



INSTALLATION INSTRUCTIONS AND OPERATION MANUAL FOR MODEL E240

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ENERGY RECOVERY VENTILATOR

INSTALLATION INSTRUCTIONS FOR RESIDENTIAL ENERGY RECOVERY VENTILATOR AGENCY CERTIFIED PRODUCT LABELS



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 1812
and CAN/CSE C349.00

I - SHIPPING AND PACKING LIST

Package 1 of 1 contains:

- 1 - Energy Recovery Wheel Assembly
- 1 - Box (4) Adapter Collars
- 1 - Literature Package

II - SHIPPING DAMAGE

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

III - GENERAL

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

IV - REQUIREMENTS

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

V - APPLICATION

The **SMART ERV** unit can be used with split system units or as a stand alone unit. These ventilators 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 within the cassette frame work. In winter, the ERV transfers 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 intake 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 — 100 Lbs. [Carton].
2. Remove carton. Internal box has accessory inside.
3. All panels must be in place for rigging.

! CAUTION

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

VII - INSTALLATION

Different types of applications can be accomplished with the **SMART ERV** unit. It can be matched with a split system shared ductwork installation or as a stand alone using its own dedicated ductwork.

Shared Ductwork

This method uses the existing HVAC duct system. Both the supply and return ducts from the **SMART ERV** unit are attached to the return air duct of the HVAC system. It is preferred to keep three feet between the two connections in the HVAC duct with the **supply** line closest to the air handler of the HVAC equipment. With this method, the **SMART ERV** and the air handler thermostat **MUST** be wired to run together (interlocked). Refer to air handler interlock wiring in this instruction.

Stand Alone Ductwork

This method is used in buildings that do not have forced air ductwork already installed or for dedicated rooms. Highly contaminated areas, such as kitchen, bathroom and laundry should have return air grilles. While living areas such as family rooms and bedrooms should have supply grilles. With this type of application a simple contact closer device or "optional" Remote Equipment Stat can signal the **SMART ERV** unit to operate. Refer to field wiring in this instruction.

Placement of Unit

Mount the **SMART ERV** unit in a location near existing ductwork and furnace, if using the shared duct system. It is recommended that the unit be placed in an unconditioned space (attic, crawl space, storage area, and basement), indoor application only. Isolate the unit if suspending (bungee cords) from the rafters. Avoid connecting to the mid-span of rafter; this could result in structural damage. Allow proper spacing for maintenance and service of the unit.

Mounting Positions

Suspended:

The **SMART ERV** units come with "D" ring hangers located on all four corners and on both sides. With **SMART ERV** unit removed from carton, position the

unit in front of you and determine how you plan to layout the installation. The unit is **not** position sensitive. It only requires proper spacing for maintenance and service of the unit. Allow 24 inches on the tool-less entry side for removal of filters and enthalpy wheel.

Shelf:

The **SMART ERV** unit can be placed on a flat, dry, level surface of 20 inches by 24 inches that can support 90 lbs. Allow 24 inches on the tool-less entry side for removal of filters and enthalpy wheel.

Ductwork

All duct work must be insulated and sealed with a vapor barrier such as *Flex duct*. The **SMART ERV** unit comes with four 6 inch duct collars (field installed) that attach to one end of the unit. Remove gasket backing cover from the duct collar. Insert plastic zips with the "hook" facing away from the center and enter the zip clip holder from the back to the front. **Before placement into panel verify that pressure tap plug is removed or is accessible for removal to perform air balancing reading.** Insert duct collar into panel and pull zips tight. They can be cut off or left long based on personal preference. Then using sheet metal screws secure the duct collar to the panel if needed. Attach *Flex duct* with zip tie.

Two ducts will connect on the duct collars marked "**Intake**" and "**Exhaust**" that will run to the outside, while the other ducts will connect to "**Supply**" and "**Return**" which will run to the shared or stand alone duct work. To prevent pressure drop and to increase air flow, use the largest practical duct for the installation. For shared ductwork, it is recommended to use a Wye boot fitting when connecting the "Supply" to the existing HVAC return ductwork. This will enhance the airflow integration into the existing return airstream.

