



TRLPe100 & TRLPe100C ERV INSTALLATION, OPERATION & MAINTENANCE MANUAL

FOR SINGLE/MULTI-FAMILY
APPLICATIONS



Model TRLPe100C Shown

IMPORTANT SAFETY INFORMATION

CAUTION

RISK OF ELECTRIC SHOCK OR EQUIPMENT DAMAGE

Whenever electrical wiring is connected, disconnected or changed, the power supply to the ERV and its controls must be disconnected. Lock and tag the disconnect switch or circuit breaker to prevent accidental reconnection of electric power.

CAUTION

RISK OF INJURY FROM FALLING OBJECTS

Installation of this unit requires hoisting hardware overhead and working directly beneath heavy objects during the installation process. Observe all OSHA-approved work practices. Always wear OSHA-approved Personal Protective Equipment (PPE).

CAUTION

RISK OF CONTACT WITH HIGH SPEED MOVING PARTS

This appliance has two high speed fans that can cause injury or be damaged if objects come into contact with the impellers when they are spinning. The fans may be controlled by external controlling devices and switch on at any time. When working in the area of the fans, electric power to the unit must be disconnected.

IMPORTANT

Only persons who have been properly trained and authorized are to access the ERV electrical box and the controller. Changes to the controller are to be made only by trained and authorized personnel.

IMPORTANT

All ductwork is to be designed and installed in accordance with SMACNA guidelines.

IMPORTANT


This equipment is to be installed by following Industry Best Practices and all applicable codes. Any damage to components, assemblies, subassemblies or the cabinet which is caused by improper installation practices will void the warranty.

IMPORTANT

This ERV is intended for ducted ventilation only. Ducting at least 40 inches [1 meter] in length must be installed on all four airstreams.

UNIT RECORDS

Record information as shown below. In the unlikely event that factory assistance is ever required, this information will be needed.

 **NOTE:** This page is to be completed by the installing contractor. The completed document is to be turned over to the owner after start-up.

Locate the Soler & Palau unit label, to be found outside of the appliance. Record the model and serial numbers below.

NOTE: This information is for purposes of identifying the specific air handling appliance. Unit-specific option data can then be obtained, as needed, from the Model Number.

ERV Model: TRLPe100
 TRLPe100C

Serial Number:

Installing Contractor:

Startup Date:

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IMPORTANT USER INFORMATION

SAVE THIS MANUAL

NOTICE

This manual has space for recording operating settings at time of unit commissioning that must be completed by the installer. *See Sections 8.1 and 8.2 of this manual.* This manual also contains space for maintaining written records of settings and maintenance. *See Section 9.2 of this manual, Maintenance Records.*

Information that is recorded is specific to just one ERV. If additional ERVs are being documented, please make copies of these pages and identify each copy by its unit tag.

TRLPe100 & TRLPe100C ERV

NOTE: This unit is an Energy Recovery Ventilator, or ERV. It is commonly referred to throughout this manual as an ERV.

1.0 OVERVIEW

1.1 DESCRIPTION

The TRLPe100C and TRLPe100 ERVs are multi-speed air-to-air energy recovery ventilators that are designed for residential application and have multiple installation options. They can be installed between joists that are spaced a minimum of 24" on center, they can be suspended from chains or they can be mounted on a wall or other object. Each type of installation can be accomplished by a single person. The TRLPe100C and the TRLPe100 are identical except for the method of wiring the power source to the unit. The TRLPe100C has an integral line cord, ready to be plugged into a standard 120 VAC receptacle, while the TRLPe100 is to be hard-wired by the installer.

The ERV exhausts stale room air while transferring both latent and sensible energy into an incoming fresh outdoor air stream. Energy recovery is accomplished by a fifth-generation static plate heat exchanger core. Both air streams are controlled by integral 48 VDC fans. Both air streams have a continuous flow of about 50 CFM and a "Boost" flow rate of up to 114 CFM. The flow rates are adjusted at the time of installation by means of integral potentiometers and may switch back and forth during operation.

The airflow rate can be changed from Continuous to Boost at any time, using many different optional sensors or control devices.

In order for enthalpic cores to work efficiently, the air streams must be balanced. Pressure taps are provided for purposes of measuring internal air pressure and then adjusting the potentiometers that control the fans.

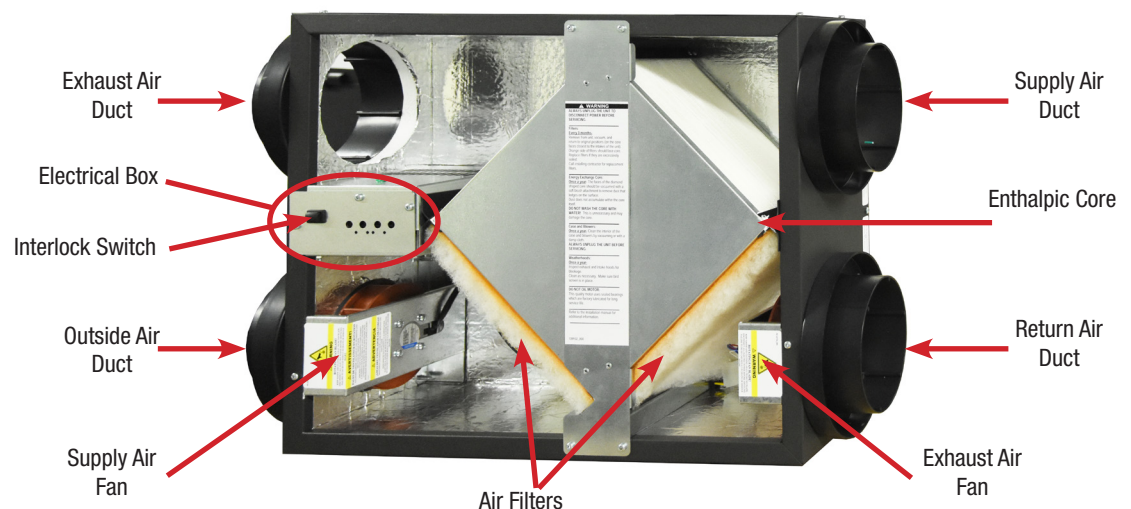
The hinged door has an opening for viewing and access to the potentiometers. The entire cabinet is lined with foil-backed 1" thick foam insulation.

1.2 OPERATING MODES

The TRLPe unit has two different operating modes; Continuous and Boost. Continuous mode provides and exhausts a low level of air, between 30 CFM and 88 CFM. Boost mode provides and exhausts a greater level of air, between 60 CFM and 114 CFM.

The two operating modes are selectable and controlled independently so that different controlling methods can be used to switch back and forth. Example: an occupancy sensor could be used to turn the unit on to Continuous mode and then an IAQ sensor could be used to switch the unit to Boost mode.

In either operating mode, the speed of each fan is automatically adjusted to hold the desired airflow rate. This allows the TRLPe unit to provide consistent ventilation as filters load up or the system resistance changes.

