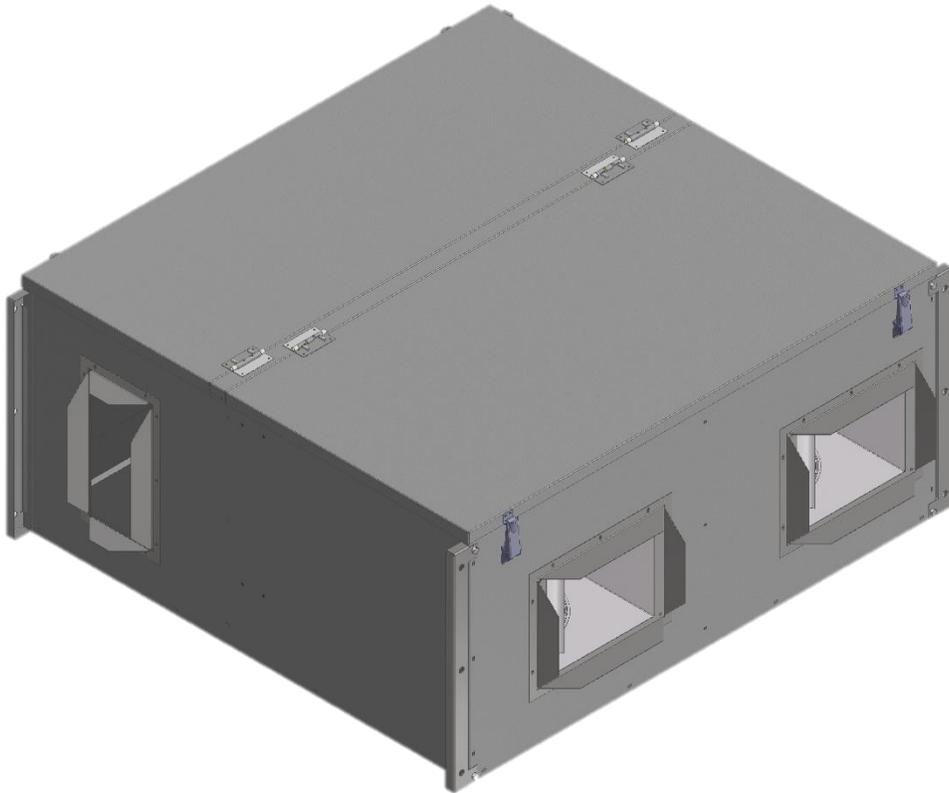


MiniCore Ventilator (500, 1000) Series Engineering Guide



November 2017

V1.0

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Functionality and Benefits

Ruskin offers two models of MiniCore Ventilator to reduce the building's tempering loads in all climates. They are perfect for applications requiring between (300 – 1250) cfm for ventilation. This range of ERV requirement is typically found in homes and high rise dwellings, restaurants, classrooms, health care applications and office buildings. The MiniCore Ventilator are designed for indoor installation and can be ceiling or floor mounted. Below are few features and benefits of Static Plate Core.

Table 1: Features and Benefits

Features	Benefits
Sustainability and Compliance with Industry Standards	<p>Johnson Controls Inc., products qualifies for U.S. Green Business Council LEED credits. The standard code officials recognize the benefits of utilizing MiniCore Ventilators in light commercial applications. Johnson Controls Inc., third party certification ETL (per UL 1995, CSA 22.2) and energy core performance (AHRI) verify that these units provide the published amounts of ventilation air at the mandated energy recovery effectiveness per ASHRAE standard 62.1.</p> 
CPQ/EDGE Software	World class ordering system which allows customers to spec the models based on individual/site requirements. Easy web interface that can be controlled and make use on any smartphone/tablet or a desktop pc. Extremely easy for anyone to get quick resolutions and answers for the configured product like energy recovery ventilators.
Maintenance/Serviceability	Johnson Controls products such as preconditioners have been designed to permit easy access to filters, static plate core and blower assemblies. As reassurance to the purchaser, each static core carries a five-year warranty and each unit carries a one-year warranty.
Exceptional Payback/System Efficiency	MiniCore Ventilator with advanced polymer membrane, innovative core design and continuous pleating manufacturing process enables it to increase system efficiencies and energy savings for commercial buildings.
Built in Disconnect	Factory installed non fused NEMA 3R 30 amp single phase power switch available to turn power on and off externally.
Duct Orientation	Field configurable outdoor and return air duct connections for job site flexibility. Simplifies installation and easily accommodate into various duct orientations (see Figure 4).
Long Duct Collar	New engineering design of the duct collars allows easier field attachment to the unit.

