

# Evaporative Condenser Chiller / Dual Source Heat Pump



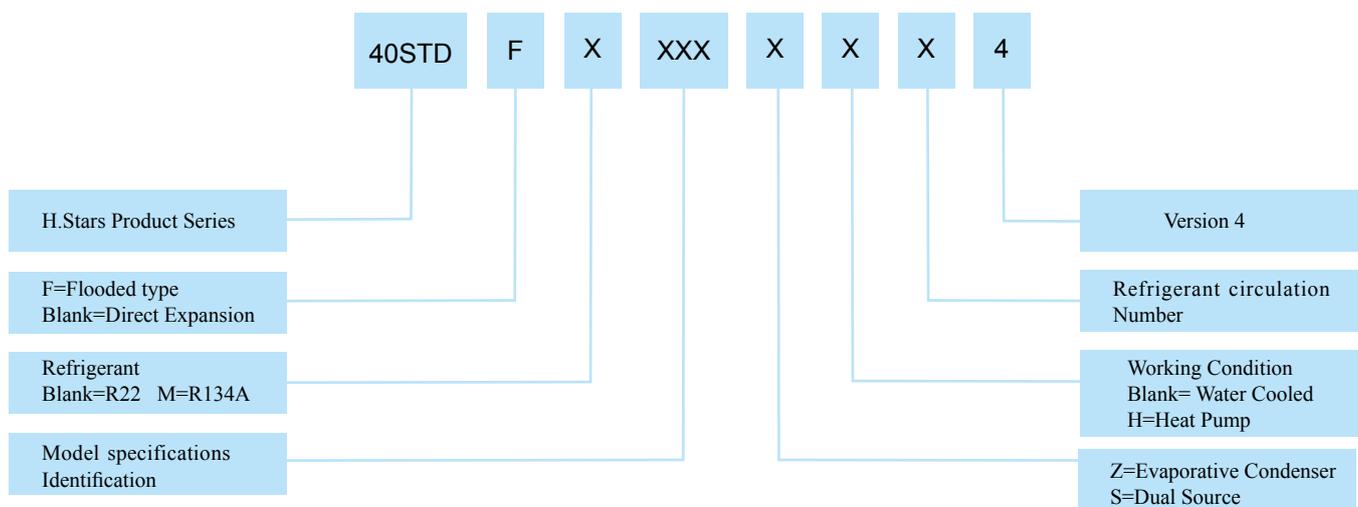
H.Stars (Guangzhou) Refrigerating Equipment Group Ltd.



H.Stars evaporative condenser chiller adopts an evaporative condenser, which uses the evaporation of water to absorb latent heat to condense the refrigerant vapor. The heat released from the evaporation of refrigerant transferred to the outer water film by the oil film, pipe wall and dirt, and then the heat is transferred to the air by the evaporation of the water. Compared with ordinary water-cooled condensers

and air-cooled condensers, the water consumption of evaporative condenser is less, and the fan air volume is also smaller, so Evaporative Condenser Chiller has the advantages of less water consumption, low sound level, low condensing temperature, energy saving and environmental friendly. It is especially suitable for use in areas where water is scarce and the weather is dry.

## Model Nomenclature



## Low system operating costs

Compressor input power is at least 10% less than other cooling tower/condenser systems, and 30% less power than air-cooled condenser systems; fan power consumption is the same as cooling tower/condenser systems, and it is about 1/3 power of an air-cooled condenser at the same specification. Due to the lower pump head and smaller water flow, the pump power is approximately 25 percent of the pump power required in a typical cooling tower/condenser system.

## High efficiency shell and tube heat exchanger

The indoor unit adopts the self-developed and self-produced high-efficiency shell-and-tube heat exchanger, and the electronic expansion valve is combined with the orifice plate to throttle the refrigerant to ensure that the evaporator is always in a high-efficiency heat exchange state. IPLV reached 10.7, partial load value exceeds 13.

## Save space and water

The evaporative condenser saves the valuable space by combining the condenser coil and the cooling tower together, beside smaller pumps and pipelines can be installed compare to cooling tower/condenser system. Evaporative condensers require only about 50% of the upwind area of an air-cooled condenser at the same specification. Moreover, it costs less water consumption (3~5% of water-cooled condenser), and the air flow is small.

## Low investment cost

The evaporative condenser integrates cooling tower, condenser, circulating water tank, circulating water pump and water pipe, which reduces equipment and installation cost such as cooling towers, circulating water pumps and water pipes in the cooling tower/condenser system. Since the evaporative condenser utilizes the evaporative cooling, it can effectively reduce heat exchange area, the number of fans, and power consumption of fan motor.

## High efficiency fin evaporator

The dual-source heat pump unit adopts outdoor air-cooled fin-type evaporator, which use air as the heat source during winter, compared with the ground source heat pump system, the investment cost is greatly reduced, no special machine room is needed, and the civil construction investment cost is reduced. Multi-purpose, cooling in summer, heating during winter.

## Heat recovery (optional)

H.Stars (Guangzhou) Refrigerating Equipment Group Ltd. is the first manufacturer in China to use condensing heat recovery technology (patent number: ZL03223588.7). It uses a heat recovery device to recover the waste heat generated during the refrigeration process, which provides customers with chilled water and supply large amount of free hot water.



Indoor Unit of Evaporative Condense Chiller

## Evaporative Condenser Chiller

### Standard configuration

Standard configuration	Hanbell Screw Compressor / Danfoss Scroll compressor
Evaporator	Self-produced high efficiency evaporator
Condenser	Evaporative Condenser
Controller	Microcomputer controller
Throttle device	Electronic expansion valve
Start-up mode	Star Delta Starter
Power supply	380V-3N-50Hz
Insulation material	Anti-corrosion, Waterproof, Mesh insulation
Packaging	Reinforced Shrink-wrap Covering ,industrial-grade
Oil Paint	High-strength matt paint
Water Pipe connection	Flange

High-efficiency flooded type evaporators and evaporative condensers further enhance the energy efficiency of the chiller. The evaporative condenser is low water consumption and therefore it is suitable to use in areas with water shortages and dry climates. This series have 8 standard specifications, the cooling capacity range is 423kW-1860kW, and the chilled water outlet temperature range is 5-20°C. Other than standard specifications, special products like heat recovery function, high voltage unit, explosion-proof unit, anti-corrosion unit, etc. can be customized according to customer requirements.

### Screw type dual source heat pump unit

#### Standard configuration

Compressor	Hanbell Screw Compressor
Evaporator	Self-produced high efficiency fin type evaporator / Self-produced shell and tube evaporator
Condenser	Self-produced high efficiency shell and tube Condenser / Evaporative Condenser
Fan	Axial Fan
Controller	Siemens PLC editable controller
Four-way valve	Imported four-way valve
Throttle device	Electronic expansion valve
Startup mode	Star Delta Starter
Power supply system	380V-3N-50Hz
Insulation material	Anti-corrosion, Waterproof, Mesh insulation
Packaging	Reinforced Shrink-wrap Covering ,industrial-grade
Oil Paint	High-strength matt paint
Water pipe connection	Flange

Unit adopts efficient fin-type evaporator, evaporative condenser and shell-and-tube heat exchanger (cooling and heating mode). With all those parts, unit combines the functions of evaporative cold water chiller and heat pump unit. In addition it integrates water source and air source heat pump units all together. Considering the whole system comprehensively, under the same cooling capacity and condition, the Evaporative Condenser Chiller compressor consumes 20% less power than the water cooled chiller and 40% lower than the air cooled chiller. The cooling capacity ranges from 400kw to 1100kw, the outlet chilled water temperature ranges from 5 to 20 °C, the heating capacity ranges from 350kw to 950kw, and the outlet hot water temperature ranges from 45°C to 50°C. Suitable for areas where water is limited.



## Evaporative Condenser Chiller Compressor

The compressor adopts world known twin-screw compressor with high-efficiency 5:6 asymmetric screw rotor design, which is 20%~30% higher efficiency than the general compressor.

Specific design for environmentally friendly refrigerant R134A, R407C, low failure rate, stable and reliable operation, no fault running time, 50000-80000 hours.

Unique structure of solenoid valve for oil and energy adjustment can be equipped with step or stepless control adjustment according to project needs.

The evaporating temperature ranges from -40°C to 15°C and the condensing temperature can be up to 65°C. The compressor has obtained two international certifications of 1809001 and 1809002 as well as multi-national patents in Europe and America. Built-in motor protection module includes overload, reverse, phase loss protection and fault indicator light to indicate the type of fault.

Built-in high-efficiency oil and gas separator and oil tank ensure stable oil supply to the compressor.



## Dual source heat pump dedicated compressor

The dedicated compressor has a medium pressure valve, whose pressure is close to the intermediate of the two-stage compression, for the economizer. This economizer connection design can achieve no compressed return loss, so as to ensure the compressor can keep running in optimal condition through the whole loading phase.

Built-in economizer with specific flow path provides reliable protection to the compressor.

According to the characteristics of the user's project, different compression ratios are designed to prevent over-compression or under-compression, as a result the compressor can operate at the optimum efficiency way.

During the heat pump condition, the compression ratio is relatively high, as well as the power consumption. In this case, the economizer can reduce the power consumption of the compressor thus achieves a larger energy efficiency

ratio, increases the cooling capacity, and improve efficiency and reliability of the system.

The unique motor cooling circuit design ensures reliable cooling of the motor while guarantee high efficiency of the compressor, so that the compressor can operate in a wide range and more adaptable.

