Midea®

Air-cooled Screw Chiller Unit

Installation Operation and Maintenance Manual

CE

Please keep this manual carefully for future reference and read it carefully before operation

Notice

- The installation section of this manual is designed for qualified persons only.
- Be sure to read the operating section before conducting operation in order to prevent unit damage and unnecessary accidents.
- The contents of this manual are subject to change without prior notice for further improvement of related models.
- Standard: EN14511.
- Report to and register in the local corresponding administrative organization before and after operating the pressure vessel unit.
- The Air-cooled Screw Chiller Unit is designed based on the following conditions:

	Refrigeration condition
	R134a
Water side outlet temperature	5～15° C
Air side inlet temperature	21～43° C

Warning

Personnel must be fully acquainted with the operation manual before operating the refrigerant system

Warning

1. The refrigerant R134a used in Midea LSBLGCW series air-cooled screw chiller is a kind of medium-pressure refrigerant which belongs to liquefied gas. Its saturated vapor pressure grows exponentially with temperature. If the temperature goes high, the corresponding saturated vapor pressure also will be high. In order to ensure the safety of the unit, the ambient temperature around the unit shall be below 43°C during downtime, otherwise the chilled water pump shall be started to reduce the temperature of evaporator. Flame cutting or welding shall be strictly prohibited on the shell-and-tube heat exchanger, finned heat exchanger, and the pipeline of the unit when there is refrigerant in the unit. Tightening bolts or nuts is prohibited when the unit is running or under pressure. If leakage is found on joint, pressure must be released before tightening bolts or nuts. Leakage of refrigerant shall be avoided when the unit is being adjusted or in use. The R134a vapor concentration (AEL) acceptable by human body in the air is 1000 PPM, and working under such condition will not have a bad effect on the health of operators. If emerging great amount of spillage or leakage, the R134a vapor concentration will center on the low place near the ground, causing oxygen deficiency in human body. At this time, a fan shall be used to ventilate the low place near the ground. Do not enter the affected area before the refrigerant vapor is expelled in order to prevent the human body suffering bad effect. Do not let the liquid R134a contact your skin and eyes; otherwise it might cause injury by freezing.

2. For safety, when using Midea LSBLGCW series air-cooled screw chiller, the following shall be noted:

- Vent-pipe and air change pipe should be installed outside, and also far away from the air inlet;
- Make sure it is well ventilated. If necessary, use auxiliary ventilation equipment to eliminate the refrigerant vapor generated by accidental leakage;

- If applicable, install air detector to monitor the refrigerant vapor concentration in the air;
- Please read the safety instructions carefully and make sure all the requirements are obeyed;
- Please keep this manual carefully for future reference;
- Ensure the controller are well grounded, and check it periodically. Unsuitable earthing may result in electric shock suddenness;
- Ensure the strong electric and weak electric are separately piped;
- Ensure the wiring is strictly accord with the wiring diagram;
- The voltage input of isolating transformer is AC380V±10% ,50Hz, make sure it is correct;
- Do not use sharp objects to press the touchable screen, do not press the screen too hard;
- Do not pull or distort the power supply cables and communication wires;
- Do not use acid or alkaline substance to clean the dirty on the machine. Use soft cloth bedewed with clean water to wipe the unit;
- In case of fire happens, cut off the power supply immediately , and use the fire extinguisher that specially designed for oil fire and electric fire;
- It is not allowed to use the machine inside an explosive environment;
- Please contact us or our local agent in case of malfunction happens, do not repair by yourself.

Content

1 General Information

1. 1 Functions

Midea Air-cooled Screw Chiller Unit adopts twin-screw compressor designed with the most advanced. Air-cooled Screw Chiller Unit dispense with many auxiliaries such as cooling tower、cooling water pump、boiler、 relevant piping system and so on. System structure is suppleness, installation space is frugal, maintenance manage is convenience and the unit is energy-saving, the unit apply to the area where water is shortage. Air-cooled Screw Chiller Unit installs outside , adopts advanced technique, low-noise, high-energy efficiency, semi-enclosed two-screw compressor. Two-screw compressor matches with the high-energy efficiency evaporator and condenser, it can exerts the best performance. In the condenser , the fins arrange in some size in the condenser pipe, and also adopts high-efficiency ,low-noise fan. Screw compressor , high-efficiency evaporator, high-heat exchange efficiency condenser and microcomputer control box connect by bolts, adopt steel-structure, spray antirust paint in the surface, all these can ensure the reliably running and the performance.

All Air-cooled Screw Chiller Units are transported to locale in whole, Before leaving the factory, all the refrigeration pipes finished the assemblage, and also charged the refrigerant and lubricant oil.

Midea Air-cooled Screw Chiller Unit adopts twin-screw compressor designed with the most advanced, industrial third-generation asymmetric technology of 5 gear teeth to 6 gear teeth. It has a variable capacity, and is high-efficiency and energy-saving. It has the humanistic microcomputer control system with remote control function. The ten self-protection features ensure the safe and reliable running. The unit series is complete and can be tailored to meet various needs of customers. The Air-cooled Screw Chiller Unit features of compact size, low noise high energy-efficiency ratio and long service life, and is easy to operate and maintain. Thus they find a wide utilization in a great variety of locations, such as hotels, restaurants, office buildings, stores and hospitals. And they are also applicable to the air conditioning sites in metallurgical, chemical, mechanical, and electronic industries.

1. 2 Features

1.2.1 Simple、economic device

（1）The unit series can be used in all kinds of builds by the compact size, and save space.

（2）The unit can be disassembly and assembly fast and convenient by the boltin-structure.

（3）light weight design predigests operation request, and also reduces the installation time and expense.

（4）The refrigerant and lubricant oil are charged before leaving factory, which reduce the workload ,material and installation expense in locale.

（5）The consumer need to afford evaporator pipes and some other necessary pipes.

（6）The oil cooler and relevant purification system are taken out, which reduce the unit weight.

（7）The consumer should do some simple power supply connect.

（8）The unit has passed full trial-run test before being delivered to ensure the reliable running on the spot.

（9）The unit drives directly, runs high-efficiency、reliably and maintenance expediently by the small movement assemblies.

（10）Installation convenient, don't need cooling tower: The unit releases heat to the air when cooling. It has no cooling tower and cooling water pump, thus being particularly useful in water-deficient areas. And it requires no special room and can be installed on the roof and ground, and other outdoor areas.

1.2.2 State of technique, Accuracy control

（1）The sensors related to control and other assemblies are equipped by factory, and tested.

（2）Intelligent control：The unit is controlled by micro-controller and has the automatic control functions of fault diagnosis, energy management and anti-freezing monitoring, which ensures the high-efficiency operation of the unit, and more convenient in use. The unit with RS485 communication interface. The startup and shutdown of each unit may be controlled by the host computer, reducing the running cost to the lowest.

（3）complete and safe control system: All electrically controllable elements belong to famous brands with stable quality and reliable function; The unit designed with multiple security measures ensure the safe and reliable running.，including high and low pressure protection、oil feed pressure difference protection、anti-freezing protection、water flow protection、converse default phase protection、Overload protection and so on.

1.2.3 Reliability and handy maintenance

（1）With driving directly，slow-speed of revolution，few-movement components and so on, the unit runs efficiently and reliably, and is convenient in management.

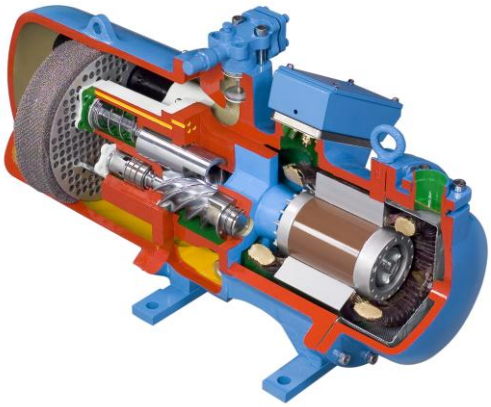
（2）with electronic expansion valve technique, ensure the unit to afford the steady and reliable performance.

1.2.4 Easy to install, simple structure

The unit has passed full trial-run test before being delivered to ensure the reliable running on the spot. The unit can be placed in service only after being connected with power and water source during field installation. The installation and adjustment are very simple and convenient. With simple structure and convenient operation, and allocated automatic protecting and adjusting equipment, the unit is convenient in management.

1. 3 Components

1.3.1Compressor



（1）Midea Air-cooled Screw Chiller Unit adopts twin-screw compressor designed with the most advanced, industrial third-generation asymmetric technology of 5 gear teeth to 6 gear teeth. The rotors are processed by high-precision CNC and each part is well-proportioned and none-gap matching, which minimizes the friction resistance and clearance lost, guarantees quit running and good duration. Compare to single-screw compressor, the twin-screw compressor has the strong points of gapless-loss, high- efficiency cubage, low-noise、few easy workout parts。The tooth form gets a patent for England and USA.

（2）The lubricant is supplied automatically by pressure difference inside the compressor. It is unnecessary to add an extra lubricant pump. Complicated oil line system is not required, which make the whole structure simple, and the unit runs more efficiently and reliably, and is convenient in management. Every movement component can keep the best lubrication in the compressor.

（3）Adopts special High Precision and zero clearance bearing，ensure the longest useful time.

（4）The bearing of compressor is from SKY, Sweden, the long lifespan of which ensure screw-type main unit to run continuously more than 30,000 hours.

1.3.2 Evaporator

Shell-and-tube evaporator adopts high-efficiency rifled pipes, special tube layout design，and the state change 、the flow velocity 、the pressure drop of the refrigerant are seriously considered in refrigerant condition to ensure sufficient evaporation, in order to strengthen the refrigerating capacity.

1.3.3 Condenser

Finned heat exchanger adopts high- efficiency heat transfer tubes with the distinguishing feature of high efficiency and so on.. The unit is able to adjust the capacity matching with load change to advance the efficiency of compressor , reduce the energy consumption, increase the unit’s service life.

The fans install in the top of condenser to supply low-noise, high-power which are low-noise, balance-run, small-shake.

Aluminous-fin cupreous corrosion resistant tube is cross banding to supply high coefficient of heat transfer.

1.3.4 Economizer

The capacity and efficiency levels of the unit will be enhanced using of economizer by the cold cycle or two-stage refrigeration cycle. Especially, in the high condensation temperature and low evaporation temperature, the energy-saving effect is more obvious. Screw Unit unique interface of the economizer directly take the gaseous state back to the compressor for re-pressure compressing which is under the best compression ratio.

1.3.5 Fluid spay system

Two-stage liquid spray system is able to prevent overheating when the compressor is high-load , at the same time, flexible control can reduce the impact of the unit's energy efficiency.

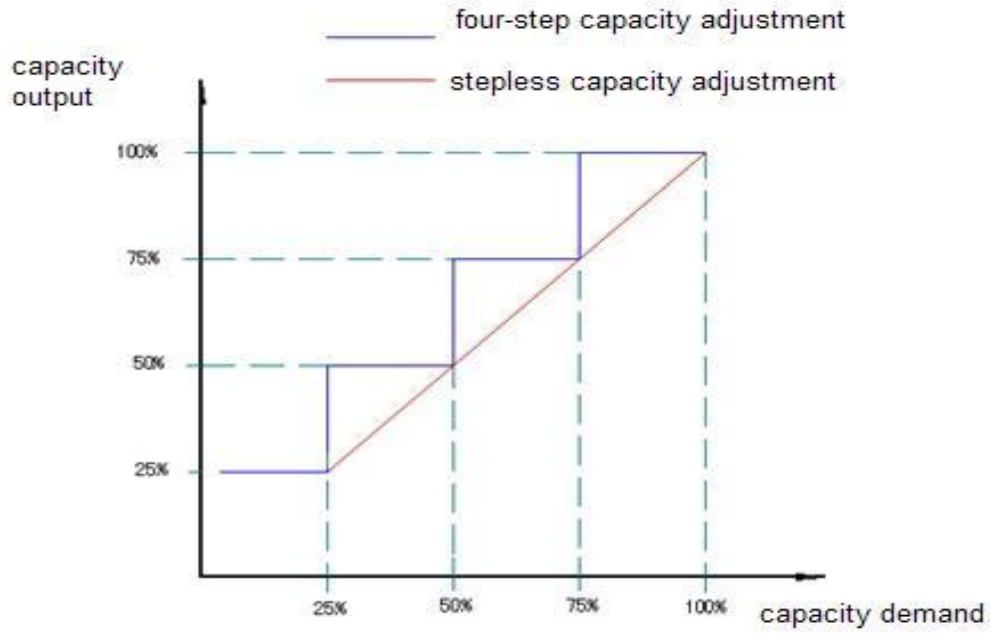
1.3.6 Intelligent control

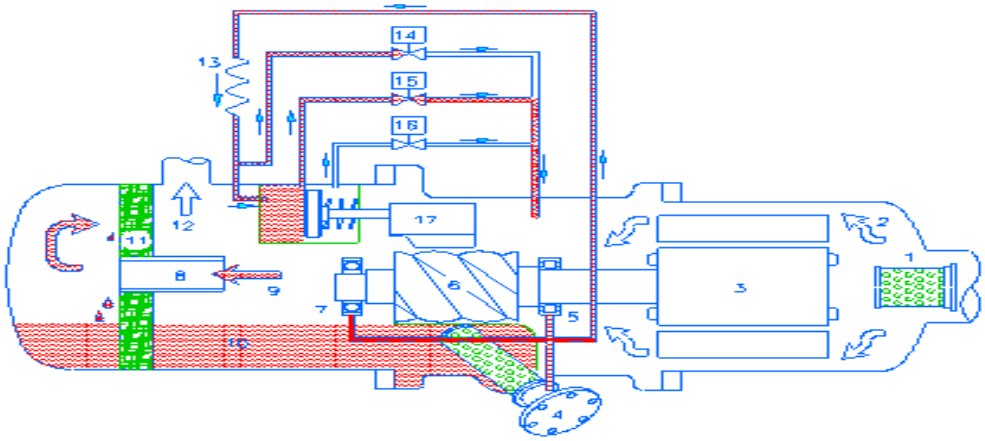
（1）The unit is controlled by micro-controller and has the automatic control functions of fault diagnosis, energy management and anti-freezing monitoring, which ensures the high-efficiency operation of the unit, and more convenient in use. The unit with RS485 communication interface makes it can carry on networking control to multi-units. The unit can be controlled by the host computer through RS485/RS232 interface conversion program. The startup and shutdown of each unit may be controlled by the host computer according to the load demand and runtime.

（2）The unit is designed with multiple security measures, which ensures the safe and trustiness, well running.

1.3.7 Variable capacity, High-efficiency and energy-saving

Whit adjustable variable volume and special volume control valve for precise control, the compressor is able to adjust the refrigerant compressed amount precisely matching with load change. 4-stage capacity output control(25%,50%,75% and 100%) or step-less capacity control(optional product) directly saves operation cost and energy.

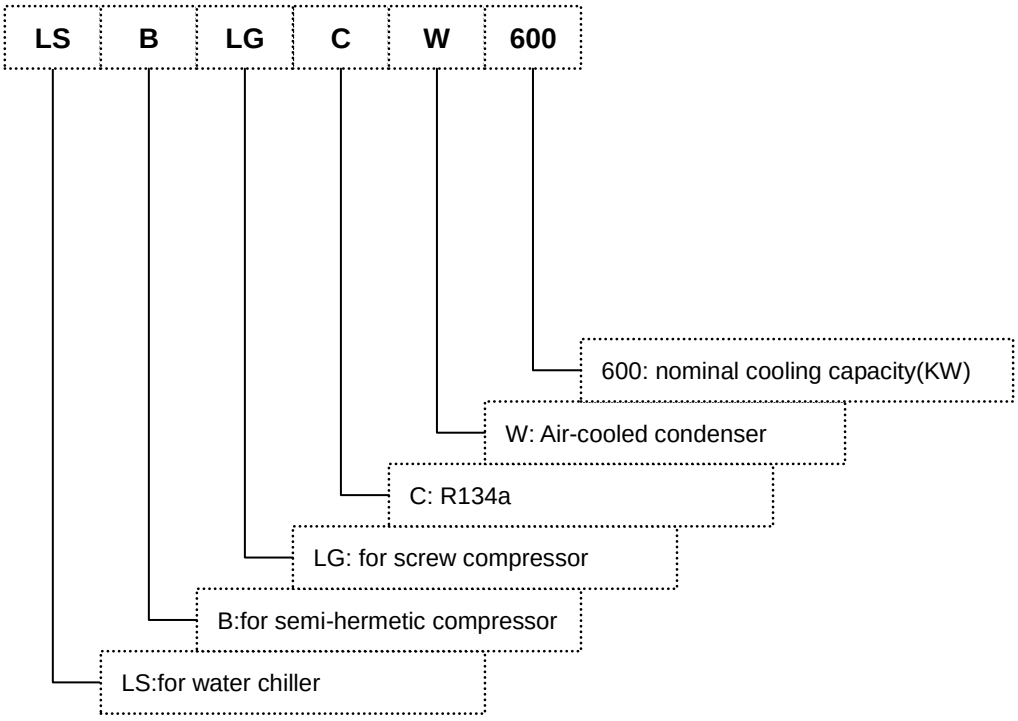




Compressor Capacity Adjustment Drawing

Item	Content	Item	Content	Item	Content
1	Suction filter	7	Exhaust end bearing	13	Capillary
2	Refrigerant gas（low pressure）	8	Vent-pipe	14	Capability control electromagnetic valve(start)SV1
3	Motor	9	Refrigerant gas（high pressure、oiliness）	15	Capability control electromagnetic valve (50%use)SV3
4	Motor oil filter	10	Chilled major oil	16	Capability control electromagnetic valve (75%use)SV2
5	Suction end bearing	11	Oil separator filter screen	17	Capability controller
6	Compressor rotor	12	Refrigerant gas（high pressure）		

2 Nomenclature



3 Model, parameter, operational principle and running range

3. 1 Model、parameter

Nominal performance parameter

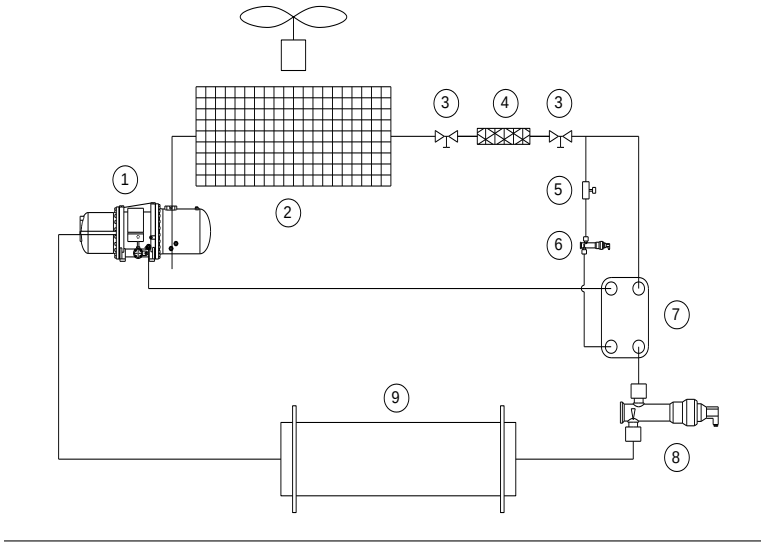
Model			LSBLGCW600
Cooling capacity		kW	596
Rated power consumption		kW	184
Compressor	Model		Semi- hermetic, twin screw compressor
	Quantity		1
Energy adjustment method			Auto
Energy adjustment range%			（25%、50%、75%、100%）&（Step-less）
Refrigerant	Type		R134a
	charge（kg）		105
Power supply			380V/3N/50Hz
Air Side Heat-exchanger	Type		High efficient exchanger tube + aluminium fins
	Fans Quantity		10
	Air Volume（m^3/h）		20000×10
	Motor input（kW）		1.8×10
Water Side Heat-exchanger	Type		Shell-and-tube heat-exchanger
	Water Volume（t/h）		102
	Water pressure drop（kpa）		40
	Inlet/outlet Pipe diameter（mm）		DN125
Water side fouling factor（m^2.k/kw）			0.086 （m^2.k/kw）
Dimension（mm）		Length	5700
		Width	2250
		Height	2400
Shipping weight（kg）			5000
Running weight（kg）			5200

NOTE :(1) The above parameters are based on the following conditions: The refrigeration nominal work condition : the outlet water temperature is 7°C on the heat exchange water side, the inlet water temperature is 12°C, and the ambient temperature is 35°C.

(2) The above parameters are the basic module', the parameters of combinations accord to the basic module.

