, M36, M46 & M62

INSTALLATION INSTRUCTIONS FOR ENERGY RECOVERY VENTILATOR (FIXED) FOR STAND ALONE SIDE BY SIDE MECHANICAL ROOM / INDOOR APPLICATION

Energy recovery COMPONENT certified to the AHRI Air-to-Air Energy Recovery Ventilation Equipment Certification Program in accordance with AHRI Standard 1060-2000. Actual performance in packaged equipment may vary.

ETL Certified per UL 1995 and CSA 22.2

I - Shipping And Packing List

Package contains:
1 — Energy Recovery Ventilator Assembly
1 — Intake and Exhaust Damper Kits (If Ordered)

I I - Shipping Damage

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

III - General

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.

IV - Requirements

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

V - Application

These **Energy Recovery Ventilators** (ERV) are designed to be primarily used in a horizontal discharge manner connected to ductwork in an side by side configuration and mounted inside* a building. They can be installed free standing on vibration isolators on the ground or hung from the structure in a manner that supports the 4 corners of the unit. These ventilators conserve energy by transferring humidity and heat energy across two opposing air streams using a rotary heat exchanger (the energy recovery wheel). This process works in the summer by rejecting heat energy from intake air and in the winter by conserving heat energy from the exhaust air, allowing outdoor 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.

***These units are not approved for outdoor use.**

VI - Rigging Unit For Lifting

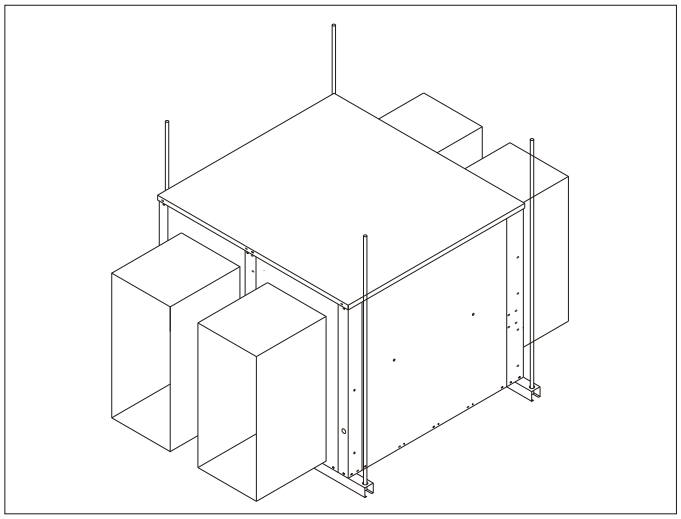
1. Maximum weight of the unit varies per series (300-1200 lbs crated)
2. Remove crating
3. All panels must be in place for lifting.
4. Remove box containing screws and accessories from the Controls section.

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.



5. When hanging from the structure (usual instillation) proper rigging should be used, Unistrut or angle iron is suitable along with (minimum) 3/8ths all-thread. Prepare rigging before lifting unit making sure that ERV will be supported at the 4 corners and that access panels will not be blocked.
6. Orientation of the unit is not important in so much as both blowers are sized equally and both air streams have filters before the energy recovery wheel, however caution should be taken that the unit is installed in a way that matches ductwork orientation for supply and exhaust air streams and provides clearance to access unit for maintenance.
7. Lift unit into place.

VII - Installation

1. Attach ductwork to duct flanges on ERV, seal with foil tape or mastic.
2. Remove control access panel to connect field wiring.
3. Route Class II low voltage wire (3 conductor) from thermostat, relay, or Energy Management through small bushing provided on a panel near the controls section. Location varies by model.
4. Connect low voltage wires to terminals 1-3 on the control board according to the Mechanical Engineers chosen controls scheme. **See Stand Alone ERV Controls Schemes for options.**
5. On units with Variable Frequency Drives a separate terminal strip is provided to connect low voltage (0-10 VDC externally provided) controls for the Drives.

Due to size constraints factory installed dampers are not available, on applications where dampers are required, field installed dampers with 24v actuators are recommended and are available from manufacturer as an accessory kit.

6. Connect wires from dampers to the factory provided plugs (J160 and J161 on Wiring Diagram) making sure that the 24V+ and 24Vc are connected to the proper terminals. See installation instructions with damper kits for proper orientation and wiring.

High Voltage

7. All Electrical connections must conform to any local codes and current National Electric Codes (NEC) or Canadian Electric Codes (CEC). Refer closely to unit wiring diagram in the unit and/or in these instructions for proper wiring connections.
8. Refer to unit nameplate for minimum circuit ampacity (MCA) and maximum overcurrent protection size (fuse).
9. Electrical data is listed on unit rating plate as well as the motor name plates.
10. Connect line voltage power from field installed power disconnect to ERV fuse block in the control box of the unit. Use provided knockout on outside panel next to controls section. **See Wiring Diagrams on Pages 9-12.**
11. Ground unit with suitable ground connection either through unit supply wiring or to an earth ground.
12. Remove motor access panels, check that blowers have belts in place and that motors spin freely. Blower RPM can be adjusted to meet CFM and external static pressure requirements by adjusting the sheave on the blower motors and by replacing the pulley kits on units ordered without variable frequency drives. Multiple pulley arrangements are available from the manufacturer to meet the entire range of the units CFM options.

Caution: Blower speed must be adjusted for the given external static pressure and airflow (CFM) requirements. If blower speed is not adjusted for conditions, possible motor overloading can occur.

13. Start unit to test operation. Turn on power disconnect, turn on unit either from controls or by Jumping 24v+ from transformer (blue low voltage wire) to terminal #1. Check that motors are spinning the right direction (3 phase units only) that the enthalpy wheel is spinning and that motorized intake air and exhaust dampers are opening.

If unit is operating properly proceed to next step, if not operating properly **See Trouble shooting guide on Page 4.**

14. Clean up, caulk any open joints, holes or seams to make the unit air tight. Remove any jumpers, replace all access panels on the unit and secure.
15. Leave this instruction manual with the owner or in an envelope near the unit.

