Precision Environmental Control

Ceiling Systems – CM Series
3, 5, and 7-Ton

ENGINEERING MANUAL

NOMENCLATURE

CM	S	050	A	Z	46	E	H	0	S	00000000

SERIES:
CM: CEILING MOUNT

ARRANGEMENT:
S: HORIZONTAL-STRAIGHT
R: HORIZONTAL-RIGHT
L: HORIZONTAL-LEFT
D: HORIZONTAL-DOWN

MODEL:
010 (1-TON)
015 (1.5-TON)
020 (2-TON)
030 (3-TON)
050 (5-TON)
060 (6-TON)
070 (7-TON)
080 (8-TON)
100 (10-TON)

COOLING TYPE:
A: AIR COOLED
C: CHILLED WATER
D: DUAL COOL
F: FREE-COOL
G: GLYCOL COOLED
W: WATER COOLED

COMPRESSOR TYPE:
Z: SCROLL

VOLTAGE:
16: 230/1/60
36: 208-230/3/60
46: 460/3/60
56: 575/3/60

HEATING:
0: NONE
E: ELECTRIC REHEAT
R: HOT GAS REHEAT
T: STEAM REHEAT
W: HOT WATER REHEAT

HUMIDIFIER:
0: NONE
H: ELECTRODE STEAM HUMIDIFIER
L: LIVE STEAM (STEAMGRID)

CABINET:
G: GALVANIZED
A: ALUMINUM
P: LIGHT GREY
S: SPECIAL

CONTROL TYPE:
0: NO MICROPROCESSOR
S: STANDARD MICROPROCESSOR
T: WALL THERMOSTAT

MISCELLANEOUS:
A: FRESH AIR INTAKE
C: CONDENSATE PUMP
E: COIL TEMPERATURE SENSOR
F: FIRESTAT ONLY
G: HOT GAS BYPASS
H: HIGH EFFICIENCY (60%) FILTERS
K: SMOKE & FIRE DETECTOR
N: ANTI-HAMMER VALVE
(FREE COOL & DUAL COOL ONLY)
S: WATER FLOW SWITCH
T: 2-WAY CHILLED WATER VALVE
U: FUSED DISCONNECT
V: 3-WAY CHILLED WATER VALVE
W: WATER DETECTOR (QTY: 2)
Y: SHUNT-TRIP DISCONNECT
Z: SPECIAL

TOTAL PROTECTION — THE ECOSAIRE® APPROACH

Ecosaire® has been maintaining optimum operating conditions in data centers throughout the world for almost three decades.

Recognizing the emerging trends toward smaller, more powerful hardware with reduced cooling requirements, Ecosaire® designed the CM Series of three, five and seven-ton cooling units with features specifically aimed at providing increased reliability, serviceability, and energy efficiency.

Reliability

Heavy-duty scroll compressors, all-copper refrigeration tubing, state-of-the-art microprocessor controls, heavy-duty electrical components, and the Humitronic canister humidifier all contribute to exceptional durability. Separate circuit breakers protect the compressor, fan, humidifier, and electric reheat so there are no troublesome fuses to replace. The CM Series units provide year-round service, twenty-four hours a day, 365-days a year.

Efficiency

Computer rooms are kept at comparatively high humidity conditions to prevent static electricity problems. Most air conditioners remove this humidity as a normal function of the cooling process, forcing their humidifier to make up the loss. Since an electric humidifier can be very expensive to operate, Ecosaire® has designed the CM Series so it does not remove excessive humidity during normal operation. By providing high sensible cooling, compressor energy is not wasted on unnecessary dehumidification so the humidifier does not have to work overtime.

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Serviceability

Few business situations require more immediate attention than a data center that has been shut down. Should a problem arise with the CM Series, it can be serviced with exceptional ease. Readily accessible compressors, fan assemblies, and electrical components assure quick repair. Each belt-driven fan assembly employs a blower motor set for fast changeouts. Total side service provides easy access to the air filters and components.

Ecosaire® Features

ALL UNITS FEATURE:

- High sensible cooling
- Small footprint
- Microprocessor controls
- Non-locking disconnect switch
- Individual branch circuit breakers
- Thermal/acoustical insulation on all interior cabinet surfaces
- Two pleated filters
- Crankcase heater
- Refrigerant reclaim valve
- Automatic restart after power failure
- Horizontal discharge
- Quick changeout blower assemblies
- Belt-driven blowers
- ETL Listed

STANDARD FEATURES

Supervisaire® Controls

The Supervisaire® Microprocessor Controls provide extremely user-friendly, programmable monitoring and control for all Ecosaire® Precision Environment Control systems. Individual Ecosaire® units can be connected to a built-in local area network together with a supervisory panel complete with a backlit graphics display for robust redundant environmental control. At the same time, the system can be connected to a personal computer supervisory system either directly or via a network, or to a BACNET™, ECHELON™ and MODBUS™ interface.

A wall-mounted remote control panel with display is standard, and can be mounted in a convenient location.

Belt-Driven Blower Motors

Efficient motors power each belt-driven blower. Each blower assembly is accessible through the side of the unit and allows the blower to be removed and replaced quickly should the need arise. Each blower motor is two-speed to allow even air flow over the entire coil while the unit is dehumidifying with reduced air flow. On down flow units, a vertical air discharge plenum helps reduce back pressure for maximum air flow and efficiency.

Efficient Refrigeration System

The refrigeration system consists of a high-efficiency scroll compressor, filter/dryer, low-pressure switch, manual-reset high-pressure switch, externally-equalized thermal-expansion valve, sight glass/moisture indicator, refrigerant reclaim valve and refrigeration service valves.

The compressor is located behind an access panel for ease of service while in operation. Copper cooling coils and refrigeration tubing are used throughout. The cooling coil includes a corrosion-resistant stainless steel drain pan.

Convenient Component Access

Ecosaire® has given careful consideration to all the needs of the serviceman. We made sure that each component could be serviced or replaced without interference from other parts or from the unit itself. All refrigeration and humidifier components are easily accessible. Electrical components are conveniently located at the front of the unit and are positioned for easy changeout. The filters can be replaced from the side. Easy side service access also means zero clearance requirements on both ends of the unit, allowing installation in tight places.

