



ENGINEERING MANUAL

Mini-Mate2
5 Ton
50 & 60 Hz

**ISO 9000
CERTIFIED
COMPANY**



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DESIGNED TO MATCH COMPUTER & ELECTRONIC EQUIPMENT NEEDS — FROM INSTALLATION TO OPERATION

Installed above the ceiling, the Mini-Mate2 Systems control the cooling, humidity and air distribution required by sensitive electronic equipment. A range of sizes and configurations are available to meet site needs.

The Mini-Mate2 is also easy to use. Advanced microprocessor technology allows easy, precise control, and menu-driven monitoring keeps you informed of system operation on the LCD readout. These features, combined with Liebert quality construction and reliable components, guarantee satisfaction from installation through operation.

Computer Matched. Liebert Systems are designed to control the environment required for computers and other sensitive electronic equipment. Mini-Mate2 provides complete control on an around-the-clock basis, and the high sensible heat ratio required by sensitive electronic equipment.

Easy Installation. Each split system has thermostat-type wiring to controls and condensing unit. Optional sweat adapters assist with field refrigerant piping.

Easy to Service. Low maintenance components are easily accessed through removable front panels. Spare parts are always in Liebert inventory and available on short notice.

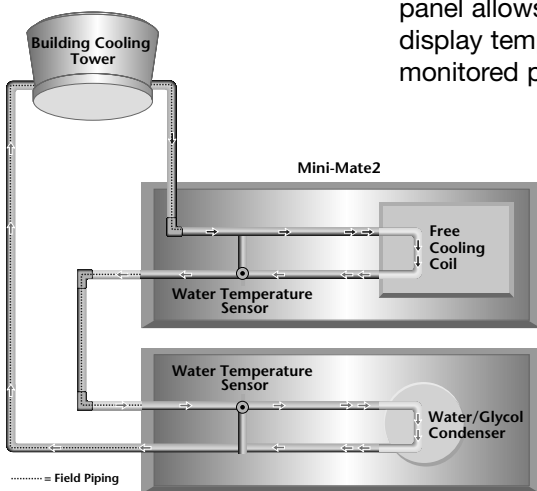
Advanced Control Technology. A menu-driven microprocessor control system provides precise temperature and humidity control, and accurate alarm setpoints. Using touch sensitive buttons, the wall-mounted monitor/control panel allows you to select and display temperature and other monitored parameters.

High Efficiency. High sensible heat ratio, scroll compressor, and precise microprocessor control allow the system to operate efficiently.

Space Saving Design. All indoor components are installed above the ceiling, so no floor space is required.

Reliable. The Mini-Mate family installed base is a testimony to the system reliability. Components include a rugged scroll compressor, high efficiency copper-tube, aluminum-fin evaporator coil and double inlet, direct drive fan.

Agency Listed. Units are ETL and CSA (NRTL-C) certified. NRTL-C meets both U.S. and Canadian government safety requirements, providing fast, hassle-free inspection and building code approvals. The units are also MEA listed, for New York City applications.



When water temperature goes below 45°, cooling switches over to Free-Cooling operation. A separate chilled water source can also be used with Air-Cooled system.



The microprocessor control system, with its user-friendly wall-mounted display, provides precise control of all unit functions.

- Free-cooling option. A second cooling coil allows the system to take advantage of colder outdoor temperatures and bypass compressor operation.

Standard Features — 5 Ton Systems

- The Mini-Mate2 is a split system air, water, or glycol cooled unit, or self-contained chilled water unit.
- The evaporator section includes the evaporator coil, adjustable belt-driven blower assembly, microprocessor control and a stainless-steel drain pan.
- Centrifugal Fan Condensing Unit includes scroll compressor, condenser coil, centrifugal blower assembly, high-pressure switch, Lee-temp head pressure control. Unit must be mounted indoors.
- The standard prop fan condensing unit includes scroll compressor, prop fan, high head pressure switch, and Lee-temp head pressure control (for operation down to -30°F (-39°C) ambient.) Condensing unit is rated for 95°F (35°C) ambient.
- Water/Glycol Condensing Units include scroll compressor, coaxial condenser, high head pressure switch, and 2-way water regulating valve designed for 150 psi (1034.3 kPa). Condensing unit can be used on water or glycol cooling loop.
- Chilled water fan/coil section includes chilled water coil and 2-way slow close motorized valve. Design pressure is 300 psi (1034.3 kPa), 60 psi close-off differential.
- Microprocessor Controls includes a 2-line, 16 character, wall-mounted LCD display which provides temperature setpoint

and sensitivity adjustment, humidity setpoint and sensitivity adjustment, digital display of temperature, humidity, setpoints, sensitivities, and alarm conditions. A 7-key membrane keypad for setpoint/program control, unit on/off, and alarm silence is located below the LCD display. The wall box display is connected to the main control board with four (4), field supplied thermostat-type wires. The temperature and humidity sensors are located in the wallbox, which can be remote up to 300 feet (91.4 m) from the evaporator unit. Control also includes common alarm terminals and shutdown terminals. The unit automatically restarts after a power outage.

Optional Equipment (Factory Installed)

- Electric Reheat includes 304/304 stainless steel finned tubular reheat elements, with high limit safety switch.
- SCR Electric Reheat includes the controller and software to provide full cooling with modulating reheat. Reheat capacity is upsized to offset the cooling capacity.
- Hot Water Reheat includes hot water coil, 2-way solenoid valve, and Y-strainer. Note: this option is not available with free-cooling option, or other reheat options.
- Canister Humidifier Package includes steam generating type humidifier with automatic flushing circuit, inlet strainer, drain, and solenoid valve.
- Free-Cooling Option includes coil, 3-way slow-close valve, and separate supply and return piping for chilled water cooling. Free-cooling is activated when water temperature reaches pre-set (typically 45°F) temperature. Valve is rated for 300 psi (2068 kPa) working pressure.
- If Free-Cooling Coil is used on an open tower system, a Cu/N (Cupro-Nickel) Coil should be specified to prevent coil tube corrosion, or a field supplied heat exchanger can be installed to separate the tower loop from the free-cooling loop.
- Hot Gas Bypass (Condensing Units). This optional system bypasses hot gas around the compressor directly to suction to provide capacity control and reduce compressor cycling. System includes liquid injection valve to maintain proper suction superheat.
- Smoke Detector is factory installed and wired to provide an audible and visual alarm at the wallbox, and shut the unit off.
- Firestat senses the return air temperature and shuts down unit if temperature reaches 125°F (51.7°C).
- Prop fan Condensing Units are available in the following optional configurations:
 - 95°F (35°C) ambient with hot gas bypass, for low load conditions.
 - 105°F (40°C) ambient for high ambient conditions.
 - 105°F (40°C) ambient with hot gas bypass for high ambient and low load conditions.
 - 95°F (35°C) ambient Quietline for low noise level conditions below 56 dba.
- Water/Glycol Condensing Units are available with the following piping options:
 - 2-way water reg. valve with 350 psi (2413 kPa) design pressure.
 - 3-way water reg. valve with 150 psi (1034 kPa) design pressure.
 - 3-way water reg. valve with 350 psi (2413 kPa) design pressure.
- Factory installed non-fused disconnect switch allows unit to be turned off for maintenance. Disconnect switch is available on evaporators and indoor condensing units.
- 3-way slow close chilled water valve, rated for 300 psi (2068 kPa) working pressure.

Optional Equipment (Factory Installed) cont...

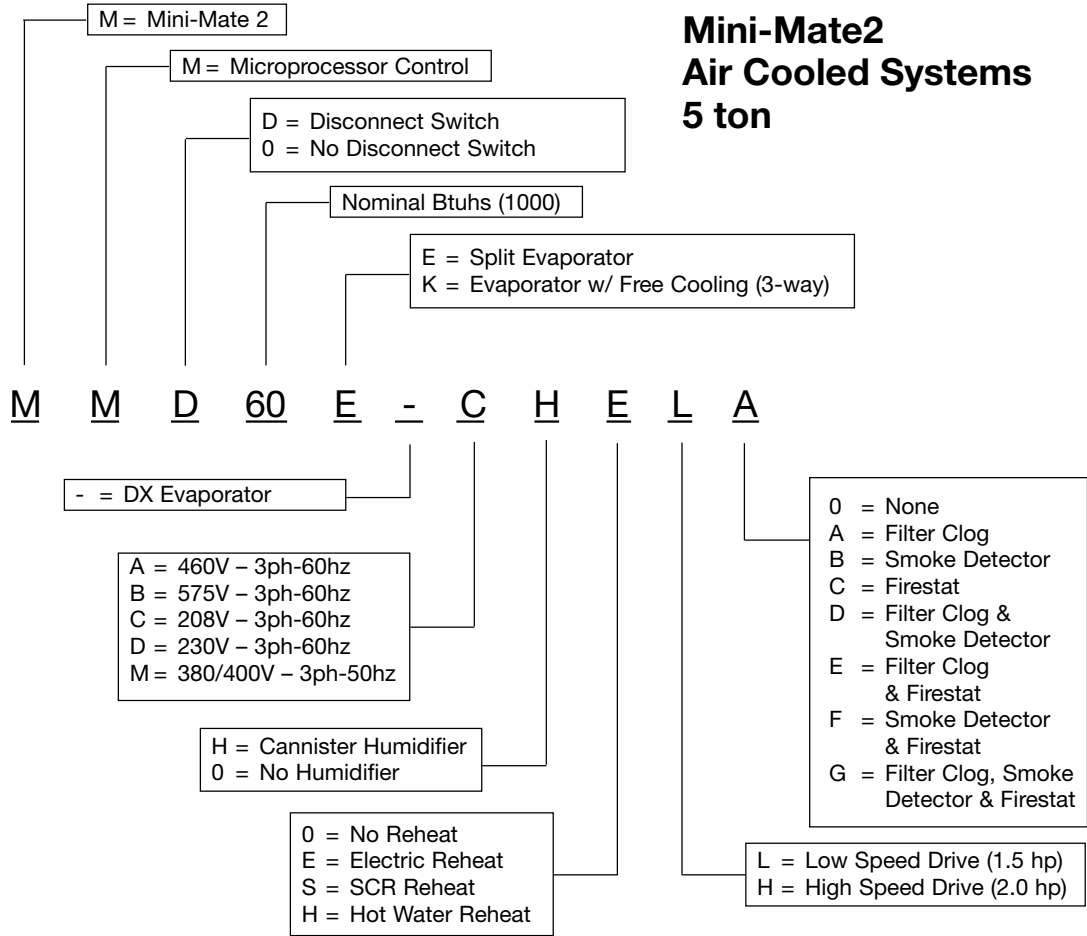
- 2-way modulating chilled water valve, rated for 150 psi (1034 kPa) operating pressure, 72 psi (496 kPa) close-off rating.
- 3-way modulating chilled water valve, rated for 150 psi (1034 kPa) operating pressure, 72 psi (496 kPa) close-off rating.

