Kalstein

YR Recirculating Chiller
(YR02293 to YR02305)

Instruction Manual

Thank you very much for purchasing our Recirculating Chiller YR.

Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a hand place for future reference.

Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

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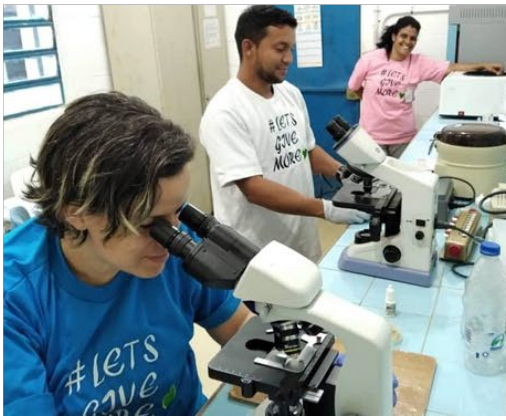

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Contenido

NAME AND MODEL

Recirculating Chiller YR02301

USE

Kalstein´s YR Recirculating Chiller use its compressor and circulating pump can provide low temperature liquid to outside. This compact chiller is particularly designed for lab scale rotary evaporator. YR Kalstein´s Series Recirculating Chiller provides low temperature liquid to other machines with its cooling system and circulating system.

PRODUCT INTRODUCTION

Thanks for choosing “YR Series Recirculating Chiller” . This operation manual stated the installation, using, maintaining and servicing of recirculating chiller. Before using this instrument, please ensure that you have read and understood this manual completely.

- Safety

This chapter describes the installation, safety rules in the process of using of “YR Series Recirculating Chiller”. Users must grasp the related warning signs, strictly abide by the operation procedures to ensure the security of the equipment and personal and avoid the occurrence of accident.

  - User’s Qualification

YR Series Recirculating Chiller must be operated by the person who has the

practical operating experiences and can grasp of the detailed requirements in this manual. Otherwise, it must be used under the guidance of the person who has the related technology skills.

- Proper Use

YR series recirculating chiller requested to install indoor, it can be used with many kinds of devices to provide low-temperature condition for experiment or production.

Application fields:

a) Can be used to cool the rotary evaporator and reactor.

b) YR02302 to YR02305 high pressure circulating pump can be used to cool analytical instrument such as AAS, ICP, etc.

c) YR series recirculating chiller can also provide cooling liquid to EM, laser device, etc.

- Improper Use

The operation that not according to the related stipulation in this manual are regarded as improper use. Any damage caused by improper use are responsible by the users themselves.

- Operating under the following conditions is prohibited:

a) Used in explosive gas environment or explosive dust environment;

b) Used in the places which the power supply is not in conformity with the requirements;

c) Used in high magnetic fields, corrosive environment.

- ## Warning Sign

Sign	Description
 Danger	Danger It shows that the situation is very dangerous and will lead to death or serious injury.
 Warning	Warning It shows that the situation is very dangerous and will lead to death or serious injury.
 Note	Note It shows that the situation is very dangerous and will lead to injury.
 Prohibit	Prohibit Get wet in the rain or splashing water.
 Note	Note Beware of close to the rotating parts.
	Note Please wear protective equipment, otherwise may cause personal injury.
Reminder	Reminder May cause equipment damage.

Especially pay attention to each warning sign.

- ## Hazards Related to the Instrument

Please pay attention to the following safety tips:

 Danger	Danger ● Do not use it in explosive gas environment or explosive dust environment
 Prohibit	Prohibited ● Do not use it outdoor. Get wet in the rain or splashing water will cause electrification on metallic shell surfaces, and will cause casualties.
 Warning	Warning ● Make sure the power supply is in conformity with the requirements on the nameplate. ● Please put the equipment equipotential connection and earthed reliably.

