



Johnson Controls - Hitachi Wanbao Air Conditioning (Guangzhou)Co., Ltd.
江森自控日立万宝空调(广州)有限公司

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节能典范 · 值得信赖



CRAA质量认证



体系认证
CNAS C146-E CNAS C146-Q

质量管理体系认证
ISO9001



环境管理体系认证
ISO14001



体系认证
CNAS C146-S

职业健康安全管理体系
认证OHSAS18001



AHRI认证



质量安全

江森自控日立万宝空调(广州)有限公司相关产品已获得上述认证

江森自控日立万宝空调(广州)有限公司保留产品资料修改更新的权利，
恕不另行通知，此举有助日立公司随时把最新的科技创意带给客户采用。
具体产品性能由双方在合同中约定，本样本仅供参考。



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HITACHI

Magnetic Bearing Centrifugal Chiller

VM Series

Oil free worry free/Highly efficient/Stable & Reliable



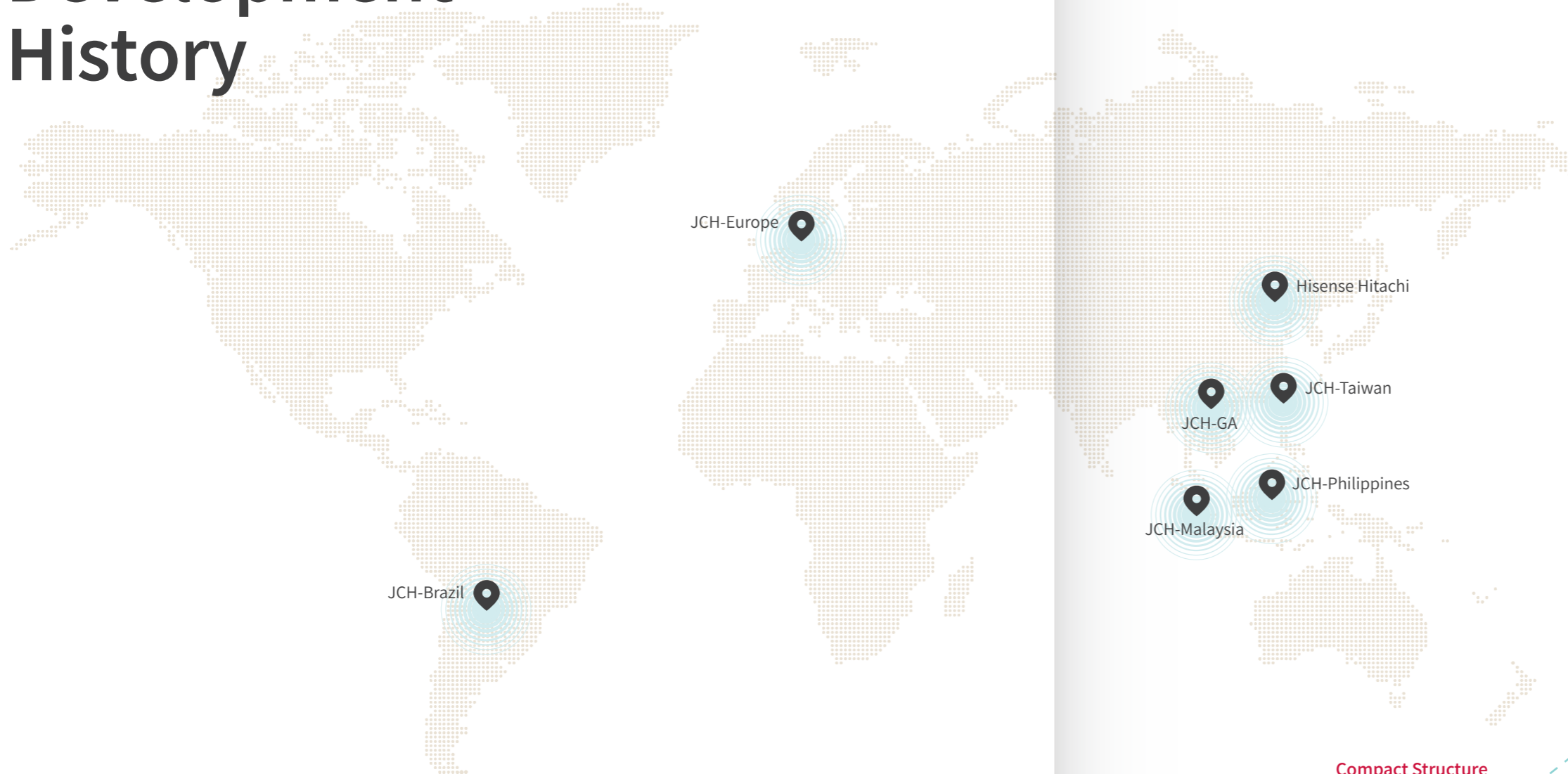
Cooling & Heating



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Development History



Johnson Controls – Hitachi Wanbao Air Conditioning (Guangzhou) Co., Ltd., abbreviated as JCH-GA, was established in 1998. Since then, JCH-GA has strived to become a total HVAC equipment manufacturer by covering water-cooled screw chillers, air-cooled screw chillers, centrifugal chillers, absorption chillers, air-cooled scroll modular chillers(heat pumps), water-cooled IR screw and many more in its product range. Utilizing the various core technologies and patents Hitachi has on HVAC, as well as technical advantages and wealth of experience across product types, JCH-GA has been at the forefront of innovation, providing reliable, highly efficient and sustainable high quality products to our customers worldwide. Using our broad product portfolio, JCH-GA will provide the optimum HVAC product solution based on our clients' requests.

1998 Johnson Controls – Hitachi Wanbao Air Conditioning (Guangzhou) Co., Ltd Established



1933 Breakthrough of "0 to 1"
First Centrifugal Chiller

1955 High Efficiency and Energy Saving
First VSD Centrifugal Chiller

1989 Largest in the World
10,000 RT Chiller Started

1996 Sustainable and Efficient
First "R134a" refrigerant two stage compression centrifugal compressor

2012 Compact Structure
Full series compact design compressor implemented

2017 Technical Innovation
Use of High speed VSD moto, single bearing direct drive with two stage impellers

2021 Oil Free Worry Free
Hitachi Magnetic Bearing VSD Centrifugal Chiller VM Series

HVAC Manufacturing Bases:

- 3 in Japan
- 4 in China (including Taiwan)
- 8 other global bases

Since our establishment, we have always been fulfilling our customers 'potential needs, creating new value and realizing their dreams as being the basic management principles of our firm. In order to achieve this, our focus is to develop cutting-edge technology and start from a globalized standpoint to think, innovate and act without boundaries for our innovation, while building the company into somewhere dynamic that fulfills the aspirations of each employee. Additionally, we not only respond to our customers needs, but also provide solutions looking into the medium and long term, what actually brings value to our customers. We operate under the principle of setting grand goals, not being bound by traditional methods, act in innovative ways to improve on existing skills and technology worldwide, while constantly taking in new ideas and knowledge. These are our core values as a company.

And Hitachi will continue to innovate.....



Certified & Trusted



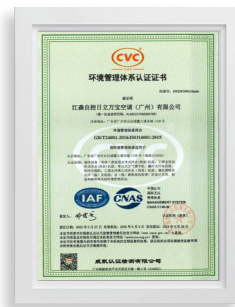
Performance of VM series receiving US AHRI and China CRAA Certification



ASME Certification



China Specialized Equipment Production Certification



ISO Environment Standard Certificate



ISO Health and Safety Certificate



ISO Quality Management System Certificate

Recognized Manufacturing Capability

Top 100 ISO Certified Firms, With ASME Pressure Vessel manufacturing certification, testing equipment verified by US AHRI and China GMPI



