FerroTec

Model No.
FCCA10221
FCCA15221
FCCA30221
FCCA52221

Operation Manual Vapor Compression Chiller

Please read this operation manual carefully and keep it properly

Preface

Thank you very much for purchasing Ferrotec Chiller (herein after referred to as the "product").This manual describes in detail how to operate the product. Before installing or performing operations related to this product, be sure to read this manual carefully to have a thorough understanding of the overview and safety of this product. In particular, you need to follow the safety instructions regarding "Danger", "Warning" and "Caution".

Warning Notice

This product is equipped with a "Warning" label and a "Caution" label to inform the operator of the dangers associated with the product. Before you start, Check the contents and location of all labels.Only trained personnel can operate the product.Transportation, installation and maintenance (including hazardous work) shall be carried out by persons with sufficient knowledge and experience of the product.

⚠ WARNING

The access end of the power cable must match the leakage and overload protection devices according to the rated current marked on the device nameplate. It is strictly forbidden to open the electric control box when it is powered on. If internal maintenance is required, be sure to unplug the power plug first and operate by professionals in the case of power failure.

⚠ WARNING

Read the label on the case carefully and be familiar with the relevant operation (do not tear or scratch the label). If there is a fault alarm when maintaining the product, you must cut off the power supply, otherwise it may cause personal injury!

Note: Please read this manual carefully before use. The design and performance of our products will be continuously improved, and the specifications are subject to change without prior notice.

Packaged items

Model	Serial Number	Project	Number
FCCA10221 FCCA15221	1	Complete machine	1
	2	Power cord	1
	3	Operation manual	1
	4	Pagoda joint	2
	5	Certificate of conformity	1
FCCA30221 FCCA52221	1	Complete machine	1
	2	Operation manual	1
	3	Certificate of conformity	1

Contents

1. Application

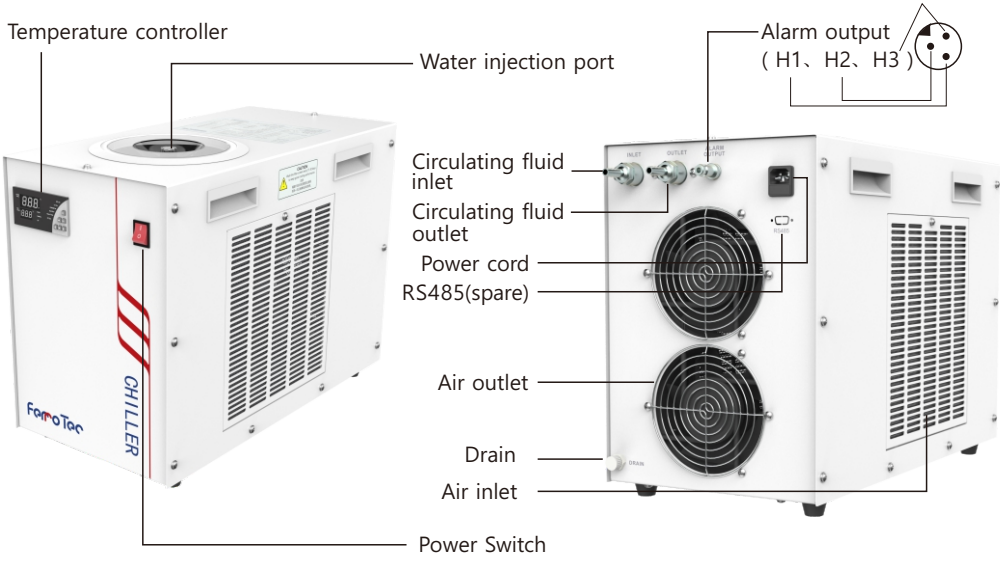
This type of chiller is suitable for cooling down small power industrial equipments. It can be applied to the cooling of laser marking machine, laser engraving machine, non-metal laser cutting machine, metal laser cutting machine, SLA3D printer, laser drilling machine and other equipments.