	● Before open the equipment enclosure for maintenance and repair, be sure to disconnect the power supply, then operate it after 5s, ensure the residual voltage release to safety value to avoid electric shock. ● In the case of equipment shell not installed completely, do not use the equipment put into use to prevent electric shock. ● If found the refrigerant leakage, please open the ventilation device to reduce the cold media content in air as soon as possible. ● Side plate clasp hands shall not be used for move devices
 Note	Note ● If there's any abnomal situation when using it, pleaase disconnect the power supply immediately for troubleshooting or contact professional maintenance personnel. ● Please wear leather working gloves when cleaning and maintenance. Beware of condenser fin injure your hands.
 Note	Note Do not close to the rotating parts in case of personal injury.
Reminder	Reminder ● Do not use it in the high temperature, moist environment. Otherwise, it will affect the normal running and lifetime. ● Clean the condenser regularly. The device cooling capacity will reduce and the power consumption will increase when the condenser jammed with dirt. ● Reserve a certain amount of space near the inlet and outlet of the equipment. Do not put any items within 0.7m of its inlet and outlet. The cooling capacity will decrease if there's any blocks. ● Choose secondary refrigerant. Please choose suitable secondary refrigerant according to the operating temperature range and equipment components material. ● Do not rotate the circulating pump empty in case of damaging it. ● Keep well ventilated around the equipment.

○ Other Hazards

 Warning	Warning ● If there's any corrosive material such as acid, alkali vapor around the equipment, the equipment insulation will be damaged and the components performance and service life will be impacted. ● Do not contact the secondary refrigerant of these series equipments with foods, drugs and tobacco in case of personal injury.

○Safety Measures

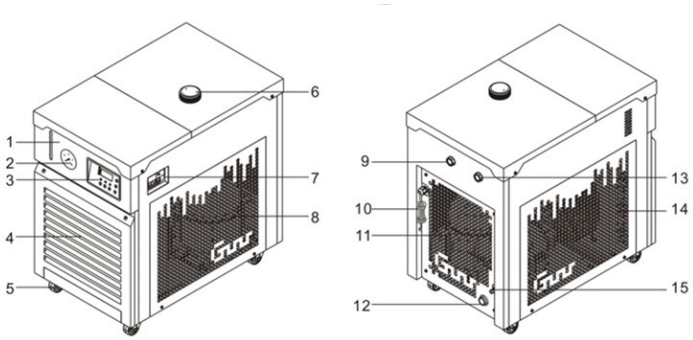
	● Please wear personal protective equipment when operating this instrument, such as protective glasses, protective clothing and gloves

- **Instrument Synopsis**

YR series recirculating chiller use its compressor and circulating pump can provide low temperature liquid to outside.

Model instruction:

- **Instrument Configuration**



F1. YR02293、YR02294、YR02295、YR02297、
DL YR02298 and YR02299 Recirculating Chiller

1 Liquid level window	6 Filling port	11 Back board
2 Bath fluid outlet pressure gauge	7 Circuit breaker	12 Liquid drain port
3 Control panel	8 Right board	13 Bath fluid outlet
4 Front board	9 Bath fluid inlet	14 Left board
5 Caster	10 Power cord	15 Overflow port

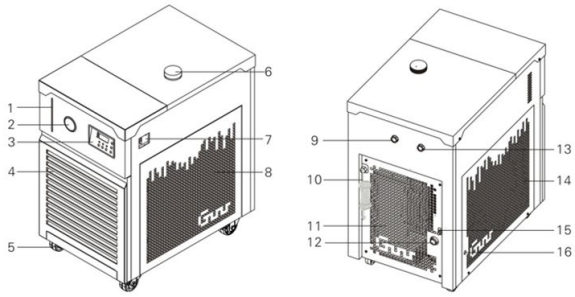


Figure 2　YR02302、YR02303 and YR02304 Recirculating Chiller

1 Liquid level window	6 Filling port	11 Back board	16 Adjust pump pressure
2 Bath fluid outlet	7 Circuit breaker	12 Liquid drain port	
3 Control panel	8 Right board	13 Bath fluid outlet	
4 Front board	9 Bath fluid inlet	14 Left board	
5 Caster	10 Power cord	15 Overflow port	

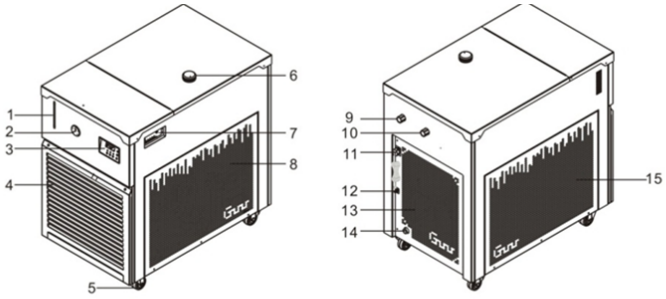


Figure 3　YR02305 and YR02300 Recirculating Chiller

1 Liquid level window	6 Filling port	11 Power cord
2 Bath fluid outlet pressure gauge	7 Circuit breaker	12 Overflow port
3 Control panel	8 Right board	13 Back board
4 Front board	9 Bath fluid inlet	14 Liquid drain port
5 Caster	10 Bath fluid outlet	15 Left board

