

---

**AIR-COOLED FLOODED SCREW CHILLER**

---

**INSTALLATION AND OPERATION MANUAL**

---

## Instruction

1. The description about unit installation in this manual is only intended for the use and reference by qualified installation persons.
2. When you are ready to use the unit, be sure to read the Instructions of Unit Use and Controller Operation first, so as to avoid damages to the unit or accidents caused by your misoperation.
3. The content of this manual is subject to change without a prior notice to change or improve some models.
4. Standard: GB/T18430.1-2007.
5. Register the pressure vessel unit with the local management organization before and after it is used.
6. The GAW series units are designed based on the following environment conditions:

Operating range of GAW series units					
No.	Model	Water outlet temperature	Ambient temperature	Voltage	Water flow
1	GAW-AAC1T1	4-20°C	5-45°C	360-400V	50%~120% of rated water flow
2	GAW-ALC1T1			380-420V	
3	GAW-AAC1T3		5~52°C	360-400V	
4	GAW-AFC1T1		5-45°C	440-480V	

### Safety Warning

This product contains pressure refrigerant, moving parts and electrical components, which are dangerous and may cause personnel injury. For the sake of safety, please read through the related content of this manual carefully before moving the equipment or performing any operations on it. All the operations can be performed by professionals who have mastered the skills for these operations only, and they must use appropriate tools, wear protective cloths, and take safety protection measures. This manual aims to provide information to professionals engaged in this kind of work.

### Check

Carefully check the shipment for completeness against the packing list immediately upon receipt. If there is any conspicuous damage resulting from transportation, indicate it on the freight bill of the transport company and immediately submit a request in writing to ask the transport agent to carry out inspection. Our company will not bear the liability for compensation for any damages that arise after the acceptance of the goods.

### Storage

If the unit is not installed immediately, take proper protective measures to prevent damage, corrosion or wear during storage:

1. All interfaces such as the water pipe joints are properly sealed.

2. The storage temperature should not exceed 55°C, and direct sunlight should be avoided.
3. The air-cooled coil heat exchanger on the unit should be covered to prevent corrosion of the fin. Open storage is prohibited, in particular in construction sites.
4. To reduce the possibility of accidental damages (such as smashing and collision), manage to store the unit in a zone with the lowest occurrence rate of various activities.
5. Take down the electric control cabinet key and hand it to the person in charge on the field for keeping.
6. Regular inspection is required during storage.

## **Safety Precautions**

The refrigerant R134a used in the GAW series is a medium-pressure refrigerant. The saturated steam pressure of this liquefied gas is related to the temperature. When the temperature is high, the corresponding saturated steam pressure is high. To ensure safety of the unit, the ambient temperature during unit shutdown should not exceed 45°C; otherwise, the chilled water pump should be turned on to cool the evaporator. When the unit contains refrigerant, flame cutting or welding on the shell-and-tube heat exchanger, fin-type heat exchanger, liquid receiver and the unit pipeline is prohibited. Do not fasten bolts or nuts when the unit is operating or under pressure; in case of finding leakage on the joint face, be sure to fasten the bolts and nuts after pressure relief. Avoid leakage of the refrigerant during commissioning and use of the unit. The largest concentration of R134a steam (AEL) in the air that a human body can take is 1000 ppm. Working under this steam concentration condition will not cause adverse effects to the body. However, if a large amount of the steam is spilled or leaked, the R134a steam will descend and concentrate near the ground, causing oxygen deficiency to the body. In this case, improve the ventilation and use fans to circulate air near the ground. Do not enter the contaminated area until the refrigerant steam is removed to avoid adverse effects on the human body. Prevent the liquid refrigerant from coming into contact with your skin and eyes, lest your skin and eyes would be harmed.

Use a special refrigerant pumping device to fill in or extract the refrigerant. The refrigerant extracted from the unit should be injected into the liquid storage tank that complies with the designed unit pressure and is designed and manufactured according to the relevant standard of pressure vessel. The refrigerant cannot be discharged into the air or sewer directly. To ensure compliance with the safety requirements when using this series of units in a closed area, pay attention to the following items:

- ◆ Ensure good ventilation. If necessary, auxiliary ventilation equipment must be used to remove the refrigerant steam formed by accidental leakage;
- ◆ If conditions permit, use a pipe to connect the discharge port of the safety valve on the liquid receiver to the outside;
- ◆ If conditions permit, install an air detector to monitor the refrigerant steam concentration in the air;
- ◆ Be sure to carefully read the safety requirements and strictly comply with all the safety requirements;
- ◆ Keep the instructions properly so that it can be referenced by the relevant personnel anytime;

- ◆ Ensure that the controller is reliably grounded, and frequently check if the grounding is reliable because improper grounding may lead to electric shock accidents;
- ◆ Separate strong current from weak current. Connect wires strictly according to the wiring diagram;
- ◆ Never use sharp objects to press the touch screen, or apply a pressure too large on the touch screen lest it would be damaged;
- ◆ Do not pull or twist the power cord and communication line, lest a serious fault would be caused;
- ◆ Wet a cloth with neutral water, wring it out, and use it to wipe dirt. Do not use acid or alkaline chemical to remove dirt;
- ◆ In case of a fire, turn off the main power supply immediately and use a fire extinguisher suitable for oil fire and electric fire;
- ◆ The machine cannot be used in an environment with hidden explosion dangers;
- ◆ In case of any need for repair, contact the manufacturer. Do not repair the unit by yourself.

**After reading, please keep this manual properly so that it can be taken out for reference anytime. Meanwhile, make this manual accessible to the other operators of the unit.**

## Contents

1. Product Overview .....	2
1.1 Unit Overview .....	2
1.2 Unit Features .....	2
1.3 Design Features .....	3
2 Nomenclature .....	7
3 Performance Specifications and Operation Range .....	8
3.2 Table for Performance Coefficients Under Variable Operating Condition .....	16
3.3 Operating Range .....	17
4 Unit Installation .....	18
4.1 Requirements for Transportation, Loading Unloading and Lifting .....	18
4.2 Installation Foundation Requirements .....	20
4.3 Installation space requirements .....	22
4.4 Dimensions .....	26
4.5 Chilled Water Pipeline Connection .....	28
4.6 Electrical Installation Requirements and Wiring Diagram .....	33
5 Test Run .....	44
5.1 Check Before Test Run .....	44
5.2 Test Run .....	46
5.3 Test Run Record .....	48
6 Unit Operation and Controller Operation Guidance .....	49
6.1 Check Before Use .....	49
6.2 Unit Startup Sequence .....	49
6.3 Unit Stopping Sequence .....	49
6.4 Controller Operation Instructions .....	49
6.5 Unit Operation Precautions .....	54
6.6 Unit Anti-freezing Precautions .....	55
7 Troubleshooting .....	57
8 Repair and Maintenance .....	62
Routine Maintenance .....	62
Appendix .....	64
Maintenance (Service) Record Sheet .....	64
Environmental Protection Description .....	65

## 1. Product Overview

### 1.1 Unit Overview

Coming with the twin screw compressor specifically designed for the R134a refrigerant, GAW series air-cooled flooded screw chiller adopts high-efficiency flooded heat exchanger designed with the latest technology, unique oil return technology, ECO economizer circulation design and other optimized design. The COP of the full series units reach 3.2 (China's EEI level 3.2) or above. Selective cooling parts and control components provided by world-famous manufacturers, together with the cutting-edge intelligent control solution with the latest design, contribute to the high efficiency, energy conservation, stability and reliability of this air-conditioning main unit. Gplus boasts a lab for testing performance of large 350RT air-cooled screw units where a variety of extreme operating conditions are simulated to ensure the quality and performance of the unit. The unit can be reliably applied to comfort and industrial scenarios, such as hotel, hospital, office building, shopping mall, apartment, and factory.

Before the unit is started, all the members involved in the field installation, startup, operation and maintenance should carefully read this manual, and make clear the precautions related to the installation site.

### 1.2 Unit Features

#### **Green and environmental protection**

The environmentally-friendly refrigerant HFC-R134a employed, which does not contain chloride ion, is harmless to the atmospheric ozone layer, has no ban period in the Montreal Agreement, and realizes higher efficiency, fewer power consumption and reduced CO<sub>2</sub>emissions.

#### **High efficiency and energy saving**

The unit adopts the most advanced semi-hermetic double-screw compressor. Its excellent rotor profile design, high-efficiency fluorine-resistant motor and high-precision manufacturing ensure the unparalleled mechanical efficiency of the compressor.

This series of products of Gplus provide a unique control mode. They can determine the optimal outlet water temperature of the unit according to the outdoor ambient temperature and the return water temperature of the air conditioning system, and automatically adjust the set outlet water temperature of the unit. It greatly reduces power consumption of the unit and saves the operation cost for users on the premise of satisfying the indoor cooling/heating capacity and comfort requirements.

#### **Safe and reliable**

The intelligent control system monitors operation of the unit in real time to guarantee reliability. For example, power supply protection (under-voltage, over-voltage, reverse phase, phase loss, and phase imbalance), high/low pressure, no pressure difference, discharge temperature, oil level, oil pressure difference, water flow, freezing protection, motor overheating/overload protection, ensuring the unit's operation safety.

The unit is equipped with the most advanced large-capacity electronic expansion valves,

combined with the excellent electronic expansion valve control system developed independently and verified with long-time testing, to improve the operation stability of the entire refrigeration system.

### **Intelligent Control**

The industrial grade microcomputer controller ensures continuous and stable operation of the unit. Modules communicate and connect to each other through RS485. The unit display screen can be used to manage all modules to monitor the data and operation status and select the number of modules. The operation of each module is relatively independent and under centralized control.

### **Easy maintenance**

The unit is equipped with an aesthetic and easy-to-use color LCD touch screen and a friendly all-Chinese graphic operation interface with which all operations can be done by tapping on the screen. With multi-level password protection, it can effectively prevent unauthorized operation and ensure the safe operation of the unit. Modular design is adopted. For the multi-modular unit, when some units are being maintained, the entire air conditioning system can still operate normally to achieve maintenance without stopping the system.

### **Simple installation**

The refrigerant and refrigerant oil have been filled in before delivery. The parts of the unit that need heat insulation have undergone insulation treatment, tested and commissioned according to the requirements of GB/T18430.1, and only the water pipe and power supply need to be connected on the field. The unit can be put into use after being started and debugged by the after-sales service personnel of Gplus for the first time on the field.

## **1.3 Design Features**

### **High-efficiency Compressor**

The high-efficiency semi-hermetic screw compressor, which is specially designed for the optimization of R134a refrigerant, can realize stepless regulation for energy through its slide valve. The energy regulation ranges of a single-compressor unit and a dual-compressor unit are from 25% to 100% and from 12.5% to 100% respectively, which can avoid problems faced by common step regulation units such as frequent start and stop, large fluctuations in water temperature and especially, excessive temperature and humidity control in technological places, minimizing the operating cost.

### **Air-side heat exchanger**

The air-side heat exchanger composed of aluminum fins made up of high efficient internal threaded copper tubes, and reasonable tube bundle design ensure the refrigerant to run at the optimum flow rate regardless of gas state or liquid state, and reduces the flow resistance of refrigerant. In addition, the designed heat exchange area, air duct and fins are increased to balance the surface air velocity and the distribution of refrigerant, improving heat exchange performance.

The unit adopts the low-noise type outer rotor axial flow fan. The blades of the fan have

gone through dynamic and static balance tests. The long type air duct for diversion effectively reduces the airflow noise. Moreover, the built-in thermistor overheat protection component of the motor ensures safe and reliable operation; Motor protection class IP54, insulation class F.

### **Water-side heat exchanger**

The unit comes with an efficient flooded heat exchanger, with the efficient heat exchange tubes completely immersed in refrigerant when the unit is operating. The complex tooth-type structure on the external surface of the heat exchange tube facilitates nuclear boiling, thus largely improving the heat transmission outside the tube; The spiral tooth-type structure on the internal surface of the efficient heat exchange tube helps enhance the disturbance of refrigerating medium when it is flowing in the tube, which greatly increases the heat exchange efficiency in the tube. The enhanced heat transfer both inside and outside the tubes increases the efficiency of the heat exchanger as a whole, which then improves the efficiency of the unit. Due to reasonable flow speed of refrigerating medium inside the heat exchanger, the linear pressure loss and power consumption are reduced.

Each pressure vessel has been manufactured, tested and inspected in accordance with the national pressure vessel standard. The heat exchanger surface adopts 20 mm thick soft closed-hole foam rubber plastic insulation material to reduce energy loss.

### **Throttling mechanism**

The unit is equipped with a DANFOSS electronic expansion valve with 3,810 regulation steps that has a high control accuracy, fast response and quick regulation. Under full load and partial load, the electronic expansion valve can always have an excellent performance that helps greatly increase the energy conservation performance and stability of the unit as well as lower the operation cost.

The electronic expansion valve adopts the original liquid level meter to control the liquid level height of the refrigerant in the evaporator, which can accurately control the refrigerant flow into the evaporator, dynamically adjust the deviation between the actual liquid level and target level of the evaporator, so as to not only ensure the operating safety of the compressor, but also give consideration to the operating efficiency of the whole machine.

### **Two-stage high-efficiency oil separator + unique oil return technology**

GAW series unit adopts two-stage oil separation technology. The compressor has built-in stage-1 efficient oil separator to reduce oil contained in the refrigerant. In addition, the efficient horizontal oil separator is adopted for stage 2. It features a built-in high-strength stainless steel filter screen, and realizes three-stage oil separation through collision, filtration, and gravity. This increases the efficiency if compared with a conventional centrifugal oil separator when the unit operates at low load and low flow rate of the refrigerant. The two-stage oil separation design enables the oil separation efficiency to exceed 99.9% at any load in all operating conditions, which greatly reduces oil residual in the heat exchanger and increases the operating efficiency of the entire unit.

The patented continuous oil return technology of Gplus - oil injected by oil - ensures the safety of oil supply for the compressor in long-term operation as it can take the residual

0.1% refrigeration oil in the evaporator back to the compressor without increasing the power consumption of the compressor.

### **Economizer circulation**

GAW series units are designed with the economizer. Economizer circulation increases the refrigerant flow in the condenser and enlarges the enthalpy difference of the main circulation loop. It significantly increases the compressor efficiency and reduces the discharge temperature of the compressor. In addition, it dramatically improves the refrigeration performance and reliability of the unit. In nominal cooling conditions, the cooling capacity is improved by 10%-15% and the COP is increased by 3%-5%.

### **Microcomputer controller**

The industrial-level microcomputer controller, together with the LCD touch screen, constitutes the control unit of the unit. While TICA's unique self-control technology and up-to-edge control technology in the world create powerful control functions of the controller.

With a cutting-edge intelligent control program and an advanced capacity regulation system, the single compressor can realize stepless regulation at a load range of 25% - 100%. The unit load and the load at the user side which are highly matched ensures precise control of water temperature by the unit under all working conditions, and the temperature control precision can reach  $\pm 0.3^{\circ}\text{C}$ .

The intelligent defrosting technology makes it possible to accurately judge the best timing for defrosting so as to realize timely defrosting and to avoid false defrosting and frequent defrosting.

The application of graded control for the unit fan effectively reduces the power consumption of the unit in the transitional seasons;

The advanced pre-control function makes it possible for the operator to take relevant remedy measures in a timely manner before any failure occurs to avoid frequent shutdown of the unit;

The unit supports the compiling of weekly operating schedules to implement comprehensive automatic start and stop control of the unit, which truly implements unattended and automatic operation.

### **Main functions**

- Local or remote automatic control
- Real-time display of data and status such as temperature, pressure, and accumulated running time
- Display and settings of control parameters
- Automatic shutdown upon alarm and failure display
- Historical fault memory
- Multiple time switch functions and real-time clock display
- Control of the balanced operation of the compressor
- Frequent startup/shutdown prevention of compressors
- Anti-freezing protection
- Graded energy-saving control of the fan
- Intelligent and reliable defrosting control

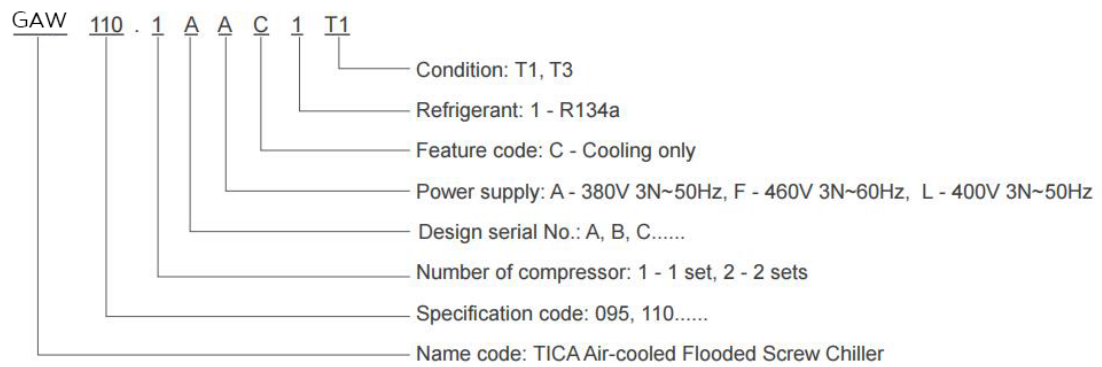
## **Protection functions**

- Power supply protection (phase loss, reverse phase, over-voltage, under-voltage, and phase imbalance)
- Anti-freezing protection
- Compressor oil level protection
- Protection of high condensation pressure
- Protection of low evaporation pressure
- Compressor motor overheat protection
- Compressor motor overload protection
- Compressor start failure protection
- Protection of no pressure difference
- Compressor reverse rotation protection
- Evaporator water cut-off protection
- System pressure warning protection
- High discharge temperature protection

## **Communication functions**

The unit can communicate through RS485 standard interface of Modbus protocol to facilitate the access to building control system.

