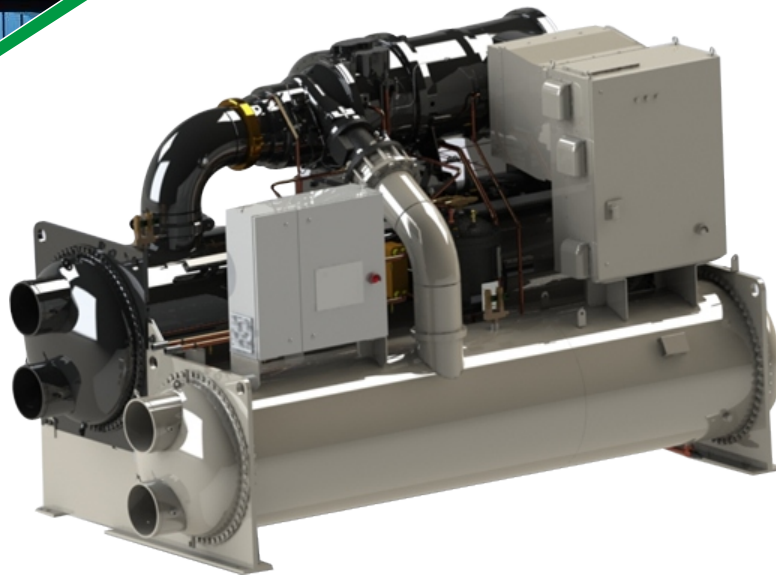




Water Cooled Centrifugal Chiller HTS/HTC



Cooling capacity: 300-2600 Tons (1055.0kW-9142.0kW)
HFC-134a Refrigerant



ISO9001



ISO14001



OHSAS18001



XK06-015-00425



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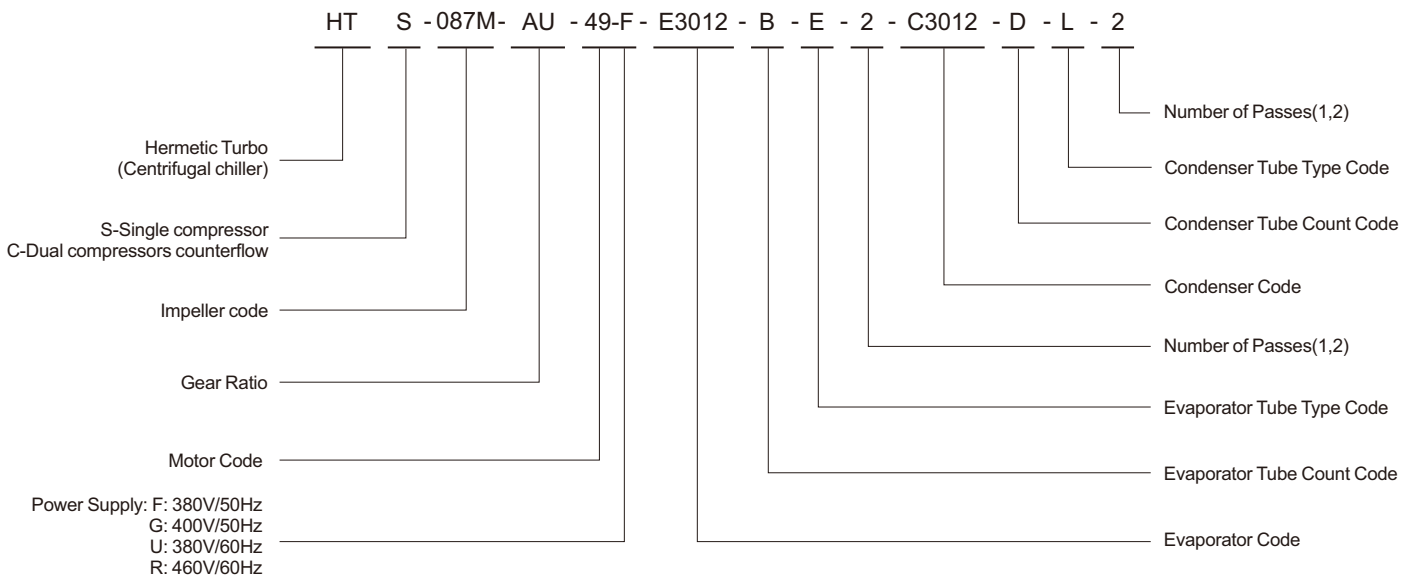
Introduction

World-Class Design Leader

Daikin, as the world leading air conditioning company, has earned a worldwide reputation for providing high quality products and expertise to meet variable requirements from different customers. Our customers benefit from maximum energy saving, lower installation and operation cost, quiet operation, superior indoor air quality. Daikin has been dedicating to the ongoing commitment of products development and technology innovation and also offers industrial-leading and excellent performance products as always.



Nomenclature





Technology Features

Compressor

Semi-hermetic single stage compressor

Daikin centrifugal chillers have been designed with reliable and sustainable gear driveline system.

