

Model WM Energy Recovery Mini Systems (850 to 11,000 CFM)

Now AHRI 1060 Certified!

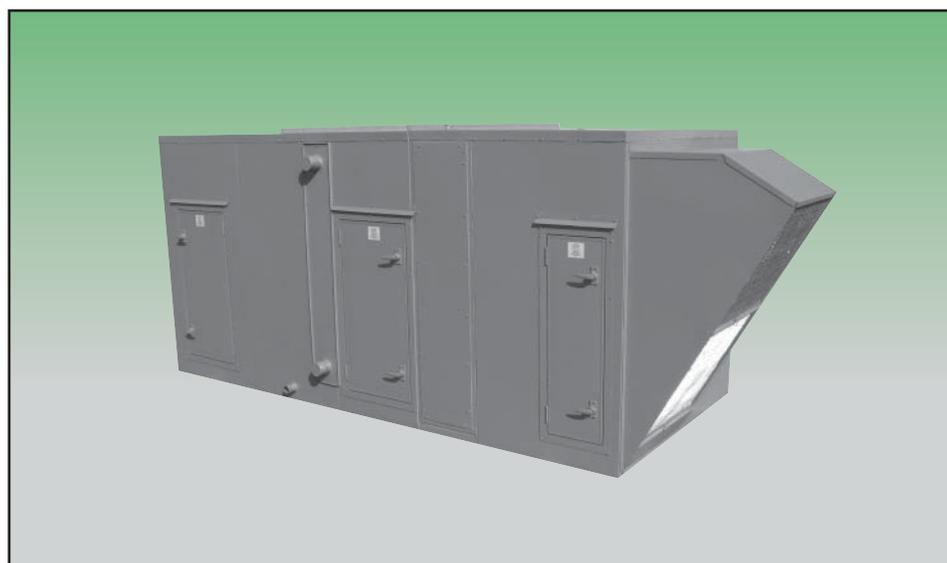
Carnes Energy Recovery Mini Systems provide affordable preconditioned ventilation air, flexible design and offers supplemental heating or cooling.

BENEFITS:

- Full energy recovery wheel benefits from enthalpy media.
- Optional supplemental conditioning in a painted steel cabinet.
- 6 standard duct arrangements, special configurations available.
- Latched and hinged double wall access doors.

AVAILABLE OPTIONS INCLUDE:

- ETL/CSA Listing for quick building code approvals.
- Complete wheel control options, variable speed wheel drive, electronic controller, frost controls, and electric preheat.
- Variable speed fan drives.
- Double wall construction, airflow gauge, dirty filter switches.
- DX, chilled water, hot water coils and electric reheat available.
- Weather hoods with moisture eliminators, motorized dampers.
- Roof curbs.
- Optional 5 year wheel only or unit mechanical warranty.



PRODUCT OVERVIEW

• MINISYSTEMS

Carnes Energy Recovery MiniSystems provide affordable preconditioned ventilation air by combining the highly effective Carnes energy recovery wheel with flexible cabinet design in 4 sizes for airflows from 850 to 11,000 CFM. Additional wheel and unit control options and optional supplemental heating and/or cooling is available to provide single source conditioning.

The Model WMWA offers the base MiniSystem design consisting of a 16 gauge painted steel cabinet with 12 gauge steel base. The housing roof, sides, and internal partition are insulated with 1 inch thick, 4 lb density, foil faced insulation. Optional 24 gauge steel inner liner is available for additional IAQ protection. Hinged doors with rain deflectors are provided for access to all compartments and internal components. 6 Standard Duct Arrangements are available for design flexibility. Special duct arrangements are available.

• MINISYSTEMS WITH COILS

Model WMEA utilizes Electric Heating Coils- Features include: fusing, multiple stage and/ or SCR control, airflow proving switch, UL Listing. Heater may require an independent power circuit separate from the Energy Recovery MiniSystem power circuit.

Model WMHA incorporates Hot Water Coils up to 2 rows deep.

Model WMCA offers DX or Chilled Water Cooling Coils up to 6 rows deep. All cooling coils are equipped with a stainless steel condensate drain pan incorporating a bottom drain extending through the side of the cabinet to allow connection to a P-Trap

Complete wheel controls with defrost options are available to maximize operational flexibility and efficiency. All controls needed for unit operation are installed in the external control panel(s). Included are a single point power connection with NEMA 3R disconnect, internal fusing, and 24 volt control circuit.

Forward curved belt drive blowers with adjustable belt sheaves are mounted on neoprene vibration isolators.

Motors – ODP, TEFC, High efficiency, High efficiency TEFC, and 2 speed motors are available. Fan Variable Frequency Drives are also available on special request.

