

# Energy Recovery Ventilators

## Models ERM, MiniVent, ERV and ERVe

### Untempered Preconditioners



Greenheck offers a complete line of energy recovery ventilators to reduce your building's tempering loads in all climates. From outdoor roof-mounted applications to indoor ceiling-mounted units, Greenheck's preconditioners offer the installation flexibility for both new construction and retrofit applications.

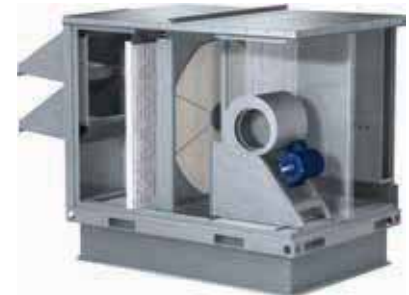
Models MiniVent, ERV and ERVe incorporate innovative design features with varying levels of configurable options and energy wheel performances to provide a quality constructed unit with operational flexibility. The result is a product that will fit seamlessly into your building to improve your indoor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



MiniVent



Model ERV



Model ERVe

Features	Benefits
<p><b>Industry Leading Selection Software (CAPS)</b></p>	<p>Greenheck's computer aided product selection (CAPS) software reduces design time by quickly analyzing system design parameters and providing a list of units with various energy wheel and fan combinations to minimize cost and optimize performance. The program outputs fan, electrical, and energy wheel performance data, as well as configuration-specific 2-D and 3-D drawings for easy implementation into building schedules and plans.</p>
<p><b>Compliance with Industry Standards</b></p>	<p>Code officials recognize the benefits of utilizing energy recovery in applications with large amounts of ventilation air. Greenheck's third party certification for airflow (AMCA) and energy wheel performance (AHRI) verify that these units provide the published amounts of ventilation air at the mandated energy recovery effectiveness per ASHRAE standards and energy codes.</p>
<p><b>Maintenance/ Serviceability</b></p>	<p>Greenheck's preconditioners have been designed to allow easy access to filters, blower assemblies and wheel cassettes. As reassurance to the customer, each unit carries a one-year warranty and each energy wheel (segments, cassette, belt and pulleys) carries a five-year warranty.</p>
<p><b>System Efficiency/ Payback</b></p>	<p>The incorporation of energy recovery allows for equipment downsizing as well as continued 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.</p>

## 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.



Greenheck certifies that the ERVe and ERV models shown herein are licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

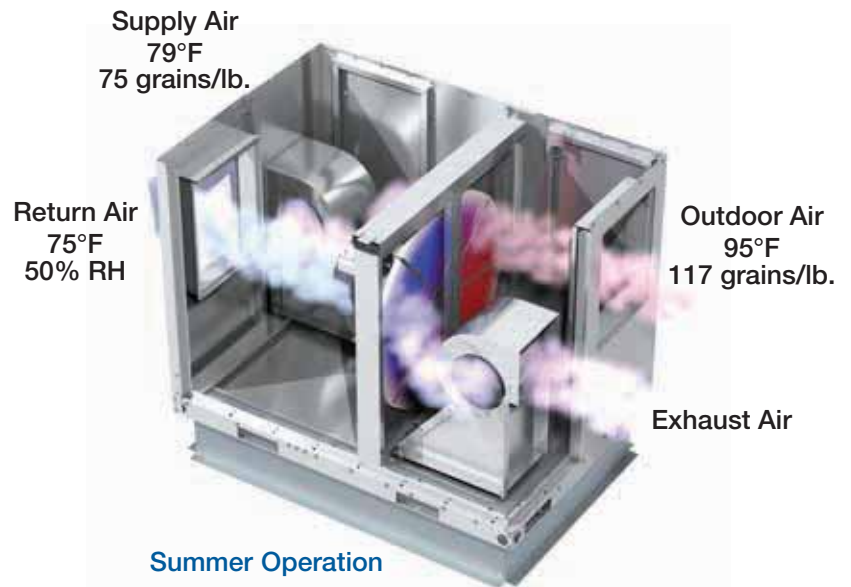


Energy recovery wheels are certified by the AHRI Air-to-Air Energy Recovery Ventilation Equipment Certification Program in accordance with AHRI Standard 1060. Actual performance in packaged equipment may vary. Certified ratings are available in the Certified Product Directory at [www.ahridirectory.org](http://www.ahridirectory.org).

## How does energy recovery work?

Energy recovery is the process through which energy is transferred between the conditioned return air from the space and the fresh outdoor air which imposes the load on the equipment. This is done by rotating an energy wheel between the two airstreams. All energy wheels include:

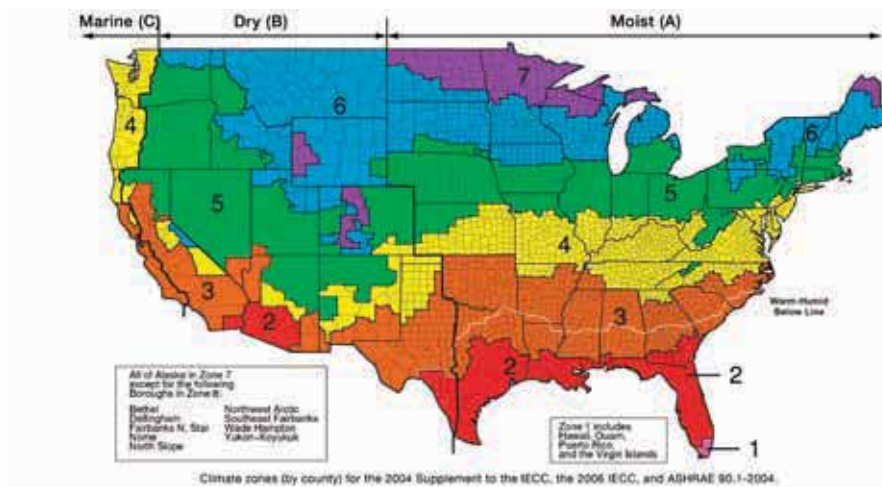
- Polymer heat transfer media for sensible energy transfer
- Silica gel desiccant permanently bonded to polymer media for latent energy transfer
- Removable segments for ease of maintenance
- Five-year manufacturer's warranty



