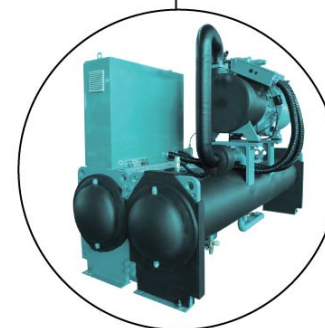




Mammoth®
The Leader In Custom HVAC & Energy Saving



**Water-Cooled Screw Chiller
(Flooded R134a, Transience Series)
170kW~2844kW (50Hz)**



Mammoth (Shanghai) Air Conditioning Ltd.

Mammoth®
The Leader In Custom HVAC & Energy Saving



ISO9001 ISO14001 OHSAS18001

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www.mammothchina.com

Mammoth dedicates to continuous improvement of products
and unit parameters are subject to change without notice.

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Since 1935, Mammoth has been producing and installing air conditioning units with the most innovative technologies. Our solutions are found in some of the world's most important buildings for its unparalleled flexibility and efficiency. When performance and energy efficiency are important factors to a project, our products are often chosen as the final solution.

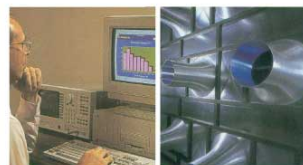


Established in Minneapolis, USA - 1935



Since 1988, Mammoth has been providing energy saving products to projects in China. In 2002, Mammoth invested US\$10 million to establish its manufacturing facility in Anji, China's #1 Ecological County, and its national sales headquarter in Shanghai to provide custom engineered air conditioning systems for projects in China and abroad.

Energy Saving & Innovation



Mammoth produces air conditioning equipment that leverages energy saving and innovative technologies. Our products include, but not limited to, geothermal & water source heat pumps, air & water cooled commercial air conditioning units, fan coils, AHU, VAV box, screw chillers, and energy recovery units.

Customization & Energy Saving is Our Standard



Mammoth has been recognized as a leader in providing custom designed Total Energy Solution HVAC Systems. Our solutions can fit any design applications from WSHP systems to geothermal systems, from hybrid systems to various energy saving systems. Based on the needs of our customers, our recommendations help our customers assess the economic benefits of Mammoth solutions over alternative systems.

Outstanding Achievement



Mammoth has also brought its innovative design concepts to the industry. We have printed numerous technical design manuals and books to facilitate engineers in the design of Renewable Energy HVAC Systems. Together with industry associations and the commercial section of the US Embassy and Consulate General Offices, we have frequently conducted technical seminars in major cities in China and abroad. We have supplied our solutions to projects that amount to almost 10 million sq. m., and have been continuously recognized as the leader in Renewable Energy products in China.



Unit Introduction

Featuring several improvements and innovations, Transience series water-cooled screw chillers are the newest additions to the Mammoth portfolio. With cooling capacity ranging from 170KW to 2,844KW, these units use Mammoth's screw type compressors and flooded evaporators that utilize advanced 2 dimension EXV discharge superheat control valves with stepless energy control technology. These units are optimally designed for easy transport, installation, and can generate domestic hot water through our innovative water-to-water recovery technology.



