

**motivair**<sup>®</sup>  
COOLING SOLUTIONS

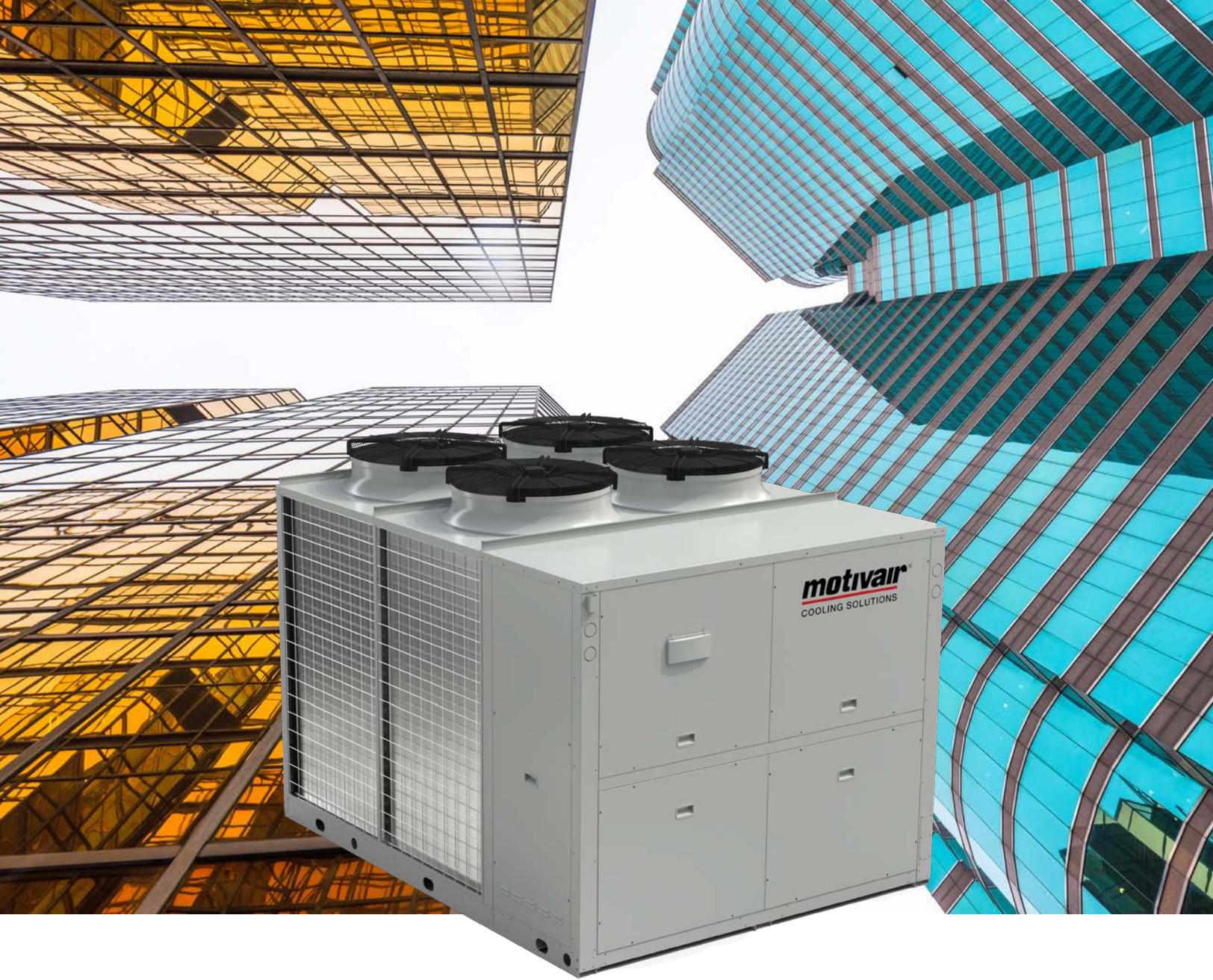


## **MHR Simultaneous Heat Recovery Chillers**

15 - 350 Tons

**OUR BUSINESS IS COOLING YOURS™**

[motivaircorp.com](http://motivaircorp.com)



## When downtime is not an option

Businesses who function in today's advanced industrial manufacturing and mission critical environments depend on chiller systems to provide a reliable source of chilled water, which can improve overall system uptime and efficiencies.

