

INDUSTRIAL CHILLER TECHNICAL MANUAL



Thank you for choosing and purchasing our products.
Please read carefully the technical manual before application.
Please make safekeeping of the technical
manual for further reference.



MAIN PRODUCTS

Air cooled chiller
Water cooled chiller
Screw style air cooled chiller
Screw style water cooled chiller

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SAFETY PRECAUTIONS FOR ATTENTION


To avoid any dangers caused to operators themselves or others, or any losses on assets, instructions are made on safety precautions to be observed as follows.


The sorts of safety precautions to be followed can be distinguished by

 Operation strictly prohibited


 Operation must be plemented

The below explains what will happen if someone fails to heed particular precaution statement

 **Danger** Hidden dangerous is indicated, personal injuries or casualties can be caused for the nonobservances.

 **Caution** Hidden dangerous is indicated, low-grade personal injuries or casualties can be caused for the nonobservances.

 **Danger!**

	Do not operate the device where water, corrosive or inflammable gas can be found or near inflammable substances	Fire accident can be caused.
	Do not place any inflammable substances on the device	
	Do not damage the power lines of the device; or attach overstress or pressure from both sides	Wire damage or electric shock can be caused.
	Do not operate device with the power lines dipped in oil or water	
	Do not operate the device under vibrations or strong impacts.	Fire accident, injury or electric shock can be caused.
	Do not disassemble the electric elements in the electric cabinet.	
Do not touch the high-temperature or rotating parts of the device		
Do not operate the device or make wiring connection with hands wet.		



Danger!

	Wiring connection must be operated by professional electrician.	Wiring connection by personnel without professional competence can cause electric shock.
	Safety validation must be made after the device is moved or natural disaster happens	Fire accident, electric shock and injury can be caused with validation ignored.
	The equipment shall be operated in conditions with fewer dusts and away from water and oil.	Fire accident or damage can be caused when operating the device in improper places.
	Emergency stop electric circuit shall be set external the device during installation to ensure that the device can be stopped and the power supply can be cut off on emergent circumstances.	Electric shock can be caused when operating without cutting off the power supply.
	Do not contact any part of the body with the metal parts of the connecting terminals when opening the electric cabinet.	Accident such as electric shock and injury can be caused.

Caution!

	Never apply transformers with power capacity less than the power of the device.	Accident such as fire accident, electric shock and injury can be caused with the instructions ignored.
	Appropriate arrangements shall be made when making operations such as installation etc. According to the net weight of the device.	
	Spontaneous disassembly and alteration of the device is strictly prohibited.	Accident such as fire accident, electric shock and injury can be caused with the instructions ignored.
	Make sure that the environmental condition where the device is being operated is controlled within the application temperature and humidity.	
	The designated installation methods shall be followed strictly.	
	When making combination application of the device with other devices, the application must be made according to the relevant instructions on the combination.	Accident such as electric shock, injury, damage and fire accident can be caused with the instructions ignored.



Caution!

	When making operations of conveying and setting etc, pay attention to the stability of the device to avoid accidents caused by dropping or slipping	Injury or failure can be caused with the instructions ignored.
	Do not drag the wires and the rotation parts of the device when making the conveying.	
	Restarting can probably happen when the power supply is resumed after the power failure, therefore settings of the device shall be properly made to avoid accidents of the restarting and ensure the personal safety.	Accident of injury can be caused with the instructions ignored.
	Make sure that the device is operated stably.	
Keep the device away from strong impacts; avoid connecting and disconnecting the power supply too frequently.	Accident of electric shock, injury, damage and fire accident can be caused with the instructions ignored.	