Ship-Loose Accessories

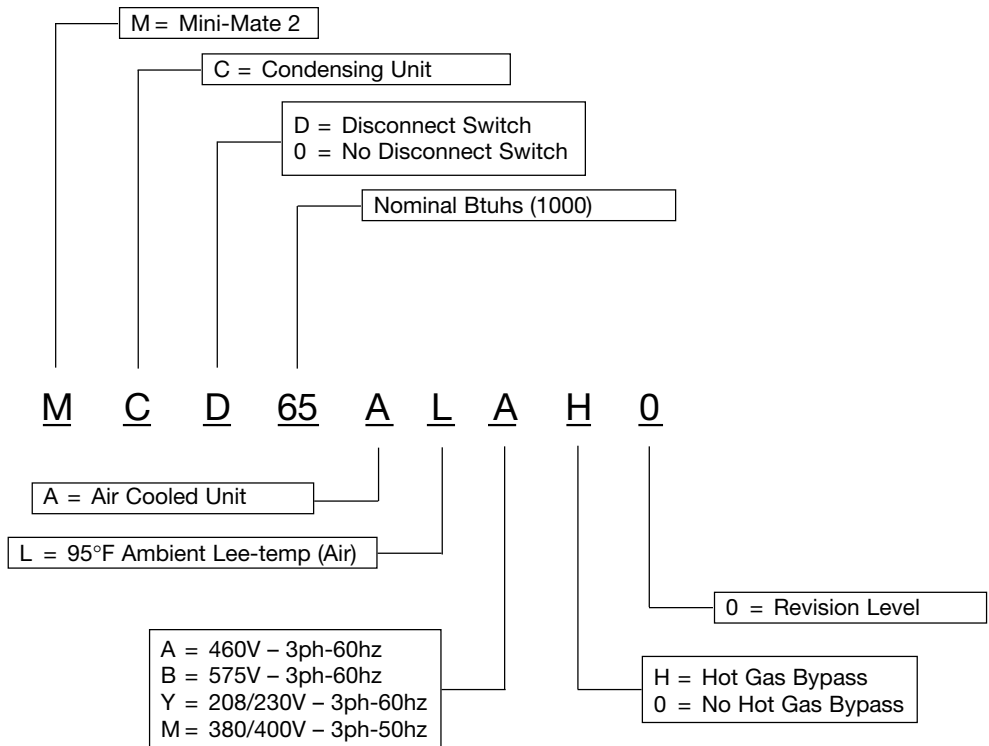
- Filter Box includes filter box with 1" (25.4 mm) duct flange connection, quantity 2, 20" x 20" x 4" (508mm x 508mm x 102mm) filters, and a 1" (25.4 mm) duct flange for use on the supply air opening. A 20% or 30% efficient filter is available.
- Refrigerant-line Sweat Adapter Kit contains two suction and two liquid line compatible fittings that allow field-supplied refrigerant lines to be used.
- Condensate Pump is field mounted on the left side of the cabinet and is equipped with a check valve.
- Remote Temperature and Humidity Sensors include sensors mounted in an attractive case with 30 ft. (9m) of cable. Note: Microprocessor control includes sensors mounted in the wallbox.
- Monitoring and Control Equipment is available for the Mini-Mate2:
 - SiteScan Site Monitoring System
 - Dry Contact Monitors RCM 4 and RCM 8
 - Auto-changeover controls, AC3 and RAC2-8
 - Single point power kit interconnects the high voltage sections of a close-coupled evaporator and indoor condensing unit.

Evaporators

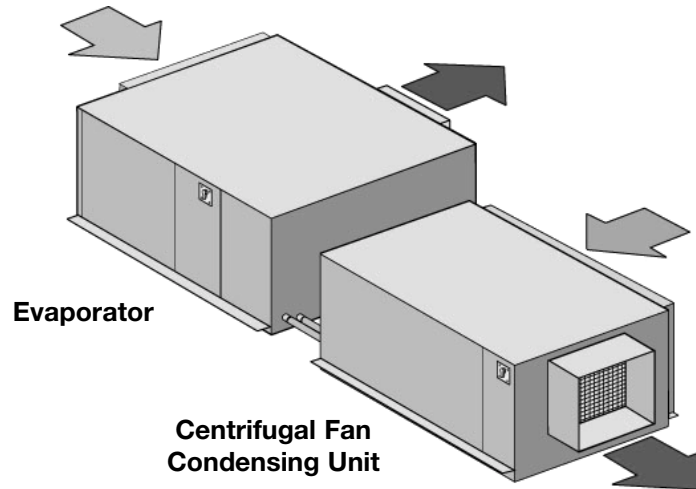
Mini-Mate2 Air Cooled Systems 5 ton



Centrifugal Air Cooled Condensing Units

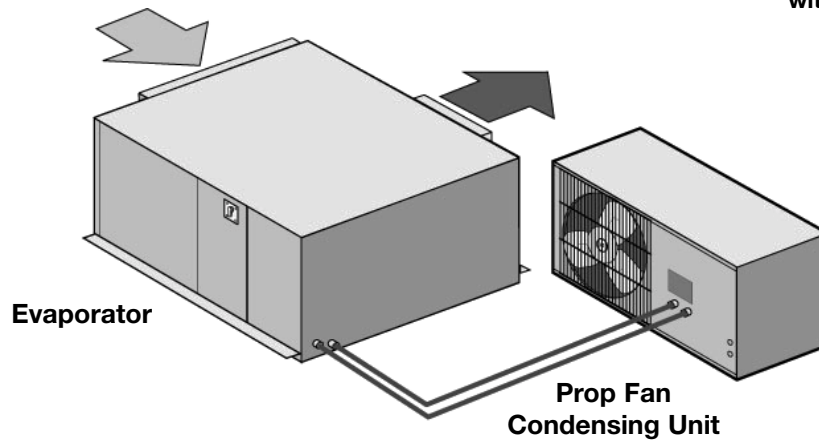


**Mini-Mate2
Air Cooled Systems
5 ton**



**Split System Evaporator
Supply & Return Air Ducted
Remote Air Cooled Condensing Unit**

Note: All split systems may be close-coupled or configured with condensing unit located remotely from the evaporator.

