Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

Technical Support
1-800-789-8550
appliedservice@greenheckgroup.com



General Safety Information

Only qualified personnel should install this system. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

DANGER
Always disconnect power before working on or near this equipment. Lock and tag the disconnect switch or breaker to prevent accidental power up.
CAUTION
When servicing the unit, the internal components may be hot enough to cause pain or injury. Allow time for cooling before servicing.
CAUTION
Precaution should be taken in explosive atmospheres.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC), the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.
2. All moving parts must be free to rotate without striking or rubbing any stationary objects.
3. Unit must be securely and adequately grounded.
4. Do not spin fan wheel faster than maximum cataloged fan RPM. Adjustments to fan speed significantly effects motor load. If the fan RPM is changed, the motor current should be checked to make sure it is not exceeding the motor nameplate amps.
5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to the unit while it is running.

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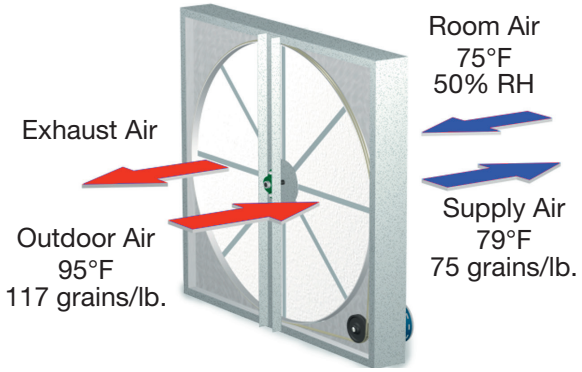
Unit Overview

Basic Unit

The ERW-E units are prewired such that when a call for outside air is made (via field supplied 24 VAC control signal wired to unit control center), the supply fan, exhaust fan and energy wheel are energized and optional motorized dampers open. The ERW-E is normally slaved (24 volt) to the roof top air handler. When the roof top air handler starts, the auxiliary contactor in the air handler closes to start the ERW-E.

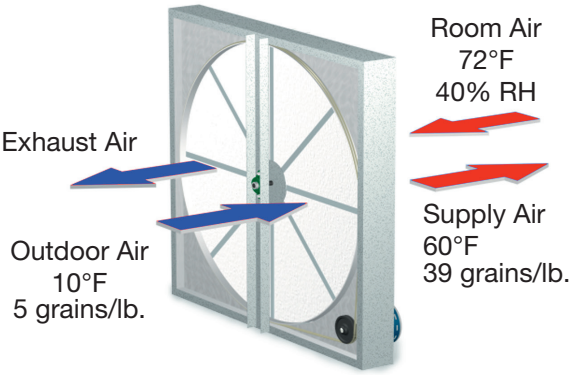
Summer Operation

Outdoor air is preconditioned (temperature and moisture levels are decreased) by the transfer of energy from the cooler, drier exhaust air via the energy recovery wheel. The preconditioned air is typically mixed with return air going back to the air handler for final conditioning.



Winter Operation

Outdoor air is preconditioned (temperature and moisture levels are increased) by the transfer of energy from the warmer, more humid exhaust air via the energy recovery wheel. The preconditioned air is typically mixed with return air going back to the air handler for final conditioning.



Receiving

This product may have been exposed to road salt during transit. If so, immediately wash off all visible white residue from all exterior surfaces. Upon receiving the product, check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier if any damage is detected, **do not refuse shipment**. The customer shall make notation of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which should be countersigned by the delivering carrier. If damaged, immediately contact your manufacturer's representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

Handling

Units are to be rigged and moved by the lifting brackets provided or by the skid when a forklift is used. Location of brackets varies by model and size. Handle in such a manner as to keep from scratching or chipping the coating. Damaged finish may reduce ability of unit to resist corrosion.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Storage

Units are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the unit and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

The ideal environment for the storage of units and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain, or snow. Units designed for outdoor applications may be stored outdoors. All accessories must be stored indoors in a clean, dry atmosphere.

Indoor

Maintain temperatures evenly to prevent condensation. Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. To avoid condensation, allow cold parts to reach room temperature. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ in. (89 mm) off the floor. Clearance should be provided to permit air circulation and space for inspection.

Outdoor

The unit should be placed on a level surface to prevent water from leaking into the unit. The unit should be elevated so that it is above water and snow levels. Ensure sufficient support to prevent unit from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight, and space for periodic inspection. To minimize water accumulation, place all unit parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles.

Inspection and Maintenance

While in storage, inspect units once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the fan wheel by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Units with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Wipe thoroughly clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Removing from Storage

As units are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the equipment goes into operation.

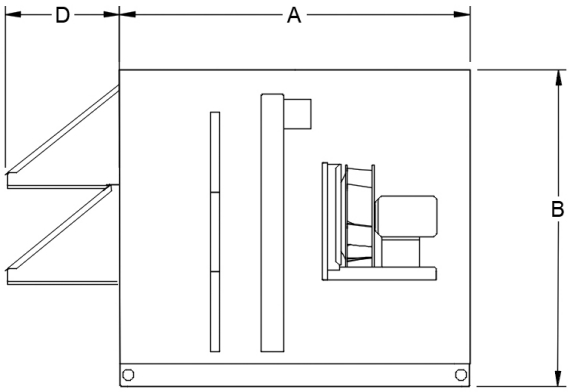
Prior to installing the unit and system components, inspect the unit assembly to make sure it is in working order.

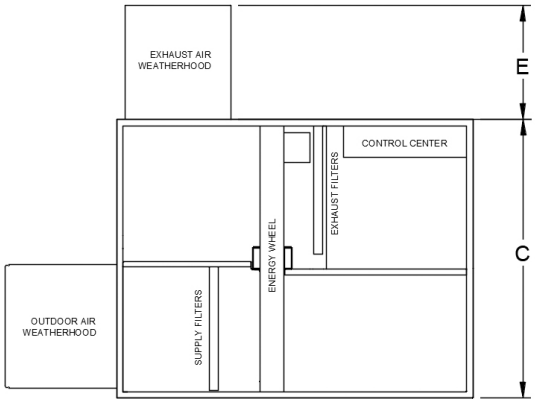
1. Check all fasteners, set screws on the fan, wheel, motor base, and accessories for tightness.
2. Rotate the fan wheel(s) by hand and assure no parts are rubbing.

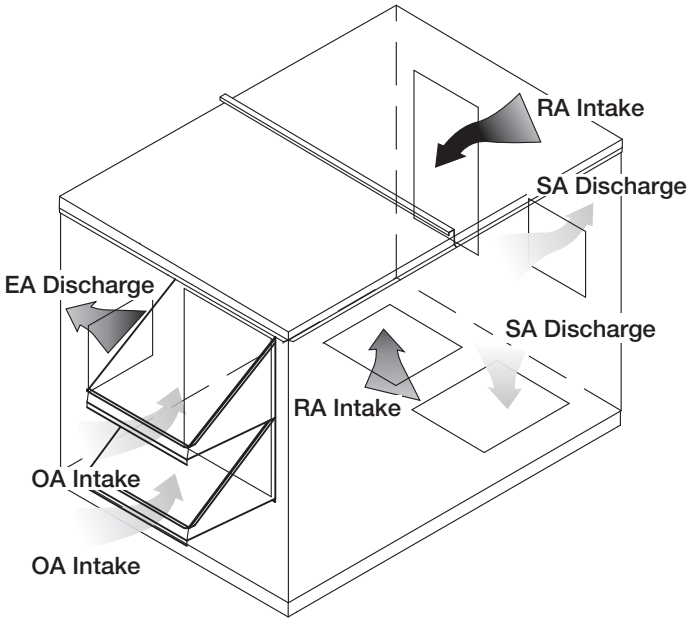
Installation

Dimensional Data

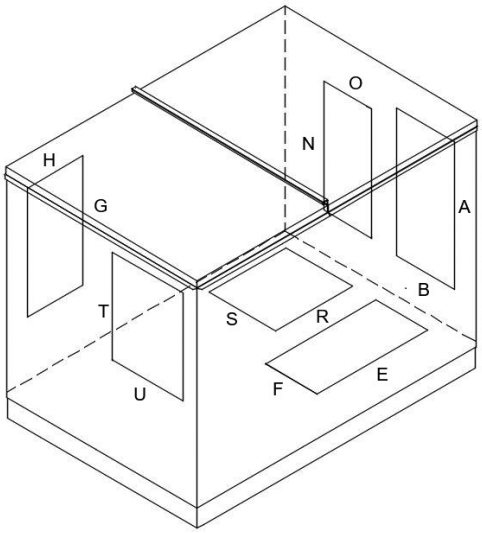
Unit Dimensions

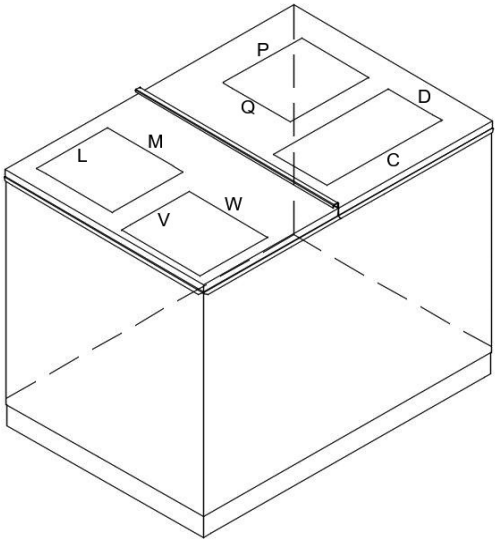


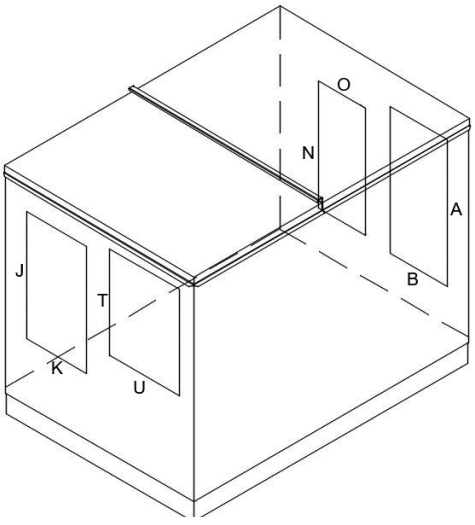




Duct Dimensions







Dimensional Data - *continued*

Unit Dimensions					
Model	A	B	C	D	E
ERW-E10	48.1	28.1	33.7	12.2	14.8
ERW-E20	65.9	52.6	45.1	18	20.7
ERW-E35	68.1	62.6	53.2	22.1	17.8
ERW-E45	72.1	68.9	60.2	22	19.1
ERW-E55	83	75.4	70.2	21.7	23.5

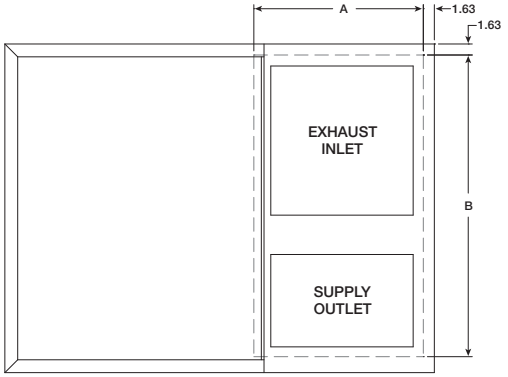
All dimensions are in inches. Door handles, hinges and other protrusions are not included in the dimensions above. Dimensions are rounded up to the nearest .1 inch.