1.FOREWORD

1.1 User Precautions

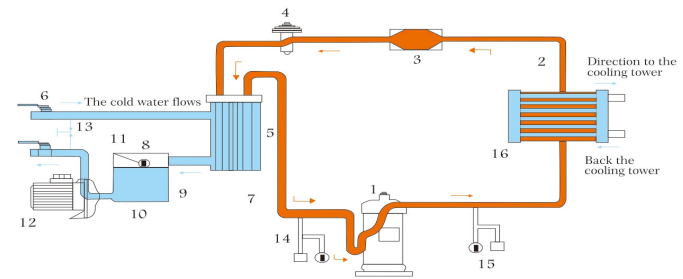
- 1.Please read the technical manual carefully before the installation and application of the device.
- 2.The performances, operations and maintenances of the device will be detailed in the following characters.
- 3.The documentations must be provided to the managerial personnel and the onsite operation and maintenance personnel.
- 4.The device has been made various testing before making the delivery to ensure that the device is complied with exfactory standards. Proper application, careful maintenance of the device is the greatest guarantees to ensure the reliability, stability and effective operation of the device.
- 5.The documentation is permanent file for the device, please make proper keeping of the documents.

1.2 Application environments

- 1.The device is required to be applied in the indoor environments of clean and neat, ensure that there's ample light and ventilations.
- 2.The environmental temperatures for the operation of the device shall be controlled within the range of 5°C to 45°C,the surrounding temperature where operation is made for more than 24 hours shall be no more than 40°C.
- 3.The air humidity shall be controlled within the range of 20% to 95%, certain space shall be left surrounding the device.
- 4.Irrelevant personnel are not allowed to enter the working area when the device is under operation.
- 5.Make proper use of the device. do not operate the device beyond the application ranges.



2. PRODUCT SPECIFICATIONS AND PRODUCT FEATURE



INDUSTRIAL CHILLERS(WATER COOLED)											
Models	SFL-5S	SFL-8S	SFL-10S	SFL-12S	SFL-15S	SFL-20S	SFL-25S	SFL-30S	SFL-40S	SFL-50S	
Power source	3PH/460V/50HZ/3PH/220V/50HZ										
Cooling capacity	BTU/hr	52200	80400	103200	122280	155880	202920	254400	310880	404280	
	kcal/hr	13154	20260	26006	30814	39281	51135	64108	78140	101678	
Input power	W	15287	23476	30260	35850	45705	59580	74725	90685	116520	
	kW	4.6	7.6	9.1	10.6	14.4	18.2	22	27.3	36.3	
Compressor/Refrigerant	Model	Hermetic Scroll/ Piston Type									
	Input Power	kW	3.75	6	7.5	9	11.2	15	18.7	22.5	30
	Species	R407C									
	Throttle mode	Capillary Tube/Temperature-sensitive and External Pressure-equalizing Expansion valve									
Evaporator	Model	Coil type/Internal thread high efficiency shell and tube heat exchange									
	Flow of refrigerated water	m ³ /h	7	12	12	12	16	16	16	18	18
	water pipe interface	PT	1.5"	1.5"	1.5"	1.5"	2.0"	2.0"	2.0"	2.5"	3.0"
Condenser	Model	External Thread High Efficiency Shell and Tube heat exchanger									
	Flow of cooling water	m ³ /h	15	18	20	22	24	28	36	44	50
	water pipe interface	PT	1.5"	1.5"	1.5"	2.0"	2.0"	2.0"	2.0"	3.0"	3.0"
Clitem storage		90	90	90	120	120	120	120	150	200	
Protector		High and low pressure protection, overheat protection, anti-phase protection, compressor over temperature protection, fusible plug protection, auto temp temperature switch protection, etc.									
		It can be placed directly on the working site, keep constant running even under changeable temperature outdoors and prevent dust from influencing heat elimination.									
External Dimension	L	mm	1180	1250	1250	1250	1500	1750	1750	1950	2350
	W	mm	650	700	700	700	800	850	880	1050	1100
	H	mm	1250	1300	1300	1300	1300	1300	1300	1550	1550
Net Weight	kg	150	180	200	220	280	360	380	460	560	

Industrial water cooled chillers are designed of case type, totally-enclosed case shell, and beautiful appearance. It can be placed directly on the working site, keep constant running even under changeable temperature outdoors and prevent dust from influencing heat elimination.

