Main function and Technique index

The controller is the special controller for heat pump water heater, it contains five temperature sensors (water temperature, defrost temperature, exhaust temperature, backwater temperature and display temperature) , four controlling output(compressor, defrost fan and circulating pump) one alarm signal input (used for high and low pressure protection). Main function as below:

1. Temperature Display and Controlling ： It can display every sensor's temp, and it can also control the temperature of water in water tank at the set temperature.

2. Auto Defrosting 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 even at low temperature.

3. Exhaust temperature protection: When the exhaust temperature is too high, the controller protection: turns off the unit and generates alarm signal, and it can control the outdoor fan according to the exhaust temperature.

4. Circulating pump and freeze protection: circulating pump starts 30 seconds earlier and stops 60 seconds later than compressor .When compressor is off or in heat preservation condition, and backwater temperature is lower than setting temp (F16) for 5 seconds, circulating pump is off for 30 minutes, circulating pump starts working for 1 minute. If backwater temp is still lower than setting temp, start compressor and fan until backwater temp is higher than setting temp(F17), then turn them off.

5. External alarm: one external switch valve alarm signal input, it can be set to 3 modes: always open, always closed or forbidden, and you can set the times and time of the auto recovery.

6. Running in different period of time: The controller has two modes: "Auto" and "Econ", in "Econ" mode, the controller can set 3 periods of time, it can only heat in these periods of time.

7. Double temp sensor protection in water tank: tank sensor can replace display sensor, that is to say, if one sensor is broken, controller will choose the other one to control automatically.

8. Others: Water tank sensor use double sensor. Real Time Clock, On-off State Memory when the power is off (adjustable), Direction of Others：cross valve can be set, Compressor start delay protection, Sensor Error Alarm, High Temperature Alarm, Add Fluorin, Test and so on.

Main Technique Index:

Range of Temperature Display：-50～150°C

Range of Temperature Set：0～100°C

Power Supply：220V±10% AC

Operation Environment：Temperature -10℃～50℃，humidity ≤85%.

Output Load Capability：Compressor 10A/250VAC，Others 2A/250VAC

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

Executive standard：Q/320585 XYK 01

Operating Guide

1 Display

The controller usually displays the water temperature sensor tests, press "▲"display exhaust temperature, press "▼"display defrost temperature. Press "▲" and "▼" together display backwater temperature, enter parameter F94 setting, display tank temp.

2 On/Off

Press "⊙" to turn on and off the controller, "ON" displays "HEAT'，"STANDBY", "RETAIN HEAT" or "DEFROST". The controller will always display current time ,water temperature and water level in spite of on or off.

3 Set water temperature

Press key "S", and then enter the state of temperature set, flickeringly display setting temperature, use the key "▲" and "▼" to change the setting value("▲"adds 1°C and "▼"minuses 1°C, press and hold it over 0.5 seconds can add or minus rapidly). Press key "s" again to exit setting state.

Controller begins to heat when it checks that water temperature is lower than (setting temperature-D-value temperature), and stops heating when water temperature is higher than setting temperature.

4 Set time

Press "🕒", hour part of the time display is coruscating, use "▲" and "▼" to adjust the hour, press "🕒" again after adjusting, then you can adjust the minute in the same way, finally you can press "🕒" exit the state of time setting.

5 Set working mode

Press key "mode" to change two modes between "auto mode" and "economical mode". Can control the heat pump whether to heat or not according to setting temperature in "auto mode". Controller only heats in the three setting periods of time when it is in "economical mode", and in other time it doesn't work.

6 Set time of economical mode

Long press "🕒" for 2 seconds, the controller can enter the state of heat period of time, you can set 3 heat periods of time in turn according to the display of LCD.(press "🕒" to switch setting items, press "▲" or "▼" to change its value)

The controller can be set 3 heat periods of time at most, if you don't need so many periods of time, you can set the starting time and ending time which you don't need as "00:00".

In addition, if the ending time is earlier than starting time, the controller considers this ending time is next day. For example, the period of time is "22:00" to "03:30", the controller considers it as 22:00 at night to 03:30 next day.