Duct Dimensions							
	Model	End		Top		Bottom	
		A	B	C	D	E	F
		Length	Width	Length	Width	Length	Width
Supply	ERW-E10	6.8	7	N/A	N/A	6.8	7
	ERW-E20	30	14	26	11.75	26	12
	ERW-E35	36	18	28	14	28	14
	ERW-E45	41	19	28.75	16.25	28.75	16.25
	ERW-E55	45	25	33.5	21.625	33.5	21.625
	Model	Side		End		Top	
		G	H	J	K	L	M
		Length	Width	Length	Width	Length	Width
Exhaust	ERW-E10	6.8	7	6.8	7	N/A	N/A
	ERW-E20	26	14	26	14	16	16.75
	ERW-E35	32	18	32	18	21	16
	ERW-E45	35	17	22	20	35	17
	ERW-E55	39	25	25.75	25	25.75	25
	Model	End		Top		Bottom	
		N	O	P	Q	R	S
		Length	Width	Length	Width	Length	Width
Return	ERW-E10	16	10	N/A	N/A	16	10
	ERW-E20	26	11	15	17.5	18	15.5
	ERW-E35	28	16	21.25	20.25	21.5	20.5
	ERW-E45	30.25	19.25	25.25	17.75	25.5	24.5
	ERW-E55	35	24	29.5	20.5	26	28
	Model	End		Top			
		T	U	V	W		
		Length	Width	Length	Width		
Outdoor Air	ERW-E10	6.8	7	N/A	N/A		
	ERW-E20	22	16.75	15	17.5		
	ERW-E35	28	18.75	19.25	14		
	ERW-E45	28	22.75	19.25	15		
	ERW-E55	48	26.75	26	16.5		

All dimensions are in inches.

Intake and Discharge Options				
	Bottom	Top	Side	End
Outdoor Air (OA) Intake		X		X
Supply Air (SA) Discharge (to the space)	X	X	X	X
Return Air (RA) Intake (from the space)	X	X		X
Exhaust Air (EA) Discharge		X	X	X

Recommended Roof Opening & Weights



Model	A	B	Approx. Weight (lbs.)
ERW-E10	26.5	20	370
ERW-E20	22	37	1060
ERW-E35	25	44.5	1400
ERW-E45	27	51.5	1470
ERW-E55	27	60	2040

All dimensions are in inches. These weights include sheet metal weights added together with the largest motors, blowers and accessories for the units.

Position the unit roof opening such that the supply discharge and exhaust inlet of the unit will line up with the corresponding ductwork. Be sure to allow for the recommended service clearances when positioning the opening (see Service Clearances). Do not face the outdoor air intake of the unit into prevailing wind and keep the intake away from any other exhaust fans. Likewise, position the exhaust discharge opening away from outdoor air intakes of any other equipment.

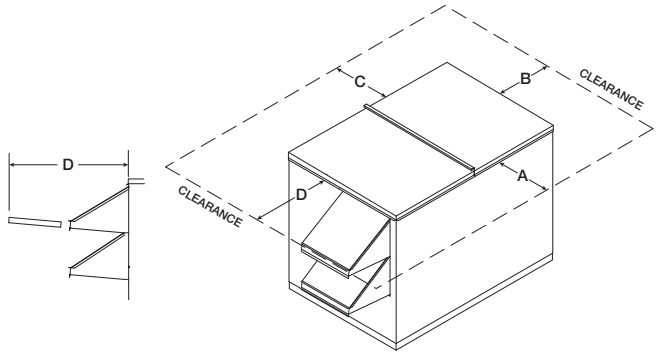
When cutting only duct openings, cut opening 1-inch **(25 mm)** larger than duct size to allow clearance for installation. Area enclosed by roof curb must comply with clearance to combustible materials. If the roof is constructed of combustible materials, area within the roof curb must be ventilated, left open, or covered with non-combustible material which has an “R” value of at least 5. If area within curb is open, higher radiated sound levels may result.

Where the supply or warm air duct passes thru a combustible roof, a clearance of one inch must be maintained between the outside edges of the duct and combustible material in accordance with NFPA Standard 90A.

Installation

Service Clearances

ERW-E units require minimum clearances to perform routine maintenance, such as filter replacement and energy wheel cassette inspection. Blower and motor assemblies, energy recovery wheel cassette and filter sections are always provided with a service door or panel for proper component access.

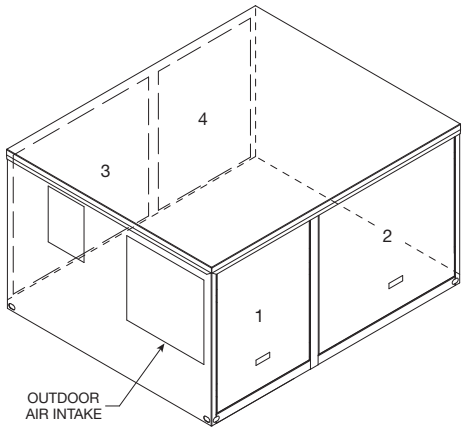


Recommended Service Clearances				
Model	A	B	C	D
ERW-E10	32	0	32	24
ERW-E20	24	24	42	35
ERW-E35	32	24	48	43
ERW-E45	32	24	54	43
ERW-E55	32	24	60	44

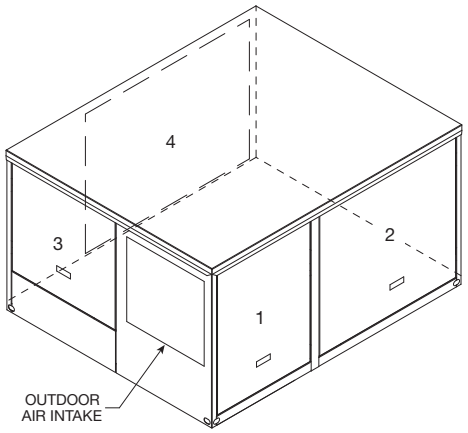
All dimensions are in inches.

Access Panel Description and Location

ERW-E10



Exhaust Air Discharge End

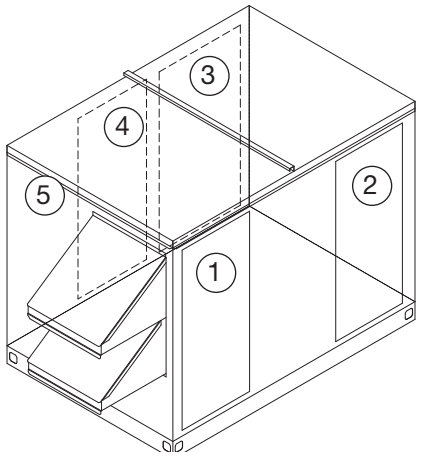


Exhaust Air Discharge Side

1	Outdoor air intake damper Preheater and controls Outdoor air sensors
2	Energy wheel cassette Supply filters Supply blower and motor
3	Exhaust blower and motor Exhaust filters (end exhaust discharge) Return air intake dampers (end exhaust discharge)
4	Electrical control center Main disconnect Exhaust filters (side exhaust discharge) Return air intake damper (side exhaust discharge)

Access Panel Description and Location - *continued*

ERW-E20, -30, -45, -55



1	Outdoor air filters Frost control Outdoor air sensors Preheater and controls Outdoor air intake damper
2	Supply blower and motor
3	Electric control center Main disconnect
4	Energy wheel cassette Exhaust air filters Exhaust air intake damper
5	Exhaust blower and motor Outdoor air intake damper actuator

Handling

While this unit was constructed with quality and dependability in mind, damage still may occur during handling of the unit for installation. Exercise extreme caution to prevent any damage from occurring to the refrigerant system.

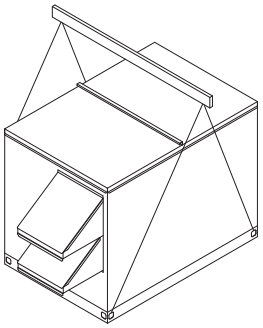
The system design and installation should follow accepted industry practice, such as described in the ASHRAE Handbook. Adequate space should be left around the unit for piping coils and drains, filter replacement, and maintenance. Sufficient space should be provided on the side of the unit for routine service and component removal should that become necessary.

Lifting

WARNING

All factory provided lifting lugs must be used when lifting the unit. Failure to comply with this safety precaution could result in property damage, serious injury or death.

1. Before lifting, be sure that all shipping material has been removed from unit.
2. To assist in determining rigging requirements, weights are shown below.
3. Unit must be lifted by all corner lifting points provided on base structure.
4. Rigger to use suitable mating hardware to attach to unit corner lifting points.
5. Spreader bar(s) must span the unit to prevent damage to the cabinet by the lift cables.



6. Always test-lift the unit to check for proper balance and rigging before hoisting to desired location.
7. Never lift units by weatherhoods.
8. Never lift units in windy conditions.
9. Preparation of curb and roof openings should be completed prior to lifting unit to the roof.
10. Check to be sure that gasketing (supplied by others) has been applied to the curb prior to lifting the unit and setting on curb.

Roof Curb Mounting

Roof curb details including duct location dimensions, are available on Roof Curb Assembly Instructions, Part Number 486436.

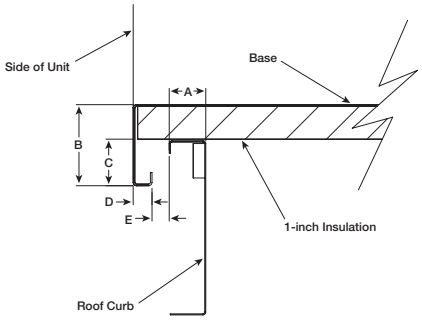
Rooftop units require curbs to be mounted first. The duct connections must be located so they will be clear of structural members of the building.

1. **Factory Supplied Roof Curbs:** Roof curbs are Model GKD. The GKD ships in a knockdown kit (includes duct adapter) and requires field assembly (by others). Assembly instructions are included with the GKD curbs.

Roof Curb Mounting - *continued*

2. **Install Curb:** Locate curb over roof opening and fasten in place. (Refer to Recommended Roof Openings). Check that the diagonal dimensions are within ±1/8 inch of each other and adjust as necessary. For proper unit operation, it is important that the installation be level. Shim as required to level.
3. **Install Ductwork:** Installation of all ducts should be done in accordance with SMACNA and AMCA guidelines. Duct adapter provided to support ducts prior to setting the unit.
4. **Install Insulation:** One-inch deep insulation pans were provided with the curb assembly. Install insulation prior to setting the unit. Insulation is not included from the factory.
5. **Set the Unit:** Lift unit to a point directly above the curb and duct openings. Guide unit while lowering to align with duct openings. Roof curbs fit inside the unit base. Make sure the unit is properly seated on the curb and is level.
6. **Fastening:** The installer is responsible for ensuring that the unit fastening methods are sufficient to account for the weight and size of these additional modules.

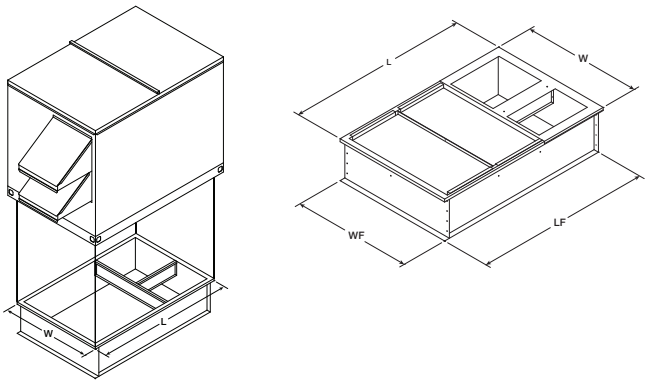
Curb Outside Dimensions and Weights



ERW-E10
Curb Cap Details for Factory Supplied Roof Curbs

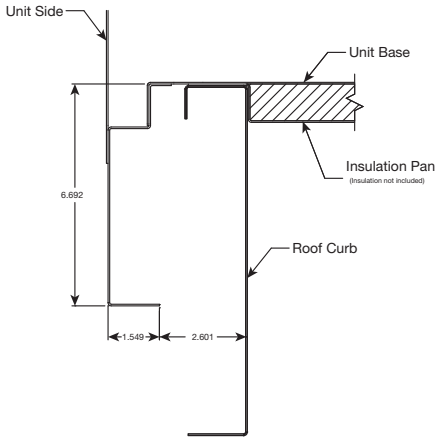
Model	A	B	C	D	E
ERW-E10	1.88	2	1	0.80	0.84

All dimensions are in inches.



