SICC-W

Water-cooled Central Water Chiller

Date: Nov., 2022
Version: Ver.C (English)

Contents

Table Index

Picture Index

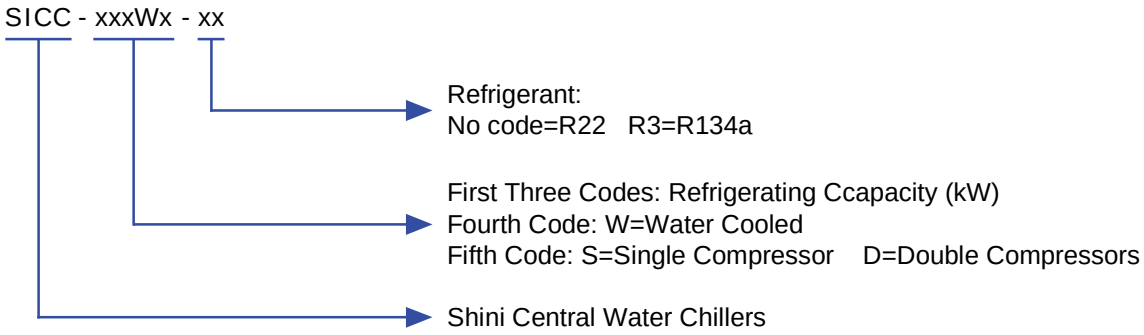
1. General Description

Read this manual carefully before operation to prevent damage of the machine or personal injuries.

SICC-W series water chillers are applicable for cooling moulds to reduce products molding cycle, also they are available in the cooling of equipments in order to maintain a normal temperature. Besides, they are suitable for other industries with the need of cooling.

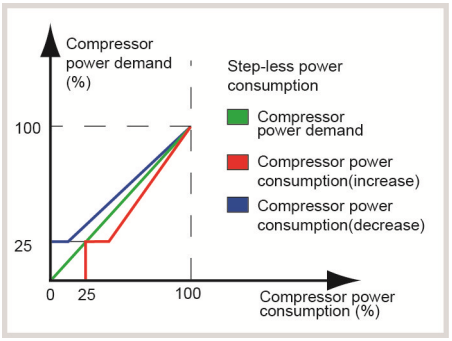
Model: SICC-450WD-R3

1.1 Coding Principle



1.2 Feature

- Brand twin-screw compressor with long service life.
- Multi-level compressor output capacity adjusting function are designed to save power.
- Evaporator and condenser are strictly built according to national standards.
- Extendability of the controller makes upgrade of both hardware and software much easier.
- Based on serial number, frequency and times of faults, the causes can be analyzed via both query and statistics functions to do the improvements.
- Standard equipped with high/low pressure switch, anti-freeze switch, fusible plug, overload protector, coil overheat protector, temperature auto switch, reverse protector.



Step-less loading capacity

All service work should be carried out by a person with technical training or corresponding professional experience. The manual contains instructions for both handling and servicing. Chapter 6, which contains service instructions intended for service engineers. Other chapters contain instructions for the daily operator.

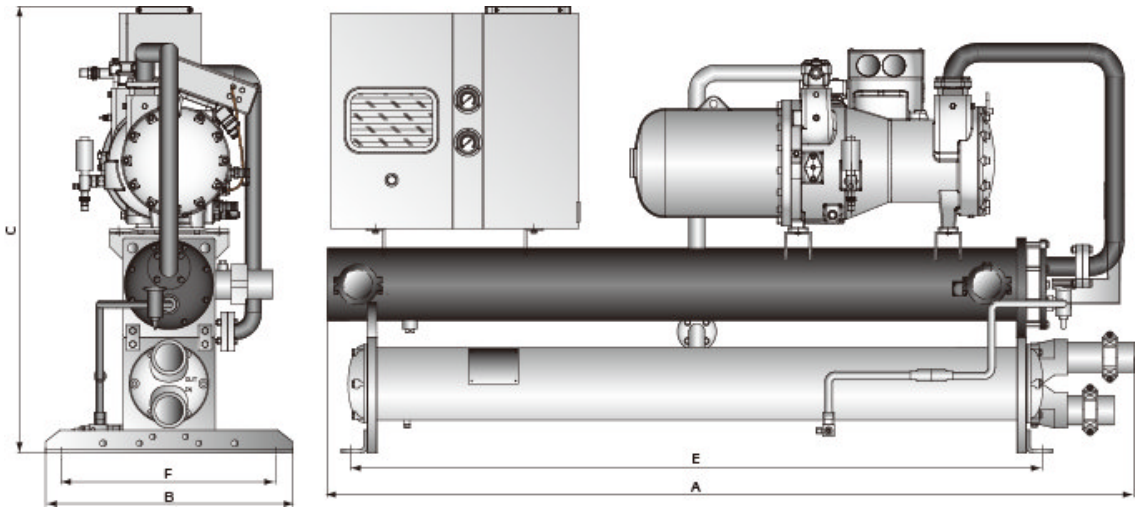
Any modifications of the machine must be approved by SHINI in order to avoid personal injury and damage to machine. We shall not be liable for any damage caused by unauthorized change of the machine.

Our company provides excellent after-sales service. Should you have any problem during using the machine, please contact the company or the local vendor.

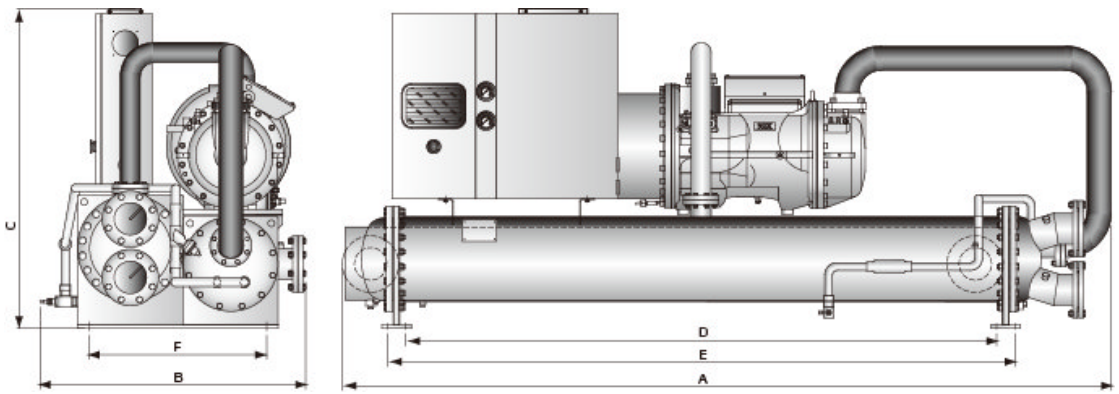
Shini Hotline Service:
Headquarter and Taipei factory：
Tel: + 886 (0)2 2680 9119
Shini Plastics Technologies (Dongguan), Inc.：
Tel: +86 (0)769 8331 3588
Shini Plastics Technologies (Pinghu), Inc.：
Tel: +86 (0)573 8522 5288
Shinden Precision Machinery (Chongqing), Inc.:
+86 (0)23 6431 0898

1.3 Technical Specifications

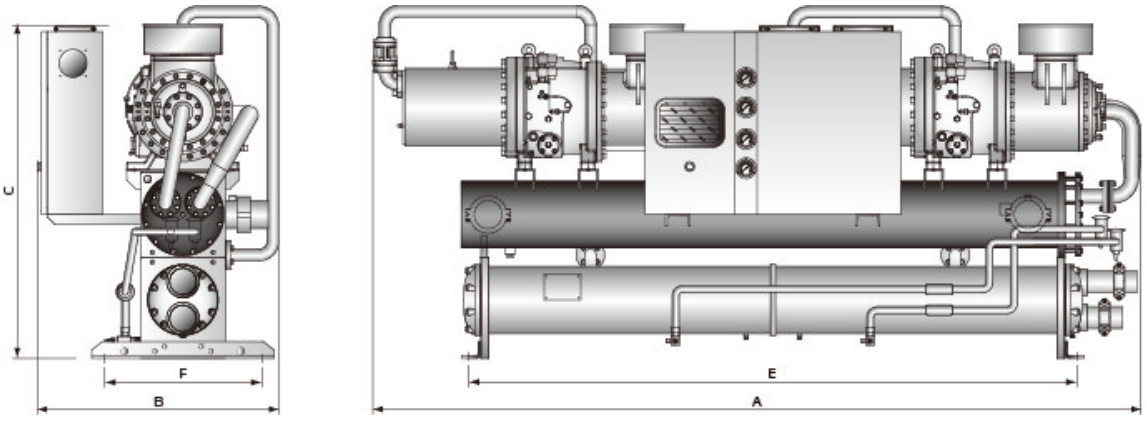
1.3.1 SICC-W Dimensions



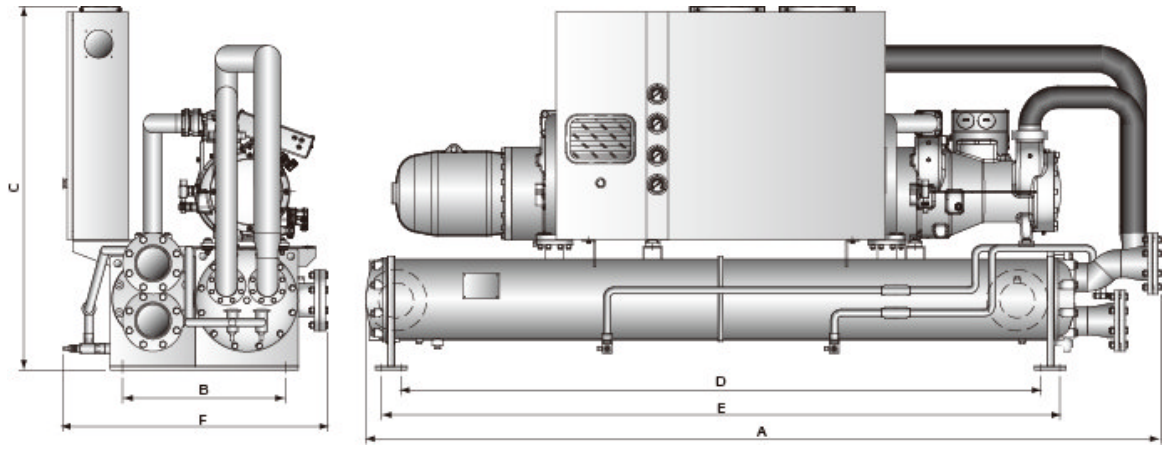
SICC-157WS & SICC-130WS-R3~SICC-220WS-R3



SICC-319WS ~ SICC-767WS



SICC-314WD & SICC-260WD-R3~ SICC-450WD-R3



SICC-518WD~SICC-1076WD

Picture 1-1: Outline Dimension

1.3.2 Specification

Table 1-1: Specification of SICC-W Single Compressor R22

Item \ Model			SICC-157WS	SICC-319WS	SICC-413WS	SICC-538WS	SICC-611WS	SICC-767WS
Refrigeration Capacity 1)		kW	157	319	413	538	611	767
		Kcal/hr	135,020	274,340	355,180	462,680	525,460	659,620
Refrigeration Capacity 2)		kW	128	251	330	430	488	610
		Kcal/hr	110,080	215,860	283,800	369,800	419,680	524,600
Power Source		-	3Φ 400V 50Hz					
Power Consumption		kW	36.1	68	100.3	120.9	125.9	156.7
Operation Current		A	63	122	179	216	225	280
Start-up Current		A	269	516	579	757	586	805
Power Adjustment		-	Capacity level 4 control					
Refrigeration Oil	Filling Quantity	L	11	17	17	21	21	25
	Type	-	KL320SH					
Refrigerant Filling Quantity		Kg	26	46	61	76	91	111
Evaporator	Type	-	U type tube-in-shell style			Tube-in-shell style		
	Chilled water quantity	m^3/hr	27.0	54.9	71.0	92.5	105.0	131.9
	Pressure Loss	kPa	48	54	63	63	66	80
	Pipe Coupler	clamp	DN80	DN100	DN125	DN125	DN125	DN150
Condenser	Type	-	Tube-in-shell style					
	Cooling water quantity	m^3/hr	35.1	71.3	92.3	120.3	136.6	171.5
	Pressure Loss	kPa	20	30	45	45	45	58
	Pipe Coupler	clamp	DN80	DN100	DN125	DN125	DN125	DN150
Unit Dimensions	A	mm	2550	3000	3100	3350	3300	3000
	B	mm	750	1050	1100	1150	1200	1350
	C	mm	1400	1200	1250	1400	1500	1500
Installing Dimensions	D	mm	1970	2550	2550	2780	2780	2780
	E	mm	/	2390	2390	2620	2620	2620
	F	mm	650	600	600	670	790	870
Net Weight		kg	1150	1480	1650	1980	2200	2650
Operating Weight		kg	1250	1600	1800	2130	2400	2850
Measures Exchange			1 kW=860kcal/hr 1RT=3024kcal/hr 10000Btu/hr=2520kcal/hr					

Note: 1) Parameter test condition 1: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 15˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

2) Parameter test condition 2: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 7˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

3) Machine operation conditions: outlet chilling water temperature is at 8~25˚C, inlet chilling water temperature is at 19~33˚C, For special requirements, the machine can be customized.