SEE System Check or Trouble Shooting Guide for further information on the proper operation of the ERV.

VIII - Stand Alone ERV Controls Schemes

Dependent Options

Thermostat: This is the standard way to wire an ERV, when the ductwork of the stand alone ERV is attached to the ductwork of a single AC system the controls of the ERV should be wired in parallel with the controls with "G" to 1, "C" to 2 and "W" to 3. The ERV will operate whenever the RTU's blower is operating.

Energy Management – Building Management Systems: The ERV needs a 24 Volt AC signal to operate, connect the 24V+ to 1 and the 24V C to 2, the unit can be operated off of a relay or BMS controller if necessary.

Dedicated Options

When using a control method that does not involve an outside 24V controls signal power can be borrowed from the unit's transformer for short thermostat wire runs. Any run over 150' however should be powered by a separate transformer.

Thermostat: When using an ERV to service a large area with multiple AC units or when not tying directly into the ductwork of a single AC system the ERV can be run off of its own Thermostat. Splice the 24V+ wire "R" onto the XFORMER + terminal of the ERV control board, then wire "G" and "C" onto terminals 1 and 2 respectively, program Thermostat to energize G when space is occupied.

CO_2 Sensor/ Transmitter: An ERV can be wired to a wall mounted CO_2 Sensor/ Transmitter with relay like Johnson Controls CD-WR0-00-0 (or CD-WRD-00-0) in order to operate the ERV when ventilation is required due to high CO_2 levels. This type of transmitter has an adjustable set point, and a relay that the 24V+ signal can be wired into and "G" wire can be wired out of. "G" should be wired to #1 terminal. The ERV will then turn on and provide fresh air to the space to lower CO_2 levels.

Quickstep: Units equipped with the Quick Step controls option use an onboard microprocessor, factory installed CO_2 sensor and variable frequency drives to modulate airflow through the ERV to control for Carbon Dioxide. To operate the unit enter the Supply and Exhaust CFM values (they do not have to be the same value) into the Quick Step flexstat control along with maximum CO_2 level and the controls will modulate the blowers to ensure CO_2 levels are not above set point.

ON/OFF switch or Timer: Wire 24V+ from transformer onto the input of the switch and connect the output of the switch to terminal 1 on the control board. The ERV can be turned on manually or be set to turn on at a regular schedule when the building is occupied.

IX – Operation

How It Works

The unit contains an energy recovery wheel (ERW) that is a revolutionary concept in rotary air-to-air heat exchangers. 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°F, it is recommended to use the (optional) low ambient kit.

Optional Kits

Motorized Intake Air Damper
This damper is field mounted in the intake air ductwork, it opens when the ERV supply blower is energized and closes when de-energized.

Motorized Exhaust Air Damper
This Damper is field mounted in the exhaust air ductwork, it opens when the ERV is energized and closes when the ERV is de-energized.

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

Rotation 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 adds 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 below 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
Indoor units come with intake air and exhaust air filter racks and filters standard, 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 ordered with the ERV as an accessory kit, a qualified technician needs to field install the smoke detector into the ductwork and wire controls to break common in case of alarm.

CO_2 Sensor
See Quickstep in Controls schemes. A factory installed Co_2 sensor can be added to the unit to adjust ventilation on a CO_2 parts per million demand. This sensor is mounted next to the return air inlet and is not a relay, it only provides feedback to the quick step controls to adjust motor speed and is not suitable to turn the unit on and off on CO_2 demand.

X - System Check

1. Disconnect main power
2. On units controlled by thermostats turn T-stat fan switch to "On". Otherwise jump 24v+ to terminal #1.
3. Restore power to unit, observe ERV wheel rotation and both fresh air and exhaust air blowers.

Note: If the low ambient kit is used the jumper between terminals 5&6 should be removed and replaced with blue and yellow wires for the sensor. If system check out is being done at low ambient temperatures this kit can cause the unit not to

operate. Under these conditions jump terminals 5&6.

4. Verify the ERV three phase blower motors are phased sequentially ensuring correct rotation and operation. If both blowers are running backwards:
   A. Disconnect Power.
   B. Reverse and two 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 can be found on each motor and on the unit's name plate.
6. Verify that the intake air and exhaust air motorized dampers are opening and closing when unit turns on/off.

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

7. Return damper settings. When tied into an HVAC system manually adjust the position of the field installed dampers to balance Air flow.
8. 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.

Adjustment to the blower speed is accomplished by changing the sheave setting on both fresh air and exhaust air blowers.

Flow / Blower Speed Adjustment

Blower speed selection is accomplished by changing the sheave setting on both fresh air and exhaust air blowers. To set ERV for the required air flow (CFM), the external static pressure applied to the ERV (duct static) must be known. See the CFM vs External Static Pressure chart for the appropriate unit to determine the correct blower RPM for the specified CFM and External Static Pressure.

After blower speed adjustments have been made. Ensure that when the belt is replaced it is tensioned correctly. The motor mounting plate can be adjusted to tension the belt. If using a belt tension checker, adjust the span to the appropriate setting and check the belt defection force. The belt deflection force should be between 5-8 lbs or the lowest tension at which the belt will not slip under peak load conditions.

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.

XI - Sequence of Operation

1. The thermostat or Building Management System (BMS), sends a 24 Volt AC signal to the HVAC system for cooling, heating, fan only or ventilation operation.
2. The ERV is activated simultaneously with the blower of the AC system. The intake 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 AC system is energized and the outdoor conditions are adequate for energy recovery.
3. If the optional motorized intake air damper kit is present, and the end switch wired correctly, 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 intake 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 intake air blower will reactivate.
5. If the start, stop, jog [Climate Smart] 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.

XII - 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) in Fan or Cool or T-2 (Com) and T-3 (W) in Heat. These terminals must be powered by an external power source to operate the ERV.