## ASHRAE 90.1 Compliance

ASHRAE 90.1-2010 requires the use of energy recovery based upon a unit's supply airflow, outdoor air percentage, and geographic location. The standard mandates the total effectiveness (sensible and latent) be a minimum of 50%. This language has been adopted in the 2012 International Energy Conservation Code®.

The effectiveness of energy recovery varies depending on the device type, material, and airflow balance. This value is determined based on the test procedure outlined in the Air-Conditioning, Heating, and Refrigeration Institution (AHRI) Standard 1060.



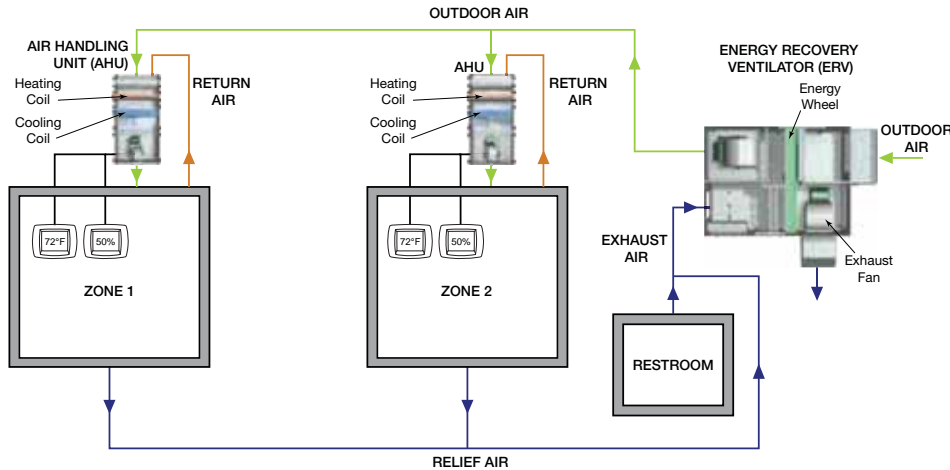
Zone	Percentage of Outdoor Air at Full Design Airflow Rate (cfm)					
	30% ≤ 40%	40% ≤ 50%	50% ≤ 60%	60% ≤ 70%	70% ≤ 80%	≥ 80%
Design Supply Fan Airflow Rate (cfm)						
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	≥ 5,000	≥ 5,000
1B, 2B, 5C	NR	NR	≥ 26,000	≥ 12,000	≥ 5,000	≥ 4,000
6B	≥ 11,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,500	≥ 1,500
1A, 2A, 3A, 4A, 5A, 6A	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	≥ 0
7, 8	≥ 2,500	≥ 1,000	≥ 0	≥ 0	≥ 0	≥ 0

NR = Not recommended

## Typical Applications for Energy Recovery

- Animal Shelters
- Churches
- Locker Rooms
- Bars and Clubs
- Dormitories
- Nursing Homes
- Veterinary Hospitals
- Function Halls
- Schools
- Office Buildings
- Printing Shops
- Restaurants

## Energy Recovery with Ducted Air Handlers

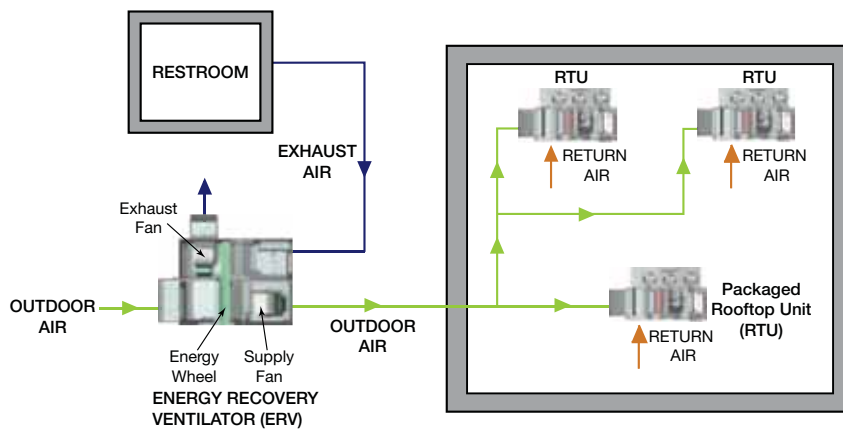


### Preconditioner Applications

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.

