SIC-R2

Operation Manual of CFC-free

Refrigerant Water Chiller

Date: Jun, 2017

Version: Ver.D (English)

SHINI

Contents

Table Index

Picture Index

1. General Description

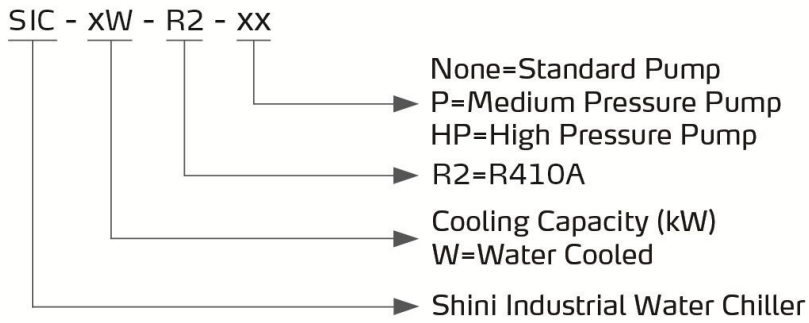
Please read through this operation manual before using and installation to avoid damage of the machine and personal injuries.

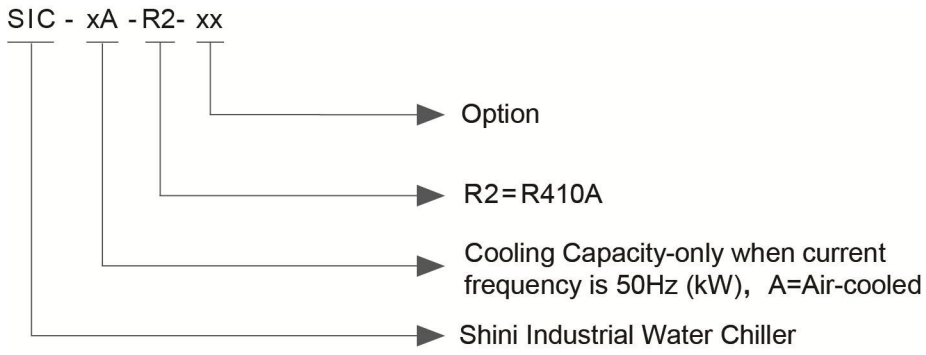
SIC-R2 water chiller comprises of two series; water-cooled and air-cooled, both adopt single vapor compression circuit and equipped with compressor overload protection, pump overload protection, anti-phase and open phase alarm, anti-freeze protection, pressure controller which all ensure a stable and long-service-life performance. This cooler series can cool quickly and stably to meet the customer requirements. It works based on the principle of heat and cold exchange. It is indispensable equipment in modern industry.

Model: SIC-33W-R2

Model: SIC-7.5A-R2

1.1 Coding Principle





1.2 Main Features

- Cooling range 7~25℃.
- Insulated water tank and evaporator made of stainless steel.
- Equipped with anti-freeze therostate.
- Adopt R410A refrigerant to improve coefficient of performance (COP) and R410A is ozone-friendly.
- Refrigeration loop controlled by high and low pressure switches to ensure stable operation.
- Compressor and pump overload protection.
- Adopt precise high-precision temperature controller with an accuracy of ±1℃
- All adopt quality compressors from major supplier.
- Single-system cooler is equipped with low pressure pumps as standard configurations, while two-system and above cooler are equipped with medium pressure pumps as standard configurations.
- SIC-W-R2 Adopt tube-in-shell condenser with excellent heat transfer and rapid cooling.

- SIC-A-R2 Adopt fin style condenser design. Without any need of cooling water for excellent heat transfer and rapid cooling.
- Hot air bypass valve can be opted for balancing cooling capacity to achieve accurate temperature control and prevent machine starts/stops frequently.
- Equipped with RS485 communication interface to realize centralized monitoring.

All service work should be carried out by a person with technical training or corresponding professional experience. The manual contains instructions for both handling and servicing. Chapter 7, which contains service instructions intended for service engineers. Other chapters contain instructions for the daily operator.

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

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

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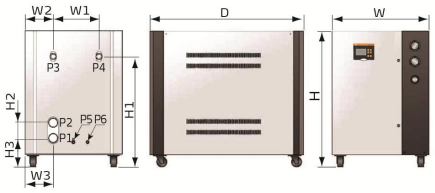
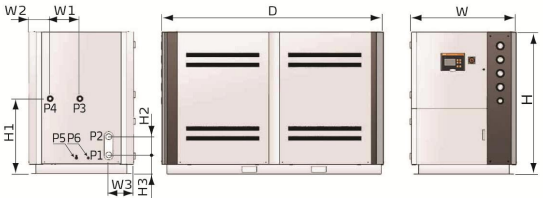
1.3 Technical Specifications

1.3.1 External Dimensions

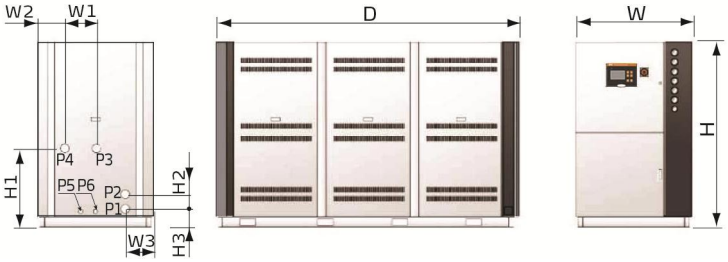
(SIC-W-R2 Series)



SIC-9W~42W-R2

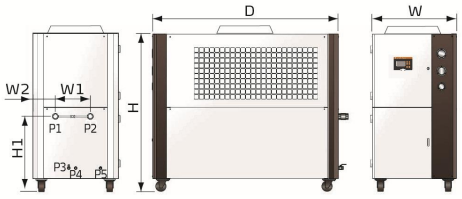


SIC-56W~84W-R2

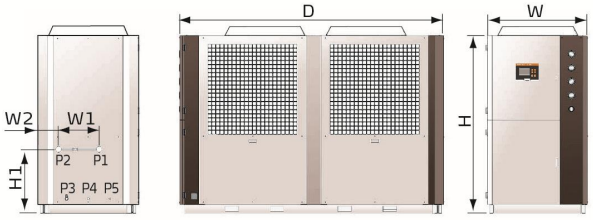


SIC-112W~132W-R2

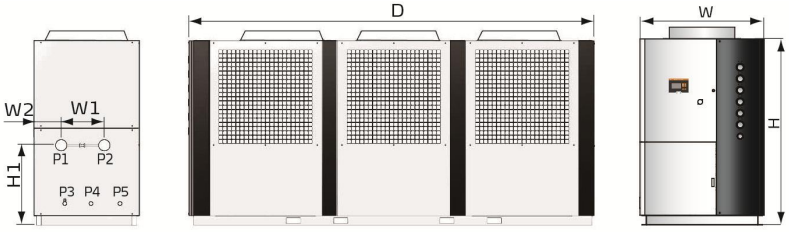
(SIC-A-R2 Series)



SIC-7.5A-R2~SIC-38A-R2



SIC-48A-R2~SIC-75A-R2



SIC-100A-R2~SIC-114A-R2

Picture 1-1: Outline Dimensional Drawing

Table 1-1: Specifications

Model	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	W (mm)	W1 (mm)	W2 (mm)	W3 (mm)	D (mm)
SIC-9W-R2	970	790	91	207	605	273	164	164	1080
SIC-14W-R2	970	790	91	207	605	273	164	164	1080
SIC-21W-R2	1050	910	140	225	830	370	230	230	1200
SIC-28W-R2	1050	910	140	225	830	370	230	230	1200
SIC-33W-R2	1200	1078	140	308	865	459	202	162	1470
SIC-42W-R2	1200	1078	140	308	865	459	202	162	1470
SIC-56W-R2	1450	765	200	190	1055	300	295	205	2235
SIC-66W-R2	1450	765	200	190	1055	300	295	205	2235
SIC-84W-R2	1450	765	200	200	1055	300	215	205	2235
SIC-112W-R2	1760	750	140	190	1100	300	260	267	2870
SIC-126W-R2	1760	490	140	190	1100	300	230	250	3052
SIC-132W-R2	1760	520	140	190	1100	205	325	505	3285

Model	P1 Cooling Water Inlet (inch)	P2 Cooling Water Outlet (inch)	P3 Process Water Inlet (inch)	P4 Process Water Outlet (inch)	P5 Water Tank Outlet Port (inch)	P6 Water Tank Overflow Port (inch)	Weight (kg)
SIC-9W-R2	$1^1/_2$	$1^1/_2$	1	1	1/2	1/2	210
SIC-14W-R2	$1^1/_2$	$1^1/_2$	1	1	1/2	1/2	240
SIC-21W-R2	$1^1/_2$	$1^1/_2$	$1^1/_2$	$1^1/_2$	1/2	1/2	330
SIC-28W-R2	$1^1/_2$	$1^1/_2$	$1^1/_2$	$1^1/_2$	1/2	1/2	340
SIC-33W-R2	2	2	2	2	1/2	1/2	430
SIC-42W-R2	2	2	2	2	1/2	1/2	495
SIC-56W-R2	$2^1/_2$	$2^1/_2$	2	2	1/2	1/2	750
SIC-66W-R2	$2^1/_2$	$2^1/_2$	2	2	1/2	1/2	760
SIC-84W-R2	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	1/2	1/2	800
SIC-112W-R2	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	1/2	1/2	1200
SIC-126W-R2	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	1	1	1450
SIC-132W-R2	$2\times2^1/_2$	$2\times2^1/_2$	$2^1/_2$	$2^1/_2$	1	1	1750