3. 2 Working Principle

The Air-cooled Screw Chiller Unit mainly consists of five assemblies: compressor, finned heat exchanger, electronic expansion valve, shell-and-tube heat exchanger , electrical control system, and other accessories. The primary refrigerating circular principle of the unit is as follows:



1	Twin screw compressor	4	Filter	7	Economizer
2	Finned heat exchanger	5	Solenoid valve	8	Electronic expansion valve
3	Cut-off valve	6	Economizer expansion valve	9	Shell-and-tube heat-exchanger

3.3 Running range

Content	Running range
Environment TEMP.	21℃～43℃
Water outlet TEMP.	5℃～15℃
Water flow volume	Rating flow volume±20%
Max inlet/outlet water TEMP. difference	8℃
Voltage	Rating Voltage±10%
Voltage phase difference	±2%
Power supply frequency	Rating frequency±2%
Evaporator max working pressure on water side	1.0Pa
Compressor max start count	6 times/H
Environment quality	Don't use in corrosive environment Don't use in high humidity environment
Drainage system	The height of dropsy should not be higher than the base of the unit on the spot

3.4 Capacity Table

Model	Water outlet ℃	Ambient temp℃													
		21		25		29		35		38		40		43	
		CC kw	PI kw	CC kw	PI kw	CC kw	PI kw	CC kw	PI kw	CC kw	PI kw	CC kw	PI kw	CC kw	PI kw
LSBLGCW 600	4.5	608	140	591	151	573	163	544	183	529	194	518	202	501	214
	5.5	631	141	613	152	595	164	564	183	549	194	537	202	520	214
	7	665	141	647	152	628	164	596	184	579	195	568	203	550	215
	8	687	142	669	153	650	165	617	185	599	195	588	203	569	215
	10	736	143	717	154	696	166	663	186	643	196	631	204	612	216
	12.5	800	144	780	155	759	167	721	187	702	198	689	205	667	218
	15	869	144	848	156	824	169	785	189	764	199	750	207	726	219

Remark: CC: Cooling Capacity PI: Power input

4 Accessories and special function units

4.1 Standard accessories

No.	Name of standard accessories	Unit	Quantity	Specification
1	Product qualification certificate	copy	1	
2	User's guide	copy	1	
3	Water flow controller joint	piece	1	G1"
4	Foundation bolt	suite	6	M16*300
5	Packing list	copy	1	

4.2 Optional accessories

No.	Name of optional accessories	Unit	Quantity	Specification
1	Water flow switch	piece	According to the consumer	

4.3 Special function units

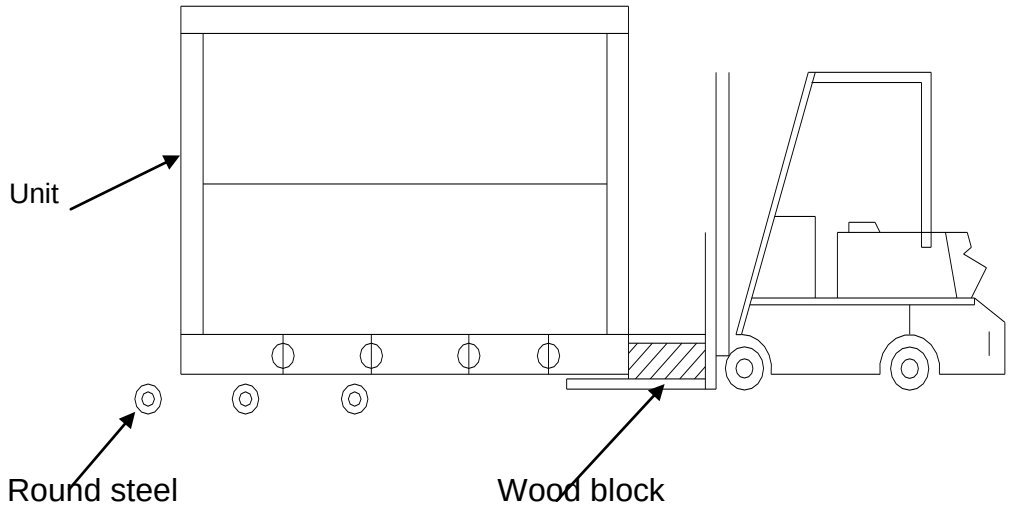
No.	Unit	Function	Content
1	High temp chiller	Max. ambient temp can be 48℃	Difinite Max. ambient temp
2	Super-high temp chiller	Max. ambient temp can be 56℃	Difinite Max. ambient temp
3	Heat-recovery chiller	Can be heat-recovery part condenser heating	Difinite heat-recovery amount

5 Installation

5.1 Transportation, assemble and disassemble, and hoisting

（1）To avoid the unit from being damaged during the moving process, it is recommended to load or unload the unit by crane. If it is a short-haul moving, fork truck can be used, and the unit bears the symmetrical horizontal force with the entire gasket wood. It is recommended that put 3 to 6 easy-roll bar under the unit for the slow-moving, as follows:

Horizontal scroll sketch map



（2）Lifting and Mounting Unit

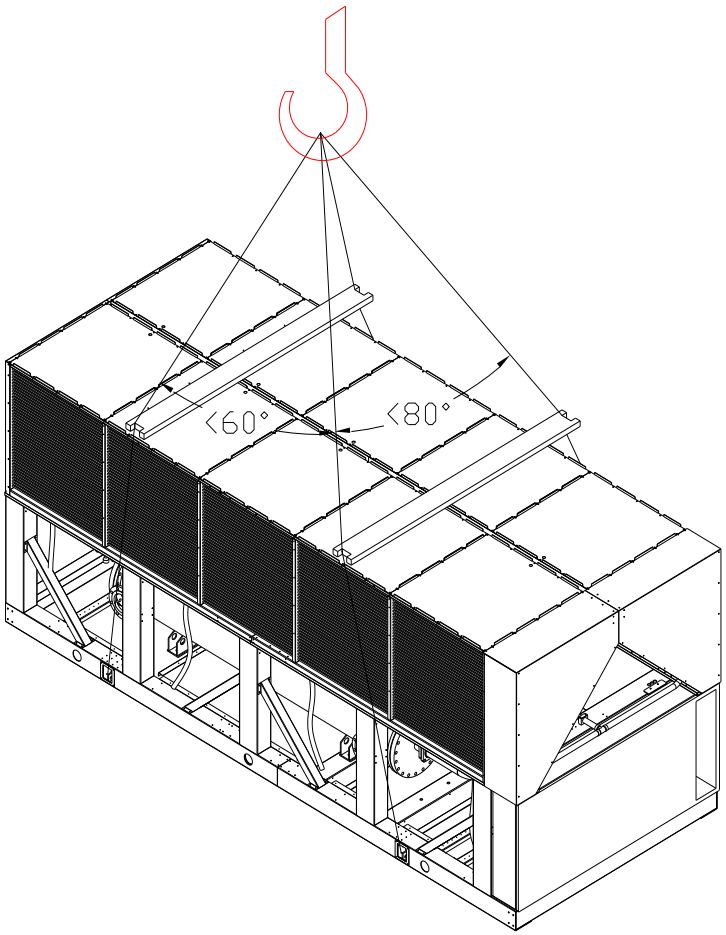
Choose a suitable crane according to the unit's weight（Buy an insurance for it if it is convenient）;

Hoist the unit according to the following chart strictly. The steel rope shall wind the lifting hook one circle to prevent steel rope slipping and causing danger when the weight is unbalanced.

Move the unit by placing a roller in the bottom of the unit to avoid damage.

Security guard circle should be set up when hoist the unit, and also abide by the local Safety Regulations when hoist the unit. Prohibit non-staff from entering the security guard circle or staying under the unit and the hoisting crane.

The lifting schematic diagram of the unit is shown below:

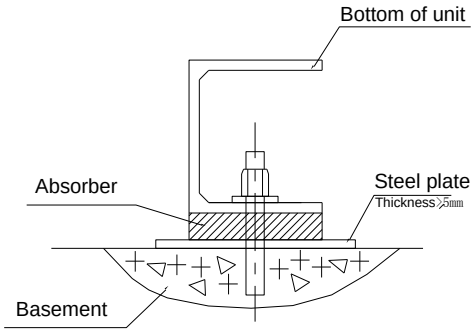


5.2 Requirements on foundation and Foundation drawing

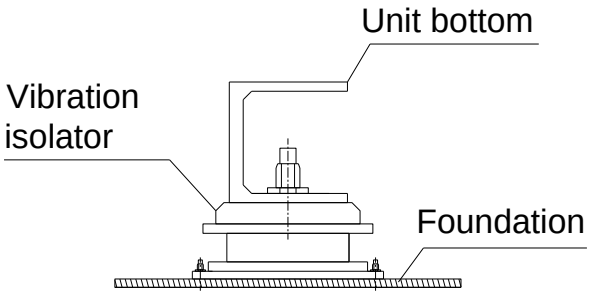
5.2.1 Requirements on foundation

Be sure to take the preparation and structure of base into consideration seriously during installation, especially avoid the intensity and noise of floor when the machine is installed on the top storey of buildings. It is recommended to discuss with the building designer before conducting installation.

Anti-vibration pad shall be placed between the base frame and base in order to avoid transmitting vibration and noise during the runtime of the unit, and make sure the unit is even during installation. Use a shock absorber when necessary.

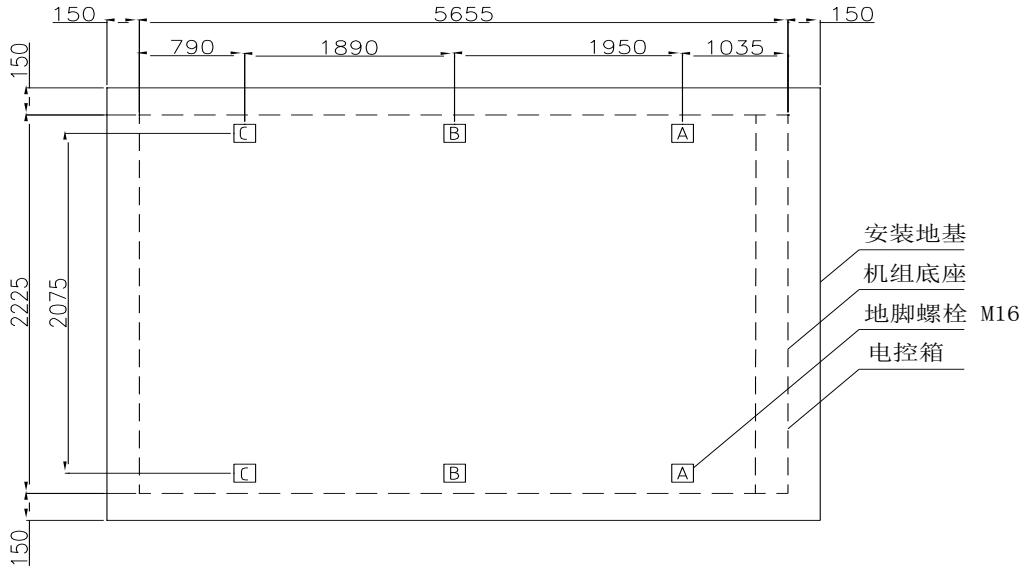


If the unit will be installed on the top of the building, where the vibration level should be restricted. It is recommended that use spring isolators as absorber, please refer to following diagram.



5.2.2 Foundation Drawing

LSBLGCW600



Unit	Weight to be supported by spring isolator		
	A	B	C
LSBLGCW600	890	930	780

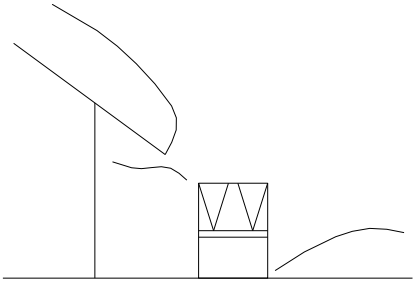
5. 3 Installation space and Dimensions

5.3.1 Required installation space

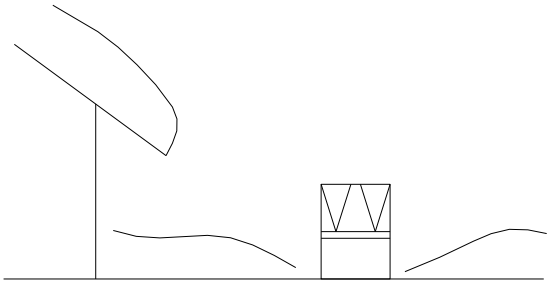
Leave enough space around the unit and between units, for air circulating and operation as well as maintenance.

For the area where might be get snow piled during winter season, the following should be noticed:

（1）Do not install the unit under an eave of a house

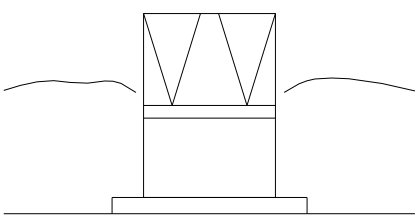


× Wrong installation

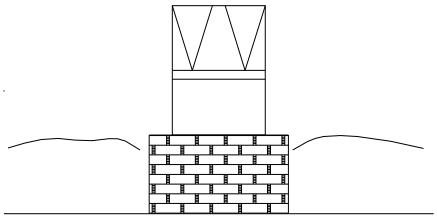


√ Rignt installation

（2）Raise the foundation according to the possible snow height. （The foundation must be at least 1m higher than the max. snow height）

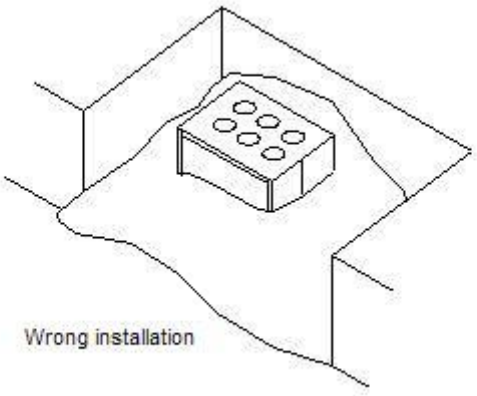


× Wrong installation

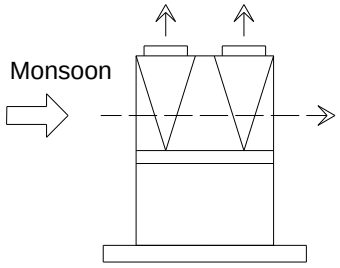


√ Right installation

（3）Do not install the unit at place where might be piled with snow



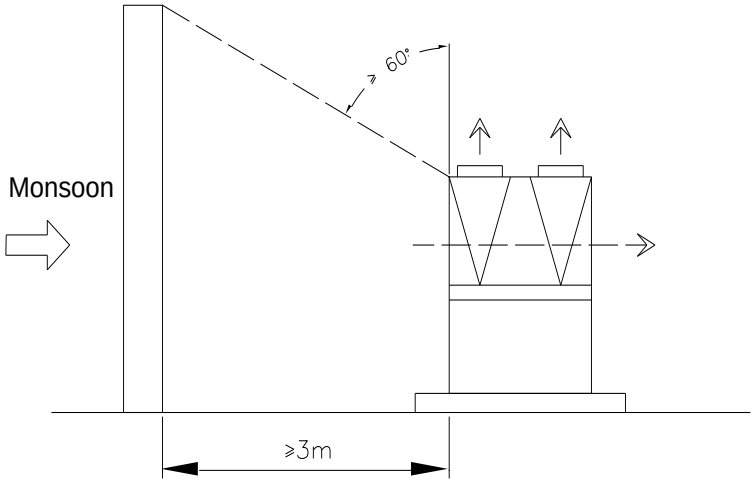
For area where strong monsoon exists, if the unit's heat-exchanger directly faces the monsoon, (as indicated below), when the monsoon wind velocity is higher than the fan blowing velocity, there will be direct airflow occurs as shown in dashed arrow below.



Thus will cause influence to the heat-exchanging process, consequently the cooling capacity will drop, even will cause malfunction sometimes.

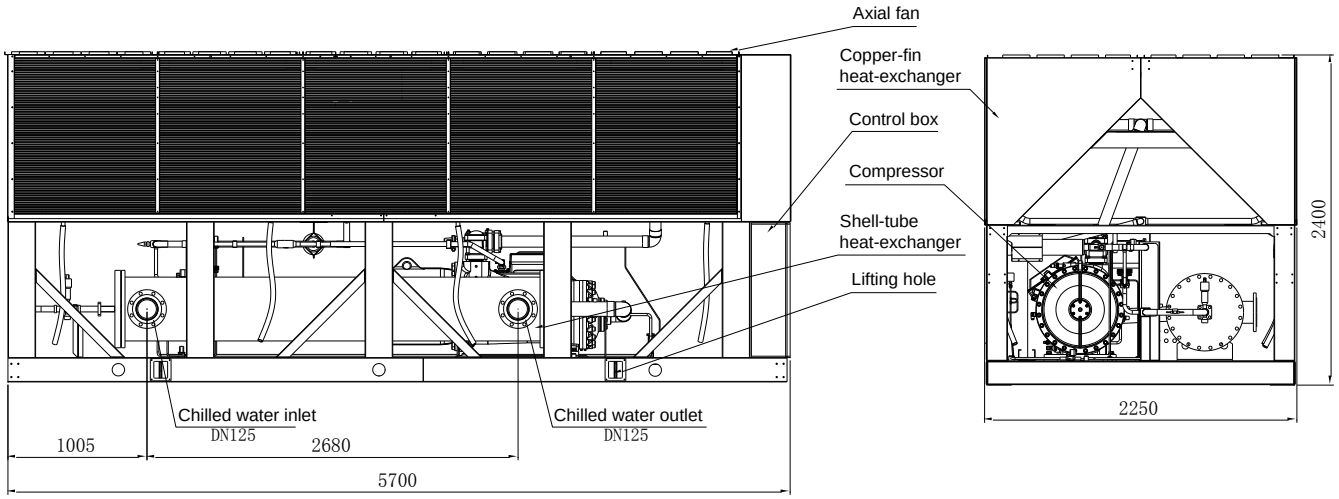
In order to reduce this phenomena, the Air-cooled Screw Chiller Units are designed seriously considered. Even so，in order to reduce the unnecessary malfunction ， the unit's heat-exchanger should not face the monsoon.

If the aforementioned situation can not be avoided , it has to be installed like that, please install a windbreak as follow

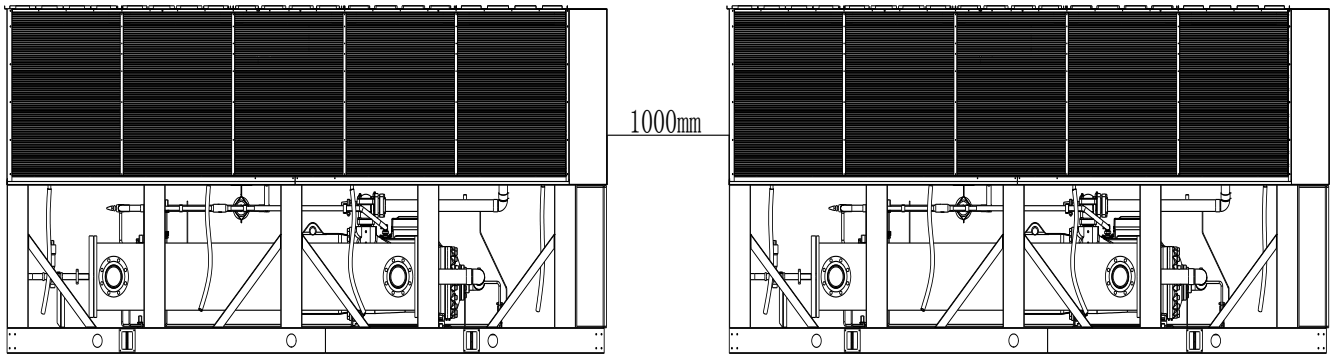


5.3.2 Dimensions：

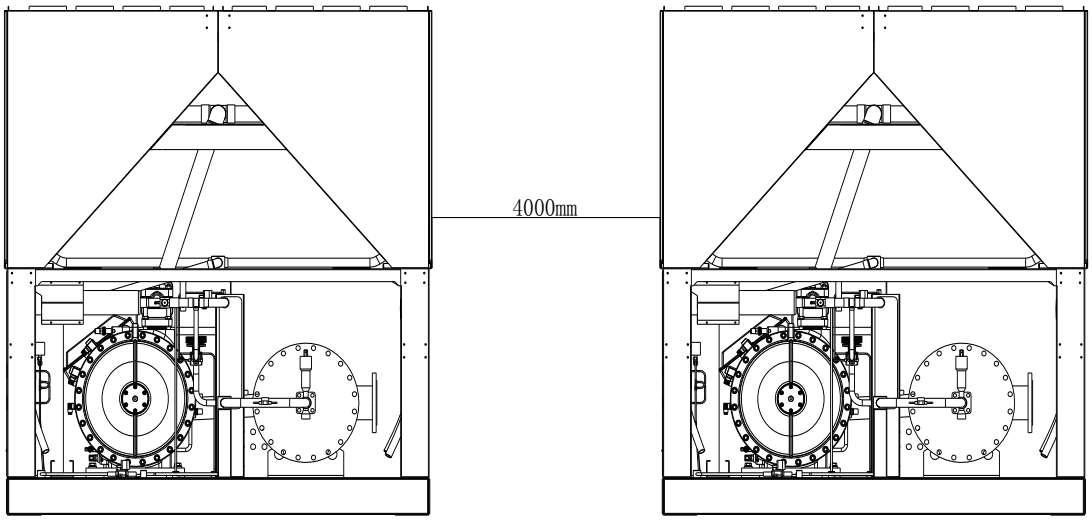
LSBLGCW600



For 2 or more units combination, it can install as below:



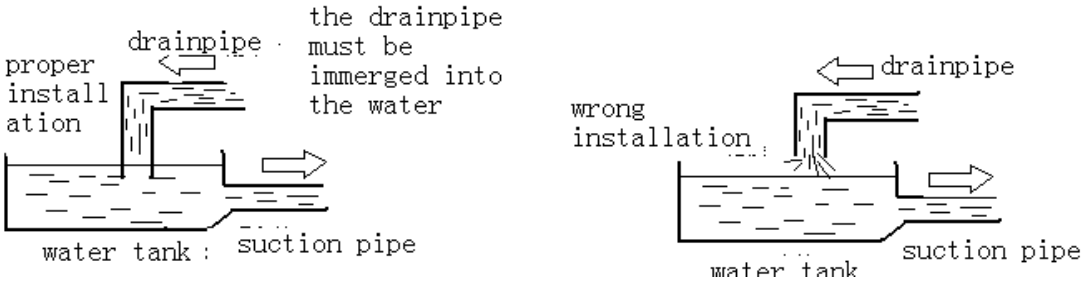
If the project site is limited for sitting the units, the below arranging way also can be taken, but there must be enough space for maintenance



5.4 Water System Installation and Recommended System Diagram

5.4.1 Water System Installation

- Water system installation must follow routine installing rule to achieve max working efficiency. Inner pipe should have no foreign matter and all chilled water Pipe must be accord with local pipeline engineering rules.
- Safety valve (opening pressure not below 1.0MPa) must be installed.
- Chilled water pipeline must be cleaned by by-pass, do not connect evaporator into water system before pipeline washing.
- Piping construction must set aside enough space for maintenance. besides, it should be able to carry through draining valve maintenance on pipeline.
- To avoid decrease of pump capacity by valves such as three-way valve, all pipeline should be installed straightly and simplely.
- It's recommended to install manual shutoff valve for facility of maintenance operation.
- All low position must install drain pipe to ensure thorough drainage of evaporator and pipelines.
- Deflation valve must be installed on the top position of chilled pipe in order to drain inner air, deflation and drain pipe is no need of thermal insulation for convenience of maintenance.
- Anti-freezing measures(drainage, water circulation pump running, heater heating) should be taken to avoid damages of dry expansion evaporator when ambient temperature lower than 0℃ in winter or chiller off working.
- Water quality must be accord with chilled water quality standard of JRA-GL-02.
- Do not let internal pipe water expose to air as follow drawing.