Every critical cooling application is unique, which is why the Motivair® MHR Simultaneous Heat Recovery Chillers have been designed to accommodate a wide range of operating points and customization based specifically on the needs of the customer. No other air-cooled chiller offers such a broad range of features and benefits that can be used in combination to create a chiller best suited for your business's needs.

As an industry leader, we aim to deliver innovative products, reliable solutions and an unwavering commitment to excellence.



# RECOVER HEAT AND MAXIMIZE ENERGY EFFICIENCY

Motivair has developed a simpler and more practical way to reclaim continuous and/or variable heat from the refrigeration cycle.

The MHR range uses a shell & tube or plate design heat exchanger in series with the main condenser, to heat a separate hot water loop to 95°-105°F and recover up to 95% of the available heat. A reduced hot water flow can recover 20-25% of the available heat up to 140°F without raising the head pressure or impacting the chiller efficiency.

100% of available heat can be recovered up to 140°F using parallel heat recovery. This is available with R-410A or R134a refrigerant. *100% heat recovery is equivalent to approximately 130% of the chiller cooling capacity (Evaporator cooling capacity Btu/h + compressor power kW = total heat rejected).*

Motivair MHR chillers are available in both air-cooled and water-cooled versions. Higher temperature heat recovery may require R-134a refrigerant, so that higher condensing temperatures can be achieved at lower head pressures.

Heat recovery is simply & automatically regulated in series heat recovery because when the hot water loop reaches the desired temperature the hot gas passes through the heat recovery condenser to the main air or water cooled condenser, where the surplus heat is rejected.

No refrigerant valves or controls are normally required. The standard condenser controls (EC fan speed regulation or water regulating valves) operate to maintain the design head pressure.

Cold start-up on the hot water loop is easily controlled by a thermostatically controlled hot water mixing valve, which partially by-passes the heat recovery exchanger until the head pressure can be maintained at the required level.

## ABOUT HEAT RECOVERY

The most common and traditional method of recovering heat in a chiller is by using a single heat recovery (water-cooled) condenser, or a secondary heat recovery condenser in parallel with the standard air or water-cooled condenser. Using this method, the amount of heat recovered, and the temperature of the hot water can adversely impact the chiller performance and operating cost.

Refrigerant control valves are required to direct the hot gas to either condenser, depending on the heat required at any time. Generally, this is best suited for geothermal applications where the cooling duty is insignificant and the only useful product of the chiller is maximum continuous heat at the required temperature.

