



Air-Cooled Chillers



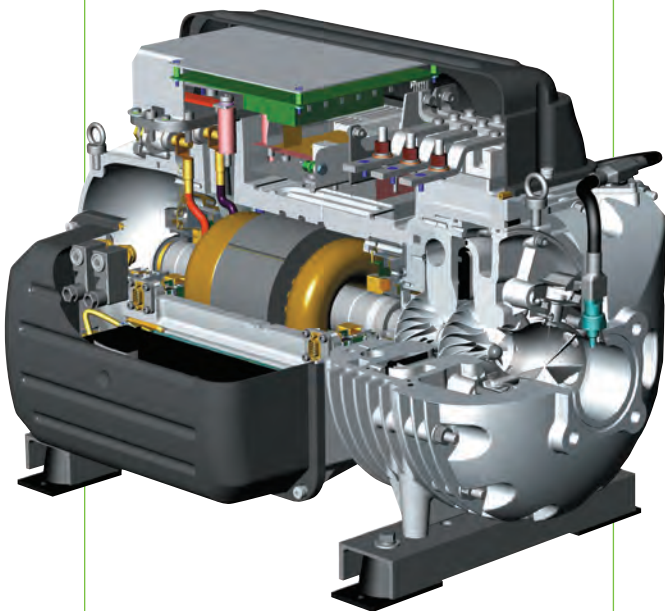
60-500 Ton Models, featuring
Magnetic Centrifugal Compressor Technology



motivair®
COOLING SOLUTIONS
www.motivaircorp.com

MAGNETIC CENTRIFUGAL COMPRESSOR TECHNOLOGY

The Motivair MLT chiller range features the world-renowned Turbocor centrifugal compressor. Designed with aerospace technology, the Turbocor compressor offers unparalleled performance in efficiency, sound level and reliability. With energy usage between 30%-50% less than traditional compressors, the Turbocor option creates new opportunities for ultra high efficiency chiller designs from Motivair.



VARIABLE FREQUENCY DRIVE SPEED CONTROL

An integrated variable frequency drive allows each compressor to reduce speed and maximize energy savings as the heat load of the system or chiller condensing temperatures decrease. The compressors' Insulated Gate Bipolar Transistor (IGBT) converts DC voltage to an adjustable three-phase AC voltage. An internal electronics system determines speed control based on feedback from the compressor motor and magnetic bearings.

OIL-FREE MAGNETIC BEARINGS

Oil-Free compressor operation eliminates inefficiencies that exist in standard oil lubricated screw and centrifugal compressor systems. Oil related service expenses are also eliminated. Friction-free magnetic bearings levitate the compressor's motor/shaft/impeller assembly which eliminates any metal to metal contact and associated component wear. An internal electronic control system dictates magnetic bearing and speed control. Compressor shaft location is monitored 100,000 times per second ensuring accurate positioning.



Integrated Electronic Package

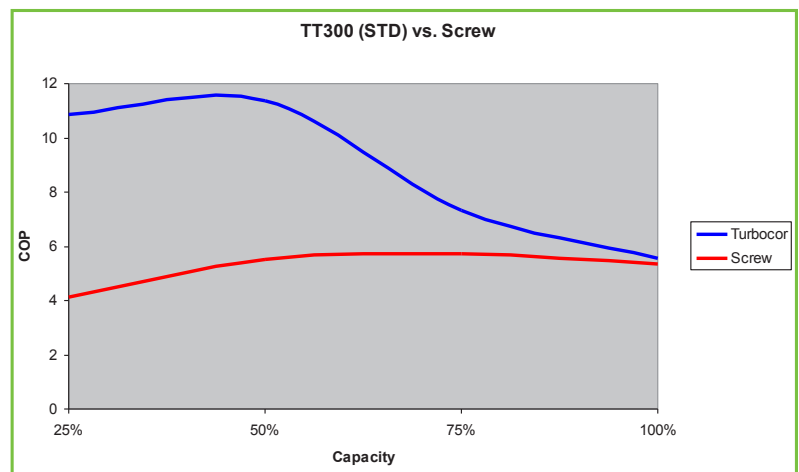
Built in digital electronics provide independent logic, control and monitoring for each individual compressor in real time allowing for precise speed control and motor/shaft/impeller position.

Soft Start Module

Inrush current is dramatically reduced during startup, reducing thermal stress on motor stator.