US AHRI Certification



CRAA Product Certification



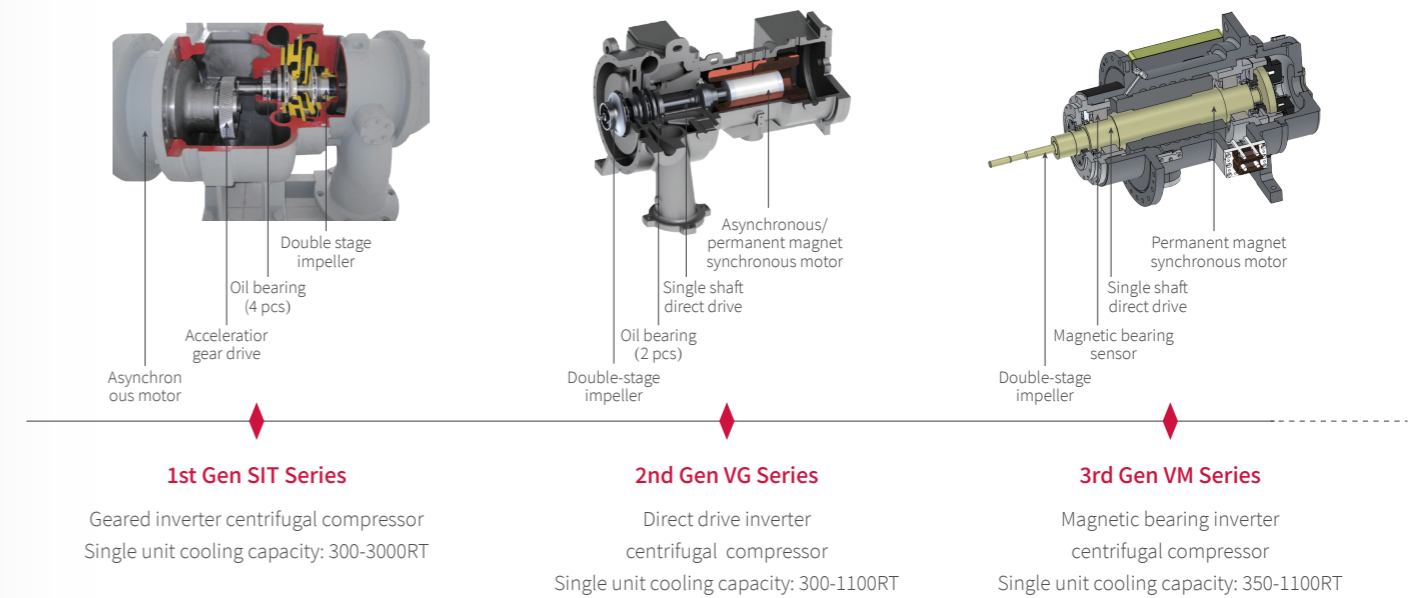
China Energy Efficiency Certificate



China Energy Efficiency Certificate

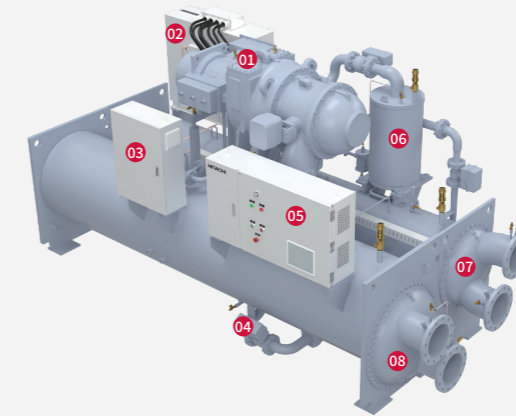
Development History

Hitachi VSD Centrifugal Compressor Development History



Chiller Structural Components

- Magnetic Bearing Compressor**
 - No friction in operation
 - No need for oil system
- VSD Starter Cabinet**
 - Better part load efficiency
 - Lower starting current
- Magnetic Bearing Controller**
 - Precise rotor control
 - Motor Linkage to ensure safety
- Electric Expansion Valve**
 - Flow Meter + Electric Expansion Valve
 - More precise flow control
- Chiller Electric Control Box**
 - Low voltage power supply for control box
 - Safer operation
- Vertical type Economizer**
 - Separate from compressor
 - Highly efficient and energy saving
- Highly Efficient Condenser**
 - High performance heat transfer tubes
 - Integrated sub-cooler design
- Highly Efficient Evaporator**
 - High performance heat transfer tubes
 - Optimized tubing placement



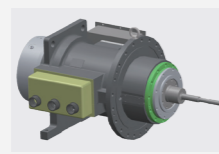
Magnetic Bearing Technology

Application fields of magnetic levitation technology

Magnetic bearing technology refers to the use of magnetic force to make objects in a frictionless, contactless suspension state, which has been widely used in different fields such as maglev trains, magnetic bearing centrifugal compressors, maglev composite molecular pumps, and maglev turbine vacuum pumps. For example, the magnetic levitation centrifugal compressor achieves frictionless through bearing suspension, without the need for lubricating oil system, efficiency is higher and easier to maintain.



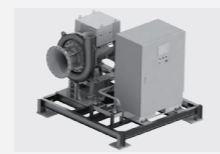
Maglev trains



Magnetic bearing centrifugal compressor



Magnetic levitation composite molecular pump



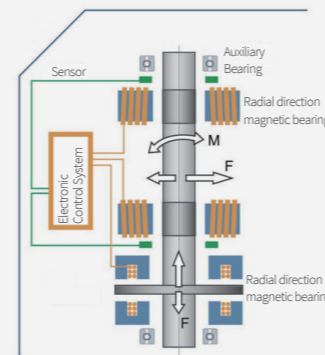
Magnetic levitation turbine vacuum pump

The working principle of magnetic bearing suspension

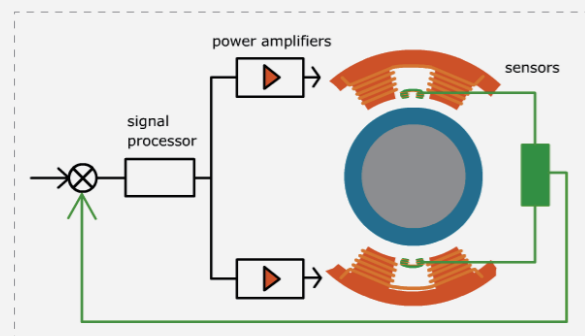
The electromagnets are arranged in the form of radial bearings and axial bearings and provide magnetic pull to lift the rotating shaft of the machine. The current in the electromagnet is regulated by a precise digital electronic control system that provides magnetic force to respond to changes in external loads at any time to keep the shaft well centered. In this way, the shaft is lifted contactless, and the bearing can be adjusted by a digital electronic control system. These features enhance the performance of high-speed rotating machines, making the equipment have remarkable characteristics of high reliability and low energy consumption.

Components

- The magnetic bearing itself
- Sensor
- Electronic Control System
- Auxiliary Bearings



Magnetic levitation electrical principle

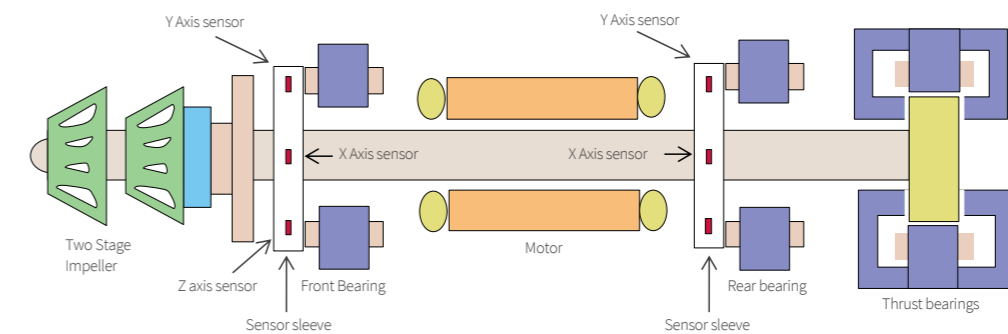


The figure on the left is a simple magnetic levitation electrical schematic diagram, which is composed of four parts: rotor, sensor, controller and actuator, in which the actuator includes two parts: electromagnet and power amplifier. Suppose that at the reference position, the rotor is disturbed by a downward disturbance and will deviate from its reference position, then the sensor detects the displacement of the rotor to deviate from the reference point, and the signal processor that acts as the controller transfers the detected displacement into a control signal. This control signal is then converted into a control current by a power amplifier, which generates a magnetic force in the actuation magnet and thus drives the rotor back to its original equilibrium position. Therefore, the rotor is always in a stable equilibrium state, regardless of downward or upward disturbances.

Highly Efficient and Energy Saving

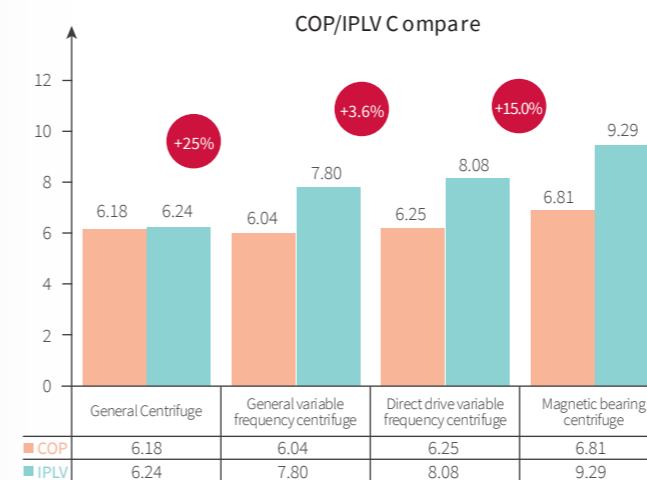
Highly-efficient magnetic bearing centrifugal compressor to achieve excellent energy saving results with high COP/IPLV

Hitachi magnetic bearing centrifugal compressor is designed with high speed direct drive design, without speed increase gear, reducing transmission loss, and based on magnetic levitation technology, the use of proprietary magnetic bearings instead of traditional mechanical bearings, allows for no lubricating oil, further reduce mechanical losses. With Hitachi's high-efficiency two-stage impeller, the COP at full load can be as high as 6.81 and the comprehensive part-load efficiency IPLV can be as high as 9.29 under the GB standard working conditions.



