

Energy Recovery Ventilators Preconditioners

Models MiniVent, ERV, ERVe, ERVi, MiniCore, ECV, and ERM



Greenheck offers a complete line of energy recovery ventilators to reduce a building's tempering loads for all climates. From outdoor, roof-mounted applications to indoor, ceiling-mounted units, Greenheck preconditioners offer installation flexibility for both new construction and retrofit applications. The complete line covers a broad spectrum of airflow, ranging from 150 to 12,000 cfm. Each unit includes a total energy wheel or energy core with supply and exhaust blowers, along with factory prewired electrical components.



ERVi



MiniCore



ECV

Features	Benefits
Industry Leading Selection Software CAPS® and eCAPS®	Greenheck's Computer-Aided Product Selection software (CAPS and eCAPS) analyzes system design parameters quickly and provides a list of units with energy recovery wheel and energy core combinations. This analysis reduces design time, minimizes cost and optimizes performance. CAPS and eCAPS output fan, electrical, and energy recovery performance data as well as configured 2D and Revit® drawings for easy implementation into building schedules and plans.
Compliance with Industry Standards	Code officials recognize the benefits of utilizing energy recovery in applications with large amounts of ventilation air. Greenheck's third-party certification for energy core performance from the Air-Conditioning, Heating and Refrigeration Institute (AHRI) verifies the units provide the mandated energy recovery effectiveness per ASHRAE standards and energy codes.
Maintenance Serviceability	Greenheck's preconditioners allow easy access to filters, blower assemblies, and energy cores. Each unit also has an 18 month warranty, including a five year warranty on the energy wheel or energy core for added peace of mind.
System Efficiency Payback	The incorporation of energy recovery allows for equipment downsizing and lower energy costs throughout the life of the equipment. This downsizing moderates the variability of loads on the system, increasing the efficiency of furnaces, electric heaters, DX coils, and water systems.

Product Certifications

Greenheck takes pride in offering a high-quality, reliable product. We invest our resources into designing, testing and manufacturing products to ensure customer satisfaction.

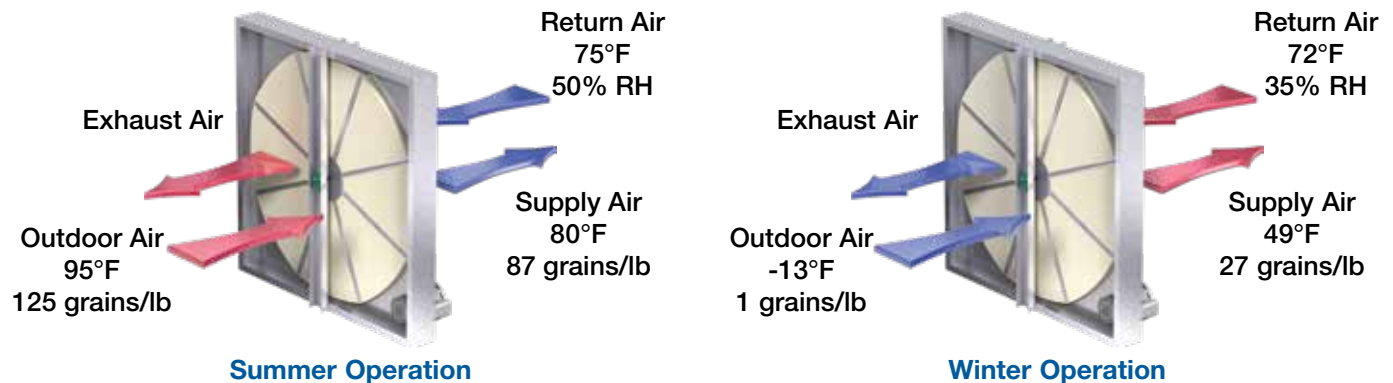


ETL Listed for electrical and overall unit safety. Every unit is tested at the factory before it is shipped to the jobsite.