Independent Blower Control	The MiniCore ventilators will have the capability to receive an external signal to control supply and exhaust blowers at different speeds.
Mounting Options	The horizontal, vertical and side mount are built into single mounting bracket for easy installation and flexibility.
Access doors	Removable access doors with spring loaded hinges make the unit easily serviceable. Draw down latches are used to open/close the door.
Insulation	Quarter inch rubberized foam insulation has a thermal resistance of R-1 to prevent heat transfer through the panel with peel and stick backing. ASTM equivalent UL723.
Cabinet Construction	20 gauge exterior panels, painted steel with 500 hour salt spray certification.
Controls	Terminal strip version to provide dry contact closure to start and 0-10 signal to ramp the blowers up on ECM model.
Filters	1" throw away, 2" MERV 8 or 13 pleated filters before the static core in both the intake and exhaust sides.

Unit Overview

MiniCore Ventilator ERVs shown in Figure 1&2 shall be used to add a new dimension to our current Mini Energy Recovery Ventilator line up as an indoor option in light commercial applications. Tempering of incoming fresh air is done by high performing static core featuring advanced polymer membrane that promotes significant health benefits and energy savings for buildings and their occupants. The heat exchanger consists of alternating layers of fixed solid plates that are separated and sealed. Typical flow is cross current and the advanced polymer membrane blocks the contaminants and odors, recovering sensible and latent energy.