## 2 Nomenclature



### 3 Performance Specifications and Operation Range

#### 3.1.1 Table for Technical Performance of Chillers (GAW-AAC1T1)

Table for Technical Parameters of T1 Condition.(380V 3N~ 50Hz)										
Model GAW-AAC1T1			095.1	120.1	140.1	155.1	180.1	205.1	225.1	240.1
Nominal cooling capacity		kW	336	425	495	556	645	725	791	820
		kcal/h	288960	365500	425700	478160	554700	623500	680260	705200
Cooling power input		kW	99.5	133.0	147.0	166.0	190.8	215.8	244.5	255.4
EER		kW/kW	3.38	3.20	3.37	3.35	3.38	3.36	3.24	3.21
Cooling rated current		A	183	229	264	294	340	378	430	447
Maximum startup current		A	358	488	615	683	845	845	965	965
Maximum operating current		A	254	303	353	388	439	480	563	504
Refrigerant	Type		R134a							
	Refrigerant circuit number		1							
Compressor	Type		Semi-hermetic screw compressor							
	Energy regulation range		25%-100% stepless regulation							
	Startup Type		Y-Δ							
Fan	Air flow	m <sup>3</sup> /h	147000	147000	196000	196000	245000	245000	294000	294000
	Quantity	Set	6	6	8	8	10	10	12	12
	Power input	kW	13.8	13.8	18.4	18.4	23.0	23.0	27.6	27.6
	Current	A	31.8	31.8	42.4	42.4	53.0	53.0	63.6	63.6
Water side heat exchanger	Type		Highly Efficient Flooded Shell-and-Tube							
	Water flow	m <sup>3</sup> /h	58	73	85	96	111	125	136	141
	Water pipe diameter	DN	150	150	150	150	150	150	150	200
	Water pressure drop	kPa	62	68	71	68	67	71	72	67
	Design Pressure of Water Side	MPa	1.0							
Dimensions	Length	mm	3600	3600	4790	4790	5990	5990	7180	7180
	Width	mm	2250							
	High	mm	2460							
Weight of unit	Transportation	kg	3660	4150	4600	4700	5530	5650	6200	6380
	Operation	kg	3710	4210	4670	4780	5620	5750	6310	6500

**Table for Technical Parameters of T1 Condition.(380V 3N~ 50Hz)**

Model GAW-AAC1T1			140.2	160.2	180.2	205.2	240.2	260.2	280.2	310.2	340.2	360.2	375.2	410.2	445.2	475.2	
Nominal cooling capacity	kW		503	568	644	732	850	894	989	1112	1184	1291	1316	1450	1564	1682	
	kcal/h		432580	488480	553840	629520	731000	768840	850540	956320	1018240	1110260	1131760	1247000	1345040	1446520	
Cooling power input	kW		154.8	177.5	200.6	224.6	266.0	268.8	294.1	335.4	348.8	380.8	391.7	429.4	484.2	523.3	
EER	kW/kW		3.25	3.20	3.21	3.26	3.20	3.33	3.36	3.32	3.39	3.39	3.36	3.38	3.23	3.21	
Cooling rated current	A		290	327	362	399	459	491	527	593	629	679	694	753	851	912	
Maximum startup current	A		596	601	671	671	791	968	968	1071	1284	1284	1325	1325	1517	1458	
Maximum operating current	A		435	486	562	562	606	707	707	777	878	878	960	960	1104	986	
Refrigerant	Type		R134a														
	Refrigerant circuit number		2														
Compressor	Type		Semi-hermetic screw compressor														
	Energy regulation range		12.5%-100% stepless regulation														
	Startup Type		Y-Δ														
Fan	Air flow	m <sup>3</sup> /h	196000	196000	294000	294000	294000	392000	392000	392000	490000	490000	490000	490000	450000	450000	
	Quantity	Set	8	8	12	12	12	16	16	16	20	20	20	20	20	20	
	Power input	kW	18.4	18.4	27.6	27.6	27.6	36.8	36.8	36.8	46.0	46.0	46.0	46.0	46.0	46	
	Current	A	42.4	42.4	63.6	63.6	63.6	84.8	84.8	84.8	106.0	106.0	106.0	106.0	106.0	106.0	
Water side heat exchanger	Type		Highly Efficient Flooded Shell-and-Tube														
	Water flow	m <sup>3</sup> /h	87	98	111	126	146	154	170	191	204	222	226	249	269	289	
	Water pipe diameter	DN	150	150	150	150	200	200	200	200	200	200	200	200	200	200	
	Water pressure drop	kPa	62	66	68	71	71	68	71	69	69	68	71	72	72	70	
	Design Pressure of Water Side	MPa	1.0														
Dimensions	Length	mm	4790	4790	7180	7180	7180	9570	9570	9570	11970	11970	11970	11970	11970	11970	
	Width	mm	2250														
	High	mm	2460							2520							
Weight of unit	Transportation	kg	5420	5560	7320	7452	8300	9080	9200	9400	10910	11060	11120	11300	11850	11950	
	Operation	kg	5490	5640	7430	7572	8430	9220	9350	9560	11080	11240	11310	11500	12060	12170	

Note:

- Nominal cooling condition: chilled water inlet/outlet temperature is 12°C/7°C, ambient dry bulb temperature is 35°C.
- The parameter of power supply is 380V 3N~ 50Hz. Allowable voltage fluctuation range is 360V-400V.
- The above parameters may change because of product improvement. Therefore, it shall be subject to the parameters on the product nameplate and the actual product.

### 3.1.2 Table for Technical Performance of Chillers (GAW-AAC1T3)

Table for Technical Parameters of T3 Condition.(380V/400V 3N~ 50Hz)

Model GAW-AAC1T3		095.1	120.1	140.1	155.1	180.1	205.1	225.1	
Nominal cooling capacity	kW	336	425	495	556	645	725	791	
	kcal/h	288960	365500	425700	478160	554700	623500	680260	
Cooling power input	kW	99.5	133.0	147.0	166.0	190.8	215.8	244.5	
Cooling rated current	A	183	229	264	294	340	378	430	
EER	kW/kW	3.38	3.20	3.37	3.35	3.38	3.36	3.24	
Nominal cooling capacity①	kW	298	377	438	493	571	642	701	
	kcal/h	256280	324220	376680	423980	491060	552120	602860	
Cooling power input①	kW	124.0	165.7	183.1	206.7	237.6	268.7	304.5	
Cooling rated current①	A	222	279	321	357	414	461	524	
Maximum startup current	A	358	488	615	683	845	845	965	
Maximum operating current	A	259	379	431	483	526	526	660	
Power supply		380V 3N~ 50Hz							
Refrigerant	Type	R134a							
	Refrigerant circuit number	1							
Compressor	Type	Semi-hermetic screw compressor							
	Energy regulation range	25%-100% stepless regulation							
	Startup Type	Y-Δ							
Fan	Air flow	m <sup>3</sup> /h	147000	147000	196000	196000	245000	245000	294000
	Quantity	Set	6	6	8	8	10	10	12
	Power input	kW	13.8	13.8	18.4	18.4	23.0	23.0	27.6
	Current	A	31.8	31.8	42.4	42.4	53.0	53.0	63.6
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube							
	Water flow	m <sup>3</sup> /h	58	73	85	96	111	125	136
	Water pipe diameter	DN	150	150	150	150	150	150	150
	Water pressure drop	kPa	62	68	71	68	67	71	72
	Design Pressure of Water Side	MPa	1.0						
Dimensions	Length	mm	3600	3600	4790	4790	5990	5990	7180
	Width	mm	2250						
	High	mm	2460						
Weight of unit	Transportation	kg	3660	4150	4600	4700	5530	5650	6200
	Operation	kg	3710	4210	4670	4780	5620	5750	6310

**Table for Technical Parameters of T3 Condition.(380V/400V 3N~ 50Hz)**

Model GAW-AAC1T3		140.2	160.2	180.2	205.2	240.2	260.2	280.2	310.2	340.2	360.2	375.2	410.2	445.2	
Nominal cooling capacity	kW	503	568	644	733	850	894	989	1112	1184	1291	1316	1450	1564	
	kcal/h	432580	488480	553840	630380	731000	768840	850540	956320	1018240	1110260	1131760	1247000	1345040	
Cooling power input	kW	154.8	177.5	200.6	224.7	266.0	268.8	294.1	335.4	348.8	380.8	391.7	429.4	484.2	
Cooling rated current	A	290	327	362	399	459	491	527	593	629	679	694	753	851	
EER	kW/kW	3.25	3.20	3.21	3.26	3.20	3.33	3.36	3.32	3.39	3.39	3.36	3.38	3.23	
Nominal cooling capacity①	kW	428	483	548	648	753	760	876	985	1007	1144	1119	1284	1385	
	kcal/h	368080	415380	471280	557280	647580	653600	753360	847100	866020	983840	962340	1104240	1191100	
Cooling power input①	kW	189.2	217.0	245.2	279.7	331.3	328.6	366.2	417.7	426.3	474.2	478.8	534.7	603.0	
Cooling rated current①	A	348	392	433	486	559	587	642	722	753	826	830	917	1036	
Maximum startup current	A	626	637	695	695	867	1046	1046	1166	1371	1371	1371	1371	1614	
Maximum operating current	A	496	558	610	610	758	863	863	967	1052	1052	1052	1052	1298	
Power supply		380V 3N~ 50Hz													
Refrigerant	Type	R134a													
	Refrigerant circuit number	2													
Compressor	Type	Semi-hermetic screw compressor													
	Energy regulation range	12.5%-100% stepless regulation													
	Startup Type	Y-Δ													
Fan	Air flow	m³/h	196000	196000	294000	294000	294000	392000	392000	392000	490000	490000	490000	490000	450000
	Quantity	Set	8	8	12	12	12	16	16	16	20	20	20	20	20
	Power input	kW	18.4	18.4	27.6	27.6	27.6	36.8	36.8	36.8	46.0	46.0	46.0	46.0	46.0
	Current	A	42.4	42.4	63.6	63.6	63.6	84.8	84.8	84.8	106.0	106.0	106.0	106.0	106.0
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube													
	Water flow	m³/h	87	98	111	126	146	154	170	191	204	222	226	249	269
	Water pipe diameter	DN	150	150	150	150	200	200	200	200	200	200	200	200	200
	Water pressure drop	kPa	62	66	68	71	71	68	71	69	69	68	71	72	72
Design Pressure of Water Side	MPa	1.0													
Dimensions	Length	mm	4790	4790	7180	7180	7180	9570	9570	9570	11970	11970	11970	11970	11970
	Width	mm	2250												
	High	mm	2460						2520						
Weight of unit	Transportation	kg	5420	5560	7320	7452	8300	9080	9200	9400	10910	11060	11120	11300	11850
	Operation	kg	5490	5640	7430	7572	8430	9220	9350	9560	11080	11240	11310	11500	12060

Note:

- Nominal cooling condition: chilled water inlet/outlet temperature is 12°C/7°C, ambient dry bulb temperature is 35°C.
- ①: The parameters in condition of: chilled water inlet/outlet temperature is 12°C/7°C, ambient dry bulb temperature is 46°C.

3. Allowable voltage fluctuation range is 360 V-400 V.
4. The above parameters may change because of product improvement. Therefore, it shall be subject to the parameters on the product nameplate and the actual product.

### 3.1.3 Table for Technical Performance of Chillers (GAW-ALC1T1)

**Table for Technical Parameters of T1 Condition.(400V 3N~ 50Hz**

Model GAW-ALC1T1		095.1	120.1	140.1	155.1	180.1	205.1	225.1	240.1	
Nominal cooling capacity	kW	336	425	495	556	645	725	791	820	
	kcal/h	288960	365500	425700	478160	554700	623500	680260	705200	
Cooling power input	kW	99.5	133.0	147.0	166.0	190.8	215.8	244.5	255.4	
EER	kW/kW	3.38	3.20	3.37	3.35	3.38	3.36	3.24	3.21	
Cooling rated current	A	173	218	250	279	323	359	409	425	
Maximum startup current	A	340	464	584	649	803	803	917	917	
Maximum operating current	A	241	288	336	369	417	456	534	478	
Refrigerant	Type	R134a								
	Refrigerant circuit number	1								
Compressor	Type	Semi-hermetic screw compressor								
	Energy regulation range	25%-100% stepless regulation								
	Startup Type	Y-Δ								
Fan	Air flow	m <sup>3</sup> /h	147000	147000	196000	196000	245000	245000	294000	294000
	Quantity	Set	6	6	8	8	10	10	12	12
	Power input	kW	13.8	13.8	18.4	18.4	23.0	23.0	27.6	27.6
	Current	A	30.2	30.2	40.3	40.3	50.4	50.4	60.5	60.5
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube								
	Water flow	m <sup>3</sup> /h	58	73	85	96	111	125	136	141
	Water pipe diameter	DN	150	150	150	150	150	150	150	200
	Water pressure drop	kPa	62	68	71	68	67	71	72	67
Dimensions	Design Pressure of Water Side	MPa	1.0							
	Length	mm	3600	3600	4790	4790	5990	5990	7180	7180
	Width	mm	2250							
Weight of unit	High	mm	2460							
	Transportation	kg	3660	4150	4600	4700	5530	5650	6200	6380
	Operation	kg	3710	4210	4670	4780	5620	5750	6310	6500

**Table for Technical Parameters of T1 Condition.(400V 3N~ 50Hz)**

Model GAW-ALC1T1		140.2	160.2	180.2	205.2	240.2	260.2	280.2	310.2	340.2	360.2	375.2	410.2	445.2	475.2	
Nominal cooling capacity	kW	503	568	644	732	850	894	989	1112	1184	1291	1316	1450	1564	1682	
	kcal/h	432580	488480	553840	629520	731000	768840	850540	956320	1018240	1110260	1131760	1247000	1345040	1446520	
Cooling power input	kW	154.8	177.5	200.6	224.6	266.0	268.8	294.1	335.4	348.8	380.8	391.7	429.4	484.2	523.3	
EER	kW/kW	3.25	3.20	3.21	3.26	3.20	3.33	3.36	3.32	3.39	3.39	3.36	3.38	3.23	3.21	
Cooling rated current	A	276	311	344	379	436	466	501	563	598	645	659	715	808	866	
Maximum startup current	A	566	571	637	637	751	920	920	1018	1220	1220	1259	1259	1441	1385	
Maximum operating current	A	413	462	534	534	575	671	671	738	834	834	912	912	1049	937	
Refrigerant	Type	R134a														
	Refrigerant circuit number	2														
Compressor	Type	Semi-hermetic screw compressor														
	Energy regulation range	12.5%-100% stepless regulation														
	Startup Type	Y-Δ														
Fan	Air flow	m <sup>3</sup> /h	196000	196000	294000	294000	294000	392000	392000	392000	490000	490000	490000	490000	450000	450000
	Quantity	Set	8	8	12	12	12	16	16	16	20	20	20	20	20	20
	Power input	kW	18.4	18.4	27.6	27.6	27.6	36.8	36.8	36.8	46.0	46.0	46.0	46.0	46.0	46.0
	Current	A	40.3	40.3	60.5	60.5	60.5	80.6	80.6	80.6	100.8	100.8	100.8	100.8	100.8	100.8
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube														
	Water flow	m <sup>3</sup> /h	87	98	111	126	146	154	170	191	204	222	226	249	269	289
	Water pipe diameter	DN	150	150	150	150	200	200	200	200	200	200	200	200	200	200
	Water pressure drop	kPa	62	66	68	71	71	68	71	69	69	68	71	72	72	70
Design Pressure of Water Side	MPa	1.0														
Dimensions	Length	mm	4790	4790	7180	7180	7180	9570	9570	9570	11970	11970	11970	11970	11970	11970
	Width	mm	2250													
	High	mm	2460						2520							
Weight of unit	Transportation	kg	5420	5560	7320	7452	8300	9080	9200	9400	10910	11060	11120	11300	11850	11950
	Operation	kg	5490	5640	7430	7572	8430	9220	9350	9560	11080	11240	11310	11500	12060	12170

Note:

1. Nominal cooling condition: chilled water inlet/outlet temperature is 12°C/7°C, ambient dry bulb temperature is 35°C.
2. The parameter of power supply is 400V 3N~ 50Hz.Allowable voltage fluctuation range is 380V-420V.
3. The above parameters may change because of product improvement. Therefore, it shall be subject to the parameters on the product nameplate and the actual product.