Adopt shell and tube style, manufactured with latest CAD/CAM design and processing technique fit in with CNC processing center. Adopt international most advanced screw compressor imported from Europe, high-efficiency heat exchanger. It is widely used in field of plastic, electroplating, leather, medicine, PU, chemical, shoes, printing, etc. Can do a kind of product according to customer's claim

- 1.Compressor
- 2.Cooled condenser
- 3.Drier filter
- 4.Expansion valve
- 5.Evaporator
- 6.Globe valve
- 7.Antifreezing switch
- 8.Float switch
- 9.Temperature sensor
- 10.Water tank
- 11.Pressure gange
- 12.Pump
- 13.Pressure relieve valve
- 14.Low pressure controller
- 15.High pressure controller
- 16.Pressure release valve



INDUSTRIAL CHILLER

TECHNICAL MANUAL

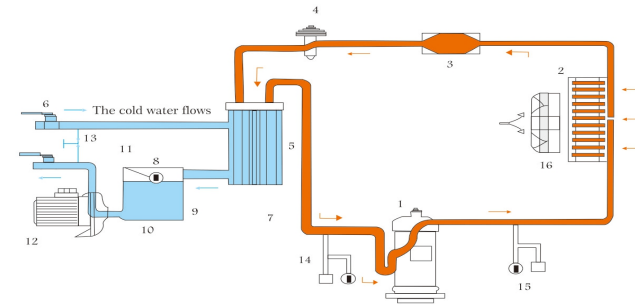
PRODUCT SPECIFICATIONS AND PRODUCT FEATURE



INDUSTRIAL CHILLERS(AIR COOLED)													
Models	SFL-03F	SFL-05F	SFL-08F	SFL-10F	SFL-12F	SFL-15F	SFL-20F	SFL-25F	SFL-30F	SFL-40F	SFL-50F		
Power source	3PH/460V/60HZ(3PH/220V/60HZ)												
Cooling capacity	BTU/hr	28768	48806.4	76384	99200	120630	152768	193638.4	248000	289664	382912	486080	
	kcal/hr	7250	12300	19250	25000	30400	38500	48800	62500	73000	96500	122500	
Input power	W	8420	14285	22358	29036	35305	44715	56678	72590	84785	112078	142276	
	kW	2.8	4.3	6.8	8.4	10.2	13.6	16.8	21.5	25	32.9	42.5	
Model	Hermetic Scroll/ Piston Type												
Input Power	kW	2.1	3.75	6	7.5	9	11.2	15	18.7	22.5	30	37.5	
Species	R407C												
Throttle mode	Capillary Tubes/ Temperature-sensitive and External Pressure-equalizing Expansion Valve												
Model	Coil Type/Internal Thread High Efficiency Shell and Tube heat exchanger												
Flow of refrigerant water pipe interface	m ³ /h	7	12	12	16	16	18	18	20	20	30	30	
	PT	1"	1.5"	1.5"	1.5"	1.5"	2.0"	2.0"	2.0"	2.5"	3.0"	3.0"	
Model	High Efficient Red Copper Tube Covered Into Aluminium Fins+ Low Noise Outer-rotor Axial Fan												
Cooling air amount	m ³ /h	3500	7000	7300	9000	9500	15600	16500	20500	22500	31000	40000	
Fan Power	kW	0.18x1	0.18 x 2	0.18 x 2	0.25 x 2	0.25 x 2	0.55 x 2	0.55 x 2	0.55 x 3	0.55 x 4	0.55 x 4	0.75 x 4	
Cistern storage		64	80	90	90	90	230	250	270	270	300	300	
Protector	High and low pressure protection, overload protection, anti-phase protection, compressor over temperature protection, fusible plug protection, auto temp temperature switch protection, etc.												
External Dimension	L	mm	980	1250	1300	1300	1400	1750	1950	2350	2800	3180	3350
	W	mm	680	750	800	800	850	930	930	930	1140	1300	
	H	mm	1200	1330	1480	1480	1580	1600	1600	1720	1750	2180	2400
Net Weight	kg	175	253	310	340	396	420	480	520	580	640	840	

SFL-xxF Series Industrial Water Cooling Machine can be installed easily and it is unnecessary to be used with cooling tower. There are various specifications of machines available and cooling range varies from 7250 to 245000 kilocalorie(3HP-100HP). The unit is designed with multiple safety protections to ensure safe operation.