2 inch, 30%, disposable pleated filters are incorporated for the outside air and the return air compartments. Other filter types and sizes are available.

Weather hoods with aluminum moisture eliminators and a variety of gravity and motorized dampers are available.

(by others). This eliminates any possibility of standing water in the drain pan. DX Coils are provided with distributors to receive expansion valves at the liquid connections.

Model WMAA includes either a DX or Chilled Water Cooling coil in series with either Electric Heat or a Hot Water Coil for complete supplemental conditioning capability.

Other types of supplemental conditioning, such as Dehumidifier Heat Pipes, may be available on special order. Please consult with Carnes Co. for availability of specific components.

Recovery MiniSystem

UNIT SELECTION PROCEDURE

Carnes provides equipment selection and performance calculation software for the Energy Recovery MiniSystems (Energy-C-Lect). This powerful tool is the simplest and fastest way to perform energy recovery performance, unit selection, and submittals. The latest Energy-C-Lect version is available on the Carnes website.

The following manual selection guidelines are provided primarily so that you may understand the underlying assumptions and calculations behind the selection software. **Use Energy-C-Lect for actual selection, performance, and submittals.**

MODEL	WMWA, WMEA, WMHA	WMCA, WMAA	
UNIT SIZE	AIRFLOW, CFM (L/S)		MAX. ESP, in. w.g. (kPa)
WM_A03	700 (330)	700 (330)	2.25 (0.56)
	1,900 (897)	1,600 (755)	2.25 (0.56)
	--	2,400 (1132)	2.25 (0.56)
	2,900 (1369)	--	2.5 (0.622)
WM_A06	1,740 (821)	1,740 (821)	3.0 (0.746)
	3,500 (1652)	3,500 (1652)	3.0 (0.746)
	--	3,850 (1817)	2.5 (0.622)
	5,220 (2464)	--	1.5 (0.373)
WM_A09	2,800 (1321)	2,800 (1321)	3.0 (0.746)
	5,600 (2643)	5,600 (2643)	3.0 (0.746)
	--	6,200 (2926)	2.5 (0.622)
	7,500 (3540)	--	1.0 (0.249)
WM_A14	4,300 (2029)	4,300 (2029)	3.0 (0.746)
	7,600 (3587)	7,600 (3587)	2.5 (0.622)
	--	9,620 (4540)	1.5 (0.373)
	11,000 (5191)	--	0.25 (0.062)

Unit Size	Approx. Max. Installed Weight (Lbs./Kg.)		DIMENSIONS LISTED IN INCHES (Millimeters)					
			Max. Coil Dimensions		Maximum Coil Face Area in Sq. Ft. (m ²)	Filter Quantity Size	Roof Curb Dimensions	
	WMWA without Coils	Cabinet with Coils	FH	FL			WMWA without Coils	Maximum with Coils
WM_A03	1,260 (572)	1,510 (685)	36 (914)	17 (432)	4.3 (0.4)	4 - 18 x 20 x 2 (457 x 508 x 51)	58 x 42 (1473 x 1067)	106 x 42 (2692 x 1067)
WM_A06	1,550 (703)	1,810 (821)	46 (1168)	22 (559)	7.0 (0.7)	4 - 24 x 24 x 2 (610 x 60 x 51)	70 x 52 (1778 x 1321)	118 x 52 (2997 x 1321)
WM_A09	2,050 (930)	2,650 (1202)	58 (1473)	28 (711)	11.3 (1.0)	6 - 18 x 20 x 2 (457 x 508 x 51) 6 - 12 x 20 x 2 (305 x 508 x 51)	78 x 64 (1981 x 1626)	126 x 64 (3200 x 1626)
WM_A14	3,100 (1406)	3,980 (1805)	72 (1829)	35 (889)	17.5 (1.6)	12 - 18 x 25 x 2 (457 x 2350 x 51)	100 x 78 (2540 x 1981)	148 x 78 (3759 x 1981)