4) The noise level is tested at 1m in front of and 1.5m above the machine.

5) As per application needs, stepless compressor output capacity adjusting function can be optionally available.

Table 1-2: Specification of SICC-W Double Compressor R22

Item \ Model			SICC-314WD	SICC-518WD	SICC-638WD	SICC-706WD	SICC-826WD	SICC-1076WD
Refrigeration Capacity [1]		kW	314	518	638	706	826	1076
		Kcal/hr	270,040	445,480	548,680	607,160	710,360	925,360
Refrigeration Capacity [2]		kW	256	408	502	578	660	860
		Kcal/hr	220,160	350,880	431,720	497,080	567,600	739,600
Power Source		-	3Φ 400V 50Hz					
Power Consumption		kW	70.8	106.5	136.0	140.5	200.6	241.8
Operation Current		A	126	213	243	291	359	432
Start-up Current		A	332	530	638	707	758	973
Power Adjustment		-	Capacity level 8 control					
Refrigeration Oil	Filling Quantity	L	22	26	34	34	34	42
	Type	-	KL320SH					
Refrigerant Filling Quantity		Kg	51	71	91	111	121	151
Evaporator	Type	-	U type tube-in-shell style			Tube-in-shell style		
	Chilled water quantity	m^3/hr	54.0	89.1	109.8	121.4	142.1	185.0
	Pressure Loss	kPa	60	63	66	66	66	80
	Cooling water quantity	clamp	DN100	DN125	DN125	DN150	DN150	DN150
Condenser	Type	-	Tube-in-shell style					
	Cooling water quantity	m^3/hr	70.2	115.8	142.7	157.9	184.7	240.6
	Pressure Loss	kPa	40	40	57	57	57	64
	Pipe Coupler	clamp	DN100	DN125	DN125	DN150	DN150	DN150
Unit Dimensions	A	mm	3000	3300	3450	3600	3700	3950
	B	mm	950	950	1250	1350	1350	1450
	C	mm	1650	1750	1450	1450	1600	1650
Installing Dimensions	D	mm	2370	2570	2780	2780	3080	3080
	E	mm	/	/	2620	2620	2920	2920
	F	mm	650	650	670	870	870	980
Net Weight		kg	1880	2200	2750	2950	2850	3880
Operating Weight		kg	2000	2350	2950	3150	3150	4180
Measures Exchange			1 kW=860kcal/hr 1RT=3024kcal/hr 10000Btu/hr=2520kcal/hr					

Note: 1) Parameter test condition 1: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 15˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

2) Parameter test condition 2: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 7˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

3) Machine operation conditions: outlet chilling water temperature is at 8~25˚C, inlet chilling water temperature is at 19~33˚C, For special requirements, the machine can be customized.

4) The noise level is tested at 1m in front of and 1.5m above the machine.

5) As per application needs, stepless compressor output capacity adjusting function can be optionally available.

Table 1-3：Specification of SICC-W-R3 Single Compressor R134a

Item \ Model			SICC-130WS-R3	SICC-188WS-R3	SICC-220WS-R3
Refrigeration Capacity [1]		kW	130	188	220
		Kcal/hr	111,800	161,680	189,200
Refrigeration Capacity [2]		kW	104	150	176
		Kcal/hr	89,440	129,000	151,360
Power Source		-	3Φ 400V 50Hz		
Power Consumption		kW	24	35.8	40.9
Operation Current		A	41.5	60	69
Start-up Current		A	310	480	600
Power Adjustment		-	Step-less loading capacity control		
Refrigeration Oil	Filling Quantity	L	7	14	16
	Type	-	HBR-B08		
Refrigerant Filling Quantity		Kg	22	26	32
Evaporator	Type	-	Tube-in-shell style		
	Chilled water quantity	m^3/hr	22	32	37.5
	Pressure Loss	kPa	46	50	52
	Pipe Coupler		Φ3" clamp	Φ3" clamp	Φ3" clamp
Condenser	Type	-	Tube-in-shell style		
	Cooling water quantity	m^3/hr	26.5	38.5	45
	Pressure Loss	kPa	20	20	30
	Pipe Coupler		2.5"PT female	3.0"PT female	3.0"PT female
Unit Dimensions	A	mm	2490	2650	2780
	B	mm	750	850	850
	C	mm	1525	1655	1670
Installing Dimensions	D	mm	-	-	-
	E	mm	1100	1266	1327
	F	mm	540	640	640
Net Weight		kg	940	1200	1260
Operating Weight		kg	1040	1300	1360
Measures Exchange			1 kW=860kcal/hr 1RT=3024kcal/hr 10000Btu/hr=2520kcal/hr		

Note: 1) Parameter test condition 1: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 15˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

2) Parameter test condition 2: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 7˚C; cooling water inlet temperature 30˚C; cooling water flow 0.215m^3/(h.kW).

3) Machine operation conditions: outlet chilling water temperature is at 8~25˚C, inlet chilling water temperature is at 19~33˚C, For special requirements, the machine can be customized.

4) The noise level is tested at 1m in front of and 1.5m above the machine.

5) As per application needs, stepless compressor output capacity adjusting function can be optionally available.

Table 1-4：Specification of SICC-W-R3 Double Compressor R134a

Item \ Model			SICC-260WD-R3	SICC-380WD-R3	SICC-450WD-R3
Refrigeration Capacity [1]		kW	260	380	450
		Kcal/hr	223,600	326,800	387,000
Refrigeration Capacity [2]		kW	208	300	351
		Kcal/hr	178,880	258,000	301,860
Power Source		-	3Φ 400V 50Hz		
Power Consumption		kW	48	71.6	81.8
Operation Current		A	83	120	138
Start-up Current		A	351.5	540	669
Power Adjustment		-	Step-less loading capacity control		
Refrigeration Oil	Filling Quantity	L	14	28	32
	Type	-	HBR-B08		
Refrigerant Filling Quantity		Kg	44	52	64
Evaporator	Type	-	Tube-in-shell style		
	Chilled water quantity	m^3/hr	44	64	75
	Pressure Loss	kPa	58	63	63
	Pipe Coupler		Φ4" clamp	Φ5" clamp	Φ5" clamp
Condenser	Type	-	Tube-in-shell style		
	Chilled water quantity	m^3/hr	53	77	90
	Pressure Loss	kPa	40	40	60
	Pipe Coupler		2.5"PT female	3.0"PT female	3.0"PT female
Unit Dimensions	A	mm	2850	3110	3250
	B	mm	1075	1125	1125
	C	mm	1570	1750	1750
Installing Dimensions	D	mm	-	-	-
	E	mm	1260	1467	1467
	F	mm	798	878	878
Net Weight		kg	1860	2340	2530
Operating Weight		kg	2060	2590	2800
Measures Exchange			1 kW=860kcal/hr 1RT=3024kcal/hr 10000Btu/hr=2520kcal/hr		

Note:

1) Parameter test condition: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 15℃; cooling water inlet temperature 30℃; cooling water flow 0.215m^3/(h.kW).
2) Parameter test condition 2: chilled water flow 0.172m^3/(h.kW);chilled water outlet temperature 7℃; cooling water inlet temperature 30℃; cooling water flow 0.215m^3/(h.kW).
3) Machine operation conditions: outlet chilling water temperature is at 8~25℃, inlet chilling water temperature is at 19~33℃， For special requirements, the machine can be customized.
4) The noise level is tested at 1m in front of and 1.5m above the machine.
5) As per application needs, stepless compressor output capacity adjusting function can be optionally available.

1.4 Safety Regulations

Strictly abide by the following safety regulations to prevent damage of the machine or personal injuries.

1.4.1 Safety Signs and Labels

Notice !

The installation of electrical devices should be conducted by professional electricians.

During repair and maintenance, must turn off the main switch and control switch.

Warning!

High voltage danger!

Put up this symbol in the shell of the electric cabinet!

Warning!

CAUTION !

Be careful! This symbol stands that take careful hereby!

Warning!

Make sure the touch panel fixed stably. Otherwise, the touch panel would drop may cause human injury or machine damage.

Warning!

It must use the appointed cable for controller. Don’t share the same power source with other device to avoid the danger of overload. The power of fuse and breaker should comply with the controller. Don’t use the cable and fuse which are beyond the specified level.

Warning!

Don’t use sharp objects to press the key to avoid controller damage.

Don’t twist or pull the controller cable to avoid controller damage and failure.

Don’t clean the controller with benzene, diluent or chemical cloth. Otherwise, it may cause decoloration or failure. If it needs cleaning, please immerse the cloth in neutral detergent and squeeze the water, then clean the controller with the dry cloth. Don’t exert large force on the displayer and the joint to avoid color variation.

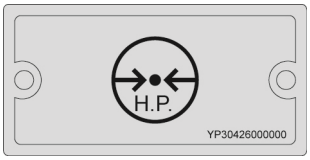
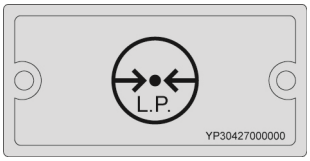
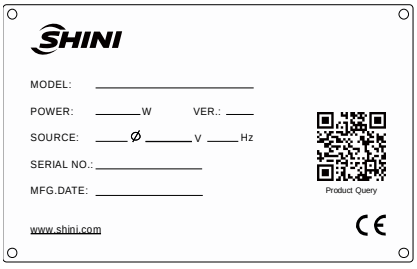
Notice !

No need for regular inspection because all the electrical parts in the control unit are fixed tightly!

Notice !

CPU must be installed inside the main unit which is at the stable level without accumulated rain, snow, leaves and wastes. It should separate the strong and weak current according to regulation, and had better to keep the control board and contactor above 50mm.

1.4.2 Signs and Labels

	High pressure gauge: display pressure in the high-pressure side of refrigerant system.
	Low pressure gauge: display pressure in the low-pressure side of refrigerant system.
SHINI	Shini LOGO
	Shini nameplate records the machine’s basic information, and the customer can get the instruction manual by scanning the QR code.

	Power label: display the voltage.

1.5 Operation Regulations

1. Cut power and repair the machine as following situations:

   A. The protective switch can't cut off the power.
   B. The compressor has abnormal impact.
   C. Motor current exceeds 10% of normal load.
   D. High/low pressure gauge exceeds the set pressure of auto switch but not shutdown the machine.
   E. Machine can not start smoothly.
   F. Machine running but has no refrigeration function.
   G. Machine can not start up after shutdown.

2. For the global ecological balance and environment, to reduce atmospheric ozonosphere destruction by the refrigerant (R22), in the process of machine inspection and maintenance (as filter replacement) to replenish the refrigerant R22 (no free change of refrigerant), it should prevent refrigerant leakage or even the exhausting to the atmosphere. If there is refrigerant leakage, shutdown the machine immediately and repair it.

