Haier

Air Cooled Semi-hermetic Screw Chiller

Installation, operation and technical manual

Heat pump

R22 refrigerant

193KW~1265KW

3PH, 380V~400V, 50Hz

Haier Commercial Air Conditioning

MANUAL CODE: SYJS-007-08REV.0 2008-03-20

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1. Nomenclature

Code Explanation for chiller

1	2			3	4	5	6	7			8		9		10	
chiller system	compressor type			capacity (for Centrifugal chiller: Rt; other: KW)				product type			unit character		suitable voltage		design number	
C	Centrifugal chiller		C	1	0	6	9	heat pump	R22	A	air cooled	A	100-115V, 60Hz	1	fixed frequency	A-G
	Screw chiller	air cooled	I	0	2	3	7		R407C	B	water cooled	W	220-240V, 50Hz	2	inverter	H-Q
		water cooled		0	0	1	2		R132	C	earth source	E	115-220V, 50/60Hz	3	DC inverter	R-Z
		earth source							R134a	D			220-220V, 60Hz	4		
	Air-cooled module chiller		A						R410a	E			110V, 50-60Hz	5		
	Light chiller	split-packaged	H					cooling only	R22	M			220V, 50-60Hz	6		
		single-packaged	R						R407C	N			127V, 60Hz	7		
	Water-cooled cabinet chiller		W						R123	O			240V, 50Hz	8		
	Hydronic system	Cassatte	B						R134a	P			110-220V, 50/60Hz	9		
		Duct	D						R410a	Q			330V, 50Hz	A		
		Cabinet	P										400V, 50Hz	B		
		Wall mounted	S										3300V, 50Hz	C		
													6600V, 50Hz	D		
													380-400V, 50Hz	N		
													415V, 50Hz	M		

Note: Haier air-cooled screw (heat pump) chiller is module-structured. The chiller assembly is a flexible combination of the basic modules of 193KW, 247KW and 316KW. In the catalog, models of above 316KW are some typical module-combined products recommended by Haier.

For example: CI0740AANB chiller is composed of one CI0247AANB and two CI0247AANC chillers.

Capacity Regulation Mode

Step Capacity Regulation Mode: Each compressor has four steps of capacity regulation: 100% - 75% - 50% - 25%, among which 25% step is for the startup of compressor.

Compressor Qty.	Startup	Capacity Regulation During Chiller Operation	Regulation Steps
1 Compressor	25%	50%,75%,100%	4
2 Compressor	12.50%	25%,37.5%,50%,62.5%,75%,87.5%,100%	8
3 Compressor	8.30%	16.7%,25%,33.3%,41.7%,50%,58.3%,66.7%,75%,83.3%,91.7%,100%	12
4 Compressor	6.25%	12.5%,18.8%,25%,31.3%,37.5%,43.8%,50%,56.3%,62.5%,68.8%,75%, 81.3%,87.5%,93.8%,100%	16

2. Product character

Haier air-cooled (heat pump) chiller is a comprehensive product developed by Haier. This product series adopt compressors, system parts and electrical components of well-known brands and they are characterized by compact structure, cutting-edge technology, reliable control, cost-effective operation and convenient installation. The computer-controlled system can not only improve control precision and reliability, but also realize multi-step energy adjustment, through which the balance of chiller capacity and customer load is optimized and thus to effect economical operation. The chiller is under continuous control by means of large volume information display. Unattended and energy-saving operation can be realized using the preset operation mode and operation program. The computer-controlled system can be connected to master computer so as to render network-based automatic management of the whole building. The air-cooled integral structure is dispensed with such components as cooling tower and cooling pump and can save project construction cost. This product can serve as central air-condition system for hotels, stores and office buildings and can meet the technological air-conditioning requirements in textiles, chemical, metallurgical, pharmaceutical and power industries.

2.1 Motor

The compressor motor is 3-phase scal perator induction type, and the operation voltage will be confirmed as per the nameplate.

The inner refrigerant suction system is cooled by the refrigerant.

Started up by Y -△ type

2.2 Compressor

The compressor is equipped with the protection device of discharging temperature, discharging pressure, suction pressure, motor coil temperature, motor coil, etc.

The unit adopts screw type compressor. Within 3 minutes after startup, the compressor is in the transitional period.

Note: 1) To avoid the compressor start/stop frequency, once shut off, please do not start up the compressor in 3 minutes. 2) When several compressors are installed, the time difference of the compressor startup needs to be set.

The capacity adjustment will be realized by the refrigerant driving the slide valve.

In the compressor there is high efficiency oil segregator.

The screw axis and the rotor are one complete unit in the mold.

2.3 SHELL&TUBE heat exchanger

In cooling mode, SHELL&TUBE heat exchanger is as evaporator, while, in heating mode, it is as condenser.

The SHELL&TUBE heat exchanger adopts high efficiency copper pipe.

In the SHELL&TUBE heat exchanger, the freezed water will flow out of the copper pipe, while the refrigerant flow in the copper pipe.

Out of the SHELL&TUBE heat exchanger, there is the heat insulation material.

2.4 Condenser

Condenser adopts the pinned coil type structure, and adopts the high efficiency copper pipe. The condenser fan motor is with low noise.

2.5 Electric control

Adopt the PCB to control the operation.

The unit can realize remote operation and passive element starup/stop control.

The control of water temperature will act according to the water outlet temperature.

The unit can realize compulsorily unit quantity control and compulsorily capacity control for the unit with several compressors.

When failure occurs, the normal compressor can continue running (for the unit with several compressors).

When abnormal, the unit can monitor the current water temperature, operation time.

In operation, the unit can monitor the water temperature, capacity state, and operation time.

On the crystal touch screen, you can control the unit.

When abnormal, the failure information will display on the crystal touch screen automatically.

The unit can realize the interlock and remote control between the cooling/cold water pump and the master unit.

Note: Do not damage the power cable.

The following items can be tested if abnormal: high pressure, low pressure, compressor motor coil temperature, compressor discharging temperature, anti-freeze, reverse power supply, etc.

2.6 Safety Device

For the requirement of safety, there is solenoid valve on the discharging pipe to discharge the gas when the pressure is too high. Must not install any stop valve on the pipe with safety relief valve.

The unit is equipped with safety device to confirm the safe operation. When one safety device acts, the failure indicator will light, and the corresponding function will stop, while the other function is normal.

Suggestion: Once one section occurs abnormal phenomenon, you should shut off the unit to check the reason to avoid the worse damage.

safety device	Protection point	Set value	Action reasons
Delay time when shut off	The interval time between compressor stops and restart up	15minutes	Compressor startup/stop frequently
High pressure sensor	Discharging pressure protection	2.4Mpa	Refrigerant charged too much
			Ambient temperature too high
			Condenser blocked, bad ventilation
			Non-condensing gas in system
Water temperature sensor	Anti-freezed protection for chilled water	5℃	Chilled water temperature too low
			Set temperature too low
Discharging temperature sensor	Discharging temperature protection	in：100±2.5℃ out：89±2.5℃	Because of leakage, refrigerant too little
			Solenoid valve of compressor heat exchanging pipe shut off because of failure
			Stop valve on condenser outlet shutoff
Motor overheat protection	Compressor motor protection	in：105±5℃ out：88±11℃	Identical with high pressure switch (high pressure protection)
Low pressure sensor	Suction pressure protection	0.35Mpa (cooling) 0.1Mpa (heating)	Expansion valve shutoff because of failure
			Stop valve on condenser outlet shutoff
			Chilled water flow too low
			Evaporator blocked
Reverse phase protection	Compressor motor reverse protection	Phase sequence correct	Power wiring incorrect
Over current relay	Compressor motor over current protection	According to the compressor	Motor over current

3. Specifications

model			CI0193AANB	CI0193AANC	CI0247AANB	CI0247AANC	CI0316AANB	CI0316AANC	CI0386AANB	CI0493AANB	CI0563AANB
combination			A	B	C	D	E	F	A+B	C+D	E+D
cooling capacity	R22	kW	193.1	193.1	246.6	246.6	316.3	316.3	386.2	493.2	562.9
		X104Kcal/h	16.6	16.6	21.2	21.2	27.2	27.2	33.2	42.4	48.4
heating capacity	R22	kW	221	221	282.6	282.6	362.9	362.9	442	565.2	645.5
		X104Kcal/h	19	19	24.3	24.3	31.2	31.2	38	48.6	55.5
power supply	tyep		3PH, 5-wire, 380V, 50HZ								
	total	kW	71.6	71.6	79.8	79.8	90.9	90.9	143.2	159.6	170.7
compressor	type		semi-hermetic screw type specially for heat pump type compressor								
	quantity		1						2		
	input power	kW	66.4	66.4	72	72	83.1	83.1	132.8	144	155.1
capacity control			25%、50%、75%、100%								
air side heat exchanger	type		high efficiency, heat exchanging pipe cross the hydrophilic aluminum foil								
	fan power	kW	4*1.3	4*1.3	6*1.3	6*1.3	6*1.3	6*1.3	8*1.3	12*1.3	12*1.3
	fan type		axial fan with low noise								
water side heat exchanger	type		dry type shell&shell heat exchanger								
	rated water flow	m3/h	33	33	42.4	42.4	54.4	54.4	66	84.8	96.8
	water inlet/outlet pipe dimension	DN	80	80	100	100	100	100	80*2	100*2	100*2
	water side resistance	kPa	45	45	45	45	45	45	45	45	45
refrigerant	type	R22	R22	R22	R22	R22	R22	R22	R22	R22	R22
	charge	Kg	68	68	90	90	100	100	136	180	190
noise level		dB(A)	68	68	68	68	71	71	73	74	74
exterior dimension	unit length	mm	2285	2285	3250	3250	3250	3250	4570	6500	6500
	unit width	mm	2140								
	unit height	mm	2608								
shipping dimension	unit length	mm	2535	2535	3500	3500	3500	3500	5070	7000	7000
	unit width	mm	2235								
	unit height	mm	2650								
weight	unit weight	kg	2450	2450	2800	2800	3300	3300	4900	5600	6100
	operation weight	kg	2600	2600	2965	2965	3430	3430	5200	5930	6395
	shipping weight	kg	2500	2500	2850	2850	3350	3350	5000	5700	6200

Note:
1.cooling condition: water outlet temperature 7℃, water inlet temperature 12℃, ambient temperature 35℃.
2.heating condition: water outlet temperature 45℃, ambient temperature: DB 7℃, WB 6℃.
3.noise level is the average value measured at 2 meter to the unit, 1.5 meter high to the gound.
4.unit total capacity is counted in the cooling condition.
5. the length of multi-module chiller is not included the 450mm maintenance space between modules.

model			CI0633AANB	CI0740AANB	CI0810AANB	CI0879AANB	CI0949AANB	CI1056AANB	CI1196AANB	CI1265AANB
combination			E+F	C+D*2	E+D*2	E+F+D	E+F*2	E+D*3	E+F*2+D	E+F*3
cooling capacity	R22	kW	632.6	739.8	809.5	879.2	948.9	1056.1	1195.5	1265.2
		X104Kcal/h	54.4	63.6	69.6	75.6	81.6	90.8	102.8	108.8
heating capacity	R22	kW	725.8	847.8	928.1	1008.4	1088.7	1210.7	1371.3	1451.6
		X104Kcal/h	62.4	72.9	79.8	86.7	93.6	104.1	117.9	124.8
power supply	tyep		3PH, 5-wire, 380V, 50HZ							
	total	kW	181.8	239.4	250.5	261.6	272.7	330.3	352.5	363.6
compressor	type		semi-hermetic screw type specially for heat pump type compressor							
	quantity		2	3				4		
	input power	kW	166.2	216	227.1	238.2	249.3	229.1	321.3	332.4
capacity control			25%、50%、75%、100%							
air side heat exchanger	type		high efficiency, heat exchanging pipe cross the hydrophilic aluminum foil							
	fan power	kW	12*1.3	18*1.3	18*1.3	18*1.3	18*1.3	24*1.3	24*1.3	24*1.3
	fan type		axial fan with low noise							
water side heat exchanger	type		dry type shell&shell heat exchanger							
	rated water flow	m3/h	108.8	127.2	139.2	151.2	163.2	181.6	205.6	217.6
	water inlet/outlet pipe dimension	DN	100*2	100*3	100*3	100*3	100*3	100*4	100*4	100*4
	water side resistance	kPa	45	45	45	45	45	45	45	45
refrigerant	type	R22	R22	R22	R22	R22	R22	R22	R22	R22
	charge	Kg	200	270	280	290	300	370	390	400
noise level		dB(A)	76	74	75	75	76	76	76	78
exterior dimension	unit length	mm	6500	9750	9750	9750	9750	13000	13000	13000
	unit width	mm	2140							
	unit height	mm	2608							
shipping dimension	unit length	mm	7000	10500	10500	10500	10500	14000	14000	14000
	unit width	mm	2235							
	unit height	mm	2650							
weight	unit weight	kg	6600	8400	8900	9400	9900	11700	12700	13200
	operation weight	kg	6860	8895	9360	9825	10290	12325	13255	13720
	shipping weight	kg	6700	8550	9050	9550	9550	11900	12900	13400

Note:
1.cooling condition: water outlet temperature 7℃, water inlet temperature 12℃, ambient temperature 35℃.
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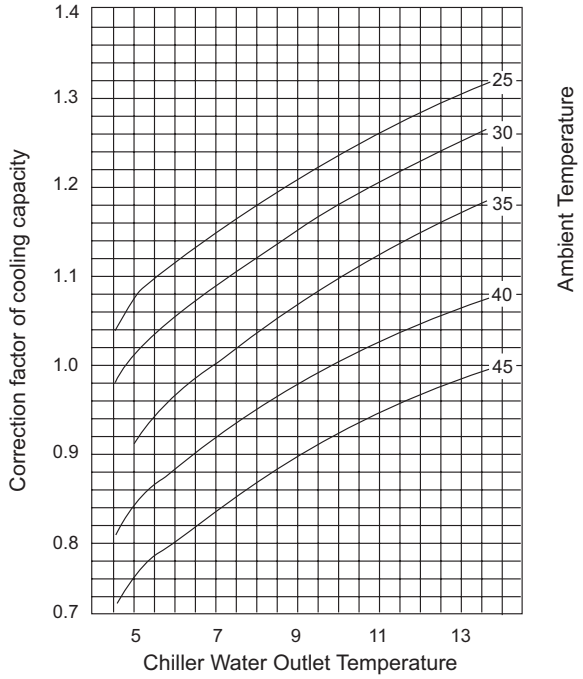
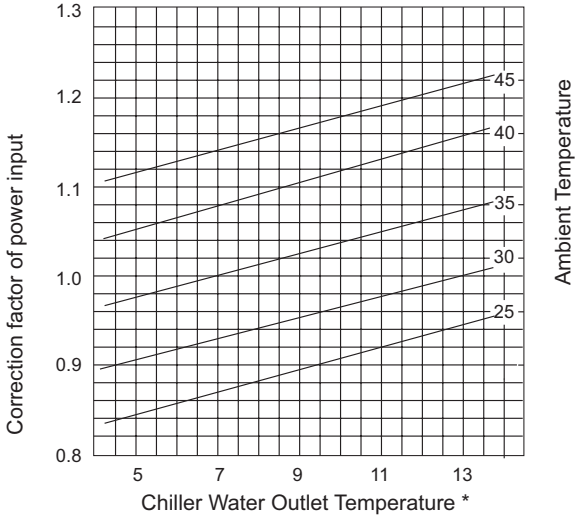
Performance curves

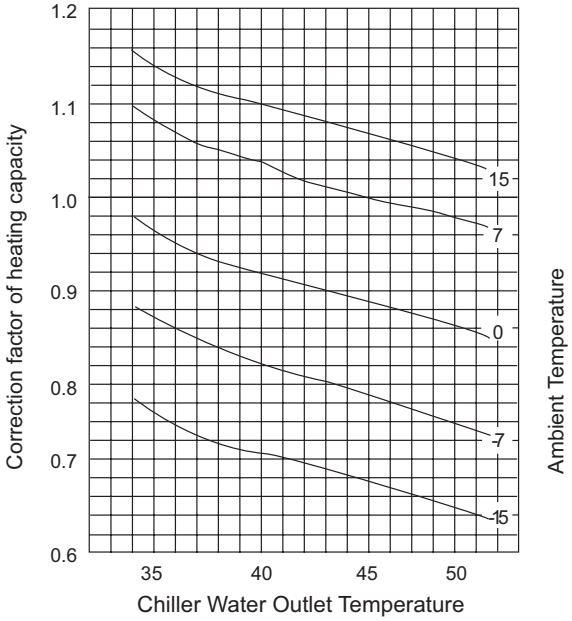
Cooling capacity correction factor curve