The patented designs "automatically unload slider" is the pure mechanical structure design. It is simple and effective to achieve the light load startup of the compressor.

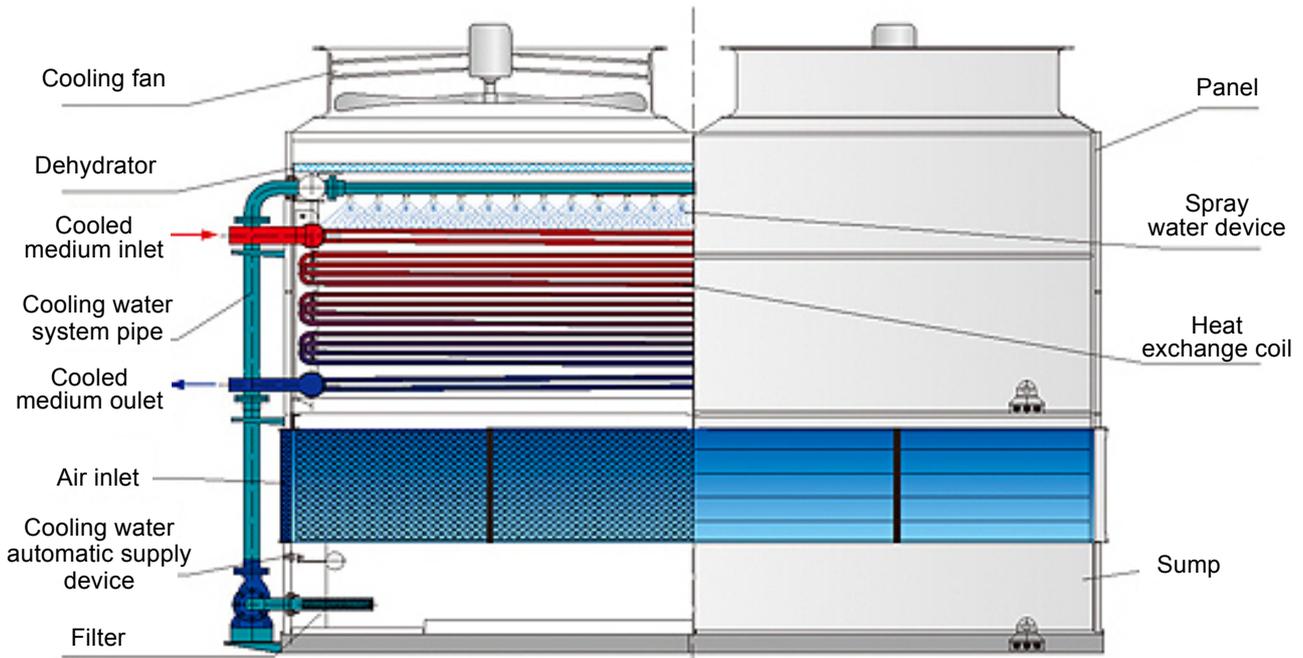


## Evaporative condenser (outdoor condenser)

SPL series evaporative condenser is an effective heat exchange equipment developed base on the most advanced heat exchange technology in the world.

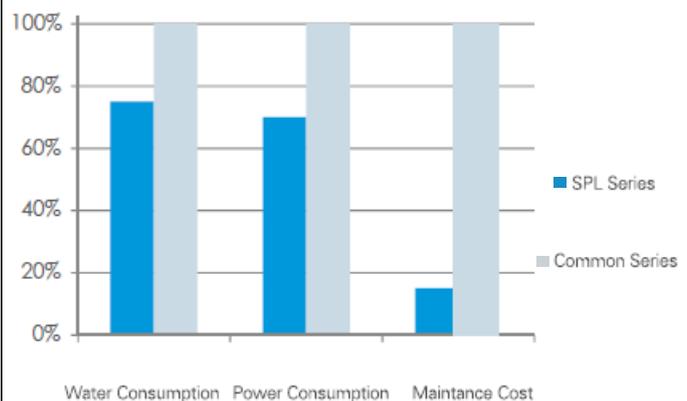
The SPL series evaporative condenser uses water and air as a cooling medium to transfer heat from high-temperature gaseous refrigerant in the coil. After cooling, the refrigerant is condensed into a liquid state from gaseous state. Internal include water distribution system, condensing coil, water removal system, etc. External include circulating water pump, electronic descaling instrument, and axial fan at the top of the coil. When the axial flow fan operates, internal become in a negative pressure state. During operation, the cooling water is distributed by the water distribution system and sprays on the coil surface uniformly under strong wind. The high-temperature gaseous refrigerant enters from the upper part of the coil, and then condensed

into liquid form refrigerant and flows out from the bottom of the coil. During the process, the refrigerant transfer heat to the water and air outside the coil, and the heat transfer rate is significantly improved by the wind. After the cooling water and air absorb heat, the temperature rises sharply, part of the cooling water is vaporized into water vapor, and a large amount of heat is taken away by evaporation of the water and is discharged into the atmosphere by the wind. At the same time, the water in the hot gas is cut off by the dehydrator, and the cooling water that has not been vaporized flows back to the sump, after that the circulation pump re-sent the water to the water distribution system to continue the cycle. The water lost because the evaporation is automatic refueled by the float valve in the sump.



## Low operating cost, energy saving and environmental protection

Due to the unique structure and the special high thermal performance of the product, the condensation temperature is low. By that, the product is a high COP and water-saving, low sound level, no pollution, and low maintenance cost product. It is an energy saving and environmental protection product.



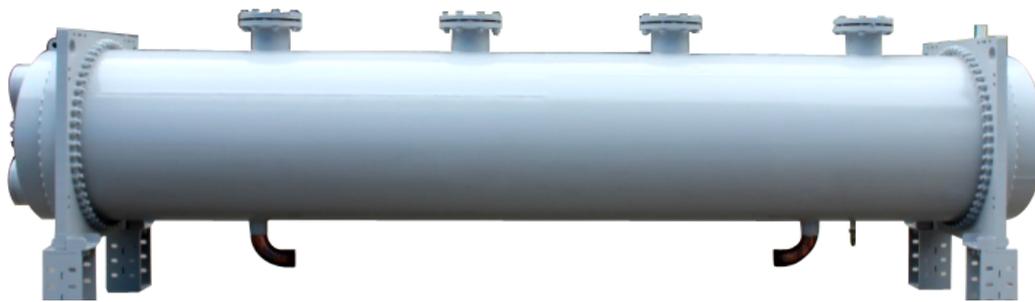
## High efficiency evaporator (indoor evaporator)

The heat exchanger is divided into two parts, the lower part is the heat exchanger, and it adopts the high-efficiency heat exchange copper tube. The heat exchange copper tube is submerging in the refrigerant, and therefore the heat transfer efficiency is high. The upper part is a gas-liquid separator; the height difference is used to separate the liquid refrigerant. At the same time, the larger size of the shell can reduce the gaseous refrigerant flow rate; prevent the refrigerant droplets from being carried out along the gas outlet. Fully separate the droplets to avoid the liquid hammer phenomenon of the compressor. This layout utilizes the height of the space, the diameter of the heat exchanger and the width of the whole unit, thereby

reducing the floor area of the unit; the performance of the unit is efficient, clean, safe, energy-saving, beautiful, and durable.

Adopts evaporation tube with highly enhanced surface, and it is completely submerging in the refrigerant, as a result the heat transfer efficiency is relatively high. The gaseous refrigerant does not need to be superheated; therefore the evaporation temperature can be greatly improved.

After the refrigerant evaporates and returns to the compressor, the refrigerating oil will flow downward and be concentrated at the bottom of the evaporator, which is more convenient to return oil.



High efficiency evaporator

## High efficiency condenser (double source heat pump unit indoor unit condenser)

The condenser shell is made of Q345R steel, and the heat exchange tube is double-sided enhanced high-efficiency copper tube. It is used to condense the high-temperature and high-pressure gaseous refrigerant into a liquid state with certain degrees of sub-cooling, by that the refrigeration unit can run efficiently and energy-saving.

## Economizer

The economizer shell is made of Q345R steel and the heat exchange copper tube is high-efficiency microfin tube. The liquid refrigerant after condensation from the condenser is further cooled by part of the refrigerant in the unit, which increases the sub-cooling and let the unit run more efficiency.



Economizer

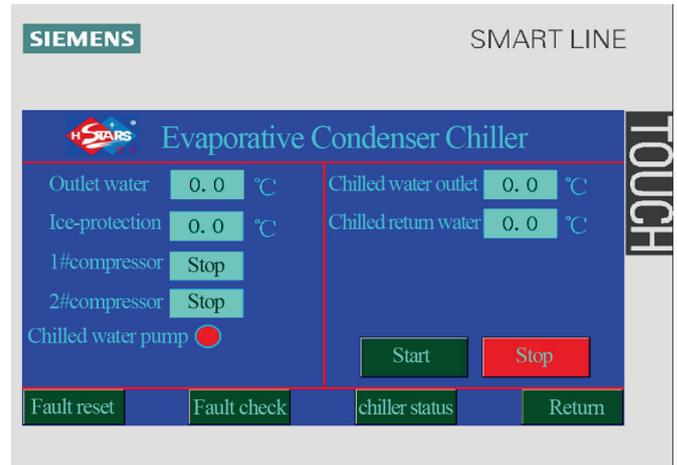
## Fin evaporator (double source heat pump unit outdoor evaporator)

1. V-shape structural air cooler, efficient and simple;
2. Copper tube sleeve aluminum fin design, uniform wind speed;
3. Leading special finned design and most reasonable copper tube arrangement, V-shape installations, improved condenser heat transfer rate, reduce fan operating sound.
4. The copper tube and the aluminum fins are closely connected, and the performance is high and stable heat exchange.
5. Advanced process equipment and fin mold ensure the quality of the product.