3. Before machine delivery, there're sorts of labels attached on the machine, please follow the regulations strictly.

1.6 Exemption Clause

The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

1) Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.
2) Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and

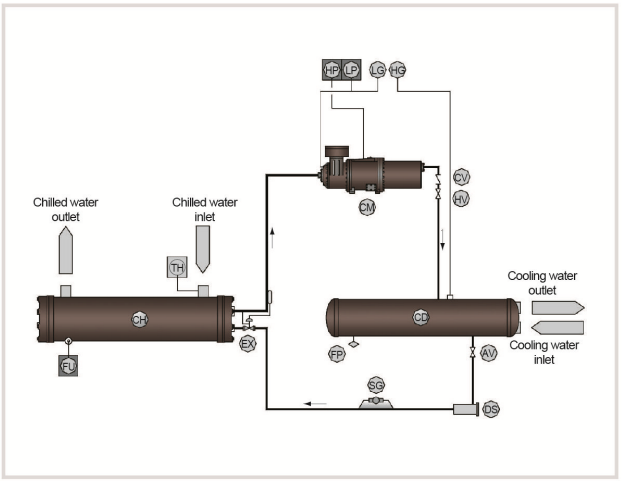
machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.

3) Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.
4) Employing consumables or oil media that are not appointed by Shini.

2. Structure Characteristics and Working Principle

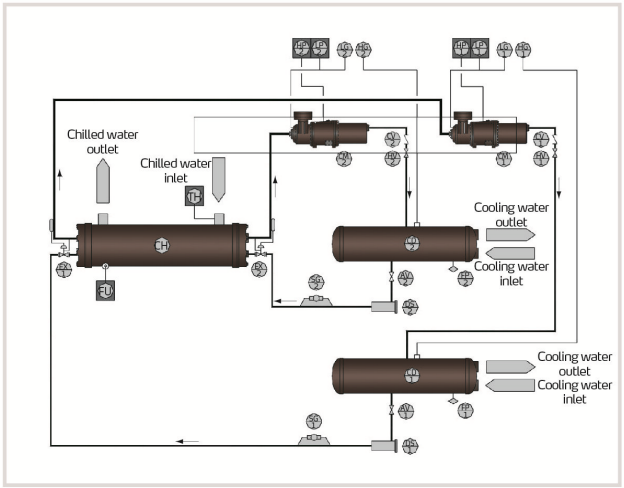
2.1 Working Principle of SICC-W

The SICC-W water-cooled central water chiller is mainly made up of four components which are compressor, condenser, thermostatic expansion valve and evaporator. It uses single stage vapor compression refrigeration system, and takes the advantage of the mechanism of transformation between gas and liquid status for absorbing and releasing heat by using of refrigerant to achieve the effectiveness of refrigeration.



Sign	Name	Amount Remark
CM	Compressor	1
CD	Condenser	1
CH	Evaporator	1
EX	Expansion valve	1
FP	Fusible plug	1
AV	Angle valve	1
DS	Drier filter	1
SG	Refrigerant indicator	1
CV	Contrary stop value	1
HV	High pressure valve	1
HG	High pressure gauge	1
LG	low pressure gauge	1
HP	High pressure switch	1
LP	Low pressure switch	1
TH	Thermo switch	1
FU	Anti-freezing switch	1

Picture 2-1: Working Principle of SICC-W Single Compressor Series



Sign	Name	Amount Remark
CM1-2	Compressor	2
CD1-2	Condenser	2
CH	Evaporator	1
EX1-2	Expansion valve	2
FP1-2	Fusible plug	2
AV1-2	Angle valve	2
DS1-2	Drier filter	2
SG1-2	Refrigerant indicator	2
CV1-2	Contrary stop value	2
HV1-2	High pressure valve	2
HG1-2	High pressure gauge	2
LG1-2	low pressure gauge	2
HP1-2	High pressure switch	2
LP1-2	Low pressure switch	2
TH	Thermo switch	1
FU	Anti-freezing switch	1

Picture 2-2: Working Principle of SICC-W Double Compressor Series

3. Installation and Debugging

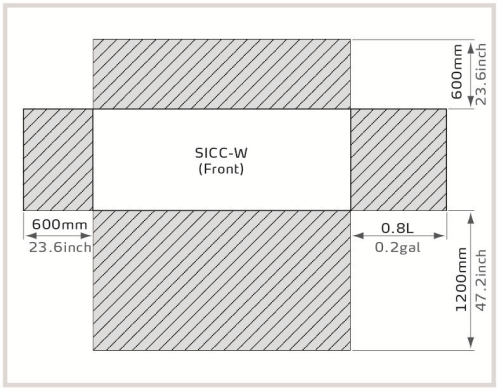
Note: Please read this chapter carefully before installation, and you must install the machine according to the following procedures!

Before installing the chiller, please design the pipe system reasonably, lay out the position of injection mould machine and cooling water tower to make the repair and maintenance convenient, the installation of chiller should be convenient to operate and keep appropriate distance from cooling water tower. The cooling water tower should be installed in the open air, and make sure that the cooling water tower is placed in the environment with good ventilation to release contamination and gas; If the cooling water tower is located in factory, the exhaust fan should be installed to keep air circulating. As the exhausted air may contain a great deal of moisture, the working capacity of the switches and controllers could be influenced if the exhaust fan is installed too close to the machine.

3.1 Installation Notice

3.1.1 Select the installation side

1) Select the floor which can fully support the unit operation weight, the intensity of the ground needs to be reinforced and makes it uneasy to cause resonance and noise.
2) Avoid being installed in the place which has lots of rainfall, sunshine or any place that has direct heat radiate.
3) Ambient temp. Range from 0℃~40℃, relative humidity (RH) within 75%, with good ventilation, less dust.
4) Near to power and convenient for construction.
5) Place which is easy for checking or maintenance, please keep some service space as figure 3-1 shows. L in below figure-1 stands for unit length, please refer to the catalog of water chiller, the reserved cleaning space for condenser is 0.8L, please take both sides into consideration.



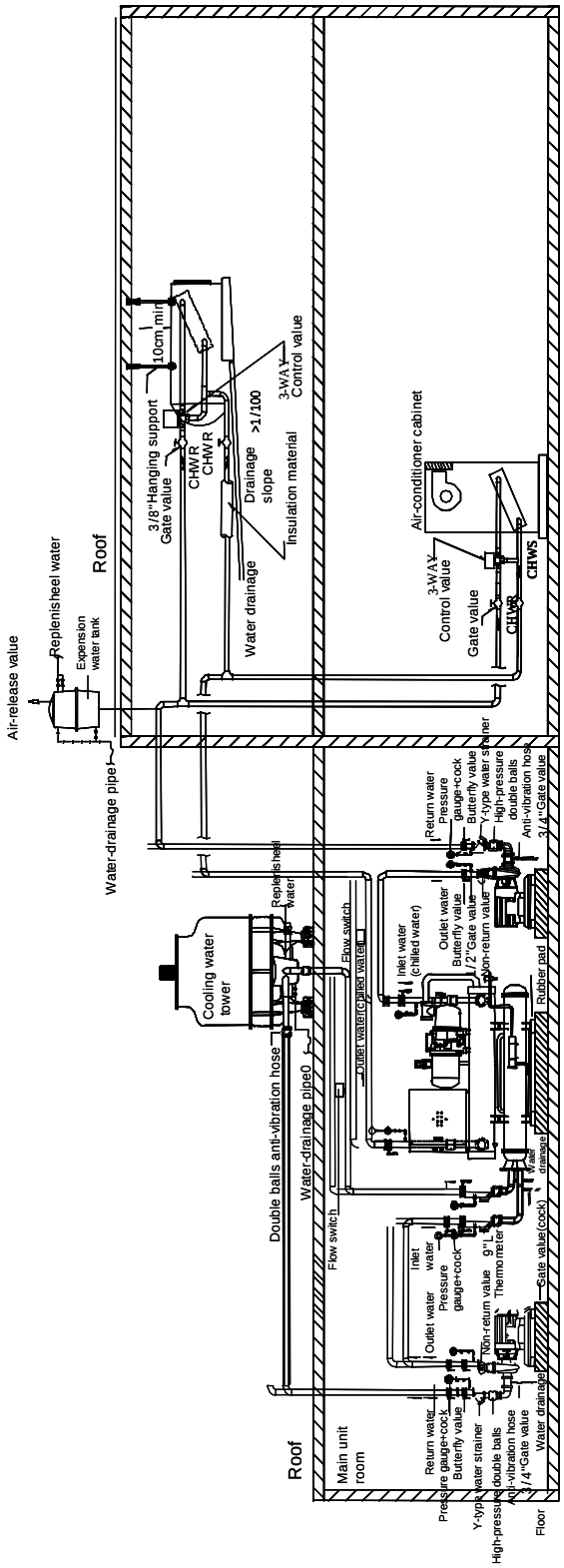
Picture 3-1: Drawing of Installation Site

3.1.2 Installation Notice of Pipeline Connection

1) Mount the water pump at water inlet, mount the expension tank at inlet of water pump. Mount the filter at water pump inlet to avoid the foreign matters getting in the heat exchanger.
2) If the machine is installed at the area with poor water quality, it should process water treatment to avoid heat exchanger damage.
3) In order to improve the efficiency of water system, the air-release valve must be mounted at the air accumulated part of water pipe.
4) The waterflow switch must be installed in the pipeline, the joint must be connected in machine control circuit.
5) If machine is mounted in lower temperature envrionment, long time (about several days) suspension of machine would cause water pipe freezing. So the structure and design of water pipeline should have anti-freeze function to avoid machine damage.
6) The machine will rest for a long time (abour several months) in winter, so it had better to exhaust the water from the pipeline to avoid pipe freezening.
7) Make sure water pipeline with good insulation to improve machine efficiency and reduce heat lost of the system.
8) To ensure machine efficiency, clean the pipeline after work to avoid foreign matters getting into the pipeline.
9) Connect the machine to the ground during installation to avoid electric leakage accident.
10) Don’t start up the compressor immediately when the power is cut off. When machine in suspension over 2 hours in winter, over 5 hours in

summer, it must run two hours to preheat the oil which enables the machine to operate.

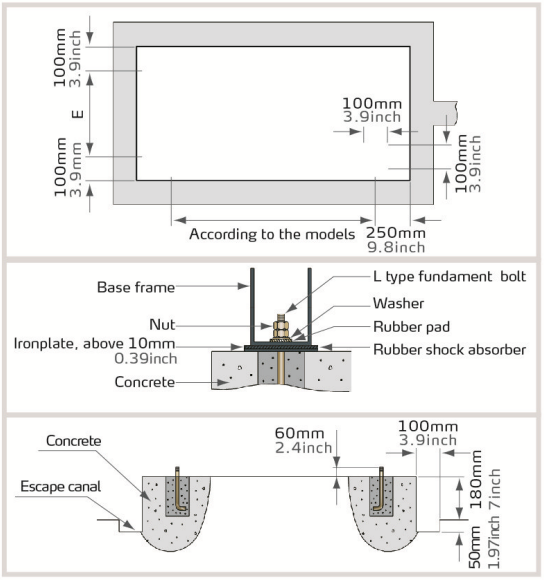
11) The evaporators of Shini Water Chillers are not suitable for the open style of chilled water system. It should avoid the poor working performance caused by
12) circulating water pollution. Contact Shini company if there's in special application.
13) The inlet water temperature of customer's workshop is below 20℃.
14) The pipeline connection of Water-cooled Water Chiller refers to below picture 3-2.
15) Don't arrange the cooling water tower and chimney in the same interface.



Picture 3-2: Drawing of Water-cooled Water Chillers Pipeline Connection

3.1.3 Bearing Base

1) The foundation of the concrete base is according to the operation weight of the machine. Had better to lay steel bars of diameter over 9.5 mm(#3) clustered together on the upper and lower layers of the base with 10 cm distance.
2) When making concrete floor to be foundation, it is necessary to rough the surface. After cleaning, water the floor and then start installation.
3) The concrete base has to be rigid; the mixing proportion of concrete is 1: 2: 4. According to requirements, to put required anchor screws into the base. Polish the surface of the base and make it flat after work.
4) Install the machine on the base after the concrete is fully dried.
5) Ensure water drainage around the bearing base works well. Make sure there's no accident caused by accumulated water.