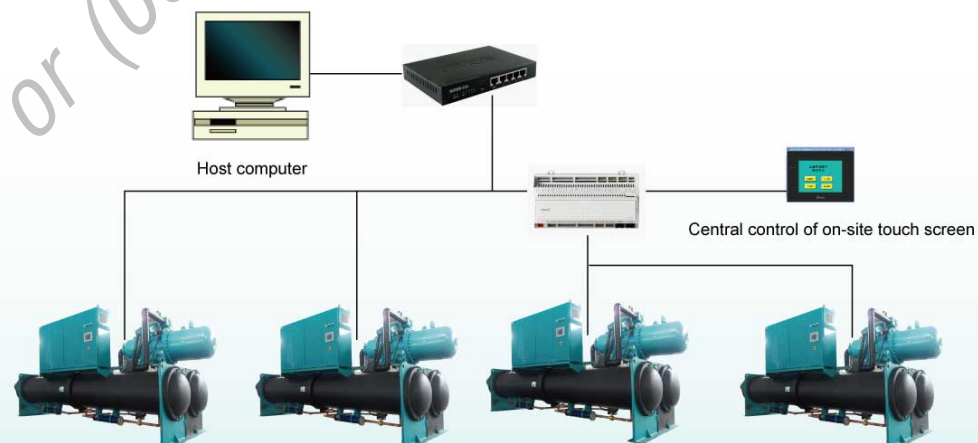
Product Introduction

Stable operation

High-quality semi-closed double screw compressor, optimized oil-way design, pressure-gradient oil supply, simple maintenance of oil way, each unit passes strict performance test in accordance with GB/T18430 before delivery, which ensures reliability.

Energy saving and high efficiency

Compressor operates under partial load condition for most of time. The special design of screw compressor, stepless capacity regulator and 2D discharge superheat control of electronic expansion valve ensure high unit efficiency under part load condition.



Unit Features

Screw compressor

- Featuring world-class technology and patented Y-2 rotor profile, Mammoth semi-hermetic direct-drive twin-screw compressor has higher efficiency and lower noise.
- The compressor is directly driven by motor to get lower noise, higher efficiency and smaller size; the semi-closed motor show good cooling effect and free of refrigerant leakage.
- Optimized suction and discharge as well as economizer ports, improved slide valves and rotor oil injection are special designed for flooded units, ensures low oil content in discharge gas.
- Stepless energy regulation, seamless fit with load changes, and increased energy utilization efficiency ensures long-term constant leaving water temperature.



Electronic expansion valve

- Utilization of electronic expansion valve allows high sensitivity during detection of superheat degree and rapid adjustment response.
- Precisely regulating of refrigerant flow and evaporator liquid level ensures high suction oil return efficiency in part load condition so that the part load efficiency always remains at the highest level.



Quick installation and commissioning

- Units are designed with bolt-together construction.
- All units fit through standard double-width doors.
- Quick vitacaulic coupling or flange type water pipe connections.
- Piping direction can be exchanged freely.
- Only water pipe and power source need to be connected at site.

Comparison among throttling devices

Electronic Expansion Valve	Thermostatic Expansion Valve	Orifice Plate
Most accurate flow control is allowed	Flow control dead zone exists	Flow rate fixed
Superheat degree is variable	Superheat degree is fixed	Superheat degree is beyond control
Evaporator liquid level can be controlled precisely	Average liquid level control is allowed	Can not control liquid level
Part load efficiency is increased	The efficiency can not be increased	Part load efficiency is reduced
Better evaporator oil return is achieved	Oil return is adversely affected	Can not help oil return
It can be incorporated in control system	Can not be controlled	Can not be controlled

Condenser and flooded evaporator

- With optimized structural design and small heat transfer temperature difference, the flooded shell and tube evaporator ensures uniform distribution of heat exchange temperature field.
- The outer fin design of heat exchange tube enhances the evaporation core required for nucleate boiling so that efficiency of heat exchange on tube outside is increased.
- The ridge design inside the heat exchange tube increases heat exchange area as well as efficiency of heat exchange inside tube, and creates turbulence then laminar flow is changed to turbulent flow so that scaling is postponed.
- Design, manufacture and inspection of each vessel comply with related standards and regulations such as G150 Steel pressure vessels, GB151 Tubular Heat Exchangers, NB/T47012 Pressure Vessels for Refrigerating Equipments and TSG R0004 Supervision Regulation on safety Technology for Stationary Pressure Vessel. The vessels are manufactured by a CNC machining center so that machining accuracy is ensured. The hydrogen leak detection method guarantees air tightness of 10^{-6} Pa.m³/s and ensures that refrigerant leakage is less than 14g/year.
- The elastic tube bundle support design featuring use of U-shaped bulging groove structure can effectively absorb vibration, avoid friction, and completely eliminate the possibility of copper tube fracture.