Professional VSD+precise flow control to achieve better comprehensive part-load efficiency

By using of high-efficiency, easy-to-maintain mounted inverters, Hitachi's unique pressure ratio inverter control technology and liquid level sensor control throttling mode, the compressor always operates at the optimal speed in all working conditions, while maintaining the optimal refrigerant liquid level height in the heat exchanger, and achieving better comprehensive part-load efficiency.



$$IPLV(GB)=0.023A+0.415B+0.461C+0.101D$$

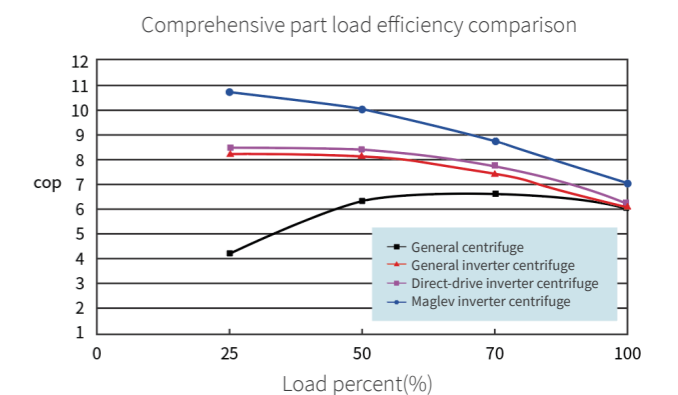
IPLV(GB)=Integrated Part Load Value

A=COP or EER at 100% load (30°C ECWT)

B=COP or EER at 75% load (26°C ECWT)

C=COP or EER at 50% load (23°C ECWT)

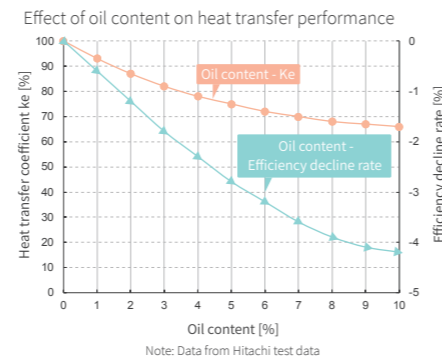
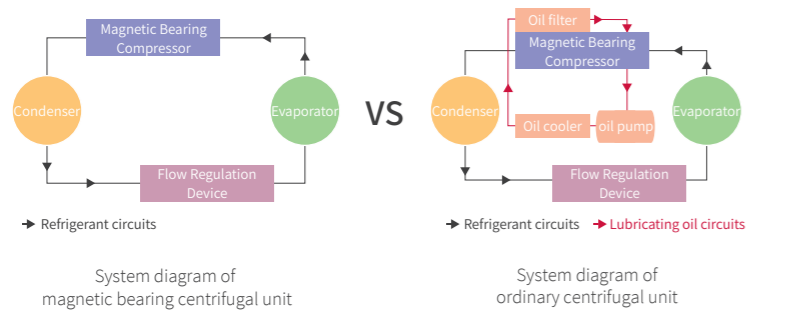
D=COP or EER at 25% load (19°C ECWT)



Energy Efficient

The system is oil-free, maximizing system efficiency

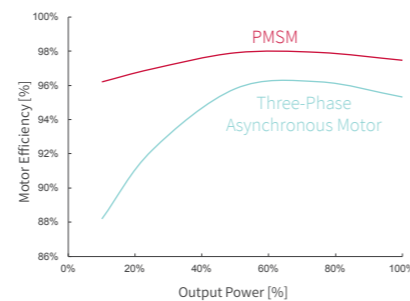
Combined with magnetic bearing technology, the refrigeration system operates without oil. Compared to traditional oil-lubricated bearing solutions, the magnetic bearing system is extremely simple, eliminating the need for complex oil-lubricated circuits, reducing additional losses and maximizing system efficiency by eliminating the adverse effects of lubricating oil on the heat exchanger.



Permanent magnet synchronous motor to improve motor efficiency

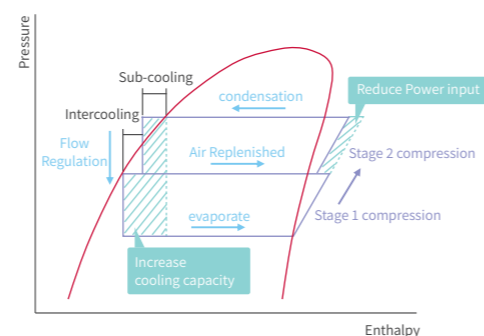
Permanent magnet synchronous motors have obvious advantages over asynchronous motors. There is no excitation loss, and within operating range, motor efficiency is high, especially the partial load efficiency is significantly improved, and the power factor is high at the same time, which better improves the quality factor of the power grid, and saves the investment of the power grid. In the main operating range of the unit, that is, 25%~75% load, the efficiency of the permanent magnet synchronous motor is about 5% higher than that of the three-phase asynchronous motor on average.

The permanent magnet synchronous motor adopts the refrigerant injection cooling technology of spiral surrounding, the temperature field of the motor is uniform, and the bounce of the stator silicon steel sheet is low, which ensures the efficient operation of the motor.



Patented design of sub-cooler and economizer to improve heat exchange efficiency

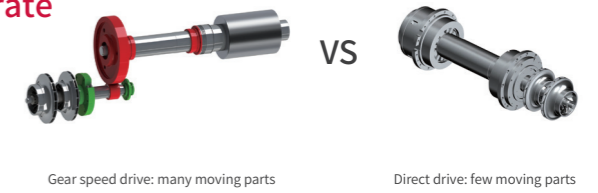
The patented sub-cooler and centrifugal economizer are used to improve the subcooling degree and gas-liquid separation performance, thereby improving the cooling capacity and heat exchange efficiency overall.



Stable and Reliable

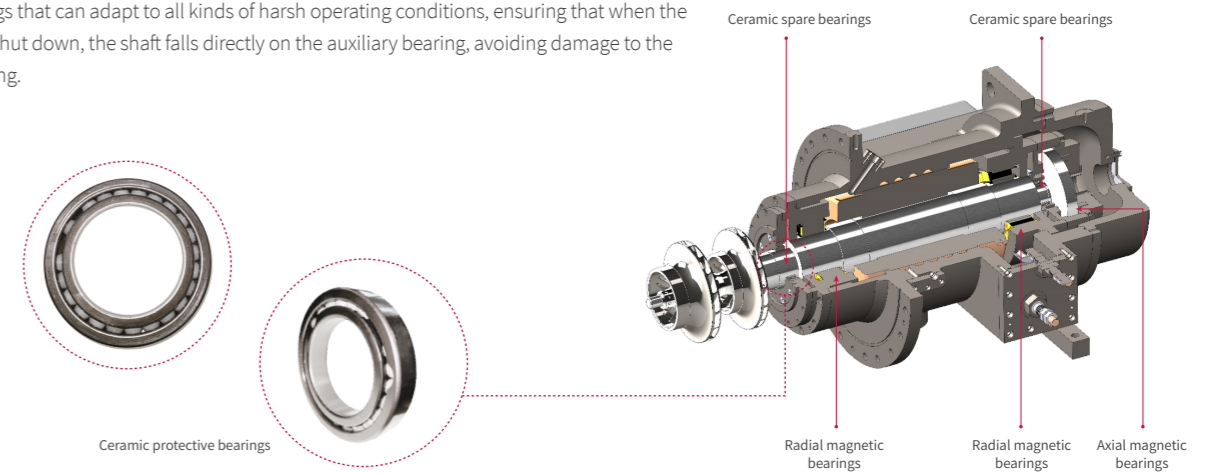
Direct Drive Motor, allowing for lower failure rate

The frequency conversion single-shaft direct drive impeller is adopted, the speed increase gear is canceled, the transmission system is simpler, the moving parts are reduced, the failure rate is lower, and the reliability is higher.



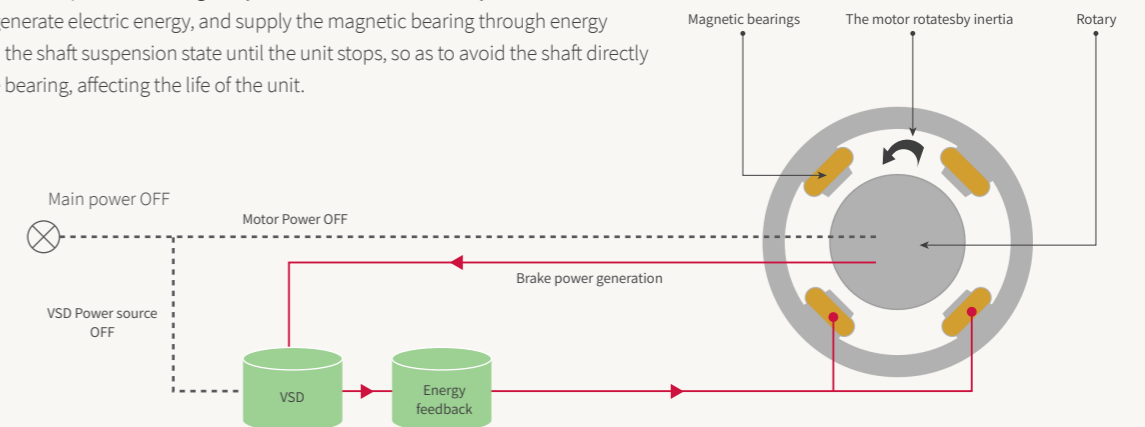
Auxiliary bearings to avoid damage to magnetic bearings

The compressor comes standard with an auxiliary bearing system, which is custom-designed with ceramic bearings that can adapt to all kinds of harsh operating conditions, ensuring that when the compressor is shut down, the shaft falls directly on the auxiliary bearing, avoiding damage to the magnetic bearing.



Emergency power-off protection system to effectively protect bearing life

It is equipped with a complete emergency power-off protection system as standard. In the event of an emergency power failure, the permanent magnet synchronous motor rotates by inertia to brake and generate electricity, generate electric energy, and supply the magnetic bearing through energy feedback to maintain the shaft suspension state until the unit stops, so as to avoid the shaft directly falling and hitting the bearing, affecting the life of the unit.



