

motivair®
COOLING SOLUTIONS



 **centricor™**

60-350 Ton Models, featuring
Magnetic Centrifugal Compressor Technology



OUR BUSINESS IS COOLING YOURS®

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 compressor in real time allowing for precise speed control and motor/shaft/impeller position.

INCREASED
EFFICIENCY

LOWER
GWP

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



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. Low GWP refrigerants including R1234ze, R513A, & R515B are also available.

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.



CONDENSER FAN & MOTORS

Fans feature high strength composite fan blades which improve overall efficiency and generate less 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.



CONDENSER & FREE COOLING OPTION

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 Motivaair 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. Copper tube and aluminum fin condenser coils are also available.



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

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



WHEN DOWNTIME IS NOT AN OPTION

The Ultimate Solution For Industry-Leading 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 1200 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 PIONEER OF FREE-COOLING CHILLERS

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 SYSTEM

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 Adiabatic System automatically activates 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 before it enters the condenser coils. Water that is not evaporated is collected and recycled. Depending on geographic location, inlet air temperatures can be reduced by up to 25°F 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 virtually no 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. The evaporative media is easily removed for field service, cleaning or inexpensive replacement. Virtually maintenance-free and requiring little or no water treatment, the Adiabatic System is ideal for clients seeking simple and reliable efficiency gains for their air-cooled chiller system.

FREE-COOLING CHILLER SYSTEMS

Motivair Free-Cooling chillers can be ordered with the adiabatic option fitted. By automatically turning on the system when Free Cooling is active and the ambient temperature is above freezing, partial and 100% Free-Cooling operating hours can be significantly increased. This allows the refrigeration compressors to be turned off for longer periods of time, in addition to the improved summer air cooled efficiency described above.

The Adiabatic System is controlled and protected by the proprietary Motivair chiller PLC software and is completely automatic including auto fill, winter drain down, low water level and anti-freeze alarms.

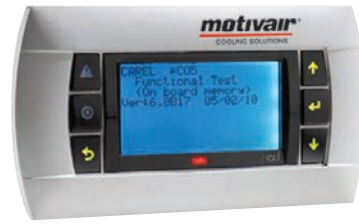


PLC Controls

WHEN MAXIMUM UPTIME AND LOWEST TCO MATTER MOST

The MLT range features the PCO5 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.



BOARD 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 MLT 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.

CONTROL FEATURES:

- 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)
- MLC & MLC-FC CONTROLS
PCO5 Display PCO5

CENTURION MONITORING SYSTEM

This optional feature empowers the owner by providing a wide range of safeties and access to critical data from a remote location via cellular service, outside of the customer's firewall.

If the chiller is operating in an unsafe condition or in the unlikely event of an alarm, designated contacts are immediately notified by the chiller of its condition. The pending alarm can then be avoided or quickly corrected.

FEATURES:

- Data trending
- Password protected multi-level access
- Adjustable warning thresholds

MLT SPECIFICATIONS

| Centricor™ | MLT | 270 | 330 | 350 | 425 | 440 | 525 | 625 | 700 | 870 | 1100 | 1200 |
|-----------------------------------|--|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Nominal Cooling Capacity * | Tons | 75 | 94 | 101 | 120 | 125 | 150 | 175 | 199 | 250 | 300 | 350 |
| 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 | 3,000,000 | 3,600,000 | 4,200,000 |
| Min Load @ Nom. Design Conditions | Tons | 21 | 23 | 25 | 37 | 50 | 50 | 52 | 67 | 75 | 65 | 80 |
| Compressor | Qty | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| Refrigerant | Type | R-134A | | | | | | | | | | |
| Refrigerant Circuits | Qty | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| Compressor Running Current | Amps | 93.3 | 116.9 | 124.8 | 162.7 | 76.1 | 93.1 | 105.4 | 125.1 | 171.5 | 135.5 | 158.0 |
| Evaporator | | | | | | | | | | | | |
| Type | Shell & Tube | | | | | | | | | | | |
| Fluid Flow Rate | GPM | 180 | 226 | 242 | 286 | 299 | 359 | 420 | 477 | 600 | 715 | 837 |
| Pressure Drop | Psid | 10.73 | 12.76 | 11.43 | 10.43 | 11.18 | 7.99 | 10.54 | 10.21 | 6.50 | 8.5 | 8.5 |
| Evaporator Volume | Gallons | 9 | 11 | 13 | 15 | 15 | 21 | 21 | 25 | 32 | 42 | 42 |
| Inlet/Outlet Connections | in | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 8 |
| Condenser | | | | | | | | | | | | |
| Type | Microchannel or Copper Tube & Aluminum Fin | | | | | | | | | | | |
| Sound Pressure ** | dB(A) | 59 | 59 | 61 | 62 | 61 | 62 | 62 | 64 | 66 | 67 | 67 |
| Fans | Type | EC | | | | | | | | | | |
| Fan quantity | Qty | 6 | 6 | 6 | 8 | 8 | 10 | 12 | 12 | 14 | 18 | 18 |
| Total Airflow | CFM | 62,228 | 76,916 | 77,551 | 97,045 | 100,647 | 125,650 | 150,864 | 150,864 | 171,000 | 220,000 | 220,000 |
| Absorbed Current | Amps | 19.3 | 19.3 | 19.3 | 25.8 | 25.8 | 32.2 | 38.6 | 38.6 | 55.0 | 70.2 | 70.2 |
| 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 | 280.0 | 333.7 | 384.4 |
| Full Load | Amps | 112.6 | 136.2 | 144.1 | 188.5 | 178.0 | 218.4 | 249.4 | 288.8 | 398.0 | 477.0 | 546.0 |
| MCA | Amps | 135.9 | 165.4 | 175.3 | 229.2 | 197.0 | 241.7 | 275.8 | 320.1 | 441.0 | 511.0 | 585.0 |
| MOP | Amps | 229.2 | 282.3 | 300.1 | 391.9 | 273.1 | 334.8 | 381.2 | 445.2 | 600.0 | 600.0 | 700.0 |
| Dimensions / Weights | | | | | | | | | | | | |
| Length | in | 136.2 | 177.6 | 177.6 | 177.6 | 177.6 | 218.9 | 260.2 | 260.2 | 386.0 | 504.0 | 504.0 |
| Width | in | 87.0 | 87.0 | 87.0 | | 87.0 | | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 |
| Height | in | 98.5 | 98.5 | 98.5 | | 98.5 | | 98.5 | 98.5 | 98.5 | 98.5 | 98.5 |
| Shipping Weight | Lbs | 4,806 | 5,666 | 5,732 | 6,239 | 6,548 | 8,245 | 9,215 | 9,392 | 14,750 | 19,600 | 19,800 |
| Operating Weight | Lbs | 4,877 | 5,752 | 5,836 | 6,363 | 6,671 | 8,417 | 9,387 | 9,599 | 15,200 | 20,200 | 20,400 |

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.

*** FL AMCA MOP are based on 460/3/60

motivair[®]

COOLING SOLUTIONS



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.



MLC & MLC-FC

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



ChilledDoor[®]

Advanced server rack cooling system fits and standard or OEM computer rack. Removes up to 75 kW of server heat per door.



CDU

Coolant Distribution Unit from 20kW - 1 MW heat removal for use with the ChilledDoor[®] or other computer cooling systems.



PTS

Pump/Tank Stations for chillers and cooling systems.



MFC

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

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