Intertek

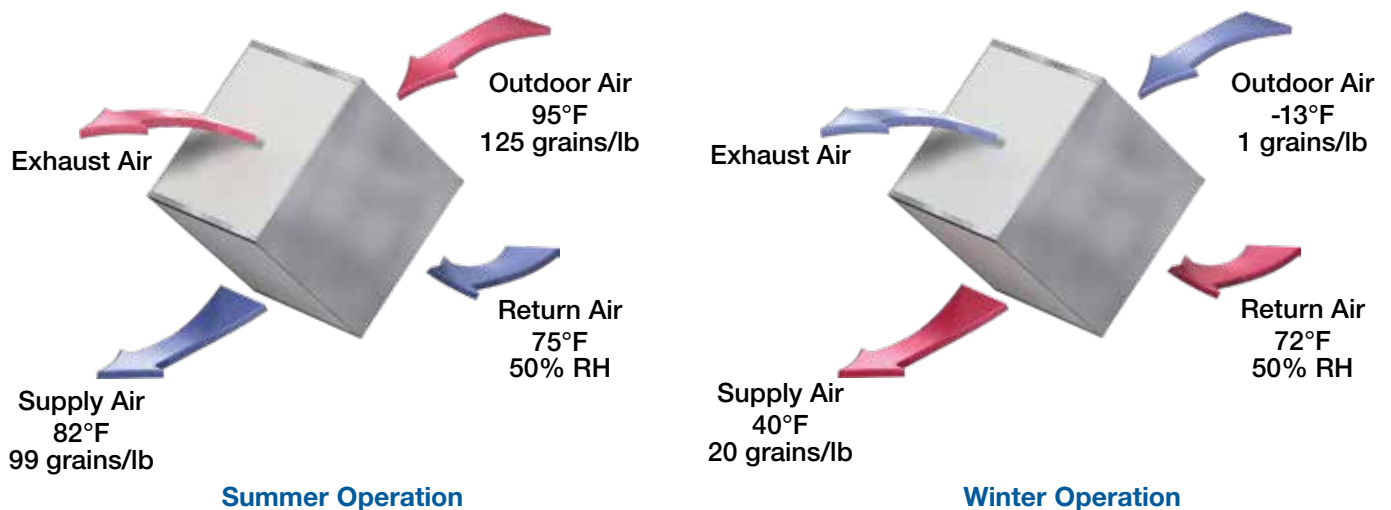
Energy Wheel Technology

The total energy wheel is constructed of a polymer heat transfer media for sensible energy transfer and a silica gel desiccant that is permanently bonded to the polymer media for latent energy transfer. Total energy wheels are the most efficient energy recovery devices available. When supply and exhaust airflows are balanced, energy wheels have an enthalpy recovery ratio (ERR) of up to 80%. Energy wheels have a life expectancy up to 20 years and offer easy maintenance as wheel segments remove for washing.



Energy Core Technology

The total energy core is offered in a fiber or polymer membrane, layered in a cross-flow corrugated structure. The core separates the supply and exhaust airstream, ensuring only fresh air is introduced into the indoor space. The fiber and polymer membrane media transfers both sensible energy (heat) and latent energy (moisture). When supply and exhaust airflows are balanced, energy cores have an (ERR) of up to 60%.



ASHRAE 90.1 Compliance

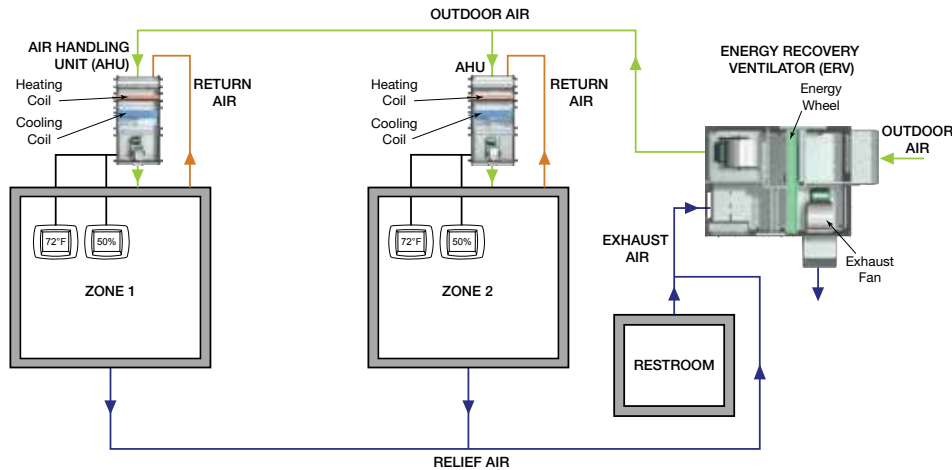
ASHRAE 90.1-2022 (Table 6.5.6.1) requires the use of energy recovery based upon a unit's supply airflow, outdoor air percentage, geographic location, and application operating hours. The standard mandates that the enthalpy recovery ratio (ERR) be a minimum of 50%. This language was adopted in the 2021 International Energy Conservation Code (IECC).

The effectiveness of an energy recovery device varies based on the type, material, and supply/exhaust airflows. This value is determined based on a test procedure outlined in AHRI Standard 1060. All Greenheck energy wheels and cores are third-party certified to AHRI 1060.

Typical Applications for Energy Recovery

- Churches
- Locker Rooms
- Dormitories
- Nursing Homes
- Function Halls
- Schools
- Office Buildings
- Hospitals

Energy Recovery with Ducted Air Handlers

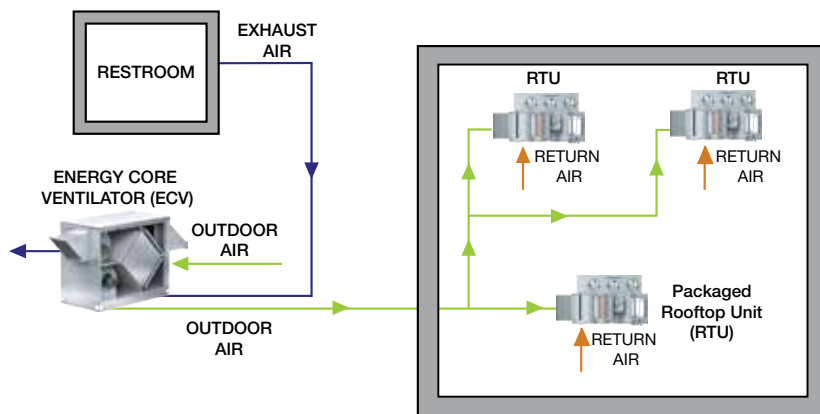


Preconditioner Applications

These diagrams illustrate how energy recovery units can be used in conjunction with other HVAC equipment. Fresh, outdoor air enters the energy recovery unit and is pretreated before entering the heating and cooling equipment.