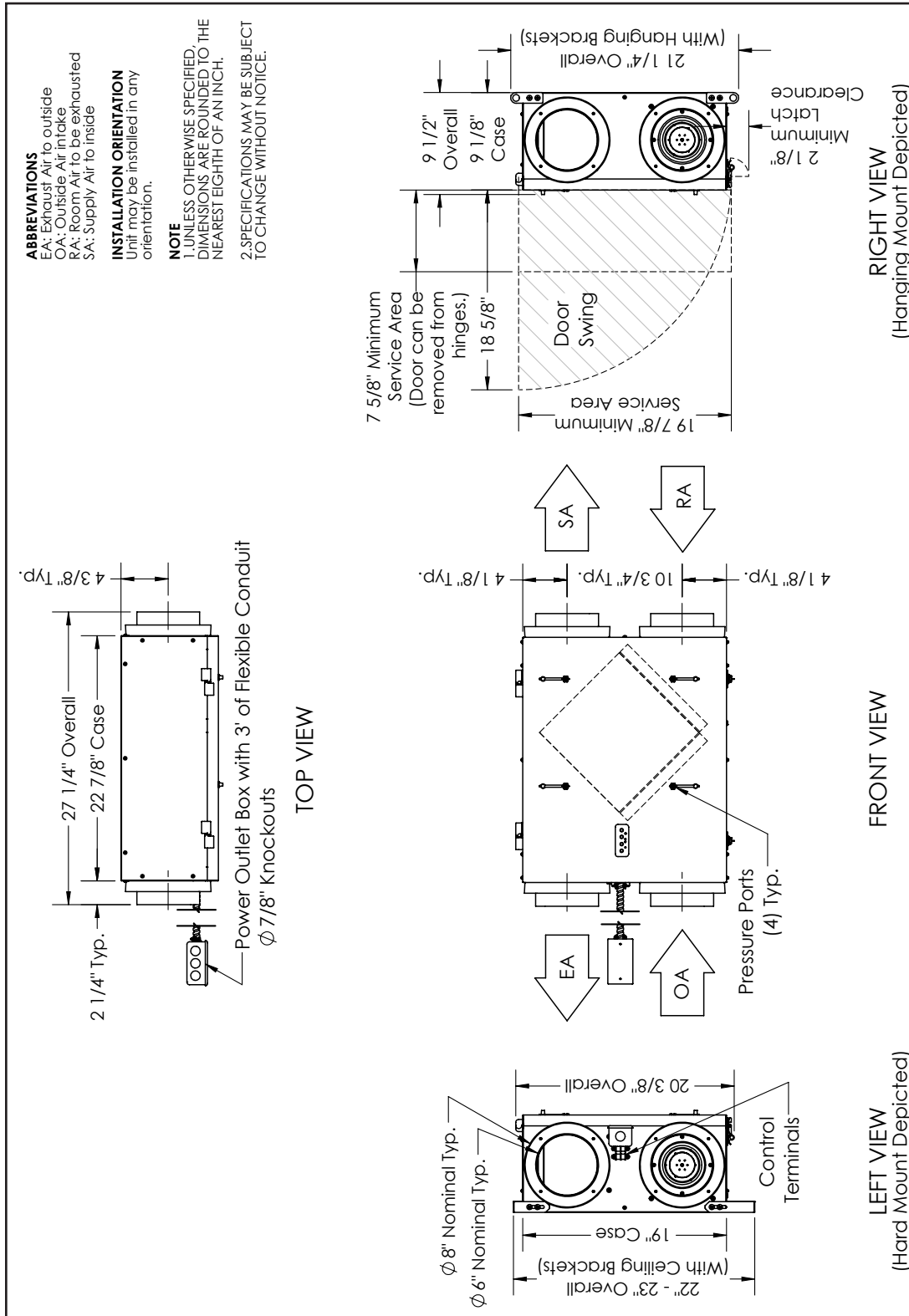


TRLPe Cutaway View

TRLPe100 & TRLPe100C ERV

1.3 DIMENSIONED DRAWINGS

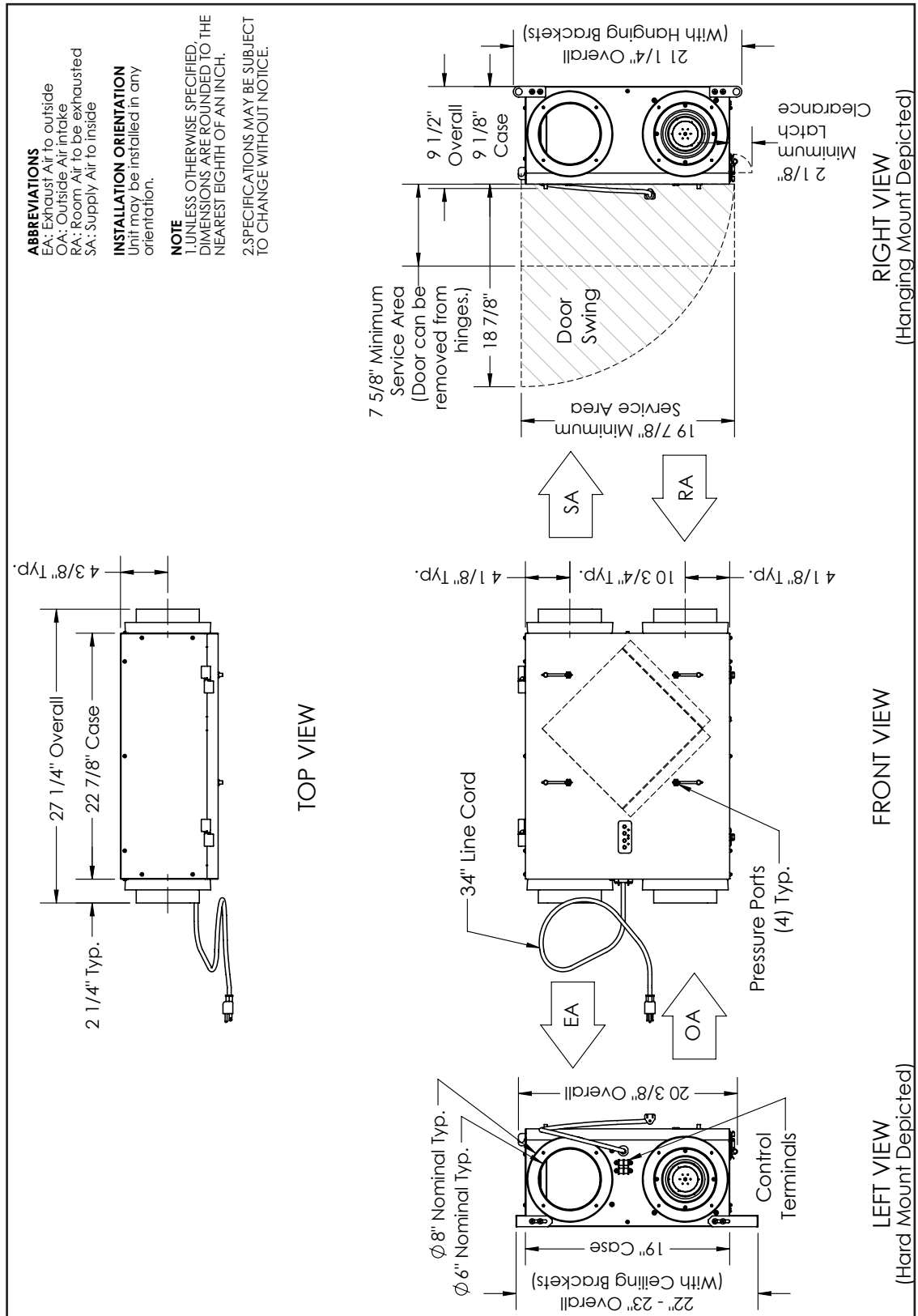
1.3.1 TRLPe100 Dimensioned Drawing



TRLPe100 Dimensioned Drawing

TRLPe100 & TRLPe100C ERV

1.3.2 TRLPe100C Dimensioned Drawing



TRLPe100C Dimensioned Drawing

TRLPe100 & TRLPe100C ERV

1.4 UNIT WEIGHT

The hanging weight of each TRLPe unit is about 32 pounds.
The shipping weight of each TRLPe unit is about 38 pounds.

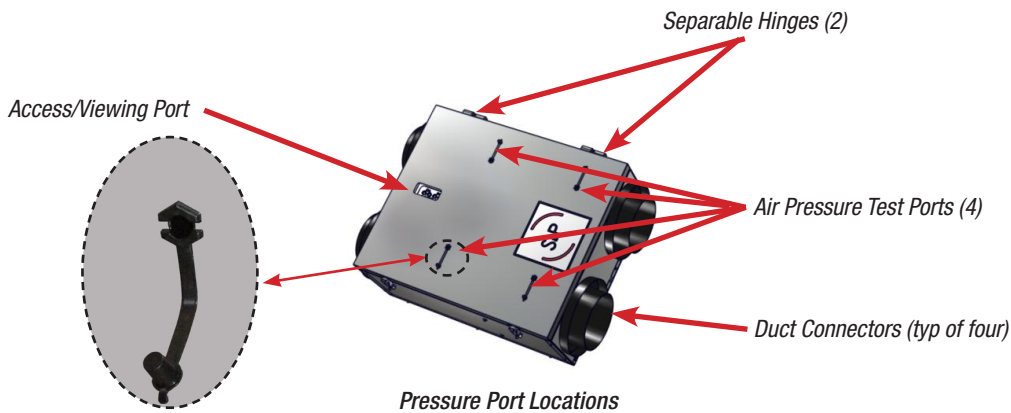
2.0 COMPONENT DESCRIPTION

2.1 CABINET

The cabinet is built of 22 gauge (0.64 mm) galvanized steel and is painted charcoal gray. It has a hinged, removable door. On the exterior of the cabinet are found four combination 6" or 8" duct connectors, 2 low-voltage terminal strips, four air pressure test ports and an access / viewing port. On each corner, there are two 1/4 - 20 rivet nuts for installation of mounting brackets.

2.1.1 Removable Door w/ Interlock Switch

The insulated access door is hinged on one long side and has two securing latches on the other long side. The hinges are separable to allow for removal of the access door for servicing. The door has an access / viewing port built in to permit adjustment of the fan potentiometers and a clear view of the control module with its integrated LED indicator lights. Directly behind the access door is a pressure-sensitive interlock switch that will shut off power to the unit if the door is opened during operation. Also installed on the door are four air pressure test ports, used for connecting a manometer and taking air pressure measurements.



2.2 FANS

The TRLPe unit has two advanced, high efficiency electronically commutated (EC) 48 VDC variable speed fans. One fan is used for incoming air (Outdoor Air which becomes Supply Air) and the other fan is for the outgoing air stream (Return Air which becomes Exhaust Air). The speed of each fan is controlled independently by a PWM (Pulse Width Modulation) signal from the controller. The fans will operate at speeds between 2,850 and 5,000 RPM.



EC Fan Assembly (typ)

2.3 CONTROLLER

The controller regulates the speed of each fan by providing a PWM (Pulse Width Modulation) signal to the EC motor. Incoming line voltage goes to a power supply which provides 48 VDC for the fans, and to a step-down Class II transformer which provides 24 VAC to the externally-mounted low-voltage terminal strips. The controller has four potentiometers that are adjusted by the user to establish fan speeds for each operation mode. There is one LED to confirm the presence of 120 VAC at the unit and also two indicator LEDs to signal fan fault conditions.


TRLPe100 & TRLPe100C ERV

2.3.1 Controller Power Supply

Each TRLPe unit has two terminal strips mounted on the end of the unit. The terminal strip that is further away from the hinged door is a power supply terminal. The integral power supply provides up to 5 VA which can be used to power the various optional control accessories.

2.4 DUCTS

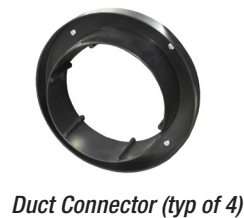
TRLPe units are supplied with a set of 4 duct connectors that must be field-installed. The connectors can be used for either 6" round or 8" round ducts. Typical duct runs should be 6" diameter and should not exceed 20 feet in length and rigid ducting is preferred over flexible ducting. If the duct runs exceed 20 feet in length or if the pressure drop in the duct is excessive, 8 inch round ducting should be used instead.