- Do not connect any electric appliance earthing to unit water pipeline which can arouse electrolytic corrosion of pipeline.
- Anticorrosive measure must be taken for buried pipeline.

- Do pay attention to water flow speed, expansion tank position and exhaust plug position to ensure no air pocket.

- Flexible tube should be equipped on water inlet/outlet of unit and pump to avoid vibration transmit to building.

- Design inlet/outlet of evaporator must adhere to following rules:

a) Circulation pump outlet should connect with inlet of evaporator; pump inlet should not connect to water return pipeline rather than evaporator.

b) One water filter with more than 25 mesh should be installed on chilled water inlet of evaporator.

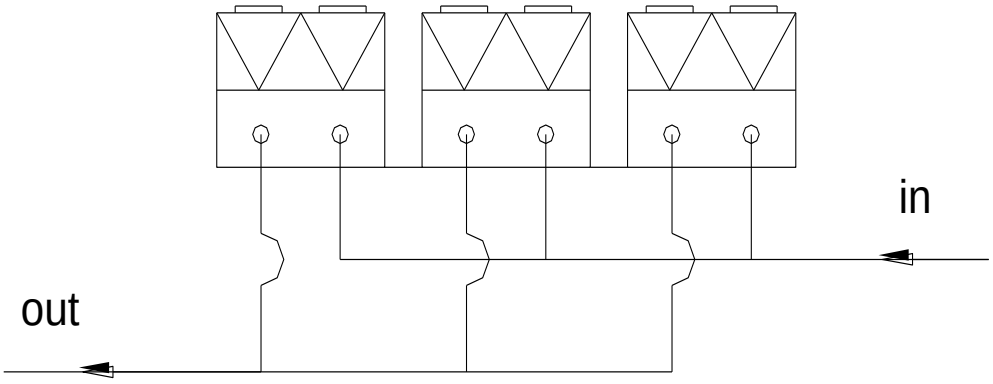
c) All chilled water pipeline must be thoroughly cleaned without foreign matter before unit running, do not crush any foreign matter into evaporator.

d) Thermometer and pressure gauge should be installed on water inlet and outlet to make it easily for maintenance.

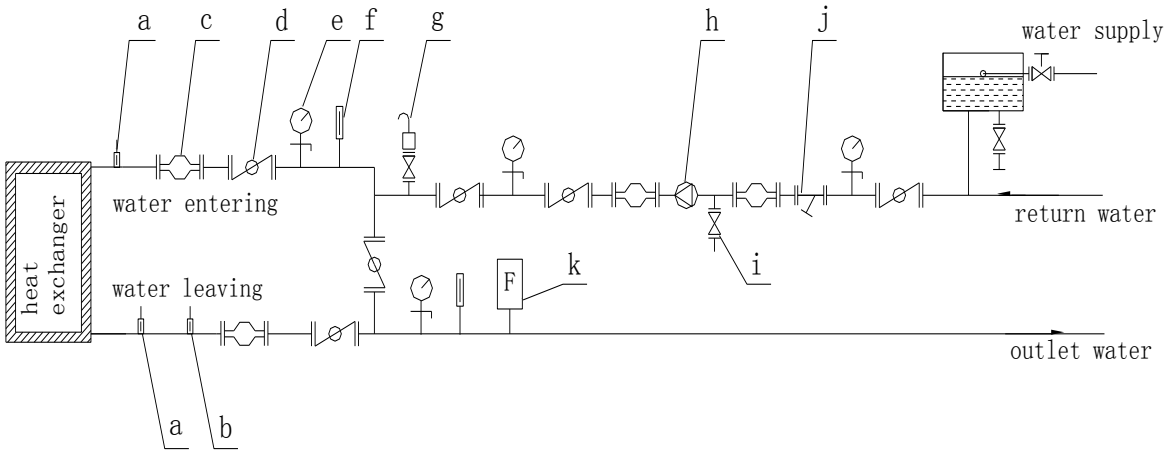
e) One water switch must be installed on outlet of each evaporator, the water switch should be install at horizontal straight pipe and the two end of the water switch must more than 5 times diameter of pipeline. The water switch is connected with terminal on control box, for detail please refer to wiring diagram.

Warning: Please affirm water flow direction when installation.

Water switch can not use to startup and shutdown.



5.4.2 Recommended System Diagram



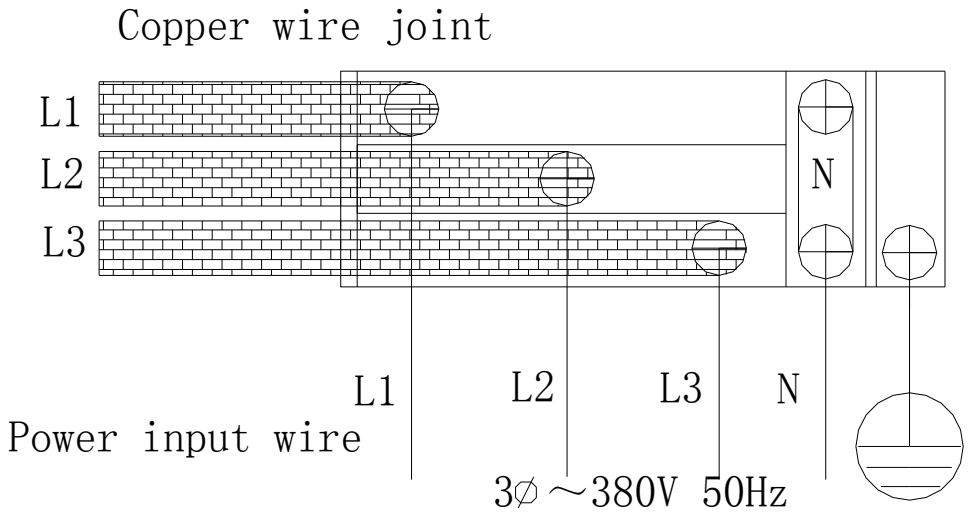
a	Temp. sensor	b	Thermo switch	c	shockproof joint
d	Butterfly valve	e	Pressure gauge	f	Thermometer
g	Automatic air relief	h	Water pump	i	Drain valve
j	Y-shape filter	k	Water flow switch		

5.5 Wiring Requirements and Electric Wiring Diagram

5.5.1 Wiring Requirements

（1）Main power supply wiring diagram

Main power supply wire specification: power supply cable must refer to correlative national regulation, dust guard must be installed on power supply cable inlet to avoid dust into wiring box when Wiring is completed. Main power supply wiring measures as following diagram.



Main power wiring diagram

Unit Model	Cable Range of Wiring Box	Recommended Cable Size
LSBLGCW600	BVR120~BVR185	BVR185

Note: Please refer to this cable range of wiring box when choose cable, exceeding this range may result in cable loosen and any damage due to this is beyond Midea responsibility.

（2）Main switch wiring

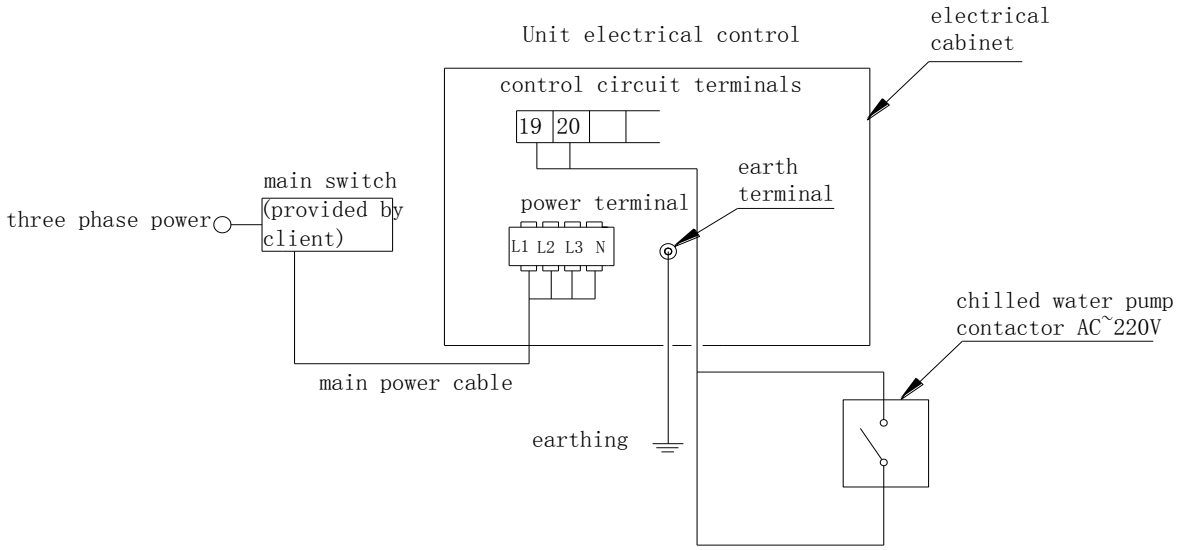
To avoid short circuit accident do harm to electric appliance such as transformer , cable and considering convenience for maintenance and control, proper capacity breaker must be installed on each power supply cable.
Note: One breaker for one unit, and one breaker for multi-units is forbidden.
The supply disconnecting device shall fulfill all of the following requirements:

- In accordance with IEC/EN 60947-2 or IEC/EN60947-3
- Isolate the electrical equipment from the supply and have one OFF and one ON position marked with “O” and “I”
- Have an external operating means.
- Be provided with a means permitting it to be locked in the OFF position.

- Disconnect all live conductors of its power supply circuit.
- Have a breaking capacity sufficient to interrupt the current of the largest motor when stalled together with the sum of the normal running currents of all other motors and/or loads.

Note: Main switch must be cut off before maintenance, and make sure main switch is on OFF state.

（3）Unit control wiring diagram: Magnetic switch of unit and pump must be Coordinated control, main power need to connect to power supply terminals.



Unit control wiring diagram

(Note: wiring terminal may vary, please refer to circuit diagram delivered with unit for detail.)

（4）Notes for the installation of unit wiring

The outboard wiring shall be conducted by qualified electrician. When connecting, pay attention to the following:

a) The supply voltage shall be stable when the unit is running. The working voltage of the unit shall be kept in the range of ±10% of the rated value by taking all voltage-decreasing factors into consideration. Too high or too low voltage may have bad effect on the unit.

b) The voltage discrepancy between phases shall not exceed 2% of the rated value and the difference value between highest and lowest phasing current shall be lesser than 3% of the rated value so as not to cause overheating of the compressor.

c) The supply frequency shall be kept in the range of ±2% of the rated value.

d) The lowest starting voltage of the unit shall be above 90% of the rated value.

e) Too long power cord will disable the booting of compressor, so the length of power cord shall ensure that the voltage drop between two ends is lesser than 2% of the rated value. If the length cannot be cut down, the power cord shall be thicker.

f) The wiring between power source and the unit shall be connected strictly according to the electrical code with outstanding anti-electricity-theft function. After the unit is connected with power supply, measure the wiring between electrical fittings terminator and the unit with 500v megger to make sure it is insulated and the insulating resistance shall be at least above 5 MΩ.

g) The unit shell shall be equipped with sound and reliable ground-fault-protection to avoid electrical shock hazards and protect personnel safety according to the electrical code.

h) The running current input power and other parameters shown in the nameplate of the unit shall be the testing value under standard working condition. There will be huge disparities in actual running with the actual load of system and the high/low of ambient temperature, so select the power source, transformer, no fuse breaker and wiring capacity according to the worst working condition.

i) The magnetic switch used for the water circular pump must be connected with the operating circuit on unit body. The above-mentioned magnetic switch is installed by the field workers and is not included in the power distribution box of the unit.

j) Wiring should follow rules of design and follow horizontal an vertical direction, space between cable should keep a special distance.

k) Phase line color is different from zero line color ,it’s recommended that all cable should be uniform in the same building, protective earth wire(PE line) should adopt yellow-green color wire and which must be insulation wire; Zero should adopt baby blue insulation wire.

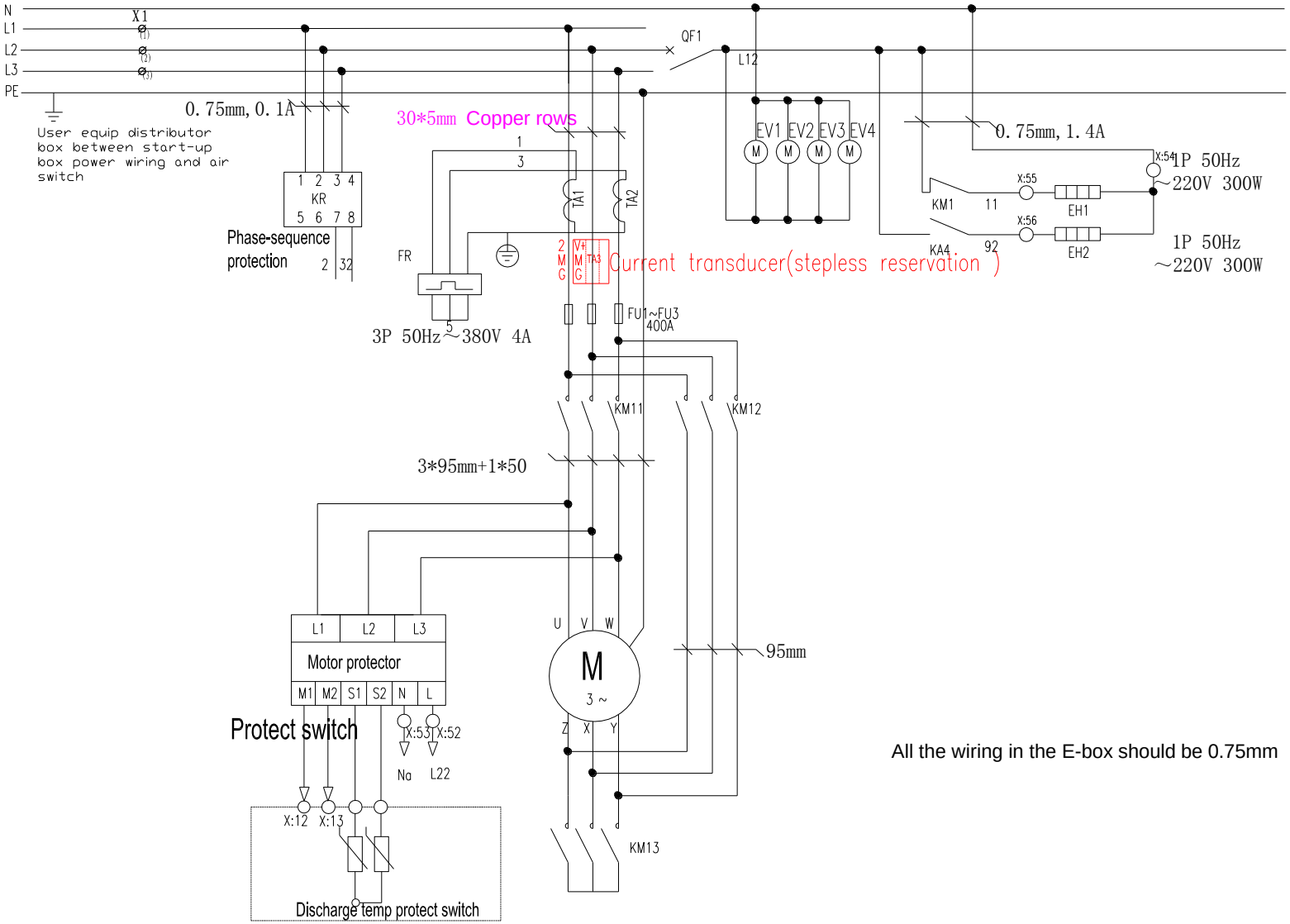
l) Insulation inspection should be taken After wiring engineering .insulation resistance should meet correlative rules of local national standards and make records.

m) Protective earth wire (PE line) should be reliabely connected. Simulation action must be taken for wire which has leakage protection and make records.

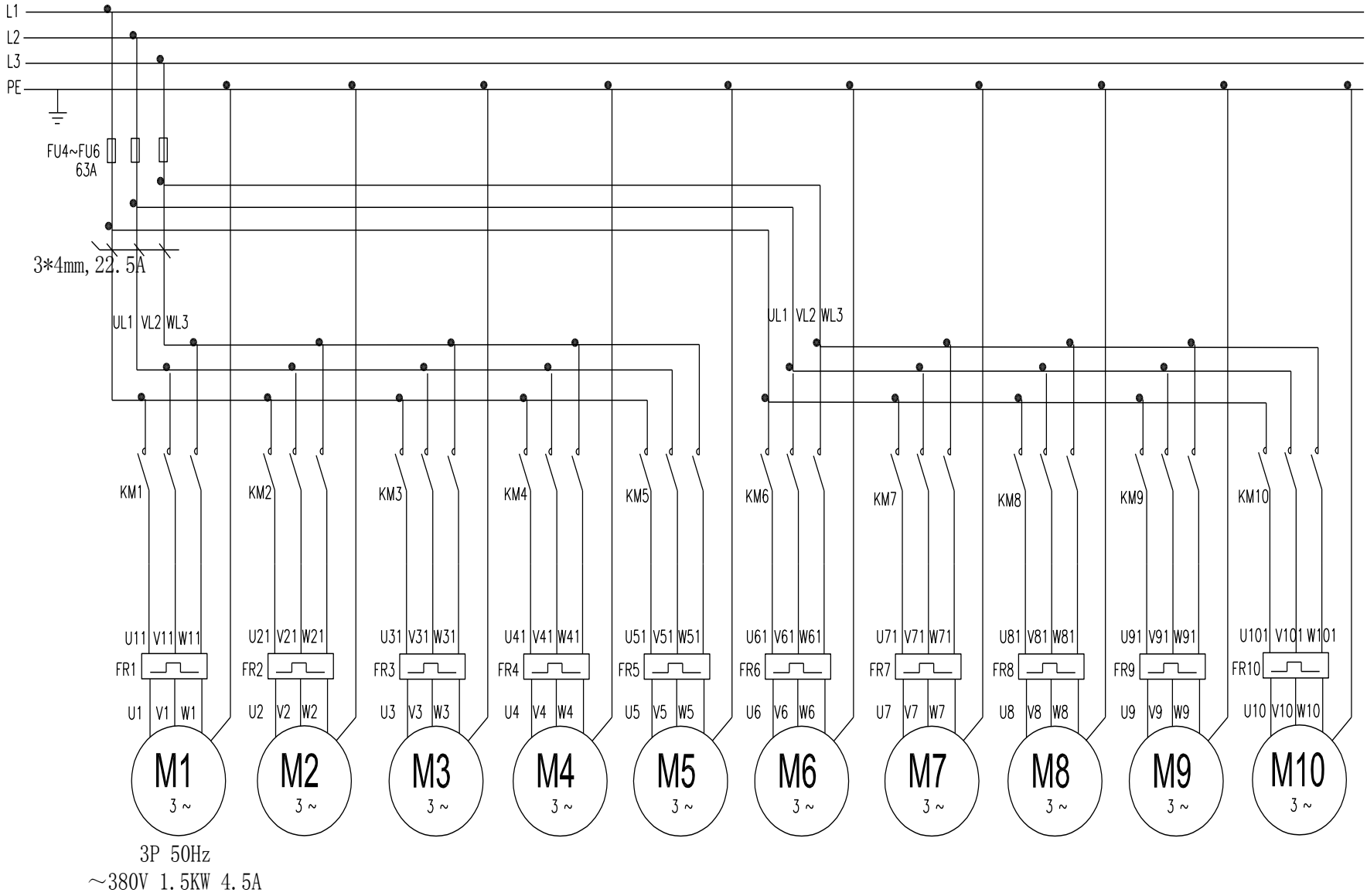
n) All electrical wiring must adopt copper cable and choose cable according to electrical load. wire need parallel connection and same size cable.