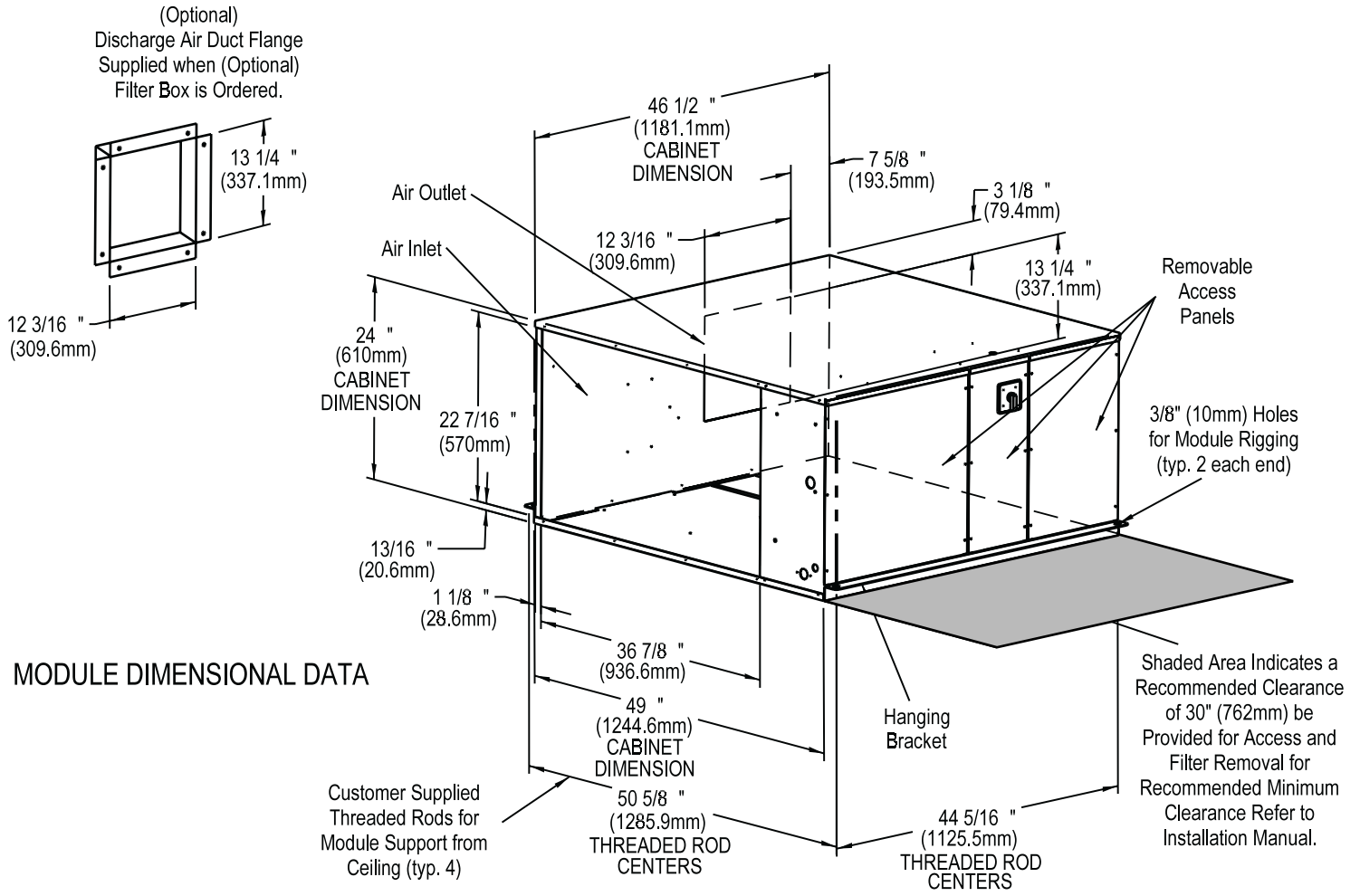


**Split System Evaporator
Supply & Return Air Ducted
Outdoor Prop Fan Condensing Unit**

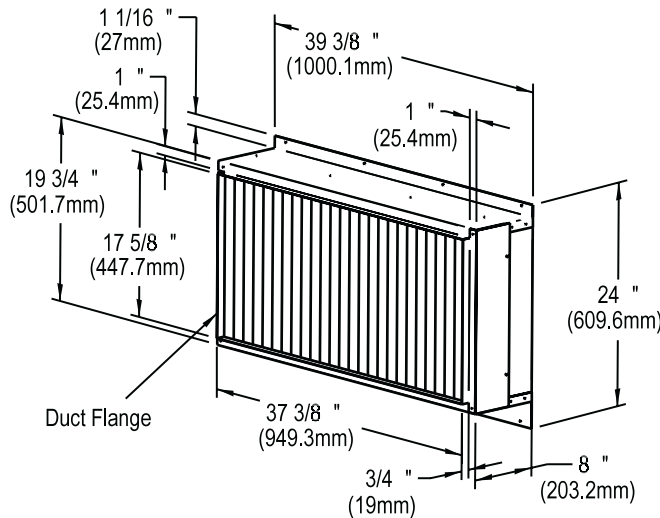
5 ton Mini-Mate2, Air Cooled Systems

Unit Dimensional Data

FAN/COIL-MODULE
Air, Water/Glycol (DX) & Chilled Water

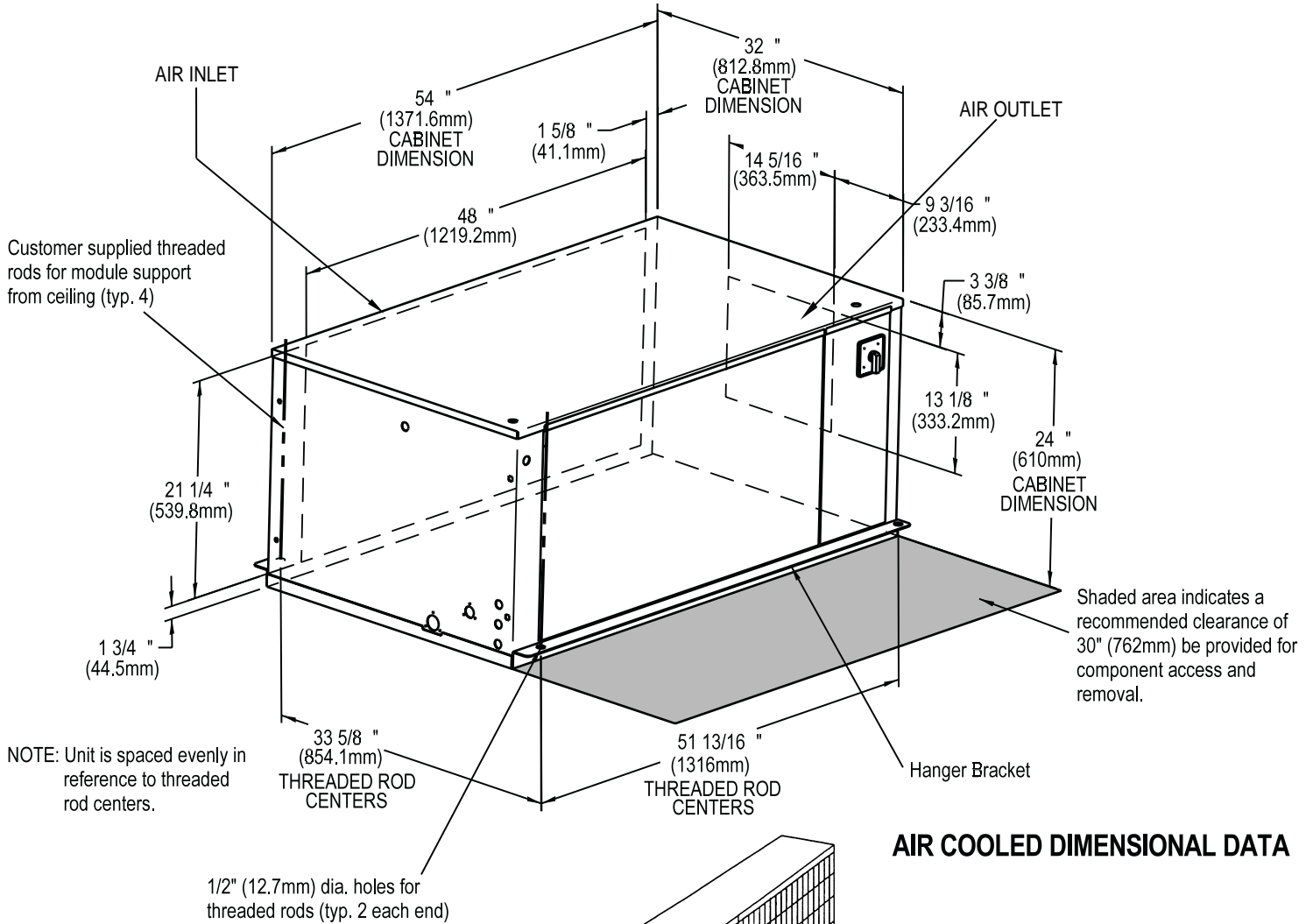


MODULE DIMENSIONAL DATA



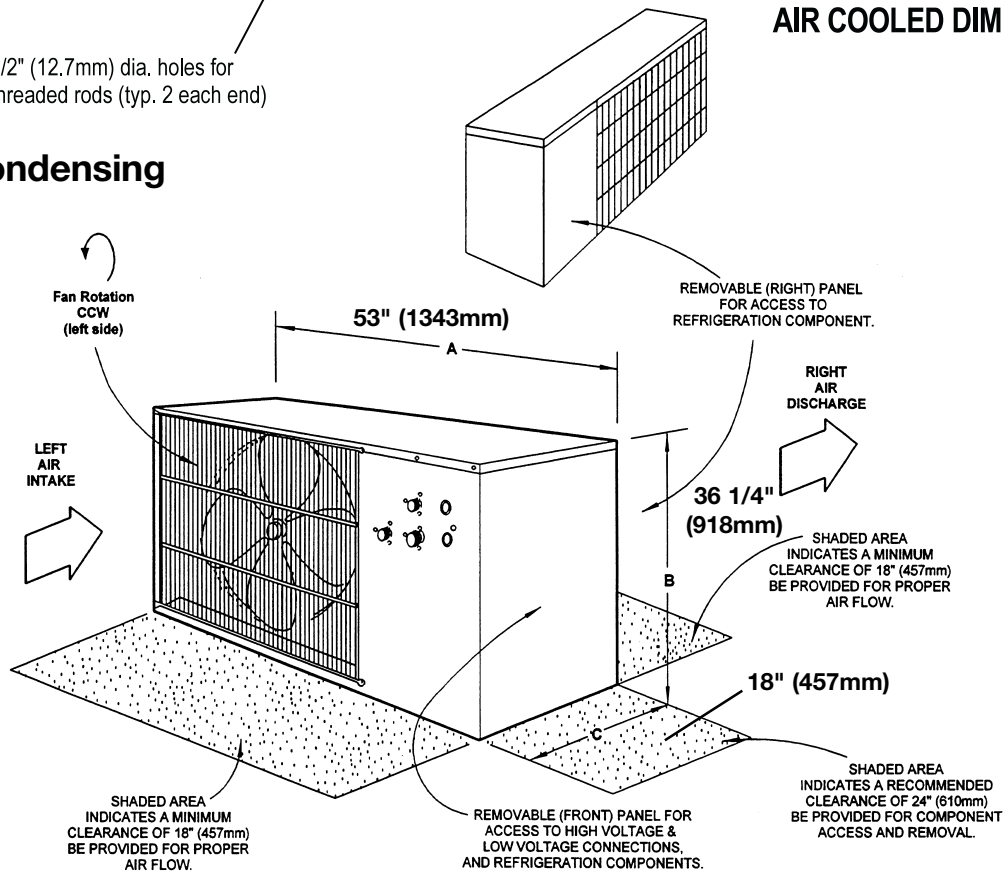
(OPTIONAL) FILTER BOX

5 ton Mini-Mate2, Air Cooled Systems Indoor Condensing Module



AIR COOLED DIMENSIONAL DATA

Outdoor Condensing Module



Air Cooled Data, 60 Hz

Air Cooled Systems	with Outdoor Condensing Unit		with Centrifugal Condensing Unit		
	5-ton		5-ton		
Evaporator Model	MM*60E		MM*60E		
Condensing Unit Model	PFC067A		MC*65A		
Net Capacity Data - BTUH (kw)					
80 F (26.7 C) DB	Total	65200	(19.1)	66200	(19.4)
50% RH	Sensible	54400	(15.9)	54800	(16.1)
75 F (23.9 C) DB	Total	60900	(17.8)	61800	(18.1)
50% RH	Sensible	52800	(15.5)	53100	(15.6)
72 F (22.2 C) DB	Total	58700	(17.2)	59400	(17.4)
50% RH	Sensible	51800	(15.2)	52100	(15.3)
Fan Data - Evaporator					
CFM (CMH)		2500	(4248)	2500	(4248)
Fan Motor HP (W)		1.5	(1119)	1.5	(1119)
External Static Pressure, in (mm)		0.5	(13)	0.5	(13)
Evaporator Coil - Copper Tube/Aluminum Fin					
Face Area ft ² (m ²)		5.6	(0.52)	5.6	(0.52)
Coil Rows		4		4	
Max Face Velocity-fpm (m/s)		444	(2.26)	444	(2.26)
Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @208V-3ph		39100	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @230V-3ph		39100	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @460V-3ph		39100	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @575V-3ph		39100	(11.5)	39110	(11.5)
SCR Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @208V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @230V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @460V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @575V-3ph		N/A	N/A	N/A	N/A
Hot Water Reheat Data (based on 180 F Water)					
Capacity - BTUH (kw)		70595	(20.7)	70595	(20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)	1.5	(5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)	0.8	(2.4)
Humidifier Data - Steam Generator Type					
Capacity - lbs/hr (kg/hr)		8	(3.6)	8	(3.6)
Kw		2.8		2.8	
Condensing Unit Options: 95 F (35 C) Ambient		Operation to -30F (-34.4 C) Ambient		Operation to -30F (-28.9 C) Ambient	
Condensing Unit Model Number		PFC067A		MCD65A	
Face Area ft ² (m ²)		10.5	(0.98)	7.3	(0.68)
Rows of Coil		3		4	
CFM (CMH)		4200	(7140)	3500	(5947)
Motor Hp (W)		0.5	(373)	2.0	(1.5)
External Static Pressure, in wg. (mm)		n/a	n/a	0.50	(13)
Evaporator Connection Sizes					
Liquid Line - Coupling Female, in.		1/2" - #10			
Suction Line - Coupling Female, in.		1-1/8" - #12			
Humidifier Supply, in.		0.25			
Evaporator Drain, in.		0.75			
Filter Dimensions, qty 2, 4"x20"x20" (102mmx508mmx508mm)					

* Specify Disconnect or No Disconnect

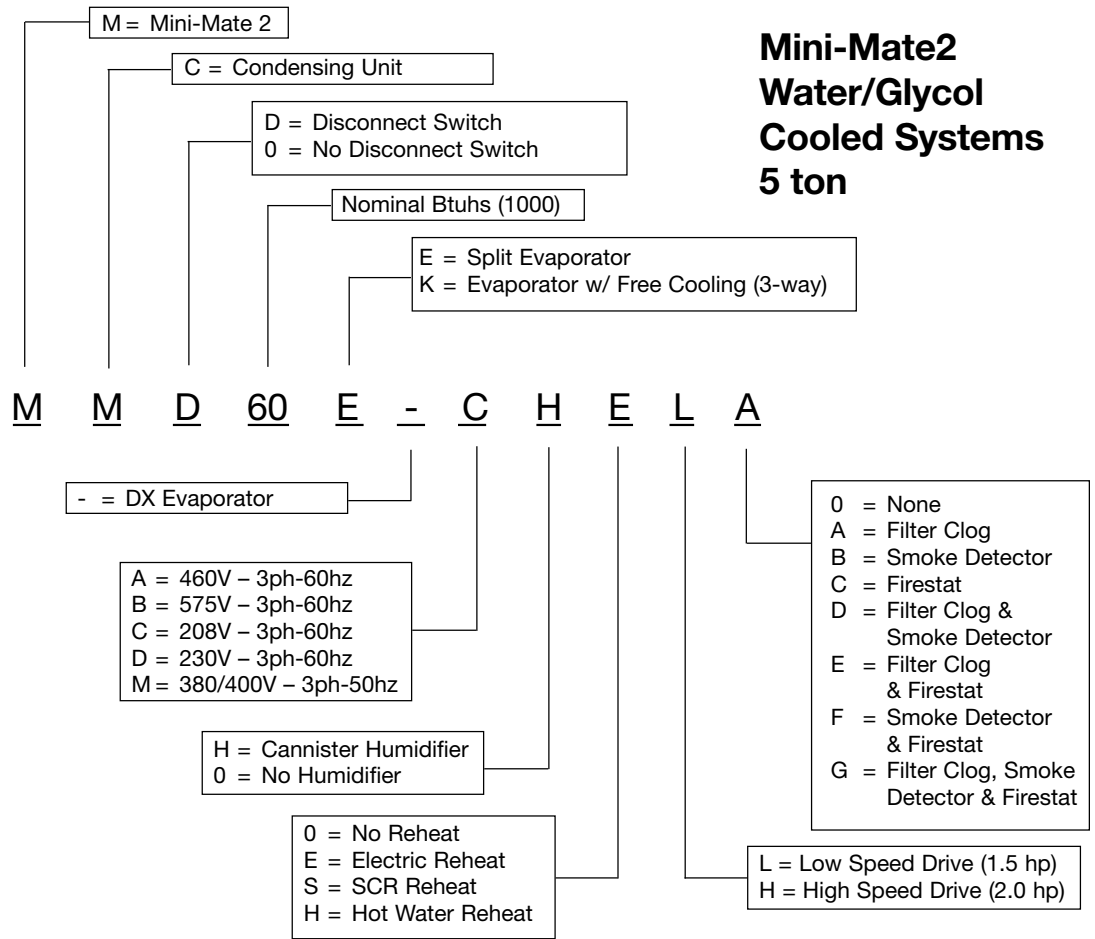
Air Cooled Data, 50Hz

Air Cooled Systems	with Outdoor Condensing Unit		with Centrifugal Condensing Unit	
	5-ton		5-ton	
Evaporator Model	MM*59E		MM*59E	
Condensing Unit Model	PFC066A		MC*64A	
Net Capacity Data - BTUH (kw)				
80 F (26.7 C) DB	Total	63900	(18.7)	65500 (19.2)
50% RH	Sensible	54000	(15.8)	54600 (16.0)
75 F (23.9 C) DB	Total	59500	(17.4)	61000 (17.9)
50% RH	Sensible	52200	(15.3)	52800 (15.5)
72 F (22.2 C) DB	Total	57200	(16.8)	58600 (17.2)
50% RH	Sensible	51200	(15.0)	51700 (15.1)
Fan Data - Evaporator				
CFM (CMH)		2500	(4248)	2500 (4248)
Fan Motor HP (W)		1.5	(1119)	1.5 (1119)
External Static Pressure, in (mm)		0.5	(13)	0.5 (13)
Evaporator Coil - Copper Tube/Aluminum Fin				
Face Area ft ² (m ²)		5.6	(0.52)	5.6 (0.52)
Coil Rows		4		4
Max Face Velocity-fpm (m/s)		444	(2.26)	444 (2.26)
Electric Reheat Data (Includes Fan Motor)				
Capacity - BTUH (kw) @380V-3ph		35780	(10.5)	35780 (10.5)
Capacity - BTUH (kw) @400V-3ph		39110	(11.5)	39110 (11.5)
SCR Electric Reheat Data (Includes Fan Motor)				
Capacity - BTUH (kw) @380V-3ph		51195	(15.0)	51195 (15.0)
Capacity - BTUH (kw) @400V-3ph		56190	(16.5)	56190 (16.5)
Hot Water Reheat Data (based on 180 F Water)				
Capacity - BTUH (kw)- High Speed		70595	(20.7)	70595 (20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)	1.5 (5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)	0.8 (2.4)
Humidifier Data - Steam Generator Type				
Capacity - lbs/hr (kg/hr)		8	(3.6)	8 (3.6)
Kw		2.8		2.8
		Outdoor Propeller Fan		Indoor Centrifugal Fan
Condensing Unit Options: 95 F (35 C) Ambient		Operation to -30F (-34.4 C) Ambient		Operation to -30F (-28.9 C) Ambient
Condensing Unit Model Number		PFC066A		MCD64A
Face Area ft ² (m ²)		10.5	(0.98)	7.3 (0.68)
Rows of Coil		3	(3)	4 (4)
CFM (CMH)		3600	(6116)	2500 (4248)
Motor Hp (W)		0.50	(373)	2.0 (1.5)
External Static Pressure, in wg. (mm)		n/a	n/a	0.5 (13)
Evaporator Connection Sizes				
Liquid Line - Coupling Female, in.		1/2" - #10		
Suction Line - Coupling Female, in.		1-1/8" - #12		
Humidifier Supply, in.		0.25		
Evaporator Drain, in.		0.75		
Filter Dimensions, qty 2, 4"x20"x20" (102mmx508mmx508mm)				