Picture 3-3: Bearing Base

3.1.4 Water Pipe Connection

1) When connect the unit with external water pipe system, please according to the pipeline regulation of the air conditioner.
2) The auxiliary devices such as anti-vibration hose, sluice valve, filter, waterflow switch, water-pressure gauge, thermometer, cooling water tower, cooling water pump should be mounted in the cooling-water pipeline system.

3) The auxiliary devices such as anti-vibration hose, sluice valve, filter, waterflow switch, water-pressure gauge, thermometer, expansion tank, cold water pump should be mounted in the cold-water pipeline system.

Note: The water pipeline should add the insulation layer.

3.1.5 The Overhead Hoisting of the Unit

1) Propose plans of overhead hoisting before practise, including entering date for each unit, outline dimension, weight, path, reserved holes, hanging and transporting device as well. Please refer following table.

2) According to safety regulation, when hanging and transporting units, assign special person to direct and there must be warning and precaution measures to ensure safety of people and machines.
3) Use roller or J-hook to hanging and transporting units. Forbidden to directly hit or attach rope at the friable parts such as copper pipe, valve body, control box etc. The rope contacting parts of the unit should have protective pad.
4) Take great care when transporting the unit to avoid the over wobbling or crush which may cause damage to machine or bring harm to personnel and construction.

Table 3-1： Notice for Machine Lifting and Transporting

Items		Check points
Transporting	Path	1. Check aisle, stair gate and transporting path. 2. Check roof, base room and hanging path.
	Unload	1. Check the weight of the unit. 2. Prepare unload device 3. Check the temporary laying place.
	Transporting	1. If the large-scale machine can be decomposed, then decompose it and transport each part respectively and then combine them finally. 2. If the large-scale machine cannot be decomposed, then dig hole in the wall or earth to transport it.
Path adjustment		Adjust with the wall, floor to facilitate transporting.

3.2 Power Connection

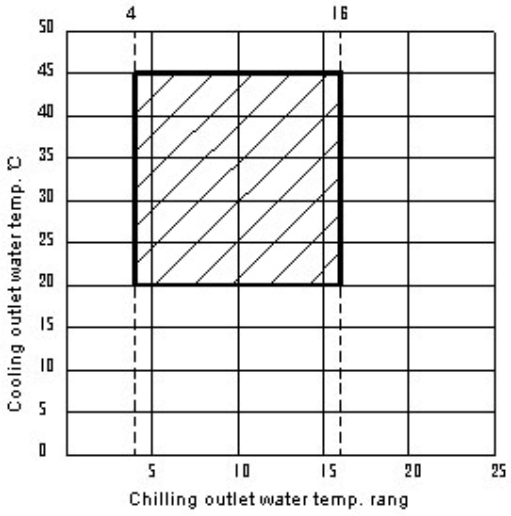
1) Make sure the voltage and frequency of the power source comply with those indicated on the manufacturer nameplate that attached to the machine.
2) Power cable and earth connection should conform to your local regulations.
3) Use independent electrical wires and power switch. Diameter of electrical wire should not be less than those used in the control box.
4) The power cable connection terminals should be tightened securely.
5) The machine adopts 3-phase 5-wire power source, connect the power lead (L1, L2, L3) to the live wires, and the earth (PE) to the ground.
   Power supply requirements:
   Main power voltage: +/- 5%
   Main power frequency: +/- 2%
6) ***Please refer to electrical drawing of each model to get the detailed power supply specifications***

   Note: Please make sure that the power supply is cut off before wiring!

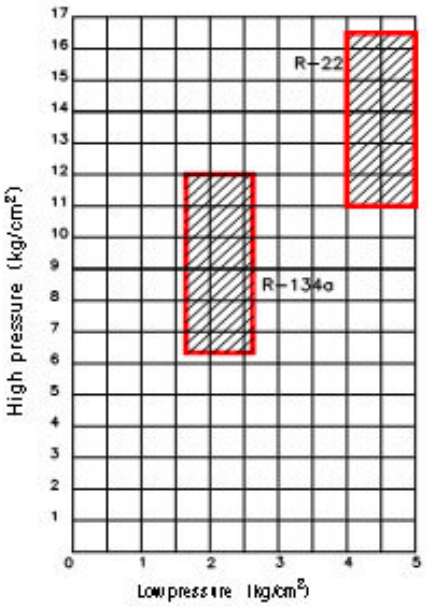
3.3 Operation Range

3.3.1 Water-cooled Water Chillers Operation Range

1) Machine working in summer, the temp. range of outcoming condenser cooling water and evoprator chilled water is as below (pic.3-4)
2) When machine is working, the refrigerant are R22 and R134a, the high pressure and low pressure range is as below (pic.3-5)



Picture 3-4: Outlet Water Temp. Range



Picture 3-5: High/low Pressure Range

3) When machine is working, the temperature and pressure beyond its working range, it means the machine is under abnormal working state. Take proper measures to the machine, please refer 6.1.

3.4 Standard Control of Water Quality

When circulating cooling water contacted with air in the cooling tower, it partly evaporates and takes the heat away.
In the process, cooling water will be dirted and corrupted due to air pollution.
The polluted water will cause sorts of problems to the chiller.
The failures caused by poor water quality can be divided into: corrosion (condenser broken), incrustation (lead to high pressure trouble), algae mud (due to microorganism) as following:

1) Corrosion: Metal corrosion may cause leakage. If the corrosion is inside the condenser, it will corrode the cooling water. Change the pipe, otherwise the entire condenser needs to be changed. If the corrosion generates rust, it may block the pipeline and make high pressure switch working. At this moment, repairing would be very expensive, and the condenser would in poor capacity. Possible reasons of the corrosion as following:
   A. Poor water quality causes corrosive effect on metals, standard water quality as below Table 3-1.
   B. Even if the water quality is good, after corruption it would still cause corrosive effect on metals.
   C. The faster the flowrate, the earlier the metal would be corroded. So use the standard amout of cooling water is best.
   D. If the mud, sand or dust accumulated in the cooling pipe, it also will accelerate the corrosion.
   E. If there is algae mud, would accelerate the corrosion too.

2) When there is incrustation inside the cooling pipe, it hinders heat conduction directly, besides, the cooling waterflow reduces which leads to high pressure switch works and machine shutdown.

Moreover, the incrustation will also cause corrosion or pinholes to condenser and cooling pipe. Possible reasons of incrustation as following:

A. The cooling water contains $CaCO_3$, SiO_2, Fe, after long time of circulation, it would evaporate. The concentration would be increased till it exceeds the solubility and precipitates on the pipe.

B. As corrosion resultant accumulated inside the pipe.

C. As algae mud brought into the pipe by waterflow.

D. As mud and sand get in and deposited inside the pipe.

3) Algae mud “When the conditions like food, proper temperature, oxygen and sunlight (no necessary) suitable for microorganism growing in the cooling tower, it will soon block and corrode the pipeline. The treatment of circulation cooling water is mainly to solve the problems like incrustation, corrosion, dirt and microorganism. To be specific, the corrosion rate should be controlled lower than 0.125（mm/a）; annual dirt coefficient at 0.00017~0.00052m^2·K/W; Total number of anaerobic bacteria per milliliter should less thann 103.

To meet above requirements, it should add antisludging agent to avoid incrustation, add corrosion inhibitor to avoid corrosion. Eliminate the microorganism by stripping biocide.

However, the situation is not very simple, because it has many reasons.

For example, each factory the water quality of replenished water, concentration times of circutation water, water quality of circulation water, flowrate, structure and material of heat exchanger, technique medium leakage and water temperature are different.

Therefore, the pharmaceutical formula to treat with circulation cooling water is different.

Firstly, control the content of CA2+, reduce it and soften the water. There are 4 methods for reference:

1. Lon exchange resin
2. Add antisludging agent
3. Add corrosion inhibitor
4. Add biocide

Table 3-2: Standard Water Quality

Items（ppm）			Replenshed Water Sta.	Cooling Water Sta.(1)	Tendency	
					Corrosion	Incrustation
Basic Reasons	PH(25℃)		6.0～8.0	6.0～8.0	○	○
	Electric Conductivity (25℃) (v/m)	(ppm)	below 200	below 500(4)	○	
	cl-	(ppm)	below 50	below 200	○	
	SO_4--	(ppm)	below 50	below 200	○	
	Fe	(ppm)	below 0.3	below 1.0(2)	○	○
	$CaCO_3$	(ppm)	below 50	below 100		○
	$CaCO_3$	(ppm)	below 50	below 200		○
Suggested Reasons(3)	S--	(ppm)	can't detect	can't detect	○	
	NH_4+	(ppm)	can't detect	can't detect	○	
	SiO_2	(ppm)	below 30	below 30		○

Note: 1) Cooling water is the water which passes through the condenser, not just passes through once orcirculates.

2) When use the plastic pipe, the value should be lower than 0.5ppm.

3) Although suggested reasons have much impact on water quality, but there's no actual evidence, so mark it with "suggested".

4) When use the antirust agent, the value increased to 1,000ppm is permitted.

5) When the water quality doesn't meet above standards, should add treatment device for the water in pipeline.

According to the material: water with PH＜6.5, hardness ＜50mg/L will corrode the copper; carbon dioxide ＞50mg/L, ground water with high solubility and hardness will corrode the copper to rough surface. So we suggest the customer could pay special attention to water quality.

3.5 Operation Procedure

1. Check before machine start:
   1) Check whether the machine earth wire is connected to the ground.
   2) Check whether the circulation system of chilled water and cooling water is full filled, air in the pipe is exhausted out, and if the replenishing water valve is turn on.
   3) Check whether each pipeline valve is at correct position.
   4) Check whether there is any abnormality of each control part and switch in the electrical cabinet (Repair it, if there is.)
   5) Check whether the voltage of power is correct.

6) Check whether the pressure of main machine is correct, if the refrigerant oil is enough (Please observe the refrigerant oil sensor, the oil level should keep above its 2/3).

2. Start-up Process:

1) Start fan motor of each air conditioner.
2) Start fan motor of the cooling water tower.
3) Start circulation pump of the cooling water pump.
4) Start circulation pump of the chilled water.
5) Start the motor of compressor.

※The first start up of machine or long after machine shutdown, the crankcase oil heater must be heated about 8-16 hours before machine start up.

3. Shutdown Process:

Reversely as the start-up order.

4. Transporting Notice:

1) Electrical part:
   A. Check whether the voltage is normal（400V±5%）after start up.
   B. If all the power switches are turned on.
   C. Whether the ampere meter after machine start up works normally.
2) Machine part:
   A. Whether each motor runs normally.
   B. Whether there is special and abnormal noise when machine works.
   C. Whether the circulation-water pump works well and water pressure is normal.
   D. Whether machine pressure gauge works normally (when use R22 refrigerant, normal low pressure gauge is within 3.5~5.0kg/cm^2, normal high pressure gauge is within 12~17kg/cm^2; when use R134a refrigerant, normal low pressure gauge is within 1.5~2.5kg/cm^2, high pressure gauge is within 7~11kg/cm^2).
   E. Through level sensor to check whether the refrigerant oil is normal (not below its 1/4)
   F. When high/low pressure switch or oil pressure switch trips, should check its reason and repair it before start up the machine again.

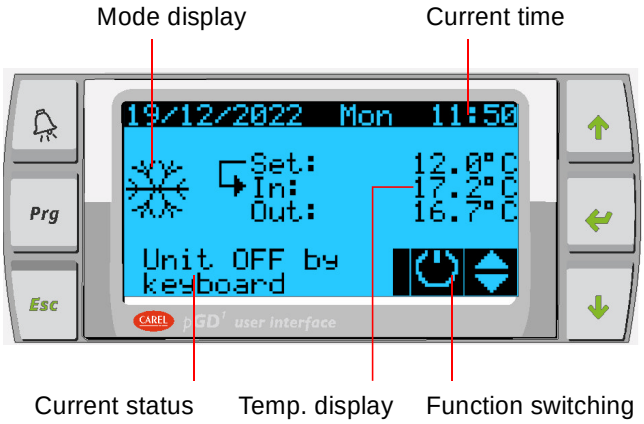
G. When voltage-limit controller trips, it should pay attention to the voltage rise up and fall down.