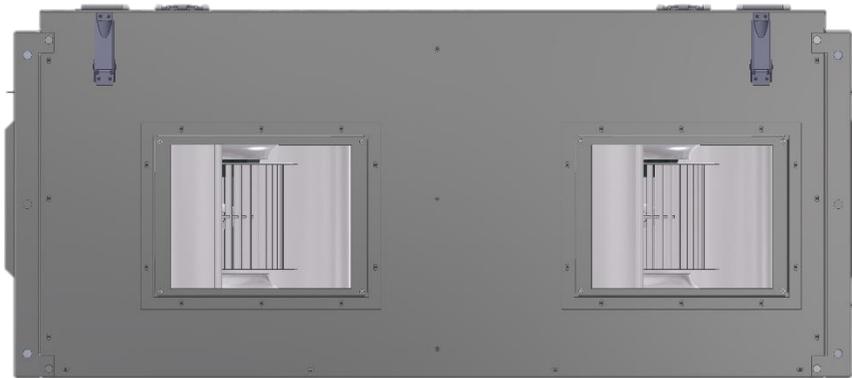


Figure 1: MiniCore Ventilator Front view

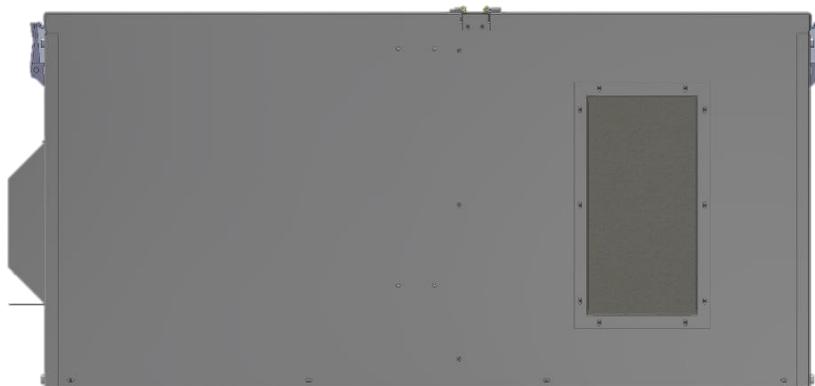


Figure 2: MiniCore Ventilator side view

MiniCore Ventilator (500/1000) Series

These MiniCore ventilator units can also be mounted on a shelf or on the floor of a mechanical room but normal installation is hanging from the 4 corners using the hanging brackets (see Figure 3). The maximum weight of a MiniCore Ventilator Core is less than xx lbs., so the use of metal strap to hang the unit is acceptable though using 3/8" all thread is preferable. When hanging the unit be sure to take into account the need to provide access for filter replacement and blower balancing.

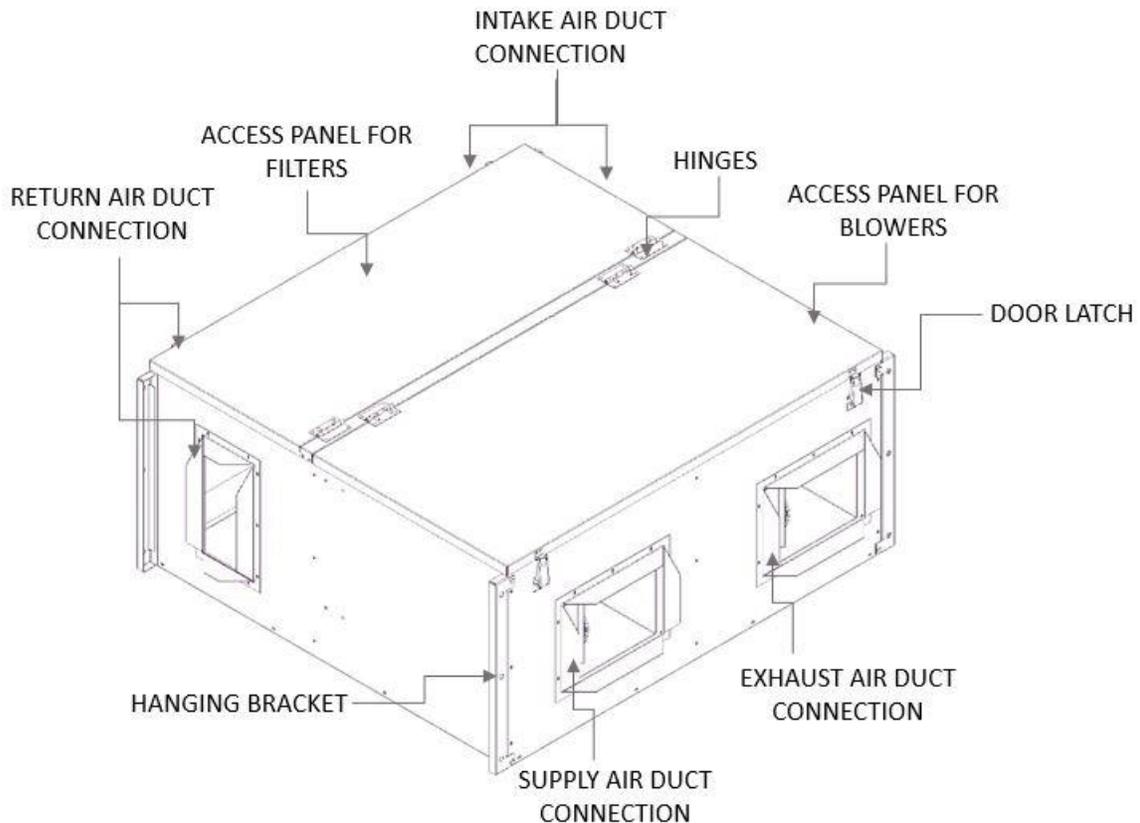


Figure 3: MiniCore Ventilator

Orientation of the MiniCore Ventilator is important for maximizing airflow, to understand the duct connections it is best to separate the static plate core into 4 sectors as shown in Figure 4. With fresh air intake and return air intake on one side and fresh air supply and return air exhaust on the other. The fresh air intake and return air can either be mounted on the back or side of the unit, by switching the duct collar and cover panel attached using 5/16" screws.