Unit Controls

Automatic setting function of leaving water temperature

- During unit part load operation, leaving water temperature is raised automatically.
- Stable entering water temperature is maintained.
- Comfort is improved in each air-conditioned room

Convenient autorun function

- Auto start function
- Auto stop function
- One-week auto start/stop function



Strong hardware status diagnosis function

- Temperature sensor failure detection
- Power contactor failure detection
- Controller failure detection

Innovative preventive control mechanism

- Current preventive control can trigger preventive response to overload possibly caused by excessive load.
- Evaporating temperature preventive control can trigger preventive response to shutdown possibly caused by insufficient load.
- Condensing temperature preventive control can trigger preventive response to overpressure possibly caused by excessive load.

Perfect unit protection and alarm function

- Excellent multiple anti-freeze protection
- Water flow loss protection
- Shutdown in case of too low leaving water temperature
- Evaporating temperature and pressure protection
- Various power protections
- Low discharge superheat degree protection
- Oil filter replacement alarm
- Refrigerant pressure difference protection

Unit Options

Option

- Total heat recovery
- KD shipping of unit: In 3 or 4 parts
- Delivery with nitrogen filled and field charge of refrigerant
- High water pressure of condenser and/or evaporator: 2.0 MPa
- Witness testing
- Rubber vibration isolator

Control options

- Circuit breaker
- Solid state starter
- Remote communication port RS485 (Modbus)
- Remote control cabinet for centralized control



Industry-Leading

Long history and rich experience bring up industry-leading products.

Unit Description

$\frac{MSW}{1} \frac{120}{2}$

- 1: Product type: MSW represents Mammoth Water-Cooled Screw Chiller
- 2: Product model

Description of Unit Factory Feature Code:

$\frac{A}{1} \frac{E}{2} \frac{F}{3}$

- 1 Refrigerant type: C-R22; A-R134a
- 2 Design SN
- 3 Unit type: F: Standard-total heat recovery; X: High temperature-total heat recovery unit; N: Copper-nickel alloy exchanger; Standard unit: default

Water-Cooled Screw Chiller Technical Specification (R134a)