The precision-engineered gear driven design allows for lighter components, less vibration, and giving ability to select gear ratios that will provide the optimum impeller speed for your application. Daikin gear drive compressor has a series of top speed ratios that allow for selecting the maximum efficiency impeller from full load to part load range.



Daikin's impeller design is only with larger compression coefficient and small pressure loss but also at quite a low noise sound level.

The compressor cooling capacity is controlled by inlet guide vane installed at the entry of compressor to offer required refrigerant quantity.

The advanced inlet guide vane produces linear refrigerant flow at high load condition. Pre-whirl the suck gas refrigerant at part load to improve the compression efficiency. The simple and small discharge volute design guide compressor gas directly entering the condenser ensuring the compressor efficiency. Daikin semi-hermetic centrifugal chiller has benefited our customer by easy-to-maintenance as well as eliminating additional cost of plant room ventilation system due to compressor motor is cooled by refrigerant.

High Efficient Heat Exchanger

Evaporator and condenser shall be shell-and-tube type, designed, constructed, tested and stamped according to the requirement of GB code. The Shell-tube type vessel operating with refrigerant in shell and water in tubes with 2 pass as standard. The smart vessel has optimized the compact structure to greatly improve heat transfer and downsize the footprint as well. Replaceable enhanced copper tubes are fabricated from integral finned copper and mechanically bonded to steel tube sheet for maximum heat transfer.

Electronic Expansion Valve

Daikin centrifugal chiller is equipped with a high-precision throttling device, which can be adjusted by electronic expansion valve or electronic pilot valve plus main valve in response to different application. The chiller controller is able to adjust precisely the electronic expansion valve opening to provide adequate refrigerant flow by keeping monitoring the condenser liquid level.



Lubrication System

A separately driven electric oil pump assembly supplies lubrication at controlled temperature and pressure to all bearing surfaces and is the source of hydraulic pressure for the capacity control system.

The control system will not allow the compressor to start until oil pressure, at the proper temperature, is established. It also allows the oil pump to operate after compressor shut down to provide lubrication during coast-down. Lubricant from the pump is supplied to the compressor through a water-cooled, brazed-plate heat exchanger and single or dual five-micron oil filters internal to compressor. All bearing surfaces are pressure lubricated. Drive gears operate in a controlled lubricant mist atmosphere that efficiently cools and lubricates them.

Lubricant is made available under pressure from the compressor oil filter to the unit capacity control system and is used to position the inlet guide vanes in response to changes in leaving chiller water temperature. If a power failure occurs, an emergency oil reservoir provides adequate lubrication flow under pressure, and prevents damage that could occur during the coast-down period with the oil pump stopped.

Since the Daikin chillers are positive pressure, there is no need to change the lubricant or filter on a regular basis. As with any equipment of this type, an annual oil check is recommended to evaluate the lubricant condition.

Twin Relief Valves

The spring loaded pressure twin relief valves, mounted on a transfer valve, are installed on the vessel so that one relief valve can be shut off and removed for testing or replacement, leaving the other in operation, only one of the two valves in operation.

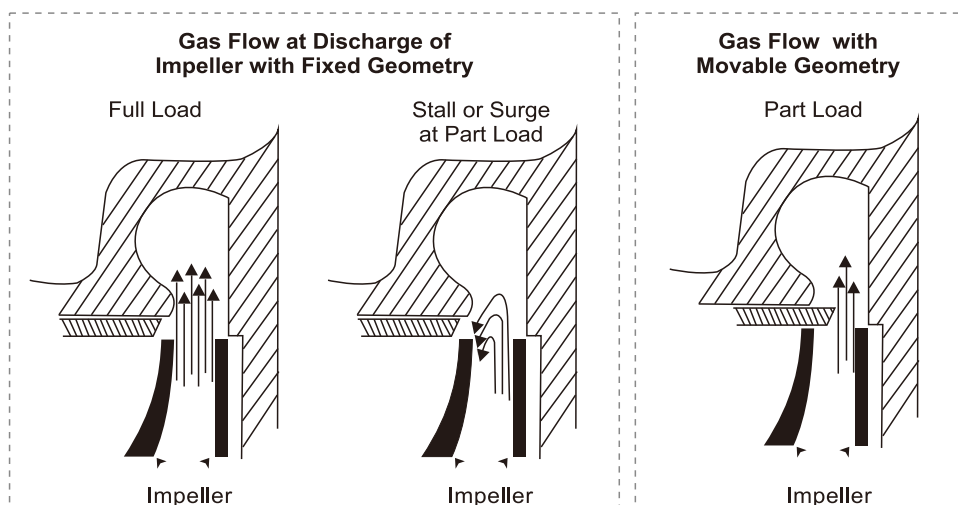
Excellent Unloading

Daikin pioneered use of movable discharge geometry to lower the surge point of centrifugal compressors. The point which the compressor enters a stall or surge condition generally limits compressor unloading. Chillers with a fixed discharge will experience or surge at low load.