Duct Options

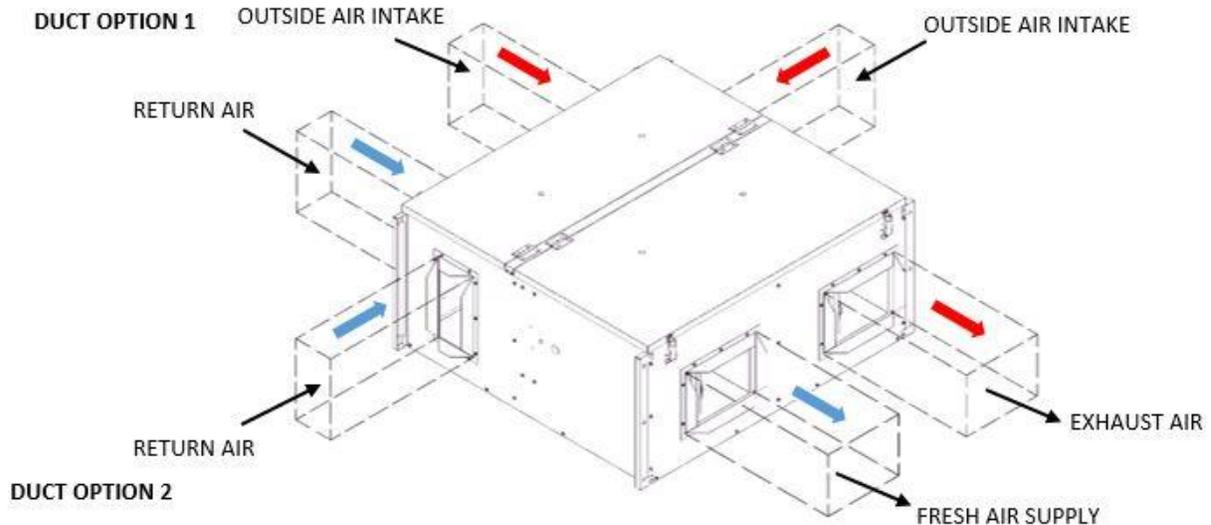


Figure 4: Ducting Options for MiniCore Ventilator

Wiring

A knock out is provided for high voltage on the side of the unit, a properly sized power disconnect is recommended and can be attached to the cabinet.

High voltage

120V: Connect the high voltage wires to L1 (Hot) & L3 (Common), hook the ground wire to the provided grounding screw inside disconnect. (see wiring diagram) **(MCV500 only)**

208/230V: single phase: Connect the high voltage wires to L1 (Hot) & L3 (Common), connect the ground wire to the provided ground screw inside disconnect (see wiring diagram). Check voltage into the unit and select the correct voltage tap input to the transformer from 230V to 208V if necessary by switching wires.

Low voltage: Low voltage terminal strip is provided on the outside of the unit. Hook a switch between terminal #1 and #3/dry contact closure to activate the unit. For ECM control models (+) 0-10 applied to terminal #4 and #6 and common to terminal #5 and #7.

Working Principle

The unit contains a high performance energy recovery core featuring advanced polymer membrane providing both latent and sensible energy recovery with no cross contamination or moving parts. During this cross flow the total enthalpy static core uses the exhaust air to temper the outside air by transferring humidity and heat from one air stream to another. Inside the static core is a superior polymer membrane (see Figure 5) that dehumidifies and cools the outside air in summer and at the winter time it recovers the lost heat and humidity making the building comfortable and healthier by maintaining ideal indoor air temperature.