Item	Model	MSW075	MSW085	MSW095	MSW120	MSW140	MSW165	MSW175	MSW210	MSW240	
Cooling Parameters	Cooling Capacity kW	170	203	232	300	337	410	467	539	598	
	Cooling Power Input kW	35	43	48	63	71	80	90	103	115	
	Evaporator Load Water Flow m³/h	29	35	40	52	58	71	80	93	103	
	Water Pressure Drop kPa	35	33	33	34	41	65	46	48	48	
	Condenser Source Water Flow m³/h	37	44	50	65	72	88	100	116	129	
	Water Pressure Drop kPa	25	26	27	33	28	64	46	44	43	
Heat Recovery Parameters	Standard Heat Recovery Heating Capacity	190	227	260	336	377	454	517	596	662	
	Standard Heat Recovery Water Flow	33	39	45	58	65	78	89	103	114	
	Standard Heat Recovery Water Pressure Drop	23	25	26	31	26	62	42	41	40	
	High Temperature Heat Recovery Heating Capacity	168	200	229	295	332	401	456	525	583	
	High Temperature Heat Recovery Water Flow	29	34	39	51	57	69	78	90	100	
	High Temperature Heat Recovery Water Pressure Drop	21	23	25	28	24	58	38	38	38	
Compressor Performance	Inlet & Outlet Pipe Diameter		Φ114.3			Φ133		Φ168.3			
	Water Connections		Victaulic								
	Type		Semi-Hermetic Screw Compressor								
	Capacity Control %		Continuous Capacity Control 0, 25~100								
	Power Source		380V/3N~/50Hz								
	Quantity		1								
	Starting Method		Y-△start								
	Unit Rated Current A		75	89	101	130	145	166	187	214	237
	Standard Heat Recovery Rated Current		88	105	119	154	171	196	222	252	280
	High Temperature Heat Recovery Rated Current		101	120	134	173	193	221	250	284	316
	Cooling-only	Circuit 1(Y/△)	180/539	235/706	220/660	248/743	287/861	406/1219	406/1219	459/1376	549/1648
	Starting Current	Circuit 2(Y/△)	/	/	/	/	/	/	/	/	/
Standard Heat Recovery	Circuit 1(Y/△)	235/706	283/848	220/660	287/861	317/950	406/1219	459/1376	549/1648	653/1960	
Starting Current	Circuit 2(Y/△)	/	/	/	/	/	/	/	/	/	
High Temperature Heat	Circuit 1(Y/△)	283/848	316/948	287/861	317/950	426/1279	549/1648	653/1960	730/2190	730/2190	
Recovery Starting Current	Circuit 2(Y/△)	/	/	/	/	/	/	/	/	/	
Control Method		Digital Operation System, Microprocessor Automatic Control									
Protection		High Pressure, Low Pressure, Anti-Freeze, Water Flow, Overload, Phase Protection									
Evaporator Inlet and Outlet Pipe Diameter mm		Φ114.3			Φ133		Φ168.3				
Condenser Inlet and Outlet Pipe Diameter mm		Φ114.3			Φ133		Φ168.3				
Water Connections		Victaulic									
Refrigerant Charge R134a kg		85	100	115	145	160	200	225	260	260	
Refrigerant Oil Charge L		19	17	26	26	26	28	28	38	38	
Standard Overall Dimension	Length mm	2450	2450	2450	2450	2450	2850	2850	2850	2850	
	Width mm	1230	1230	1230	1230	1230	1300	1300	1300	1300	
	Height mm	1800	1800	1950	1950	1950	2130	2130	2130	2130	
Shipping Weight kg		2055	2180	2450	2600	2745	3650	3705	3855	3855	
Operating Weight kg		2153	2286	2567	2734	2893	3831	3908	4125	4125	

Notes:

- Standard unit water side design pressure is 1.0MPa.
- Under nominal cooling condition, entering condenser water temperature is 30℃ and leaving chilled water temperature is 7℃.
- Under nominal full heat recovery mode, leaving chilled water temperature is 7℃ and leaving domestic hot water temperature is 45℃. Under high temperature full heat recovery mode, leaving chilled water temperature is 7℃ and leaving domestic hot water temperature is 60℃.
- The maximum current for the unit is 1.25 times as large as rated current. The size of water pipe is outer diameter.
- Mammoth is committed to a policy of continuous product improvements and thus reserves the right to change specifications and design without notice.

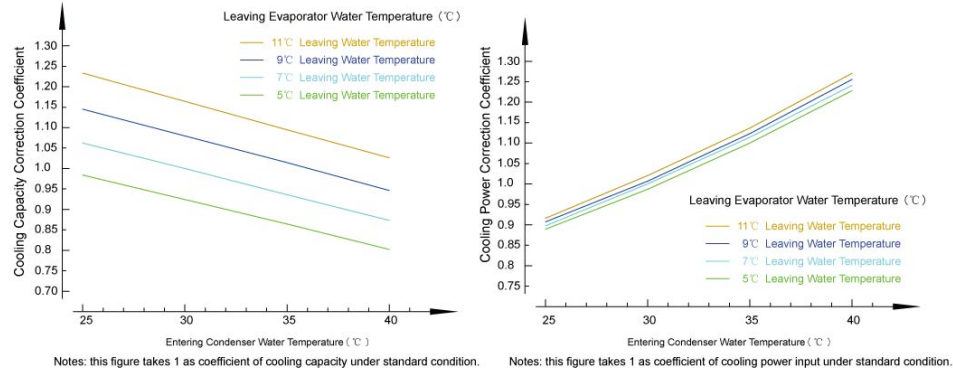
Water-Cooled Screw Chiller Technical Specification (R134a)