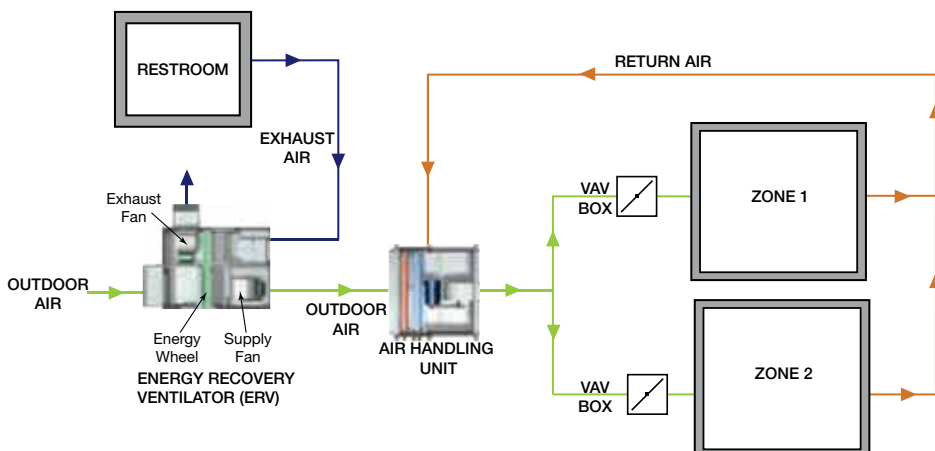
## Energy Recovery with Packaged Rooftop Equipment



### 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 not only allowable to return restroom exhaust, but is recommended to maximize the benefit.

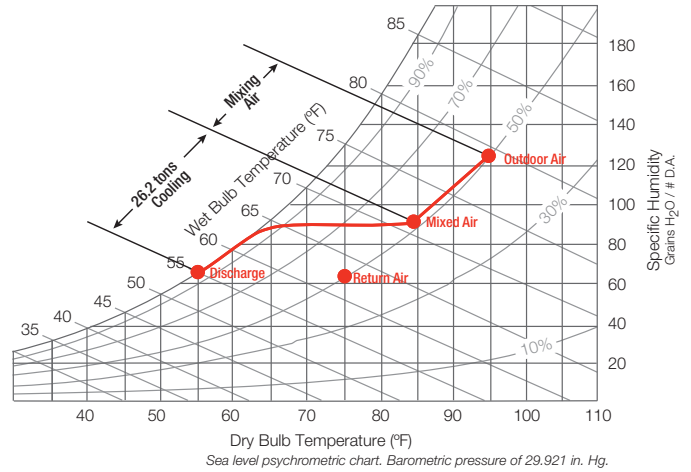
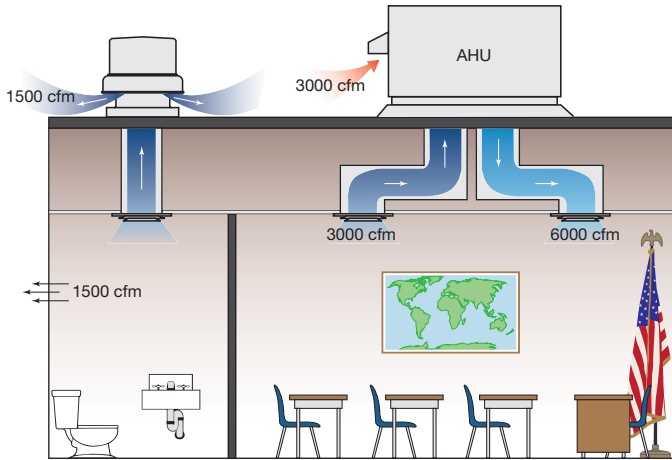
## Energy Recovery with Variable Air Volume



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

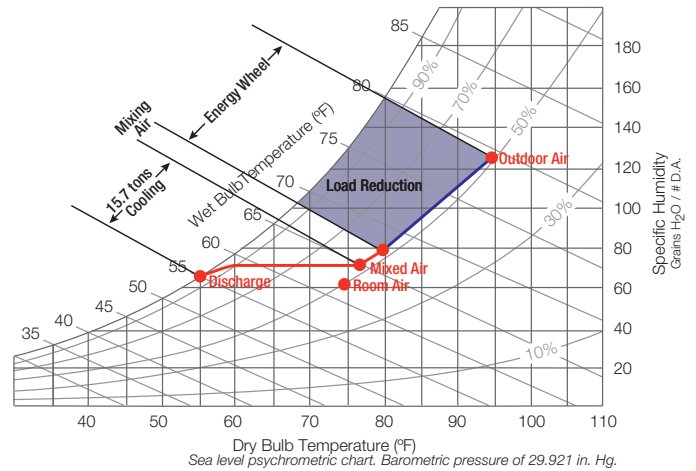
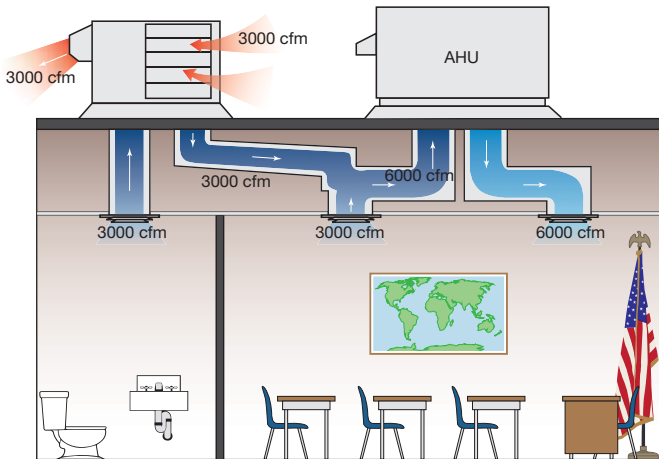
## Traditional System:

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)
Boston, MA	1.14	0.1433	6.29	\$451	\$1,241	1.97
Houston, TX	0.69	0.0883	11.70	\$1,584	\$308	1.19
Minneapolis, MN	0.73	0.0863	8.05	\$348	\$1,215	1.67
Phoenix, AZ	0.98	0.0950	7.12	\$531	\$374	2.04
Raleigh, NC	0.94	0.0813	10.30	\$806	\$805	1.36
St. Louis, MO	0.98	0.0804	13.53	\$625	\$1,288	1.05
Tampa, FL	1.09	0.0985	13.18	\$2,182	\$238	1.03

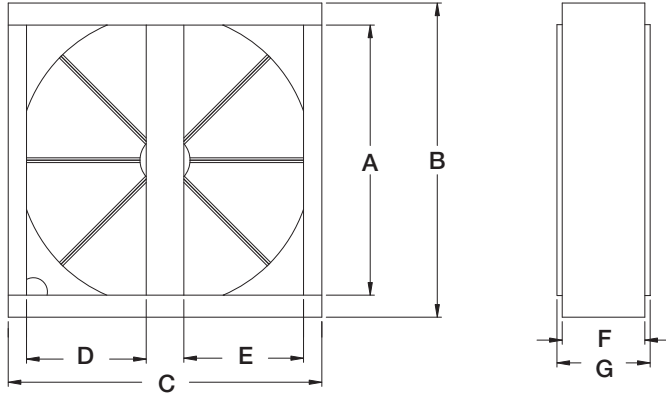
Actual savings will vary based on system design and application.

Data source: U.S. Energy Information Administration, *Natural Gas Annual and Monthly Electric Sales and Revenue Report with State Distributions Report, 2011*  
 Assumptions: \$4/cfm energy recovery cost; \$700/ton avoided cooling equipment cost; 70% effective energy wheel; operating hours: Mon.-Fri., 6am-6pm



Greenheck's model ERM is a modular energy recovery device capable of handling 600 to 10,000 cfm of ventilation air. This unit is designed for 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. A wiring box for connection to the electrical supply is also a standard feature.

Model	A	B	C	D	E	F	G	Approx. Weight (lbs.)	Airflow Range (cfm)	Voltage	Hertz	Amps	Phase	Motor HP
	inches													
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



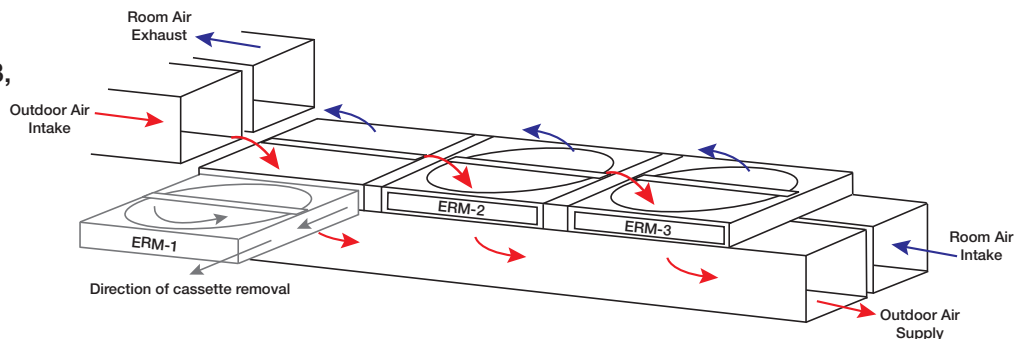
**Model Number Code**

**ERM - 36S - 15**

<p>Model Parent</p> <p>Wheel Diameter</p> <p>36 (36 in.)</p> <p>52 (52 in.)</p> <p>58 (58 in.)</p> <p>64 (64 in.)</p> <p>74 (74 in.)</p>	<p>Wheel Thickness</p> <p>15 (1½ in.)</p> <p>30 (3 in.)</p> <p>Airflow Rate</p> <p>H - High</p> <p>S - Low</p>
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## 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.

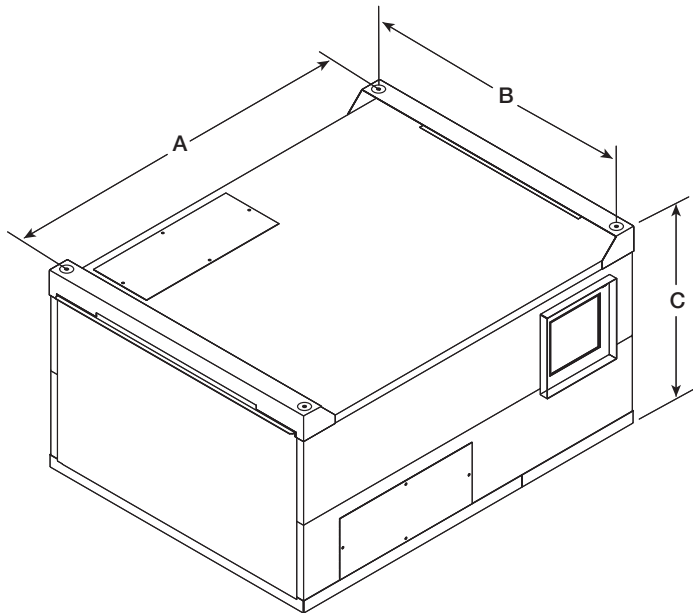


# Model MiniVent

Models MiniVent-450 and 750 are energy recovery ventilators for commercial and institutional applications that require 150 to 850 cfm of ventilation air. The compact design provides an economical solution for individual spaces, such as school classrooms and small offices. The MiniVent is designed for indoor installations and may be floor-mounted or ceiling-hung. A removable panel enables easy access to filters and enthalpy wheel. Unit comes standard with backdraft damper and optional Vari-Green® EC motors available.