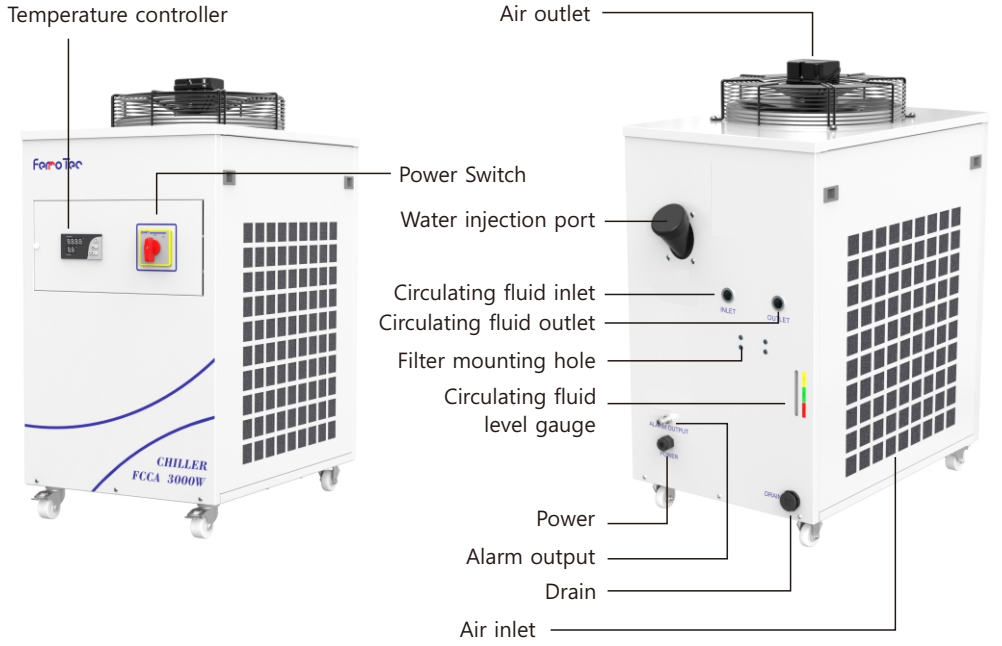
2. Basic parameters

Model			FCCA10221	FCCA15221	FCCA30221	FCCA52221
Cooling mode			Vapor compression refrigeration			
Heat dissipation mode			Air-cooled			
Control mode			Temperature controller			
Ambient temperature/ humidity			5℃-40℃，30-70%RH			
Refrigerant			R134a	R410A		
Circulating fluid system	Circulating fluid		DI Water/15% ethylene glycol in water			
	Operating temperature range		5.0℃-40.0℃			
	Cooling capacity (20℃) ※1		950~1000W	1450~1500W	3000~3200W	5100~5300W
	Heating capacity		450~500W		400W	400W
	Temperature stability※ 2		±0.6℃	±0.6℃	±0.5℃	±0.5℃
	Pump		Max flow rate 16L/min, max head 16m		Max flow rate 31L/min, max head 19m	
	Tank volume		6.5L		14L	
	Port size	IN/OUT	Rc1/2			
		Drain	φ10		Rc1/2	
Electrical system	Power supply		Single-phase220V，50Hz			
	Current overload protection		10A	10A	20A	20A
	Rated current		2.5A	4.5A	7A	11A
	Communication		Aviation plug			

※1 Ambient temperature 25℃，Setting temperature 20℃，
※2 Under stable load without turbulence.

3. Part name


Temperature controller
Water injection port
Alarm output
(H1、H2、H3)
Circulating fluid inlet
Circulating fluid outlet
Power cord
RS485(spare)
Air outlet
Drain
Air inlet
Power Switch
FerroTec
CHILLER


Temperature controller
Air outlet
Power Switch
Water injection port
Circulating fluid inlet
Circulating fluid outlet
Filter mounting hole
Circulating fluid level gauge
Power
Alarm output
Drain
Air inlet
FerroTec
CHILLER
FCCA 3000W

4. Installation Precautions

The installation of the chiller must be completed by professional technicians and should comply with relevant regulations, standards and product operation manuals. When installing, check the following:

1. After opening the box, the user should carefully check the whole machine to confirm that there is no damage to the product parts during transportation.