Low Noise

Sound levels of a Turbocor compressor can be measured at 72 dBA (TT300) in a typical mechanical room which is significantly less than a comparable screw compressor of similar tonnage. This feature offers new applications for low noise chiller operation and eliminates costly compressor wraps and enclosures needed for traditional compressor systems.



FLEXIBILITY IN SYSTEM DESIGN

EVAPORATOR OPTIONS

Flooded shell and tube evaporators are a preferred standard for the MLT chiller range. By using a flooded refrigerant shell with process water/ glycol in the tubes, design evaporating approach temperatures create optimal chiller efficiencies. Custom selections are available to handle high glycol concentrations.

Standard Certifications: ASME, CRN, PED



Shell and Tube evaporators offer high efficiency performance and allow for alternate design criteria with refrigerant in the tubes and process water/glycol in the shell when required.

Stainless steel brazed plate evaporators are used only for custom water-cooled chiller applications where size constraints require a reduced overall chiller footprint.

Standard certifications: UL

CONDENSER FANS AND MOTORS

Fans feature high strength composite fan blades which improve overall efficiency during high speed operation and in general generate lower sound when compared to traditional commercial HVAC equipment..

Motors are TEAO and suitable for permanent outdoor use. Each fan features Electronically Commutated (EC) variable speed motor technology. More efficient than VFD

speed control, EC motors offer the highest efficiencies and added chiller redundancy. These exceptionally reliable motors feature a reversed stator and rotor, which eliminates the traditional fan motor shaft. The outer shell of the motor is the rotating body, to which the composite blades are bolted.

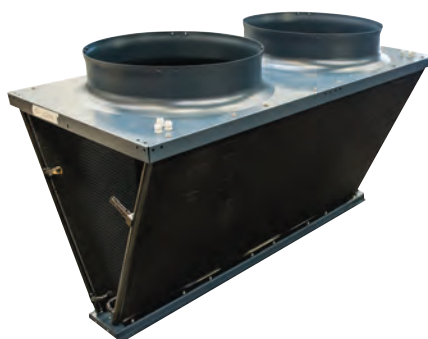
This unique arrangement reduces torque stress on the blades, eliminates fan blade stress fractures, maximizes airflow, and maintains efficiency over the entire performance curve.



CONDENSERS

Standard air-cooled MLT chillers feature high efficiency aluminum Microchannel condenser coils built in a "V" configuration. These state of the art, vacuum brazed condensers are light weight, versatile and offer unparalleled condensing efficiency.

The MLT-FC integrated air-cooled condenser/ Free Cooling coils are constructed from seamless copper tubes expanded into aluminum fins. This unique design, available only from Motivair features a combined



condenser/free-Cooling coil constructed as a single coil with two independent circuits, one for refrigerant and one for glycol free Cooling. Both condensing and free-cooling performance are optimized for maximum efficiency.

REFRIGERANT

All MLT chillers feature environmentally friendly R-134A refrigerant. Ideally suited for use with Turbocor compressors, R-134A offers maximum overall chiller performance, EER and IPLV data.