NOTE: For all units:
 RA = Room Air into unit
 OA = Outside Air into unit
 SA = Supply Air to inside
 EA = Exhaust Air to outside

A total of four duct runs will generally be used:

- One duct will provide clean outdoor air (Outside Air) to the TRLPe unit. This duct will normally be capped by an air inlet cap mounted on the exterior side wall of a residence and equipped with a bird screen.
- One duct will be needed to exhaust stale air (Exhaust Air) to the outdoors. This duct will normally end at an exhaust cap located on an exterior wall of a residence. The exhaust air cap should be located at least 10 feet from the fresh air intake opening.
- One duct will be needed to deliver fresh, conditioned air (Supply Air) from the TRLPe unit to a desired location in the residence. This duct will normally end in a floor or wall grate having an area of at least 28 square inches.
- One duct is used to collect old, stale air from the residence (Return Air) and use it in the TRLPe unit before exhausting it to the outdoors. The TRLPe unit uses this old, stale air and collects both the sensible (heat) energy and the latent (moisture) energy from the air and then transfers the energies to the incoming stream of fresh air.



2.5 ENTHALPIC CORE



The cores used in all ERVs are 5th generation, static plate enthalpic cores. They are commonly referred to in this manual as "cores".

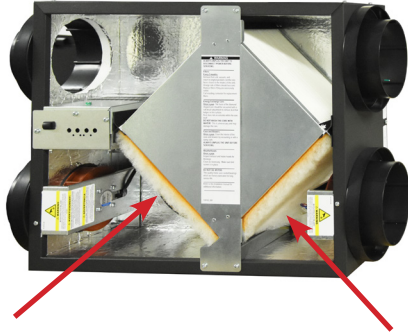
Each TRLPe unit is equipped with an advanced enthalpic core. The core is constructed of a fibrous material in many layers that are oriented so that two separate air streams can pass through in close proximity to each other in many different layers. In the core, both the sensible (heat) energy and latent (moisture) energy are rejected by the RA airstream and the core then injects those energies into the fresh outdoor airstream, which is then ducted to wherever it is needed in a residence.



TRLPe100 & TRLPe100C ERV

2.6 FILTERS

Each TRLPe unit is equipped at the factory with mesh-type anti-microbial MERV 8 filters on both the OA and RA sides of the core. If desired, the mesh-type OA filter can be replaced with an optional MERV 13 pleated paper filter.



*Pleated Paper MERV 13 Filter
(optional for OA, typ)*

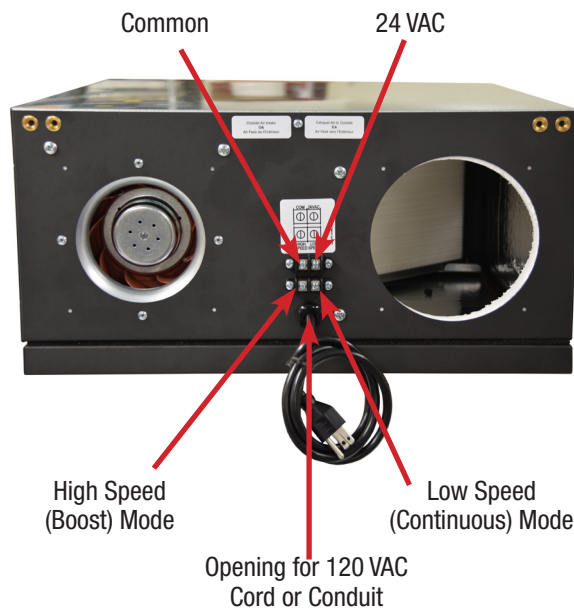
OA Filter (filters the incoming outdoor air for use in the Occupied Space and also protects the core). This filter can be replaced with a pleated paper MERV 13 filter.

RA Filter (protects the core from dust and dirt being carried by the Return Air stream)

TRLPe Filter Locations

2.7 CONTROLS TERMINAL STRIPS

There are two terminal strips installed on the end of each unit. One terminal strip provides connection to the Continuous and Boost modes and the other strip provides 24 VAC for connection to either of the operating modes or to control accessories. See the *Low Voltage Wiring Schematics in Section 10.5 of this manual.*



Controls Terminal Strips

TRLPe100 & TRLPe100C ERV

2.8 INSTALLATION HARDWARE

A variety of installation hardware is shipped with each unit, providing for mounting between wood joists, hanging from owner-supplied and installed chains with vibration isolation springs or mounting on a vertical surface, such as a wall or other support panel.

Supplied with all units:

Four duct collars, to be field-installed on the TRLPe unit with factory-provided sheet metal screws.

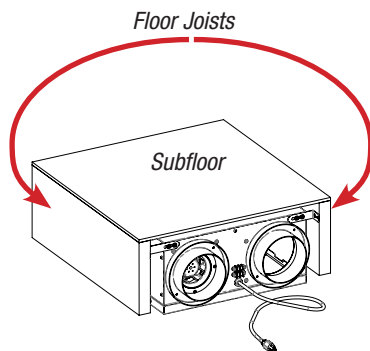


One package of sheet metal screws for installation of the duct collars. The enclosed washers are not needed for this application.



2.8.1 Horizontal Installation Between Wood Joists

Supplied with all units:

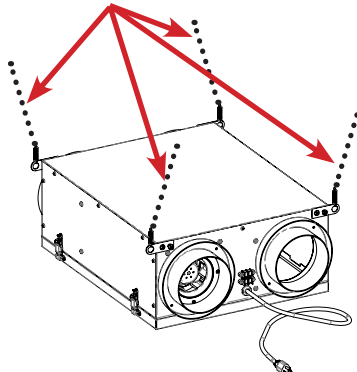


For horizontal installation between wood structural members (joists) only. The short L-brackets are used on the hinge side of the unit, the long L-brackets are used on the latch side. The installer must provide thread-lock, one drop per machine screw, and must provide four 1-1/4 #10 pan head screws for anchoring the brackets to wood joists. The minimum distance between joists is 22" and the maximum distance is 23".

2.8.2 Horizontal Installation Hanging From Chains

Supplied with all units:

User-Supplied Support Chains
(splayed outward for stability)



Chain support brackets are field-installed on each corner of the TRLPe unit with two of the factory-supplied machine screws per bracket. Installer must provide thread-lock, one drop per machine screw. Installer must provide chain with a minimum load-bearing rating of 90 pounds and all anchoring / connecting hardware. Supporting chains are to be angled outward from the brackets to the anchor points to reduce sway. Vibration Isolation Springs are to be installed on each of the four installed support chains as shown in Section 8.4 of this manual. Support chains are attached to the chain support brackets by S-hooks supplied by others, and then crimped shut.

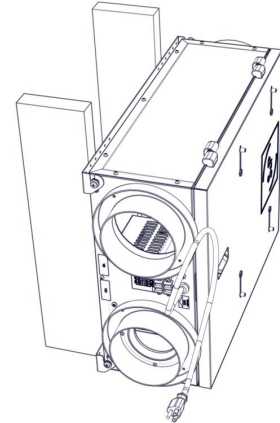
TRLPe100 & TRLPe100C ERV

2.8.3 Vertical Installation on a Wall or Panel

Optional Vertical Installation Kit:



For vertical installation on stud walls or user-supplied support/backing panels. The installer must provide eight #10 X 2" coarse thread pan head sheet metal screws for installation in wood studs, two screws per stud per bracket. Installer to provide #10 fine thread pan head screws for installation into steel studs. When mounted on field-supplied plywood panel, the panel should be a minimum of 3/4 inch thick. Mounting screws should be #12 X 3/4" pan head. Factory-provided mounting screw holes will have to be enlarged.




3.0 HOW IT WORKS


The TRLPe unit is an Energy Recovery Ventilator, or ERV. It draws fresh outdoor air into the unit where it collects the energy from an exhaust air stream and then ducts that fresh air to wherever it is needed. In some cases, a dedicated duct will deliver the fresh air to a dedicated duct louver and in other cases, the TRLPe unit will be ducted directly into existing HVAC ductwork. The exhaust air stream is ducted to the outdoors and discharged. The enthalpic core is where both latent and sensible energies are transferred from the RA airstream to the SA airstream. The unit has two speeds that can be set by the owner; one is a lower, Continuous speed mode for when minimal fresh air is needed and the second is a Boost mode to respond to a greater need for fresh air.

For greatest energy recovery efficiency, the two air streams must be balanced, such that the same mass of air is conducted in both directions through the core. Alternatively, it may be desirable to the owner to have a slight positive static pressure in the occupied space, in which case the fans will be set for a slight imbalance. This slight positive pressure (and imbalance) would result in less air infiltration into the residence. It would also produce slightly lower energy recovery efficiency because of the imbalance.

If desired, the Continuous mode can be adjusted for balanced operation and the Boost mode could be set for very high positive pressure so that the ERV would function as a supplier of makeup air. The settings for each mode are independent of each other. This imbalance would be desirable in cases where an exhaust fan is also switched on, such as either a kitchen or a bathroom exhaust.

A number of different methods can be used to switch the unit from OFF to Continuous mode or OFF directly to Boost mode or to switch from Continuous to Boost mode. These methods range from manual switching devices to air quality sensors. See *Control Accessories, Section 4.0 of this manual*.

 Sensible energy is often referred to as "heat energy".

 Latent energy is often referred to as "moisture energy".

TRLPe100 & TRLPe100C ERV**4.0 CONTROL ACCESSORIES****4.1 CO2 MONITOR**

(optional accessory, field-installed)

May be used as an ON / OFF control or to switch from Continuous mode to Boost mode as changing levels of carbon dioxide are detected.



Room CO2 Sensor (wall mount)

4.2 OCCUPANCY SENSOR

(optional accessory, field-installed)

Used for occupancy-based ventilation, hardwired to the low voltage terminal strips. It may be used to turn the unit ON or Off or to switch from Continuous mode to Boost mode.



Occupancy Sensor (ceiling mount)



Occupancy Sensor (wall mount)

TRLPe100 & TRLPe100C ERV

4.3 MANUAL ON/OFF SWITCH

(provided by others, field-installed)

May be used to switch the ERV ON to Continuous mode or to switch from Continuous to Boost mode.



