NA1556-3 Air-cooled Water Chilling Unit Controller (shuangfeng)

☞ Main Function and Control Logic

The temperature testing has three channels: one is at the backwater inlet, as the temperature controlling signal. One is at the water outlet, used for frostbite preventing. The other is in the outdoor machine, used for defrosting.

Five output channels: compressor, condensate fan, cross shuttle valve, water pump, alarm output.

Four switching value inputs (passive point signal): high pressure protection, low pressure protection, overload protection, water pressure switch.

Control Logic:

1. Water pump

   The water pump is always running after the system is on, and it will stop when the system is off or it is in the state of water lack error. If the controller doesn't receive the water pressure signal after the water pump has been running for 1 minute, it will stop running and give an alarm (water lack alarm). If the water pressure signal has disappeared for over 5 seconds when the water pump is running, it will stop running and give an alarm (water lack alarm).

2. Startup

   The controller will first check the water pressure signal after reaching the startup temperature, and the condensate fan will be turned on if the water pressure signal is normal, also the compressor starts up after delaying for 3 seconds and the cross shuttle valve will start up with the compressor according to the operating mode. In addition, the compressor has the function of delay protection, and the function can ensure that the compressor must start up again after 3 minutes (The delay time is adjustable).

3. Halt

   1） Normal halt:
   When reaching the stop temperature, the compressor and the cross shuttle valve stop firstly, delay for 6 seconds, condensate fan stops, but the water pump will not stop.

   2） Error halt:
   A: When the unit error (high pressure, low pressure, overload, temperature sensor error) occurs, the compressor and the cross shuttle valve stop firstly, the condensate fan will stops normally, but the water pump will not stop.
   B: When the water lack error occurs, the compressor, the cross shuttle valve and the water pump stop first, the condensate fan will stop normally.

   3） Preventing frostbite halt:
   When the temperature of the water outlet is below 3℃, the compressor will stop, the condensate fan will stop normally, but the water pump will not stop. The state will resume when the temperature goes up to 5℃.

   4） Shut down:
   All the Devices will stop when the controlling system stops.

4. Operating mode

   It contains three kinds of mode: "refrigeration", "heating", constant temperature".

   1） Refrigerating mode:
   When the current temperature (the temperature at the controlling point, being same below) is higher than "the set temperature +temperature difference", the unit begins to refrigerate. When the current temperature goes down to the setting temperature, the unit will stop.

   2） Heating mode:
   The unit begins to heat when the current temperature is below "the setting temperature-temperature difference", and stops when the current temperature goes up to "setting temperature".

   3） Constant temperature mode:
   The unit begins to refrigerate when the current temperature is higher than "setting temperature + temperature difference", and stops when the current temperature is lower than the "setting temperature. In the same way, the unit begins to heat when the current temperature is lower than "setting temperature - temperature difference", and stops when the current temperature is higher than the "setting temperature.

5. Defrosting

   The controller first judge that whether needs to defrost by checking the outdoor machine temperature when begins to heat, and judge whether needs to defrost in the process of heating according to the accumulative low temperature time of the outdoor machine, the controller will not defrost in the state of no heating.

6. Fault protection and alarm

   Pressure: always open, the controller will stop when the point is close, corresponding indicator light

will flash and the alarm output is given at the same time.

Deficient phase: always open, the controller will stop when the point is close, corresponding indicator light will flash and the alarm output is given at the same time.

Overload: always open, the controller will stop when the point is close, corresponding indicator light will flash and the alarm output is given at the same time.

Water lack: always open, the point will close when the water pressure is normal, after the water pump delayed, it will stop if the point is not close, corresponding indicator light will flash and the alarm output is given at the same time.

Temp sensor error: the unit stops when the temperature sensor is open or short, the controller gives the error code (the nixietube is showing "A01"), and at the same time gives a alarm output.

Preventing frostbite sensor error: the unit stops when the frostbite preventing sensor is open or short, the controller gives the error code (the nixietube is showing "A02"), and at the same time gives a alarm output.

Defrosting sensor error: the unit stops when the defrosting sensor is open or short, the controller gives the error code (the nixietube is showing "A03"), and at the same time gives a alarm output.

Preventing frostbite alarm: the unit stops when the temperature of the water outlet is below 3℃, the controller gives the error code (the nixietube is showing "A04"), and the unit will run again when the temperature of the water outlet is above 5℃.

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℃～45℃, humidity≤85%.
- **Relay contact capability:** 2A/380VAC (Pure resistive load)
- **Temperature sensor:** NTC R25=5kΩ, B (25/50) =3470K
- **Executive standard:** Q/320585 XYK 01-2004 (NA1556-CHTFAX)

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 temp	Display the temperature of water inlet	-
Water out temp	Display the temperature of water outlet	
Temp setting	Temp setting (not revised)	Temp setting(have been revised)
Temp difference	Temp difference setting (not revised)	Temp difference setting(have been revised)
Pressure	-	High pressure alarm
Deficient phase	-	Low pressure alarm
Overload	-	Overload alarm
(Water lack)	-	(Water lack alarm)

State indication:

LED	Red	Green	flash
Refrigeration(Heat)	(Heating)	Refrigerating	Compressor delay protection
Fan(Defrost)	(Defrosting)	(Fan running)	Compressor delay protection
Water pump	-	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?

Press the on-off key and hold it for 1 second, 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.

Pressing the on-off key and releasing it immediately can do nothing, only holding it for1 second can achieve the function, in this way you can prevent doing wrong operation.

How to shut down?

Press the on-off key and hold it for 1 second, 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.

How to set the temperature and temperature difference?