Model	H (mm)	H1 (mm)	W (mm)	W1 (mm)	W2 (mm)	D (mm)	P1 Chilled Water Inlet (inch)	P2 Chilled Water Outlet (inch)	P3 Water Tank Outfall (inch)	P4 Water Tank Overfall (inch)	P5 Water Tank Refill Port (inch)	Weight (kg)
SIC-7.5A-R2	1200	625	685	277	200	1190	1	1	1/2	1/2	1/2	305
SIC-12A-R2	1490	640	735	360	174	1320	1	1	1/2	1/2	1/2	315
SIC-18A-R2	1430	640	735	300	204	1610	$1^1/_2$	$1^1/_2$	1/2	1/2	1/2	400
SIC-24A-R2	1440	640	735	300	204	1610	$1^1/_2$	$1^1/_2$	1/2	1/2	1/2	420
SIC-28A-R2	1560	726	905	390	223	1782	$1^1/_2$	$1^1/_2$	1/2	1/2	1/2	530
SIC-38A-R2	1560	726	905	390	223	1782	2	2	1/2	1/2	1/2	540
SIC-48A-R2	1942	755	1208	400	257	2922	2	2	1	1/2	1/2	775
SIC-58A-R2	1942	755	1208	400	257	2922	2	2	1	1/2	1/2	800

SIC-75A-R2	1942	755	1208	418	257	2922	$2^1/_2$	$2^1/_2$	1	1/2	1/2	840
SIC-100A-R2	1942	641	1300	800	243	3475	$2^1/_2$	$2^1/_2$	1	1	1	1400
SIC-114A-R2	1942	641	1300	900	255	3475	$2^1/_2$	$2^1/_2$	1	1	1	1600

1.3.2 Specification List

Table 1-2: Specification List (SIC-W-R2)

Item/Parameters \ Model SIC-			9W-R2	14W-R2	21W-R2	28W-R2	33W-R2	42W-R2	56W-R2	66W-R2	84W-R2	112W-R2	126W-R2	132W-R2
Ver.			C	C	C	C	C	C	B	B	B	B	B	B
Refrigerant Capacity [1]	kW	50Hz	9	14	21	28	33	42	56	66	84	112	126	132
		60Hz	10.8	16.8	25.2	33.6	39.6	50.4	67.2	79.2	100.8	134.4	151.2	158.4
	kcal/hr	50Hz	7,740	12,040	18,060	24,080	28,380	36,120	48,160	56,760	72,240	94,320	108,360	113,520
		60Hz	9,288	14,448	21,672	28,896	34,056	43,344	57,792	68,112	86,688	115,584	130,032	136,224
Compressor	Power (kW)	Type	Scroll											
		50Hz	2.5	3.55	5.5	7.35	8.35	10.5	14.7	16.7	21	28.35	31.5	33.4
		60Hz	3.2	4.5	6.4	8.5	9.75	12.5	17	19.5	25	33.5	37.5	39
Refrigerant	Weight (kg)		2.5	3.0	5.5	5.5	9.8	8.7	10.8	16	17.4	21.4	26.1	32
	Control Mode		Thermostatic expansion valve											
	Type		R410A											
Evaporator	Type		Tube-in-shell style											
Condenser	Type		Tube-in-shell style											
	In/out Pipe(inch)		$1^1/_2$				2		$2^1/_2$					$2x2^1/_2$
	Cooling Water Flow (L/min)		33.5	52.2	78.3	104.3	123	156.5	208.7	246	313	417.4	469.6	491.9
Water Tank (L)			40		70		80		200			400		
Pump[2]	Power (kW)	50Hz	0.75 / 0.75 / 1.1		1.1 / 1.1 / 1.1		1.1/1.5/2.2		2.2/1.8/2.4		2.2/3.0/4.0		2.2/4.0/5.5	
		60Hz	0.75 / 0.75 / 1.5		1.1 / 1.1 / 1.5		2.2		3		5			
	Pump Flow (L/min)	50Hz	25.8	40.1	60.2	80.3	94.6	120.4	160.5	189.2	240.8	321.1	361.2	378.4
		60Hz	30.9	48	71.9	96	113	147.2	191.7	226	287.7	383.6	431.6	452.2
	Working Pressure (kg/cm^2)	50Hz	3.3/3.7 /4.5	3.1/3.5 /4.3	2.8/3.9 /5.7	2.7/3.3 /4.0	2.7/3.7 /4.7	2.6/3.5 /4.5	-/3.2/4.4	-/3.1/4.1	-/3.4/4.1	-/2.8/3.8	-/3.7/4.4	-/3.2/4.3
		60Hz	-/3.50 /5.4	-/2.90 /5	-/3.35 /4.5	-/3.90/-	-/4.0/5.4	-/5.0/6.2	-/4.1/5.1	-/4.4/-	-	-	-	-
Total Power[3](kW)		50Hz	3.25	4.3	6.61	8.45	9.45	11.6	16.9	18.9	23.2	30.55	32.7	35.6
		60Hz	3.15	5.6	7.22	9.21	11.39	14.6	19.22	21.38	30.3	38.41	42.7	42.26
Pipe cooling (inch)	Chilled water outlet		1×1		$1^1/_2$×1		2×1				$2^1/_2$×1		$2^1/_2$×1	
	Chilled water inlet		1×1		$1^1/_2$×1		2×1				$2^1/_2$×1		$2^1/_2$×1	
	Drainage port of water tank		1/2									1		
	Overflowe port of water tank		1/2									1		
Protections	Compressor		Overload relay											
	Pump		Overload relay											
	Refrigerant Circuit		High and low pressure switch/anti-freeze switch											
	Cooling water ciucuit		By-pass valve/Water level switch(Option)											
Operation Noise Db(A)			69	70.5	70.4	12.5	71.4	74	75.5	73.3	78.5	81.4	79.6	86.5
Power			3Φ, 230 / 400 / 460 / 575VAC, 50 / 60Hz											
Measures Exchange			1 kW = 860 kcal/hr 1 RT = 3024 kcal/hr 10000 Btu/hr = 2520 kcal/hr											

Note: 1) Refrigeration capacity is based on the flow 0.172 m^3 / (h.k W) and the outlet temperature of 7℃/44.6°F of chilled water under the environment temperature of 30℃/86°F and cooling water flow of 0.215 m^3 / (h.k W).

2) The working pressure of water pump is the pressure when negative pressure of inlet water is 0.

3)This pump is used as standard either for domestic of southeast aisa;medium (Model denotes"P", such as SIC-9W-R2-P) or high pressure pumps (Model denotes "HP",such as SIC-9W-R2-P), are optional for optional for installation on customer's demands.

4) Pump power is included in total power.

5) Demands on special voltage of power supply could be satisfied.

Table 1-3: Specification List (SIC-A-R2 50HZ)

Item/Parameters \ Model SIC-		7.5A-R2	12A-R2	18A-R2	24A-R2	28A-R2	38A-R2	48A-R2	58A-R2	75A-R2	100A-R2	114A-R2
Ver.		C	C	C	C	D	D	B	B	B	B	B
Refrigerant Capacity [1]	kW	7.5	12	18	24	28	38	48	58	75	100	114
Refrigerant Capacity [2]	kW	9.5	14	24	32	38	45	64	76	90	121	135
Compressor	Type	Scroll										
	Power	2.9	4.2	6.4	8.72	9.36	12.25	17.44	18.72	24.86	33.58	37.29
Refrigerant	Weight (kg)	3.5	5.0	5.5	5.5	9.0	12.5	7.5x2	8x2		7.8x2+6.8	8.7x3
	Control Mode	Thermostatic expansion valve										
	Type	R410A										
Evaporator	Type	Tube-in-shell style										
Condenser	Type	Fin style										
	Blower (kW)	0.19	0.55	2×0.23	2×0.385	2×0.6	2×0.78	2×1.03	2×0.85	2×1.92	2×2.2+1.5	3×2.2
Water Tank Capacity (L)		30		65		80		186		230	316	
Pump [2] (50Hz/60Hz)	Power (kW)	0.75 / 0.75 / 1.1		1.1 / 1.1 / 1.1		1.1/1.5/2.2		-/1.8/2.4		-/3.0/4.0		-/4.0/5.5
	Pump Flow (L/min)	21.5	34.4	51.6	68.8	80.3	108.9	137.6	166.3	215.0	286.7	32.8
	Working Pressure (kg/cm^2)	3.3/3.7 /4.5	3.2/3.5 /4.4	2.8/4.1 /4.9	2.7/3.85 /4.5	3.1/3.9 /4.9	2.4/3.8 /4.6	-/3.4/4.5	-/3.2/4.3	-/3.5/4.1	-/3.1/3.9	-/3.7/4.9
Total Power (kW) (50Hz/60Hz)		3.8/3.8 /4.2	5.5/5.5 /5.9	7.8/7.8 /7.8	10.6/10.6 /10.6	11.7/12 /12.8	14.9/15.3 /16	-/21.3 /21.9	-/22.2 /22.8	-/31.7 /32.7	-/42.5 /43.5	-/47.9 /49.4
Pipe Coupling (inch)	Cooling Water Outlet	1		$1^1/_2$		2				$2^1/_2$		
	Water Tank Inlet	1		$1^1/_2$		2				$2^1/_2$		
	Water Tank Drainage Port	1/2						1				
	Water Tank Overflow Port	1/2									1	
Protective Devices	Compressor	Overload relay										
	Pump	Overload relay										
	Cooling Water Circuit	High and low pressure switch/anti-freeze switch										
	Water Circuit	Flow switch/Water level switch (Optional)/By-pass valve										
Operation Noise dB (A)		78	75	74	78	81	86	84	82	86	90	90
Power(VAC)		3Φ, 400VAC, 50Hz										
Measures Exchange		1 kW = 860 kcal/hr 1 RT = 3,024 kcal/hr 10,000 Btu/hr = 2,520 kcal/hr										

Note: 1) Refrigeration capacity 1 is based on the flow 0.172 m3 / (h.k W) the chilled water outlet Temperature of 7℃/44.6°F and the environment temperature of 35℃/95°F.

2) Refrigeration capacity 2 is based on the flow 0.172 m3 / (h.k W) the chilled water outlet Temperature of 20℃/68°F and the environment temperature of 30℃/86°F.

3) It is the working pressure of water pump when negative pressure of inlet water is 0.

4) Low pressure pump is for domestic and Southeast Asia export, customers can change for medium pressure pumps (use P for short; e.g.: SIC-and A-R2-P) or high pressure pumps (use HP for short; e.g.: SIC-and A-R2-HP), specific parameters in turn as shown above.

5) Pump power is included in total power.

6) Special orders of machine voltage can be acceptable according to customers's request.