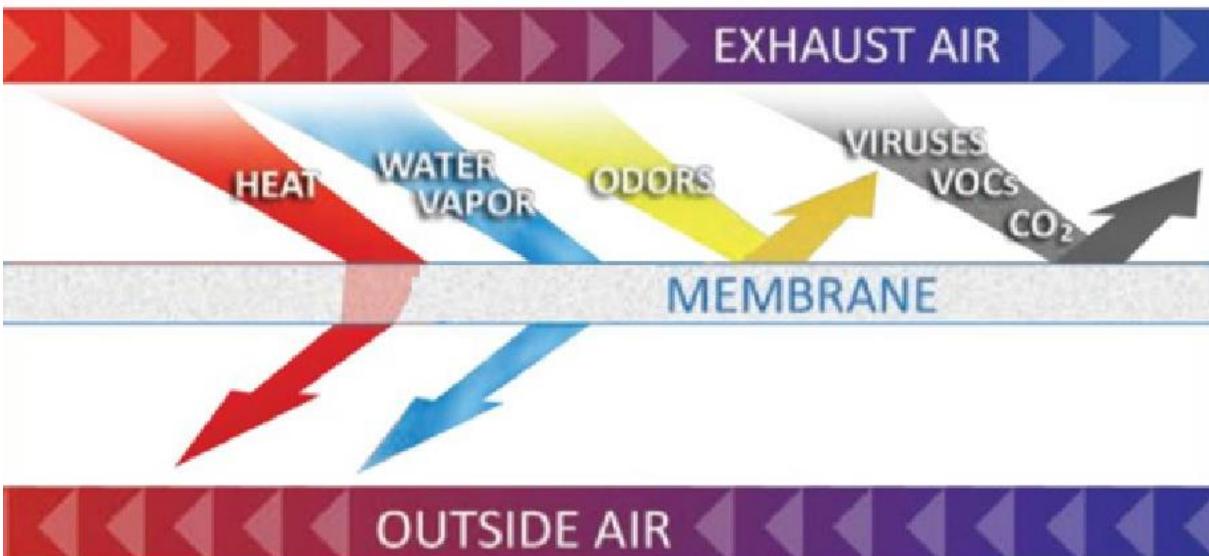


Figure 5: Airflow through Static Core

The new energy recovery core increases 25% higher water vapor transfer rate and increases the latent energy recover by up to 10%. The membrane is selective in nature where the chemistry of materials allows thermal energy to transfer across allowing heat exchange and the water vapor allowing humidity exchange, while the membrane resists the crossover of odors, viruses, VOCs and CO₂.

The higher rate of water vapor transfer, along with the new engineering design allows the core to operate at lower temperatures before requiring defrost. Thus use of its unique and robust polymer membrane allows superior performance, lower pressure drop and water wash ability making a great solution for different applications.

Core Specifications

Specification for the static core are listed below:

- ERV Core must be AHRI Certified and should have no moving parts.
- Minimum of 50% total energy recovery effectiveness tested to AHRI 1060 to meet ASHRAE 90.1.
- 0% Exhaust air transfer ration (Cross-contamination) tested to AHRI 1060.
- Mold and bacteria resistance tested to ISO 846a and ISO 846c with a rating of 0 for both.
- Water washable while maintaining both the energy recovery effectiveness and 0% EATR1 rating.
- Freeze tolerant tested to 40 freeze thaw cycles from -20°C to $+20^{\circ}\text{C}$ while maintaining both energy recovery effectiveness and 0% EATR rating.
- Comply with UL 723 flame certification with a flame spread index that shall not be over 25 and a smoke index that shall not be over 50 (UL1812 is the basic standard applicable to “Ducted Heat Recovery Ventilators”. National fire protection association (NFPA) 90A (std for AC and ventilating systems) and 90B (standard for warm air heating and air conditioning systems) compliance would be great to have as well.