Whether ducting into terminal units, such as air handlers or directly feeding into a rooftop unit, these preconditioners provide the ability to reduce the outdoor air load of these systems.

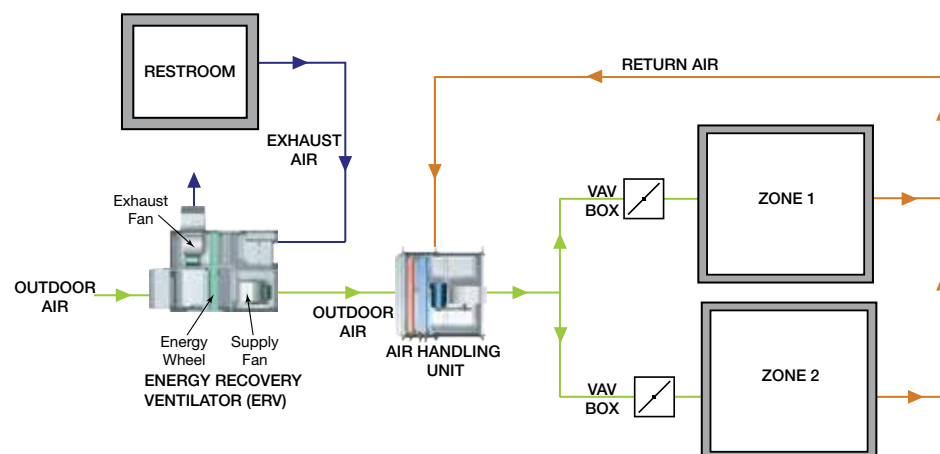
Energy Recovery with Packaged Rooftop Equipment



Recovering Restroom Exhaust

ASHRAE Standard 62.1 dictates that energy recovery devices rated for less than 10% cross-contamination can return restroom exhaust through the device. Any volume of air transferred through the device can be reclassified as fresh outdoor air. All of Greenheck's energy recovery units are rated well below the 10% limit. Therefore, it is allowable to return restroom exhaust and recommended to maximize the benefit.

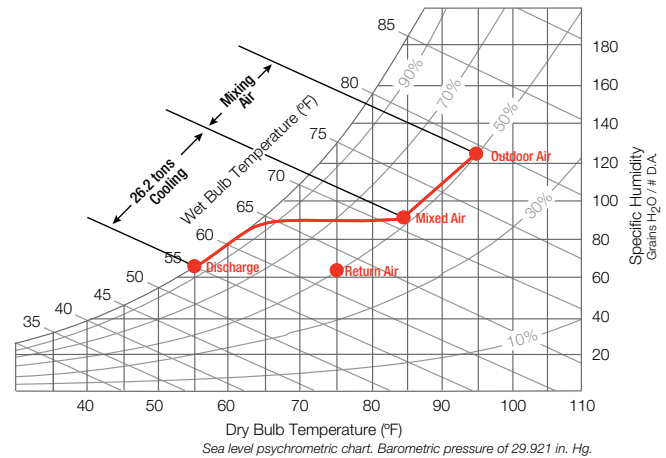
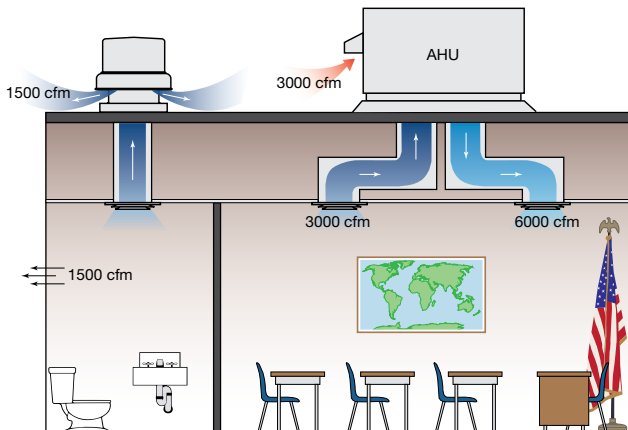
Energy Recovery with Variable Air Volume



Required Supply Air (CFM)	Minimum Outdoor Air (CFM)	Minimum Exhaust (CFM)	Outdoor Design (DB/WB)	Indoor Design (DB/RH)
6,000	3,000	1,500	95°F/78°F	75°F/50%RH