Fresh Outdoor Air Intake and Inside Air Exhaust Openings should be located according to local code requirements for wall or roof top openings and should have several feet of separation between each other. Snow levels should also be taken into account. Special attention should be given to other adjacent exhaust vents from combustion fired equipment and the required separation distance needed.

Wiring

The **SMART ERV** unit is equipped with a three-pronged grounding plug for your protection against shock hazards and should be plugged directly into a properly grounded, 120V, 15 amp, three-pronged wall receptacle.

Note: *Complete low voltage field wiring as shown on page .*

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.

The **SMART ERV** can be field wired into many different methods of control. On applications that require shared duct work with a furnace/air handler, the *Furnace interlock method* should be used. Locate the low voltage connection within the furnace/air handler that comes from the 24 VAC room thermostat. Connect 3 wires (Class II -20 or 22 gauge) in parallel at the terminals "G", "C" and "W".

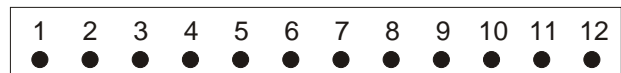
Reference furnace/air handler's manufactures manual.

If the application is a stand alone, then the *Contact closure method* is recommended. With a switch, dry contact, a timer, de-humidistat, humidistat or energy management controller can active the unit. **Refer to wiring diagram within the manual to detail wiring connections.**

Options

A **Remote Equipment Stat (RES-1)** can be used as an independent controller or in conjunction with the above mentioned methods. The physical size of the RES-1 is equivalent to an electronic thermostat and housed in a plastic housing. The housing has a snap on cover to have access to the circuit board and the wire termination connector which is mounted on the back side of the circuit board. This connector is removable so wire can be connected to the terminal block and then inserted back onto the pins of the circuit board. It has an Off/Auto/On slide switch that will activate the base control board of the **SMART ERV** unit. A Dirty Filter/maintenance LED will be displayed after a number of hours of operation and can only be reset at the base control board. Also a red LED will come on when the **SMART ERV** enthalpy wheel is turning, however if this wheel stops turning due to a failure (broken/slipping belt, defective motor, worn-out bearing or debris with-in the media) this LED will flash. Another feature on the **RES-1** is the fan speed control that allows the consumer to change blower speed by 2 steps of lower flow rates. It also allows the consumer to "Lockout" the base control board selected economizer mode for a fixed period of three hours with an indicator LED showing this function. The unit requires 12 conductors of solid copper wire (Class II-20 or 22 gauge) to communicate with the base control board. **Refer to wiring diagram within the manual to detail wiring connections.**

"Optional" Remote Equipment Stat Connections



PIN POSITION	FUNCTION
1	Wheel Rotation LED
2	Dirty Filter LED
3	Economizer Lockout LED
4	Low Speed LED
5	Medium Speed LED
6	High Speed LED
7	Remote Switch "ON"
8	Remote Switch "OFF"
9	Economizer Push Button
10	Speed Up Push Button
11	Speed Down Push Button
12	Ground

A Motorized Outdoor Air Damper (MOAD) (by others) can be field installed in the intake air duct run. This 24 VAC motorized damper is powered open and spring return with wiring connecting the base control board. With a demand for operation the MOAD will power open and continue to be open until a low ambient signal is set into place if the system is in Mode B. At that point the power will be removed until the system comes out defrost cycle.

VIII - OPERATION

How It Works

The unit contains an Energy Recovery Wheel (ERW) that is a new concept in rotary air-to-air heat exchanger. Designed as a packaged unit for ease of installation and maintenance, only matching up to and connection of electrical power is required to make the system operational. The concept consists of a unique rotary energy recovery wheel that rotates in and out of intake air streams within a heavy duty, permanently installed blower cabinet that provides ready access to all internal components. The media is a polymeric material that is coated and permanently bonded with a dry desiccant for total enthalpy recovery. The wheel is belt driven by a PSC motor and drive belt.