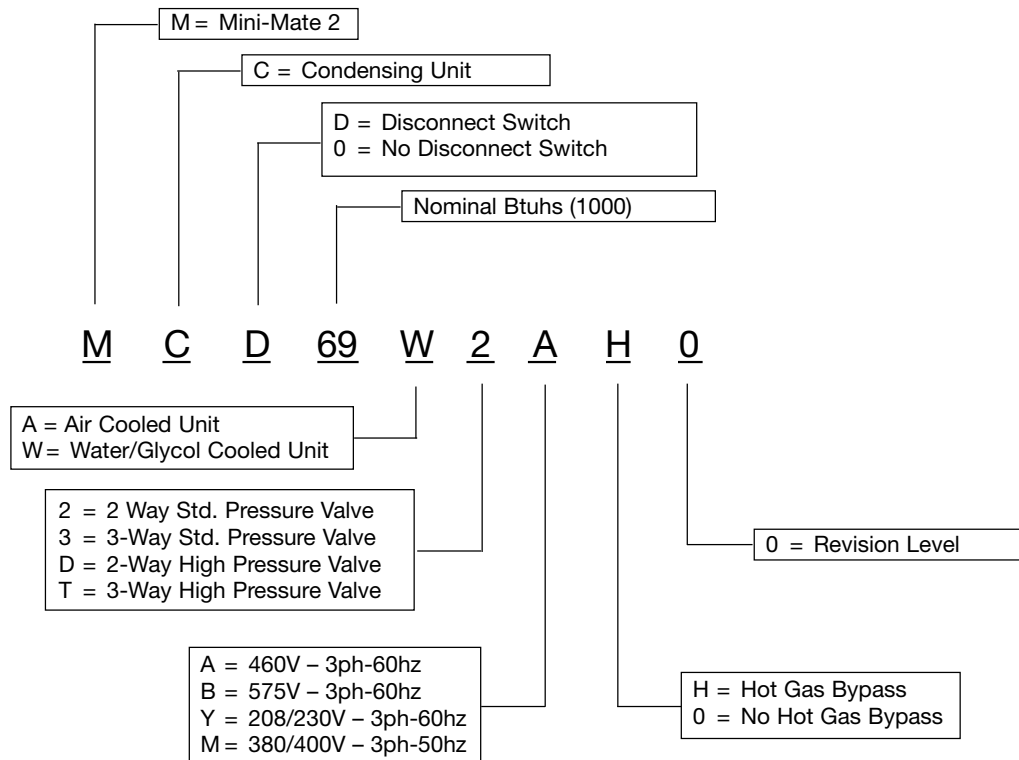
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Evaporators

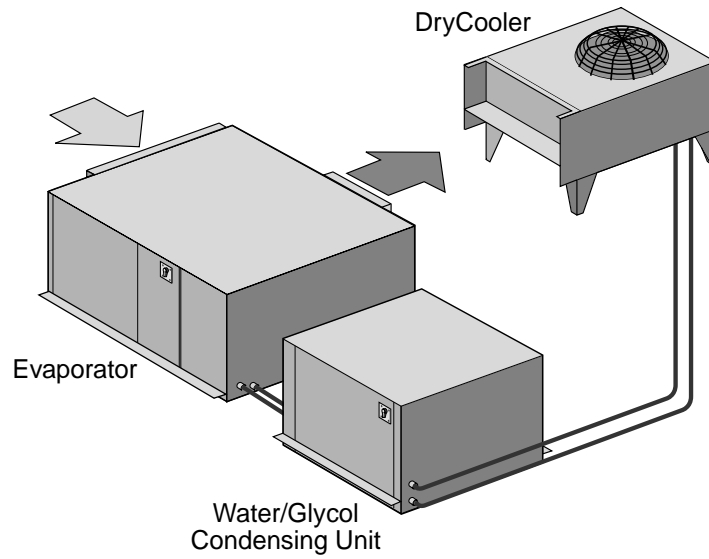
Mini-Mate2 Water/Glycol Cooled Systems 5 ton



Water Cooled Condensing Units

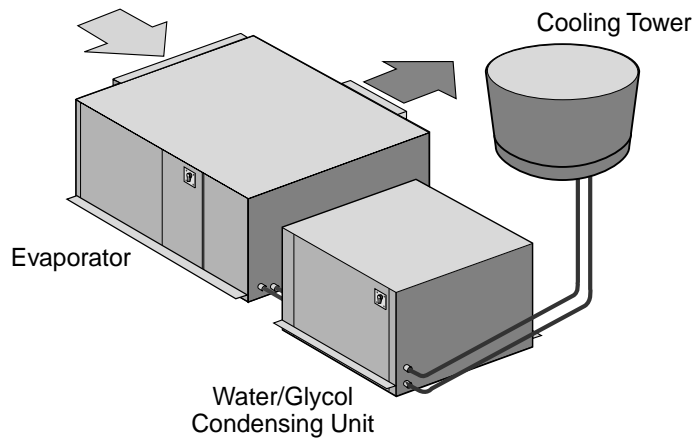


**Mini-Mate2
Water/Glycol
Cooled Systems
5 ton**



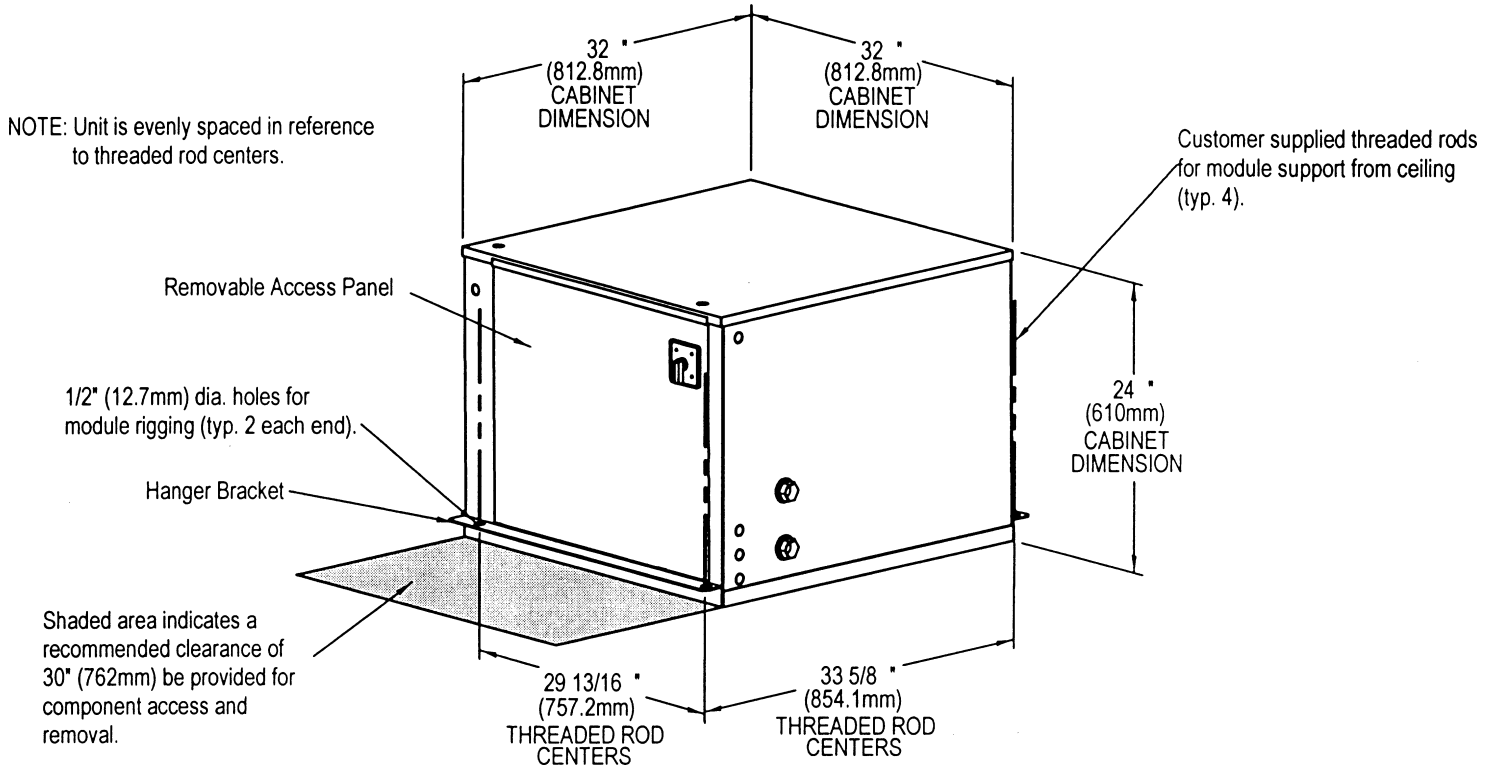
**Split System Evaporator
Supply & Return Air Ducted
Remote Water/Glycol Condensing Unit**

Note: All split systems may be close-coupled or configured with condensing unit located remotely from the evaporator.



**Split System Evaporator
Supply & Return Air Ducted
Remote Water/Glycol Condensing Unit**

2-ton and 3-ton Mini-Mate2, Water/Glycol Cooled Condensing Unit Unit Dimensional Data



**Note: An evaporator must be selected for each condensing unit.
For evaporator dimensional data see page 8.**

Water/Glycol Data, 60 Hz

Water Cooled and Glycol Cooled		5-ton		5-ton	
		WATER COOLED		GLYCOL COOLED	
Evaporator Model		MM*60E		MM*60E	
Condensing Unit Model		MC*69W		MC*69W	
Net Capacity Data - BTUH (kw)					
80 F (26.7 C) DB	Total	69800	(20.5)	62200	(18.2)
50% RH	Sensible	55700	(16.3)	52900	(15.5)
75 F (23.9 C) DB	Total	65200	(19.1)	57900	(17.0)
50% RH	Sensible	54000	(15.8)	51100	(15.0)
72 F (22.2 C) DB	Total	62400	(18.3)	55400	(16.2)
50% RH	Sensible	52900	(15.5)	50000	(14.6)
Fan Data - Evaporator					
CFM (CMH)		2500	(4248)	2500	(4248)
Fan Motor Hp (W)		1.5	(1119)	1.5	(1119)
External Static Pressure, in (mm)		0.5	(13)	0.5	(13)
Evaporator Coil - Copper Tube/Aluminum Fin					
Face Area ft2 (m2)		5.6	(0.52)	5.6	(0.52)
Coil Rows		4		4	
Max Face Velocity-fpm (m/s)		444	(2.26)	444	(2.26)
Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @208V-3ph		39110	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @230V-3ph		39110	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @460V-3ph		39110	(11.5)	39110	(11.5)
Capacity - BTUH (kw) @575V-3ph		39110	(11.5)	39110	(11.5)
SCR Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @208V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @230V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @460V-3ph		56190	(16.5)	56190	(16.5)
Capacity - BTUH (kw) @575V-3ph		N/A	N/A	N/A	N/A
Hot Water Reheat Data (based on 180 F Water)					
Capacity - BTUH (kw)		70595	(20.7)	70595	(20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)	1.5	(5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)	0.8	(2.4)
Humidifier Data - Steam Generator Type					
Capacity - lbs/hr (kg/hr)		8	(3.6)	8	(3.6)
Kw		2.8		2.8	
Water and Glycol Condensing Unit Options					
Condensing Unit Model Number		MCD69W		MCD69W	
Condenser Water Requirements - 85°F EWT (29.4°C), 105°F (40.6°C) Condensing Temp					
THR - BTUH/H (Kw) @ 75°F/50% (23.9C/50%)		84200	(24.7)	N/A	N/A
Flow Rate - gpm (l/m)		15.3	(57.9)	N/A	N/A
Pressure drop - psi (kPa)		8.2	(24.4)	N/A	N/A
Condenser Glycol Requirements - 110 F EGT (43.3 C) - 40%					
THR - BTUH/H (Kw) @ 75°F/50% (23.9C/50%)		N/A	N/A	81400	(23.8)
Flow Rate - GPM (l/m)		N/A	N/A	20	(75.7)
Pressure Drop - ft. (kPa)		N/A	N/A	37.5	(111.9)
Unit Volume Gal. (L)		N/A	N/A	2.0	(7.5)
Water supply and return connection, in		1"		1"	
Evaporator Connection Sizes					
Liquid Line - Coupling Female, in.		1/2" -#10			
Suction Line - Coupling Female, in.		1-1/8" - #12			
Humidifier Supply, in.		0.25			
Evaporator Drain, in.		0.75			