Fin evaporator

## PLC+ full color 7 inch touch screen



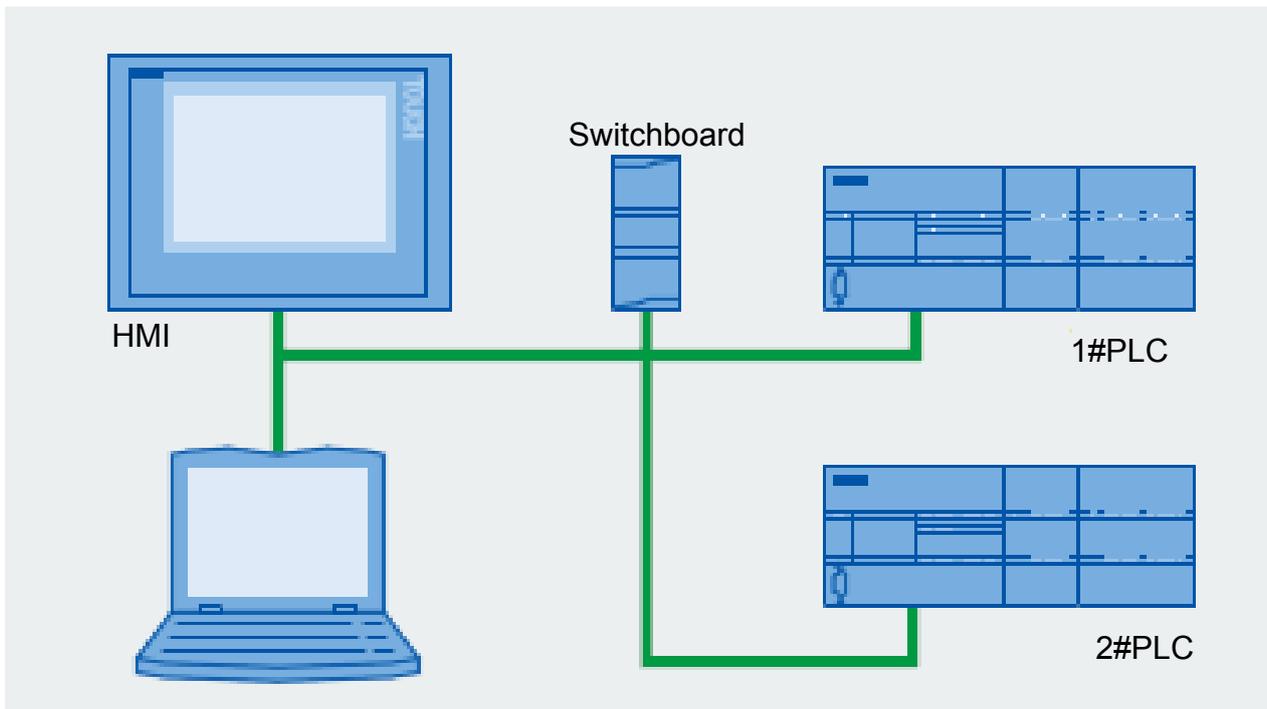
## Controller Advantages

1. Intelligent control, automatic energy adjustment enables the unit operates efficiently at the most economical working condition. The compressor starts and runs according to the running time, reduces the starting current of the unit. It includes overload, short circuit protection, anti-freeze protection, system pressure too low / high protection, chilled water flow protection, etc. Controller integrates chilled water pump, evaporative condenser system control logic
2. The processing speed is fast and the PLC is equipped with Siemens special high-speed processor

chip. Basic instruction execution time can reach 0.15us, which is far ahead in the same level PLC, a powerful "core"

3. Extendable function, touch screen integrated USB port, support connect mouse, keyboard and flash drive to record data and store the alarm content.

4. Convenient network connection, multi-unit network connection simultaneous monitoring function is supported; convenient communication port support Modbus RTU or Ethernet OPC protocol communication.



## Fault display and processing

System fault				
Fault code	Fault name	Testing condition	Alarm action	Fault resolution
1	chilled water pump overload	Power-on detection	Unit shut down	Check [chilled water pump overload] switch signal
2	Insufficient chilled water flow	Pump has been turned on, Water flow has established	Unit shut down	Check water flow switch signal
3	System power failure	Power-on detection	Unit shut down	Check [system power failure] switch signal
4	Chilled water return temperature failure	Power-on detection	Select control return water, Unit shut down, Unit shut down	Check the corresponding temperature sensor
5	Chilled water outlet temperature failure	Power-on detection		
6	Chilled water outlet temperature too low	Unit operation detection	Unit shut down	Check whether the corresponding temperature is in the normal range

Compressor failure				
1	Compressor low pressure (switch)	Compressor operating detection	Stop corresponding compressor	Check (low pressure compressor) switch signal
2	Compressor low pressure (pressure sensor)	Compressor operating detection	Stop corresponding compressor	Check whether the low pressure of the compressor is in the normal range
3	Compressor high pressure (switch)	Power-on detection	Stop corresponding compressor	Check (compressor high pressure) switch signal
4	Compressor high pressure (pressure sensor)	Power-on detection	Stop corresponding compressor	Check whether the high pressure of the compressor is in the normal range
5	Compressor pressure difference is too low	Compressor operating detection	Stop corresponding compressor	Check whether the high pressure of the compressor is in the normal range
6	Compressor pressure difference is too high	Compressor operating detection	Stop corresponding compressor	Check whether the compressor pressure difference is in the normal range
7	Compressor compress ratio is too high	Compressor operating detection	Stop corresponding compressor	Check whether the compressor compress ratio is in the normal range
8	Compressor overload	Power-on detection	Stop corresponding compressor	Check (compressor overload) switch signal
9	Compressor oil level is too low	Compressor operating detection	Stop corresponding compressor	Check (compressor oil level switch) switch signal
10	Oil shortage when unit stop	Power-on detection	Stop corresponding compressor	Check (compressor oil level switch) switch signal
11	Compressor oil pressure difference is too large (switch)	Compressor operating detection	Stop corresponding compressor	Check (compressor oil pressure difference switch) switch signal
12	Compressor oil pressure difference is too large (pressure sensor)	Compressor operating detection	Stop corresponding compressor	Check whether the high pressure pre-oil pressure difference is in the normal range
13	Anti-freeze protection	Power-on detection	Stop the corresponding compressor when the evaporator works independently	Check the [anti-freeze switch] switch signal
14	Compressor internal protection	Power-on detection	Stop corresponding compressor	Check [Compressor internal protection] switch signal
15	Exhaust gas temperature is too high	Power-on detection	Stop corresponding compressor	Check whether the exhaust gas temperature is in the normal range
16	Oil pressure sensor failure	Power-on detection	Stop corresponding compressor	Check corresponding sensor
17	High pressure sensor failure	Power-on detection	Stop corresponding compressor	
18	Low pressure sensor failure	Power-on detection	Stop corresponding compressor	
19	Chilled water outlet temperature sensor failure	Power-on detection	Stop corresponding compressor	
20	Suction gas sensor failure	Power-on detection	Stop corresponding compressor	

## 40STD series double source heat pump unit technical parameters (cooling and heating function)

Refrigerant: R22 Power supply: 380V-3N-50Hz

Model	Nominal cooling condition			Nominal heating condition			Capacity control %	Refrigerant charge (excluding evaporative condenser) kg	Chilled water				Evaporative condenser					Fin type evaporator			Operation sound level dB(A)	Total weight (including indoor and outdoor units) kg	Operating weight (including indoor and outdoor units)kg		
	cooling capacitykW	Compressor input power kW	Efficiency	Heating capacitykW	Compressor input power kW	Efficiency			Water flow m3/h	Water pressure drop KPa	Water side maximum pressure Mpa	Inlet /outlet water pipe connection	Model	Fans air flow x1000 m3/h	Water pump water flow m3/h	Compressor Input Power kW	Refrigerant charge kg	Water consumption kg/h	Weight kg	Model				Fans air flow x 1000 m3/h	Power quantity kW
40STD-420SHS4	383	72	5.32	330	89	3.70	0 50 75 100	90	66	68	1	4"	SPL-700	78	70	7.0	150	700	3800	ZF050*2	161	2.0*8	70	7340	9340
40STD-550SHS4	506	95	5.33	440	118	3.74		130	87	70	1	5"	SPL-1050	79*2	84	17.0	190	1100	4960	ZF065*2	170	1.2*12	70	8300	10800
40STD-700SHS4	634	117	5.42	550	145	3.79		150	109	70	1	5"	SPL-1165B	63.5*2	150	11.0	280	1300	6070	ZF080*2	241	2.0*12	73	10820	14820
40STD-840SHS4	767	140	5.48	660	173	3.82		170	132	72	1	6"	SPL-1420	78*2	150	14.0	310	1500	7050	ZF050*4	322	2.0*16	74	12000	17000
40STD-1000SHS4	898	165	5.44	770	204	3.78		190	154	74	1	6"	SPL-1620	71*3	150	19.5	310	1700	7630	ZF050*4	322	2.0*16	76	14500	20500
40STD-1250SHS4	1142	209	5.46	980	258	3.79		230	196	74	1	8"	SPL-2010C	79*3	180	26.5	390	2000	8830	ZF065*4	780	1.2*24	76	17000	23000
40STD-1600SHS4	1463	259	5.65	1250	321	3.89		310	252	80	1	8"	SPL-2620	100*3	233	28.0	510	2500	11060	ZF080*4	482	2.0*24	78	19000	26000
40STD-1860SHS4	1697	299	5.68	1450	371	3.91		380	292	82	1	8"	SPL-3000	87*4	233	35.5	620	3000	13890	ZF080*4	482	2.0*24	80	21500	28500