Model	L	W	LF	WF	Curb Weight (lbs.)
ERW-E10	42.75	30.5	42.75	30.5	50
ERW-E20	61.103	40.353	61.007	40.161	93
ERW-E35	63.353	48.478	63.353	48.286	106
ERW-E45	67.353	55.478	67.353	55.286	120
ERW-E55	78.228	65.416	78.228	65.224	148

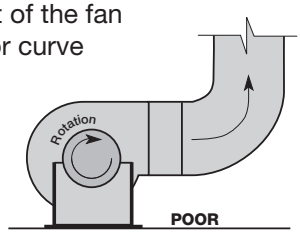
All dimensions are in inches.
Weights are for 14-inch high GKD type curbs.

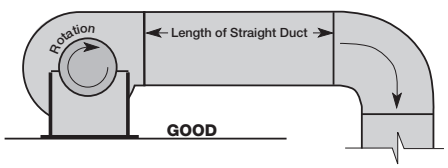


Curb Cap Details for Factory Supplied Roof Curbs

Ductwork Connections

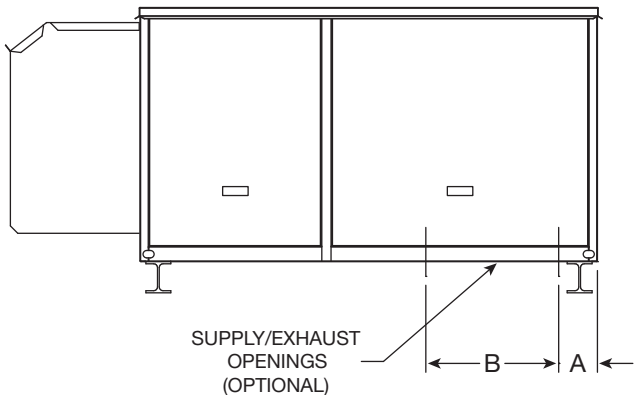
Examples of poor and good fan-to-duct connections are shown below. Airflow out of the fan should be directed straight or curve the same direction as the fan wheel rotates. Poor duct installation will result in low airflow and other system effects.





Installation

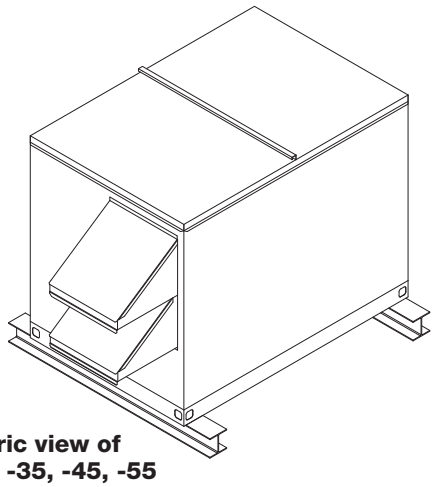
- Recommended discharge duct size and length should be calculated using the duct dimensions outlined on Page 5 and AMCA Publication 201 for effective duct length. Refer to plans for appropriate job specific duct size and/ or velocity limitations.
- Recommended duct sizes are based on velocities across the cfm range of each model at approximately 800 feet per minute (FPM) at minimum airflow and up to 1600 fpm at maximum airflow. Recommended duct sizes are only intended to be a guide and may not satisfy the requirements of the project. Refer to plans for appropriate job specific duct size and/or velocity limitations.
- Straight duct lengths were calculated based on 100% effective duct length requirements as prescribed in AMCA Publication 201. Calculated values have been rounded up to nearest foot.



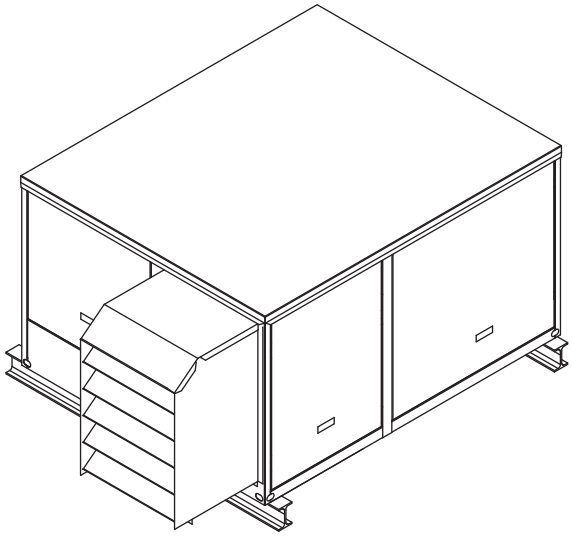
Side view of ERW-E10 on rails

Rail Mounting / Layout

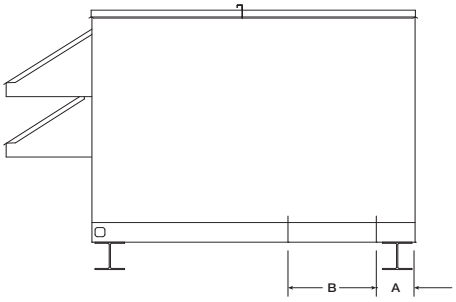
1. Rails designed to handle the weight of the ERW-E should be positioned as shown on the diagram (rails by others).
2. Make sure that rail positioning does not interfere with the supply air discharge opening or the exhaust air intake opening on the ERW-E unit. Avoid area dimensioned “B” below.
3. Rails should extend beyond the unit a minimum of 12 inches on each side.
4. Set unit on rails.



Isometric view of ERW-E20, -35, -45, -55 on rails



Isometric view of ERW-E10 on rails



Side view of ERW-E20, -35, -45, -55 on rails

Installation

Outdoor Air Weatherhood

Outdoor air weatherhood will be factory mounted.

Exhaust Weatherhood

The exhaust weatherhood is shipped separately as a kit with its own instructions.



Dampers

Backdraft dampers are always included as an integral part of the exhaust hood assemblies. Motorized outdoor air and exhaust air dampers are optional and are factory mounted and wired at the intake.



Electrical Information

The unit must be electrically grounded in accordance with the current National Electrical Code, ANSI/NFPA 70. In Canada, use current CSA Standard C22.1, Canadian Electrical Code, Part 1. In addition, the installer should be aware of any local ordinances or electrical company requirements that might apply. System power wiring must be properly fused and conform to the local and national electrical codes. System power wiring is to the unit main disconnect (door interlocking disconnect switch standard on most units) or distribution block and must be compatible with the ratings on the nameplate: supply power voltage, phase, and amperage (Minimum Circuit Amps - MCA, Maximum Overcurrent Protection - MOP). All wiring beyond this point has been done by the manufacturer and cannot be modified without affecting the unit's agency / safety certification.

If field installing an additional disconnect switch, it is recommended that there is at least four feet of service room between the switch and system access panels. When providing or replacing fuses in a fusible disconnect, use dual element time delay fuses and size according to the rating plate.

If power supply is desired through bottom of unit, run the wiring through the curb, cut a hole in the cabinet bottom, and wire to the disconnect switch. Seal penetration in cabinet bottom to prevent leakage.

The electric supply to the unit must meet stringent requirements for the system to operate properly. Voltage supply and voltage imbalance between phases should be within the following tolerances. If the power is not within these voltage tolerances, contact the power company prior to operating the system.

Voltage Supply: See voltage use range on the rating plate. Measure and record each supply leg voltage at all line disconnect switches. Readings must fall within the allowable range on the rating plate.

Voltage Imbalance: In a 3-phase system, excessive voltage imbalance between phases will cause motors to overheat and eventually fail. Maximum allowable imbalance is 2%. To determine voltage imbalance, use recorded voltage measurements in this formula.

Key: V1, V2, V3 = line voltages as measured

VA (average) = (V1 + V2 + V3) / 3

VD = Line voltage (V1, V2 or V3) that deviates farthest from average (VA)

Formula: % Voltage Imbalance = [100 x (VA-VD)] / VA

Electrical Information

CAUTION

If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105ºC.

CAUTION

High voltage wiring is run in the top roof panel(s) of this unit. Do not install sensors or other devices through the top panel(s).

WARNING

To prevent injury or death due to electrocution or contact with moving parts, lock disconnect switch open.

Most factory supplied electrical components are prewired. To determine what electrical accessories require additional field wiring, refer to the unit specific wiring diagram located on the inside of the unit control center access door. The low voltage control circuit is 24 VAC and control wiring should not exceed 0.75 ohms.

Refer to Field Control Wiring Length/Gauge table for wire length maximums for a given wire gauge.

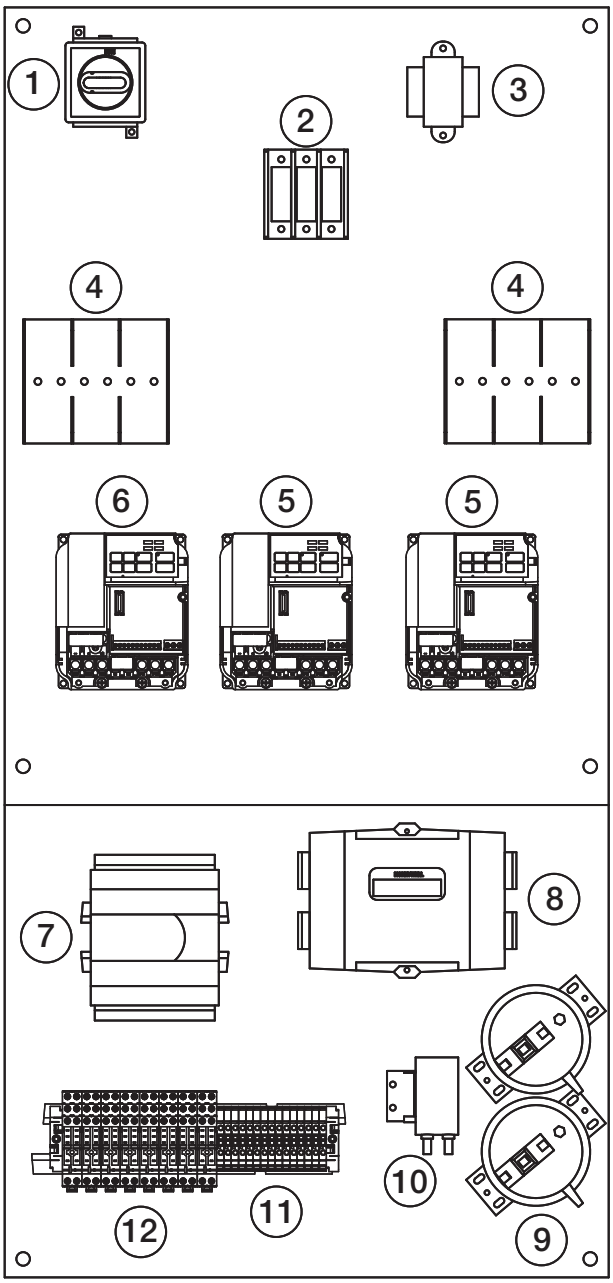
Field Control Wiring Length/Gauge	
Total Wire Length	Minimum Wire Gauge
125 ft.	18
200 ft.	16
300 ft.	14
450 ft.	12

Control wires should not be run inside the same conduit as that carrying the supply power. Make sure that field supplied conduit does not interfere with access panel operation.

If wire resistance exceeds 0.75 ohms, an industrial-style, plug-in relay should be added to the unit control center and wired in place of the remote switch (typically between terminal blocks R and G on the terminal strip (refer to Typical Control Center Components). The relay must be rated for at least 5 amps and have a 24 VAC coil. Failure to comply with these guidelines may cause motor starters to “chatter” or not pull in which can cause contactor failures and/or motor failures.