Due to refrigerant re-entering the impeller, when in a stall condition, the refrigerant gas is unable to enter

the volute due to its low velocity and remains stalled in the impeller. In a surge condition the gas rapidly reverses direction in the impeller causing excessive vibration and heat. Daikin compressors reduce the discharge area as load decreases to maintain gas velocity and greatly reduce the tendency to stall or surge.

Figure 1: Fixed vs. Movable Discharge Geometry





Above the drawing on the left shows a cross section view of the operation at full load of a unit with a fixed compressor discharge. At full load, a large quantity of gas is discharged with a fairly uniform discharge velocity as indicated by the arrows. The center drawing shows a fixed compressor discharge at reduced capacity. Note that the velocity is not uniform and the refrigerant tends to re-enter the impeller. This is caused by low velocity in the discharge area and the high pressure in the condenser, resulting in unstable surge operation and with noise and vibration generated. The following cut-away picture shows the unique Daikin movable discharge geometry. As the capacity reduces, the movable piston travels inward, reducing the discharge cross section area and maintaining the refrigerant velocity. This mechanism allows our excellent unloading capacity reduction.

Noise Reduction

Most of the noise for the centrifugal compressor is caused by the high speed gas flow in the discharge pipe. Daikin refrigerant injection system supply a small amount of liquid refrigerant to discharge side through series of radial discharge nozzle, forming mist refrigerants to absorb sound energy. In addition, the flash gas can reduce the discharge superheat of the compressor and increase the condenser efficiency.

Low Cooling Water Temperature Start

To improve the performance of the unit, the cooling water entry temperature can be reduced when the environmental wet bulb temperature is lower than the design temperature. Daikin centrifugal chillers adopt precise throttling device and advanced control system. Our chiller is able to start even when the cooling water temperature as low as 8°C, which saves the initial investment and electricity for the user.

Refrigerant Storage

During the off-season or maintenance, the condenser could be sized to hold the whole refrigerant charge by closing the shut-off valve on liquid line and discharge check valve. This feature help to eliminate the need for extra storage tank.

Rapid Start

The optional rapid restart function could be best choice for power critical condition. In the unlikely event of power loss, it would take at least 15 minutes or even longer to restart a normal chiller. But Daikin centrifugal chiller can restart the chiller within 30 seconds from power failure to the comment that the compressor start to run again. This feature will help the chiller quickly restore to its original operation condition, ensuring your facilities or service online as always.

Performance Test

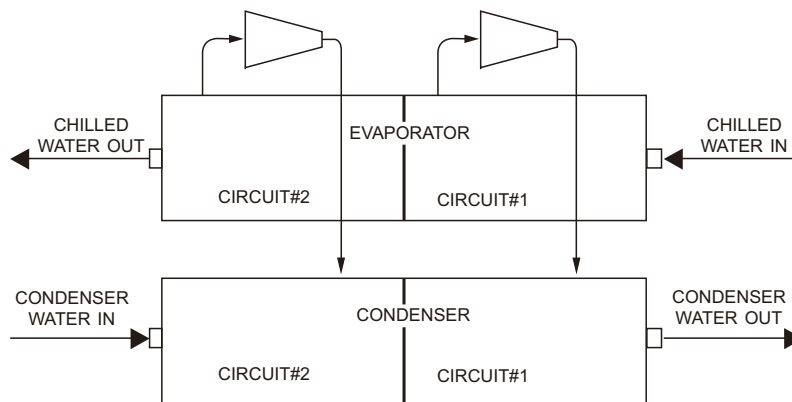
Every chiller must pass 100% performance testing on the AHRI recognized test platform before delivery. This ensure chiller properly operating and qualified before ex-factory and deliver the chiller to customer without any problem.

Dual Compressor Centrifugal Chillers

Dual Compressor Centrifugal Chillers

Daikin is the expert when it comes to dual centrifugal compressor technology, successfully building dual compressor centrifugal chillers since 1971.

Figure2: Dual Circuit HTC Counter flow chillers.



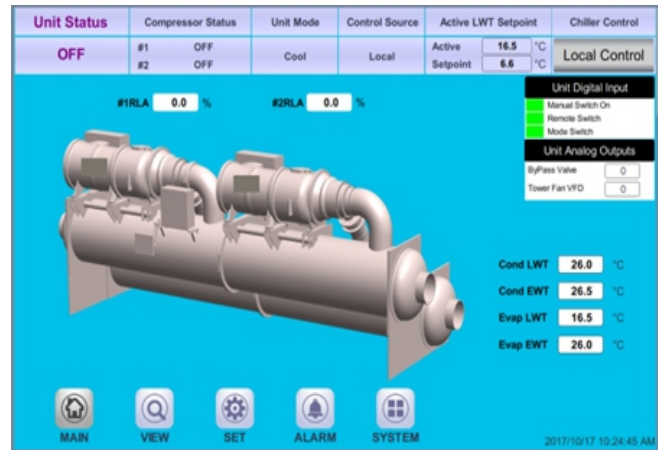
These chillers have a separate refrigerant circuit for each compressor. They are available in single pass only. BY reducing the lift on each compressor, they provide the high full load efficiency advantage of two separate chillers arranged for counterflow operation in a single compact unit.