When slowly rotating through counter flowing exhaust and intake air streams the ERW adsorbs sensible heat and latent heat from the warmer air stream and transfers this total energy to the cooler air stream during the second half of its rotating cycle. Rotating at 30 revolutions per minute, the wheel provides constant flow of energy from warmer to cooler air stream. The large energy transfer surface and laminar flow through the wheel causes this constant flow of recovered energy to represent up to 75% 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 intake air on an air conditioning system can often be two to three times that of the sensible heat load and in the winter it is a significant part of a humidification heat load.

During both the summer and winter, the 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 cleared by air, first in one direction then the other. Because it is always dry, dust or other particles impinging on the surface during one half cycle, are readily removed during the next half cycle.

Low Ambient mode is appropriate for climates with limited HVAC system operation when outdoor temperatures are below 15°F.

The frost threshold is the outdoor temperature at which frost will begin to form on the **SMART ERV** wheel. For energy recovery ventilators, the frost threshold is typically below 15°F. Frost threshold is dependent on indoor temperature and humidity. The recommended setpoint should be set accordingly on the ERV base control board. The table shows how the frost threshold temperatures vary depending on indoor conditions.

Frost Threshold Temperature		
Indoor RH At 70°F	Frost Threshold Temperature	Recommended Temperature Setpoint
20%	0°F	5°F
30%	5°F	10°F
40%	10°F	15°F

Because Energy Recovery Ventilators have a low frost threshold, frost control is not activated in many climates. Where outdoor temperatures may drop below the frost threshold during the **SMART ERV** operational hours, different low ambient modes of frost control options are available.

Recovery Mode

The **SMART ERV** unit will run on the following: a thermostat call for blower operation in heating or cooling; continuous blower operation from the furnace/air handler interface; contact closure from an external switch; or a signal from **RES-1** auto/on switch. The ERW will rotate between supply and exhaust air streams. While the ERW is rotating, both the supply and exhaust air blowers will be operating to overcome the air resistance of the heat transfer media of the ERW. The **SMART ERV** unit will continue to operate in this mode until monitored temperatures of the air supply and exhaust air streams fall into preset temperature bands that cause the unit to change modes of operation. The other modes are listed below.

Economizer Mode:

During this mode the **SMART ERV** unit has determined that the monitored supply air temperature is between 70 and 50 degrees F. Operation of the ERW is stopped for a period of 10 minutes but the supply and exhaust air blowers continue to run as long as the system has operation demand. If system runs for longer than 10 minutes, then after that time interval the ERW will be activated for 1 minute to purge itself of any debris and/or moisture build up. This will allow cool air into the building without any transfer of energy (a.k.a. Free Cooling). The mode can be locked out with an "optional" switch installed on the base control board or by activating the economizer lockout function on the **RES-1**.

Low Ambient Mode For Frost Control:

There are two methods that are field changeable. Unit is factory set for Mode A.

Mode A:

The supply air blower will reduce speed to operate at 70% of the exhaust air blower when the temperature falls below the defrost set point. The defrost set point is field adjustable with the dial on the base control board. The supply air blower speed is automatically restored to the operational set point when the exhaust air temperature rises 16°F above the board set point. With unit operating in this mode the system provides make-up air into the building as the supply air blower is running at a reduced speed to avoid building depressurization.

Mode B:

The supply air blower and "optional" **Motorized Outdoor Air Damper (MOAD)** will turn off when the temperature falls below the defrost set point. The defrost set point is field adjustable with the dial on the base control board. The supply air blower operation is automatically restored when the exhaust air temperature rises 16 degrees F above the board set point. With the unit operating in this mode, provisions should be considered for introducing make-up air into the building when the supply air blower is off to avoid the building depressurizing.

Blower Speed Adjustment

Blower speed selection is accomplished by changing the speed selection dial on the base control board in the control box. Both supply and exhaust air blowers are direct drive motors. Both blowers are factory set at "max" speed for maximum airflow. To determine air flow setting, external static pressure readings will need to be read across the **SMART ERV** in the duct collar ports.