ON/OFF Switch, Manual

4.4 DIGITAL TIME CLOCK (STC7D-W)

(optional accessory, field-installed)

May be used to switch an ERV ON to Continuous mode or to switch from Continuous mode to Boost mode at a predetermined time.



STC7D-W

4.5 PERCENTAGE TIMER CONTROL (SPTL)

(optional accessory, field-installed)

May be used to regulate the amount of time the unit will operate in each hour that the unit has power. Settings range from 10% operating time to 100%. Also used to switch from Continuous mode to Boost mode for selected amounts of time per hour.



Percentage Timer Control (SPTL)

4.6 TIMER PUSH BUTTON POINT-OF-USE (SPBL)

(optional accessory, field-installed)

Works in conjunction with the SPTL timer shown above. Depending on how many times the switch is pressed, it will cause the unit to operate for 20, 40 or 60 minutes.



Push Button Point-of-Use Control (SPBL)

TRLPe100 & TRLPe100C ERV

5.0 COMPANION CONTROL DEVICES

The TRLPe unit may be used as a stand-alone device, controlled by its own control accessories, or it may be installed as a slave device, controlled by a “master” controlling system that incorporates its own sensors. Operation of the TRLPe unit is then dependent on control signals from the master controlling system, hardwired to the low voltage terminal strips.

6.0 INSTALLATION REQUIREMENTS

Soler & Palau recommends installation of the TRLPe unit by a professional HVAC installer due to knowledge of building codes and balancing of the air streams prior to use. The TRLPe unit can be installed by one person.

6.1 INSTALLATION POSITION

May be installed in any position providing sufficient clearance as shown in Section 1.3 of this manual. Preferred position is horizontal so that the hinged access door can swing down to allow for easiest filter changes and cleaning of the enthalpic core.

6.2 CLEARANCES

Primary consideration is sufficient space to open door latches and for the door to be able to swing open at least 90 degrees. See the dimensioned drawing in Section 1.3 of this manual for required clearances.

6.3 DUCT LENGTHS AND INSULATION

For all installations, SMACNA guidelines for duct installation should be followed. The most commonly-used ducting is 6” diameter flexible. Rigid ducting is preferred because there is less resistance to airflow, resulting in less power consumption to deliver the same amount of air.

Outside air intake should be at least 10’ from the exhaust air vent

If the TRLPe unit is located in a conditioned space, only the OA and EA ducts need to be insulated. If it is installed in an unconditioned space such as an attic or crawl space, all ducts must be insulated.

6.4 AC POWER SOURCE

6.4.1 Model TRLPe100C

Power requirements: 120 VAC, 2.0 amps

The TRLPe100C has an integral 34 inch long power supply cord. The installer must provide a standard, grounded 120 VAC outlet in the proximity of the ERV. Check all local codes.

6.4.2 Model TRLPe100

Power requirements: 120 VAC, 2.0 amps

The TRLPe100 is to be hard-wired by the installer. Check all local codes before wiring. A disconnect switch on the AC supply line may be required.

6.5 LOAD BEARING CAPACITY OF SUPPORTS

The TRLPe unit is to be installed by attachment to building structural members such as joists, bar joists, beams, wall studs and columns. It is not be supported by attachment to fixtures such as ductwork or air handlers unless the fixtures are permanently installed and capable of providing adequate support. Whenever an ERV is installed on or supported by a fixture, the installation must be approved by a design engineer.

TRLPe100 & TRLPe100C ERV

7.0 UNIT INSTALLATION



CAUTION

RISK OF INJURY FROM FALLING OBJECTS

Installation of this unit requires hoisting equipment and hardware overhead and working directly beneath heavy objects during the installation process. Observe all OSHA-approved work practices.

7.1 USER-SUPPLIED INSTALLATION MATERIALS

Solar & Palau suggests the use of a duct hoist for hoisting the TRLPe unit into position.

For all installations:

- medium-strength thread-lock
- UL-181 - rated mastic for duct connections
- Common hand tools such as pliers, drill, screwdriver bits, stud finder, etc.

For wall bracket installations between wood joists:

- Four #10 X 1 - 1/4" coarse thread sheet metal screws

For chain-suspended installations:

- Chain with a 90 pound load rating
- Anchoring hardware as needed
- Attaching hardware such as "S" hooks to connect the chains to the unit support brackets



Duct Hoist (typ)



Hex head sheet metal screws may be substituted for pan head sheet metal screws.

For wall bracket installations:

Note: wall brackets must be supported by two wall studs. If the desired location of the TRLPe unit does not permit support by two wall studs, the TRLPe unit must be mounted on a user-supplied 3/4 inch thick plywood panel that is anchored on two wall studs.

- 24" level
- Framing square (optional)
- 8 screws for attaching the brackets to the studs or to a plywood panel

7.2 VERIFY INSTALLATION REQUIREMENTS

Verify required clearances, availability of 120 VAC, access to motor potentiometers, visibility of LEDs, clearances for ductwork and length of ductwork. *See Section 2.8.1 of this manual.*

7.3 L-BRACKET INSTALLATION

User-supplied materials required:

- 1 1/4" X #10 coarse thread pan head sheet metal screws (4)
- Thread-lock

Installation instructions:

SEE SECTION 2.8.1 HORIZONTAL INSTALLATION BETWEEN WOOD JOISTS

- Install the four duct collars on the ends of the TRLPe unit, using the sheet metal screws provided.
- Loosely install the four L-brackets on the TRLPe unit using the factory-provided 1/4 - 20 machine screws. Apply a drop of thread-lock to each screw as it is installed. The L-brackets should be positioned toward the center of the TRPLe unit, providing clearance for the unit when it is raised into position.
- Raise the TRLPe unit into its final location.
- Screw the two brackets on one side to its support joist with user-supplied 1 1/4" #10 coarse thread sheet metal screws.
- Screw the other two brackets on the other side of the TRLPe unit to the other support joist.
- Adjust the TRLPe unit side-to-side, as desired and then tighten all four L-brackets.



When hanging a TRLPe unit between joists, the unit may be lowered so that it hangs below the joists. When this is done, the L-brackets must still be anchored to the joists a minimum of 1" above the bottoms of the joists.




When installing machine screws into the rivet nuts on the TRLPe unit, do not over-tighten the screws. The threads in the rivet nuts can be stripped.

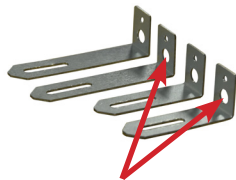
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Alternate Installation instructions:

An alternate method of installing a TRLPe unit is to provide temporary support screws in the joists and then hang the unit on those screws by means of the second set of pre-punched holes in the L-brackets.

- Install the four duct collars on the TRLPe unit, using the sheet metal screws provided.
- Loosely install the four L-brackets on the TRLPe unit using the factory-provided 1/4 - 20 machine screws. Apply a drop of thread-lock to each screw as it is installed. The L-brackets should be positioned toward the center of the TRLPe unit, providing clearance for the unit when it is raised into position between the joists.
- From the underside of the joists, identify where the unit is to be located.
- On either side of the joist space the unit will occupy, mark four screw locations, one for each of the corner L-brackets. Space the marks such that they are 1" or more below the underside of the subfloor and 23 29/32" apart. Mark one joist first, then transfer the marks to the second joist, ensuring that the marks on both joists are aligned.
- Use a scratch awl to start each screw hole and install four 1 1/2" X #10 pan head sheet metal screws, leaving them about 1/4" out.
- Raise the TRLPe unit into position and slip the large bracket holes onto the temporary screws.
- Install and tighten four 1 1/4" X #10 coarse thread pan head sheet metal screws through the smaller holes in the L-brackets.
- Adjust the TRLPe unit side-to-side as desired. Ensure there is adequate clearance for the door latches to open and for the door to swing open at least 90 degrees.
- Tighten the eight 1/4 - 20 machine screws that secure the L-brackets in place.
- Remove the temporary holding screws.

 These instructions are intended for when a duct hoist is not available and installation is being performed by a single person.



Temporary Screw Holes (typ)

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7.4 CHAIN INSTALLATION


User-supplied materials required:

- Chain with a minimum load bearing capacity of 90 pounds
- S-hooks for attaching the chains to the TRLPe unit mounting brackets
- Fastening hardware for attaching the chains to supports
- Thread-lock, medium strength

Installation instructions:

SEE SECTION 2.8.2 HORIZONTAL INSTALLATION HANGING FROM CHAINS

- Install the four duct collars on the TRLPe unit, using the sheet metal screws provided.
- Attach the four corner brackets to the TRLPe unit using the factory-supplied 1/4 - 20 machine screws. Apply a drop of thread-lock (provided by installer) to each machine screw when it is installed.
- Install the four support chains from support points. Chains should be located so that they are splayed slightly outward from the TRLPe unit, providing sway resistance.
- Install an S-hook on each support chain.
- Raise the TRLPe unit and slip the S-hooks onto the mounting brackets. Crimp the S-hooks shut.
- Install a Vibration Isolator Spring onto each chain such that it shortens the chain and permits the springs to support the TRLPe unit. Correctly installed springs and chains should result in the springs extending about 1 inch each.

 When installing machine screws into the rivet nuts on the TRLPe unit, do not over-tighten the screws. The threads in the rivet nuts can be stripped.

Install 4 Duct Collars on Unit



Install 4 Brackets on Unit




Install Support Chains, Hang Unit From Chains



Install Vibration Isolator Springs on Support Chains



 Wall brackets are to be supported by two wall studs, with two screws per bracket at each wall stud location. If the TRLPe unit must be positioned such that the brackets can not span two wall studs, a 3/4" thick plywood mounting panel that is large enough to span two wall studs must be provided and installed.