Stable and Reliable

Strict anti-surge measures

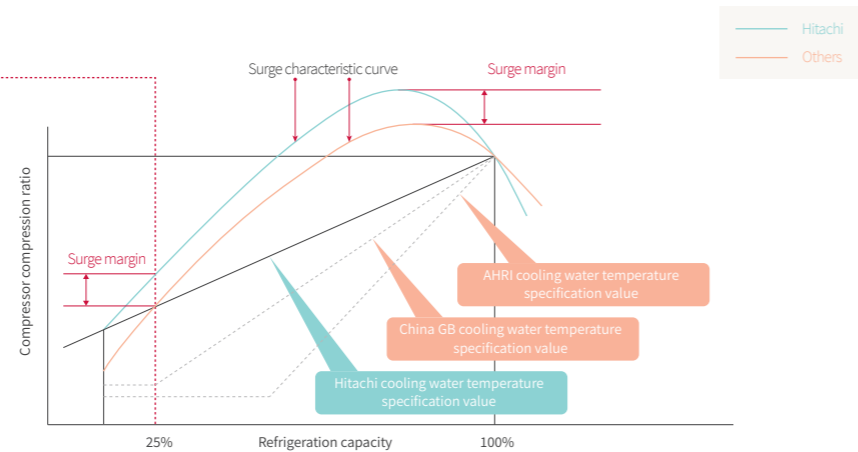
Due to the high ambient temperature in Japan in summer, the industry standard JIS has high requirements for the stable operation of the unit in a high-temperature environment. Hitachi centrifugal unit strictly abides by the Japanese JIS standard, and adopts a two-stage wing-shaped three-dimensional high-efficiency impeller and vane diffuser, which can operate stably even when the refrigeration load is small and the cooling water temperature is high, preventing the occurrence of surge and ensuring high reliability of operation.

By detecting the unit's pressure ratio of high and low pressure of the unit to change the speed, the unit surge phenomenon caused by the pollution of the heat transfer tube is avoided, and at the same time, the unit is escorted by strict surge detection and avoidance function.

When the compressor is about to stall, the force of the magnetic bearing is uneven, and the signal is fed back to the compressor bearing controller to send a shutdown command.

Cooling water inlet temperature under different loads:

Load	Hitachi Standard	AHRI Standard	GB Standard
100%	32°C	29.4°C	30°C
75%	30.75°C	23.9°C	26°C
50%	29.5°C	18.3°C	23°C
25%	28.25°C	18.3°C	19°C
0%	27°C	18.3°C	19°C



Key parts, multiple safety guarantees

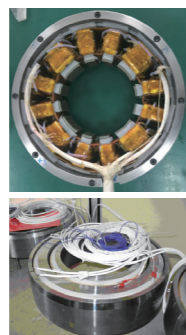
Impeller

The impeller is made of special aluminum alloy material with high strength, and the ideal fluid shape is precisely cast through vacuum, and at the same time, the impeller structure is analyzed for strength, three-coordinate detection, dynamic balance test and over-speed test to ensure that the impeller runs reliably at high speed.



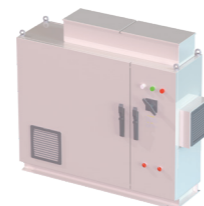
Magnetic bearing

The use of pure electromagnetic force to support the rotor suspension, can well avoid the risk of bearing demagnetization.



High-frequency vector inverter

A special refrigerant cold inverter for refrigeration compressors specially developed in the field of central air conditioning, which has the characteristics of small size, high efficiency, low harmonics and high protection. Direct cooling of refrigerant, unique heat dissipation design to ensure the temperature uniformity of the power device, intelligent anti-condensation technology to ensure safe operation in high temperature and high humidity environment.

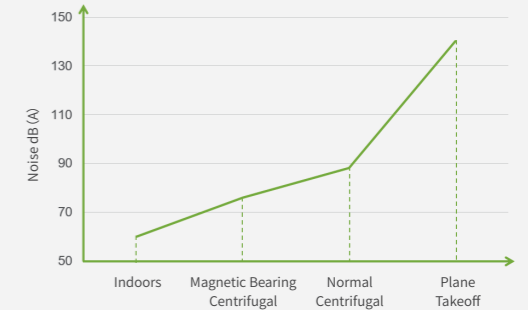


Environmental Responsibility

Quiet Operation and Sustainable for the Environment

Noise is an important factor in evaluating the environmental impact of a unit. VM series adopts magnetic bearing, the moving parts are completely suspended, frictionless operation, and the operating noise is as low as 76dB (A), which is 5-10 decibels less than that of ordinary centrifugal units.

Lower noise means a more comfortable environment in the computer room. The comfortable environment allows the operator to control the efficient and stable operation of the unit.

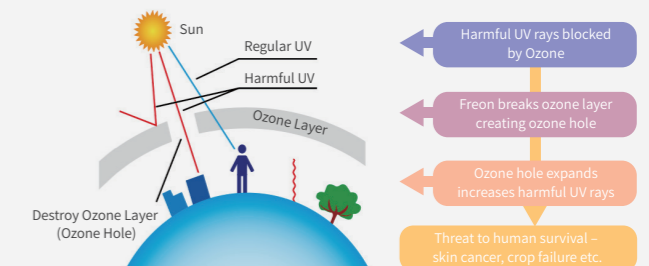


Smooth operation without vibration

The compressor does not have mechanical contact when working, its vibration level is very low, there is no vibration impact on the surrounding building environment, there is no need to purchase and install expensive noise and vibration reduction components, and the on-site installation is convenient.

Environmentally friendly refrigerant to protect the ozone layer

R134a refrigerant does not contain chlorine atoms, has no destructive effect on the atmospheric ozone layer, meets environmental protection requirements, and has no ban period in the latest Montreal protocol.



Oil free system, reducing pollution to the environment

The refrigeration system runs without oil, eliminating a series of devices such as lubrication system, saving space and eliminating the problem of environmental pollution caused by lubricating oil.



Precise Control



Color touch screen display, easy to operate

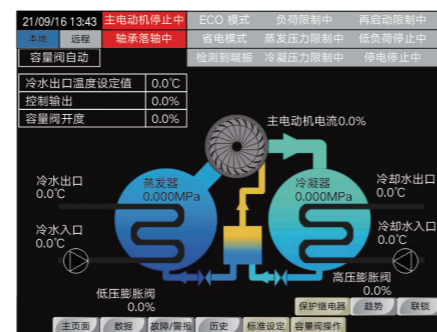
- The control center is completely composed of a 10.4-inch color liquid crystal touch display (LCD) with a clean and clear appearance.
- The colorful color touch screen improves the convenience of identification, and the operation is simple and fast. Centralized display of simple process and various operation information of the unit.
- Centralized control of various settings and statuses of the unit.
- Set up three-level access rights according to the different needs of manufacturers, customer service maintenance and user use.

Display information

- Displays the operation status and operation data of each operation
- Displays a trend graph in action
- Displays past trend data (updated every minute.)
- Display and save fault and alarm history
- Displays the corresponding guidance in case of a malfunction

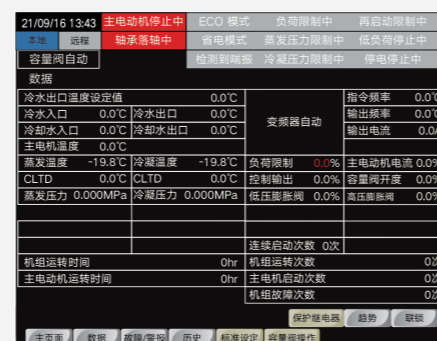
Displays operating status

- The main motor is stopping
- The bearing falls in the shaft
- Low load stops
- The power outage is in progress
- ECO mode
- Power saving mode
- Surge detected
- Load limiting
- Evaporation pressure is limited
- Condensation pressure is limited
- Rebooting is being limited



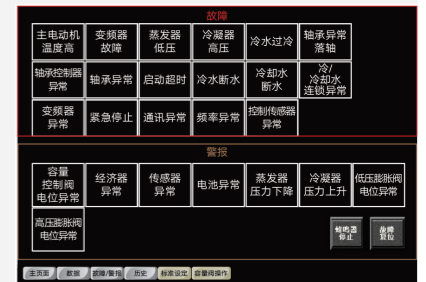
Displays simulated data

- Cold water inlet temperature
- Cooling water inlet temperature
- Main motor temperature
- Evaporation pressure
- Output current
- High-pressure expansion valve opening
- Cold water outlet temperature
- Cooling water outlet temperature
- CLTD (condenser approximation temperature)
- Condensing pressure
- Main motor current
- Low pressure expansion valve opening
- Evaporation temperature
- Condensing temperature ELTD (evaporator approximation temperature)
- Output frequency
- Volumetric valve opening



Fault and alarm information

- The temperature of the main motor is high
- Cold water is supercooled
- Startup timeout
- The inverter is abnormal
- The control sensor is abnormal
- The potential of the volume control valve is abnormal
- Evaporator pressure drops
- Inverter failure
- Abnormal bearing dropping
- Cold water cut-off
- Emergency stop
- Abnormal economizer
- The condenser pressure rises
- Low pressure of evaporator
- The bearing controller is abnormal
- Cooling water cut-off (optional)
- Abnormal communication
- Abnormal sensor
- The potential of the low-pressure expansion valve is abnormal
- Condenser high pressure
- Abnormal bearings
- Cold/cooling water interlocking abnormality
- Abnormal frequency
- Abnormal battery
- The potential of the high-pressure expansion valve is abnormal



Remote communication functions

Through the RS485 physical bus, using the same communication format as the superior communication MODBUS RTU, communicate with other equipment, collect and monitor the data of the unit in real time, and the user can form a group control system according to the actual needs. The user can control the start and stop of the unit through the remote signal, and set the temperature or load limit value of the chiller outlet by inputting DC4-20mA current signal remotely according to their own needs, and the load limit range is 5%~100%.