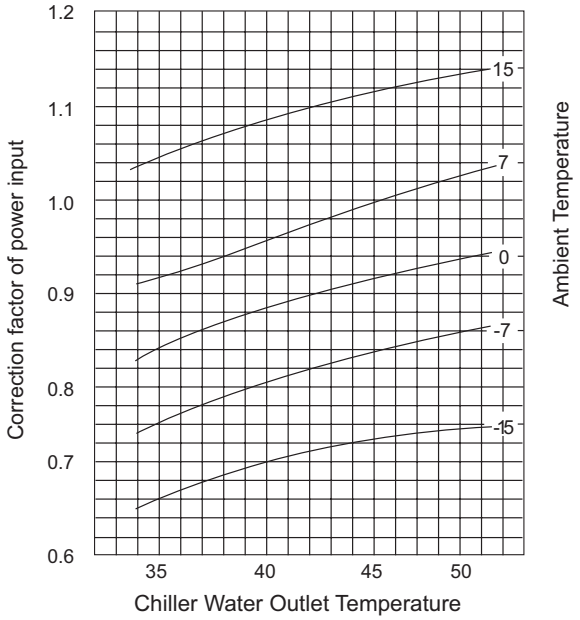
Cooling power input correction factor curve



Heating capacity correction factor curve



Heating power input correction factor curve



Chiller Electrical Data

Model	Fan Power (kW)	Max Operating Current (A)	Power Wire Size (mm^2)
CI0193AANB CI0193AANC	1.3X4	165	3X70
CI0247AANB CI0247AANC	1.3X6	215	3X95
CI0316AANB CI0316AANC	1.3X6	250	3X95
CI0386AANB	1.3X8	330	2(3X70)
CI0493AANB	1.3X12	430	2(3X95)
CI0563AANB	1.3X12	465	3X95+3X95
CI0633AANB	1.3X12	500	2(3X95)
CI0740AANB	1.3X18	645	3(3X95)
CI0810AANB	1.3X18	680	2(3X95)+(3X95)
CI0879AANB	1.3X18	715	3X95+2(3X95)
CI0949AANB	1.3X18	750	3(3X95)
CI1056AANB	1.3X24	895	3(3X95)+(3X95)
CI1196AANB	1.3X24	965	(3X95)+3(3X95)
CI1265AANB	1.3X24	1000	4(3X95)

Note:

1.The diameter of ground wire should be 2 sizes smaller than the power wire. (Refer to the 4-core electrical wire standards)

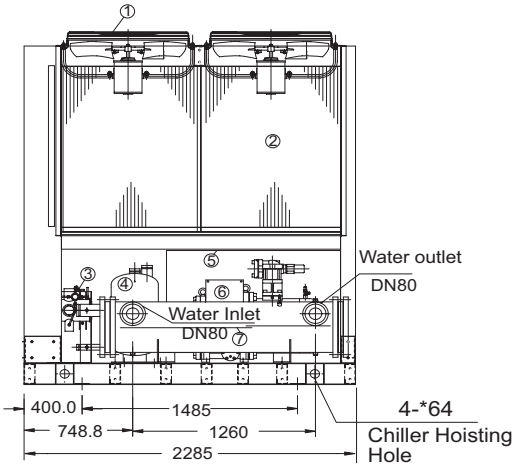
2.It is advisable to select copper core lead wire conforming to national standard BV or BVR or VV-IKV power cable.

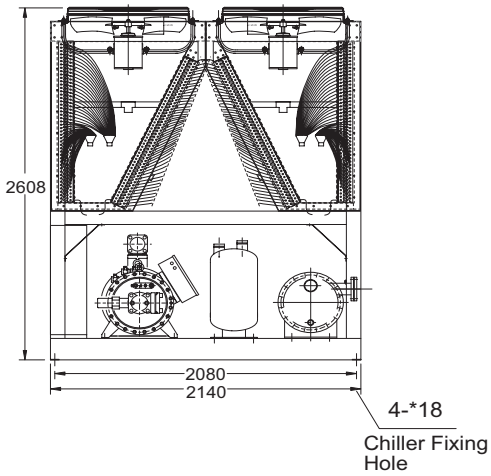
3.Using separate PVC pipe for each line of incoming power cable, and different power lines may not be mixed up in one PVC pipe.

4.When connecting wires, give adequate consideration to that the length of wire will cause pressure drop. Ensure the power supply to the chiller conforms to the parameters: 3~, 380 $\pm$ 10%V, 50Hz.

4. Dimension data

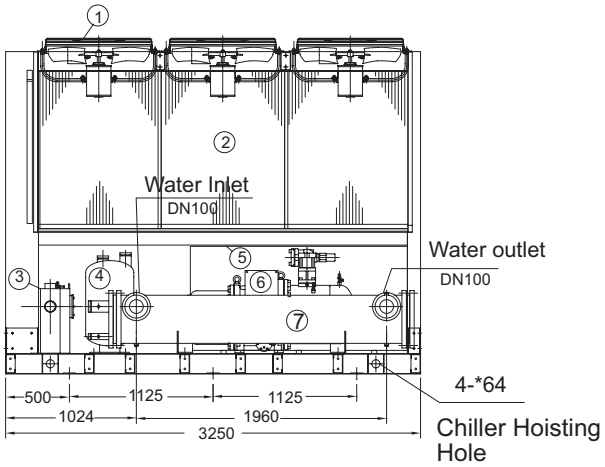
CI0193AANB (Module A) and CI0193AANC (Module B)

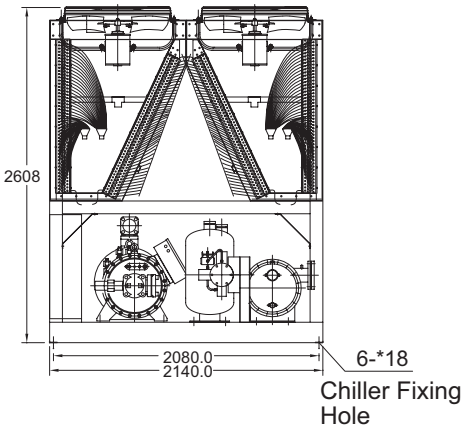




CI0247AANB (Module C) and CI0247AANC (Module D)

CI0316AANB (Module E) and CI0316AANC (Module F)

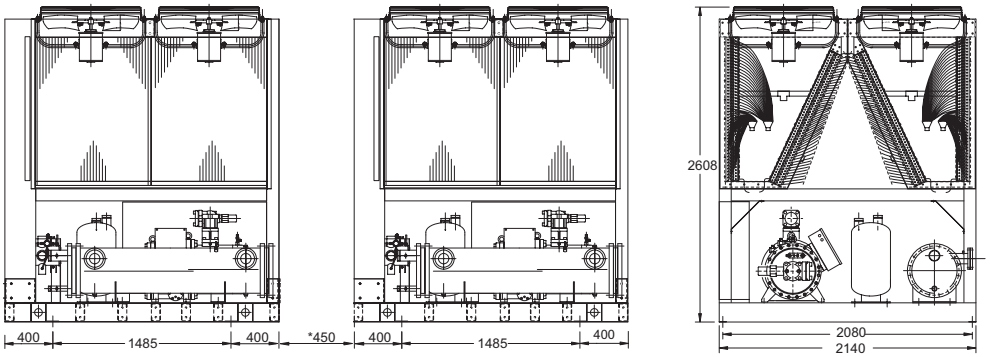




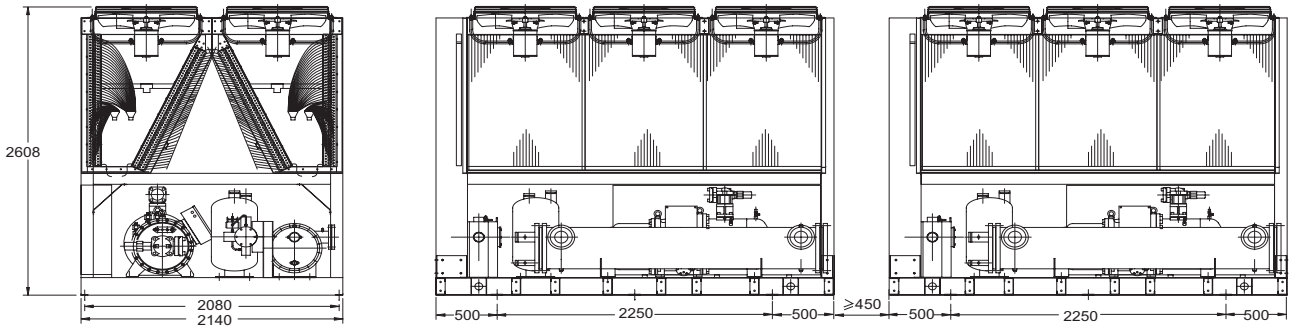
Note:

1. Parts Name: (1) Fan, (2) Condenser, (3) Four-way Valve, (4) Gas & Liquid Separator
   (5) Electrical Control Cabinet, (6) Compressor, (7) evaporator
2. Leave at least 2m around the chiller for ventilation and servicing purpose;
3. The multi-compressor chiller is normally composed of six basic modules A, B, C, D, E and F. For ezample, CI1056AANB(E+D*3) means the chiller is composed of three D modules and one E module;
4. For unidentified parts in a multi-compressor chiller, please refer to the basic modules;
5. When combing modules, the space between modules should be more than 450mm for ventilation, servicing and maintenance.

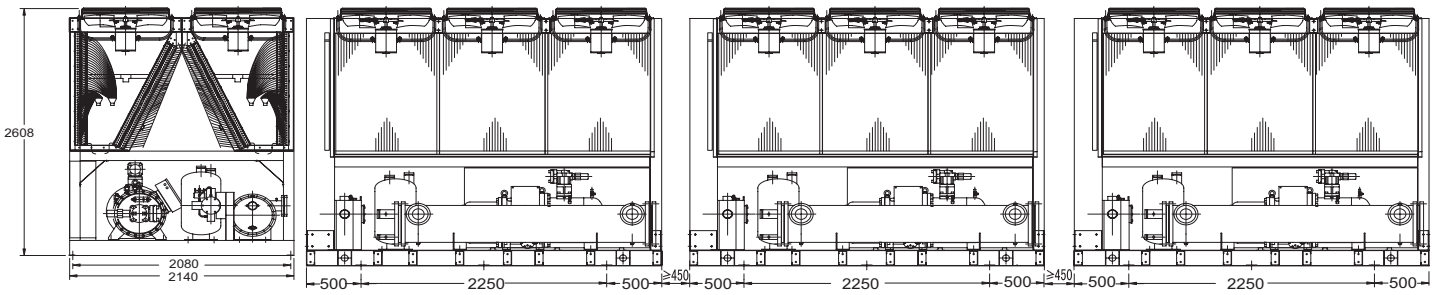
CI0386AANB (A+B)



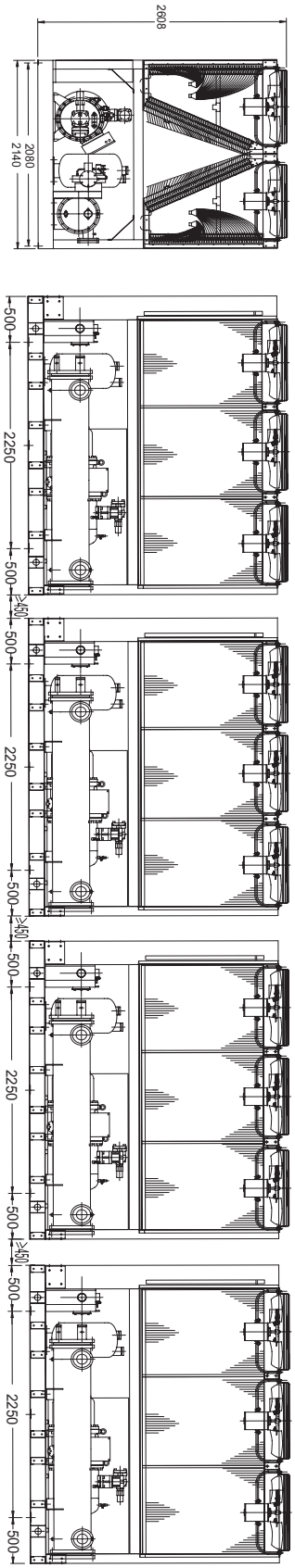
CI0493AANB (C+D)
CI0563AANB (E+D)
CI0633AANB (E+F)



CI0740AANB (C+D*2)
CI0810AANB (E+D*2)
CI0879AANB (E+F+D)
CI0949AANB (E+F*2)

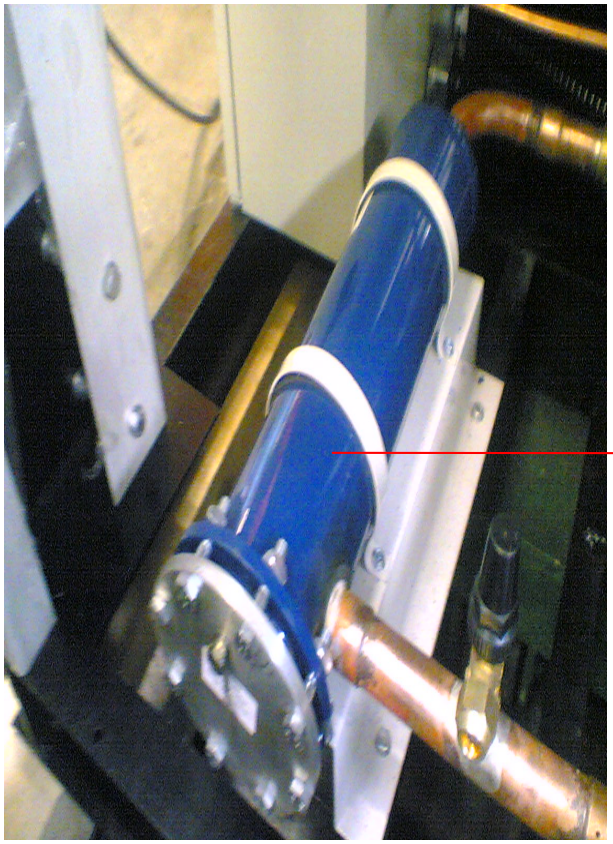


CI1056AANB (E+D*3)
CI1196AANB (E+F*2+D)
CI1265AANB (E+F*3)

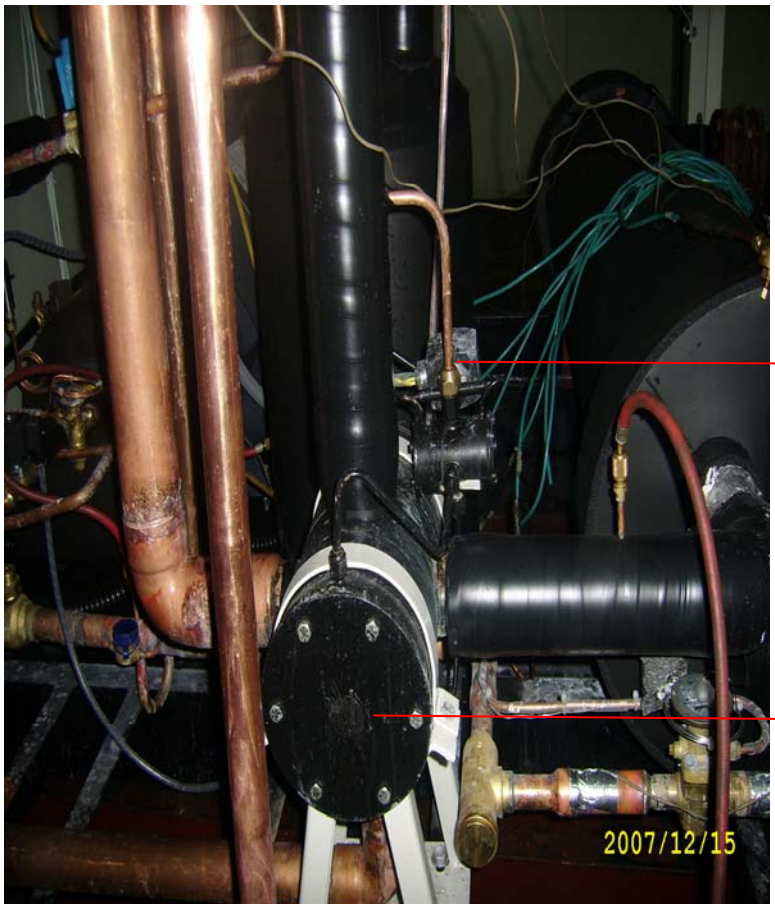


Part name

25%—50%—75% compressor capacity regulation solenoid valve, control the movement of capacity piston by oil pressure drop so that the compressor can adjust the capacity flexibly according to the actual capacity.