Note:

- Nominal cooling capacity standard: air dry / wet bulb temperature 35°C/24°C, chilled water inlet / outlet temperature 12°C/7°C; fouling coefficient 0.088m<sup>2</sup> .°C/KW;
- Nominal heating standard: air dry and wet bulb temperature 7 °C / 6 °C, hot water inlet and outlet water temperature 40 °C / 45 °C;
- Ambient temperature range for cooling: 15°C-43°C; Ambient temperature range for heating: -10°C-43°C.
- Hot water temperature range: 35 °C -50 °C;
- Chilled water temperature range: 5 °C- 20 °C;
- The double-source heat pump unit is divided into three parts: heat pump unit, evaporative condenser and fin evaporator;
- Specifications and dimensions improvement change may not be noticed.

## 40STD Evaporative Condenser Chiller unit technical parameter (cooling function only)

Refrigerant: R22 Power supply: 380V-3N-50Hz

Model	Cooling capacity kW	Compressor input power kW	Efficiency	Capacity control %	Refrigerant charge (excluding evaporative condenser) kg	Chilled water				Evaporative condenser						Operation sound level dB(A)	Total weight (including indoor and outdoor units) kg	Operating weight (including indoor and outdoor units) kg	
						Water flow m3/h	Water pressure drop KPa	Water Side Max. Pressure Mpa	Inlet /outlet water pipe connection	Model	Fan air flow x1000 m3/h	Water pump water flow m3/h	Compressor Input Power kW	Refrigerant charge kg	Water consumption kg/h				Weight kg
40STD-F420ZS4	412	73	5.64	0 50 75 100	92	71	68	1	4"	SPL-735	87	70	9.0	150	700	3810	70	6340	8340
40STD-F550ZS4	543	96	5.66		109	93	70	1	5"	SPL-1000	71*2	84	13.0	190	1000	4940	70	7500	10000
40STD-F700ZS4	680	118	5.76		140	117	70	1	5"	SPL-1285B	78*2	150	14.0	250	1300	6090	73	9090	13540
40STD-F840ZS4	823	141	5.84		179	142	72	1	6"	SPL-1490	87*2	150	18.0	310	1500	7070	74	10820	14190
40STD-F1000ZS4	964	166	5.81		191	166	74	1	6"	SPL-1765C	71*3	180	20.5	320	1800	8050	76	12000	17000
40STD-F1250ZS4	1226	211	5.81		216	211	74	1	8"	SPL-2245	87*3	180	26.5	460	2300	9790	78	14500	21500
40STD-F1600ZS4	1570	262	5.99		264	270	76	1	8"	SPL-2830	125*3	233	38.5	520	2900	11090	78	16500	23500
40STD-F1860ZS4	1821	302	6.03		310	313	76	1	8"	SPL-3470	100*4	233	35.5	680	3500	14540	80	20540	27500
40STD-F2000ZD4	1928	332	5.81		383	332	78	1	10"	SPL-3740	125*4	233	49.5	680	3800	14580	80	21500	28540
40STD-F2500ZD4	2452	422	5.81		435	422	78	1	10"	SPL-4420	125*4	286	51.5	820	4000	15740	82	23740	31740
40STD-F3200ZD4	3140	524	5.99		528	540	80	1	10"	SPL-5520	125*5	286	62.5	1000	5000	19300	84	28300	39300
40STD-F3720ZD4	3642	604	6.03		625	626	82	1	12"	SPL-6000	125*5	286	62.5	1250	6000	21300	84	31300	41800

Note:

- Nominal cooling capacity standard: air dry / wet bulb temperature 35°C / 24 °C chilled water inlet / outlet temperature is 12 °C / 7 °C; fouling coefficient 0.088 m<sup>2</sup> .°C/kW
- Ambient temperature range: 15°C-43 °C;
- Chilled water temperature range: 5 °C - 20 °C;
- The high pressure reservoir is an optional accessory;
- Specifications and dimensions improvement change may not be noticed.

## 40STD series double source heat pump unit technical parameters (cooling and heating function)

Refrigerant: R22 Power supply: 460V-3N-60Hz

Model	Nominal cooling condition			Nominal heating condition			Capacity control %	Refrigerant charge (excluding evaporative condenser) kg	Chilled water				Evaporative condenser					Fin type evaporator			Operation sound level dB(A)	Total weight (including indoor and outdoor units) kg	Operating weight (including indoor and outdoor units) kg		
	cooling capacity kW	Compressor input power kW	Efficiency	Heating capacity kW	Compressor input power kW	Efficiency			Water flow m <sup>3</sup> /h	Water pressure drop KPa	Water side maximum pressure Mpa	Inlet/outlet water pipe connection	Model	Fans air flow x1000 m <sup>3</sup> /h	Water pump water flow m <sup>3</sup> /h	Compressor Input Power kW	Refrigerant charge kg	Water consumption kg/h	Weight kg	Model				Fans air flow x 1000 m <sup>3</sup> /h	Power quantity kW
40STD-420SHS4	460	86	5.32	396	107	3.70	0 50 75 100	90	79	68	1	4"	SPL-700	94	84	8.4	150	700	3800	ZF050*2	193	2.5*8	70	8074	10274
40STD-550SHS4	607	114	5.33	528	141	3.74		130	104	70	1	5"	SPL-1050	95*2	101	20.4	190	1100	4960	ZF065*2	204	1.5*12	70	9130	11880
40STD-700SHS4	761	140	5.42	660	174	3.79		150	131	70	1	5"	SPL-1165B	76*2	180	13.2	280	1300	6070	ZF080*2	289	2.5*12	73	11902	16302
40STD-840SHS4	920	168	5.48	792	208	3.82		170	158	72	1	6"	SPL-1420	94*2	180	16.8	310	1500	7050	ZF050*4	386	2.5*16	74	13200	18700
40STD-1000SHS4	1078	198	5.44	924	244	3.78		190	185	74	1	6"	SPL-1620	85*3	180	23.4	310	1700	7630	ZF050*4	386	2.5*16	76	15950	22550
40STD-1250SHS4	1370	251	5.46	1176	310	3.79		230	236	74	1	8"	SPL-2010C	95*3	216	31.8	390	2000	8830	ZF065*4	936	1.5*24	76	18700	25300
40STD-1600SHS4	1756	311	5.65	1500	385	3.89		310	302	80	1	8"	SPL-2620	120*3	280	33.6	510	2500	11060	ZF080*4	579	2.5*24	78	20900	28600
40STD-1860SHS4	2036	359	5.68	1740	445	3.91		380	350	82	1	8"	SPL-3000	104*4	280	42.6	620	3000	13890	ZF080*4	579	2.5*24	80	23650	31350

Note:

- Nominal cooling capacity standard: air dry / wet bulb temperature 35°C/24°C, chilled water inlet / outlet temperature 12°C/7°C; fouling coefficient 0.088m<sup>2</sup> .°C/KW;
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- Ambient temperature range for cooling: 15°C-43°C; Ambient temperature range for heating: -10°C-43°C.
- Hot water temperature range: 35°C -50°C;
- Chilled water temperature range: 5°C- 20°C;
- The double-source heat pump unit is divided into three parts: heat pump unit, evaporative condenser and fin evaporator;
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## 40STD Evaporative Condenser Chiller unit technical parameter (cooling function only)

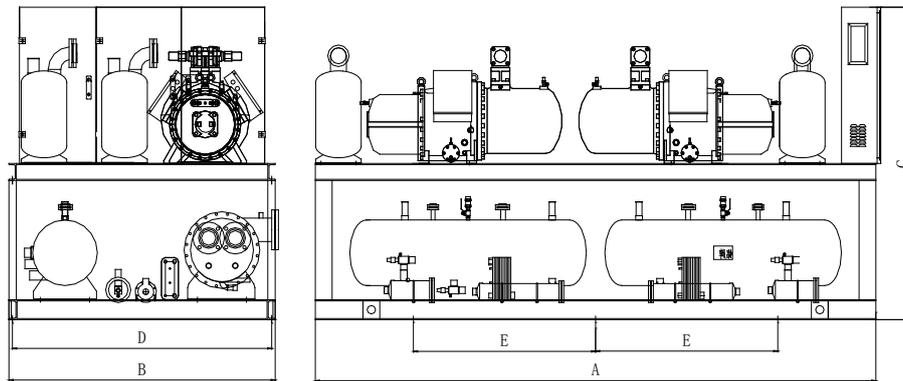
Refrigerant: R22 Power supply: 460V-3N-60Hz