Air cooling chiller adopts international famous-brand compressor, have electricity leakage protection, over loading protection, Over pressure protection, refrigerant abnormality protection, compressor overheat protection combination perfect. Corrosion resistant tin in air cooling style heat exchanger, manufactured with technics of quadratic flanging tin machine. Don't need another pump and water tower, the machine have the features such as reliable in running, clean easily, strong cooling capacity, low noise, long service life and easy to operate. Can do a kind of product according to customer's claim.



- 1.Compressor
- 2.Cooled condenser
- 3.Drier filter
- 4.Expansion valve
- 5.Evaporator
- 6.Globe valve
- 7.Antifreezing switch
- 8.Float switch
- 9.Temperature sensor
- 10.Water tank
- 11.Pressure gage
- 12.Pump
- 13.Pressure relieve valve
- 14.Low pressure controller
- 15.High pressure controller
- 16.Fan



3.INSTALLATION INSTRUCTION

3.1 Preparation before installation

- 1.Other devices, stacking of materials and maintenance space must be taken into consideration before determining the installation position of the device. At least a distant of 1m is required to be kept surrounding the device.
- 2.The arrangements of power supply must be made before the installation, the load power of the power source wires shall be over the total power of the device.
- 3.Please check whether the machine appearance has been damaged during the transportation. If there is the obvious damage of the appearance, please don't hesitate to contact with the factory or seller.

3.2 Precaution of installation

- 1.Keep the device level and flat and ensure the ventilation of the surroundings.The ambient temperature shall not exceed 45°C indoors
- 2.During making the installation, do not change the tube diameter of the cooling water outlet in case that alarming is made on high pressure caused by poor heat dissipation.
- 3.Filter valves must be made on the return circuits of refrigerated water and cooling water when the water source is too directly or the surroundings near the water tower is too poor. Periodical cleaning shall be made.
- 4.If the refrigeration water system is designed as closing pipelines, exhaust valve shall be installed at the highest position of the system and drain valve at the lowest position of the system to facilitate the cleanings and drainages of the system.
- 5.Proper cooling tower with ample size shall be determined according to the refrigeration capacity of the device. The reference method is that each 1HP compressor shall be

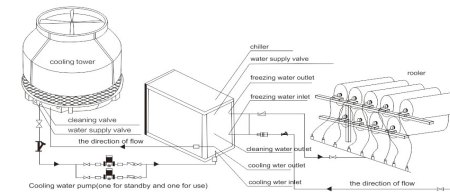
allocated with a cooling tower of 1.5 ton.

6.After the coolant hoses and pipelines have passed the leakage testing, coat them with heat preservation layer to avoid heat dissipation and pipeline dripping.

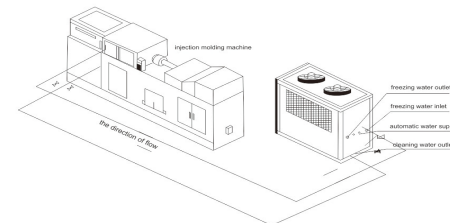
7.The water pump, water tower and water supply pump of the circulating water system can be connected into the control circuits of the chillers to facilitated operations and protect the chiller.

3.3 DIAGRAM OF INSTALLATION

Installation Schematic of chiller (water-cooled)



Installation Schematic of chiller (air-cooled)





4.OPERATION INSTRUCTION

4.1 Main Function and Technique Index



- Temperature display range:** -50~150°C (The step between -9.9 and 99.9 is 0.1°C , else 1°C)
- Temperature setting range:** -45 ~ 145°C (The range can be set)
- Power supply:** 220V±10% or 460V±10% (Refer to the wiring diagram)
- Operation Environment:** temperature -20°C ~ 50°C , humidity 85%.
- Relay contact capability:** 2A/250VAC (pure resistive load)
- Temperature sensor:** NTC R25=5kΩ , B (25/50)=3470K
- Executive standard:** Q/320585 XYK 01 (NA610-CHTA)

4.2 Operation Guide

What's the meaning of the index lights on the panel?

The function of the index lights on the panel is showing below:

Indicator light	Indicator light name	Light	Flash
	Temperature setting	In the state of temperature setting	-
	Refrigeration	Refrigerating	Ready to refrigerate, in the state of compressor state delay protection
	Heat	Heating	Ready to heat, in the state of compressor state delay protection
	Not use	-	-

The meaning of the nixietube display:

The nixietube usually shows temperature, if it shows "SHr", it means the temperature sensor is short, and "OPE" means the temperature sensor is open. The temperature and the alarm code (Axx) will show alternately when in the alarm state.