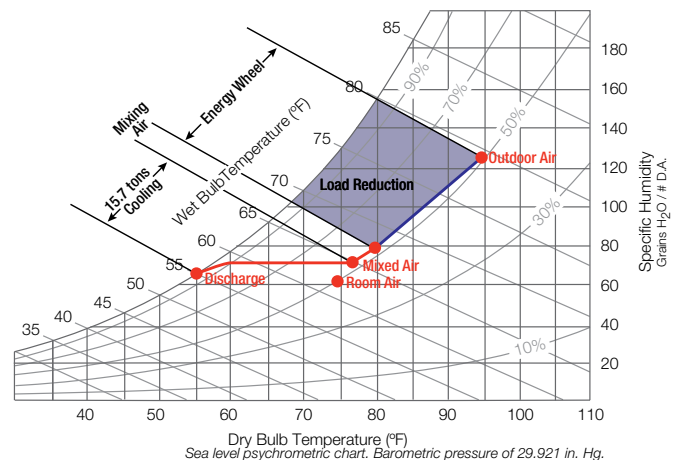
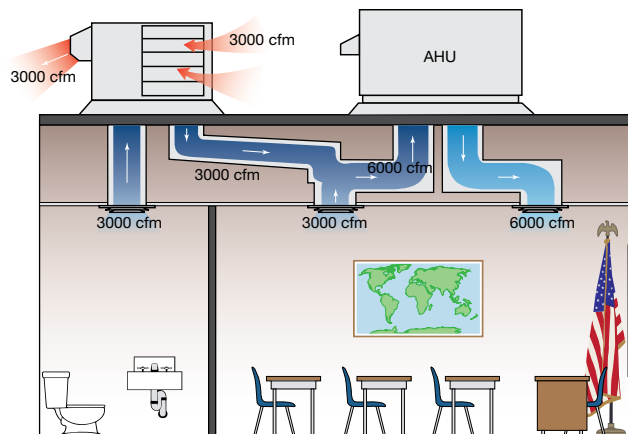
Traditional System:

An air handling unit and exhaust fan handle the entire load.



Traditional System with Energy Recovery:

An energy recovery unit reduces the outdoor air load on the AHU and replaces the exhaust fan.



Equipment Reduction using Energy Recovery on 3,000 cfm Outdoor Air						
	Natural Gas Price (\$/therm)	Electric Cost (\$/kWh)	Cooling Equipment Reduction (tons)	Annual Summer Cooling Savings	Annual Winter Heating Savings	Approximate Payback (Years)
Atlanta, GA	1.763	0.119	11.1	\$1,238	\$1,790	0.6
Boston, MA	1.473	0.225	9.8	\$679	\$3,138	0.8
Houston, TX	1.110	0.129	13.4	\$2,640	\$583	0.1
Minneapolis, MN	0.724	0.135	8.6	\$266	\$1,905	1.9
Phoenix, AZ	1.569	0.124	10.5	\$693	\$648	1.6
St. Louis, MO	1.000	0.105	13.1	\$734	\$1,700	0

Actual savings will vary based on system design and application.

Data source: U.S. Bureau of Labor Statistics, *Average energy prices for the United States, regions, census divisions, and selected metropolitan areas, 2020*
Assumptions: 3,000 cfm OA & EA; \$700/ton avoided A/C equipment cost; operating hours: Mon.-Fri., 8am-8pm

Models MiniVent, ERV, ERVe and ERVi incorporate innovative design features with varying levels of configurable options and energy wheel performances to provide a quality constructed unit with operational flexibility. The result is a product that will fit seamlessly into your building to improve your indoor air quality while reducing energy costs.

Model MiniVent (150 - 1,000 cfm)

- Indoor installations
- Configurable intake/discharge positions
- Vari-Green® electronically commutated (EC) motors
- Backdraft dampers
- Printed circuit board (PCB) controller
- Remote unit On/Off control
- Optional accessories
 - Base or hanging isolation kit
 - Non-fused disconnect switch
 - Timed exhaust frost control
 - 7-day timeclock
 - Motion detector
 - CO₂ sensor control
 - VOC monitor control
 - Smoke detectors



Model Number Code		
MiniVent - 750 - VG		
Model Parent	Nominal Airflow	Vari-Green®
	450 (450 cfm)	
	750 (750 cfm)	

Model ERVi (375 - 2,500 cfm)

- Indoor installations
- Low profile, modular construction design
- Microprocessor controls
- 1-inch foam injected construction
- Single side access
- Vari-Green® electronically commutated (EC) motors
- Non-fused disconnect switch
- Optional accessories
 - BMS integration
 - Wheel economizer controls
 - Frost controls
 - Motorized dampers



Model Number Code				
ERVi - 10 - HF - L H E				
Nominal Airflow	Energy Recovery Characteristic	Access	Discharge	
10 (375 to 1,500 cfm)	HF High flow	R - Right	E - Ends	
20 (1,000 to 2,500 cfm)	HE High Effectiveness	L - Left	S - Sides	
		Orientation		
		H - Horizontal		

Model ERVe (1,000 - 6,000 cfm)

- Outdoor installations
- Double-wall construction
- Hinged access
- Non-fused disconnect switch
- Optional accessories
 - Microprocessor controls
 - BMS integration
 - Wheel economizer controls
 - Frost controls
 - Motorized dampers



Model Number Code		
ERVe - 35 - 30H		
Model Parent	Nominal Airflow	Airflow Rate
	20 (2,000 cfm)	H - High
	35 (3,500 cfm)	L - Low
	45 (4,500 cfm)	
	55 (6,000 cfm)	
	Wheel Thickness	
	15 (1½ in.)	
	30 (3 in.)	