Model	Cooling capacity kW	Compressor input power kW	Efficiency	Capacity control %	Refrigerant charge (excluding evaporative condenser) kg	Chilled water				Evaporative condenser						Operation sound level dB(A)	Total weight (including indoor and outdoor units) kg	Operating weight (including indoor and outdoor units) kg	
						Water flow m <sup>3</sup> /h	Water pressure drop KPa	Water Side Max. Pressure Mpa	Inlet/outlet water pipe connection	Model	Fan air flow x1000 m <sup>3</sup> /h	Water pump water flow m <sup>3</sup> /h	Compressor Input Power kW	Refrigerant charge kg	Water consumption kg/h				Weight kg
40STD-F420ZS4	494	88	5.64	0 50 75 100	92	85	68	1	4"	SPL-735	104	84	11	150	700	3810	70	6974	9174
40STD-F550ZS4	652	115	5.66		109	112	70	1	5"	SPL-1000	85*2	101	16	190	1000	4940	70	8250	11000
40STD-F700ZS4	816	142	5.76		140	140	70	1	5"	SPL-1285B	94*2	180	17	250	1300	6090	73	9999	14894
40STD-F840ZS4	988	169	5.84		179	170	72	1	6"	SPL-1490	104*2	180	22	310	1500	7070	74	11902	15609
40STD-F1000ZS4	1157	199	5.81		191	199	74	1	6"	SPL-1765C	85*3	216	25	320	1800	8050	76	13200	18700
40STD-F1250ZS4	1471	253	5.81		216	253	74	1	8"	SPL-2245	104*3	216	32	460	2300	9790	78	15950	23650
40STD-F1600ZS4	1884	314	5.99		264	324	76	1	8"	SPL-2830	150*3	280	46	520	2900	11090	78	18150	25850
40STD-F1860ZS4	2185	362	6.03		310	376	76	1	8"	SPL-3470	120*4	280	43	680	3500	14540	80	22594	30250
40STD-F2000ZD4	2314	398	5.81		383	398	78	1	10"	SPL-3740	150*4	280	59	680	3800	14580	80	23650	31394
40STD-F2500ZD4	2942	506	5.81		435	506	78	1	10"	SPL-4420	150*4	343	62	820	4000	15740	82	26114	34914
40STD-F3200ZD4	3768	629	5.99	528	648	80	1	10"	SPL-5520	150*5	343	75	1000	5000	19300	84	31130	43230	
40STD-F3720ZD4	4370	725	6.03	625	752	82	1	12"	SPL-6000	150*5	343	75	1250	6000	21300	84	34430	45980	

Note:

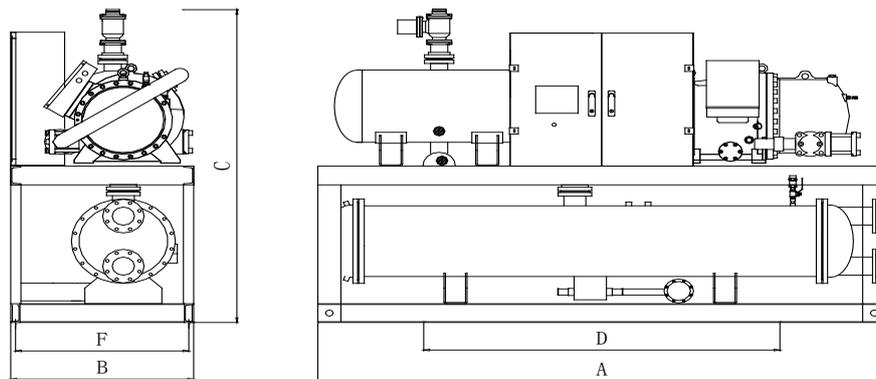
- Nominal cooling capacity standard: air dry / wet bulb temperature 35°C / 24°C chilled water inlet / outlet temperature is 12°C / 7°C; fouling coefficient 0.088 m<sup>2</sup>. °C/kW
- Ambient temperature range: 15°C-43°C;
- Chilled water temperature range: 5°C - 20°C;
- The high pressure reservoir is an optional accessory;
- Specifications and dimensions improvement change may not be noticed.

## Double source heat pump unit indoor and outdoor unit Dimensions drawing



Model	A	B	C	D	E
40STD-420SHS4	2400	1700	2200	1650	700
40STD-550SHS4	2600	1800	2250	1750	700
40STD-700SHS4	3200	1800	2250	1750	1000
40STD-840SHS4	3200	2000	2200	1950	1000
40STD-1000SHS4	4200	2100	2250	2050	1500
40STD-1250SHS4	4200	2100	2250	2050	1500
40STD-1600SHS4	5000	2200	2250	2050	2000
40STD-1860SHS4	5000	2200	2250	2050	2000

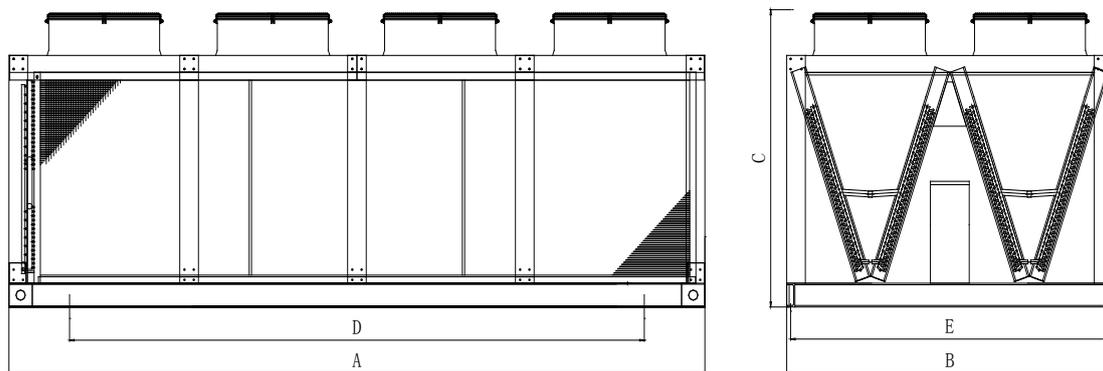
## Evaporative Condenser Chiller unit indoor and outdoor unit Dimensions drawing



Model	A	B	C	D	E
40STD-F420ZS4	3600	1100	2000	2800	1000
40STD-F550ZS4	3600	1100	2100	2800	1000
40STD-F700ZS4	3800	1300	2300	3000	1200
40STD-F840ZS4	3800	1300	2300	3000	1200
40STD-F1000ZS4	3800	1400	2500	3000	1300
40STD-F1250ZS4	4100	1600	2500	3000	1500
40STD-F1600ZS4	4500	1800	2700	3500	1700
40STD-F1860ZS4	4500	1900	2700	3500	1800
40STD-F2000ZS4	6000	2300	2900	5000	2200
40STD-F2500ZS4	6000	2300	2900	5000	2200
40STD-F3200ZS4	6500	2300	2900	5500	2200
40STD-F3720ZS4	6500	2300	2900	5500	2200

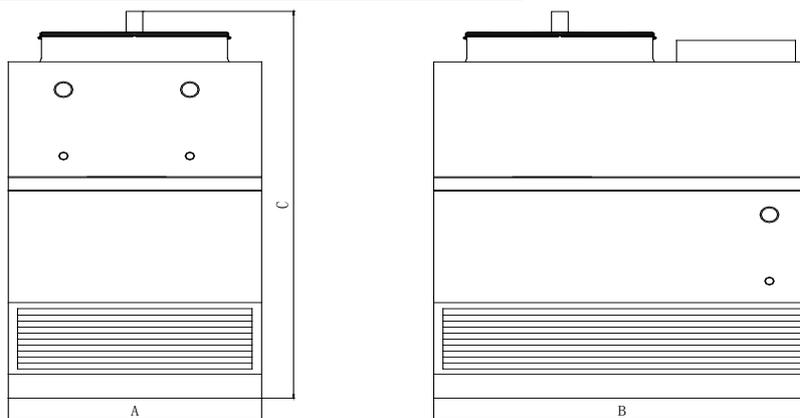
Unit:mm

## Double source heat pump unit outdoor evaporator unit Dimensions drawing



Model	A	B	C	D	E
40STD-420SHS4	4500	2100	1750	3600	2050
40STD-550SHS4	6800	2100	1750	6000	2050
40STD-700SHS4	6800	2100	1750	6000	2050
40STD-840SHS4	4500*2	2100	1750	3600*2	2050
40STD-1000SHS4	4500*2	2100	1750	3600*2	2050
40STD-1250SHS4	6800*2	2100	1750	6000*2	2050
40STD-1600SHS4	6800*2	2100	1750	6000*2	2050
40STD-1860SHS4	6800*2	2100	1750	6000*2	2050