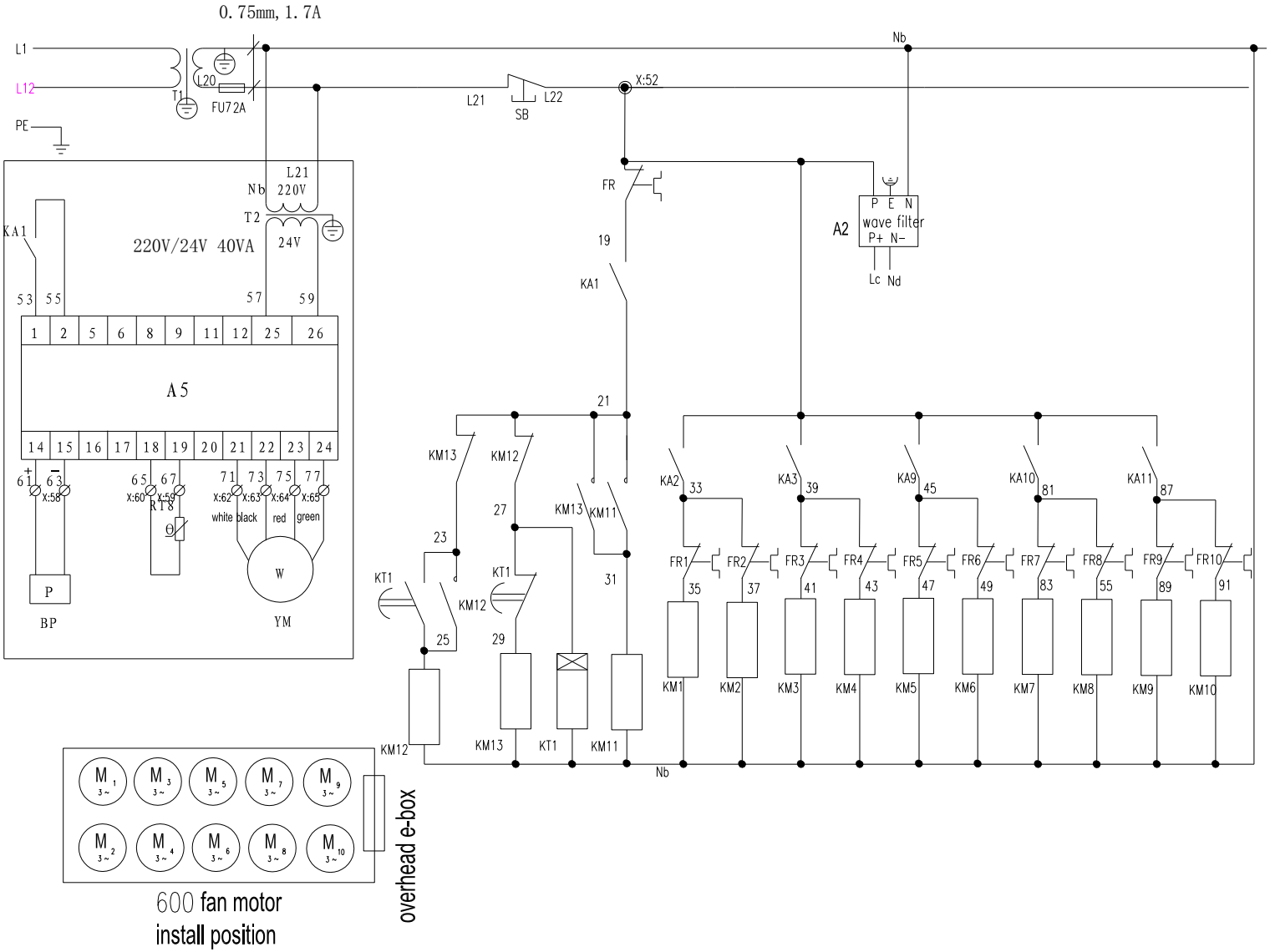
o) Face of cable sheath should show follow symbol: name of manufacture, unit model and rated voltage, all symbol should be clear, easy to recognize and bear wiping.

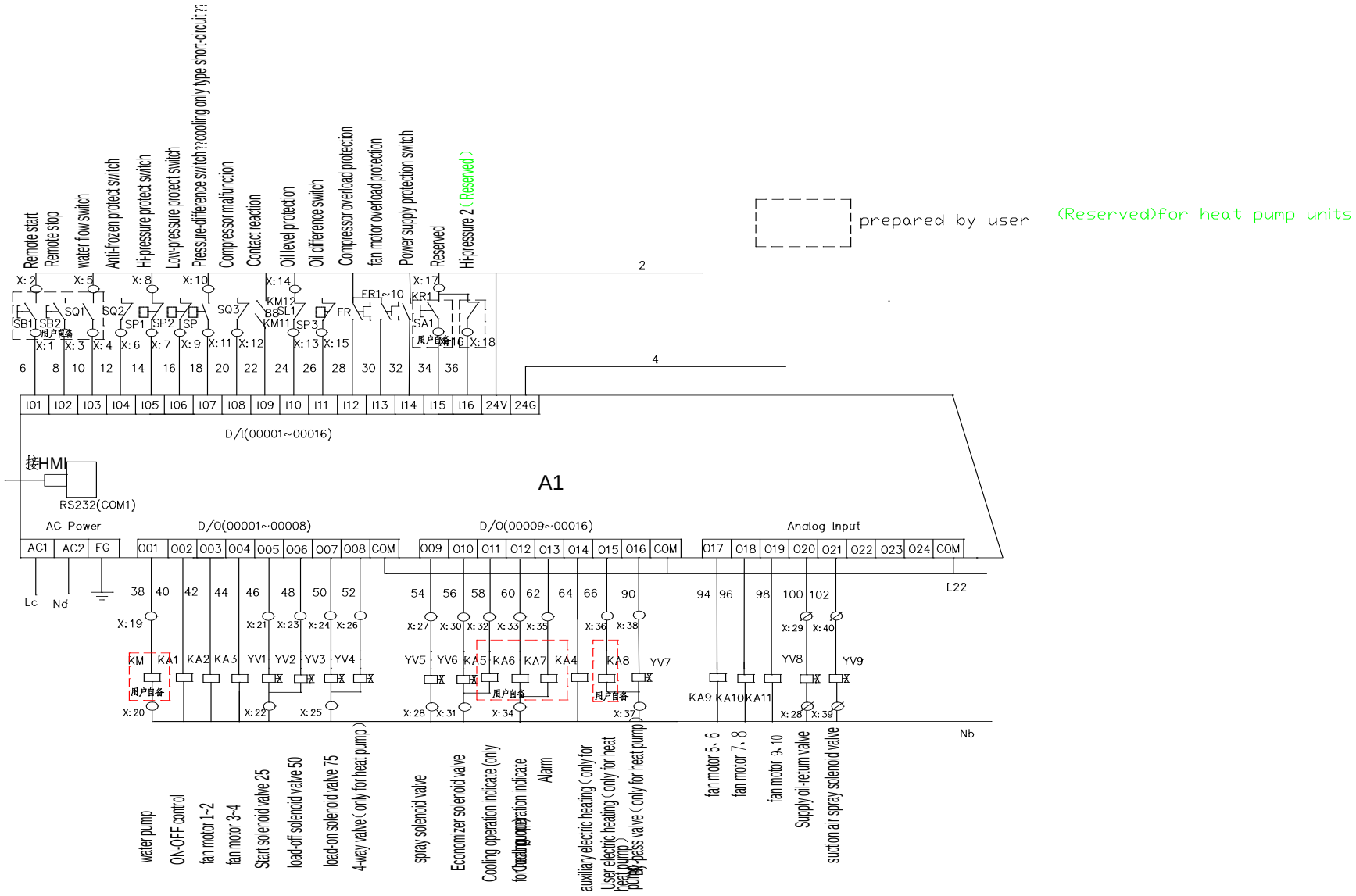
5.5.2 Electrical wiring diagram

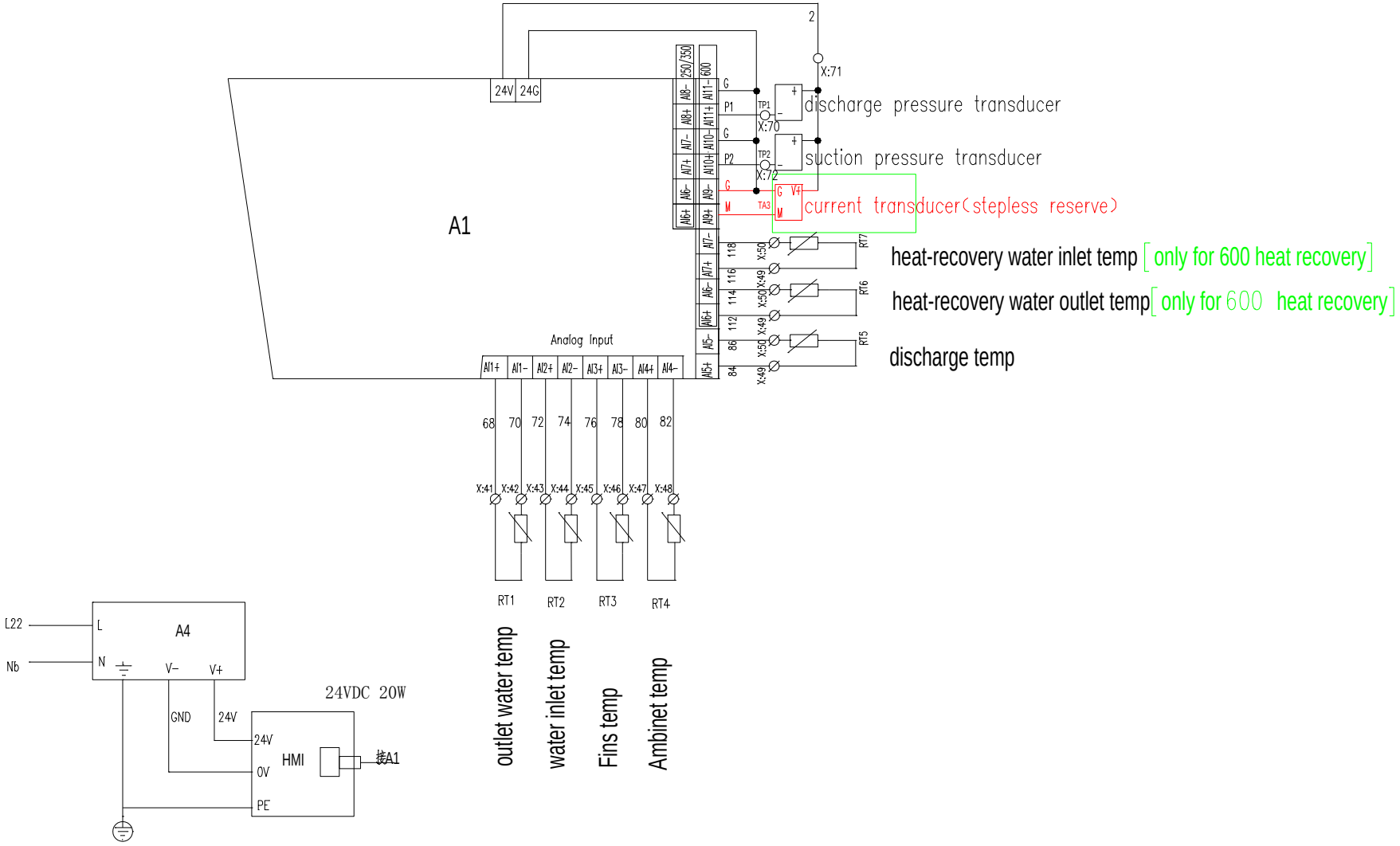


All the wiring in the E-box should be 0.75mm


L1
L2
L3
PE
FU4~FU6
63A
3*4mm, 22.5A
UL1 VL2 WL3
UL1 VL2 WL3
KM1
KM2
KM3
KM4
KM5
KM6
KM7
KM8
KM9
KM10
U11 V11 W11
U21 V21 W21
U31 V31 W31
U41 V41 W41
U51 V51 W51
U61 V61 W61
U71 V71 W71
U81 V81 W81
U91 V91 W91
U101 V101 W101
FR1
FR2
FR3
FR4
FR5
FR6
FR7
FR8
FR9
FR10
U1 V1 W1
U2 V2 W2
U3 V3 W3
U4 V4 W4
U5 V5 W5
U6 V6 W6
U7 V7 W7
U8 V8 W8
U9 V9 W9
U10 V10 W10
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
3 ~
3P 50Hz
~380V 1.5KW 4.5A


0.75mm, 1.7A
L1
L12
PE
T1
L20
FU7 2A
L21
SB
L22
X:52
Nb
L21
220V
Nb
T2
220V/24V 40VA
24V
KA1
53 55
57 59
1 2 5 6 8 9 11 12 25 26
A5
14 15 16 17 18 19 20 21 22 23 24
61 63
X:58
65 67
X:60 X:59
RT8
71 73 75 77
X:62 X:63 X:64 X:65
white black red green
P
BP
W
YM
FR
19
KA1
21
A2
P E N
wave filter
P+ N-
Lc Nd
KM13
KM12
27
KM13 KM11
23
KT1
KM12
25
29
31
KM12
KM13
KT1
KM11
KA2 33
KA3 39
KA9 45
KA10 81
KA11 87
FR1 FR2 FR3 FR4 FR5 FR6 FR7 FR8 FR9 FR10
35 37 41 43 47 49 83 55 89 91
KM1 KM2 KM3 KM4 KM5 KM6 KM7 KM8 KM9 KM10
Nb
M1 M3 M5 M7 M9
M2 M4 M6 M8 M10
3~
600 fan motor
install position
overhead e-box


prepared by user
(Reserved)for heat pump units
Remote start
Remote stop
water flow switch
Anti-frozen protect switch
Hi-pressure protect switch
Low-pressure protect switch
Pressure-difference switch ??cooling only type short-circuit??
Compressor malfunction
Contact reaction
Oil level protection
Oil difference switch
Compressor overload protection
fan motor overload protection
Power supply protection switch
Reserved
Hi-pressure 2 (Reserved)
SB1 SB2 SQ1 SQ2 SP1 SP2 SP SQ3 KM12 KM11 SL1 SP3 FR FR1~10 KR1 SA1
I01 I02 I03 I04 I05 I06 I07 I08 I09 I10 I11 I12 I13 I14 I15 I16 24V 24G
D/I(00001~00016)
接HMI
RS232(COM1)
A1
AC Power
AC1 AC2 FG
D/O(00001~00008)
O01 O02 O03 O04 O05 O06 O07 O08 COM
D/O(00009~00016)
O09 O10 O11 O12 O13 O14 O15 O16 COM
Analog Input
O17 O18 O19 O20 O21 O22 O23 O24 COM
L22
Lc
Nd
Nb
KM KA1 KA2 KA3 YV1 YV2 YV3 YV4
YV5 YV6 KA5 KA6 KA7 KA4 KA8 YV7
KA9 KA10 KA11 YV8 YV9
water pump
ON-OFF control
fan motor 1~2
fan motor 3~4
Start solenoid valve 25
load-off solenoid valve 50
load-on solenoid valve 75
4-way valve (only for heat pump)
spray solenoid valve
Economizer solenoid valve
Cooling operation indicate (only
Alarm
auxiliary electric heating (only for
User electric heating (only for heat
pump)
fan motor 5、6
fan motor 7、8
fan motor 9、10
Supply oil-return valve
suction air spray solenoid valve


A1
24V
24G
X:71
discharge pressure transducer
X:70
suction pressure transducer
X:72
current transducer(stepless reserve)
heat-recovery water inlet temp [only for 600 heat recovery]
heat-recovery water outlet temp[only for 600 heat recovery]
discharge temp
Analog Input
RT1
RT2
RT3
RT4
outlet water temp
water inlet temp
Fins temp
Ambinet temp
A4
L22
Nb
24VDC 20W
HMI
GND
24V
0V
PE

ITEM	SYMBOL	DESCRIPTION	ITEM	SYMBOL	DESCRIPTION
1	TA1,TA2	current transformer	26	TP2	low pressure sensor
2	FU1~FU16	fuse	27	RT8	suction temp.sensor
3	KR	Phasesequence protector	28	SP3	oil differential pressure switch
4	KM11,KM12,KM13	compressor contactor	29	RT5	discharge temp.sensor
5	FR1	overload relay	30	RT2/RT1	water outlet/inlet temp.sensor
6	M	compressor	31	TP1	discharge pressure sensor
7	QF1	air breaker switch	32	HM1	human-manchine interface
8	KT1	time relay	33	A1	Programmable Logic Controller
9	KM1-KM10	fan contactor	34	YV3/YV2	load / unload solenoid valve
10	M1-M10	fan motor	35	YV5	liquid injection solenoid valve
11	FU7	fuse	36	KR1	power protection switch
12	T1,T2	transformer	37	SQ2	temp.controller(disconnection when lower than 3℃)
13	SB	stop switch	38	RT4	ambinet temp sensor
14	EH1	compressor heater	39	YV8	return liquid injection solenoid valve
15	EH2	electric heater	40	YV9	liquid injection solenoid valve
16	A2	filter	41	YV6	economizer solenoid valve
17	KA1-KA6	relay	42	KA5/KA6	cooling/heating output indicate relay
18	A5	electronic expansion valve driver module	43	KA7	output alarm relay
19	YM	expansion valve	44	T11	current transducer
20	SQ3	compressor inner Integrated protection	45	A4	breaker switch power supply
21	SL1	oil level switch	46	YV8	by-pass solenoid valve
22	KA1	unit switch	47	RT3	fins temp sensor
23	SP	differential pressure switch	48	RT6/RT7	heat recovery water outlet/inlet temp.sensor
24	SQ1	water switch	49	FR1~FR10	overload relay
25	SP1,SP3/SP2	high /low pressure switch	50	EV1~EV4	axial flow fan motor

（Note :Wiring position of each unit may different, please refer to electrical diagram delivered with unit for detail）

6 Trial Run

6.1 Inspection before trial run

6.1.1 Water system part

1) All water pipeline should be clean, correct connect and right water flow direction.
2) Check inlet/outlet water pipe connection to ensure reliable connection.
3) Start-up water valve
4) Startup pump.
5) Check whether there is leakage on connect joint.
6) Open air exhausted valve to drain system internal air then close it.
7) Inspect chilled water side pressure losses and check whether water flow rate is correct.
8) Inspect whether inlet/outlet water temp. in control cabinet is equal to thermometer temp.

6.1.2 Electrical circuit part

1) Cut main power switch and check all startup circuit and control circuit in cabinet.
2) Check whether power supply is equal to unit nameplate to ensure voltage variation range is not exceeding 10%, and phase voltage unbalance is not exceeding 2%.Power phase sequence should be equal to unit nameplate.
3) Check whether there is enough electricity supply capacity to meet unit full load running.
4) Check whether unit is correct earthing.
5) Affirm whether capacity of cable and protector is equal to unit running demand, and complete interlock control connection and dial code according to electrical control diagram.
6) Affirm all air conditioning accessories and control equipment in good condition.

6.1.3 Unit part

1) Check whether unit internal pressure and oil level is normal
2) Check whether all safety control equipment is on initial state and its setting is correct.
3) Check whether unit valve is in correct position and whether there is refrigeration leakage sound.
4) Check whether compressor resistance is normal(phase resistance, phase-phase resistance, phase-earth resistance)
5) Cut compressor power before connecting main power .
6) Startup and check whether Y-delt transform is normal(check whether 3 phase voltage is 380V).
7) Check whether there is phase loss(phase-ground voltage is 220V)
8) Check whether all local setting which set by control panel is strictly according to

requirement ?

9) Check whether expansion valve can open and shut normally.

10) Check whether load/unload solenoid valve work normally by manually.

11) Check whether compressor oil heater is normal and whether it meet open condition.

12) If above items is normal, then startup air conditioning accessory and pump.

13) Cut main power and connect compressor power.

Then connect main power and startup unit again.

6.2 Trial Run Operation

1) Connect refrigeration gauge with unit and lay temp. probe, then startup one compressor. Inspect whether compressor Y-delt transform is normal and voltage of each contactor.