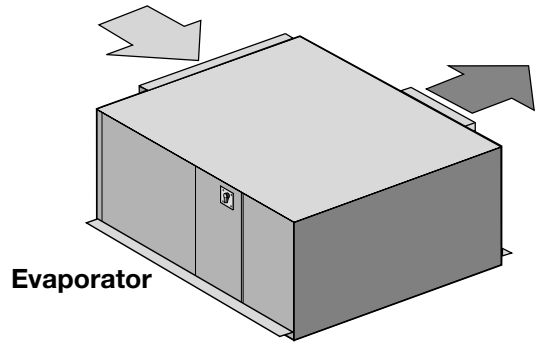
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Water/Glycol Data, 50 Hz

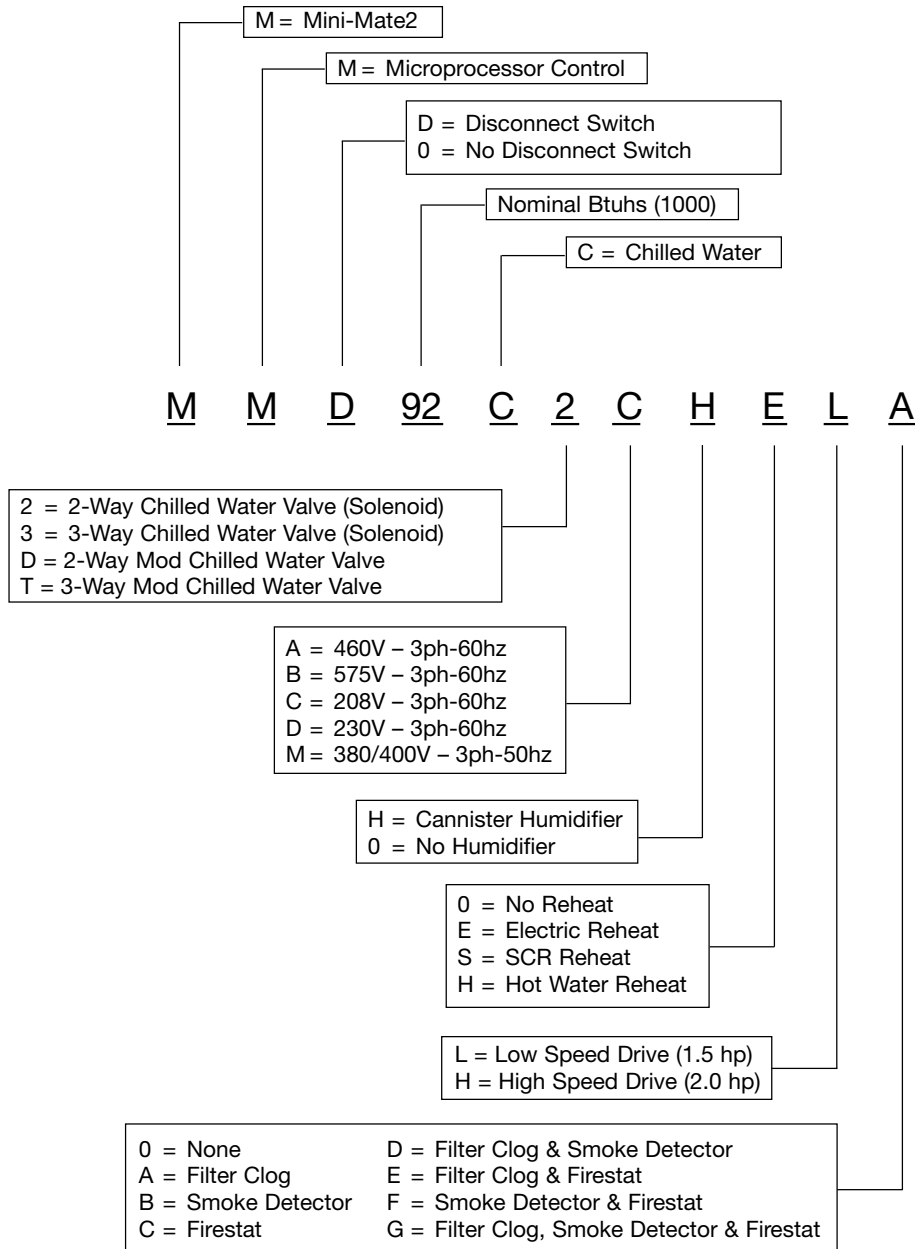
Water Cooled and Glycol Cooled		5-ton		5-ton	
		WATER COOLED		GLYCOL COOLED	
Evaporator Model		MM*59E		MM*59E	
Condensing Unit Model		MC*68W		MC*68W	
Net Capacity Data - BTUH (kw)					
80 F (26.7 C) DB	Total	67700	(19.8)	61400	(18.0)
50% RH	Sensible	54900	(16.1)	52600	(15.4)
75 F (23.9 C) DB	Total	62800	(18.4)	57100	(16.7)
50% RH	Sensible	53100	(15.6)	50800	(14.9)
72 F (22.2 C) DB	Total	60000	(17.6)	54800	(16.1)
50% RH	Sensible	51900	(15.2)	49700	(14.6)
Fan Data - Evaporator					
CFM (CMH)		2500	(4248)	2500	(4248)
Fan Motor Hp (W)		1.5	(1119)	1.5	(1119)
External Static Pressure, in (mm)		0.5	(13)	0.5	(13)
Evaporator Coil - Copper Tube/Aluminum Fin					
Face Area ft2 (m2)		5.6	(0.52)	5.6	(0.52)
Coil Rows		4		4	
Max Face Velocity-fpm (m/s)		444	(2.26)	444	(2.26)
Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @380V-3ph		35780	(10.5)	35780	(10.5)
Capacity - BTUH (kw) @400V-3ph		39110	(11.5)	39110	(11.5)
SCR Electric Reheat Data (Includes Fan Motor)					
Capacity - BTUH (kw) @380V-3ph		51195	(15.0)	51195	(15.0)
Capacity - BTUH (kw) @400V-3ph		56190	(16.5)	56190	(16.5)
Hot Water Reheat Data (based on 180 F Water)					
Capacity - BTUH (kw)		70595	(20.7)	70595	(20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)	1.5	(5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)	0.8	(2.4)
Humidifier Data - Steam Generator Type					
Capacity - lbs/hr (kg/hr)		8	(3.6)	8	(3.6)
Kw		2.8		0.0	
Water and Glycol Condensing Unit Options					
Condensing Unit Model Number		MCD68W		MCD68W	
Condenser Water Requirements - 85°F EWT (29.4°C), 105°F (40.6°C) Condensing Temp					
THR - BTU/H (Kw) @ 75°F/50% (23.9C/50%)		82400	(24.1)	N/A	N/A
Flow Rate - gpm (l/m)		10.0	(37.9)	N/A	N/A
Pressure drop - psi (kPa)		3.7	(11.1)	N/A	N/A
Condenser Glycol Requirements - 110 F EGT (43.3 C) - 40%					
THR - BTU/H (Kw) @ 75°F/50% (23.9C/50%)		N/A	N/A	80300	(23.5)
Flow Rate - GPM (l/m)		N/A	N/A	20.0	(75.7)
Pressure Drop - ft. (kPa)		N/A	N/A	37.5	(111.9)
Unit Volume Gal. (L)		N/A	N/A	2.0	(7.5)
Evaporator Connection Sizes					
Liquid Line - Coupling Female, in.		1/2" -#10			
Suction Line - Coupling Female, in.		1-1/8" - #12			
Humidifier Supply, in.		0.25			
Evaporator Drain, in.		0.75			
Filter Dimensions, qty 2, 4" x 20" x 20" (102mm x 508mm x 508mm)					