Typical Control Center Components

1. Main disconnect (non-fusible, lockable)
2. Distribution block
3. 24 VAC control transformer
4. Fuses
5. VFD blowers or contactor without VFD
6. VFD wheel or contactor without VFD
7. BMS controller
8. Outdoor airflow monitor
9. Dirty filter pressure switch
10. Wheel pressure switch
11. Low voltage terminal strip
12. Relays



Electrical Information

Optional Accessory Wiring Schematics

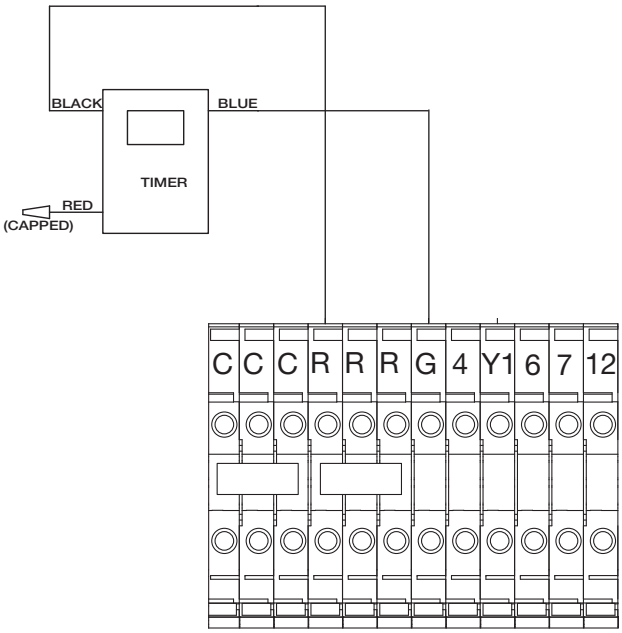
Remote Panel

The remote panel is available with a number of different alarm lights and switches to control the unit. The remote panel ships loose and requires mounting and wiring in the field. The remote panel is available with the following options:

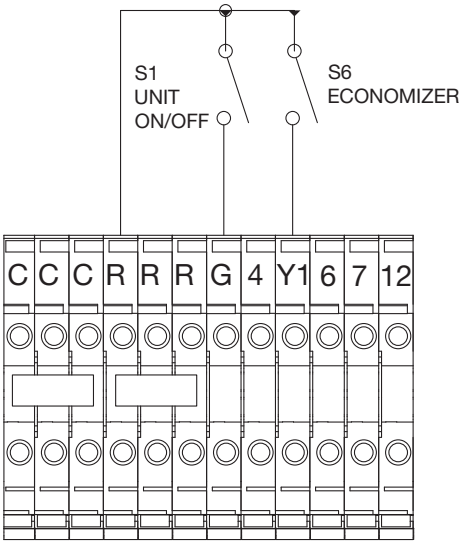
- Unit on/off switch
- Unit on/off light
- 7-day time clock
- Hand/off/auto switch
- Dirty filter light
- Economizer light
- Frost control light
- Wheel rotation sensor light



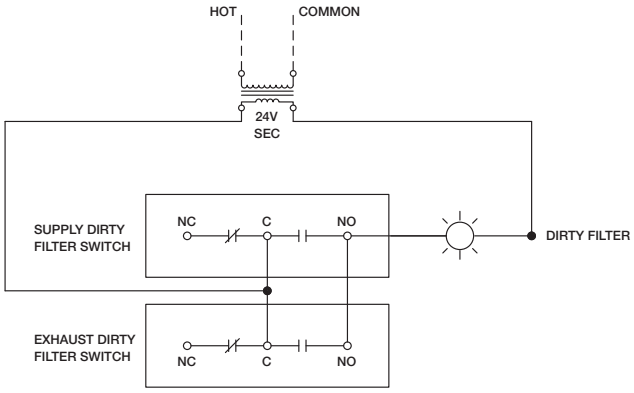
7-Day Timer



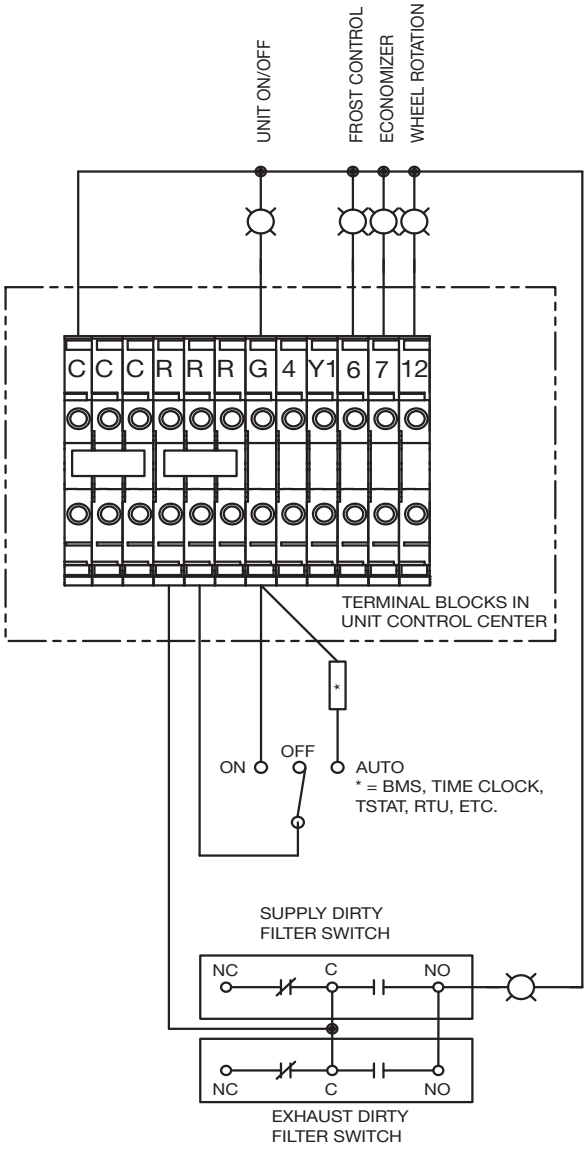
Unit Interfacing Terminals



Dirty Filter Indicator
(powered by others)



On/Off/Auto Switch & Indictor Light Wiring



ON/OFF/AUTO SWITCH ALLOWS THREE MODES OF OPERATION
"ON" - UNIT IS TURNED ON MANUALLY
"OFF" - UNIT IS TURNED OFF MANAUALLY
"AUTO" - UNIT IS CONTROLLED VIA SCHEDULER OF BMS, TIME CLOCK, TSTAT, ETC.

Optional Component Overview

Electric Heater

Factory installed electric heaters can be provided for preheat frost control. An electric preheater warms the outdoor air prior to the energy recovery wheel to prevent frosting on the wheel. Electric heaters are available in 208, 230, or 460 VAC (refer to heater nameplate for voltage).

Preheaters: Preheaters are standard as single-stage on/off control. Preheaters are single point wired at the factory. A thermodisc temperature sensor (with a 5°F set point) is mounted in the outdoor airstream after the preheater to turn the preheater on. See Frost Control Application/Operation for typical set points. If the temperature falls below the set point and the wheel pressure drop sensor is triggered, the preheater will turn on.

Access to the preheater control panel is through the outdoor air filter door.

Economizer

The energy wheel operation can be altered to take advantage of economizer operation (free cooling). Available modes are:

1. Stop wheel
2. Modulating wheel
3. Exhaust only operation

Stop wheel: A field-supplied call for cool (Y1) is required. De-energizing the wheel is accomplished one of three ways:

1. The outdoor air temperature is less than the outdoor dry bulb set point (DRYBLB SET)
2. The outdoor air temperature is less than the return air temperature
3. The outdoor air enthalpy is within the preset enthalpy curve

Effectively, the two sensors create a deadband where the energy recovery wheel will not operate and free cooling from outside can be brought into the building unconditioned.

Modulating wheel (factory): A variable frequency drive is fully programmed at the factory. A “call for cool” must be field wired to the unit (terminals provided in unit-refer to wiring diagram in unit control center) to allow for initiation of economizer mode. The unit recognizes economizer conditions based one of the previously mention sensors and set points. The unit will then modulate the wheel speed to maintain the mixed air temperature set point (MAT SET).

Modulating wheel (by others): A variable frequency drive is fully programmed at the factory. A field-supplied 0-10 Vdc signal will be required for operation of the energy wheel. The field will be required to have full control of the energy wheel speed at all times. If no 0-10 Vdc signal is provided, the energy wheel will run at the factory default of 3 Hz and no energy transfer will be captured.

Exhaust only operation: The unit will have the capability to receive an external signal to power the supply fan on/off.

Frost Control

Extremely cold outdoor air temperatures can cause moisture condensation and frosting on the energy recovery wheel. Frost control is an optional feature that will prevent/control wheel frosting. Available options are:

1. Timed exhaust
2. Electric preheat
3. Modulating wheel

All of these options are provided with a Therm-O Disc mounted in the outdoor air intake compartment and a pressure sensor to monitor pressure drop across the energy wheel.

An outdoor air temperature of below 5ºF and an increase in pressure drop would indicate that frost is occurring. Both the pressure sensor and the outdoor air thermodisc must trigger in order to initiate frost control. The two sensors together ensure that frost control is only initiated during a real frost condition.

Timed exhaust frost control includes a timer in addition to the thermodisc and wheel pressure sensor. When timed exhaust frost control is initiated, the timer will turn the supply blower off. Time exhaust using default timer setting will shut down the supply fan for 5 minutes every 30 minutes to allow exhaust to defrost energy wheel. Use the test procedure in the Optional Start-Up Accessories section for troubleshooting.

Electric preheat frost control includes an electric heater (at outdoor air intake) in addition to the thermodisc and pressure sensor on wheel. When electric preheat frost control is initiated, the electric preheater will turn on and warm the air entering the energy wheel to avoid frosting. Use the test procedure in the Optional Start-Up Accessories section for troubleshooting.

Modulating wheel frost control includes a variable frequency drive (VFD) in addition to the thermodisc and pressure sensor. When modulating wheel frost control is initiated, the VFD will reduce the speed of the wheel. Reducing the speed of the energy wheel reduces its effectiveness, which keeps the exhaust air condition from reaching saturation, thus, eliminating condensation and frosting. If the outdoor air temperature is greater than the frost threshold temperature OR the pressure differential is less than the set point, the wheel will run at full speed. If the outdoor air temperature is less than 5ºF AND the pressure differential is greater than the set point, the wheel will run at reduced speed until the pressure differential falls below the set point. The VFD will be fully programmed at the factory.

Optional Component Overview

Variable Frequency Drives (VFD)

VFDs are used to control the speed of the fan as either multi-speed or modulating control. Multi-speed VFDs reference a contact which can be made by a switch or a sensor with a satisfied set point. Modulating control references a 2-10 Vdc signal to the VFD which will vary the fan speed from a minimum 50% to full 100% rpm. An optional CO_2 sensor is available to provide both a set point contact or a modulating 2-10 Vdc signal.

CO_2 Sensor

This accessory is often used in Demand Control Ventilation (DCV) applications. The factory provided sensors can either be set to reference a set point for multi-speed operation, or output a 2-10 Vdc signal to modulate the fan speed. These can either be shipped loose to mount in the ductwork, or can be factory mounted in the return air intake. Follow instructions supplied with sensor for installation and wiring details.

Rotation Sensor

The rotation sensor monitors energy wheel rotation. If the wheel should stop rotating, the sensor will close a set of contacts in the unit control center. Field-wiring of a light (or other alarm) between terminals R and 12 in the unit control center will notify maintenance personnel when a failure has occurred.

Dirty Filter Sensor

Dirty filter sensors monitor pressure drop across the outdoor air filters, exhaust air filters, or both. If the pressure drop across the filters exceeds the set point, the sensor will close a set of contacts in the unit control center. Field-wiring of a light (or other alarm) to these contacts will notify maintenance personnel when filters need to be replaced. The switch has not been set at the factory due to external system losses that will affect the switch. This switch will need minor field adjustments after the unit has been installed with all ductwork complete. The dirty filter switch is mounted in the exhaust inlet compartment next to the unit control center or in unit control center.