### 3.1.4 Table for Technical Performance of Chillers (GAW-AFC1T1)

Table for Technical Parameters of T1 Condition.(460V 3N~ 60Hz)

Model GAW-AFC1T1		100.1	120.1	145.1	165.1	190.1	215.1	245.1	265.1	285.1	
Nominal cooling capacity	kW	355	430	513	579	667	755	867	940	1011	
	kcal/h	305300	369800	441180	497940	573620	649300	745620	808400	869460	
Cooling power input	kW	107.4	133.9	157.6	178.3	203.2	231.5	256.7	292.2	311.5	
Cooling rated current	A	157	188	217	253	286	327	358	408	433	
EER	kW/kW	3.31	3.21	3.26	3.25	3.28	3.26	3.38	3.22	3.25	
Maximum startup current	A	314	371	465	586	650	805	805	917	917	
Maximum operating current	A	219	268	296	335	378	416	466	545	490	
Power supply		460 V~3 N~60 Hz									
Refrigerant	Type	R134a									
	Refrigerant circuit number	1									
Compressor	Type	Semi-hermetic screw compressor									
	Energy regulation range	25%-100% stepless regulation									
	Startup Type	Y-Δ									
Fan	Air flow	m <sup>3</sup> /h	147000	147000	196000	196000	245000	245000	294000	343000	343000
	Quantity	Set	6	6	8	8	10	10	12	14	14
	Power input	kW	13.2	13.2	17.6	17.6	22	22	26.4	30.8	30.8
	Current	A	31.8	31.8	42.4	42.4	53	53	63.6	74.2	74.2
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube									
	Water flow	m <sup>3</sup> /h	61	74	88	100	115	130	149	162	174
	Water pipe diameter	DN	150	150	150	150	150	150	200	200	200
	Water pressure drop	kPa	69	70	76	74	72	77	74	73	71
	Design Pressure of Water Side	MPa	1.0								
Dimensions	Length	mm	3600	3600	4790	4790	5990	5990	7180	8380	8380
	Width	mm	2250								
	High	mm	2460								
Weight of unit	Transportation	kg	3630	4120	4570	4670	5520	5610	6140	7020	7050
	Operation	kg	3680	4170	4630	4730	5610	5700	6240	7140	7195

**Table for Technical Parameters of T1 Condition.(460V 3N~ 60Hz)**

Model GAW-AFC1T1		150.2	165.2	200.2	225.2	240.2	260.2	290.2	300.2	330.2	345.2	380.2	395.2	430.2	445.2	485.2	
Nominal cooling capacity	kW	528	589	709	795	860	922	1026	1052	1159	1210	1335	1393	1511	1566	1715	
	kcal/h	454080	506540	609740	683700	739600	792920	882360	904720	996740	1040600	1148100	1197980	1299460	1346760	1474900	
Cooling power input	kW	164.6	183.8	212.6	241.3	267.7	281.8	315.2	328.5	356.6	369.1	402.2	423.3	458.3	469.6	510.8	
Cooling rated current	A	242	272	312	350	376	392	434	474	506	527	566	603	647	660	711	
EER	kW/kW	3.21	3.20	3.33	3.29	3.21	3.27	3.26	3.20	3.25	3.28	3.32	3.29	3.30	3.33	3.36	
Maximum startup current	A	485	522	533	582	639	761	761	921	921	1028	1028	1221	1221	1260	1260	
Maximum operating current	A	370	417	438	482	536	593	593	671	671	756	756	832	832	910	910	
Power supply		460 V~3 N~60 Hz															
Refrigerant	Type	R134a															
	Refrigerant circuit number	2															
Compressor	Type	Semi-hermetic screw compressor															
	Energy regulation range	12.5%-100% stepless regulation															
	Startup Type	Y-Δ															
Fan	Air flow	m³/h	196000	196000	294000	294000	294000	392000	392000	392000	392000	490000	490000	490000	490000	450000	450000
	Quantity	Set	8	8	12	12	12	16	16	16	16	20	20	20	20	20	20
	Power input	kW	17.6	17.6	26.4	26.4	26.4	35.2	35.2	35.2	35.2	44	44	44	44	44	44
	Current	A	42.4	42.4	63.6	63.6	63.6	84.8	84.8	84.8	84.8	106	106	106	106	106	106
Water side heat exchanger	Type	Highly Efficient Flooded Shell-and-Tube															
	Water flow	m³/h	91	101	122	137	148	159	177	181	199	208	230	240	260	269	295
	Water pipe diameter	DN	150	150	150	150	200	200	200	200	200	200	200	200	200	200	200
	Water pressure drop	kPa	68	71	68	71	73	72	68	71	67	72	73	72	72	72	73
	Design Pressure of Water Side	MPa	1.0														
Dimensions	Length	mm	4790	4790	7180	7180	7180	9570	9570	9570	9570	11970	11970	11970	11970	11970	11970
	Width	mm	2250														
	High	mm	2460						2520								
Weight of unit	Transportation	kg	5240	5340	7260	8170	8240	8980	9140	9260	9340	10850	11040	11080	11280	11630	12040
	Operation	kg	5320	5420	7360	8280	8360	9090	9260	9390	9480	11000	11200	11250	11460	11820	12240

Note:

1. Nominal cooling condition: chilled water inlet/outlet temperature is 12°C/7°C, ambient dry bulb temperature is 35°C.
2. Allowable voltage fluctuation range is 440 V-480 V.
3. The above parameters may change because of product improvement. Therefore, it shall be subject to the parameters on the product nameplate and the actual product.

### 3.2 Table for Performance Coefficients Under Variable Operating Condition

#### Cooling Condition

Water outlet temperature (°C)	Item	Ambient temperature (°C)								
		5	10	15	20	25	30	35	40	45
5	Cooling capacity	1.04	1.03	1.02	1.00	0.98	0.95	0.93	0.90	0.88
	Power	0.66	0.68	0.72	0.76	0.82	0.89	0.97	1.07	1.19
7	Cooling capacity	1.12	1.11	1.09	1.07	1.05	1.02	1.00	0.97	0.94
	Power	0.69	0.71	0.74	0.79	0.85	0.92	1.00	1.11	1.23
8	Cooling capacity	1.16	1.14	1.13	1.11	1.08	1.06	1.03	1.00	0.97
	Power	0.70	0.72	0.75	0.80	0.86	0.93	1.02	1.12	1.24
9	Cooling capacity	1.19	1.18	1.16	1.14	1.12	1.09	1.07	1.03	1.00
	Power	0.71	0.73	0.77	0.81	0.87	0.95	1.03	1.14	1.26
10	Cooling capacity	1.22	1.21	1.20	1.17	1.15	1.13	1.10	1.06	1.03
	Power	0.73	0.75	0.78	0.83	0.89	0.96	1.04	1.16	1.28
12	Cooling capacity	1.29	1.28	1.26	1.24	1.22	1.19	1.16	1.12	1.09
	Power	0.76	0.77	0.81	0.85	0.92	0.99	1.07	1.19	1.31
15	Cooling capacity	1.38	1.37	1.36	1.33	1.31	1.28	1.24	1.20	1.16
	Power	0.80	0.81	0.85	0.89	0.96	1.03	1.11	1.23	1.36
20	Cooling capacity	1.46	1.46	1.44	1.42	1.40	1.36	1.32	1.27	1.23
	Power	0.84	0.85	0.88	0.93	0.99	1.07	1.16	1.28	1.40

### 3.3 Operating Range

Content	Operating range
Water flow	Rated flow: 50%-120%
Maximum difference between water inlet and outlet temperature	8°C
Voltage	Rated voltage $\pm 10\%$
Phase voltage difference	$\pm 2\%$
Power frequency	Rated frequency $\pm 2\%$
Maximum working pressure on water side of heat exchanger	1.0MPa
Maximum startup frequency of compressor	4 times/hour
Ambient air quality	Cannot be used in corrosive atmosphere; Cannot be used in extremely high humidity environments
Drainage system	The height of the accumulated water in the position where the unit is installed must not exceed the base of the unit

## 4 Unit Installation

### Warning

The knowledge introduced in this manual is detailed, but it does not mean that anyone who has read this manual can undertake any job of installation, debugging, operation and maintenance. To ensure validity of the warranty period, the equipment must be installed by the maintenance personnel authorized by Gplus or qualified workers with experience in chiller installation and maintenance. All the relevant specifications must be observed during installation, especially when electrical wiring and other safety protection elements (e.g., the pressure relief valve are involved).

When the voltage exceeds the operating range of the unit, the unit will be damaged. Before installation, make sure that all the circuit breakers of the unit are disconnected.

Gplus shall not bear any responsibilities for harms or damages caused to the unit due to the failure of observing the steps or instructions provided in this manual.

### 4.1 Requirements for Transportation, Loading Unloading and Lifting

(1) Unit transportation precautions

- Abide by national and local laws and regulations during transportation of the unit.
- Avoid collision between the unit and other objects during transportation.
- Do not place other goods on or inside the unit.
- Rollover is forbidden.
- Temperature range during transportation and storage: -25°C to +55°C.

Check the unit according to the following table after the unit is transported.

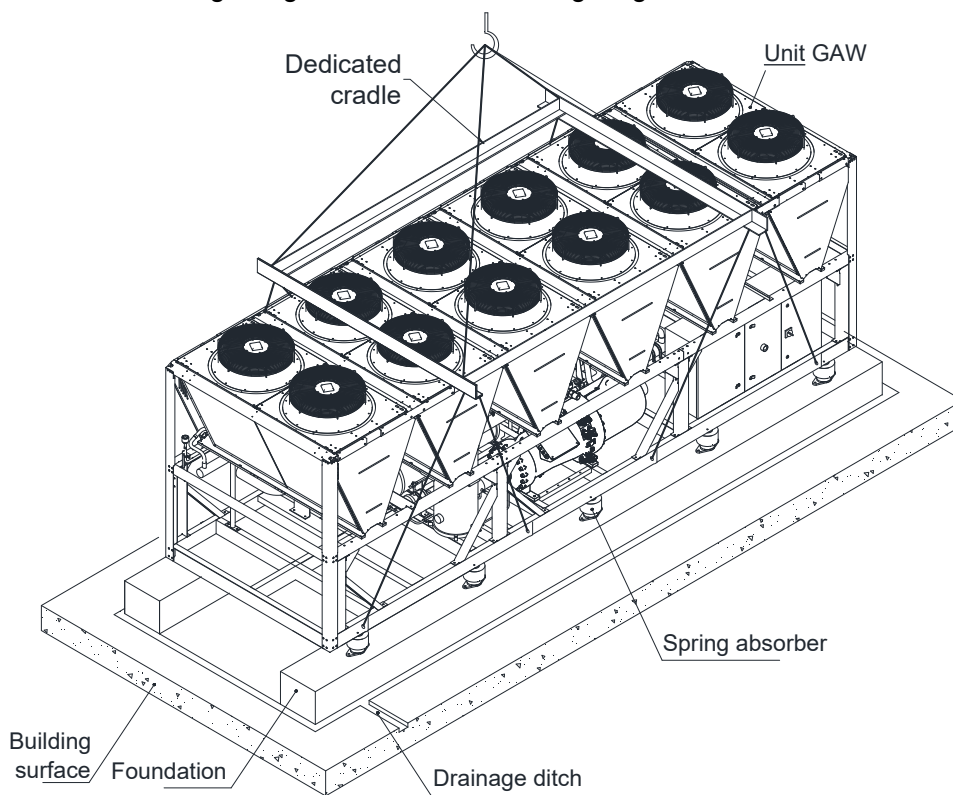
No.	Check items and requirements	Handling method when something not meeting the requirement is found
1	The unit cannot be damaged during transportation.	If the unit is found damaged during transportation, indicate it on the freight bill of the transport company and immediately submit a request in writing to ask the transport agent to come for inspection.
2	The specifications and quantities of the unit accessories should be consistent with the packing list attached to the machine.	Please contact the distributor.
3	The water inlet and outlet covers of the shell and tube heat exchanger for the unit should be kept intact, and the covers cannot be opened before the unit is connected to the water pipe.	Please contact the distributor.

## (2) Unit loading and unloading

The unit is transported as a whole, and the refrigerant required for normal operation has been charged in the unit. During loading, handle the unit carefully, avoiding damages to the unit due to improper operation. Make sure that the hook fits and is fastened with the unit. Note to prevent the sling from damaging the unit. During loading and unloading of the unit, operate carefully to avoid damages to the unit. It is recommended to use a crane to load and unload the unit.

## (3) Lifting

Be sure to use a cable twisted rope or chain with a sufficient bearing capacity to fasten the lifting hole on the unit bottom to lift the unit, and operate according to the requirements of the lifting diagram; make sure that the control cabinet and other parts of the unit are not damaged, and note to use special lifting equipment such as spreader bar and cradle to protect the unit during lifting. Refer to the unit lifting diagram for related contents:



Unit lifting diagram

### Notes:

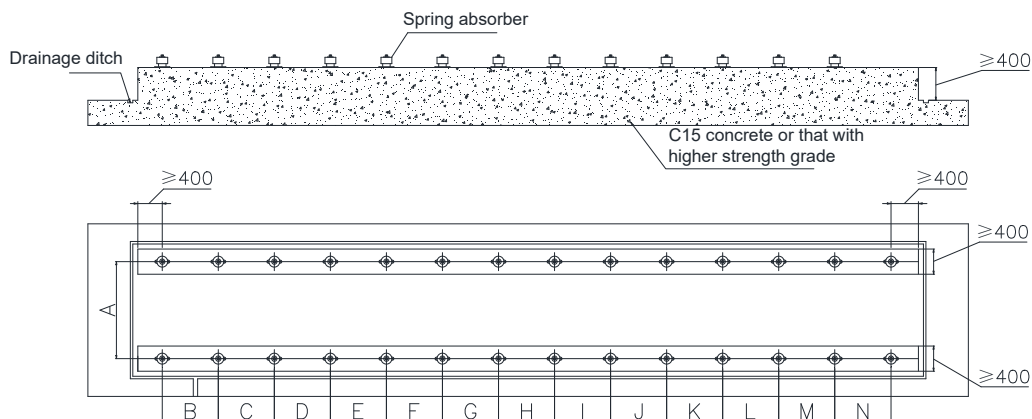
1. Lift the unit according to the diagram. Note to use special lifting equipment such as spreader bar and cradle to protect the unit during lifting; otherwise, the unit will be severely damaged.
2. After the unit is lifted, if its surface has been scratched, it is recommended to re-paint the scratched surface.

**Warning: Use all the lifting lugs of the unit during lifting. Gplus shall not be held responsible for any damages to the unit due to the failure of following the diagram requirements strictly.**

## 4.2 Installation Foundation Requirements

### 4.2.1 Installation Foundation Requirements

The unit should be placed on the horizontal plane foundation, bottom or building roof that can bear the operating weight of the complete set of equipment and the weight of the maintenance personnel. For the operating weight, refer to the unit technical performance table. If the unit location is too high, it is not convenient for the maintenance personnel to complete repair, an appropriate scaffold should be set up around the unit. The scaffold must be able to withstand the weight of the maintenance personnel and their equipment. Refer to the dimensional drawing of the unit installation foundation and feet:



Dimensional drawing of the unit installation foundation and feet

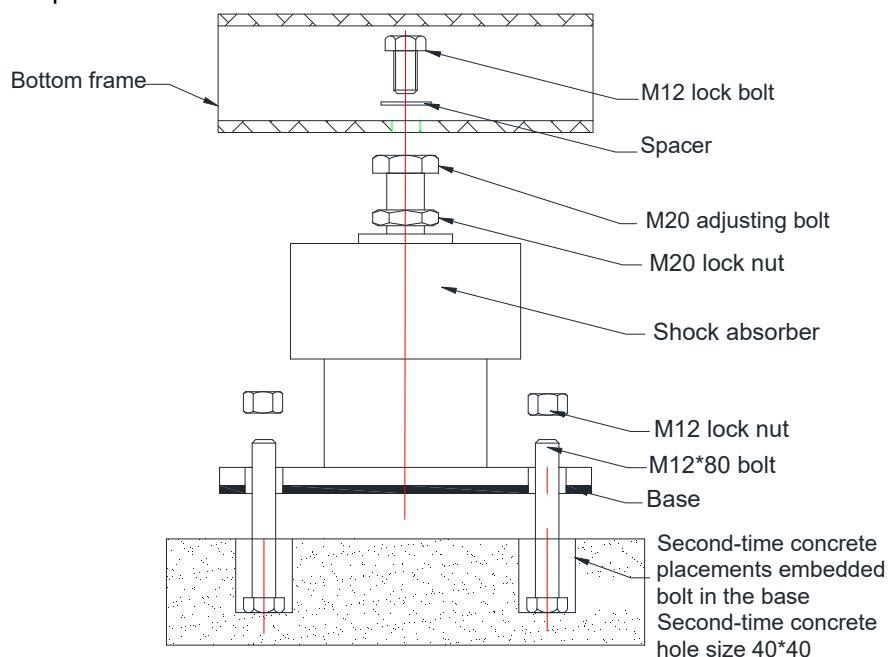
Model	Code (mm)														Shock absorber	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Model	Quantity
GAW095.1AA/LC1T1 GAW095.1AAC1T3 GAW100.1AFC1T1	2170	1392	1392	-	-	-	-	-	-	-	-	-	-	-	MHD-850	6
GAW120.1AA/LC1T1 GAW120.1AAC1T3 GAW120.1AFC1T1	2170	1392	1392	-	-	-	-	-	-	-	-	-	-	-	MHD-1050	6
GAW140.1AA/LC1T1 GAW140.1AAC1T3 GAW145.1AFC1T1	2170	1390	1390	1390	-	-	-	-	-	-	-	-	-	-	MHD-810	8
GAW155.1AA/LC1T1 GAW155.1AAC1T3 GAW165.1AFC1T1	2170	1390	1390	1390	-	-	-	-	-	-	-	-	-	-	MHD-850	8
GAW180.1AA/LC1T1 GAW205.1AA/LC1T1 GAW180.1AAC1T3 GAW205.1AAC1T3 GAW190.1AFC1T1 GAW215.1AFC1T1	2170	1340	1340	1340	1340	-	-	-	-	-	-	-	-	-	MHD-810	10
GAW225.1AA/LC1T1 GAW240.1AA/LC1T1 GAW225.1AAC1T3 GAW245.1AFC1T1	2170	1588	1588	1588	1588	-	-	-	-	-	-	-	-	-	MHD-920	10