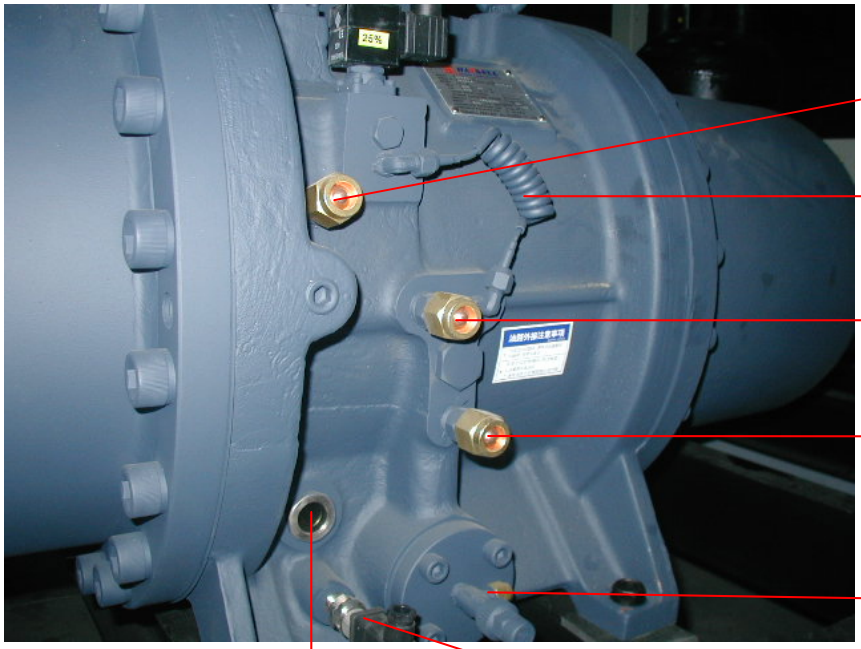


Filter drier, used to remove moisture and impurity in the refrigerant.



Solenoid valve before 4-way valve, used to control the reverse of 4-way valve.

4-way valve, reverse when electrify is complete in heating mode



Refrigerant spray hole, enter the middle of compressor and reduce the discharge temp..

Capacity regulation capillary

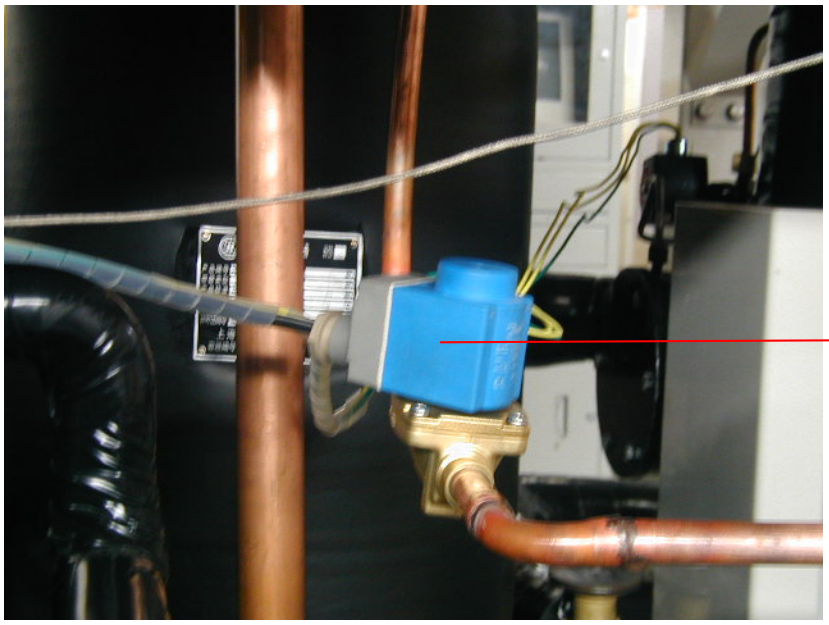
Oil inlet connector

Oil outlet connector

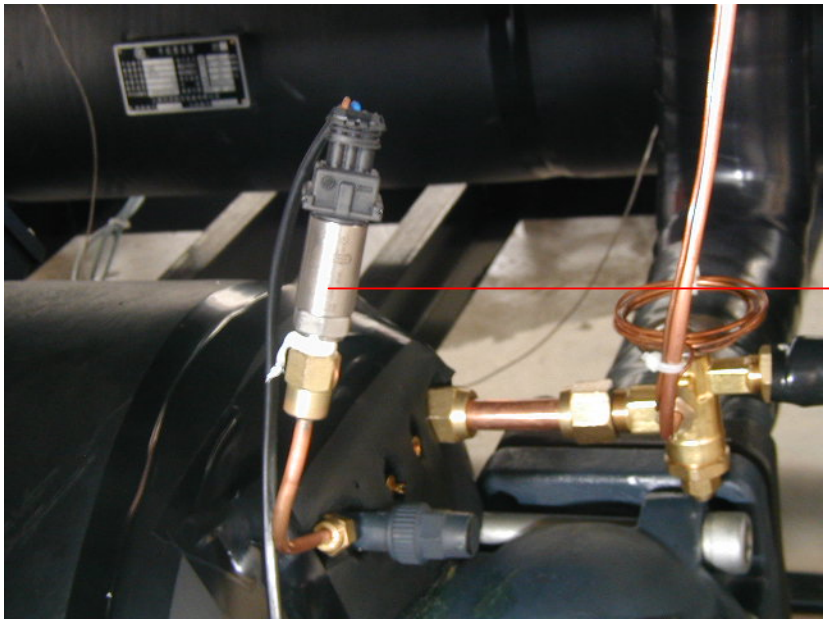
Oil pressure drop switch, used to inspect the pressure drop of the two side of oil filter

Oil inspect glass, used to observe the oil lower level of compressor

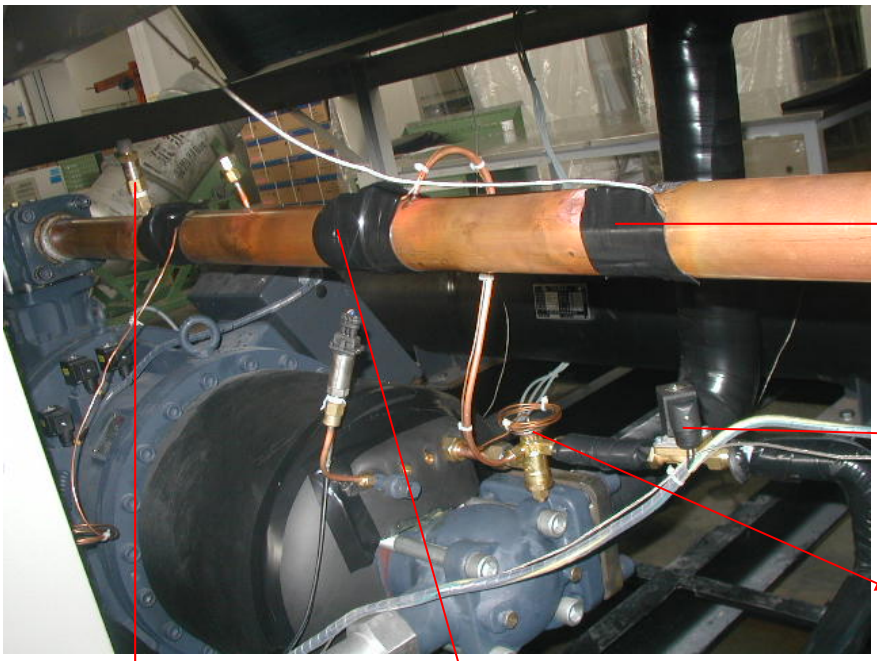
Compressor crankcase heater, used to heat up the oil



By-pass valve, when the compressor is run in part capacity, move the refrigerant from discharging side to suction side.



Low pressure sensor, used to detect the compressor suction pressure and protect when the suction pressure is too low



Discharging temp. sensor, used to detect the compressor discharging temp. and prevent discharging temp. from too high.

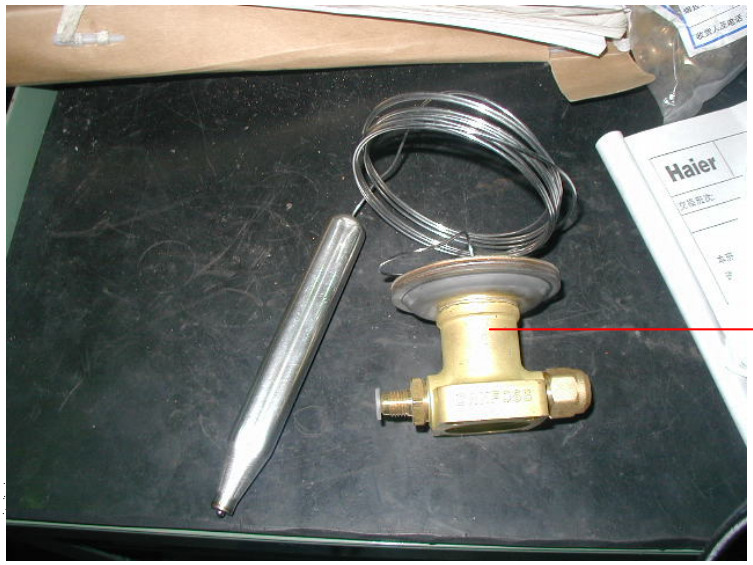
Liquid spray solenoid valve, used for compressor refrigerant spray protection, prevent the motor of compressor overheat and discharging temp. too high.

Thermostatic expansion valve, control the spray of refrigerant by liquid-spray solenoid valve and discharging temperature which is detected by the thermostat.

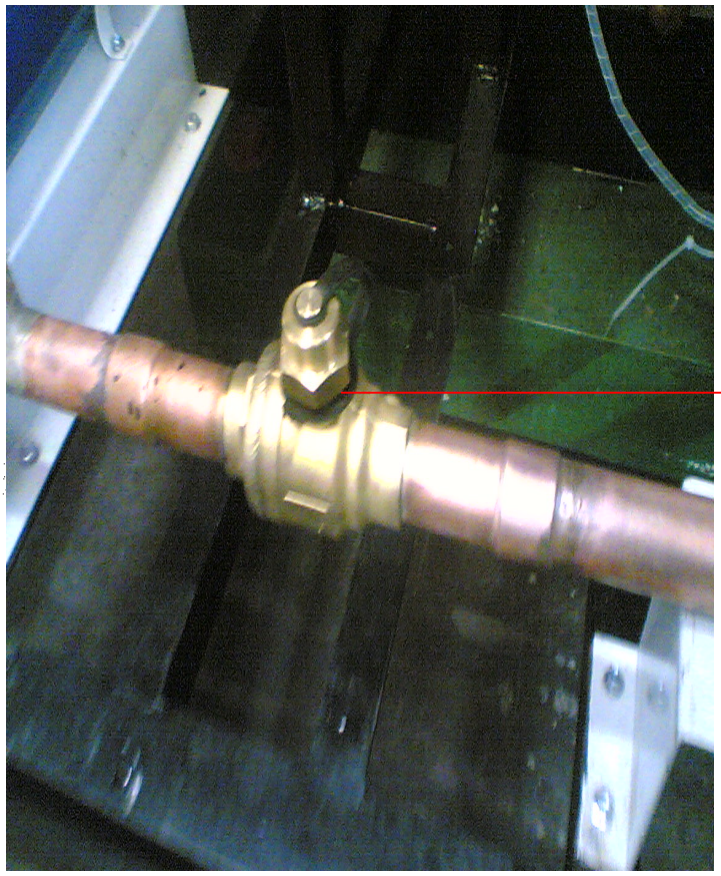
Safety valve, used to decrease the pressure when the system pressure is too high.

Thermal expansion thermostat，fixed on the discharging pipe.

One-way valve, used to prevent refrigerant flow back.

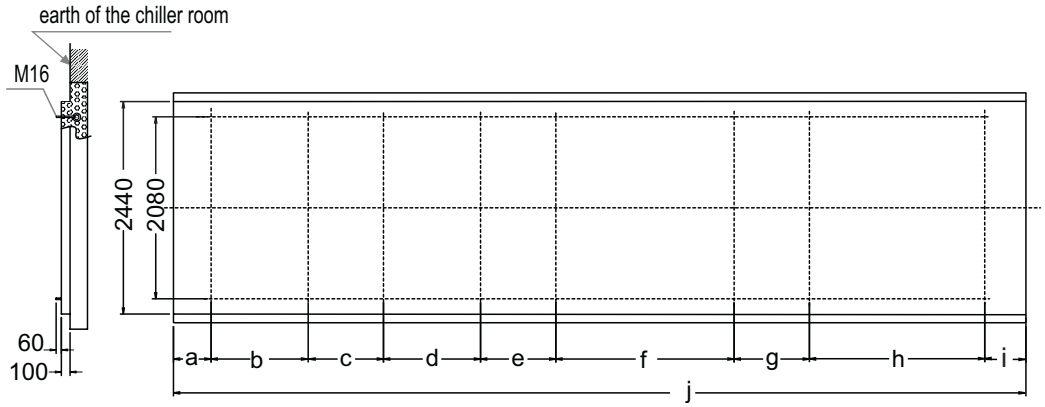


Thermostatic expansion valve, used to throttle the refrigerant and decrease the pressure.



Spherical valve, install at the each side of filter drier, which is used to close the system when maintain the filter drier.

Foundation drawing



Model \ Dimension	a	b	c	d	e	f	g	h	i	j
CI0193AANB CI0193AANC	400	1485							400	2285
CI0247AANB CI0247AANC	500	2250							500	3250
CI0316AANB CI0316AANC										
CI0386AANB	400	1485	1250	1485					400	5020
CI0493AANB	500	2250	1450	2250					500	6950
CI0563AANB										
CI0633AANB										
CI0740AANB	500	2250	1450	2250	1350	1485			400	9685
CI0879AANB										
CI0810AANB	500	2250	1450	2250	1450	2250			500	10650
CI0949AANB										
CI1056AANB	500	2250	1450	2250	1450	2250	1450	2250	500	14350
CI1196AANB										
CI1265AANB										

Note:
1. The chllers should be installed on the appropriative concrete foundation, the rigid pedestal(such as groove steel) can be used in special condition.
2. The concrete fondation or rigid pedestal should be bear the weight of the chiller in operation.
3. The above foundation drawing is just for reference, the detail install method is based on the factual conditions.4. The above dimensions include the 450mm maintenance space between chillers.

5. Installation

5.1 Inspection & Acceptance

When the chiller is shipped to the place of delivery in accordance with the contract, the client shall engage in inspection and acceptance.

a. Check the completeness of documents shipped with the chiller;

b. Check the model, specification and accessory to the chiller against the above-mentioned documents;

c. Check the chiller for any broken parts and the completeness of spare parts;

d. Check if there is any leakage of refrigerant charged into the equipment.

Please timely notify us or our business branch in case of any broken parts or any doubt, so that we can handle it with a proper manner.

After inspection of the equipment, it is advisable to adopt proper protective measures. Do not hastily remove the package so as to avoid possible damage to the equipment.

5.2 Handling & Hoisting

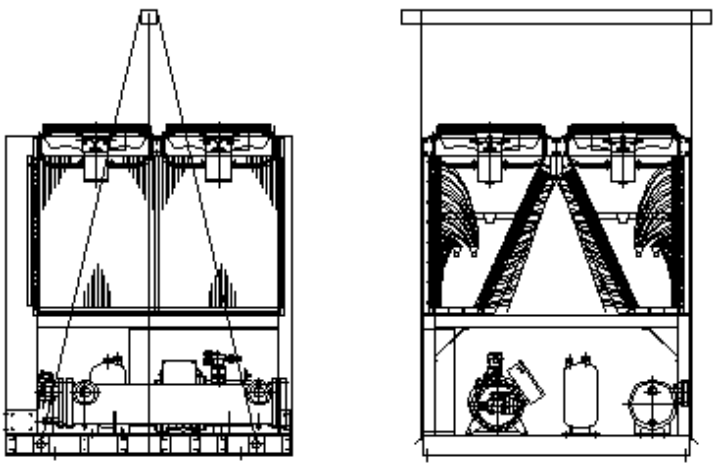
All the chillers have gone through rigid testing and inspection procedures before leaving the factory to ensure their quality and performance. Please handle the equipment with extreme care to avoid damage to the control and piping system.

1) Transport the equipment to a location as close to the installation site as possible before removing the outer package and stand the equipment on its end. When transporting chiller without package, it needs to follow the procedures given below:

A. Move the chiller with rollers. Insert three identical rollers under the base of chiller. The roller should be a little bit wider than the chiller bracket to maintain its balance.

B. Lift up the chiller with forklift truck. Insert the fork under the chiller base and lift it up with extreme care. The fork should be in fast contact with the two longitudinal beams on the base.