## Double source heat pump unit outdoor unit Evaporative Condenser Chiller unit outdoor unit dimensions drawing

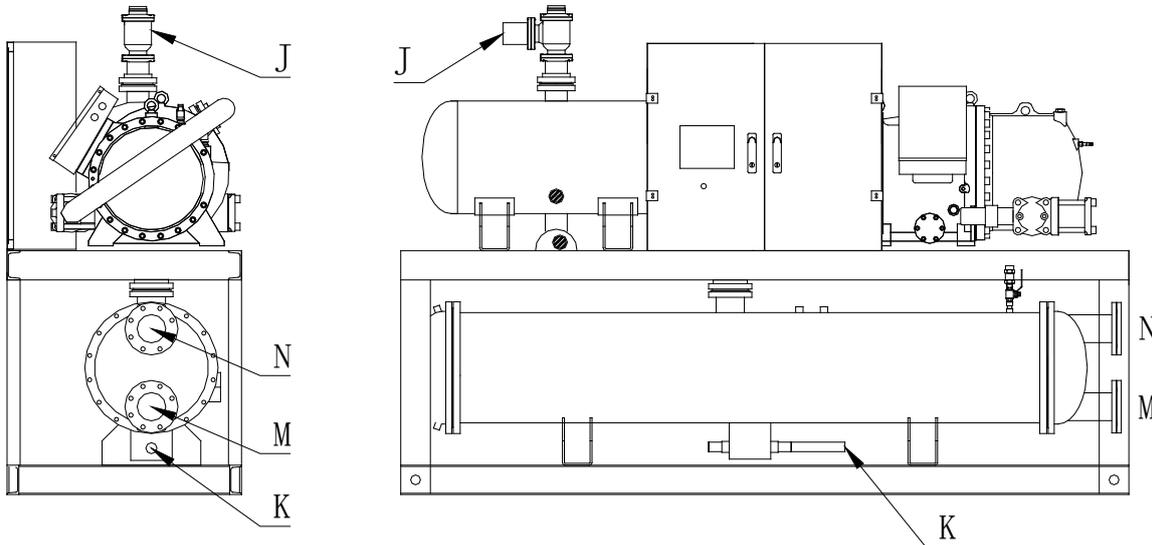


Double source heat pump unit outdoor unit dimensions			
Model	A	B	C
SPL-700	1930	3010	4890
SPL-1050	3575	2410	4290
SPL-1165B	3775	2710	4890
SPL-1420	3775	3010	4890
SPL-1620	5320	2410	4910
SPL-2010C	5320	2710	4910
SPL-2620	5780	3210	4910
SPL-3000	7465	3010	4910

Evaporative Condenser Chiller unit outdoor unit dimensions			
Model	A	B	C
SPL-735	1930	3010	4890
SPL-1000	3575	2410	4290
SPL-1285B	3775	2710	4890
SPL-1490	3775	3010	4890
SPL-1765C	5320	2710	4910
SPL-2245	5620	3010	4910
SPL-2830	5780	3210	5010
SPL-3470	7680	3210	4910
SPL-4420	7680	3510	5010
SPL-5520	9580	3510	5010
SPL-6000	9580	3610	5250

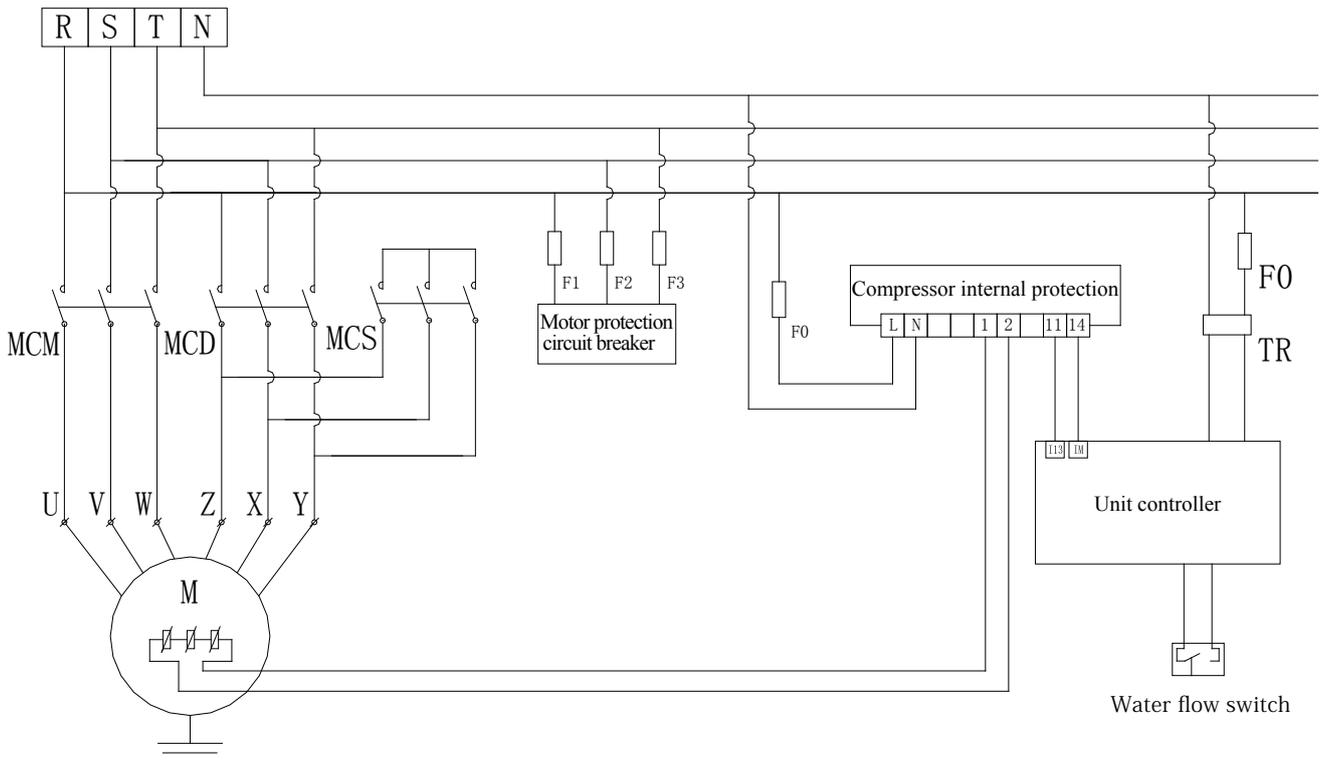
Unit:mm

## Pipe connection diagram / (liquid refrigerant pipe and water pipe)

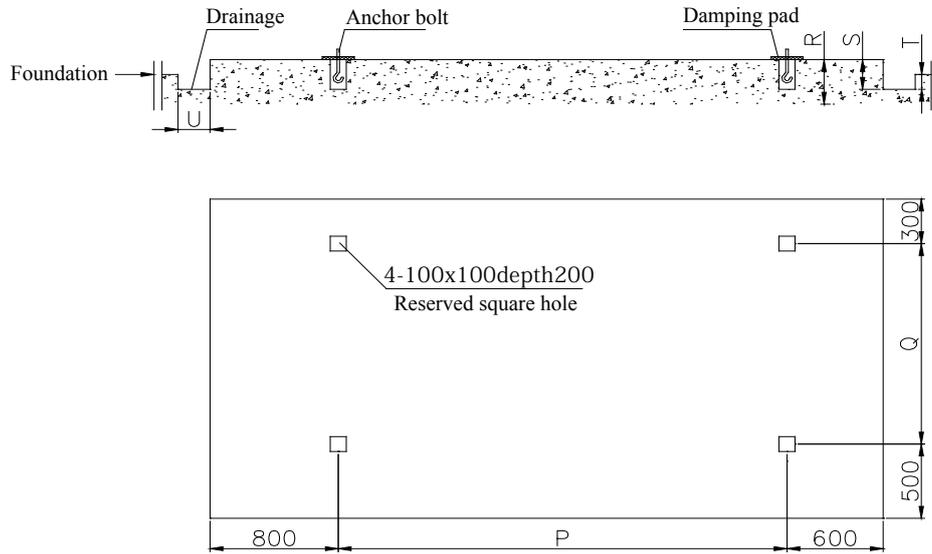


Code	J	K	M	N
Connection	Gaseous refrigerant outlet	Liquid refrigerant inlet	Evaporator water outlet	Evaporator water inlet

## Wiring diagram



## Unit installation diagram



## Indoor unit installation dimension (main unit)

Model	P	Q	R	S	T	U
40STD-F420ZS4	2800	1000	300	200	100	200
40STD-F550ZS4	2800	1000	300	200	100	200
40STD-F700ZS4	3000	1200	300	200	100	200
40STD-F840ZS4	3000	1200	300	200	100	200
40STD-F1000ZS4	3000	1300	300	200	100	200
40STD-F1250ZS4	3000	1500	300	200	100	200
40STD-F1600ZS4	3500	1700	300	200	100	200
40STD-F1860ZS4	3500	1800	300	200	100	200
40STD-F2000ZS4	5000	2200	300	200	100	200
40STD-F2500ZS4	5000	2200	300	200	100	200
40STD-F3200ZS4	5500	2200	300	200	100	200
40STD-F3720ZS4	5500	2200	300	200	100	200
40STD-420SHS4	2400	1400	300	200	100	200
40STD-550SHS4	2600	1400	300	200	100	200
40STD-700SHS4	3200	2000	300	200	100	200
40STD-840SHS4	3200	2000	300	200	100	200
40STD-1000SHS4	4200	3000	300	200	100	200
40STD-1250SHS4	4200	3000	300	200	100	200
40STD-1600SHS4	5000	4000	300	200	100	200
40STD-1860SHS4	5000	4000	300	200	100	200

## Outdoor unit installation dimension (fin type condenser)

Model	P	Q	R	S	T	U
40STD-420SHS4	3600	2050	300	200	100	200
40STD-550SHS4	6000	2050	300	200	100	200
40STD-700SHS4	6000	2050	300	200	100	200
40STD-840SHS4	3600*2	2050	300	200	100	200
40STD-1000SHS4	3600*2	2050	300	200	100	200
40STD-1250SHS4	6000*2	2050	300	200	100	200
40STD-1600SHS4	6000*2	2050	300	200	100	200
40STD-1860SHS4	6000*2	2050	300	200	100	200