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

FREE-COOLING

THE ULTIMATE SOLUTION FOR OPTIMAL ENERGY SAVINGS

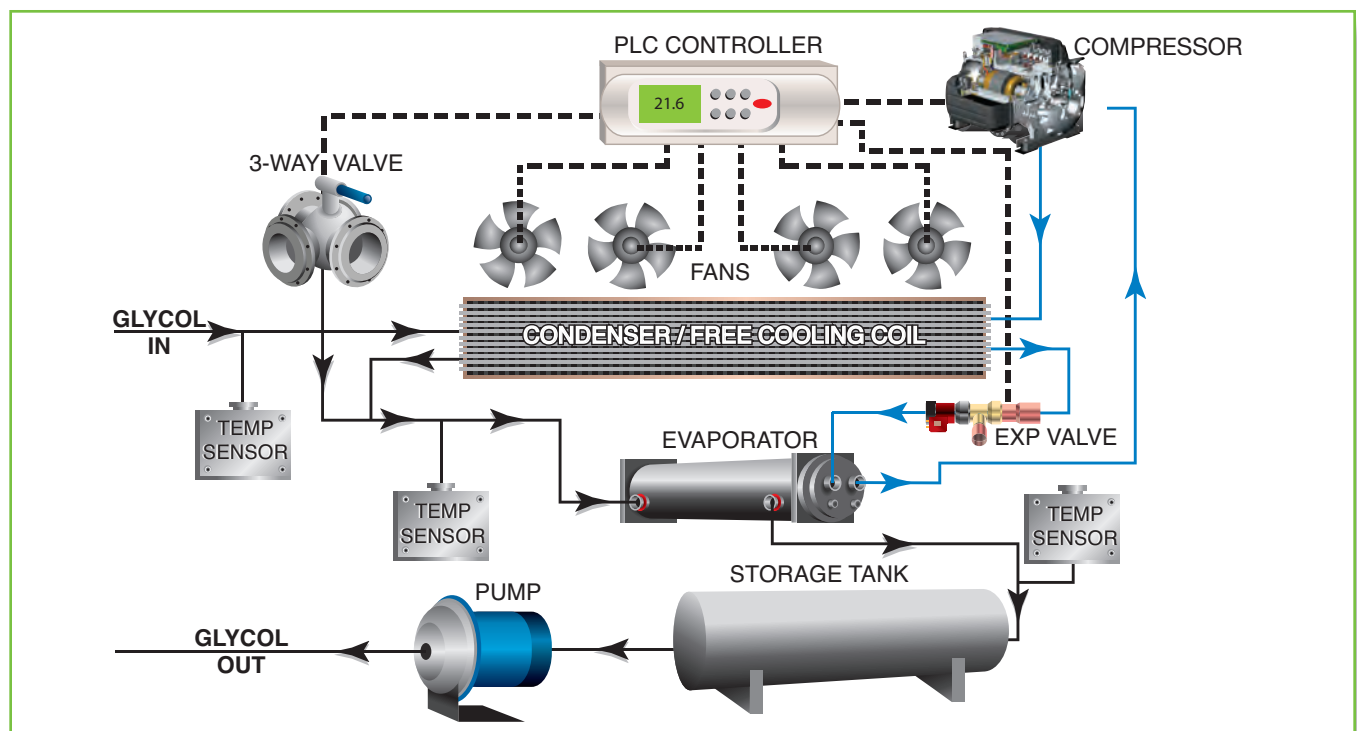
The Motivair MLT-FC chillers with integrated “Free-Cooling” are designed to provide the owner with optimal performance, year round, in varying ambient temperatures. This “Free-Cooling” option, available on models MLT-FC 200 – MLT-FC 1750 is complete with the “Free-Cooling” system and the Centricor advanced PLC control package – a unique single package for year-round energy savings.

The high efficiency centrifugal refrigeration plant is designed to cool the designated heat load during summer months. 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 Turbocor centrifugal compressors are unloaded and eventually cycled off by the PLC, which continuously monitors the system.

Energy savings in areas with cooler winter months are substantial. The ability to allow the Turbocor compressors to unload in cooler weather further drives overall chiller efficiencies. Wear and tear on chiller components is dramatically reduced, due to fewer start-ups and running hours during winter months. Automatic switching between mechanical cooling and “Free-Cooling” is seamless, which allows 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!

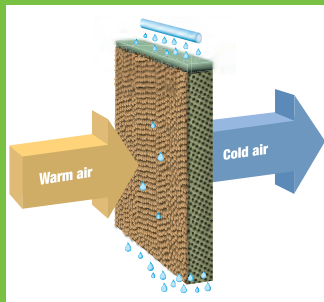
The MLT-FC chillers were designed, built and tested specifically as factory-packaged Free Cooling Chillers. There are no aftermarket or 3rd party add-on free cooling coils, components or controls. Motivair free cooling chillers are ETL tested and listed to current UL & CSA standards. Motivair is the only USA supplier with a cataloged and tested Free Cooling chiller range. Trust your mission critical process to the Free-Cooling Chiller experts by specifying Motivair Free-Cooling chillers.



ADIABATIC “EFFICIENCY BOOSTING” SYSTEM

AIR-COOLED CHILLER SYSTEMS

The Motivair Adiabatic “Efficiency Boosting” System uses a proprietary evaporative “Pre-Cooling” media designed to pre-cool warm ambient air before it reaches the air-cooled chiller condenser coils. During warmer seasonal weather, the PLC automatically activates the Adiabatic System and allows a small flow of city water to wet the evaporative media. Warm, dry air first passes through the evaporative



media where it is pre-cooled by evaporation before it enters the condenser coils. Water that is not evaporated is collected and recycled.