Use HTC Chillers When:

- High efficiency and large capacity is required with series flow
- Project requirements is lowest kW per ton performance at full load with high electrical demand charges
- Single pass counter flow series design, water pressure drop decrease to 40kPa, save pump energy consumption by 30% compare to traditional unit

Control Features

The Micro Tech V Control system gives you the ultimate in chiller control. The control includes many energy-saving features to keep your chiller running efficiently. Reliable, economic use of any chiller depends largely on an easy operator interface. That's why operation simplicity was one of the main consideration in the development of the Micro Tech V controller. The operator interface with the chiller is a 12-inch color touch-screen. The operator can clearly see the entire chiller graphically displayed, with key operating parameters viewable on the screen.



Proactive Control

By constantly monitoring chiller status, the Micro Tech V controller will automatically take proactive measures to relieve abnormal conditions or shut the unit down if a fault occurs. For example, if a problem occurs in the cooling tower and discharge pressure starts to rise, the controller will automatically hold the load point and activate an alarm signal. A further rise in pressure will initiate compressor unloading in an effort to maintain the setpoint pressure. If the pressure continues to rise, the unit will shut off at the cutout pressure setting.

Human Machine Interface Touch Screen

The human machine interface touch screen (HMI) is the primary device by which commands and entries into the control system are made. It also displays all controller data and information on a series of graphic screen. A single HMI is used on both single and dual compressor units.

The HMI contains a USB disk that can be used for loading information to and from the control system. There is a screen-saver programed into the system. The screen is reactivated by touching it anywhere.

Open Choices Benefits

- Easy to integrated into your building automatic system
- Factory or filed installed communication modules
- Comprehensive point list for system integration, equipment, monitoring and alarm notification
- Comprehensive data exchange

Protocol Options

- BACnet MS/TP
- BACnet/IP
- BACNet Ethernet
- Modbus RTU
- LONWORKS



Technical Data

HTS Star-Delta/Solid-State (380V/3P~/50Hz)

Model	Cooling capacity Tons(kW)	Power Consumption kW	COP kW/ kW	Rated Load A	Evap.		Cond.		Chiller Weight Kg	Operation Weight Kg
					Flow Rate L/s	Pressure Drop kPa	Flow Rate L/s	Pressure Drop kPa		
HTS087MAU49F/E3612-CE-2/C3012-DL-2	500.0(1758)	279.6	6.288	487	75.45	42.3	93.80	50.2	7713	8809
HTS087MAU49F/E3009-CE-2/C2609-CL-2	500.0(1758)	297.5	5.910	517	75.45	73.8	94.67	58.8	5520	6109
HTS087MAU49F/E3612-BE-2/C3012-DL-2	550.0(1934)	307.7	6.287	535	83.01	37.3	103.3	59.3	7908	9064
HTS087MAU49F/E3009-BE-2/C2609-BL-2	550.0(1934)	328.2	5.894	571	83.01	68.7	104.3	56.2	5645	6375
HTS087MAU49F/E3612-BE-2/C3612-BL-2	600.0(2110)	337.1	6.259	586	90.56	43.7	112.8	22.3	9132	10753
HTS087MAT57F/E3609-BE-2/C3009-CL-2	600.0(2110)	364.4	5.790	632	90.56	33.4	114.1	45.5	7089	8086
HTS100MAZ59F/E3012-FK-2/C3012-JK-2	700.0(2462)	425.3	5.789	735	105.7	91.4	132.7	99.3	8769	9901
HTS100MAZ59F/E3012-EK-2/C3012-EK-2	700.0(2462)	411.1	5.989	709	105.7	72.7	132.0	65.8	8990	10122
HTS100MAY71F/E3312-FK-2/C3012-EK-2	760.0(2673)	460.3	5.807	793	114.7	55.0	144.1	76.3	9208	10369
HTS113MBE71F/E3312-QH-2/C3012-FK-2	800.0(2813)	463.5	6.070	799	120.7	76.1	150.8	94.5	9158	10319
HTS113MBE71F/E3312-QH-2/C3012-EK-2	850.0(2989)	490.9	6.090	848	128.3	84.5	160.2	91.2	9226	10387
HTS126LBHN0F/E3612-EK-2/C3012-EK-2	950.0(3340)	575.1	5.808	986	143.4	48.2	180.4	112	9803	11218
HTS126LBHN0F/E3612-FK-2/C3612-KK-2	950.0(3340)	571.5	5.845	980	143.4	57.9	180.3	88.9	10400	12146
HTS126MBHN0F/E3612-EK-2/C3612-JK-2	1050(3692)	635.7	5.808	1095	158.5	57.7	199.6	93.0	10495	12241
HTS126MBHN0F/E3612-EK-2/C3612-GK-2	1100(3868)	666.7	5.802	1151	166.0	62.8	209.2	91.3	10559	12305
HTS126MBHN1F/E3912-PH-2/C3612-FK-2	1200(4220)	712.8	5.921	1237	181.1	76.0	227.7	92.9	11043	12936