Unit:mm

## Important notes

1. Pipe support spacing should be less than 1.5 meters;
2. Smooth incision and no burrs;
3. The pipe shall be polished and blown clean with nitrogen gas before welding;
4. Nitrogen gas should be filled in the pipeline during welding;
5. When the steel pipe is welded, argon arc welding shall be used before electric welding;
6. When the copper pipe is welded, it should be

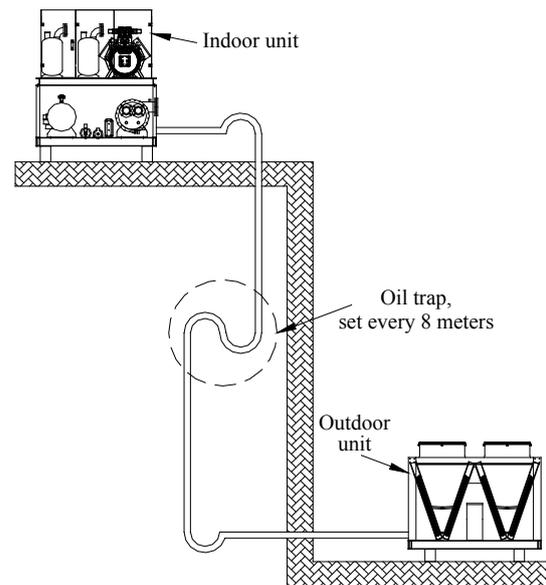
- welded from the bottom or side, and try not to weld from the top;
7. No water, dirt or dust should enter the pipe during the whole construction process;
8. The total length of refrigerant pipeline shall not exceed 300 meters;
9. When the outdoor unit is above the indoor unit, the maximum height difference is not more than 80 meters;
10. When the outdoor unit is under the indoor unit, the maximum height difference is no more than 50 meters.

## Design scheme for return oil trap of refrigerant pipeline

### Standard configuration

When main unit is higher than outdoor unit (evaporator), it has a riser between evaporator and main compressor suction inlet, since compressor oil will not evaporate in evaporator and it will be accumulated at the bottom. When Oil trap is installed at the bottom of the evaporator, oil accumulation at the bottom of the evaporator will be significant reduce. As long as the oil trap is blocked, the pressure difference of both sides is built, once the pressure is big enough, pressure different "pump" compressor oil up, until it reach the horizontal suction pipe, the compressor oil is easy to go back to compressor.

If you are concerned that the riser is too long to reach the top of the pump, you should consider setting a S shape oil trap for the riser suction pipe at every certain height difference (say 8 meters) to allow the compressor oil return to the main unit.

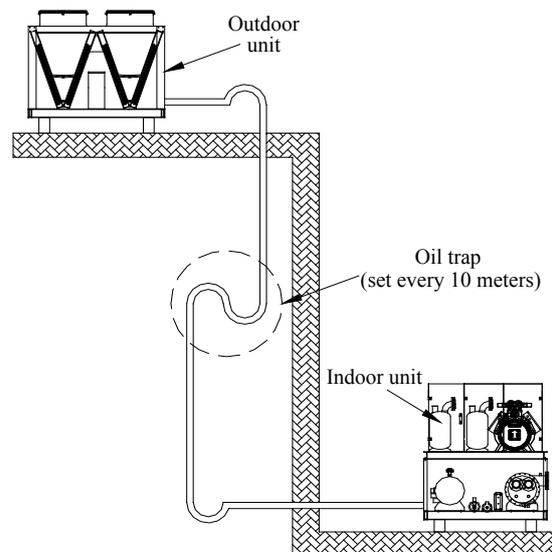


### Outdoor unit is higher

When the main unit is much lower than the outdoor unit (evaporator), the compressor oil can return to the main unit without the oil trap since it can return to the main unit by gravity, but when oil return amount is too large, it may cause liquid hammer phenomenon to the compressor. Oil trap should be installed at every certain distance (such as 10 meters) on the main vertical suction pipe, in order to let compressor oil returned to the unit gradually.

When the vertical pipe exceeds 10 meters, oil trap should install every 10 meters or less.

The oil trap is made of two U-shaped curves or P-shaped curve, and the height is generally 3-5 times of the pipe diameter.



## Heat recovery

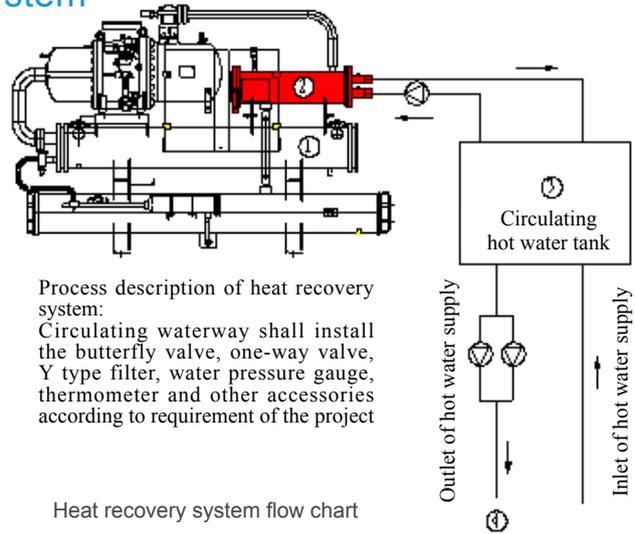
H.Stars Group has been engaged in research and practice of heat recovery technology and application for a long time and has accumulated a lot of experience in heat recovery and utilization with national patent of heat recovery approved.

Free hot water supplied all year around , cost and energy saving, it not only reduces the heat pollution to the environment caused by condensation heat from the chiller ,but also decreases the running cost and the noise from the cooling tower.



## Process description of heat recovery system

1. Chiller produces chilled water for air condition of the building, and keeps the temperature of the building at a comfortable temperature;
2. During chiller produce chilled water, the heat generated by the chiller is recovered through the heat recovery unit and it heating up the water in the circulating water tank, and the hot water in the circulating water tank is provided.
3. This system provides low cost hot water, but the supply of hot water will depend on the chiller usage and seasonality. When heat recovery is used, another hot water auxiliary system should be installed for backup.



Heat recovery system flow chart



China machinery industry science and technology award

Model of chiller	30%Heating recovery		100%Heating recovery	
	Model of heat recovery device	Heating recovery capacity (kW)	Model of heat recovery device	Heating recovery capacity (kW)
40STD-F420ZS4	UHR030A	100	UHR105A	370
40STD-F550ZS4	UHR040A	140	UHR140A	500
40STD-F700ZS4	UHR050A	170	UHR160A	560
40STD-F840ZS4	UHR065A	230	UHR210A	740
40STD-F1000ZS4	UHR075A	260	UHR250A	880
40STD-F1250ZS4	UHR100A	350	UHR340A	1200
40STD-F1600ZS4	UHR120A	420	UHR400A	1400
40STD-F1860ZS4	UHR140A	500	UHR460A	1600
40STD-F2000ZD4	UHR150A	530	UHR500A	1750
40STD-F2500ZD4	UHR205A	720	UHR680A	2400
40STD-F3200ZD4	UHR240A	840	UHR800A	2800
40STD-F3720ZD4	UHR275A	960	UHR920A	3200
40STE-420SHS4	UHR030A	100	UHR100A	350
40STE-550SHS4	UHR040A	140	UHR130A	450
40STE-700SHS4	UHR050A	170	UHR160A	560
40STE-840SHS4	UHR060A	210	UHR195A	680
40STE-1000SHS4	UHR070A	240	UHR225A	800
40STE-1250SHS4	UHR085A	300	UHR285A	1000
40STE-1600SHS4	UHR110A	380	UHR365A	1300
40STE-1860SHS4	UHR135A	470	UHR425A	1500

Heating recovery capacity table

## Heat Exchanger Tube

### Condenser Heat Exchange Tube



Condenser heat exchange tube Specification sheet

Heat exchange tube material	Copper Tube	Aluminum Brass Tube	Nickel Copper Tube	Stainless Tube
Tube thickness option 1 (mm)	1	1.2	1	1
Tube thickness option 2 (mm)	1.1	1.3	1.1	1.15
Tube thickness option 3 (mm)	1.2	1.4	1.2	1.2
Tube thickness option 4 (mm)	1.3	1.5	1.3	1.35
Suitable for water quality	Standard non-corrosive neutral water	seawater	Alkaline water	Acid water

### Evaporator Heat Exchanger Tube



Evaporator heat exchange tube specification sheet

Heat exchange tube material	Copper Tube	Aluminum Brass Tube	Nickel Copper Tube	Stainless Tube
Tube thickness option 1 (mm)	1	1.2	1	1
Tube thickness option 2 (mm)	1.1	1.3	1.1	1.15
Tube thickness option 3 (mm)	1.2	1.4	1.2	1.2
Tube thickness option 4 (mm)	1.3	1.5	1.3	1.35
Suitable for water quality	Standard non-corrosive neutral water	seawater	Alkaline water	Acid water