A jumper from Xformer + to T-1 can be used to test operation of the ERV if an external 24V controls signal 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/ Climate Smart #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 intake 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 or 3&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 kit 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 Intake 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 field installed fresh air damper plug (P-160) to contactor. In models without a fresh air damper kit 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 intake Air Damper Does Not open

1. Verify 24V in between terminals 1&2 or 3&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. Make sure that field installed wires are connected securely and to the proper lines. 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 or 3&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. Make sure that field installed wires are connected securely and to the proper lines. If the damper actuator still does not move the actuator is bad ans should be replaced.

Options and Accessories Troubleshooting

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.

Note: 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.

XIII - Maintenance

1. All motors use prelubricated sealed bearings; no further lubrication is necessary.
2. Make visual inspection of motors, belts and wheel rotating bearings during routine maintenance.
3. Eight pie-shaped 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 & P150] **(Refer to wiring diagram in this instruction manual).** Remove segment and wash with water and/or mild detergent.
4. To install wheel segments follow steps A through E . **See Figure 1**. 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 segments 90° to balance the wheel while the third segment is installed. Rotate the wheel 180° again to install the fourth segment opposite the third. Repeat this sequence with the remaining four segments.

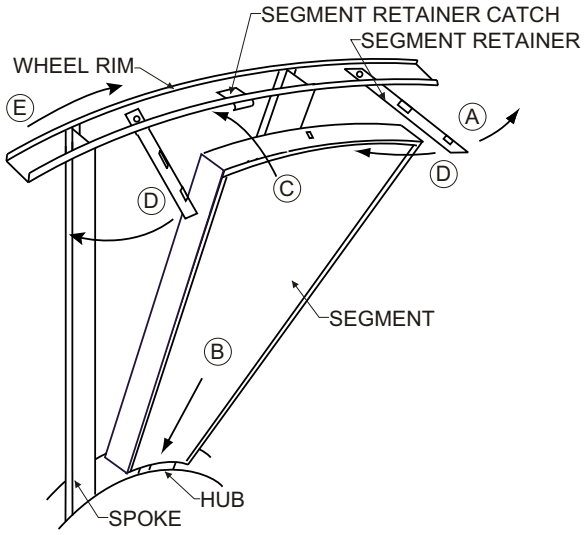


FIGURE 1

XIV - Pulley Kit Installation

The units are shipped from the factory at the low static setting. Pulley kits are available for the medium and high static settings. To install a pulley kit.

1. Check content of pulley kit, if pulley kit contains:
   A. An adjustable sheave and a fixed pitch pulley then remove belt and both motor and blower pulley.
   B. An adjustable sheave then remove the motor pulley.
   C. A fixed pitch pulley then remove the blower pulley.

2- Replace pulley(s) with the pulley(s) from pulley kit. Make sure each pulley is installed with a key. Tighten the set screw on the pulley(s) to 100 in.lb.

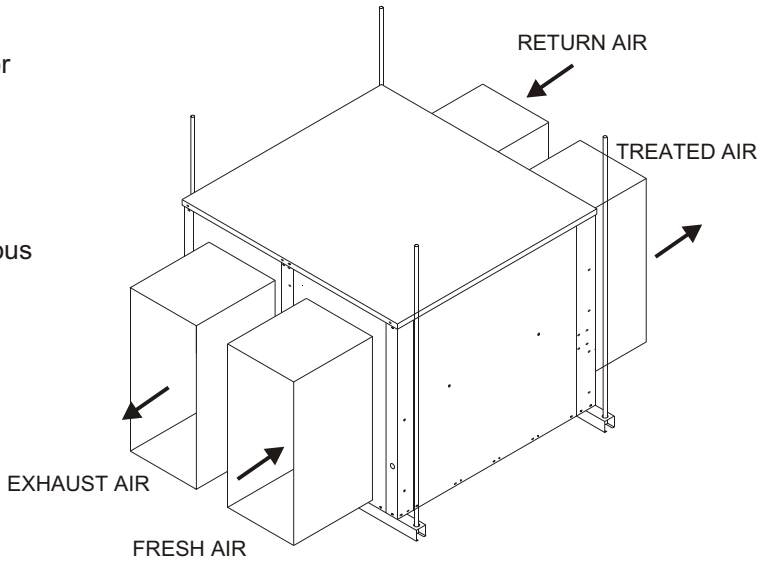
3- Install the belt that came with the pulley kit. Tension belt as explained in the blower speed adjustment section.

4- Check the speed of the blower. Adjust the motor sheave to increase or decrease the speed of the blower. See blower adjustment section.

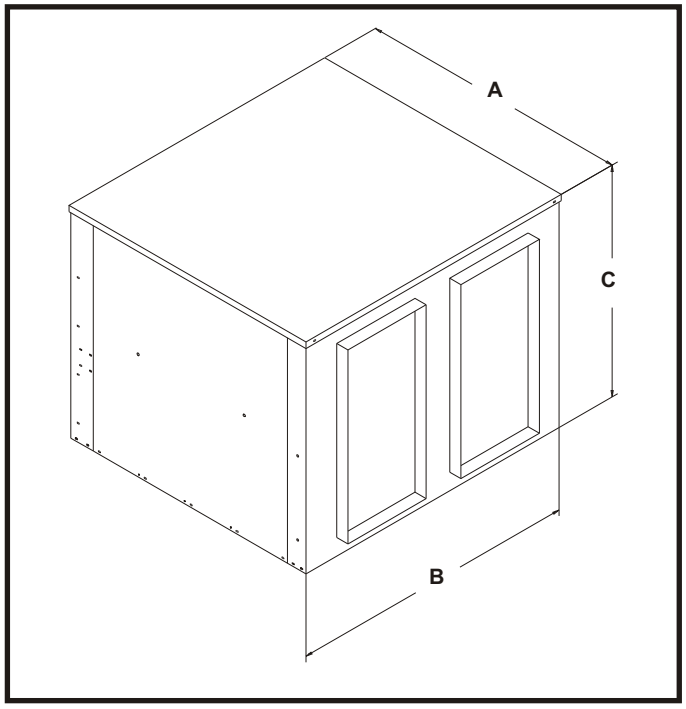
M-02 Series Stand Alone ERV'S For Side by Side Indoor Application