H. Check whether the return water pipe is frosted, if it has frosted, check it immediately.

4. Operation Guide

4.1 Manipulator Connection

4.1.1 Press Key Layout



Picture 4-1：Operation Panel Diagram

4.1.2 Key Functions

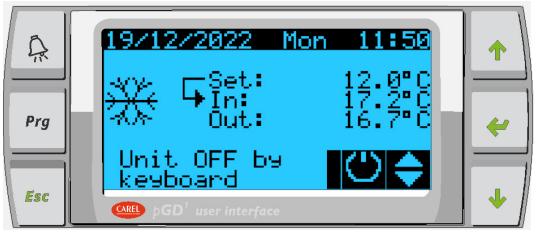
Press Keys	Functions
- *Alarm*	Display the alarm list or manual fault reset
Prg - *Prg*	Enter the main menu tree
Esc - *Esc*	Return to the previous screen
- *Up*	Scroll up the list or increase the value on the touch panel
- *Down*	Scroll down the list or decrease the value on the touch panel
- *Enter*	Enter the selected submenu or confirm the set value.

4.2 Description of Main Operation Panel

4.2.1 Operation Panel

The operation screen mainly displays the unit operation status.

It has start/stop function; unit basic information display; compressor status display; Function of running prompts.



Picture 4-2：Operation Panel

1) Mode display: display cooling/heating mode.
2) Current time: display current system time.
3) Temp. display: display the inlet and outlet temp. of the evaporator, and the unit set temp.
4) Current status: display the unit shutdown or the current operating capacity of the compressor.
5) Function switching: switch to the function mode selected through UP/DOWN, such as user settings, IO point table, switch on/off button, etc.

Picture 4-3：Function Switching Diagram

4.2.2 On/Off Screen

When the function mode is , click the ↵ button to enter the On/Off screen, and click<UP>or<DOWN> button to switch on/off, as below:

Picture 4-4：Switch On/Off Screen 1

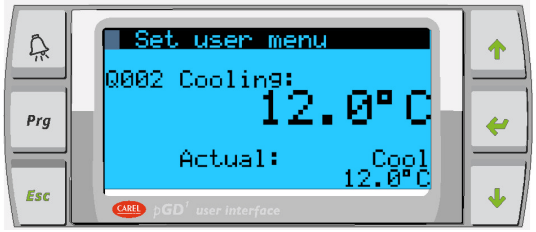
Picture 4-5：Switch On/Off Screen 2

Picture 4-6：Switch On/Off Screen 3

After clicking the<Start>button, the operation screen will display current operating capacity of the compressor.

4.2.3 User Setting Screen

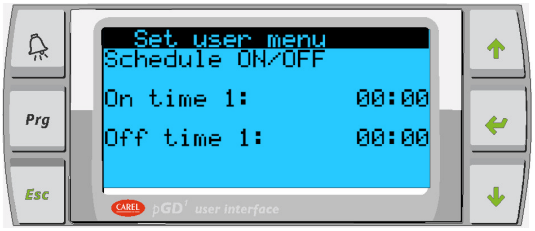
When the function mode is Set, click the ↵ button to enter the user setting screen, and click the<UP> or <DOWN> button to switch between screens of temperature setting, time setting, language switching, timer on/off and switch on/off, as shown below:



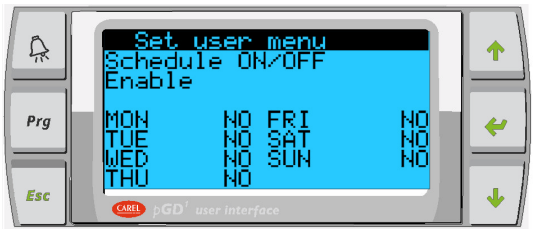
Picture 4-7：Temp. Setting Screen

Picture 4-8： Time Setting Screen

Picture 4-9： Lang. Switching Screen



Picture 4-10：Switch On/Off Screen 1

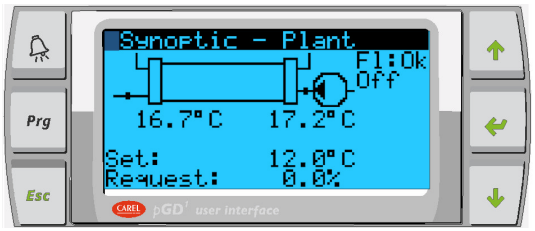


Picture 4-11：Switch On/Off Screen 2

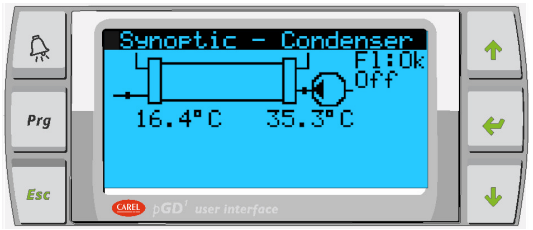
In above screens, it can set five periods for timing on/off every day, and choose whether to enable the timing function from Monday to Sunday.

4.2.4 I/O Display Screen

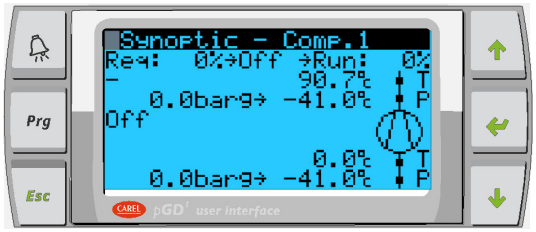
When the function mode is  , click the ↵ button to enter the unit information display screen, and click the<UP> or <DOWN> button to switch between the evaporator, condensor and compressor screens; Display the water temp. of current container, water flow switch status, compressor operating capacity, current demand, etc. as shown below:



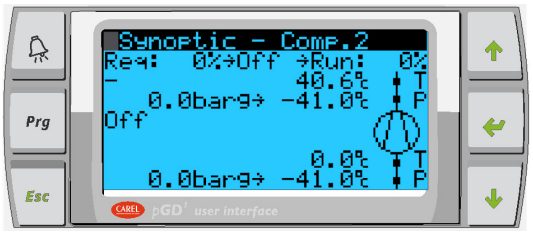
Picture 4-12：Evaporator Operation Screen



Picture 4-13： Condensor Operation Screen

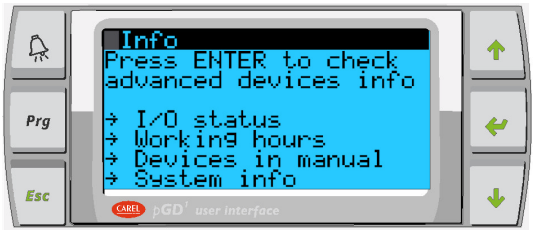


Picture 4-14： Compressor Operation Screen 1

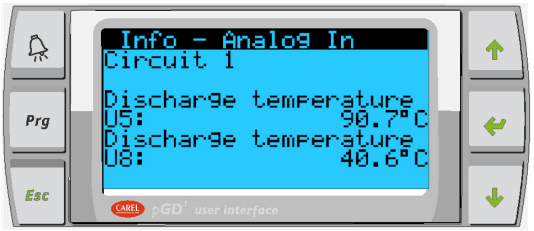


Picture 4-15： Compressor Operation Screen 2

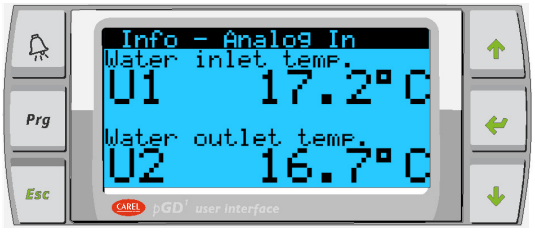
If the user needs to input and output the status, working time and system information, it also can through the following screens:



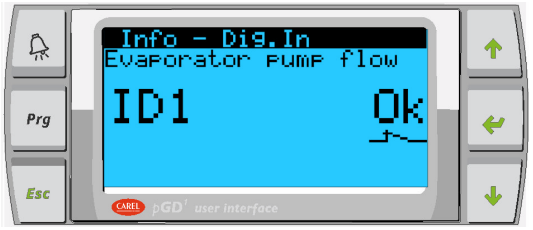
Picture 4-16： Info. Screen



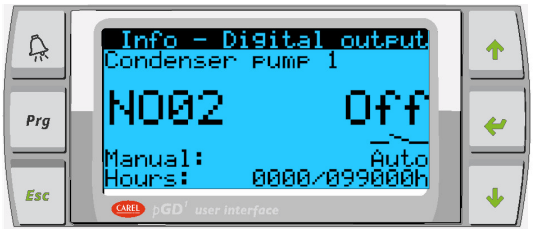
Picture 4-17：Analog Quantity Screen1



Picture 4-18：Analog Quantity Screen 2



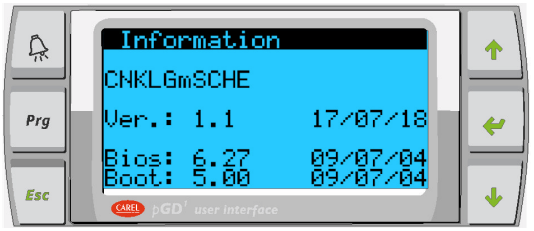
Picture 4-19： Digital Quantity Input Screen



Picture 4-20：Digital Quantity Output Screen 1

Picture 4-21： Digital Quantity Output Screen 2

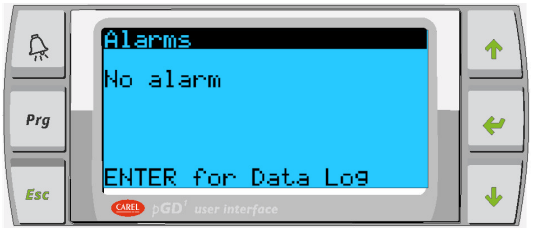
Picture 4-22：Digital Quantity Output Screen 3



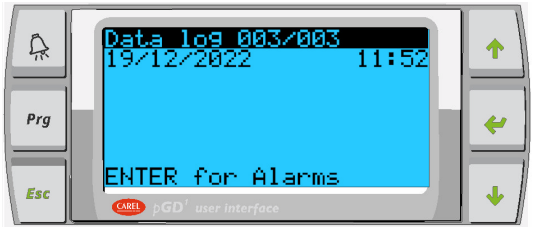
Picture 4-23：Program Info. Screen

4.2.5 Fault Inquiry

When the machine fault occurs, the button will on, and press the button to enter current alarm screen.



Picture 4-24： Current Alarm Screen



Picture 4-25：Historical Alarm Screen

If the external alarm signal of current fault is removed, click the button on current fault inquiry screen to reset the alarm manually, and it will jump to the main screen automatically. If multiple faults occur at current, press the ↑ or ↓ button to inquire other fault alarms.

4.3 Menu Screen Description

Main menu - function tree (click<Prg>to enter)

Click<Prg> button on any screen to enter the main menu.

Main Menu Contents
A factory parameters
B electronic expansion valve
C condenser parameter
D compressor parameters
E hardware/software

F log out

Click the ↑ or ↓ button on the main menu, select a first level submenu with the cursor "→", and then click the ↵ button to enter the first level submenu. After entering the first level submenu, click the ↑ or ↓ button to turn pages up and down. If there is a second level submenu under the first level submenu, click the ↑ or ↓ button to select a second level submenu with the cursor "→", and then click the ↵ button to enter the second level submenu. Detailed description of each submenu screen is as below:

4.3.1 "A Factory Parameters" Menu

In the main menu, select the " A factory parameters" with the cursor "→", and then click the ↵ button to enter the submenu. After entering the submenu, click the ↑ or ↓ button to turn pages up and down.