Item	Model	MSW295	MSW395	MSW420	MSW460	MSW550	MSW710	MSW760	MSW820	MSW860	MSW960	
Cooling Parameters	Cooling Capacity kW	712	824	941	1078	1218	1600	1838	1980	2472	2844	
	Cooling Power Input kW	137	158	178	205	228	275	317	342	426	489	
	Evaporator Load Water Flow m³/h	122	142	162	185	209	275	316	341	425	489	
	Water Pressure Drop kPa	53	53	55	55	67	42	45	75	75	80	
	Condenser Source Water Flow m³/h	153	177	202	232	262	344	395	426	531	611	
	Water Pressure Drop kPa	48	53	45	59	56	49	53	70	70	75	
Heat Recovery Parameters	Standard Heat Recovery Heating Capacity	789	911	1039	1191	1335	1758	2022	2180	2719	3128	
	Standard Heat Recovery Water Flow	136	157	179	205	230	302	348	375	468	538	
	Standard Heat Recovery Water Pressure Drop	45	50	41	52	51	46	49	65	65	70	
	High Temperature Heat Recovery Heating Capacity	696	804	917	1050	1184	1545	1775	1926	2400	2760	
	High Temperature Heat Recovery Water Flow	120	138	158	181	204	266	305	331	413	475	
	High Temperature Heat Recovery Water Pressure Drop	42	48	39	47	47	42	44	70	70	75	
Compressor Performance	Inlet & Outlet Pipe Diameter	Φ219.1					Φ273		DN250			
	Water Connections	Victaulic							Flange			
	Type	Semi-Hermetic Screw Compressor										
	Capacity Control %	Continuous Capacity Control 0, 12.5~100							Continuous Capacity Control 0, 8.5~100			
	Power Source	380V/3N~/50Hz										
	Quantity	2							3			
	Starting Method	Y-△start										
	Unit Rated Current A	290	332	374	428	474	590	680	711	885	1020	
	Standard Heat Recovery Rated Current	342	392	443	504	560	700	804	840	1050	1206	
	High Temperature Heat Recovery Rated Current	368	442	500	568	632	792	900	948	1188	1350	
	Cooling-only Starting Current	Circuit 1(Y/△)	287/861	406/1219	406/1219	459/1376	549/1648	783/2348	908/2724	549/1376	783/2348	908/2724
		Circuit 2(Y/△)	287/861	406/1219	406/1219	459/1376	549/1648	783/2348	908/2724	549/1376	783/2348	908/2724
Circuit 3(Y/△)		/	/	/	/	/	/	/	549/1376	783/2348	908/2724	
Standard Heat Recovery Starting Current	Circuit 1(Y/△)	317/950	406/1219	459/1376	549/1648	653/1960	783/2348	908/2724	653/1960	783/2348	908/2724	
	Circuit 2(Y/△)	317/950	406/1219	459/1376	549/1648	653/1960	783/2348	908/2724	653/1960	783/2348	908/2724	
	Circuit 3(Y/△)	/	/	/	/	/	/	/	653/1960	783/2348	908/2724	
High Temperature Heat Recovery Starting Current	Circuit 1(Y/△)	426/1279	549/1648	653/1960	730/2190	730/2190	908/2724	979/2936	730/2190	908/2724	979/2936	
	Circuit 2(Y/△)	426/1279	549/1648	653/1960	730/2190	730/2190	908/2724	979/2936	730/2190	908/2724	979/2936	
	Circuit 3(Y/△)	/	/	/	/	/	/	/	730/2190	908/2724	979/2936	
Control Method		Digital Operation System, Microprocessor Automatic Control										
Protection		High Pressure, Low Pressure, Anti-Freeze, Water Flow, Overload, Phase Protection										
Evaporator Inlet and Outlet Pipe Diameter mm		Φ219.1					Φ273		DN250			
Condenser Inlet and Outlet Pipe Diameter mm		Φ219.1					Φ273		DN250			
Water Connections		Victaulic					Flange					
Refrigerant Charge R134a kg		320	400	450	520	580	665	736	550	700	800	
Refrigerant Oil Charge L		2*26	2*28	2*28	2*38	2*38	2*43	2*43	3*38	3*43	3*43	
Standard Overall Dimension	Length mm	4650	4650	4650	4650	4650	5800	5800	4900	4900	4900	
	Width mm	1550	1550	1550	1730	1730	1800	1800	2350	2500	2500	
	Height mm	2300	2300	2300	2480	2480	2850	2850	2800	2800	2800	
Shipping Weight kg		5990	6750	6860	7750	8030	9650	10365	11600	12500	13100	
Operating Weight kg		6429	7209	7381	8400	8719	10380	11250	12600	13500	14100	