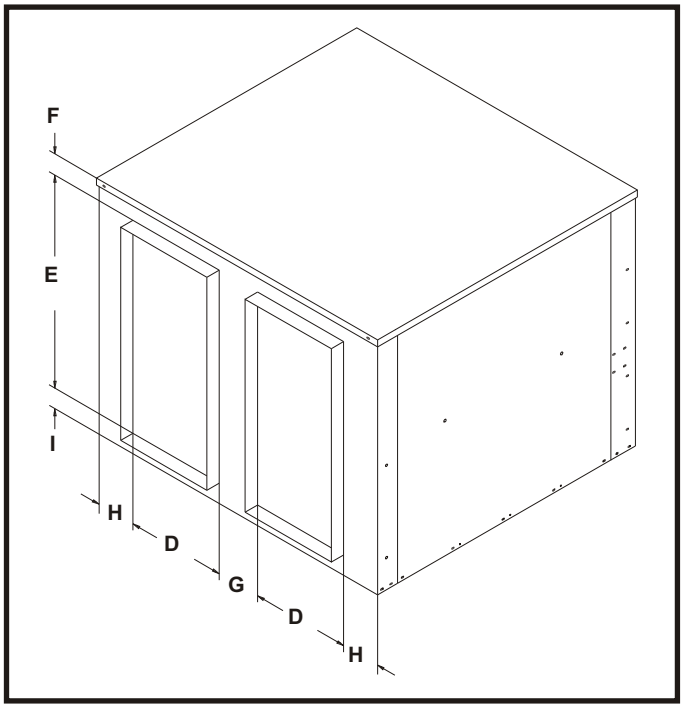
Features and Notes

1. Stand alone design allows higher levels of outdoor air to be introduced into the a/c space.
2. Static test ports provided to verify intake and exhaust CFM.
3. Balancing damper(s) is field provided when connected to ductwork. System will not operate properly without balancing damper.
4. See blower performance charts for airflow at various E.S.P..
5. Filter rack with 2" pleated filters included.



ERV with Horizontal Ductwork
(balancing damper(s) field supplied)





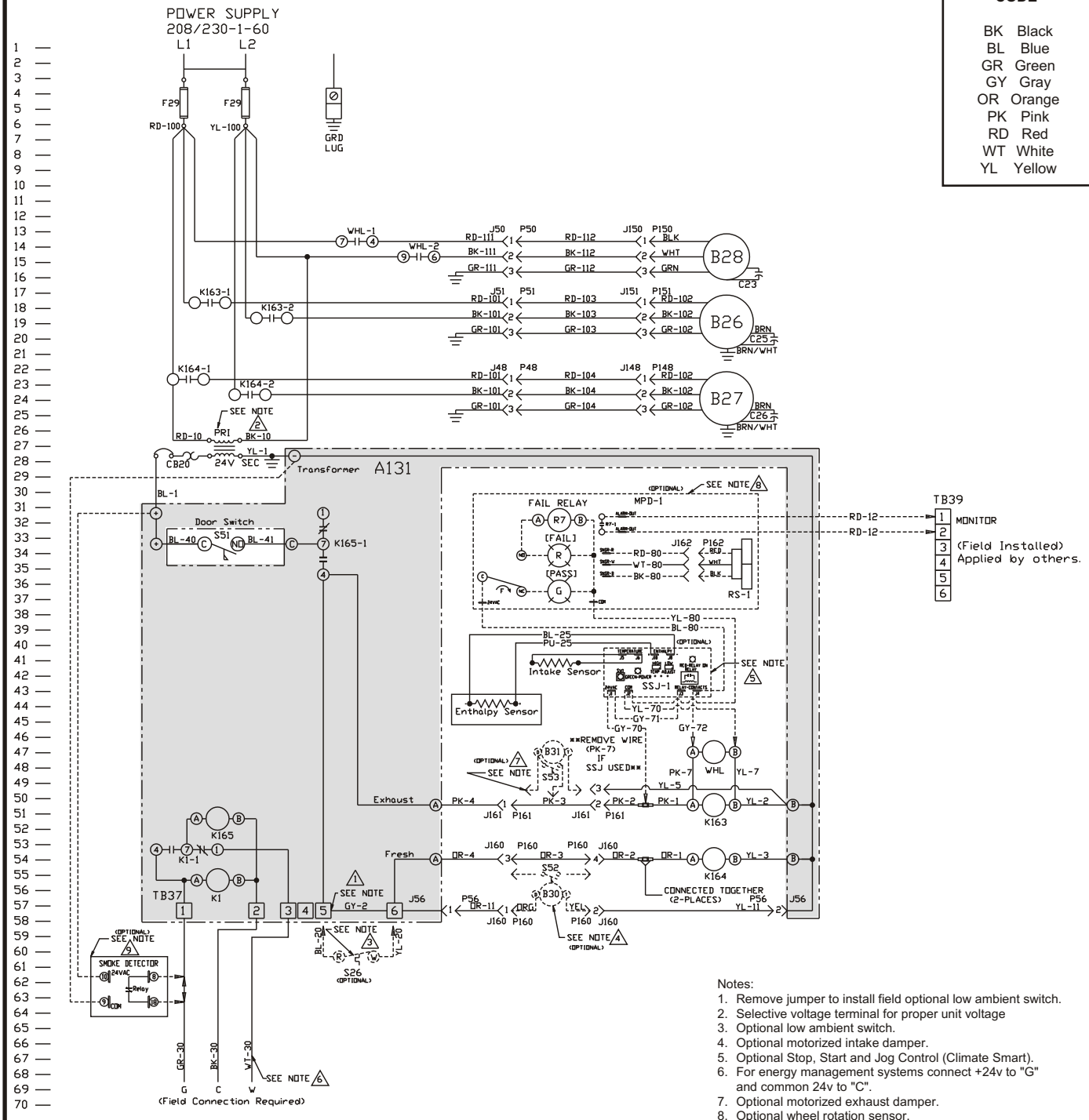
ERV Data		Dimensional Data								
ERV Series	**CFM Range**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
M11-02	300-1100	44.75	32.13	33.50	11.00	27.00	4.00	4.25	2.88	2.50
M20-02	1200-2000	54.38	37.25	37.50	12.00	30.00	5.87	5.13	4.06	1.63
M28-02	1200-2800	52.25	42.63	43.56	14.00	32.00	8.69	5.25	4.25	2.88
M36-02	2000-3600	60.00	46.69	57.37	16.50	39.50	12.00	5.50	4.05	5.88
M46-02	3000-4600	60.00	52.69	57.37	16.50	39.50	12.00	8.69	5.50	5.88
M62-02	4600-6200	72.00	70.88	63.63	19.50	39.50	17.53	14.50	8.70	6.60