Table 4-1：A Factory Parameter Description

Panel Index	Screen Description	Default	Unit	Function Description
Evaporator water pump	running time	0	h	Display the running time of evaporation water pump
	maintenance time	99000	h	Display the maintenance time of evaporator water pump
Evaporator water pump	status	OFF		The water pump status
	manual	Auto		Startup mode of evaporation water pump
Cooling set point	minimum	8	℃	Minimum cooling temp.
	maximum	20	℃	Maximum cooling temp.

Temp. control	startup stage	return water temp.		Control mode at unit startup stage
	running stage	output water temp.		Control mode at unit running stage
	running delay	180	S	Temp. control delay 180s
	temp. filter delay	5	S	Temp. control filtering delay 5s
PID	start PID control			PID as default.
	running PID control			
Water flow alarm delay	start	20	S	Alarm delays 20s when the water flow switch gives alarm
	running	2	S	Alarm delays 2s when the water flow switch is running
Evaporator water pump delay	Compressor startup	60	S	The evaporator water pump starts 60S before the compressor starts
	After compressor shutdown	360	S	The evaporator water pump stops 360s after the compressor stops
Evaporator anti-freezing pipe heater	set the value	4	℃	The start temp. of evaporator anti-freezing pipe heater is 4℃
	deviation	2	℃	The final temp. of evaporator anti-freezing pipe heater is 6℃
Refrigeration operation anti-freezing (temp.)	set the value	4	℃	Anti-freezing start temp. when the refrigerating is 4℃.
	deviation	2	℃	Anti-freezing final temp. when the refrigerating is 6℃.
Shutdown anti-freezing (temp.)	set the value after pump startup	4	℃	When the system is shut down, the anti-freezing pump start temp. is 4℃.
	stop setting the value	6	℃	When the system is shut down, the anti-freezing pump final temp. is 6℃.
Anti-freezing	pump running	300	S	After the anti-freezing pump runs for 300s, stop

pump running time	water pump stops	1500	S	the anti-freezing circulation for 1500s.
Analog quantity input calibration	return water temp.	real-time temp.	℃	Display chilled return water temperature
	calibration	0	℃	Compensate the chilled return water temperature
	outlet water temp.	real-time temp.	℃	Display the chilled outlet water temperature
	calibration	0	℃	Compensate the chilled outlet water temperature
Digital quantity input logic	remote switch	disconnected alarm		Logic status of remote switch alarm
	water flow switch	disconnected alarm		Logic status of flow switch alarm
	water pump overload	disconnected alarm		Logic status of chilled pump overload alarm
Digital quantity output logic	Refrigeration water pump	normally open		Logic state of chilled water pump
	Alarm output	normally open		Alarm output logic state
	Anti-freezing pipe heater	normally open		Anti-freezing heating logic state
Anti-freezing setting	Anti-freezing setting	water pump		Anti-freezing setting water pump enabled
	Shutdown anti-freezing enabling			Anti-freezing setting water pump disabled
Setting	Unit type	cooling only		Unit work type is refrigerating
Setting	Anti-freezing setting	temp.		Anti-freezing setting data is temperature

Explain:

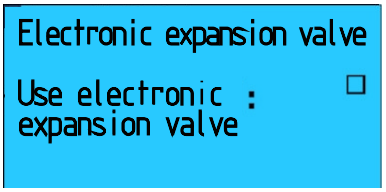
1. Please set the parameters when the unit shuts down.

2. When setting parameters, the parameters can be fine-tuned by keying up and keying down.

The adjustment range is 0.1 ℃ per time.

3. When the parameter setting value exceeds the parameter setting limit, the parameter setting value will be automatically adjusted to the parameter setting limit.

4.3.2 Menu Description of "B Electronic Expansion Valve"



Picture 4-26：Electronic Expansion Valve

This screen is "Electronic Expansion Valve"

The standard model doesn't have this function, please don't select it !

4.3.3 Menu Description of "C Condenser Parameter"

In the "main menu", select the "C condenser parameter" with the cursor "→", and then click the ↵ button to enter the submenu. After entering the submenu, click the ↑ or ↓ button to turn page up and down.

Table 4-2："C Condenser Parameter" Meun Description

Panel Index	Panel Description	Default	Unit	Function Description
Condenser water pump	running time	0	h	Display the running time of the condenser water pump
	maintenance time	99000	h	Display maintenance time of the condenser water pump
Condenser water pump	status	close		The status of condenser water pump
	manual	auto		The start-up mode of condenser water pump
Water flow alarm delay	start	20	S	20s delay before water flow switch alarming
	running	10	S	10s delay before running after water flow switch alarming
Evaporator water pump delay	compressor startup	30	S	The evaporator water pump starts 30S before the compressor starts
	after compressor stops	120	S	The evaporator water pump stops 120S after the compressor shutdown.
Analog input calibration	outlet water temp.	real-time temp.	℃	Display the cooling water outlet temperature
	calibration	0	℃	Compensate the cooling outlet water temp.

	return water temp.	real-time temp.	℃	Display the cooling return water temp.
	calibration	0	℃	Compensate the cooling return water temp.
Digital input logic	water pump overload			Logical status of the cooling water pump overload alarm
	water flow switch	disconnected alarm		Logical status of water flow switch alarm
Digital output logic	condensation water pump	normally open		Logic status of cooling water pump

Explain:

1. Please set the parameters when the unit shuts down;

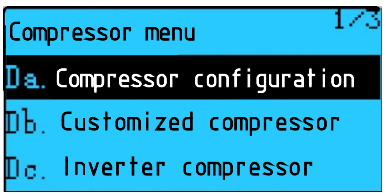
2. When setting parameters, the parameters can be fine-tuned by keying up and keying down.

The adjustment range is 0.1 ℃ per time;

3. When the parameter setting value exceeds the parameter setting limit, the parameter setting value will be automatically adjusted to the parameter setting limit.

4.3.4 Menu Description of "D Condenser Parameter"

In the "main menu", select "D compressor parameter" with the cursor "→", and then click the ↵ button to enter the submenu. After entering the submenu, click ↑ or ↓ button to turn page up and down.



Picture 4-27：Compressor Menu Screen

4.3.4.1 "Da Compressor Configuration" Description

Table 4-3："Da Compressor Configuration" Description

Panel Index	Panel Description	Default	Unit	Function Description
1# compressor	running time	0	h	Display the running time of compressor 1 #
	maintenance time	30000	h	Display the maintenance time of compressor 1 #
	status	0%		The status of compressor 1#, 0% is the shutdown status
	manual	AUTO		The start mode of compressor 1#

Protective time	Min. shutdown time	180	S	Min. shutdown time of compressor: 300s
	Min. alarm shutdown time	180	S	Min. alarm shutdown time of compressor is 180s.
	Min. startup time	300	S	Min. startup time of compressor is 300s
	Min. interval between twice startup	600	S	The min. interval between compressor twice startup is 600s
Max. design condition of the unit	Min. evaporating temp.	-2	℃	Min. evaporating temp. is -2℃;
	Max. condensing temp.	55	℃	Max. condensing temp. is 55℃.
Low pressure switch alarm delay	start	0	S	The alarm delays 0s in the compressor start low pressure detection
	running	0	S	The alarm delays 0s in the compressor running low pressure detection
Oil level switch alarm delay	start	30	S	The alarm delays 30s in the oil level switch start detection (The standard mode doesn't have this function).
	running	10	S	The alarm delays 10s in the oil level switch operation detection.
Over-current alarm	delay	10	S	The delay of compressor over-current alarm is 10s
High suction pressure alarm delay	start	10	S	The alarm delays 10s in the high suction pressure start detection
	running	5	S	The alarm delays 5s in the high suction pressure running detection
Low compression ratio alarm delay	start	20	S	The alarm delays 10s in the low compression ratio start detection
	running	10	S	The alarm delays 5s in the low compression ratio running detection
Low pressure difference alarm delay	start	20	S	The alarm delays 20s in the low pressure difference start detection
	running	10	S	The alarm delays 10s in the low pressure difference running detection
Low exhaust pressure alarm delay	start	20	S	The alarm delays 20s in the low exhaust pressure start detection
	running	10	S	The alarm delays 10s in the low exhaust pressure running detection

Low suction pressure alarm delay	start	20	S	The alarm delays 20s in the low suction pressure start detection
	running	10	S	The alarm delays 10s in the low suction pressure running detection
	set the value of low pressure difference alarm	4	Barg	The low pressure difference alarm is set to 4Bar
	high exhaust pressure alarm delay	3	S	The high exhaust pressure alarm delay is 3s
High exhaust temp. alarm	set the value	90	℃	The high exhaust temp. alarm is set to 90℃.
	return difference	10	℃	The high exhaust temp. alarm return difference is 10℃.
Valve pulse interval	minimum	3	S	The min. valve pulse interval is 3s.
	maximum	12	S	The max. valve pulse interval is 12s.
Star-delta start	star-delta start delay	5000	ms	Star-delta start delay 5000 ms
	star running time	100	ms	Star running time is 100 ms
	start type	star-delta		Start mode is star-delta start
Digital input logic	1# low pressure switch	disconnected alarm		1# low pressure switch alarm logic state
	1# oil level switch	disconnected alarm		1# oil level switch alarm logic state
	1# high pressure switch	disconnected alarm		1# high pressure switch alarm logic state
	1# compressor overload	disconnected alarm		1# compressor overload alarm logic state
	1# oil pressure difference switch	disconnected alarm		1# oil pressure difference switch alarm logic state
	compressor internal protection	disconnected alarm		Logic state of compressor internal protection alarm
1# exhaust temp. probe calibration	U5	real-time temp.	℃	1# exhaust probe temp.
	calibration	0	℃	1# exhaust temp. probe temp. calibration value
Compressor current	FLA	real-time current	A	compressor real-time current
Compressor parameter	The number of compressors	1		single compressor 1, the number of double compressor is 2
	Refrigerant type	R134a		refrigerant model

High and low pressure protection (analog quantity)	Low pressure protection	√		low pressure protection
	High pressure protection	√		high pressure protection
Compressor parameter	1# compressor enabling	√		select it when necessary
	2 compressor enabling			select it when necessary
	Interval pre-protection	-		Interval pre-protection function
	economizer	-		Optional economizer of compressor
	spray solenoid valve	-		Optional spray solenoid valve of compressor

4.3.4.2 “Db Customized Compressor”

Customized compressor is only applicable to customer needs customation.

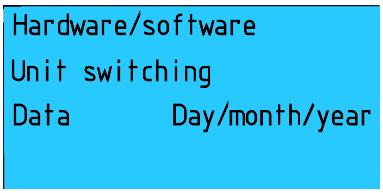
4.3.4.3 “Dc Inverter Compressor”

The menu is only applicable to inverter compressor unit. The standard model uses stepless adjustable compressor, which has no optional settings.

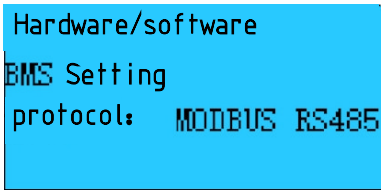
4.3.5 “E Hardware/Software” Menu Description

In the "main menu", select the "E hardware/software" with the cursor "→", and then click the ↵ button to enter the submenu. After entering the submenu, click ↑ or ↓ button to turn page up and down.

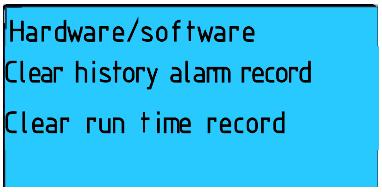
Picture 4-28：Parameter Unit Screen



Picture 4-29：System Date Format

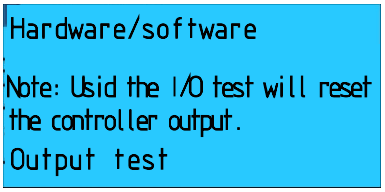


Picture 4-30：Comm. Protocol Address



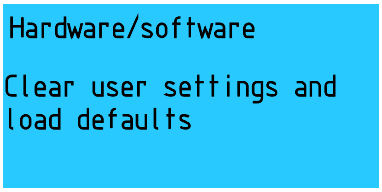
Picture 4-31：Historical Alarm Record and Run Time Record Clear Screen

This is the "Historical Alarm Record and Run Time Record Clear Screen". Please don't clear the corresponding records, so as to avoid affecting the after-sales and maintenance personnel to judge the working status.