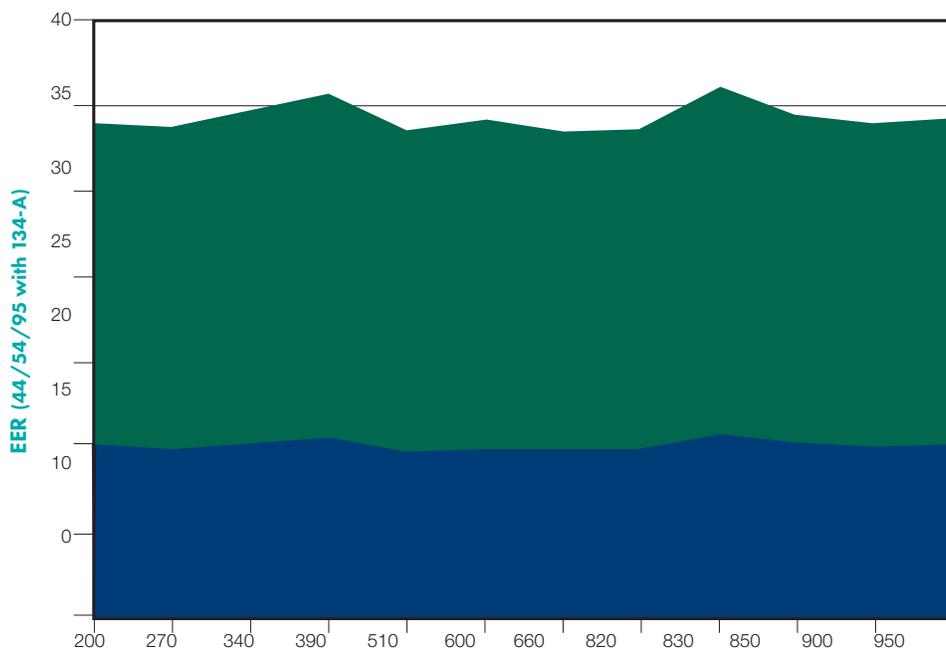
# LOWEST TOTAL COST OF OWNERSHIP

## INNOVATION

The MHR chillers were developed to take advantage of energy saving for any application requiring simultaneous cooling & heating from 15 through 350 tons. These are air-cooled or water-cooled chillers with scroll or screw compressors designed to recover up to 100% of the available heat to a closed circuit hot water loop.

Simultaneous heat recovery produces significant benefits including but not limited to substantially reduced energy costs, reduced environmental emissions and significantly increased overall chiller efficiencies. Energy that would typically be wasted can now be transferred back into the application as FREE HEAT.

### EFFICIENCIES



■ MHR-A with Simultaneous Heat Recovery  
■ Standard Air Cooled Chiller

### Advantages

- Produce simultaneous heating and cooling
- Ultra high efficiency
- Reduces building energy costs
- Reduces environmental emissions
- Standard R-410A & R-134A refrigerant
- Can be used as a key component for designing a LEED certified building

### Applications

- Hotels
- Hospitals
- Data Processing Centers
- Dormitories
- K-12
- High Rise Condos
- Correctional Facilities
- Food Processing
- Pharmaceutical Mfg.
- Industrial Mfg

# Advanced PLC controls

## WHEN MAXIMUM UPTIME AND LOWEST TCO MATTER MOST

The MHR 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.



### 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)



## INTELLIGENT CHILLER RESPONSE

The Latest generation of Motivaire® software allows the chillers to respond to system changes in real time and to adjust performance accordingly. The proprietary control logic in Motivaire 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

## 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

# Application Defined Features & Options



## COMPRESSOR OPTIONS

MHR chillers feature two compressor options. Scroll compressors with R410A are available from 15-250 tons and range from 1-6 compressors and come with 1,2,4, or 6 stages. Each compressor features 3 steps of unloading for virtually unlimited capacity control and allow two completely independent refrigeration circuits. This allows one circuit to be serviced while the second circuit remains fully operational. Positive lubrication, low oil level switch and motor over-temperature protection all combine to provide extended compressor life. Efficient and robust semi hermetic screw compressors with R134A are available from 60-350 tons.



## CONDENSER FAN OPTIONS

Fans feature heavy duty, composite blades, which do not flex or lose efficiency at the top of their performance curve. EC Motors feature reversed stator and rotor, eliminating the traditional motor shaft. Motors are TEAO; suitable for outdoor use, and variable speed operation.



## EVAPORATORS AND HEAT RECOVERY

The MHR chillers feature either an ASME U and CRN stamped, dual circuited shell & tube evaporator or a brazed plate evaporator. The shell & tube vessel uses a direct expansion design complete with a carbon steel shell and heavy gauge copper tubes while the brazed plate option uses stainless steel plates with copper braze. Both options insure long life cycles and highly efficient heat transfer under varying loads.

### Heat Recovery:

The MHR heat recovery condenser(s) feature either an ASME U and CRN stamped shell & tube heat exchanger or a coded brazed plate heat exchanger. These recovery heat exchangers are in series with the air-cooled or water-cooled condenser(s) and can be sized for partial or total heat recovery. To reclaim the heat of compression the refrigerant passes through the heat recovery exchanger(s) to provide hot water (up to 140°F) to a secondary loop. Ideal for VAV re-heat or boiler pre-heat. Capturing and reusing this heat, provides reliable simultaneous heating and cooling while increasing system efficiency.