* Specify Disconnect or No Disconnect

Mini-Mate2 Chilled Water Systems 5 ton

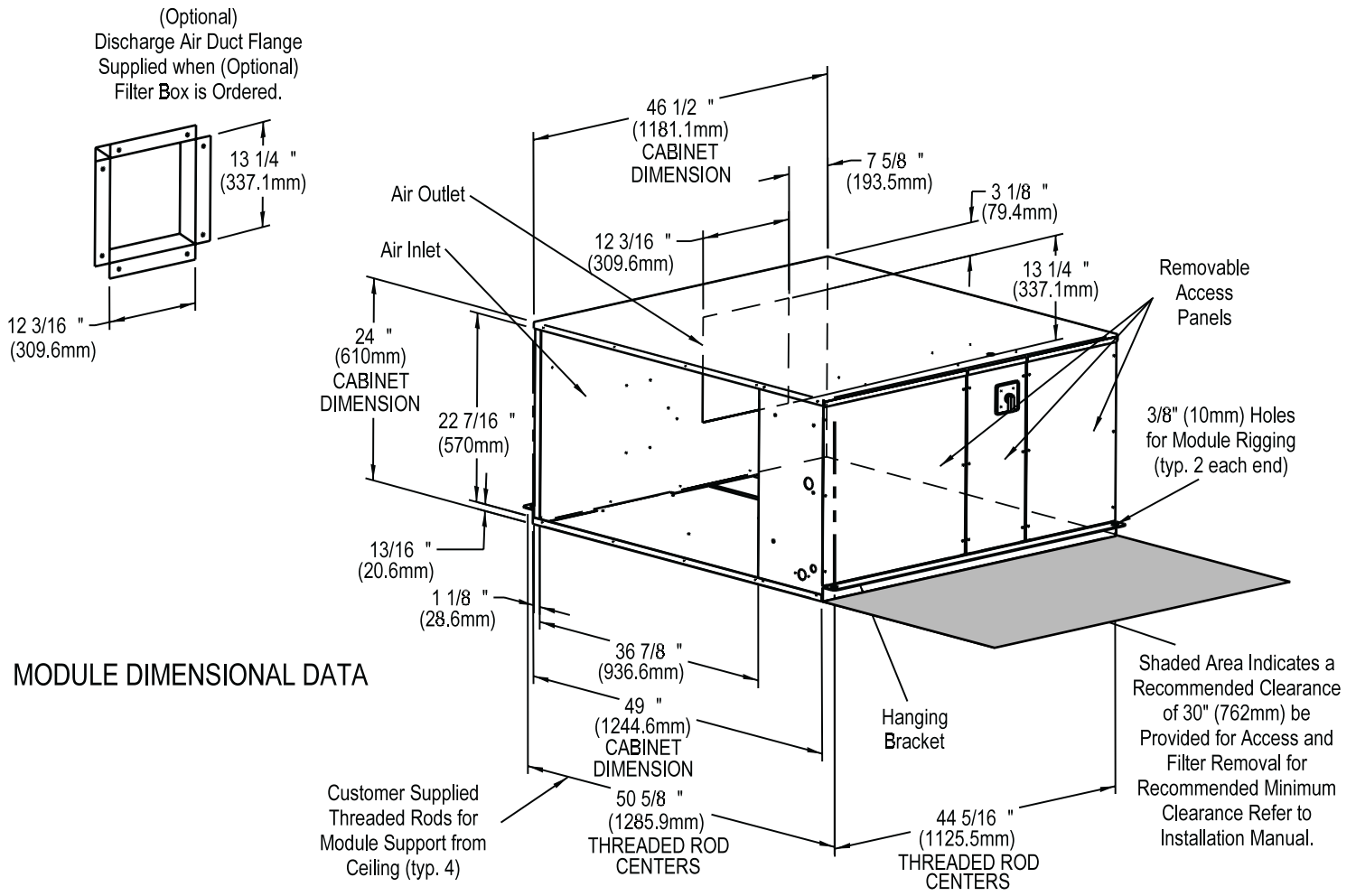


Chilled Water Ducted

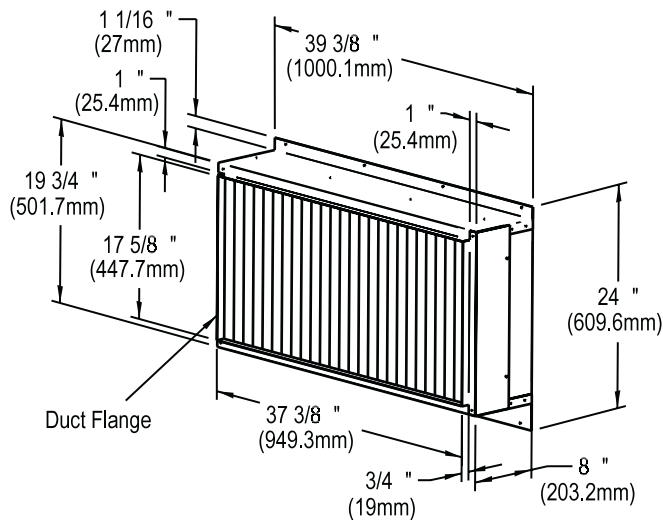


5-ton Mini-Mate2, Chilled Water System Unit Dimensional Data

FAN/COIL MODULE



MODULE DIMENSIONAL DATA



(OPTIONAL) FILTER BOX

Chilled Water Data, 60 Hz

		5-ton	
		CHILLED WATER	
		MM*92C	
Capacity Data - BTUH (kw)			
80 F (26.7 C) DB	Total	95900	(28.1)
50% RH	Sensible	69600	(20.4)
Flow Rate - GPM (l/m)		19.1	(72.3)
Pressure Drop - PSI (kPa)		27.5	(189.6)
75 F (23.9 C) DB	Total	67100	(19.7)
50% RH	Sensible	59000	(17.3)
Flow Rate - GPM (l/m)		13.3	(50.4)
Pressure Drop - PSI (kPa)		(92.4)	
72 F (22.2 C) DB	Total	49600	(14.5)
50% RH	Sensible	49600	(14.5)
Flow Rate - GPM (l/m)		10.0	(37.9)
Pressure Drop - PSI (kPa)		7.6	(52.4)
Fan Data - Evaporator			
CFM (CMH)		2500	(4248)
Fan Motor Hp (W)		1.5	(1.1)
External Static Pressure, in (mm)		0.5	(13)
Evaporator Coil - Copper Tube/Aluminum Fin			
Face Area ft2 (m2)		5.6	(0.5)
Coil Rows		4	
Max Face Velocity-fpm (m/s)		444	(2.3)
Electric Reheat Data (Includes Fan Motor)			
Capacity - BTUH (kw) @208V-3ph		39110	(11.5)
Capacity - BTUH (kw) @230V-3ph		39110	(11.5)
Capacity - BTUH (kw) @460V-3ph		39110	(11.5)
Capacity - BTUH (kw) @575V-3ph		39110	(11.5)
SCR Electric Reheat Data (Includes Fan Motor)			
Capacity - BTUH (kw) @208V-3ph		56190	(16.5)
Capacity - BTUH (kw) @230V-3ph		56190	(16.5)
Capacity - BTUH (kw) @460V-3ph		56190	(16.5)
Capacity - BTUH (kw) @575V-3ph		N/A	N/A
Hot Water Reheat Data (based on 180 F Water)			
Capacity - BTUH (kw)		70595	(20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)
Humidifier Data - Steam Generator Type			
Capacity - lbs/hr (kg/hr)		8	(3.6)
Kw		2.8	
Connection Sizes			
Chilled Water Supply and Return, NPT Female		1"	
Humidifier Supply, in.		0.25	
Evaporator Drain, in.		0.75	
Valve (on/off Slow-Close)			
Valve Size		1"	
Valve Cv		7.0	
Maximum Static Operating Pressure, psi (kPa)		300	(895.2)
Close-off Pressure, psi		60	(179)
Valve (Modulating)			
Valve Size		1"	
Valve Cv		11.6	
Maximum Static Operating Pressure, psi (kPa)		150	(1034)
Close-off Pressure, psi		72	(496)
Filter Dimensions, qty 2, 4" x 20" x 20" (102mm x 508mm x 508mm)			

*Specify Disconnect or No Disconnect

Chilled Water Data, 50 Hz

		5-ton	
		CHILLED WATER	
		MM*91C	
Capacity Data - BTUH (kw)			
80 F (26.7 C) DB	Total	95900	(28.1)
50% RH	Sensible	69600	(20.4)
Flow Rate - GPM (l/m)		19.1	(72.3)
Pressure Drop - PSI (kPa)		27.5	(189.6)
75 F (23.9 C) DB	Total	67100	(19.7)
50% RH	Sensible	59000	(17.3)
Flow Rate - GPM (l/m)		13.3	(50.4)
Pressure Drop - PSI (kPa)		(92.4)	
72 F (22.2 C) DB	Total	49600	(14.5)
50% RH	Sensible	49600	(14.5)
Flow Rate - GPM (l/m)		10.0	(37.9)
Pressure Drop - PSI (kPa)		7.6	(52.4)
Fan Data - Evaporator			
CFM (CMH)		2500	(4248)
Fan Motor Hp (W)		1.5	(1.12)
External Static Pressure, in (mm)		0.5	(13)
Evaporator Coil - Copper Tube/Aluminum Fin			
Face Area ft2 (m2)		5.6	(0.37)
Coil Rows		4	
Max Face Velocity-fpm (m/s)		444	(2.3)
Electric Reheat Data (Includes Fan Motor)			
Capacity - BTUH (kw) @380V-3ph		35780	(10.5)
Capacity - BTUH (kw) @400V-3ph		39110	(11.5)
SCR Electric Reheat Data (Includes Fan Motor)			
Capacity - BTUH (kw) @380V-3ph		51195	(15.0)
Capacity - BTUH (kw) @400V-3ph		56190	(16.5)
Hot Water Reheat Data (based on 180 F Water)			
Capacity - BTUH (kw)		70595	(20.7)
Flow Rate - GPM (l/m)		1.5	(5.7)
Pressure Drop - ft (kPa)		0.8	(2.4)
Humidifier Data - Steam Generator Type			
Capacity - lbs/hr (kg/hr)		8	(3.6)
Kw		2.8	
Connection Sizes			
Chilled Water Supply and Return, NPT Female		1"	
Humidifier Supply, in.		0.25	
Evaporator Drain, in.		0.75	
Valve (on/off Slow-Close)			
Valve Size		1"	
Valve Cv		7.0	
Maximum Static Operating Pressure, psi (kPa)		300	(895.2)
Close-off Pressure, psi		60	(179)
Valve (Modulating)			
Valve Size		1"	
Valve Cv		11.6	
Maximum Static Operating Pressure, psi (kPa)		150	(1034)
Close-off Pressure, psi		72	(496)
Filter Dimensions, qty 2, 4" x 20" x 20" (102mm x 508mm x 508mm)			

Evaporator Electrical Data, 60 Hz

Standard 1.5 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model Number	MM*60E	MM*60E	MM*60E	MM*60E
Cooling Only				
FLA	5.6	5.6	2.8	2.0
WSA	7.0	7.0	3.5	2.5
OPD	15	15	15	15
with Electric Reheat				
FLA	33.4	30.7	15.4	12.0
WSA	41.8	38.4	19.3	15.0
OPD	45	40	20	15
with SCR Reheat				
FLA	47.2	43.3	21.6	N/A
WSA	59.0	54.1	27.0	N/A
OPD	60	60	30	N/A
with Humidifier				
FLA	15.4	14.5	7.2	5.5
WSA	19.3	18.1	9.0	6.9
OPD	20	20	15	15
with Electric Reheat and Humidifier				
FLA	43.2	39.6	19.8	15.5
WSA	54.0	49.5	24.8	19.4
OPD	60	50	25	20
with SCR Reheat and Humidifier				
FLA	57.0	52.2	26.0	N/A
WSA	71.3	65.3	32.5	N/A
OPD	80	70	35	N/A

Optional 2.0 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model Number	MM*60E	MM*60E	MM*60E	MM*60E
Cooling Only				
FLA	5.8	5.8	2.9	2.3
WSA	7.3	7.3	3.6	2.9
OPD	15	15	15	15
with Electric Reheat				
FLA	33.6	30.9	15.5	12.3
WSA	42.0	38.6	19.4	15.4
OPD	15	40	20	20
with SCR Reheat				
FLA	47.4	43.5	21.7	N/A
WSA	59.3	54.4	27.1	N/A
OPD	60	60	30	N/A
with Humidifier				
FLA	15.6	14.7	7.3	5.8
WSA	19.5	18.4	9.1	7.3
OPD	20	20	15	15
with Electric Reheat and Humidifier				
FLA	43.4	39.8	19.9	15.8
WSA	54.3	49.8	24.9	19.8
OPD	60	50	25	20
with SCR Reheat and Humidifier				
FLA	57.2	52.4	26.1	N/A
WSA	71.5	65.5	32.6	N/A
OPD	80	70	35	N/A

Notes:

1. Use MMD60E electrical data for MMD92C chilled water units
2. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Evaporator Electrical Data, 50 Hz

Standard 1.5 hp motor	380/400-3-50
Base Evaporator Model Number	MM*59E
Cooling Only	
FLA	3.2
WSA	4.0
with Electric Reheat	
FLA	17.6
WSA	22.0
with SCR Reheat	
FLA	24.9
WSA	31.1
with Humidifier	
FLA	8.3
WSA	10.4
with Electric Reheat and Humidifier	
FLA	22.7
WSA	28.4
with SCR Reheat and Humidifier	
FLA	30.0
WSA	37.5

Optional 2.0 hp motor	380/400-3-50
Base Evaporator Model Number	MM*59E
Cooling Only	
FLA	3.7
WSA	4.6
with Electric Reheat	
FLA	18.1
WSA	22.6
with SCR Reheat	
FLA	25.4
WSA	31.8
with Humidifier	
FLA	8.8
WSA	11.0
with Electric Reheat and Humidifier	
FLA	23.2
WSA	29.0
with SCR Reheat and Humidifier	
FLA	30.5
WSA	38.1

Notes:

1. Use MMD59E electrical data for MMD91C chilled water units
2. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Split System Air Cooled Electrical Data, 60 Hz with Single-Point Power Kit

Standard 1.5 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model	MM*60E	MM*60E	MM*60E	MM*60E
Base Condensing Unit Model	MC*65A	MC*65A	MC*65A	MC*65A
Cooling Only				
FLA	32.1	32.1	15.7	11.7
WSA	37.3	37.3	18.2	13.6
OPD	50	50	25	20
with Electric Reheat				
FLA	59.9	57.2	28.3	21.7
WSA	72	68.7	34.0	26.1
OPD	80	80	40	30
with SCR Reheat				
FLA	73.7	69.8	34.5	N/A
WSA	89.3	84.4	41.7	N/A
OPD	90	90	45	N/A
with Humidifier				
FLA	41.9	41.0	20.1	15.2
WSA	47.9	46.2	22.6	17.1
OPD	60	60	30	20
with Electric Reheat and Humidifier				
FLA	59.9	57.2	28.3	21.7
WSA	72	68.7	34.0	26.1
OPD	80	80	40	30
with SCR Reheat and Humidifier				
FLA	83.5	78.7	38.9	N/A
WSA	99	93.3	46.1	N/A
OPD	100	100	50	N/A