Air Balancing Adjustment

1. With a manometer measure pressure drop [inches of water column] between the intake and supply ducts of the **SMART ERV** unit. Unit CFM is determined then by referring to **Table #1**. If CFM values are not per design, adjust knob on control base for intake air and repeat measure method.
2. With a manometer measure pressure drop [inches of water column] between the return and exhaust ducts of the **SMART ERV** unit. Unit CFM is determined then by referring to **Table #1**. If CFM values are not per design, adjust knob on control base for intake air and repeat measure method.

IX - SYSTEM CHECK

1. Disconnect **SMART ERV** main power.
2. Remove control access panel and apply.
3. Restore power to unit. Observe **SMART ERV** drive motor for wheel and both blowers are running.
4. Verify that the **SMART ERV** blower motors are set to "max" speed and operating.
5. Cleanup once ERV is operating 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 the unit.

X - MAINTENANCE

Motor Maintenance

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

Mechanical Inspection

Make visual inspection of **SMART ERV** rotating bearings during routine maintenance. Filters should be checked periodically and cleaned when necessary. Filters are located in front of recovery wheel. **DO NOT** replace 1" pleated filters with throwaway type filters.

Energy Recovery 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 **SMART ERV** access panel and unplug [J27 & P27] (**Refer to wiring diagram in this instruction manual**). Discoloration and staining of ERV segment does not affect its performance. Only excessive buildup of foreign material need be removed. If the segment appears excessively dirty, it should be cleaned to ensure maximum operating efficiency. To clean the wheel remove belts, screw from center hub, grasp segment by rim and remove. Thoroughly spray plastic surface with mild household cleaner 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.

Service Override Switches

Service override switches are used when trouble shooting the system and are listed in the table. They will manually turn on individual motor and override inputs and have a 3 hour maximum operation time if left in override position.

Also the unit has a red LED indication flash when wheel rotation is detected every 5 seconds. If fault occurs, the LED will glow steady and wheel motor LED (green) will flash. All motor outputs have a green LED when powered. An amber LED will glow when system has reached 1000 hours of operation for dirty filter check and/or clean your enthalpy wheel. This is manually resettable by toggling #8 DIP switch (**See Table**).

Service Override Switches (DIP Switches) Table

1	2	3	4	5	6	7	8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* "ON" is when the top is depressed.

Switch function when activated.

1. Exhaust Override
2. Intake Override
3. Wheel Override
4. Used for short time testing
5. Reset to default values and clear hour counters
6. ON Override
7. Defrost Mode "B"
8. Filter timer reset

XI - WARRANTY

Manufactured Parts

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

Other Supplied Parts

SMART ERV comes with a guarantee to replace standard components purchased new from the manufacturer, (motors, controls, etc.) that may be found defective, within twelve (12) months of the installation date. The ERW carries a 5 year parts warranty. The components warranty, however, excludes service call charges and labor cost for replacing or adjusting the defective part.