Disconnect Switch

A factory mounted non-locking disconnect switch is standard on all CM Series units, eliminating the need for a field supplied, wall-mounted disconnect.

One-Year Parts Warranty

All CM Series equipment are warranted to be free from defects in material and workmanship for a period of one year.

STANDARD FEATURES/INDIVIDUAL SYSTEMS

Remote Air-Cooled Condenser (air-cooled only)

The standard air-cooled condenser provides rated cooling capacity at an outdoor ambient of 95°F. Variable speed fan controls provide operation down to –20°F. Head pressure controls system (flooded condenser) with receivers provide operation down to –40°F.

Water-Cooled Condenser (water and glycol units)

The counterflow water-cooled condenser is a heavy-duty brazed-plate heat exchanger constructed of AISI-316 stainless steel. It is fitted with a two-way, head pressure controlled, 150 psig, water-regulating valve. (See field-installed accessories).

Remote Glycol Cooler (water and glycol units)

The standard glycol cooler provides rated cooling capacity at an outdoor ambient of 95°F. Factory-mounted fan-cycling controls regulate the glycol temperature. (See field-installed accessories).

FACTORY-INSTALLED OPTIONS

Humitronic Humidifier

The Humitronic steam canister provides 100 percent particle-free steam to the computer room which is essential to computer reliability. Steam canisters operate with greater efficiency and less maintenance than any infrared or immersion humidifier available. The humidifier can be adjusted down to 20 percent of rated capacity to match room load conditions.

Steam is generated by passing an electric current through ordinary tap water in a non-conductive cylinder. The water quickly reaches boiling temperature, producing pure steam. No other form of humidification is as clean.

Installation is simple. No expensive water treatment is required. A simple 1/4-inch copper or cold-water supply tube is all that is needed.

Service requirements are reduced to a minimum. When the plastic cylinder is filled with contaminants, the cylinder is simply discarded and quickly replaced.

Electric Reheat Coil

Enclosed, low-watt density, fin-tube electric heating elements are available to maintain room temperature requirements. They are designed to withstand moist conditions and feature optional 2, 3 stage or proportional control.

Hot-Gas Reheat

A hot-gas reheat coil can be furnished complete with three-way hot-gas valve and a refrigerant check valve. The coil is constructed of copper tubes expanded into aluminum fins. The hot-gas reheat coil maintains room temperature during the dehumidification cycle only.

Hot-Water Reheat

A hot-water coil can be furnished to maintain room temperature. The coil is complete with two-way valve and Y-strainer. The coil is constructed of copper tubes expanded into aluminum fins.

FACTORY-INSTALLED OPTIONS

Full-Function Microprocessor Control

Supervisaire® Microprocessor Controls provide easy-to-use, programmable monitoring and control for each unit. Precision control is enhanced by presenting the user with current room conditions, set-point control, system operational status, password protection, screen scrolling, menu-driven displays, alarm history and more.

Low-Ambient Air-Cooled Condenser

For colder climates, the air-cooled condenser can be provided with a factory-installed three-way head-pressure control valve, a check valve, and an insulated, heated liquid receiver sized to provide –40°F low-ambient operation.

Firestat/Smoke Detector

A factory-mounted combination fire and smoke detector is available to activate the unit's alarm and to shut down the unit.

Water Detector

The CM Series can be provided with a factory-installed water detector. The standard arrangement includes two water sensors pre-wired to a ten-foot cable. Up to four sensors can be ordered.

High-Pressure Water-Regulating Valve

The unit can be supplied with a two-way high-pressure water-regulating valve rated at 300 psig.

Three-Way Water-Regulating Valve

The unit can be supplied with a three-way water-regulating valve rated at 300 psig.

Hot Gas Bypass Valve

The unit can be supplied with a hot gas bypass valve to allow optimum unit operation at reduced heat load capacity condition.

High-Efficiency Air Filter (60%)

The unit can be supplied with a high efficiency air filter to allow filtration at higher level. The disposable filter shall be rated not less than 60% efficient by ASHRAE 52-76 method.

Extended Compressor Warranty

An extended compressor warranty is available. It provides for a replacement compressor for a period as specified.

FIELD-INSTALLED ACCESSORIES

High-Ambient Air-Cooled Condenser

Air-cooled condensers are available to provide rated cooling capacity at an outdoor temperature of 100°F or 105°F. They feature factory-mounted controls, copper tubing and variable speed fan controls to allow operation down to –20°F. Head pressure controls system (flooded condenser) with receivers provide operation down to –40°F.

High-Ambient Glycol Cooler

Glycol coolers are available to provide rated cooling capacity at outdoor temperatures of 100°F or 105°F. They feature factory-mounted controls, copper tubing and fan cycling to control glycol temperature.

Single/Dual Pump Packages

A field mounted pump and pump control panel is available for glycol installations. Glycol systems requiring optimum system protection can be supplied with dual full-sized pumps. When the flow switch senses a loss of flow, the controls will automatically start the stand-by pump and activate a visual and audible alarm on the dual-pump control panel. The control panel includes an alarm silence switch, pump-run-indicator lights, and lead/lag switch. With the pump package, an accessory kit is provided containing an expansion tank, air purger, air vent and two check valves.

Condensate Pump

The optional condensate pump quickly pumps condensate or humidifier spillage water to a remote drain. It is rated for 20 gph at 18 ft. head and is complete with motor, reservoir and float switch.

