NA8036 User Guide

☞ Main Function and Technique Index

Main Function:

The controller is the special controller for heat pump water heater, it contains 2 temperature sensors (water temperature, outdoor temperature), 3 control outputs (compressor, defrost, fan) and 3 alarm signal inputs (used for high and low pressure protection). Its main function is showing below:

☞ **Temperature Display and Controlling (Refrigerate or Heat):** It can display water tank temperature and outdoor temperature, and control the temperature in water tank between the temperature upper and lower limit.

☞ **Auto Defrost Controlling:** It has defrosting controlling logic of heat pump optimization design, and can defrost effectively in order to ensure that the outdoor machine can run normally at low temperature.

☞ **External alarm:** 3 External alarm inputs, it can be set to 5 modes: always open, always open locked, always closed, always closed locked or forbidden.

☞ **Others:** Temperature upper and lower limit can be set, compressor start delay protection, temperature sensor error alarm and so on.

Main Technique Index:

Temperature display range: -50～150℃(The resolution is 0.1℃)
-58～302℉(The resolution is 0.1℉)

Power supply: AC 220V±10% or AC 380V±10% (Refer to the wiring diagram)

Operating environment: temperature -20℃～50℃, 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 (NA8036-HTD)

🕮 Operating Guide

Panel:

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

The function of the LED on the panel is showing below:

Index Light	Name	Light	Flash
	Temp Setting	In the state of temp setting	-
	Refrigeration	Refrigerating	Ready to refrigerate, in the state of compressor start delay protection
	Heat	Heating	Ready to heat, in the state of compressor start delay protection
	Defrost	Defrosting	Ready to defrost, in the state of compressor start delay protection
	Fan	Fan running	-
	Alarm	-	Alarm state

☝ ***The meaning of the LED display***

The LED 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
FLS	External alarm 1	External alarm signal 1, please refer to the internal parameter code "F51"
HP	External alarm 2	External alarm signal 2, please refer to the internal parameter code "F52"
LP	External alarm 3	External alarm signal 3, please refer to the internal parameter code "F53"
A21	Water temperature sensor error	Open or short（showing "OPE" or "SHr"）
A22	Outdoor machine sensor error	Open or short（showing "OPE" or "SHr" when press the key "▼"）
A99	Over probation time	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?***

Press the key "set" for at least 2 seconds, then enter the state of temperature setting, here the LED displays the setting temperature, then using "▲" key or "▼" key can change the 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）. After setting, press "set" again, then exit the state of parameter setting. (The setting temp range is limited by the parameters F13 and F14, please refer to the senior operation). Pressing the key "M" in the setting process means cancel and exit, but the setting value will not be saved.

☝ ***How to read the outdoor temperature?***

When displaying current temperature, press "▼" key, Controller will display defrosting temperature. Loose "▼" key, then return to current temperature.

☝ ***How to heat and refrigerate forcibly?***

When displaying current temperature, the temperature is between "setting temperature－temperature difference" and "setting temperature", the system may or not heat, here you press the key "▲" and hold it for 5 seconds, the controller will enter the heat state forcibly when in the heat state, and stop heating when the temperature is above "setting temperature"; When the temperature is between "setting temperature" and "setting temperature＋temperature difference", the system may or not refrigerate, here you press the key "▲" and hold it for 5 seconds, the controller will enter the refrigeration state forcibly when in the refrigeration state, and stop refrigerating when the temperature is below "setting temperature".

✓ Advanced Operation

Press the key "M" and hold it for 5 seconds, and if you have set the password, the LED display the "PAS" to hint you to enter the password, you can use the key "▲" and "▼" to enter the password, if the password is correct, the LED will display the 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(pressing the key and not release can add or minus rapidly), then press the "set" key to return to the state of showing parameter code after finishing setting. Pressing the key "M" can exit the parameter setting state when display the parameter code, pressing the key "M" means cancel when in the process of setting parameter, and the parameter will not be changed.

Internal parameter code is showing below:

Sort	Code	Parameter Name	Range	Factory setting	Unit	Remark
Temperature	F10	Setting temperature	0 － 20	0.0	℃/℉	
	F11	Setting temperature	F14 – F13	20	℃/℉	The setting range is limited by F13 and F14
	F12	Temperature difference	0.1 – 20	0.5	℃/℉	Control the temperature difference, please refer to the temperature controlling
	F13	Max setting temperature	-58 - 302	60	℃/℉	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	-58 – 302	10	℃/℉	
	F18	Outdoor machine sensor adjustment	-20 – 20	0.0	℃/℉	Adjust outdoor machine sensor bias
	F19	Temp sensor adjustment	-20 – 20	0.0	℃/℉	Adjust water temperature sensor bias