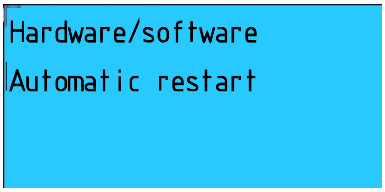
Picture 4-32：Enabling I/O Test Screen

This is the "Enabling I/O Test screen", which mustn't be used by non-professionals!



Picture 4-33：User Settings Clear Screen

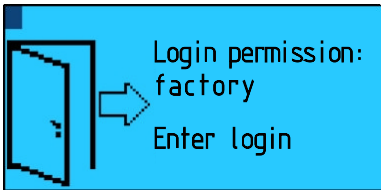
This is the "User Setting Clear Screen", which mustn't be used by non-professionals! It can avoid affecting normal operation of the machine.



Picture 4-34：Auto Restart Screen

4.3.6 "F Logout" Menu Description

In the "main menu", select the "F Switch Unit" with the cursor "→", and then press the ↵ button to enter the "F Logout" Menu.



Picture 4-35：Logout the Main Menu

4.4 Controller Fault Code Table

Fault Code	Fault Description	Reset Mode	Alarm Actions	Remarks
Alarm01	The temp. sensor of air-conditioning return water fails	auto reset	The alarm occurs and the whole unit stops	This sensor alarm only alarms after sensor short circuit or open circuit detecton (10K, 25 degrees（β 3435)) If the temp. is greater than or equal to 124.9 ℃ or less than or equal to -124.9 ℃, it alarms for sensor fault.
Alarm02	The temp. sensor of air-conditioning inlet water fails			
Alarm03	The temp. sensor of cooling outlet water fails			
Alarm04	The temp. sensor of cooling return water fails			
Alarm05	Air-conditioning water flow error	manual reset	After circulating pump startup and the run time exceeds the alarm start delay, detect whether the protective switch of circulating water flow is disconnected, the fault of circulating water flow will be triggered if the disconnection duration exceeds the circulating water alarm delay; The whole unit will stop in case of failure;	Check the circulating water pump, circulating water flow switch and air conditioning water in the pipe
Alarm06	Air-conditioning water pump overload		Failure occurs and the whole unit stops	Check the circulating water pump and its thermal relay

Alarm07	Cooling water flow error		Detect whether the cooling water flow's protective switch is disconnected, and the fault of cooling water flow will be triggered if the disconnection duration exceeds the alarm run delay, and the cooling pump start and run time exceeds the alarm start delay; The whole unit will stop in case of failure;	Fault manual reset. In case of failure, stop the corresponding compressor.
Alarm08	Cooling water pump overload		Failure occurs and the whole unit stops	Check the cooling water pump and water pump thermal relay.
Alarm09	Cooling fan overload		Failure occurs and the whole unit stops	
Alarm10	The difference between inlet and outlet water temp. of evaporator is too large		After the evaporation pump start, detect the temp. difference between the evaporator inlet and outlet water. When the temp. difference is greater than the alarm set value and the alarm delay is maintained, the unit will alarm and shutdown.	
Alarm11	The difference between inlet and outlet water temp. of condenser is too large		After the condenser pump start, detect the temp. difference between the condenser inlet and outlet water. When the temp. difference is greater than the alarm set value and the alarm delay is maintained, the unit will alarm and shutdown.	
Alarm12	The suction pressure sensor of circuit 1 fails	auto reset	In case of failure, the circuit 1 stops;	Check whether the sensor wiring and probe are damaged.
Alarm13	The suction temp. sensor of circuit 1 fails			
Alarm14	The exhaust pressure sensor of circuit 1 fails			
Alarm15	The exhaust temp. sensor of circuit 1 fails			
Alarm16	The superheat of circuit 1 is too low	manual reset	After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit superheat is too low; If the current superheat is lower than the set value of low superheat (default is **2.0℃)** , the unit will adjust the opening of the expansion valve according to the integral time of low superheat (default is 150s); If the low superheat alarm delay is maintained (**default is 300s**)**,** and the unit current superheat is still lower than the set value of low superheat, it will trigger the circuit low superheat alarm, and stop the circuit 1;	

Alarm17	Low evaporation pressure of circuit 1	auto reset	After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit's low evaporation pressure is too low. If the unit current evaporation pressure is lower than the set value of low evaporation pressure (default is 20.0 ℃), the unit will adjust the opening of the expansion valve according to the integral time of low evaporation pressure (**default is 150s**). If the low evaporation pressure delay is maintained (**default is 300s**)**,** and the unit current evaporation pressure is still lower than the set value of low evaporation pressure, it will trigger the circuit low evaporation pressure alarm, and stop the circuit 1;	
Alarm18	High evaporation temp. of circuit 1		After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit's high evaporation pressure is too high. If the unit current evaporation pressure is higher than the set value of high evaporation pressure (default is 20.0 ℃), the unit will adjust the opening of the expansion valve according to the integral time of high evaporation pressure (**default is 200s**). If the high evaporation pressure delay is maintained (**default is 300s**)**,** and the unit current evaporation pressure is still higher than the set value of high evaporation pressure, it will trigger the circuit high evaporation pressure alarm, and stop the circuit 1;	
Alarm19	The electronic expansion valve of circuit 1 fails	manual reset	In case of failure, the circuit 1 stops;	Check whether the wiring of electronic expansion valve is incorrect or loose.
Alarm20	Too low suction temp. of circuit 1	auto reset		
Alarm21	Too high condensing temp. of circuit 1			
Alarm22	The driving cell of circuit 1's electronic expansion valve fails			
Alarm23	Drive fault of circuit 1's electronic expansion valve			
Alarm24	The electronic expansion valve of circuit 1 can't be closed fully			
Alarm25	The electronic expansion valve of circuit 1 closed urgently			

Alarm26	Incorrect version of circuit 1's electronic expansion valve			Please check the FW version of the electronic expansion valve, FW ⩾ 5.0.
Alarm27	Misconfiguration of circuit 1's electronic expansion valve			Please check whether the parameters of the electronic expansion valve are correct!
Alarm28	The circuit 1's electronic expansion valve disconnected.			Please check the wiring of EVD module!
Alarm29	Too high rressure ratio of circuit 1		After the section protection is enabled, when the pressure ratio is too high and it lasts for 180s (default), it will delay 5s, give alarm and stop circuit 1;	When the section management function is enabled, the unit will detect whether the current operation exceeds the compressor's operation range according to the evaporation temp., condensation temp. and exhaust air temp. based on the compressor's operation section. When exceeding the compressor's running section, the
Alarm30	Too high exhaust pressure of circuit 1	manual reset	After the compressor start up, it detects that the high pressure value is higher than the high pressure alarm value and the alarm delay is maintained (default is 3s), it will trigger the high exhaust pressure of the circuit.	
Alarm31	Too high compressor current of circuit 1	auto reset	When the fault signal maintains the high current protection delay time, it will trigger the compressor over-current alarm, give the alarm and stop corresponding circuit system.	
Alarm32	Too high suction pressure of circuit 1		Detection of compressor start delay (over suction pressure protection start delay, the default is 120s). When the fault signal duration exceeds the over suction pressure alarm delay (default is 60s), it will trigger the high suction pressure of the circuit.	
Alarm33	Too low pressure ratio of circuit 1		Detection of compressor start delay (low pressure ratio protection start delay, the default is 120s). When the fault signal duration exceeds the low pressure ratio alarm delay (default is 20s), it will trigger the low pressure ratio of the circuit.	
Alarm34	Under protection of high and low pressure difference in circuit 1's operation	manual reset	Detect the difference value between the compressor high pressure and low pressure. The unit alarm and stop circuit 1 when the difference value is lower than the set value of high and low pressure difference, the alarm operation delay is maintained, and the compressor run time is greater than the alarm start delay.	
Alarm35	Too high exhaust temp. of circuit 1		It triggers the fault signal alarm directly, gives alarm and stops the corresponding circuit system.	

Alarm36	Too low exhaust pressure of circuit 1	auto reset	Detection of compressor start delay (low exhaust pressure protection start delay, the default is 180s). When the fault signal duration exceeds the low exhaust pressure alarm delay (default is 60s), it will trigger low exhaust pressure of the circuit.	unit will trigger corresponding fault signal.
Alarm37	Too low suction pressure of circuit 1	semi-auto reset	Detection of compressor start delay (low suction pressure protection start delay, the default is 180s). When the fault signal duration exceeds the low suction pressure alarm delay (default is 60s), it will trigger the low exhaust pressure of the circuit.	
Alarm38	High pressure alarm of circuit 1	manual reset	Power-on detects that the high pressure switch is disconnected, it will trigger the circuit high pressure alarm	
Alarm39	Low pressure alarm of circuit 1		Detection of compressor start delay (low pressure start delay, the default is 30s). When the low pressure switch is disconnected and the disconnection duration exceeds the low pressure alarm delay (the default is 10s), it will trigger the compressor low pressure alarm.	
Alarm40	Compressor oil level alarm of circuit 1		Detection of compressor start delay (oil level start delay, the default is 30s). When the oil level switch is disconnected and the disconnection duration exceeds the oil level alarm delay (the default is 15s), it will trigger the compressor oil level alarm.	
Alarm41	Anti-freezing protection during circuit 1's operation		Start power-on detection when the unit is running. If the system low pressure value is lower than the anti-freezing set temp., it will trigger the unit's anti-freezing protection, and stop circuit 1;	
Alarm42	Compressor oil pressure difference alarm of circuit 1		Detect the switch signal of compressor's oil pressure difference. When the oil pressure differential switch is disconnected, the alarm operation delay is maintained, and the compressor running time is greater than the alarm start delay, the unit will alarm and stop circuit 1.	
Alarm43	Compressor motor superheat of circuit 1		In case of failure, the circuit 1 stops;	
Alarm44	Compressor internal protection of circuit 1			
Alarm45	Circuit 1 inverter fault	auto reset		
Alarm46	Circuit 1 phase sequence alarm		In case of failure, the circuit 1 stops;	
Alarm47	Circuit 2 suction pressure sensor fault	auto reset	In case of failure, the circuit 2 stops;	
Alarm48	Circuit 2 suction temp. sensor fault			
Alarm49	Circuit 2 exhaust pressure sensor fault			
Alarm50	Circuit 2 exhaust temp. sensor fault			

Alarm51	Too low superheat of circuit 2	manual reset	After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit superheat is too low; If the current superheat is lower than the set value of low superheat (default is **2.0℃）,** the unit will adjust the opening of the expansion valve according to the integral time of low superheat (default is 150s); If the low superheat alarm delay is maintained (**default is 300s),** and the unit current superheat is still lower than the set value of low superheat, it will trigger the circuit low superheat alarm, and stop the circuit 2;	
Alarm52	Low evaporation pressure of circuit 2	auto reset	After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit's low evaporation pressure is too low. If the unit current evaporation pressure is lower than the set value of low evaporation pressure (default is 20.0 ℃), the unit will adjust the opening of the expansion valve according to the integral time of low evaporation pressure (**default is 150s**). If the low evaporation pressure delay is maintained (**default is 300s),** and the unit current evaporation pressure is still lower than the set value of low evaporation pressure, it will trigger the circuit low evaporation pressure alarm, and stop the circuit 2;	
Alarm53	High evaporation pressure of circuit 2		After the electronic expansion valve enters the superheat adjustment, it starts to detect whether the unit's high evaporation pressure is too high. If the unit current evaporation pressure is higher than the set value of high evaporation pressure (default is 20.0 ℃), the unit will adjust the opening of the expansion valve according to the integral time of high evaporation pressure (**default is 200s**). If the high evaporation pressure delay is maintained (**default is 300s),** and the unit current evaporation pressure is still higher than the set value of high evaporation pressure, it will trigger the circuit high evaporation pressure alarm, and stop the circuit 2;	
Alarm54	Electronic expansion valve of circuit 2 fails	manual reset	In case of failure, the circuit 2 stops;	
Alarm55	The suction temp. of circuit 2 is too low	auto reset		
Alarm56	Condensing temp. of circuit 2 is too high			
Alarm57	Electronic expansion valve battery of circuit 2 fails			
Alarm58	The drive of circuit 2's electronic expansion valve fails			
Alarm59	The electronic expansion valve of circuit 2 can't be closed fully			
Alarm60	The electronic expansion valve of circuit 2 closed urgently			