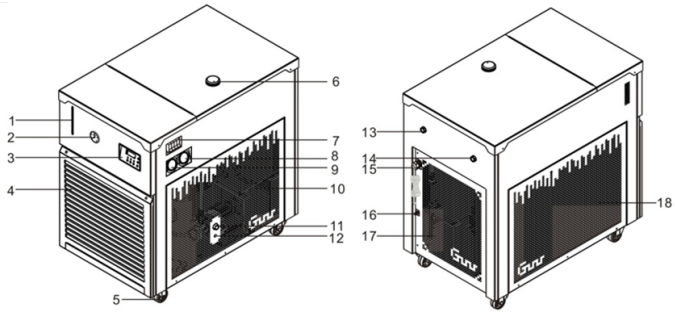


Figure 4　YR02305 Recirculating Chiller

1 Liquid level window	7 Circuit breaker	13 Bath fluid inlet
2 Bath fluid outlet pressure gauge	8 Condensing pressure gauge	14 Bath fluid outlet
3 Control panel	9Evaporating pressure gauge	15 Power cord
4 Front board	10 Right board	16 Overflow port
5 Caster	11 Liquid drain port	17 Back board
6 Filling port	12 Adjust pump pressure	18 Left board

- Control Panel Instruction

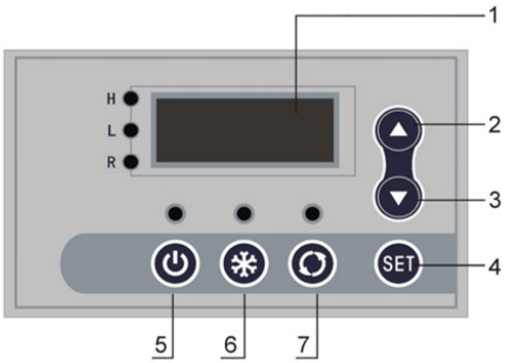


Figure 1.5 Control panel

1 Temperature display window

2 Up key

3 Down key

4 "SET" key

5 Power switch

6 Cooling switch

7 Circulation switch

UNPACKING AND INSTALLATION

1) Open the outer packing, read the user manual carefully, and check whether the components are complete or not compare with the packing list.

2) Please placed it correctly for more than 12hours before starting up.

3) Place the equipment stability. Keep well ventilated and maintain the ambient temperature below 35℃.

Note: Do not cover the ventilation opening of the apparatus.

4) Twine some PTEE seal tape clock wisely at the screw connection of valve, tight it a lign with the equipment liquid inlet and outlet. Then use the tube to connect the valve and cooling load.

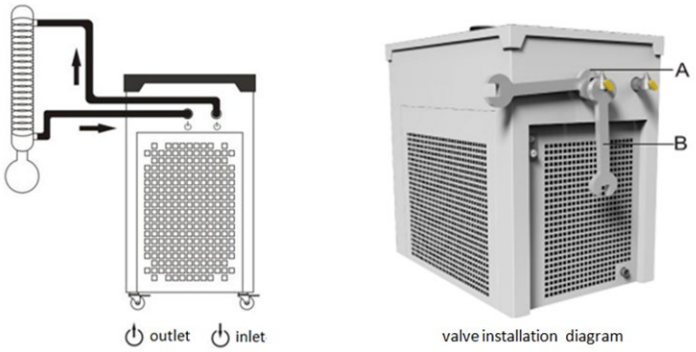


Figure 2.1 Equipment external connection diagram

5) If there's any liquid splash or sprinkle on the surface of shell, please wipe clean first, and use it again after confirming the components are intact.