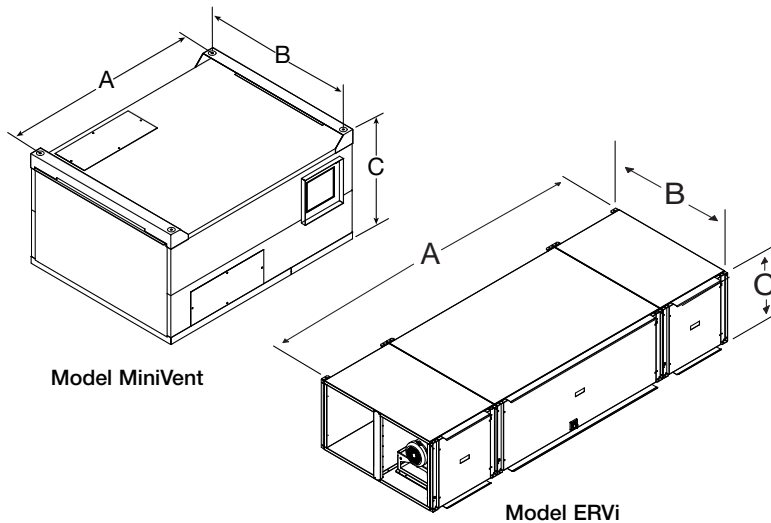
Model ERV (300 - 12,000 cfm)

- Indoor or outdoor installations
- Low profile
- Vari-Green® electronically commutated (EC) motors on model ERV-10
- Non-fused disconnect switch
- Optional accessories
 - Fan VFD
 - Microprocessor controls
 - BMS integration
 - Wheel economizer controls
 - Frost controls
 - Motorized dampers
 - Double-wall construction
 - Hinged Access



Model Number Code			
ERV - 45 - 30H - VG			
Model Parent	Nominal Airflow	Wheel Thickness	Vari-Green®
	10 (1,000 cfm)	15 (1.5 in.)	Airflow Rate
	20 (2,000 cfm)	30 (3 in.)	H - High
	45 (4,500 cfm)		L - Low
	90 (9,000 cfm)		
	120 (12,000 cfm)		

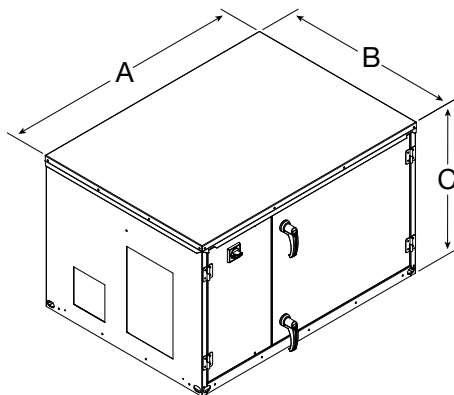
Model MiniVent and ERVi



MiniVent Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake		X		X
SA Discharge				X
RA Intake	X			X
EA Discharge				X

ERVi Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake				X
SA Discharge				X
RA Intake				X
EA Discharge				X

Models ERV and ERVe



ERV Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake				X
SA Discharge	X			X
RA Intake	X			X
EA Discharge			X	X

ERVe Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake				X
SA Discharge	X			X
RA Intake	X			X
EA Discharge			X	

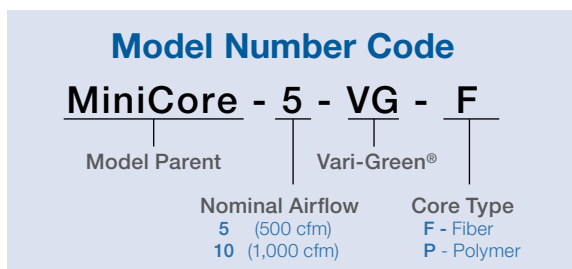
Model	Length (A)	Width (B)	Height (C)	Approx. Weight (lbs)	Airflow Range (CFM)
MiniVent-450	37.6	26.4	19.9	150	150 - 450
MiniVent-750	43.2	33.0	23.8	250	450 - 1,000
ERV-10	46.2	33.8	28.0	300	300 - 1,000
ERV-20	62.0	51.1	34.4	720	750 - 2,200
ERV-45	67.0	67.1	44.7	1,100	2,200 - 4,500
ERV-90	124.4	84.1	66.3	3,230	4,000 - 9,000
ERV-120	146.1	96.5	76.4	3,700	7,500 - 12,000
ERVe-20	65.9	45.1	52.6	950	1,000 - 2,200
ERVe-35	68.1	53.2	62.6	1,270	2,000 - 3,400
ERVe-45	72.1	60.2	68.9	1,500	2,200 - 4,500
ERVe-55	83.0	70.2	75.4	1,960	4,500 - 6,000
ERVi-10	106	37.3	18	510	375 - 1,500
ERVi-20	114	43.1	23	645	750 - 2,500

All dimensions shown in inches.