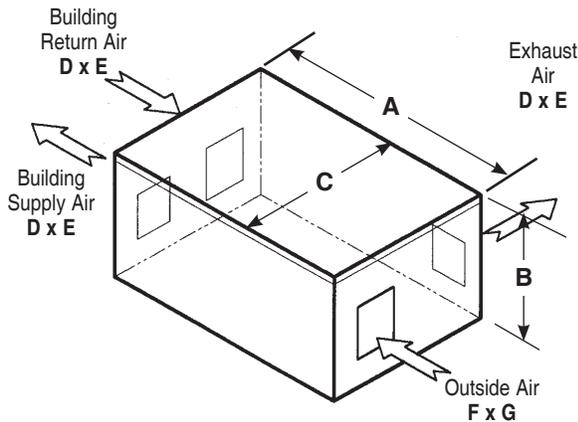
DIMENSIONS AND WEIGHTS

Unit Size	DIMENSIONS LISTED IN INCHES (Millimeters)								Intake Hood Length
	A		B	C	D	E	F	G	
	WMWA without Coils	Maximum with Coils*							
WM_A03	60 (1524)	108 (2743)	47-1/2 (1206)	44 (1118)	16 (406)	14 (356)	21 (533)	16 (406)	18-1/2 (470)
WM_A06	72 (1829)	120 (3048)	57-1/2 (1460)	54 (1372)	20(508)	18 (457)	26 (660)	22 (559)	26-1/2 (673)
WM_A09	80 (2032)	128 (3251)	69-1/2 (1765)	66 (1676)	24 (610)	20 (508)	34 (864)	28 (711)	27-1/2 (698)
WM_A14	102 (2591)	150 (3810)	83-1/2 (2121)	80 (2032)	30 (762)	24 (610)	42 (1067)	34 (864)	32-1/2 (825)

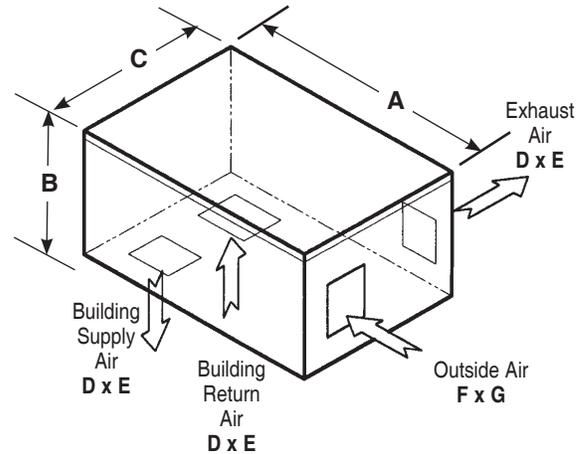
*Cabinet lengths may be up to 16 inches (406mm) less depending on coil selected.

NOTE: Allow at least 30" (610mm) clearance on all sides of the unit, except for the control panel side for servicing. You must allow sufficient clearance around the control panel to meet local codes concerning serviceability. Allow unit width clearance on side that rotor may need to be removed.