COMPONENT CODE

A131	Fixed Relay Board	J150	Jack, Wheel Motor Harness	P161	Plug, Damper Exhaust Motor Harness
B26	Motor, Exhaust Air	J151	Jack, Exhaust Air Motor Harness	RS-1	Rotation Sensor (Optional)
B27	Motor, Intake Air	J160	Jack, Damper Intake Motor Harness	S26	Switch, Low Ambient (Optional)
B28	Motor, Desiccant Wheel	J161	Jack, Damper Exhaust Motor Harness	S51	Switch, Door
B30	Motor, Damper Intake (Optional)	K163	Contactor, Exhaust Air Motor	S52	Switch, Damper Intake
B31	Motor, Damper Exhaust (Optional)	K164	Contactor, Intake Air Motor	S53	Switch, Damper Exhaust
C23	Capacitor, Wheel Motor	MPD-1	Missing Pulse Detector Board (Optional)	SD	Smoke Detector (Optional)
C25	Capacitor, Exhaust Air	P48	Plug, Intake Air Motor Harness	SSJ	Climate Smart Board (Optional)
C26	Capacitor, Intake Air	P50	Plug, Wheel Motor Harness	T27	Transformer, Control
F29	Fuse	P51	Plug, Exhaust Air Motor Harness	T28	Transformer, Step-down (Optional)
J48	Jack, Control Box (Intake Air)	P56	Plug, Damper Motor Harness	TB37	Terminal Block (Low Voltage)
J50	Jack, Control Box (Wheel)	P148	Plug, Intake Air Motor	TB39	Terminal Block (Monitoring)
J51	Jack, Control Box (Exhaust Air)	P150	Plug, Wheel Motor	WHL	Relay, Wheel Motor
J56	Jack, Control Box (Damper)	P151	Plug, Exhaust Air Motor		
J148	Jack, Intake Air Motor Harness	P160	Plug, Damper Intake Motor Harness		

WIRE COLOR CODE

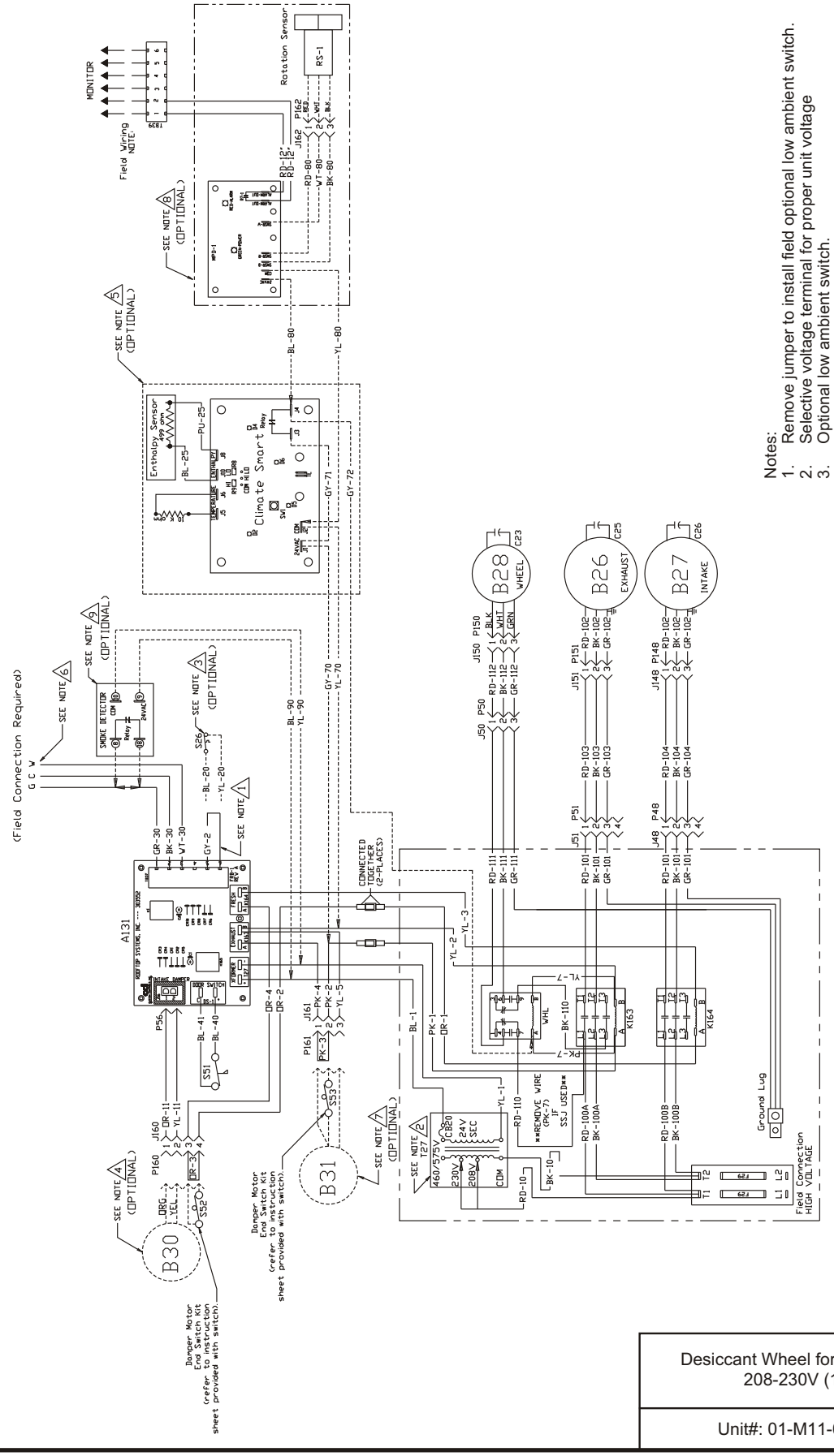
BK	Black
BL	Blue
GR	Green
GY	Gray
OR	Orange
PK	Pink
RD	Red
WT	White
YL	Yellow