7) The air-cooled water chiller is applicable to the conditions under the environment temperature of 43℃/109.5°F.

Table 1-4: Specification List (SIC-A-R2 60HZ)

Item/Parameters \ Model SIC-		12A-R2	24A-R2	28A-R2	38A-R2	48A-R2	58A-R2	75A-R2	100A-R2	114A-R2
Ver.		C	C	D	D	B	B	B	B	B
Refrigerant Capacity [1]	kW	15	30	35.5	45	60	70	90	122	136
Refrigerant Capacity [2]	kW	17.5	37.5	41	48	75	82	96	133.5	144
Compressor	Type	Scroll								
	Power (kW)	5.28	10.2	11.73	14.8	20.4	23.76	29.6	39.8	44.4
Refrigerant	Weight (kg)	5.0	5.5	9.0	12.5	7.5x2	8x2		7.8x2+6.8	8.7x3
	Control Mode	Thermostatic expansion valve								
	Type	R410A								
Evaporator	Type	Tube-in-shell style								
Condenser	Type	Fin style								
	Blower (kW)	0.91	2×0.57	2×0.91	2×1.1	2×2.2		2×2.2	2×2.2+2.2	3×2.2
Water Tank Capacity (L)		50	855	150		180	200	270	400	
Pump [2] (50Hz/60Hz)	Power (kW)	0.75 / 1.5	1.1 /1.5	2.2/3.0		3.0/3.0		5.5/5.5		
	Pump Flow (L/min)	43.1	86.2	102	129.3	172.3	201.1	258.5	350.4	390.7
	Working Pressure (kg/cm^2)	-/3.1/5.1	-/3.0/4.2	-/2.7/4.1	-/2.5/3.9	-/4.5/5.6	-/3.9/4.8	-/2.8/2.8	-/4.5/4.5	-/4.1/4.1
Total Power (kW)		-/6.9/7.6	-/12.4/12.8	-/15.7/16.5	-/19.2/20	27.8	31.1	39.5	51.9	56.5
Pipe Coupling (inch)	Cooling Water Outlet	1	$1^1/_2$	2				2.5		
	Water Tank Inlet	1	$1^1/_2$	2				2.5		
	Water Tank Drainage Port	1/2				1				
	Water Tank Overflow Port	1/2							1	
Protective Devices	Compressor	Overload relay								
	Pump	Overload relay								
	Cooling Water Circuit	High and low pressure switch/anti-freeze switch								
	Water Circuit	Flow switch/Water level switch (Optional)/By-pass valve								
Operation Noise dB (A)		75	78	81	86	84	82	86	90	90
Power(VAC)		3Φ, 400VAC, 50Hz								
Measures Exchange		1 kW = 860 kcal/hr 1 RT = 3,024 kcal/hr 10,000 Btu/hr = 2,520 kcal/hr								

Note: 1) Refrigeration capacity 1 is based on the flow 0.172 m3 / (h.k W) the chilled water outlet Temperature of 7℃/44.6°F and the environment temperature of 35℃/95°F.

2) Refrigeration capacity 2 is based on the flow 0.172 m3 / (h.k W) the chilled water outlet Temperature of 20℃/68°F and the environment temperature of 30℃/86°F.

3) It is the working pressure of water pump when negative pressure of inlet water is 0.

4) Low pressure pump is for domestic and Southeast Asia export, customers can change for medium pressure pumps (use P for short; e.g.: SIC-and A-R2-P) or high pressure pumps (use HP for short; e.g.: SIC-and A-R2-HP), specific parameters in turn as shown above.

5) Pump power is included in total power.

6) Special orders of machine voltage can be acceptable according to customers's request.

7) The air-cooled water chiller is applicable to the conditions under the environment temperature of 43℃/109.5°F.

1.4 Safety Regulations

The user must conform to the following safety rules when operating the machine.

1.4.1 Security Labels

Attention!

Installation of the device is allowed only to the professional electrician. Before maintaining and repairing the device, be sure to turn off the main switch and control switch.

Warning! High Voltage!

This label is posted on enclosure of the electrical control cabinet!

Warning! Be careful!

Pay more attentions at the places where this sign is attached!

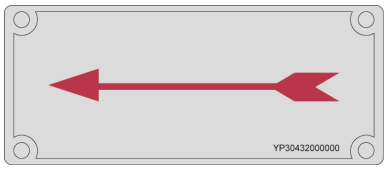
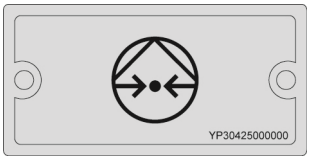
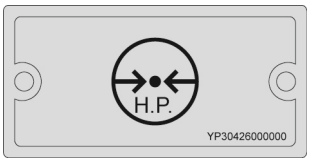
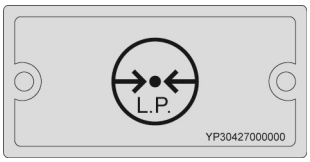
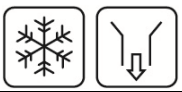
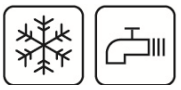
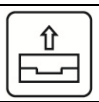
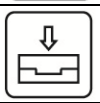
Attention!

Drain the water inside when power off at the cold day to avoid freezing!

Attention!

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

1.4.2 Signs and Labels

	This is for indicating motor rotating direction. When phase reversal happens, the alarm sounds and indicator on control panel will indicate. Please exchange the place of the two electrical wires to solve this problem.
	Pump pressure gauge: display actual pressure of cold water system.
	High pressure gauge: display pressure in the high-pressure side of refrigerant system.
	Low pressure gauge: display pressure in the low-pressure side of refrigerant system.
	Cooling Water Outlet
	Cooling Water Inlet
	Chilled Water Return(From Mould)
	Chilled Water Outlet (To Mould)
	Drain
	Overflow

1.5 Exemption Clause

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

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

1. Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.
2. Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.
3. Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.
4. Employing consumables or oil media that are not appointed by Shini.

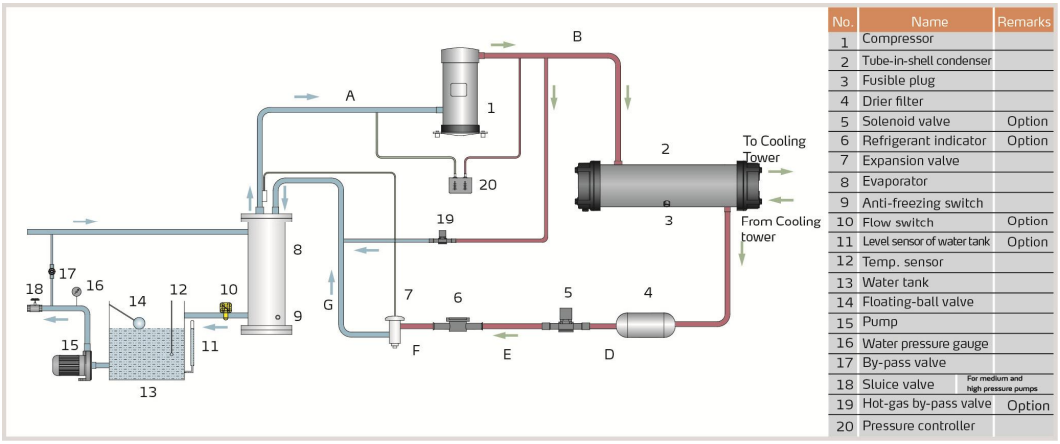
2. Structural Features and Working Principle

2.1 Main Functions

SIC-R2 water chiller is mainly made up of four components. They are compressor, condenser, thermostate expansion valve and evaporator. The machine uses single stage vapor compression refrigeration system and takes the advantage of the mechanism of transformation between gas and liquid for absorbing and releasing heat by using of refrigerant to achieve the effectiveness of refrigeration.

2.1.1 Working Principle

A. Water-cooled Series



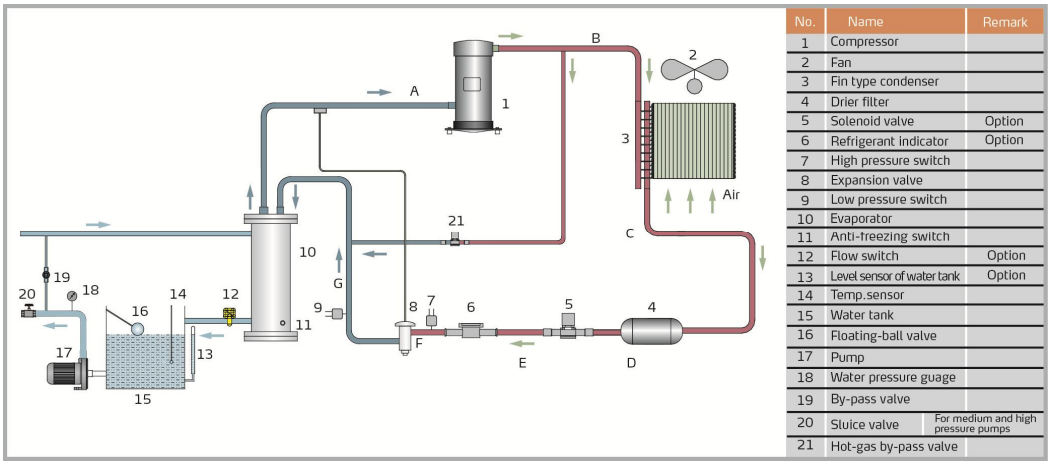
No.	Name	Remarks
1	Compressor	
2	Tube-in-shell condenser	
3	Fusible plug	
4	Drier filter	
5	Solenoid valve	Option
6	Refrigerant indicator	Option
7	Expansion valve	
8	Evaporator	
9	Anti-freezing switch	
10	Flow switch	Option
11	Level sensor of water tank	Option
12	Temp. sensor	
13	Water tank	
14	Floating-ball valve	
15	Pump	
16	Water pressure gauge	
17	By-pass valve	
18	Sluice valve	For medium and high pressure pumps
19	Hot-gas by-pass valve	Option
20	Pressure controller	

Picture 2-1: Working Principle

When the SIC-W water-cooled water chiller starting up, compressor starts working. Refrigerant is compressed into high temperature and high pressure gas in the process from B to C, and then be cooled when passing through the condenser and changed into liquid. Heat is taken away by the cooling water. In the process from C to D to E and F, the liquid refrigerant is dried and filtered by drier filter. After that, it will pass through solenoid valve, refrigerant indicator and then reach expansion valve. In the process from F to G, the high pressure liquid refrigerant will be throttled and depressurized by heat expansion valve and temperature will go down. In the process from G to A, chilled water absorbs the heat of process water in the evaporator and returns back to compressor. This heat exchange process repeats until process water is cooled down to required temperature.