Ecosaire® Technical Data

NET CAPACITY DATA, BTUH

AIR-COOLED		MODEL CM030A	CM050A	CM070A
80°F DB, 67°F WB, 95°F Condenser EAT	Total	34,600	65,200	93,900
	Sensible	29,900	56,200	79,000
75°F DB, 62.5°F WB, 95°F Condenser EAT	Total	31,600	59,200	84,900
	Sensible	29,900	55,200	78,900
72°F DB, 60°F WB, 95°F Condenser EAT	Total	30,100	56,700	79,900
	Sensible	29,100	54,700	75,900

WATER-COOLED		MODEL CM030W	CM050W	CM070W
80°F DB, 67°F WB	Total	37,300	69,200	102,400
	Sensible	31,100	58,200	82,000
75°F DB, 62.5°F WB	Total	33,900	64,000	92,900
	Sensible	31,000	57,280	81,900
72°F DB, 60°F WB	Total	32,300	61,200	87,900
	Sensible	30,100	56,300	79,900

WATER-COOLED CONDENSER REQUIREMENTS			
85°F EWT – GPM	9.1	17.1	25.0
Pressure Drop – PSIG	2.8	7.5	7.6
75°F EWT – GPM	9.0	16.9	25.0
Pressure Drop – PSIG	2.8	7.5	7.6
65°F EWT – GPM	8.9	16.9	24.9
Pressure Drop – PSIG	2.8	7.5	7.5
Note: Pressure drops include condenser, regulating valve and internal piping.			

GLYCOL COOLED		MODEL CM030G	CM050G	CM070G
80°F DB, 67°F WB	Total	33,000	61,200	91,900
	Sensible	29,100	54,700	77,900
75°F DB, 62.5°F WB	Total	29,900	56,200	81,900
	Sensible	29,300	53,500	77,900
72°F DB, 60°F WB	Total	28,400	53,700	77,900
	Sensible	28,400	53,700	74,900

GLYCOL PRESSURE DROP DATA			
Flow at 95°F Ambient – 40%, GPM	9.50	17.7	26.5
Room Unit Press Drop – PSIG	4.30	6.5	5.6
Glycol Cooler Max Press Drop – PSIG	2.50	5.1	3.9
Pump Head – Ft. of Water – PSIG	30	33	32
Available Head – PSIG	23.2	21.4	22.5

GLYCOL PUMP DATA			
Standard Pump HP	1	1.50	1.50
Pump Suction – FPT	1.25	1.25	1.25
Pump Discharge – FPT	1	1	1

INTERNAL VOLUMES – GAL.			
Room Unit	0.25	0.33	0.39
Glycol Cooler (see table on next page)			
Expansion Tank	1	1	1
Note: Glycol systems are rated at 110°F EGT, 120°F LGT, 40% solution.			

Ecosaire® Technical Data

CHILLED WATER		MODEL CM030C	CM050C	CM070C
80°F DB, 67°F WB	Total	57,430	110,400	155,300
	Sensible	38,100	72,500	103,100
75°F DB, 62.5°F WB	Total	39,800	76,700	108,800
	Sensible	31,900	60,800	87,400
72°F DB, 60°F WB	Total	31,900	61,500	87,800
	Sensible	28,700	54,500	78,400

PHYSICAL DATA

BLOWER	MODEL CM030	CM050	CM070
Motor HP	.75	1.5	3
No. of Motors	1	1	1
Type	Belt-Driven	Belt-Driven	Belt-Driven
CFM	1,500	2,850	4,000
Ext. Static Pressure – In. of Water	.3”	.5”	.5”
EVAPORATOR COIL			
Face Area – Sq. Ft.	3.6	6.4	8.3
Rows	4	4	4
Face Velocity – FPM	416.6	444.2	480.0
CHILLED-WATER COIL			
Face Area – Sq. Ft.	3.6	6.4	8.3
Rows	4	4	5
Face Velocity – FPM	416.6	444.2	480.0
3-Way Valve Size – Inches	.75	1	1
Valve Cv	12	14	14
WATER/GLYCOL-COOLED CONDENSER			
Type – Stainless-Steel Brazed Plate			
Max. Refrigerant Pressure	400	400	400
TWO-WAY WATER/GLYCOL REGULATING VALVE			
Size – NPT	.75	1	1-1/4
Max Working Press – Std PSIG	150	150	150
Max Working Press – Opt PSIG	300	300	300
AIR FILTERS			
Quantity	1	2	2
Size	24 x 24 x 2	24 x 24 x 2	18 x 25 x 2
ELECTRIC REHEAT			
Type – Enclosed Fin-Tube Coil, Three-Stage			
Capacity – Btu/h	22,000	39,300	39,300
Capacity – kW	5.9	10.4	10.4

Ecosaire® Technical Data

PHYSICAL DATA

HOT-GAS REHEAT	MODEL CM030	CM050	CM070
Capacity – MBH	23	39	39
HOT-WATER REHEAT			
Capacity – MBH @ 180°F EWT	36,600	66,200	82,800
Flow – GPM	2	3	3
HUMIDIFIER			
Type – Steam Canister			
Capacity – LB./HR.	10	10	10
kW	3.4	3.4	3.4
UNIT CONNECTION SIZES (INCHES)			
Refrigerant Inlet – Air-Cooled	1/2	1/2	5/8
Refrigerant Outlet – Air-Cooled	5/8	5/8	7/8
Water Inlet/Outlet – Water/Glycol-Cooled	7/8	1-1/8	1-1/8
Chilled Water Inlet/Outlet	3/4	1	1
Condensate Drain	7/8”	7/8”	7/8”
UNIT SIZES – INCHES			
Height	24	24	28
Width	32-1/2	49	60
Depth*	57	60	60
WEIGHT (APPROX. LB.)			
Air-Cooled Models	725	800	860
Water/Glycol Models	770	855	925
Chilled-Water Models	650	720	760

*Add 6” for filter rack

Ecosaire® Technical Data

AIR-COOLED CONDENSER SELECTION

MODEL	CM030 DESIGN AMB (°F)	CM050 DESIGN AMB (°F)	CM070 DESIGN AMB (°F)
CMD05	95	-	-
CMD05	100	-	-
CMD07	105	95	-
CMD08	-	100	95
CMD09	-	105	100
CMD11	-	-	105

Standard condensers include variable speed fan control for –20°F operation. Optional low-ambient condensers include flood-back components for operation down to –40°F. 100°F ambient selections can be used for 5,000 feet altitude at 95°F ambient.