Notes:
1. Remove jumper to install field optional low ambient switch.
2. Selective voltage terminal for proper unit voltage
3. Optional low ambient switch.
4. Optional motorized intake damper.
5. Optional Stop, Start and Jog Control (Climate Smart).
6. For energy management systems connect +24v to "G" and common 24v to "C".
7. Optional motorized exhaust damper.
8. Optional wheel rotation sensor.
9. Optional smoke detector.

M11-21-2ERV

ERV UNIT WIRING DIAGRAM



Notes:

1. Remove jumper to install field optional low ambient switch.
2. Selective voltage terminal for proper unit voltage
3. Optional low ambient switch.
4. Optional motorized intake damper.
5. Optional Stop, Start and Jog Control (Climate Smart).
6. For energy management systems connect +24v to "G" and common 24v to "C".
7. Optional motorized exhaust damper.
8. Optional wheel rotation sensor.
9. Optional smoke detector.

Desiccant Wheel for Rooftop Unit
208-230V (1 PH)

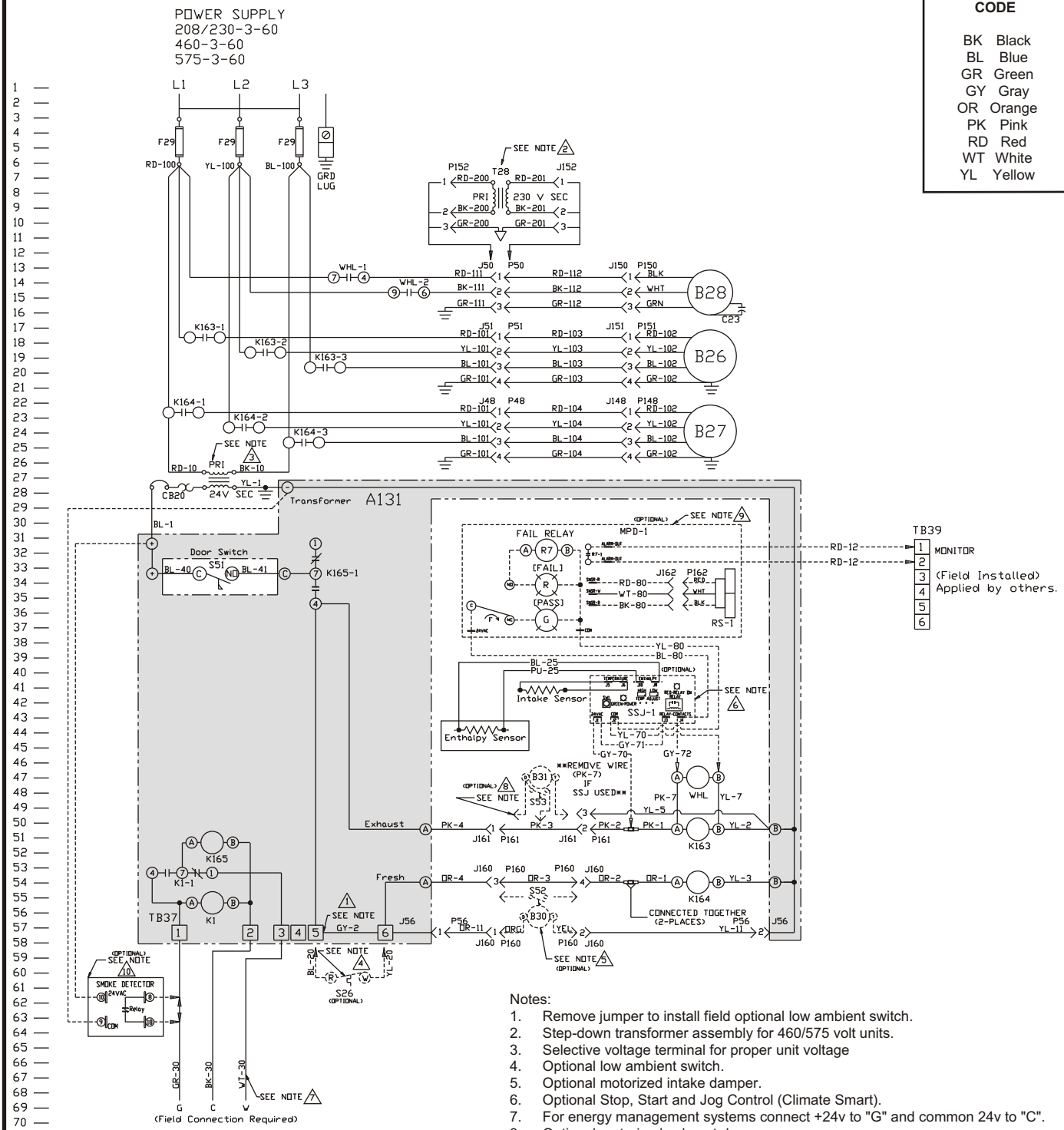
Unit#: 01-M11-02XX-21

COMPONENT CODE

A131	Fixed Relay Board	J152	Jack, Transformer (High Voltage)	P161	Plug, Damper Exhaust Motor Harness
B26	Motor, Exhaust Air	J160	Jack, Damper Intake Motor Harness	RS-1	Rotation Sensor (Optional)
B27	Motor, Intake Air	J161	Jack, Damper Exhaust Motor Harness	S26	Switch, Low Ambient (Optional)
B28	Motor, Desiccant Wheel	K163	Contactor, Exhaust Air Motor	S51	Switch, Door
B30	Motor, Damper Intake (Optional)	K164	Contactor, Intake Air Motor	S52	Switch, Damper Intake