Notes:

- Above chiller cooling capacity is based on AHRI standard condition :
Evap: EEWT 12.22°C, ELWT 6.67°C; Fouling factor 0.0176°C·m²/ kW;
Cond: CEWT 29.44°C, CLWT 34.61°C; Fouling factor 0.0440°C·m²/ kW;
- Above chiller is recommended, please contact local sales for other specific models;
- Standard: 2 Pass evaporator and condenser;
- Above data based on selection program [DST13.40](#). For specific project, please refer to the latest version.





Technical Data

HTC Star-Delta/Solid-State (380V/3P~/50Hz)

Model	Cooling capacity Tons(kW)	Power Consumption kW	COP kW/ kW	Rated Load A	Evap.		Cond.		Chiller Weight Kg	Operation Weight Kg
					Flow Rate L/s	Pressure Drop kPa	Flow Rate L/s	Pressure Drop kPa		
HTC113MBE71F/E3620-CE-1/C3620-CLYY-1	1600(5626)	905.3	6.215	815;745	241.5	82.7	300.0	40.9	16977	20068
HTC113MBE71F/E3620-CE-1/C3620-BLYY-1	1700(5979)	959.4	6.232	867;789	256.6	92.3	318.9	34.4	17343	20434
HTC126LBH83F/E4220-CE-1/C3620-CLYY-1	1800(6329)	1026	6.171	922;840	271.6	48.3	338.2	50.5	19008	22480
HTC126LBH83F/E4220-CE-1/C3620-BLYY-1	1900(6680)	1082	6.174	976;887	286.7	53.2	357.0	41.8	19374	22846
HTC126MBH83F/E4220-CE-1/C3620-CLYY-1	2000(7032)	1159	6.068	1049;953	301.8	58.3	376.9	61.0	18995	22467
HTC126MBHN0F/E4220-CE-1/C3620-CLYY-1	2100(7384)	1212	6.097	1090;991	316.9	63.7	395.7	66.4	18995	22467
HTC126MBHN0F/E4220-CE-1/C3620-BLYY-1	2200(7735)	1267	6.106	1145;1037	332.0	69.3	414.5	54.3	19374	22846
HTC126MBHN0F/E4220-BE-1/C3620-BLYY-1	2300(8087)	1331	6.075	1207;1091	347.1	60.5	433.7	58.8	19759	23231
HTC126MBHN0F/E4220-BE-1/C4220-BLYY-1	2400(8438)	1386	6.090	1262;1137	362.1	65.3	452.4	32.4	22187	26337
HTC126MBGN2F/E4220-BE-1/C4220-BLYY-1	2500(8790)	1506	5.838	1385;1250	377.3	70.3	474.3	34.61	22187	26337
HTC126MBFN2F/E4820-BE-1/C4820-BLYY-1	2600(9142)	1598	5.722	1473;1329	392.4	44.8	495.0	23.1	26482	31978

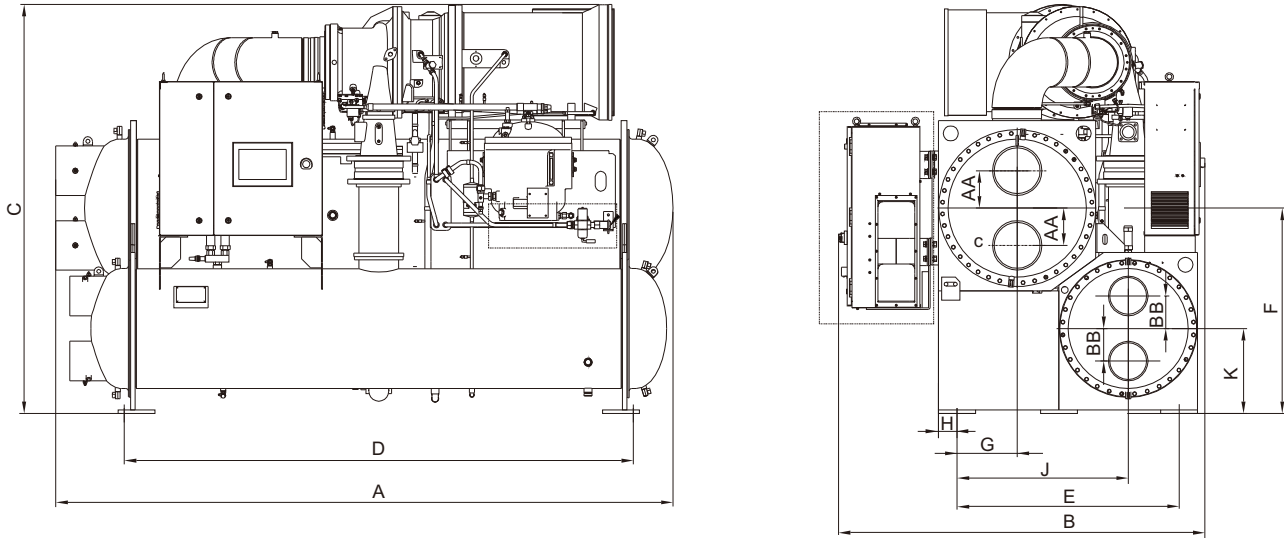
Notes:

- Above chiller cooling capacity is based on AHRI standard condition:
Evap: EEWT 12.22°C, ELWT 6.67°C; Fouling factor 0.0176°C·m²/ kW;
Cond: CEWT 29.44°C, CLWT 34.61°C; Fouling factor 0.0440 °C·m²/ kW;
- Above chiller is recommended, please contact local sales for other specific models;
- Standard: 1 Pass evaporator and condenser;
- Cable entrance: Top in and top out;
- Above data based on selection program [DST13.40](#). For specific project, please refer to the latest version.





Dimensions



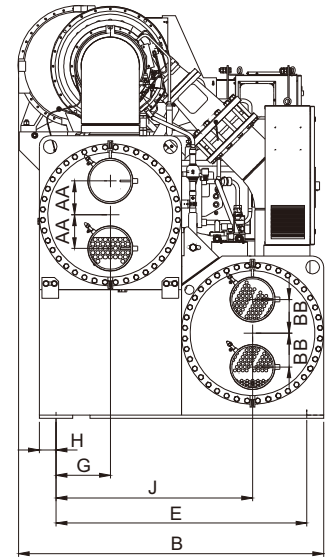
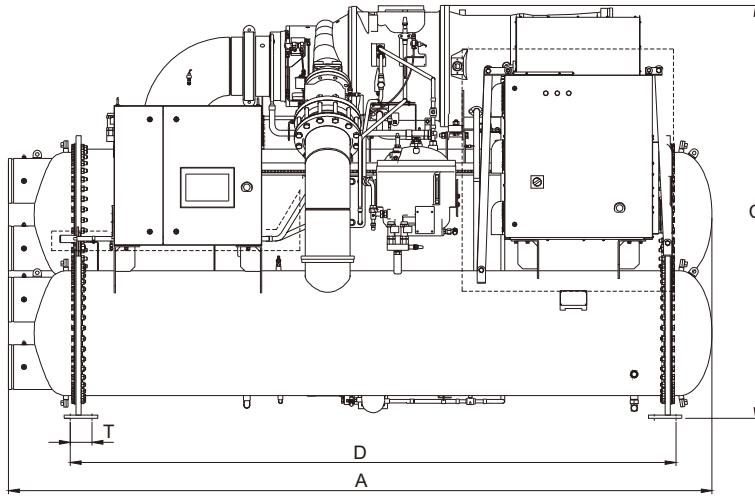
HTS079~087 (380V/3P~/50Hz)

Model	Dimensions(mm)						Evap. pipe connection(mm)				Cond. pipe connection(mm)			
	A	B	C	D	E	H	F	G	AA	OD	J	K	BB	OD
HTS079~087/E2609/C2209	3360	1994	2010	2808	1041	102	979	281	180	φ219	824	426	145	φ219
HTS079~087/E2612/C2212	4246	1994	2010	3694	1041	102	979	281	180	φ219	824	426	145	φ219
HTS079~087/E2609/C2609	3294	1972	2144	2808	1105	102	1102	281	180	φ219	824	469	180	φ219
HTS079~087/E2612/C2612	4180	1972	2144	3694	1105	102	1102	281	180	φ219	824	469	180	φ219
HTS079~087/E3009/C2609	3405	2022	2258	2808	1225	102	1134	331	206	φ273	944	469	180	φ219
HTS079~087/E3012/C2612	4291	2022	2258	3694	1225	102	1134	331	206	φ273	944	469	180	φ219
HTS079~087/E3009/C3009	3420	2045	2397	2808	1276	102	1273	331	206	φ273	944	520	206	φ273
HTS079~087/E3012/C3012	4300	2045	2397	3694	1276	102	1273	331	206	φ273	944	520	206	φ273
HTS079~087/E3609/C3009	3464	2445	2427	2808	1682	102	1226	408	248	φ273	1351	520	206	φ273
HTS079~087/E3612/C3012	4350	2445	2427	3694	1682	102	1226	408	248	φ273	1351	520	206	φ273
HTS079~087/E3612/C3612	4350	2598	2690	3694	1834	102	1490	406	248	φ273	1425	596	248	φ325

Notes:

- 1、It's difficult to avoid deviation during design and manufacture;
- 2、A,B,C dimension deviation ±13mm and above dimension without insulation.