7Advanced operation

Long press "S" for 5 seconds or " UP DOWN UP DOWN UP UP DOWN" to enter the state of value setting, at this time, LCD shows "Fxx", "xx" is a double-digit number, which represents parameter code. You can use "▲" or "▼" to choose parameter code. Choose one code and then press "S", it can display corresponding parameter value. At this time you can use "▲" or "▼" again to set parameter value, press "S" again after finishing setting, return the state of parameter code. Internal parameter

code is showing below:

Sort	Code	Parameter name	Range	Factory setting	Unit	Remark
Temperature	F12	D-value temperature	1-10	5	°C	
	F13	Max setting temperature	30-100	60	°C	
	F14	Min setting temperature	0-29	10	°C	
	F16	circulating pump starting temp	5-15	10	°C	
	F17	circulating pump stopping temp	10-20	15	°C	
	F18	Sensor error	0-3	0		0: normal 1: tank sensor error 2: display sensor error 3: tank sensor and display sensor error
	F19	Water temp sensor adjustment	-20-20	0	°C	Adjust the water temperature measurement error
Compressor	F21	Compressor delay time	1-10	3	minute	
Defrosting	F31	Defrost start temperature	-20-20	-3	°C	
	F32	Defrost end temperature	0-50	10	°C	
	F33	Defrost start time	1-180	30	minute	
	F34	Max defrost time	0-99	5	minute	0:no defrost
	F37	Setting the direction of valve	0-1	0	-	0: close when heating, open when defrost 1: open when heating, close when defrost
Water pump	F41	Deficient water protection D-value	0-50	12	°C	
Alarm	F50	external alarm mode	0-2	0	-	0：no external alarm 1: always open, alarm when closed 2: always closed, alarm when open
	F51	The self recovery times of external alarm	0-10	3	times	
	F52	The resetting time of the self recovery time(external alarm)	0-180	60	minute	on the notice

	F57	Exhaust temperature protection mode	0-2	2	-	0:no protection 1: high temp protect, fan no control 2: high temp protect, fan control
	F58	Exhaust protection temperature	50-125	110	°C	
	F59	The D-value of exhaust protection temperature	1-20	10	°C	
Function Set	F61	Set whether memorize the on-off state after power off	1-0	1	-	1: memorize 0:no memorize
X Testing	F90	Display motherboard type				
	F91	Display motherboard version number				
	F92	Display panel type				
	F93	Display panel version number				
	F94	Display water tank temp				
	F97	Reserved				
	F98	Add fluorin	The controller shows "AdF" after entering this function, turn on compressor and fan, four-way valve state is in connection with freeze mode(more details are available on " automatic defrosting principles"). Press key "s" to exit or exit test automatically after 25 minutes.
	F99	Test output signal	After entering the function, the controller displays "CCC", and attracts all relays in turn, in order to be used for outer plate testing, and please don't use it when the controller is running! Press key "s" to exit or exit test automatically after 30 seconds.
	End	Exit				

Notice:

"F51the self recovery times of outside alarm" means the times that when outside alarm signal goes back to normal, the times of system goes back to normal working state. When it goes beyond the times, the system can't go on working although outside alarm signal goes back to normal, and the system will come to breakdown state. At this time, the system locks itself and needs turning off manually to recover.

"F52 the resetting time of the self recovery time(outside alarm)" means when the time that outside alarm signal remains in the normal state reaches the parameter setting time, the system will recount the self recovery times if it breaks down next time.

e.g. F51=1, F52=60, it means the system can recover automatically when it breaks downs for the first time within 60 minutes, and it locks itself and needs recovering manually when it breaks down for the second time within 60 minutes.

8 Alarm

The controller enters the alarm state when the abnormal state below happens:

Alarm name	LCD display	Alarm code	Action	Recovery	Explanation
Outside alarm	Alarm	A11	Stop heating	automatic or manual,（can be set by F51,F52）	Manual recovery: first turn off controller then turns on controller
Water temp sensor and display sensor error	Alarm	A21	Stop heating	automatic	Water temp sensor and display sensor are both broken
Defrost temp sensor alarm	Alarm	A22	-	automatic	
Exhaust temp sensor alarm	Alarm	A23	-	automatic	Exhaust protect mode（F57）:0 means no alarm
Backwater sensor alarm	Alarm	A24	-	automatic	No freeze protection and deficient water flow protection
Communication error with defrost board	Drop			automatic	Temp display "---"
Exhaust temp is too high	Hi-T	A33	Stop heating	Recover automatically when exhaust temp drops	
Deficient water protection	Alarm	A35	Stop heating	Manual	Turn off then turn on

Notice:

1、When temperature sensor is alarm, it shows "OPE", which means temperature sensor is open, and "SHr" means temperature sensor is short. Pressing "▲" or "▼" can observe every temp sensor's temperature.

2、Alarm code and the temperature will show alternately when in the alarm state.