The code is showing below:

Code	signification	Explanation
A11	External Alarm	External alarm input, refer to the internal parameter code "F50"
A21	Temp sensor error	Open or short (showing "SHr" or "OPE")
A99	Probation time ends	If you have set the probation time F87, the alarm occurs when the accumulative running time is over probation time, and the controller can not work.

How to set the temperature

In the state of displaying current temperature, press the keys " " and " " at the same time, indicator light lights, then enter the state of temperature setting, here the nixietube shows the temperature of setting, then use the key " " or key " " to change the value of setting. " " adds 0.1°C , " " minus 0.1°C , press and hold them over 0.5 seconds can add or minus rapidly. Press both keys at the same time or without any operation for 5 seconds to exit the state of setting (The temperature range is limited by F13 and F14, please refer to the advanced operation).

4.3 Basic Operation principle

Temperature controlling

The controller has 2 temperature controlling mode: Refrigeration and Heat(F29). Temperature controlling point is controlled by "setting temperature (F11, or press the both keys to set)" and "temperature difference(F12)". In refrigeration mode, the controller begins to refrigerate when the temperature of the temperature sensor is over "setting temperature + temperature difference", and it stops refrigerating when the temperature is under "setting temperature - temperature difference"; In heat mode, the controller begins to heat when the temperature of the temperature sensor is under "setting temperature - temperature difference", and it stops heating when the temperature is over "setting temperature + temperature difference".

Compressor delay time

The compressor delay time is set by F21, for example, 3 minutes. The controller contains a "compressor



halt calculagraph”, and it begins to time when compressor stops, the program first check the calculagraph before booting the compressor next time, the program will immediately boot the compressor if the calculagraph reach 3 minutes ,if the calculagraph doesn't reach 3 minutes ,it will boot again when the calculagraph reaches 3 minutes. Thus you can ensure that the boot alternation is over 3 minutes after halt, so it can prevent to breaking the compressor as a result of frequent boot. In addition, the controller doesn't boot the compressor within 3 minutes after turning on the power supply, thus the compressor can also be protected in the state of power cut and then power on.

External alarm

The controller can connect a switching value as external alarm source (Pin 4, 5), when the external alarm occurs, the controller stops, displays the alarm code “A11” and generates alarm output. External alarm signal has 5 modes (F50):

- 0: without external alarm
- 1: always open, unlocked
- 2: always open, locked
- 3: always closed, unlocked
- 4: always closed, locked

“Always open” means in normal state, external alarm signal is open, if closed, the controller will give an alarm; “Always closed” is on the contrary. “Locked” means that when external alarm signal becomes normal, the controller is still in the alarm state, and it needs to press any key to resume.

Probation time

A probation time can be set (F87), the controller can add up the running time after power is on, if the accumulative running time is over the probation time, the controller will stop and display the alarm code A99, if you want to eliminate the limit of probation time, set the F87 to “OFF”, also you can use the F86 to clear the accumulative running time, and you can try to use it again. The parameter F85 can be used to examine the accumulative running time of the controller (hour).

Password

In order to prevent irrespective persons from changing the parameters, you can set a password (F80), and if you have set a password, the controller will hint you to enter the password after you press the key “M” for 5 seconds, you must enter the correct password, and then you can set the parameters. If you don't need the password, you can set F80 to “OFF”. Notice that you must remember the password, and if you forget the password, you can not enter the set state.

4.4 Advanced Operation

Press the key “ ” for 5 seconds to enter the state of parameter setting, and if you have set the password, the LED display the “PAS” to hint you to enter the password, you can use the key “ ” to change number and use the key “ ” to shift. If the password is correct, the LED will display the parameter code, use “ ” or “ ” to select the parameter code, and press the key “ ” and “ ” at the same time to display the parameter value, here you can use the key “ ” and “ ” to set the parameter (pressing the key and not release can add or minus rapidly), then press the both keys at the same time to return to the state of showing parameter code after finishing setting.