2. It needs to be ensured that there is good ventilation in the inlet and outlet passages.

3. External wiring should be reliably grounded to ensure the safety of the chiller's use.

Note:①The distance between the air outlet on the back side of the chiller and the air inlet on both sides from the surrounding objects is not less than 30cm, otherwise affect the performance of the product.

②The dust cover must be removed and washed every 15 to 30 days to avoid affecting the cooling efficiency.

4. It is recommended that a water filter be added to the external piping connected to the laser equipment.

Note: Wrapping thermal insulation cotton outside the external piping can effectively prevent condensation on the external piping.

5. Making sure to fill the tank with the proper amount of water before turning on the machine. The water level should be between the lowest and highest levels, or with the tank float at the top.

Note:①If the tank is not filled with water and turned on, it is easy to damage the pump.

②Clean the tank and replace the circulating water once a month.

③Softened water containing purified water, distilled water, etc. can be added.

5. Parameter settings

1. Power-on inspection and precautions

1.1. Turn on the power and press the power switch. The water pump inside the chiller starts to work, and after a period of time, the water level in the water tank drops. If the water level is lower than the minimum water level, E6 will alarm; please add circulating water again until the alarm is eliminated.

1.2. After the chiller running, check whether there is water leakage in each pipe of the whole machine. If there is water leakage, the power supply should be cut off and the pipes should be reassembled.

1.3. After normal operation, the temperature controller automatically controls the start and stop of the compressor, fan, solenoid valve and other devices according to the set temperature.

Note: Please do not repeatedly start and stop the chiller, otherwise it will seriously affect the service life of the compressor of the chiller.

2. Parameter setting

The factory set of temperature controller is constant temperature control mode, the water temperature is 25℃. Users can adjust themselves according to the actual situation.

2.1 Temperature Controller Panel Introduction

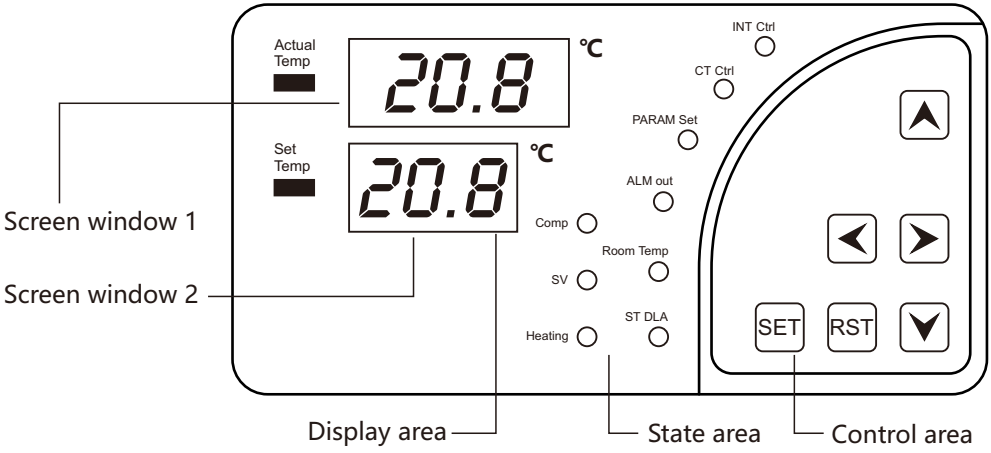
Displayed in normal state

Screen window 1"ActualTemp" indicates actual water temperature.

Screen window 2 "Set Temp" Indicates setting water temperature.

All preceding "-" indicates sub-zero

Note: Parameters or alarm codes will display during regulation or abnormal state.