Hot-air bypass function: the compressor continues working when process water is cooled down to required temperature, then the hot-air bypass valve opens as the temperature drops to its set value. A part of the refrigerant from the compressor passes through the by-pass valve and then reaches evaporator, balancing out part of the machine refrigerating capacity and then goes back to compressor without passing through the condenser. With the help of hot-air bypass valve, the system can stay in an balanced condition and meanwhile can keep control accuracy within ±1℃

B. Air-cooled Series



No.	Name	Remark
1	Compressor	
2	Fan	
3	Fin type condenser	
4	Drier filter	
5	Solenoid valve	Option
6	Refrigerant indicator	Option
7	High pressure switch	
8	Expansion valve	
9	Low pressure switch	
10	Evaporator	
11	Anti-freezing switch	
12	Flow switch	Option
13	Level sensor of water tank	Option
14	Temp.sensor	
15	Water tank	
16	Floating-ball valve	
17	Pump	
18	Water pressure guage	
19	By-pass valve	
20	Sluice valve	For medium and high pressure pumps
21	Hot-gas by-pass valve	

Picture 2-2: Working Principle

When SIC-A-R2 air-cooled water chiller starting-up, compressor starts working. Refrigerant is compressed into high temperature high pressure gas in the process form B to C, and then be cooled when passing through condenser and changed into liquid. Heat is taken away by the cooling air. In the process from C to D to E and F, liquid refrigerant is dried and filtered by the drier filter. After that, it passes through solenoid valve, level sensor and then reaches the expansion valve. In the process from F to G, the high pressure liquid refrigerant is throttled and depressurized by heat expansion valve and temperature goes down. In the process from G to A, chilled water absorbs the heat of process water in evaporator and returns back to the compressor. This heat exchange process repeats until process water is cooled down to requirement temperature.

Hot-air bypass function: the compressor continues working when the process water is cooled down to required temperature, then the hot-air bypass valve

opens as the temperature drops to its set value. A part of the refrigerant from compressor passes through by-pass valve and then reaches evaporator, balancing out part of the machine refrigerating capacity and then goes back to compressor without passing through condenser. With the help of hot-air bypass valve, system can stay in balanced condition and meanwhile can keep control accuracy within ±1℃.

2.2 Main Parts and Functions

2.2.1 Compressor

1) Compressing and conveying the refrigeration steam and forming low pressure in evaporator and high pressure in condenser, the compressor is the core of the whole system.
2) SIC-R2 adopts scroll compressor.

Picture 2-3: Compressor

2.2.2 Condensor

A. Water-cooled Series

1) Condenser is a heat output device which is used to discharge the heat absorbed by the evaporator and converted by the compressor to the cooling medium.
2) SIC-W-R2 adopts horizontal tube-in-shell condenser.

Picture 2-4: Condenser

B. Air-cooled Series

1) Condenser is a heat output device which is used to discharge the heat absorbed by the evaporator and converted by the compressor to the cooling medium.
2) SIC-A-R2 adopts fin-style condenser.

Picture 2-5: Condenser

2.2.3 Drying Filter

1) The functions of the dry filter are: clean the impurity in the refrigerant, absorb the free moisture in the refrigerant, and prevent the narrow section (especially the valve port of the heat expansion valve) of the pipe from forming ice jam.
2) The size of the filter is usually chosen according to the caliber of the cooling agent pipe.
3) The dry filter is installed in front of the heat expansion valve to maintain the strictness of the valve.

Picture 2-6: Drying Filter

2.2.4 Evaporator

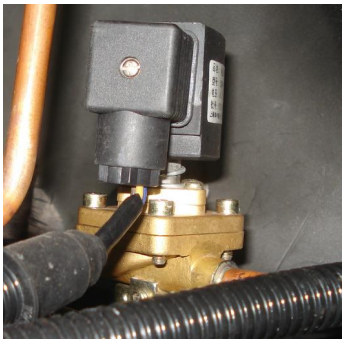
1) The evaporator is the equipment which output the refrigerating capacity, in which the cooling agent absorb the heat of the cooled objects and achieve the aim of refrigeration.
2) SIC-W-R2 adopts adopts tube-in-shell horizontal evaporator.

Picture 2-7: Evaporator

2.2.5 High and Low Pressure Switch

1) The high and low pressure switch are used to control the working pressure of the compressor suction port and outlet port.
2) The high pressure of switch is 40 bar, and the low pressure of switch is 5 bar.
3) Give an alarm when the pressure of the compressor outlet port is higher than 40 bar or the pressure of the compressor suction port is lower than 5 bar.

2.2.6 Hot Air Bypass Valve



Picture 2-8: Hot Air Bypass Valve

1) Hot air by-pass valve is used to bypass the cooling refrigerant when the temperature is low to prevent frequent starts and stops of the compressor and achieve accurate temperature control.
2) Hot air by-pass valve is installed on the connecting pipe of the compressor outlet and expansion valve outlet.

2.3 Options

2.3.1 Liquid Level Indicator

Picture 2-9: Liquid Level Indicator

Through the liquid level indicator, the water level in the tank can be viewd.
Please confirm the version number of the manual before you order to ensure the stock number and the parts are consistent.

2.3.2 Liquid Pipe Solenoid Valve

Picture 2-10: Liquid Pipe Solenoid Valve

1) Liquid pipe solenoid valve is used to cut the refrigerant supply immediately after the machine stops to prevent the compressor freezing.
2) Solenoid vlave is installed in front of the refrigerant indicator.

2.3.3 Refrigerant Indicator

Picture 2-11: Refrigerant Indicator

1) The refrigerant indicator is used to detect whether the refrigerant is filled appropriately.
2) The refrigerant indicator is used to detect the water ratio of the system.
3) The refrigerant indicator is installed infront of expansion valve.

2.3.4 Flow Switch

Picture 2-12: Flow Switch

1) Flow switch is adopted to detect whether the chilled water flow is sufficient.
2) Flow switch is installed on the water pipe between the evaporator and the water tank.

2.3.5 Medium or high pressure pumps

Medium and high pressure pumps are optional to meet any pressure requirements.

3. Installation and Debugging

 Attention!

Read this chapter before installation. Install the machine according to following steps!

3.1 Machine Location

1) Water chiller should be installed in an environment that has good ventilation, such as draughty area near the window. Ambient temperature should not be more than 43℃. Use ventilator or exhaust pipe to conduct the hot air produced by the chiller to the outside. If the chiller is installed outdoors, protective cover should be used.
2) Please ensure at least 1m installation and maintenance space around the machine.

3.2 Power Connectors

1) Make sure that the voltage and frequency corresponds with the requirements on manufacturer's name plate.
2) Connection of the machine electrical wires and negative wire according to local rules and regulations.
3) Use independent electrical wires and switch. Diameter of electrical wire should not be smaller than that of the electric wire which is used for the electrical control box.
4) Wiring connections should be firmly fixed.
5) The chiller use three phase & five core wire. Connect wire N to null wire, G to earth wire, and others to live wire.
6) Power supply:
   Voltage deviation: Rated voltage on the nameplate: ±5%
   Frequency deviation: ±2%
7) Specific power supply specifications please refer to the schematic model.

 Electrical wire connection of water chiller should be done by qualified electrician! Electrical wiring circuit should not be modified unless

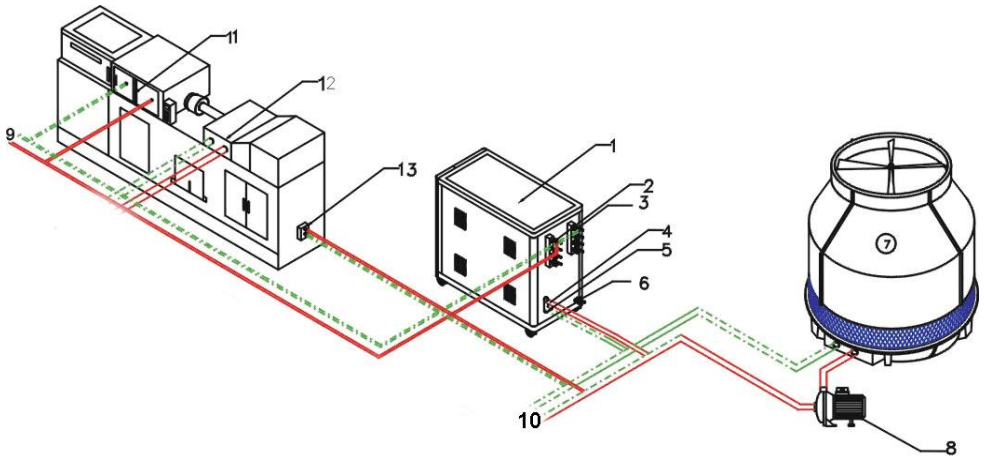
authorized by our company. We shall not be reliable for machine damages caused by unauthorized modification.

Attention!

Before connecting the machine with power supply, please make sure that main switch is turned off !