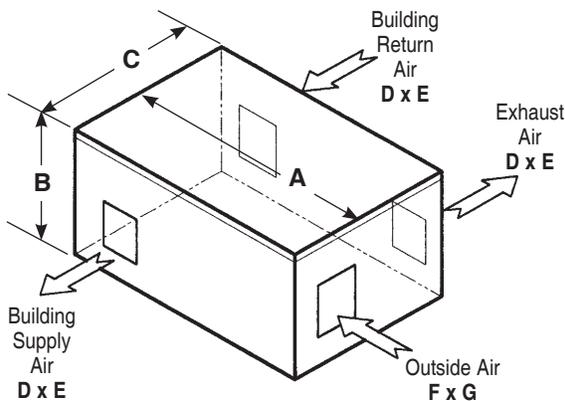
UNIT ARRANGEMENT # 1



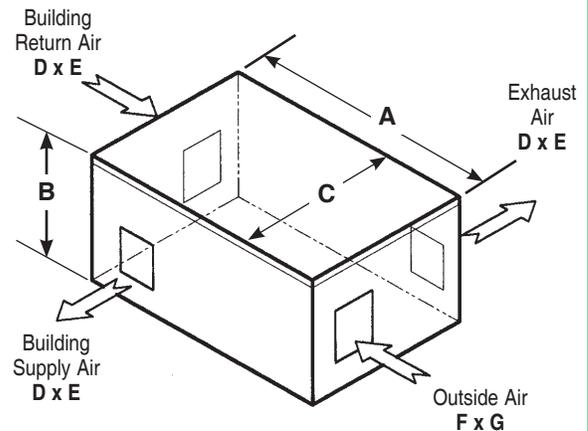
UNIT ARRANGEMENT # 2



UNIT ARRANGEMENT # 3

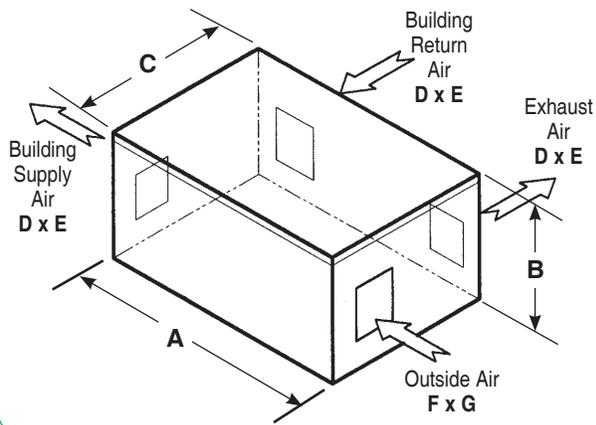


UNIT ARRANGEMENT # 4

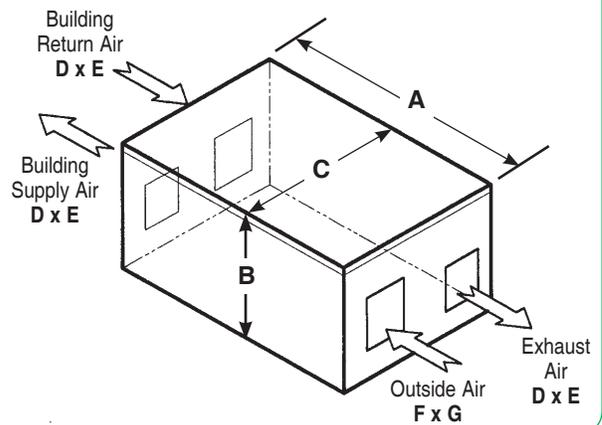


DIMENSIONS AND WEIGHTS

UNIT ARRANGEMENT # 5

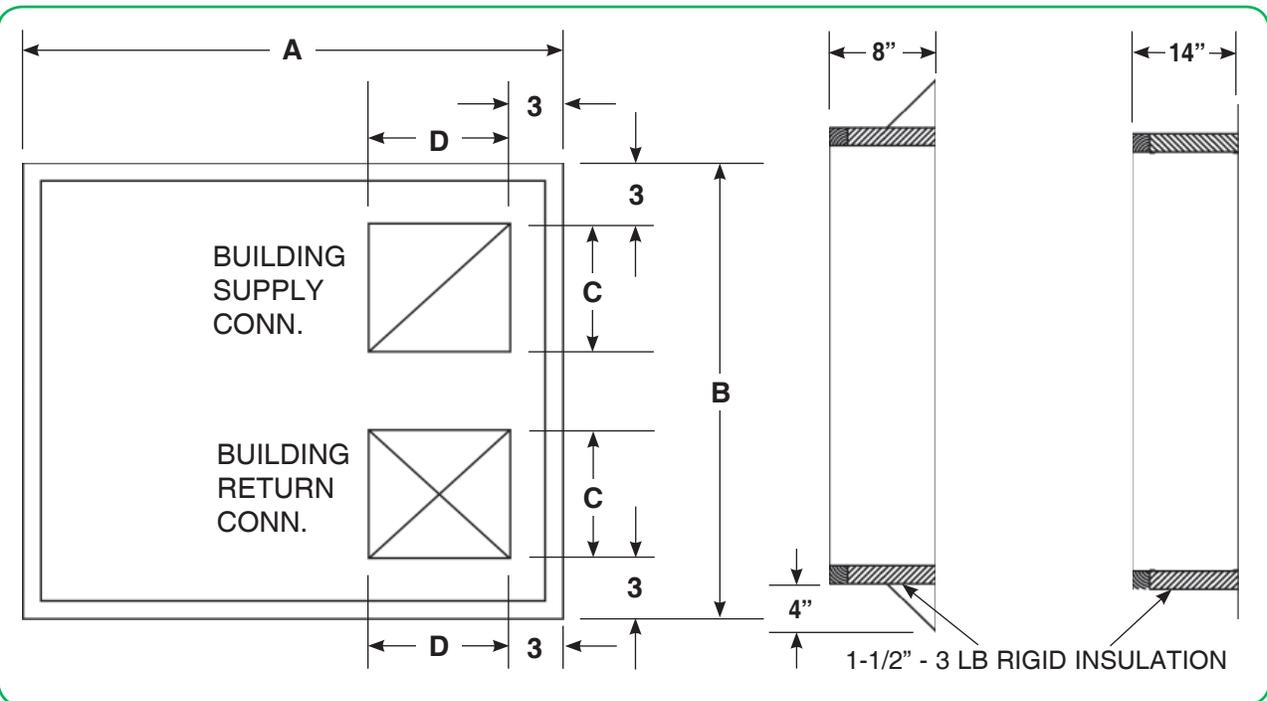


UNIT ARRANGEMENT # 6



CURB & ROOF OPENING

DIMENSIONS LISTED IN INCHES (Millimeters)					
	WMWA with- out Coils	Maximum with Coils			
UNIT SIZE	A	A	B	C	D
03	58 (1473)	106 (2692)	42 (1067)	16 (406)	14 (356)
06	70 (1778)	118 (2997)	52 (1321)	20 (508)	18 (457)
09	78 (1981)	126 (3200)	64 (1626)	24 (610)	20 (508)
14	100 (2540)	148 (3759)	78 (1981)	30 (762)	24 (610)