Service Outlet

120 VAC GFCI service outlet ships loose for field installation. Requires separate power source so power is available when unit main disconnect is turned off for servicing.

Airflow Monitor

A factory-wired, mounted, and powered airflow monitoring system is provided in the outdoor and/or exhaust air streams. The airflow control system offers the following functionality:

- Display of outdoor and/or exhaust airflow rate in actual cubic feet per minute (CFM) or actual liters per second (LPS) on a 16 character LCD display.
- Two configurable analog outputs for transmitting outdoor and/or exhaust airflow rate, outdoor air temperature, or a proportional-integral-derivative (PID) control signal based on an outdoor airflow set point.
- A configurable digital output that operates based on an airflow set point or range.

Operation

Outdoor and/or exhaust airflow monitoring is accomplished using two thermal dispersion sensors that accurately measure airflow velocity down to zero feet per minute (fpm). The airflow controller takes the average measurement for two sensor configurations, and determines the outdoor airflow rate based on the effective intake area. Field calibration of the outdoor airflow monitoring device determines the effective intake area of the unit. Refer to GreenTrol® Automation Inc. GF-N2211 technical data sheet for further detail.

IMPORTANT

For the airflow monitoring device to perform as intended, field calibration is required. Calibration of the airflow monitoring device requires an independent measurement of airflow and should be performed when the system undergoes test and balance.

Start-Up

DANGER

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit to OFF at disconnect switch(es). Unit may have multiple power supplies.

WARNING

Use caution when removing access panels or other unit components, especially while standing on a ladder or other potentially unsteady base. Access panels and unit components can be heavy and serious injury may occur.

Do not operate energy recovery ventilator without the filters and birdscreens installed. They prevent the entry of foreign objects such as leaves, birds, etc.

CAUTION

Do not run unit during construction phase. Damage to internal components may result and void warranty.

General Start-Up Information

Every installation requires a comprehensive start-up to ensure proper operation of the unit. As part of that process, the following checklist must be completed and information recorded. Starting up the unit in accordance with this checklist will not only ensure proper operation, but will also provide valuable information to personnel performing future maintenance. Should an issue arise which requires factory assistance, this completed document will allow unit experts to provide quicker resolve. Qualified personnel should perform start-up to ensure safe and proper practices are followed.

Unit Model Number _____
(e.g. ERW-E20)

Unit Serial Number _____
(e.g. 10111000)

Energy Wheel Date Code _____
(e.g. 0450)

Start-Up Date _____

Start-Up Personnel Name _____

Start-Up Company _____

Phone Number _____

Pre Start-Up Checklist – check as items are completed.

- ☐ Disconnect and lock-out all power switches
- ☐ Remove any foreign objects that are located in the energy recovery unit.
- ☐ Check all fasteners, set-screws, and locking collars on the fans, motor bases and accessories for tightness.
- ☐ Rotate the fan wheels and energy recovery wheels by hand and ensure no parts are rubbing. If rubbing occurs, refer to Start-Up section for more information.
- ☐ Filters can load up with dirt during building construction. Replace any dirty pleated filters and clean the aluminum mesh filters in the intake hood. Refer to Routine Maintenance section.
- ☐ Verify that non-motorized dampers open and close properly.
- ☐ Check the tightness of all factory wiring connections.
- ☐ Verify control wire gauge. Refer to the Electrical Connections section.
- ☐ Verify diameter seal settings on the energy recovery wheel. Refer to Start-Up section for more information.
- ☐ Install exhaust inlet motorized damper. Refer to Unit Accessories section.

SPECIAL TOOLS REQUIRED

- Voltage Meter (with wire probes)
- Amperage Meter
- Thermometer
- Tachometer
- Incline manometer or equivalent

Start-Up Checklist

The unit will be in operational mode during start-up. Use necessary precautions to avoid injury. All data must be collected while the unit is running. In order to measure volts and amps, the control center door must be open, and the unit energized using a crescent wrench to turn the disconnect handle.

Check line voltage at unit disconnect

_____ L1-L2 volts
_____ L2-L3 volts
_____ L1-L3 volts

Motor Amp Draw

• Supply Fan		• Exhaust Fan	
_____	L1 amps	_____	L1 amps
_____	L2 amps	_____	L2 amps
_____	L3 amps	_____	L3 amps

• Energy Wheel

_____ L1 amps
_____ L2 amps
_____ L3 amps

Fan RPM

_____ Supply Fan _____ Exhaust Fan

Correct fan rotation direction

Supply Fan Yes / No
Exhaust Fan Yes / No

Start-Up

Optional Accessories Checklist

Refer to the respective sections in this Installation, Operation and Maintenance Manual for detailed information.

Refer to wiring diagram in unit control center to determine what electrical accessories were provided.

Provided with Unit?		Frost Control Application / Operation section:	Setting	Factory Default
Yes	No	Frost Control set point		5ºF
		Differential		2ºF
		Timer		Refer to IOM
Yes	No	Frost Control Modulating		Refer to IOM

Economizer Application / Operation section:				
Yes	No	Economizer (temperature)		
		Set point		65ºF
		Offset		20ºF
		Differential		2ºF
Yes	No	Economizer (enthalpy)		
		Set point		D
Yes	No	Economizer (modulating)		Refer to IOM

Optional Accessories section:			Operational		
Yes	No	Wheel Rotation Sensor	Yes	No	N/A
Yes	No	OA Dirty Filter Sensor	Yes	No	N/A
Yes	No	EA Dirty Filter Sensor	Yes	No	N/A
Yes	No	CO_2 Sensor	Yes	No	N/A
Yes	No	Service Outlet	Yes	No	N/A
Yes	No	Remote Control Panel	Yes	No	N/A

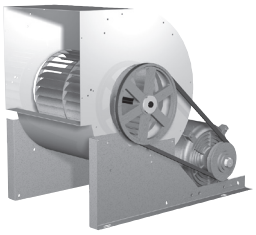
Variable Frequency Drives section:		Operational		
	Blower VFDs	Yes	No	N/A
	Wheel VFD	Yes	No	N/A

Damper section:			Operational		
Yes	No	Outdoor Air Damper	Yes	No	N/A
Yes	No	Exhaust Air Damper	Yes	No	N/A

Start-Up Components

Fans

The ERW-E10 models contain two forward curved (supply and exhaust) fans. These forward curved fans should be checked for free rotation. If any binding occurs, check for concealed damage and foreign objects in the fan housing.



Forward Curved Fan

CAUTION

When operating conditions of the fan are to be changed (speed, pressure, temperature, etc.), consult the manufacturer to determine if the unit can operate safely at the new conditions.

Plenum Fans

Models ERW-E20, ERW-E35, ERW-E45, and ERW-E55 each contain two plenum fans, one exhaust and one supply.

Plenum fans are single width, single inlet fans. The impellers are unhoused with blades that curve away from the direction of rotation. These fans throw the air radially outward, approximately 90 degrees from the inlet direction.

Plenum Fan Alignment

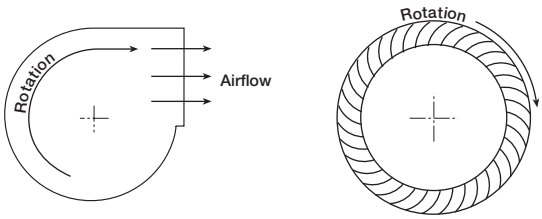
If necessary, adjust wheel position by loosening the wheel hub from the motor shaft. Adjust wheel position so the back edge of the plenum wheel is 8-inches from the inside face of the venturi panel.

Fan Performance Modifications

Due to job specification revisions, it may be necessary to adjust or change the sheave or pulley to obtain the desired airflow at the time of installation. Start-up technician must check blower amperage to ensure that the amperage listed on the motor nameplate is not exceeded. Amperage to be tested with access doors closed and ductwork installed.

Direction of Fan Wheel Rotation

Blower access is labeled on unit. Check for proper wheel rotation by momentarily energizing the fan. Rotation is determined by viewing the wheel from the drive side and should match the rotation decal affixed to the fan housing (see Rotation Direction figures). If the wheel is rotating the wrong way, direction can be reversed by interchanging any two of the three electrical leads. Check for unusual noise, vibration, or overheating of bearings. Refer to the Troubleshooting section of this manual if a problem develops.



Forward Curved

Fan RPM

Supply fan and exhaust fan will have an adjustable motor pulley (on 15 HP and below) preset at the factory to the customer specified RPM. Fan speed can be increased or decreased by adjusting the pitch diameter of the motor pulley. Multi-groove variable pitch pulleys must be adjusted an equal number of turns open or closed. Any increase in fan speed represents a substantial increase in load on the motor. Always check the motor amperage reading and compare it to the amperage rating shown on the motor nameplate when changing fan RPM. All access doors must be installed except the control center door. ***Do not operate units with access doors open or without proper ductwork in place as the fan motors will overload.***

Start-Up Components

Vibration

Excessive vibration may be experienced during initial start-up. Left unchecked, excessive vibration can cause a multitude of problems, including structural and/or component failure. The most common sources of vibration are listed.

Wheel Unbalance
Mechanical Looseness
Poor Inlet/Outlet Conditions
Foundation Stiffness

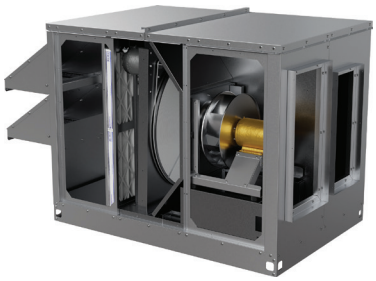
Many of these conditions can be discovered by careful observation. Refer to the Troubleshooting section of this manual for corrective actions. If observation cannot locate the source of vibration, a qualified technician using vibration analysis equipment should be consulted. If the problem is wheel unbalance, in-place balancing can be done.

Generally, fan vibration and noise is transmitted to other parts of the building by the ductwork. To eliminate this undesirable effect, the use of heavy canvas connectors is recommended.

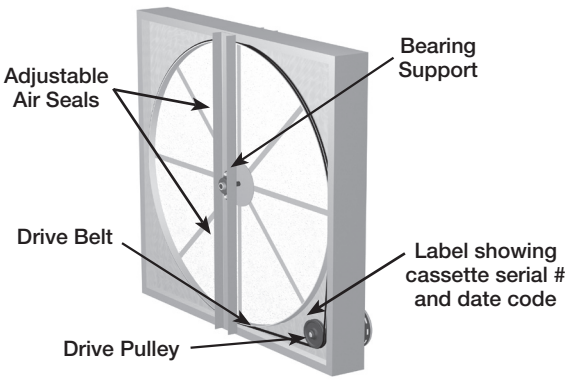
Energy Recovery Wheel

The ERW-E models contain a total energy recovery wheel. The wheels are inspected for proper mechanical operation at the factory. However, during shipping and handling, shifting can occur that may affect wheel operation. The wheel is accessible through the access door marked "Energy Wheel Cassette Access".

Turn the energy recovery wheels by hand to verify free operation. The wheel should rotate smoothly and should not wobble.



Inside layout of ERW-E



Drive Belt

Inspect the drive belt. Make sure the belt rides smoothly through the pulley and over the wheel rim.

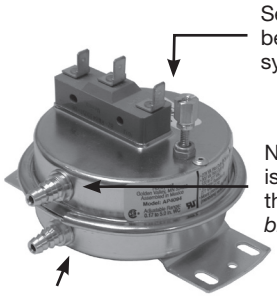
Air Seals

Check that the air seals located around the outside of the wheel and across the center (both sides of wheel) are secure and in good condition. Air seal clearance is determined by placing a sheet of paper, to act as a feeler gauge, against the wheel face. To access seals, follow the instructions in the Energy Recovery Wheel Maintenance section. To adjust the air seals, loosen all eight seal retaining screws. These screws are located on the bearing support that spans the length of the cassette through the wheel center. Tighten the screws so the air seals tug slightly on the sheet of paper.

Replace cassette into unit, plug in wheel drive, replace access door and apply power. Observe by opening door slightly (remove filters if necessary to view wheel) the wheel should rotate freely at about 20-40 RPM.