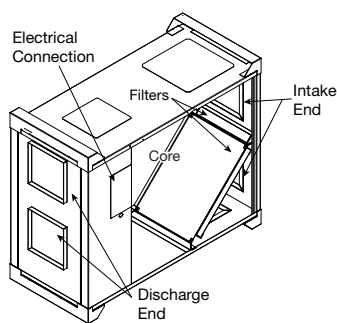
Greenheck's MiniCore and ECV models are air-to-air energy recovery ventilators that utilize total energy core technology to reduce your building's heating and cooling loads on mechanical equipment.

Model MiniCore (150 - 1,000 cfm)

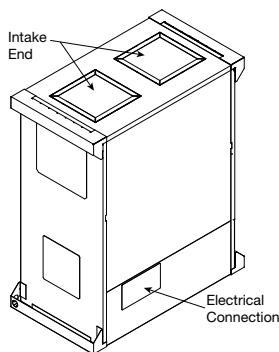
- Indoor installation
- Fiber or Polymer membrane energy core
- Configurable intake/discharge positions
- Vari-Green® electronically commutated (EC) motors
- Backdraft dampers
- Printed circuit board (PCB) controller
- Remote unit On/Off control
- Optional accessories
 - Base or hanging isolation kit
 - Non-fused unit disconnect switch
 - Timed exhaust frost control
 - 7-day timeclock
 - Motion detector
 - CO₂ sensor control
 - VOC monitor control
 - Smoke detectors



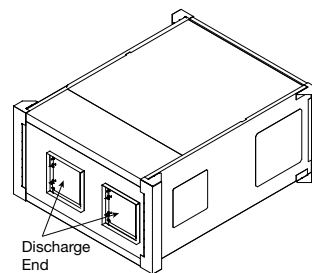
Mounting Options



Horizontal



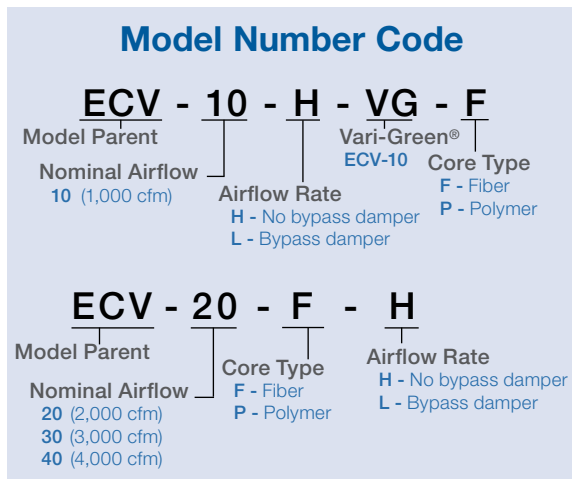
Vertical



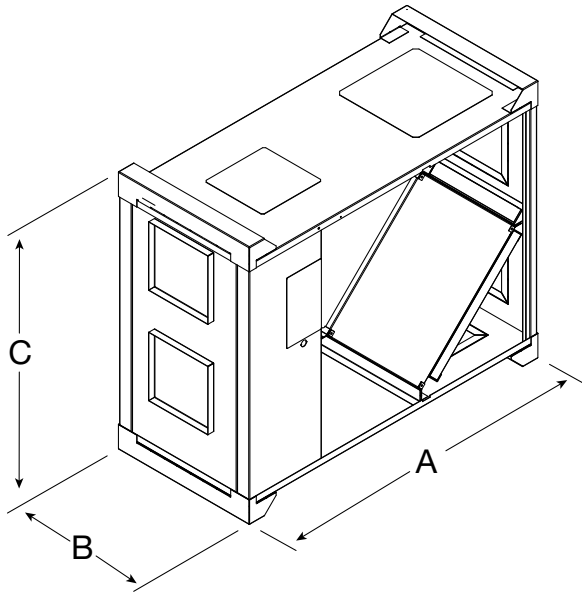
Side

Model ECV (300 - 5,000 cfm)

- Indoor or outdoor installations
- Fiber or polymer membrane energy core
- Vari-Green® electronically commutated (EC) motors on model ECV-10
- Non-fused disconnect switch
- Fan VFDs on models ECV-20, ECV-30, and ECV-40
- Optional accessories
 - Microprocessor controls
 - BMS integration
 - Core economizer controls
 - Frost controls
 - Motorized dampers
 - Double-wall construction
 - Lift off or hinged access