Figure 6: Static Plate Core

Nomenclature

A. (MCV500) Series a.k.a. 01xH/E-01/21

- MCV500 Standard model includes – (Permanent Split Capacitor Motor, Blowers and Static Core)
- MCV500 E – (Electronically Commuted Motor, Blowers and Static Core)

B. (MCV1000) Series a.k.a. 01xH/E-21

- MCV1000 Standard model includes – (Permanent Split Capacitor Motor, Blowers and Static Core)
- MCV1000 E – (Electronically Commuted Motor, Blowers and Static Core)

Technical Specifications

Table 2: Unit Data

MiniCore Ventilator Series	Dimensions (L x W x H) (in)	Duct size (in)		cfm	Voltage (v)	Fuse amps (A)	Phase
		Supply	Return				
MCV500/MCV500E	44.25 x 42.25 x 15.50	12" x 6"	12" x 8"	300-700	120/208-230	30/15/25/15	1
MCV1000/MCV1000E	44.25 x 42.25 x 20.66			500-1000	208-230	20/20	1

Net weight and shipping weight yet to be determined

Table 3: Core Performance Data

MCV500			
CFM	350	500	750
Core size unframed (mm)	550	550	550
Plate size framed (mm)	575	575	575
Core width unframed (mm)	279.6	279.6	279.6
Core width framed (mm)	304.8	304.8	304.8
PD open channel (in)	0.22	0.33	0.52
PD corrugated (in)	0.56	0.87	1.48
Sensible (Summer)	71%	67%	63%
Latent (Summer)	57%	52%	46%
Total (Summer)	62%	57%	52%
Sensible (Winter)	71%	67%	63%
Latent (Winter)	56%	51%	44%
Total (Winter)	66%	61%	56%
Average	65%	60%	54%

MCV1000			
CFM	750	1000	1250
Core size unframed (mm)	550	550	550
Plate size framed (mm)	575	575	575
Core width unframed (mm)	482	482	482
Core width framed (mm)	508	508	508
PD open channel (in)	0.28	0.39	0.50
PD corrugated (in)	0.73	1.05	1.42
Sensible (Summer)	68%	65%	63%
Latent (Summer)	53%	49%	46%
Total (Summer)	59%	55%	53%
Sensible (Winter)	68%	65%	63%
Latent (Winter)	53%	48%	45%
Total (Winter)	63%	60%	57%
Average	62%	58%	55%

Table 4: Blower Data

MiniCore Ventilator Series	Motor Horse Power	Wheel size (dia × width) (inches)	Motor speed (s)	No. of Blowers	Motor type
MCV500/MCV500 E	1/2	DD 9 × 4A	3/2(Modulating)	2	Permanent Split Capacitor Motor/ Electronically Commuted Motor
MCV1000/MCV1000E	3/4	DD 9 × 6A	3/2(Modulating)	2	Permanent Split Capacitor Motor/ Electronically Commuted Motor

Table 5: Filter Data

MiniCore Ventilator Series	Filter Type	Dimensions (in)	Filter type	Dimensions (in)
MCV500/MCV500E	MERV 8/ MERV 13	14 x 20 x 2	Throw away	14 x 20x 1
MCV1000/MCV1000E		20 x 20 x 2		20 x 20 x 1

Electrical Panel

The MiniCore ventilator is designed to work with single-phase AC power and can accommodate a range of line voltages and frequencies.