Model	A	B	C	Approx. Weight (lbs.)	Airflow Range (cfm)
	inches				
450	37.6	26.4	19.9	150	150 - 500
750	43.2	33	23.8	250	450 - 850



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

**Model Number Code**  
**MiniVent - 750**

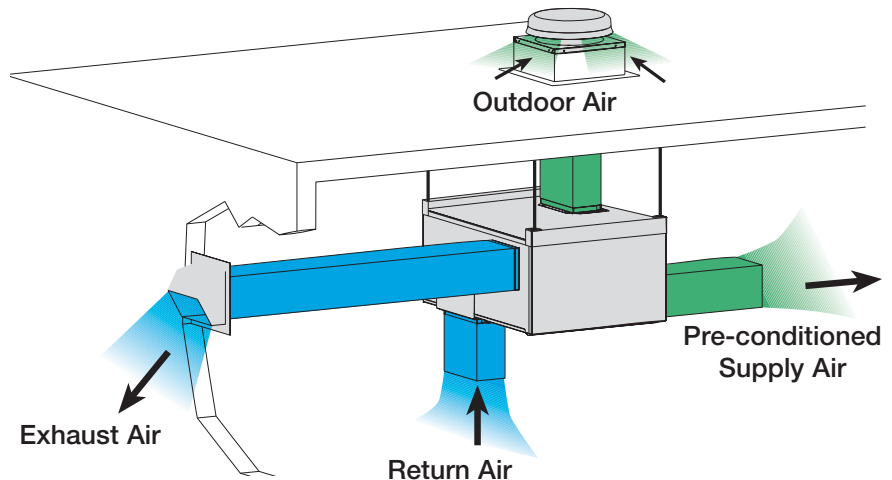
Model Parent

Nominal Airflow  
450 (450 cfm)  
750 (750 cfm)

## Typical Installation

The illustration shows a MiniVent in a typical ceiling-hung installation.

Outdoor air is drawn through a model GRS roof mounted gravity intake hood and preconditioned by the enthalpy wheel. Outdoor air is then supplied either to an air handler or directly to the space. Energy is recovered from stale return air before it is exhausted through a model WC wall cap.



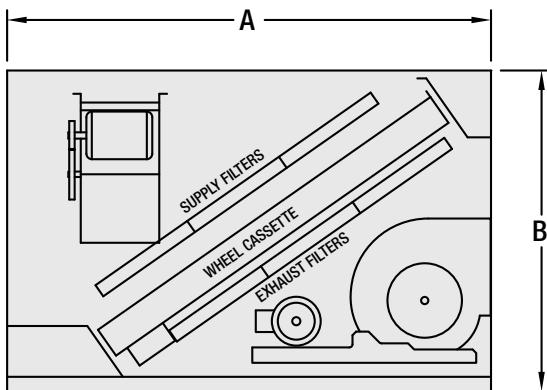
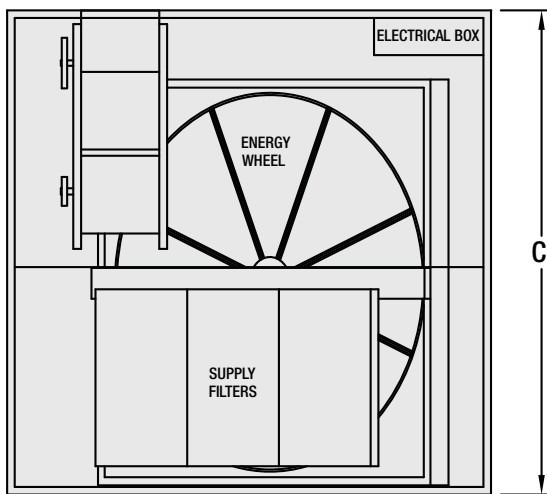
Models ERV-10, 20, 45 and 55 are designed for indoor-mounted commercial and institutional applications requiring 500 to 6,000 cfm of ventilation air. A key design consideration for these units is mounting location. Several duct configurations allow for floor-mounted or ceiling-hung installation. Access panels allow for easy access to the unit's wheel, filters, motors and controls.