Notes:

- Standard unit water side design pressure is 1.0MPa.
- Under nominal cooling condition, entering condenser water temperature is 30℃ and leaving chilled water temperature is 7℃.
- Under nominal full heat recovery mode, leaving chilled water temperature is 7℃ and leaving domestic hot water temperature is 45℃. Under high temperature full heat recovery mode, leaving chilled water temperature is 7℃ and leaving domestic hot water temperature is 60℃.
- The maximum current for the unit is 1.25 times as large as rated current. The size of water pipe is outer diameter.
- Mammoth is committed to a policy of continuous product improvements and thus reserves the right to change specifications and design without notice.

Water-Cooled Screw Chiller Correction Coefficient Table (R134a)

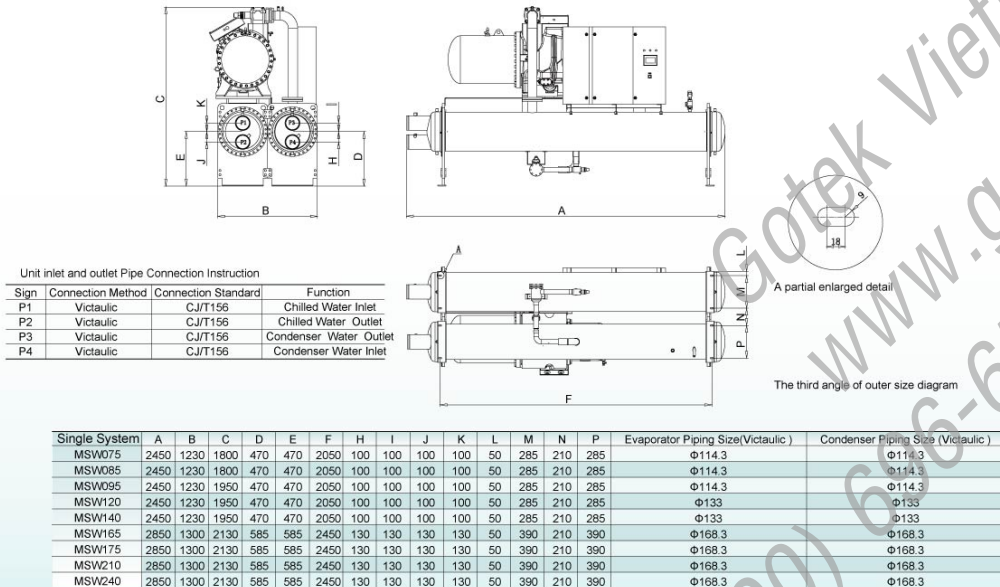


Remarks:

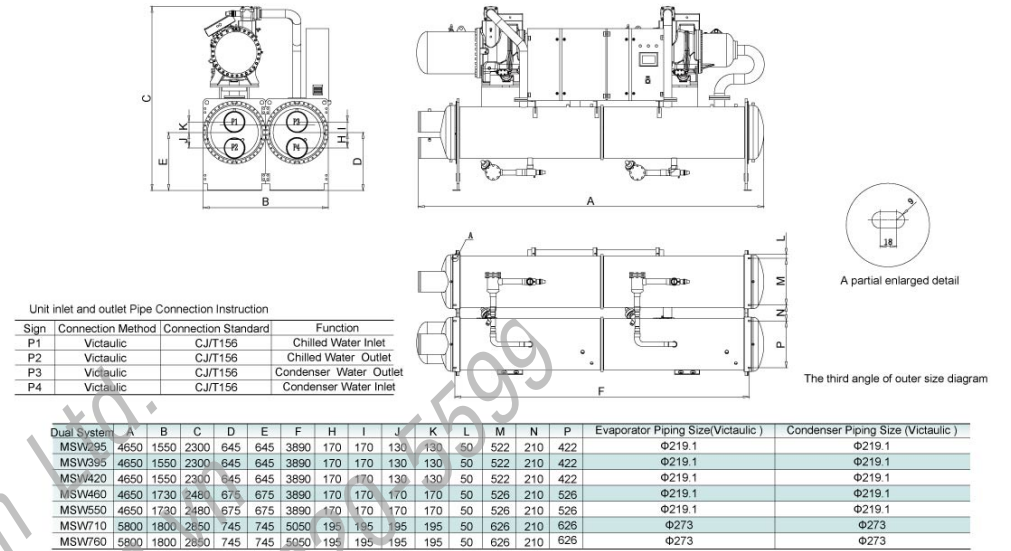
- 1 The data in the figure is for reference only. Variable working condition may be slightly different due to different compressor type.
- 2 Correction data can not exceed compressor operation range.

Dimensions

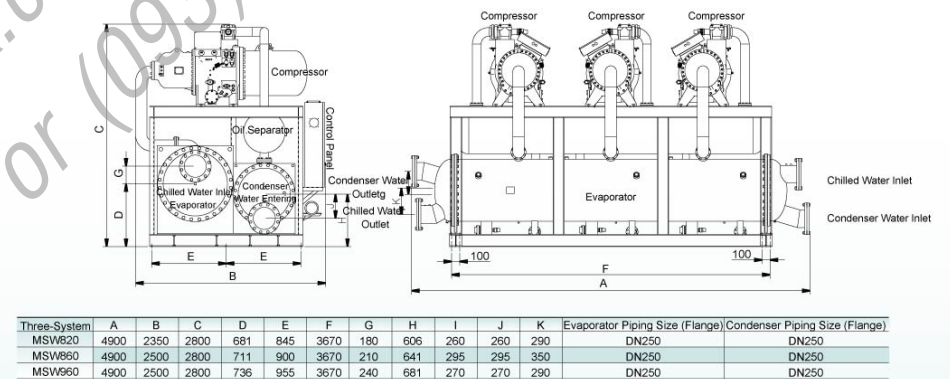
Single System R134a Flooded Type Units Dimensional Data



Dual System R134a Flooded Type Units Dimensional Data



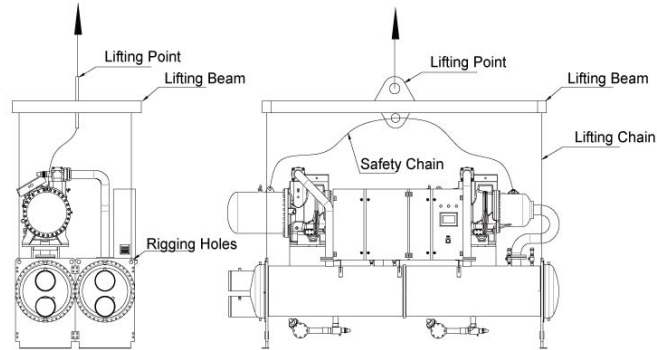
Three-System R134a Flooded Type Units Dimensional Data



Unit Hoisting Diagram

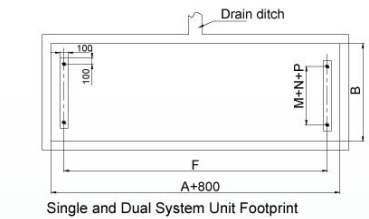
Caution

If the lifting chain will touch any part of the unit, clip on a flexible material to avoid scratching of unit surface. For heavy units, try to add more lifting points to reduce the possibility of unit parts damage.