Limitation of Warranties

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

SMART ERV AIRFLOW @ MAX BALANCED FLOW

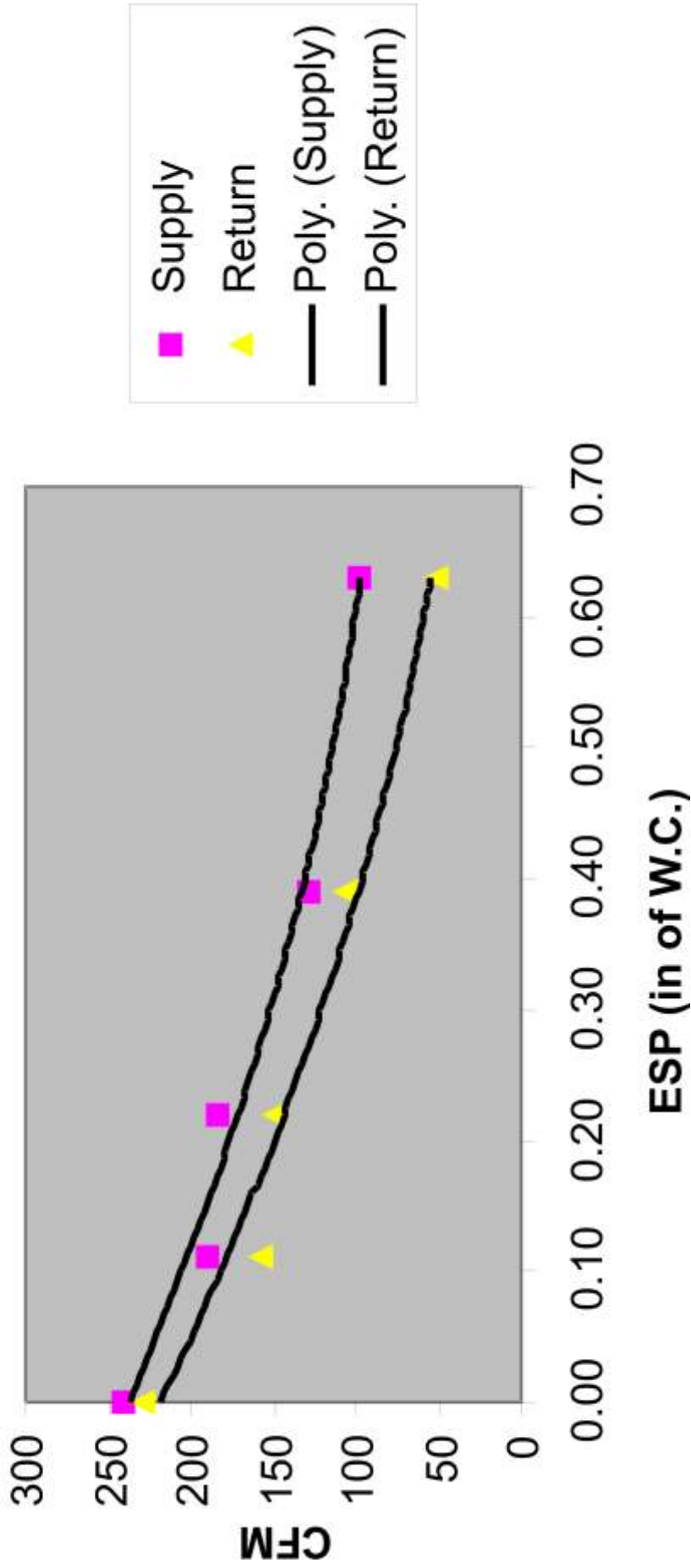
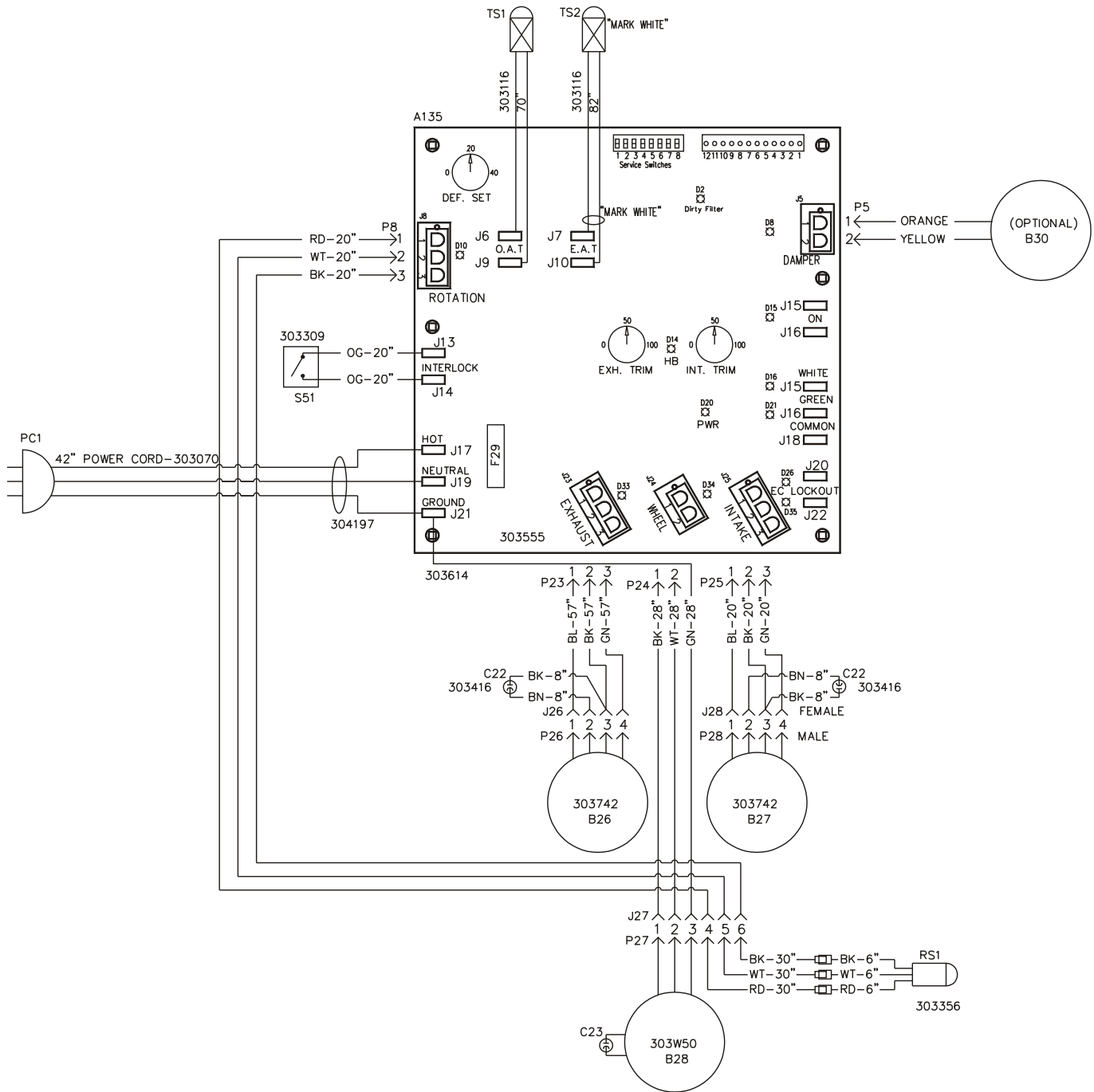