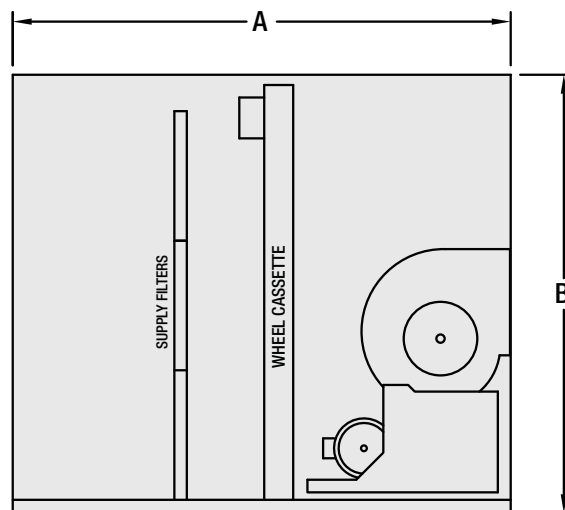
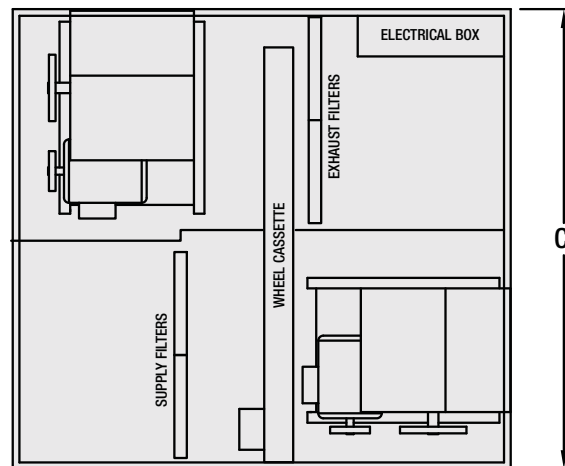
Model	A	B	C	Approx. Weight (lbs.)	Airflow Range (cfm)
	inches				
ERV-10	46.1	27	33.7	300	500 - 1,000
ERV-20	62	31.1	51	720	1,000 - 2,200
ERV-45	67	44.4	67.1	1100	2,200 - 4,300
ERV-55	74.9	66	69.2	1470	4,300 - 5,800

All weights include dampers and filters.

ERV-10, 20, 45



ERV-55





Models ERV-90 and 120 are designed for both indoor and outdoor applications requiring 5,000 to 12,000 cfm of ventilation air. The dual-wheel design provides exceptional effectiveness while retaining its ease of maintenance characteristics.

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

Model	A	B	C	D	E	Approx. Weight (lbs.)	Airflow Range (cfm)
	inches						
ERV-90	124.4	66.3	84.1	16.4	25.3	3,230	5,000 - 9,000
ERV-120	146.1	76.4	96.5	18.0	29.3	3,700	9,000 - 12,000

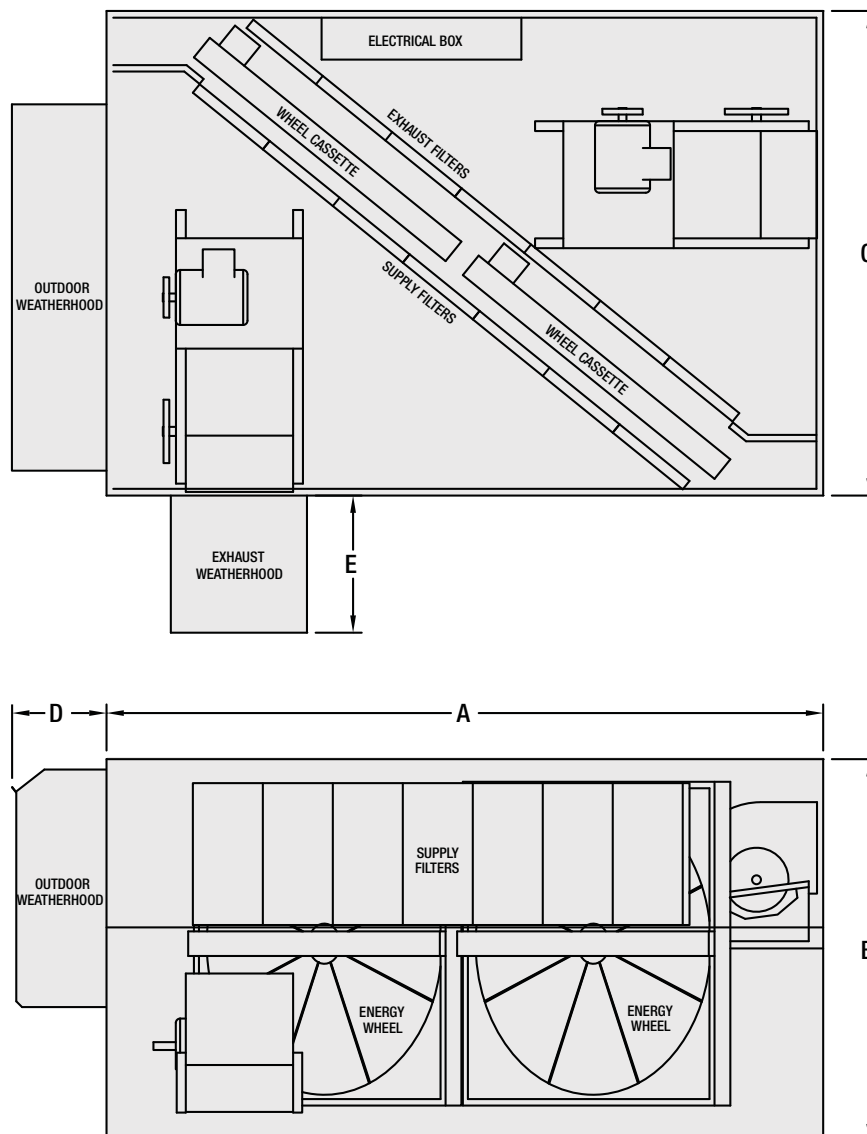
All weights include weatherhoods, dampers, and filters.