The client may make by its own two hoisting racks and place them on top of the chiller to expand the steel cable so as to avoid damage to the chiller panel. The strength of the steel wire should be at least 3 times of the weight of the chiller. The hoisting hole on the chiller should be fast. When hoisting, no personnel may stand under the chiller. Weight of the chiller is indicated in the rating plate. (Refer to Diagram 1)

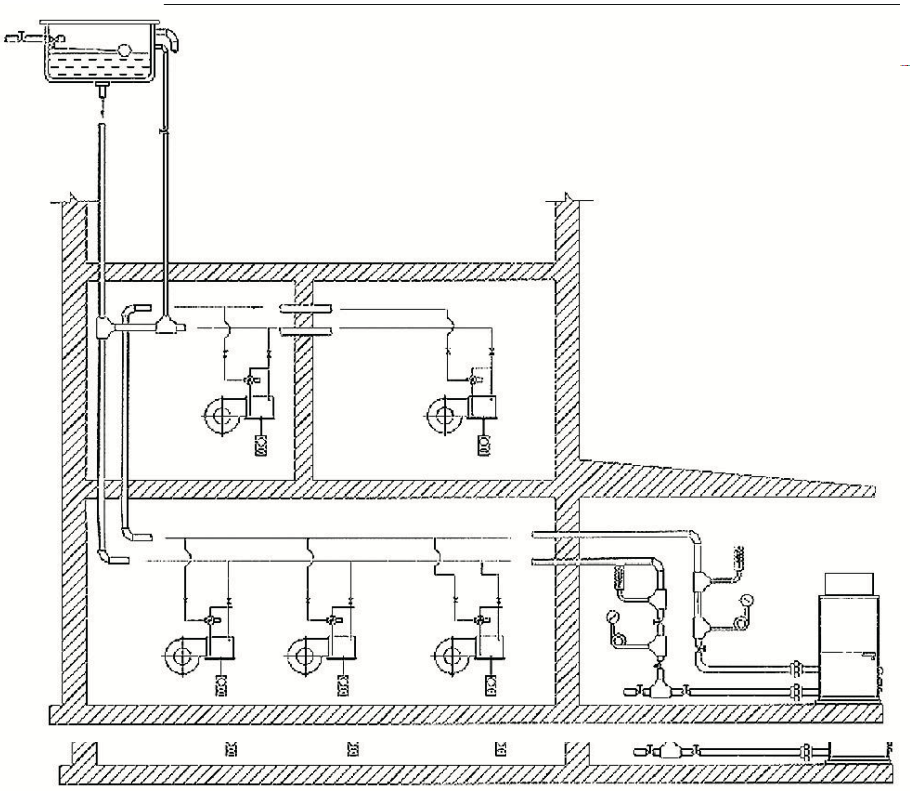


(Diagram 1)

5.3 Installation

Installstion instructions for Air-cooled Screw chiller

1. Haier Air-cooled Screw Chiller can be installed on the roof, platform, earth etc. anywhere easy to install.
2. Install the chiller on stabile, firm and flat concret foundation or metal steel bracket, and the supporting surface can bear the operating weight of the unit.
3. Recommend that maintemance space among units should be over 450mm.
4. There shall be over 2m space around the unit to be convenient for ventilation.
5. Try to keep the unit away from sunshine and rain, it is recommended to cover the unit with shed, but be sure there is a space over 3m above the air outlet for releasing heat easily.
6. An anti-vibration cushion shall be equipped between the unit and the foundation.
7. The installation and thermal insulation of the water pipes of the air conditioning system shall be designed and instructed by the professionals and shall implement the relevant regulations of the Installation Standard for HV & AC.
8. The external water pipe system must be equipped with anti-vibration hose, water filter, electronic water cleaner,one-way valve, discharging valve, stop valve and expansion tank, etc. thermometer and pressure gauge should be installed to the pipe system for observe chiller and the whole unit operation condition conveniently.
9. The cold water pump should be installed on the water inlet pipe of system, a water filter must be equipped on water inlet pipe and use the mesh with 16~40-mesh filter to guarantee the water quality.
10. The anti-vibration hose must be used between water inlet pipe and water pipe of system. At the same time, the pipes and the water pump shall have bracket to prevent the unit from receiving force.
11. Ceaning and heat preservation of system must be done before connecting the pipe with the unit.



a. Location

The unit should be located on the place where you clean and maintain easily. The concerning data and the required space will be displayed in the exterior figure. Firstly, the air ventilation should be taken into consideration. Because the air around the unit will make heat exchanging with the material in the condenser, and the air will bring away the heat energy, so the ventilation should be good. If this basic condition can be met, the condensing temperature will increase, further more, the operation efficiency and the power consumption will rise, as a result, the unit will be damaged. The unit can be located in the place where the scream, hot air or much smoke exists. Another considerate question is the place far away from the noisy area and measures must be taken to avoid the transition of noise and vibration. The unit should be installed out of the gallery, the public area or the rest area. To proper airflow, the distance from the unit to the wall or obstacle should be less than 1.5m. On the top of the unit, there is no obstacle.

b. Foundation

For normal operation, the foundation must be horizontal. If installed on the building top, the building must be strong enough to bear the great weight. If installed on the ground, suggest that the concrete ground will be better, such as following figure.

If the area cannot permit the vibration, the unit bottom should be equipped with the anti-vibration device. Please select the rubber shock absorber or spring shock absorber as per the actual supporting point. When the shock absorber is used, the connection between the unit and water pipe should be equipped with the flexible joint against the connector break.

Note: The performance of the flexible joint pipe must be accordant with the liquid and the pressure, which flow through the joint pipe. All the exterior pipes connected to the unit must use the flexible cord when being suspended; while when being passed through the wall, the ceiling, or the floor, the pipe connected to the flexible pipe must be added the sleeve pipe to prevent the vibration being transferred into the building.

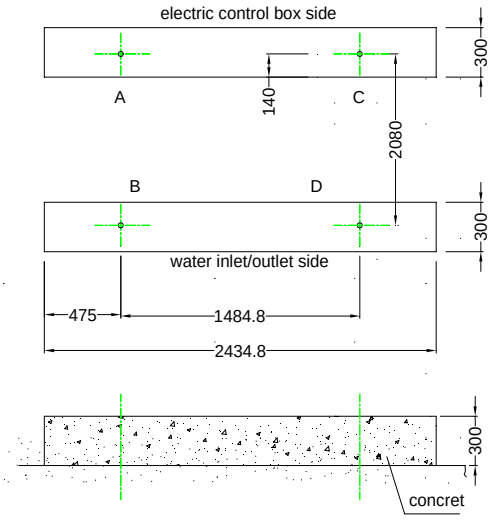
The flexible joint also is needed between the unit and the power supply wires.

c. Maintenance & Ventilation Space

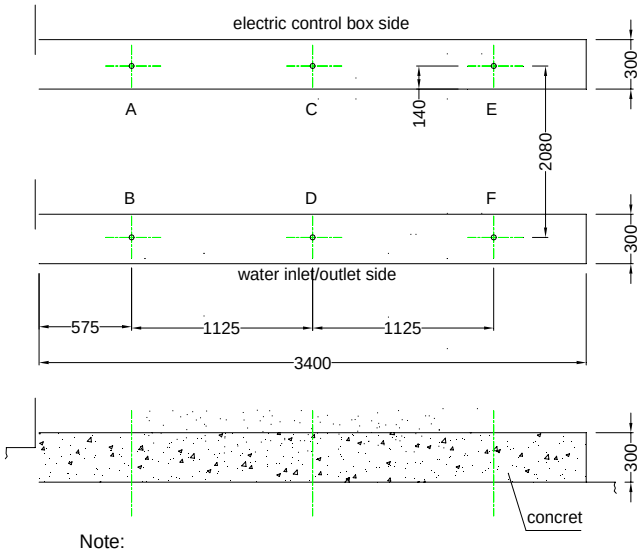
The chiller should be properly ventilated. A minimum space of 2m should be left between the chiller and other objects. It is desirable to build a herringbone shelter 2m over the highest point of the chiller to avoid sunshine and rain. Please take note of the 2m minimum space requirement if a shelter is built. At least 450mm space should be left beteen the chillers for easy maintenance.

The supporting points and foundation

CI0193AANB CI0193AANC



CI0247AANB CI0247AANC
CI0316AANB CI0316AANC



Model	supporting points						total weight
	A	B	C	D	E	F	
	kg	kg	kg	kg	kg	kg	kg
CI0193AANB CI0193AANC	649	640	675	634			2600
CI0247AANB CI0247AANC	474	481	512	508	502	488	2965
CI0316AANB CI0316AANC	577	584	615	611	605	591	3583

Note:
1.The above supporting points do not include the weight of water circuit out of the unit and the exterior power cable bracket
2.The foundation must be plane
3.The installer can adopt the expansion bolt M16 or embedded foundation bolt, the embedded depth is about 240mm(for reference) and the extention length is about 50mm(for reference)
4.When used rubber shock absorber, there need not joint among the unit, the foundation and the rubber shock absorber, only to place the shock absorber between the unit and the foundation
5.When used spring shock absorber, there is joint between the unit and the absorber,while we suggest no joint between the absorber and the foundation. After the absorber is installed, please adjust it until the bottom plate is horizontal.

5.4 Maintenance of water side

After the bottom plate is horizontal, connect the water pipe of SHELL&TUBE heat exchanger. Because the SHELL&TUBE heat exchanger will be cleaned or changed, the exterior pipe should be disassembled. The discharging valve should be installed on the higher position to ensure the air can be exhausted completely. The water relief valve is installed on the lower position to discharge water easily.

On the water circuit, there is the temperature indicator and the pressure indicator. In order to disconnect the unit and the exterior pipe in maintenance, the stop valve is installed on the water circuit. To reduce the block in the evaporator, it is important to deal with water before the chilled water enters the evaporator. After the whole system is full of water, startup the pump to exhaust the air in the system.

Even if the cool load changes, heat pump unit also need to operate under the stable water flow. Generally, the unit can operate normally under the design water flow with tolerance of plus/minus 10%. The changing water flow can result in unstable operation control, especially for the control of cool/hot water inlet/outlet temperature.

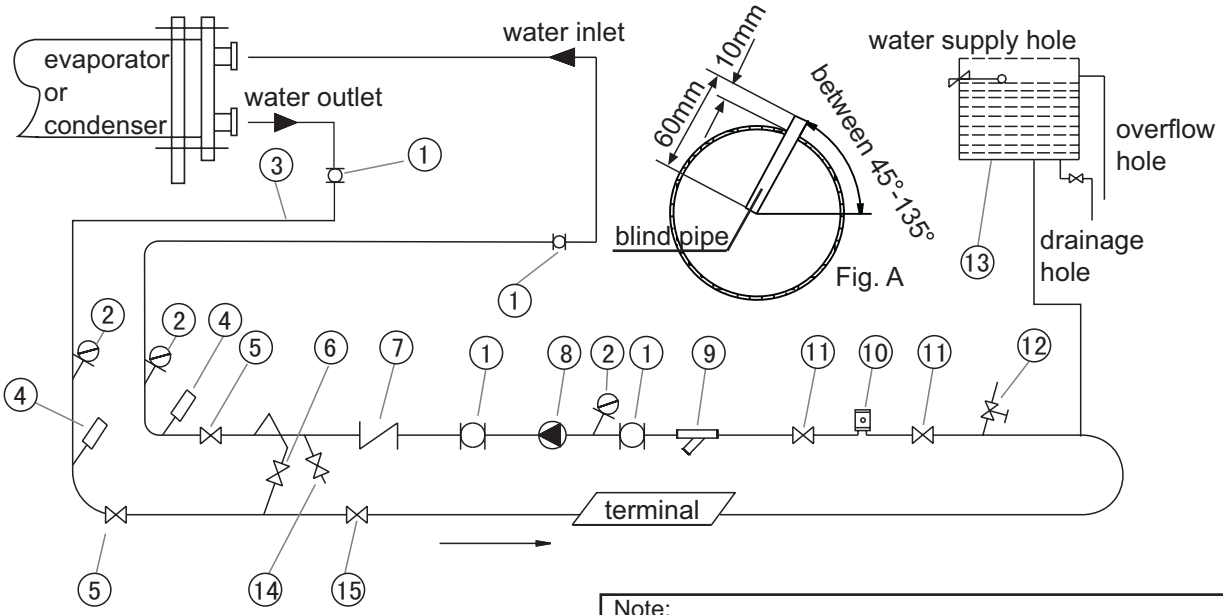
Chilled water systerm

There are sign on the connecting part of each pipe, please do as the sign shows, the following items should be done when connect pipes:

1. The connector or flange of all pipes should be as near as possible to the chillers for easy disassemble when necessary.

2. The connector of chilled water inlet/outlet pipe should use flexible hose joint.

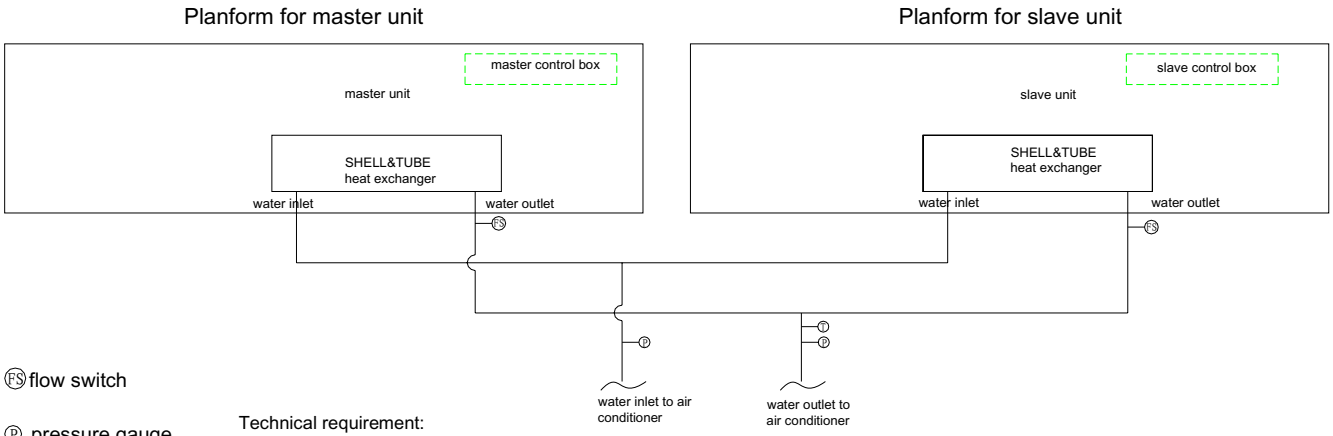
3. Set the water flow switch and compressor control wire which installed on the water pipe interlock to insure the water flow.



Note:
1. Water flow switch must be installed vertically on the straight part of water outlet pipe. the length of straight pipe beside the switch is 5 times than the pipe diameter.
2.The arrowhead of switch must point to the water flow direction.
3.Oar-vane type water flow switch is used in the operation pressure is 10bar gauge pressure.

1- flexible hose joint
2- pressure gauge
3- total water outlet temp. sensor install palce(blind pipe, refer to Fig. A)
4- thermometer
5, 11, 15 - stop valve
6- by-pass valve
7- one-way valve
8- water pump
9- water strainer
10- electrical water processor
12- auto discharging air valve(highest in the water system)
13- expansion water tank
14- drainage valve

Multiple units are combined, the water pipes out of unit connection figure:



FS flow switch

Ⓟ pressure gauge

Ⓣ water temperature sensor

Technical requirement:
1.Temperature sensor must be installed on the main water pipe of the unit.
2.Temperature sensor should be installed at the place far from the electric box <15m.
3.In the sleeve of temperature sensor should be filled with appropriate glycerin. After the sensor has been inserted in the sleeve, seal the sleeve hole with the sealant.
4.The communication wire between two units can not be over 50m.

5.5 Installation for water pump

Must install stop valve at the water inlet/outlet to make the general maintenance conveniently.

Suggest that the thermometer and pressure gauge are installed at the water inlet/outlet of heat exchanger in order to check or maintain the unit easily.

Suggest that the filter is installed close to water inlet joint of evaporator to prevent the dirt into the heat exchanger.

Chilled water pump on the pipe should be installed on the water inlet pipe of the evaporator. Other object except for the unit can control the pump.

Suggest that all the pipes connected to the unit should be equipped with the anti-vibration device. If the unit has the shock absorber, the unit and the pipe should be connected in cross type.

On the lower points of the pipes, the drainage joint can be set, while on the higher position, the air discharging joint can be set.

Before the water pipe is put the heat preservation and the unit is filled with water, please check the pipe leakage.

Must install the required flow switch.

When the project needs to install the dirt removal system, please avoid the water inlet/outlet pipe of the heat exchanger, otherwise, that will affect the efficiency.

5.6 Control of Water Quality

When industrial water is used as chilling water, there is little scale formed. When water from well or river is used, more sediment such as scale or sand will settle down in the evaporator, which will reduce the water flow and leads to freezing of pipes. So the water should be filtered and softened with chemicals before being supplied to chilling water system. It is necessary to analyze the PH value, conductivity, the concentration of chlorine ion and sulfuric ion.The following is the water quality standards adopted by Haier:

Evaporator Water Quality Standard:

PH Value	6.5-8.0
Conductivity	≤200uv/cm(25°)
Chlorine Ion	≤50ppm
Sodium Ion	≤50ppm
Total Ferrous Content	≤0.3ppm
Alkaline Ion	≤50ppm
Total Hardness	≤50ppm
Sulfuric Ion	None
Ammonia Ion	None
Silicon	≤30ppm
Sodium Ion	Not Required

Note:

1) Do not install the chiller indoor. or leave at least 1.5m between air vent and the ceiling if have to and equip the chiller with proper ventilation equipment so that the heat generated by the chiller during operation can quickly dissipate.

2) The refrigerant R22 for the unit is nontoxic and non-flammable. it will permeate near the ground if leakage occur for R22 is heavier than air. So the ventilation must be will if install the chiller inside in an enclosed room to avoid suffocation.

3) Stop the chiller immediately and contact with the technician in time if leakage occurs. Naked fire is prohibited in the site, or the refrigerant will be reduced to harmful gases.

4) Connect water systems between modules in parallel when applying multi-module. Each module should have a flow switch and a minimum 450mm space should be left between modules for maintenance.