Depending on geographic location, condenser inlet temperatures can be reduced by up to 20F yielding significant chiller efficiency gains, increased reliability during extreme summer weather and reduced building energy demand loads.

The evaporative media is specifically designed for ultra low pressure drop with minimal added static to condenser fans. As a factory supplied option, media thickness and air flow velocities are designed to allow zero water carry over onto the chiller coils, thus keeping condenser coils clean and dry at all times.

The MLC-AD Adiabatic system is totally automated, allowing the media to be mechanically positioned in front of the coils when ON and then moved away from the condenser coils when the Adiabatic System is OFF, eliminating any added coil pressure drop. Evaporative media is easily removed for field service, cleaning or inexpensive replacement. Virtually maintenance-free and requiring no water treatment the Adiabatic System is ideal for clients seeking simple and reliable efficiency gains for their air-cooled chiller system.

SELECTABLE OPERATION MODES

The MLT-AD chiller can be owner programmed to operate based on four (4) separate, selectable modes.

- **Condensing Temperature:** Used to operate the MLT-AD whenever chiller condensing temperatures rise above a specified set point. Ideal for optimizing energy efficiency in warm, dry climates
- **Condensing Pressure:** Used to maintain a maximum design condensing pressure
- **Outdoor Ambient:** Used to trim inlet condenser air temperatures only on the warmest days
- **Hourly Schedule:** Used to run the Adiabatic system on a timed schedule for low noise chiller operation by reducing fan speed

The Adiabatic System is controlled & protected by the proprietary Motivair chiller PLC software and is completely automatic. The only customer connections are water supply, fill and drain lines. Standard system includes auto fill, winter drain down, low water level and anti-freeze alarm.



MLT-AD
with Adiabatic
System

ADVANCED CONTROLS, MONITORING & SECURITY

CENTRICOR™ CONTROLS

The Centricor range features new, state of the art controls designed specifically to control and manage TurboCor compressor technology. A panel mounted PLC creates an intuitive controller that presents new opportunities for chiller programming, control, logic and monitoring.

Standard Features:

- Highly visible display screen
- User friendly push-buttons
- Adjustable alarm set points
- Compressor variable speed control
- Anti compressor short cycling
- Compressor failure alarm
- Adjustable water set point
- Supply/Return water temp display
- Low water temperature alarm
- Freeze alarm
- Evaporator differential pressure alarm
- High/Low refrigerant pressure alarm
- General alarm relay
- Remote start/stop relay
- Manual alarm reset
- BacNet, Modbus, Ethernet communication (optional)

INTELLIGENT CHILLER MANAGEMENT SYSTEM

Multiple Centricor chillers installed on a common chilled water loop creates additional opportunities for energy savings. The optional ICMS is a separate control package mounted in any one of the multiple chillers installed in the system. It is then connected to all other chillers and acts as a master controller over the Centricor™ chiller plant. As the cooling load requirements vary, the ICMS works to optimize the total chiller plant efficiency by unloading compressors accordingly. This system is extremely effective when installed on N+1 chiller plants, allowing all chillers to run continuously in an unloaded condition. The ICMS focuses only on chiller plant optimization and is not used to control any other critical building functions such as building pumps. Should the ICMS ever fail, all chillers revert back to their standard operating conditions and default to their own internal PLC.

CENTURION™ MONITORING SYSTEM



Each Centricor chiller is equipped with the Centurion Monitoring System as a standard. The intent of this system is to empower the owner by providing a wide range of safeties and access to critical data often not provided by chiller manufactures. The result is a fully transparent exchange of data between the owner and the Centricor chiller. Throughout the first year of operation, each chiller is remotely monitored by the factory at no charge. Should there be a situation where the chiller is operating in an unsafe condition or in the unlikely event of an alarm, three (3) owner contacts and the factory are all immediately notified by the chiller of the condition either by email or text message. The pending alarm condition can then be avoided or corrected in the fastest way possible. The Centurion System offers other unique features such as data trending, password protected multi-level access and adjustable warning thresholds to alert the owner that operation is reaching a critical limit. For more information on the Centurion Monitoring System, consult your local Motivaire representative.