AIR-COOLED CONDENSER DATA

AIR-COOLED CONDENSER	INLET ODS	OUTLET ODS	WEIGHT LB.	ARRANGEMENT	MOTOR QTY	MOTOR HP
CMD05	7/8	7/8	210	1 x 1	1	1/4
CMD05	7/8	7/8	308	1 x 1	1	1/2
CMD07	7/8	7/8	335	1 x 1	1	1/2
CMD08	1-1/8	7/8	350	1 x 1	1	1/2
CMD09	1-1/8	7/8	489	1 x 2	2	1/2
CMD11	1-1/8	1-1/8	518	1 x 2	2	1/2

Note: *Please consult Ecosaire Air-Cooled Condenser Catalogue for further information.*

GLYCOL COOLER SELECTION

MODEL	CM030 DESIGN AMB (°F)	CM050 DESIGN AMB (°F)	CM070 DESIGN AMB (°F)
FMD05-E4	95	-	-
FMD08-E8	100	95	-
FMD09-E7	-	100	95
FMD11-E6	105	-	-
FMD18-E14	-	105	100
FMD20-E14	-	-	105

GLYCOL COOLER DATA

GLYCOL COOLERS	INLET ODS	OUTLET ODS	WEIGHT LB.	ARRANGEMENT	MOTOR QTY	MOTOR HP	VOLUME GAL
FMD05-E4	1-1/4	1-1/4	246	1 x 1	1	1/2	2.0
FMD08-E8	1-1/4	1-1/4	280	1 x 1	1	1/2	4.1
FMD09-E7	1-1/4	1-1/4	391	1 x 2	2	1/2	4.1
FMD11-E6	1-1/4	1-1/4	414	1 x 2	2	1/2	5.8
FMD18-E14	1-1/4	1-1/4	582	1 x 3	3	1/2	8.5
FMD20-E14	1-1/2	1-1/2	593	1 x 3	3	1/2	8.5

Note: *Please consult Ecosaire Fluid Solution Catalogue for further information.*

Ecosaire® Technical Data

CEILING MOUNTED UNIT

Air-Cooled, Water-Cooled and Glycol-Cooled

REHEAT		YES				YES				NO				NO			
HUMIDIFIER		YES				NO				YES				NO			
Volts																	
Amps		208	230	460	575	208	230	460	575	208	230	460	575	208	230	460	575
	FLA	38	36	16	14	34	35	16	14	38	36	16	14	21	21	9	8
CM030	MCA	46	43	20	17	41	43	20	17	46	43	20	17	25	25	10	10
	MFS/MBS	50	50	20	20	45	45	20	20	50	50	20	20	30	30	15	15
	FLAfl	47	50	25	20	47	50	25	20	45	43	22	17	29	28	14	11
CM050	MCA	57	61	31	25	57	61	31	25	54	51	26	21	34	33	17	13
	MFS/MBS	70	70	35	25	70	70	35	25	60	60	30	25	40	40	20	20
	FLA	52	55	27	24	52	55	27	25	51	48	24	22	34	34	16	16
CM070	MCA	64	68	33	30	64	68	33	30	61	58	29	26	41	40	19	19
	MFS/MBS	70	70	35	35	70	70	35	35	70	70	35	30	50	50	25	25

Note: Maximum fuse size and maximum circuit breaker size are identical.

CEILING MOUNTED UNIT

Chilled Water

REHEAT		YES				YES				NO				NO			
HUMIDIFIER		YES				NO				YES				NO			
Volts																	
Amps		208	230	460	575	208	230	460	575	208	230	460	575	208	230	460	575
	FLA	34	34	17	14	18	19	10	8	21	19	10	8	5	4	2	2
CM030	MCA	41	41	21	17	21	23	11	9	25	23	11	9	6	5	3	2
	MFS/MBS	45	45	25	20	25	25	15	15	30	25	15	15	15	15	15	15
	FLA	48	49	25	20	32	35	17	14	26	23	12	9	9	9	4	3
CM050	MCA	58	60	30	24	38	41	21	17	30	27	14	11	11	10	5	4
	MFS/MBS	60	60	30	25	40	45	25	20	30	30	15	15	15	15	15	15
	FLA	48	49	25	20	32	35	17	14	26	23	12	9	9	9	4	3
CM070	MCA	58	60	30	24	38	41	21	17	30	27	14	11	11	10	5	4
	MFS/MBS	60	60	30	25	40	45	25	20	30	30	15	15	15	15	15	15

Note: Maximum fuse size and maximum circuit breaker size are identical.

AIR-COOLED CONDENSERS

PHASE		1-Ø	3-Ø	3-Ø	3-Ø
MODEL	AMPS	208/230	208/230	460	575
CMD05	FLA	2.9	2.6	1.3	0.6
to	MCA	3.6	3.2	1.6	0.8
CMD08	MFS/MBS	15	15	15	15
CMD09	FLA	5.8	5.2	2.6	1.2
and	MCA	6.5	5.8	2.9	1.3
CMD11	MFS/MBS	15	15	15	15

Add 1.0 to FLA and MCA when equipped with –40°F controls.

Please consult the "Remote Condenser Catalogue" for detailed information.