Internal parameter code is showing below:

Sort	Code	Parameter Name	Range	Factory setting	Unit	Remark
Temperature	F11	Setting temperature	F14 – F13	0	°C	The setting range is limited by F13 and F14
	F12	Temperature difference	0.1 – 20	1.0	°C	Control the temperature difference, please refer to the temperature controlling
	F13	Max setting temperature	-45 - 145	145	°C	Notice: the controller will follow the rule of F14<F11<F13 forcibly, if you find out that one parameter can not be adjusted, it is because the parameter is limited by other parameters, you must first adjust other parameters
	F14	Min setting temperature	-45 – 145	-45	°C	
	F19	Temp sensor adjustment	-20.0 – 20.0	0.0	°C	Adjust the temperature sensor bias
Compressor	F21	Compressor delay time	0 -- 10	3	min	
	F29	Compressor controlling mode (temp controlling mode)	C/H	C	-	C: refrigeration mode H: Heat mode
Alarm	F50	External alarm mode	0 -- 4	0	-	0: without external alarm 1: always open, unlocked 2: always open, locked 3: always closed, unlocked 4: always closed, locked
System setting	F80	Password	OFF 001 -- 999	OFF	-	OFF means no password 000 means clearing password
	F85	Display accumulative running time	-	-	hour	
	F86	Accumulative running time reset	-	-	-	
	F87	Probation time	OFF 1 -- 999	OFF	hour	The controller will stop if the accumulative time is over probation time, and show the alarm code “A99”. OFF means no probation time
Testing	F98	Reserved				
	F99	Test self	This function can attract all relays in turn, and please don't use it when the controller is running!			
	End	Exit				



5.REPAIR AND MAINTENANCE

5.1 Common faults and solutions

Description	State	Solution
Phase loss failure	Bright	(1)The voltage of main power supply is abnormal. (2)The order of R.S.T of main power is not correct, exchange the position of two line.
High pressure protection	Not bright	Indication that input circuit is in order.
	Bright	Indicate poor heat elimination and ventilation, check the surrounding environment of machine unit.(For water cooling type, check whether such external circulation system as cooling tower, water pump and condenser work normally). Press the pressure switch(two small red spots)after troubleshooting.
Host machine failure	Not bright	Indicate that system is in order.
	Bright	(1)Check whether the connected wire from AC contactor to main wire of compressor is noema. (2)The compressor is damaged(have professional refrigeration technician check it)
Water pump failure	Bright	(1)Water pump is clamped inside when out of use for a long time(for starting of auxiliary pump) (2)The host machine is lack of water the water pump is damaged, change the water pump.
Operation of host machine	Bright	Work normally
	Not bright	Not start the machine, or it is in temp, contril delay.

5.2 Cautions for mainte

In case that the equipment goes out of order , please check it according to the above chart. Contact us or professional refrigeration technician if failing in shooting trouble.Non professional is allowed to repair lest larger loss occlur.

5.3 Maintences

- 1.Condenser shall be cleaned under the following circumstances: The chiller has been operated for over half years; the circulating water is in order while warnings are often made on high pressure, the refrigeration capacity is lowered or the high pressure indication is over 20Kg/cm2 under operations.
- 2.Keep the cleanliness of the water tower and the air ventilation surrounding the water tower to avoid the irrelevant materials to enter the water tower to reduce the heat dissipation efficiency.
- 3.To reduce the dew accumulation of the molds, before stopping the injectioner, first turn off the refrigeration water and the chiller; stop the injectioner after the temperature of the mold is heated up so that the mold will not be damaged by corrosion.
- 4.The blades of the water pump of the chiller can be blocked by water fouling after the suspension for a long period. Please rotate the water pump before starting to ensure that the water pump is in order.
- 5.If the chiller will be suspended for a long time, especially in winter, the residual water in the water tank and condenser shall be discharged to prevent the condenser from being frost broken or blocked.
- 6.Cleaning shall be made on the cooling fin and evaporator of the chiller when the Air cooled chiller has been operated for 3 to 6 months with methods as follows: Clean up the dusts and irrelevant materials in the cooling fin with compressed air; the cleaning methods of the evaporator can be referred to water cooled chiller.