Recovery MiniSystems

SIZE	SERVICE CLEARANCE		FILTERS QTY AND SIZE
	SUPPLY SIDE	ALL OTHER SIZES	
03	44 (1118)	30 (762)	4 - 18 x 20 x 2 (457 x 508 x 51)
06	54 (1372)	32 (813)	4 - 24 x 24 x 2 (610 x 610 x 51)
09	66 (1676)	42 (1067)	6 - 18 x 20 x 2 (457 x 508 x 51) 6 - 12 x 20 x 2 (305 x 508 x 51)
14	80 (2032)	42 (1067)	12 - 18 x 25 x 2 (457 x 635 x 51)

OPTIONS

• WHEEL CONTROL OPTIONS

Variable Speed Drive with External Input Signal (DDC) Wheel rotational speed and supply air discharge temperature shall be controlled by a 3 phase AC motor through an external control signal and a variable frequency controller.

Variable Speed Drive with Frost Control and External Input Signal (DDC) Wheel rotational speed and supply air discharge temperature shall be controlled by a 3 phase AC motor through an external control signal and a variable frequency controller with frost control.

Variable Speed Drive Wheel rotational speed and supply air discharge temperature shall be controlled by an integral reduction motor through a proportional discharge sensor, differential heating/cooling changeover and variable frequency motor controller.

Variable Speed Drive with Frost Control Pressure differential switch and outside air thermostat are interlocked to the motor controller to reduce wheel rotational speed upon sensing an increase in wheel pressure drop caused by frost formation on the wheel rotor.

Temperature Controlled Economizer Mode Adjustable temperature actuated thermostats operate wheel for heating and cooling, and stop wheel for “free cooling” economizer mode. Most appropriate for low humidity climates.

Constant Speed Drive (Default Option) Wheel continuously operates at constant speed. An external on/off wheel control circuit is supplied.

Enthalpy Controlled Economizer Mode

Adjustable enthalpy controller operates wheel for cooling, and stops wheel for economizer mode. Ideal for use in high humidity climates where latent recovery is the major contributor to total energy savings. Override circuit for heating mode is required.

Rotation Detector provides output signal for remote alarm upon rotation failure.

• UNIT OPTIONS

Double Wall Construction securely isolates insulation to prevent damage and air supply contamination.

ETL Listing Available listing shows tests for conformity to UL Standard 1812, and certification to CAN/CSA C22.2 No. 236.

7-Day Programmable Time Clock

Airflow Monitor Gage allows reading of actual supply or return airflow at the unit.

Dirty Filter Sensors provide adjustable set-point pressure drop indication for supply and exhaust air streams.

Remote Panel with customer selected display is available to be field installed and wired.

Fan VFDs allow speed.

• EXTENDED WARRANTIES

- Standard rotor warranty is 5 years from shipment. Unit warranty is 1 year from shipment.

- Optional mechanical only extended warranties are available for up to 5 years from shipment.

ACCESSORIES

• **DAMPERS**

- Gravity backdraft dampers for both outside air and exhaust opening.
- Motorized supply damper with gravity damper on exhaust.
- Motorized supply and exhaust damper.

• **WEATHER HOODS**

- Galvanized steel WEATHER HOODS are

available. Outside air intakes are complete with aluminum moisture eliminators.

• **ROOF CURBS**

- Prefabricated roof curbs of galvanized or galvalume steel construction with fiberglass insulation are available in 8 inch and 14 inch heights for outdoor installation. Other curb heights are available.

FROST CONTROL OPTIONS

• **PREHEAT COIL**

Customer selectable KW prevents frost formation by heating outside air above Frost Formation Temperature. A separate power circuit may be required.

• **VARIABLE SPEED WHEEL DRIVE WITH DEFROST**

Wheel rotation speed is reduced when supply air temperature drops below setpoint for a customer adjustable defrost cycle.