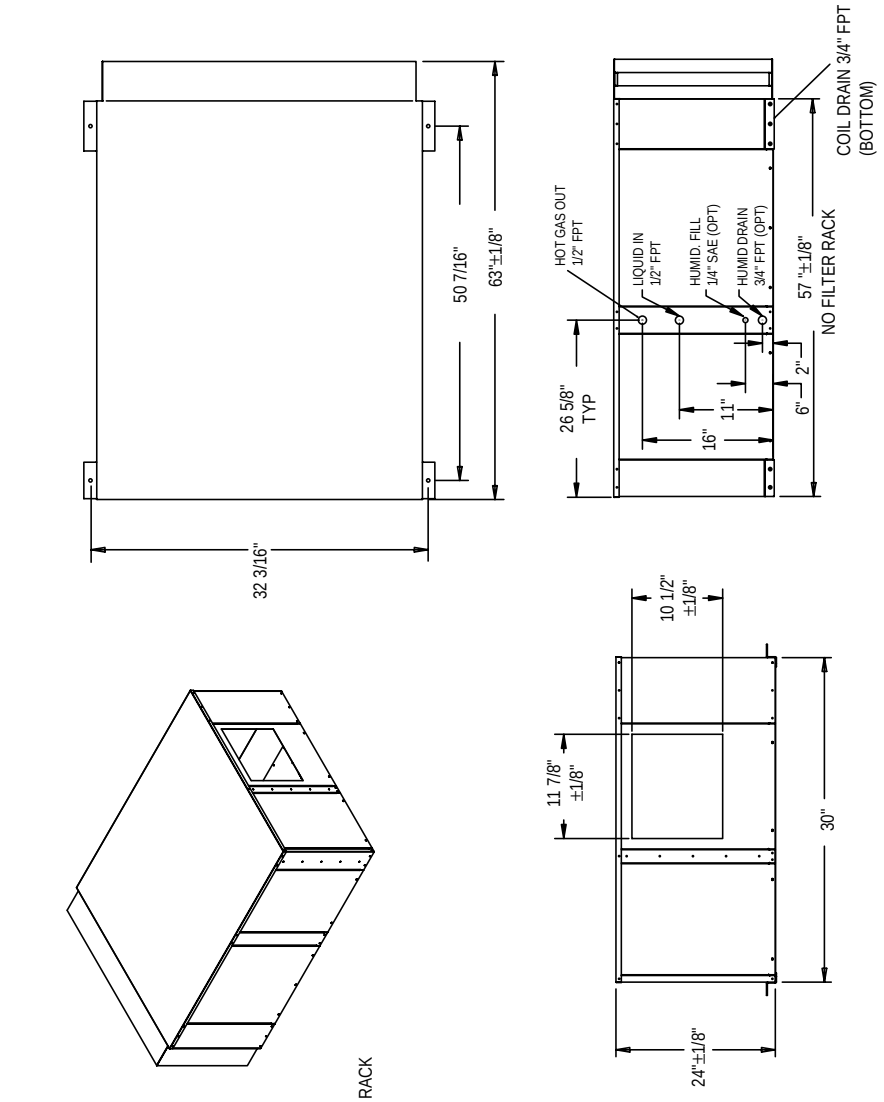
Ecosaire® Technical Data

GLYCOL COOLERS

PHASE MODEL	AMPS	1-Ø 208/230	3-Ø 208/230	3-Ø 460	3-Ø 575
FMD05-E4	FLA	2.9	2.6	1.3	0.8
to	MCA	3.6	3.3	1.6	1.0
FMD08-E8	MFS	15	15	15	15
FMD09-E7	FLA	5.8	5.2	2.6	1.6
to	MCA	6.5	5.9	2.9	1.8
FMD11-E6	MFS	15	15	15	15
FMD18-E14	FLA	8.7	7.8	3.9	2.4
to	MCA	9.4	8.5	4.2	2.6
FMD20-E14	MFS	15	15	15	15

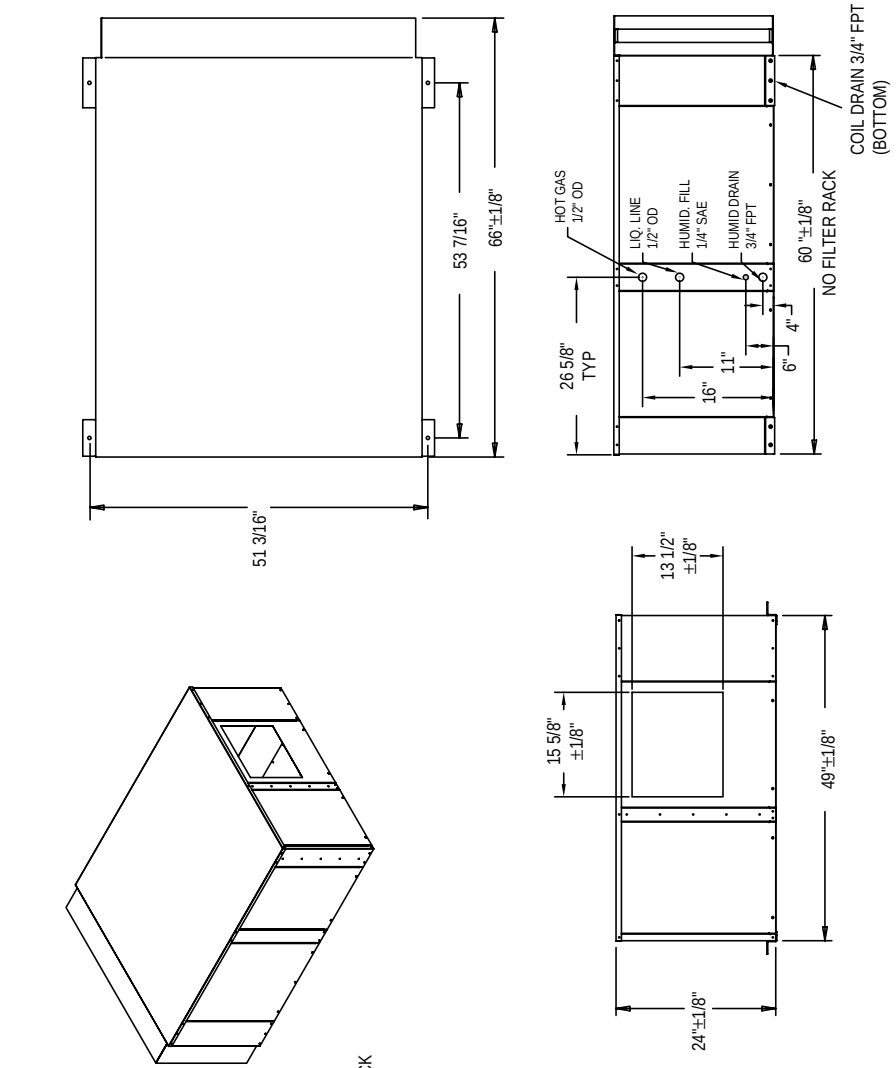
Add 1.0 to FLA and MCA when equipped with –40°F controls.