B31	Motor, Damper Exhaust (Optional)	MPD-1	Missing Pulse Detector Board (Optional)	S53	Switch, Damper Exhaust
C23	Capacitor, Wheel Motor	P48	Plug, Intake Air Motor Harness	SD	Smoke Detector (Optional)
F29	Fuse	P50	Plug, Wheel Motor Harness	SSJ	Climate Smart Board (Optional)
J48	Jack, Control Box (Intake Air)	P51	Plug, Exhaust Air Motor Harness	T27	Transformer, Control
J50	Jack, Control Box (Wheel)	P56	Plug, Damper Motor Harness	T28	Transformer, Step-down (Optional)
J51	Jack, Control Box (Exhaust Air)	P148	Plug, Intake Air Motor	TB37	Terminal Block (Low Voltage)
J56	Jack, Control Box (Damper)	P150	Plug, Wheel Motor	TB39	Terminal Block (Monitoring)
J148	Jack, Intake Air Motor Harness	P151	Plug, Exhaust Air Motor	WHL	Relay, Wheel Motor
J150	Jack, Wheel Motor Harness	P152	Plug, Transformer (High Voltage)		
J151	Jack, Exhaust Air Motor Harness	P160	Plug, Damper Intake Motor Harness		

WIRE COLOR CODE

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

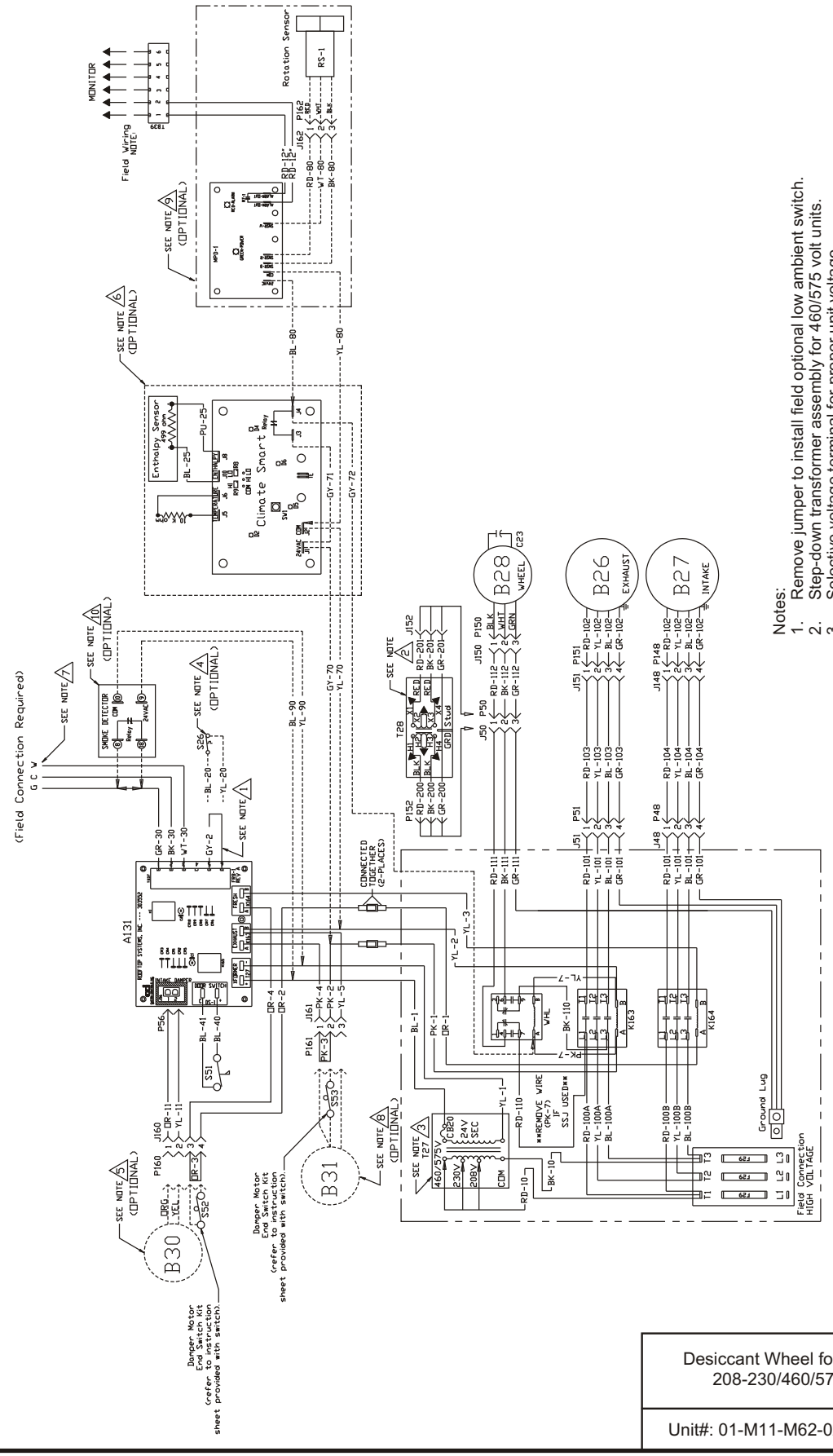


M11-M62-2ERV

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. Optional Stop, Start and Jog Control (Climate Smart).
7. For energy management systems connect +24v to "G" and common 24v to "C".
8. Optional motorized exhaust damper.
9. Optional wheel rotation sensor.

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. Optional Stop, Start and Jog Control (Climate Smart).
7. For energy management systems connect +24v to "G" and common 24v to "C".
8. Optional motorized exhaust damper.
9. Optional wheel rotation sensor.
10. Optional smoke detector.