Optional 2.0 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model	MM*60E	MM*60E	MM*60E	MM*60E
Base Condensing Unit Model	MC*65A	MC*65A	MC*65A	MC*65A
Cooling Only				
FLA	32.3	32.3	15.8	12.0
WSA	37.5	37.5	18.3	13.9
OPD	50	50	25	20
with Electric Reheat				
FLA	60.1	57.4	28.4	22.0
WSA	72.2	68.9	34.1	26.4
OPD	80	80	40	30
with SCR Reheat				
FLA	73.9	70.0	34.6	N/A
WSA	89.5	84.6	41.8	N/A
OPD	90	90	45	N/A
with Humidifier				
FLA	42.1	41.2	20.2	15.5
WSA	47.3	46.4	22.7	17.4
OPD	60	60	30	20
with Electric Reheat and Humidifier				
FLA	60.1	57.4	28.4	22.0
WSA	72.2	68.9	34.1	26.4
OPD	80	80	40	30
with SCR Reheat and Humidifier				
FLA	83.7	78.9	39.0	N/A
WSA	99.3	93.5	46.2	N/A
OPD	100	100	50	N/A

Notes:

1. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Split System Air Cooled Electrical Data, 50 Hz with Single-Point Power Kit

Standard 1.5 hp motor	380/400-3-50
Base Evaporator Model	MM*59E
Base Condensing Unit Model	MC*64A
Cooling Only	
FLA	16.9
WSA	19.4
with Electric Reheat	
FLA	31.3
WSA	37.4
with SCR Reheat	
FLA	38.6
WSA	46.5
with Humidifier	
FLA	22.0
WSA	24.5
with Electric Reheat and Humidifier	
FLA	31.3
WSA	37.4
with SCR Reheat and Humidifier	
FLA	43.7
WSA	51.6

Optional 2.0 hp motor	380/400-3-50
Base Evaporator Model	MM*59E
Base Condensing Unit Model	MC*64A
Cooling Only	
FLA	17.4
WSA	19.9
with Electric Reheat	
FLA	31.8
WSA	37.9
with SCR Reheat	
FLA	39.1
WSA	47.0
with Humidifier	
FLA	22.5
WSA	25.0
with Electric Reheat and Humidifier	
FLA	31.8
WSA	37.9
with SCR Reheat and Humidifier	
FLA	44.2
WSA	52.1

Notes:

1. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Split System Water/Glycol Cooled Electrical Data, 60 Hz with Single-Point Power Kit

Standard 1.5 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model	MM*60E	MM*60E	MM*60E	MM*60E
Base Condensing Unit Model	MC*69W	MC*69W	MC*69W	MC*69W
Cooling Only				
FLA	26.3	26.3	12.8	9.4
WSA	31.5	31.5	15.3	11.3
OPD	50	50	25	15
with Electric Reheat				
FLA	54.1	51.4	25.4	19.4
WSA	66.2	62.9	31.1	23.8
OPD	70	70	35	25.0
with SCR Reheat				
FLA	67.9	64.0	31.6	N/A
WSA	83.5	78.6	38.8	N/A
OPD	90	80.0	40	N/A
with Humidifier				
FLA	36.1	35.2	17.2	12.9
WSA	41.3	40.4	19.7	14.8
OPD	60	60	25	20
with Electric Reheat and Humidifier				
FLA	54.1	51.4	25.4	19.4
WSA	66.2	62.9	31.1	23.8
OPD	70	70	35	25
with SCR Reheat and Humidifier				
FLA	77.7	72.9	36.0	N/A
WSA	93.3	87.5	43.2	N/A
OPD	100	90	45	N/A

Optional 2.0 hp motor	208-3-60	230-3-60	460-3-60	575-3-60
Base Evaporator Model	MM*60E	MM*60E	MM*60E	MM*60E
Base Condensing Unit Model	MC*69W	MC*69W	MC*69W	MC*69W
Cooling Only				
FLA	26.5	26.5	12.9	9.7
WSA	31.7	31.7	15.4	11.6
OPD	50	50	25	15
with Electric Reheat				
FLA	54.3	51.6	25.5	19.7
WSA	66.4	63.1	31.2	24.1
OPD	80	70	35	25
with SCR Reheat				
FLA	68.1	64.2	31.7	N/A
WSA	83.7	78.8	38.9	N/A
OPD	90	90	40	N/A
with Humidifier				
FLA	36.3	35.4	17.3	13.2
WSA	41.5	40.6	19.8	15.1
OPD	60	60	25	20
with Electric Reheat and Humidifier				
FLA	54.3	51.6	25.5	19.7
WSA	66.4	63.1	31.2	24.1
OPD	80	50	35	25
with SCR Reheat and Humidifier				
FLA	77.9	73.1	36.1	N/A
WSA	93.5	87.7	43.3	N/A
OPD	100	90	45	N/A

Notes:

1. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Split System Water/Glycol Cooled Electrical Data, 50 Hz with Single-Point Power Kit

Standard 1.5 hp motor	380/400-3-50
Base Evaporator Model	MM*59E
Base Condensing Unit Model	MC*68W
Cooling Only	
FLA	13.2
WSA	15.7
with Electric Reheat	
FLA	27.6
WSA	33.7
with SCR Reheat	
FLA	34.9
WSA	42.8
with Humidifier	
FLA	18.3
WSA	20.8
with Electric Reheat and Humidifier	
FLA	27.6
WSA	33.7
with SCR Reheat and Humidifier	
FLA	40.0
WSA	47.9

Standard 2.0 hp motor	380/400-3-50
Base Evaporator Model	MM*59E
Base Condensing Unit Model	MC*68W
Cooling Only	
FLA	13.7
WSA	16.2
with Electric Reheat	
FLA	28.1
WSA	34.2
with SCR Reheat	
FLA	35.4
WSA	43.3
with Humidifier	
FLA	18.8
WSA	21.3
with Electric Reheat and Humidifier	
FLA	28.1
WSA	34.2
with SCR Reheat and Humidifier	
FLA	40.5
WSA	48.4

Notes:

1. Use "no reheat" category for units with Hot Water Reheat

* Specify Disconnect or No Disconnect

Indoor Condensing Unit Electrical Data

	208-3-60	230-3-60	460-3-60	575-3-60
MC*65A				
FLA	26.5	26.5	12.9	9.7
WSA	31.7	31.7	15.4	11.6
OPD	50	50	25	15
MC*69W				
FLA	20.7	20.7	10.0	7.4
WSA	25.9	25.9	12.5	9.3
OPD	45	45	20	15
380/400-3-50				
MC*64A				
FLA	13.7			
WSA	16.2			
MC*68W				
FLA	10			
WSA	12.5			

Outdoor Prop Fan Condensing Unit Electrical Data

PFC067A- L0	208/230-3-60	460-3-60	575-3-60
FLA	22.1	11.4	9.2
WSA	26.9	13.9	11.6
OPD	45	20	15

5-Ton Mini-Mate2, Static Pressure

Turns Open	1.5 hp Motor (60hz)		2.0 hp Motor (60hz)	
	RPM	External Static, in.	RPM	External Static, in.
0	n/a	n/a	1329	n/a
0.5	n/a	n/a	1296	n/a
1	1037	0.9	1264	n/a
1.5	1005	0.7	1231	1.5
2	972	0.6	1199	1.4
2.5	940	0.5	1167	1.3
3	907	0.4	1134	1.2
3.5	875	0.3	1102	1.1
4	843	0.2	1069	1.0
4.5	810	0.1	1037	0.9
5	778	0.0	1005	0.7

Indoor Condensing Unit

Refrigerant Charge (R-22)		Unit Weights	lbs	kg
Evaporators	oz			
MM*60E	4	MM*60E	498	226
MM*59E	4	MM*59E	498	226
		MM*92C	498	226
		MM*91C	498	226

Indoor Condensing Units

Refrigerant Charge (R-22)		Unit Weights	lbs	kg
	lbs			
MC*65A	27.0	MC*65A	449	204
MC*64A	27.0	MC*64A	449	204
MC*69W	5.9	MC*69W	282	128
MC*68W	5.9	MC*68W	282	128

Outdoor Prop Fan Condensing Units

Refrigerant Charge (R-22)	-Unit Weight	lbs	kg
PFC067A-L0	26.6 lbs	PFC067A-L0	351

Note: weights are unit weight only, not shipping.

Refrigerant Line Sizes

	Suction	Liquid
50 feet	1/2"	1 1/8"
100 feet	5/8"	1 1/8"
150 feet	5/8"	1 1/8"
200 feet	5/8"	1 1/8"

Note: Suction and liquid lines may require additional specialty items when vertical lines exceed 20 ft. (6 M). Contact Liebert Application Engineering for assistance.

MULTIPLE UNIT DRY COOLER SELECTION CHART								
	QTY	FLOW GPM (l/m)	95°F (35°C) AMBIENT		100°F (37.8°C) AMBIENT		105°F (40.6°C) AMBIENT	
			DRY- COOLER MODEL	PRESS. DROP FT. (kPa)	DRY- COOLER MODEL	PRESS. DROP FT. (kPa)	DRY- COOLER MODEL	PRESS. DROP FT. (kPa)
MC*69W	1	20 (76)	DSF109	3 (8)	DSF139_8	15 (45)	DSF197	4 (12)
	2	40 (151)	DSO174	11 (33)	DSO225_16	17 (51)	DSO350	4 (12)
MC*68W	3	60 (227)	DSO260	10 (30)	DSO350	9 (27)	DSO620_32	12 (36)
	4	80 (303)	DSO350	15 (45)	DSO491	6 (18)	DSO700	4 (13)
	6	120 (454)	DSO620	6 (18)	DSO700	9 (27)	two DSO620_32	12 (36)

GUIDE SPECIFICATIONS — 5-ton Systems

1.0 General

1.1. Summary

These specifications describe requirements for an environmental control system. The system shall be designed to control temperature and relative humidity conditions within the room.

The manufacturer shall design and furnish all equipment in the quantities and configurations shown on the project drawings.

System shall be supplied with ETL and CSA (NRTL) listing according to UL 1995.

The system model number(s) shall be _____

1.2 Design Requirements

The environmental control system shall be a Liebert Mini-Mate2 factory assembled unit. On direct expansion models, the refrigeration system shall be split, with the compressor located in a remote or close-coupled condensing unit.

The evaporator section shall be designed for above dropped-ceiling installation. Condensing units shall be designed for either outdoor or above-dropped-ceiling installation.

The system shall have a total cooling capacity of _____ BTU/hr (kW), and a sensible cooling capacity of _____ BTU/hr (kW), based on the entering air condition of _____ °F (°C) dry bulb, and _____ °F (°C) wet bulb.

The unit is to be supplied for operation on a _____ volt, _____ phase, _____ Hz power supply.

1.3 Submittals

Submittals shall be provided with the proposal and shall include: Single-Line Diagrams; Dimensional, Electrical, and Capacity data; Piping and Electrical Connection Drawings.

1.4 QUALITY ASSURANCE

The specified system shall be factory-tested before shipment. Testing shall include, but shall not be limited to: Quality Control Checks, "Hi-Pot" Test (two times rated voltage plus 1000 volts, per NRTL agency requirements), and Metering Calibration Tests. The system shall be designed and manufactured according to world class quality standards. The manufacturer shall be ISO 9001 certified.

2.0 Product

2.1 Standard Features/ All Systems

2.1.1 Evaporator Cabinet Construction

The cabinet and chassis shall be constructed of heavy gauge galvanized steel, and shall be serviceable from one side. Mounting brackets shall be factory attached to the cabinet.

2.1.2 Air Distribution

The fan shall be the centrifugal type, double width, double inlet. The shaft shall be heavy-duty steel with self-aligning ball bearings with minimum life of 100,000 hours. The fan motor shall be 1750 rpm (1450 rpm @ 50 Hz) and mounted on an adjustable base. The drive package shall be equipped with an adjustable motor pulley. The fan/motor assembly shall be mounted on vibration isolators.

The evaporator system shall be capable of delivering _____ CFM (CMH) at _____ inches (mm) of external static pressure. The fan motor shall be _____ HP (W).

System shall be suitable for ducted air distribution.

2.1.3 Microprocessor Control

The control system shall be microprocessor based. The wall-mounted control enclosure shall include a 2-line by 16-character

LCD display providing continuous display of operating status and alarm condition. A 7-key membrane keypad for setpoint/program control and unit on/off shall be located below the display.

Temperature and humidity sensors shall be located in the wallbox, which shall be capable of being located up to 300 ft (91.4m) from the evaporator unit.

2.1.3.1 Monitoring

The LCD display shall provide on/off indication, operating mode indication (cooling, heating, humidifying, dehumidifying) and current day, time, temperature and humidity (if applicable) indication. The monitoring system shall be capable of relaying unit operating parameters and alarms to the Liebert SiteScan® monitoring system.

