

MLC Air-Cooled Chillers **MLC-FC Free Cooling Chillers**

60 - 350 Tons



- Mission Critical Cooling
- Central Plant Process Cooling
- Specialized HVAC Cooling Systems



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motivairTM

COOLING SOLUTIONS

www.motivaircorp.com





The MLC range of chillers was designed for Mission Critical Facilities, Central Chiller applications, larger critical industrial processes and customized HVAC systems. The development of this expanded chiller range was focused on four important design criteria: reliability, efficiency, flexibility and control.

The MLC-FC range offers all of the above features plus maximum Free Cooling energy savings in cooler ambient temperatures. MLC-FC chillers are ideally applied to year round data processing, medical & industrial process cooling applications.

MLC & MLC-FC RANGE OF CHILLERS

RELIABILITY

The MLC chillers have been designed for ultimate reliability. Dual screw compressors, independent refrigeration circuits, automatic lead/lag control, state of the art PLC controllers with multiple safeties and alarms, and premium refrigeration components all combine to create a reliable chiller suited for the most demanding applications.

EFFICIENCY & FLEXIBILITY

This new generation of MLC & MLC-FC chillers utilizes the latest technologies to produce the highest possible efficiency. By integrating PLC algorithms, variable frequency drives, R-134a refrigerant and cutting edge production techniques, Motivair is able to maximize chiller performance with minimum energy consumption.

Unlike many other manufacturers, Motivair has the ability to modify and adapt its standard range of chillers to meet a customer's unique needs. Chillers can be designed for high or low water and high or low ambient temperatures. Chillers can be equipped with an Integrated Free Cooling system, low noise option, high elevation package, pump and tank stations. They can be adapted to integrate with almost any Building Control System. These options along with many other custom additions allow Motivair to create the best solution for any customer's cooling requirements.

CONTROL

Optimizing the performance of the MLC chillers is achieved through a customized PLC controller. Close control of the supply water temperature and total control of the chiller operation allows the customer to receive the very best performance from the chiller and the equipment being cooled. Eight total steps of unloading achieve optimal stability during changing heat loads, while minimizing power costs. Compressor lead/lag control can be customized by the operator, and insures even wear on each refrigeration screw compressor. Condenser fan speed control insures reliable operation during exposure to low ambient temperatures. An optional Integrated Free-Cooling System built into the chiller automatically switches the chiller operation to maximize energy savings and increase chiller component life when ambient temperatures drop below the selected return water temperatures.



MLC & MLC-FC CHILLER FEATURES

REFRIGERATION COMPRESSORS

All MLC chillers feature two heavy duty, 3500-RPM semi hermetic screw



compressors mounted in two completely independent refrigeration circuits. Each compressor

features 4 steps of unloading for virtually unlimited capacity control. One circuit can be serviced while the second circuit remains fully operational. Positive lubrication, low oil level switch, motor over temperature protection and Liquid injection, all combine to provide extended compressor life.

EVAPORATOR

The MLC & MLC-FC chillers feature an ASME U stamped, dual circuited evaporator mounted on the chiller base. Carbon steel shell with heavy gauge copper tubes insures long life and highly efficient heat transfer under varying loads. All MLC evaporators feature removable end bonnets and pressure relief valves.

REFRIGERANT COMPONENTS

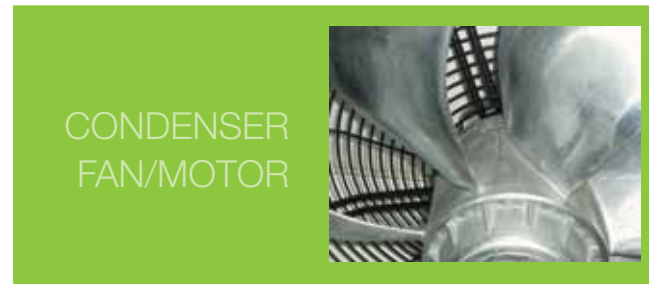
Each circuit includes an electronic expansion valve, liquid receiver, filter dryer with replaceable core, sight glass with color-change moisture indicator, pump down service valves on compressor and receiver, high and low side service access valves, HP and LP pressure safety switches, and glycerin filled HP and LP gauges.

CONDENSERS

The MLC air-cooled condensers are constructed from seamless copper tubes expanded into aluminum fins. The large face area, combined with the induced air flow from multiple fans results in 100% rated cooling capacity at 95°F ambient. Standard fan speed control permits reliable chiller operation in -20°F (glycol required). Remote air-cooled condensers feature galvanized steel or aluminum housings, compartmentalized fans, weatherproof fan motors, fan cycling/fan speed control, and independent fan motor overloads and contactors.