2.2.Indicator lights and definition

Abbr.	Full name	Indicator lights	State
Comp	Compressor	Lights up	Starts
SV	Solenoid valve	Lights up	Starts
Heating	Electric heating rod	Lights up	Starts
INT Ctrl	Intelligent mode	Lights up	Intelligent mode
CT Ctrl	Constant mode	Lights up	Constant mode
PARAM Set	Parameter setting mode	Lights up	Parameter setting mode
ALM OUT	Alarm output	Lights up	Alarm output
Room Temp	Room temperature	Lights up	Room temperature
ST DLA	Power-on delay	Lights up	Power-on delay

Adjustment keys:

Key: Up key

Key: Left key

SET Key: Set key

Key: Down key

Key: Right key

RST Key: Enter key

2.3 Parameter adjustment method

First press and hold down the "▲" key, then press SET button at the same time for more than 5s, until window 1 shows "00" and window 2 shows "PAS", at this time, press the "▲" key to adjust to "08". Then press the SET key to enter the adjustment mode. Window 2 displays the parameter F0, Window 1 displays the corresponding parameter value of F0, which enters the setting state of the temperature controller at this time.

Change the parameter item (code F0~F11) by "◀ ▶" key, change the corresponding parameter value by "▲ ▼ " key, press the RST key at any time, it will save the modified parameter and exit the parameter setting state, and run according to the new parameter. If the RST key is not pressed within 20s, the temperature controller will automatically exit the parameter setting state and run according to the original parameters. The relevant code meanings and parameter adjustment ranges are shown in the following table.

No	Code	Item	Range	Factory settings	Note
1	F0	Setting temperature	F9～F8/ -20.0～40.0℃	25.0℃	Intelligent mode/ Constant mode
2	F1	Temperature difference value	–15.0～5.0℃	-2.0℃	Precision 0.1℃
3	F2	Refrigeration return difference	0.1～3.0℃	0.8℃	Precision 0.1℃
4	F3	Control mode	0、1	1	0-Constant mode、 1-Intelligent mode
5	F4	High water temperature alarm	1.0～20.0℃	10.0℃	Precision 0.1℃
6	F5	Low water temperature alarm	1.0～60.0℃	15.0℃	Precision 0.1℃
7	F6	High ambient temperature alarm	40.0～50.0℃	45.0℃	Precision 0.1℃
8	F7	Password	00～99	08	
9	F8	Maximum set water temperature	(F9＋1)～40.0℃	30.0℃	Not valid in constant temperature mode
10	F9	Minimum set water temperature	1.0～ (F8 - 1)℃	20.0℃	Minimum value 1.0, Not valid in constant temperature mode
11	F10	Flow pulse frequency alarm value	0-99	8	Below the set value will flow alarm

Note:

①In the parameter setting state, the system operates according to the original parameters;

②In constant control mode, the water temperature is controlled by the "F0" parameter;

③In the intelligent control mode, the water temperature is automatically adjusted according to the temperature change. The temperature difference is controlled by the "F1" parameter.

When room temperature + F1 is less than F9, the water temperature setting is equal to F9 ;

When room temperature + F1 is greater than F8, the water temperature setting is equal to F8 ;

When room temperature + F1 is less than or equal to F8 and greater than or equal to F9, the water temperature setting is equal to room temperature + F1;

2.4 Restore factory settings

Press and hold down the " ▲▼ " key at the same time and then press the temperature control power switch at the same time, after 3s, "rE" is displayed, and all the set values are restored to the factory values, and then after another 3s, it will return to the normal working condition and run according to the factory set values.

2.5 Check the room temperature

In the non-setting state, press the " ▼ " key to display the temperature sensor detection value (Room Temp light is on, indicating that the display is room temperature), and then resume displaying the water temperature after 6s.