5) Use cuprum-core soft cable which can meet the current requiement of chiller as power supply cable, the cable should be connected with cuprum block directly when enter electric box and setted away from weak electrical wire, otherwise, it is forbidden to install or maintain when power is on.

6) Confirm if the electrical connection is well before debugging. The connection may become flexible during transport, so fix the connection again before debugging.

7) The dip switch on the PCB control module is forbidden to be changed.

5.7 Installation of electric control

Install the power cable (3-phase, 4-wire type)

Check if the local power supply (voltage, frequency) can meet the requirement of the unit.

Please install residual circuit circuit-breaker.

Note: For the safety, the unit must be grounded.

Fix the chilled water inlet/outlet temperature sensor: It is placed on the exterior pipes vertically (less than 450mm to the unit).

Fix the chilled water inlet/outlet pressure drop controller: high pressure side is connected to the inlet; low pressure side is connected to the outlet.

6. Unit startup and stop

6.1 Check before startup

6.1.1 Water circuit

Confirm if the water circuit has leakage and if the water flow direction is correct.

Open all the water valves.

Start up the chilled water pump.

Exhaust the air in the water circuit of heat exchanger.

Check the water side resistance consumption of heat exchanger and if the water flow volume is correct.

Confirm the temperature sensor is fixed correctly.

6.1.2 Wiring circuit

Cut off the main power switch, and check all the startup circuit and control circuit.

Confirm the switch is at OFF state.

Check the power supply if the voltage fluctuation (within ±10%), the phase voltage unbalance (within ± 2%), and the power frequency fluctuation (within ±2%) are in the permitted range.

Check if there is enough power supply capacity to meet the requirement of startup and full load operation.

Water switch is fixed as per the circuit diagram.

For multi-compressor system, please wire the communication cables as per the group control wiring diagram.

Confirm that all the wires and the fuses are the proper specs matching with the unit.

Confirm all the accessories and the control device operate normally, and at the first operation, their cooling capacity can meet the operation requirement.

Though the electric circuit such as control box and the sensors, etc. has been tested before out of factory. Because in the transportation, there are some uncertain effects, please check the unit carefully again before the unit is put into use.

6.1.3 System section

Confirm if the compressor oil heater has been electrified for 24 hours.

Through the liquid sight glass of the oil segregator, if you can observe the oil level, please add the oil.

Check the fan-driving device, if there is corrosion or rust and if the fan needs to be cleaned, etc. For the problems, maintain or adjust the unit.

Open the manual stop valve of the liquid spray pipe fully.

Open the suction, discharging stop valves, and then turn 1/2 circle in clockwise.

Open the liquid supplying valve fully.

Open the chilled water pump.

6.2 Unit startup and stop

1.Close the exterior main power switch, and enter the unit operation surface, that is the auto startup program.

2.If the unit occurs failure in running, the control box can alarm automatically or cut off the power supply, meanwhile, on the screen there is the failure information.

3.Parameters in the cooling standard condition:

Parameter	Standard value	Fluctuation range
Condensing pressure	18kg/cm^2	±2kg/cm^2
Evaporating pressure	4.2kg/cm^2	±0.5kg/cm^2
Discharging temp.	80℃	±10℃
Suction temp.	12℃	±5℃
Liquid supply temp.	45℃	±3℃
The above value is the basic value in the operation.		

4. Parameters in the heating standard condition:

Parameter	Standard value	Fluctuation range
Condensing pressure	18kg/cm^2	±2kg/cm^2
Evaporating pressure	3.5kg/cm^2	±0.5kg/cm^2
Discharging temp.	80℃	±10℃
Suction temp.	4℃	±5℃
Liquid supply temp.	45℃	±3℃
The above value is the basic value in the operation.		

Note: You had better not use EMERGENCY if not necessary. Only after the failure is eliminated, the unit can start up.

6.3 Stop for long time

If the unit does not run for long time, the following measures will be taken:

Close the liquid supply stop valve, and operate the compressor to extract the refrigerant, then stop the unit.

Close the compressor suction, discharging stop valve, and stop the water pump.

Shut off all the power supply.

Make the emergency at OFF state.

All the shut-off switches must be marked the sign as warning. Only after the compressor suction, discharging stop valve and liquid supply stop valve, also and the liquid spray stop valve are open, the unit can be started up.

7 Maintenance

Must not make the maintenance in operation.

7.1 System maintenance

To ensure the unit can operate normally with full load, and do not occur the failure, the below clauses should be checked on period.

Check the humidity of the liquid sight glass on the liquid supply pipes. Confirm there is full of liquid and the humidity indicator is dry state. If the humidity is too high or there is air bubble in the glass, even though the unit has enough refrigerant, you had better change the filter drier core.

7.2 Electric control maintenance

Note: Before any maintenance for electric control, shut off the power of whole electric control box.

The electric parts need not special maintenance and only need to be fixed the wring every month appropriately.

If the wiring is not performed as per the requirement, the guarantee will be invalid. The fuse shutoff or the breaker acting shows short circuit or overload. Before changing fuse or restart the compressor, you must find out the failure and repair it. The control box must be repaired by the experienced engineer. *For any damage because of any modification of control box, the manufacturer will not take any responsibility.*

7.3 Recommended daily checking items

Time	Position	Checking items	Correct value
Before startup	1.oil heater	Check if the electric heater is electrified when stop	Start the electric heater
	2.liquid sight glass of oil segregator	Oil level	Ensure the oil level of the glass should be over 1/3.
	3.manual stop valve of the liquid spray pipe	Check if the valve is open fully	Open the valve
	4.voltage of power supply	To check with a voltmeter	Not over rated value±10%
	5.ambient temperature(outdoor)	To check with a thermometer	≤40℃
Startup	1.liquid sight glass of side cover	Check the wheel rotation	Wiring as per EY302947
	2.solenoid valve on the liquid spray pipe	When startup, check if it is open	
	3.vibration and noise	To feel and listen	No abnormal vibration and noise
Operation	1.liquid sight glass of oil segregator	Oil level	Recharge refrigerant oil*
	2.solenoid valve on the liquid spray pipe	Check if spraying oil	
	3.discharging pressure	Check high pressure gauge	1.1~1.8MPa
	4.suction pressure	Check low pressure gauge	0.3~0.6MPa
	5.suction pressure drop among the running compressors	Check low pressure gauge	≤0.05MPa
	6.hot water outlet temperature (in heating)	To check with thermometer	30~45℃
	7.chilled water outlet temperature (in cooling)	To check with thermometer	5~10℃

	8.discharging pressure drop among the running compressors	Check high pressure gauge	≤0.1MPa
Every season	1.refrigerant volume	Check liquid sight glass	No air bubble in the liquid of the pipe
	2.lubracation oil volume	Oil level	In the permitted range

Note: The additional oil volume cannot be over 10 liter.

7.4 Recommended maintenance period

Item \ Running time(h)	1000	2500	5000	10000	35000
Electric insulation		△	△	△	△
Motor		△	△	△	△
Liquid spray control valve				△	△
Solenoid valve				△	△
Suction filter	△	△	△	△	○
Oil filter	△	△	△	△	○
Filter of the liquid spray pipe	△	△	△	△	○
Refrigerant oil				○	○
Note: △check ○change					

8. General maintenance

Checking the cycling water: discharge the water from the heat exchanger. If the water is dirty, the cooling efficiency will reduce, at the time, the water in the system should be changed.

8.1 Check of heat exchanger and pipes

8.1.1 Check of evaporator

The dirty surface of heat exchanger will reduce the working efficiency. The material of the SHELL&TUBE heat exchanger is steel and copper pipe, and the heat exchanger can be used for the water system which has been treated. In some area, the water quality is very hard, therefore the evaporator will be blocked, and will result that the system stop because of failure or the operation is not economical. In the condition, please consult the specialist to get the high quality water.

8.1.2 Check of condenser

In the operation, if the environment air is dirty and the dirt on the condenser is much, please often clean the condenser. With the dirt condenser, the unit will run under high pressure, as a result, the system will not meet the satisfied effect. Please clean the coil with soft brush and cool water or ask for the professional person. *Do not clean with hot water or cream*. Otherwise, the inner pressure of the system will increase. Before the seasonal startup, clean the condenser surface. As per the cleanness, confirm the periodic cleaning.

8.1.3 Checking the pipes

The periodic checking of pipes mainly is to remove and clean. And then check the leakage of the welding gap, the flange, the sealed cushion, the thread type, etc.

8.2 Refrigerant charge

When lack of refrigerant (adjusted on the standard condition: cooling: ambient temperature 35℃, water outlet temperature 7℃; heating: ambient temp 7℃, water outlet temp 45℃. In running, the liquid sight glass must be clear.), firstly please check the leakage position and amend it. If there is non-condensing air, firstly evacuate the system and then add refrigerant.

Procedure of charging refrigerant:

a. Close the compressor discharging valve, condenser liquid supply valve, liquid spray valve(single screw unit), and separate condenser.

b. Connect the hose with the accumulator, and tighten the nut. Then connect the hose with refrigerant charging valve, temporarily do not tighten the nut. Open the accumulator valve a little to discharge the air until the refrigerant go out of the hose, then tighten the nut of hose connector on the refrigerant charging valve.

c. Open the big refrigerant charging valve of condenser slowly. By the pressure drop, fill the refrigerant into the condenser automatically until it meets the admired volume.

d. After the pressure is in balance (weight of accumulator no change), if the refrigerant still does not meet the admired volume, heat the lower section of the accumulator to ensure the refrigerant can be charged continuously. Once it meets the admired volume, stop heating at once and close the valve of accumulator.

e. Close the refrigerant charging valve, and disassemble the refrigerant charging pipe.

f. If one bottom of refrigerant cannot meet the requirement, please change the accumulator, and repeat the above procedure until it meets the requirement.

g. If lack of refrigerant, and the refrigerant weight in the system is unknown, please perform the No 1, No2 and then start up the unit (liquid supply stop valve had better not to open largely). Open the refrigerant

charging valve of the condenser slowly, and observe how the liquid sight glass and the condensing pressure change. If there is refrigerant foam in the liquid sight glass, or the pressure and the admired pressure on the condition cannot be accordant, that shows the system is lack of refrigerant. As per the actual situation, perform No3, No4. Until the light glass and the pressure gauge resume normal, shut off the refrigerant charging valve, and open the liquid supply stop valve slowly. If there is refrigerant foam in the liquid sight glass, or the pressure and the admired pressure on the condition cannot be accordant, open the refrigerant charging valve to charge the refrigerant. Repeat the above the procedure, when the liquid supply stop valve is fully open, If there is refrigerant foam in the liquid sight glass, or the pressure and the admired pressure on the condition can be accordant, that shows the refrigerant has been charged well. Perform No 5, and record the refrigerant volume.

8.3 Troubleshooting

Section	Phenomenon	Reason	Solution
Solenoid valve	Shutoff time over 3s	1.the hole of the valve plug side is blocked	1.Remove the dirt in the hole and install a filter in front of the valve
	After powered on, the valve can not open	1.Voltage is below 85%	1.adjust the voltage within ±10%
		2.The coil has been burnt out or the connector falls off	2.If necessary, open the valve to check or change the coil. New coil must be dipped and dried, and fill a layer of glue made of quartz and pitch (the weight proportion 3:1) between the coil and the shell.
	The gap between the valve plug and the valve bracket is not sealed, there is leakage	1.the hole of the valve plug side is blocked	1.Remove the dirt in the hole
		2.The sealed loop of valve plug is worn out or distorted.	2.change the sealed loop
		3.Pressure drop between the pressure before and after the valve is lower 10% than the weighed pressure.	3.Comply with the requirement
	The sealed section between the static part and movable part is not sealed well.	1.sealed cushion is not placed well.	1.place the sealed cushion and tighten firmly and evenly
		2.sealed cushion is worn out or distorted.	2.change the sealed part
	After electrified, the valve plug does not start up	1.pressure relief hole is dirt	1.Eliminate the dirt in the hole
		2.the improper medium, and the bad viscosity	2.bad viscosity, enlarge the pressure relief hole
Compressor	Compressor not startup	1.Main switch cannot close	1.close the switch
		2.fuse is burnt out, and the circuit switch is not close	2. check if the wiring circuit and the motor coil have been grounded or in short circuit. check if it is overload (after troubleshooting),change the fuse or close the switch to check if the connection is loose or rusty.

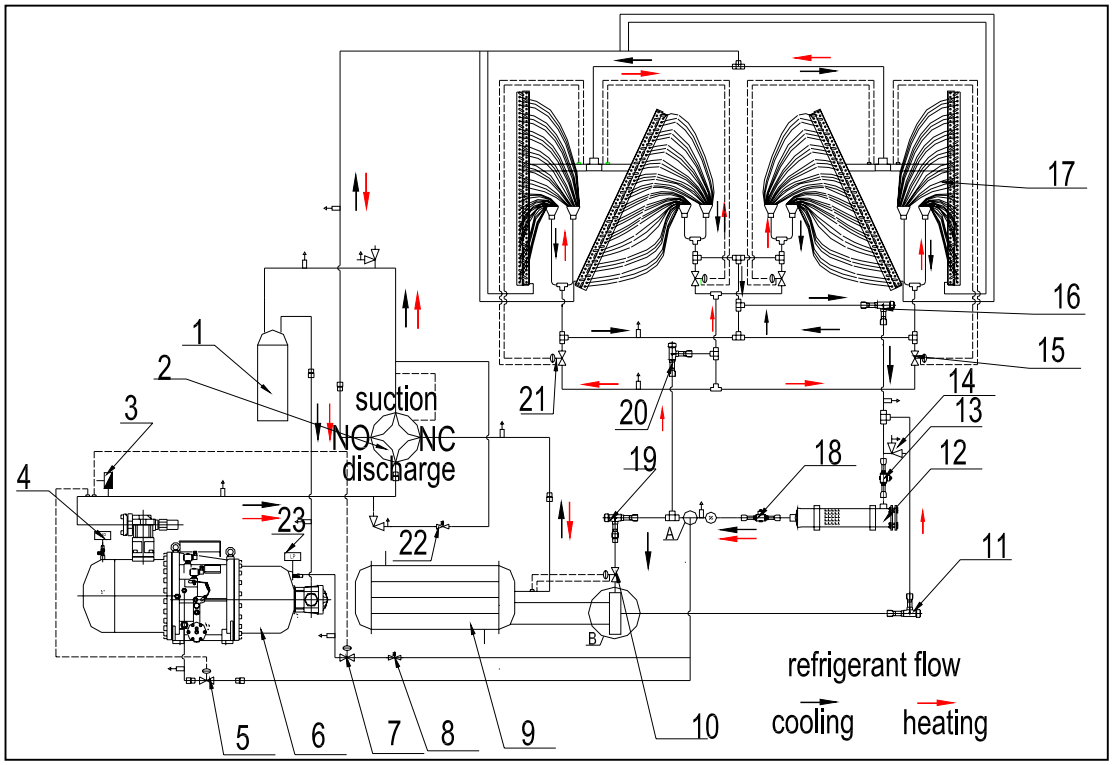
		3.overheat protection disconnection	3.auto reset of overload protection. Before the overheat protection resumes normal, please eliminate the problem.
		4.contactor or solenoid valve failure	4.modify or change
		5.safety device acts, then the unit stops	5.confirm the stop type and reason. Before the safety function has resume, please eliminate the problem.
		6.no heat load	6.wait for the heat load
			7.modify or change the solenoid valve
			8.check if the motor is in short circuit, in cut circuit or burnt out.
			9.check all the wiring terminals, and tighten the screws.
			10.make the safety switch reset
	Compressor cannot operate and be noisy	1. wrong wiring	1. check and re-wring
		2. low voltage	2. check the power voltage
		3. starter invalid	3. change
		4. compressor damaged	4. change
	Compressor is noisy and vibrates greatly	1. too much refrigerant enters the compressor	1. check the expansion valve set value
		2. compressor damaged	2. change
	Compressor can add or reduce the load	1. capacity control failure	1. change
		2. load reducing device failure	2. change
		3. the thermostat grade occurs failure or the wire is broken down	3. change
		4. grade set not reasonable	4. re-set
	The interval between compressor adding and reducing load is too short	1. the water thermostat is abnormal	1. change
		2. water flow is not adequate	2. adjust the water flow
	The compressor heat-sensitive protection switch is broken down	1. the operation condition exceeds the designed range	1.change the condition to the admired range
		2. discharging valve is not open fully	2.open the valve
		3. motor abnormal	3.change the compressor
motor	Motor overload, relay broken down	1. when in great load, the voltage is too low	1. check if the power voltage drop is too high
		2. the motor coil damaged	2. change the compressor

		3. power cable is loose	3. check all the connection and tighten them
		4. condensing temperature too high	4. lower the discharging pressure
		5. abnormal power cable result in the voltage unbalance	5. check the power voltage, do not start up the compressor until the trouble is eliminated
		6. overload relay damaged, ambient temperature too high	6. improve the ventilation to get good radiator
unit	Discharging pressure too high	1. there is non-condensing gas in the system	1. discharge the non-condensing gas
		2. too much refrigerant	2. extract the redundant refrigerant
		3. discharging stop valve not open	3. open the discharging stop valve
		4. air outlet temperature of condenser too high	4. check if the installation is proper and the fin is blocked
	Discharging pressure is too low	1. condensing temperature not adjusted properly	1. check the condenser control and operation process
		2. suction stop valve not open fully	2. open the suction stop valve
		3. lack of refrigerant	3. check the leakage and maintain, charge the refrigerant
		4. suction pressure too low	
	Oil supply abnormal	1. oil filter inlet is blocked	1. clean
		2. liquid type refrigerant enters the oil segregator	2. check the electric heater, adjust the overheat value of expansion valve. Check the liquid supply solenoid valve to adjust the water flow
		3. oil pressure gauge is not correct	3. modify or change, close the valve. Open it until there is reading.
		4. oil lever too low	4. add the oil

9. Control device

The core component adopts touching type screen; the surface is dialog type, easy to operate. The whole control device is highly automatic and highly reliable.