Ecosaire® 3-Ton
Unit Dimensions



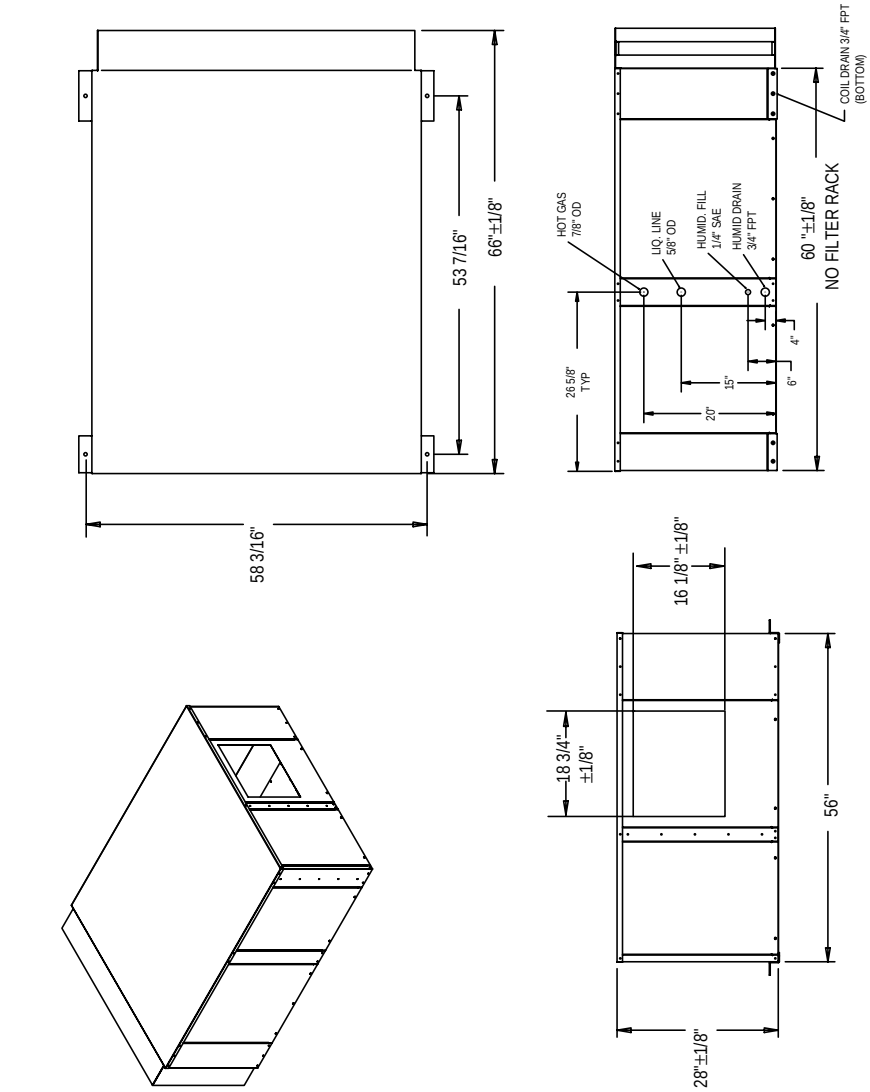
NOTES:
1. AIR DISCHARGE AVALABLE IN (4) LOCATIONS
   RIGHT,BACK,LEFT AND BOTTOM.
   (FRONT OF UNIT = FILTER SIDE)
2. BACK DISCHARGE SHOWN

Ecosaire® 5-Ton
Unit Dimensions



NOTES:
1. AIR DISCHARGE AVAILABLE IN (4)
   LOCATIONS RIGHT,BACK,LEFT AND BOTTOM.
   (FRONT OF UNIT = FILTER SIDE)
2. ESTIMATED WEIGHT = 696 LBS
3. BACK DISCHARGE SHOWN

Ecosaire® 7-Ton
Unit Dimensions



NOTES:
1. AIR DISCHARGE AVALABLE IN (4) LOCATIONS
   RIGHT,BACK,LEFT AND BOTTOM.
   (FRONT OF UNIT = FILTER SIDE)
2. BACK DISCHARGE SHOWN

ENGINEERING GUIDE SPECIFICATIONS

The computer-room air conditioning shall be a factory assembled (self-contained system) (split system) with a horizontal ducted air discharge and draw-through fans. The system shall be specifically designed for computer room conditions and shall include a refrigeration circuit, (reheat section), (humidifier), belt-driven fans, microprocessor controls and all components necessary for complete operation. It shall be designed to provide high sensible cooling during the normal cooling mode. It shall have a sensible capacity of ___ Btuh and a total capacity not to exceed ___ Btuh, based on an entering air temperature of ___ °F dry bulb and ____ °F wet bulb. It shall be capable of controlling room conditions to within + 1°F and + 2 percent RH.

STANDARD FEATURES

Cabinet

The cabinet shall be designed for horizontal air flow, with draw-through fans. The cabinet and frame shall be constructed of cold-rolled galvanized steel. The interior panel air surfaces and access panels shall be insulated with black-mat-coated fiberglass insulation. The access panels shall be easily removable for service. The unit shall require side service access only. All components must be positioned for simple service and replacement. The electrical, compressor and humidifier compartments shall allow inspection. All service connections shall be made through the side of the unit.

Supply Blower Assemblies

There shall be a multiple or single DWDI, forward-curved, belt-driven centrifugal blower(s) located in the draw-through position, for even air flow over the entire coil surface. Each blower shall be constructed of heavy-gauge corrosion-resistant steel and shall be statically and dynamically balanced before shipment. Each blower assembly shall be easily removable from the side of the unit without disturbing any other component. It shall be driven by a heavy-duty, drip-proof motor with Class B insulation and permanently lubricated ball bearings rated for the life of the unit. Each blower motor shall have internal overload protection.

Filter

The filter frame shall be integral to the unit and shall allow for easy replacement from the front of the unit. The filters shall be rated not less than 30 percent efficient by the ASHRAE 52-76 method.

Refrigeration System

The refrigeration system shall be completely factory assembled with type-L copper tubing and shall include a direct-expansion evaporator coil, solid-core filter/dryer, adjustable externally equalized tx valve, manual-reset high-pressure switch, low-pressure switch, refrigeration service valves, sight glass/moisture indicator, refrigerant reclaim valve, liquid-line solenoid valve (air-cooled only) and heat-pump-duty hermetic compressor. Water and glycol-cooled units shall include a stainless steel brazed-plate refrigeration condenser and water regulating valve.