SPECIFICATIONS

Table 3.1 YR series recirculating chiller specifications

Model		YR02293	YR02294	YR02295	YR02296
Minimum no-load temperature (℃)		-10			
*Operating Temperature Range (℃)		-10～25			
Ambient temperature (℃)		5～35			
Environmental relative humidity (%)		≤70			
Power supply (V/Hz)		1～，220V，50Hz			3～，380V，50Hz
Temperature display		Digital			
Temperature stability (℃)		±2			
Sensor indexing number		Pt100			
Safety protection		Delay, overheating, overcurrent			
**Cooling capacity at 15℃ (W)		1000	2000	3000	6000
Total power(W)		1200	1408	1920	3325
Refrigerant		R134a			
Circulating pump	Flow(L/min)	30			40
	Pressure(bar)	1			1.4
Outer loop interface		Thread connection: R1/2″			Thread connection: R3/4″
Connection hose		Silicone rubber hose: Φ13×Φ9mm			
Material of liquid storage tank		SUS304			
Dimension of complete machine L×W×H(mm)		690×435×720	690×465×820	760×495×860	1055×650×1070
Total weight(kg)		70	80	108	195

Table 3.2 YR series recirculating chiller specifications

Model		YR02302	YR02303	YR02304	YR02305
Minimum no-load temperature (℃)		-10			
*Operating Temperature Range (℃)		-10～25			
Ambient temperature (℃)		5～35			
Environmental relative humidity (%)		≤70			
Power supply (V/Hz)		1～，220V，50Hz			3～，380V，50Hz
Temperature display		Digital			
Temperature stability (℃)		±2			
Sensor indexing number		Pt100			
Safety protection		Delay, overheating, overcurrent			
**Cooling capacity at 15℃ (W)		1000	2000	3000	6000
Total power(W)		1165	1370	2200	3800
Refrigerant		R134a			
Circulating pump	Flow(L/min)	7	7	16	16
	Pressure(bar)	1～10	1～10	1～10	1～10
Outer loop interface		Thread connection : R1/2″			
Connection hose		SBR synthetic rubber: Φ17×Φ10mm			
Material of liquid storage tank		SUS304			
Dimension of complete machine L×W×H(mm)		690×435×720	690×465×820	760×495×860	1055×650×1070
Total weight(kg)		70	80	108	195

* Operating temperature range should ≤ RT-5℃.

**Ambient temperature is 25℃, secondary refrigerant temperature is 15℃

Table 3.3 YR series recirculating chiller specifications

Model		YR02297	YR02298	YR02299	YR02300
Minimum no-load temperature (℃)		-30			
*Operating Temperature Range (℃)		-30～5			
**Ambient temperature (℃)		5～35			
Environmental relative humidity (%)		≤70			
Power supply (V/Hz)		1～，220V，50Hz			3～，380V，50Hz
Temperature display		Digital			
Temperature stability (℃)		±2			
Sensor indexing number		Pt100			
Safety protection		Delay, overheating, overcurrent			
Refrigerant		R410A			R404A
Total power (W)		1070	1475	1935	2820
Cooling capacity (W)	0℃	1250	1750	2800	6000
	-10℃	800	1100	1800	4000
	-20℃	300	700	1000	2500
	-25℃	150	300	500	1100
Circulating pump	Flow(L/min)	20			40
	Pressure(bar)	0.6			1.4
Outer loop interface		Thread connection: R1/2"			Thread connection: R3/4"
Connectin hose		Silicone rubber hose: Φ13×Φ9mm			
Material of liquid storage tank		SUS304			
Dimension of complete machine L×W×H(mm)		690×435×720	690×465×820	760×495×860	1055×650×1070
Total weight(kg)		70	80	108	195

* Operating temperature range should≤RT-5℃.

** Ambient temperature is 25℃

OPERATING

- **How to choose secondary refrigerant**

Target temperature decide the secondary refrigerant type of YR series recirculating chiller. Secondary refrigerant should be non-toxic, non-corrosive, viscosity ≤ 22mPa•s at low temperature.

a) The distilled water or deionized water was recommended as a refrigerating medium when operating temperature above 10 ℃.

b) Ethylene glycol aqueous solution or 99% (mass fraction) of ethanol was recommended as a refrigerating medium when operating temperature between -30～10℃.