3.3 Water connections

A. Water-cooled Series

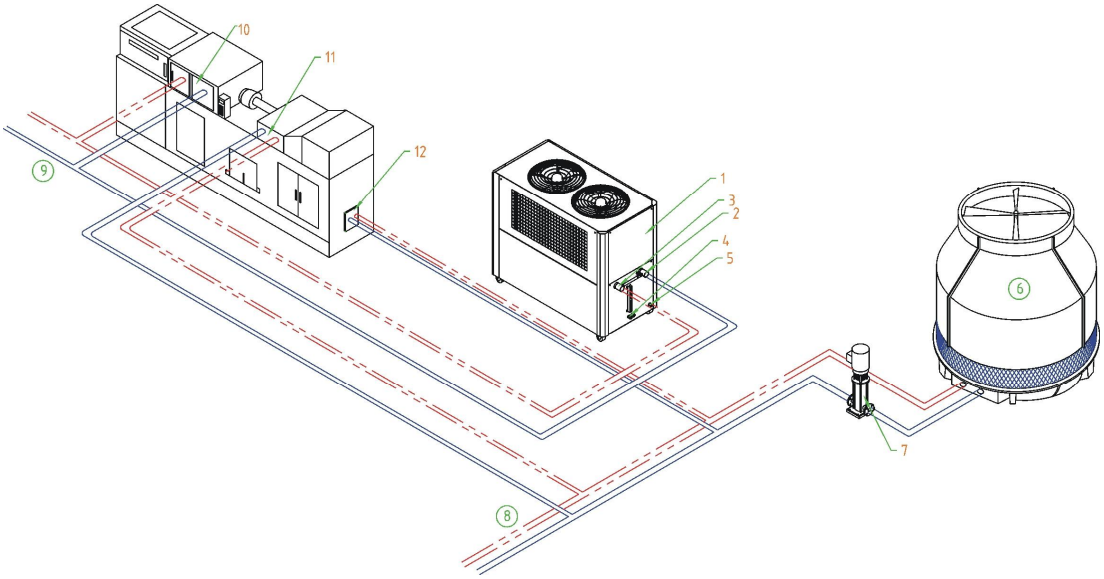


Parts Name ：

1. Water chiller 2. Chilled water outlet 3. Chilled water inlet
4. Cooling water outlet 5. Cooling water inlet 6. Water outfall
7. Cooling water tower 8. Cooling water pump
9. Chilled water circulation 10. Cooling water circulation
11. Mould cooling 12. Cooling tank 13. Oil cooling

Picture 3-1: Installation Diagram

B. Air-cooled Series



Parts Name ：

1. Water chiller	2. Chilled water inlet	3. Chilled water outlet
4. Water outfall	5. Water refill port	6. Cooling water pump
7. Cooling water circulation	8. Chilled water circulation	
9. Mould Cooling	10. Cooling tank	12. Oil Cooling

Picture 3-2: Installation Diagram

3.3.1 Notice of Pipeline Installation

1) According to the installation configuration diagram to install the pipe system, and use thermal insulation materials to protect the refrigerated water pipe.
2) Choose the suited cooling water tower according to the refrigerating capacity of the water chiller. The specific information could consult the cooling tower supplier.
3) The diameter of the circulate pump line should not be smaller than the condenser pipe diameter. (Piping system should be mounted according to the assembly diagram). Heavy caliber pipe should be used to connect the cooling water in long distance delivery.
4) At the lowest part of cooling water circulation, drainage valve should be installed.
5) Water filter should used in the cooling water and chilled water circulation pipe if water quality and surroundings of cooling tower is bad.

6) After the installation is completed, check if there are leakages in the circulation system. Cooling water circulation pipe should be covered with a layer of insulated material to avoid temperature increasing and water drops forming on the surface of circulation pipe.

7) This seires of models mainly use cooling tower's circulation to cool down the water. During the installation, users should provide enough cooling water to the water chiller. Otherwise, machine would over high pressure and reduce cooling capacity. The dimension of cooling water inlet/outlet and the flow please refer to 1.3 Technical Specifications. Cooling water pressure should be 2.5~4bar, cooling water temperature is suggested at 25~35℃.

8) Water used in the system must be processed since water with high PH may cause corrosion to copper tube and lower the lifetime of the machine. Use water with pH ranged 7.0~8.5.

3.4 Water Tank Filling

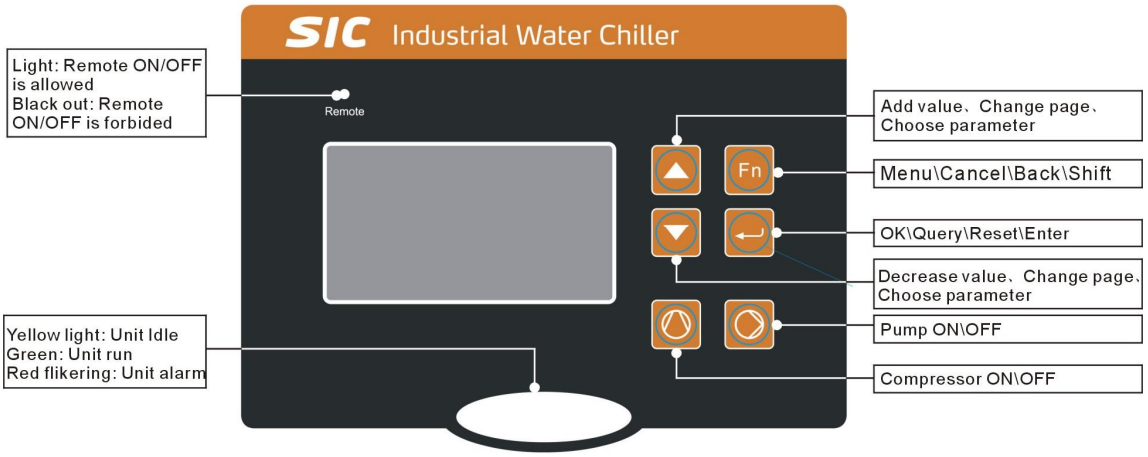
The filling port of this series model has connected to the water-tank circulation loop of the condenser. As long as the circulation loop works normally, it can ensure the normal filling of the water tank. Air-cooled series are reserved with water tank filling port. Please refer to label explanation in 1.4.2 for connecting water supply.

 Attention!

Don't start up the water chiller before the tank is full filled with water!

4. Application and Operation

4.1 Panel Diagram

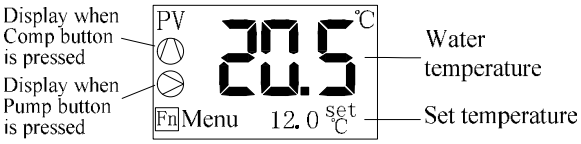


4.2 Common Screens

Commonly used screens include the main screen and the alarm screen.

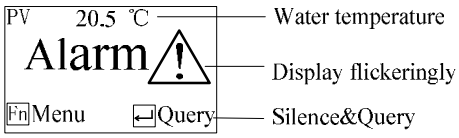
1. Main Screen

The system will enter the main screen after countdown, which displays as follows:



2. Alarm Screen

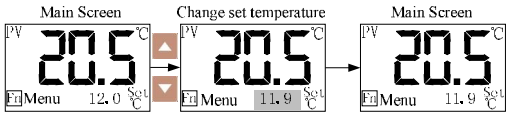
In case of unit failure, the alarm screen is as follows:



4.3 Quick Operation

1. Changing and Setting Temperature

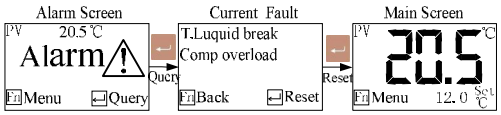
If the user parameter [Lock Temp.] is set to "No", the setting temperature can be modified directly in the main screen, with operation details as follows:



Note: the setting temperature can also be modified in the user parameters.

2. Query/Reset Fault

In case of fault, the alarm screen will automatically pop up. The operation details of query and reset faults are as follows:



Attention!

Pump rotating direction should be correct.

Attention!

Before starting the system, make sure that cooling water pump is turned on. Check the water tank of the chiller. Do not start the machine when there is no water left in water tank. We shall not be liable for any damages caused by this reason.

Attention!

In order to reduce the possibilities of machine damage and prolong the life, start the machine with correct methods.

Attention!

The compressor can't be started frequently because of its characteristics (Frequent start will shorten its service life.). If emergency shut-down happens, the compressor will run again 3 minutes later.

4.4 Startup

1) Open the main power switch.
2) Set the temperature of chilling water (if the temp. has already been set, omit this step). The minimum temperature of this series machine should be set as 7℃.
3) Press  button to start the water pump.
4) Press  button to start the compressor.

4.5 Shutdown

1) Turn off the switch of compressor.
2) Turn off the pump switch. If it adopts the quick molding cycle and low cooling water temperature, keep continuous running of water pump till the mould temperature rises to non-condensated temperature, then turn off the pump switch.
3) Switch the main power switch to OFF position.

 Attention!

When main power switch is at ON position, please be careful the electric shock!

 Attention!

As to reduce the machine damage and prolong its service life, please turn off the machine in correct orders.

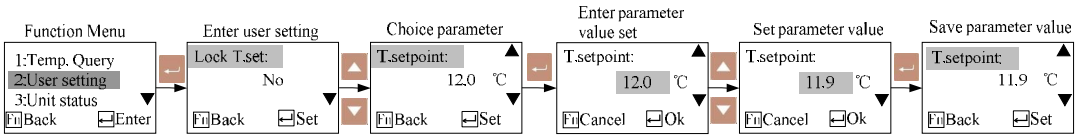
4.6 User Menu

Press the button Fn on the main screen to enter the User Menu, which includes five items as the table below:

No.	Menu Item	Funtion	Remark
1	User Setting	To set the user parameters	-
2	Unit Status	To display the current operating status of the unit	--
3	Fault Record	Allowing the query of the last 10 faults	Press ↵ for 2s to clear the fault history.
4	Machine Set	To set language, backlight, time and so on.	--
5	Temp Query	To query all the temperature value	It is not display these item If measure the water temperature only.

4.6.1 Parameter Operation

For the modification operation of parameter value, the user's modification of setting temperature will be described as an example.