2) Check compressor current.

3) Check whether rotation direction of each fan is right and whether running is normal, then inspect running current.

4) Inspect whether oil level is normal and whether capacity adjusting solenoid valve is rightly operate(this can be checked by use one no magnetic knife to touch the valve and judge if there has magnetism)

5) Let the compressor run at least 20 min then check all parameters and inspect whether suction/discharge pressure is normal.

6) Inspect opening of electrical expansion valve according to suction temperature and judge whether it is in normal range.

7) Inspect whether suction superheat degree is within 5—7 ℃, and whether discharge superheat degree and condensation superheat degree is in normal range.

8) Inspect whether solenoid valve and expansion valve on injection pipe is running well when discharge temperature is too high. (this can be checked by use one no magnetic knife to touch the valve and judge if there has magnetism).

9) Shutdown the unit and check whether compressor oil level is normal.

10) Enough air conditioning load is in need to let unit keep run, to make sure that all air conditioning appliance is open.

11) After trial run, check all valve bonnet and fasten it . Clean unit and clean oil dirt in all joint.

7 Unit Use And Operation Direction Of Controller

7.1 Inspection before use

1) Judge whether the time for heating up the refrigerator oil of the compressor is long enough, generally speaking, four to eight hours is required. Keep the oil temperature above 23℃. (The time for heating up the refrigerator oil of the compressor varies according to ambient temperature; the lower the ambient temperature is, the more time it requires.) Time for heating up the oil is set as follows:
2) Click the “Set the Parameter” on the main screen and display the following screen for parameter setup, as Figure 6-1 shows. Click the value box after the “Preheating for Startup” and set the time for preheating, taking minute as its unit, for example, 240 minutes is four hours.

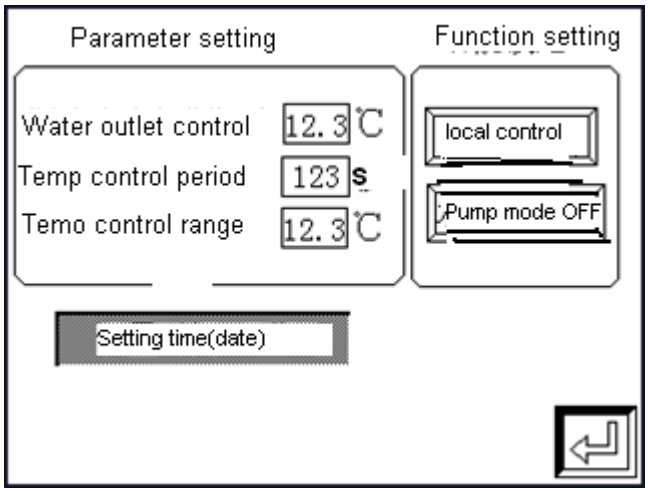


Figure 7-1 Parameter Setup Screen

3) 2. Check whether there is sufficient water in the water circulating system and whether the water make-up valve is open.
4) 3. Check whether all the lines and switch handles are placed properly.
5) 4. Check whether all the stop valves are open. Make sure that all the valves are open when the unit starts up.
6) 5. Check whether all the control switches and components in the electricity cabinet are normal or not.
7) 6. Check whether the power supply and voltage are normal.
8) 7. Check whether the pressure gauge of the unit is normal or not. Under normal conditions, when the indoor temperature is 25℃ to 28℃, the pressure shown on the pressure gauge is 7-10kgf/cm2G.

7.2 Startup procedures

1) Start up the water pump of the water circulating system.
2) Start up the fan motor.
3) Start up the compressor.

Note: Observe the pressure gauge when starting up the compressor. Turn it off if anything abnormal occurs.

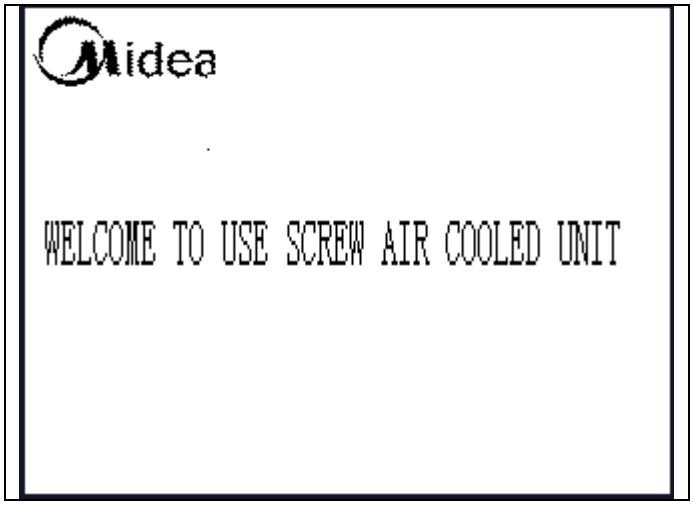
7.3 Stop procedures

Operate the startup procedures in reverse. (Note: At refrigerating status, the water pump of the cooling water circulating system can be stopped at least five minutes after the compressor is off.)

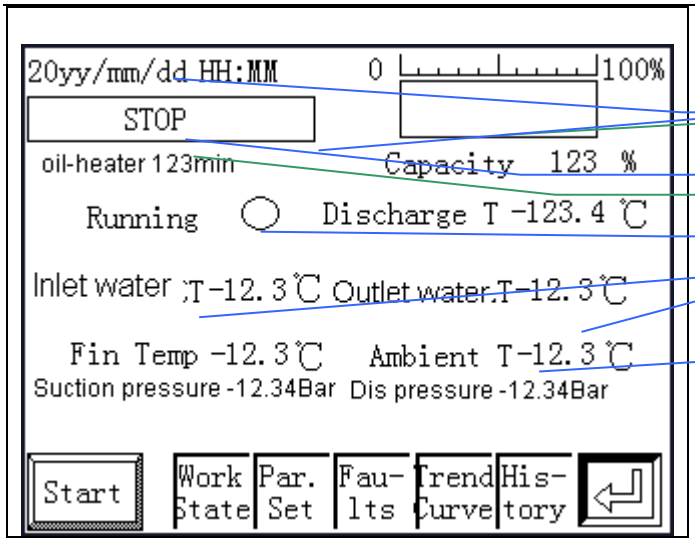
7.4 Direction of controller

Note: We reserve the rights to alter following picture partly without notice, please refer to real picture for details.

Operating Interface



WELCOME page, display company information. Press anyplace to enter main interface



Main interface shows basic information needed by client.

Date

Energy steps bar chart

Alarm

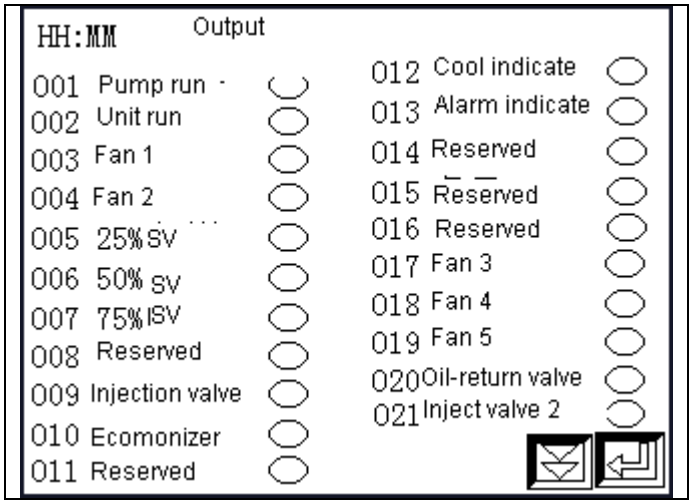
Running state

Compressor state

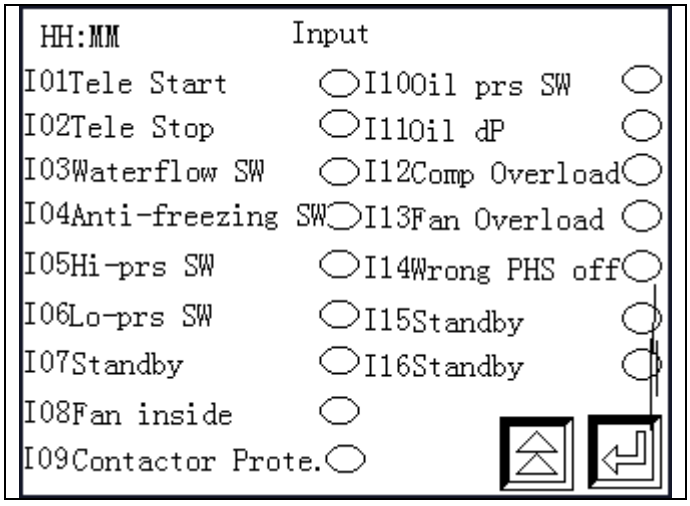
Leaving and entering water temp.

Fins temp.and ambient temp.

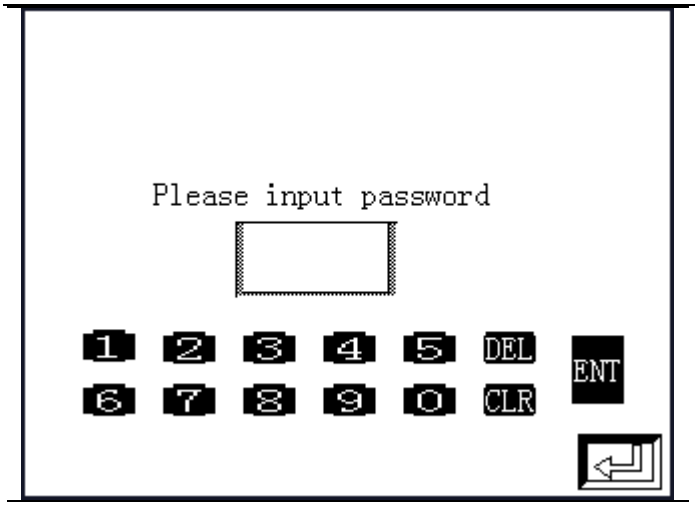
Note: Main interface shows all temp, suction pressure display, capacity display and time that need heater oil



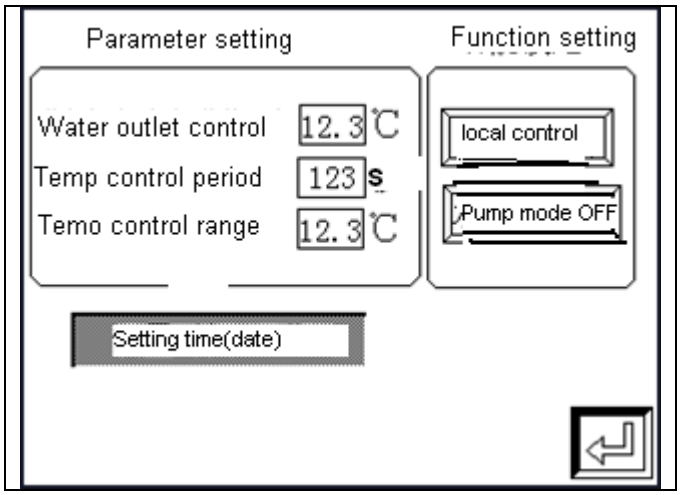
Output state interface shows all output points state, solid type is close state and hollow type is cut state. Multi-units parallel connection shows this interface independently.



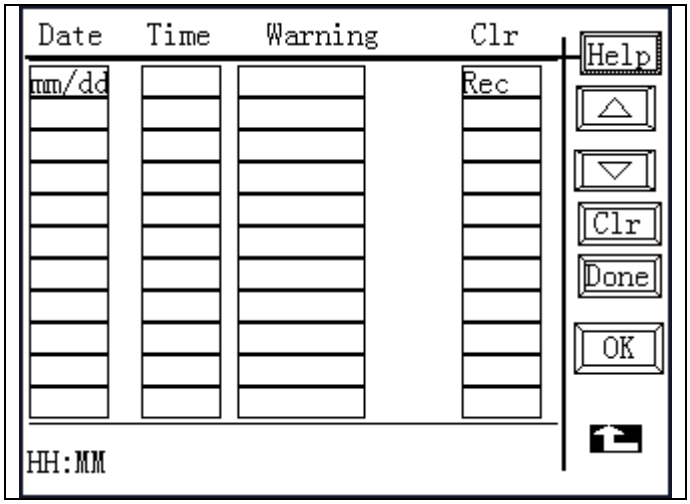
Input state interface shows all output points state, solid type is close state and hollow type is cut state. Multi-units parallel connection shows this interface independently.



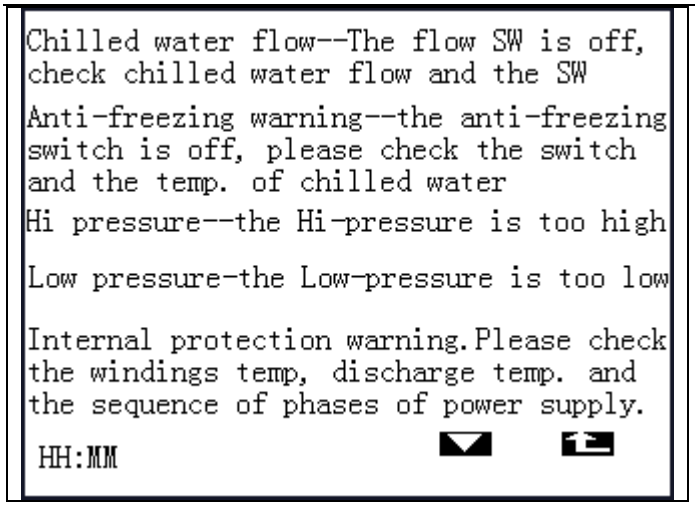
Input password then press ENT can enter parameter setting interface, password is 4 bit:1111.There is wrong clue when password is wrong, then input right password again. Press ↵ can go back to main interface.



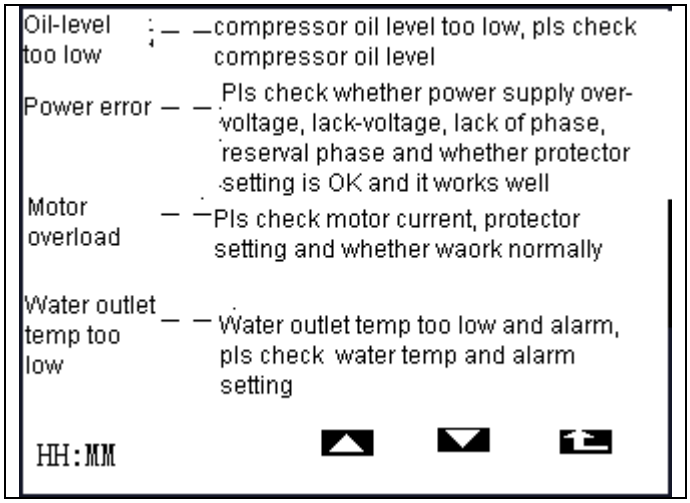
Parameter setting interface can set control measure: local control or remote control and water pump mode. Water Pump mode is to control pump solely before unit startup.
Press set-up time(Date)can enter time and date setting interface.



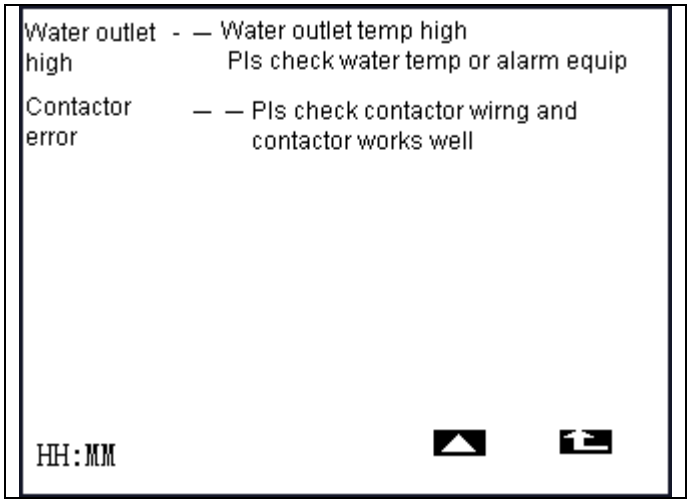
Alarm interface shows current and former alarm records, alarm time and faults settled time is also attainable. Press Help can enter help interface to inspect faults reason and solving measure. Press ▲ and ▼ can choose alarm record and delete it, press OK to affirm alarm.



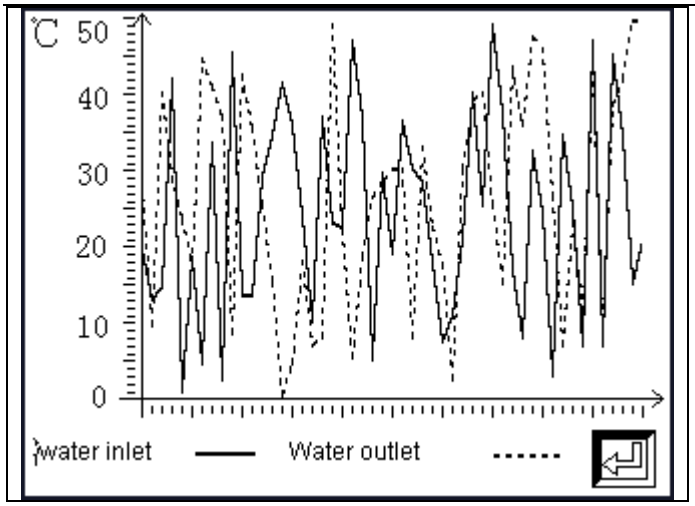
Alarm help interface can check faults reason and measure, press ▼ can enter next help interface.



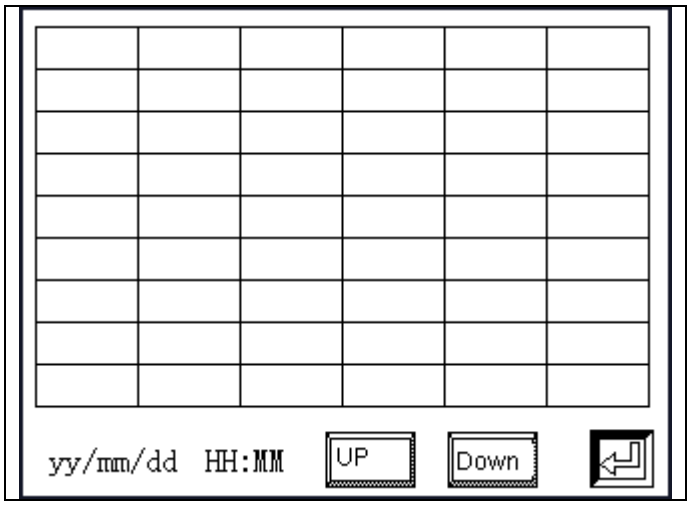
Alarm help interface can check faults reason and measure, press ▼ can enter next help interface. press ▲ can enter last help interface.



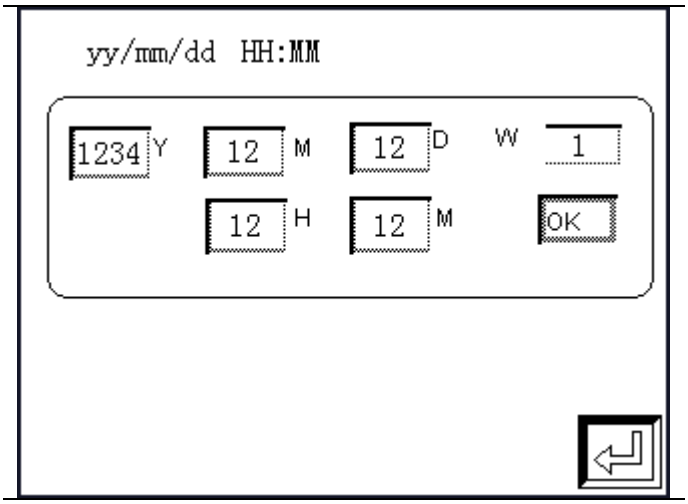
Alarm help interface can check faults reason and measure, press ▲ can enter next help interface.



The graph shown water temp change. It can help know unit operate stably.



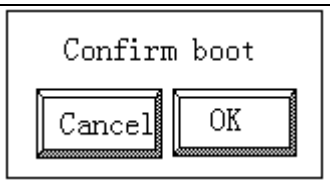
History data interface, shown compressor ON/OFF, And during operation, every 15min, each water temp, it can cycle record 800 items



Put the date on this interface. Such as 2009-01-01 12:06. You can input 2009-01-01 12:06, then press OK. You can see from the screen that the Date and Time confirm and modify OK.
Note: The data range is 2001-2089. don't input the date out of the range, or any unexpect result, Midea won't afford.

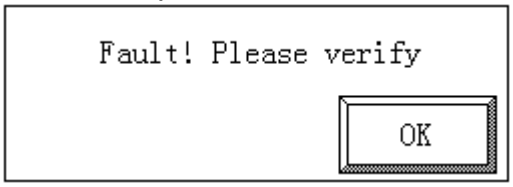
Startup operation：

A unit control mode selection dialog box pops up while pressing the unit icon. Select "Remote Control" the chiller will start and stop by the remote star-up/stop button; Select "Local Control" a confirmation box as follows pops up, press OK the chiller will be star-up.