STANDARD FEATURES

Evaporator Coil

The evaporator coil shall be constructed of seamless copper tubing expanded into aluminum fins. The coils shall be pressure tested to 150 psig. It shall be mounted in a corrosion-proof heavy-duty plastic drain pan. The coil shall be designed for 100 percent sensible cooling capacity at 72°F DB, 45 percent RH. It shall have a minimum face area of ___ sq. ft. and a maximum face velocity of ___ ft. per min.

Chilled-Water Coil (Chilled-Water Units)

The chilled-water coil shall be constructed of seamless copper tubing expanded into aluminum fins. The coil shall be pressure tested to 150 psig. It shall be mounted in corrosion-proof heavy-duty plastic drain pan. It shall distribute water throughout the full face area, and shall be factory piped to a motorized, three-way*, proportional chilled-water valve rated at 400 psig. The coil shall be designed for 100 percent sensible cooling capacity at 72°F DB, 45% RH. It shall have a minimum face area of ___ sq. ft. and a maximum face velocity of ___ ft. per min.

High-Efficiency Compressor

The scroll compressor shall be rated for heat pump duty and shall be of a current high-efficiency design. It shall include inherent motor protection, anti-slug protection, oil strainer, crankcase heater, internal pressure relief, resilient suspension and quick-connect refrigeration service valves with gauge ports on suction and discharge lines. The compressor shall be serviceable with the unit in operation without disturbing the performance or air flow.

Electrical

The electrical panel shall be located out of the air stream to allow service while the unit is in operation. All electrical components shall be located behind the access panel and shall contain all circuit breakers, contactors, relays and transformers. Separate branch circuit breakers shall be provided for the compressor, electric reheat, blower motor(s), controls and humidifier circuits.

Disconnect Switch

A factory-mounted non-locking disconnect switch located in the high-voltage electrical section shall be standard.

STANDARD FEATURES

Supervisaire® Microprocessor Controller

All unit functions shall be controlled by the Supervisaire® microprocessor. The Supervisaire® shall be capable of controlling room conditions within the following parameters:

Temperature set point 40 to 85°F
Temperature control band 1 to 30°F
Humidity set point 40 to 80 percent rh
Humidity control band 1 to 30 percent rh

The Supervisaire® control panel consists of six buttons for Program, Escape, Enter, Up and Down arrow and alarm access. A four-row, 20-character/row, alphanumeric LCD shall display all system-parameter setting screens, alarm-message screens, and systemstatus screens. The parameters shall be set with the up and down buttons.

The alarms are:

- FIRE DETECTED
- LOSS OF AIR FLOW-CHECK FAN
- CHANGE AIR FILTERS
- WATER DETECTED UNDER FLOOR
- LOSS OF FLUID FLOW
- HIGH FLUID TEMP
- VOLTAGE ERROR
- COMPRESSOR 1 HIGH PRESSURE
- COMPRESSOR 2 HIGH PRESSURE
- COMPRESSOR 1 LOW PRESSURE
- COMPRESSOR 2 LOW PRESSURE
- CUSTOMER ALARM
- SPECIAL ALARM 1
- EMERGENCY POWER ON
- POWER RESTART
- HIGH ROOM TEMPERATURE
- LOW ROOM TEMPERATURE
- LOW ROOM HUMIDITY
- HIGH ROOM HUMIDITY
- HIGH COIL 1 TEMPERATURE
- LOW COIL 1 TEMPERATURE
- LOW COIL 2 TEMPERATURE
- DISCHARGE TEMP SENSOR FAILURE
- ROOM TEMPERATURE SENSOR FAILURE
- ROOM HUMIDITY SENSOR FAILURE
- WATER TEMPERATURE SENSOR FAILURE
- COIL 1 TEMPERATURE SENSOR FAILURE
- COIL 2 TEMPERATURE SENSOR FAILURE
- CUSTOMER TEMPERATURE SENSOR FAILURE

The alarm memory shall save the data for all the last 50 alarms including the alarm message, time and date of occurrence, room temperature and humidity at occurrence. The battery backup shall protect and maintain the real-time clock. The batteries shall have an inactive life of eight to ten years and an active life of six to eight years.

Adjustable sequential load activation shall allow the time delay between stages to be set in seconds in order to reduce inrush current and/or vary the response time.

STANDARD FEATURES / INDIVIDUAL SYSTEMS

Air-Controlled Condenser and Controls

The unit shall be provided with a remote air-cooled condenser. It shall be sized to provide full cooling capacity at (95) (100) (105)°F maximum ambient. The condenser casing, structural supports, coil frame and motor supports shall be constructed of 16-gauge galvanized steel. The mounting legs shall be 10-gauge galvanized steel. The coil shall be constructed of copper coils expanded into aluminum fins, pressure tested to 450 psig. The fan blade shall be aluminum, riveted to a zinc-plated steel hub. All motors shall be 1/2 hp, single-speed. Motors shall be drip-proof with permanently lubricated and sealed ball bearings and inherent overload protection.

The integral condenser controls shall include a contactor(s), control relay, variable speed fan control switch, and high and low-voltage terminal strips factory-wired in a weatherproof enclosure. The controls shall provide -20°F low ambient operation. The air-cooled condenser shall be sized to provide the specified cooling capacity at a maximum outdoor ambient of ___°F.

WATER-COOLED

Water-Cooled Condenser

The water-cooled condenser shall be a heavy-duty, counterflow, brazed-plate heat exchanger. It shall be constructed of AISI-316 stainless-steel plates and shall be pressure tested at 570 psi. Maximum working pressure shall be 430 psi. It shall be fitted with a two-way, head-pressure-controlled, 150 psig, water-regulating valve.

GLYCOL-COOLED

Glycol-Cooled Condenser

The glycol-cooled condenser shall be a heavy-duty, counterflow, brazed-plate heat exchanger. It shall be constructed of AISI-316 stainless-steel plates and shall be pressure tested at 570 psi. Maximum working pressure shall be 430 psi. It shall be fitted with a two-way, head-pressure-controlled, 150 psig, water-regulating valve.