4.6.2 User Setting

All the parameters in user settings please refer to following table:

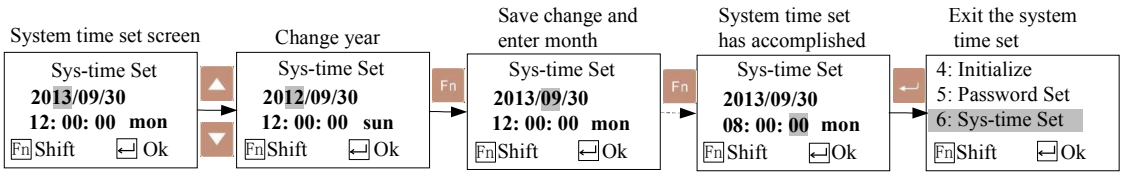
No.	Parameter Name	Factory Default	Setting Range	Remark
1	Lock Temp.	No	Yes ~ No	Yes: the [Set Temp.] can not be modified on the main screen when locked. No: the [Set Temp.] can be modified on the main screen.
2	Set Temp.	20.0℃	7.0~25℃	Setting range is limited by the manufacturer parameters [max. Temp.], [min. Temp.].
3	On/Off Mode	Local	Local / Local + Remote / Remote	Local: the unit can only start and stop locally. Local + Remote: the start and stop of the unit can be controlled both locally and remotely. Remote: the unit can only start and stop remotely.

4.6.3 Machine Set

The machine set includes six items as the table below:

No.	Item	Function	Remark
1	Language	To set the display language.	Chinese and English
2	Backlight Time	Setting range: 0~255min	0: backlight is not turned off.
3	Compr Use Time	To query the cumulative operation time of the compressor	
4	Comm. Setting	To set baud rate, parity bit, stop bit and communication address.	Communication protocol: Modbus RTU
5	Machine Info.	To query the machine version information.	
6	Clock setting	To query and set the system time.	

4.6.4 System Time Set



Note: Press the button  can exit the system time set quickly, and the set value will be saved when exit.

5. Trouble-shooting

Table 5-1: Single Compressor

Fault	Test Conditions	Troubleshooting	Solution
Compressor pressure High	Test when the compressor button has pressed	Stop compressor only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor pressure Low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor runs the test.		
Compressor Overload	Compressor runs the test		
Water Temp. Low	Test after pump starts	Stop the compressor, and do not stop the pump.	Check if the water temperature is lower than the set temperature of Liquid protection.
Water Temp. High		Stop the compressor, and do not stop the pump.	Check if the water temperature is higher than the set temperature of Liquid protection.
Anti-freeze Err	Power on to test	Stop the compressor, and do not stop the pump.	Check if the antifreeze input is consistent with the switch setting.
Water-temp. Sensor breaks			Check if the temperature probe is in proper contact.
Water-temp. Sensor short circuit			
Anti-freeze Sensor breaks			
Anti-freeze Sensor short circuit			
Anti-freeze Temp Low			Check if the antifreeze temperature is lower than the set temperature of antifreeze protection.
Blower fault (Only applicable for air-cooled series)	Compressor 1 runs the test	Stop the compressor, and do not stop the pump.	Check if the input is consistent with the switch setting.
Water Flow Short	Test after the pump starts for [Pump on Delay] time	Stop the unit	Check if the water flow input is consistent with the switch setting.
Pump Overload	Test after pump starts	Stop the unit	Check if the pump overload input is consistent with the switch setting.
Phase Err	Power on to test	Stop the unit	Check if there is default phase or anti-phase in the three-phase power input and if the switch is correct.
Water Level Low	Power on to test	Stop the unit	Check if the water level input is consistent with the switch setting.
Need Maintenance	Test after pump starts	The unit cannot start once stops (the accumulative operation time of compressor exceeds the set value).	Need Maintenance

Table 5-2: Double Compressor

Fault	Test Conditions	Troubleshooting	Solution
Compressor 1 pressure high	Test when the compressor button has pressed	Stop compressor 1 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 1 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 1 runs the test.		
Compressor 1 overload	Compressor 1 runs the test		
Compressor 2 pressure high	Test when the compressor button has pressed	Stop compressor 2 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 2 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 2 runs the test.		
Compressor 2 overload	Compressor 2 runs the test		
Water Temp. Low	Runs test	Stop the compressor, and do not stop the pump.	Check if the water temperature is lower than the set temperature of Liquid protection.
Water Temp. High		Stop the compressor, and do not stop the pump.	Check if the water temperature is higher than the set temperature of Liquid protection.
Anti-freeze Err	Power on to test	Stop the compressor, and do not stop the pump.	Check if the antifreeze input is consistent with the switch setting.
Water-temp. Sensor breaks			Check if the temperature probe is in proper contact.
Water-temp. Sensor short circuit			
Anti-freeze Sensor breaks			
Anti-freeze Sensor short circuit			
Anti-freeze temperature is too low		Stop the compressor, and do not stop the pump.	Check if the antifreeze temperature is lower than the set temperature of antifreeze protection
Blower 1 fault (Only applicable for air-cooled series)	Compressor 1 runs the test	Stop the compressor, and do not stop the pump.	Check if the blower 1 fault input input is consistent with the switch setting.
Blower 2 fault (Only applicable for air-cooled series)	Compressor 2 runs the test		Check if the blower 2 fault input input is consistent with the switch setting.
Water flow short	Test after the pump starts for (Pump on delay)time	Stop the unit	Check if the water flow input is consistent with the switch setting
Pump Overload	Test after pump starts	Stop the unit	Check if the pump overload input is consistent with the switch setting.
Phase Err	Power on to test	Stop the unit	Check if there is default phase or anti-phase in the three-phase power input and if the switch is correct.
Water Level Low	Power on to test	Stop the unit	Check if the water level input is consistent with the switch setting.
Need Maintenance	Test after pump starts	The unit connot start once stops(the accumulative operation time of compressor exceeds the set value)	