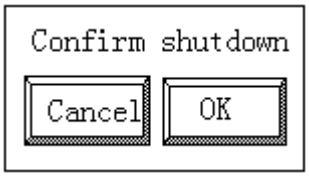
Within 15 minutes after chiller stop or 25 minutes interval of stop/start, press unit icon a waiting for start box will pops up. Press OK to close the box.

The follow box pops up when chiller stop fault occurs. Press OK to close the box.

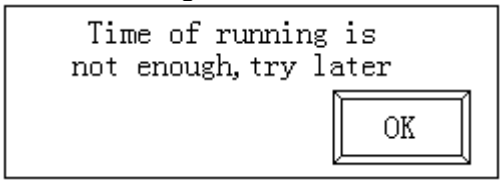


Stop operation：

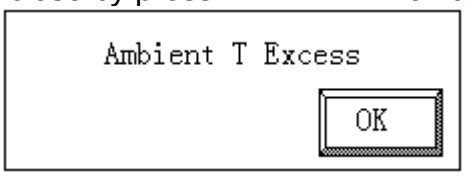
Press chiller stop button when chiller starts, operates, pauses the followed stop confirmation box will pops up. Press OK the chiller will be stopped according to normal stop procedure; press Cancel to close the box.



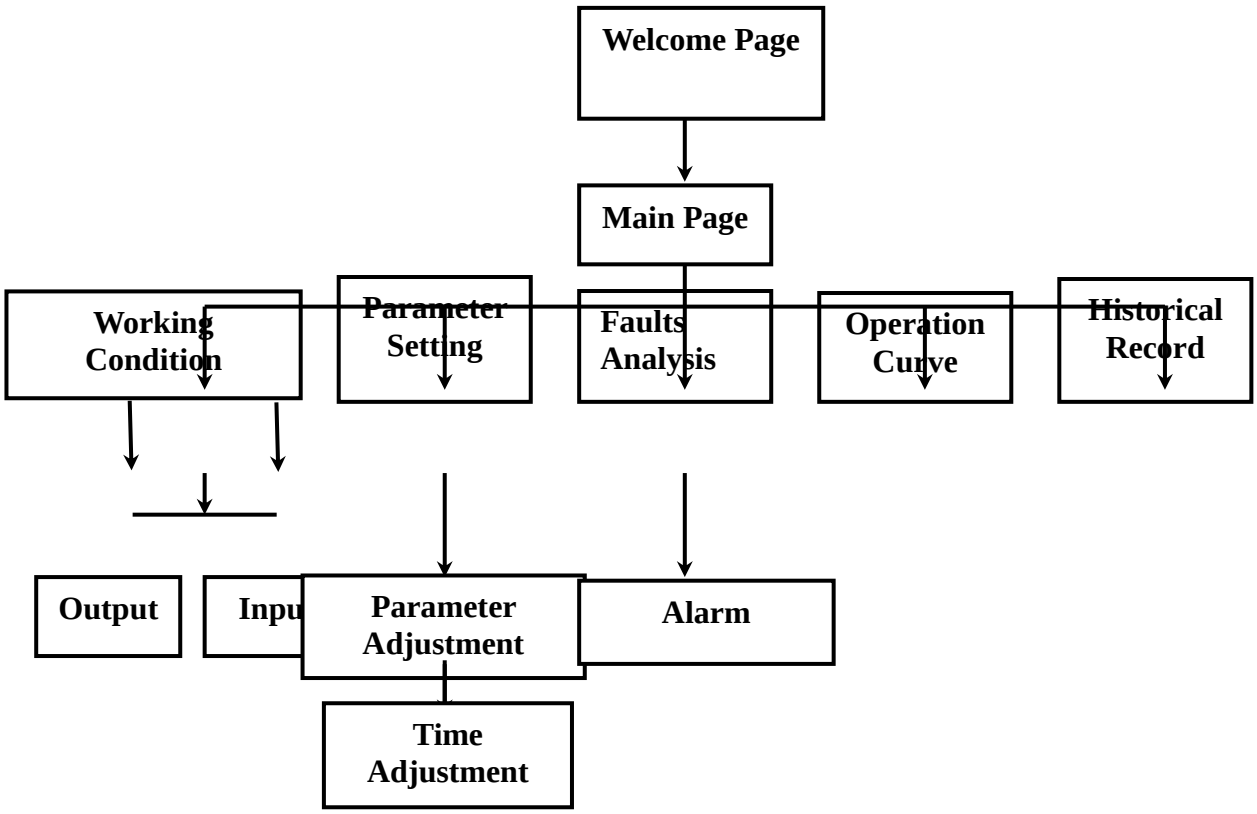
Within 15 minutes after compressor starts, if press stop button the follow box will pops up to notice the min. operation time is not enough. Press OK to close the box.



When the ambient temperature exceeds the chiller operation ambient temperature limitation during chiller works, an followed box will pops up and chiller will stop after min. operation time reaches. This box can be only close by press OK when ambient temperature returns to



7.5Control interface



7.6 Fault Alarm

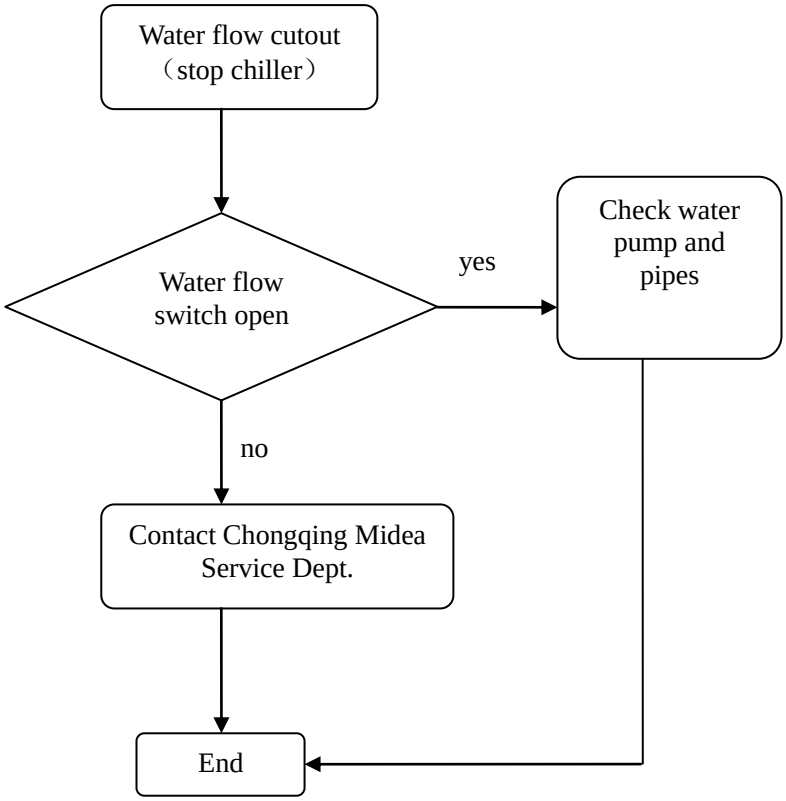
Fault	Judge Condition	Handle Method	Probable Reason	Reset Method
Water flow cutout	Check the water flow after 3 minutes of pumps starts, water flow switch keeps disconnect for 5 seconds	Chiller Stop	Water flow too low Water flow switch wrong installation Water flow switch connection loose	Manual
Anti-freeze protection	Antifreeze protection switch keeps disconnect for 3 seconds	Chiller Stop	Water temperature<3˚C Anti-freeze switch connection loose	Manual
High-pressure alarm	High pressure switch keeps disconnect for 3 seconds	Chiller Stop	Discharge pressure too high High pressure switch connection loose	Manual
Low-pressure alarm	Low pressure switch keeps disconnect for 1 seconds	Chiller Stop	Suction pressure too low Low pressure switch connection loose	Manual
Compressor Inside Protection	Compressor inside protection switch keeps disconnect for 3 seconds	Chiller Stop	Motor temperature too high Motor reversal Phase loss Phase voltage unbalance Compressor inside protection switch connection loose	Manual
Oil level protection	Oil level switch keeps disconnect for 60 seconds	Chiller Stop	Oil level too low Oil level switch connection loose	Manual
Oil pressure differential protection	Oil pressure differential switch keeps disconnect for 30 seconds	Chiller Stop	Oil filter clogging Oil pressure differential switch connection loose	Manual
Compressor overload	Compressor thermal overload relay keeps disconnect for 3 seconds	Chiller Stop	Compressor overload Thermal overload relay error Connection loose	Manual
Fan overload	Fan thermal overload relay keeps disconnect for 3 seconds	Chiller Stop	Fan overload Thermal overload relay error Connection loose	Manual
Power Fault	Power protection	Chiller Stop	Phase voltage	Manual

Fault	Judge Condition	Handle Method	Probable Reason	Reset Method
	mode disconnect for 3 seconds		unbalance Voltage too low Voltage too high Phase reverse, phase loss Connection loose	
Contactor Fault	Contactor feedback keeps disconnect for 0.1 second after 10 seconds of compressor operation	Chiller Stop	Contactor pick-up unstable Contactor connection loose Auxiliary relay pick-up unstable	Manual
Discharge temperature too high	Discharge temperature >110℃ for 10 seconds	Chiller Stop		Manual
Fin temperature too high	Fin temperature>70℃ for 10 seconds	Chiller Stop		Manual
Water outlet temperature sensor open circuit	PT100 resistance>300Ω	Chiller Stop		Manual
Water outlet temperature sensor short circuit	PT100 resistance<20Ω	Chiller Stop		Manual
Water inlet temperature sensor open circuit	PT100 resistance>300Ω	Chiller Stop		Manual
Water inlet temperature sensor short circuit	PT100 resistance<20Ω	Chiller Stop		Manual
Ambient temperature sensor open circuit	PT100 resistance>300Ω	Chiller Stop		Manual
Ambient temperature sensor short circuit	PT100 resistance<20Ω	Chiller Stop		Manual
Fin temperature sensor open circuit	PT100 resistance>300Ω	Chiller Stop		Manual
Fin temperature sensor short circuit	PT100 resistance<20Ω	Chiller Stop		Manual
Discharge temperature	PT100 resistance>300Ω	Chiller Stop		Manual

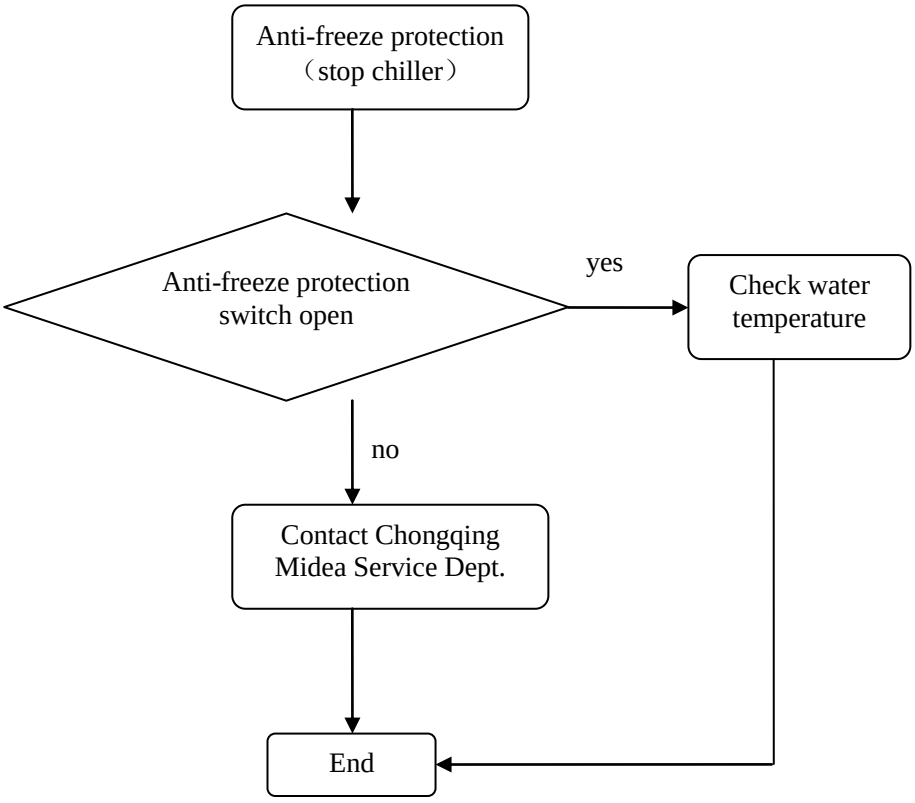
Fault	Judge Condition	Handle Method	Probable Reason	Reset Method
sensor open circuit				
Discharge temperature sensor short circuit	PT100 resistance<20Ω	Chiller Stop		Manual