GAW265.1AFC1T1 GAW285.1AFC1T1	2170	1300	1300	1300	1300	1300	1300	-	-	-	-	-	-	-	MHD-730	14
GAW140.2AA/LC1T1 GAW160.2AA/LC1T1 GAW140.2AAC1T3 GAW160.2AAC1T3 GAW150.2AFC1T1 GAW165.2AFC1T1	2170	1390	1390	1390	-	-	-	-	-	-	-	-	-	-	MHD-1050	8
GAW180.2AA/LC1T1 GAW205.2AA/LC1T1 GAW180.2AAC1T3 GAW205.2AAC1T3 GAW200.2AFC1T1	2170	1588	1588	1588	1588	-	-	-	-	-	-	-	-	-	MHD-1050	10
GAW240.2AA/LC1T1 GAW240.2AAC1T3 GAW225.2AFC1T1 GAW240.2AFC1T1	2170	1588	1588	1588	1588	-	-	-	-	-	-	-	-	-	MHD-1200	10
GAW260.2AA/LC1T1 GAW280.2AA/LC1T1 GAW260.2AAC1T3 GAW280.2AAC1T3 GAW260.2AFC1T1 GAW290.2AFC1T1	2170	1255	1255	1255	1255	1255	1255	1255	-	-	-	-	-	-	MHD-810	16
GAW310.2AA/LC1T1 GAW310.2AAC1T3 GAW300.2AFC1T1 GAW330.2AFC1T1	2170	1255	1255	1255	1255	1255	1255	1255	-	-	-	-	-	-	MHD-850	16
GAW340.2AA/LC1T1 GAW360.2AA/LC1T1 GAW375.2AA/LC1T1 GAW410.2AA/LC1T1 GAW340.2AAC1T3 GAW360.2AAC1T3 GAW375.2AAC1T3 GAW410.2AAC1T3 GAW345.2AFC1T1 GAW380.2AFC1T1 GAW395.2AFC1T1 GAW430.2AFC1T1	2170	1240	1240	1240	1240	1240	1240	1240	1240	1240	-	-	-	-	MHD-810	20
GAW445.2AA/LC1T1 GAW475.2AA/LC1T1 GAW445.2AAC1T3 GAW445.2AFC1T1 GAW485.2AFC1T1	2170	1240	1240	1240	1240	1240	1240	1240	1240	1240	-	-	-	-	MHD-850	20

#### 4.2.2 Instructions for Installation and Use of the MHD Series Shock Absorber

1. Check the model of the shock absorber against the model that needs to be configured at each point on the unit before installation;
2. Unscrew the M12 bolt of the shock absorber (as shown in the figure below) and place the shock absorber under the bottom frame of the unit (the bottom frame has a  $\varnothing 14$  hole);
3. Align the center hole on the M20 adjusting bolt on the shock absorber with the mounting hole on the bottom frame of the unit (as shown in the figure below), and

- insert the M12 bolt. Do not tighten the M12 bolt;
4. Make sure that the spring absorber is vertical and use the M12 fixing nut to fix the shock absorber on the ground (M12\*80 bolts need to be embedded on the ground. The shock absorber itself has anti-slip and anti-roll functions and does not need to be fixed on the ground). After installation, measure the height of the unit bottom frame and foundation with a ruler. If the unit bottom frame is found to be uneven, the free height of the shock absorber can be adjusted as required as follows: Rotate the M20 nut counterclockwise (upward) with a wrench; Rotate the M20 adjusting bolt counterclockwise with the wrench to adjust the free height to ensure that the unit works horizontally;
  5. After installation, tighten the M12 nut on the bottom frame of the unit after the M20 nut is fastened;
  6. The shock absorber must work in the vertical state. Do not use a hard object to knock and impact the shock absorber.



Shock Absorber Installation Diagram

**Notes:**

1. Foundation levelness  $\leq 0.1\%$ ;
2. The bearing capacity of foundation  $\geq 1.5$  times of the operating weight of unit;
3. Drainage ditches must be provided around the foundation to prevent accumulation of water;
4. Shock absorber must be installed between the unit and the foundation (the shock absorber has anti-slip and anti-roll functions and does not need to be fixed on the foundation);
5. The spring absorber is an optional part of the unit.

## 4.3 Installation space requirements

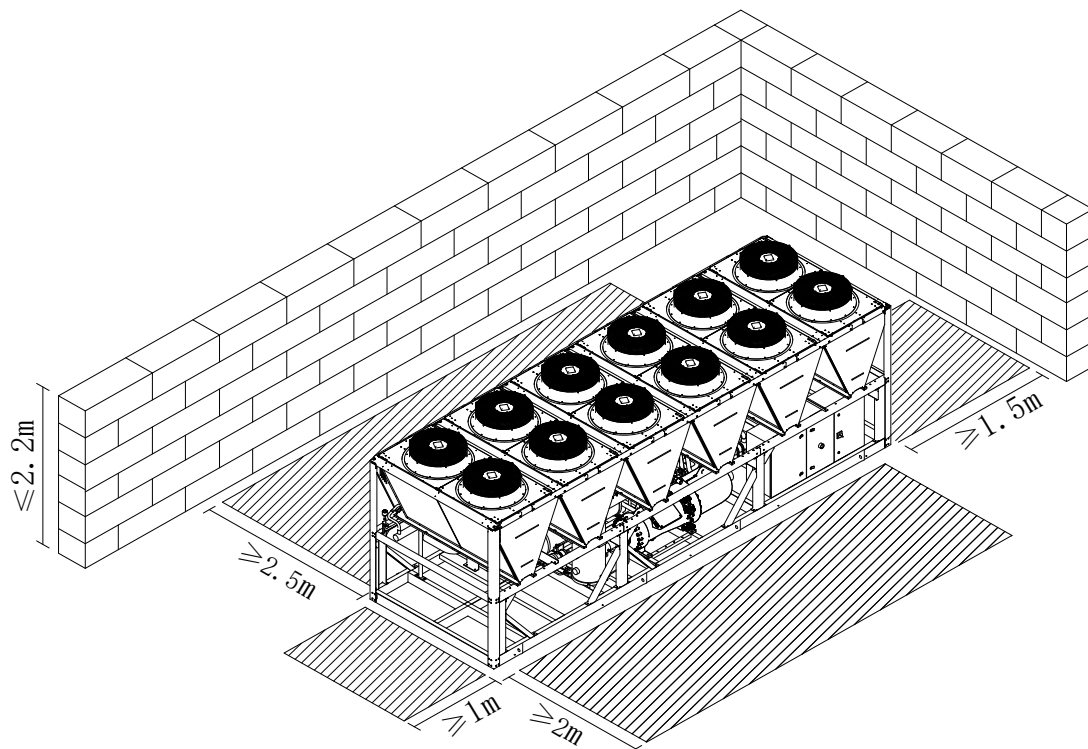
### 4.3.1 Environmental Requirements

It is preferred to install the unit in a site with less direct sunlight and enough fresh air used to ensure the heat exchange effect of the air-side heat exchanger. There should be enough spacing around the unit to allow air to flow into the air-side heat exchanger and such space can also be used as maintenance passages. It is proper to use the unit in a

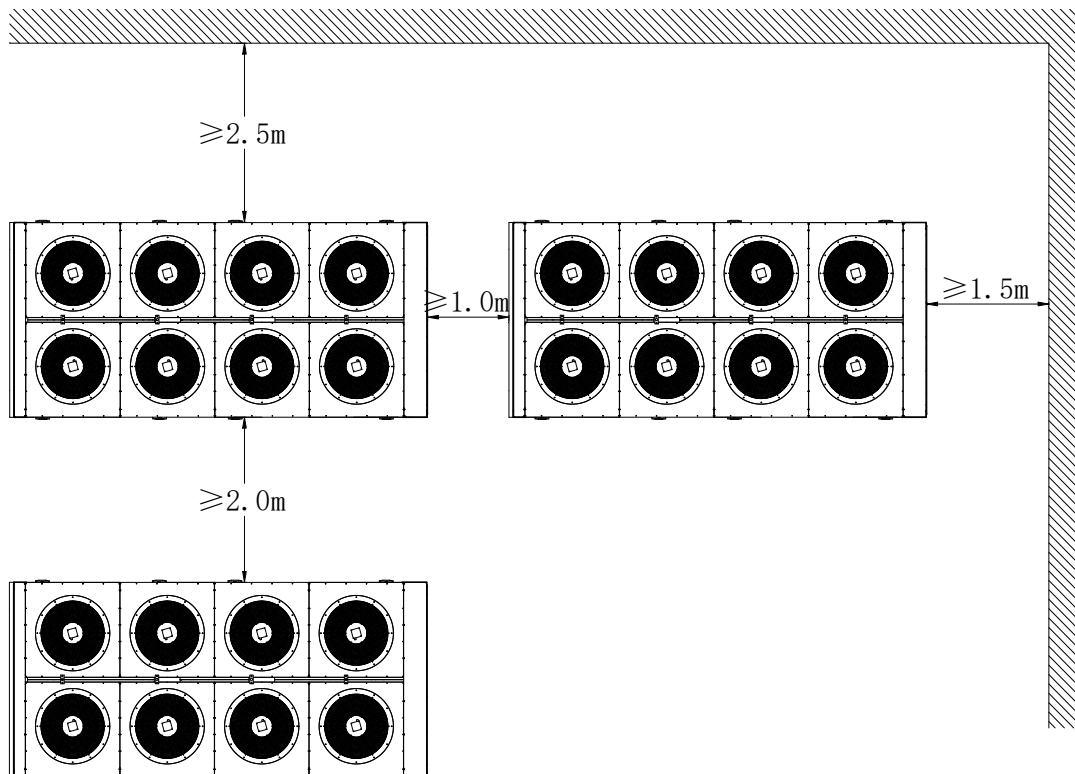
region with an ambient temperature above  $-10^{\circ}\text{C}$ . In the area with snowfall in winter where the unit needs to operate in winter, if snow may be accumulated on the installation site, the installation height must be increased. It is recommended to install a snow cover to ensure normal air flow of the air-side heat exchanger.

### 4.3.2 Space Requirements

To ensure an adequate air flow in the air side heat exchanger and prevent recirculation of discharged hot air, the arrangement interval of units should satisfy the layout requirements for corners or depressions and arrangement requirements of multiple units. Otherwise, the air flowing through the air side heat exchanger will be limited, or the discharge backflow will occur, resulting in the cooling capacity loss, power consumption increase, and even a failure. During installation, also take into account the influence on discharged air of the unit by the downdraft near high buildings around the unit.



Layout requirements for corners or depressions



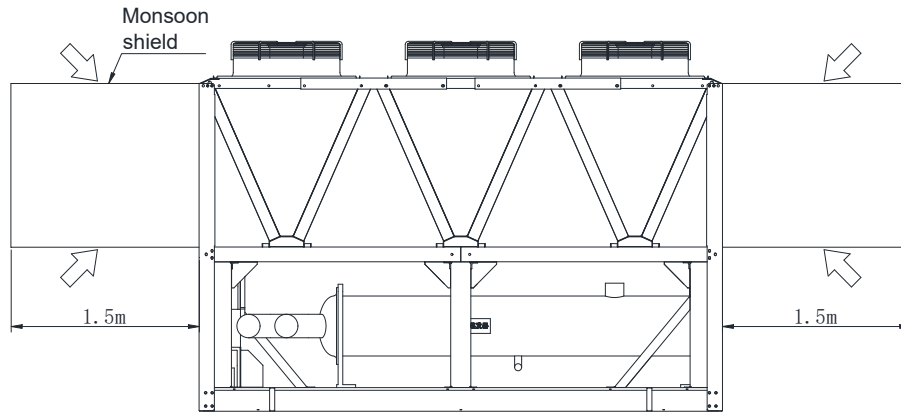
Arrangement requirements of multiple units

Notes:

1. The unit must be installed in a place with good ventilation and heat transmission. To prevent inverse flow of heat exchanging air, it is recommended to reserve side spacing as shown above; under such conditions, there should not be any obstacles below the unit.
2. If the unit is blocked by buildings on top, a space height of at least 3 m shall be reserved, ensuring air ventilation of the unit.
3. Since the re-circulating hot air seriously affects the energy efficiency ratio of unit and even causes the condensing pressure to be too high or the fan motor to get faulty, be sure to reserve the above-mentioned installation space.

### 4.3.3 Monsoon Requirements

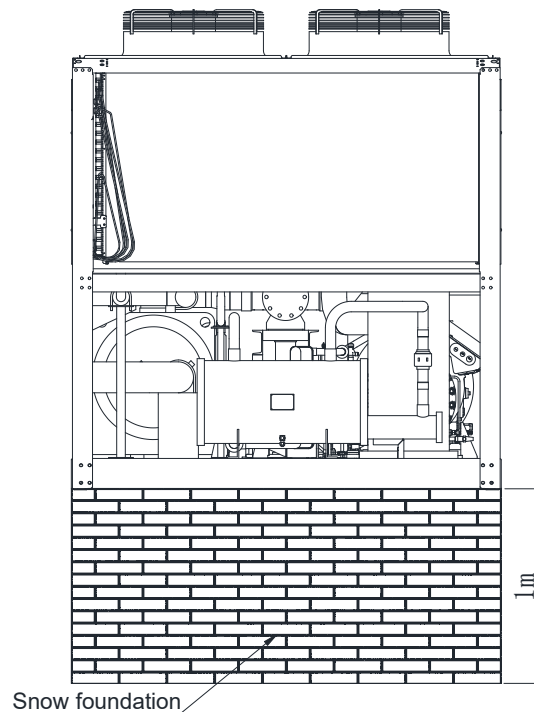
For regions with strong monsoon, if the air-side heat exchanger is installed facing the direction of the monsoon, when the monsoon wind speed is larger than the intake air speed of the fan, the air that has been heat-exchanged by one side heat exchanger will be heat-exchanged again by another heat exchanger, affecting the heat exchange efficiency, decreasing the capacity of the unit and even causing a failure to the unit in severe conditions. To prevent it, do not install the air-side heat exchanger facing the direction of the monsoon. If it is impossible to avoid the impact of the monsoon due to special in-site condition, install the monsoon shield as follows.



Monsoon Shield Installation Diagram

#### 4.3.4 Requirements for Areas with Snowfall and Accumulated Snow

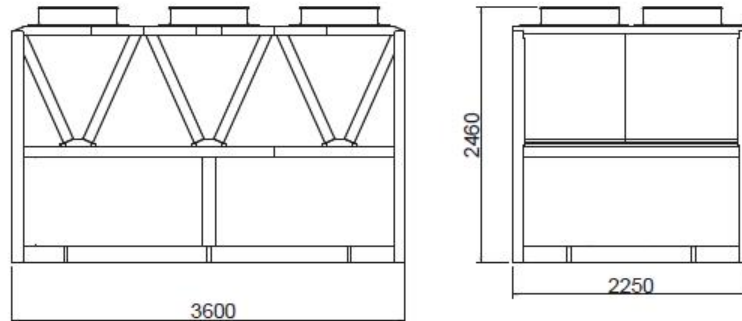
For some areas where it snows frequently in winter, snow prevention measures need to be taken for the air side heat exchanger of the unit; otherwise, it will affect the heat exchange effect of the unit seriously (perennial cooling unit), cause instability in unit operation, be unable to meet the user's requirements, and result in a unit failure in severe conditions. At the same time, the installation height of the unit needs to be increased according to the snow amount to facilitate unit maintenance in the area where snow is easily accumulated. Refer to snow cover and snow foundation installation diagram