## ADDITIONAL OPTIONS

Standard EC 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 fuses and contactors. Water-cooled shell and tube condensers feature a coded carbon steel shell with heavy gauge copper tubes, removable end bonnets and pressure relief valves.

# MHR Specifications

## TECHNICAL SPECIFICATIONS:

MHR-A AIR COOLED CHILLERS WITH SCREW COMPRESSORS	MHR-A	200	270	340	390	510	600	660	820	830	850	900
Nominal Cooling Capacity EWT 54F LWT 44F AMB 95F	btu/h	696,665	938,575	1,163,833	1,372,026	1,726,978	1,924,932	2,245,754	2,706,509	2,883,985	3,030,744	3,351,566
Compressor Nominal Absorbed Power Per Comp.	kW	38.0	50.5	60.7	67.5	91.5	98.3	122.8	150.0	139.8	156.8	181.3
Refrigerating Circuit	Qty	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
Capacity Steps Per Compressor	Qty	3	3	3	3	3	3	3	3	3	3	3
Heat Recovery Circuit	Qty	1	1	1	1	1	1	1	1	1	1	1
Nominal Heating Capacity - Series Circuit (1)	btu/h	747,924	1,004,063	1,239,710	1,437,790	1,864,688	2,113,996	2,424,777	2,916,563	3,032,679	3,244,420	3,558,617
Nominal Heated Water Temperature (IN/OUT)	Deg. F	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115
Nominal Heating Circuit Pressure Drop	PSI	3.8	5.3	7.4	7.8	4.6	6.1	4.9	8.1	8.6	5.7	7.1
Heated Water Connections	in	2-1/2"	2-1/2"	2-1/2"	2-1/2"	3"	3"	3"	3"	3"	3"	3"
<b>MHR-AIR COOLED CONDENSER</b>												
Electronic Fan Speed Control	Qty	1	1	1	1	1	1	1	1	1	1	1
Total Air Flow	CFM	43,013	67,804	65,685	86,026	86,026	102,978	110,605	128,404	155,314	155,314	155,314
Fans	Qty	4	6	6	8	8	10	10	12	14	14	14
Fans Total Absorbed Power	kW	5	7.5	7.5	10	10	12.5	12.5	15	17.5	17.5	17.5
<b>MHR-A NOISE DATA</b>												
Sound Pressure Level	dba at 30'	72	73	75	76	76	77	77	77	78	78	78
MHR-A Power	V/Ph/Hz	----- 460/3/60 -----										
FLA (Full Load Amps)*	Amps	114.8	156.7	187.7	211.8	292.8	304.9	353.9	432.6	418.7	438.5	499.7
MCA (Minimum Circuit Ampacity)*	Amps	127.3	173.5	208.4	234.6	325.8	388.4	393.5	481.2	464.6	486.9	555.7
MOP (Maximum Overcurrent Protection)*	Amps	177.4	240.9	291.3	325.9	457.5	472.6	552.2	675.6	648.4	680.6	780
<b>MHR-A OPTIONAL PUMPS &amp; TANK-OPTIONAL</b>												
Nominal Pump Flow (MHR-A)	GPM	126.6	165.2	218.9	249.2	323.5	389.0	426.8	523.2	557.1	612.8	681.6
Nominal Pump Pressure (MHR-A)	PSI	26.1	27.5	26.1	23.2	24.6	27.5	24.6	23.9	22.5	27.5	26.1
Pump Power	kW	2.2	4	4	4	5.5	7.5	7.5	10	10	12.5	12.5
Pump Current	Amps	4.5	7.6	7.6	7.6	10.2	13	13	17.5	17.5	20.5	20.5
Tank Volume	Gal	290	290	530	530	530	530	530	530	530	530	790
<b>MHR-A DIMENSIONS &amp; WEIGHTS</b>												
MHR-A Length**	in	140	140	173	219	219	264	264	350	396	396	396
MHR-A Width**	in	87	87	87	87	87	87	87	87	87	87	87
MHR-A Height**	in	83	83	83	83	83	83	83	83	99	99	99
MHR-A Weight***	lbs	4,961	5,248	7,166	8,533	9,261	9,933	11,124	12,988	14,332	15,876	16,240
<b>MHR-W WATER COOLED CHILLERS WITH SCREW COMPRESSORS</b>												
Nominal Cooling Capacity EWT 54F LWT 44F CWT 85F	btu/h	894,200	1,143,350	1,450,520	1,689,430	2,385,690	2,508,550	2,968,900	3,511,980	3,675,800	4,041,000	4,334,500