9.1 System diagram



1. air-liquid segregator 2. 4-way valve 3. safety valve 4. high pressure sensor 5. high temperature expansion valve 6. compressor 7. expansion valve 8. liquid supply solenoid valve 9. evaporator 10. thermostatic expansion valve for cooling 11. one-way valve 12. filter drier 13. ball valve 14. corner valve 15. thermostatic expansion valve for heating 16. one-way valve 17. condenser 18. ball valve 19. one-way valve 20. one-way valve 21. thermostatic expansion valve for heating 22. liquid spray solenoid valve 23. low pressure sensor

The compressor takes in low-pressure superheat refrigerating gas from the dry-type evaporator and compresses it into high-pressure, high-temperature steam-gas. The steam-gas discharges heat to the ambient environment when going through the condenser and is condensed into saturated or super-cool refrigerating liquid, which flow is regulated and pressure reduced through expansion valve. Then, the liquid flows into the dry-type evaporator, where it absorbs heat from cold water, gasifies and is again taken in by the compressor to start a new cycle. Thus, the cold water passing the dry-type evaporator is cooled down and flows into the air-conditioning area.

In heat pump cycle, the direction of refrigerant flow is switched over by means of four-way valve. After being compressed by the compressor, the high-pressure, high-temperature refrigerating gas is directly discharged into the shell and tube heat exchanger (dry-type evaporator) and heat is released to cold water in this process to realize heating. The condensed refrigerant flows through expansion valve, where its flow is regulated and pressure reduced and then evaporates in the air-cool condenser by absorbing ambient heat. The gas is then

taken in by the compressor to start a new cycle.

9.2 Daily maintenance:

In order to maintain the unit performance and life, please check the below items in daily maintenance:

1.Check if the high/low pressure switch data is in accordant with the requirement.

2.Observe the refrigerant oil level.

3.Observe the refrigerant oil color, if is seems brown or black, please change the oil.

4.Observe the pressure gauge, and confirm if the high/low pressure is correct and the working points have tolerance, record the operation data.

5.Measure if the working current of the compressor is correct.

6.Check if the unit is stable and if the unit can run continuously.

7.Confirm if the unit and the condenser is noisy.

8.Confirm if the drainage is OK.

9.Confirm if the refrigerant charge is proper.

10.If the condenser fan motor is running normally and the rotation direction is correct.

11.If the wire has been bitten, worn, over hot, aged and if the connector is loose.

12.The leakage of electric system.

13.If the electric parts are insulated, bad radiator, or over heat, etc. phenomenon.

14.Check if the condenser is blocked by the dirt or sundries. If yes, please clear immediately.

15.If there is tough, collision or friction among pipes, please adjust or add the rubber.

16.If the refrigerant pipe and welding point are rusty, please remove the rust with the tender sand paper and cloth, then paint the anti-rust varnish.

17.If the frame and other steel shell are rust, remove the rust with the rough sand paper and the cloth, then paint the anti-rust lacquer with the same color.

10. Wiring diagram

The wiring diagram can be devided as main control circuit and slave control diagram, each diagram included three parts: main control return circuit, PCB circuit and terminal connection diagram. The two type wiring diagram are used for any combination, because the quantity of fan motor and address of input/output are defferent, wiring diagram of the six basic modules is not completely same, but the basic control is similar.

Take CI0386AANB as example:

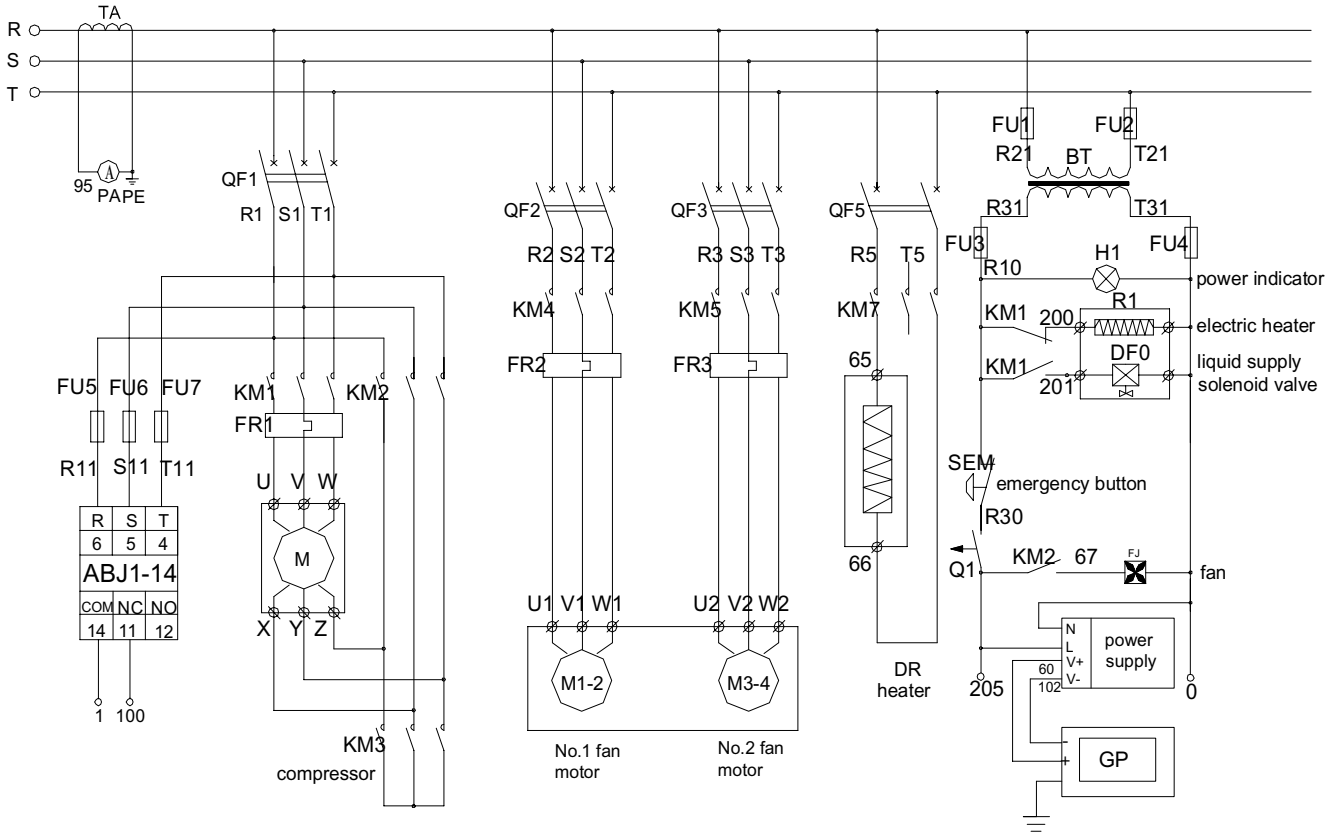
1. Combination type: CI0386AANB=CI0193AANB+CI0193AANC, one is used as main control, the other one is used as slave control, the main configuration differenceis as following:

	Touch screen	24V DC power	Control part of strong power
Main control 193	have	have	same
Slave control 193	none	none	

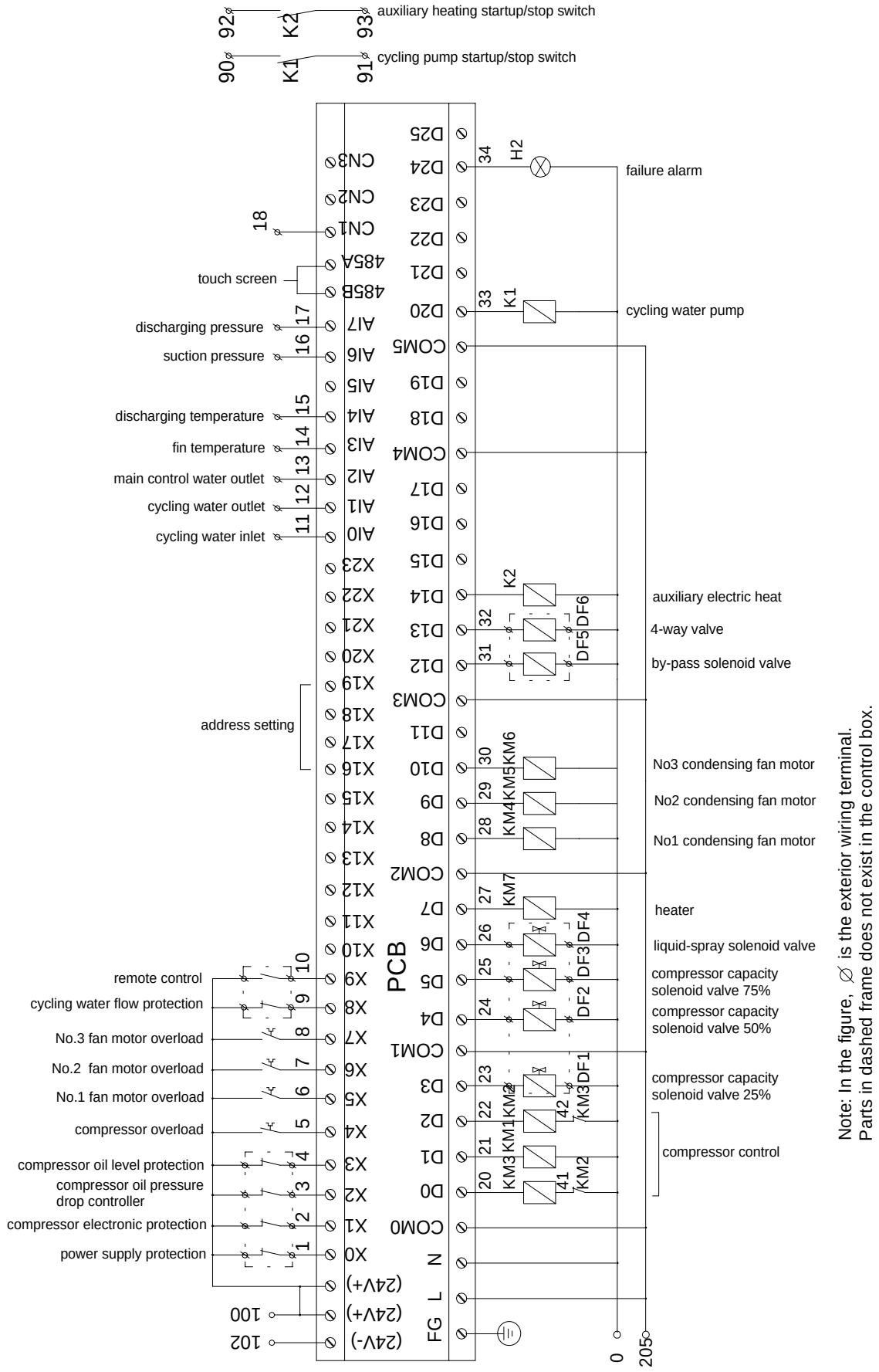
2. Control 4 condensing fan motor, which is divided to 2 groups and controlled by contactor and relay, the wiring digram is as following:

10.1 Main control circuit

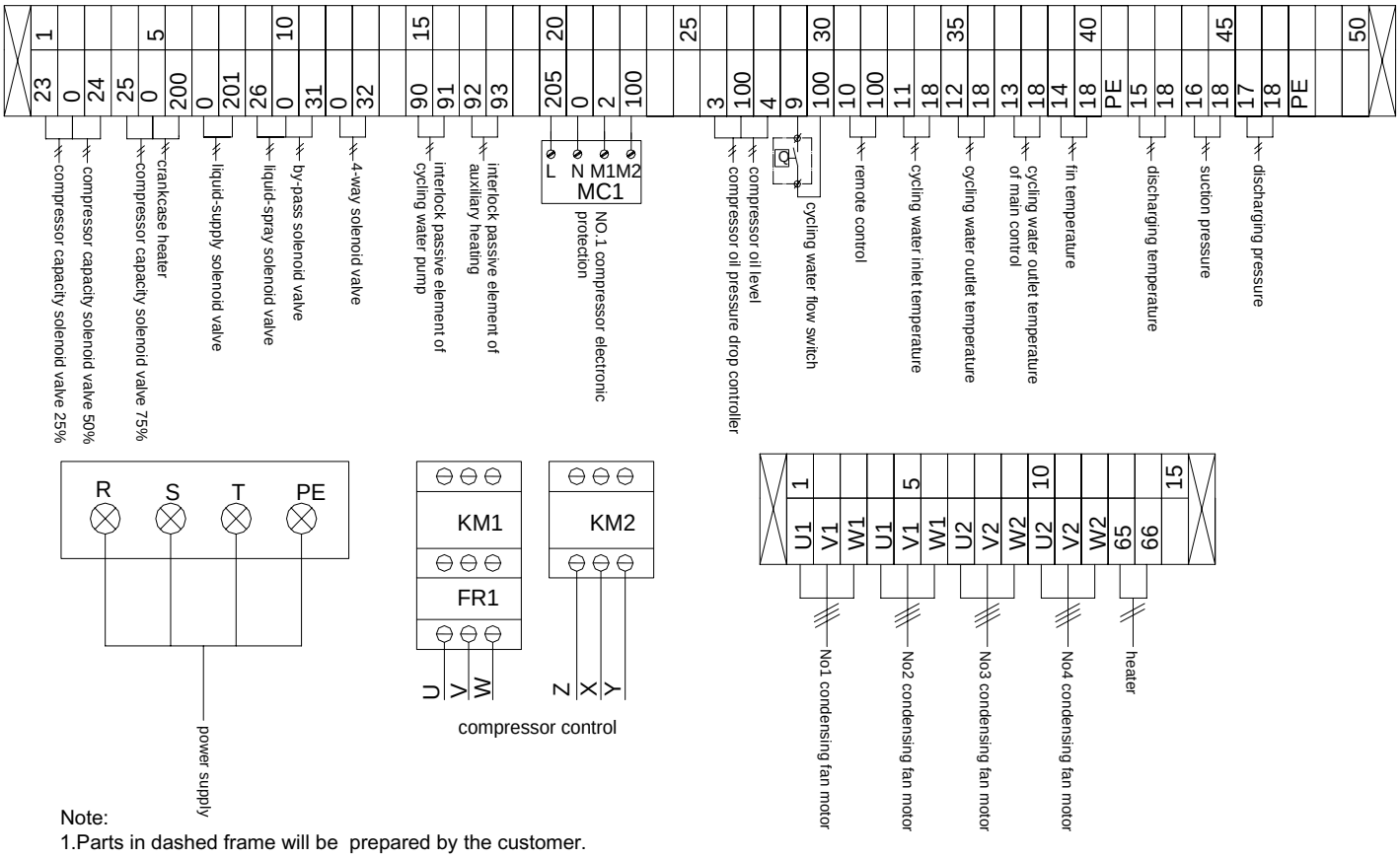
1) 386 main control return circuit: it is the sketch map for compressor, fan motor and PCB power supply mostly.



2) 386 PCB circuit: it is the input/output control of PCB mostly.



3) 386 terminal connection diagram: it is the connection for external control mostly.



Note:
1.Parts in dashed frame will be prepared by the customer.
2.Temperature sensor adopts the 3-core shielded wire RVVP3x0.5.

10.2 Slave control circuit

1) 386 slave control return circuit: the most difference between the main control circuit is there are no power supply and touch screen .

2) 386 PCB circuit: the most difference with the main control circuit is that 3 ports are not used: X7(No. 3 fan) motor overload); AI2(main control water outlet) and D10(No. 3 condensing fan motor).

3) 386 terminal connection diagram: it is the connection for external control mostly.

11. Control system

11.1 Electric control function for chiller PCB 0010452932

1. Cooling mode：

Startup: After pressing ON button, the cycling pump works firstly, the 25% solenoid valve will start 1 minute(revisable) later, 10 seconds later the main and Y contactor of compressor start, 5 seconds(revisable) later, Y-△ conversion begins, Y contactor will close and △ contactor will open, 10 seconds later, the 25% solenoid valve will be open and start the 50% solenoid valve, the startup is complete, enter energy regulation process.