**Model Number Code**

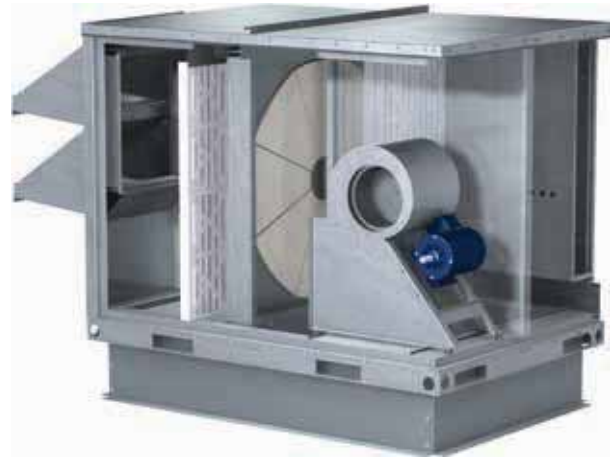
**ERV - 45 - 30H**

<p>Model Parent</p> <p>Nominal Airflow</p> <ul style="list-style-type: none"> <li>10 (1,000 cfm)</li> <li>20 (2,000 cfm)</li> <li>45 (4,500 cfm)</li> <li>55 (5,500 cfm)</li> <li>90 (9,000 cfm)</li> <li>120 (12,000 cfm)</li> </ul>	<p>Wheel Thickness</p> <ul style="list-style-type: none"> <li>15 (1½ in.)</li> <li>30 (3 in.)</li> </ul> <p>Airflow Rate</p> <ul style="list-style-type: none"> <li>H - High</li> <li>L - Low</li> </ul>
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**ERV-90, 120**



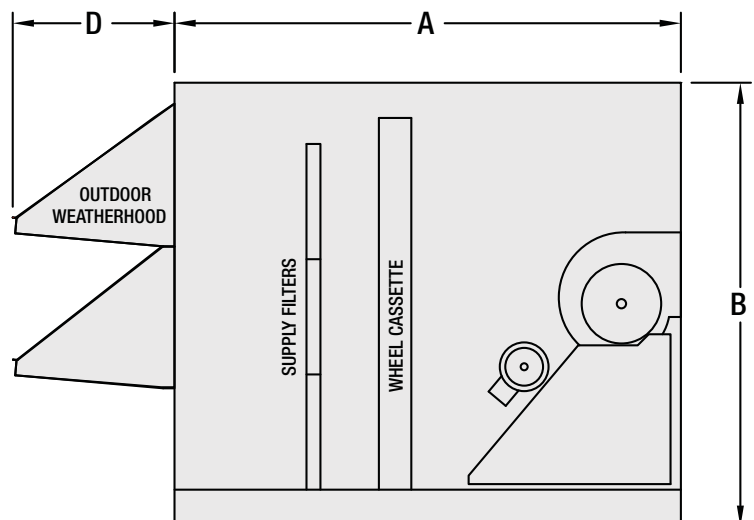
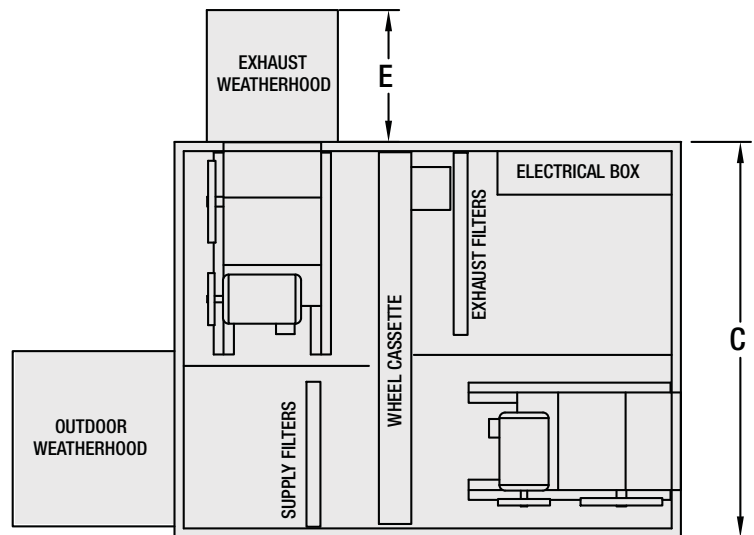
The model ERVe is designed for outdoor-mounted commercial and institutional applications requiring 1,000 to 6,000 cfm of ventilation air. The configurability of this unit allows for easy incorporation on rooftops or outdoor pad mounting scenarios. Hinged doors allow easy access to the unit's wheel, filters, motors and controls.



Model	A	B	C	D	E	Approx. Weight (lbs.)	Airflow Range (cfm)
	inches						
ERVe-20	65.8	49.6	45.1	17.8	20.8	940	1,000 - 2,200
ERVe-35	68.1	59.7	59.7	21.8	17.8	1,270	2,200 - 3,400
ERVe-45	72.1	65.9	65.9	21.8	19.2	1,480	3,400 - 4,500
ERVe-55	83	72.3	72.3	21.8	23.9	1,970	4,500 - 6,000

All weights include weatherhoods, dampers, and filters.