CONDENSER FANS & MOTORS

Fans feature heavy-duty, cast aluminum blades, which do not flex or lose efficiency at the top of their



performance curve. Motors are TEAO; suitable for outdoor use, and variable speed operation. These exceptionally reliable motors feature reversed stator and rotor, which eliminates the traditional motor shaft. The outer shell of the motor is the rotating body, to which the rigid cast aluminum blades are cast or bolted. This unique arrangement reduces torque stress on the blades, eliminates fan blade stress fractures, maximizes airflow, and maintains efficiency over the entire performance curve.

REFRIGERANTS

As a global supplier Motivaair produces the MLC & MLC-FC chillers with the widest variety of environmentally compatible refrigerants available in industry today. The current standard is R-134A refrigerant which is the most efficient refrigerant available. Other options include R-407C and R-404A which are used based on application requirements.



MLC-FC INTEGRATED “FREE-COOLING”

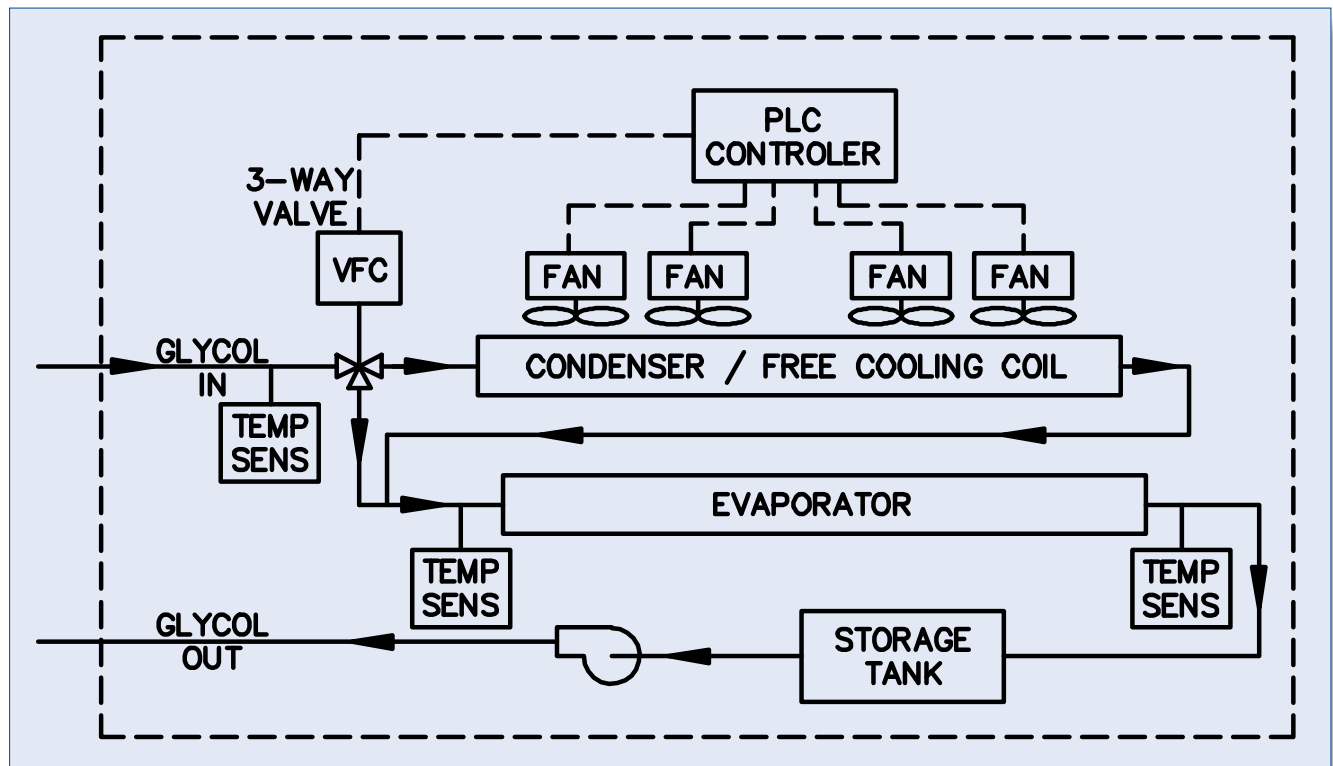
THE ULTIMATE SOLUTION FOR OPTIMAL ENERGY SAVINGS

The Motivair MLC-FC chillers with “Free-Cooling” capability are designed to provide the owner with optimal performance, year round, in varying ambient temperatures. This “Free-Cooling” option, available on models MLC-FC 200 – MLC-FC 1200 is supplied complete with “Free-Cooling” coil and the PCO3 advanced PLC control package – a unique single package for year-round energy savings.