Compressor Nominal Absorbed Power Per Comp.	kW	36.5	45.5	57.0	64.5	88.0	100.5	110.0	129.5	134.5	147.5	157.5
Refrigerating Circuit	Qty	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
Capacity Steps Per Compressor	Qty	3	3	3	3	3	3	3	3	3	3	3
<b>MHR-W HEAT RECOVERY CIRCUIT</b>												
Nominal Heating Capacity - Series Circuit (4)	btu/h	955,484	1,217,922	1,539,299	1,766,703	2,561,876	2,732,900	3,188,095	3,764,916	3,856,026	4,307,138	4,586,694
Nominal Heated Water Temperature (IN/OUT)	Deg F	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115	105/115
Nominal Heating Circuit Pressure Drop	PSI	6.2	7.1	9.1	10.4	9.5	10.8	9.3	6.8	7.4	7.4	7.4
Heated Water Connections	in	2 x 2.5"	2 x 2.5"	2 x 2.5"	2 x 2.5"	2 x 3"	2 x 3"	2 x 3"	2 x 4"	2 x 4"	2 x 4"	2 x 4"
<b>MHR-WATER COOLED CONDENSER</b>												
Condenser Quantity	Qty	2	2	2	2	2	2	2	2	2	2	2
Required Water Flow at 85F	GPM	228	290	368	426	597	638	743	878	918	1008	1081
Condenser Connections	in	2.5"	2.5"	2.5"	2.5"	3"	3"	3"	4"	4"	4"	4"
<b>MHR-W NOISE DATA</b>												
Sound Pressure Level	dba at 30'	58	58	59	59	61	61	62	63	64	64	64
<b>MHR-W POWER</b>												
FLA (Full Load Amps)	Amps	105	125	153	191	249	263	296	364	371	402	438
MCA (Minimum Circuit Ampacity)	Amps	118	141	172	215	280	296	333	410	417	452	493
MOP (Maximum Overcurrent Protection)	Amps	170	204	248	311	404	427	480	592	603	653	712
<b>MHR-W DIMENSIONS &amp; WEIGHTS</b>												
MHR-W Length	in	134	134	134	134	126	126	126	134	134	154	154
MHR-W Width	in	31	31	31	31	56	56	75	75	75	79	79
MHR-W Height	in	79	79	79	79	85	85	87	87	87	89	89
MHR-W Weight	lbs	3,275	3,540	4,553	4,995	6,196	6,384	7,177	8,335	8,379	9,746	10,286

Does not include optional pump(s) \*\* Optional Pumps & Tank may effect dimensions \*\*\* Does not include Optional pump(s) or tank (1) Series heat recovery configuration. Pumps and tank not available on MHR-W  
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# ***motivair***<sup>®</sup>

**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-SC Air-Cooled Scroll Chillers**

100 – 285 tons air-cooled with scroll compressors to accommodate a wide range of operating points and customization for today's advanced industrial manufacturing and mission critical environments. Available Integrated Free-Cooling.



## **PTS**

Pump/Tank Stations for chillers and cooling systems. Standard and custom designs available.



## **MFC**

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



## **Chilled Door<sup>®</sup> Rack Cooling System**

Advanced server rack cooling system fits and standard or OEM computer rack. Removes up to 75 kW of server heat per door. Learn more at [www.chilleddoor.com](http://www.chilleddoor.com)



## **CDU**

The Coolant Distribution Unit (CDU) provides 100% sensible cooling up to 1.25MW, depending on the model. For use with the ChilledDoor<sup>®</sup> or other IT cooling systems.

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