Energy regulation: when cycling water outlet temp. ＞ setting temp. + download temp. difference, the chiller will upload from 25% to 100%, or will keep the original energy. When cycling water outlet temp. ＜ setting temp. － download temp. difference, the chiller will download from 100%～25% until stop working. The condensed fan started by steps, start of stop the fan by comparing the setting pressure with the detect value, the started pressure of fist group fans is P1(can be setted between 1.45-1.75MPa), the started pressure of second group fans is P2(can be setted between 1.65-1.95MPa), the started pressure of third group fans is P3(can be setted between 1.85-2.15MPa), the pressure difference for each group fan is 0.3MPa. After the chiller works for 100%, the chiller will download compulsively to 75% when the discharging pressure is over 2.25MPa(revisable) until the pressure resume to 2.0MPa(revisable), then upload to 100% again. (Note: once the fan starts, run 10 seconds compulsively and then judge if the fan stops by pressure; judge pressure and restart fan motor after the fan motor has stopped for 5 seconds) When compressor run in 50% lasts for over 30 minutes, compressor will unload to 75% compulsively, then upload or download by adjusting temp. condition. The chiller will download to 75% compulsively when the discharging pressure is over 2.25MPa(revisable) and will not upload to 100% unless the pressure resume to 2.0MPa(revisable).

Stop the chiller: the current capacity change to 25% operation when stop the chiller, 1 minute later the compressor stops, 10 seconds later the fan motors stop in turn, 5 seconds later stop the 25% valve, another 1 minute(revisable) later stop the water pump.

2. Heat mode:

Startup: After pressing ON button, the cycling pump works firstly, the 1# condensing fan motor will start and 4-way valve open after 1 minute(revisable), 3 seconds later 2# condensing fan motor start, 3 seconds later 3# condensing fan motor start, 5 seconds later 25% solenoid valve start, 10 seconds later the main and Y contactor of compressor start, 5 seconds(revisable) later, Y-△ conversion begins, Y contactor will close and △ contactor will open, 10 seconds later, the 25% solenoid valve will be open and start the 50% solenoid valve, the startup is complete, enter energy regulation process.

Energy regulation: when cycling water outlet temp. ＞ setting temp. + download temp. difference, the chiller will upload from 25% to 100%, or will keep the original energy. When cycling water outlet temp. ＜ setting temp. － download temp. difference, the chiller will download from 100%～25% until stop working. The condensed fan started all without be controlled by pressure. When compressor run in 50% lasts for over 30 minutes, compressor will unload to 75% compulsively, then upload or download by adjusting temp. condition. The chiller will download to 75% compulsively when the discharging pressure is over 2.25MPa(revisable) and will not upload to 100% unless the pressure resume to 2.0MPa(revisable).

Stop the chiller: the current capacity change to 25% operation when stop the chiller, 1 minute later the compressor stops, 10 seconds later the fan motors stop in turn, fan motors stop at 5 seconds interval in turns, 5 seconds later stop the 25% valve and 4-way valve, another 1 minute(revisable) later stop the water pump.

Defrost: there are two types to defrost: pressure defrost and temp. defrost.

a. When the suction pressure is less than the defrost pressure setted value, judge if the defrost interval is met, enter defrost if it meets the interval and quit defrost compulsively if reach the max. defrost time. when during defrost, the condensing fan motor stops and 4-way valve reverse when the compressor download to

50%, at the same time by-pass valve is connected, some times later the compressor energy up to 75%, some times later the compressor energy up to 100%. When quit defrost, the compressor download to 50% firstly, 4-way valve reverse and close the by-pass valve, run in heating mode.

b. When the fin temp. enter the defrost temp. setted value, judge if the defrost interval is met, enter defrost if it meets the interval, quit defrost compulsively if the chiller do not reach the defrost quit temp. when at the max. defrost time, the defrost action is the same with pressure defrost.

Quit defrost if one of the below conditions is met:

1. Meet the max. defrost time;
2. Both the discharging pressure and fin temp. meet the defrost quit condition.

Note: start to time the defrost time interval only when defrost once, the first defrost after compressor startup is not limited by the defrost interval.

3. Upload condition: 1. Cycling water outlet temp. meets the condition;
2. Meet the min. time of chiller stops;
3. Upload according to upload/download interval.

Upload procedure: 1# chiller25%→1# chiller 50%→1# chiller 75%→1# chiller 100%→1# chiller 75%→2# chiller 25%→2# chiller 50%→2# chiller 75%→1# chiller 100%→2# chiller 100%→1# chiller 75%→2# chiller 75%→3# chiller 25%→3# chiller 50%→3# chiller 75%→1# chiller 100%→2# chiller 100%→3# chiller 100%→1# chiller 75%→2# chiller 75%→3# chiller 75%→4# chiller 25%→4# chiller 50%→4# chiller 75%→1# chiller 100%→2# chiller 100%→3# chiller 100%→4# chiller 100%

4. Download condition: 1. Cycling water outlet temp. meets the condition;
2. Meet the min. time of chiller stops;
3. Download according to upload/download interval.

Download procedure: 1# chiller 100%→1# chiller 75%→2# chiller 75%→3# chiller 75%→4# chiller 75%→1# chiller 50%→2# chiller 50%→3# chiller 50%→4# chiller 50%→1# chiller 25%→2# chiller 25%→3# chiller 25%→4# chiller 25%→1# chiller stop→2# chiller stop→3# chiller stop→4# chiller stop

Before the later chiller startup, the former chillers which have started will download to 75% and then start the later chiller.

Note: 1#, 2#, 3# and 4# are just startup serial number and not concrete number for chiller, which chiller startup first is decided by its own operation time, start the chiller which the accumulative time is shortest firstly. When press button to stop chiller, stop the chiller according to the chiller number sequence.

Timer: select timer control except in individual control condition, enter time segment setting after selecting time segment, the min. interval between startup and stop is 10 minutes in one time segment, and the min. interval between time segment is 10 minutes. The touch screen will show operation display when start the timer control, this display can only stop chiller once manually, if can not enter the regulation display after operating once, only the timer can be used.

Long-distance control: select long-distance control except in individual control condition, chiller startup when switch on the long-distance input port, or will stop will cut off the port. The touch screen will show operation display when start the long-distance control, this display can only stop chiller once manually, if can not enter the regulation display after operating once, only the long-distance can be used.

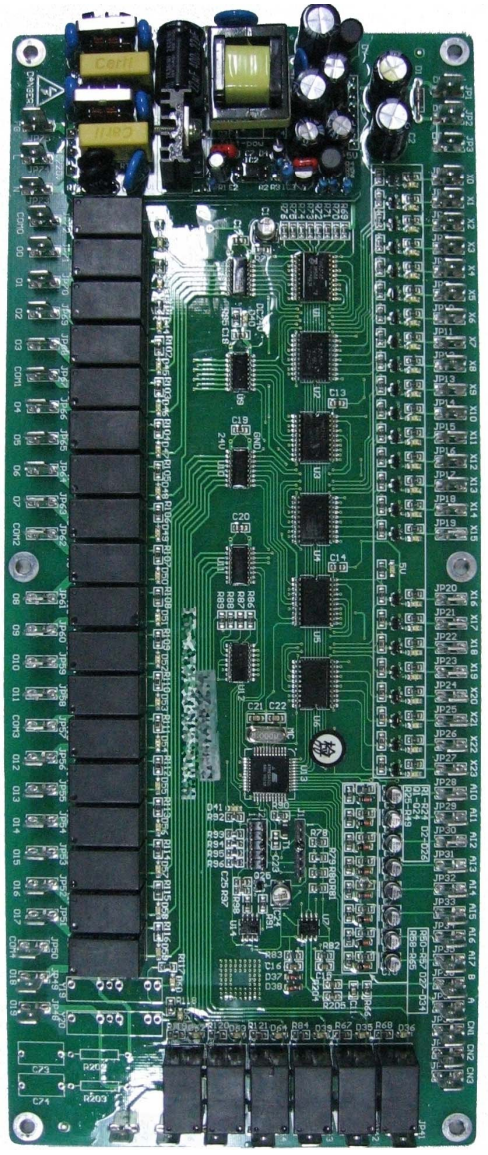
Note: Cut off the power of controller once after changing the control type, every time the controller power off should last for 5 seconds.

Other failures:

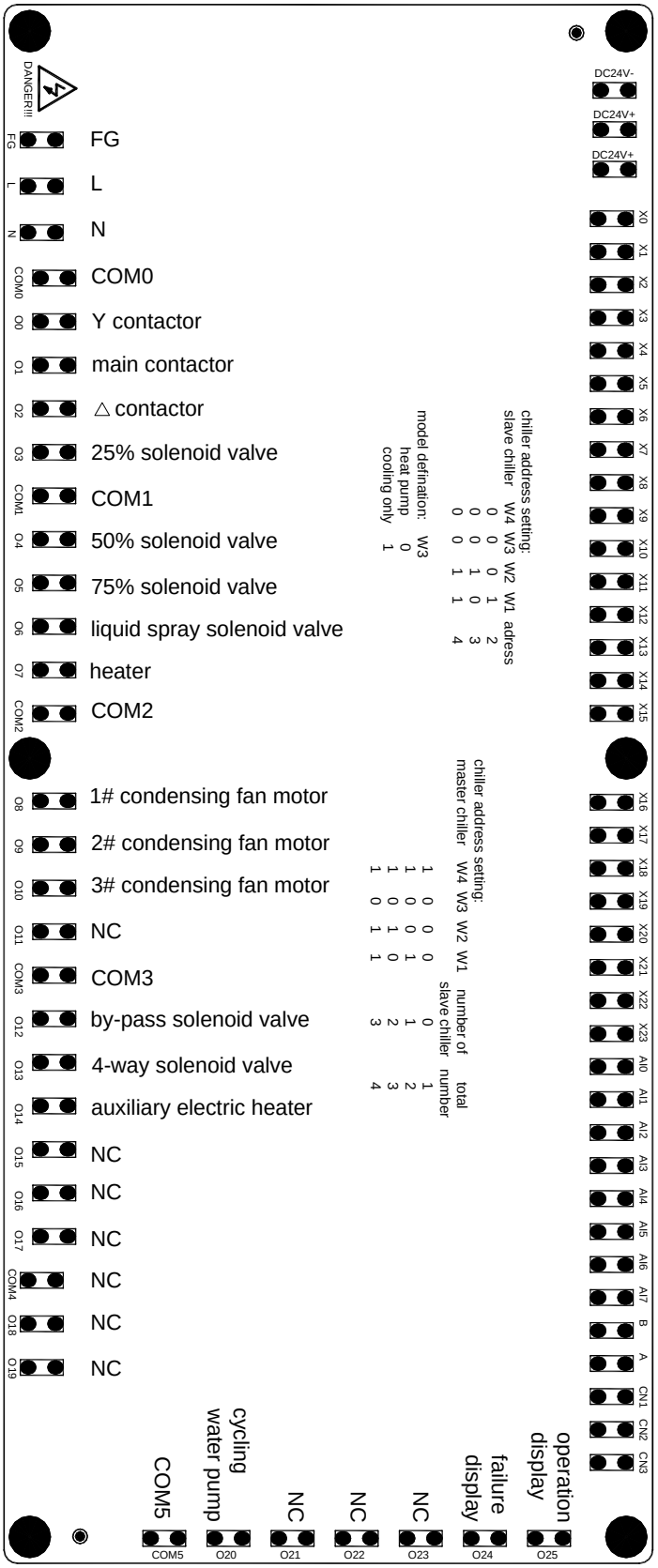
Failure	Action	Management	Remark
Water outlet temp. sensor failure	Last for 5 seconds, chiller downloads and stops, the water pump will not stop	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.	

Water inlet temp. sensor failure	Last for 5 seconds, chiller downloads and stops, the water pump will not stop	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.	
Discharging temp. sensor failure	Last for 5 seconds, chiller downloads and stops, the water pump will not stop	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.	
Fin temp. sensor failure	Last for 5 seconds, chiller downloads and stops, the water pump will not stop	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.	Heat pump model
Discharging pressure sensor failure	Last for 5 seconds, chiller downloads and stops, the water pump will not stop	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.	Can not short circuit
Suction pressure sensor failure	Chiller stops immediately, alarm discharging protection, then alarm discharging failure.	Press “reset” after troubleshooting, stop water pump later, press ”ON” to restart.。	Can not short circuit

PCB 0010452932 photo



PCB diagram


DANGER!!!
FG
L
N
COM0
O0
O1
O2
O3
COM1
O4
O5
O6
O7
COM2
O8
O9
O10
O11
COM3
O12
O13
O14
O15
O16
O17
COM4
O18
O19
FG
L
N
COM0
Y contactor
main contactor
△contactor
25% solenoid valve
COM1
50% solenoid valve
75% solenoid valve
liquid spray solenoid valve
heater
COM2
1# condensing fan motor
2# condensing fan motor
3# condensing fan motor
NC
COM3
by-pass solenoid valve
4-way solenoid valve
auxiliary electric heater
NC
NC
NC
NC
NC
NC
chiller address setting:
slave chiller W4 W3 W2 W1 adress
0 0 0 0 1
0 0 0 1 0 2
0 0 1 0 3
0 0 1 1 4
model defination: W3
heat pump 0
cooling only 1
chiller address setting:
master chiller W4 W3 W2 W1
1 0 0 0 0
1 0 0 0 1
1 0 0 1 0
1 0 1 1
number of slave chiller
0
1
2
3
total number
1
2
3
4
COM5
cycling water pump
NC
NC
NC
failure display
operation display
COM5
O20
O21
O22
O23
O24
O25
DC24V-
DC24V+
DC24V+
X0
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
X16
X17
X18
X19
X20
X21
X22
X23
AI0
AI1
AI2
AI3
AI4
AI5
AI6
AI7
B
A
CN1
CN2
CN3
DC24V-
DC24V+
DI COM
power supply protection
electronic protection
oil pressure drop protection
oil level protection
compressor overload
1# fan motor overload
2# fan motor overload
3# fan motor overload
cycling water flow protection
long-distance switch
W4
W3
W2
W1
water inlet of system
water outlet of system
water outlet of master control
fin temp.
discharging temp.
NC
suction pressure
discharging pressure
485-B
485-A
AI COM
AI COM
AI COM

11.2 Tuch screen control system

●Control operation

The hardcore of control equipment adopt TT-KT0150509-V3.0 of ATMEL-MEGA32, the operation interface adopt ST400 touch screen of Digital in Japan, the low pressure organ adopt LG electricity. The whole control system is stable and reliable.

11.2.1 Preparation before start the unit

1. Check if the power capacity is accord with the unit before first startup.

2. Check if the voltage is accord with the unit.

Note: the voltage for the unit is: 3-phase, 380 V±10%；50HZ。

3. Check the insulation performance of each connection part of compressor and motor.

Note: the insulation resistance should no less than 2 MΩ.

4. The power lamp will light and oil heater (R1) start working if electrified the control cabinet which is with the operation panel.

Note: heat the unit at least 8 hours before startup.

5. “SEM” is the emergency switch, use this switch when need to stop immediately when the unit is working, do not use it facilely.

Note: self-lock when the button is pressed, there is no electricity for control cabinet and touch screen, press the vortical button to reset.

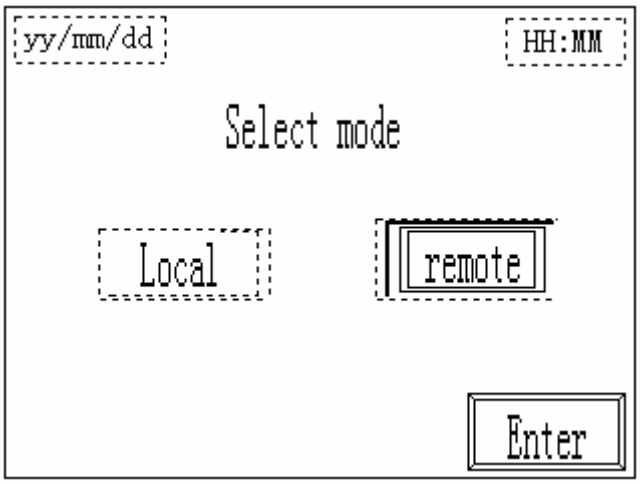
11.2.2 Display and operation

“Q1” is the single pole switch, the control circuit will operate when close the switch. The controller and ST400 touch screen will start working.

* Startup display

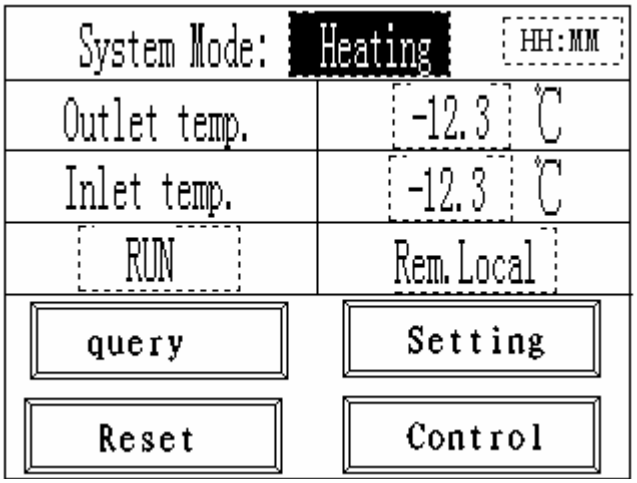
10 seconds later, turn the current display to “Status selection” display automatically.