Table 4.1 The correspondence for the ratio of ethylene glycol aqueous solution and freezing point

Mass fraction（%）	15	25	30	40	50	55
Freezing point（℃）	-5	-10	-15	-22	-33	-40

Note:

Ethanol is flammable item, caution risk of fire!

c) Explosion limits: 3.5%～18.0%(volume)； Open cup flash point： 13℃。

d) Users can choose suitable refrigerant according to the demand.

e) It is prohibited to use brine (KCl/H2O, NaCl/H2O, CaCl2/H2O)as refrigerant medium.

f) The secondary refrigerant shouldn't corrode stainless steel, chromium and silicone rubber material.

- How to add secondary refrigerant

Open the upper lid of filling hole, pour the refrigerant into the reservoir slowly. When pour into the refrigerant, observe the liquid level of liquid level display tube. Liquid volume must exceed the minimum liquid level of display tube, do not exceed the maximum liquid level. Install the filling hole upper hole after filling.

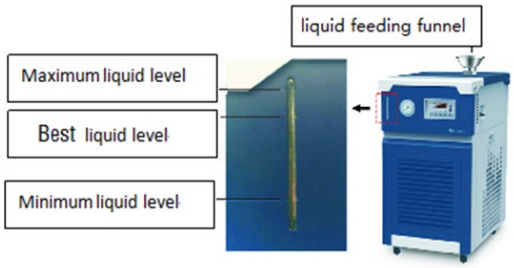


Figure 4.2

- Power Connection

The required power must be provided in accordance with the requirements for equipment nameplate in the power properties. And shall meet the following requirements:

(1) The power supply must be grounding reliably.

a) Users need to offer three pole security socket with protective earthing line for single phase power supply recirculating chillers.

b) For three-phase power supply recirculating chillers, users power supply should be three phase four wire.

(2) Three-phase power supply recirculating chillers has phase sequence relay in it. The connected power phase sequence should be consistent with recirculating chiller requirements. Otherwise, the chiller will not boot properly. At this point, exchange any two-phase line connection.

Note:

Responsibility shall be borne by the user if they don't connect the power supply not according to the above requirements to cause people get an electric shock or equipment damage.

- Starting up and setting specifications
    - Close circuit breaker

Placed the circuit breaker (7) of the right side of the panel to " | "to switch on the power supply. The power will be disconnected if the circuit breaker (7) at "O".

    - Temperature setting

Press "⏻" Power switch on control panel as shown in figure 1.5.1， indicator light will be lighted up, "Temperature display window ▮▮" shows "InPO"at the same time. After 4s it will enter the running state, "Temperature display window ▮▮"start to display the actual measurement temperature.

1) Press "SET", "Temperature display window ▮▮"display settled temperature character "SP", then press "▲"again or "▼"to increase or decrease settled temperature to required temperature.

2) Press "▲" or "▼"once， set the temperature increase or decrease 0.1℃；Touch &Hold "▲" or "▼" above 3s，the settled temperature will increase or decrease. After to the settled temperature, press "SET", this settled temperature will be automatic save. If you don't press "SET" for a period of long time, it means to give up this setting, the program will auto-exit and maintain original settled valve.

- Open circulation unit

The recirculation system must be started before start the cooling function, otherwise the equipment can't work normally. There's a vacuum gauge in the recirculation

system which can display outlet pressure of the system.

In the guarantee the circulation line under the premise of valves are in the open state, press “button” on the control panel in figure 1.5.1, start the recirculation pump, then the recirculation system will start working.

- Adjust high-pressure circulating pump

YR series, users can adjust outlet pressure according to the demand. Closed the outlet valve of recirculation system in figure 2.1, use a screwdriver to adjust high-pressure of recirculation pump, the pressure will be increased if adjust it clockwise, otherwise the pressure will be decreased. Adjust time should not exceed 10s. Open the outlet valve of the recirculation chiller after it reach the required pressure, the system will be working normally.