Optional Start-Up Components

Dirty Filter Switch



To adjust the switch, the unit must be running with all of the access doors in place, except for the compartment where the switch is located (exhaust intake compartment). The adjusting screw is located on the top of the switch.

1. Open the filter compartment and place a sheet of plastic or cardboard over 50% of the filter media.
2. Replace the filter compartment door.
3. Check to see if there is power at the alert signal leads (refer to electrical diagram).
4. Whether there is power or not, turn the adjustment screw on the dirty filter gauge (clockwise if you did not have power, counterclockwise if you did have power) until the power comes on or just before the power goes off.
5. Open the filter compartment and remove the obstructing material.
6. Replace the door and check to make sure that you do **not** have power at the alert signal leads.

The unit is now ready for operation.

Optional Start-Up Components

Economizer

Relevant Set Points

1. MAT SET The mixed air temperature set point after the energy wheel. The control will modulate the energy wheel to maintain temperature as best as it can. (Set point menu, default 53°F)
2. LOW T LOCK The set point for the low temperature mechanical cooling lockout. (Set point menu, default 32°F)
3. DRYBLB SET The outdoor air set point to call for economizer. (Set point menu, default 63°F)
4. MIN POS The minimum signal voltage sent to the energy wheel. This must be set to 2 Vdc. (Set point menu, default 2.8 Vdc)
5. AUX1 O The controllers operating sequence structure. (Set point menu, default 'None')
6. ERV OAT SP The set point for low temperature economizer lockout. This is the low temperature set point when AUX1 O is set to ERV. (Set point menu, default 32°F)
7. STG3 DLY Time delay after second cooling stage is enabled (Advanced setup menu, default 2 hrs.)

Using the Keypad with Settings and Parameters

To use the keypad when working with Set points, System and Advanced Settings, Checkout tests, and Alarms:

1. Navigate to the desired menu.
2. Press ↵ (enter) to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press ↵ (enter) to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.*
6. Press the ▼ button to increase (change) the displayed parameter value.*
7. Press ↵ (enter) to accept the displayed value and store it in non-volatile RAM.
8. CHANGE STORED displays.
9. Press ↵ (enter) to return the current menu parameter.
10. Press ⓘ (escape) to return to the current menu parameter.

* When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

The table shows which set points are relevant to the given sequences. Refer to the wiring diagram for the units's sequence.

	MODULATE WHEEL			STOP WHEEL		
	OA Temp	OA Enthalpy	OA/RA Temp Differential	OA Temp	OA Enthalpy	OA/RA Temp Differential
DRYBLB SET	X			X		
MAT SET	X	X	X	X	X	X
LOW T LOCK	X	X	X	X	X	X
ERV OAT SP				X	X	X
MIN POS	X	X	X			
AUX1 OUT				ERV	ERV	ERV
STG3 DLY	X	X	X	X	X	X

Stop Wheel

1. Navigate to the Checkout menu and press ↵ enter).
2. The energy wheel and cooling should stop.
3. Navigate to Connect ERV and press ↵ (enter) twice to run the test.
4. Voltage between AUX1-O and C should be 24 VAC. The energy wheel should activate.

Modulate Wheel

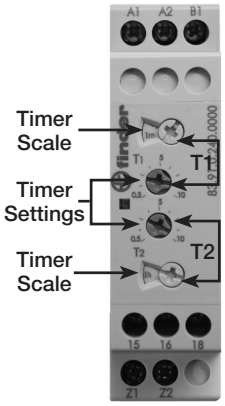
1. Navigate to the Checkout menu and press ↵ Enter).
2. The cooling should turn off and the wheel should be rotating at full speed.
3. Navigate to Damper Open and press ↵ (enter) twice to run the test.
4. Voltage between terminals ACT 2-10 and ACT COM should be 10 Vdc. This will slow the wheel down to minimum speed.
5. Press ⓘ (escape), navigate to Damper Close and press ↵ (enter) twice to run the test.
6. Voltage between terminal ACT 2-10 and ACT COM should be 2 Vdc. This will speed the wheel up to maximum speed.

Optional Start-Up Components

Frost Control

Timed Exhaust

1. Remove power from unit.
2. Jumper the frost indicating wheel pressure switch in the unit control center.
3. Jumper the temperature indicating thermodisc in the unit control center. Thermodisc has a pre-set temperature of 5ºF.
4. Set the frost control timer scale for T1 and T2 to 1m. Set the timer settings for T1 and T2 to 10.
5. Add power to the unit. Blower should cycle on for one minute, then turn off for one minute.
6. Remove power from unit and remove jumpers that were placed. Re-set timer settings.
   - **T1** timer setting set to **5** and timer scale set to **10m** for 5 minutes of wheel off time.
   - **T2** timer setting set to **5** and timer scale set to **1h** for 30 minutes of wheel on time.



Electric Preheat

1. Remove power from unit.
2. Jumper the frost indicating wheel pressure switch in the preheat control center.
3. Jumper the temperature indicating thermodisc in the preheat control center. Thermodisc has a pre-set temperature of 5º F.
4. Apply power to unit. Preheater should turn on.

Variable Frequency Drives

Factory installed, wired and programmed variable frequency drives (FVDs) have been provided for modulating or multi-speed control of the blowers and energy recovery wheel for economizer and frost control modes. One VFD, either ABB (ACH180 / ACS180) or Yaskawa (V1000 or J1000), is provided for each blower (supply air and exhaust) and one VFD for the energy recovery wheel.

Refer to the tables in this section for factory settings and field wiring requirements. Refer to the unit control center for unit specific wiring diagram. When making adjustments outside of the factory set points, refer to the VFD instruction manual available online for you VFD.

Control Connections

ABB (ACH180 / ACS180)



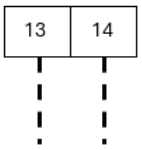
Connections

1. Safe torque-off connection
2. Relay output connection
3. EIA-485 termination jumper
4. Digital inputs and outputs
5. Analog inputs and outputs
6. EIA-485 (Modbus RTU, BACnet MS/TP, etc.)
7. Panel connector (external panel or adapter for PC connection)
8. Cold configuration connection for CCA-01 (frames R2...R4 only)

Option 1 ~ 0-10V

User to provide isolation as required

0-10 VDC CONTROL SIGNAL (BY OTHERS)
WIRED TO 13 (+) AND 14 (COMMON)
0 VDC= 50% of Max speed
10 VDC = Max speed
FOR ONE 0-10SIGNAL, WIRE THE DRIVES IN PARALLEL
SEE VFD INSTALATION MANUAL FOR MORE DETAIL.



Optional Start-Up Components

Factory Set Points

With Direct Drive units, the Variable frequency drives (VFD's) for the blowers are factory set up to operate at constant speed or modulating.

- Constant speed: VFD is set to run at the maximum speed required for the application
- Modulating: 0-10 VDC signal wired in the field by others or via our microprocessor varies the speed of the blower between maximum speed and 50% maximum speed.
    - Units may be selected with CO2 sensors which follow the sequence outlined in the microprocessor IOM.

For Drive Operation

- Terminal 8 to Terminal 21 contact for On/Off
- Terminal 14 (AI1 0-10Vdc) referenced to Terminal 13 (AGND)

Default control connection for the ABB standard macro

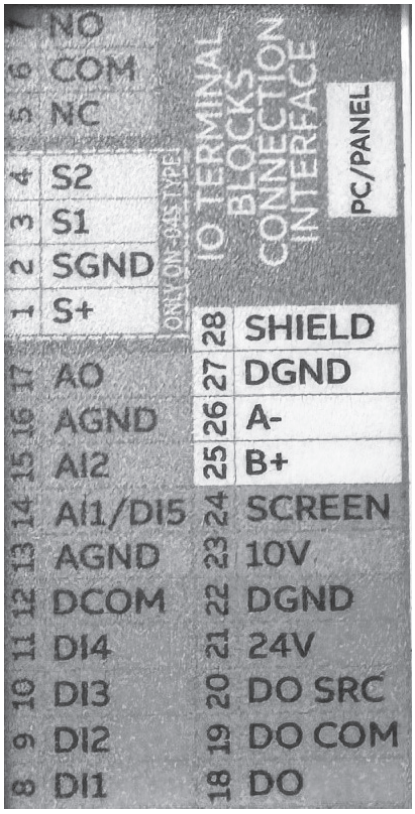


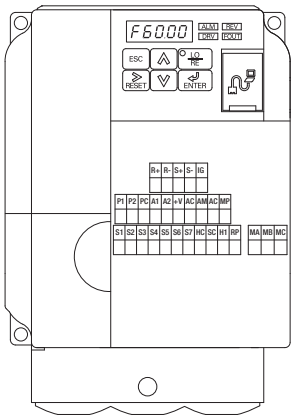
ABB Drive Parameters (Blowers)			
Parameter	Description	Microprocessor	Terminal Strip
1024	Fault function	12	16
1217	A1 Bias (scaling 0-10)	0	0
1218	A1 Gain (scaling 0-10)	10	10
1219	Min Freq for 0V	0	50% of 1220
1220	Max Freq for 10V	TBD	TBD
2011	Stopping Method	1	1
2041	Start Interlock	0	0
2103	Stop Mode	1	1
2119	Scalar Start	1	1
2211	Stop Method	0	0
2222	Speed Selection1	0	0
2223	Speed Selection2	0	0
2821	Freq Function	1	1
2822	SW 1	0	0
2823	SW 2	0	0
2824	SW 3	0	0
2827	Speed 2	0	0
2828	Speed 3	0	0
2831	Speed 4	0	0
2872	Acel	10	10
2873	Decel	10	10
3014	Max Frequency	TBD	TBD
3111	Auto Reset	0	0
3114	Resets	5	5
3115	Reset Time	60	60
3556	Motor Protect	2	2
4601	Speed Scale	1800	1800
4602	Freq Scale	60	60
4632	Speed Agreement	15	15
9607	SAVE	1	1
9906	Motor FLA	TDB	TBD
9909	Motor Speed	TDB	TBD
9913	Motor ID	2	2

Optional Start-Up Components

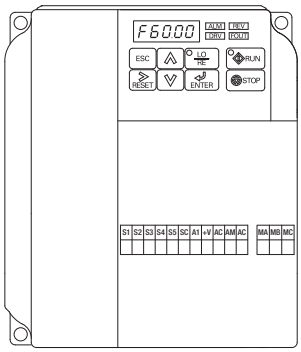
ABB Variable Frequency Drive Parameters for Energy Recovery Wheel			
Parameter	Description	Microprocessor	Terminal Strip
1024	Fault function	12	16
1217	A1 Bias (scaling 0-10)	0	2
1218	A1 Gain (scaling 0-10)	10	10
1219	Min Freq for 0V	3	45
1220	Max Freq for 10V	45	3
2011	Stopping Method	1	1
2041	Start Interlock	0	0
2103	Stop Mode	1	1
2119	Scalar Start	1	1
2211	Stop Method	0	0
2222	Speed Selection1	0	0
2223	Speed Selection2	0	0
2821	Freq Function	1	1
2822	SW 1	3	3
2823	SW 2	0	0
2826	Speed 1	6	6
2871	Freq 2 Ramp	5	5
2872	Acel	10	10
2873	Decel	10	10
2875	Decel2	600	600
3014	Max Frequency	45	45
3111	Auto Reset	0	0
3114	Resets	5	5
3115	Reset Time	60	60
3551	Motor Load	120	120
3552	ZeroSpeed	100	100
3554	Motor Temp Char	221	221
3556	Motor Protect	2	2
4601	Speed Scale	1800	1800
4602	Freq Scale	60	60
4632	Speed Agreement	10	10
9607	SAVE	1	1
9906	Motor FLA	TDB	TBD
9907	Motor Voltage	TDB	TBD
9909	Motor Speed	1140	1140
9913	Motor ID	2	2

Control Connections

Yaskawa (V1000 or J1000)



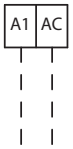
V1000



J1000

☐ OPTION 1 - 0-10 VDC CONTROL

USER TO PROVIDE ISOLATION AS REQUIRED



0-10 VDC CONTROL SIGNAL (BY OTHERS)
WIRED TO A1 (+) AND AC (COMMON)
0 VDC = 30 Hz
10 VDC = 60 Hz

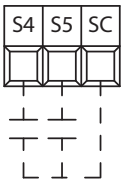
FOR ONE 0-10 SIGNAL, WIRE TO DRIVES IN PARALLEL

SEE VFD INSTALLATION MANUAL FOR MORE DETAIL

FOR CONTINUOUS 60Hz OPERATION JUMPER TERMINALS A1 AND +V.