7.7 Safety protection flow chart

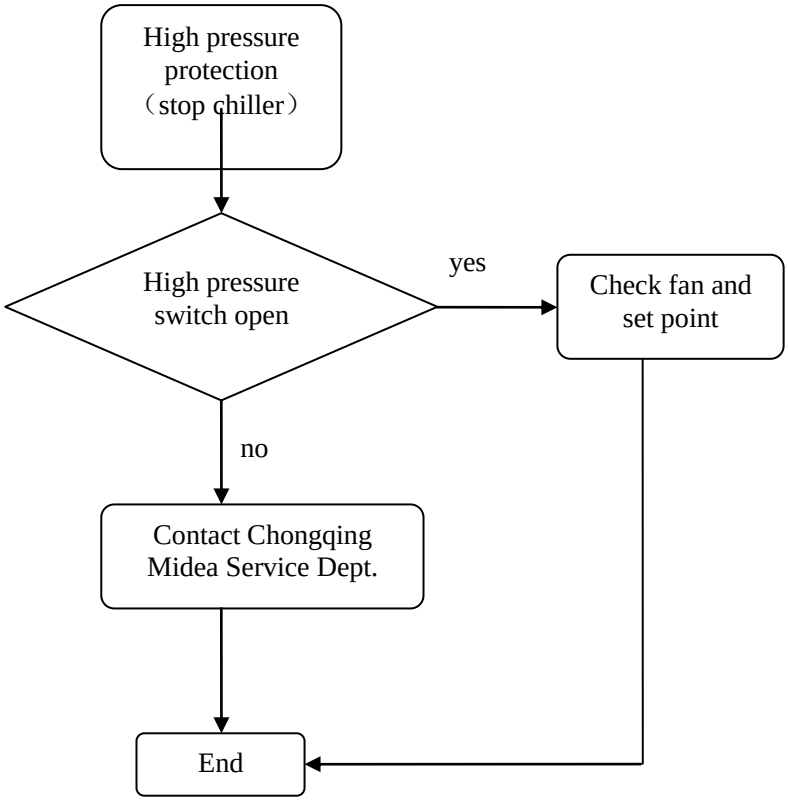
1) Water flow cutout



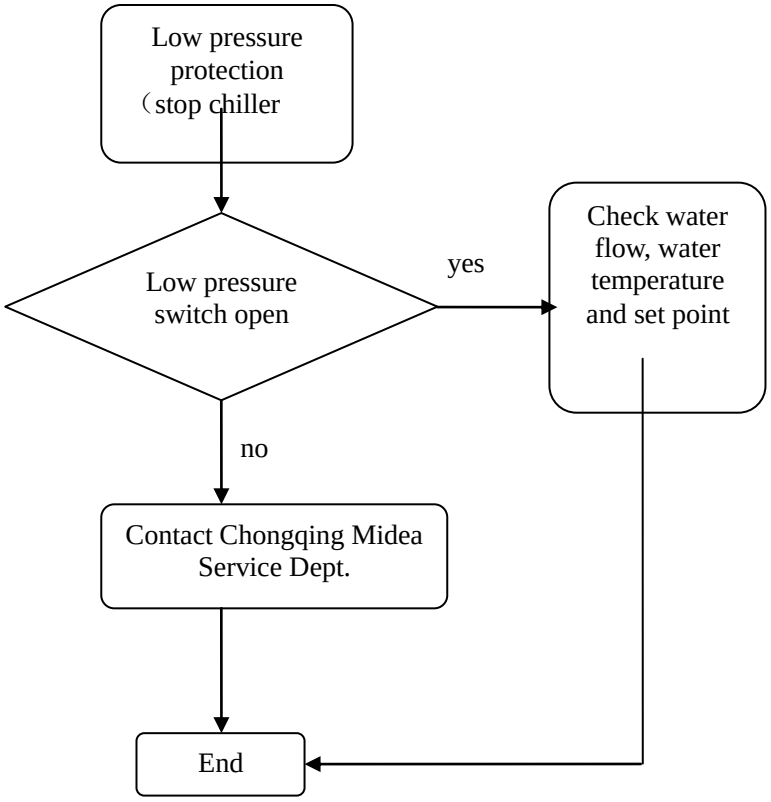
2) Anti-freeze protection



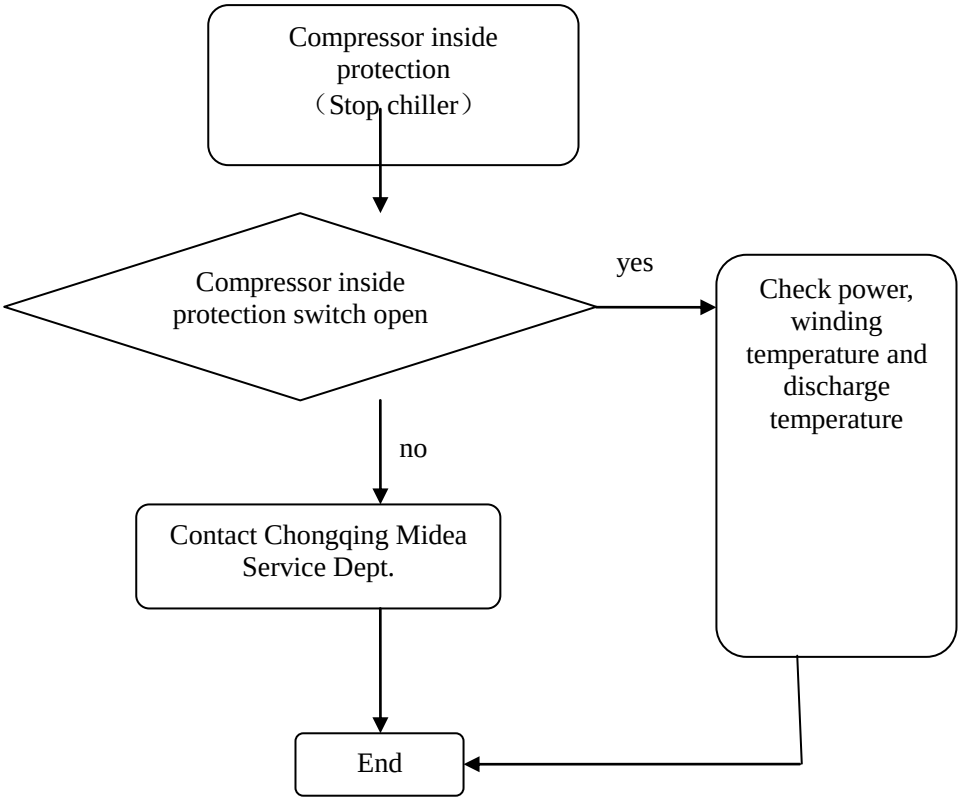
3) High pressure protection



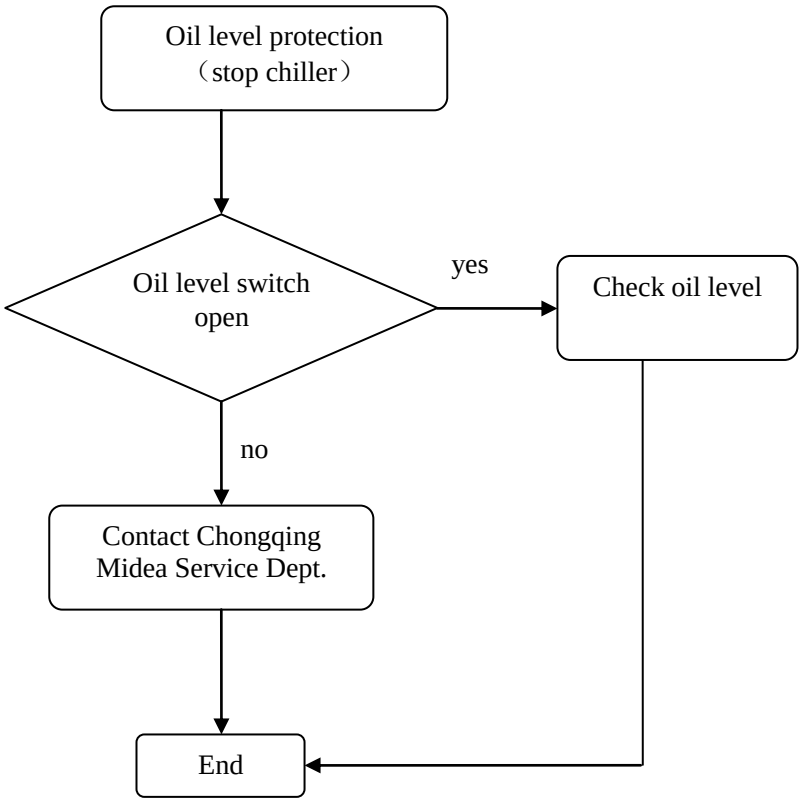
4) Low pressure protection



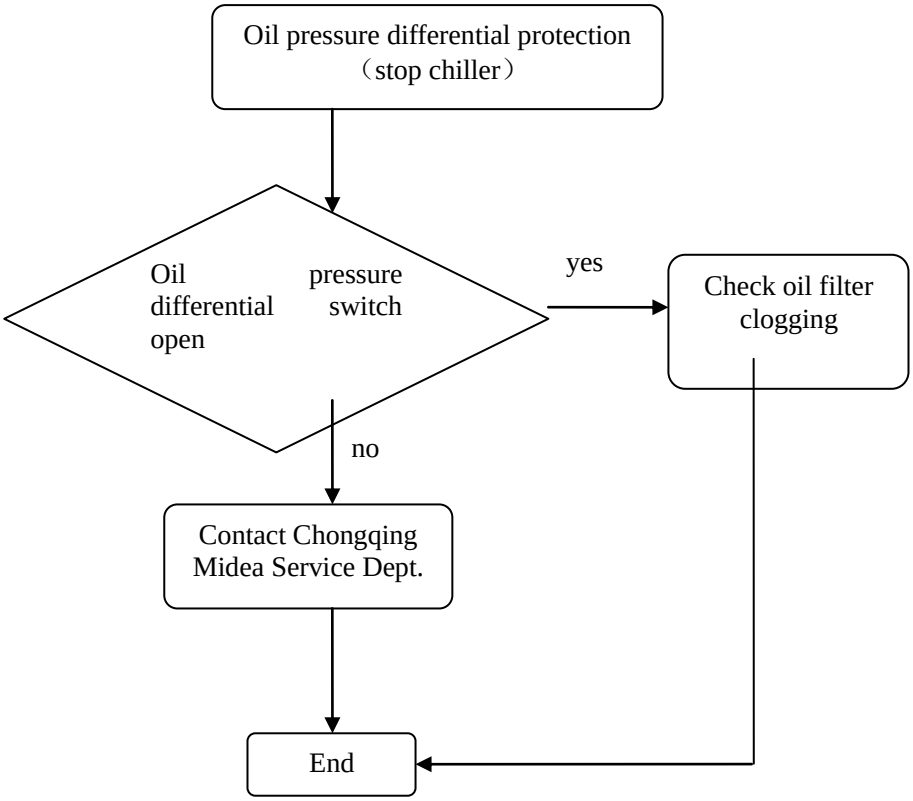
5) Compressor inside protection



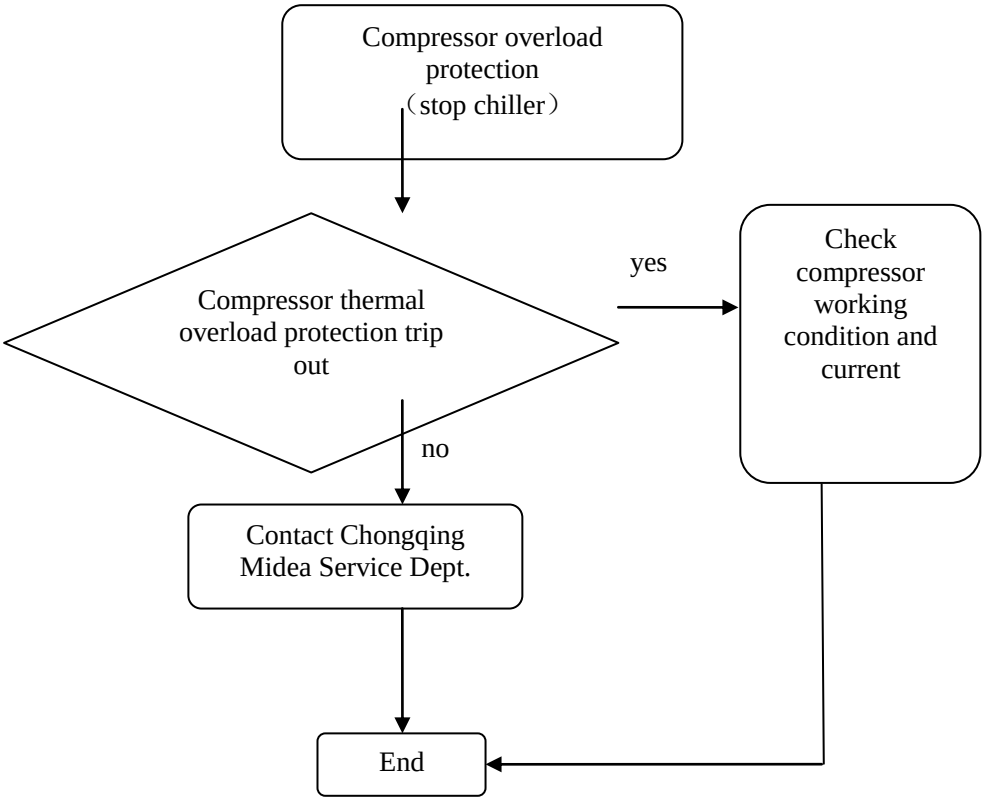
6) Oil level protection



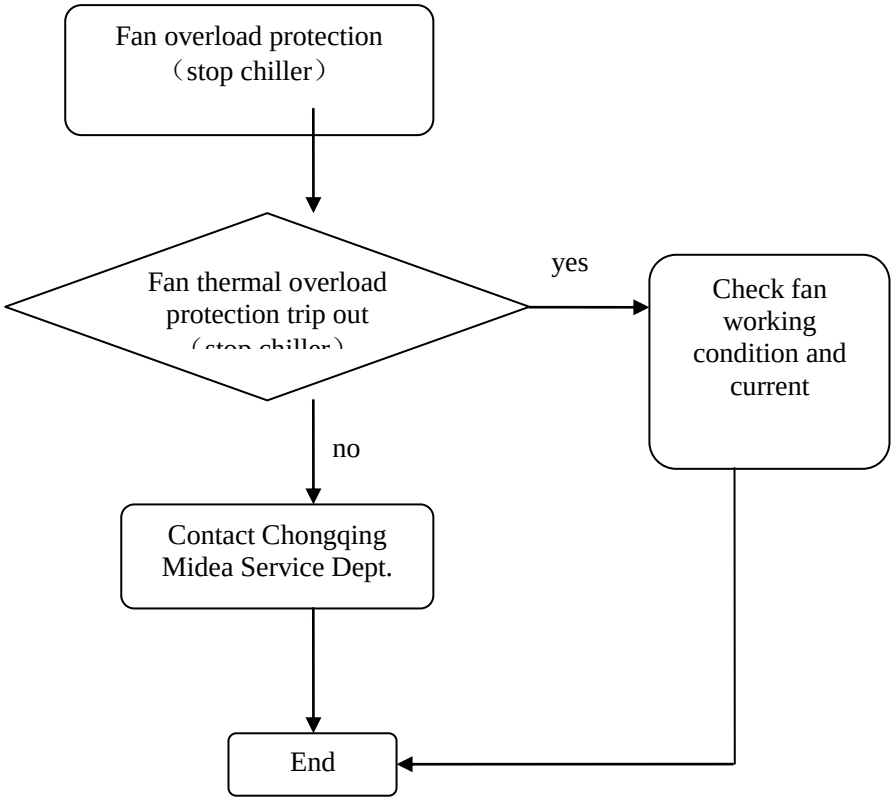
7) Oil pressure differential protection



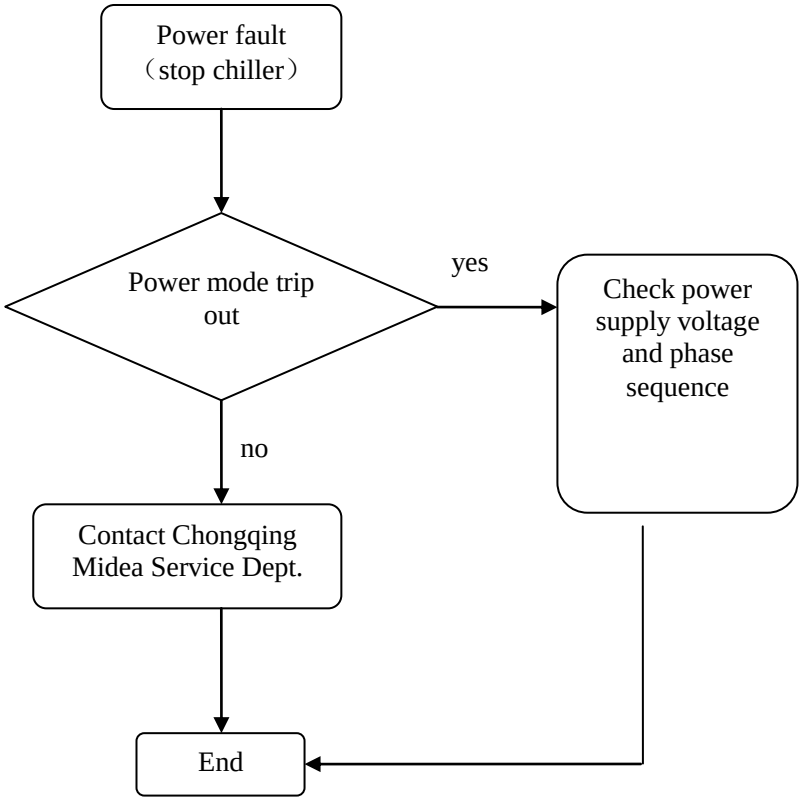
8) Compressor overload protection



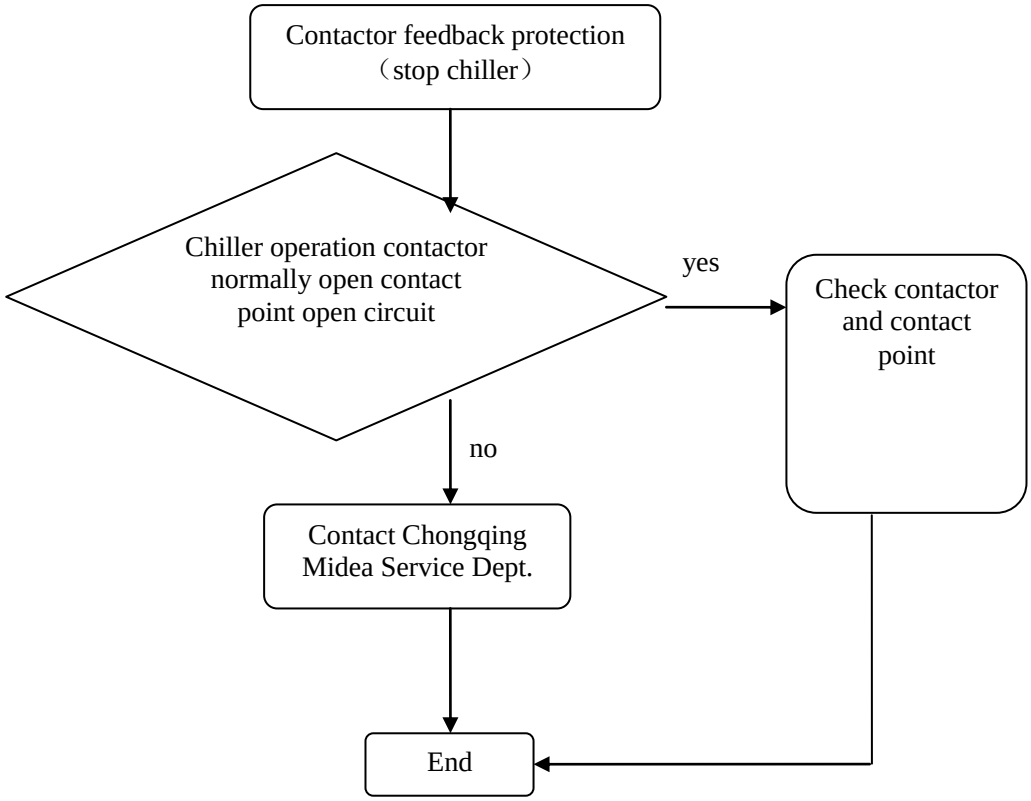
9) Fan overload protection



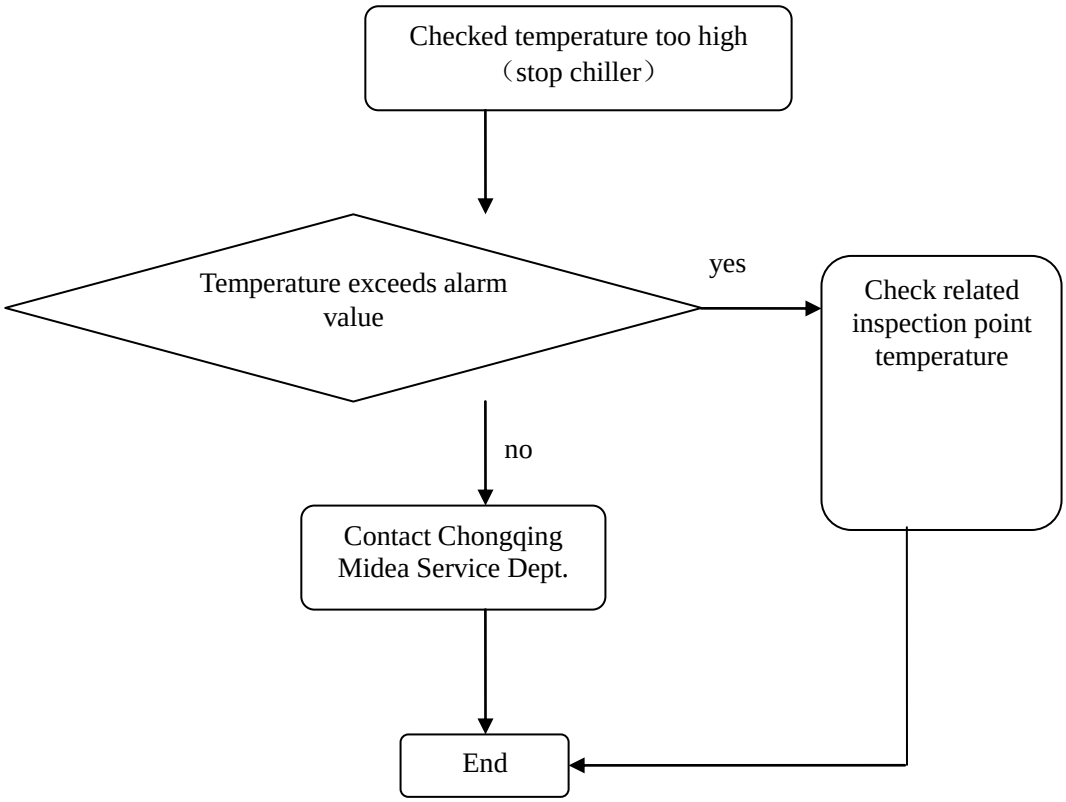
10) Power fault



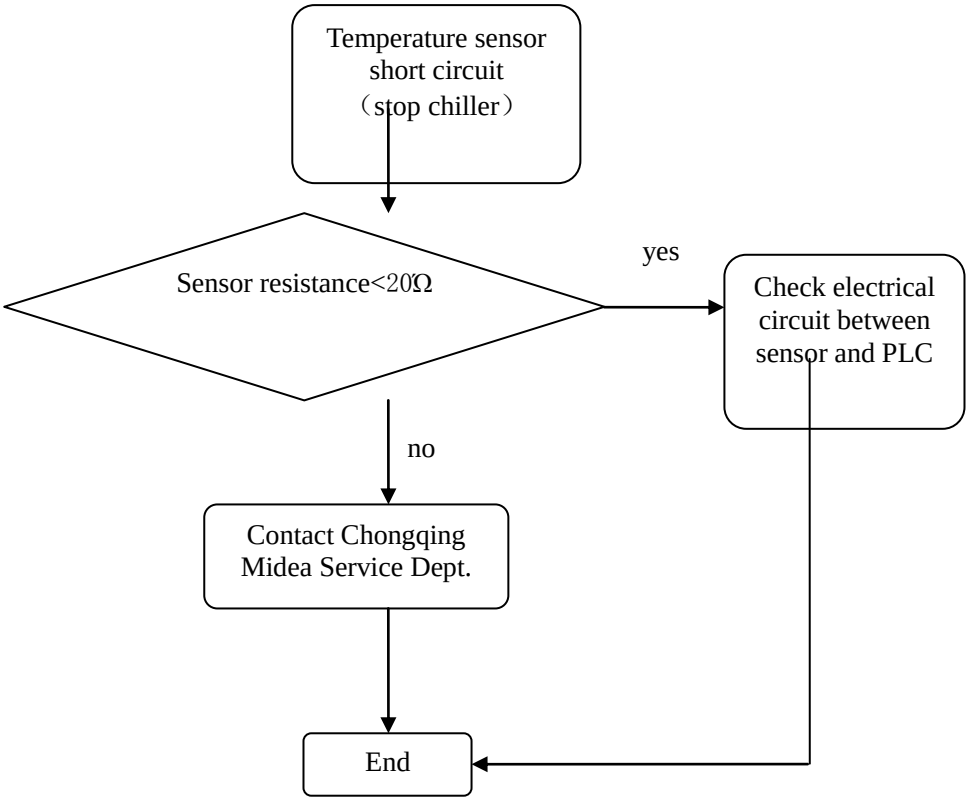
11) Contactor feedback protection



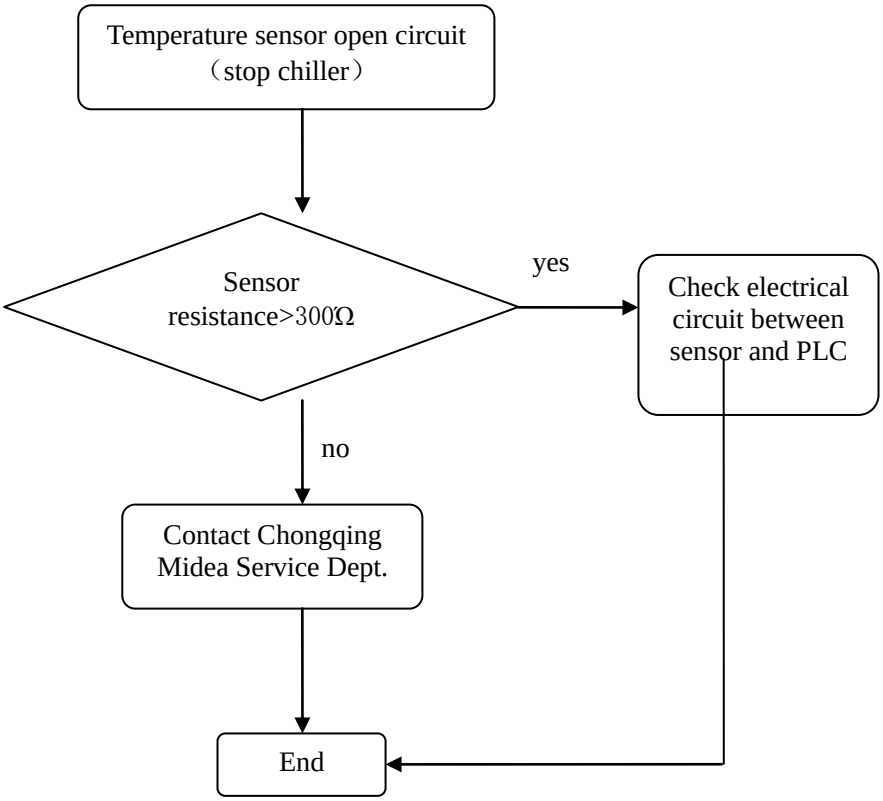
12) Discharge/Fin temperature too high



13) Water outlet/water inlet/ambient/fin/discharge temperature sensor short circuit



14) Water outlet/water inlet/ambient/fin/discharge temperature sensor open circuit



7.8 Chiller operation notice

- To use mixture of different brands lubricant is strictly forbidden and the added oil brand should be equivalent with IOMM required。When replace oil the oil remains in the compressor and chiller should be drained out and then new oil can be added and the dry-filter can be replaced. Please also notice some POE dilutes with MO and easily qualitative change thus after new oil added another replace of oil should be carried out to clear the remains oil;
- If emergency occurs during compressor startup, the chiller can be stopped via the "Emergency Stop" in the control panel;
- The set point of electrical expansion valve can not be changed without permission of Midea professionals otherwise normal chiller operation may occur.