* Operation status selection



The 【local】button display the current control status, turn to 【remote】button after touching; Touch 【enter】button, change the current display to “main operation status” display.

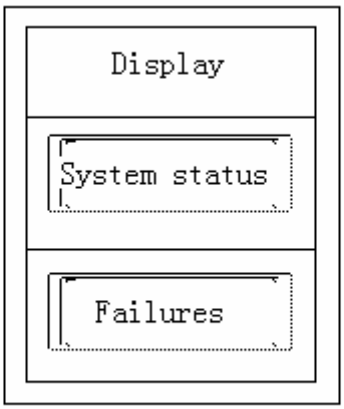
* Operation main display



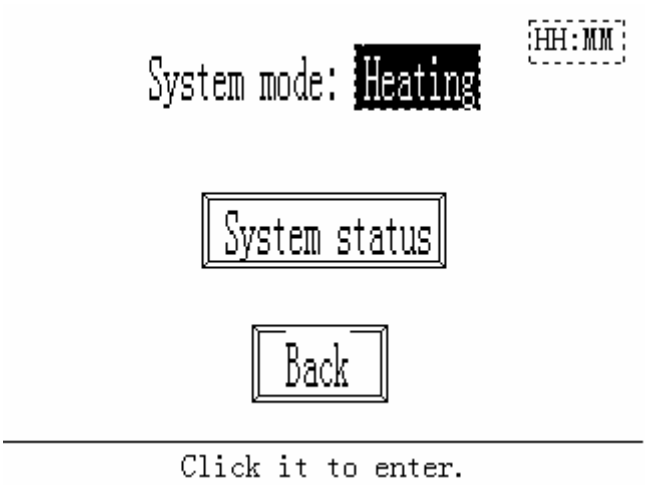
The current status can be seen in this display: cooling/heating of unit, start/stop of system, remote/local control mode and current water inlet/outlet temperature of system.

* Status query

Press 【query】 button, “query” display will appear automatically as the following figure.

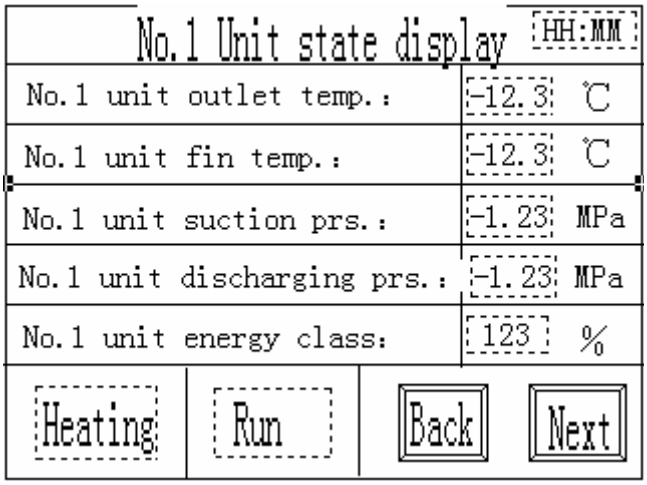


Press 【System status】 button, turn to “chiller concise status”.

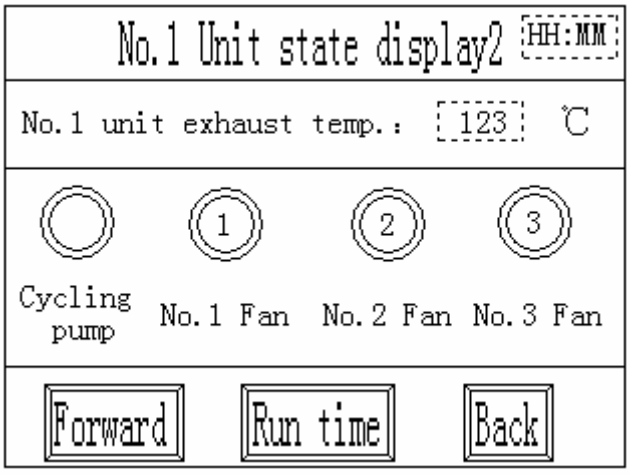


Press 【System status】 button, turn to “chiller detail status”:

Status 1 display the chiller current ambient state.

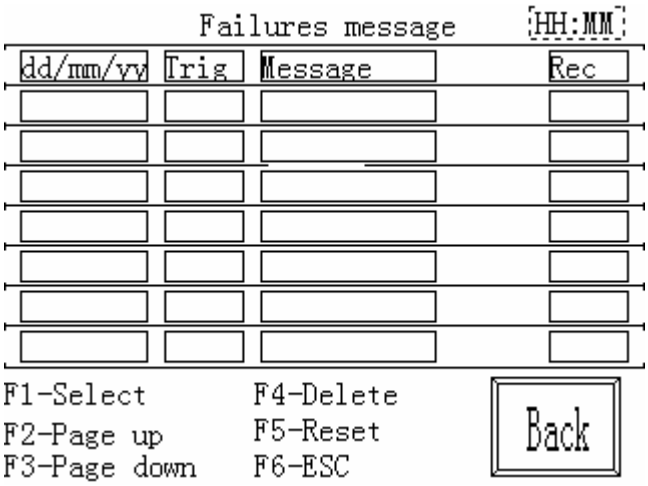


Press “Next” to status 2, which is display the chiller current operation state.



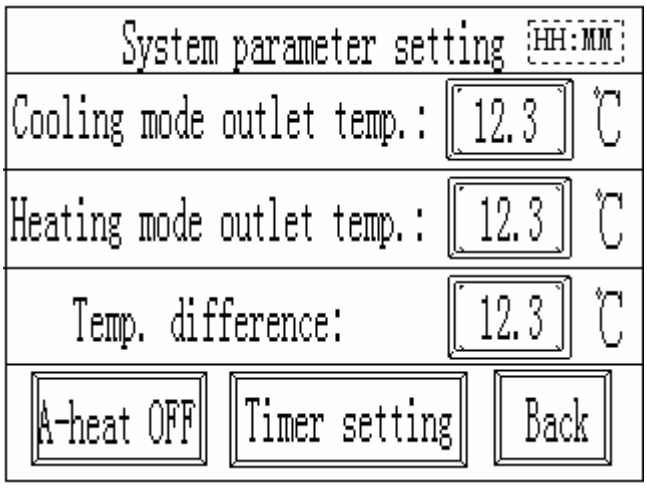
Press 【Failure】 button, turn to “chiller alarm info.” display, operate according to the display instructions.

The 【reset】 operation of “main operation status“ display can be used after troubleshooting the alarmed failure.



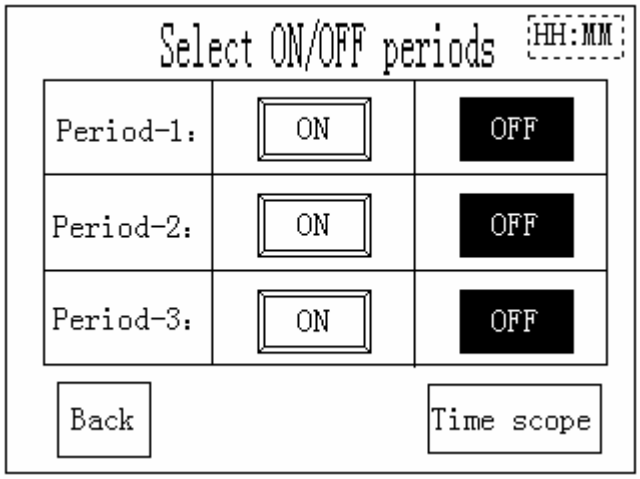
* User setting

Press 【setting】 button, the display changed to “chiller operation setting”:



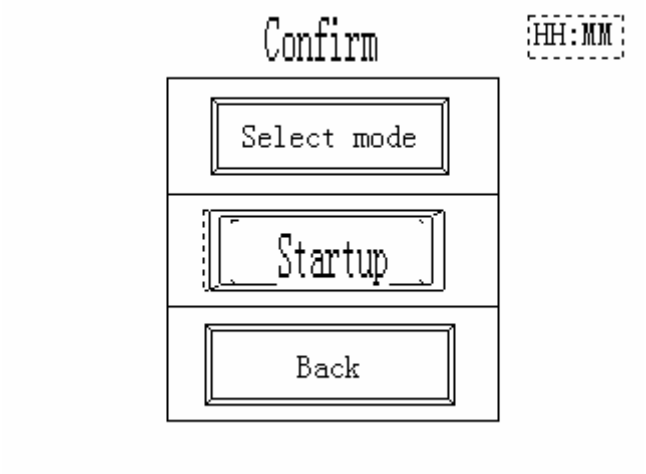
Press 【A-heat OFF】 button, turn to “auxiliary heater ON” display.

Press 【Timer setting】 button, the figure changed to “timer setting”:



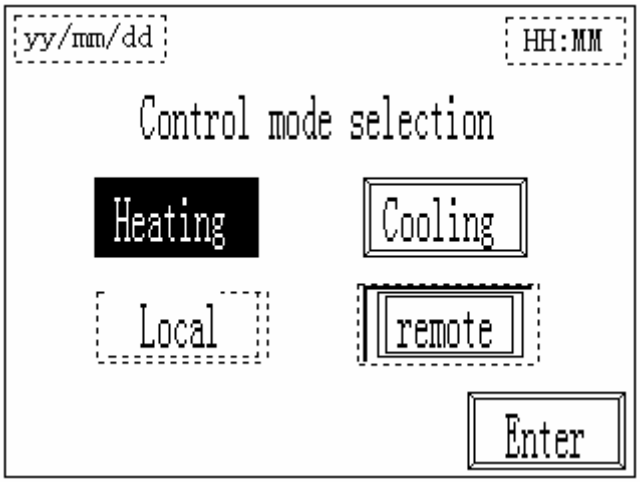
* Unit startup/stop

Press 【ON】or【OFF】 button, the middle of screen will appear “confirm” figure as the following:



Press 【Select mode】 button, turn to “unit operation select”;

Press【startup】button, the middle of screen will appear “confirm” figure，press and then the chiller will startup.



Press 【cooling】 button, the button will changed to black and turn to “cooling mode”;

Press 【heating】 button, the button will changed to black and turn to “heating mode”;

The 【local】button display the current control status, turn to 【remote】button after touching;

Individual control is means single compressor chiller or multi-chiller main control mode.

There is “second-class parameter setting” in the touch screen, which is only used by manufacturer, if the chiller can not work normally, please contact with the dealer for help.

11.2.3 System control function

11.2.3.1 Cooling type

Press the 【Start】 button on the “start/stop chiller” display of touch screen, the cycling water pump starts firstly, 2 minutes later fan motor starts and 1 minute later compressor startup.

Stop chiller directly: Press the 【Stop】 button on the “start/stop chiller” display of touch screen, confirm and then stop is available. The master unit stops firstly, after the compressor stops, 3 minutes later cycling pump will stop.

Upload procedure

a. When the control equipment have been electrified over 5 minutes and the cooling water outlet temperature is more than (setting value+2℃)【the setting value is usually 7℃】, the chiller will enter startup.

Note: The unit is started up by Y-⊿ type, and the conversion time is 5 second. Please note the turning direction of the compressor when first start up.

b. The unit will stop upload when the cooling water outlet temperature is between (setting value+2℃) and (setting value-2℃）.

Download procedure

a. The unit will start download when the cooling water outlet temperature is less than (setting value-2℃) and will keep on download when the outlet temperature is still less than (setting value-2℃) 3 minutes later.

b. Unit will download quickly when there is failure occurred in piping system or unit stopped, the compressor will running in 50% capacity for 1 minute and then stop.

c. The compressor will stop when failure occurs itself and will work again when failure has been eliminated.

11.2.3.2 Heating type

Press the 【Start】 button on the "start/stop chiller" display of touch screen, the cycling pump starts firstly, 2 minutes later fan motor starts and 1 minute later compressor startup.

Stop directly: Press the【Stop】button on touch screen,【Stop】will change to white, confirm and then stop is available. The master unit stops firstly, 3 minutes later cycling pump stops.

Upload procedure

a. The unit will startup when the control equipment have been electrified over 5 minutes and the warm water outlet temperature is less than (setting value-2℃)【the setting value is usually 45℃】.

Note: The unit is started up by Y-⊿ type, the conversion time is 5 second. The compressor will running in 25% capacity for 30 seconds and then turn to 50% capacity when startup. Please note the turning direction of the compressor when first start up.

b. The unit will stop upload when the warm water outlet temperature is between (setting value-2℃) and (setting value+2℃）.

Download procedure

a. The unit will start download when the warm water outlet temperature is more than (setting value+3℃) and will keep on download when the outlet temperature is still more than (setting value+3℃) 3 minutes later.

b. Unit will download quickly when there is failure occurred in piping system or unit stopped, the compressor will running in 50% capacity for 1 minute and then stop.

c. The compressor will stop when failure occurs itself and will work again when failure has been eliminated.

11.2.4 Troubleshooting procedure

PCB classified manage kinds of failure.

11.2.4.1 Piping system failure

① Cycling water cut-off: when the cycling water stop flow or the flow volume is too low, the target flow controller in this cycling pipe will activate and control the system alarm, units will stop respectively. Startup the chiller manually after cycling water system is normal.

② Cooling water outlet temperature is too low: the control system will alarm when the cooling water outlet temperature is less than 3℃ and the chillers will stop respectively during cooling mode, until the temperature reach 6℃ and failure had been eliminated, the chiller can be started manually.

③ Warm water outlet temperature is too high: the control system will alarm when the warm water outlet temperature is over 60℃ and the chillers will stop respectively during heating mode, until the temperature reach 50℃ and failure had been eliminated, the chiller can be started manually.

④ Power protector protection: power protector can protect the phase sequence, lack of voltage and over voltage of 3-phase, the protector is normally open.

11.2.4.2 Compressor system failure

① High/low pressure protection: the unit will check the comparative between the suction pressure and setting value of suction pressure (alarm when less than the setting value), the discharge pressure and setting value of discharge pressure (alarm when more than the setting value), press 【Reset】 on the touch screen after troubleshooting, the compressor will restart.

② Oil level too low: the control system will alarm and compressor will stop if the oil level switch has opened for 60 seconds during compressor working. Press 【Reset】 on the touch screen after troubleshooting, the compressor will restart.

③ Pressure difference of oil filter is too high: the control system will alarm and compressor will stop if the pressure difference switches beside oil filter have opened for 60 seconds during compressor working. That means the oil filter blocked and need to be cleaned. Press 【failure reset】 on the touch screen after troubleshooting, the compressor will restart.

④ Compressor electrical controller protection: the main influence factors of compressor inner electrical controller protection are: motor of compressor overheat, discharge temperature too high. The compressor will stop when electrical controller actives, the compressor can be restarted after failure disappeared. Once failure occurs, the touch screen will display “Failure” automatically no matter what condition the unit in.

⑤ Compressor discharge temperature protection: when the detect value of discharge temperature is higher than its setting protection value, resume when it is lower than its setting value - 5 ℃. Once failure occurs, the touch screen will display “Failure” automatically no matter what condition the unit in.

⑥ Compressor overload protection: control system alarm when the running current is higher than the relay setting value for protection, compressor stops once failure occurs.

11.2.5 Checkup process

Though the control cabinet has been checked systemically before out of factory, but because of time or other possible deleterious factors, check the chiller carefully before using.

a. Check the exterior wiring connection of chiller and the install situation of sensor according to the electrical control principle diagram.

b. Tighten the screws of each electrical organ in control cabinet, tighten connect port of compressor wiring connect box.

c. Check the insulation performance of each compressor and fan motor.

d. Turn on the main control circuit power, the touch screen should enter “start display” automatically, if there is no display in the touch screen, please check the connect wire of AC220V power and DC24V power.

e. Confirm the parameter setting display.

11.2.6 Maintainance

a. The electrical control cabinet should have well ventilation, the ambient temperature may be less than 45℃, ambient relative humidity is less than 90%. The control cabinet is forbidden to be exposed to water.

b. Object should not be put in the control cabinet.

c. Maintain the air switch and AC contactor of control cabinet at least once a year.

d. User should check if the exterior wiring connection of control board and touch screen in the control cabinet is tighten. If there is any abnormal, please inform the factory.

11.2.7 Install instruction

a. Install the receive wire of power supply: drive wire(3-phase and 4-wire: for 3 live wires and one earth wire) of two compressor.

Note: the chiller must be earthed reliably to insure the safety of operate person.

b. Install the temperature-inspect organ of cycling water outlet/inlet: the inspect point is on the exterior pipe(not exceed 450mm from chiller). Screw connector should be welded vertically on the inspect point. Each wiring connection of sensor should be processed according to the wiring diagram strictly.

c. Install the cycling water, water flow detect organ: the flow detect organ(target flow controller) is installed on the cycling water pipe(not exceed 200mm from chiller). Select normal open(open when there is no water) when make wiring connection.

Sincere Forever

Haier Group

Haier Industrial Park, No.1, Haier Road

266101, Qingdao, China

http://www.haier.com