• **EXHAUST ONLY FROST CONTROL**

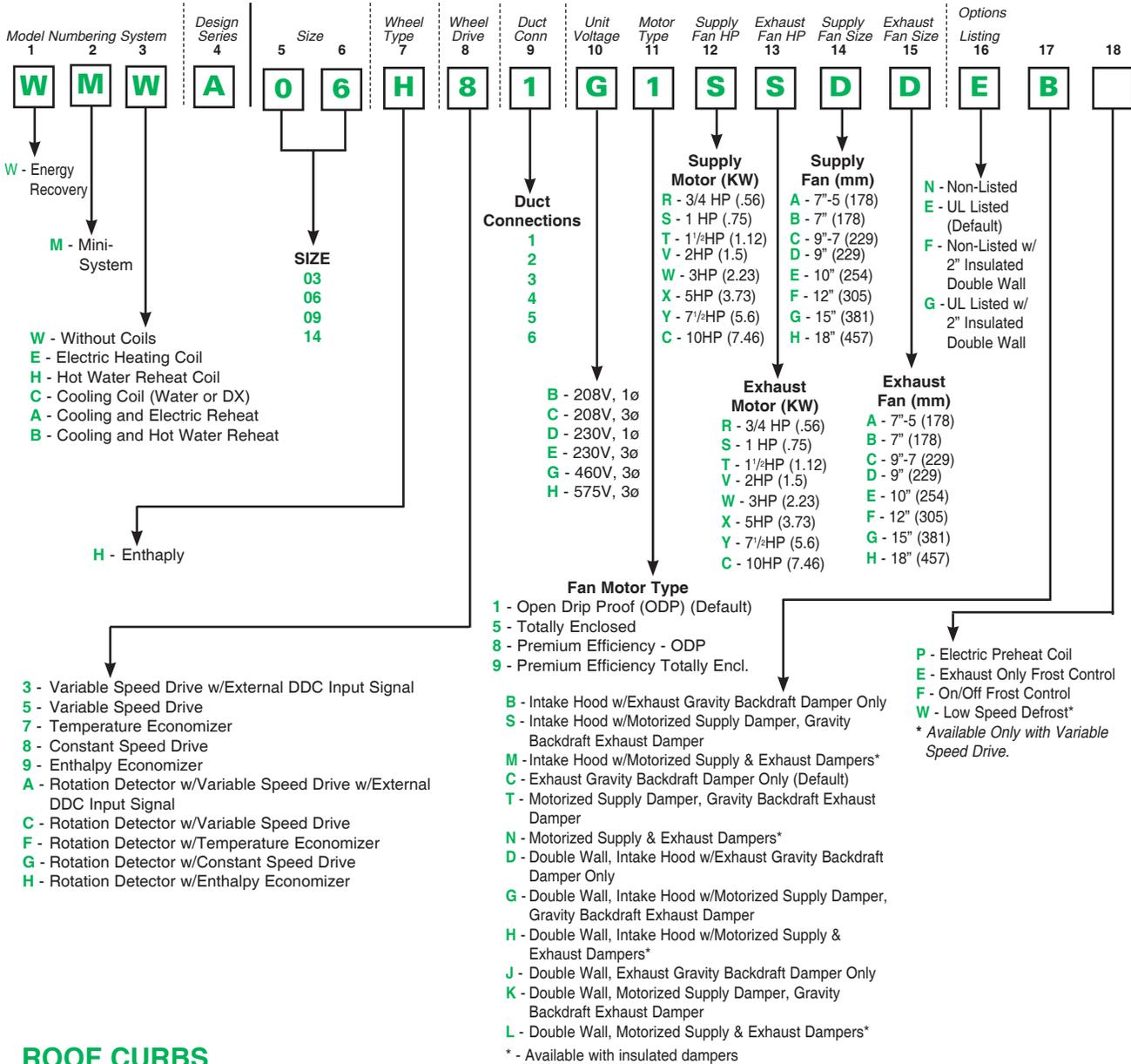
Low supply air temperature initiates field adjustable timed defrost cycle, shutting off supply blower momentarily for defrost.

• **ON/OFF FROST CONTROL**

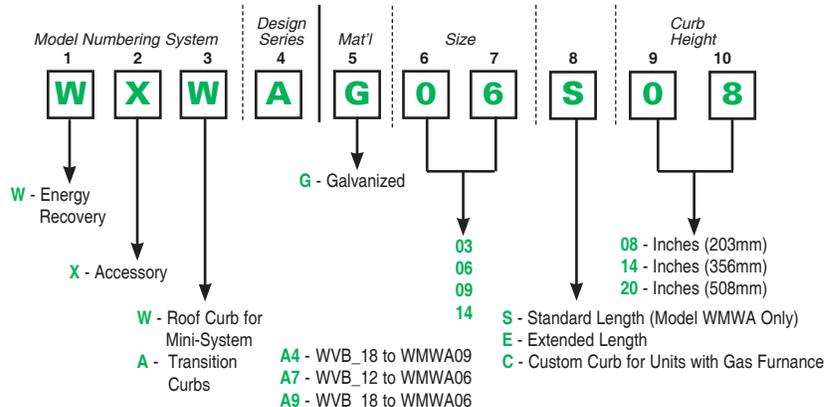
Unit will shut unit off when outside air temperature is below the field adjustable setpoint.