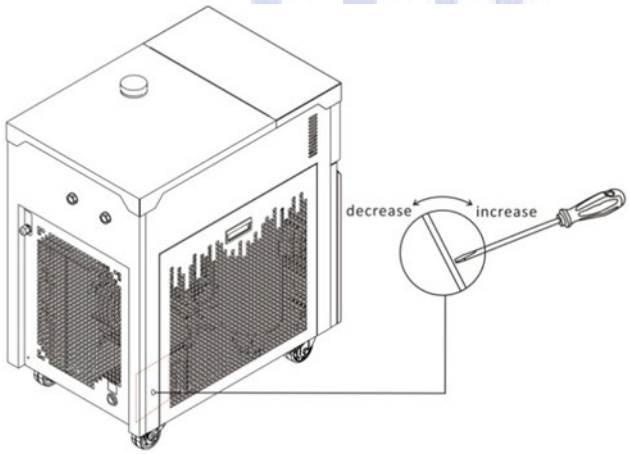


Figure 4.6 Adjust pressure of high-pressure circulating pump

- Open cooling unit

After set the parameter and start the circulation system, press “❄” switch， Compressor will start working. When the temperature decreased less than the settled temperature 1.8℃，the compressor will stop working automatically. When its temperature 2℃ higher than settled temperature (The compressor needs to reach its delay time) the compressor will start working itself. Repeat this progress to make

the circulating system temperature maintained around the settled valve.

- Power off

To ensure normal operation, to close the recirculating chiller should be strictly in accordance with the following steps:

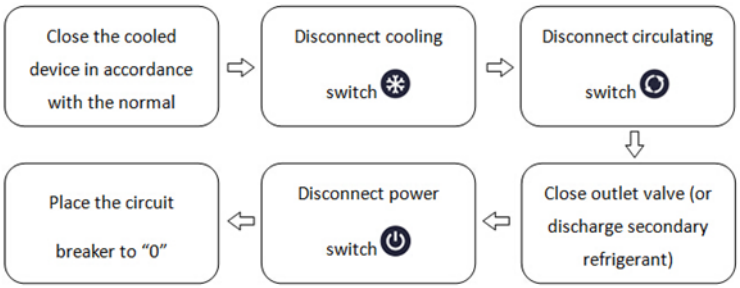


Figure 4.8 Shut down cooling system

Note: If the position of secondary refrigerant inlet of the device which needs to be cold above the recyclable chiller outlet, after using it, please close the recirculating chiller outlet valve first, then stop running circulating pump to avoid secondary backflow. If needs to disconnect the chiller and cold equipment, please take off the connection hose at the secondary refrigerant outlet valve, drain the secondary refrigerant into the prepared container.

PROTECTION FUNCTION

1) The compressor of the equipment has its own overheating protection function, when the compressor overtemperature or overcurrent, it will outage automatically for protection.

2) The equipment's is equipped with a circuit breaker with overload protection and short circuit protection function.

3) YR series recirculating chiller which adopts high-pressure circulating pump, there's a liquid filter at the liquid inlet can filter impurities in the secondary refrigerant to prevent the blade injury from damage, and avoid circulation pipeline blocked.

Note: The equipment protection devices have been executed (or settled) before delivery, users do not change it by yourself.

MAINTENANCE AND MANAGEMENT

Ensure to make the equipment running normally to increase of service life, users should do daily maintenance and management. Before maintenance, please disconnect equipment power supply, preparing tools, materials according to start working according to the specific requirements in the operation manual. Otherwise, it will cause electric shock or equipment damage.

- **Management**

1) Please use soft cloth to wipe the body surface regularly to keep it clean. Direct flush with water is prohibited.

2) Beware of water and other liquid poured into the body except the recirculating system.

3) Do not use a brush, polishing powder, acid and thinner etc. to clean surface of the body

in case of coating damaged.

4) Reservoir must be dried after cleaning in case of pollute the secondary refrigerant medium when using it next time.

5) Please check the equipment connection pipe regularly, if found aging or damage, please replace it according to original specifications.

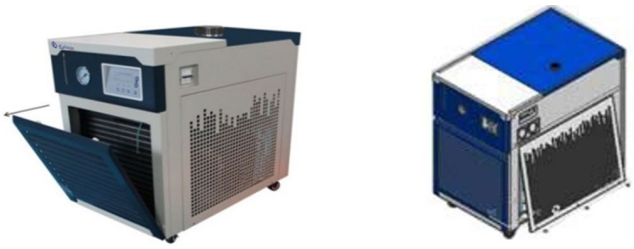
- Maintenance of cooling system

In order to maintain the refrigeration effect, please clean up the cooling system (condenser) regularly. Please follow the steps below:

1) Turn-off the equipment power supply.

2) Pull the shake hands handle of the side plate of the device after making the side plate to outward tilt angle, then move up it to take down as shown in figure6.2.1(a)

3) As shown in figure 6.2.1(b), remove the screw, pull the side plate outward inclined to a certain angle, then pull down the side plate to take it down.