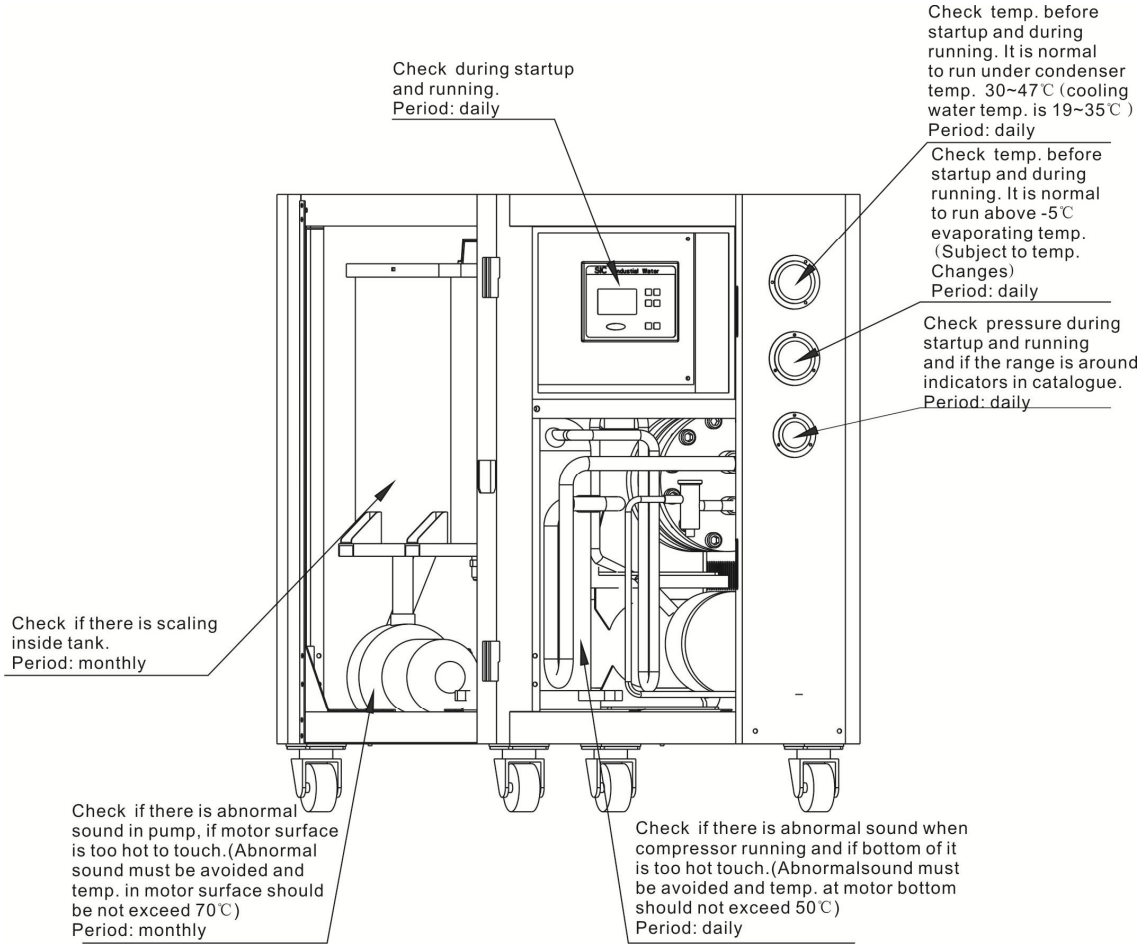
Table 5-3: Triple,Quadruple Compressor

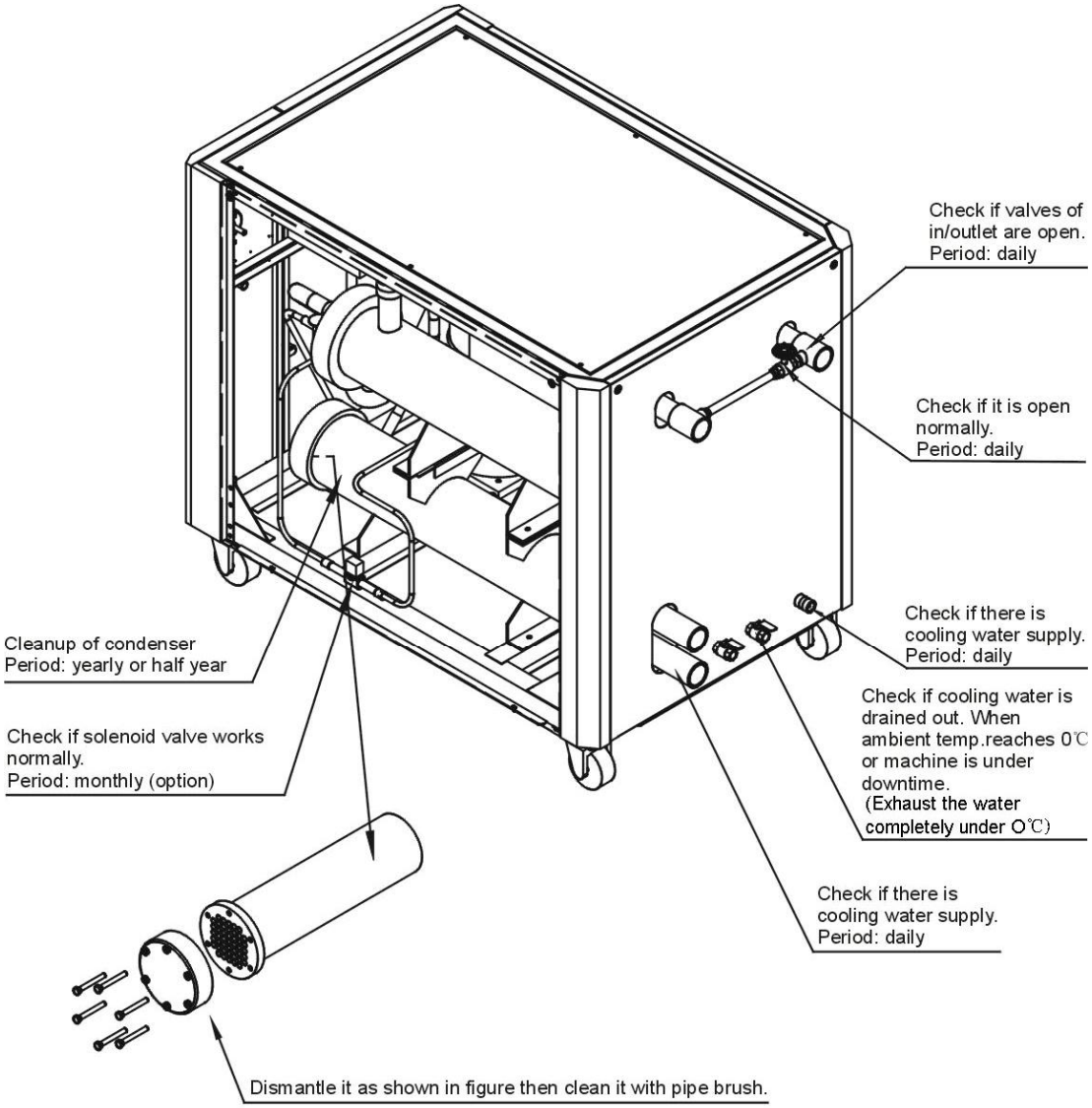
Fault	Test Conditions	Troubleshooting	Solution
Compressor 1 pressure high	Test when the compressor button has pressed	Stop compressor 1 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 1 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 1 runs the test.		
Compressor 1 overload	Compressor 1 runs the test		
Compressor 2 pressure high	Test when the compressor button has pressed	Stop compressor 2 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 2 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 2 runs the test.		
Compressor 2 overload	Compressor 2 runs the test		
Compressor 3 pressure high	Test when the compressor button has pressed	Stop compressor 3 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 3 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 3 runs the test.		
Compressor 3 overload	Compressor 3 runs the test		
Compressor 4 pressure high	Test when the compressor button has pressed	Stop compressor 4 only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Compressor 4 pressure low	If the [LP Check Delay] is 0, test when the compressor button has pressed;If the [LP Check Delay] is not 0, then compressor 4 runs the test.		
Compressor 4 overload	Compressor 4 runs the test		
Water Temp. Low	Test after pump starts	Stop the compressor, and do not stop the pump.	Check if the water temperature is lower than the set temperature of Liquid protection.
Water Temp. High		Stop the compressor, and do not stop the pump.	Check if the water temperature is higher than the set temperature of Liquid protection.
Anti-freeze Err	Power on to test	Stop the compressor, and do not stop the pump.	Check if the antifreeze input is consistent with the switch setting.
Water-temp. Sensor breaks			Check if the temperature probe is in proper contact.
Water-temp. Sensor short circuit			
Anti-freeze Sensor breaks			
Anti-freeze Sensor short circuit			
Anti-freeze temperature is too low		Stop the compressor, and do not stop the pump.	Check if the antifreeze temperature is lower than the set temperature of antifreeze protection

Fault	Test Conditions	Troubleshooting	Solution
Blower 1 fault (Only applicable for air-cooled series)	Compressor 1 runs the test	Stop the compressor, and do not stop the pump.	Check if the blower 1 fault input input is consistent with the switch setting.
Blower 2 fault (Only applicable for air-cooled series)	Compressor 2 runs the test		Check if the blower 2 fault input input is consistent with the switch setting.
Blower 3 fault (Only applicable for air-cooled series)	Compressor 3 runs the test		Check if the blower 3 fault input input is consistent with the switch setting.
Blower 4 fault (Only applicable for air-cooled series)	Compressor 4 runs the test		Check if the blower 4 fault input input is consistent with the switch setting.
Water flow short	Test after the pump starts for (Pump on delay)time	Stop the unit	Check if the water flow input is consistent with the switch setting
Pump Overload	Test after pump starts	Stop the unit	Check if the pump overload input is consistent with the switch setting.
Phase Err	Power on to test	Stop the unit	Check if there is default phase or anti-phase in the three-phase power input and if the switch is correct.
Water Level Low	Power on to test	Stop the unit	Check if the water level input is consistent with the switch setting.
Need Maintenance	Test after pump starts	The unit connot start once stops(the accumulative operation time of compressor exceeds the set value)	