ORDERING INFORMATION

MINISYSTEM

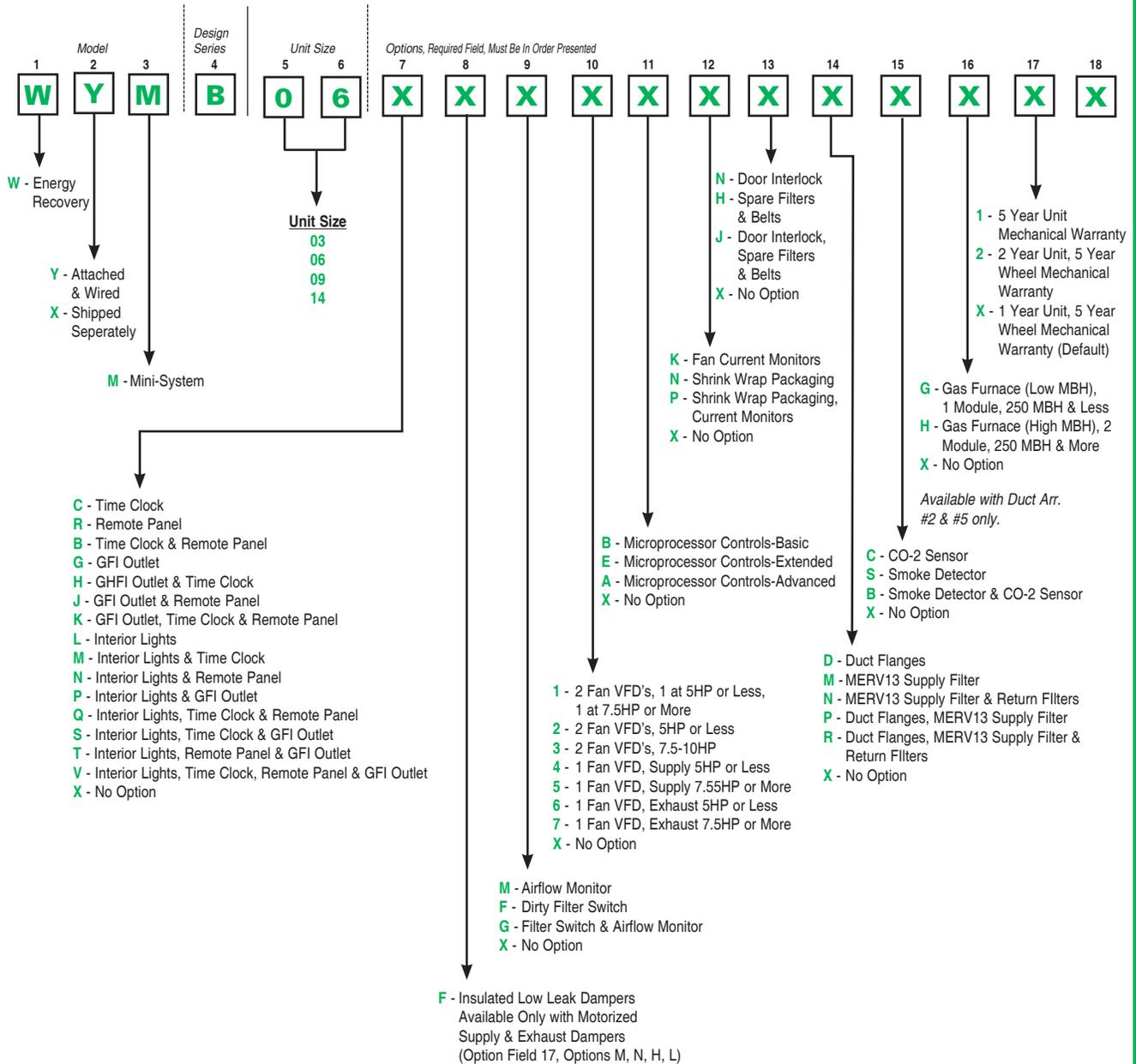


ROOF CURBS



▼ ORDERING INFORMATION

WM OPTIONAL CONTROLS



▼ TYPICAL SPECIFICATIONS

• GENERAL

Furnish and install where shown the CARNES Energy Recovery MiniSystem, Model WM_A. Unit manufacturer shall have a minimum of 10 years experience in the design, application, and manufacture of Energy Recovery Wheels and associated air handling devices.

Option: Unit shall be ETL listed in Category 169 and Category 294 for Heating and Cooling Equipment in accordance with UL Standard 1995, Heating and Cooling Equipment, and CSA C22.2 No. 236.