Table 1

SMART ERV UNIT WIRING DIAGRAM

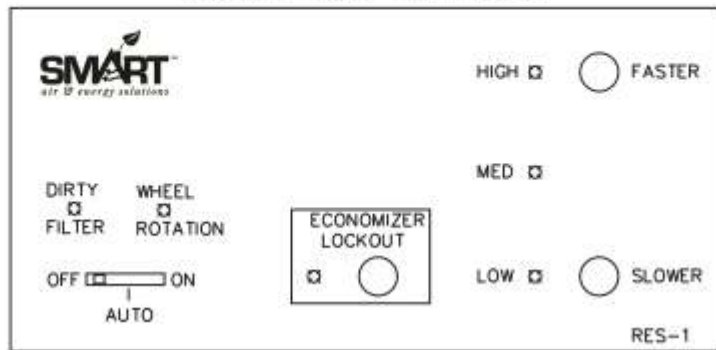


Desiccant Wheel for Rooftop Unit
208-230/460V/575V (3 PH)

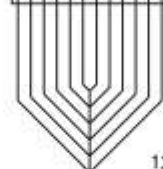
Unit#: 01-R0201XX-23/-33/-43

Field Wiring

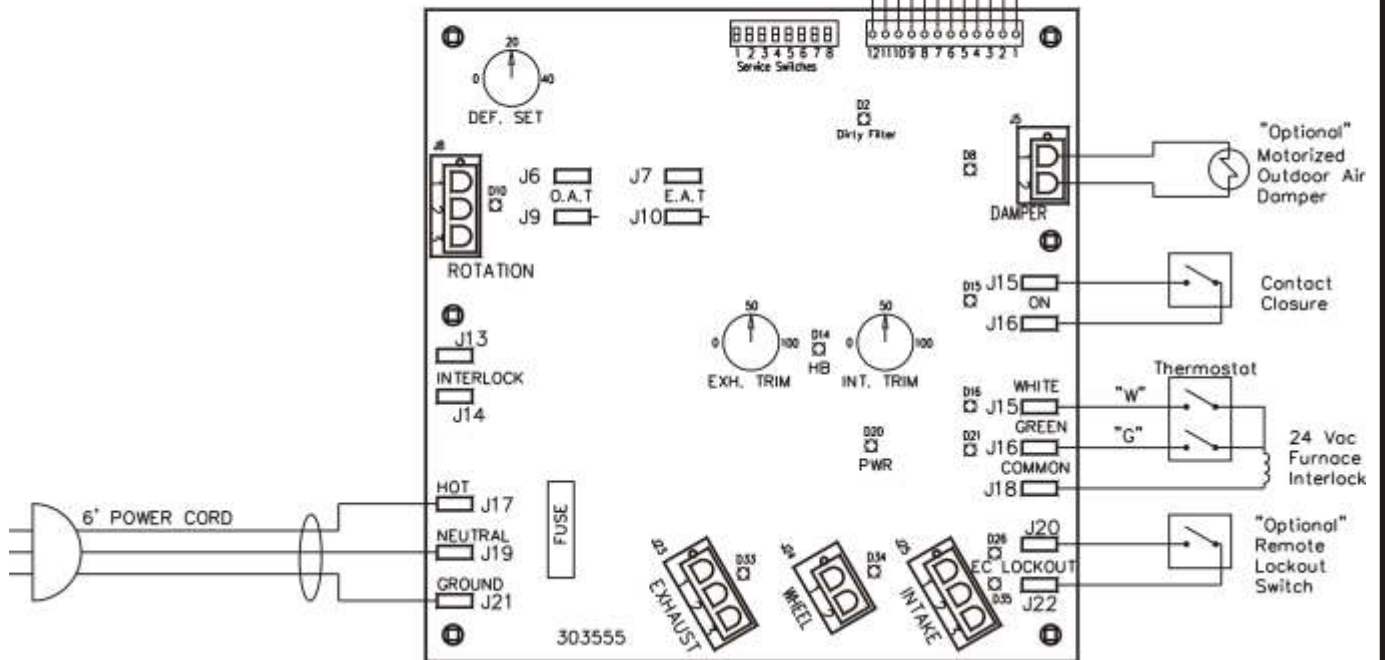
"Optional" REMOTE EQUIPMENT STAT



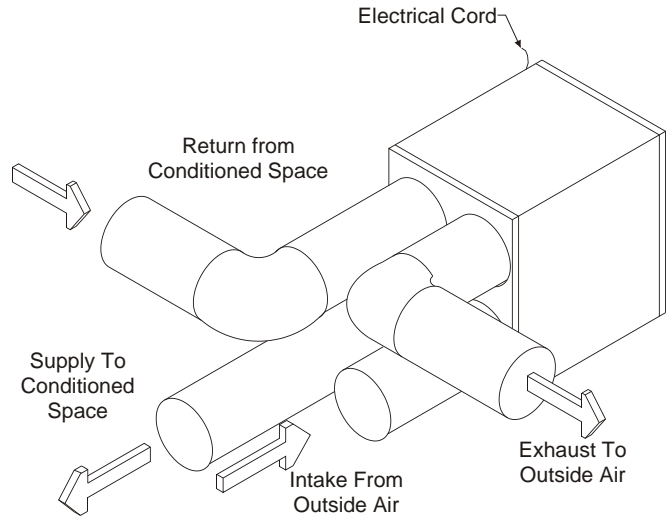
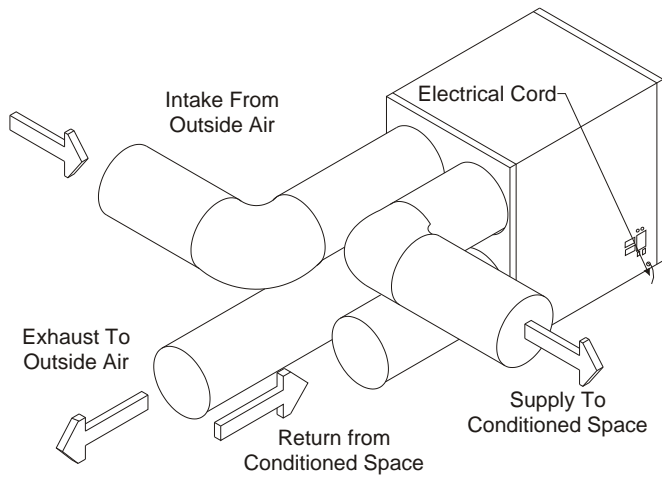
1 2 3 4 5 6 7 8 9 10 11 12