2.1.3.2 Control Setpoint Parameters

- Temp. Setpoint 65-85°F (18 to 29°C)
- Temp. Sensitivity 1 to 5°F (1 to 3°C)
- Humidity Setpoint 20-80% RH
- Humidity Sensitivity 1 to 10% RH

2.1.3.3 Unit Controls

2.1.3.3.1 Compressor Short-Cycle Control

The control system shall prevent compressor short-cycling by a 3 minute timer from compressor stop to the next start.

2.1.3.3.2 Common Alarm and Remote On/Off

A common alarm relay shall be provided to provide a contact closure to a remote alarm device. Two (2) terminals shall also be provided for remote on/off control. Individual alarms shall be "enabled" or "disabled" from reporting to the common alarm.

2.1.3.3.3 Setback Control

The control shall be programmable on a daily basis or on a 5 day/2 day program schedule. It shall be capable of accepting 2 programs per day.

2.1.3.3.4. Temperature Calibration

The control shall include the capabilities to calibrate the temperature and humidity sensors and adjust the sensor response delay time from 1 to 90 seconds. The control shall be capable of displaying temperature values in °F or °C.

2.1.3.3.5. System Auto Restart

For start-up after power failure, the system shall provide automatic restart with a programmable (up to 9.9 minutes in 6-second increments) time delay. Programming can be performed either at the wallmounted controller or from the central site monitoring system.

2.1.4 Alarms

2.1.4.1 Unit Alarm

The control system shall monitor unit operation and activate an audible and visual alarm in the event of the following factory preset alarm conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- High Water Alarm - Lockout Unit Operation
- High Head Pressure
- Loss of Power
- Compressor Short Cycle

2.1.4.2 Custom Alarms (2x)

- Humidifier Problem
- Filter Clog
- Water Detected
- Smoke Detected

User customized text can be entered for the two (2) custom alarms.

2.1.4.3 Alarm Controls

Each alarm (unit and custom) shall be separately enabled or disabled, selected to activate the common alarm (except for high head pressure).

2.1.4.4 Audible Alarm

The audible alarm shall annunciate any alarm that is enabled by the operator.

2.1.4.5 Common Alarm

A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

2.1.4.6 Remote Monitoring

All alarms shall be communicated to the Liebert site monitoring system with the following information: date and time of occurrence, unit number, and present temperature and humidity.

2.2 Direct Expansion System Evaporator Components

2.2.1 Direct Expansion Coil

The evaporator section shall include evaporator coil, thermostatic expansion valve, and filter drier.

The evaporator coil shall have 5.6 sq.ft. (0.52 sq.m) face area, 4 rows deep. It shall be constructed of copper tubes and aluminum fins and have a maximum face velocity of ___ ft. per minute (m/s) at ___ CFM (CMH). An externally equalized thermostatic expansion valve shall control refrigerant flow.

The coil shall be provided with a stainless steel drain pan, with an internally trapped drain line.

2.2 Chilled Water System Components

2.2.1 Chilled Water Control Valve (On/Off)

The (2-way) (3-way) control valve shall be motorized slow-acting type to reduce water hammer. Design pressure shall be 300 psig (2067 kPa) static pressure, with a maximum close-off pressure of ___ psi (kPa).

2.2.1 Chilled Water Control Valve (Modulating)

A (2-way) (3-way) modulating valve controlled by the microprocessor to position the valve in response to room conditions. Design pressure

shall be 150 psig (1034 kPa) static pressure, with a maximum close-off pressure of ___ psi (kPa).

2.2.2 Chilled Water Coil

The cooling coil shall have a minimum of 5.6 sq.ft. (0.52 sq.m) face area, 4 rows deep. It shall be constructed of copper tubes and aluminum fins and have a maximum face velocity of ___ ft. per minute (m/s) at ___ CFM (CMH). The coil shall be supplied with 45°F (7.2°C) entering water temperature. The coil shall be supplied with ___ GPM (l/s) of chilled water and the pressure drop shall not exceed ___ PSI (kPa). The coil assembly shall be mounted in a stainless steel condensate drain pan, with internally trapped drain line.

2.3 Air-Cooled Centrifugal Fan Condensing Unit

The condenser coil shall be constructed of copper tubes and aluminum fins. The condensing unit shall be factory charged with R-22 refrigerant and sealed. The condensing unit can be coupled directly to the evaporator or can be mounted remote to the evaporator.

Components shall include scroll compressor, high-pressure switch, Lee-temp refrigerant receiver, head pressure control valve, and liquid line solenoid valve.

The condensing unit shall be designed for 95°F (35°C) ambient and be capable of operation to -20°F (-29°C) ambient. The fan motor assembly shall be belt-drive.

The condenser fan shall be centrifugal type, double inlet, heavy-duty steel shaft, with self-aligning bearings. The fan motor shall operate at 1750 rpm (1450 rpm @ 50 Hz), shall be equipped with adjustable motor pulley, and shall be mounted on an adjustable base. The fan and motor assembly shall be mounted on vibration isolators.

The condenser fan shall be designed for ___ CFM (CMH) at ___" (mm) external static pressure.

(Option) A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

2.3 Air-Cooled Prop Fan Condensing Unit

The condenser coil shall be constructed of copper tubes and aluminum fins with a direct-drive propeller-type fan, and shall include a scroll compressor, high pressure switch, and lee-temp receiver. All components shall be factory assembled, charged with R-22 refrigerant and sealed. No internal piping, brazing, dehydration, or charging shall be required. Condensing unit shall be designed for 95°F (35°C) ambient and be capable of operation to -30°F (-34.4°C).

Components shall include scroll compressor, high-pressure switch, Lee-temp refrigerant receiver, head pressure control valve, and liquid line solenoid valve.

(Option) The condensing unit shall be designed to operate at a sound level less than 58 dba.

(Option) A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

(Option) The outdoor condensing unit shall be designed for design ambient operation of 105°F (40.6°C)

2.3 Water/ Glycol Cooled Condensing Unit

The water/glycol condensing unit shall be equipped with a coaxial condenser having a total system pressure drop of _____ ft. of water (kPa) and a flow rate of _____ GPM (l/s) with _____ °F (°C) entering water/glycol temperature. Components shall include scroll compressor, high-pressure switch, The condensing unit shall be factory charged with R-22 refrigerant.

The condenser circuit shall be pre-piped with a [(2-way) (3-way)] regulating valve which is head-pressure actuated.

The condenser water/glycol circuit shall be designed for a static operating pressure of [(150 PSI (1034 kPa)) (350 PSI (2413 kPa))].

(Option) A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

2.4 Factory Installed Options

2.4.1 Steam Generating Humidifier

The environmental control system shall be equipped with a steam generating humidifier that is controlled by the microprocessor control system. It shall be complete with disposable canister, all supply and drain valves, steam distributor, and electronic controls. The need to change canister shall be annunciated on the microprocessor wallbox control panel. The humidifier shall have a capacity of _____ lbs./hr. (kg/h). An LED light on the humidifier assembly shall indicate cylinder full, over-current detection, fill system fault, and end of cylinder life conditions.

2.4.2 Electric Reheat

The electric reheat shall be low-watt density, 304/304 stainless steel, finned-tubular. The reheat section shall include an NRTL approved safety switch to protect the system from overheating. The capacity of the reheat coils shall be _____ BTU/HR (kW), controlled in one stage.

2.4.3 Hot Water Reheat

The hot water reheat coil shall have copper tubes and aluminum fins with a capacity of _____ BTU/HR (kW) when supplied with _____ °F (°C) entering water temperature at _____ GPM (l/s) flow rate. Maximum pressure drop shall be _____ PSI (kPa). The control system shall be factory prepiped with a 2-way solenoid valve and cleanable Y-strainer.

2.4.4 SCR Electric Reheat

The electric reheat shall be low-watt density, 304/304 stainless steel, finned-tubular and shall be capable of maintaining room dry bulb conditions when the system is calling for dehumidification. The reheat section shall include an NRTL approved safety switch to protect the system from overheating.

The SCR (Silicon Controlled Rectifier) controller shall proportionally control the reheat elements to maintain the selected room temperature. The rapid cycling made possible by the SCR controller provides precise temperature control, and the more constant element temperature improves heater life. The unit microprocessor control shall operate the SCR controller, while cooling is locked on. The capacity of the reheat coils shall be _____ BTU/HR (kW), with input power of _____ kW.

2.4.5 Disconnect Switch, Non-Locking

The non-automatic, non-locking, molded case circuit breaker shall be factory mounted in the high voltage section of the electrical panel. The switch shall be accessible from the front of the unit.

2.4.6 Firestat

The firestat shall immediately shut down the system when high temperatures are detected. The firestat shall be mounted with the sensing element in the return air.

2.4.7 Smoke Detector

The smoke detector shall immediately shut down the environmental control system and activate the alarm system when activated. The sensing element shall be located in the return air compartment.

2.4.8 Free-Cooling/Dual Cooling Source

A free-cooling coil shall be integral to the evaporator cabinet, and shall be constructed of copper tubes and aluminum fins. The coil shall be rated at _____ BTU/HR (kW) sensible cooling capacity with a 45°F (22°C), ___% glycol solution. The coil shall require _____ GPM (l/s) and the total unit pressure drop shall not exceed _____ feet of water (kPa) when in the free cooling mode. Free-cooling shall be activated by a temperature stat, and shall include factory piped three-way valve and separate supply and return piping.

2.5 Ship-Loose Accessories

2.5.1 Remote Sensors

The unit shall be supplied with remote temperature and humidity sensors. The sensors shall be connected to the unit by a _____ ft. (m) shielded cable.

2.5.2. Air Filter Box

The evaporator section shall be supplied with an air filter box for use with ducted installations. Two (2) filters shall be included 4" x 20" x 20" (102 mm x 508mm x 508mm) each, pleated type, with a minimum efficiency of ___%, based on ASHRAE 52.1.

2.5.3 Condensate Pump

The condensate pump shall have the capacity of ___ GPH (___ l/h) at ___ ft. head (___ kPa). It shall be complete with integral float switch, pump, motor assembly, and reservoir.

2.5.4 Refrigerant Line Sweat Adapter Kit

Provide a sweat adapter kit to permit field brazing of refrigerant line connections.

2.5.5 Single Point Power Kit

A single point power kit shall be provided for a close-coupled system to allow a single electrical power feed to supply power to both the evaporator and indoor close-coupled condensing unit.

2.5.6 Liebert SiteScan® Site Monitoring System

A Liebert SiteScan Site Monitoring System Model _____ shall be provided for remote monitoring of the Mini-Mate2 unit and monitoring of other Liebert support equipment. The SiteScan shall have the capability to monitor and change (at the user direction) the temperature and humidity setpoints and sensitivities of each unit. The printer shall provide the user with chronological alarm information. It shall also be capable of being programmed to print out environmental conditions or operating modes at each unit.

Provide indicated quantities of the following:

- _____ Leak Detection System(s) Model _____
- _____ Remote Monitor(s) Model _____
- _____ Auto-changeover Control(s) Model _____

2.5.7 Drycooler

The Liebert manufactured drycooler shall be the low-profile, slow speed, multiple direct drive propeller fan type. The drycooler shall be constructed of aluminum and contain a copper tube, aluminum fin coil with an integral electric control panel. The drycooler shall be designed for _____°F (°C) ambient.

2.5.8 Glycol Pump Package

The system shall include a centrifugal pump mounted in a weatherproof and vented enclosure. The pump shall be rated for _____ gpm (l/s) at _____ ft. (kPa) of head, and operate on _____ volt, ___ phase, _____ Hz.

3.0 Execution

3.1 Installation of Air Conditioning Unit

3.1.1 General

Install air conditioning unit in accordance with manufacturer's installation instructions. Install unit plumb and level, firmly anchored to support the unit weights in location indicated, and maintain manufacturer's recommended clearances.

3.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

3.1.3 Piping Connections

Install and connect devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

3.1.4 Supply and Drain Water Piping

Connect water supply and drains to air conditioning unit. Unit drain shall be trapped internally, and shall not be trapped externally.

3.2 Field Quality Control

Start up air conditioning unit in accordance with manufacturer's start up instructions. Test controls and demonstrate compliance with requirements.

NOTE: These Guide Specifications comply with the outlines of the Construction Specifications Institute per CSI MP-2-1 and MP-2-2.

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