Remote signal output

- Chiller operation signal output
- Main motor operation signal output
- Re-start the limit signal output
- Remote/local signal output alarm signal output
- Chilled water pump interlocking signal output
- Main motor current analog signal output (DC4-20mA)
- Condensing pressure analog signal output (DC4-20mA)
- Analog signal output of volumetric valve opening (DC4-20mA)
- Fault signal output
- Low-load stop signal output
- Cooling water pump interlocking signal output

Options

The evaporator/condenser water side pressure

The standard unit is designed to withstand a pressure of 1.0MPa, and there are 1.6, 2.0MPa specifications and special requirements for selection.

Refrigerant isolation valves

Isolate and store the refrigerant in the condenser for easy access, eliminating the need for time-consuming and laborious transfer of the refrigerant to other vessels.

Spring vibration absorber

The standard unit is equipped with a high-elasticity rubber damping gasket, and if there are special application requirements, a spring damping device can be selected to further reduce the vibration transmission of the unit to the load-bearing surface.

Dismantling and shipping in parts

If the equipment handling space is limited and the whole chiller is not allowed to be lifted, the chiller can be disassembled into several large parts (compressor, heat exchanger, electric control box, economizer) and then hoisted to a smaller space.

Marine water tank

The marine water tank makes it extremely easy to clean the copper pipes of the heat exchanger without having to remove the water pipes.

Harmonic Filter (5%)

It is suitable for special needs such as data center, electronic precision, medical cleaning, etc., to suppress harmonics and improve power factor.

Chiller Specifications

Technical data sheet

Recommended selection example (power supply AC 380V/50Hz/3φ/3W, VSD start)

Type	Cooling Capacity			COP 1※	IPLV (GB)	Input power 2※	COP 2※	Rated Current 2※	Evaporator			Condenser			Overall Dimension				Shipping Weight	Operating Weight	Ref.Amount (Initial charge)	
	USRT	kW	kW						Flow rate	Pressure drop	Pipe Diameter	Pass	Flow rate	Pressure drop	Pipe Diameter	Pass	L	W				H
HC-F05PM200GPUVM-SC	200.0	703.3	124.5	5.650	7.685	129.6	5.427	210	121.0	64.0	150	—	142.8	62.8	150	4100	2000	2150	3500	5.6	6.7	420
HC-F05PM250GPUVM-SC	250.0	879.1	153.5	5.728	7.794	159.7	5.504	259	151.2	74.4	150	—	178.1	68.5	150	4100	2000	2150	3500	5.7	6.9	420
HC-F05PM300GPUVM-SC	300.0	1055	176.0	5.994	8.166	183.1	5.760	297	181.4	75.1	150	—	212.3	72.1	200	4100	2000	2150	3500	5.8	7.1	450
HC-F10PM350GPUVM-SC	350.0	1231	193.3	6.368	8.813	207.2	5.940	335	211.7	70.9	200	—	246.6	74.5	200	4150	2000	2350	3500	6.0	7.4	550
HC-F10PM400GPUVM-SC	400.0	1407	220.5	6.378	8.827	236.4	5.950	383	241.9	72.9	200	—	281.8	73.4	200	4150	2000	2350	3500	6.1	7.6	570
HC-F10PM450GPUVM-SC	450.0	1582	248.1	6.378	8.827	265.9	5.950	430	272.2	69.5	200	—	317.0	73.5	200	4150	2000	2350	3500	6.2	7.8	600
HC-F20PM500GPUVM-SC	500.0	1758	263.1	6.683	9.260	282.2	6.230	457	302.4	81.3	200	—	350.0	83.5	250	4650	2150	2400	4000	8.7	10.7	750
HC-F20PM550GPUVM-SC	550.0	1934	289.4	6.683	9.260	310.4	6.230	502	332.6	81.2	200	—	385.0	83.1	250	4650	2150	2400	4000	8.8	10.8	750
HC-F20PM600GPUVM-SC	600.0	2110	314.7	6.703	9.289	337.6	6.250	546	362.9	81.9	250	—	419.8	83.4	250	4650	2150	2400	4000	8.9	10.9	800
HC-F20PM650GPUVM-SC	650.0	2286	341.0	6.703	9.289	365.7	6.250	592	393.1	82.5	250	2	454.8	84.4	250	4650	2150	2400	4000	9.0	11.0	800
HC-F25PM700GPUVM-SC	700.0	2461	376.1	6.545	9.064	403.5	6.100	653	423.4	81.1	250	—	491.4	87.0	250	4700	2480	2700	4000	10.4	12.6	870
HC-F25PM750GPUVM-SC	750.0	2637	402.9	6.545	9.064	432.2	6.102	699	453.6	83.5	250	—	526.5	86.2	250	4700	2480	2700	4000	10.6	12.9	870
HC-F25PM800GPUVM-SC	800.0	2813	429.8	6.545	9.064	460.8	6.104	745	483.8	83.9	250	—	561.6	84.2	300	4700	2480	2700	4000	10.8	13.2	900
HC-F25PM850GPUVM-SC	850.0	2989	456.7	6.545	9.064	489.5	6.106	792	514.1	84.2	250	—	596.6	86.9	300	4700	2480	2700	4000	11.0	13.4	900
HC-F30PM900GPUVM-SC	900.0	3165	482.0	6.565	9.093	516.7	6.125	836	544.3	85.3	300	—	631.4	87.7	300	4700	2580	2800	4000	11.8	14.5	1050
HC-F30PM950GPUVM-SC	950.0	3340	508.1	6.575	9.108	545.1	6.128	882	574.6	85.3	300	—	666.5	86.1	300	4700	2580	2800	4000	12.0	14.8	1050
HC-F30PM1000GPUVM-SC	1000	3516	534.8	6.575	9.108	573.2	6.135	927	604.8	87.0	300	—	701.4	86.1	350	4700	2580	2800	4000	12.2	15.1	1100
HC-F30PM1050GPUVM-SC	1050	3692	560.7	6.585	9.121	601.5	6.138	973	635.0	83.9	300	—	736.5	85.8	350	4700	2580	2800	4000	12.4	15.3	1100
HC-F30PM1100GPUVM-SC	1100	3868	587.4	6.585	9.121	629.5	6.144	1018	665.3	83.3	300	—	771.4	80.7	350	4700	2580	2800	4000	12.6	15.6	1100

Note:

(1) The parameter table in the table meets the requirements of AHRI 550/590 and AHRI 551/591, based on Hitachi Chiller Selection V2.10_a0009, and the specific items are subject to the latest version of the computer selection.

Annotation (1*) Applicable working conditions: chilled water inlet/outlet temperature 12/7°C, cooling water inlet/outlet temperature 30/35°C;

Annotation (2*) Applicable conditions: chilled water inlet/outlet temperature 12/7°C, cooling water inlet/outlet temperature 32/37°C.

(2) This table is based on normal water, so please contact us if you need to use seawater, salt water, etc.

(3) Operating power supply: AC 220V/50Hz/1φ

(4) The operating pressure of cold water and cooling water is 1.0 MPa, if it exceeds this specification, please specify it at the time of inquiry (the maximum pressure used for the alternative is 2.0 MPa)

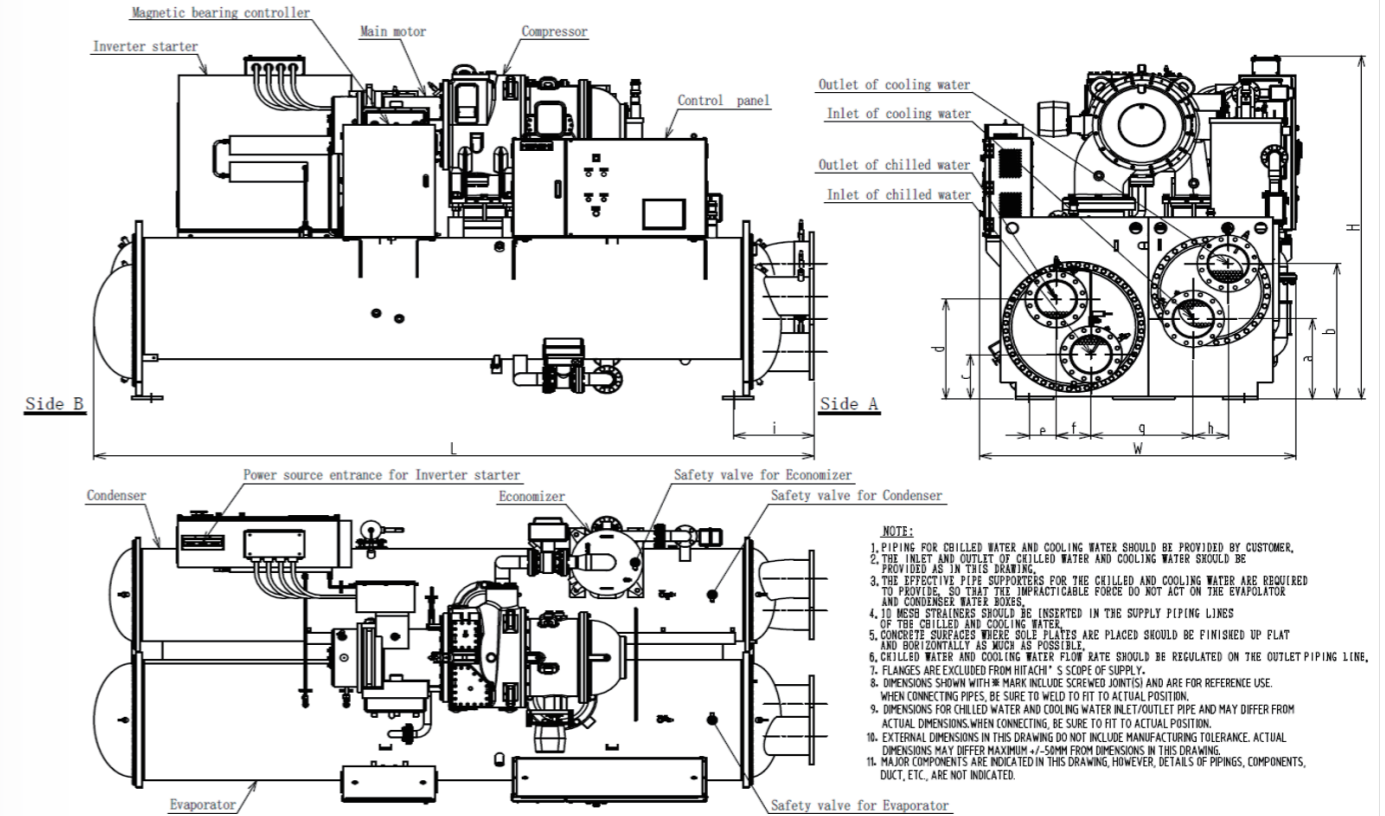
(5) The fouling coefficient of the water side of the evaporator is 0.018m²/kW, and the fouling coefficient of the water side of the condenser is 0.044m²/kW.