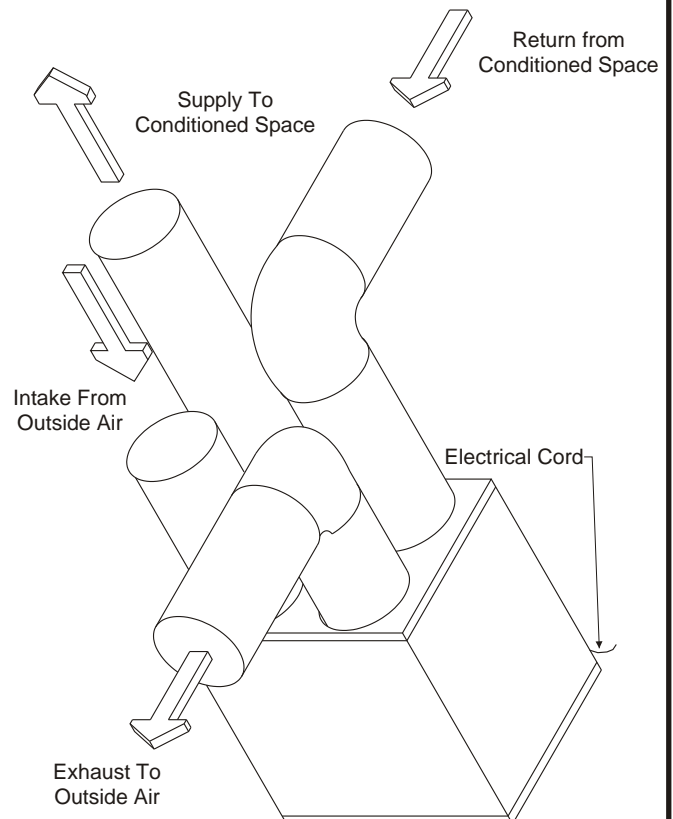
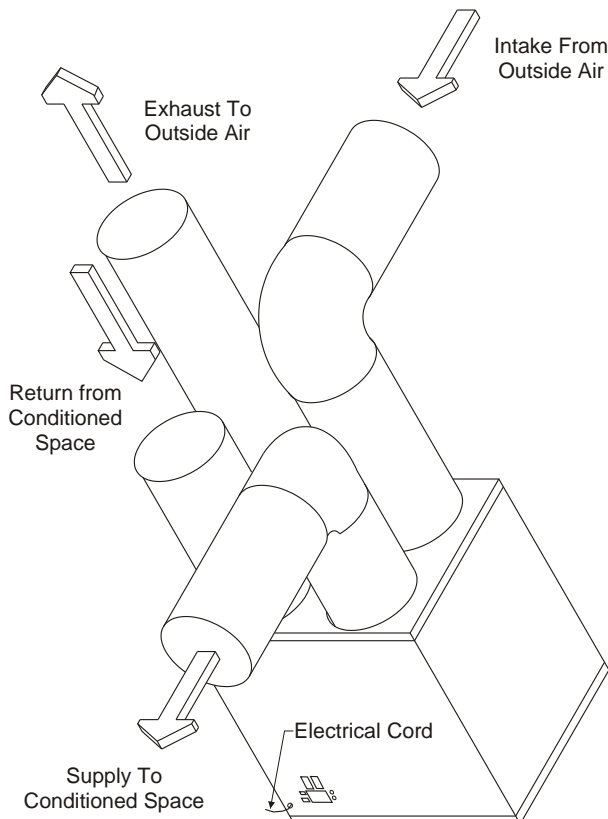
12-CONDUCTOR THERMOSTAT WIRE (FIELD PROVIDED)



Horizontal Duct Arrangements



Upflow Duct Arrangements



SMART air & energy solutions™

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