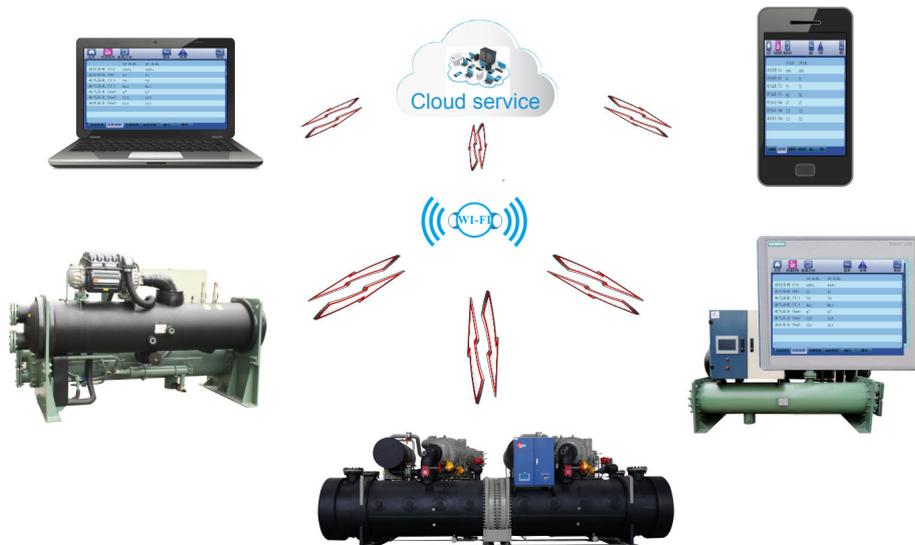
**Important Notice:**

Heat exchanger is the key components of the chiller unit, whose technology directly affects the quality of the product. Also, the heat exchange tube, which is the only component of the heat exchanger in contact with the ambient, closely affects the life of the unit.

The thickness and material of the heat exchange tube are very important. Customers can choose the suitable material and thickness of heat exchanger tube according to the air and water quality.

## Cloud service (remote monitoring)

Central A/C cloud service system



**Cloud service value:**

- Remote control adjustment
- Remote monitoring
- Remote upgrade
- Fault warning
- Remote diagnosis
- Product distribution management
- Historical data analysis

## VFD (Variable Frequency Device)

### Stable and reliable

The VFD integrates industrial chiller with simple compressor structure, and adopts the motor speed to control the output to achieve true stepless control to improve compressor reliability. Refrigerant suction cooling motor at low temperature, more stable.

### Easy installation

VFD industrial chiller integrates with VFD starter cabinet into one combined unit, simplifying the user site wiring. Refrigerant and compressor oil is charged before shipping, saving user's installation and commissioning costs.

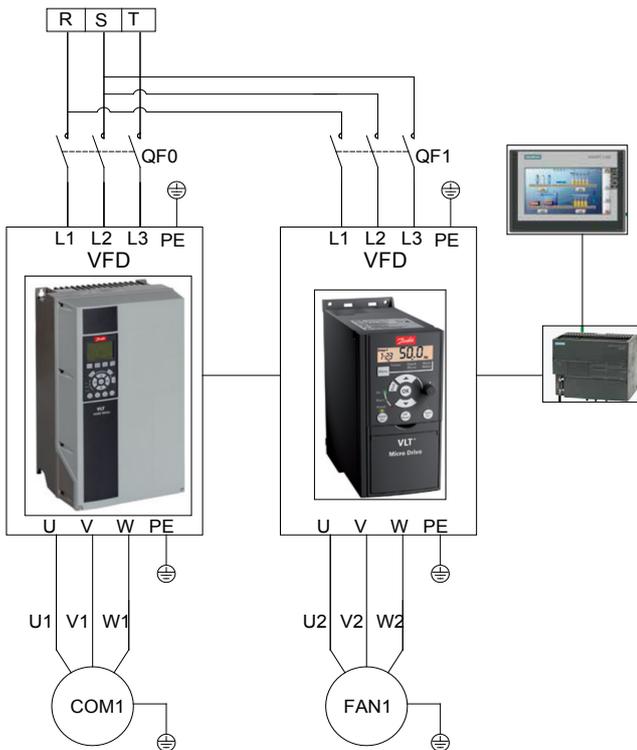
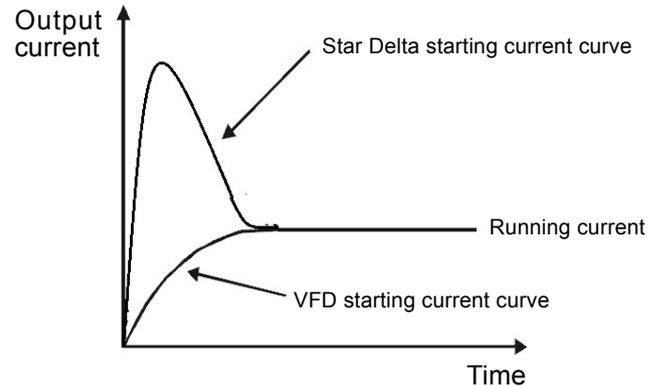
### High efficiency and energy saving

Adopts world class variable frequency drive technology to improve integrated part load value (IPLV) up to 10.

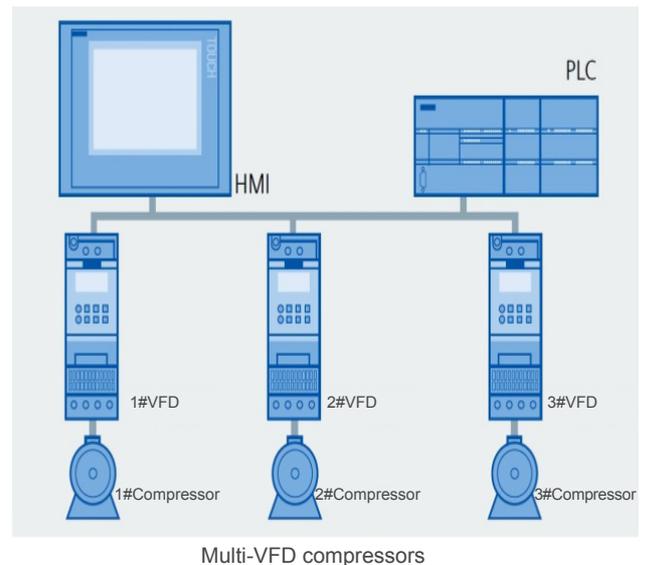
### VFD advantages

VFD is a soft start; reduce the impact of start-up current;

The VFD has its own DC reactor to minimize harmonic interference; Optional low-harmonic filter. VFD input power meets the IEEE-519 specification for harmonic distortion with harmonic filter over-temperature protection and capacitance switching.



VFD compressor / VFD fan control



Multi-VFD compressors

## Optional items

- Anti-sound panel
- Compressor oil
- Air handling unit (AHU)
- Low-temperature cooling medium
- Electric heater
- Fin evaporator roof



**H.Stars Group**

H.Stars (Guangzhou) Refrigerating Equipment Group Ltd., established in 1992, in Economic & Technological Development Zone of Guangzhou, China, composed of 8 subsidiaries to provide one-stop solution to HVAC customers, specializing in R&D, production, design and installation. As the company grows, H.Stars group expands its business globally and has sold to 53 different countries. H.Stars Group is awarded with "New and High Technology Enterprise in Guangzhou" and has become the training base of many universities both in China and abroad via technology cooperation.

H.Stars Group supplies an extensive line of Commercial and Industrial Energy Saving HVAC products including: Air Cooled Chiller, Water Cooled Chiller, Industrial Chiller, Centrifugal Chiller, Magnetic oil free centrifugal chiller, Multi-function Chiller, Hot Water Unit, Heat Recovery Unit, Heat Pump Unit, Condensing Unit, Glycol Chiller, Shell and Tube Heat Exchanger, Air Handling Unit, Fan Coil Unit, Cooling Tower, etc. all type of HVAC products.

H.Stars Group has been dedicated in quality and innovation and is technically strong in commercial and industrial application as a HVAC manufacturer. Apart from obtaining plenty of energy-saving product patents, H.Stars Group has achieved CE certifications for Pressure Vessel and standard chillers, BR1, ASME, ISO9001:2000, ISO14001:2004 and other certifications.

A good reputation of H.Stars Group has been built and delivers a full HVAC service to customers worldwide. Our products are widely applied in industries for cooling of Laser generators, Welding electrodes, Cutting machines, Electric spark machines, Extrusion process, Hydraulic System, Electroplating, Ultrasonic Cleaning, Ion Plating film, Electronic facility, Electrical appliance components, Compressed Gas Dehumidification, Dairy and Beverage Cooling processing, Pharmaceutical and Biological products, Medical equipment, Glass Coating, Tempered Glass and Cultivation Sea Food.

H.Stars Group will continue to develop energy saving and environmental friendly equipment to create "The Efficiency Planet" as our obligation. By focusing on customers' needs and wants in order to contribute more our potentials, from now on, H.Stars Group will hand in hand with you to be a shining star in the foreseeable future.



### **H.Stars (Guangzhou) Refrigerating Equipment Group Ltd**

Address: No.1 Guoyuan 4th Road, Guangzhou Economic & Technological Development Zone, HuangPu District, Guangzhou,China Zip Code 510530

Email: [sales@hstars.com.cn](mailto:sales@hstars.com.cn)

Tel: +862062266755 ext. 886

Fax: +862082266081

Website: [www.hstarschiller.com](http://www.hstarschiller.com)

Facebook: [www.facebook.com/Hstarsgroup](http://www.facebook.com/Hstarsgroup)

LinkedIn: [www.linkedin.com/company/hstarsgroup](http://www.linkedin.com/company/hstarsgroup)

Twitter: [twitter.com/HStarsGroup](http://twitter.com/HStarsGroup)

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