(6) It is the Company's consistent policy to improve our products, and the configuration is subject to change without notice.

Model description

HC	—	※※	F20PM	600	GP	U	VM	—	SC	—	※※※	—	※※※
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩				
Number	Code description								Options				
①	High Pressure Refrigerant Centrifugal Chiller								—				
②	Refrigerant Code								Default: HFC-134a				
③	Compressor Model								—				
④	Nominal Cooling Capacity (RT)								—				
⑤	Heat Exchanger Code								GP: Level control type				
⑥	Unit mounted inverter								U: Airborne				
⑦	Product Series Number								VM: Maglev direct drive VSD series				
⑧	Application Product Code								SC: With Subcooler Application				
⑨	Evaporator / Condenser Code								Default: Standard Product; ※※※: Special Products				
⑩	Motor Code								Default: Standard Product; ※※※: Special Product				

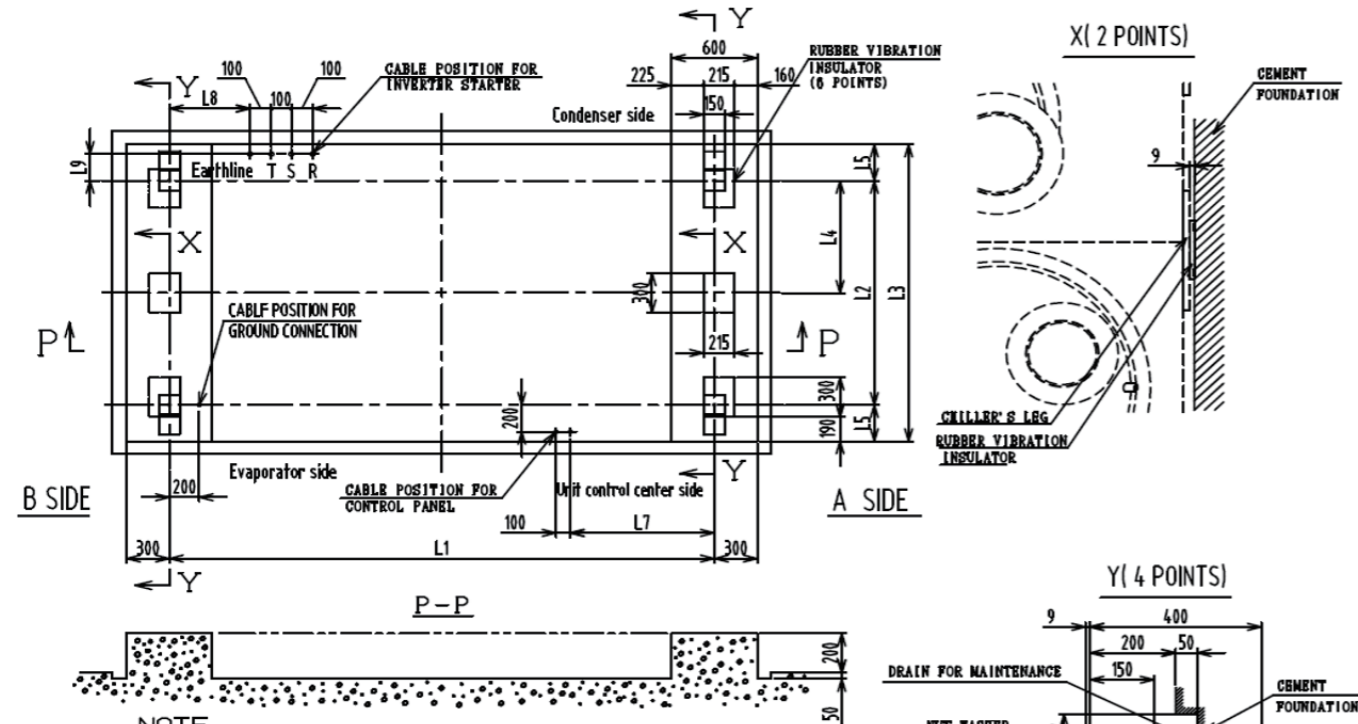
Unit dimensions



- NOTE:
1. PIPING FOR CHILLED WATER AND COOLING WATER SHOULD BE PROVIDED BY CUSTOMER.
 2. THE INLET AND OUTLET OF CHILLED WATER AND COOLING WATER SHOULD BE PROVIDED AS IN THIS DRAWING.
 3. THE EFFECTIVE PIPE SUPPORTERS FOR THE CHILLED AND COOLING WATER ARE REQUIRED TO PROVIDE, SO THAT THE IMPACT LOADS DO NOT ACT ON THE EVAPORATOR AND CONDENSER WATER BOXES.
 4. 10 MESH STRAINERS SHOULD BE INSERTED IN THE SUPPLY PIPING LINES OF THE CHILLED AND COOLING WATER.
 5. CONCRETE SURFACES WHERE SOLE PLATES ARE PLACED SHOULD BE FINISHED UP FLAT AND HORIZONTAL AS MUCH AS POSSIBLE.
 6. CHILLED WATER AND COOLING WATER FLOW RATE SHOULD BE REGULATED ON THE OUTLET PIPING LINE.
 7. FLANGES ARE EXCLUDED FROM HITACHI'S SCOPE OF SUPPLY.
 8. DIMENSIONS SHOWN WITH # MARK INCLUDE SCREWED JOINTS AND ARE FOR REFERENCE USE. WHEN CONNECTING PIPES, BE SURE TO WELD TO FIT TO ACTUAL POSITION.
 9. DIMENSIONS FOR CHILLED WATER AND COOLING WATER INLET/OUTLET PIPE AND MAY DIFFER FROM ACTUAL DIMENSIONS WHEN CONNECTING, BE SURE TO FIT TO ACTUAL POSITION.
 10. EXTERNAL DIMENSIONS IN THIS DRAWING DO NOT INCLUDE MANUFACTURING TOLERANCE. ACTUAL DIMENSIONS MAY DIFFER MAXIMUM +/-50MM FROM DIMENSIONS IN THIS DRAWING.
 11. MAJOR COMPONENTS ARE INDICATED IN THIS DRAWING, HOWEVER, DETAILS OF PIPINGS, COMPONENTS, DUCT, ETC., ARE NOT INDICATED.

Type	Overall Dimension			Pipe Position Dimensions									
	L	W	H	a	b	c	d	e	f	g	h	i	
HC-F05PM200GPUVM-SC	4100	2000	2150	417	697	331	643	117	180	562	213	528	
HC-F05PM250GPUVM-SC	4100	2000	2150	417	697	351	663	117	180	562	213	528	
HC-F05PM300GPUVM-SC	4100	2000	2150	373	741	351	663	117	180	562	213	528	
HC-F10PM350GPUVM-SC	4150	2000	2350	511	857	352	692	170	196	652	200	528	
HC-F10PM400GPUVM-SC	4150	2000	2350	511	857	371.5	711.5	170	196	652	200	528	
HC-F10PM450GPUVM-SC	4150	2000	2350	511	857	391	731	170	196	652	200	528	
HC-F20PM500GPUVM-SC	4650	2150	2400	573	967	318	712	176.2	227.5	667.5	227.5	524	
HC-F20PM550GPUVM-SC	4650	2150	2400	573	967	338	732	176.2	227.5	667.5	227.5	524	
HC-F20PM600GPUVM-SC	4650	2150	2400	573	967	357	751	176.2	227.5	667.5	227.5	524	
HC-F20PM650GPUVM-SC	4650	2150	2400	573	967	377	771	176.2	227.5	667.5	227.5	524	
HC-F25PM700GPUVM-SC	4700	2480	2700	512	962	438.5	832.5	231	227.5	773	260	524	
HC-F25PM750GPUVM-SC	4700	2480	2700	512	962	458	852	231	227.5	773	260	524	
HC-F25PM800GPUVM-SC	4700	2480	2700	512	962	478	872	231	227.5	773	260	524	
HC-F25PM850GPUVM-SC	4700	2480	2700	512	962	498	892	231	227.5	773	260	524	
HC-F30PM900GPUVM-SC	4700	2580	2800	645	1095	442	927	245	280	800	260	521	
HC-F30PM950GPUVM-SC	4700	2580	2800	645	1095	462	947	245	280	800	260	521	
HC-F30PM1000GPUVM-SC	4700	2580	2800	627.5	1112.5	461.5	946.5	245	280	790	280	521	
HC-F30PM1050GPUVM-SC	4700	2580	2800	627.5	1112.5	461.5	946.5	245	280	790	280	521	
HC-F30PM1100GPUVM-SC	4700	2580	2800t	627.5	1112.5	481	966	245	280	790	280	521	