Alarm61	Incorrect version of circuit 2's electronic expansion valve			（FW<5.0 failure，>=5.0 fault reset）
Alarm62	Misconfiguration of circuit 2's electronic expansion valve			
Alarm63	The circuit 2's electronic expansion valve disconnected.			
Alarm64	Too high pressure ratio of circuit 2		After the section protection is enabled, when the pressure ratio is too high and it lasts for 180s (default), it will delay 5s, give alarm and stop circuit 2;	
Alarm65	Too high exhaust pressure of circuit 2	manual reset	After the compressor starts, it detects that the high pressure is higher than the high pressure alarm and the alarm delay is maintained (default is 3s), it will trigger the high exhaust pressure of the circuit.	
Alarm66	The compressor current of circuit 2 is too high	auto reset	When the fault signal maintains the high current protection delay time, it will trigger the compressor over current alarm, give alarm and stop corresponding circuit system.	
Alarm67	The suction pressure of circuit 2 is too high		Detection of compressor start delay (high suction pressure protection start delay, the default is 120s). When the fault signal duration exceeds the high suction pressure alarm delay (the default is 60s), it will trigger the high suction pressure of the circuit.	
Alarm68	Too low pressure ratio of circuit 2		Detection of compressor start delay (low pressure ratio protection start delay, the default is 60s). When the fault signal duration exceeds the low pressure ratio alarm delay (default is 20s), it will trigger the low pressure ratio of the circuit.	
Alarm69	Under protection of high and low pressure difference in circuit 2's operation	manual reset	Detect the difference between the high pressure and low pressure of compressor. When the difference is lower than the set value of high and low differential pressure, the alarm running delay is maintained, and the compressor running time is greater than the alarm start delay, the unit will alarm and stop the circuit 2;	
Alarm70	Too high exhaust temp. of circuit 2		It triggers the fault signal and gives alarm directly, gives alarm and stops corresponding circuit system.	
Alarm71	Too low exhaust pressure of circuit 2	auto reset	Detection of compressor start delay (low exhaust pressure protection start delay, the default is 180s). When the fault signal duration exceeds the low exhaust pressure alarm delay (default is 60s), it will trigger low exhaust pressure of the circuit.	
Alarm72	Too low suction pressure of circuit 2	semi-auto reset	Detection of compressor start delay (low suction pressure protection start delay, the default is 180s). When the fault signal duration exceeds the low suction pressure alarm delay (default is 60s), it will trigger low suction pressure of the circuit.	
Alarm73	Circuit 2 high pressure alarm	manual reset	The power-on detects the high pressure switch is disconnected, and it triggers the circuit high pressure alarm.	

Alarm74	Circuit 2 low pressure alarm		Detection of compressor start delay (low pressure start delay, the default is 30s). When the low pressure switch is disconnected and the disconnection duration exceeds the low pressure alarm delay (default is 10s), it will trigger compressor low pressure alarm.	
Alarm75	Compressor oil level alarm of circuit 2		In the delay detection after compressor start (In oil level start delay, the default is 30s). When the oil level switch is disconnected and the disconnection duration exceeds the oil level alarm delay (default is 15s), it will trigger the compressor oil level alarm.	
Alarm76	Anti-freezing protection during circuit 2's operation		Start power-on detection when the unit is running. If the system low pressure value is lower than the anti-freezing set temp., it will trigger the unit's anti-freezing protection, and stop the circuit 2;	
Alarm77	Compressor oil pressure difference alarm of circuit 2		Detect the switch signal of compressor's oil pressure difference. When the oil pressure differential switch is disconnected, the alarm running delay is maintained, and the compressor running time is greater than the alarm start delay, the unit will alarm and stop circuit 2.	
Alarm78	Compressor motor superheat of circuit 2		In case of failure, the circuit 2 stops;	
Alarm79	Circuit 2 inverter fault			
Alarm80	Phase sequence alarm of circuit 2		In case of failure, the circuit 2 stops;	
Alarm81	Compressor 1 current sensor fails	auto reset	Alarm display only, no stop	
Alarm82	Compressor 2 current sensor fails			
Alarm83	Clock card fails			Controller hardware error, please replace the controller in case of this failure!
Alarm84	Controller fault			
Alarm85	Stop and anti-freezing: evaporation water pump turns on			
Alarm86	Stop and anti-freezing: condensate pump turns on			
Alarm87	Stop and anti-freezing: pipe heater turns on			

5. Trouble-shooting

Faults	Protective Device Action	Possible Reasons	Solution
1. Both water pump and compressor can not start	Protective device no action.	a. No power supply b. Power fuse of return control loop burnt out. c. Return control loop and contacts poor connection. d. Water pump overload relay no reset or failure. e. Water pump, compressor failure.	a. Check after power on b. After check protective return loop, replace it. c. Repair or replace d. Repair or replace e. Repair or replace
2. Water pump run, but compressor can't start.	High pressure switch tripped	a. No reset b. Contact failure	a. Check and reset b. Repair or replace
	Anti-freeze switch tripped	a. No reset b. Contact failure	a. Check and reset b. Repair or replace
	Compressor overload relay tripped	a. No reset b. Contact failure	a. Check and reset b. Repair or replace
	Compressor overheat protective contacts tripped	a. Contact failure	a.Repair or replace
	Waterflow switch or water pump, fan contacts of water tower can't work	a. Too much air inside water pipe, water pump idle running. b. Contact failure	a. Exclude air out of water pipe. b. Repair or replace
	Low pressure switch tripped	a.Refrigerant pipeline system, valve closed b.Refrigerant leakage or fill-up shortage c.Contacts failure	a. Open valve b. System leakage check, repair or replenish refrigerant c. Repair or replace
	Protective device no action	a. Temp.switch with high set temp. b. Temp. switch failure c. Compressor short of phase and didn't run d. Motor buzzs e. Control return loop, contacts poor connection	a.Correct temp.switch set point b. Repair or replace c. Repair main circuit contacts or replace 47R limit-voltage controller d. Repair or replace e. Repair or replace
3.After machine start,only compressor tripped.	High pressure switch tripped (High high pressure)	a.Cooling water pipe, water valve don't open or closed b. Cooling fan didn't work c. Cooling water pump or fan motor of cooling water tower reversed d. Cooling waterflow shortage, much temp. difference between inlet/outlet water e. Condenser fouls too much f. High-pressure corner valve didn't fully open or closed g. Over fill-up of refrigerant h. Refrigerant system mixed with air. i. High pressure switch with poor regulation or failure.	a. Fully open water valve. b. Repair c. Exchange two power cables of the three phase. d. Clean water filter screen or replace water pump, pipe connection to increase waterflow or replace cooling water tower and so on. e. Clean cooling pipe with chemical agent. f. Fully open high pressure angle valve. g. Reduce refrigerant h. Exclude air in system. I .Correct set pressure or replace.

	Low pressure switch tripped (Low low pressure)	a. Liquid-release valve closed or not fully open b. Refrigerant leakage c. Refrigerant shortage d. Dryer blockage e.Low pressure switch failure	a. Fully open valve b. System leakage check, and repair. c. Replenish refrigerant. d. Pump and accumulate the refrigerant, replace the dryer. e. Repair or replace.
	Compressor overheat relay tripped	a. Overheat relay poor regulation b. Single phase running c. Voltage abnormal d. Compressor motor failure e. Running pressure too high	a. Correct set point. b. Repair main circuit. c. Improve it. d. Repair or replace e. Check the system.
	Compressor overheat protective contacts tripped	a. Compressor failure b. Contacts failure	a. Repair or replace b. Repair or replace
	Anti-freeze switch tripped	a. Low chilling waterflow cause low temp. of outlet water b. Temp.switch low set or failure c. Anti-freeze switch incorrect set or failure	a. Check water pump and eliminate the air inside water pipe. b. Correct set point or replace. c. Correct set point or replace.
4. Low high pressure	Protective device no action	a. Refrigerant shortage b. Low temp. of cooling water c. Low low pressure	a. Replenish refrigerant b. Increase water temp. c. Refer to 3. (low low pressure)
5. High low pressure	Protective device no action	a. Overload chilling b. Reduced compressor capacity c. Poor auto calibration of capacity d. Refrigerant over fill-up	a. Adjust load b. Repair or replace c. Repair or replace d. Reduce refrigerant
6.Vibration, noise	Protective device no action	a. Compressor failure b. Compressor oil shortage c. Main unit poor fixing or screw loosen d. Pipeline poor support e. Solenoid switch contacts poor connection, has foreign matters or screw loosen	a. Repair or replace b. Check and full fill refrigerant oil c. Fix and mend it. d. Re-install or add hanger e. Repair, clean or fix it.
7. Power fuse burnt or NFB tripped.	Protective device no action	a. Distribution room short circuit or connected to gound b. Compressor motor failure	a. Check circuit. b.Repair or replace
8.Capacity auto calibration device failure	Protective device no action	a. Temp. regulator failure b. Solenoid valve burnt c. Pipeline blockage d. Poor auto calibration of capacity e. Low high pressure	a. Replace or replace b. Replace c. Clean pipeline d. Repair or replace e. Adjust high pressure above 8kg.
9. Compressor overheat	Protective device no action	a. Over-heat refrigerant inside the pipe of return loop b. High high pressure c.Low low pressure	a. Adjust opening degree of expension valve b. Check, improve (Refer to 3-1) c. Check, improve (Refer to 3-2)

6. Repair and Maintenance

6.1 Daily Check

1) Machine must be operated, start-up, shutdown, repaired and maintained by specially assigned person to prolong service life.
2) Check inside and outside room temperature, chilled water pipe, inlet/outlet temp. of condensing water pipe, voltage, current, high/low pressure, oil pressure and oil surface everyday and keep the record as reference for later regulation and maintenance.
3) Keep the machine unit surface clean.
4) When the refrigerant is R22, pressure is above 19kg/cm$^{2;}$ when the refrigerant is R134a, pressure is above 12kg/cm^2, clean the copper pipe of condenser.

6.2 Maintenance Schedule

6.2.1 About the Machine

Model _____ SN _____ Manufacture date _____

Voltage _____Φ _____V Frequency _____Hz Power _____ kW

6.2.2 Installation & Inspection

☐Check if the pipe are connected correctly

☐Check if the pipe has any leakage

☐Check if the sealed joint has any crack

Electrical component installation

☐Voltage _____ V _____ Hz

☐Fuse melting current: 1 Phase _____ A 3 Phase _____A

☐Check power phase sequence

6.2.3 Monthly Check

☐Check whether the screw of each device is loose.
☐Clean filter screen of the air conditioner.
☐Clean the dust on cooling fin of the heat exchanger.
☐Check each pipe joint to see if there's leakage.
☐Check whether power cable is wore, connection is firm, each contact has burnt or not.

- ☐ Check whether oil surface of compressor is normal or not.
- ☐ Inject each motor bearing once of the grease.
- ☐ Check if chilled watersystem has air and exhausted the air or not.
- ☐ Check refrigerant pressure.
- ☐ Clean cooling water tower and change the water.
- ☐ Check water replenishment of expension water tank and water tower.

6.2.4 Half-yearly Check

- ☐ Conduct monthly check items.
- ☐ Check the cooling water tower effect and painting make-up.
- ☐ Clean filter of water pipe.
- ☐ Clean the dirt of condenser copper pipe.

6.2.5 Yearly Check

- ☐ Conduct monthly check items.
- ☐ Check whether the insulation resistance of compressor is above 10MΩ.
- ☐ Renew the refrigerant oil of compressor annually.