Snow foundation installation diagram

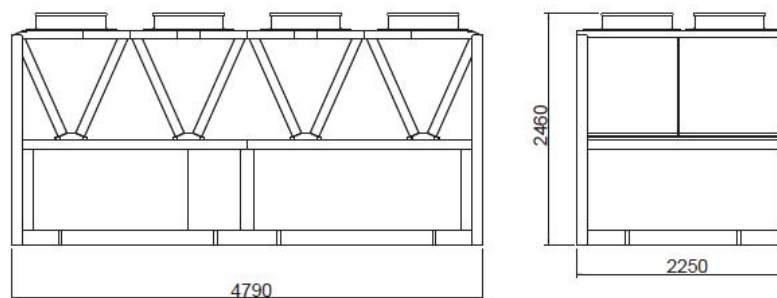
## 4.4 Dimensions

095.1/100.1/120.1

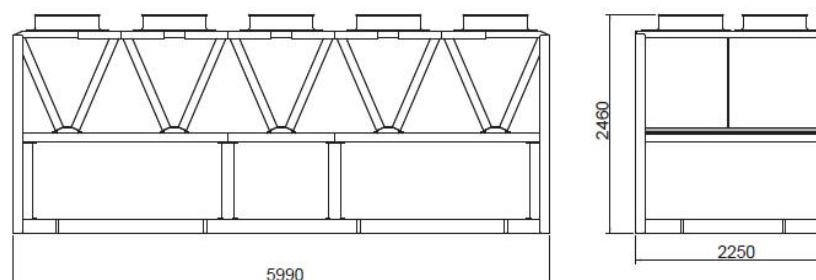


140.1/145.1/155.1/165.1

140.2/150.2/160.2/165.2

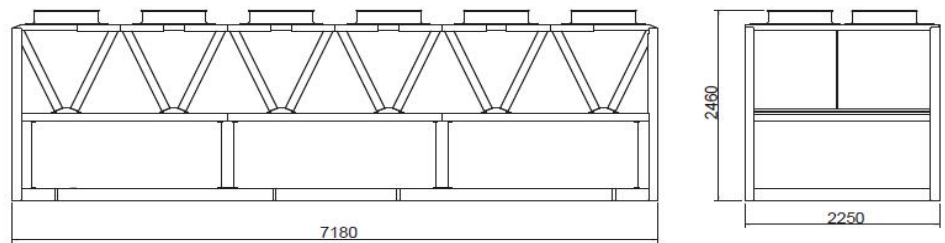


180.1/190.1/205.1/215.1

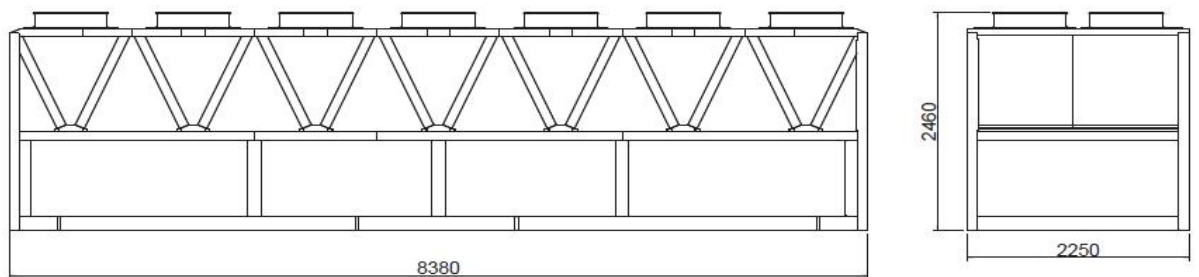


225.1/240.1/245.1

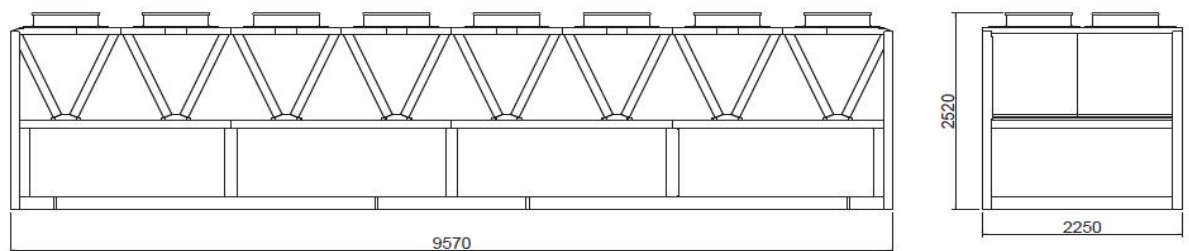
180.2/200.2/205.2/225.2/240.2



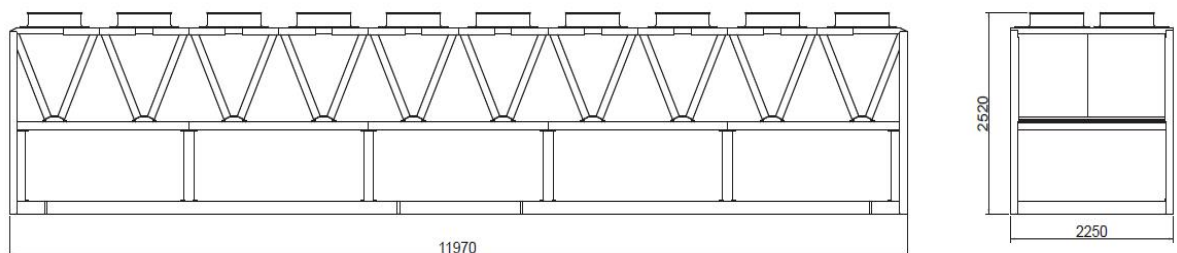
265.1/285.1



260.2/280.2/290.2/300.2/310.2/330.2



340.2/345.2/360.2/375.2/380.2/395.2/410.2/430.2/445.2/475.2/485.2



## 4.5 Chilled Water Pipeline Connection

**Warning: Do not connect the pipe to the unit before rinsing it.**

**Warning: For the water pipe network including filters and evaporators, sediment and dirt can cause serious damages to the heat exchanger and water pipe. The installer/user must ensure the quality of the chilled water and prevent air from entering the water system because air will accelerate the oxidization of the steel components inside the evaporator.**

### 4.5.1 Water System Installation Requirements

The chilled water pipe can be connected after the unit is installed in position. Water pipe connection should comply with the relevant installation procedures to ensure the maximum work efficiency. There should be no foreign matter in the pipeline, and all the chilled water pipes must conform to the local pipeline engineering rules and regulations.

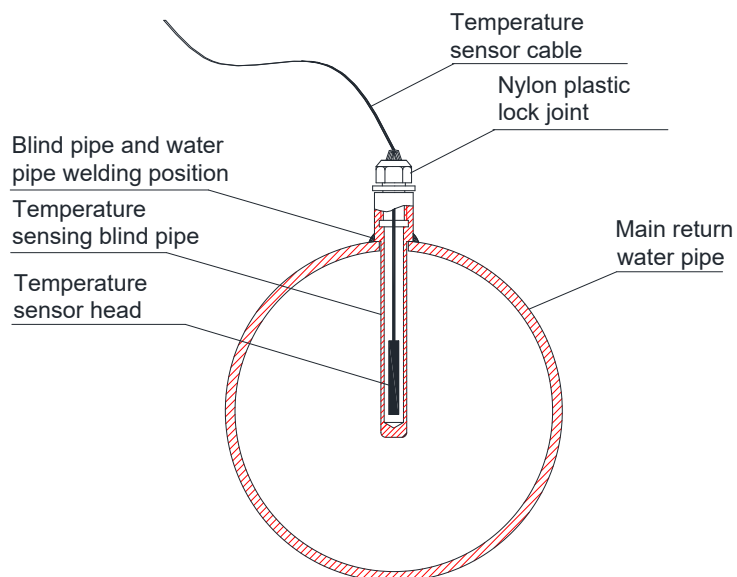
1. The evaporator's maximum flow and pressure drop cannot be exceeded at any time.
2. Before installation, rinse all the chilled water pipes thoroughly, and avoid the inlet and outlet water pipes of the unit evaporator. Make sure that there is no foreign matter in the pipes before putting the unit into operation. Do not flush any foreign matter into the evaporator.
3. The water flow must enter the evaporator through the water inlet. If the water flow through the evaporator is reversed, the performance of the unit will be adversely affected.
4. Install a damping device on all the pipelines connected to the unit; a flow control device meeting requirements must be installed.
6. The water pump installed in the water pipe system needs to be equipped with a starter. The water pump directly pumps water into the evaporator of water system.
8. Pipes and pipe joints must be supported independently and cannot be supported on the unit.
9. Check valves must be installed at the inlet and outlet of the evaporator to facilitate routine maintenance of the water system. The connected pipes and pipe joints can be easily removed to facilitate operation and cleaning, and make it easy to check the evaporator interface tube.
10. Install a filter above 60 meshes on the evaporator, as close as possible to the inlet water interface.
11. Be sure to install the evaporator bypass and bypass valve to minimize the impact resistance of the pipeline. Meanwhile, the evaporator waterway can be cut off without affecting other units in the maintenance period.  
Flexible joints should be used to connect the evaporator and the field pipeline to reduce vibration propagation of the building.
12. To facilitate maintenance, install a thermometer or pressure gauge on the water inlet and outlet pipes. The unit is not equipped with pressure and temperature instruments,

which should be purchased by the user.

13. A drainage interface should be set at all the low positions of the water system so that the water can be completely discharged from the evaporator and the water system; a discharge valve should be set at all the high positions to eliminate air from the pipeline. The discharge valve and drainage outlet are not insulated to facilitate maintenance.
14. All the components that may be condensed or frozen in the water system should be insulated, including the water pipe and clamp of the evaporator.
15. The outdoor chilled water pipeline should be wrapped with an auxiliary heating belt which is energized to give heat when necessary and should be insulated to prevent the pipeline from freezing and cracking in a low temperature environment. The power of the heating belt should be equipped with a independent fuse.
16. If the ambient temperature is lower than 0°C, when the unit is stopped, drain the water from the evaporator of the unit, preventing the unit from being frozen, or take other measures to ensure that the water temperature inside the unit does not fall below 0°C.
17. For the units connected for operation, install the mixed water temperature sensor on the public outlet water pipe of the unit.

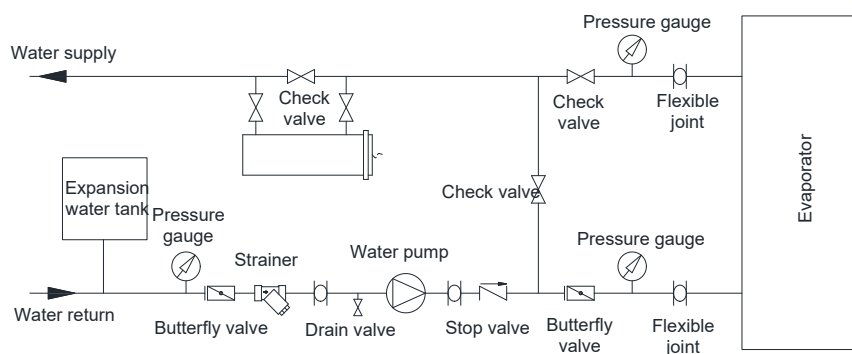
#### **4.5.2 Inter-module Combination Requirements**

1. When different modules are combined, the heat pump unit cannot be combined with the cooling-only unit.
2. The installation distance between modules should meet the requirements of the unit installation space diagram, and the length of communication line between two units cannot be greater than 50 m.
3. When multiple modular units share the same water system, the water pipe of the unit should be connected according to the water system diagram when multiple unit modules are combined for parallel use, avoiding serious imbalance of the water flow of the unit.
4. During installation, set the unit close to the main return water pipe of the water system to main module. The return water temperature probe of the main module is placed in the temperature sensing blind pipe for the main return water pipe of the unit. See the installation diagram of the main return water temperature sensor.
  - 4.1) The user must reserve a temperature sensing blind pipe interface (with a  $\Phi 18$  hole) on the main return water pipe of the unit, which is used to install the main return water temperature sensor. The temperature sensing blind pipe is welded on the interface reserved by the user.
  - 4.2) The installation position of the main return water temperature sensor is less than 15 m from the electric control box of the main module.
  - 4.3) Before installing the main return water temperature sensor, fill the blind pipe with thermal conductive silica gel, insert the return water temperature sensor into the blind pipe bottom, and use a nylon cable waterproof connector to lock the connecting wire.

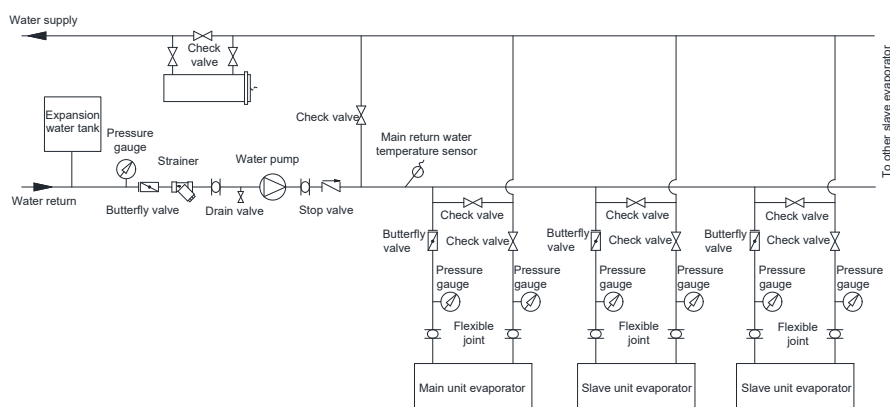


Installation diagram of the main return water temperature sensor

### 4.5.3 Recommended Water System Diagram



Water system diagram for the single unit used independently



Water system diagram for multiple unit modules combined for parallel use

## 4.5.4 Component Selection of Water System

1. Check valve: selected based on the pipe diameter; usually the selected valve diameter should be consistent with the unit connecting pipe.
2. Filter: used to filter the impurities in the system; usually 60 mesh filter or above is selected.
3. Stop valve: installed at the water outlet of the pump to avoid damages to the pump when water flows back; the diameter of the valve pipe should be consistent with the unit connecting pipe.
4. Bypass valve: installed between the inlet pipe and outlet pipe of the vessel; needs to be opened when cleaning pipelines.
5. Thermometer: It is used to facilitate overhauling and maintenance and observe the operating status of the unit. Usually the range of 0 to 100°C is selected.
6. Pump: selected based on the unit water flow parameter:  
 Pump output =  $L \times 1.1$  (L - unit water flow), and the pump lift can be calculated based on the following formula:  
 Pump lift = {Water resistance of unit + The most unfavorable pipe length\* (2% to 5%) + Air side water resistance of the most unfavorable path}\*1.1
7. Automatic air discharge valve: used to discharge air in the water system and ensure normal performance of the unit. It should be installed at the highest position of the system.
8. Expansion water tank: used to accommodate the excess water, stabilize the water pressure of the system, and add water to the system. Generally, it is installed on the water return pipe, higher than the pipeline in the system, so as to ensure the normal performance of the unit. The capacity can be calculated based on the following formula:  

$$V \text{ (capacity of the expansion water tank)} = (0.03 \sim 0.034)V_c$$
 V<sub>c</sub> - water capacity of the system
9. Energy saving tank: it is recommended to install an energy saving tank in the water system to adjust energy to reduce the load changes of the air-conditioning system when the compressor opens and stops frequently, so as to improve the system efficiency and extend the service life of the unit. The capacity can be calculated based on the following formula:  

$$\text{Energy storage tank volume } V \text{ (m}^3\text{)} = (Q/27.9n) - V_s$$
 Q — Cooling capacity (kW)  
 n - Number of compressors  
 V<sub>s</sub> — Water capacity in the pipeline of the chilled water system and in the heat exchanger m<sup>3</sup>

### **Caution**

The tested pressure value of the pipeline pressure test is greater than 1.25 times the operating pressure, but not less than 0.6 MPa. When the pressure is maintained for 5 minutes, the pressure drop is not greater than 0.02 MPa. The system is qualified when leakage is not detected.

Water pressure test should not be carried out at temperature of below 5°C, and if the pressure test with a pressure gauge is qualified, the accuracy is not less than level 1.5,

and the full scale value is 1.5 to 2 times the maximum measured pressure.

To do the pressure test, water should be added from the lower position of the system steadily and evenly, and air should be discharged at the higher position; when it reaches the required pressure, stop the pump and check the system. Do not do repairs when pressure is still exerted.

If the pressure test is passed, keep washing the pipelines (be careful not to through the equipment) until the drainage does not contain impurities such as sand and iron flings, and it is qualified if the water is not muddy.

#### 4.5.5 Water Quality Requirements

Dirt, fouling, grease and some forms of water treatment will adversely affect the heat exchange effect of evaporator and unit performance. The foreign substance in frozen water will increase the water pressure drop of the evaporator, reduce the water flow, and cause mechanical damages to the evaporator tube bundle. Alkaline water is not recommended in the chilled water system. Air in water will shorten the service life of the heat exchanger. Gplus advises consulting water treatment experts to determine the water quality that does not affect the performance of the heat exchanger. The PH value of the water passing through the evaporator must be in the range of 6.5 to 8.0. For the specific requirements for water quality, see the table below.

Item	Unit	Air conditioning water requirements
		Allowable value
Suspended substance	mg/L	< 10
pH value (25°C)	mg/L	6.5-8.0
Conductivity (25°C)	μS/L	< 800
Methyl orange alkalinity	mg/L	< 150
Acid consumption (PH=4.8)	mg/L	< 100
Total hardness CaCO <sub>3</sub>	mg/L	< 200
Fe <sup>2+</sup>	mg/L	< 1.0
Cl <sup>-</sup>	mg/L	< 200
SO <sub>4</sub> <sup>2-</sup>	mg/L	< 200
SiO <sub>2</sub>	mg/L	< 50
NH <sup>+</sup>	mg/L	< 1.0
S <sup>2-</sup>	mg/L	Not Detected
Free chlorine	mg/L	< 1.0
Petroleum category	mg/L	< 5

**Warning: Gplus shall not be held responsible for corrosion, erosion or performance degradation of the unit arising from**

**water not treated or improper treatment.**

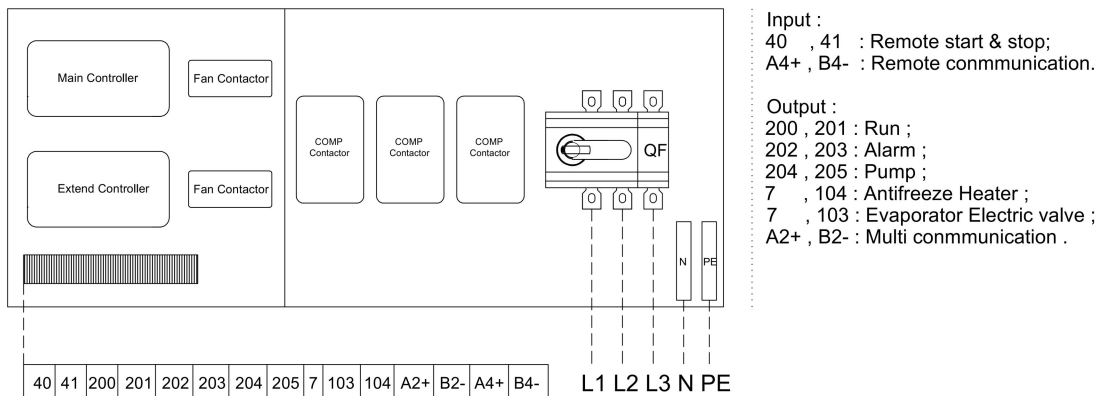
## 4.6 Electrical Installation Requirements and Wiring Diagram

### 4.6.1 Electrical Installation Requirements

(1) The specifications of general power line must meet national regulations. To prevent dust entering into distribution box, a dust-proof shield or wire casing must be provided at the entry point of general power line after wiring work is done. The following figure shows the wiring method of the general power line:

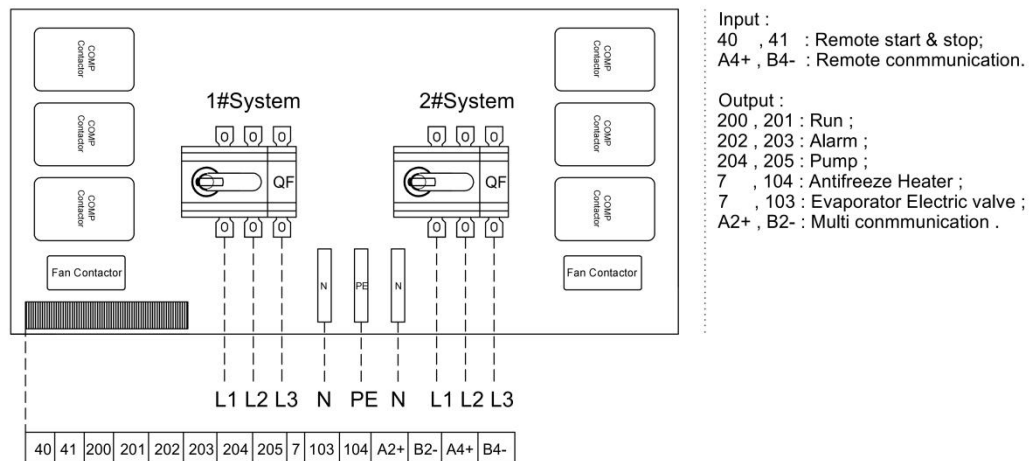
#### A) Single compressor

GAWxxx.1A/L/FC1T1/3



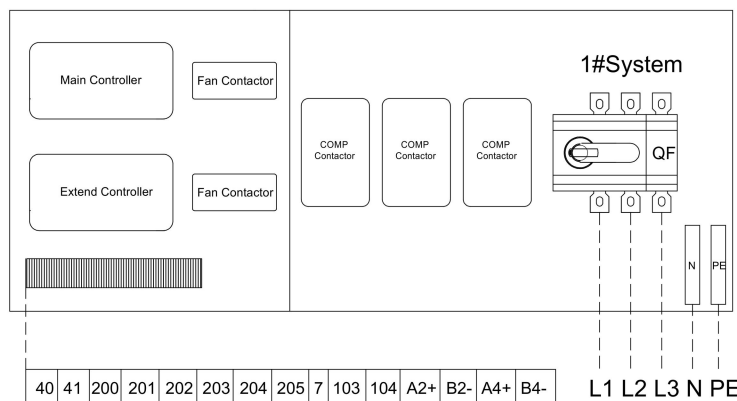
#### B) Double compressor (The electrical equipment of two compressors is placed in a single cabinet)

GAWxxx.2A/L/FC1T1/3



C) Double compressor (The electrical equipment of the two compressors is placed in their respective corresponding cabinets.)