Dimensions



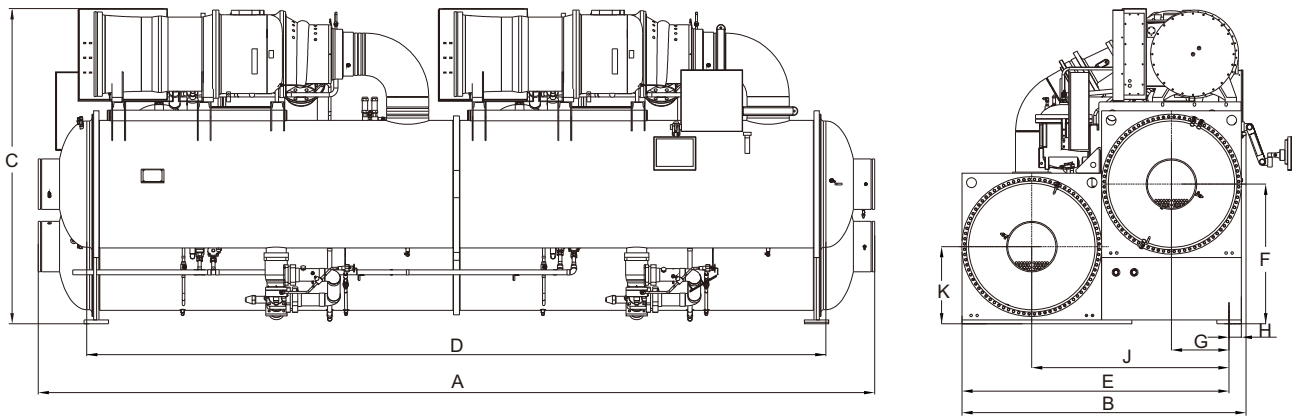
HTS100~126(380V/3P~/50Hz)

Model	Dimensions(mm)							Evap. pipe connection(mm)				Cond. pipe connection(mm)			
	A(1.0)	B	C	D	E	H	T	F	G	AA	OD	J	K	BB	OD
HTS100~126/E3012/C3012	4291	1861	2519	3694	1530	102	133	1243	332	206	φ273	1199	520	206	φ273
HTS100~126/E3312/C3012	4332	1918	2497	3694	1633	102	133	1175	383	215	φ273	1302	520	206	φ273
HTS100~126/E3612/C3012	4352	1963	2542	3694	1682	102	133	1196	407	248	φ273	1350	520	206	φ273
HTS100~126/E3612/C3612	4352	2116	2542	3694	1835	102	133	1196	407	248	φ273	1427	596	248	φ325
HTS100~126/E3912/C3612	4386	2149	2513	3694	1928	102	133	1110	454	248	φ325	1520	596	248	φ325

Notes:

- 1、 It's difficult to avoid deviation during design and manufacture;
- 2、 A,B,C dimension deviation $\pm 13\text{mm}$ and above dimension without insulation.

Dimensions

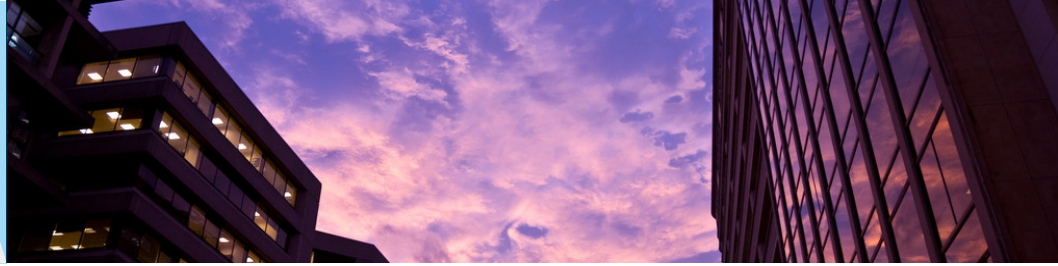


HTC/(380V/3P~/50Hz)

Model	Dimensions(mm)						Evap. pipe connection(mm)			Cond. pipe connection(mm)		
	A	B	C	D	E	H	F	G	OD	J	K	OD
HTS100~126/E3620/C3620	6914	2115	2527	6193	1834	102	1170	408	φ406	1427	571	φ406
HTS100~126/E4220/C3620	7020	2230	2569	6193	1970	102	1095	484	φ508	1580	571	φ406
HTS100~126/E4220/C4220	7020	2383	2645	6193	2139	102	1172	484	φ508	1656	648	φ508
HTS100~126/E4820/C4820	7306	2674	2794	6193	2444	102	1251	560	φ610	1884	724	φ610

Notes:

1. It's difficult to avoid deviation during design and manufacture;
2. A,B,C dimension deviation ±13mm and above dimension without insulation.