Basic Installation Dimensions for the unit

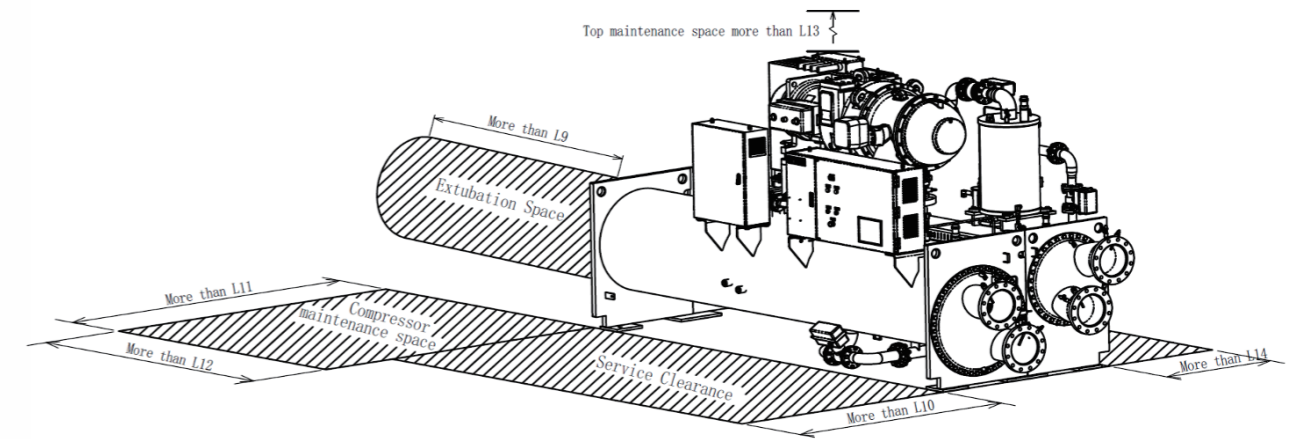


NOTE

1. The floor installation is the standard installation method of the unit, and the foundation on both sides of A and B shall be able to bear the load of the unit.
2. When the floor is installed, the rubber damping pad that comes with it should be placed.
3. As shown in the basic drawing, it can effectively drain water and prevent corrosion of the foot of the unit.
4. When cleaning the heat transfer tube of the unit, it is necessary to conduct drainage treatment. So please set up a drainage tank around the unit.
5. The concrete foundation should be smooth and level, and the horizontal error between the top center of the mounting base should be within 0.5mm every 1m (please prepare the horizontal ball for adjustment).
6. The construction of concrete foundation and cement for maintenance is not within the scope of our company.
7. Foundation bolts, nuts, washers are not within the scope of our supply, please prepare.
8. The installation method of the unit can be selected by the installer according to the local geological conditions and the requirements of the equipment installation specifications on the equipment foundation, such as the fixation method using expansion screws proposed by the design institute and the owner.
9. Floor installation requires spring shock absorber, please contact us.

Type	Unit base installation dimensions							
	L1	L2	L3	L4	L5	L6	L7	L8
—	mm	mm	mm	mm	mm	mm	mm	mm
HC-F05PM200 ~ 300GPUVM-SC	3300	1136	1896	546	380	800	210	170
HC-F10PM350 ~ 450GPUVM-SC	3300	1303	2063	617	380	800	162	98
HC-F20PM500 ~ 650GPUVM-SC	3800	1402	2162	654	380	800	166	151
HC-F25PM700 ~ 850GPUVM-SC	3800	1662	2502	782	420	800	241	258
HC-F30PM900 ~ 1100GPUVM-SC	3800	1764	2604	805	420	800	115	256

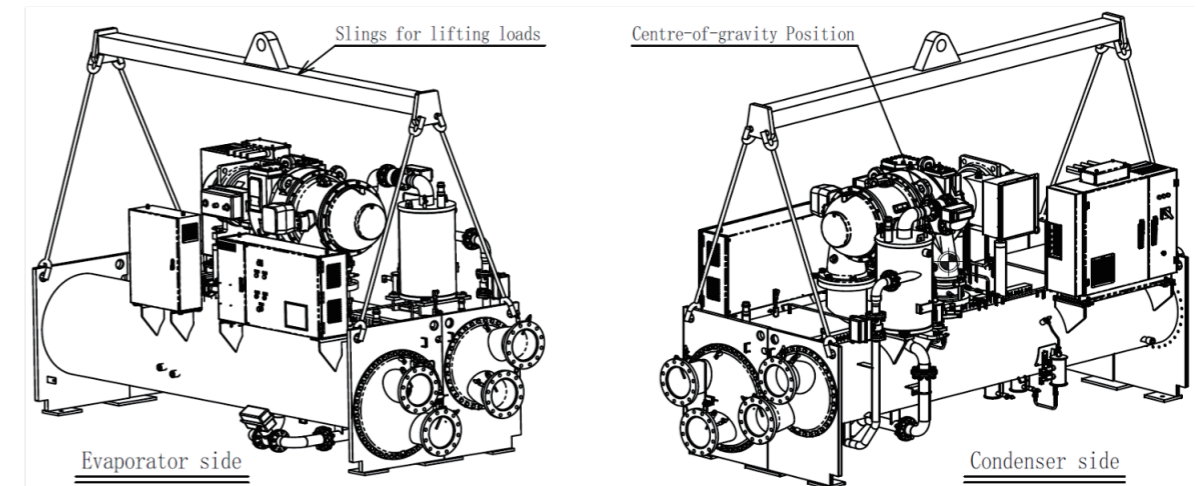
Unit maintenance space



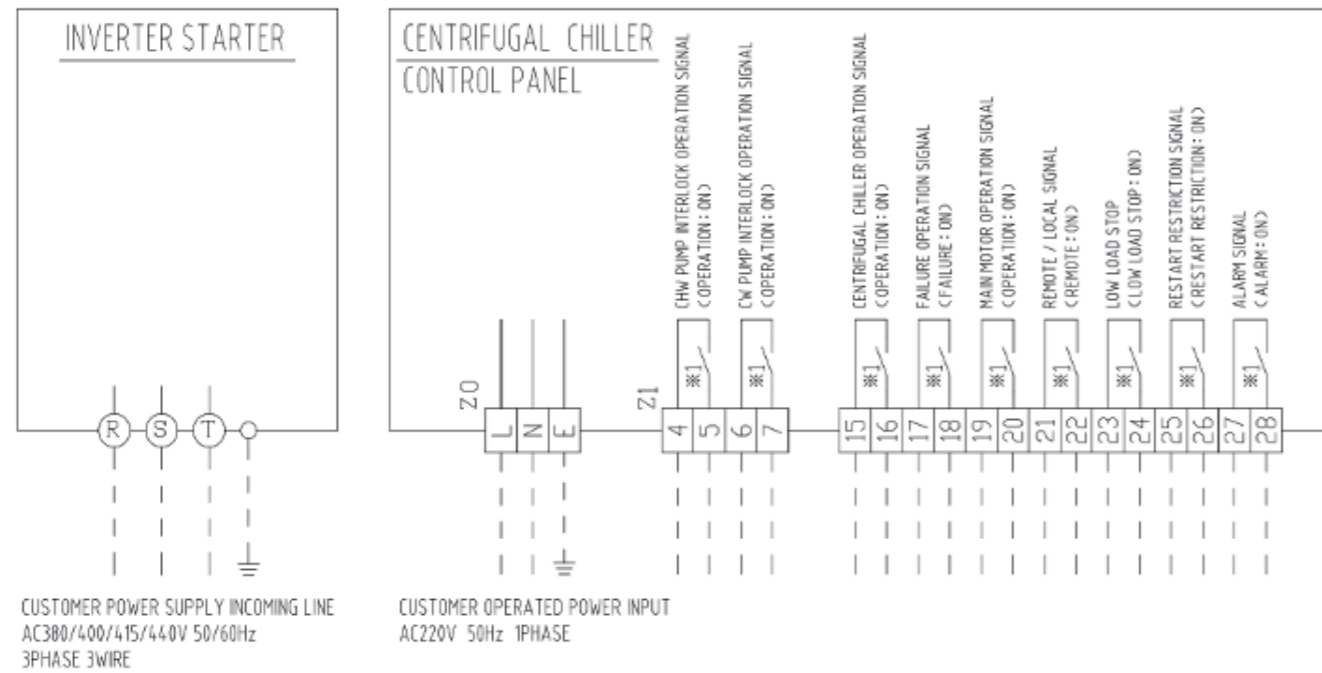
Type	Unit Maintenance Space					
	L9	L10	L11	L12	L13	L4
—	mm	mm	mm	mm	mm	mm
HC-F05PM200 ~ 300GPUVM-SC	3800	1500	2000	2500	850	500
HC-F10PM350 ~ 450GPUVM-SC	3800	1500	2000	2500	850	500
HC-F20PM500 ~ 650GPUVM-SC	4300	1500	2000	2500	850	500
HC-F25PM700 ~ 850GPUVM-SC	4300	1500	2000	2500	850	500
HC-F30PM900 ~ 1100GPUVM-SC	4300	1500	2000	2500	850	500