MLT SPECIFICATIONS

Centricor™	MLT	270	330	350	425	440	525	625	700	870	1100	1200	1400	1750
Nominal Cooling Capacity *	Tons	75	94	101	120	125	150	175	199	248	300	350	398	496
Nominal Cooling Capacity *	BTU/H	901,607	1,133,839	1,212,389	1,441,206	1,499,264	1,799,799	2,103,750	2,390,625	2,971,206	3,599,598	4,207,500	4,781,250	5,942,412
Min Load @ Nom. Design Conditions	Tons	21	23	25	37	50	50	52	67	50	50	52	67	50
Compressor	Qty	1	1	1	1	2	2	2	2	3	4	4	4	6
Refrigerent	Type	R-134A												
Refrigerent Circuits	Qty	1	1	1	1	1	1	1	1	1	2	2	2	2
Compressor Running Current	Amps	93.3	116.9	124.8	162.7	76.1	93.1	105.4	125.1	105.1	93.1	105.4	125.1	105.1
Evaporator														
Type	Flooded Shell & Tube													
Fluid Flow Rate	GPM	180	226	242	286	299	359	420	477	593	718	840	954	1,186
Pressure Drop	Psid	10.73	12.76	11.43	10.43	11.18	7.99	10.54	10.21	11.05	8.0	10.5	10.2	11.1
Evaporator Volume	Gallons	9	11	13	15	15	21	21	25	32	42	42	50	65
Inlet/Outlet Connections	in	2-1/2	2-1/2	2-1/2	3	3	4	4	4	4	CF	CF	CF	CF
Condenser														
Type	Microchannel													
Sound Pressure **	dB(A)	59	59	61	62	61	62	62	64	63	63	64	64	63
Fans	Type	EC												
Fan quantity	Qty	6	6	6	8	8	10	12	12	16	20	24	24	32
Total Airflow	CFM	62,228	76,916	77,551	97,045	100,647	125,650	150,864	150,864	201,082	251,300	301,728	301,728	402,164
Absorbed Current	Amps	19.3	19.3	19.3	25.8	25.8	32.2	38.6	38.6	51.5	64.4	77.2	77.2	103.0
Electrical														
Electrical Power	V/PH/Hz 460/3/60													
Control Power	V/PH/Hz 230/1/60													
Total Absorbed Power	kW	78.6	95.1	97.5	128.8	126.0	153.3	174.2	195.2	256.9	306.6	348.4	390.4	513.8
Full Load	Amps	112.6	136.2	144.1	188.5	178.0	218.4	249.4	288.8	366.8	436.8	498.8	577.6	733.6
MCA	Amps	135.9	165.4	175.3	229.2	197.0	241.7	275.8	320.1	393.1	460.1	525.2	608.9	759.9
MOP	Amps	229.2	282.3	300.1	391.9	273.1	334.8	381.2	445.2	498.2	553.2	630.6	734.0	865.0
Dimensions / Weights														
Length	in	136.2	177.6	177.6	177.6	177.6	218.9	260.2	260.2	342.9	437.8	520.5	520.5	685.8
Width	in	88.6	88.6	88.6	88.6	88.6	88.6	88.6	88.6	88.6	177.2	177.2	177.2	177.2
Height	in	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.4	198.8	198.8	198.8	198.8
Shipping Weight	Lbs	4,806	5,666	5,732	6,239	6,548	8,245	9,215	9,392	12,147	16,490	18,430	18,783	24,294
Operating Weight	Lbs	4,877	5,752	5,836	6,363	6,671	8,417	9,387	9,599	12,416	16,834	18,774	19,197	24,832

ADDITIONAL CHILLER OPTIONS AVAILABLE - Consult Factory for Performance Data

Integrated Free Cooling System (Page 4)
Adiabatic System (Page 5)
Low & Super Low Noise
Simplex & Duplex Pump System

*Listed Capacity Rated @ 44°F LWT / 54°F EWT / 95°F AMB

**Sound Pressure Rated @ 32.8' Feet.

APPLICATION, INTEGRATION & SOLUTIONS FOR ALL YOUR COOLING NEEDS:



MLC & MLC-FC

60-500 tons air-cooled, water-cooled & split system chillers for industrial or HVAC applications. Available Integrated Free-Cooling.



MPC & MPC-FC

1/2-100 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 and optional Free Cooling from 7.5-100 tons.



MHP

Reversible air-to-water heat pump chillers from 15-240 tons. Available with primary circulation pumps, low noise package and simultaneous heat recovery.



ChilledDoor®

Advanced chilled water 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

motivair®

COOLING SOLUTIONS

85 Woodridge Drive
Amherst, NY 14228

Tel: 716-691-9222

Fax: 716-691-9229

www.motivaircorp.com