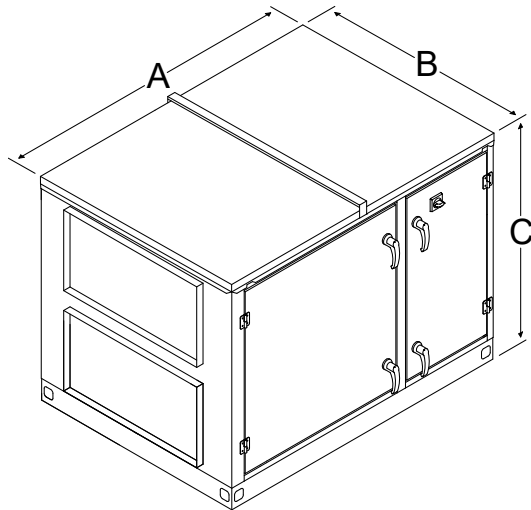


Model MiniCore



MiniCore Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake		X		X
SA Discharge	X			X
RA Intake	X			X
EA Discharge		X		X

Model ECV



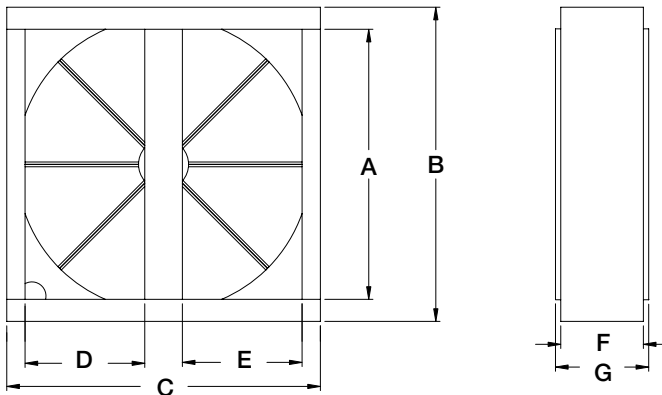
ECV Intake/Discharge Positions				
Option	Bottom	Top	Side	End
OA Intake		X		X
SA Discharge	X			X
RA Intake	X			X
EA Discharge		X		X

Model		Length (A)	Width (B)	Height (C)	Approx. Weight (lbs)	Airflow Range (CFM)
MiniCore-5-VG-F/P		47.3	16.3	39.4	215	150 - 900
MiniCore-10-VG-F/P		47.3	21.5	39.4	245	200 - 1,000
ECV-10	F	54.8	28.9	43.9	485	300 - 1,250
	P					300 - 1,250
ECV-20	F	60.0	43.8	44.9	813	750 - 2,200
	P					750 - 2,400
ECV-30	F	60.0	61.3	44.9	1075	1,600 - 3,300
	P					1,600 - 3,750
ECV-40	F	60.0	81.0	44.9	1279	1,600 - 4,400
	P					1,600 - 5,000

All dimensions shown in inches.

Model ERM (600 - 10,000 cfm)

Greenheck's model ERM is a modular energy recovery device designed for indoor mounting in new construction or retrofit applications where an energy recovery ventilator may not meet space requirements. The ERM consists of a fully insulated cabinet, installed as a permanent part of the duct system. The energy recovery wheel is completely accessible through a removable panel or duct access.



Model Number Code

ERM - 36S - 15

Model Parent

Wheel Diameter

36 (36 in.)
52 (52 in.)
58 (58 in.)
64 (64 in.)
74 (74 in.)

Wheel Thickness

15 (1½ in.)
30 (3 in.)

Airflow Rate

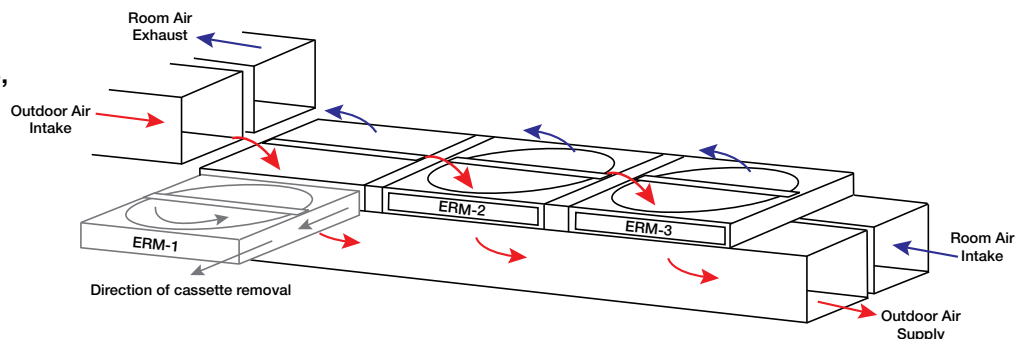
H - High
S - Low

Model	A	B	C	D	E	F	G	Approx. Weight (lbs)	Airflow Range (CFM)	Voltage	Hertz	Amps	Phase	Motor HP
ERM-36S/H	34.3	45.4	42	14.8	14.8	14.6	16.6	170	600 - 2,300	200-230/460	50/60	1.2	1	1/6
ERM-52S/H	50.4	61.6	58.4	22.4	22.4	14.6	16.6	280	2,300 - 4,500	200-230/460	50/60	2.8	1	1/2
ERM-58H	54	64.6	62.7	24.1	24.1	16.5	18.7	440	4,500 - 6,000	200-230/460	60	1.3-1.2/0.6	3	1/4
ERM-64H	59.8	70.4	68.2	26.9	26.9	19.1	21.1	700	6,000 - 7,500	200-230/460	60	1.3-1.2/0.6	3	1/4
ERM-74H	69.9	80.2	78.5	31.5	31.5	20.1	22.1	870	7,500 - 10,000	200-230/460	60	1.3-1.2/0.6	3	1/4

All dimensions shown in inches.