6. Maintenance and Repair

A. Water-cooled Series

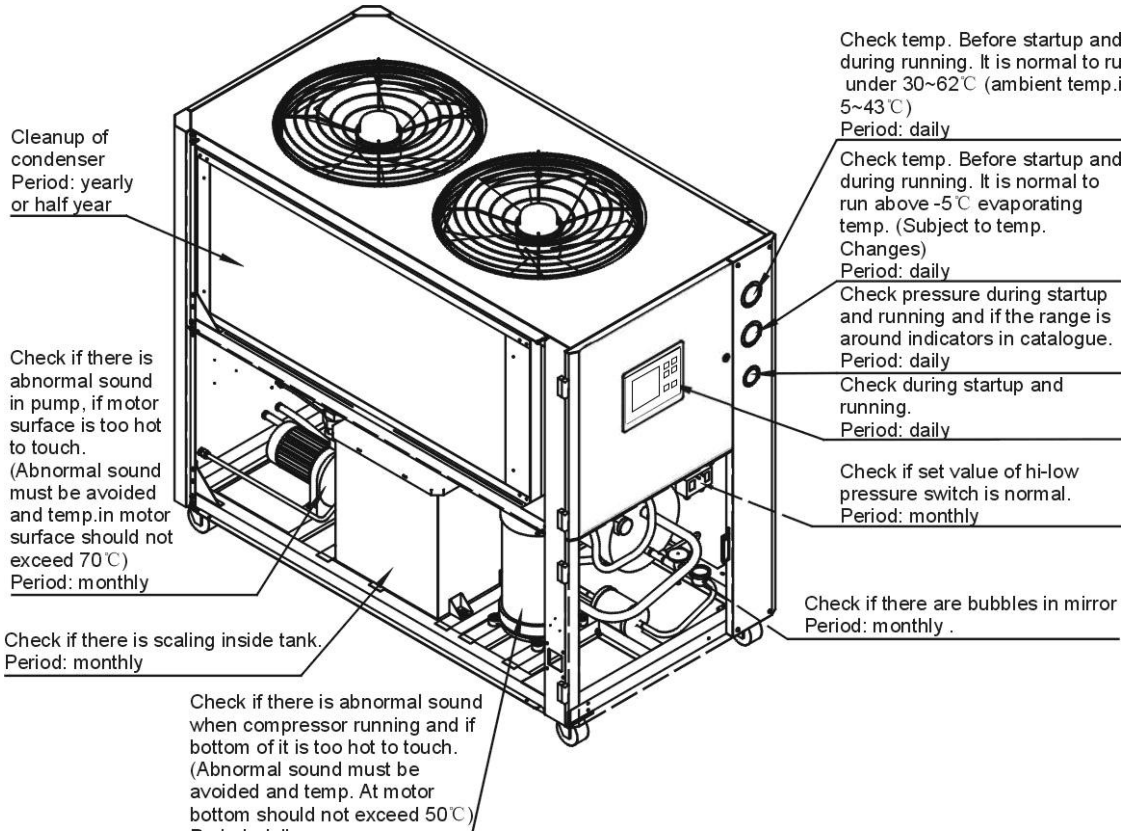


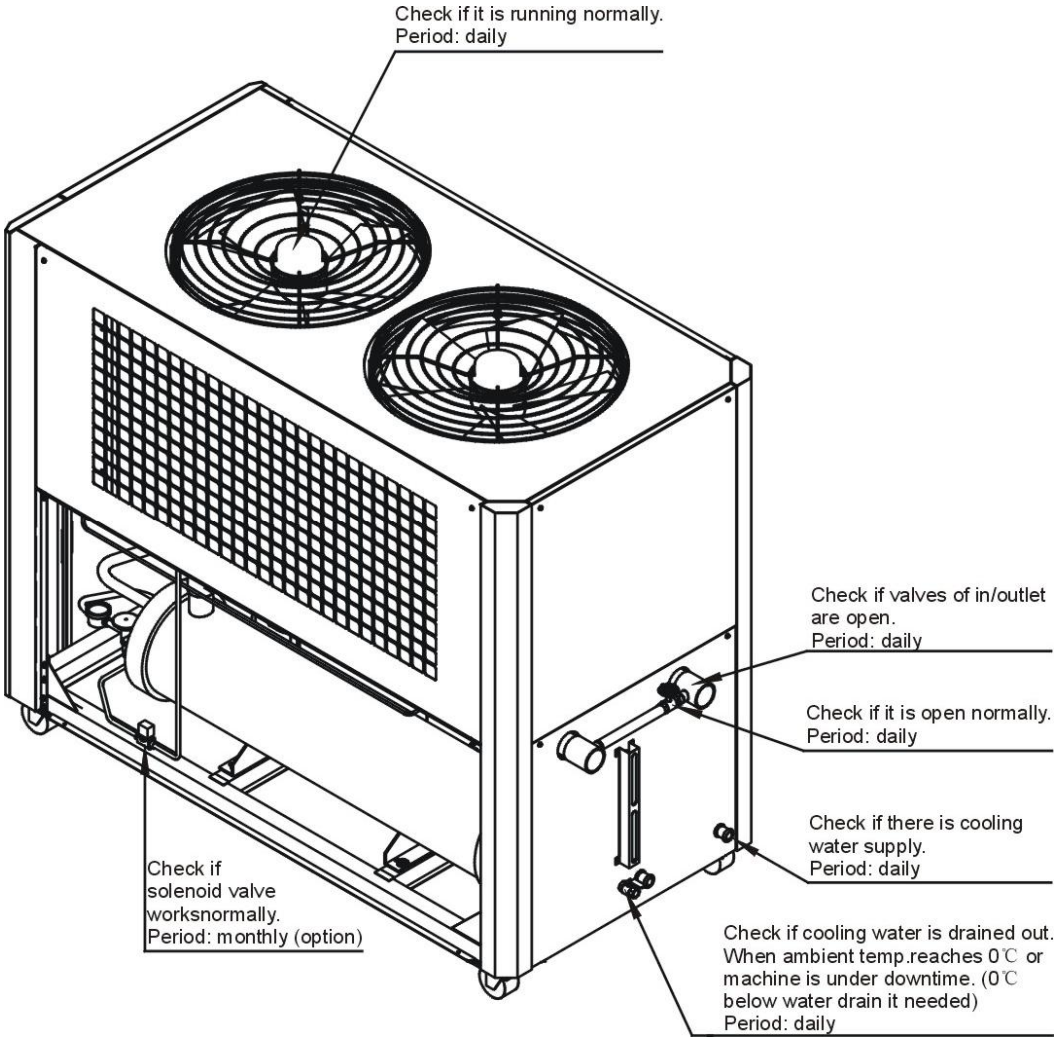


Dismantle it as shown in figure then clean it with pipe brush.

Use screw thread in this end. Also rod piece can be added based on the length of condenser so that brush moves freely to clean condenser inwall.

B. Air-cooled Series





Attention!

All repair work should be done by qualified personnel only to avoid damage to the machine or personnel injury.

In order to operate the machine rightly and safely, please caution the matter follows:

1) Do not turn off the main power switch to stop the machine, except emergency situation.
2) When failures set in and the machine stop work with buzzer sound, first turn off the main power switch of the machine (alarm indicator will die), then go to check the reason of the failures, do not force the machine on before remove the failures.

3) Please check periodicaly to prolong the life of the machine and prevent the safety accident to appear.
4) The operation and service of the machine should be done by qualified technician only.
(Please take notice that the disassembly and the inspection of the machines are hazardous when the machines are running!)

6.1 Fill in the Refrigerant

1) Infuse the nitrogen with pressure maintaining for some time. Use the soapy water to smear all the welding parts to make sure if there's the leakage.
2) Under no leakage circumstance, it should use R410A special hose for filling that connects to vacuum pump. The vacuumizing time should not less than 4h;
3) After vacuumizing, connect the refrigerant filling machine at once to detect the vacuum, and the vacuum degree should be less than 13Pa;
4) After the detection of vacuum degree is passed, select corresponding model and refrigerant capacity, then finish the auto filling.

 Attention!

1. Do not replace the refrigerant without permission.
2. Do not replace the components in the refrigerating system without permission.
3. Water is the standard working medium of the machine; consult the manufacturers for other mediums.

6.2 Components Maintenance

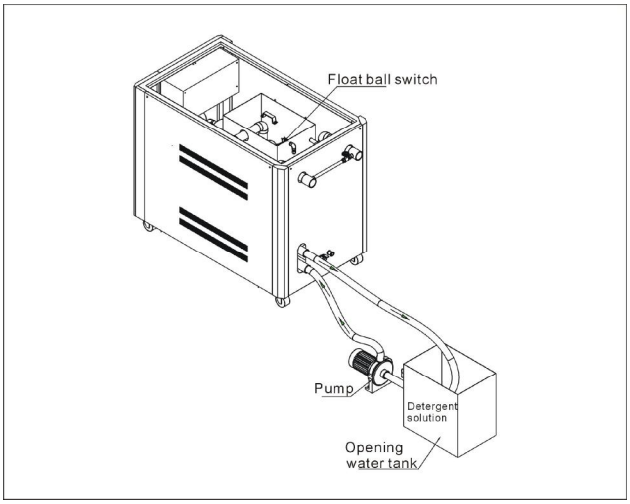
6.2.1 Condenser

A. Water-cooled series

SIC-W-R2 series water chiller adopts tube-in-shell condenser which may have incrustations piled up in the inner side of its heat pipe or sundries caused by bad water treatment. All these will influence the heat emission effect, so it is necessary to clean the condenser at fixed periods to ensure its good working performance.

If water treatment had been on to the cooling water, it is suggested that firstly use hydrogen peroxide for sterilization and then use high pressure air rifle to clean it and check whether there is still incrustation. If the cooling water had not be put under the water treatment, citric acid or sulfamic acid together with corrosion inhibitor is suggested to clean the condenser, after that use high pressure air rifle to clean it, and it is necessary to use passivator after the acid-washing.

Tube-in-shell Condenser Cleaning:



1. Ensure the float ball in water tank of the machine is closed, to prevent the detergent solution from getting into the water tank of the machine.
2. Connect pipeline with hoses according to above picture.
3. Detergent and water (according to purchased detergent mixing requirement for specific proportion) proportional to solution and pour into the opening water tank, then start-up pump cleaning.

Attention!

When the machine stops or be stored under 0℃, the pipeline should be disconnected and force the water in the condenser to come out by lifting the front part of the machine.

B. Air-cooled Series

SIC-A-R2 series water chiller use the air cooled fin style condenser which installed openly, in the using time, it is hard to avoid any dust and sundries, which will influence the heat emission effect, so it is necessary to clean the condenser at fixed periods in order to keep its working performance. Use brush, dust catcher or compressed air to clean the wings and copper pipe. Then use the low pressure water to cascade the tray pipe. Note: do not let the water to cascade on the surface of the fan motor.

Attention!

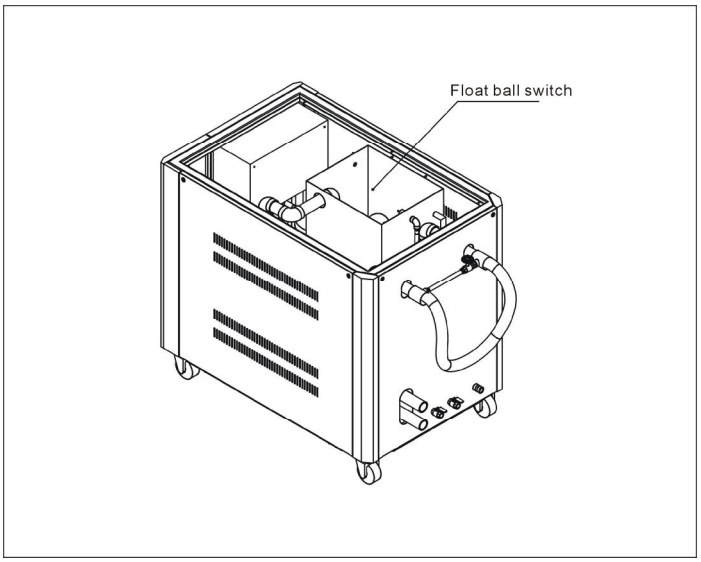
Do the cleaning work every half-year in the environment with little dust, but you must do the work every month in the environment with a great deal of dusts, and under the severe environment you had better see the situation to do the work.

6.2.2 Evaporator

SIC-R2 series water chiller adopts tube-in-shell condenser which may have incrustations piled up in the inner side of its heat pipe or sundries caused by bad water treatment. All these will influence the heat emission effect, so it is necessary to clean the condenser at fixed periods to ensure its good working performance.

Clean the evaporator use the method of cleaning the condenser, and the incrustation will discharged from the water outfall.

Tube-in-shell Evaporator Cleaning:



1. Connect chilling water inlet/outlet of machine with hoses according to above picture.
2. Bactericide and water (according to purchased bactericide mixing requirement for specific proportion) proportional to solution and pour into the water tank of machine, then start-up pump cleaning of the machine.
3. After discharging the bactericide solution when cleaning finished, it should repeat more turns of water washing to water tank for ensuring there's no bactericide solution left in the system.

Attention!Drain the water inside the evaporator away when the machine stop running under 0℃.

Melt the ice in the evaporator before starting it again.

6.3 Maintenance Schedule

6.3.1 About the Machine

Model _____ SN _____ Production date _____

Voltage_____ Φ _____ V Frequency _____ Hz

Total power _____ kW

6.3.2 Check after Installation

☐Check the pipes are all correctly connected.

☐Check if there are leakages in the piping system.

☐Check if there are breaks in welding joint.

Electrical Installation

☐Voltage: _____ V _____ Hz

☐Fuse specification: 1 Phase _____A 3 Phase _____ A

☐Check phase sequence of power supply.

6.3.3 Daily Checking

☐Check switch functions.

☐Check all the electrical wires.

☐Check whether pressure gauges are accurate.

☐Check whether compressor temperature is normal.

☐Check whether cooling water circulation is normal.

6.3.4 Weekly Checking

☐Check electrical connections.

☐Check protection & alarm function.

☐Check whether set point of hi-low pressure switch is normal.

6.3.5 Montly Checking

☐Check refrigerant circulation pipe.

☐Check whether there are bubbles in liquid indicator.

☐Check whether there is abnormal sound in pump.

☐Check whether there is scale formation in tank.

6.3.6 Trimonthly Checking

- ☐ Check whether condenser is under blockage.

6.3.7 Half-yearly Checking

- ☐ Check and clean the condenser and evaporator.
- ☐ Check and clean the filter and expansion valve.
- ☐ Check system performance.
- ☐ Clean condenser.

6.3.8 Yearly Checking

- ☐ Check whether the contactor is normal.

6.3.9 3 year Checking

- ☐ PC board renewal.
- ☐ No fuse breaker renewal.