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

Unit#: 01-M11-M62-02XX-23 thru -43

Blower RPM for M11

SUPPLY

Mist Eliminator Filter in Intake Hood (1.5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	300	N/A	N/A	1075	1280	1390	1535	1635
	500	N/A	1065	1275	1355	1505	1615	1670
	700	1060	1270	1370	1525	1610	1660	1790
	900	1310	1455	1520	1605	1655	1820	1960
	1100	1445	1515	1625	1725	1815	1955	2035

EXHAUST

Barometric Hood, 2" Pleated Filters (1.5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	300	N/A	1075	1180	1290	1445	1565	1645
	500	N/A	1170	1285	1375	1470	1605	1725
	700	1065	1280	1370	1465	1600	1680	1800
	900	1255	1360	1460	1590	1675	1755	1865
	1100	1445	1455	1585	1670	1750	1860	1935

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

	RPM Range	
Low	1000-1300	Standard Unit
Medium	1300-1750	Optional Kit
High	1750-2200	Optional Kit

Blower RPM for M20

SUPPLY

Mist Eliminator Filter in Intake Hood (2HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	1200	1100	1225	1315	1405	1440	1695	1725
	1400	1220	1275	1400	1480	1620	1730	1790
	1600	1225	1345	1475	1615	1715	1775	1890
	1800	1335	1465	1610	1710	1765	1880	1930
	2000	1380	1585	1680	1755	1815	1920	N/A

EXHAUST

Barometric Hood, 2" Pleated Filters (2HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	1200	1045	1170	1380	1475	1635	1720	1805
	1400	1115	1330	1470	1570	1725	1745	1850
	1600	1320	1460	1565	1680	1790	1840	1940
	1800	1415	1560	1725	1780	1885	1930	2045
	2000	1490	1660	1770	1875	1920	1985	N/A

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

	RPM Range	
Low	1000-1300	Standard Unit
Medium	1300-1700	Optional Kit
High	1700-2080	Optional Kit

Blower RPM for M28

SUPPLY

Mist Eliminator Filter in Intake Hood (3HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	1200	N/A	N/A	985	1115	1255	1390	1445
	1600	N/A	975	1090	1190	1320	1320	1525
	2000	960	1085	1185	1315	1410	1410	1550
	2400	1080	1240	1310	1405	1485	1485	1650
	2800	1230	1395	1505	1535	1595	1595	1775

EXHAUST

Barometric Hood, 2" Pleated Filters (3HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	1200	N/A	N/A	1050	1210	1315	1375	1465
	1600	N/A	1020	1200	1285	1365	1465	1545
	2000	1010	1190	1320	1355	1540	1580	1660
	2400	1155	1315	1425	1545	1660	1735	1785
	2800	1290	1450	1600	1725	1755	1825	1880

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

RPM Range		
Low	950-1320	Standard Unit
Medium	1325-1565	Optional Kit
High	1570-1880	Optional Kit

Blower RPM for M36

SUPPLY

Mist Eliminator Filter in Intake Hood (3HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	2000	820	930	1015	1095	1160	1245	1315
	2400	920	1010	1090	1155	1240	1305	1405
	2800	1000	1085	1150	1235	1295	1410	1500
	3200	1130	1200	1260	1395	1430	1495	1565
	3600	1190	1385	1420	1455	1510	N/A	N/A

EXHAUST

Barometric Hood, 2" Pleated Filters (3HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	2000	780	890	970	1065	1130	1235	1275
	2400	885	965	1060	1125	1230	1270	1340
	2800	945	1055	1120	1225	1265	1355	1405
	3200	1050	1135	1255	1325	1350	1415	1460
	3600	1125	1250	1305	1340	1415	N/A	N/A

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

RPM Range		
Low	700-1025	Standard Unit
Medium	1030-1305	Optional Kit
High	1325-1575	Optional Kit

Blower RPM for M46

SUPPLY

Mist Eliminator Filter in Intake Hood (5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	3000	925	1035	1110	1140	1235	1315	1350
	3400	1030	1120	1185	1225	1310	1345	1385
	3800	1100	1150	1240	1335	1385	1420	1455
	4200	1165	1245	1375	1435	1460	1505	1550
	4600	1230	1315	1335	1470	1525	1585	1655

EXHAUST

Barometric Hood, 2" Pleated Filters (5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	3000	985	1085	1155	1280	1325	1370	1440
	3400	1060	1150	1270	1320	1365	1430	1480
	3800	1145	1265	1335	1400	1450	1475	1505
	4200	1240	1330	1375	1460	1470	1515	1560
	4600	1305	1400	1420	1485	1525	1550	1650

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

	RPM Range	
Low	780-1020	Standard Unit
Medium	1000-1315	Optional Kit
High	1315-1700	Optional Kit

Blower RPM for M62

SUPPLY

Mist Eliminator Filter in Intake Hood (5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	4600	820	910	990	1020	1135	1165	1225
	5000	885	965	1040	1100	1160	1225	1280
	5400	910	1000	1095	1155	1215	1275	N/A
	5800	960	1060	1145	1205	1265	1290	N/A
	6200	1020	1110	1195	1255	1275	N/A	N/A

EXHAUST

Barometric Hood, 2" Pleated Filters (5HP)								
		External Static Pressure (in water)						
		0	0.25	0.5	0.75	1	1.25	1.5
CFM	4600	875	935	1000	1025	1140	1175	1190
	5000	910	975	1040	1130	1190	1200	1280
	5400	945	1015	1095	1150	1230	1275	N/A
	5800	990	1060	1125	1175	1265	N/A	N/A
	6200	1010	1110	1195	1200	N/A	N/A	N/A

Notes:
1. Drive losses included in the above tables.
2. Performance can vary depending on ambient conditions
3. Blower RPMs are for reference only

	RPM Range	
Low	700-900	Standard Unit
Medium	900-1100	Optional Kit
High	1100-1300	Optional Kit

START UP INFORMATION SHEET

VOLTAGE - ERV UNIT

Incoming Voltage L1-L2_____ L1-L3_____ L2-L3_____

Running Voltage L1-L2_____ L 1-L3_____ L2-L3_____

Secondary Voltage_____ C (black) to G (green) Volts*_____

C (black) to W (white) Volts*_____

*** With thermostat calling.**

AMPERAGE - ERV 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 wb Temp*_____

*** 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.