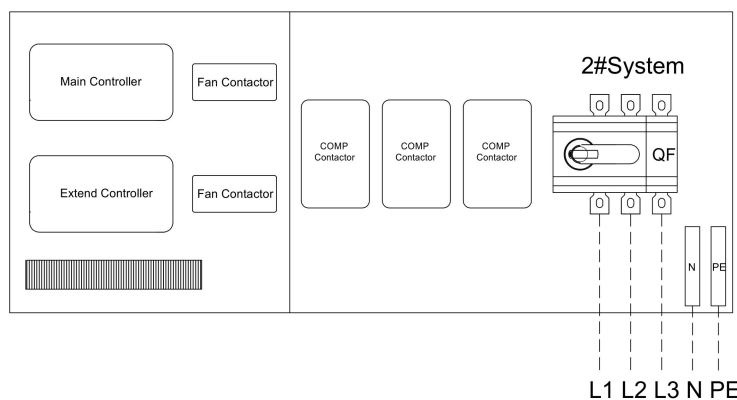
GAW xxx.2A/L/FC1T1/3



Input :  
 40 , 41 : Remote start & stop;  
 A4+ , B4- : Remote communication.

Output :  
 200 , 201 : Run ;  
 202 , 203 : Alarm ;  
 204 , 205 : Pump ;  
 7 , 104 : Antifreeze Heater ;  
 7 , 103 : Evaporator Electric valve ;  
 A2+ , B2- : Multi communication .

GAW xxx.2A/L/FC1T1/3



## (2) Unit cable selection standard

Model	Recommended power cord	Number of power cable sets	<p><b>Note: The unit power cord must be a copper core cable; in a high-temperature region, take the temperature de-rating of the breaker into consideration. Select a breaker with greater capacity.</b></p>
GAW095.1AA/LC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW120.1AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW140.1AA/LC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	1	
GAW155.1AA/LC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	1	
GAW180.1AA/LC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	1	
GAW205.1AA/LC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	1	
GAW225.1AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW240.1AA/LC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	1	
GAW095.1AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW120.1AA/LC1T3	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	1	
GAW140.1AA/LC1T3	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	1	

GAW155.1AA/LC1T3	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW180.1AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW205.1AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW225.1AA/LC1T3	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW140.2AA/LC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW160.2AA/LC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW180.2AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW205.2AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW240.2AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW255.2AA/LC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW280.2AA/LC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW310.2AA/LC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW340.2AA/LC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW360.2AA/LC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW375.2AA/LC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW410.2AA/LC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW445.2AA/LC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW475.2AA/LC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW140.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW160.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW180.2AA/LC1T3	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW205.2AA/LC1T3	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW240.2AA/LC1T3	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW255.2AA/LC1T3	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW280.2AA/LC1T3	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW310.2AA/LC1T3	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW340.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW360.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW375.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW410.2AA/LC1T3	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	4	
GAW445.2AA/LC1T3	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	4	
GAW100.1FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW120.1FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW145.1FAC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	1	
GAW165.1FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	1	
GAW190.1FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	1	
GAW215.1FAC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	1	
GAW245.1FAC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	1	
GAW265.1FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	

**Note: The unit power cord must be a copper core cable; in a high-temperature region, take the temperature de-rating of the breaker into consideration. Select a breaker with greater capacity.**

GAW285.1FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW150.2FAC1T1	3*95mm <sup>2</sup> +2*50mm <sup>2</sup>	2	
GAW165.2FAC1T1	3*95mm <sup>2</sup> +2*50mm <sup>2</sup>	2	
GAW200.2FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW225.2FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW240.2FAC1T1	3*120mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW260.2FAC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW290.2FAC1T1	3*150mm <sup>2</sup> +2*70mm <sup>2</sup>	2	
GAW300.2FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW330.2FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW345.2FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW380.2FAC1T1	3*185mm <sup>2</sup> +2*95mm <sup>2</sup>	2	
GAW395.2FAC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW430.2FAC1T1	3*240mm <sup>2</sup> +2*120mm <sup>2</sup>	2	
GAW445.2FAC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	
GAW485.2FAC1T1	3*300mm <sup>2</sup> +2*150mm <sup>2</sup>	2	

**Notes:**

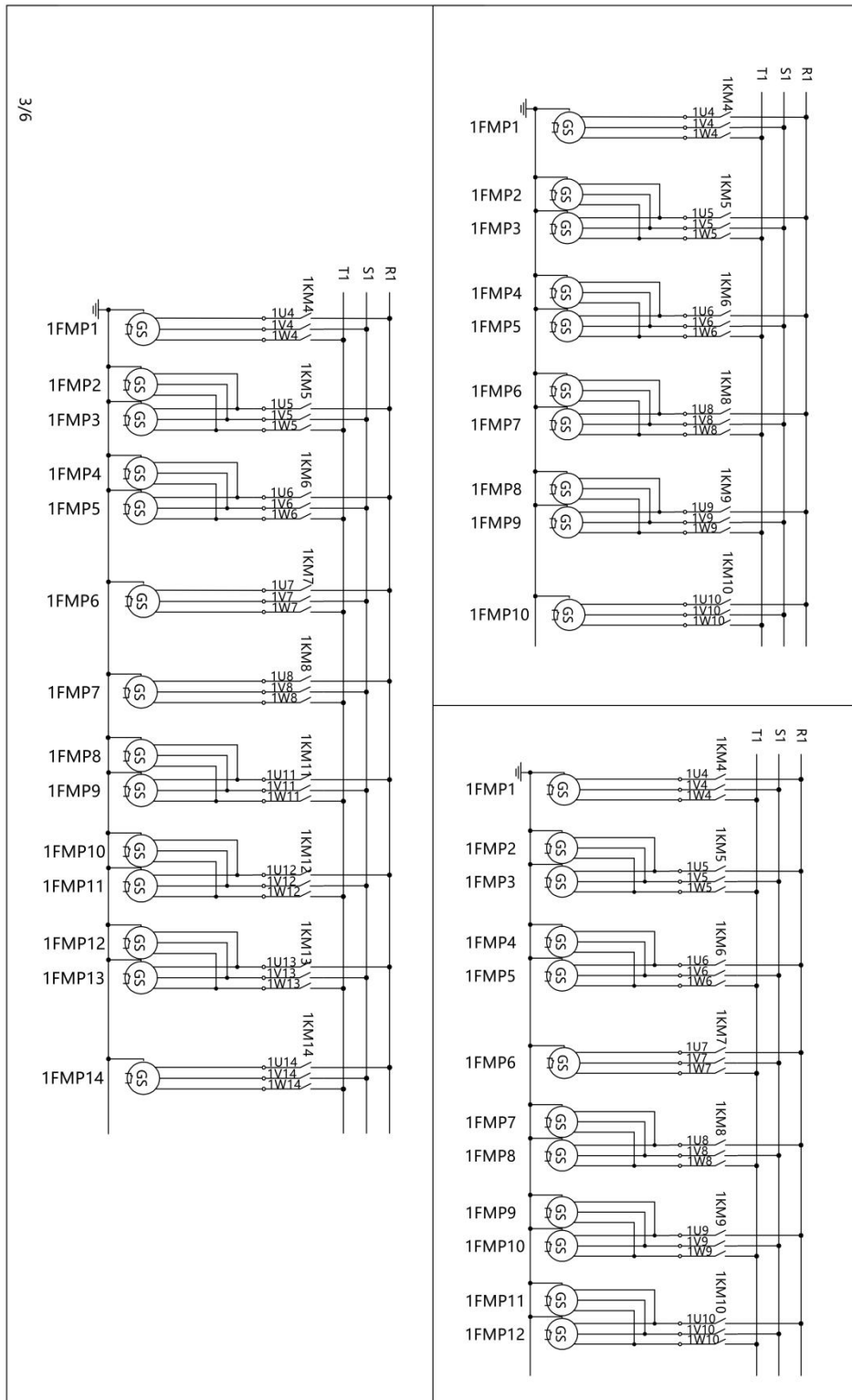
1. The above recommendation applies for standard units (BV, BVR, RV cables). If the customer orders a non-standard unit, please contact Gplus.
2. The recommended specification of the power cord is the copper core cable which is the single-core PVC insulated cable with heat resistance to 70°C as used in free air at the ambient temperature of 30°C (refer to IEC\_60364-5-523). At least one cable diameter gap is guaranteed horizontally during routing. If the actual installation conditions on site have changed, select a proper model based on the layout conditions by referring to the conducting wire specifications provided by the wire manufacturer. The selection of power wires is closely related to the local climate, soil characteristics, cable length and layout mode. Such unit engineering projects are often designed by design institutes and the selection of power wires is subject to the design of the design institutes.
3. Wiring of non-fuse air switch:  
In order to avoid damage to electrical equipment such as transformer, distribution cables and so on in the case of a short circuit, and to control the compressor independently, each group of power lines of the unit needs to be equipped with non-fuse air switches of appropriate capacity. Note: Each group of power lines must be equipped with independent non-fuse air switches.
4. Unit control wiring requirements: The water pump interlock point reserved by the unit needs to be connected to the control power supply of the water pump.
5. Precautions for installation of distribution lines:  
External distribution lines must be installed by professional electricians. Pay attention to the followings:
  - a) The power supply voltage must be stable during the operation of the unit. All voltage drop factors should be taken into consideration. The operating voltage of

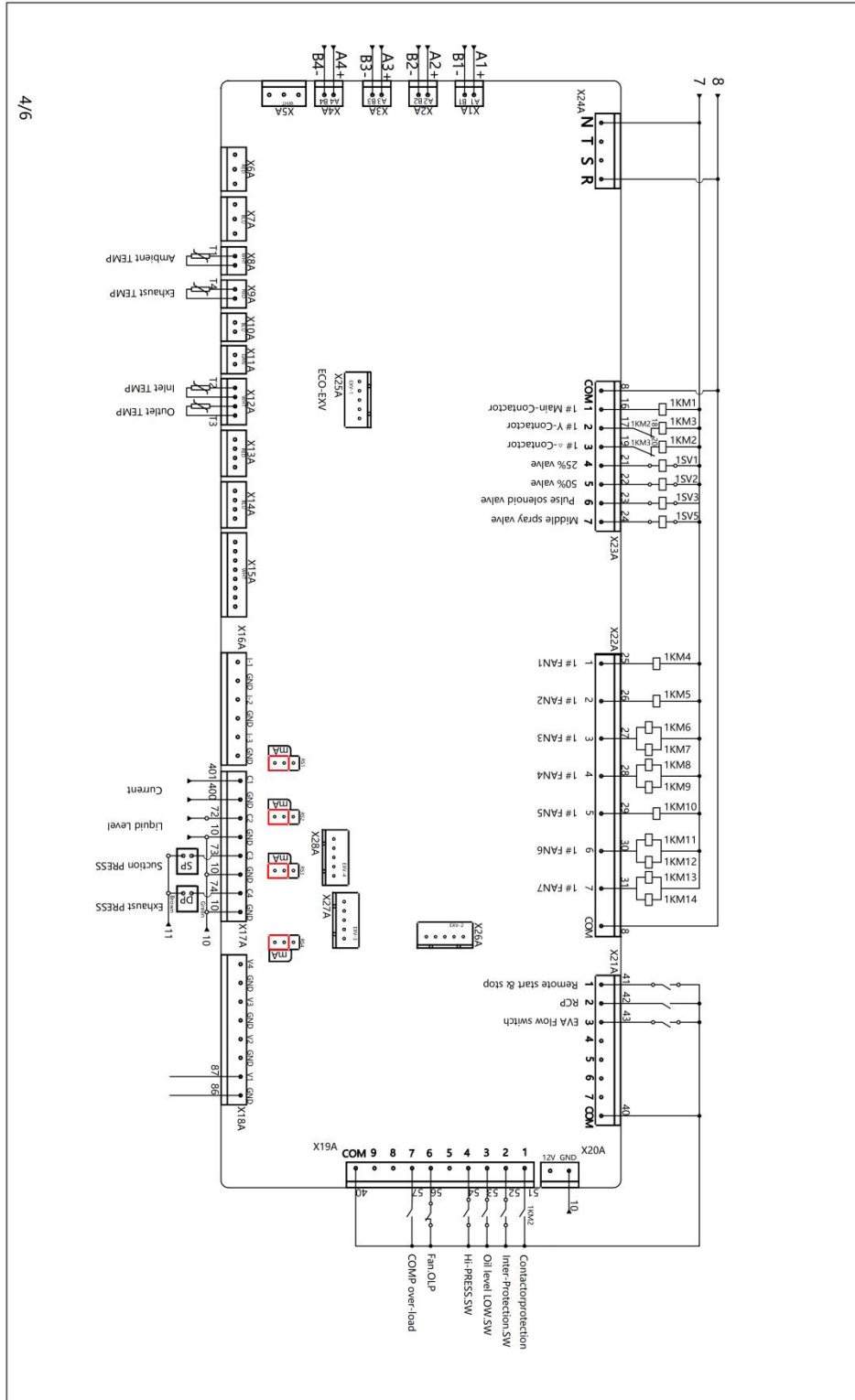
the unit must remain stable within  $\pm 10\%$  of the rated value. Voltage fluctuations will adversely affect the unit.

- b) The voltage difference between the phases must not exceed 2% of the rated value and the difference between the maximum and minimum phase current is less than 3% of the rated value to avoid overheating of the compressor.
- c) The power frequency should remain within  $\pm 2\%$  of the rated value.
- d) The minimum starting voltage of the unit should stay above 90% of the rated value.
- e) If the power cable is too long, the compressor cannot be started. Therefore, the length of the power cable must ensure that the voltage drop from the end of the power cable and tail of the power cable is less than 2% of the rated value. If the length cannot be shortened, a thicker power cable should be used.
- f) The cables between the power supply and unit should be connected in accordance with the electrical regulations and standards and must be properly insulated. After the connection of the unit, the insulation between the electrical accessory terminal and the unit should be measured by a 500 V megger. The insulation resistance should be at least 5 M $\Omega$ .
- g) In order to protect the personal safety, according to the electrical regulations, the unit shell must be equipped with reliable grounding devices to prevent an electric shock.
- h) The operating current and input power shown on the unit nameplate are the test values under standard operating conditions. As the actual load and ambient temperature of the system are different, the power supply, transformer, no-fuse switches and distribution capacity should be selected according to the actual operating conditions.
- i) The electromagnetic switch used for the water circulating pump must be linked to the operation circuit of the unit. The above-mentioned electromagnetic switches are assembled by the on-site contractor. They are not attached to the unit distribution box.
- j) If the customer chooses the network control method, the communication cable between the units must be a shielded twisted pair cable with a minimum diameter of 0.75 mm<sup>2</sup>.

