

NA1547 Water-cooled Water Chilling Unit Controller

Main Function and Control Logic

The temperature testing has two channels: one is at the water inlet, as the temperature controlling signal, the other is at the water outlet, used for preventing frostbite.

Four output channels: compressor, cooling water pump, freezing water pump, alarm output.

Three switching value inputs (passive point signal): cooling water pressure switch, freezing water pressure switch, on-off signal.

Control Logic:

1. On/off

The controller can start up or shut down with the on-off key on the panel or external switch, the light of the “power supply” lights in the on state and extinguishes in the off state.

2. Refrigeration

When it begins to refrigerate, the controller will first turn on the cooling water pump, and then turn on the compressor when the cooling water pump switch is close. When it stops refrigeration, the controller will shut off the compressor and cooling water pump. The freezing water pump is always running in the on state.

3. Water lack alarm

Check whether the cooling water and the freezing water is normal by water pressure switch, if the freezing water is lacking in the on state, the controller will turn off the freezing water pump and give an alarm and can not turn on refrigeration. If the freezing water or cooling water is lacking in the refrigerating state, the system will stop and give an alarm.


4. Frostbite preventing

If the water out temperature of the freezing water is below 3°C, the controller will stop refrigeration, but the freezing water pump is still running, the state will resume when the temperature goes up to 5°C. (The alarm temperature and the resume temperature are adjustable, and please refer to the senior operation)


Technique Index

 **Temperature display range:** -50~125°C, step 0.1°C


 **Temperature setting range:** -45~120°C

 **Power supply:** 12V AC (Use the transformer with the controller, primary voltage, 220V±10% or 380V±10%)

 **Operation Environment:** temperature -10°C~45°C, humidity≤85%.

 **Relay contact capability:** 3A/250VAC (Pure resistive load)

 **Temperature sensor:** NTC R25=5kΩ, B (25/50)=3470K

 **Executive standard:** Q/320585 XYK 01 (NA1547-CTAX)

Operating Guide

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

The function of the LED on the panel is as follows:

LED	light	flash
Backwater temperature	Display the temp of the water inlet	-
Water out temperature	Display the temp of the water outlet	-
Temp upper limit	Setting the temp upper limit(not revised)	Setting the temp upper limit(has been revised)
Temp lower limit	Setting the temp lower limit(not revised)	Setting the temp lower limit(has been revised)
Cooling water	-	Cooling water lack
Freezing water	-	Freezing water lack
Frostbite preventing sensor	-	Frostbite preventing sensor error
Frostbite preventing	-	Frostbite preventing alarm (the temperature of the water outlet is too low)
Refrigeration	Refrigerating	Ready to refrigerate(In the period of compressor delay protection or waiting for the water pressure becoming normal)
Cooling water pump	Cooling water pump running	-
Freezing water pump	Freezing water pump running	-
Power supply	System startup	-

The meaning of the nixietube display

The nixietube usually shows temperature, if it shows “EE”, it means the temperature sensor is short, and “-EE” means the temperature sensor is open.

How to start up and shut down?

The controller can startup or shut down through the on-off key on the panel or external switch:

In off state, press the on-off key and hold it for 1 second, or make the external switch close, you will hear the sound “doo”, and at the same time the light of the “power supply” lights, it means that the controller starts up, here the controller enters the controlling state.

In on state, press the on-off key and hold it for 1 second, or make the external switch open, then the light of the “power supply” extinguishes, here the controlling part stops working, and the compressor, the fan and the water pump also stop working, but the temperature display part is still working.

Notice that the controller decides to startup or shut off by checking the state transition of external switch, but not the absolute state of external switch, so no matter what the external switch is in the state of open or close, you can turn on or off the controller by pressing the on-off key for some time.

How to set the upper limit and lower limit temperature?

Press the key “set” and hold it for at least 2 seconds, the Micro-controller displays temperature that is “upper limit”, also “Upper limit” LED lights, then using the key “▲” or “▼” can adjust the parameter. After setting, press “set”, then enter the “lower limit”, using the key “▲” or “▼” can adjust the parameter, press the key “set”, enter the “Defrosting cycle”, using the key “▲” or “▼” can adjust the parameter, press the key “set” again, then exit the state of setting parameter. (the key “▲” adds 0.1°C, the key “▼” minuses 0.1°C, press and hold it over 0.5 seconds can add or minus rapidly)

Notice: 1. In the state of temperature setting, it will exit the state of setting if no one presses the key within 30 seconds.

2. The value can be only saved after exiting the state of setting. The value which has been set can not be saved if the power is off before exiting the state of setting.

How to read the temperature (the temperature of the frostbite preventing sensor) of the water outlet?

Press the select key to switch to the state of showing water outlet temperature (the light of “water outlet” lights), or press the key “▼” to show the water outlet temperature when showing water inlet temperature. Release the key to resume.

How to eliminate the alarm sound?

Press any key to eliminate.

How to deal with the alarm?

The controller will make the corresponding indicator light flash or make the nixietube display the alarm code when the alarm occurs, you must first look for the error causation according to these indications. After eliminating the errors, some alarms can resume automatically, but others can be locked, and you must press the resume key to eliminate the alarm state.