• UNIT CASING

Unit casing shall be heavy gauge painted steel construction designed for outdoor installation; with unit base and internal components of heavy gauge galvanized or painted steel. Housing roof, sides, and internal partition shall be furnished with one inch foil faced fiberboard fiberglass insulation of minimum 4 pound density. 2 inch pleated, MERV7, disposable filters shall be provided in supply and exhaust air streams. Lifting points shall be provided. On outside mounted units, outside air intake and exhaust air outlet shall not be located on same side of unit.

Option: Double wall of galvanized sheet metal shall enclose insulation.

• ACCESS

Access shall be provided through hinged and latched double wall access doors.

• ENERGY RECOVERY WHEEL

Wheel shall be an enthalpy (sensible + latent) energy recovery rotor constructed of corrugated aluminum coated with a non migrating, water selective, permanently bonded, desiccant coating to permit sensible and latent energy transfer. Energy recovery ratings shall be in accordance with ASHRAE Standard 84, and performance certified to ARI 1060. Wheel media shall be independently tested in accordance with ASTM-E-87, and shown to conform to the requirements of NFPA-90A by documenting a flame spread of less than 25 and a smoke generations rating of less than 50.

Moisture transfer shall take place in the

vapor phase and media shall remain dry to the touch in both summer and winter operation. A purge section shall be incorporated to limit carryover of exhaust air contaminants into the supply air. Rotor shall be driven by maintenance free speed reducer and welded urethane belt. Rotor shall require no cleaning under normal operating conditions. However, if cleaning should be required, the rotor shall be capable of being cleaned with vacuum, compressed air, dry steam, hot water, or light detergent.

• FANS

Fans shall be double width, double inlet, forward curved type, with individual motors and adjustable belt sheaves to enable independent balancing of supply and exhaust air streams. All blower wheels shall be statically and dynamically balanced.

• MOTORS

Motors shall be permanently lubricated, heavy duty, sealed bearing type. Motors shall meet EPACT minimum efficiency standards. Fan/motor assembly shall be mounted on neoprene vibration isolators to unit base.

• ELECTRICAL

Electrical components shall be prewired to a single point power connection, complete with all required operating circuitry installed in an external control panel, integral fuse protection, 24 volt control circuit, fan motor starters with overload protection, terminal strip connections, and externally mounted NEMA 3R disconnect as standard. External circuit connections to control unit on/off, and independently, recovery rotor on/off, shall be provided.

• ELECTRIC HEATING COIL

Electric heating coil shall be UL Listed, fused per NEC, and may require a separate power connection from the control panel. Heater shall be factory wired and installed. Control shall be multi-step with 24 Volt control circuit, airflow proving switch, secondary thermal cutout with manual reset, and interlocking disconnect switch.

Recovery MiniSystem

▼ **TYPICAL SPECIFICATIONS**

• **HOT WATER HEATING COIL**

Hot water heating coil shall be rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins.

• **COOLING COILS**

Cooling coils shall be DX or Chilled Water, and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins. DX shall be provided with distributors to receive expansion valves the liquid connections. Cooling coils shall be provided with stainless steel drain pan.

Option: Intake weather hood shall be complete with moisture eliminator.

Option: Gravity backdraft or motorized dampers shall be mounted flush to cabinet exterior.

Option: Dirty Filter Sensors provide adjustable setpoint pressure drop indication for supply and exhaust air stream filters for alarm circuits by others.

Option: Airflow monitor gauges are available to set and ensure supply and exhaust airflows.

Option: 7 Day Programmable Time Clock mounted in internal control panel or remotely is available.

Option: Remote control panel of customer defined configuration may be provided.

Option: Electric Preheat Coil shall be weather proof, of sufficient capacity to raise outside air from winter design to calculated frost formation potential temperature, and complete with supply air thermostat of appropriate temperature range. A separate electrical power circuit shall be provided to the preheat coil.

Option: Variable Speed Wheel Drive with Frost Control shall defrost wheel by reducing wheel speed whenever supply air temperature drops below setpoint for a customer adjustable timed defrost cycle.

Option: Exhaust Fan Only Frost Control shall initiate field adjustable timed defrost cycle upon sensing low supply air temperature, shutting off supply blower momentarily for wheel defrost.

Option: On/Off Frost Control will shut unit off when low outside air temperatures are sensed. Unit shall restart when outside air temperature rises above adjustable setpoint.

Option: Fan VFD for each fan to vary fan speed by external speed signal.

Option: 1 VFD to operate both fans with speed controlled by external speed signal.

Option: Digital electronic controller to monitor and control the ERV. BACnet and LonWorks communications.

• **ROOF CURBS**

Full perimeter prefabricated roof curbs of galvanized or galvalume construction with fiberglass insulation in standard 8 inch or 14 inch heights for outdoor installation shall be provided by the unit manufacturer.