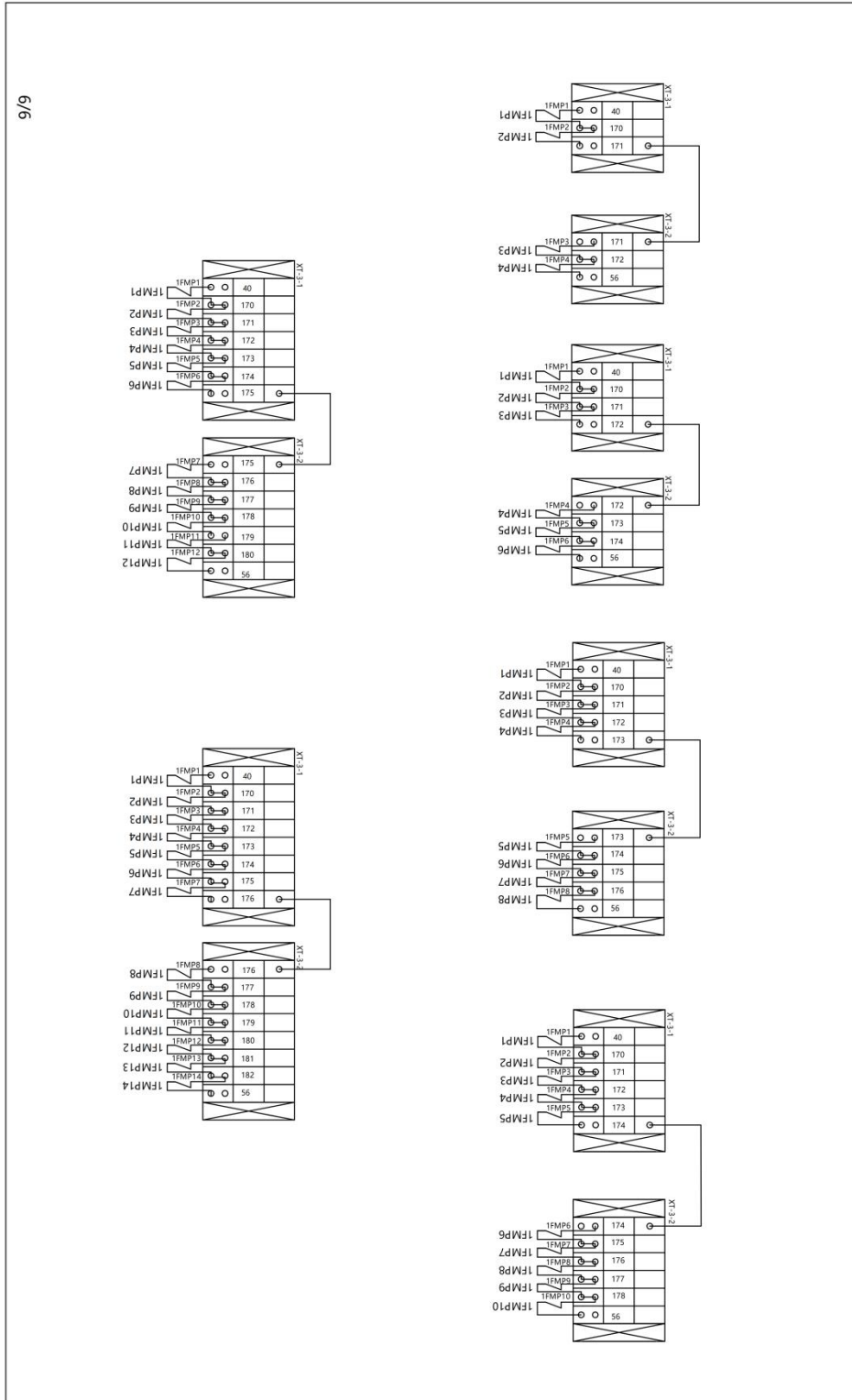












6/6

## 5 Test Run

---

### **Warning:**

To ensure validity of the warranty period, only the technical personnel of the manufacturer or the authorized technical personnel can complete the work when the equipment is debugged or used for the first time.

Gplus shall not bear any responsibilities for harms or damages caused to the unit due to the failure of observing the steps or instructions provided in this manual.

---

### 5.1 Check Before Test Run

#### 5.1.1 Waterway part

1. Flush the water pipes to keep all the water system pipelines clean, and confirm that the waterway connection is proper and the water flow direction is correct.
2. Check whether the water inlet and outlet pipes of the above heat exchanger are connected well.
3. Open all the water valves.
4. Start the water pump.
5. Check all the water pipes and joins for leakage.
6. Discharge air from the waterway, and keep the waterway clean and free of rust stain.
7. Check the water side resistance loss of the evaporator and condenser and check if the water flow is correct.
8. Check whether the inlet and outlet water temperatures of the electric control cabinet are consistent with the temperature of the water thermometer, and make sure that the main return water temperature probe is connected correctly.

#### 5.1.2 Circuit Part

1. Disconnect the main isolating switch and check all the starting circuits and control circuits of the control cabinet.
2. Check if the local power supply voltage and frequency are consistent with the values on the nameplate for the unit. The voltage fluctuation range cannot exceed  $\pm 10\%$  of the rated voltage indicated on the unit nameplate, the phase voltage unbalance cannot exceed 2%, and the phase sequence of the power supply is consistent with the indicated value.
3. Check if there is enough power supply capacity to meet the startup and full load operation conditions of the unit.
4. Check if the unit is connected to the ground and if the grounding is firm.
5. Confirm that the wire and fuse specifications match operation of the unit, and complete all the interlocking control lines according to the relevant drawings.
6. Make sure that all the air conditioning accessories and control devices operate properly.

### 5.1.3 Unit part

1. Check whether the unit pressure is normal.
2. Check whether the unit oil level is normal.
3. Check whether all ball valves and angle valves are fully open and whether the unit has a fluorine leakage sound.
4. Check whether all safety control devices are in the original state and whether their settings are correct.
5. Check whether the coil winding of the compressor is normal (phase resistance, inter-phase resistance, relative ground resistance).
6. Power on the unit and check whether the star-triangle conversion is normal (check whether the voltage between any two of the three contacts is 380V) (the compressor is powered off).
7. Check if there is any phase loss (the voltage between each phase and the ground should be 220V).
8. Check through the control panel whether the on-site settings are set correctly as required.
9. Check whether the expansion valve can be opened and closed properly (listen to the rotation sound of the stepper motor of the electronic expansion valve).
10. Check if the solenoid valve works properly.
11. Check whether the compressor oil heater is normal and heated for 8 hours.

### 5.1.4 Safety Device Part

The unit is equipped with safety protection devices to ensure safe operation. When a safety device operates, the fault indicator is turned on, this part of the function will stop, and the other parts are still normal. It is recommended that even if there is a part of abnormalities, you should also stop to check for the reasons, so as to avoid more serious accidents for the unit. For the specific safety devices on the unit, see the following table:

Safety devices	Cause of Action
High pressure protection	1. The fluorine system valve is not open
	2. Excessive refrigerant is charged
	3. Fin coil tube is blocked, air flow short circuit, heat exchanger fouls
	4. Non-condensable gas exists in the system
Anti-freezing protection	1. Chilled water temperature is too low
	2. Set temperature is too low
Discharge temperature protection	1. Less refrigerant due to leakage of the unit
	2. Solenoid valve closed due to a fault
	3. Improper adjustment of the suction superheat degree
Motor overheat protection (compressor)	Same with high pressure protection

motor protection)	
Low pressure protection	1. The liquid supply solenoid valve fails or the dry filter is blocked
	2. The expansion valve is improperly adjusted
	3. Insufficient chilled water flow or leakage of refrigerant
	4. Evaporator scaling
Phase inverter protector	Power wiring is wrong
Over-current protection	Operating current of compressor exceeds the setting
Safety valve	The pressure of working medium system is exceeded

## 5.2 Test Run

1. Connect the fluorine system pressure gauge to the suction and discharge needle valves of the unit, place the temperature probe, and start a compressor. Observe whether the star-delta start conversion of the compressor is normal, and check the voltage at the bottom wiring of each contactor.
2. Check the current of the compressor.
3. Check whether the direction of the fan is correct, whether the fan runs normally and detect the running current.
4. Check whether the oil level is normal and whether the energy regulating solenoid valve of the compressor works correctly. (Use a non-magnetic blade to check the valve.)
5. Run the compressor for at least 20 minutes. Check and monitor all parameters, observe the suction and discharge pressure of the unit.
6. Check the discharge temperature of the discharge pipe to make sure that the oil separator works properly. Observe the flow of refrigerant from the sight glass on the liquid supply pipe.
7. Observe whether the opening degree of the electronic expansion valve is within the proper range.
8. Check whether the discharge superheat degree and condensing super-cooling degree of the unit are normal after the unit enter the working condition.
9. When the discharge temperature is high, check whether the solenoid valve and expansion valve on the nozzle work. (Use a non-magnetic blade to check whether the solenoid valve is working.)
10. Stop the unit and check whether the compressor oil level is normal.
11. In order to keep the unit running, adequate air conditioning load is required. Therefore, all the air side devices should be turned on.
12. After the work is finished, check and tighten all the valve caps, clean the unit and clean all the fluorine system connectors.
13. After all the above items are normal, start air conditioning accessories and chilled

water pump.

14. The unit can be turned on after it is reconnected to the main power supply. See the following table for the inspection items:

Check item	Item	Check Method	Control Requirements
Routine	Discharge pressure	Check high pressure display value (air discharge)	R134a: 6.5-16Bar
	Difference of discharge pressure between operation compressors	Check high pressure display value (air discharge)	≤1Bar
	Suction pressure	Check the low pressure display value (air suction)	R134a: 1.6-6.4 bar
	Difference of suction pressure between operation compressors	Check the low pressure display value (air suction)	≤0.5Bar
	Power supply	Check with voltmeter	Voltage should not exceed ±10% of the rated voltage
	Hot water outlet temperature	Thermometer	See recommended operating range table
	Chilled water outlet temperature	Thermometer	See recommended operating range table
	Vibration and noise	Listen and feel	No abnormal vibration and noise
	Ambient temperature	Thermometer	See recommended operating range table
Quarterly	1 Refrigerant injection amount and refrigerant water content	Check the sight glass on the refrigerant liquid pipeline	No bubbles, test paper shows blue
	2 Lubricant injection amount	Check the oil level sight glass	The oil level is above 3/4

### 5.3 Test Run Record

In order to maintain the optimum operation of the unit, please record the state of the unit in the following table.

Test Run Record Form			
No.	Check item	Unit	Data recording
1	Ambient temperature	°C	
2	Water inlet temperature	°C	
3	Water outlet temperature	°C	
4	Discharge pressure	Bar	
5	Suction pressure	Bar	
6	Discharge temperature	°C	
7	Suction temperature	°C	
8	Three-phase power voltage	V	
		V	
		V	
9	Compressor three-phase current	A	
		A	
		A	
10	Fan three-phase current	A	
		A	
		A	
11	Oil level		
12	Any abnormal vibration or noise		
13	Any sound of refrigerant leakage		
14	Color of the compressor oil		

## 6 Unit Operation and Controller Operation Guidance

### 6.1 Check Before Use

1. Confirm whether the compressor refrigerant oil has been heated for enough time. After the unit is powered off, it must be pre-heated for 24 hours before it can be powered on again for the first time. In other cases, it should be pre-heated for 4 to 8 hours and the oil temperature should be above 23°C (The heating time of the compressor refrigerant oil depends on the ambient temperature. The lower the ambient temperature, the longer the heating time);
2. Check whether the water flow meets requirements;
3. Check whether the control switches and components on the distribution cabinet are normal;
4. Check the power and voltage;
5. Check whether the pressure displayed on the unit controller is normal. Under normal condition, the outdoor ambient temperature is 25°C to 38°C, and the high/low pressure is 3.8 to 5.9Bar (absolute pressure);
6. Check whether the two SW1 DIP switches of the last controller of the unit are switched to ON.

### 6.2 Unit Startup Sequence

1. Start the circulating water pump;
2. Start the compressor;
3. Start the fan (in the refrigeration mode, the fan is opened according to the compressor discharge pressure; in the heating mode, the fan is fully opened).

### 6.3 Unit Stopping Sequence

1. Stop the compressor;
2. Stop the fan;
3. Stop the circulating water pump.



### 6.4 Controller Operation Instructions

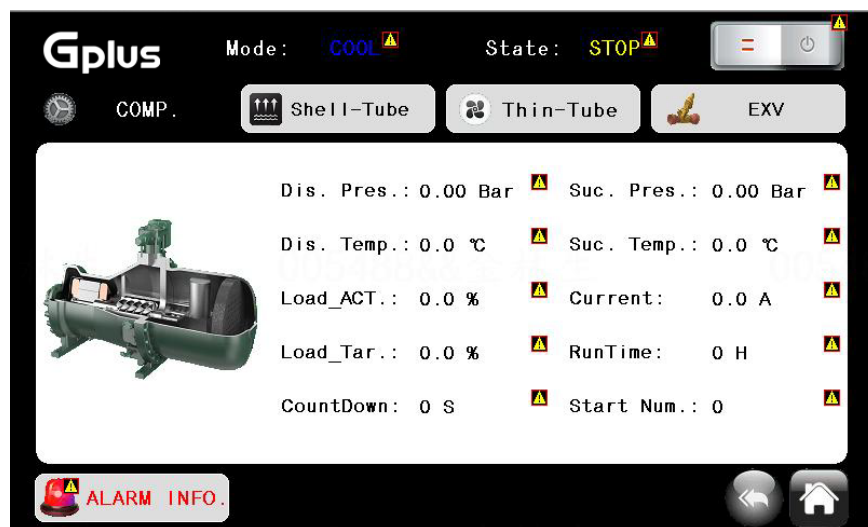
Cut off all the power supply before turning on the cabinet. In addition to the touch screen, the electric cabinet provides the white, green, red three LED indicators and an emergency stop button. The white LED indicator is the power indicator. When the electric cabinet is powered on, it is on; the green LED indicator is the running indicator. When the unit enters the automatic running state, it is on; the red LED indicator is the fault indicator. When the unit is faulty, it is on. In case of emergency, press the emergency stop button.

A touch screen is provided by our company as the control operation device. The operation method is shown as follows (take the single compressor cooling-only unit as an example, and the dual-compressor unit is also operated as follows):

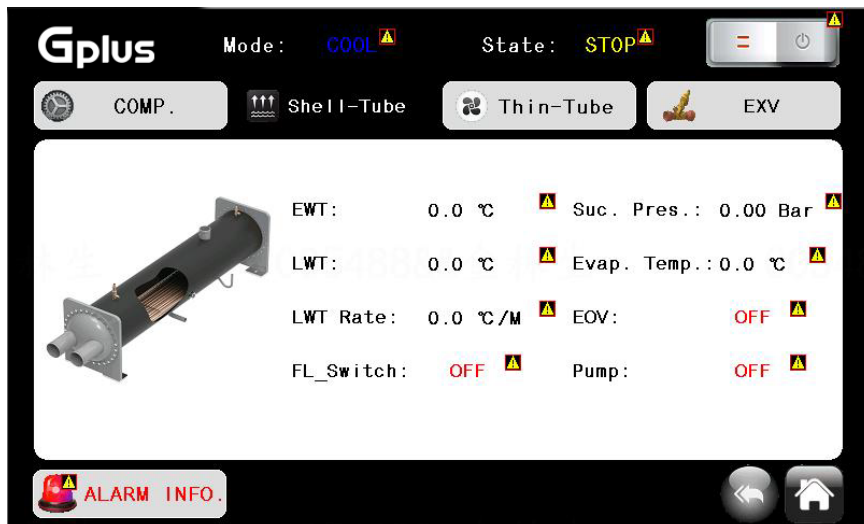
After the unit is powered on, the touch screen will show the welcome screen, as shown in the following figure. Select the display language. This operation manual takes Chinese as an example. The content of English interface is the same except the language;



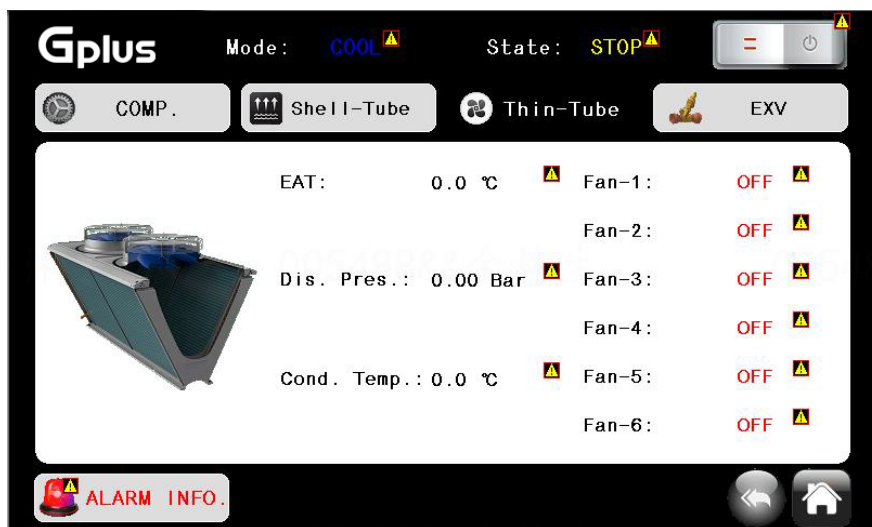
Tap any place on the **Welcome** page to enter **State** page, as shown in the following figure. This page displays the unit's key parameters. It also displays the current operation status of the unit **Start/Stop**, operation mode **Cool** and **Alarm Info**. In addition, you can also power on/off the unit. Tap the  button to return to the **Welcome** page and tap the  button to enter the **Control System** page on which all key parameters of the compressor can be queried, as shown in the following figure:



After tapping the **Shell-Tube** button, you can enter the **Shell-Tube** page by default. Key parameters of the water-side heat exchanger can be queried on this page, as shown in the following figure:

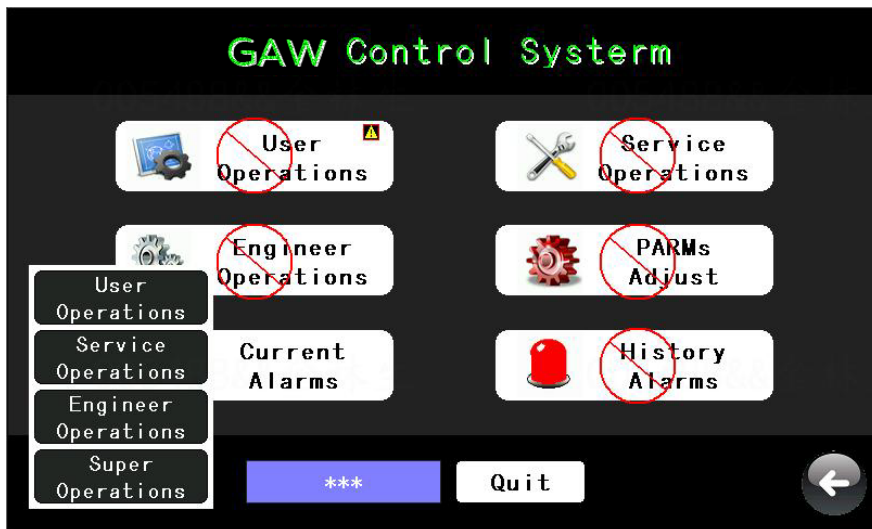


After tapping the **Thin-Tube** button, you can enter the **Thin-Tube** page by default. Key parameters of the air-side heat exchanger can be queried on this page, as shown in the following figure:



After tapping **EXV** button, you can enter **EXV** page by default. Key parameters of the electronic expansion valve can be queried on this page, as shown in the following figure:





The **User Operations** page is shown in the following figure. The customer can switch modes on this page and tap the **Cool** button to select the Cool mode. The target temperature values in the cooling and heating mode can be set. **Comp Disable/Enable** can be set. Tap the **Time Settings** button to set the timed start/stop clock.