Press the key "set" and hold it for 2 seconds, the Micro-controller displays temperature that is the "set temperature", then using "▲" key or "▼" key can change the parameter（"▲"adds 0.1°C，"▼"minuses 0.1°C，press and hold them over 0.5 seconds can add or minus rapidly）. After setting, press the key "set"

again, you will enter the "temperature difference", then using "▲" key or "▼" key can change the parameter. Press the key "set", to exit the state of setting after finishing.

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 preventing frostbite 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).

☝***How to read the temperature (the temperature of the defrosting sensor) of the outdoor machine?***

Press the key"▼" and hold it to show the outdoor machine temperature when showing backwater temperature. Release the key to show the backwater temperature.

☝ ***How to eliminate the alarm sound?***

Press any key to eliminate when in the alarm state.

☝ ***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	Code	Causation	Resume
Pressure alarm	Indicator light	Pressure switch close	Press the "resume" key
Deficient phase alarm	Indicator light	Deficient phase switch close	Press the "resume" key
Overload alarm	Indicator light	Overload switch close	Press the "resume" key
Water lack alarm	Indicator light	The water pressure is still abnormal after the water pump is running for 1 minute. Or the signal of the water pressure disappears for over 5 seconds when the water pump is running normally.	Press the "resume" key
Temp sensor error	A01	Temp sensor open or short	Auto
Frostbite preventing sensor error	A02	Frostbite preventing sensor open or short	Auto
Defrosting sensor error	A03	Defrosting sensor open or short	Auto
Frostbite preventing alarm	A04	The temperature of water outlet is below 3°C	Auto（Auto resume when the temperature of water outlet goes up to 5°C）

✓ 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 abnormity 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-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"，there into 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" key 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 "set" key**）

Internal parameter code is as follows:

Sort	Code	Parameter Name	Range	Factory Setting	Unit	Remark
Temperature	F19	Temperature Revision	-5 -- +5	0	°C	Revise the sensor bias
Compressor	F21	Compressor delay time	0 -- 10	3	min	
Defrosting	F31	Defrost start temperature	-20 - 10	3	°C	
	F32	Defrost end temperature	-20 - 20	8	°C	
	F33	Defrost start time	1 -- 240	30	min	
	F34	Max defrost time	1 -- 30	3	min	
Alarm	F51	External alarm locked time*	0 -- 240	60	min	Refer to the annotation
Mode	F61	Operating mode	0 -- 2	0	-	0: changes in temp mode 1: single refrigeration mode 2: single heating mode
Testing	F99	Check	**This function can attract all relays in turn, and please don't use it when the controller is running!**			
	F00	Exit				

*Annotation: “External alarm locked time” means that when the external alarm occurs, even if the external alarm signal has been repealed, the controller will maintain the alarm state for some time, you can eliminate the alarm forcibly by pressing the resume key.

❄ Basic Operation principle

Temperature controlling

Controlling temperature can set according to “Temperature set” and “Temperature difference” .If “set temp” is 20°C, “temp difference” is 2°C, temperature sensor apperceives the temperature higher than 22°C, compressor runs, then the temperature lower than 18°C, compressor stops. Thus temperature can be controlled between 20±2°C.

Annotation: The controller has 3 operating mode: “constant temperature”, “single refrigeration” and “single heating”, the introduce above is the operating process of the “constant temperature”, the operating process of the “single refrigeration” and “single heating” mode is similar to this, just the “single refrigeration” mode only contains the refrigerating process and the “single heating” mode only contains the heating mode. Operating mode can be set in the system function menu, please refer to the “senior operation (F61)”.

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.）

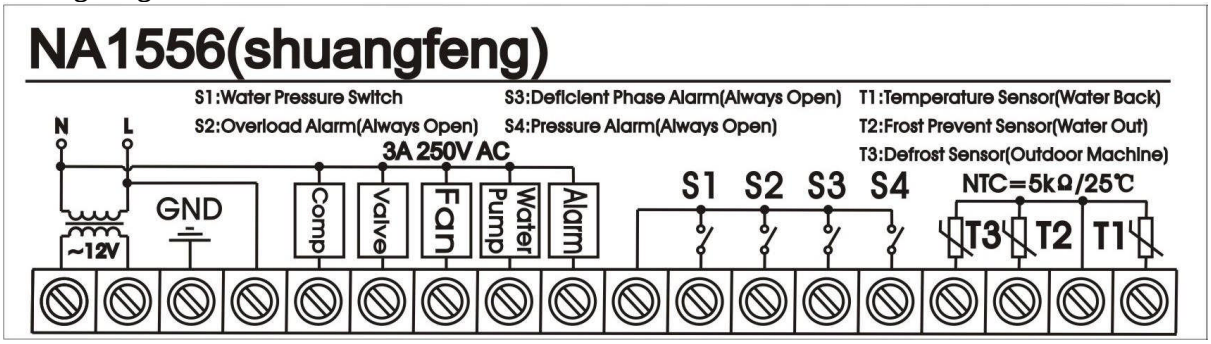
Auto defrosting principle

In the heating state, the controller will add up the running time of heat pump, if it reaches time of the “defrost cycle”, the controller will turn on defrosting. The defrosting will not be turned on in the refrigeration mode, and the controller will clear the accumulative running time of the heat pump once it begins to refrigerate.

The controller will check the defrosting effect through defrosting sensor after the defrosting is turned on, if the temperature of sensor reaches “defrost end temperature”, the controller will turn off defrosting. If the defrosting time is longer than the “defrost end time”, the controller will turn off the defrosting forcibly.

The process above only goes along in the state of heating, in other words, the controller will not turn on defrosting in the state of non-heating.

Wiring Diagram:



Notice:

1. **Please short the corresponding ends if you don’t use the signal of the hydraulic pressure, or the compressor can not start 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.**