7.5 WALL BRACKET INSTALLATIONS


User-supplied materials required:

- Thread-lock
- 2" X #10 pan head sheet metal screws (8) if installing directly into wood wall studs
- 3/4" X #12 pan head sheet metal screws (8) if installing on a user-supplied plywood panel
- 3/4" thick plywood for mounting panels if two wall studs can not be spanned

Installation instructions:

SEE SECTION 2.8.3 VERTICAL INSTALLATION ON A WALL OR PANEL

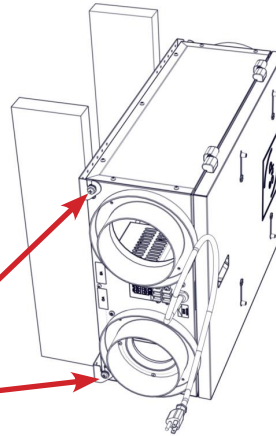
- Install the four duct collars on the TRLPe unit, using the sheet metal screws provided.
- Using a spirit level, draw a level line 22 - 7/8" long on the wall or the mounting panel. This represents (approximately) the bottom edge of the TRLPe unit.
- Draw a second level line exactly 17" above the first level line.
- Place a framing square on the lower level line and extend a plumb line onto both the upper and the lower lines. This will establish the left-to-right positions of the two wall brackets. Alternatively, use a spirit level to make a plumb line.
- Carefully install one wall bracket directly ABOVE the lower level line. The wall bracket must be lined up exactly with the plumb line and must rest precisely above the level line. Pre-drill the holes into the wall studs to prevent the screws from wandering when they are driven in.
 - If the bracket is being anchored directly into wood wall studs, use two 2" X #10 coarse thread pan head sheet metal screws per bracket per stud.
 - If the bracket is being anchored on metal studs, use two 2" X #10 fine thread pan head sheet metal screws per bracket per stud.
 - If the bracket is being mounted on a plywood mounting panel, use two 3/4" X #12 coarse

 When installing machine screws into the rivet nuts on the TRLPe unit, do not over-tighten the screws. The threads in the rivet nuts can be stripped.

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thread pan head sheet metal screws per bracket, with two screws at each end of the bracket.

- If #12 screws are being used, the pre-punched holes in the brackets will have to be enlarged.
- Carefully align and install the second wall bracket above the upper line.
- Using four of the factory-supplied 1/4 - 20 machine screws, place a grommet on each screw and install the screws in the rivet nuts as shown at right. Apply a drop of thread-lock on each screw and leave the screws loose, to help in aligning and installing the unit on the two brackets.
- Raise the TRLPe unit into position and slide the grommets into the hooked part of each bracket end.
- Tug the TRLPe unit away from the wall to seat the grommets in the brackets and then tighten all four of the machine screws. Do not over-tighten.



Use the UPPER Rivet Nut for Each Machine Screw

CAUTION

RISK OF ELECTRIC SHOCK OR EQUIPMENT DAMAGE

Whenever electrical wiring is connected, disconnected or changed, the power supply to the ERV and its controls must be disconnected. Lock and tag the disconnect switch or circuit breaker to prevent accidental reconnection of electric power.

7.6 FACTORY-RECOMMENDED ELECTRIC SERVICE ENTRY

Model TRLPe100C has a factory-installed 34" line cord and does not require connection to other supply wiring. Model TRLPe100 is to be hard-wired by the installer. Entry of electric supply wiring is to be through the factory-provided opening into the electrical box. See photos below. A 4" x 2" outlet box is provided with each TRLPe100 in which to make the field connection to power. The outlet box is to be installed in the field within 3.5' of the TRLPe100 conduit opening such that the free length of the leads inside the outlet box shall be 6 inches. The outlet box shall be secured to prevent rotation and shall be located so that connections will be accessible for inspection after the equipment is installed as intended. 3/8" trade size flexible metal conduit shall be installed for the run between the TRLPe100 and the outlet box. Depending on the installed location of the TRLPe100, it may be easier to hang the unit and connect the outlet box and any control accessories before installing the provided duct collars and ductwork.



TRLPe100C Line Voltage Entry Point



TRLPe100 Line Voltage Entry Point

7.7 FACTORY-RECOMMENDED LOW VOLTAGE SERVICE ENTRY


All low voltage connections are made on the exterior of the unit on the low voltage terminal strips. Field-installed low voltage wiring does not enter the unit.

7.8 ATTACHING DUCTS

Ducts are to be fabricated and installed per SMACNA guidelines. Use a combination of zip ties, UL-181 - rated duct mastic and then secure the duct from slipping off by means of a screw, positioned behind one or more ribs in the duct. Observe Industry Best Practices when installing and supporting the ducts.


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7.9 SELECTING AIRFLOW SETTINGS

 Airflow volumes can be changed at any time by the user as experience dictates. Whenever changing airflow volumes for either Continuous (low speed) or Boost (high speed) modes, the fans should again be balanced.

Setting the Boost mode airflow depends on the air problem being addressed. In some cases, extra fresh air is desirable to amend the air during large gatherings. In others, Boost mode may be used to provide makeup air when exhaust fans are being run. In all cases, an HVAC professional should be consulted to determine how to best set the airflow volumes to provide maximum benefit to a residence.

Airflow volumes are set by taking pressure readings at the pressure ports in the unit door and then adjusting the potentiometers. Normally, the low-speed OA and RA potentiometers are set and then the readings are compared to the *chart in Section 8.2.1* of this manual. Measuring the pressure drop across the core for each airstream is used to determine the airflow volume. After the two low speed potentiometers are set, the two high speed potentiometers should be set, as desired.

 Potentiometer settings are “remembered” by the controller. To enter a new setting, press the PROGRAM button, make the adjustment to the potentiometer and then press the PROGRAM button on the controller again to enter the new setting into the controller memory.

7.10 BALANCING AIR FLOWS

TRLPe ERVs provide the ability to deliver and eject completely balanced airflows, or to modify them as desired. In a perfect environment, airflows would be balanced so that there is no difference between Outdoor Air volume and Return Air volume. Many owners will prefer to have a slight imbalance, providing a slight excess of Outdoor Air to reduce air infiltration into a home. Some homes may require an imbalance because a furnace or water heater is not direct-vented. Again, an HVAC professional will be able to advise balance settings that will best address the circumstances in each home.

Balancing an airflow is done by setting the Outdoor Air fan speed and then adjusting the Return Air fan speed to eject the same or somewhat less air to the outdoors.

Equipment required for testing airflows:

- A magnehelic gauge (or manometer) or other device capable of measuring 0 to 1.0 inches water gauge of differential pressure.
- 2 pieces of natural rubber latex tubing, 1/8" I.D., 1/16" wall thickness works best.

Individual differential static pressures (DP) are measured ACROSS the core, using the installed pressure ports located on the removable door.



- Verify the unit has clean filters in place.
- Install a jumper on the low voltage terminals so that the unit is forced into Continuous (low speed) mode. *See wiring diagram in Section 9.4.1.*
- Press the PROGRAM button to begin changing the fan settings. The yellow LED will blink slowly.
- Open the pressure port caps for the OA air stream and then insert the tubing into the openings about 1".
- Take a differential pressure reading for the OA airstream and compare the pressure drop to the chart in Section 8.2.1 to obtain the CFM. Adjust the fan speed potentiometer (*see illustration at right*) to obtain the desired CFM. Enter the CFM information in the box in Section 8.2.2.
- Take a differential pressure reading on the RA airstream and compare the pressure drop to the table in Section 8.2.1 to find the CFM of the RA airstream. Adjust the RA fan speed potentiometer to obtain the desired balance. Enter the CFM information in the box in Section 8.2.2.
- Remove the jumper wire and reinstall it to force the unit into Boost (high speed) mode. *See the wiring diagram in Section 9.4.1.*

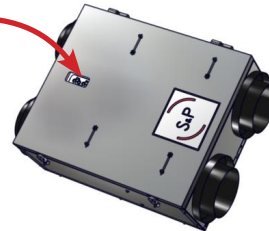
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- Repeat the process for both airstreams to set both the CFM and balance. Enter the information in the boxes in Section 8.2.3.
- After adjusting the potentiometers, take additional readings as needed to verify that fan speed settings are correct. *See illustration below.*
- Press the PROGRAM button to store the new fan settings. The yellow LED will flash quickly to indicate that the settings have been stored.



Fan Speed Control Potentiometers

Potentiometers are visible and accessible through the opening in the unit door



Adjust low speed fan settings by using the potentiometers marked "L". Adjust high speed fan settings by using the potentiometers marked with "H".

9.0 MAINTENANCE

The primary maintenance requirement is filter replacement. Filters are not to be cleaned, they must be replaced. The standard filter as shipped from the factory is a mesh-type, anti-microbial MERV 8. These standard filters ARE NOT to be sprayed with filter treatments or dust adhesives. The standard mesh-type OA MERV 8 filters may be replaced with pleated paper MERV 13 filters, if desired. Both filters should be replaced every three months, or more frequently, if needed.

The enthalpic core should be vacuumed annually. Remove the hinged access door by sliding it horizontally on its pin hinges and then remove the filters for access to the core. Use a soft-bristled nozzle on a good vacuum and carefully vacuum the inlet faces of the core.

IMPORTANT

This unit is only to be used after completion of building construction. It is not to be used during construction.

8.1 MANOMETER READINGS AT COMMISSIONING

Return Air Pressure Port	In. w.g.:	<input type="text"/>	Pressure Drop:	<input type="text"/>
Exhaust Air Pressure Port	In. w.g.:	<input type="text"/>		
Outside Air Pressure Port	In. w.g.:	<input type="text"/>	Pressure Drop:	<input type="text"/>
Supply Air Pressure Port	In. w.g.:	<input type="text"/>		

8.2 RECORDED AIRFLOW READINGS AT COMMISSIONING

8.2.1 Conversion of Pressure Drop to Airflow

ALSO SEE THE TABLE ON THE FOLLOWING PAGE.

(UNITS EQUIPPED WITH CLEAN MERV 8 FILTERS)

To determine the airflow in CFM, obtain the manometer readings shown above and calculate the differences between them. Then apply the following formula to convert the readings to CFM:

$$[\text{Airflow in CFM}] = 183 \times [\text{Core Pressure Drop in inches w.g.}]$$

Example: 1 In. w.g. of pressure drop across the core corresponds to 183 CFM, 0.5 In. w.g. corresponds to 91.5 CFM, and so on.

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(UNITS EQUIPPED WITH A MERV 13 FILTER IN THE OA AIRSTREAM)

[Airflow in CFM] = 154 X [Core Pressure Drop in inches w.g.]

Example: 1 In. w.g. of pressure drop across the core corresponds to 154 CFM of airflow. So 1 In. w.g. of pressure drop across the core corresponds to 154 CFM, 0.5 In. w.g. corresponds to 77 CFM, and so on.

Core Pressure Drop (In. W.G.)	Airflow w/ MERV 8 Filters (CFM)	Airflow w/ MERV 13 Filter (CFM)
0.1	18	15
0.2	37	31
0.3	55	46
0.4	73	62
0.5	92	77
0.6	110	92
0.7	128	108
0.8	146	123
0.9	165	139
1.0	183	154

8.2.2 Continuous Mode (low speed)

Outdoor Air Flow: CFM

Return Air Flow: CFM

8.2.3 Boost Mode (high speed)

Outdoor Air Flow: CFM

Return Air Flow: CFM

8.3 MAINTENANCE AFTER 30 DAYS OPERATION

After 30 days of unit operation, check / tighten all mounting and support hardware. Inspect filters for cleanliness. There is often construction dust collected during initial operation. If filters appear dirty, replace them.

8.4 RECALIBRATION OF AIRFLOWS

Whenever there is a reconfiguration of the heating system in a residence, to include changing damper positions, the fan speed potentiometers on the TRLPe unit should be recalibrated for optimum performance. If the residence undergoes significant structural changes, such as an addition to the home, the TRLPe unit should also be recalibrated. If optional MERV 13 filters are installed, recalibration is also required.

8.5 USING A MANOMETER

Establishing the airflow volume in the TRLPe unit is done by measuring air pressure differential (PD) across the core. Air pressure is sampled (at the same time) both in front of, and behind the core. Air pressure in the chamber between the fan and the core will be higher than the air pressure in the chamber between the core and the outlet of the unit. This difference in pressure is a direct indicator of the volume of air going through the core. The more air being pushed against the core, the greater the PD.

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In order to test for differential pressure in an HVAC system, a device called a manometer is generally used. Manometers are relatively inexpensive devices that are readily available from online retailers. The least expensive version (\$10 or less) is a simple glass tube with colored water in it, but it's not terribly accurate. A preferable device is an electronic meter, available for \$30 up to several hundred dollars. For either device, accuracy within the range of 0 to 1.0 inches of water gauge is the critical measure. Water manometers generally have graduations of .1 inches that are difficult to accurately determine. For all manometers, there are two plastic tubes that connect at the manometer and then the other ends go to pressure ports on the TRLPe unit.

To use the manometer, ensure that the TRLPe unit is in the desired operating mode (low speed or high speed) and has clean filters. The entire air delivery duct system needs to be in place and all vents should be in their normal operating position. In other words, the system should be in a normal operating condition.

Connect the manometer tubing first to the OA airstream pressure ports. Take a pressure differential reading and compare the reading to the chart in Section 8.2.1 of this manual. The PD should fall somewhere within the range of 0 to 1.0 inches of water gravity. Example: a PD reading of 0.3 inches w.g. indicates that approximately 55 CFM of air is going through, assuming that factory-original MERV-8 filters are being used. Adjust the fan speed potentiometer until you get the desired air flow, as indicated by the chart.

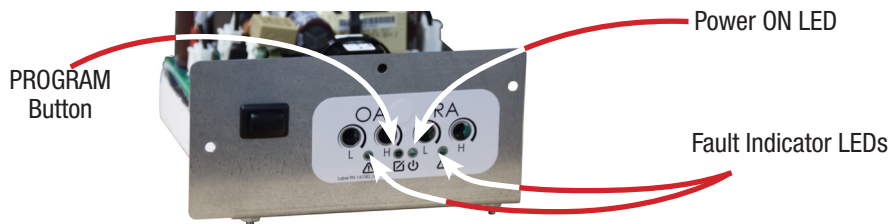
Move the tubes from the OA airstream to the RA air stream and measure the PD. If the PD is the same as the OA pressure differential, it means there is an equal amount of air going through both airstreams and the system is said to be balanced. It's generally desirable for the airstreams to be perfectly balanced, but there are a number of different reasons why one would want the RA air stream to be somewhat less than the OA airstream. This means that somewhat more air is being introduced to the home (OA) than is being ejected by the TRLPe unit (RA). The result is that there will be slightly higher air pressure inside the house than outside and air infiltration into the home will be reduced.

NOTE: Whenever fan speed potentiometers are changed, the controller has to be told to accept a change. The controller stores the last setting and will hold that setting until the PROGRAM button is pressed. After the PROGRAM button is pressed, potentiometers can be changed and the controller will accept the new setting. When changes are complete, press the PROGRAM button again to cause the controller to remember the new settings.

9.0 TROUBLESHOOTING

9.1 FAULT INDICATOR LEDS

The TRLPe unit controller has four potentiometers, three LED lights and one EDIT button. One LED light indicates the presence of 120 VAC at the controller. One LED light indicates a fault in the Outdoor Air airstream, such as no airflow. The second fault indicator LED will show a fault in the Return Air airflow.



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CAUTION: Many of the trouble shooting steps described below require working with or near live high- voltage. Take appropriate precautions against electric shock and use Personal Protective Equipment (PPE) as a safeguard. Wear gloves, safety glasses and protective head gear, as necessary.

Indications of a problem with the ERV may be the discovery of a red alarm LED on the controller or the appearance that Fresh Air is not being delivered. The first step in resolving an apparent problem with a TRLPe ERV is to verify that there actually is a problem.

Regardless of the reason for thinking there is a problem with the TRLPe unit, the first steps in trouble shooting are to check the air filters to make sure they're clean and properly positioned, and then do a hard restart of the unit. A hard restart consists of shutting off power to the unit for several seconds, until the yellow indicator LED on the unit controller goes out, and then reapply power. It takes a few moments for the control board to discharge and for the LED to stop glowing. Reapply power to see if resetting the circuit has solved the problem.

Because there are many different ways of ducting the Supply Air into a dwelling, it's often difficult to say with certainty that the fresh air provided by the TRLPe unit is not reaching its intended destination or if the ERV is simply no longer providing enough fresh air. Determine where and how the fresh air is supposed to be delivered – if it is being carried in a dedicated duct directly to the air outlet, check for air flow at the outlet.

- Verify that dampers are still correctly positioned (open). If the ERV is being ducted into a main air handling system, shut the air handling system down so that air flow at the ducts can be detected.
- Check for air flow at the air openings nearest to the TRLPe unit, not at the far end of the house. It may be necessary to hold a thin strip of tissue paper in front of a vent to realize whether or not there is air flow.
- Check for air flow in both low speed and high speed settings. It will be easier to detect air flow in the high speed setting.

TRLPe UNIT HAS AIRFLOW BUT IS MAKING NOISE

Feel the TRLPe unit while it is running to see if there is excessive vibration from the fans. Fan noise and vibration can be caused by an imbalance in the rotors or possibly by a bad bearing. Turn off power to the unit and rotate the fan impellers by hand. Make sure impellers rotate freely. Use wet swabs to clean any dust / dirt buildup off the impeller blades. **DO NOT REMOVE FAN BLADE BALANCING CLIPS!** If problem continues, a fan may have a bad bearing.

- To verify a bad fan bearing, turn off power to the unit and disconnect one fan wiring clip and then turn the unit back on. If there is noise and vibration, the fan is defective. Disconnect power, reconnect the first fan and then repeat the procedure with the second fan.

NO APPARENT AIR FLOW FROM THE TRLPe UNIT

If it seems that there is no apparent air flow, check the yellow LED indicator light on the unit controller to verify that it has power. If the yellow light is lit, the controller is receiving power.

- If it does not have power and the yellow LED is not lit, trace the power supply back to its source and isolate the problem or symptoms. Look for a switch turned off, a blown fuse or a tripped circuit breaker. If necessary, use a multimeter to trace the power supply and isolate the problem.
- If it has power and the fans will not run, disconnect all power to the unit and check the disconnect switch with an ohmmeter.
- If it has power and the yellow light is lit, check to see if the fans are running by listening for fan noise and feeling the unit for vibration from the fans. If either of the red LEDs are lit, go to Control Module Warning Lights, below.
- If it has power and the fans are running, CHECK THE FILTERS TO MAKE SURE THEY ARE CLEAN. Check the entire length of the ducts, all the way from the outdoor vent hoods to the indoor vent openings. Make sure a duct has not fallen off or that a flexible duct has not been pinched. In rare cases, there may be obstructions inside the duct. Look to see if a louver in an outdoor vent cap is stuck or blocked or if an indoor louver has been shut.
- If it has power but only one fan is running, disconnect all power to the unit and check the fan connectors to make sure they are still making contact.

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INADEQUATE OR REDUCED AIR FLOW FROM THE TRLPe UNIT

If the unit has power and both fans are running, use a manometer to check the pressure differential across the core. See *Section 8.5 Using a Manometer* in this manual. The results of a pressure differential test will provide correct information on how much air the unit is moving and also how the volume of air compares to when the unit was first installed. Check both low speed and high speed settings by changing the jumpers on the low voltage terminal strip, as shown in section 9.4 in this manual.

TRLPe UNIT FAILS TO RUN IN EITHER LOW SPEED OR HIGH SPEED MODE

The low-speed and high-speed modes operate independently of each other so there can be a failure in just one mode and it does not appear in the second mode. If one mode does not work, the problem can be isolated to either the controlling device or to an internal failure by bypassing the controlling device.

- Remove all wiring from the terminal strip as shown in section 9.4 of this manual. Mark the wires so they can be reconnected in their proper locations.
- Install a jumper wire from the 24 VAC terminal to the Low Speed terminal. Check for proper operation. Remove the jumper wire.
- Install a jumper wire from the 24 VAC terminal to the High Speed terminal. Check for proper operation. Remove the jumper wire and reinstall the control device wiring.

ONE OR MORE CONTROL MODULE WARNING LIGHTS ARE LIT

The two red LED warning lights on the control module give a warning that the fans are unable to operate within their programmed limits. The controller will continue to compensate for changes to the system, but when it senses that it is having to apply more power to maintain fan speed, it gives a red light warning.

- Perform a hard restart, as described previously. This may clear any fault condition.
- If the light(s) remain lit, search for other causes for the fans not being able to move the amount of air they are programmed for. Again, check the filters and check the ducts.

NO APPARENT REASON FOR WARNING LIGHTS OR LOW AIR FLOW

The final step in troubleshooting an ERV problem is to reset the fan potentiometers. Use a manometer and follow the instructions in *Section 8.5 Using a Manometer* in this manual. Restore the pressure differential settings to their original airflow settings (CFM), as recorded in Section 8.1 of this manual.

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9.2 MAINTENANCE RECORDS

9.2.1 Filter Change Record

FILTERS REPLACED DATE:

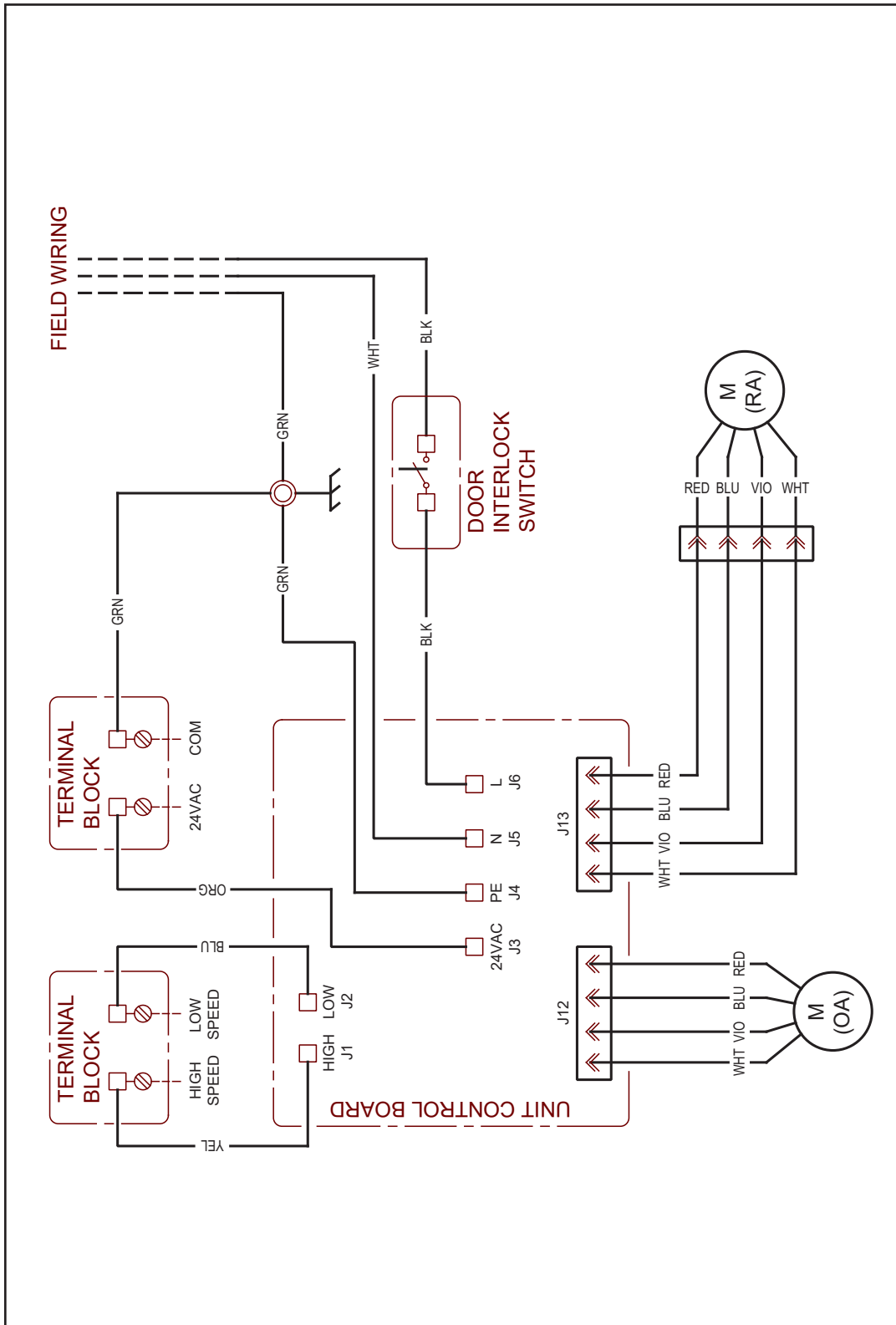
9.2.2 Enthalpic Core Cleaning Record

CORE CLEANED DATE:

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9.3 WIRING SCHEMATICS

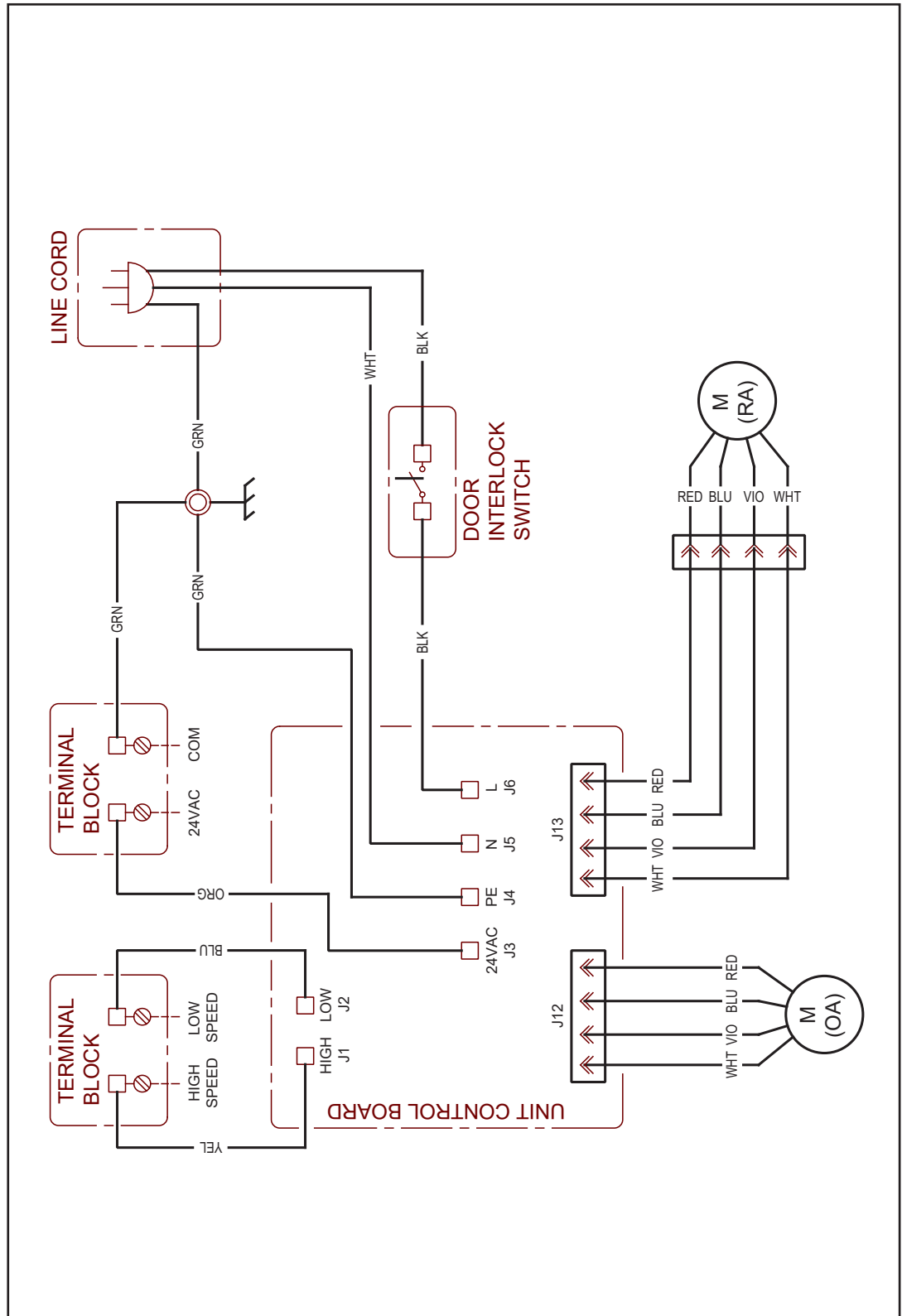
9.3.1 TRLPe100 Wiring Schematic



TRLPe100 Wiring Schematic

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9.3.2 TRLPe100C Wiring Schematic



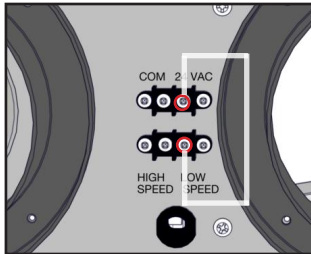
TRLPe100C Wiring Schematic

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9.4 LOW VOLTAGE WIRING DIAGRAMS

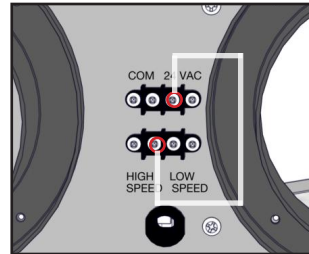
9.4.1 Low Speed / High Speed Modes UNSWITCHED

In order for the TRLPe unit to operate constantly at Low Speed, 24 VAC must be applied to the Low Speed mode terminal on the low voltage terminal strips. This is accomplished by installing a jumper between the 24 VAC terminal and the Low Speed terminal. If the unit is to operate constantly at High Speed, a jumper wire must be installed between the High Speed terminal and the 24 VAC terminal.



Constant Low Speed

For constant unswitched Low Speed operation, install an 18 gauge jumper wire from the 24 VAC terminal to the Low Speed terminal.



Constant High Speed

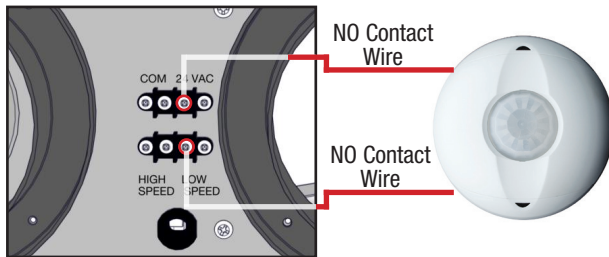
For constant High Speed unswitched operation, install a jumper wire from the 24 VAC terminal to the High Speed terminal.

Low Voltage Wiring Diagram 1

LOW SPEED	HIGH SPEED	UNIT STATE
OFF	OFF	STANDBY
ON	OFF	LOW
OFF	ON	HIGH
ON	ON	HIGH

9.4.2 Low Speed SWITCHED

If the TRLPe unit is to be normally OFF and then run in Low Speed mode in response to an external device like an occupancy sensor, the occupancy sensor Normally Open (NO) contacts must be connected to both the Low Speed terminal and the 24 VAC terminals.

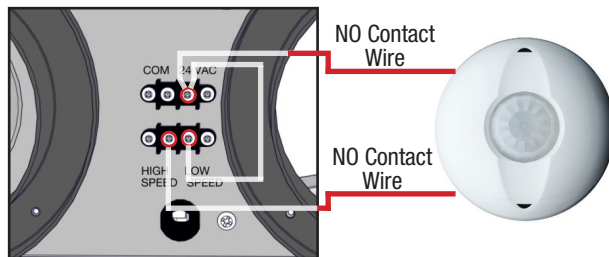


Low Voltage Wiring Diagram 2

Occupancy sensors have a total of six wires. The two NO (Normally Open) contact wires would connect to the 24 VAC and High Speed terminals. The sensor's 24 VAC power wires would connect to the COM and 24 VAC terminals on the terminal strip. This wiring configuration will vary with each control sensor.

9.4.3 Low Speed UNSWITCHED / High Speed SWITCHED

If the TRLPe unit is to run constantly at Low Speed (Continuous mode) and then switch periodically to Boost mode in response to a controlling device, a jumper must be installed between the 24 VAC terminal and the Low Speed terminal. The external controlling device such as an occupancy sensor that is to trigger Boost mode (High Speed) is then connected to the 24 VAC terminal and to the High Speed terminal.




Low Voltage Wiring Diagram 3

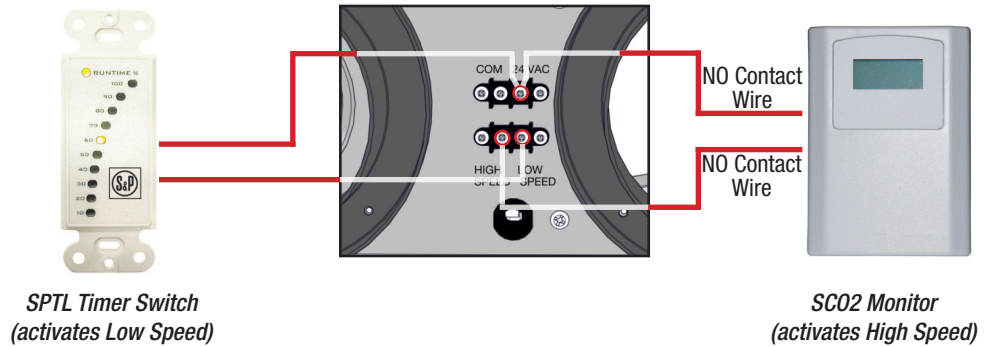
Occupancy sensors have a total of six wires. The two NO (Normally Open) contact wires would connect to the 24 VAC and High Speed terminals. The sensor's 24 VAC power wires would connect to the COM and 24 VAC terminals on the terminal strip. This wiring configuration will vary with each control sensor.

TRLPe100 & TRLPe100C ERV

9.4.4 Low Speed SWITCHED / High Speed SWITCHED

If the TRLPe unit is to be normally OFF and then switch ON in response to a switching device and also switch to High Speed in response to a second sensor or switching device, Normally Open (NO) contacts would be connected to the 24 VAC and Low Speed Terminals. The second switching device or sensor would have Normally Open contacts connected to the 24 VAC and High Speed terminals.

 CO2 monitors have terminal strips for field-supplied and installed wiring. Two wires must be connected to the COM and 24 VAC terminals on the ERV low voltage terminal strip (to provide operating voltage for the sensor) and two wires must be connected to the 24 VAC and High Speed terminals. This wiring configuration will vary with each control sensor and application.



Low Voltage Wiring Diagram 4

9.5 DOOR REMOVAL

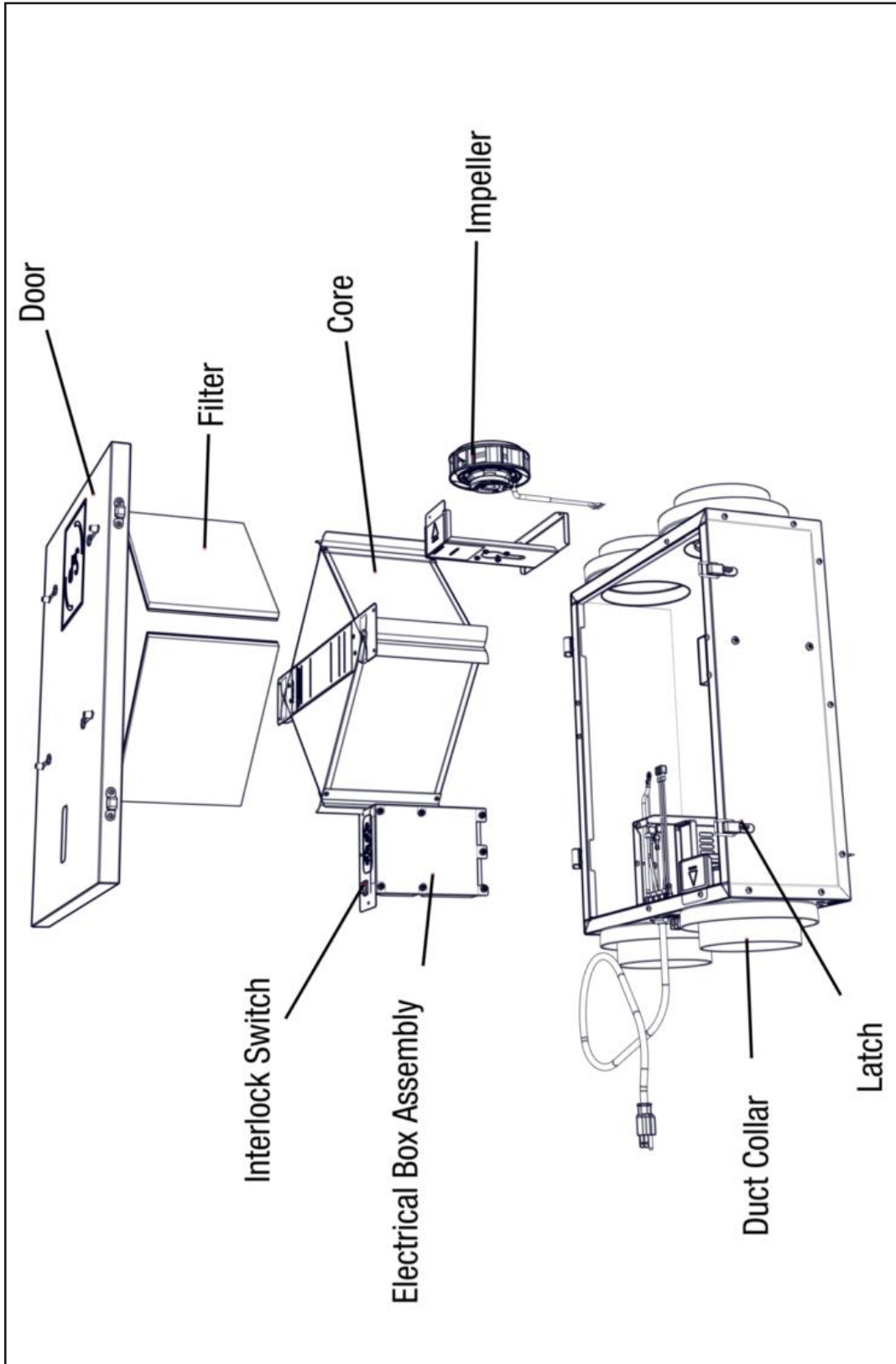
The hinged door is held in place by two separable hinges on one long edge and two security latches on the other long edge. The separable hinges have a spring-loaded detent to prevent accidental separation. To remove the door, first disconnect power to the unit. Unlatch and open the door and then strike the edge of the door, pushing the door toward the end of the TRLPe that has the low voltage terminal strips.



Unlatch and open the door, then strike the edge of the door with an open hand to overcome the spring-loaded detents. Push the door toward the electrical box.

TRLPe100 & TRLPe100C ERV

9.6 REPAIR PARTS



Repair Parts Drawing



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