The page of **Time Settings 1** is as shown in the figure below. You can set three groups of timed start/stop time points, and you can also specify any number of days from Monday to Sunday. Tap the **Disable/Enable** button to disable/enable the start/stop action at this time.



The page of **Time Settings 2** is shown in the figure below. You can designate a certain time on a specific day of the month of the year to automatically start/stop the unit. Tap the **Start Disable/Enable** button to disable/enable the start action at this time. Tap the **Stop Disable/Enable** button to disable/enable the stop action at this time.



### Warning

When any alarm occurs, please confirm the fault cause and clear the fault, instead of simply tapping the Reset button. Otherwise, starting the unit and triggering the fault repeatedly will damage the unit.

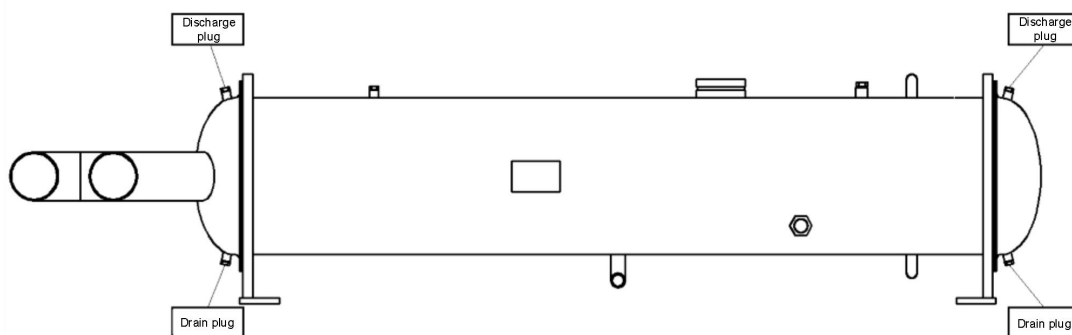
### 6.5 Unit Operation Precautions

**Warning:** In order to prevent casualties due to contact with running or live parts, the main power supply must be disconnected before maintenance check and an obvious stop sign must be placed at the switch position.

1. Before starting the unit for the first time, it is necessary to energize it for more than 24 hours to prevent frothing of the refrigerant oil. If the ambient temperature is low, the pre-heating time should be prolonged. When the temperature is low, the oil becomes sticky, hindering the startup and loading of the compressor. The heating time should be prolonged at low ambient temperature. Generally, when the system is shut down, the oil heater is automatically powered on and gives heated continuously. Therefore, do not cut off the power supply unless the unit is not to be used for a long time.
2. It is forbidden to mix refrigeration oil of different brands. Check the brand and specification of the refrigeration oil before filling in it. If you need to replace the refrigeration oil, clean up remaining refrigeration oil in the compressor and system before you can add new oil and replace the dryer filter. The blending of some synthetic oil with mineral oil may result in qualitative change. Therefore, after new oil is filled in, it is necessary to change new refrigerant oil again after some time of operation to remove all the remaining refrigerant oil.
3. When the compressor is started and an accident happens, tap the **Emergency Stop** button to stop the unit.
4. The parameters of the electronic expansion valve controller must not be adjusted without the permission of Gplus's after-sales personnel. Otherwise, the unit may fail to work properly;
5. If the safety valve on the unit is opened, make sure that the ambient environment is well ventilated. Freon leak can generate harmful phosgene when it is exposed to fire. Therefore, open flames are strictly prohibited around the unit.

## 6.6 Unit Anti-freezing Precautions

1. The air-cooled unit is usually placed outdoors, and there is a risk of freezing pipe of the container when the ambient temperature is low. **Therefore, when the outdoor ambient temperature drops below 0°C and the unit is powered off and not used for a long time, the *drain plug* and the *discharge plug* on shell covers of both sides of the evaporator must be opened (the specific position is shown in the figure below) to drain the water in the water system and the evaporator of the unit to prevent the evaporator heat exchange pipe from being damaged by freezing. After the water is drained, screw on the *drain plug* and the *discharge plug*;**



2. **The chilled water pump at the customer side must be interlocked with the unit (the control system of the unit is reserved with the pump interlock control dry contact). When the ambient temperature of the unit is low in winter and the unit**

is idle for a short period of time, the unit and the water pump must be in power-on state, and the unit will carry out anti-freezing protection according to the outdoor ambient temperature and the intelligent water temperature to prevent the evaporator heat exchange pipe from being damaged by freezing;

3. It is recommended that the outdoor chilled water pipeline should be wrapped with an auxiliary heating belt which is energized to give heat when necessary and should be insulated to prevent the pipeline from freezing and cracking in a low temperature environment;

**Warning: Gplus shall not bear any responsibilities for cracks due to freezing or damages on the evaporator heat exchange pipe caused to the unit due to the failure of observing the steps or instructions provided in this manual.**

## 7 Troubleshooting

Fault Content	Cause and solution
Power supply fault	Check the setting of the power protection value of the phase sequence protector, which should be consistent with the factory setting.
	Measure the power quality actually used by the customer.
	Check whether the wiring of the unit power supply is correct as shown in the wiring diagram.
Compressor over-current	Check whether the compressor current exceeds the factory setting (the factory setting cannot be changed).
	After the condition of power-on is met, power on again to check whether the compressor current exceeds the maximum allowable operating current.
	Check whether the current operating condition of the unit exceeds the allowable limit.
Compressor built-in protection	Check whether the three-phase power supply of the compressor is normal (including phase sequence, voltage, phase deficiency, three-phase voltage imbalance rate) and within the set range.
	Check whether the wiring of the built-in protection modules is correct as shown in the wiring diagram.
	This may be caused by the high compressor discharge temperature or motor winding temperature due to other reasons.
Oil level alarm	Check the compressor's oil level from the oil sight glass of the compressor.
	Confirm that the wiring of the oil level switch is correct as shown in the wiring diagram.
	Check whether the oil level switch is damaged.
Fan motor overheat	Check the setting of the fan overload protection, which should be consistent with the factory setting.
	Check whether the fin heat exchanger is plugged by dirt, and whether the fan motor or blade is blocked.
	Check whether the current operating condition of the unit exceeds the allowable limit.
Wrong rotation direction of compressor	Check whether the phase sequence is correct.
	Check if the suction pressure is greater than discharge pressure.
Pressure difference not	Check whether the chilled water temperature is too high during refrigeration.

established	Check whether the air-conditioner water temperature is too low during heating.
Compressor start failure	Check whether the Y- $\Delta$ conversion is normal.
Disconnection protection	Check whether the system water pump is running and whether the water flow meets the system requirements.
	Check whether the installation direction of the flow switch is correct and whether the set value of the flow switch is correct.
	Make sure that the flow switch is connected correctly as shown in the diagram.
Insufficient water flow protection	Check whether the system water pump is running and whether the water flow meets the system requirements.
	Check whether the installation direction of the flow switch is correct and whether the set value of the flow switch is correct.
	Make sure that the flow switch is connected correctly as shown in the diagram.
Excessive temperature difference protection	Check whether the water flow meets the system requirements.
	Check whether the water valve is opened fully.
Freezing protection	Check whether the system outlet water temperature is lower than 2°C.
	If the system outlet water temperature is not lower than 2°C, check whether the system outlet water temperature before the system stops is lower than 2°C.
	Check whether the wiring of anti-freezing switch is correct as shown in the wiring diagram.
High discharge pressure	Check whether the high pressure value exceeds the set threshold when the high pressure protection is triggered.
	Check whether the wiring of high pressure switch is correct as shown in the wiring diagram.
Low cooling suction pressure	Check whether the low pressure value is lower than the set threshold when the low pressure protection is triggered.
High discharge temperature	Check whether the current operating condition of the unit exceeds the allowable limit.
	Check whether the oil-cooled solenoid valve is normal.
	Check whether the liquid injection valve works normally.
	Check whether all the valves are open, and whether the pipeline is blocked.
	Check the compressor's oil level from the oil sight glass of the

	compressor.
	Check whether the electronic expansion valve works normally.
	Check whether the refrigerant leaks.
Suction pressure sensor fault	Check whether the pressure sensor is shorted or damaged.
	Check whether the pressure value is less than 0.
Discharge pressure sensor fault	Check whether the pressure sensor is shorted or damaged.
	Check whether the pressure value is less than 0.
Water outlet temperature sensor disconnected	Check whether the temperature sensor is properly connected or damaged.
Water outlet temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Return water temperature sensor disconnected	Check whether the temperature sensor is properly connected or damaged.
Return water temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Fault Content	Cause and solution
Fin temperature sensor disconnected	Check whether the temperature sensor is properly connected or damaged.
Fin temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Ambient temperature sensor disconnected	Check whether the temperature sensor is properly connected or damaged.
Ambient temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Discharge	Check whether the temperature sensor is properly connected or

temperature sensor disconnected	damaged.
Discharge temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Suction temperature sensor disconnected	Check whether the temperature sensor is properly connected or damaged.
Suction temperature not displayed or displaying 0	Check whether the temperature sensor is shorted or damaged.
Communication fault	Check whether the communication cable is damaged.
	Check whether slaves are connected to the power supply.
Compressor operation failure	Check whether the power supply is on (power supply is off).
	Check whether the plastic shell circuit breaker works (current overload).
	The startup switch fails.
	The power supply fuse of the control circuit is burnt.
	The part of linkage control fails to run.
	High and low pressure switches work.
Unit stop soon after startup	High pressure switch works.
	The unit stops due to a fault alarm.
Compressor operation failure, with sound generated	Check whether the wiring is correct.
	Check whether the power supply voltage is low.
	Check whether the compressor is damaged.
Abnormal noise or vibration of compressor	Check whether the opening of the electronic expansion valve is too large and there is a large quantity of liquid entering the compressor.
	Check whether the compressor is damaged.
Compressor load increase/decrease failure	Check whether output of the electric control board is normal.
	Check whether the solenoid valve is damaged.
Cause	Cause and solution
Compressor load increase/decrease	Check whether the oil path is blocked by dirt.

failure	
Low oil level	Check whether the system leaks.
	Check whether the opening degree of the electronic expansion valve is too small.
	Check whether the unit is started frequently.
Discharge pressure is too low (Cooling condition)	Ambient temperature is too low.
	Check whether the superheat degree of the electronic expansion valve is large.
	Check whether the system refrigerant leaks.
	Suction pressure is too low.
Discharge pressure is too high (Cooling condition)	Check whether the ambient temperature is too high.
	Check whether the fan rotates correctly.
	Check whether the fin heat exchanger is plugged by dirt, and whether the fan motor or blade is blocked.
	Check whether there is excessive refrigerant.
	Check whether non-condensable gases enter into the system.
	Check whether the discharge pressure sensor is consistent with the test value of the high pressure meter.
High suction pressure (cooling condition)	Check whether the water temperature is too high and whether the water flow is too large.
	Check whether the superheat degree of the expansion valve is small.
Suction pressure is too low (Cooling condition)	Check whether the water temperature is too low and whether the water flow is sufficient.
	Chilled water filter is blocked.
	Dry filter is blocked.
	Check whether the refrigerant is sufficient.
Compressor overheat	Check whether the oil-cooled solenoid valve works properly.
	Check whether the liquid injection valve works normally.
	The bearings of the compressor are not well lubricated; Check the compressor's oil level from the oil sight glass of the compressor.
	The pressure on the high-pressure side is too high.
	The vaporizing temperature of the refrigerant on the low pressure side is too high.
NFB open loop	Check whether the circuit is shorted.
	Check whether the circuit is grounded.
	The compressor motor fails.

## 8 Repair and Maintenance

### Routine Maintenance

Item		Frequency	Standard (procedure)	Remarks
General	Noise	Always	Listen whether there is any abnormal sound	Observe the unit at 1 m away from the middle of the unit
	Vibration	Always	Check whether the unit pipes and components vibrate violently	
	Power voltage	Always	Within rated voltage $\pm 10\%$	
Appearance	Clean	Always	Always clean	
	Rust	Always	Remove rust with an iron brush, and apply anti-rust paint	
	Stability	Always	Tighten the screws.	
	The insulating material falls off	Always	Paste it	
	Water leakage	Once a month	Check whether the drainage pipe is blocked	
Compressor	Noise	Always	There is no abnormal sound when the unit is started, running or stopped	
	Insulation resistance	Once a year	The reading is above 5 M $\Omega$ when testing with a DV 500 V megger.	
	Anti-seismic rubber is aged	Once a year	The rubber should be elastic	
	Medium-term inspection	Once/3000 hours	Pay attention to the noise, vibration and oil level	
	Medium-term inspection	Once/6000 hours	Check the actions of the safety and protection devices	
Air-side heat exchanger	Fan	Always	The air flow is normal. The high pressure is within the normal range.	
	Cleanliness	Once a month	The windage is normal. The high pressure is within the normal range.	

Shell-and-tube heat exchanger	Water flow at user side	Always	Within the benchmark $\pm 20\%$	
	Temperature	Always	Within the benchmark	
	Antifreeze fluid concentration	Once a month	Above the required concentration	
	Water quality	Once a month	Within the benchmark	Refer to the Water Quality Standard Table
	Cleanliness	Always	The refrigeration low pressure is within the benchmark	
	Drain	Always	Drain the water in the shell-and-tube heat exchanger if the unit is not to be used for a long time	Drain the water in the pipeline as well
High pressure switch	Action	Once a month	Check the action thresholds of all the protection devices	Check whether the contact mechanisms are normal
Check valve	Action	Once a month	Check whether the check valve works smoothly	

Item		Frequency	Standard (procedure)	Remarks
Control of electric appliance	Insulation resistance	Once a month	The reading is above 1 M $\Omega$ when testing with a DC 500 V megger.	
	Contact of conductors	Once a month	Wire insulation should be intact and in good contact	
Cooling system	Refrigerant leakage	Once a month	Use a leak detector to detect whether there is a refrigerant leak in the unit and the pipe joint. Drain water from the shell-and-tube heat exchanger and check for leaks at the water inlet and outlet.	Use electronic leak detector or blowtorch leak detector or soap water to check it.

---

**Appendix****Maintenance (Service) Record Sheet**

No.	Fault Description	Troubleshooting Measures	Result	Recorder	Date
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

Note: The user needs to carefully fill in this form and properly keep it.

## Environmental Protection Description

- This product complies with the environmental protection requirements of the Measures for the Administration of the Restricted Use of the Hazardous Substances Contained in Electrical and Electronic Products.
- Environmental protection service life: In the environmental protection service life, the user's normal use of this product will not cause serious pollution to the environment or cause serious damages to persons and properties. The service life is specified by Gplus. The environmental protection service life is not equivalent to the service life of safe use.
- Recycling: When this product is not needed or its service life ends, recycle it according to the related national regulations on recycling of waste electrical and electronic products. Do not discard it at will.
- Names and content of hazardous substances in products

Part Name	Hazardous Substance					
	Plumbum (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr6+)	Polybrominated biphenyl (PBB)	Polybrominated diphenyl ether (PBDE)
Right angle air discharge valve	×	○	○	○	○	○
Right angle check valve	×	○	○	○	○	○
Liquid distribution pipe assembly	×	○	○	○	○	○
Temperature sensor sleeve	×	○	○	○	○	○
Valve connector base (copper)	×	○	○	○	○	○
Two-way throttle	×	○	○	○	○	○
Ball valve	×	○	○	○	○	○
Needle valve assembly	×	○	○	○	○	○
4-way valve	×	○	○	○	○	○
Water pressure difference switch hose	×	○	○	○	○	○

assembly						
Safety valve	×	○	○	○	○	○
Injection pump assembly	×	○	○	○	○	○
Discharge temperature controller	×	○	○	○	○	○
Selector switch	×	○	○	○	○	○
Selector switch contact	×	○	○	○	○	○
Insulator nut	×	○	×	○	○	○
Indicator	×	○	○	○	○	○
Motor protector	×	○	○	○	○	○

This table is prepared according to the provisions of SJ/T 11364.

O: It indicates that the content of this hazardous substance in all homogeneous materials in this part is below the limit requirement defined in GB/T 26572.

×: It indicates that the content of this hazardous substance in at least one homogeneous material in this part exceeds the limit requirement defined in GB/T 26572. Moreover, substitution cannot be implemented at present due to technical reasons, and it will be improved gradually along with technical progress in the future.



The number in this identification indicates that the environmental protection service life of the product under the normal use status is 15 years. Some parts may also have the identification of environmental protection service life, and their environmental protection service life is subject to the number in the identification. The product configuration may be different due to different models or product improvements. The actual configuration of sold products should prevail.

# Gplus



در صورت نیاز به اطلاعات بیشتر و مشاوره اسکن نمایید.



[www.goldiranac.ir](http://www.goldiranac.ir)

۰۲۱-۲۳۰۰۸

مرکز ارتباط با مشتریان

[mbtsvc@goldiran.ir](mailto:mbtsvc@goldiran.ir)

بخش خدمات و پشتیبانی