FACTORY-INSTALLED OPTIONS

Steam Humidifier

The unit shall be fitted with a lattice-electrode steam humidifier. It shall provide particle-free steam to the air stream without moisture carryover and shall be designed to operate on cold, hard water. The electrodes shall be enclosed within a disposable plastic cylinder and shall not require cleaning. Output capacity shall be adjustable from 10 to 100 percent and efficiency shall remain constant throughout the life of the cylinder. Standard controls shall include an Auto/Off/Drain Switch and a High-Water-Level Alarm Light. A built-in strainer shall be standard.

Electric Reheat

The unit shall be fitted with three-phase electric heating elements located at the coil discharge. They shall be constructed of spiral aluminum-coated steel fins brazed to a copper-coated steel tube encasing the heating element, and shall be capable of withstanding moist conditions. The heat section shall be capable of maintaining room dry-bulb temperature using 2, 3 or proportional stages of control. A U.L. approved high-limit safety switch shall prevent overheating.

Hot-Gas Reheat

A hot-gas reheat coil shall be furnished complete with three-way hot-gas valve and a refrigerant check valve. The coil shall be constructed of copper tubes expanded into aluminum fins. The hot-gas reheat coil shall maintain room temperature during the dehumidification cycle only.

FACTORY-INSTALLED OPTIONS

Hot-Water Reheat

A hot-water coil shall be furnished to maintain room temperature. The coil shall be complete with two-way valve and Y-strainer. The coil shall be constructed of copper tubes expanded into aluminum fins.

Dead-Front Disconnect Switch

The unit shall be equipped with a factory mounted, non-locking dead-front disconnect switch. The operating lever shall protrude through the access panel and shall prevent opening the panel until switched off.

Graphic Control Panel

The remote graphic control panel shall be equipped with an advanced liquid-crystal display. It shall provide a graphic display of the temperature and humidity changes and shall feature a programmable schedule for any number of days or weeks as desired.

Smoke Detector/Firestat

The unit shall be provided with a combination smoke detector and firestat that will automatically shut the unit down and activate the alarm system.

Underfloor Water Detector

The unit shall be provided with ___ (specify 2 to 4; 2 are standard) factory-installed electronic sensing probes to sense the presence of water under the floor and to activate the unit alarm. The sensors shall be factory wired to a ten-foot cable.

Extended Compressor Warranty

The unit shall include an extended one-year compressor warranty that provides for a replacement compressor. Extended warranty shall also be available as an option.

Hot-Gas Bypass Valve

The unit shall be supplied with a hot-gas bypass valve to allow optimum unit operation at reduced heat load capacity condition.

WATER-COOLED

High-Pressure Water-Regulating Valve

The unit shall be supplied with a two-way high-pressure water-regulating valve, rated at 300 psig to allow unit operation at up to 300 psig water pressure.

FIELD-INSTALLED ACCESSORIES

External Condensate Pump

The unit shall be provided with a condensate pump rated at 32 gph at 22 ft. head. It shall be complete with pump, motor, reservoir and float switch.

AIR-COOLED

Low-Ambient Condenser

The unit shall be provided with a remote air-cooled condenser. It shall be sized to provide full cooling capacity at (95) (100) (105)°F maximum ambient. The condenser casing, structural supports, coil frame, and motor supports shall be constructed of 16-gauge galvanized steel. The mounting legs shall be constructed of 10-gauge galvanized steel. The coil shall be constructed of copper coils expanded into aluminum fins, pressure tested to 450 psig. The fan blade shall be aluminum, riveted to a zinc-plated steel hub. Fan motors shall be 1/2 hp. The motors shall be drip-proof with permanently-lubricated and sealed ball bearings and inherent overload protection. A factory installed three-way head-pressure control valve, a check valve, and an insulated, heated liquid receiver shall provide -40°F low-ambient operation.

The integral condenser controls shall include a contactor(s), control relay, and high and low-voltage terminal strips factory wired in the condenser's weatherproof enclosure.

GLYCOL-COOLED

Remote Glycol Cooler

The glycol cooler shall be sized to provide the capacity specified at an outdoor ambient of ___°F. The glycol cooler casing, structural supports, coil-frame and motor supports shall be constructed of 18-gauge galvanized steel. The mounting legs shall be 16-gauge galvanized steel. The coil shall be constructed of seamless copper tubes expanded into aluminum fins and shall be pressure tested to 450 psig. The fan blade shall be aluminum riveted to a zinc-plated hub. Each motor shall be three-phase, drip proof with permanently lubricated and sealed ball and inherent overload protection.

Glycol Control Package

The glycol cooler and pump control system shall be complete with fan contactor(s), control relay, fan-cycling temperature switch(s), and high and low-voltage terminal strips mounted in heavy-duty waterproof enclosures. The fan controls shall be factory mounted in an integral weatherproof enclosure.

Glycol Pump

The glycol circulating pump shall be 3600 RPM with a weatherproof TEFC NEMA rated motor with inherent overload protection and a close coupled pump with a 416 stainless steel shaft. The pump must be designed for continuous operation with glycol solution and must have high-head performance characteristics. The pump size shall be selected in strict accordance with the manufacturer's selection tables for proper operation.

Dual Pumps

The glycol pump kit shall include dual pumps with automatic change-over. The standby pump shall automatically start upon failure of the lead pump and shall activate both a visual and audible alarm on the indoor control panel. The control panel shall also include an alarm silence switch, primary-pump selector switch and pump-run indicator lights. A flow switch shall be supplied.

Glycol Pump Package Accessories Kit

The system shall be provided with an enclosure for the pump starter, plus an expansion tank kit and air purger with automatic air vent for field installation. Check valves shall be provided with dual pump installation.

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USA & CANADA
1.800.387.1930
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10935 Crabapple Rd.
Suite 202-A
Roswell, Georgia USA
30075

2180 Dunwin Drive, Unit 7
Mississauga, ON
Canada L5L 1C7

3999 Cote Vertu
Montreal, QC
Canada H4R 1R2

Fax: 905.828.5018
www.ecosaire.com
e-mail: info@ecosaire.com

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