The refrigeration plant is designed to cool the designated heat load during the highest summer temperatures. When ambient temperatures fall overnight or during cooler seasonal weather, the integrated “Free-Cooling” system is automatically activated. The system operates by directing the return chilled glycol through the “Free-Cooling” coil, before it enters the evaporator. This is achieved via an automatic motorized valve, controlled by the PLC,

whenever the ambient falls below the return chilled glycol temperature set point. The glycol is either partially or completely cooled in the “Free-Cooling” coil for maximum energy savings. As a result, less mechanical refrigeration is required to achieve the chilled glycol set point, and the refrigeration compressors are cycled off by the PLC, which continuously monitors the system.

Energy savings in areas with cooler winter months are substantial. Wear and tear on chiller components is dramatically reduced, due to fewer running hours during winter months. Automatic switching between mechanical cooling and “Free-Cooling” allows for optimal performance year round. As a general rule of thumb, “Free-Cooling” savings *more than pay for the initial investment in the first year of operation!*



MLC & MLC-FC CONTROLS

PLC CONTROLS

The MLC range features the PCO3 control system, which is an advanced Programmable Logic Controller, with a base-operating platform that can be easily modified to adapt to various applications. A multi-character LCD display, and easy to follow directional prompts, gives the operator complete control over all chiller functions. Multiple digital and analog inputs as well as digital and PWM outputs offer unparalleled control possibilities. Control features of the PCO3 include:



PCO3 Display



PCO3 Board

- Highly visible LCD display
- Tactile push-buttons
- Adjustable alarm set points
- °F/°C selectable
- Compressor Lead/Lag control
- Anti-Compressor short cycle
- Compressor failure alarm
- Adjustable water set point
- Supply water temp. display
- Return water temp. display
- Low water temperature alarm
- Freeze alarm
- Low water/glycol flow alarm
- High water temperature alarm
- Low refrigeration pressure alarm
- High refrigeration pressure alarm
- Irregular voltage alarm
- General Alarm Relay
- Remote Start/Stop Relay
- Manual alarm reset
- RS 232/RS 485 communication
- Ethernet Communication
- LON, BACNET, MODBUS communication (optional)



INTELLIGENT CHILLER RESPONSE

The Latest generation of Motivair software allows the chillers to respond to system changes in real time and to adjust performance accordingly. The proprietary control logic in the MLC & MLC-FC chillers provides:

- Automatic restart after a power outage
- Rapid restart of refrigeration compressors after a power outage, while affording maximum compressor protection
- Selective decision on which compressor(s) to start first based on run-time and fastest possible response to system load
- Liquid injection to the compressors under high ambient operation
- Seamless transition between refrigeration and optional Free Cooling mode based on system load, chilled water temperature, ambient temperatures and installation profile.