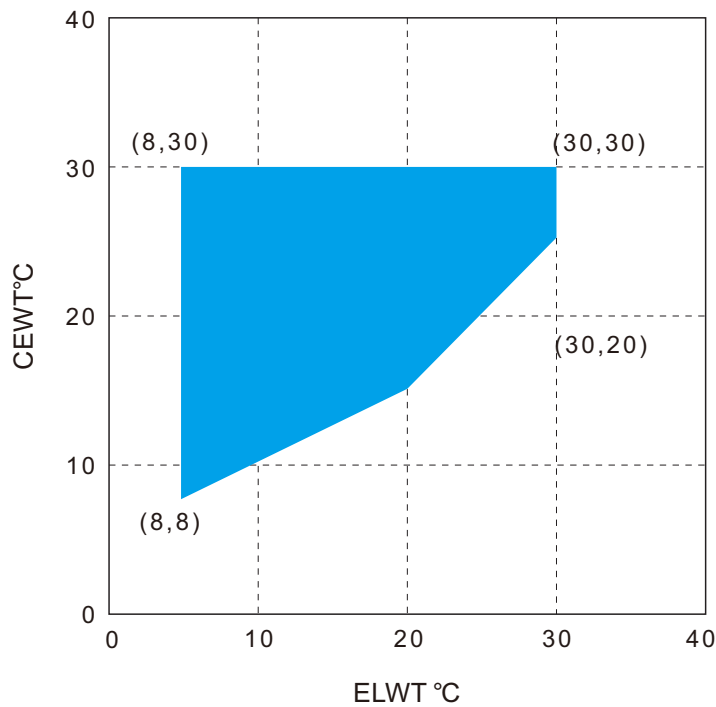


Options

Items	Standard	Options
Vessel Code	GB Standard (1.0MPa)	ASME
Water connection	Victaulic groove ready	Flange
Marine water box	None	option
Insulation	20 mm insulation on evaporator and cold surface	40 mm insulation on evaporator and cold surface
Flow switch	Differential Pressure Switch	Thermal flow switch /Paddle type
Shock absorption Device	Rubber cushion	Spring isolator
Warranty Extension	None	1-4 Year
Factory Test	Performance Test	1-4 point witness test

Notes: 40mm insulation on evaporator shell and 20mm on water head cap.

Startup Envelope



Notes : The inlet and outlet temperature difference is 5°C based on electronic expansion valve.



Application

The running condition of the chiller is as follows:

Using standard benchmark chiller running environment is as follows:

Supply Voltage	Rated voltage $\pm 10\%$	
Phase Unbalance Rate	$\pm 2\%$	
Frequency	Rated frequency $\pm 2\% \text{Hz}$	
Operating Temperature	3~40°C	
Relative Humidity	$\leq 90\%$	
Atmospheric Corrosive Gas Contents	Sulfur dioxide	$\leq 10 \text{ mg/m}^3$
	Hydrogen fluoride	$\leq 5 \text{ mg/m}^3$
	Hydrogen sulfide	$\leq 5 \text{ mg/m}^3$
	Nitrogen oxide	$\leq 5 \text{ mg/m}^3$
	Nitrogen	$\leq 1 \text{ mg/m}^3$
	Hydrogen chloride	$\leq 5 \text{ mg/m}^3$
Installation	Indoor installation, no rain or direct sunlight (for installations of the outdoor, seaside, chemical plant, or places of high concentration of corrosive gas, please contact the local DAIKIN office and distributors)	
Heat Exchange Tube Waterside Pressure	Standard chiller 1.0MPa	

Water Quality Management

When the chiller is running, the water quality of cooling water, chilled water will directly affect the machine performance and service life. So you must survey water quality in advance. And manage the water quality.

The following table contains some parameters of the water quality of open system:

Item	Chiller	Reference	Item		
			Corrosion	Scaling	
Base Items	PH (25°C)	—	<6.5~8.0	O	O
	Electrical Conductivity(25°C)	$\mu\text{s/cm}$	<800	O	O
	Chloridion Cl^-	$\text{mg}(\text{Cl}^-)/\text{L}$	<200	O	
	Sulfateion SO_4^{2-}	$\text{mgSO}_4^{2-}/\text{L}$	<200	O	
	Acid Consumption (PH=4.8)	$\text{mg}(\text{CaCO}_3)/\text{L}$	<100		O
	Full Hardness	$\text{mg}(\text{CaCO}_3)/\text{L}$	<200		O
Reference Items	Iron Fe	$\text{mg}(\text{Fe})/\text{L}$	<1.0	O	O
	Sulphion S^{2-}	$\text{mg}(\text{S}^{2-})/\text{L}$	Not Detected	O	
	Ammoniumion NH_4^+	$\text{mg}(\text{NH}_4^+)/\text{L}$	<1.0	O	
	Silicon Oxide SiO_2	$\text{mg}(\text{SiO}_2)/\text{L}$	<50		O

Notes:

1. "O" in the table the relevant factors of corrosion or scaling tendency.
2. We recommend you add water process device and contact Daikin professional servicer to deal with it.



33, CheCheng Road, Economical and Technology Development District, Wuhan, Hubei, China.
P.C. 430056

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