8 Trouble shooting

Symptom	Cause	Troubleshooting
I. Compressor does not work	No power (power cut off);	Check and deliver power;
	Switch action (current overload);	Find out the reason for current overload. If the switch volume is too small, change the switch in time. If the pressure is too low, try to improve it;
	Trouble of startup switch;	Examine and change;
	Fuse of the control circuit power source burnt out;	Change;
	Chain control part does not run;	Check whether the water pump of the chain control runs, if not, make it run;
	High and low pressure switch action;	Check the set pressure and regulate;
II. Stop soon after it starts up	High and low pressure switch action;	Ambient temperature is too high; exclude the incondensable gas; if the expansion valve blocks, clean it, if it is damaged, change it; clean away the dust on the fin heat exchanger;
III. Discharge pressure too low (refrigerating status)	Refrigerant not enough;	Add Refrigerant;
	Super heat of expansion valve too high ;	Regulate it;
	Ambient temperature too low;	Check the ambient temperature, if necessary, turn off some fans;
	Suction pressure too low;	Refer to VI.
IV. Discharge pressure too high (refrigerating status)	Too much Refrigerant;	Draw out proper amount of Refrigerant;
	Incondensable gas enters;	Exhaust the gas;
	Fin heat exchanger is dirty;	Clean the fin heat exchanger;
	Temperature of the fin heat exchanger is high;	Check the ambient temperature of fin heat exchanger and whether there is some obstacles affect the supply air rate;
	Supply air not enough for the fin heat exchanger;	Check the operation status of the Fan;
	High pressure gauge not accurate;	Change a new high pressure gauge
	Suction pressure too high;	Refer to V;
V. Suction pressure too high (refrigerating status)	Refrigeration load too large	Regulate it;
	Super heat of expansion valve too low ;	Regulate it;
VI. Suction pressure too low (refrigerating status)	Refrigeration not enough;	Add refrigeration;
	Dry filter blocks;	Clean it or change another filter sieve;
	Refrigeration load too small;	Regulate it;
	Cooling water not enough;	Regulate it;
	Cooling water filter blocks;	Clean it;
VII. Suction pressure too high (heating status)	The temperature of fin heat exchanger is high;	Check the ambient temperature;
	Super heat of expansion valve too low ;	Regulate it;
VIII. Automatic capacity adjustment device does not	Thermoregulation device trouble;	Change a new one;
	Magnetic valve power off;	Change a new one;
	Capillary pipe blocks;	Clean (by professional)

Symptom	Cause	Troubleshooting
work		
IX. Compressor overheat	Compressor bearing not good;	Renew the compressor;
	Pressure of the high pressure side is too high;	Refer to IV;
	Temperature of the refrigerant at the low pressure side too high	Regulate the pressure of low pressure side and the width of expansion valve;
	Motor overheat;	Refer to XV;
X. NFB tripping	Layout short trouble;	Measure the insulation resistance;
	Layout grounding;	As above
	Compressor motor trouble;	Measure the resistance of the compressor motor to ground and phase to phase insulation resistance;
XI. Compressor motor overload relay action	Single-phase running due to NFB tripping;	Check it;
	The voltage too high or too low or without balance;	Check the electric power distribution status;
	Single-phase running due to bad magnetic switch;	Repair it or change a new one;
	Motor not good;	After regulating, repair it or change a new one; if damaged, refrigeration media circuit must be cleaned;
	Temperature inside the electric power distribution cabinet is too high;	Remain below 60℃, find out the reason for overheating, and eliminate the trouble;
	Running pressure too high;	Refer to “IV”
	Compressor starts up too frequently;	Check each automatic adjustment device;
	Refrigerator oil in the compressor not enough;	Clean the filter sieve.
XII. Multi communication error	Communication wiring damage	Check communication wiring
	Auxiliary unit is power failure	Supply power to auxiliary unit

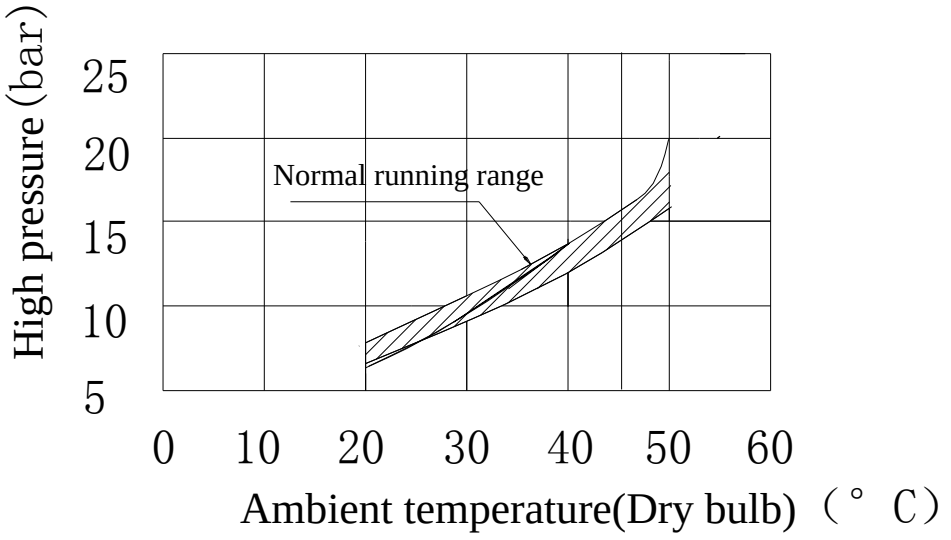
9 Maintenance

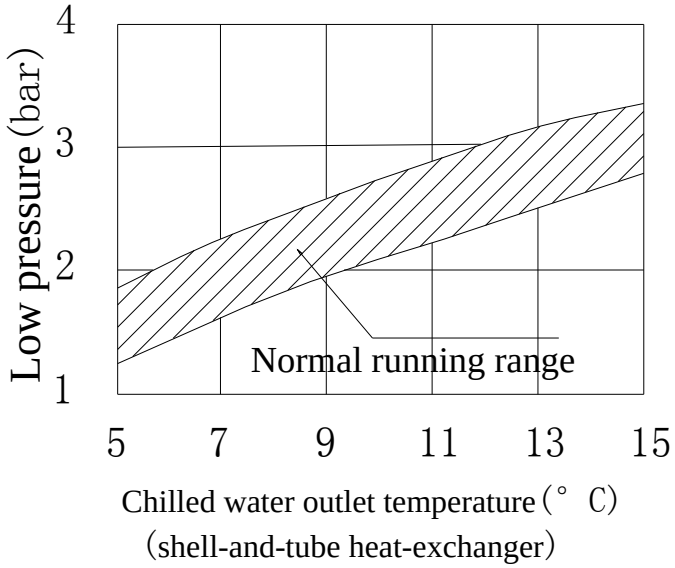
Warning
All Maintenance should be carried out by professionals of Midea.

Notice
Please copy the appendix 1～3 for recording the daily maintenance data.

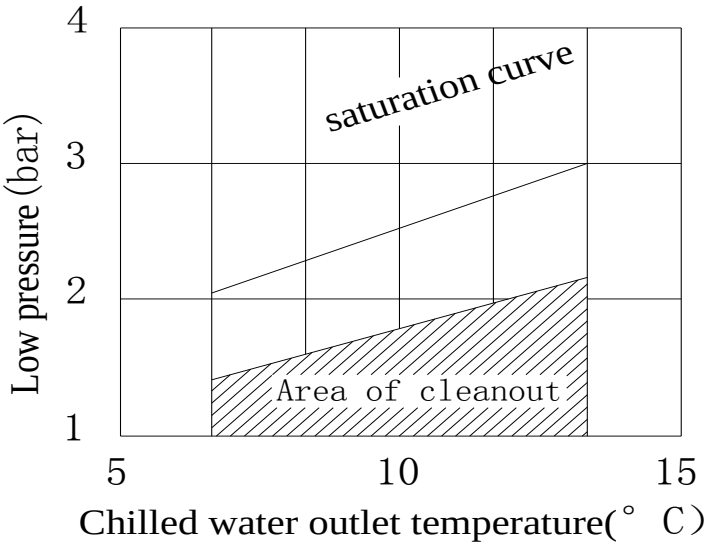
9.1 Chiller normal operation pressure

Low pressure: Normal operation pressure range of shell-tube heat exchanger as follows: low pressure<1.5bar indicates abnormal operation (low pressure can be<1.5bar when chiller startup and the pressure will increase to normal range after chiller operates stably)
High pressure: Normal operation discharge pressure as follows: high pressure<6.7 bar or >20.5 bar indicated abnormal operation.
If the pressure abnormal occurs after the chiller operates stably please refer to Chapter 8.0





9.2 Cleaning of Shell and Tube Heat Exchanger



- Stop the unit, turn off the circulative water pump, cut the connection of shell-and-tube heat exchanger, and install an anti-acid water pump to form a circulative water circuit as Figure 5-1.

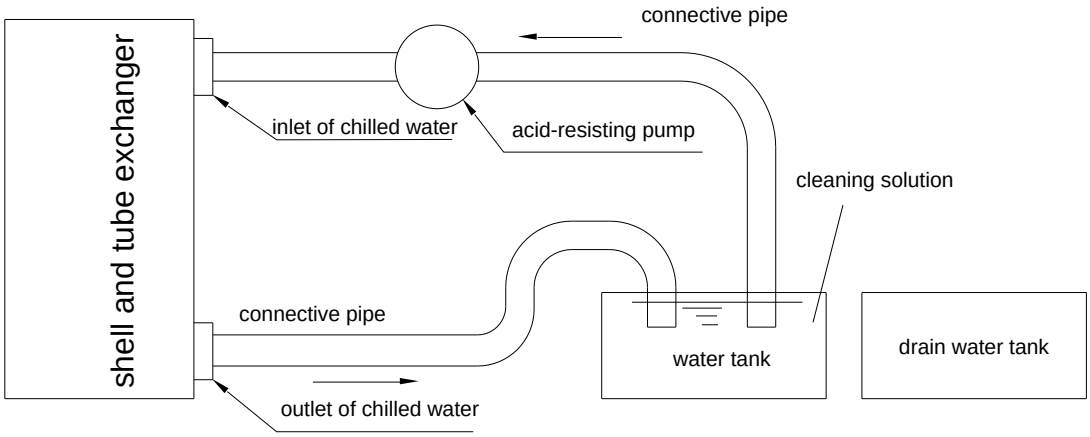


Figure 5.1 Connection of Cleaning Water System

- Add clean water to the cleaning water box, run the anti-acid water pump, make sure the water pipe is well fixed and no water leak at the connection point. Watch closely whether there is abnormal sound when running, make sure the surroundings are well ventilated, protect the equipment near the unit, and prevent equipment damage due to cleaning fluid.
- Let out the remaining water in the air-conditioning system, add diluted cleanser in the cleaning water tank to the unit with anti-acid water pump, and circulate the cleanser for proper time (circulative time depends on the type of cleanser, its concentration and dust thickness).
- Stop the anti-acid water pump; put the waste liquid after cleaning into the waste liquid tank, and the clean water to cleaning water tank. Turn on the water pump and clean the system with clean water, test its PH, add neutralizer until its PH reaches 7. Circulate until neutralization finished. Let out the water, run the circulative water pump and clean the system with water until no furring liquid flows out.
- Put the water after cleaning to the disposed water box; neutralize it with neutralizer, contact special company which deals with disposed liquid for the treatment.

Connect the pipes of the unit again according to operation status, check relative connecting points, and make sure the unit run normally;

Notes for using the cleanser

- When doing the cleaning, wear rubber gloves, do not let the cleanser split to the clothes, face or the surface. Clean with water right away once touch the cleanser;
- Use rubber or glass container for the cleanser, do not use lead container.
- Neutralize the used cleanser with lime or soda ash. Contact special company which deals with disposed liquid for the treatment.

- The cleanser does harm to human body, put it out of children's reach;
- Run the unit again after it is cleaned to confirm the cleaning effect. If expected effect is not achieved, clean it again.

9.3 Replacing of Dry Filter

Close the shut-off valves at two ends of the dry filter (If there is only one shut-off valve at one end of the dry filter, refrigerant must be recycled);

- Exhaust some refrigerant in the dry filter;
- Open the dry filter; Take out the old core of the dry filter and put in a new one;
- Cover the dry filter (Check whether any damage occurred to the seal gasket when dissembling), tighten the bolt;
- Vacuumize some parts of the dry filter;;
- Open the shut-off valve and prepare for startup;

Dry-filter

9.4 Lubricant

LSBLGCW serials air-cooled screw chiller already charged with enough lubricant before delivery, the lubricant features as follows

Lubricant: BSE170

Viscosity: 170

Tow possible reasons may result chiller startup invalid or chiller stop caused by low oil level alarm after chiller long operation:

- Oil dissolves with refrigerant and should be reclaim
- Lubricant charge deficient, follow procedures should be taken:

Procedures:

- Run chiller in full load for 90 minutes then check whether the compressor oil level rises

- Chiller startup again and normally operate, if low oil level still exists it indicates lubricant charge deficient.

  If compressor inside pressure equals 0 the lubricant can be charged via oil fill plug on compressor; If compressor inside pressure higher than 0 bar, the oil charge should be done by oil charging machine.

- The oil charged should be equivalent with the IOMM required brand and type.

9.5 Refrigerant charge and pumpdown

LSBLGCW serials air-cooled screw chiller already charged with enough refrigerant before delivery and tested. This section only shows the procedure of charging refrigerant after replacement of parts and those procedures should be carried out by Midea professionals only.

- Charging and pumpdown method:

1) Charge the refrigerant through the needle valve on the cut-off valves of each end of the dry-filter after chiller vacuumized.
2) Pumpdown the refrigerant through the needle valve on the cut-off valves of each end of the dry-filter
3) Special pumpdown device should be used when charge/discharge the refrigerant（R134a）. Pumped out refrigerant should be stored in liquid tank which accords with the chiller design pressure and related pressure vessel design requirements. Directly discharge the refrigerant（R134a）to drainage or atmosphere is not allowed.

- Refrigerant deficiency judgment：

Inspect the foam in sight glass on refrigerant liquid line to check whether chiller refrigerant is deficient and meanwhile inspect the evaporating pressure.

Ensure chiller runs in full load condition and follow the procedures in control section to inspect whether chiller operates in full load.

Check the evaporator leaving water temperature in the range of 6 +0.5℃ when chiller runs in full load.

Inspect the sight glass in liquid line, if no foam exist and compressor sight glass is approximately full, also the evaporating temperature is in normal range, it indicates sufficient refrigerant charge and no addition refrigerant is needed.

If foam occurs in sight glass and the beads lies in the bottom of sight glass, also the evaporating temperature significantly, it indicates the refrigerant deficient.

9.6 Regular Maintenance Items

Maintenance Items		Maintenance Frequency	Qualify Standards (Settlement)	Note
I. General	Noise	Anytime	Judge whether there is abnormal sound by hearing;	Watch from one meter away from the center of the unit;
	Vibration	Anytime	Watch whether the swings of distribution pipes and components are too large	
	Voltage	Anytime	Rating voltage is within ±10%	
II. Appearance	Clean	Anytime	Keep it clean anytime	
	Rust	Anytime	Rust removal by metal brush, then paint anti-rust lacquer	
	Calm	Anytime	Lock each snail	
	Insulation material flakes	Anytime	Stick it	
	Water leak	Once/ Month	Check whether the exhaust water pipe blocks	
III. Compressor	Noise	Anytime	Whether there is abnormal sound when starts up, runs or stops	
	Insulation resistance	Once/ Year	Above 5MΩ is required when testing with DV500V high resistance meter	
	shockproof rubber gets old	Once/ Year	Flexible when pressed with hands is qualified	
	Medium check	Once/3000 hours	Pay attention to the noise libation and oil level	
	Medium check	Once/6000 hours	Confirm the action of safety device and protection device	
IV. Fin heat exchanger	Fan	Anytime	Normal wind amount, high pressure in the normal range	
	Clean frequency	Once/Month	Normal wind amount, high pressure in the normal range	
V. Shell-and-tube heat exchanger	Water flow of the user side	Anytime	Within ±5% of the standard	
	Temperature	Anytime	Within the standard	
	Antifreeze concentration	Once/Month	Make sure it is set above the concentration	
	Water quality	Once/Month	Within the standard	Refer to water quality furring relations drawing
	Purity	Anytime	The low pressure is within the standard when cooling	
			The high pressure is within the standard when heating	
	Drainage	Anytime	Drain all the water if it is not used for a long time	Drain water in the distribution pipe
VI. High and low pressure switch	Action	Once/Month	Check according to “Protection Devices Action ”	Whether the match point is good
VII. Pressure Gauge	Finger	Once/ Half of a year	Compare with correct pressure gauge	
VIII. Globe valve	Action	Once/Month	Smooth action on globe valve	

Maintenance Items		Maintenance Frequency	Qualify Standards (Settlement)	Note
			switch	
IX. Refrigeration circle	Refrigeration leak	Once/Month	Check whether there is refrigeration leakage inside the unit or at the distribution pipe connecting points. Let out all the water inside the shell-and-tube heat exchanger, and check whether there is any leakage at the water inlet or outlet.	Use the electronic leak detector, or blowtorch leak detector, or soap water.
X. Electrical machine control	Insulation resistance	Once/Month	Above 5MΩ is required when testing with DV500V high resistance meter	
	Wire contact	Once/Month	Insulation layer of the wire must be under good contact condition, without damage, bolt well fixed.	
	Assistant relay	Once/Month	No abnormal action	
	Time-limited relay	Once/Month	Act according to the time set	

9.7 Maintenance Safety Requirement

- Each component should be maintained by qualified technicians. Please contact competent maintenance technicians in the event of leakage or breakdown. The safety devices should be checked after each maintenance. Once leakage occurs, all the refrigerant in unit should be pumped out and the leak point should be repaired and then charge the unit with suitable refrigerant according to the nameplate. Some parts on unit can be separated and if the leakage occurs on these parts it is no need to pump out all refrigerant in system.
- Refrigerant type should be ensured according to the nameplate before charging, to charge incorrect refrigerant will result in severe damages
- Ensure the lubricant type is equivalent with the technical document requirement when charging the lubricant in maintenance.
- Do not vent oxygen to the unit to avoid the violent reaction of oxygen and oil.
- Do not exceed the max. allowed working pressure when unit operates.
- Do not use oxygen for leakage inspection, only refrigerant or dry nitrogen is allowed.
- Do not cut any component or pipes with flames or electrical soldering unless no gas or liquid refrigerant is contained in the unit.
- Toxic gas will be generated when refrigerant contacts with naked flame thus protection should be provided for conveniently available for extinguisher.
- Protection glass should be used for avoiding splashing of refrigerant to skin or eyes. Please use soap and water to clean the refrigerant on skin and if refrigerant splashes into eyes by accident, use water to wash eyes repeatedly and immediately go hospital.
- Do not use naked flame or steam to heat refrigerant containing vessel otherwise over high pressure will result in severe danger. Only mild temperature water can be used if heating refrigerant is needed.
- Do not remove any cover or connection when chiller is operating or with internal pressure.

Ensure no internal pressure exist in unit before open any valve which may connected to atmosphere.

- If any contamination, corrosion or mechanical damage exists in valves, do not try to repair or reset any safety device.Please replace it when needed.

Appendix 1

Daily Inspection Log Sheet

Date	Ambient T（℃）	EEWT （℃）	ELWT（℃）	Discharge P （bar）	Suction P （bar）	Discharge T （℃）	Suction T （℃）
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

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Appendix 2

Key Component Inspection Log Sheet

Item	Compressor			Water-side Heat Exchanger			Air-side Heat Exchanger			Fan			Valve			Control Box			Other		
Interval (year)	Date	Inspector	Content	Date	Inspector	Content	Date	Inspector	Content	Date	Inspector	Content	Date	Inspector	Content	Date	Inspector	Content	Date	Inspector	Content
0.5																					
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					

Note：1.Fill each blank of CONTENT with either A,B or C， A：Normal B：Replace some parts C：Repair some parts

2.Inspection key point：①color of compressor oil ②oil pressure differential ③pressure differential of dry-filter and color of indicator paper in sight-glass.

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Appendix **3**

Repair（Maintenance）Record

No.	Fault Description	Maintenance	Result	Recorder
1				
2				
3				
4				
5				
6				
7				

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Relationships of the water quality and furring and corrosion amount

No.	Water Quality	Furring	Corrosion	Note
1	PH≤6 water	Hard	Large	Water insoluble matter $CaSO_4$ is very easy to be produced
2	PH≥8 water	Soft	——	Soft flow sediment formed with Fe^+ or Al^+
3	Water contains much Ca^{2+} and Mg^{2+}	Hard	——	Hard furring is easy to be produced
4	Water contains much Cl^-	Dirt	Very strong	Heavy corrosion to copper and iron
5	Water contains much SO_4^{2-} and SiO_2^{2-}	Hard	Large	$CaSO_4$ and $CaSiO_2$ are very easy to be produced
6	Water contains much Fe^{3+}	Much hard furring produced	Large	Deposit of $Fe(OH)_3$ and Fe_2O_3
7	Smelly water	Much dirt	Very strong	Sulfide, ammonia and marsh gas are easy to be produced, H_2S corrupts copper heavily
8	Contains organic matter	Much dirt	——	Furring is very easy to be produced
9	Exhaust gas from automobiles, chemistry factories, plating factories, sewage treatment plants, ammonia refrigerating factories, and fiber factories		Large	Copper pipe of the heat exchanger is corrupt because of bad water quality, thus perforation is produced
10	Dusty places, plastics factories for example	Much dirt		
11	Sulfite gas in the air		Very strong	