Unit hoisting

There are four hoisting holes (2 at each end) on the end plate of each unit, which can be used to lift the unit. The center of gravity of the chiller must be considered when lifting, so as to ensure the safety of the chiller when it is suspended and balanced on both sides. When hoisting and installing, it is not allowed to use a sling to wrap the motor/compressor assembly for lifting, not to use the bolt holes in the unit to lift, not to dump the unit for lifting, and not to lift the unit vertically. To avoid damage to the unit and external connections, use a beam/l-beam lifting assembly to safely position the chiller to the final installation position. When lifting the unit, it is important to ensure that the lifting capacity of the sling is comparable. (Slings and spreaders for lifting are not within the scope of our supply, please prepare in advance)



Schematic diagram of wiring



Delivery and Installation Chart

Category	GA Scope (Domestic)	Customer Scope	Notes
Delivery Scope	Centrifugal Chiller Unit	●	① Evaporator ② Condenser ③ Compressor ④ Electric Control Box ⑤ Bearing Control Box ⑥ Inverter Box
	Parts with Chiller	●	① Anti-vibration rubber for Chiller ② Chiller technical documents*1
Moving-in	From Factory to Site	●	-
	Installation base for unit on site		●
Assembly	On-site assembly	●	If chiller unit shipped on a disassembled form
	Unit Installation		●
Installation	Commissioning	●	Once
	Operation Instruction	●	-
Electical Works	External electrical wiring installation		●
	Basic Contracting Works		●
	External wiring works		●
Other Works	Prevent freezing of chilled water piping		●
	Water mgmt. for chiller water		●
	Evaporator insulation	●	-
	Chilled water piping works		●
Painting	Chiller Unit	●	Use anti-rust base paint and gray anti-corrosion paint
	Electical Control Box	●	Anti-rusting processing (Use anti-rust base paint: Munsell 5Y 8/1 bright)
	Starter Box	●	Anti-rusting processing (Use anti-rust base paint: Munsell 5Y 7/1 semi-gloss)
Others	Electricity, water, sand etc. for on-site installation		●
	Electricity, water etc. for on-site calibration		●

Advisory Notes

Unit storage environment

Category	Contents
Ambient Temperature	Below 40°C (When the ambient temperature is lower than 0°C, water side of evaporator and condenser must release pressure and add appropriate amount of anti-freeze, or release all water)
Relative Humidity	Relative humidity in environment should be under 80%, without condensing water
Atmosphere Corrosive Gas Content	SO ₂ : ≤10mg/m ³ HCN: ≤5mg/m ³ H ₂ S: ≤5mg/m ³ Nitrogen Oxides: ≤5mg/m ³ HCL: ≤5mg/m ³ CL: <1mg/m ³
Storage	① Please store the unit in the room with ventilation facilities, do not store outdoors in direct contact with rain, water and sunlight. ② The unit must not be placed in a corrosive, flammable and explosive, and oil mist environment

Unit operating environment

Category	Contents
Voltage Fluctuating Range	Rated running voltage ±10%
Voltage Imbalance	≤2%
Operating Environment Temperature	3°C~40°C (Chiller plant room ambient temperature)
Relative Humidity	Relative humidity in environment should be under 80%, without condensing water
Altitude	<1000 meters (High altitude will influence the electric insulation and conductive performance of the unit, need special adjustments)
Atmosphere Corrosive Gas Content	SO ₂ : ≤10mg/m ³ HCN: ≤5mg/m ³ H ₂ S: ≤5mg/m ³ Nitrogen Oxides: ≤5mg/m ³ HCL: ≤5mg/m ³ CL: <1mg/m ³
installation	① The unit cannot be installed in a corrosive, flammable and explosive environment or a place with special requirements such as oil mist, otherwise it will cause the unit to fail to operate normally or shorten the service life of the unit, and even cause fire or serious injury. If installed together with heating elements such as boilers, full attention should be paid to the impact of thermal radiation ② Please install the unit in a well-ventilated place, because over-high temperature is the cause of electrical failure and can accelerate the corrosion of the equipment ③ Please choose a place with less dust, because excessive dust is also one of the causes of electrical failure ④ Please choose a place with good lighting, which is conducive to maintenance and inspection ⑤ In order to meet the needs of maintenance, overhaul and cleaning of the evaporator-condenser heat exchange tube, there must be enough space around the unit ⑥ To facilitate machine lifting and maintenance. The crane or boom crane should be installed, and pay attention to the machine room to have sufficient height ⑦ Around the unit and the whole machine room should be able to achieve complete drainage

Unit insulation

The factory has laid a 20mm thick insulation layer on the evaporator shell (including end covers, feet, etc.), compressor suction pipes and motor housings and other parts that mainly need to be insulated.

For different use environments, 25mm, 40mm and other thickness non-standard options can be provided according to customer requirements, please specify when ordering. You can refer to the following table to select the thickness of the insulation layer:

Chilled water outlet Temperature	Ambient temperature	Relative humidity	Recommended insulation thickness
°C	°C	%	mm
te0 ≥ 5	10 ~ 32	RH ≤ 70	20
		70 < RH ≤ 73	25
		73 < RH ≤ 38	40
4 ≤ te0 < 5	10 ~ 32	RH ≤ 73	40

Note:
If the unit exceeds the above range, please contact the factory technical support to confirm the thickness of the corresponding unit insulation material.

Chilled water & cooling water variable flow control

The inverter water pump can change the water flow rate of the system according to the load change, thereby reducing the pump consumption of the system, so when the customer needs to control the variable flow of the chilled water & cooling water pump of the centrifuge, in order to ensure the normal operation of the chiller and let the system run stably and efficiently, the following precautions need to be taken into account:

(1) Chilled water & cooling water variable flow control conditions

Items	Contents	Notes
Variable flow range	50% ~ 100%	In order to prevent the chiller from entering the over-cooling protection during startup, follow the 100% flow rate during startup
Rate of flow change	Not more than 30% per minute	If the flow change (increase or decrease) is too large, the opening and closing speed of the chiller capacity control device blade can not immediately catch up, which can lead to the chilled water outlet temperature overcooling alarm, so that the host fault shutdown. Therefore, please pay full attention to the appropriateness of the rate of change of water flow
Start-up flow rate	Rated flow, maintenance time about 30 minutes	In order to prevent the chiller from entering the over-cooling protection during startup, follow the 100% flow rate during startup
The signal interrupts	Force the operation to follow the rated flow rate	When the variable flow signal is interrupted or short-circuited, the variable frequency pump is generally used to restore the rated frequency control mode. Therefore, the chilled water and cooling water will be forced to adjust to the rated flow rate when the signal is interrupted

(2) Precautions for variable flow control of chilled water & cooling water

- The chilled water circuit adopts variable flow rate, which can reduce the pump consumption of the system, and will not lead to the reduction of unit efficiency. The cooling water circuit adopts variable flow rate, although it can reduce the system pump consumption, but it will bring about the increase of the condensation pressure of the unit, and the pressure head of the compressor rises, which is easy to make the unit enter the surge area, and the power consumption of the compressor increases. In the end, the energy saved by the pump only compensates for the increased power consumption of the compressor. Therefore, when the cooling water is transformed, the temperature of the cooling water outlet should be controlled below 37°C as much as possible, and in order to ensure that the overall energy consumption of the system is reduced, it is recommended to carry out the cooling water flow according to the following table:

cooling capacity	20% ~ 70% ~ 100%
cooling water flow rate	50% ~ 100% ~ 100%

- When the chilled water & cooling water need to be controlled by variable flow, pay attention to the flow ratio can not be reversed, and the water pump of chilled water & cooling water should be controlled by frequency conversion, please ensure that the flow ratio of chilled water/cooling water is ≤ 1 .

(3) The flow rate of water in the container must be kept within a certain range, and the maximum should not exceed 3.0m/s. If the flow rate is too low, it is easy to attach scale or rust to the inner wall of the pipe, which is easy to cause problems such as the reduction of the efficiency of the main engine; if the flow rate is too high, it will lead to excessive pressure drop and increase the wear of the pipeline. Please confirm with our company for specific flow rate and flow limit, and at the same time, in terms of daily maintenance, please strictly manage water quality and clean copper pipes regularly.

Water quality management

When the unit is running, the quality of chilled water & cooling water directly affects the performance and life of the unit. Therefore, it is necessary to investigate the water quality well in advance and manage the water quality while the unit is running. It is recommended that the water used in the system meet the following parameters:

Category	Unit	Benchmark	Corrosion	Fouling
Standard Items	PH(25°C)	—	6.5 ~ 8.0	●
	Conduciveness(25°C)	μs/cm	<800	●
	CL ⁻ ions	mg(CL ⁻)/L	<200	●
	SO ₄ ²⁻ ions	mg(SO ₄ ²⁻)/L	<200	●
	Acid Consumption(PH=4.80)	mg(CaCO ₃)/L	<100	●
	Water Hardness	mg(CaCO ₃)/L	<200	●
Reference Items	Fe	mg(Fe)/L	<1.0	●
	S ²⁻	mg(S ²⁻)/L	—	●
	NH ⁺ ions	mg(NH ⁺)/L	<1.0	●
	SiO ₂	mg(SiO ₂)/L	<50	●

Note:

- The water quality index refers to the "Vapor Compression Circulating Chilled Water (Heat Pump) Unit" GB/T18430.1-2007, and the appendix cools the water quality.
- The ● in the table indicates the relevant factors of corrosion or scaling tendency.
- If the water quality does not meet the requirements of GB/T18430.1-2007, please refer to the GB50050-2007 "Design Code for Industrial Circulating Cooling Water Treatment" for treatment.

Project Case Studies



Guangzhou Nansha Wafer Semiconductor

Pingnan Brunn Renewables

Taiwan Hon Hai Technology

Zhongan Hi-Tech Fucheng Intelligent Electronics Industrial Park

Guangzhou Taihe circuit board