MLC & MLC-FC SPECIFICATIONS

MLC & MLC-FC CHILLER RANGE WITH SCREW COMPRESSORS	MLC	200	270	340	390	510	600	660	820	930	1100	1150	1200
NOMINAL COOLING CAPACITY EWT 54°F LWT 44°F AMB 95°F	BTU/H	674,383	812,700	961,050	1,286,417	1,449,100	2,052,533	2,329,883	2,730,500	3,108,183	3,566,133	4,004,733	4,244,100
MLC-FC 100% FREE COOLING AMBIENT TEMP.	°F	30.7	29.3	25.7	26.8	25.2	24.3	24.8	23.2	24.3	22.6	22.8	22.6
REFRIGERATING CIRCUIT	Qty.	2	2	2	2	2	2	2	2	2	2	2	2
SCREW COMPRESSOR	Qty.	2	2	2	2	2	2	2	2	2	2	2	2
CAPACITY STEPS (PER COMPRESSOR)	Qty.	3	3	4	4	4	4	4	4	4	4	4	4
FANS / CONDENSER													
MLC ELECTRONIC FAN SPEED CONTROL	Qty.	2	2	2	2	2	2	2	2	2	2	2	2
MLC TOTAL CONDENSER AIR FLOW	CFM	40,100	40,700	50,800	58,300	89,500	97,700	141,300	134,300	150,700	181,300	200,100	217,800
MLC FANS	Qty.	4	4	6	6	10	10	14	14	16	18	20	22
MLC FANS TOTAL NOMINAL POWER	HP	9	9	13	13	22	22	31	31	35	40	44	48
MLC-FC ELECTRONIC FAN SPEED CONTROL	Qty.	2	2	2	2	2	2	2	2	2	2	2	2
MLC-FC TOTAL CONDENSER AIR FLOW	CFM	56,600	54,400	50,800	78,000	75,600	118,000	142,000	134,000	150,800	181,300	200,100	217,800
MLC-FC FANS	Qty.	6	6	6	10	10	14	16	16	18	20	22	24
MLC-FC FANS TOTAL ABSORBED POWER	HP	13	13	13	22	22	31	35	35	40	44	63	69
OPTIONAL PUMP & TANK													
NOMINAL FLOW	GPM	149	180	213	285	321	455	516	605	688	790	887	940
OPTIONAL PUMP PRESSURE	PSI	42.0	41.9	38.4	42.8	39.7	46.0	40.7	44.8	42.6	49.0	26.2	31.2
OPTIONAL PUMP ABSORBED POWER	HP	10	10	10	15	15	25	25	30	30	CF	CF	CF
OPTIONAL PUMP ABSORBED CURRENT	A	12	12	12	19	19	30	30	36	36	-	-	-
FLANGED CHILLED WATER CONNECTIONS	IN	4"	4"	4"	5"	5"	6"	6"	6"	8"	8"	8"	8"
OPTIONAL TANK VOLUME	gallons	150	150	150	150	150	150	175	175	-	-	-	-
ELECTRICAL DATA													
POWER CIRCUIT	V/Ph/Hz	460/3/60											
AUXILIARY CIRCUIT	V/Ph/Hz	(230-24)/1/60											
MLC FULL LOAD AMPS (FLA)*	A	102	130	148	186	234	301	345	411	448	545	598	619
MLC MINIMUM CIRCUIT AMPACITY (MCA)*	A	113	145	164	207	260	335	383	457	498	606	667	689
MLC MAXIMUM OVERCURRENT PROTECTION (MOP)*	A	158	204	229	291	363	472	535	643	699	853	936	967
MLC-FC FULL LOAD AMPS (FLA)*	A	107	136	148	197	234	313	351	417	453	551	604	625
MLC-FC MINIMUM CIRCUIT AMPACITY (MCA)*	A	119	151	164	218	260	347	389	463	504	612	671	695
MLC-FC MAXIMUM OVERCURRENT PROTECTION (MOP)*	A	164	210	229	302	363	483	541	649	704	859	941	973
NOISE DATA													
MLC SOUND PRESSURE LEVEL (Silenced optional)**	dbA	61.0	63.2	63.3	64.6	64.9	67.8	69.1	70.5	71.1	71.4	72.1	72.1
MLC-FC SOUND PRESSURE LEVEL (Silenced optional)**	dbA	60.9	63.1	63.3	64.6	64.9	67.4	68	70	70.5	70.7	71.4	72.1
DIMENSIONS AND WEIGHTS													
MLC Length	IN	118	118	157	157	197	197	260	260	295	354	394	394
MLC Width	IN	79	79	79	79	79	79	79	79	79	81	81	81
MLC Height	IN	85	85	85	85	94	94	94	94	94	94	94	94
MLC-FC Length	IN	157	157	157	197	197	260	295	295	354	394	455	455
MLC-FC Width	IN	79	79	79	79	79	79	79	79	81	81	81	81
MLC-FC Height	IN	85	85	85	85	94	94	94	94	94	94	94	94
MLC Weight - Installed*	LBS	7,880	8,460	9,510	10,060	11,320	12,570	14,400	15,190	16,230	17,510	20,200	20,650
MLC-FC Weight Installed*	LBS	8,787	9,568	9,986	12,121	12,677	15,856	17,794	18,116	21,124	20,930	22,467	23,720

* Does not include optional pump or tank

** Distance measured in an open field at 33 feet from condenser

MLC CAPACITY CORRECTION CHART

Capacity Correction Factors (cf)	(Multiply catalog capacities by correction factors)						
Chilled Water Temp. (°F)	23	32	40	45	50	55	60
cf1 °F	0.63	0.77	0.93	1	1.1	1.2	1.3
Ambient Temp. (°F)	85	90	95	100	Consult Motivair		
cf2 °F (MLC)	1.06	1.03	1	0.96			
Glycol % (by weight)	0	10	20	30	40	50	Consult Motivair
cf4	1	0.99	0.98	0.97	0.96	0.94	

APPLICATION, INTEGRATION & SOLUTIONS FOR ALL YOUR COOLING NEEDS:



MPC & MPC-FC

1/2-50 ton packaged air-cooled or water-cooled chillers for Industrial cooling, Medical cooling or custom HVAC applications. Includes integrated microprocessor, pump station, and storage reservoir.



MHR

60-500 ton air cooled or water-cooled chillers with simultaneous heat recovery.



MSC SCROLL

Water-cooled scroll chillers with optional heat recovery from 15-60 tons



MCD Chilled Door®

Advanced rack cooling system fits any standard or OEM computer rack. Removes up to 45 kW of heat per door. Enhanced performance with Free Cooling chillers



PTS

Pump/Tank Stations for chillers and cooling systems



MOT & MEC

Open draft or closed loop evaporative cooling towers for process cooling or HVAC applications



MFC

Closed loop dry-coolers for process cooling and remote "Free-Cooling" applications



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