☐ OPTION 2 - MULTI SPEED CONTROL

USER TO PROVIDE CONTACTS AND ISOLATION AS REQUIRED



NEITHER S4 OR S5 CONTACT CLOSED
DRIVE SPEED = 60 Hz.

S4 TO SC CONTACT CLOSED (BY OTHERS)
DRIVE SPEED = 40 Hz.

S5 TO SC CONTACT CLOSED (BY OTHERS)
DRIVE SPEED = 30 Hz.

SEE VFD INSTALLATION MANUAL FOR MORE DETAIL

TO CHANGE THE FACTORY SET Hz CHANGE THE FOLLOWING PARAMETERS.
PARAMETER A1-01 CHANGE TO 2
PARAMETER d1-01 FOR NEW 60Hz SETTING
PARAMETER d1-02 FOR NEW 40Hz SETTING
PARAMETER d1-03 FOR NEW 30Hz SETTING
PARAMETER A1-01 CHANGE TO 0

Optional Start-Up Components

Factory Set Points

Variable frequency drives (VFDs) for the blowers are factory setup to operate in one of the three following modes:

- **Modulating:** 0-10 Vdc signal wired in the field by others varies the speed of the blower between 30 and 60 Hz
- **Multi-speed:** Digital contact closures by others command the VFD to run at multiple speed settings:
  - Open - Drive runs at 100%
  - SC to S4 - Drive runs at 66%
  - SC to S5 - Drive runs at 50%
- **CO_2 Sensor:**
  - **Set Point Control:** A carbon dioxide sensor is provided from the factory for field mounting OR unit mounting in the space(s) being served by the energy recovery unit. The CO_2 sensors are wired to the unit VFD's with two preset speeds of 700 PPM or less CO_2 = 50% fan speed and 800 PPM or greater CO_2 = 100% fan speed.
  - **Proportional Control:** A carbon dioxide sensor is provided from the factory for field mounting OR unit mounting in the space(s) being served by the energy recovery unit. The CO_2 sensors are wired to the unit VFD's with default factory settings of 500 PPM or less CO_2 = 50% fan speed and 1000 PPM or greater CO_2 = 100% fan speed. Modulation of VFD occurs proportional to CO_2 between 500 and 1000 PPM.

The terminal locations for modulating and multi-speed are shown on the previous page. Most of the set points in the VFDs are Yaskawa factory defaults. However, a few set points are changed at Valent and are shown in the tables. These settings are based on the VFD mode selected.

Change Set Points

To gain access to change set points on the V1000 and J1000 drives, parameter A1-01 needs to be set at "2". To prevent access or tampering with drive settings on either drive, change parameter A1-01 to "0".

- **Drive Operation**
  - SC to S1 contact for On/Off
  - A1 (0-10 Vdc) referenced to AC. *Can use +15 Vdc from +V.*

Resetting the V1000 drive to factory defaults

To reset the V1000 drive back to factory defaults, go to parameter A1-01 and set it to "2". Then go to A1-03 and change it to "1110" and press enter. The drive is now reset back to the settings programmed at Valent. This option is not available on the J1000.

MODULATING CONTROL FOR FAN SPEED (0-10 Vdc)

Parameter		Setting	
		V1000	J1000
A1-01	Access Level	2	2
B1-17	VFD Start-Up Setting	1	1
C6-02	Carrier Frequency	1	1
D2-02	Ref Lower Limit	50%	50%
E2-01	Motor Rated FLA	Motor FLA	Motor FLA
H2-01	Terminal MA, MC Function	5	5
H3-04	Terminal A1 Bias	50%	50%
L4-01	H2-01 Frequency Detection	15	15
L5-01	Auto Restart Attempt	5	5
A1-01	Access Level	0	0

CO_2 SENSOR CONTROL FOR FAN SPEED (1/2 speed WHEN CO_2 DROPS BELOW 700 PPM) (FULL SPEED WHEN CO_2 RISES ABOVE 800 PPM)

MULTI-SPEED CONTROL FOR FAN SPEED (1/3 OR 1/2 SPEED REDUCTION)

Parameter		Setting	
		V1000	J1000
A1-01	Access Level	2	2
B1-01	Reference Source (Frequency)	0	0
B1-17	VFD Start-Up Setting	1	1
C6-02	Carrier Frequency	1	1
D1-01	Frequency Reference 1	60 Hz	60 Hz
D1-02	Frequency Reference 2	40 Hz	40 Hz
D1-03	Frequency Reference 3	30 Hz	30 Hz
D1-04	Frequency Reference 4	60 Hz	60 lw
D2-02	Ref Lower Limit	50%	50%
E2-01	Motor Rated FLA	Motor FLA	Motor FLA
H1-04	Multi-Function Input Sel 4 (Terminal S4)	3	3
H1-05	Multi-Function Input Sel 5 (Terminal S5)	4	4
H1-06	Multi-Function Input Sel 6 (Terminal S6)	5	NA
H2-01	Terminal MA, MC Function	5	5
H3-10	A2 Not Used	F	NA
L4-01	H2-01 Frequency Detection	15	15
L5-01	Auto Restart Attempt	5	5
A1-01	Access Level	0	0

Optional Start-Up Components

CO_2 PROPORTIONAL CONTROL			
Parameter		Setting	
		V1000	J1000
B1-17	VFD Start-Up Setting	1	1
C6-02	Carrier Frequency	1	1
D2-02	Ref Lower Limit	50%	50%
E2-01	Motor Rated FLA	FLA	FLA
H3-03	Analog Frequency Reference (Gain)	150%	150%
H3-04	Analog Frequency Reference (Bias)	25%	25%
L2-01	Ride Thru Power Loss	2	2
L4-05	Frequency Ref Loss	0	NA
L5-01	Auto Restart Attempt	5	5
A1-01	Access Level	0	0

VARIABLE FREQUENCY DRIVES FOR ENERGY RECOVERY WHEEL			
Parameter		Setting – J1000	
A1-01	Access Level	2	
B1-17	VFD Auto Start	1	
C1-04	Decel Time	600	
*C4-01	Torque Gain	0.6	
C6-02	Carrier Frequency	2	
D2-01	Ref Upper Limit	40 or 50*	
D2-02	Ref Lower Limit	5%	
E2-01	Motor Rated FLA	Motor FLA	
E2-03	Motor No-Load Current	Must be less than FLA	
H1-02	Multi-Function Input (Terminal S2)	6	
H2-01	Multi-Function Output (MA, MB, MC)	4	
H1-04	Multi-Function Input Sel 4 (Terminal S4)	7	
Economizer Signal Source (0-10 Vdc)		Setting	
		Honeywell Module	Carel Controller
H3-03	Analog Frequency Reference (Gain)	0	40 or 50*
H3-04	Analog Frequency Reference (Bias)	40 or 50**	0
L1-01	Elect Thermal Overload	2	
L2-01	Ride Thru Power Loss	2	
L4-01	Frequency Detection Level	15	
L5-01	Auto Restart Attempt	5	
A1-01	Access Level	0	

* 208/230 volt only
**36 through 52 inch wheels are 40 (24 Hz)
58 or 74 inch wheel is 50 (30 Hz)

Optional Start-Up Components

Economizer

Relevant Set Points

1. MAT SET The mixed air temperature set point after the energy wheel. The control will modulate the energy wheel to maintain temperature as best as it can. (Set point menu, default 53°F)
2. LOW T LOCK The set point for the low temperature mechanical cooling lockout. (Set point menu, default 32°F)
3. DRYBLB SET The outdoor air set point to call for economizer. (Set point menu, default 63°F)
4. MIN POS The minimum signal voltage sent to the energy wheel. This must be set to 2 Vdc. (Set point menu, default 2.8 Vdc)
5. AUX1 O The controllers operating sequence structure. (Set point menu, default 'None')
6. ERV OAT SP The set point for low temperature economizer lockout. This is the low temperature set point when AUX1 O is set to ERV. (Set point menu, default 32°F)
7. STG3 DLY Time delay after second cooling stage is enabled (Advanced setup menu, default 2 hrs.)

Using the Keypad with Settings and Parameters

To use the keypad when working with Set points, System and Advanced Settings, Checkout tests, and Alarms:

1. Navigate to the desired menu.
2. Press ↵ (enter) to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press ↵ (enter) to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.[1]
6. Press the ▼ button to increase (change) the displayed parameter value.[1]
7. Press ↵ (enter) to accept the displayed value and store it in non-volatile RAM.
8. CHANGE STORED displays.
9. Press ↵ (enter) to return the current menu parameter.
10. Press ⓘ (escape) to return to the current menu parameter.

[1] When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

The table shows which set points are relevant to the given sequences. Refer to the wiring diagram for the units's sequence.

	MODULATE WHEEL			STOP WHEEL		
	OA Temp	OA Enthalpy	OA/RA Temp Differential	OA Temp	OA Enthalpy	OA/RA Temp Differential
DRYBLB SET	X			X		
MAT SET	X	X	X	X	X	X
LOW T LOCK	X	X	X	X	X	X
ERV OAT SP				X	X	X
MIN POS	X	X	X			
AUX1 OUT				ERV	ERV	ERV
STG3 DLY	X	X	X	X	X	X

Stop Wheel

1. Navigate to the Checkout menu and press ↵ (enter).
2. The energy wheel and cooling should stop.
3. Navigate to Connect ERV and press ↵ (enter) twice to run the test.
4. Voltage between AUX1-O and C should be 24 VAC. The energy wheel should activate.

Modulate Wheel

1. Navigate to the Checkout menu and press ↵ (Enter).
2. The cooling should turn off and the wheel should be rotating at full speed.
3. Navigate to Damper Open and press ↵ (enter) twice to run the test.
4. Voltage between terminals ACT 2-10 and ACT COM should be 10 Vdc. This will slow the wheel down to minimum speed.
5. Press ⓘ (escape), navigate to Damper Close and press ↵ (enter) twice to run the test.
6. Voltage between terminal ACT 2-10 and ACT COM should be 2 Vdc. This will speed the wheel up to maximum speed.

Routine Maintenance

DANGER

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit to OFF at disconnect switch(es). Unit may have multiple power supplies.

CAUTION

Use caution when removing access panels or other unit components, especially while standing on a ladder or other potentially unsteady base. Access panels and unit components can be heavy and serious injury may occur.

Once the unit has been put into operation, a routine maintenance program should be set up to preserve reliability and performance. Items to be included in this program are:

Lubrication
Apply lubrication where required

Dampers
Check for unobstructed operation

Motors
Check for cleanliness

Blower Wheel & Fasteners
Check for cleanliness
Check all fasteners for tightness
Check for fatigue, corrosion, wear

External Filter
Check for cleanliness - clean if required

Internal Filter
Check for cleanliness - replace if required

Door Seal
Check if intact and pliable

Energy Recovery Wheel
Check for cleanliness - clean if required
Check belt for wear
Check pulley, bearings, and motor

Maintenance Procedures:

Lubrication

Check all moving components for proper lubrication. Apply lubrication where required. Any components showing excessive wear should be replaced to maintain the integrity of the unit and ensure proper operation.

Dampers

Check all dampers to ensure they open and close properly and without binding. Backdraft dampers can be checked by hand to determine if blades open and close freely. Apply power to motorized dampers to ensure the actuator opens and closes the damper as designed.