Please refer to the table below:

Alarm Name	Causation	Resume
Cooling water	Cooling water lack	Press the “resume” key
Freezing water	Freezing water lack	Press the “resume” key
Frostbite preventing prober	Frostbite preventing prober error	Auto
Frostbite preventing	the temperature of the water outlet is too low	Auto

✓ **Advanced Operation**

The controller can adjust some internal parameter to meet all kinds of need. The parameter is supplied for special technologist, and common users don't need to know. Please don't change the internal parameter of the controller casually, lest lead to the abnormality of the controller. The way to set the internal parameter is as below:

Use the code to enter the state of parameter setting, the code is “up-down-up-down-up-down”, Press the key “▲”, “▼” continuously in the state of showing current temperature, and it must be finished within 3 seconds, if the code is right, you can enter the state of parameter setting, here the nixietube shows “Fxx”, thereinto xx is a number, it means parameter code.

Use “▲” or “▼” to select the parameter code, Pressing the “set” key can make it to show the value of the parameter after select the parameter, here you use “▲” or “▼” to set the parameter, then press the “set” keys to return to the state of showing parameter code after finishing setting. (**Notice: The parameter which has been changed can be only saved after returning to the state of “Fxx” by pressing the key “set”**)

Internal parameter code is as follows:

Sort	Code	Parameter Name	Range	Factory Setting	Unit	Remark
Temperature controlling	F18	Water out temp revision	-5 -- +5	0	°C	Revise water outlet prober bias (Frostbite preventing prober)

	F19	Backwater temp revision	-5 -- +5	0	°C	Revise water inlet prober bias (temp prober)
Compressor	F21	Compressor delay time	0 – 10	3	min	
Alarm	F51	Frostbite preventing temp	-30 – 20	3	°C	The controller generates frostbite preventing alarm if the water out temp is below the temp of F51
	F52	Frostbit preventing resume return difference temp	0.5 – 5	2	°C	The controller will resume from the frostbite preventing alarm if the water out temp is above the temp of F51+F52
Testing	F99	Check	This function can attract all relays in turn, and please don't use it when the controller is running!			
	F00	Exit				

❄ Basic Operation principle

🌀 Temperature controlling

Controlling temperature can set according to “Upper limit” and “Lower limit”. If “Upper limit” is 20°C, “Lower limit” is 18°C, temperature sensor (refrigerator sensor) apperceives the temperature higher than 20°C, compressor runs, then the temperature lower than 18°C, compressor stops. Thus temperature can be controlled between 18°C and 20°C.

🌀 Compressor delay time

The controller contains a “compressor halt calculagraph”, and it begins to time when compressor stops, the program first check the calculagraph before starting the compressor next time, the program will immediately start the compressor if the calculagraph reach 3 minutes ,if the calculagraph doesn't reach 3 minutes ,it will start 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.

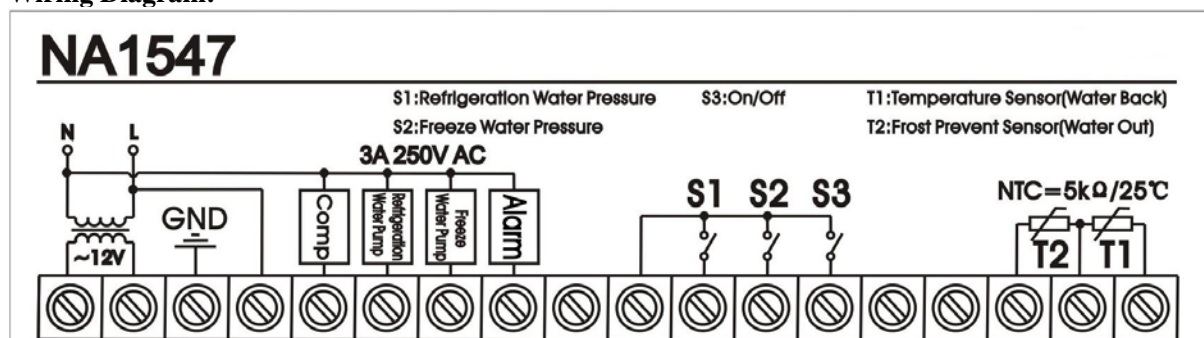
In addition, the controller doesn't boot the compressor within 3 minutes after turning on the power supply, thus the compressor can also be protected in the state of power cut and then power on.
(*Annotation: The time of boot delay protection can be adjusted, it sets to 3 minutes above.)

🌀 Water pump controlling

The freezing water pump keeps running when startup, only will be shut off when shut off or in the state of frostbite preventing water lack alarm.

Cooling water pump doesn't run when stand by, when it need to cool, the controller will first turn on the cooling water pump, then turn on the compressor after the cooling water pressure becomes normal, and the cooling water pump and the compressor will be shut off at the same time when stop cooling.

Wiring Diagram:



Notice:

1. Please short the “Cooling water pressure” and “Freezing water pressure” signal if you don't use the signal of the hydraulic pressure, or the compressor can not startup normally.
2. The earth terminal of the controller should be connected with the earth terminal of the electric cabinet reliably, be sure to connect the earth well.
3. Please use the transformers and sensors which are supplied by our company.