	F21	Compressor delay time	0 -- 10	5	min	
	F29	Compressor controlling mode (temp controlling mode)	0/OUCC/OUCH	OUCH	-	0: transform from refrigeration mode to heating mode automatically OUCC: refrigeration forcibly OUCH: heating forcibly
Defrosting	F31	Defrost start temperature	-20 – 80	-5	℃/℉	
	F32	Defrost end temperature	0 – 100	5	℃/℉	
	F33	Defrost start time	1 – 999	30	min	
	F34	Max defrost time	Off, 1 – 99	10	min	Off means no defrost and the controller doesn't display outdoor machine sensor alarm.
	F38	Fan mode when defrosting	Off or ON	OFF	-	OFF: Fan off when defrosting ON: Fan on when defrosting
Fan	F41	Fan mode	OFF 1 — 3	2	-	OFF: fan off 1:follow the compressor state, fan start delay, stop delay 2:follow the compressor state, fan start ahead, stop delay 3:fan always running
	F42	Fan ahead / delay start time	0 — 999	0	sec	Enable when F41=1 and 2
	F43	Fan delay stop time	0 — 999	0	sec	
Alarm	F51	External alarm 1	0 — 4	0	-	0: without external alarm 1: always open, unlocked 2: always open, locked 3: always closed, unlocked 4: always closed, locked 5: on/off signal*[1]
	F52	External alarm 2	0 — 4	3	-	0: without external alarm 1: always open, unlocked 2: always open, locked 3: always closed, unlocked 4: always closed, locked
	F53	External alarm 3*[2]	0 — 4	3	-	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 0001 -- 9999	OFF	-	OFF means no password 0000 means clearing password
	F81	Temperature unit	C/F	C	-	C: Centigrade F: Fahrenheit
	F84	Display compressor start times	-	-	-	
	F85	Display accumulative running time	-	-	hour	
	F86	Accumulative running time reset	-	-	-	
	F87	Probation time	OFF 1 — 9999	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	F95	Display the input voltage				
	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				

*1: When F51=5, External alarm 1 becomes on/off signal, the controller runs when it is shorted, and the controller has no display when it is open.

*2: Special controlling: if the defrost function is on, the controller doesn't use the external alarm 3 (F53=0).

❄Basic Operating Principle

Temperature controlling

F29=0: transform from refrigeration mode to heating mode automatically

The controller begins to refrigerate when water temperature is over “F11+F10+F12”, check 3 external alarms, if it is normal, the controller stops refrigerating when water temperature is below “F11+F10” and stops checking 3 external alarms at the same time.

The controller begins to heat when water temperature is below “F11-F10-F12”, check 3 external alarms, if it is normal, the controller stops heating when water temperature is below “F11-F10” and stops checking 3 external alarms at the same time.

There is no defrost when in refrigeration state. Compressor and fan run in this state (According to F41).

There is defrost when in heating state. Compressor, valve and fan run in this state (According to F41), compressor and fan run when achieving defrost condition (According to F38).

F29=OUCC: refrigeration forcibly

The controller only display “Auto” and other alarm code but not check water temperature sensor alarm; Compressor and fan (According to F41) run when 3 external alarms are normal, and only stop running when power off and alarm occurs; The controller starts defrost if satisfies defrost condition, compressor off and valve on when defrosting, fan is according to F41.

F29=OUCH: heating forcibly

The controller only display “Auto” and other alarm code but not check water temperature sensor alarm; Compressor, valve and fan (According to F41) run when 3 external alarms are normal, and only stop running when power off and alarm occurs; The controller starts defrost if satisfies defrost condition, compressor on and valve off when defrosting, fan is according to F41.

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 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. (The compressor delay time is set by F21, for example, 3 minutes.)

Auto defrosting principle

The controller will supervise the temperature of outdoor machine when heating normally, and decide whether need to defrost according to the time of the outdoor machine in the continuous low temperature state. In other words, the defrosting calculagraph begins to time when the outdoor machine temperature is lower than “defrost start temperature”, and turns on the defrosting when the value of time reaches “defrost start time”. The calculagraph will be cleared if the outdoor machine temperature is higher than “defrost start temperature” when timing, and it begins to time again when the outdoor machine temperature is lower than “defrost start temperature” next time. In other words, the value of defrosting calculagraph shows the continuous low temperature time of the outdoor machine.

The controller will turn on the compressor and cross valve after defrosting, and the heat pump is used for defrosting. The controller can check the defrosting effect with the temperature of outdoor machine, if the temperature of outdoor machine goes up to the “defrost end temperature”, the controller will turn off the function of defrosting. If the defrosting time is above “max defrost time”, the controller will turn off defrosting forcibly.

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

About fan controlling

Fan has 4 operation modes (F41):

OFF: fan is off, but it may start when defrosting (rest with F38)

1: follow the compressor state, fan starts lingeringly after compressor starts (F42), fan stops lingeringly after compressor stops (F43).

2: follow the compressor state, fan starts ahead before compressor starts (F42), fan stops lingeringly after compressor stops (F43).

3: fan always running, but it stops when external alarm occurs. In addition, it may stop when defrosting (rest with F38).

In spite of which mode, fan state is only rested with F38 when defrosting.

In spite of which mode, fan stops when external alarm occurs.

External alarm

The controller can connect 3 switching value signals as external alarm source (Pin 4,5,6,7), when the external alarm occurs, the controller stops, displays the alarm code “FL” , “HP”, “LP”. External alarm signal has 5 modes (Parameter F51, F52, F53):

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.

Wiring Diagram: