

Installation, Operation, and Maintenance Manual

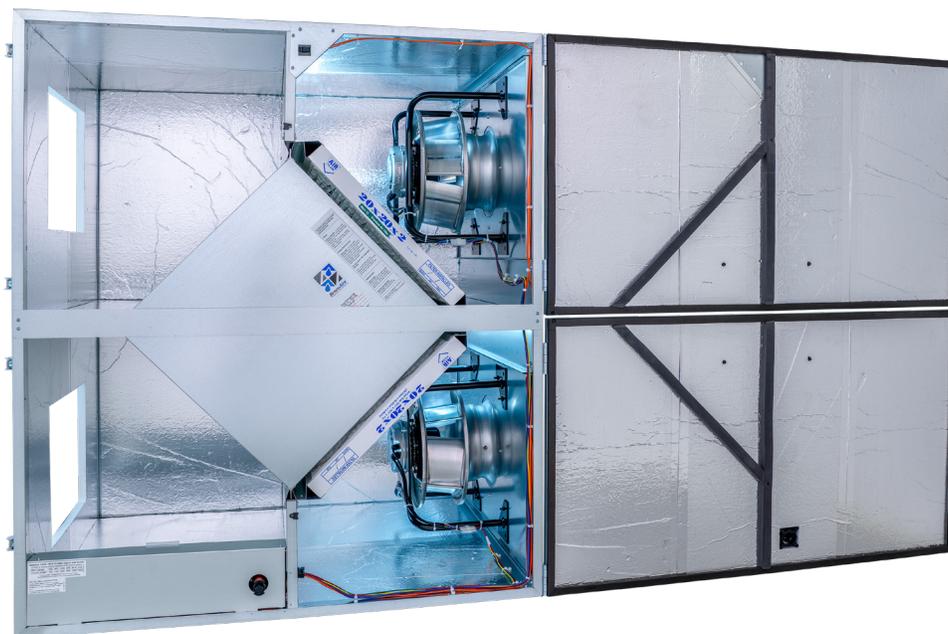
TRCeN INDOOR ERV SERIES

TRCeN500

TRCeN800

TRCeN1200

TRCeN1600



Model: TRCeN1600 shown

⚠ WARNING

EC motors (ECM) are NOT suitable for use with solid state speed control. They already have speed control built into the motor electronics.

⚠ WARNING**ARC FLASH AND ELECTRIC SHOCK HAZARD**

Arc flash and electric shock hazard. Disconnect all electric power supplies, verify with a voltmeter that electric power is off and wear protective equipment per NFPA 70E before working within electric control enclosure. Failure to comply can cause serious injury or death.

Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Before proceeding with installation, read all instructions, verifying that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The line side of the disconnect switch contains live high-voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch and verify that power is off with a volt meter. Refer to unit electrical schematic. Follow all local codes.

⚠ 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 CONTACT WITH HIGH SPEED MOVING PARTS**

Disconnect all local and remote power supplies, verify with a voltmeter that electric power is off and all fan blades have stopped rotating before working on the unit.

Do not operate this unit with any cabinet panels removed.

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 unit is intended for general ventilating and heating only. Do not use to exhaust hazardous or explosive materials and vapors. Do not connect this equipment to range hoods, fume hoods or collection systems for toxics.

IMPORTANT

This unit is for ventilating finished structures only. It is not to be used until after all construction has been completed and construction debris and dust are cleaned from the Occupied Space.

READ AND SAVE THIS MANUAL

NOTICE

This manual contains space for maintaining written records of unit maintenance and/or repairs. See Section 7.7 Maintenance Records. At the time the ERV is commissioned, a maintenance schedule should be developed by the user to incorporate monthly and seasonal maintenance and include start up maintenance tasks as described in this manual.

 **NOTE:** This unit is an energy recovery ventilator, or ERV. It is commonly referred to throughout this manual as an ERV.

UNIT INFORMATION

Record information as shown below.

In the unlikely event that factory assistance is ever required, information located on the unit label will be needed.

Locate the S&P USA unit label found on the outside of the unit.

 **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.

UNIT INFORMATION

Energy Recovery Ventilator

6393 Powers Ave., Jacksonville, FL 32217 (800) 961-7370
custserv.jax@solerpalau.com

ETL LISTED
CONFORMS TO
UL STD 1812
Intertek
4000510

CERTIFIED TO
CAN/CSA-C22.2
No. 113



ADVANCING
VENTILATION®

Option Code _____

Model/Modele TRCeN800 **Sales Order** 124144 SCCR KAIC

Serial Number F25108279C **Job Order** 80071-0000

Power Supply to Unit Alimentation d'énergie à l'unité			Motors protected by IEC Style Motor Starters Les moteurs protégés par des dé moteur de modèle de IEC	
Voltage	Minimum Circuit Amps	Max Overcurrent Protection Device	(QTY) & W/HP	FLA
208-230V	3.9	15	None	-
60 HZ 1-Phase	Amp. Minimales de Circuit	Dispositif de protection maximum contre les surintensités	(QTY) & W/CV	APC
Motors Thermally Protected Moteurs protégé thermiquement			Motors Protected by Variable Frequency Drives Les moteurs protégés par la fréquence variable conduit	
(QTY) & W/HP	FLA		(QTY) & W/HP	FLA
2@370 W	1.73		None	-
(QTY) & W/CV	APC		(QTY) & W/CV	APC

⚠ WARNING ⚠ AVERTISSEMENT

 Danger of electric shock. Always disconnect power source before servicing. Do not install in a cooking area or make line-voltage electrical power connections directly between this unit and any appliance.
 Danger de choc électrique. Toujours déconnecter la source d'alimentation avant les réparations. N'installez pas de zone cuisine ou de ligne de tension les connexions d'alimentation électrique directement entre cette unité et tout.

130137_001

UNIT LABEL (TYPICAL)

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1.0 OVERVIEW

1.1 DESCRIPTION

The TRCeN500–TRCeN1600 energy recovery ventilator (ERV) is a device for recovering both sensible energy (heat) and latent energy (moisture) from the Exhaust Air from an occupied space and injecting those energies into an incoming Outside Air stream. It accomplishes this task by forcing the two airstreams through enthalpic cores, where the energy exchange takes place. The two airstreams pass through the enthalpic cores at right angles and the airstreams never mix together. See Section 2.2 Enthalpic Cores in this manual.

Each ERV has two electric impellers, one for each airstream. Impellers have electronically commutated motors controlled by a printed circuit board, a S&P USA Commercial Controller, or by a BMS. There are a number of different control devices available to control the operation or speed of the unit fans. For further information on available control accessories, see the TRCeN S&P USA catalog.

There are two types of TRCeN500–TRCeN1600 units, one for indoor installations and one for rooftop, or outdoor, installation. This manual is for the TRCeN500–TRCeN1600, which is the indoor unit. For information on the outdoor version of this product, see the *TRCeN500RT–TRCeN1600RT Installation and Operation Manual*.

These ERVs are commonly installed as part of an air-handling system that provides heating and cooling of Supply Air. They can also be installed to operate as stand-alone devices when ducted directly to and from the occupied space.

Each unit has an integral 24VAC power supply that is used internally and can also be used as a power source for other optional control devices.

The TRCeN500–TRCeN1600 units are low-maintenance, requiring periodic replacement of the air filters and annual vacuuming of the enthalpic cores. See section 7.0 Unit Maintenance in this manual.

IMPORTANT

It is important to understand and use the equipment airstream terminology as it is used in this manual. The airstreams are defined as:

- ♦ OUTSIDE AIR (OA): Air taken from the external atmosphere and, therefore, not previously circulated through the system.
- ♦ SUPPLY AIR (SA): Air that is downstream of the enthalpic cores and is ready for conditioning or for return to the Occupied Space.
- ♦ RETURN AIR (RA): Air that is returned to the ERV from a conditioned space.
- ♦ EXHAUST AIR (EA): Air that is removed from a heating or cooling appliance or from the Occupied Space and discharged.

1.2 AIRFLOW

There are two different airflow options for the TRCeN500–TRCeN1600. They are:

- TRCeN500V–TRCeN1600V
- TRCeN500H–TRCeN1600H

The airflow configuration is indicated by digit 9 of the Configuration Code.

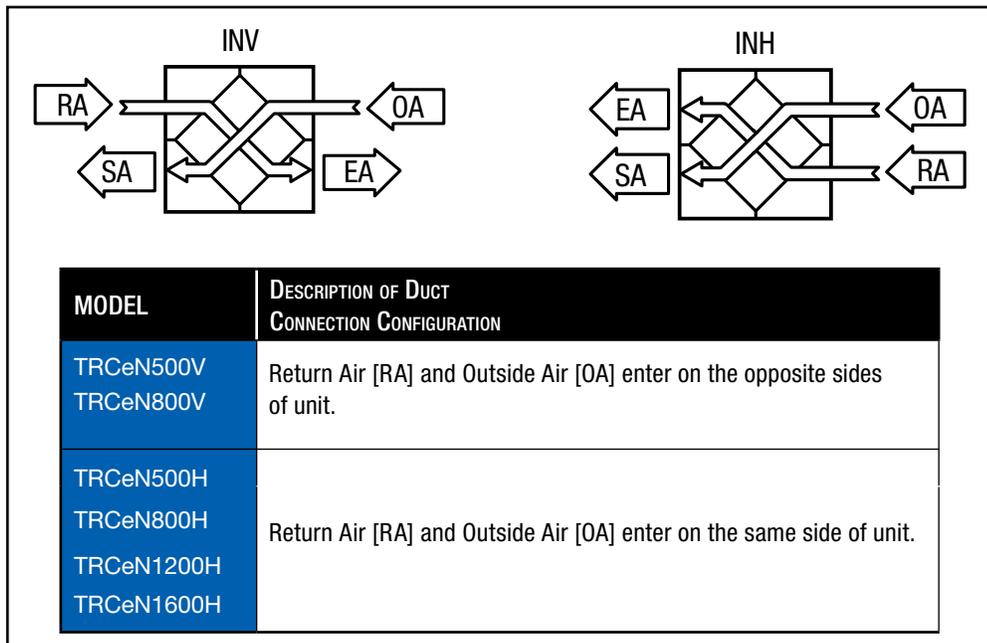


FIGURE 1.2.0 AIRFLOW ORIENTATIONS

2.0 COMPONENT DESCRIPTIONS

2.1 CABINET

The cabinet for the TRCeN500–TRCeN1600 is made of 20 gauge galvanized steel and has 1" thick high-density, foil-backed insulation on the inside. Doors are hinged and are fitted with stainless steel machine screws through the faces to prevent accidental opening of the doors when the unit is in operation. Doors may be completely removed by removing the hinge pins. Duct flanges are available as an accessory for all airstream openings for connection of field-supplied ductwork.

2.2 ENTHALPIC CORES

All TRCeN500–TRCeN1600 ERVs use a static-plate enthalpic core. The enthalpic cores transfer both latent and sensible energies between the airstreams. Gasketing is pre-installed on the cores and must be positioned to provide a proper air seal. For information on annual maintenance of the cores, see Section 7.0 Maintenance in this manual.

2.3 IMPELLER/MOTOR ASSEMBLIES

There are two impeller and motor assemblies in each ERV.

2.4 E-BOX

Every TRCeN500–TRCeN1600 is equipped with what is known as an “E-Box.” High-voltage supply wiring and low-voltage control wiring is all terminated here. If optional integrated programmable controls are installed, an additional 24VAC transformer is installed here to power both the controller and its dedicated sensors.

CAUTION

Low airflow can cause fouling of the enthalpic cores. The ERV must never be operated without clean filters in place and minimum airflow must be greater than 250 CFM per full-sized core.

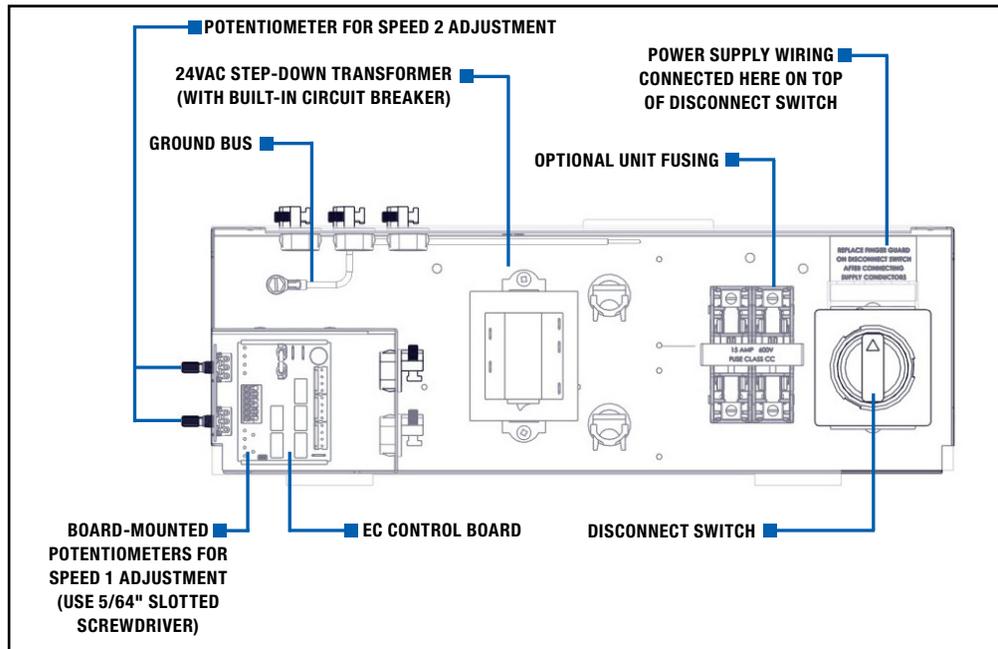


FIGURE 2.4.0 E-BOX WITHOUT CONTROLS

2.5 FILTERS

All TRCeN500 units come equipped with two MERV 8 14" x 20" x 2" (nominal) pleated filters. TRCeN800 units without internal bypass come equipped with two MERV 8 20" x 20" x 2" (nominal) pleated filters. TRCeN1200 units come equipped with two MERV 8 14" x 20" x 2" (nominal) pleated filters and two MERV 8 16" x 20" x 2" (nominal) pleated filters. TRCeN1600 units come equipped with four MERV 8 20" x 20" x 2" (nominal) pleated filters. MERV 13 filters can be ordered as an accessory and are shipped loose.

- ♦ TRCeN500: (2) 14" x 20" x 2" (nominal) pleated filters. Actual size: 13.5" x 19.5" x 1.75"
- ♦ TRCeN800: (2) 20" x 20" x 2" (nominal) pleated filters. Actual size: 19.5" x 19.5" x 1.75"
- ♦ TRCeN1200: (2) 14" x 20" x 2" (nominal) pleated filters. Actual size: 13.5" x 19.5" x 1.75"
(2) 16" x 20" x 2" (nominal) pleated filters. Actual size: 15.5" x 19.5" x 1.75"
- ♦ TRCeN1600: (4) 20" x 20" x 2" (nominal) pleated filters. Actual size: 19.5" x 19.5" x 1.75"
- ♦ Minimum recommended effectiveness: MERV 6.

3.0 SHIPPING/RECEIVING/HANDLING

TRCeN500–TRCeN1600 units are palletized at the factory and then shipped by common carrier. Upon receipt by the installer, the shipment should be inspected for shipping damage, prior to unloading. Any discovered shipping damage should be immediately reported to the S&P USA sales rep and the damage must be recorded on the Bill Of Lading, prior to signing for acceptance of the shipment. The unit can be handled with a fork lift or equipment hoist. Prior to moving the unit, verify that all latches and securing bolts on the cabinet doors are tightly fastened.

If an equipment hoist is used for moving the TRCeN500–TRCeN1600 unit, unscrew the sheet metal plates that hold the unit to the pallet. Use straps and a spreader bar to hoist the unit. The straps must be spaced to ensure the unit is level and the center of gravity is positioned properly between them. Unit hoisting weights and Center of Gravity are detailed in Sections 3.1 and 3.2 in this manual.

Perform a test lift to make sure the unit is being hoisted level and is secure.

Place the TRCeN500–TRCeN1600 unit on a flat surface where it will be protected from the weather and incidental damage. Do not remove protective coverings from any duct openings and keep the doors secured and tightly closed.

3.1 UNIT WEIGHTS AND DIMENSIONS

3.1.1 TRCeN500 Unit Dimensions and Weight:

47 3/4" L x 17 1/2" W x 50 1/4" H
148-278 lbs., varies by option(s)

3.1.2 TRCeN500 Maximum Shipping Dimensions and Weight

60" L x 32" W x 55 1/4" H
310 lbs.

3.1.3 TRCeN800 Unit Dimensions and Weight

47 3/4" L x 23 3/4" W x 50 1/4" H
194-350 lbs., varies by option(s)

3.1.4 TRCeN800 Maximum Shipping Dimensions and Weight

60" L x 32" W x 55 1/4" H
385 lbs.

3.1.7 TRCeN1200 Unit Dimensions and Weight

58 1/8" L x 33 5/8" W x 56 1/4" H
309-495 lbs., varies by option(s)

3.1.8 TRCeN1200 Maximum Shipping Dimensions and Weight

70" L x 47" W x 61 1/2" H
585 lbs.

3.1.11 TRCeN1600 Unit Dimensions and Weight

58 1/8" L x 43 3/8" W x 56 1/4" H
371-581 lbs., varies by option(s)

3.1.12 TRCeN1600 Maximum Shipping Dimensions and Weight

70" L x 47" W x 61 1/2" H
671 lbs.

3.2 RIGGING AND CENTER OF GRAVITY (COG)

3.2.1 TRCeN500-TRCeN1600 Hoisting Weights and COG

Spreader bars and straps are recommended in order to avoid damage to the unit.

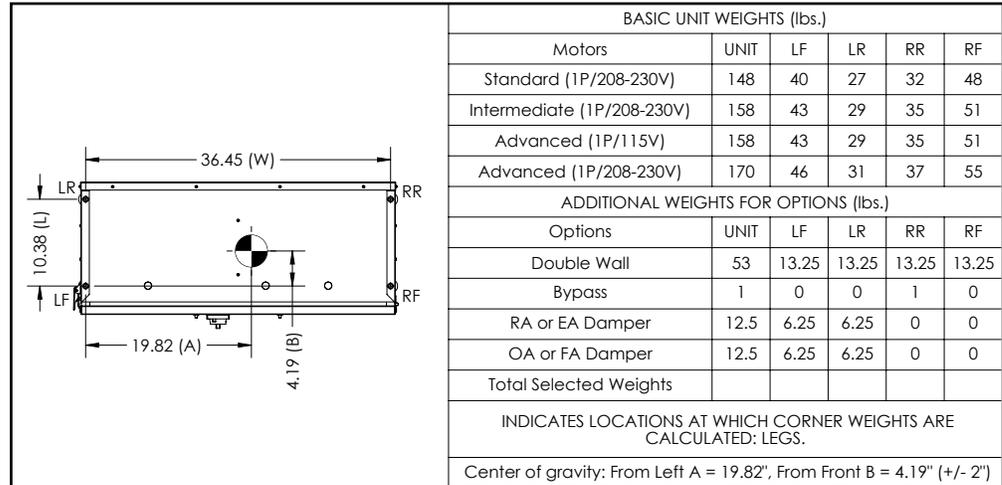


FIGURE 3.2.0 TRCeN500H WEIGHTS AND COG

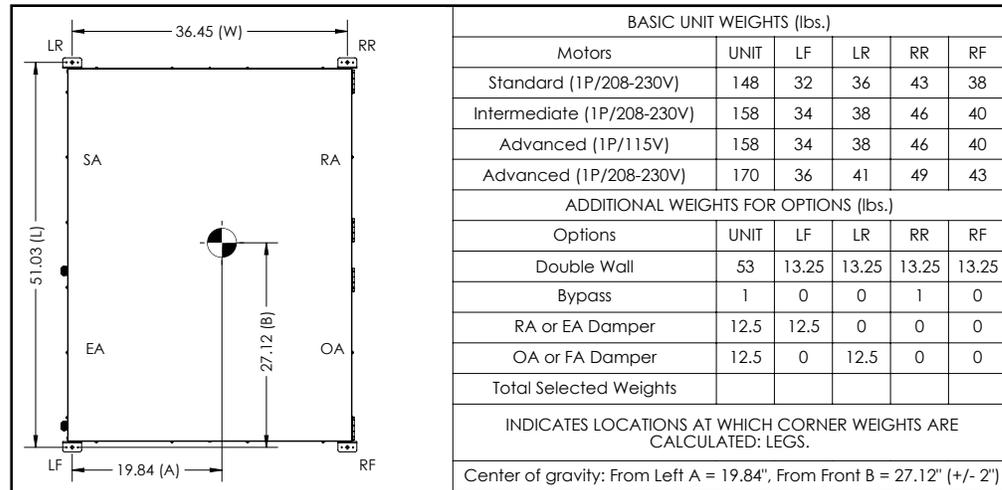


FIGURE 3.2.1 TRCeN500H WEIGHTS AND COG WITH DOORS FACING DOWNWARD

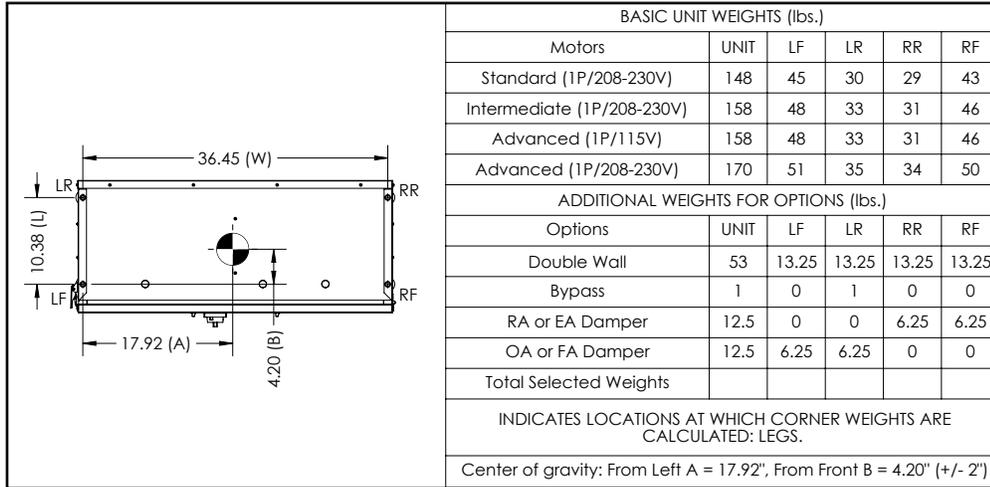


FIGURE 3.2.2 TRCeN500V WEIGHTS AND COG

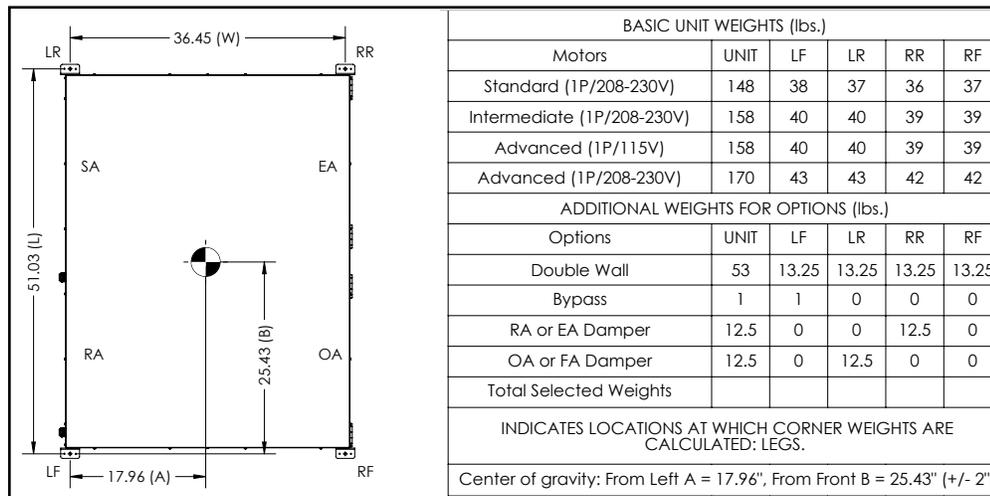


FIGURE 3.2.3 TRCeN500V WEIGHTS AND COG WITH DOORS FACING DOWNWARD

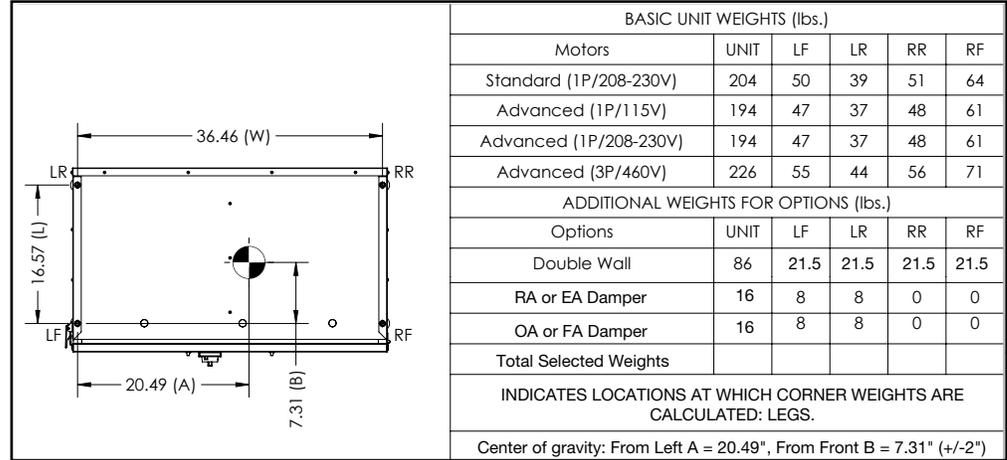


FIGURE 3.2.4 TRCeN800H WEIGHTS AND COG

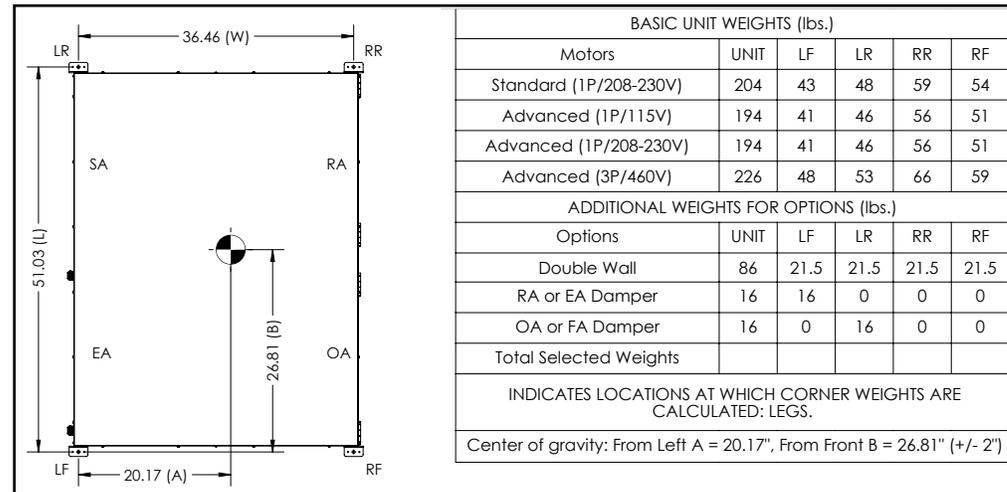


FIGURE 3.2.6 TRCeN800H WEIGHTS AND COG WITH DOORS FACING DOWNWARD

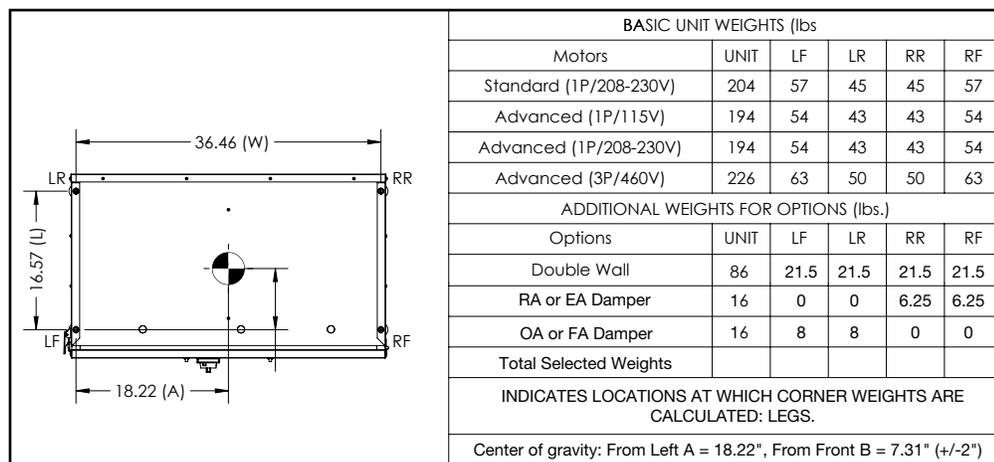


FIGURE 3.2.8 TRCeN800V WEIGHTS

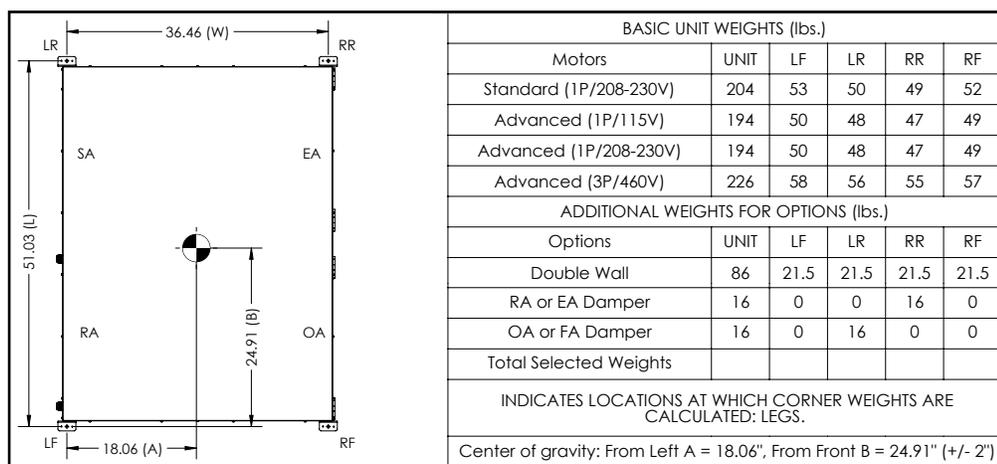


FIGURE 3.2.10 TRCeN800V WEIGHTS AND COG WITH DOORS FACING DOWNWARD

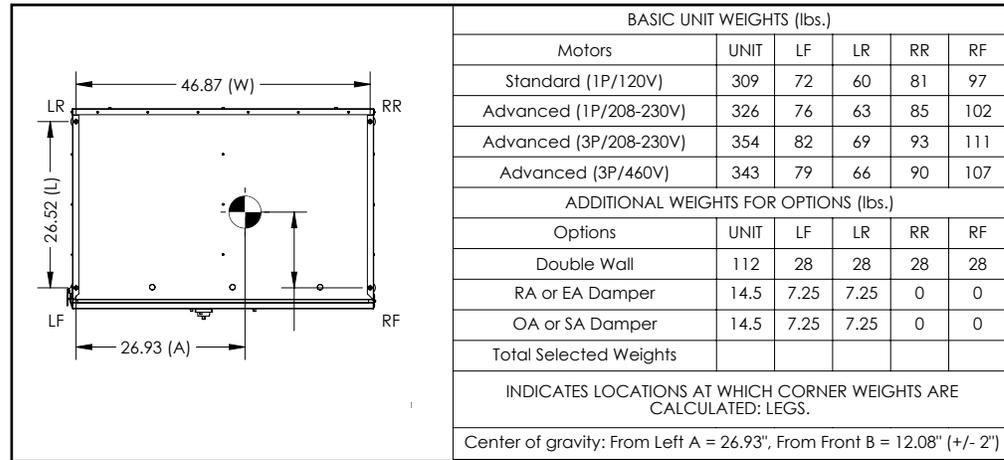


FIGURE 3.2.12 TRCeN1200H WEIGHTS AND COG

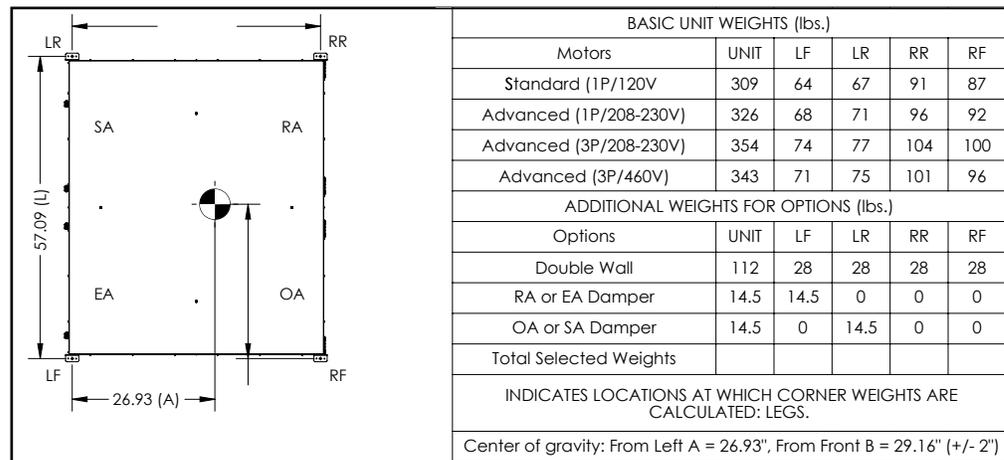


FIGURE 3.2.14 TRCeN1200H WEIGHTS AND COG WITH DOORS FACING DOWNWARD

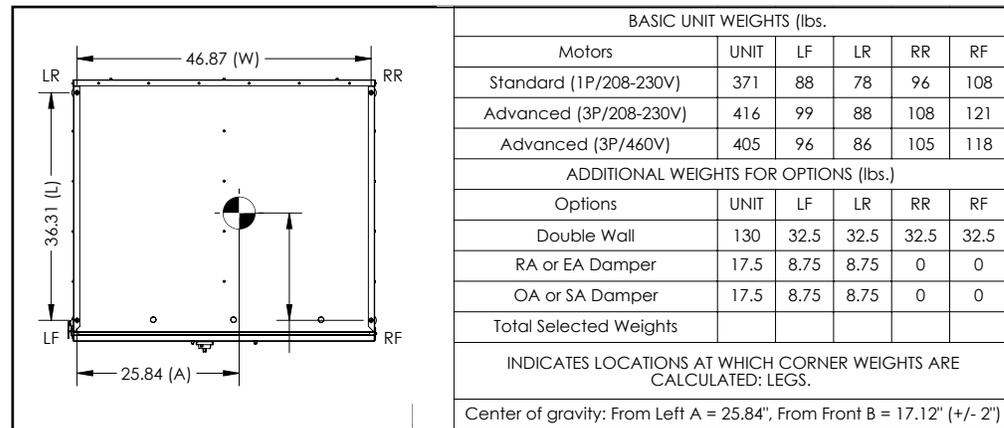


FIGURE 3.2.18 TRCeN1600H WEIGHTS AND COG

3.3 RECEIVING

Upon receipt of the TRCeN500–TRCeN1600, inspect the unit for obvious external damage. If damage is observed, take digital pictures and report the damage to your S&P USA representative. Note the damage on the carrier's Bill of Lading. Depending on expected transport and storage conditions, the unit may have only the duct openings covered, it may be stretch-wrapped or it may be crated. Do not unwrap the unit at this time. The unit will normally be moved to its final location while still wrapped and attached to its pallet.

The preferred method of hoisting the TRCeN500–TRCeN1600 from the carrier truck is by using a construction forklift or a crane.

Once the unit is unwrapped, prevent dirt and debris from entering the cabinet by covering any duct openings that do not have attached dampers. Keep the duct openings covered until it's time to connect ductwork.

3.4 STORAGE

Units that must be stored prior to installation should be left on their pallets and protected from weather and physical damage. Units must be placed on a level surface to prevent racking of the pallet and the TRCeN500–TRCeN1600. All access doors must be secured with all available hardware (door latches and securing bolts) and all openings into the cabinet must be sealed to prevent entry of dust, dirt and debris.

4.0 UNIT PLACEMENT

4.1 BEFORE YOU BEGIN

The TRCeN500–TRCeN1600 is designed for installation in a sheltered location, out of the weather. The preferred mounting location is to place the unit on a concrete floor, although it can also be suspended from a ceiling or other structural support. See Section 5.3, Suspended Mount, in this manual.

For all installations, maintain needed service clearances as shown on the dimensioned drawings located in Section 4.2 of this manual.

For all floor-mount installations, the unit should be set on its factory-provided adjustable legs and leveled. Select a location that is central to the inside duct runs and close to both the exhaust duct (to the outside) and also to the OA duct (from the outside).

The EA outlet and the OA inlet on the outside of the building should be at least 10' apart to avoid cross-contamination. Comply with all local building codes in the positioning of the duct openings. Do not position the EA outlet in a location where it will dump EA into any enclosed or occupied space. The duct inlets and outlets should be screened against insects and vermin and should be shielded from the weather to prevent entry of rain or snow.

4.2 SERVICE CLEARANCES

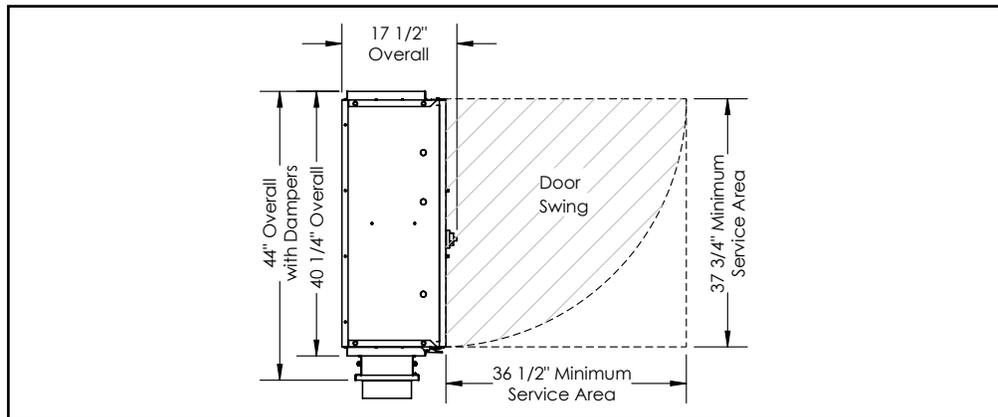


FIGURE 4.2.0 TRCeN500H SERVICE CLEARANCES, TOP VIEW

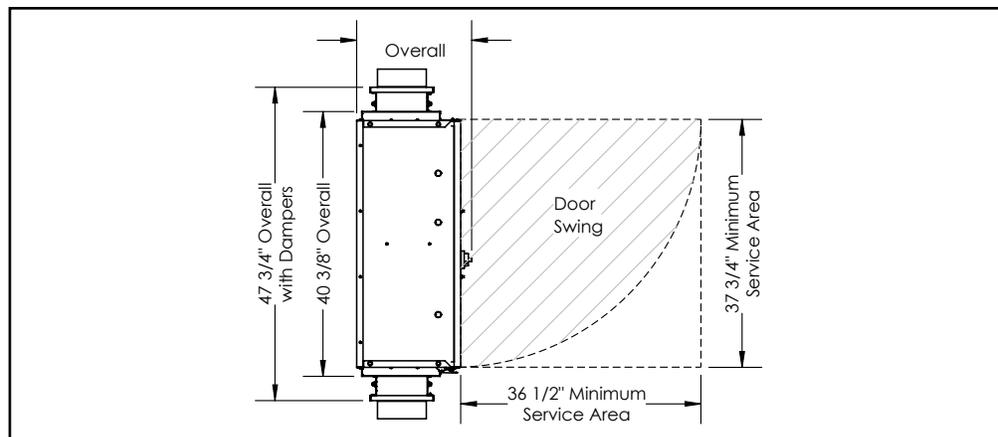


FIGURE 4.2.1 TRCeN500V SERVICE CLEARANCES, TOP VIEW

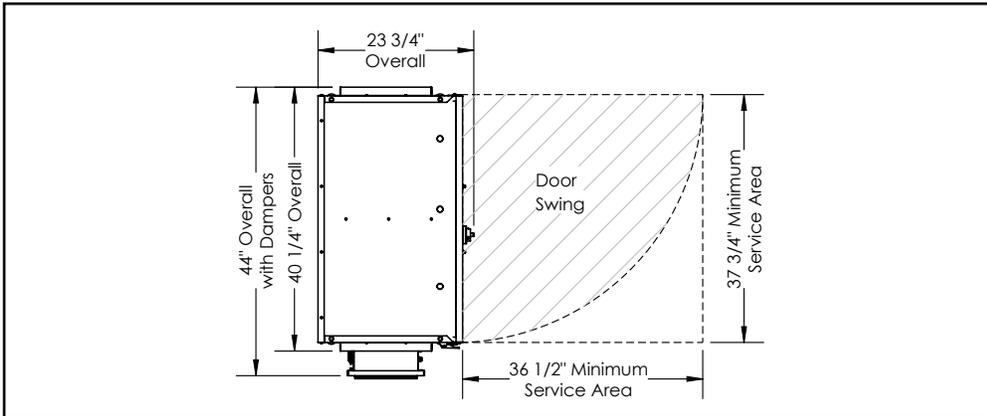


FIGURE 4.2.2 TRCeN800H SERVICE CLEARANCES, TOP VIEW

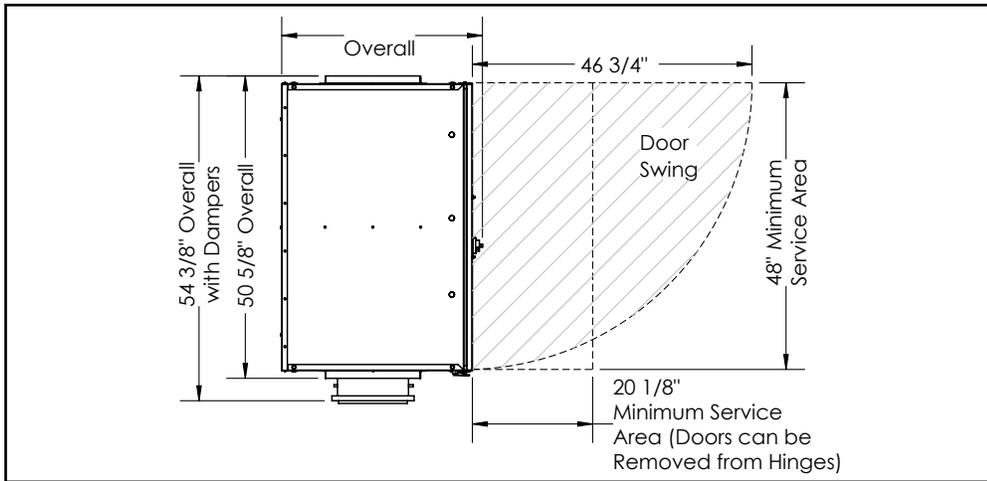


FIGURE 4.2.3 TRCeN1200H SERVICE CLEARANCES, TOP VIEW

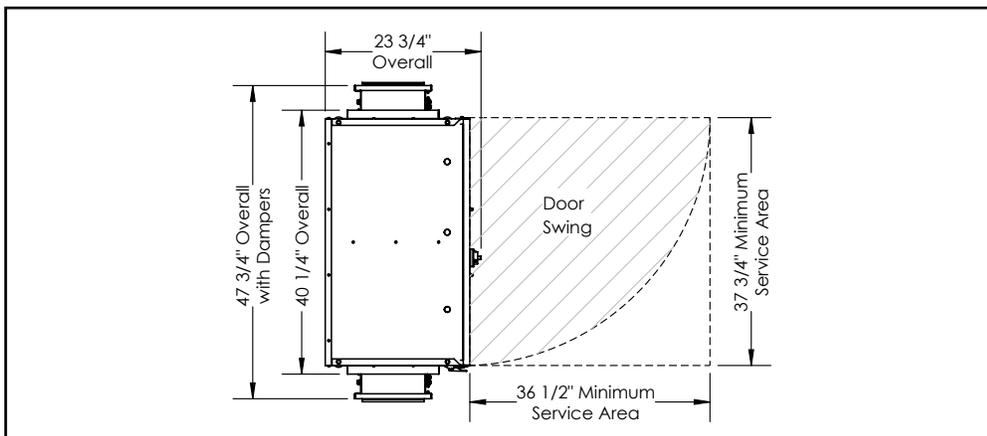


FIGURE 4.2.4 TRCeN800V SERVICE CLEARANCES, TOP VIEW

CAUTION

It is the installer's responsibility to make sure that the screws or bolts used for securing the units are properly selected for the loads and substrates involved. Secure the TRCeN500-TRCeN1600 so that it cannot fall or tip in the event of accident, structural failure or earthquake. See Rigging Information for unit weight.

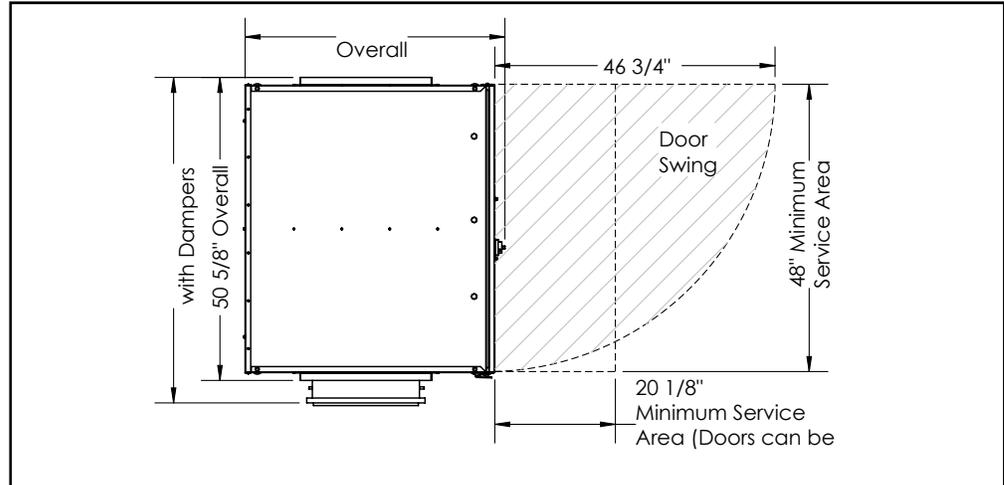


FIGURE 4.2.6 TRCeN1600H SERVICE CLEARANCES, TOP VIEW

4.3 DOOR REMOVAL

To remove the door, pull the pin vertically until it catches, approximately 2.25". Hinge will now slide apart.

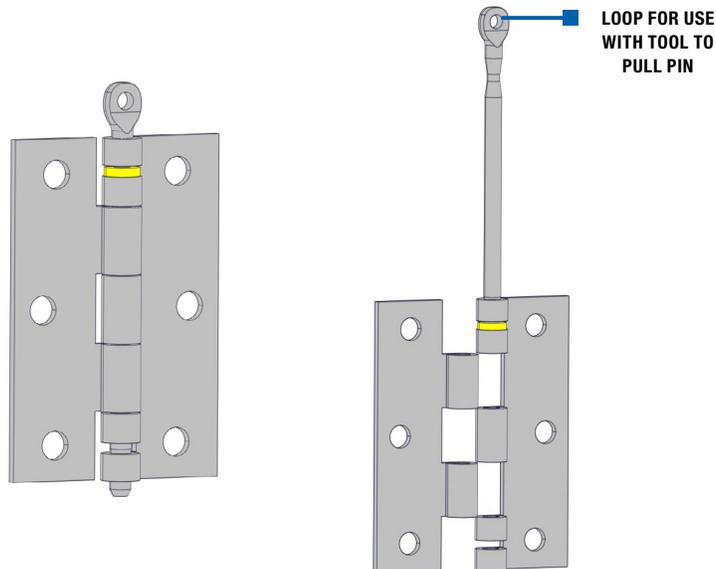


FIGURE 4.3.0 DOOR REMOVAL

4.3.1 Hinge Adjustment

If desired, the hinge pin can be removed and inverted by using needle-nose pliers, or other tool, to remove the yellow ring prior to pulling the pin from the hinge. This will allow you to fully remove the pin, which can then be inserted into the opposite end of the hinge assembly. Once done, replace the yellow ring, making sure to fully seat it.

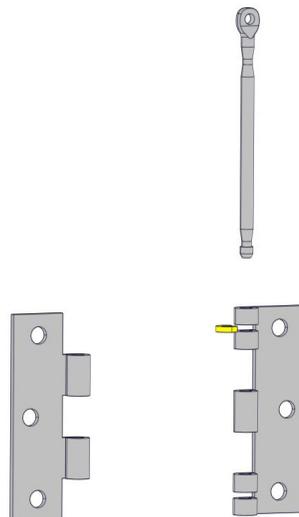


FIGURE 4.3.1 HINGE PIN REMOVAL

4.4 SOUND ATTENUATION

Take these simple steps to attenuate noise from the unit.

4.4.1 Ducts

Make sure the ductwork at the unit outlets is stiff enough to resist the flexure and resulting booming associated with system start up and shut off, as well as the turbulent flow conditions at the impeller outlets.

In general, provide smooth transitions from the ERV's outlets to the duct. The ducts connecting to the outlets should be straight for a sufficient distance, with gradual transitions to the final duct size.

These guidelines are consistent with SMACNA recommended duct layout practices for efficient and quiet air movement. Follow SMACNA guidelines.

4.4.2 Radiated Noise

The TRCeN500–TRCeN1600 is insulated with Expanded Polystyrene (EPS) foam. This provides significant attenuation of radiated sound from the unit itself.

The inlet ducts can be significant sources of radiated sound as well. The RA duct should be insulated for sound control. This insulation should start at the unit. At a minimum the first 10' of duct should be insulated. All parts of the SA and RA ducts located in a mechanical space with noise-generating equipment also should be insulated for sound control, both to minimize sound radiation out of the RA duct, and also to control sound radiation into both ducts.

4.4.3 Connecting Ducts to Unit

Flanged duct connections are available as an accessory for the duct connections of the TRCeN500–TRCeN1600 units. These allow for connection of ducts insulated on the inside or the outside, or for installation of lined duct. Please refer to dimension drawings for duct flange sizes.

5.0 INSTALLATION

5.1 DUCTWORK

5.1.1 Ducts to the Outside

The exhaust outlet and fresh air inlet on the outside of the building should be at least 10' apart to avoid cross-contamination. The exhaust outlet should not dump air into an enclosed space or any other structure. The inlets and outlets should be screened against insects and vermin and shielded from the weather to prevent the entry of rain or snow.

Ducts connecting the TRCeN500–TRCeN1600 to the outside must be insulated, with sealed vapor barrier on both inside and outside of the insulation. Insulate both the OA and EA ducts.

5.1.2 Inside Ductwork System

Follow Engineer's Ductwork Design; ductwork should be designed by an engineer to allow the unit to provide the required airflow.

5.1.3 Duct Insulation

If the inside ducts run through un-conditioned spaces, they must be insulated, with a sealed vapor barrier on both inside and outside of insulation.

5.1.4 Adjust Fan Speed to Set and Balance Airflow Rates

In most applications, the airflow rate for both the SA and the EA should be roughly equal (or "balanced") for best performance of the TRCeN500–TRCeN1600 unit. See unit specification sheet for CFM/ESP operating envelopes for available motors.

5.2 FLOOR INSTALLATION

Most units are installed in a location specified by others. In general, it's preferable to install the unit on a flat, reasonably level surface, such as a concrete floor. The factory-installed leveling legs are to be used to level the unit before connecting ductwork. When positioning the unit, it is not to be slid on its adjustable legs because they can be bent.

5.3 SUSPENDED MOUNT

5.3.1 Hanging Unit From Structure

TRCeN500–TRCeN1600 units can also be suspended from a ceiling or other structural member and may be hung in any orientation. The preferred method of support is to remove the four adjustable legs and bolt heavy-gauge Unistrut or other structural channels to the underside of the unit, using the 3/8"-16 threaded holes where the adjustable legs were located. Install 3/8"-16 bolts through the channels, into the bottom of the unit. Support the channels from threaded rods, located in an appropriate location that maintains required service clearances.

5.3.2 Hanging Vibration Isolators

When suspending TRCeN500–TRCeN1600 units from a ceiling or structure, it may be necessary to isolate the unit from transmitting vibration to the structural members. Hanging Vibration Isolators are available as an accessory for the TRCeN500–TRCeN1600. Use the corner weights depicted in Figures 3.2.0 through 3.2.3 to select isolators with the proper load ratings. The isolators are designed for use with 3/8" threaded rod. Attach the threaded rod to the support rails for the unit as shown in Figure 5.3.0. For mounting details, see the isolator specification sheets at the links below.

<http://bit.ly/4hrbDMC>

<http://bit.ly/48KwUpe>



NOTE: Ducts inside a building that are connected to the outside must be insulated with a sealed vapor barrier on both the inside and the outside of the insulation.

CAUTION

Tape both inner and outer vapor barriers of insulated duct to collars on duct adapters. This is critical to prevent migration of moisture into insulation. Build-up of moisture can result in failure of the duct system and/or frost in the insulation. Make sure any tears in the inner and outer vapor barriers are sealed.



NOTE: To prevent the entry of rain through the outside air inlet duct, observe the following:

1. Velocity at face of inlet hood should not exceed 500 FPM.
2. Inlet duct must be at least 12" inside diameter.
3. Centerline length along duct from weather hood to unit inlet must be at least 48".
4. Inlet duct must pitch downward to the outside; centerline of inlet hood must be at least 18" below the centerline of the unit inlet.
5. Outlet duct must pitch downward to the outside with a slope of at least 1/4" to the foot.

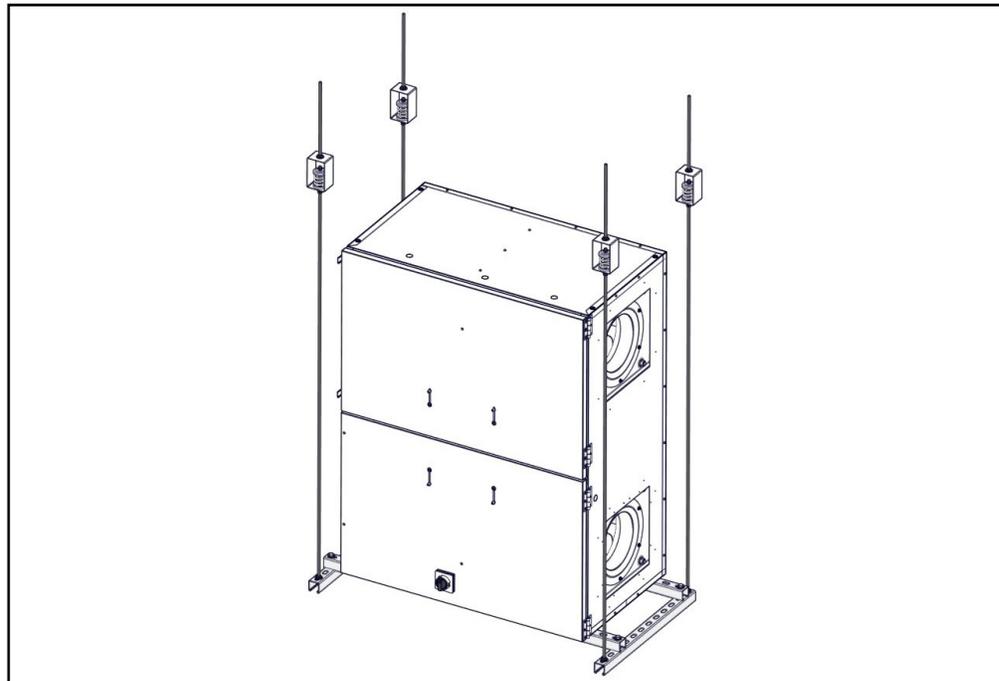


FIGURE 5.3.0 CEILING HUNG WITH OPTIONAL VIBRATION ISOLATORS

5.3.3 Hanging Bracket Kit

The TRCeN500–TRCeN1200 can also be mounted to structural members using the Hanging Bracket Kit, available as an accessory. Remove the four adjustable legs and use the included 3/8" -16 bolts and washers to attach the hanging brackets to the unit as shown in Figure 5.3.1. The hanging brackets may be attached directly to a structural member or used in combination with threaded rod and the hanging vibration isolators (see Section 5.3.4). If the spacing of the unit mount points does not fit the application, the hanging brackets may alternatively be attached directly to the cabinet using (16) #12 x 3/4" long self-tapping sheet metal screws (not provided). Ensure that the unit is adequately supported at all four corners and that the placement of the brackets maintains required service clearances.

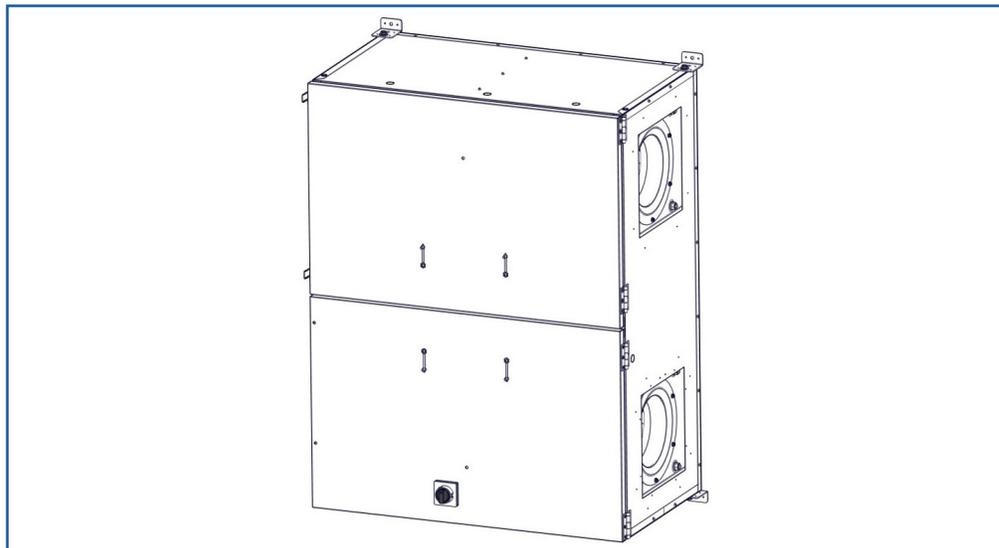


FIGURE 5.3.1 HANGING BRACKET KIT

5.3.4 Ceiling Hanging with Access Doors Facing Down

For applications where the unit access doors must face downward, the Hanging Bracket Kit may be used in combination with threaded rod and the hanging vibration isolators described in section 5.3.2. Use the corner weights depicted in Figures 3.2.4 through 3.2.7 to select isolators with the proper load ratings.

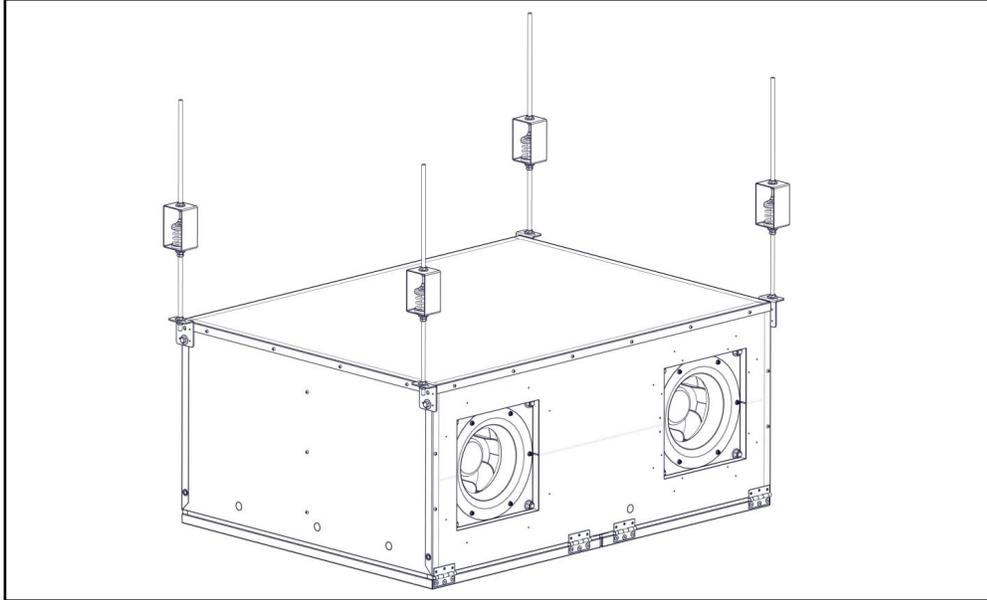


FIGURE 5.3.2 CEILING HANGING ARRANGEMENT WITH ACCESS DOORS FACING DOWN

5.3.5 Alternate Ceiling Hanging Arrangement

For instances where the Hanging Bracket Kit will not be used, it is also acceptable to bolt support members by others directly to the unit at the corner rivet nuts. Use (4) 3/8"-16 bolts and washers to attach support members (such as angle iron) to the unit as shown in Figure 5.3.3. Then attach 3/8" threaded rod to the support members near each of the four corners of the unit. Ensure that the unit is adequately supported at all four corners and that the placement of the support members and threaded rod maintains required service clearances.

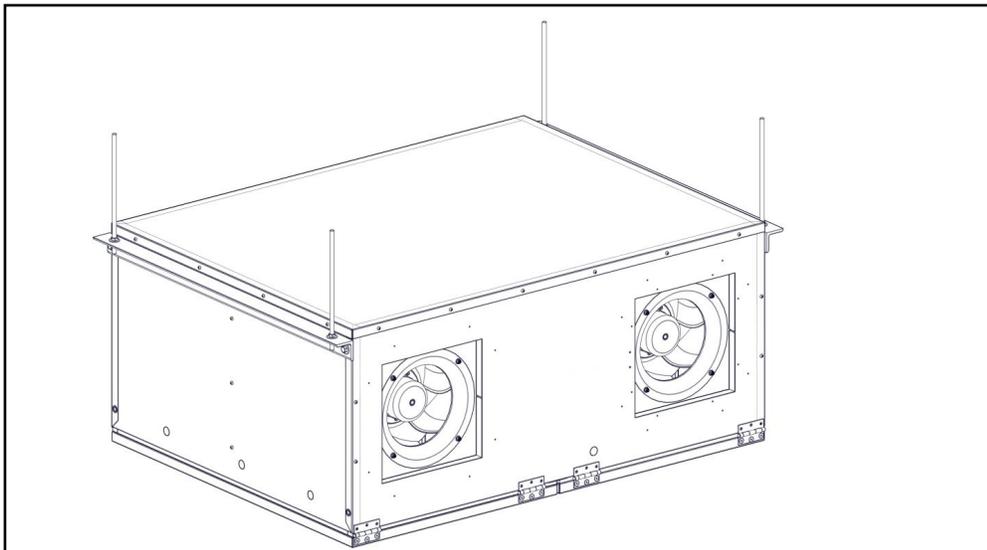


FIGURE 5.3.3 ALTERNATE CEILING HANGING ARRANGEMENT

5.4 ELECTRICAL REQUIREMENTS

Electrical Options and Ratings are identified on the Unit Label (located near electrical box). Find the complete Unit Model Number in the lower left corner of the Unit Label.

⚠ CAUTION

Before bringing power to the unit check unit nameplate to confirm it matches the voltage and phase of the power you are supplying. Remember that your field connections need to be accessible for inspection.

NOTE: Your unit is equipped with EC Motors (ECM). Use conduit, strain reliefs, etc. as required by code to secure the field wiring.

5.4.1 Factory-Recommended Electric Service Entry

The TRCeN500–TRCeN1600 has an internal E-box in the lower left corner of the unit. 7/8" knockouts are provided on the sides and bottom of the unit for high-voltage power and low-voltage control entry. Install the wiring in accordance with local codes and provide strain relief at the E-box opening.

High-voltage supply wiring is to be connected on the top side of the disconnect switch. See image below.

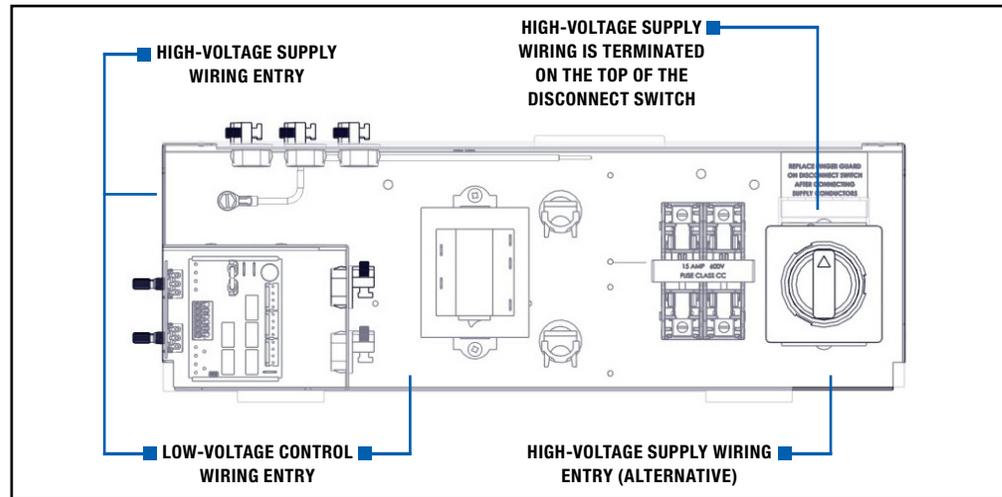


FIGURE 5.4.0 E-BOX WIRING ENTRY POINTS

5.4.2 Low Voltage Control System

This ERV is provided with a Class II 24VAC power supply system that operates the unit's EC control board. The ERV's 24VAC Power Supply can also be used to power the externally-installed controls system: up to 8VA of power is available.

The unit's power supply system includes isolation relay(s) so you can use external controls whose contact ratings are as low as 50 mA (1.2 VA). Also, it is possible to operate the isolation relays with 24VAC power from an external source (with proper wiring connections).

A built-in circuit-breaker prevents damage to the transformer and other low-voltage components in the event of a short-circuit or overload. In extreme cases, the transformer itself is designed to fail safely.

Specifications:

- Nominal Output Voltage under load: 24VAC
- Typical Output Voltage at no load: 29–31 V
- Minimum contact rating for connected control device: 50 mA (1.2 VA)
- Circuit Breaker Trip Point: 3 A

⚠ CAUTION	
1.	Connect only to components intended for use with 24VAC power.
2.	Do not undersize the low-voltage wires connected to this device. Observe the wire length and gauge limits indicated in this manual.
3.	Do not overload this unit's 24VAC power supply system. Confirm that the power requirements of devices you connect to this power supply system do not exceed 8VA in total.
4.	If an external source of 24VAC power is used to control the unit, consult the wiring schematics and connect the external power only to the specified terminals in order to avoid damaging the unit or external controls. Connect only CLASS II power to the control terminals of this unit.

NOTICE
<p>If primary-side voltage is 230VAC, move black primary-side lead from transformer's "208V" terminal to the transformer's terminal marked "240V" ("230V" in some units). Do not move the black primary-side lead that is connected to the transformer's "COM" terminal.</p>

5.4.3 How to Reset the 24VAC Circuit Breaker

If the transformer is subjected to an excessive load or a short circuit, the circuit breaker will trip to prevent the failure of the transformer. When it trips the circuit breaker's button pops up. Shut off the primary-side power to the unit, and remove the excessive load or the short. The circuit breaker can be reset about fifteen seconds after it trips by pressing in the button.

5.4.4 Limits of Power Output

If limits on wire gauge and length are observed, you may connect control devices that draw up to 8VA to the blue and red wires. More than one device can be connected as long as total steady-state load does not exceed 8VA.

Wire Gauge	#22	#20	#18	#16	#14	#12
Circuit Length	100'	150'	250'	400'	700'	1000'
<p>"Circuit Length" is distance from ERV to Control Device.</p> <p>Observe these limits to wire length and gauge in order to ensure reliable operation of the control system.</p>						

⚠ CAUTION
<p>Be careful if the external control system provides 24VAC power at its control output: make sure blue and red leads are separately capped and not connected to any other wires.</p>

5.5 WIRING SCHEMATICS

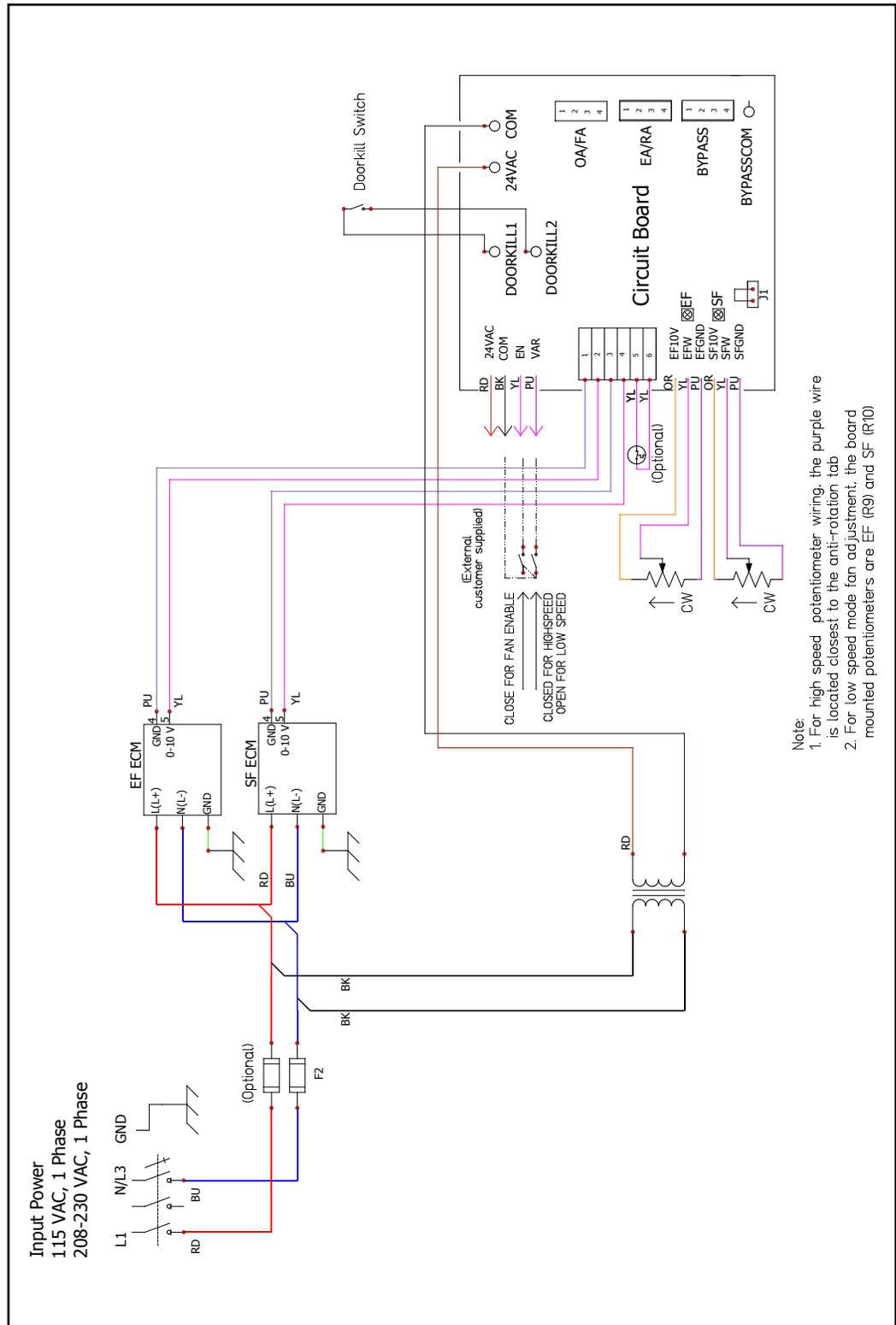


FIGURE 5.5.0 SINGLE PHASE UNIT, STANDARD

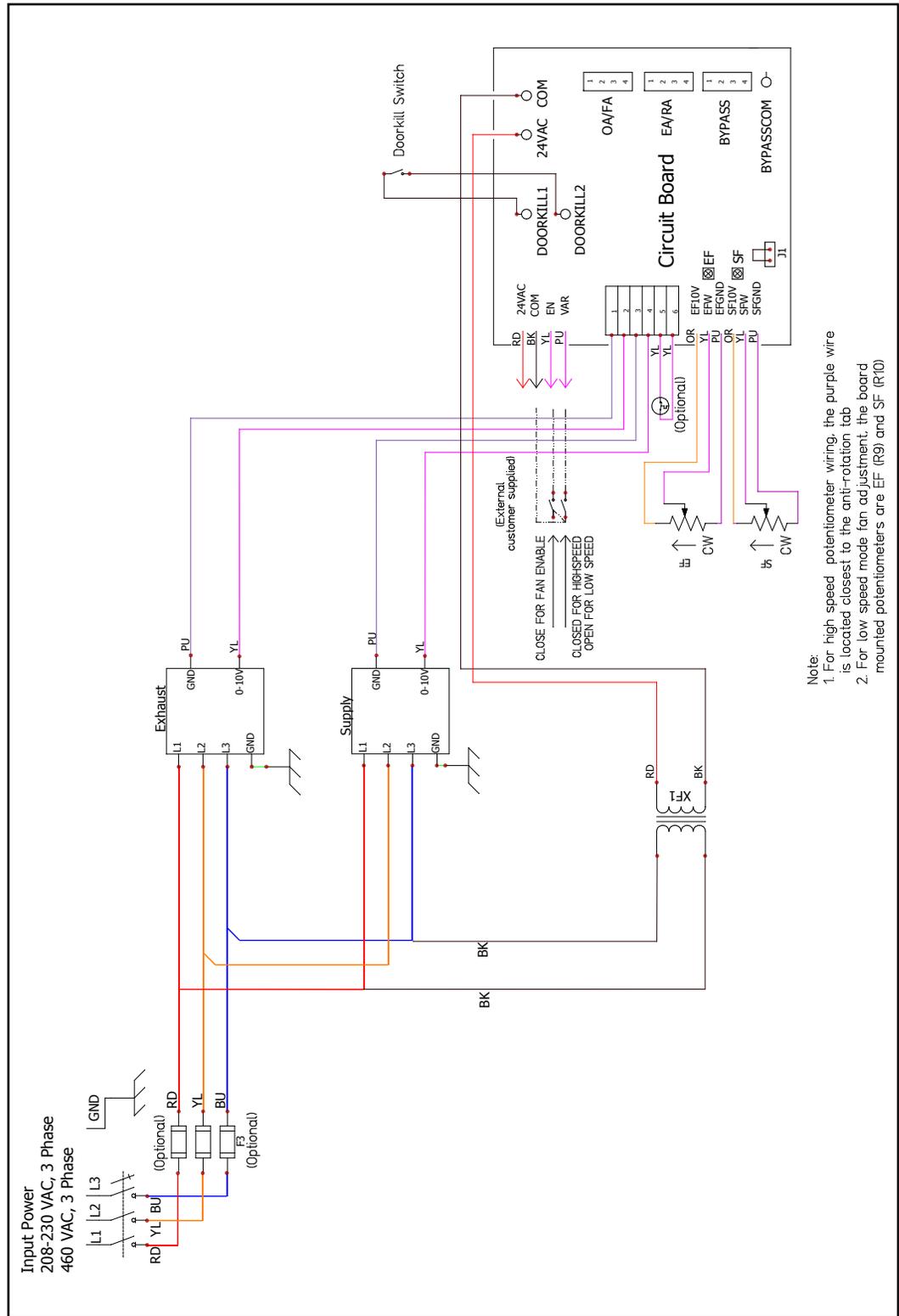


FIGURE 5.5.1 THREE PHASE UNIT, STANDARD (TRCeN1600 ONLY)

5.6 EXTERNAL CONTROL CONNECTIONS

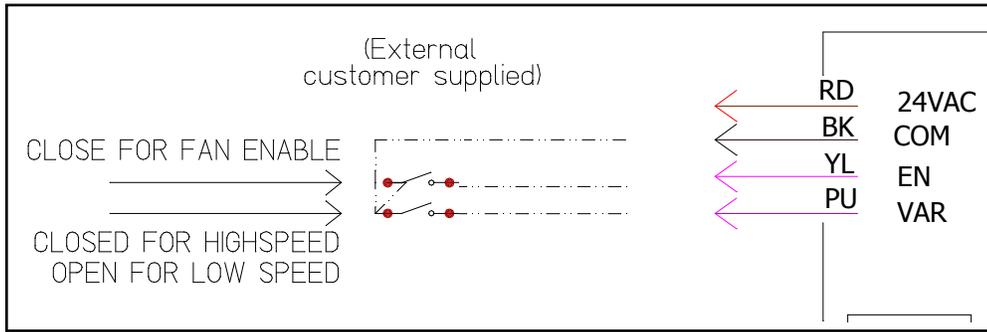


FIGURE 5.6.0 FIELD CIRCUIT DETAIL

NOTE: The simplified schematics below show only the relevant portions of the low-voltage control circuit in the ERV unit and representational external control approaches. See the complete unit schematics above.

CAUTION
Make sure the control provides no voltage or current at its output terminals.

5.6.1 Fan Enable Field Circuit

The standard control board on the TRCeN500–TRCeN1600 is designed for fan enable via a single switch or field circuit.

- To enable fan operation for both fans, close contact between the yellow EN wire and the black COM wire.

5.6.2 Fan Speed Selection Field Circuit

The standard control board on the TRCeN500–TRCeN1600 is designed for two-speed operation, with each speed enabled via a single switch or field circuit.

- To enable SPEED 1 for both fans, open contact between the purple VAR wire and the black COM wire.
- To enable SPEED 2 for both fans, close contact between the purple VAR wire and the black COM wire.

5.6.3 Fan Speed Adjustment

The standard control board on the TRCeN500–TRCeN1600 allows for field adjustment of SPEED 1 and SPEED 2 via trimming potentiometers.

- SPEED 1 is set using the two board-mounted trimming potentiometers labeled EF for the exhaust fan and SF for the supply fan. Use a 5/64" slotted screwdriver to adjust SPEED 1 for each fan. Turn the potentiometers gently to avoid damaging the control board. Do not force them to turn past the end stop.
- SPEED 2 is set using the two panel-mounted trimming potentiometers labeled EA/RA motor for the exhaust fan and OA/SA Motor for the supply fan. Turn the potentiometers by hand or use a slotted screwdriver to adjust SPEED 2 for each fan.

5.6.4 Analog Signal for Controlling SPEED 2

To utilize an external 0–10VDC analog signal for SPEED 2:

1. Remove each panel mounted potentiometer by cutting the wires at the potentiometer.
2. Connect the remote analog signal to the yellow wire from the potentiometer.
3. Connect the remote signal ground to the purple wire from the potentiometer.
4. Cap the orange wire from the potentiometer with a wire nut.

5.7 QUICK-START FOR TESTING CORRECT 3PH WIRING

All units that run on 3 phase power should be test-run immediately after high voltage wiring connections are made. This will verify that the three phases are properly connected, that the dampers will open and close properly and the fans are working properly.

For purposes of testing correct phase connections, the internal 24VAC power supply will be used to power-up the fans and all external control devices will be disabled, when applicable.

NOTE: Any changes to unit low-voltage wiring should be made with the disconnect switch in the "OFF" position.

6.0 OPERATION

6.1 PRINCIPLE OF OPERATION

The TRCeN500–TRCeN1600 has one basic purpose: to exhaust air from a structure and bring in SA from outside, while transferring heating or cooling energy from the EA to the SA.

The TRCeN500–TRCeN1600 is a very simple device, and will accomplish this purpose as long as the impeller is able to move air through the enthalpic core.

6.2 PRE-START UP

6.2.1 Verify Voltages

Using a voltmeter, test the input voltages as supplied to the disconnect switch. Refer to Digit 13 of the unit Configuration Code to find the rated voltage. The supplied voltage must be within +/- 10% of the rated voltage.

6.2.2 Verify Transformer Wiring

Units with 230VAC power source are shipped with the transformer wired for 208VAC. If the unit is receiving 230VAC, make sure the black primary-side wire on the transformer's 208V terminal has been moved to the 230V terminal.

6.2.3 Inspect Filters

Clean filters must be installed prior to fan start up.

6.2.4 Inspect Foam Gasketing

Inspect the gasketing to make sure there are no gaps allowing air movement around the cores or filters.

6.2.5 Inspect Fans

Prior to start up, the fans should be rotated by hand to make sure that the impeller is not rubbing anywhere and that they turn freely.

6.2.6 Inspect and Clean the Cabinet Interior

During the construction and installation phases of a project, dust, dirt and debris will often accumulate inside a unit. Thoroughly clean the inside of the unit by vacuuming and/or wiping metal surfaces with a damp rag.

6.2.7 Inspect Ductwork Connections

Ducts attached to the ERV must be firmly attached, sealed and supported in accordance with installation instructions and SMACNA guidelines.

6.3 UNIT START UP

6.3.1 Starting Up ECM Units

Units equipped with standard control do not require any external controlling signals and only require turning on the disconnect switch, located on the E-Box or cabinet access door. When the disconnect switch is turned "ON" any dampers will first move into their correct operating positions and then a speed signal is supplied to the motorized impellers, causing the fans to run.

Some units equipped with standard control are wired to receive an actuating signal from an external source. If there is an external actuation signal source, verify the type of signal and that it is wired according to the low-voltage wiring diagrams found in Section 5.5 of this manual. Turn "ON" the disconnect switch and then turn "ON" the actuating device. After any dampers have moved into their correct positions, a speed signal is supplied to the motorized impellers, causing the fans to run.



NOTE: The door interlock switch will prevent the fans from turning on if the access door on that side is open.

IMPORTANT

It is important to balance the airflows after the unit is operational and all ductwork has been installed. Balancing the airflows is typically required by state and/or local codes, and is often specified by the HVAC design engineer.

Optimum efficiency of the enthalpic cores is achieved when the airstreams are properly balanced.

6.4 BALANCING AIRFLOW

Airflow should be occurring in both airstreams. Sometimes the easiest place to confirm that air is moving is at a supply vent.

If exact airflow is critical, it may be desirable to permanently install flow measuring stations and manometers in the ductwork connected to the unit. These also can be used to determine when filters should be cleaned or changed.

Equipment Required:

- A magnehelic gauge or other device capable of measuring 0–1.5 in. water of differential pressure.
- 2 pieces of natural rubber latex tubing, 1/8" ID, 1/16" wall works the best.

Procedure:

The individual differential static pressures (DSP) can be measured using the installed pressure ports located in the front of the units core access doors.

- To read SCFM of SA install the “high” pressure side (+) of your measuring device to the OA port and the “low” pressure side (-) to the SA port.
- To read SCFM of RA install the “high” pressure side (+) of your measuring device to the RA port and the “low” pressure side (-) to the EA port.
- Use the reading displayed on your measurement device to cross reference the CFM output using the conversion chart.

 NOTE: ERV airflows are to be balanced after all ductwork is installed. Balancing of airflows is typically required by local or state building codes or by the HVAC design engineer.

 NOTE: The tubing should extend in the pressure port approx. 1".

 NOTE: These ports have been carefully located on the unit as to give you the most accurate airflow measurement. Do not relocate pressure ports.

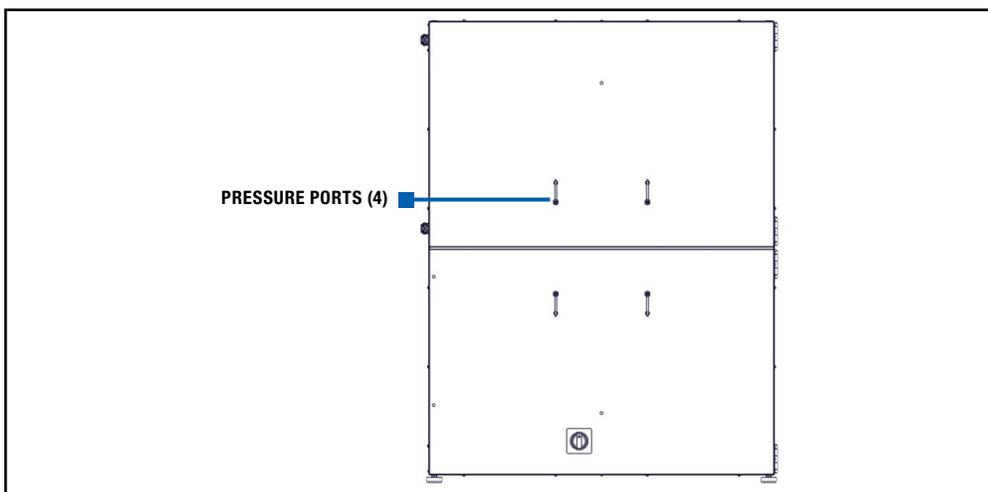


FIGURE 6.4.0 PRESSURE PORT LOCATIONS

DIFFERENTIAL STATIC ACROSS CORE DSP vs. CFM												
TRCeN500	DP (H ₂ O)	DSP	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
	Supply Air (SA)	CFM	150	230	310	380	460	540	610	690	760	840
	Return Air (RA)	CFM	150	230	310	380	460	540	610	690	760	840
TRCeN800	DP (H ₂ O)	DSP	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
	Supply Air (SA)	CFM	230	350	460	580	690	810	920	1040	1150	1270
	Return Air (RA)	CFM	230	350	460	580	690	810	920	1040	1150	1270
TRCeN1200	DP (H ₂ O)	DSP	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
	Supply Air (SA)	CFM	340	510	680	850	1020	1190	1360	1530	1700	1870
	Return Air (RA)	CFM	340	510	680	850	1020	1190	1360	1530	1700	1870
TRCeN1600	DP (H ₂ O)	DSP	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10
	Supply Air (SA)	CFM	460	690	920	1150	1380	1620	1850	2080	2310	2540
	Return Air (RA)	CFM	460	690	920	1150	1380	1620	1850	2080	2310	2540

CAUTION

The proper operating airflow range for these models are:
 TRCeN500: 166–694 CFM
 TRCeN800: 250–1100 CFM
 TRCeN1200: 369–1621 CFM
 TRCeN1600: 500–2200 CFM.

6.4.1 Filter Pressure Drop

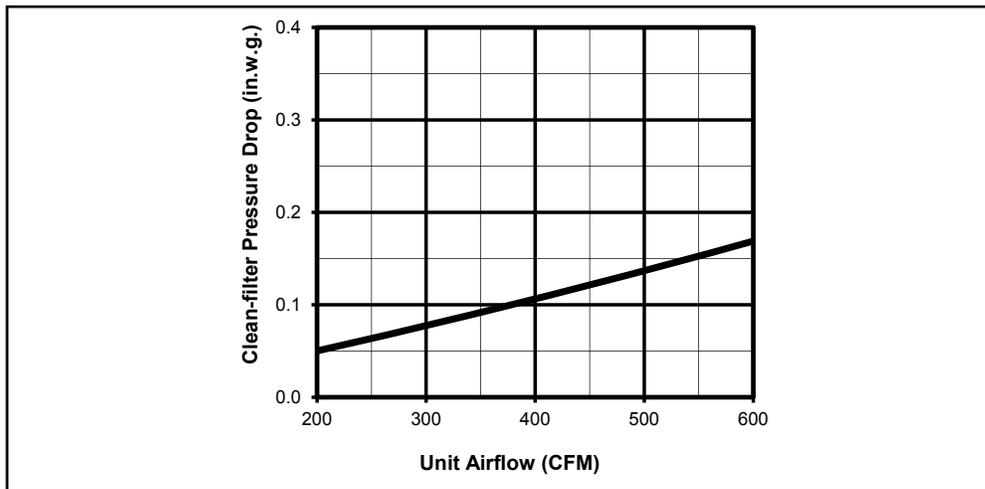


FIGURE 6.4.1 INITIAL PRESSURE DROP OF MERV 8 FILTERS, SUPPLIED WITH TRCeN500

NOTE: Clean filter pressure drop is included in unit airflow performance tables.

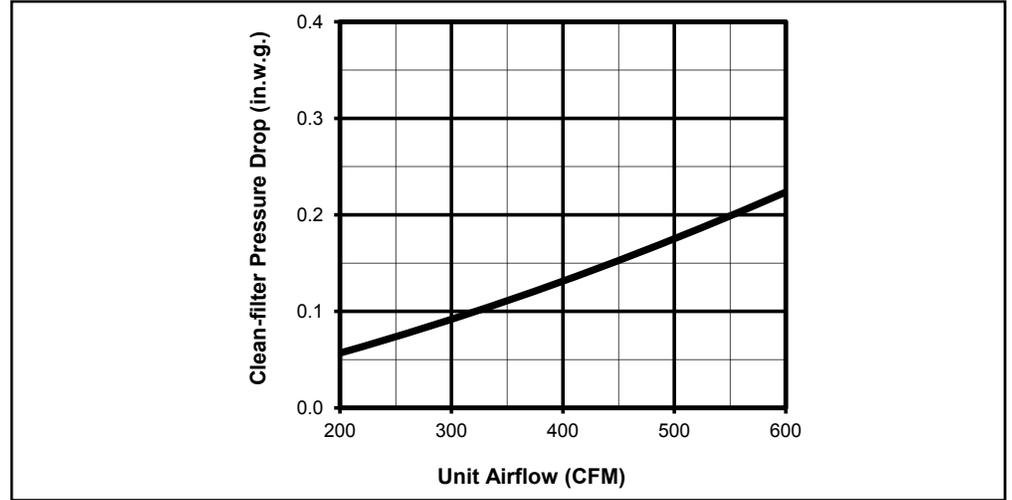


FIGURE 6.4.2 INITIAL PRESSURE DROP OF MERV 13 FILTERS, AVAILABLE AS AN TRCeN500 ACCESSORY

 NOTE: Clean filter pressure drop is included in unit airflow performance tables.

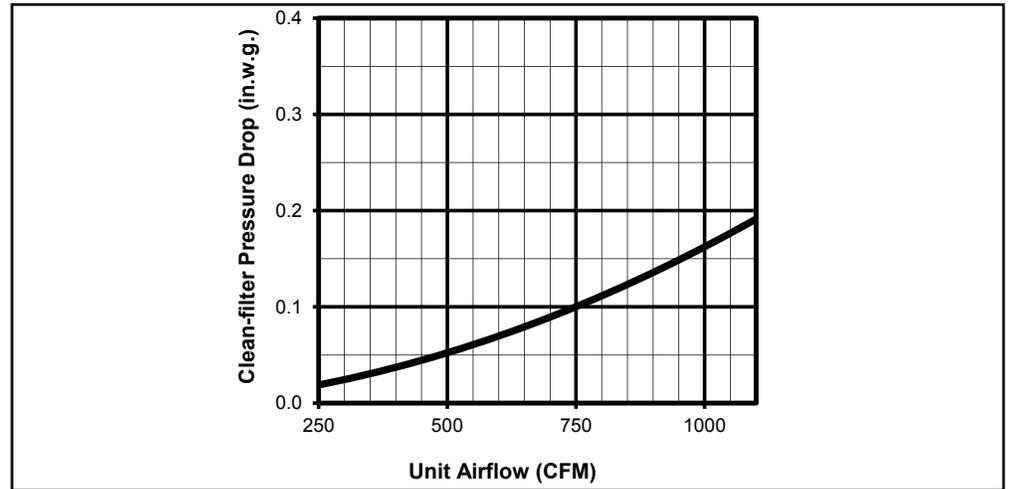


FIGURE 6.4.3 INITIAL PRESSURE DROP OF MERV 8 FILTERS, SUPPLIED WITH TRCeN800

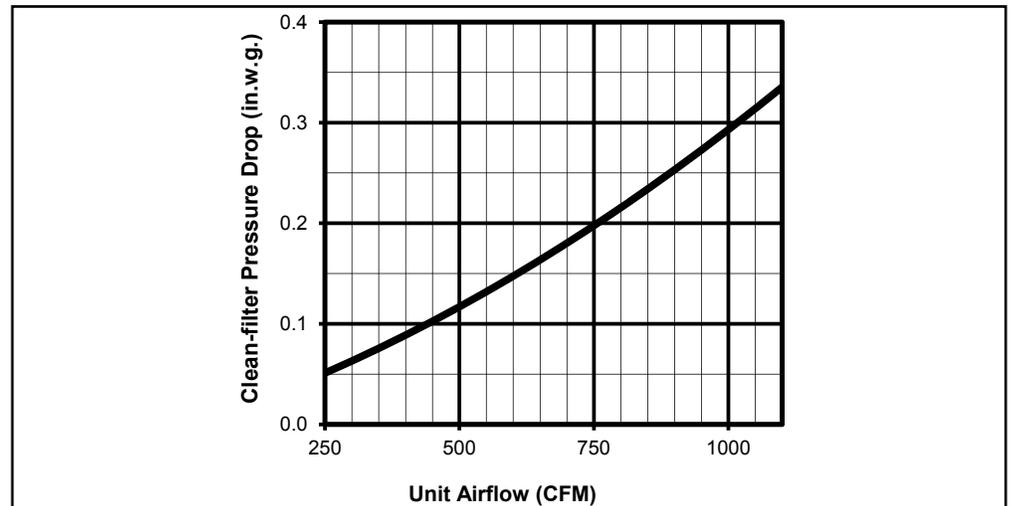


FIGURE 6.4.4 INITIAL PRESSURE DROP OF MERV 13 FILTERS, AVAILABLE AS AN TRCeN800 ACCESSORY

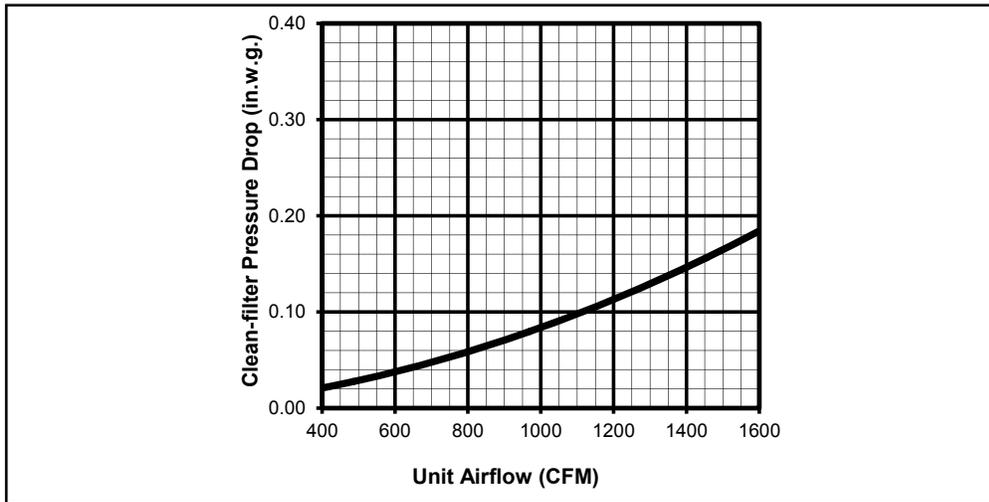


FIGURE 6.4.5 INITIAL PRESSURE DROP OF MERV 8 FILTERS, SUPPLIED WITH TRCeN1200

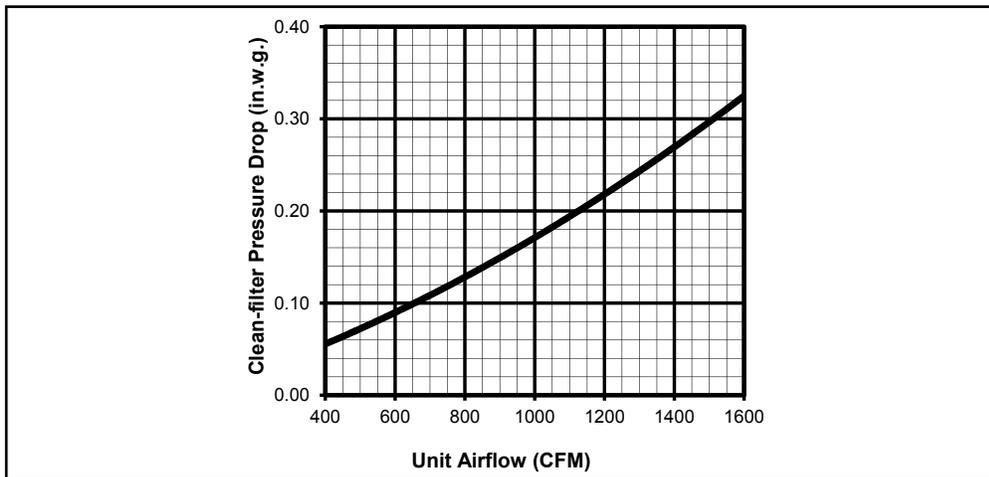


FIGURE 6.4.6 INITIAL PRESSURE DROP OF MERV 13 FILTERS, AVAILABLE AS A TRCeN1200

 NOTE: Clean filter pressure drop is included in unit airflow performance tables.

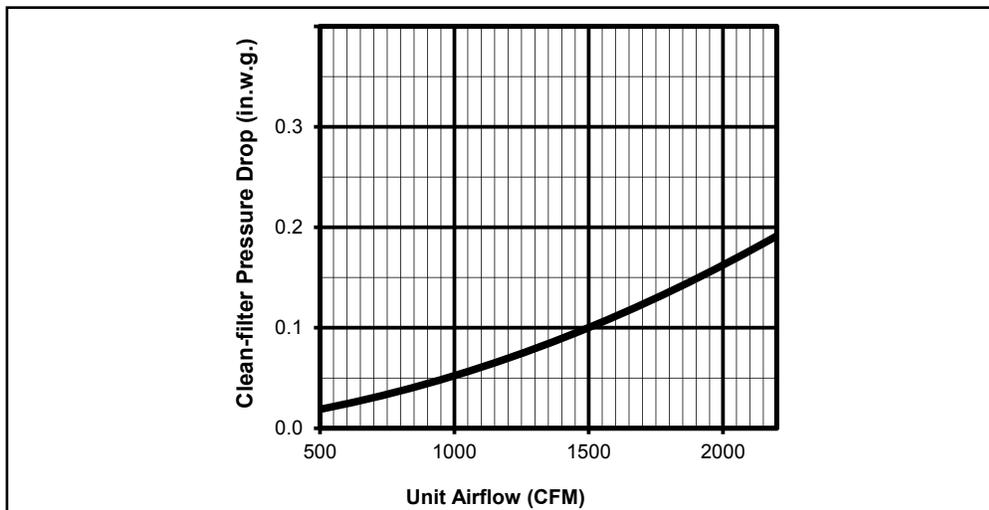


FIGURE 6.4.7 INITIAL PRESSURE DROP OF MERV 8 FILTERS, TRCeN1600



NOTE: Clean filter pressure drop is included in unit airflow performance tables.

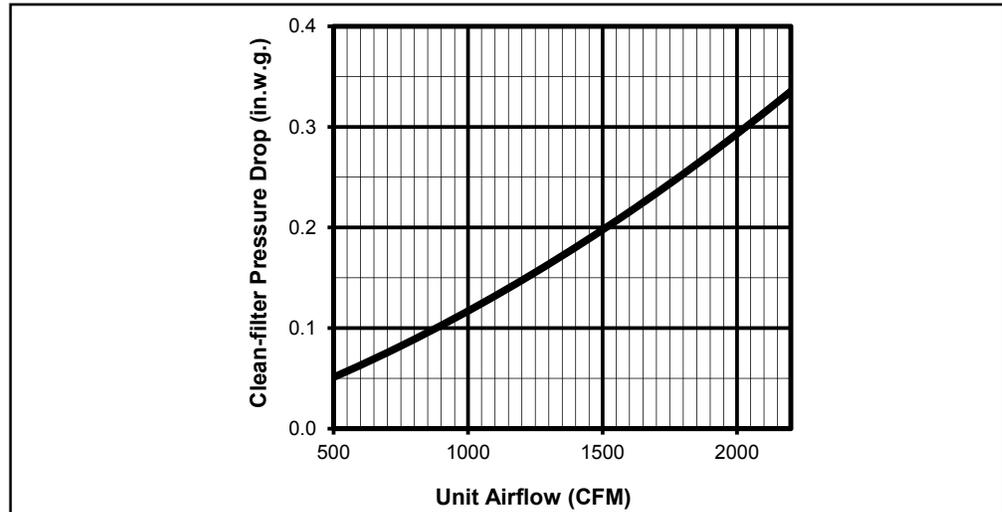


FIGURE 6.4.8 INITIAL PRESSURE DROP OF MERV 13 FILTERS, AVAILABLE AS TRCeN1600

6.5 NORMAL OPERATION

A wide variety of control schemes may be selected by the engineer, installer, or owner to meet the ventilation needs of the facility. These may include timer clocks, occupancy sensors, dehumidistats (for cool-weather operation), carbon dioxide sensors, and others. DDC systems may also control the unit. Most control schemes will operate the unit only when needed.

Continuous operation is acceptable in virtually all conditions. Unit will not be damaged by continuous operation as long as airflow occurs. Impeller motors may overheat if filters become completely blocked due to lack of maintenance. Motors are thermally protected. With continuous operation, some external frosting may occur in very cold weather (see Section 6.6).

6.6 OPERATION IN EXTREME COLD WEATHER

TRCeN500–TRCeN1600 units are capable of operating without internal frosting at temperatures down to -10°F , with indoor humidity below 40%. The units can operate under more severe conditions occasionally with little or no impact on their performance. At lower humidities, they can operate at still lower outside temperatures without freezing the enthalpic cores.

Some condensation or even frost may form on the outside of the unit or drip off the cabinet during very cold conditions, especially if the unit runs continuously. Exterior condensation during extreme cold conditions can be reduced or prevented by periodically cycling the unit “OFF” for several minutes to allow the cabinet to warm up.

⚠ WARNING

Danger of injury if unit starts unexpectedly. Switch power off at service disconnect. Lock-out/tag-out the disconnect.

⚠ WARNING

Danger of Electrical Shock when servicing an installed unit.

ALWAYS DISCONNECT POWER SOURCE BEFORE SERVICING! More than one disconnect switch may be required.

Proper wiring size selection and wiring installation are the responsibility of the electrical contractor.

7.0 MAINTENANCE

S&P USA ERVs are built to operate with minimal maintenance. After unit commissioning, the primary areas of attention are the air filters and annual vacuuming of the enthalpic cores.

7.1 MAINTENANCE 24 HRS. AFTER START UP

24 hours after unit start up:

- In new installations, check the air filters since they will often collect dust, dirt, and debris at time of start up.

7.2 MAINTENANCE 30 DAYS AFTER START UP

After 30 days of operation:

- Tighten all electrical connections.
- Check the air filters as part of the normal monthly maintenance.

7.3 MAINTENANCE SCHEDULE

Experience on the part of the service person is the most important issue in establishing a maintenance schedule. There will be times of the year when frequent inspection of the filters will be required, such as spring and summer when there may be pollen, dust, dirt or debris from budding trees and bushes that can clog the filters. Also see Section 7.7 Maintenance Records in this manual.

7.4 FILTERS

Inspection and replacement of air filters is the most frequent maintenance issue. For units that do not have filter air pressure differential sensors, filters must be visually inspected monthly, at a minimum. If a filter looks discolored or dirty, REPLACE IT! When installing new filters, DO NOT USE filter sprays. Residue from the filter spray could migrate to the enthalpic core media and damage the cores.

For units that have filter air pressure differential sensors, a dirty filter alarm will occur on the connected alarm or control device.

Filter cleanliness and replacement is the most important and frequent maintenance issue. Dirty filters will cause an immediate reduction in operating efficiency of the ERV. Normally, filters should be inspected and changed when they are dirty. Paper filters are not to be cleaned, they are to be replaced.

In general, if a filter looks dirty, replace it. The best indication of dirty filters is to check the pressure drop across the filter banks with an optional filter monitor. If it is not possible to check the pressure drop, the rule of thumb would be to change the filters every two months.

7.5 IMPELLER MOTOR

The motor needs no lubrication. If necessary vacuum clean the impeller at the same time you clean the face of the energy exchange element (annually).

7.6 ENTHALPIC CORE

⚠ CAUTION

RISK OF DAMAGE TO ENTHALPIC CORES

Whenever working within the ERV cabinet, protect the enthalpic cores from accidental damage. The core media is subject to damage from dropped tools or other foreign objects.

7.8 SERVICE PARTS

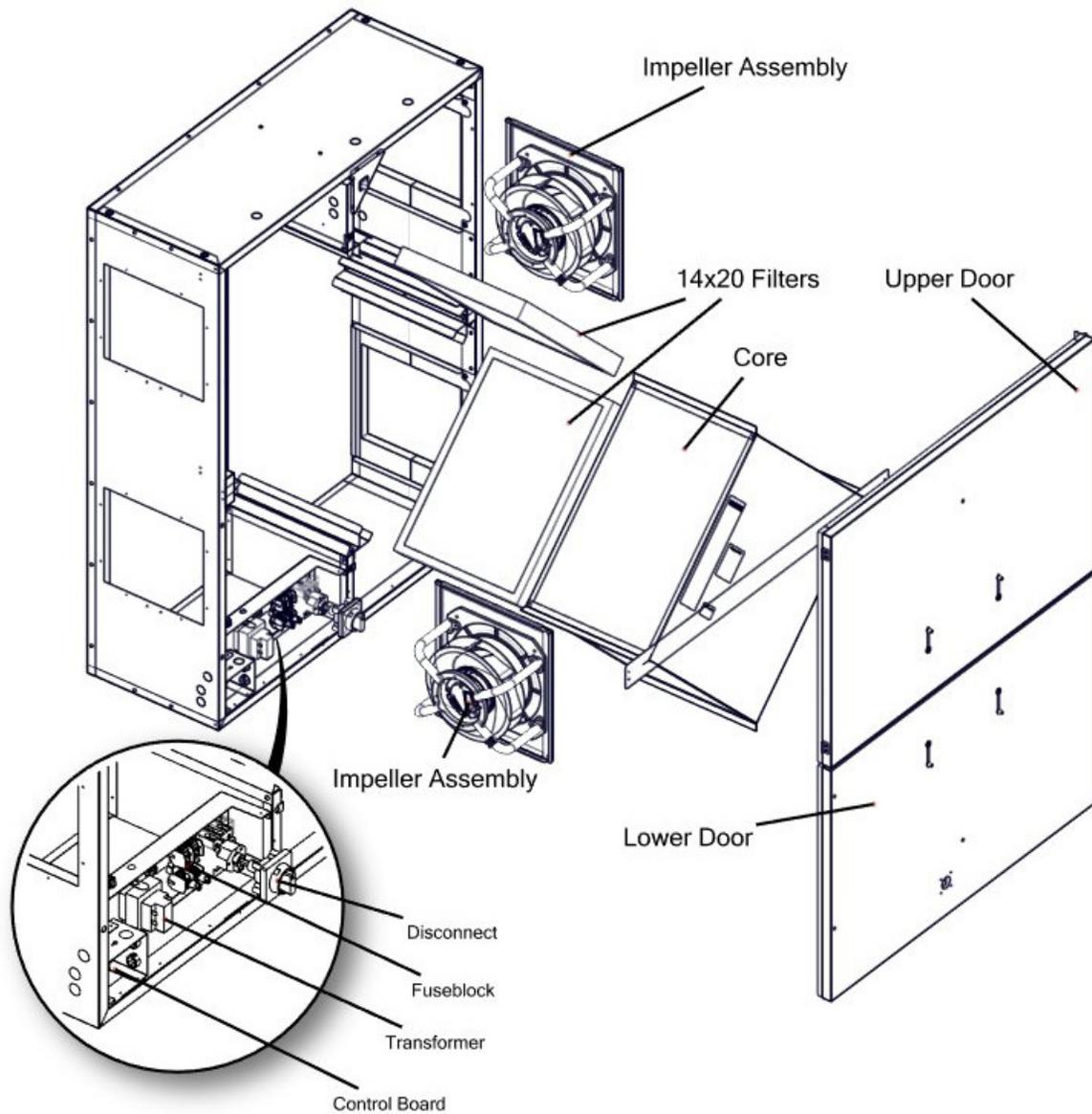


FIGURE 7.8.0 TRCeN500 SERVICE PARTS

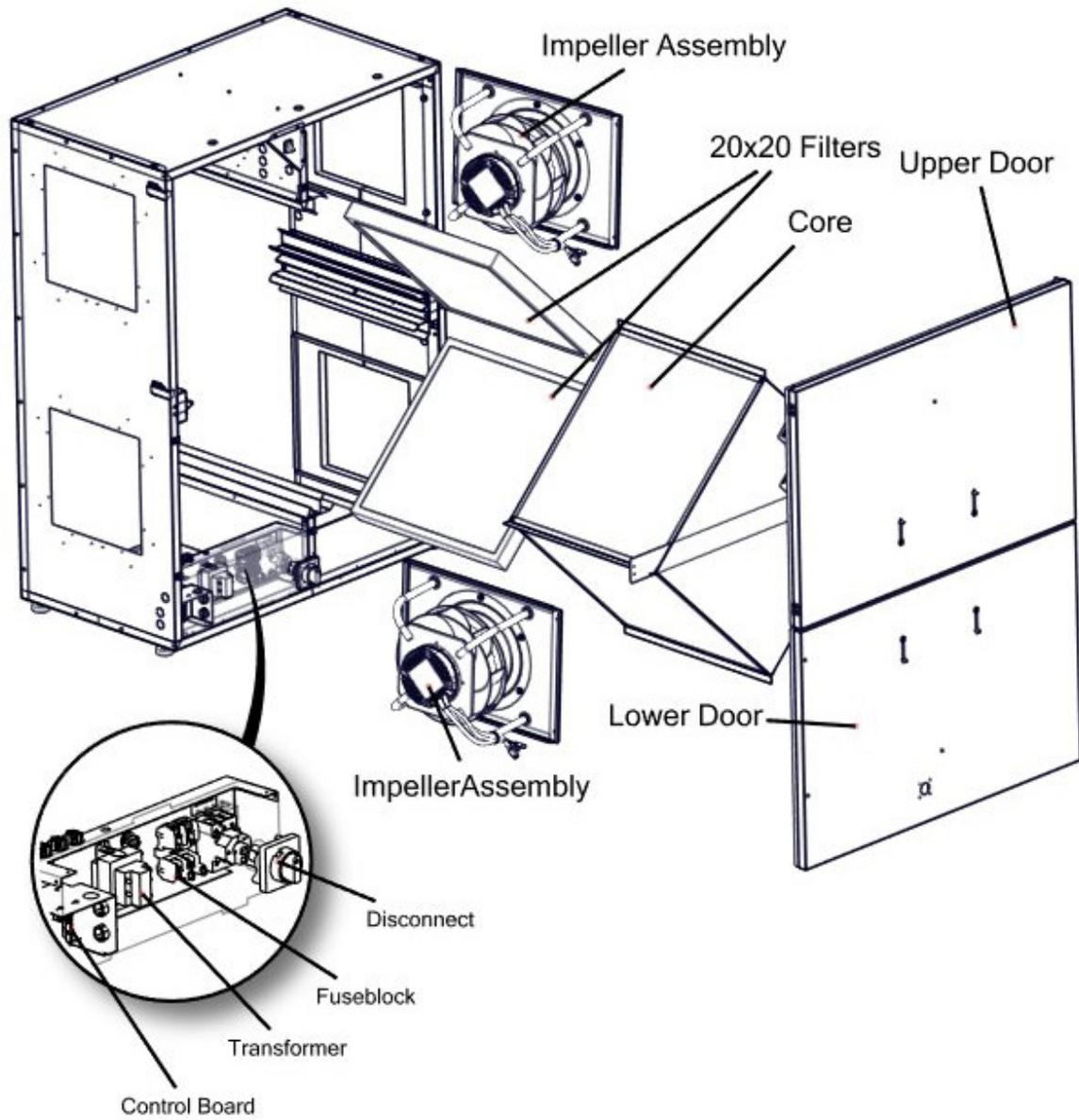


FIGURE 7.8.1 TRCeN800 SERVICE PARTS

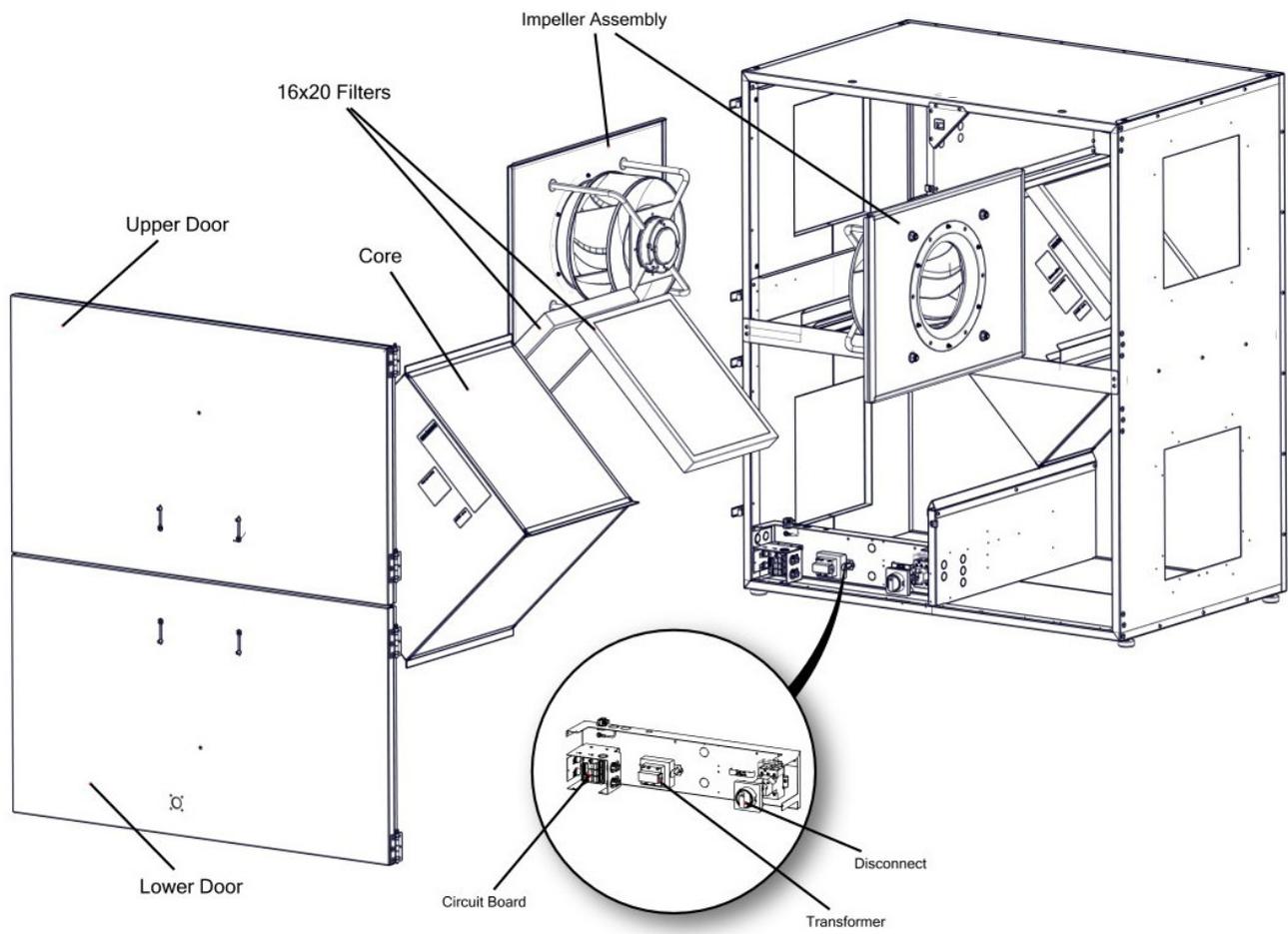


FIGURE 7.8.2 TRCeN1200 SERVICE PARTS

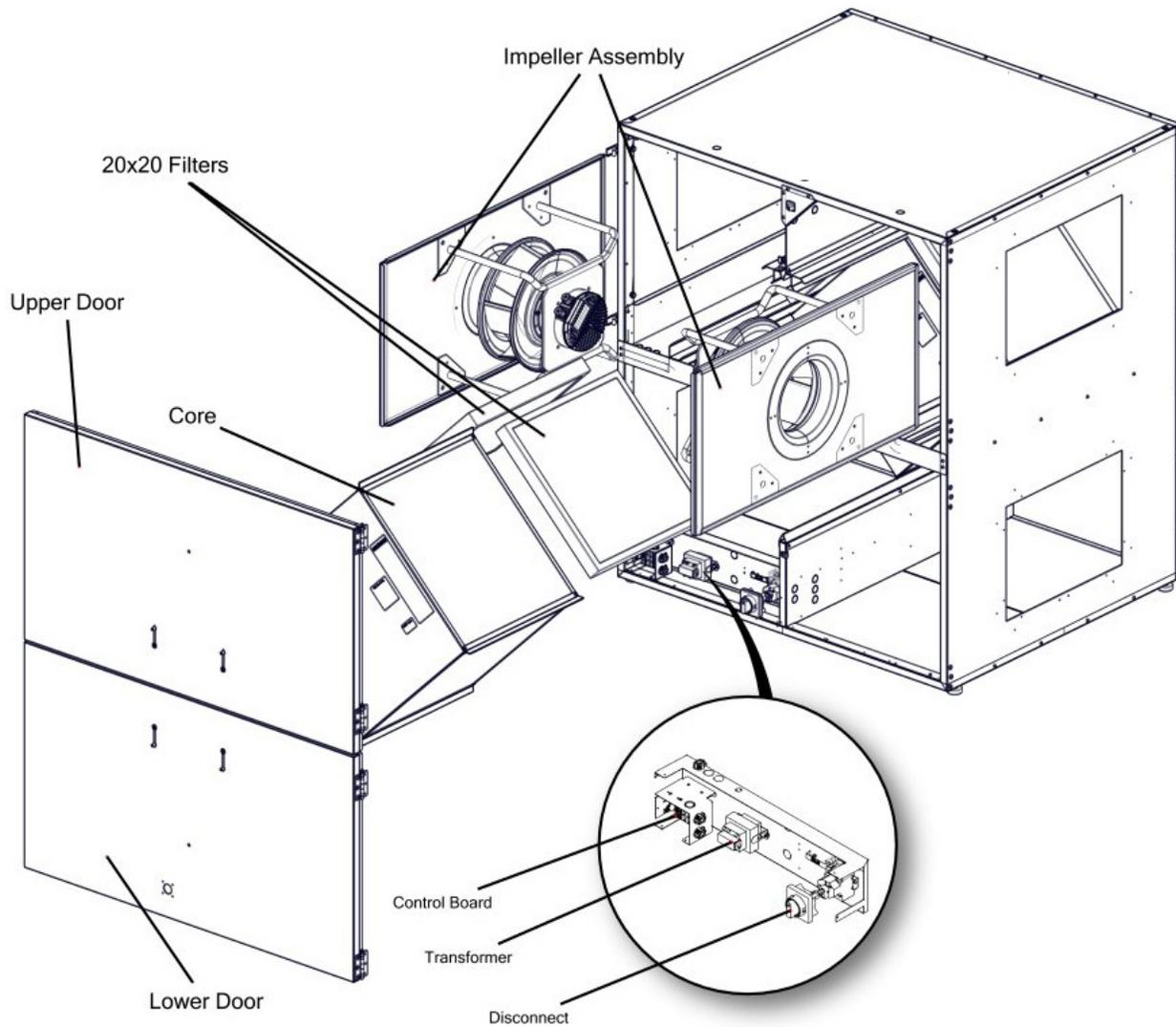


FIGURE 7.8.3 TRCeN1600 SERVICE PARTS

8.0 TROUBLESHOOTING

If problems occur with a S&P USA ERV, the primary resources for troubleshooting are the unit as-built wiring schematics and the Sequence Of Operation (SOO) for each control scheme.

9.0 FACTORY ASSISTANCE

In the unlikely event that you need assistance from the factory for a specific issue, make sure that you have the information called for in the Unit Information page in the front of this manual. The person you speak with at the factory will need that information to properly identify the unit.

To contact S&P USA Customer Service:

Call 800.961.7370

Email: custserv.jax@solerpalau.com



About S&P USA

S&P USA Ventilation Systems, based in Jacksonville, Florida, is part of Soler & Palau Ventilation Group, the world's leading fan manufacturer for over 70 years. Our mission is to provide innovative ventilation solutions that enable the world to breathe better air.

We are committed to providing quality products through excellence in design, manufacturing, and customer support with a focus on the development of our employees and customers alike. Our best-in-class team comes from a diverse background ready to serve you.

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