2.6 Quick adjustment of the set temperature

Press the SET setting key when the temperature controller is working normally. If the temperature controller is working in constant temperature mode, window 1 shows the parameter value of F0 set temperature; In intelligent mode, window 1 shows the parameter value of F1 temperature difference. Panel "PARAM" "Set" light, indicating that now for the parameter setting state, under this state, press the " ▲▼ " key can modify the parameter value of F0, F1. After modifying the parameter, press SET key or no operation within 20S, it will not save and quit; if press RST key, it will save and quit, and the new parameter will take effect.

2.7 Check the flow rate

In the non-setting state, press " ➤ " to display the flow reference value, and resume displaying the water temperature after 6 seconds.

2.8 Example of temperature regulation

①Example 1 24.0°C constant temperature setting.

The chiller is set to constant temperature mode (CT Ctrl light is on), press SET setting key

to enter the parameter setting mode. Then press the " ▲ ▼ " key to adjust the set temperature to 24.0 ℃, press the RST OK key to save and exit the parameter setting mode, and run according to the newly modified parameters

②Example 2 Setting 3.0℃ below ambient temperature.

The chiller is set to intelligent mode (INT Ctrl is on), press SET setting key to enter the parameter setting mode. Then press " ▲▼ " key to adjust the deviation to -3.0℃, press RST OK key to save and exit the parameter setting mode, and run according to the newly modified parameters.

③Example 3 Setting the temperature 40°C overheat alarm.

First press the " ▲ " key without releasing, then press the SET key for 5 seconds, window 1 shows 00, release all the keys; and then press the key " ▲" to adjust "00" to "08" (factory set password), and then press the SET key, the window 1 shows F0, and press the " ➤ " key to adjust the parameter item to F6, then press the " ▲ " or " ▼ " key to adjust the item parameter to 40℃. Press the RST OK key to save the exit parameters to return to the temperature display, and run according to the newly modified parameters.

No	Code	Item	Factory parameter	Case 1 setting values	Case 2 setting values	Case 3 setting values
1	F0	Setting temperature	25.0	24.0		25.0
2	F1	Temperature difference value	-2.0	-2.0	-3.0	-2.0
3	F2	Refrigeration return difference	0.8	0.8	0.8	0.8
4	F3	Control mode	1	0	1	0
5	F4	High water temperature alarm	10.0	10.0	10.0	10.0
6	F5	Low water temperature alarm	15.0	15.0	15.0	15.0
7	F6	High ambient temperature alarm	45.0	45.0	45.0	40.0
8	F7	Password	08	08	08	08
9	F8	Maximum set water temperature	30.0	30.0	30.0	30.0
10	F9	Minimum set water temperature	20.0	20.0	20.0	20.0
11	F10	Flow pulse frequency alarm value	0 ~ 99	8	8	8

6.Alarm functions and output

1. Table of alarm causes and operating status

Working condition / System indication	Alarm code	Buzzer	Output port H1、H2	Output port H2、H3
Water pump works properly			Open circuit	Turn-on
High room temperature	E1	Buzzing	Turn-on	Open circuit
High water temperature	E2	Buzzing	Turn-on	Open circuit
Low water temperature	E3	Buzzing	Turn-on	Open circuit
Room temperature sensor failure (Constant temperature is ineffective)	E4	Buzzing	Turn-on	Open circuit
Water temperature sensor failure	E5	Buzzing	Turn-on	Open circuit
Water shortage alarm	E6	Buzzing	Turn-on	Open circuit
The cooling water circulation circuit is blocked	E7	Buzzing	Turn-on	Open circuit
Pump failure	E7	Buzzing	Turn-on	Open circuit
The power supply is interrupted			Turn-on	Open circuit

Note :

①When alarmed, the code in error will alternate with the flow meter fault water temperature.

②However, the error code needs to be eliminated before the alarm condition stops.