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



**Model Number Code**

**ERVe - 35 - 30H**

<p>Model Parent</p> <p>Nominal Airflow</p> <ul style="list-style-type: none"> <li>20 (2,000 cfm)</li> <li>35 (3,500 cfm)</li> <li>45 (4,500 cfm)</li> <li>55 (6,000 cfm)</li> </ul>	<p>Wheel Thickness</p> <ul style="list-style-type: none"> <li>15 (1.5 in.)</li> <li>30 (3 in.)</li> </ul> <p>Airflow Rate</p> <ul style="list-style-type: none"> <li>H - High</li> <li>L - Low</li> </ul>
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## Optional Control Sequences

### Energy Wheel Economizer Control

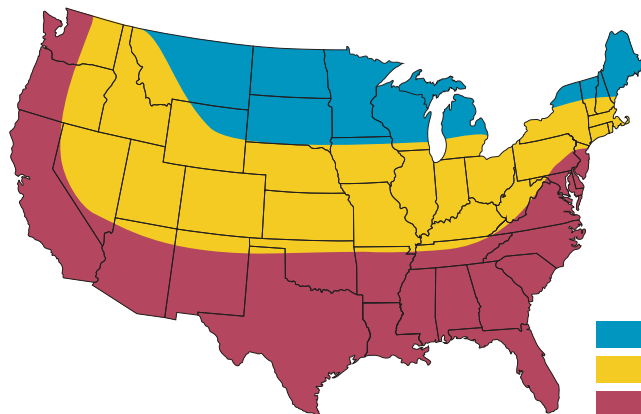
When the outdoor air conditions are favorable, the controller will allow the economizer operation. The unit will adjust the energy wheel operation to:

- **Stop wheel** - Energy wheel rotation will stop and outdoor air can be brought into the building unconditioned
- **Modulate wheel** - Energy wheel speed will modulate to maintain a leaving wheel temperature of 55°F

### Energy Wheel Frost Control

Prevents frost buildup on the energy wheel in climates that have cold outdoor winter temperatures (typically less than -10°F) and/or moist indoor conditions such as a gym locker room. 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 wheel speed to increase the time exposed in the warm return air



- Preheat Frost Control Recommended\*
- Timed Exhaust Frost Control Recommended\*
- No Frost Control Needed

\*Modulating Wheel Frost Control can also be used in these areas.

## Unit Control Options

In addition to standard analog control, Greenheck is proud to offer the following direct digital control option.

### Network Interface

The network interface offers an easy-to-use, remote-mounted display which can monitor and control the unit to verify proper operation and assist with maintenance notification without the need for full microprocessor capabilities. It easily integrates to BACnet® MS/TP or IP, LonWorks® or Modbus® RTU.



### Fan Speed Control

To accommodate the system requirements, the fan speed can be adjusted to:

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

### Demand Control Ventilation

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

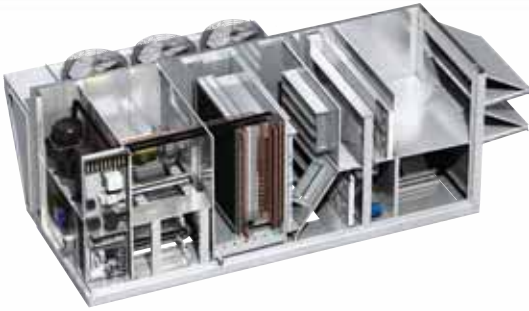
- **CO<sub>2</sub> Sensor** - Mounted in the unit, return air duct or in the space, this sensor determines occupancy and modulates the fan speed accordingly or it cycles the unit on and off to provide the appropriate amount of outdoor air.
- **Time clock** - A remote panel can be equipped with a 7-day programmable time clock to turn the unit off based on a schedule.

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	

Two operating options are available:

- **Monitor** - Allows the BMS to monitor the status and functions of the unit through a factory installed controller.
- **Monitor and control** - Allows the BMS to monitor the status and command the basic functions of the unit through a factory-installed controller. A remote panel is not available with this option.

# Additional Energy Recovery Products



## Model RVE

This rooftop ventilation unit combines the benefits of total energy recovery with supplemental heating and cooling for indoor or outdoor applications designed to process high percentages of outdoor air. Airflow capacities range from 800 to 9,500 cfm.



## Model ERCH

This dedicated outdoor air unit combines the benefits of total energy recovery with supplemental heating and cooling for applications designed to supply 100% outdoor air. Airflow capacities range from 1,000 to 10,000 cfm.



## Model APEX

This unit combines energy recovery along with several heating and cooling options. This large capacity dedicated outdoor air unit is designed for 100% outside airflow and capacities that range from 10,000 to 20,000 cfm.



### Enjoy Greenheck's extraordinary service, before, during and after the sale.

Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.

- Our Quick Delivery Program ensures shipment of our in-stock products within 24 hours of placing your order. Our Quick Build made-to-order products can be produced in 1-3-5-10-15 or 25-day production cycles, depending upon their complexity.
- Greenheck's free Computer Aided Product Selection program (CAPS), rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.
- Greenheck has been Green for a long time! Our energy-saving products and ongoing corporate commitment to sustainability can help you qualify for LEED credits.
- Our 3D service allows you to download, at no charge, easy-to-use AutoDesk™ Revit™ 3D drawings for many of our ventilation products.

Find out more about these special Greenheck services at [greenheck.com](http://greenheck.com)

## Our Commitment

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

Specific Greenheck product warranties are located on [greenheck.com](http://greenheck.com) within the product area tabs and in the Library under Warranties.

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Prepared to Support  
Green Building Efforts