Table 6: Power Requirements

MiniCore Ventilator series	Voltage In (Vac)	MCA*	MOCP*
MCV500	115	22.5	30
	230	11.25	15
MCV500E	115	18.23	25
	230	10.8	15
MCV1000	230	15.75	20
MCV1000E	230	15.08	20

*MCA - minimum current ampacity; MOCP - maximum over-current protection

Wiring Diagrams
MCV (500/1000) series

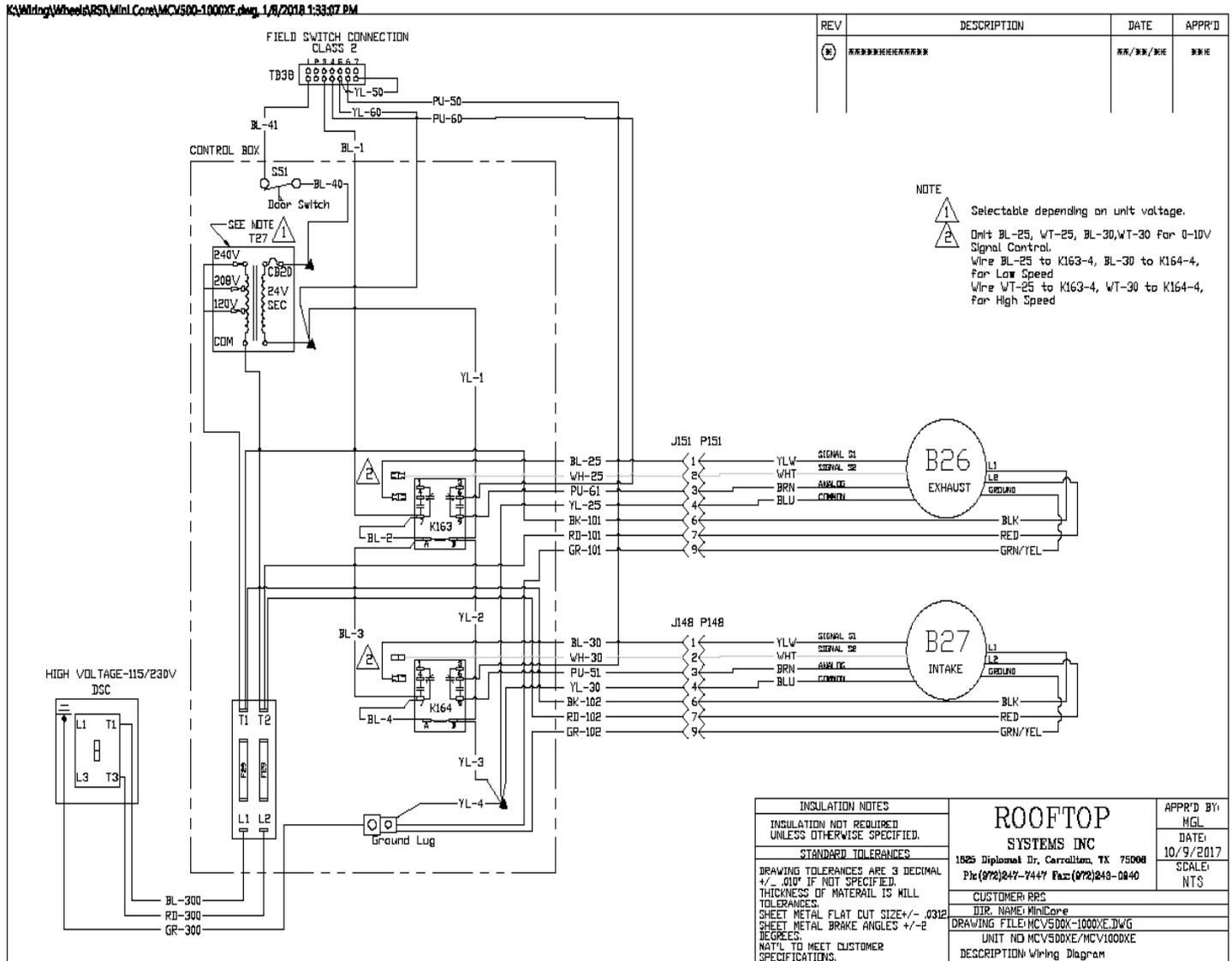


Figure 7: MCV 500/1000 Wiring Diagram

Support

For additional support required during installation or operation, please contact Product Technical Support. Due to ongoing product development and improvements, the specifications contained herein are subject to change without notice.