2、Alarm conditions

E1: Room temperature > Over high air temperature alarm value (F6 setting value)

E2: Water temperature > Set temperature + refrigeration return difference+ over high water temperature alarm F4

E3：Water temperature < Set temperature-heating return difference-over low water temperature alarm F5

E4：Room temperature sensor short or open circuit

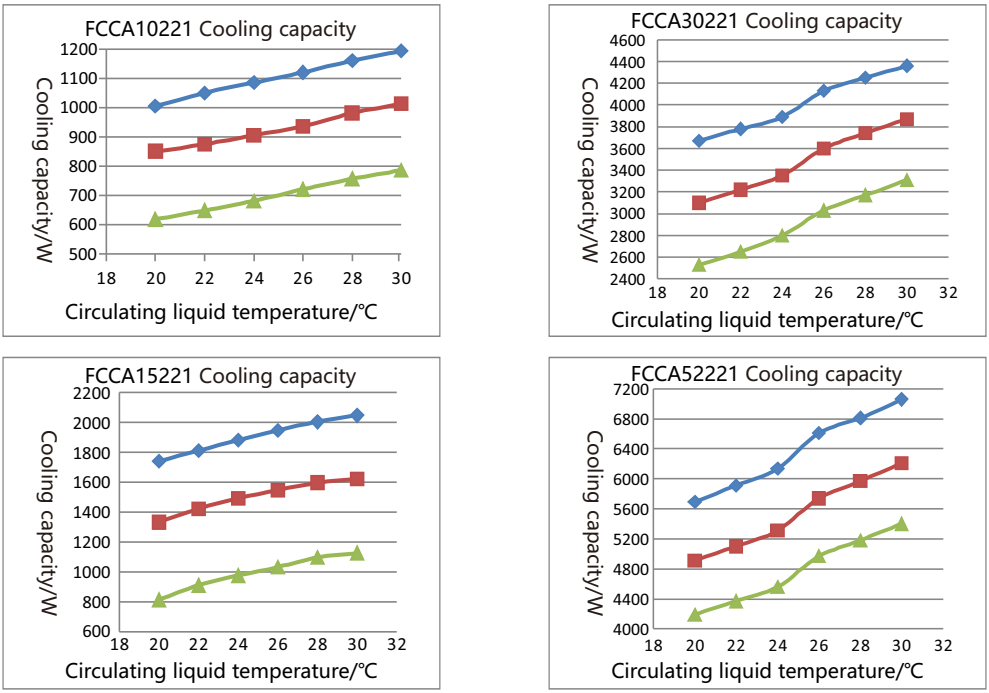
E5：Water temperature sensor short or open circuit

E6：Water level below normal

E7：Cooling water circulation circuit blocked, circulating water pump short-circuited or open circuit, flow meter short-circuited or open circuit.

7. Refrigeration performance

The performance curves of the chiller at room temperature 20°C, 30°C and 40°C are shown below:



Note: The test environment is different, the data deviates from the actual situation. The above table data is for reference.

8. Fault handling

Failure phenomenon	Cause of Failure	Treatment
No power on	Bad contact with power cord	Re-plugging the power cord
	Blown fuse	Open the cover of the electrical box inside the machine, check the fuse, replace it with a spare fuse if necessary, and check whether the power supply voltage is stable, check whether the power connector and the power supply cable are in good contact with each other.
Flow rate alarm (E7)	Clogged water circulation lines or deformation of water pipes	Check the external circulating water line
Bad cooling performance	Side panel filter clogged, bad heat dissipation	Cleaning the side panel filter (needs to be cleaned regularly)
	Bad ventilated air outlets or inlets	Ensure smooth ventilation of air outlets and inlets
	Improper setting of thermostat parameters	Reset control parameters or restore factory settings
	Frequent switching on and off of the chiller	Ensure that the chiller has enough cooling time
	Excessive heat load	Reduce the heat load, or choose a model with a larger cooling capacity
Over high room temperature alarm (Thermostat panel display E1)	High ambient temperature of the chiller	Improved ventilation, operating ambient temperature less than the ambient temperature set limit
Serious condensation	Water temperature is much lower than the ambient temperature, high humidity	Turn up the water temperature or add insulation to the water lines

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