Fan Motors

Motor maintenance is generally limited to cleaning and lubrication. Cleaning should be limited to exterior surfaces only. Removing dust and grease buildup on the motor housing assists proper motor cooling. Never wash-down motor with high pressure spray. Greasing of motors is only intended when fittings are provided. Many fractional motors are permanently lubricated for life and require no further lubrication.



Routine Maintenance

Fan Wheel & Fasteners

Wheels require very little attention when moving clean air. Occasionally oil and dust may accumulate on the wheel causing imbalance. When this occurs, the wheel and housing should be cleaned to assure smooth and safe operation. Inspect fan impeller and housing for fatigue, corrosion or wear.

Routinely check all fasteners, set screws and locking collars on the fan, motor base and accessories for tightness. A proper maintenance program will help preserve the performance and reliability designed into the fan.

External Filter Maintenance

Aluminum mesh, 2-inch deep filters are located in the supply weatherhood (if the weatherhood option was purchased). Filters should be checked and cleaned on a regular basis for best efficiency. The frequency of cleaning depends upon the cleanliness of the incoming air. These filters should be cleaned prior to start-up.

Clean filters by rinsing with a mild detergent in warm water.

Internal Filter Maintenance

The ERW-E units are always provided with 2-inch, pleated filters in the outdoor air and exhaust airstreams. These filters should be checked per a routine maintenance schedule and replaced as necessary to ensure proper airflow through the unit. See table for pleated filter size and quantity for each unit. Replacement filters shall be of same performance and quality as factory installed filters. Filter type must be pleated design with integral metal grid. Two acceptable filter replacements are Aerostar Series 400 or Farr 30/30®.

Pleated Filter Size and Quantities				
Unit Size	Supply		Exhaust	
	Size	Qty	Supply	Qty
ERW-E10	16 x 25	1	16 x 25	1
ERW-E20	20 x 20	2	20 x 20	2
ERW-E35	16 x 25	3	16 x 25	3
ERW-E45	20 x 25	3	20 x 25	3
ERW-E55	16 x 20	6	16 x 20	6

All dimensions in inches.

Outdoor Air Filters: Access to the outdoor air filters is through the door labeled as “Filter Access” on the outdoor air side of the unit.

Exhaust Air Filters: Access to the exhaust air filters is through the door labeled as “Filter Access” on the exhaust air side of the unit.

Refer to Access Door Descriptions section for additional information on filter locations.

Door Seal Maintenance

Slip-on type seal is installed on the door. Inspect at least annually to ensure that seal is still pliable and intact.

Energy Recovery Wheel Maintenance

Annual inspection of the energy recovery wheel is recommended. Units ventilating smoking lounges and other non-clean air spaces should have energy recovery wheel inspections more often based upon need. Inspections for smoke ventilation applications are recommended bimonthly to quarterly until a regular schedule can be established.

Accessing the Energy Recovery Wheel

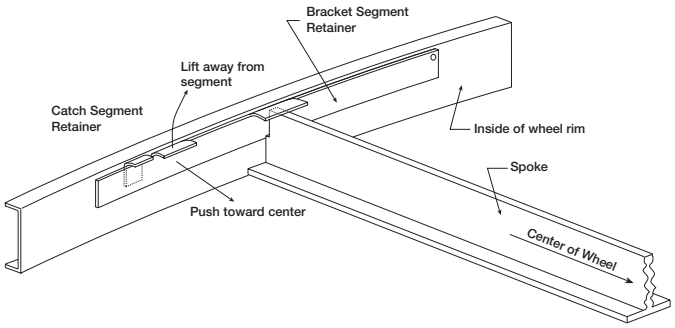
Disconnect power to the unit. Open door labeled "Energy Wheel Cassette Access".

Unplug the wheel drive motor.

Pull the wheel cassette halfway out.

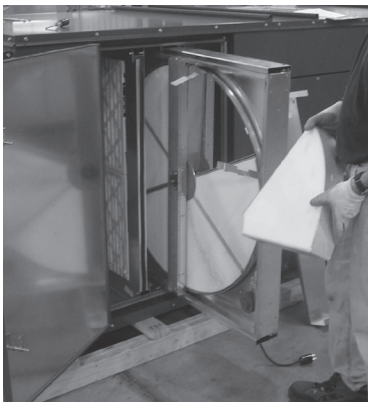
Removing the Energy Recovery Wheel Segments (stainless steel rim)

Steel retainers are located on the inside of the wheel rim. Push the retainer towards the center of the wheel, then lift up and away to release segments.



IMPORTANT

Place retainers back in the original position before rotating the energy recovery wheel, otherwise damage to retainer will occur.



Wheel segment removed

Cleaning the Energy Recovery Wheel

If the wheel appears excessively dirty, it should be cleaned to ensure maximum operating efficiency. Only excessive buildup of foreign material needs to be removed. Discoloration and staining of energy recovery wheel does not affect its performance.

Thoroughly spray wheel matrix with household cleaner such as Fantastik® or equivalent. Gently rinse with warm water and using a soft brush remove any heavier accumulation. A detergent/water solution can also be used. Avoid aggressive organic solvents, such as acetone. The energy recovery wheel segments can be soaked in the above solution overnight for stubborn dirt or accumulation.

After cleaning is complete, shake the excess water from the wheel or segments. Dry wheel or segments before placing them back into the cassette. Place wheel or segments back into cassette by reversing removal procedures.

CAUTION
Do not clean energy recovery wheel segments with water in excess of 140ºF (60ºC).
Do not dry energy recovery wheel segments in air in excess of 140ºF (60ºC).
The use of a pressure washer to clean segments is **not recommended**. Damage could result.

Energy Recovery Wheel Belt

Inspect belts each time filters are replaced. Belts that look chewed up or are leaving belt dust near the motor pulley may indicate a problem with the wheel. Be sure to inspect wheel for smooth and unrestricted rotation. If a belt requires replacement, contact the local Valent representative. Instructions for replacement will ship with the new belt.



Wheel Belt & Pulley

Energy Recovery Wheel Bearing

In the unlikely event that a wheel bearing fails, the bearing is behind a removable plate on the wheel support beam. Contact the local Valent representative for detailed instructions on how to replace the bearing.



Wheel Bearing

Troubleshooting - Economizer Alarms

Addressing Alarms

Alarms will signify a faulty sensor. When this occurs, verify all connections to the sensor and controller are secure. Press enter twice to clear the alarm. If the issue persists, consult the factory.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor), the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the ↵ (enter).
3. ERASE? displays.
4. Press ↵ (enter).
5. ALARM ERASED displays.
6. Press ⓘ (escape) to complete the action and return to the previous menu.

NOTE
After clearing the alarm, it will redisplay after five seconds.

Troubleshooting – Airflow

Test and Balance Report

The Test and Balance Report (TAB) is utilized to determine whether the appropriate amount of outdoor air and exhaust air is being supplied and removed from a building, respectively. There are no set rules on what information must be included in a TAB report. As such, if a TAB report indicates that the airflow on a unit is low, prior to contacting the factory, please determine the following information:

	Unit #1	Unit #2	Unit #3	Unit #4
Model Number				
Serial Number				
Nameplate Information				
Voltage				
Hertz				
Phase				
Outdoor Air Fan Amps				
Exhaust Fan Amps				
Outdoor Air Fan Horsepower				
Exhaust Fan Horsepower				
Design Airflow				
Outdoor Air				
Exhaust				
Measured Airflow				
Outdoor Air				
Exhaust				
Measured Data				
Blower Rotation				
Outdoor Air Fan RPM				
Exhaust Fan RPM				
Outdoor Air Fan Amp Draw				
Exhaust Fan Amp Draw				
Pressure Drop Across Energy Recovery Wheel				
Outdoor Air Side				
Exhaust Side				

Airflow problems can often be tied back to improper ductwork installation. Be sure to install ductwork in accordance with SMACNA and AMCA guidelines.

Troubleshooting – Unit

Symptom	Possible Cause	Corrective Action
Blower fails to operate	Blown fuse or open circuit breaker.	Replace fuse or reset circuit breaker and check amps.
	Defective motor or capacitor.	Replace.
	Motor starter overloaded.	Reset starter and check amps.
	Electrical.	Check for On/Off switches. Check for correct supply voltage.
	Drive.	Check for broken or loose belts. Tighten loose pulleys.
Motor over amps	CFM too high.	Check cfm and adjust drives if needed.
	Static pressures are higher or lower than design.	If higher, ductwork should be improved. If lower, fan rpm should be lower.
	Blower rotation is incorrect.	Check rotation and reverse if necessary.
	Motor voltage incorrect.	Check motor nameplate versus supplied voltage.
	Motor horsepower too low.	See specifications and catalog for fan curves to determine if horsepower is sufficient.
	Shorted windings in motor.	Replace motor.
Low airflow (cfm)	Unit damper not fully open.	Adjust damper linkage or replace damper motor.
	System static pressure too high.	Improve ductwork to eliminate losses using good duct practices.
	Blower speed too low.	Check for correct drives and rpm with catalog data.
	Fan wheels are operating backwards.	For 3-phase, see Direction of Fan Wheel Rotation under Unit Start-Up section.
	Dirty filter or energy wheel.	Follow cleaning procedures in Routine Maintenance section.
	Leaks in ductwork.	Repair.
	Elbows or other obstructions may be obstructing fan outlet.	Correct or improve ductwork.
High airflow (cfm)	Blower fan speed too high.	Check for correct fan rpm. Decrease fan speed if necessary.
	Filter(s) not in place.	Install filters.
	Insufficient static pressure (Ps) (airflow resistance).	Induce Ps into system ductwork. Make sure grilles and access doors are installed. Decrease fan speed if necessary.

Always have a completed Pre Start-Up Checklist, unit Start-Up Checklist, and Optional Accessories Checklist prior to requesting parts or service information.

Troubleshooting – Unit

Symptom	Possible Cause	Corrective Action
One or both blowers turn off intermittently and back on after about 2 minutes	Exhaust Only frost control sensors are tripping.	Adjust frost temperature sensor set point as needed.
Energy wheel does NOT turn	Air seals are too tight.	See Energy Recovery Wheel under Unit Start-Up section.
	"Economizer" sensors are operating.	Adjust temperature or enthalpy set points as needed.
	No power to wheel motor.	Make sure wheel drive is plugged in. Verify power is available.
	Wheel drive belt.	Check for loose or broken belts. Replace belts (consult factory).
	VFD overload. (OL1 on readout)	Refer to VFD section. Compare motor amp rating to setting in VFD. Adjust accordingly.
Energy wheel runs intermittently	Wheel motor overloads are tripping, due to rubbing between wheel and air seals.	Recheck air seals, make sure they are not too tight. See Energy Recovery Wheel under Unit Start-Up Section.
Excessive noise or vibration	Fan wheel rubbing on inlet.	Adjust wheel and/or inlet cone. Tighten wheel hub or bearing collars on shaft.
	Wheel out of balance.	Replace or rebalance.
	Loose wheel on shaft.	Tighten wheel setscrew.
	Motor base or blower loose.	Tighten mounting bolts.
	Buildup of material on wheel.	Clean wheel and housing.
	Noise being transmitted by duct.	Make sure ductwork is supported properly. Make sure ductwork metal thickness is sized for proper stiffness. Check duct size at discharge to ensure that air velocities are not too high.

Always have a completed Pre Start-Up Checklist, unit Start-Up Checklist, and Optional Accessories Checklist prior to requesting parts or service information.

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Contact Us

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800-789-8550
appliedservice@greenheckgroup.com

Valent Dedicated Outdoor Air Systems
60–28th Avenue North
Minneapolis, MN 55411
Main: 612-877-4800

More Information

Unit Schematics
For configuration and connection questions, see the schematics that shipped with your unit. They can typically be found attached to the main control panel door.

Mechanical and Controls Manuals
Find current mechanical and controls manuals here: www.valentair.com/resources



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Continuous product improvement is a policy of Valent; therefore, product functionality and specifications are subject to change without notice.
For the most recent product information visit the product website.

ERW-E Manual
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