(a) Spring lock tightening (b) Threaded tightening

Figure 6.2.1

4) Clean up the dust on the condenser fin (Suggest to use cleaner or soft brush to

clean it along the direction of the rib.)

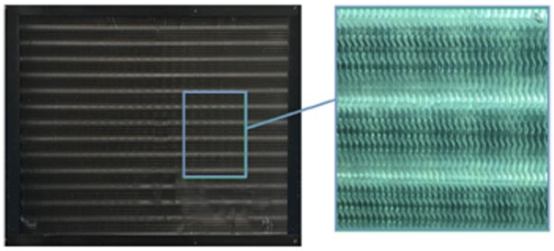


Figure 6.2.2

Note:

Do not touch condenser fin in case of injure hands!

5）After cleared, install the side panels in place.

- **Cleaning of liquid filter**

YR02302、YR02303、YR02304、YR02305 series recirculating chillers have high-pressure circulating pump, there's a liquid filter at the liquid inlet. Please clean it every three months. When cleaning it, unscrew the liquid filter base anticlockwise, take out the filter screen and unclog it. If flush the filter screen with water, please put it back in place after drying it.

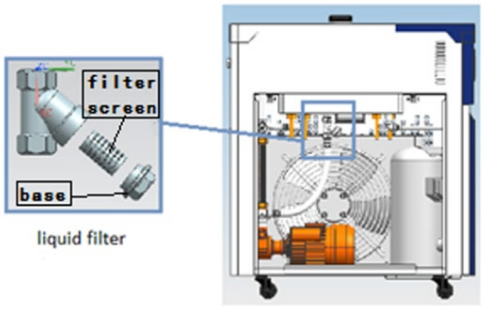


Figure 6.3 Liquid filter position

- **Maintenance requirement**

(1) Equipment maintenance must be done by the professional technical personnel

or the company authorized maintenance personnel.

(2) If the equipment needs to return to factory for maintenance, please contact us.

(3) Before return to our factory:

a) Please clean the equipment to avoid the extent of damage increased in transit.

b) Please fill in fault information records and feedback to us for reference.

c) Please add equipment with safety packaging to avoid shock, collision of the equipment in transit.

- **Common failure reason analysis and troubleshooting**

Table 6.5 The failure phenomenon and elimination

No.	Situation	Probable cause	Solutions
1	Open the power switch and has no display	Power supply is not connected	Check the power circuit
		*The power phase sequence is wrong	Adjust two phase thread connection
2	"-EO-"	Sensor lose contact	Stop using it immediately and contact us or professional maintenance personnel
		Sensor damage	
3	"-E2-"	Controller failure	
4	Temperature lose control	Power grid voltage fluctuation is bigger	Restart it after voltage stabilization
		Temperature controller poor repair stitching	Stop using it immediately and contact us or professional maintenance personnel
		Temperature controller failure	
5	Compressor is running, but Equipment refrigeration effect is poor	The environment temperature is too high	Take measures to reduce the environmental temperature
		Lack or leakage of refrigerant	Check pipelines, please contact us if need maintenance
6	Compressor not running, has abnormal noise	starting capacitance damage	Stop using it immediately and contact us or professional maintenance personnel
		Compressor damage	
7	Abnormal downtime in working process	Temperature controller failure	Stop using it immediately and contact us or professional maintenance personnel
		The compressor overheating	To improve the ventilation envi

		protection		ronment: Check whether the co ndenser fin blocked or not
8	Liquid circulation is abnormal	Circulating pump not working		Stop using it immediately and contact us or professional maintenance personnel
		Circulating pump has started	**Liquid filter was blocked	Open the filter and take out filter screen to clean it
			Liquid inlet was block	Remove the blockages
			The valve in the circulation line not open	Open the valve in circulation line
			Ice jam in the circulating pump	Stop the device then heating and thawing
			Pipeline is not smooth	Check and clean pipeline
9	Air outlet has no airflow or airflow abnormal	The fan not started		Check power lines of the fan
				Fan burn out, replace a new fan
		The fan has started	The fan was stuck	Adjust the position of fan
			Blade deformation	Replace new blade

*Be suitable for recirculating chillers which the input power supply is three phase AC.

**Be suitable for recirculating chillers which configure with high-pressure circulating pump