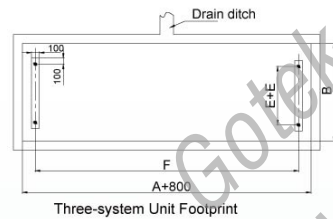


Caution: To hoist the unit, a lifting beam of adequate strength (with a length greater than that of the unit) and ropes must get ready. Otherwise, lifting is not allowed. When lifting and moving the unit, always keep it level and take care to protect parts and pipes of the unit from damage. Otherwise, serious consequence will result.

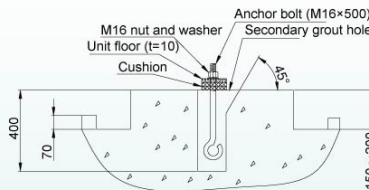
Standard Unit Footprint



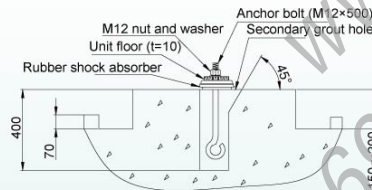
Single and Dual System Unit Footprint



Three-system Unit Footprint

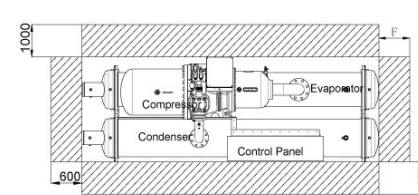


Anchor bolt embedment sectional view A

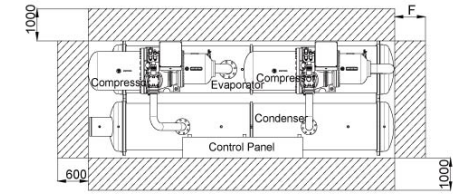


Anchor bolt embedment sectional view B

Unit Service Clearance



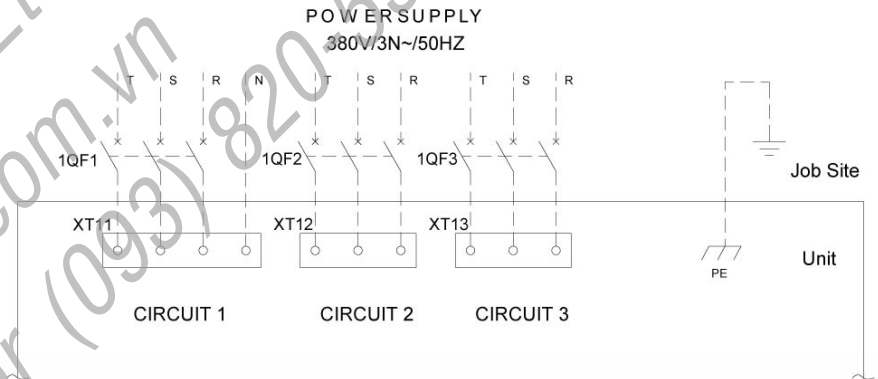
Reserved service clearance for single-system unit



Reserved service clearance for multi-system unit

Note: At least a 500 mm maintenance clearance needs to be reserved from the top of the unit.

Customer Wiring Diagram



Notes:

If the customer does not select breaker (PCB) option, the circuit breakers 1QF1, 1QF2 and 1QF3 must be provided at site.

The quantity of the power supply circuits must be the same as the compressors equipped on the unit.