Typical Installation

Models ERM-36 and 52 are easily installed either vertically or horizontally. Models ERM-58, 64, and 74 must be installed in the vertical position due to size and weight. The diagram illustrates a typical horizontal installation of multiple modules where airflow exceeds single wheel capacities.



Unit Controls

Microprocessor

The microprocessor controller is factory-programmed, wired and tested prior to shipment. The controller can operate stand-alone or integrate with a building management system (BMS) using BACnet® MSTP/IP or Modbus RTU/IP protocols.



Control Features:

- LCD display
- Built-in keypad for easy set point adjustment
- Integral 7-day time clock
- Optional remote display for service convenience
- Built-in frost and economizer controls
- Supply and exhaust fan modulation capabilities
- Monitoring points for temperature and/or relative humidity
- Heating enable sequences
- Web user interface

Optional Control Sequences and Product Features

Demand Control Ventilation

Varies the amount of outdoor air based on occupancy. Available options are:

- **CO₂ sensor** - Mounted in the unit, return air duct or in the space, this sensor determines occupancy and modulates the fan speed accordingly, or it cycles the unit on and off to provide the appropriate amount of outdoor air.
- **Time clock** - A remote panel can be equipped with a 7-day programmable time clock to turn the unit on and off based on a schedule.



Economizer Control

When the outdoor air conditions are favorable, the controller will allow the economizer operation. Available options are:

- **Bypass damper** - An integral bypass damper will cycle open, allowing approximately 50% of the incoming cool air to flow past the energy recovery core and enter the building unconditioned. (ECV only).
- **Stop wheel** - Energy wheel rotation will stop, and unconditioned air can enter the building.
- **Modulate wheel** - Energy wheel speed will modulate to maintain a leaving wheel temperature of 55°F.
- **Exhaust only operation** - Unit will have the ability to receive an external signal to power off the supply fan, most commonly used for economizer operation.



Fan Speed Control

To accommodate system requirements, the fan speed can be adjusted with a variable frequency drive. Available options are:

- **Multispeed** - Allows the fan to operate at three preset speeds that are determined by a set of input contacts.
- **Modulating** - Vary the fan speed from 50-100% based on an analog input signal.

Frost Control

The frost control operation prevents frost buildup on the energy wheel in climates that have cold outdoor winter temperatures, typically colder than -10°F, and/or moist indoor conditions such as gym locker rooms. Available options are:

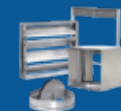
- **Timed exhaust** - Cycles supply blower to melt frost with warm return air.
- **Electric preheat** - Preheats outdoor air to avoid frosting.
- **Modulate wheel** - Reduces the energy wheel speed to increase the time exposed in the warm return air.

Frost Control Strategy Recommendations		
Winter Outside Air Design	Winter Indoor Air Design	Recommended Frost Control Strategy
≥10°F	≤50%RH	None
≥-5°F <10°F	≤35%RH	Timed Exhaust
≥10°F	≥50%RH	Electric Preheat
≥-5°F <10°F	≥35%RH	
<-5°F	Any RH	

		MiniVent	ERV	ERVe	ERVi	MiniCore	ECV	ERM
ER Technology	Polymer Wheel	✓	✓	✓	✓			✓
	Fiber Membrane Core					✓	✓	
	Polymer Membrane Core					✓	✓	
Mounting	Indoor	✓	✓		✓	✓	✓	✓
	Outdoor		✓	✓			✓	
Performance	Min Volume ^a (cfm)	150	300	1,000	375	200	300	500
	Max Volume ^a (cfm)	900	12,000	6,000	2,500	900	5,000	10,000
Control Options	Microprocessor		✓	✓	✓		✓	
	BMS Integration		✓	✓	✓		✓	
	Frost Control	✓	✓	✓	✓	✓	✓	
	Economizer		✓	✓	✓		✓	
	Vari-Green [®] Motors	✓	✓		✓	✓	✓	
	Fan VFDs		✓	✓			✓	
Certifications	Motorized Dampers ^b		✓	✓	✓		✓	
	UL Certified	✓	✓	✓	✓	✓	✓	✓
	AHRI 1060 Certified	✓	✓	✓	✓	✓	✓	✓

^a Based on 0.5 in. esp and balanced airflows.

^b All units include backdraft dampers. Motorized dampers are optional as noted by model.



Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

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