3、Automatic recovery means when the alarm disappears, the controller will exit the alarm state automatically.

4、Manual recovery means when the alarm disappears, the controller is still in the alarm state, user needs to first turn off controller, and then turn on controller.

Basic Operating Principle

1、Temperature control

Controlling temperature can be set according to "setting temperature" and "D-value temperature". Default setting temperature is 55°C and D-value temperature is 5°C. It begins to heat when the water temperature is lower than 50°C and it stops heating when the water temperature is higher than 55°C. Thus temperature can be controlled between 50℃and 55℃. If water tank temp sensor is broken(F18 display 1), use display temp -3°C to replace water tank temp. on the contrary, if display sensor is broken(F18 display 2), panel display water temp+3°C. If water tank sensor and display sensor are both broken(F18 display 3), controller alarm and stops heating.

2、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. In addition, the controller doesn't boot the compressor within 3 minutes after turning on the power supply.

notice: compressor delay time is adjustable(F21)

3、Auto Defrosting：

The controller will supervise the defrost temperature when heating, decide whether need to defrost according to the time of the defrost in the continuous low temperature state. when the temperature is lower than "defrost start temperature", first start defrosting, and start heating after defrosting. In other words, the defrosting calculagraph begins to time when the defrost temperature is lower than "defrost start time" , and turns on the defrosting when the value of time reaches "defrost start time". The calculagraph will be cleared if the defrost temperature is higher than "defrost start temperature", and it begins to time again when the defrost 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 defrost.

The controller can check the defrosting effect with the temperature of defrost, if F37=0, open circulating pump, compressor and four-way valve, close fan.   if the temperature of defrost 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, and recover to heat after defrosting, open circulating pump, compressor and fan, close four-way valve.

4、Running in different periods of time
The controller contains real time clock, and can time accurately. In "ECON MODE", the controller will ensure that whether need to heat according to water temperature, otherwise the current time is in or not in the setting period of time, if it is not in the setting period of time, then the controller will not heat whether the water temperature is high or low.

5、External alarm

External alarm is a external switch signal, which is used to connect to high and low voltage protection switch. External alarm signal has 3 modes (F50): 0: without external alarm, 1: always open, 2: always closed. "Always open" means in normal state, external alarm signal is open, if closed, the controller is alarm; "Always closed" is on the contrary.

When the external alarm signal occurs, the controller stops, and self recover to normal working state when external alarm signal comes to normal. But if the external alarm signal occurs 2 times in 1 hour, the controller will lock the alarm state, user needs to first turn off controller, and then turn on controller. The times and time can be set, more details are available on F51 and F52.

6. Circulating pump control
Circulating pump starts 30 seconds earlier and stops 60 seconds later than compressor .When compressor is off or in heat preservation condition, and backwater temperature is lower than setting temp (F16) for 5 seconds, circulating pump is off for 30 minutes, circulating pump starts working for 1 minute. If backwater temp is still lower than setting temp, start compressor and fan until backwater temp is higher than setting temp(F17), then turn them off.

7、Exhaust temperature protection

The controller detects the exhaust temperature is higher than the setting, it will enter the alarm state and stop heating. The temperature can be set(parameter F58 and F59), and the temperature can be set : fan no control(F57=1), fan control(F57=2)

For example, F58=100℃，F59=5℃

fan no control(F57=1)：Exhaust temperature is higher than 105℃ ，controller enters alarm state and stop heating. Exhaust temperature is lower than 95℃, controller exit alarm state.

fan control(F57=2)：Exhaust temperature is higher than 100℃ , controller first stops fan, Exhaust temperature is higher than 105℃ , controller enters alarm state and stop heating. Exhaust temperature is lower than 95℃ , controller exit alarm state.

If   F57=0，no exhaust temperature protection or exhaust temperature sensor trouble alarm

8、Water pump freeze protection
Circulating pump starts 30 seconds earlier and stops 60 seconds later than compressor .When compressor is off or in heat preservation condition, and backwater temperature is lower than setting temp (F16) for 5 seconds, circulating pump is off for 30 minutes, circulating pump starts working for 1 minute. If backwater temp is still lower than setting temp, start compressor and fan until backwater temp is higher than setting temp(F17), then turn them off.

9、Deficient water flow protection
If backwater temp-tank temp≥F41 for 3 seconds, start deficient water flow protection, close machine set and display alarm code.

10、Quick add fluorin

Long press key "mode" for 5 seconds, and controller enter quick add fluorin mode.

Wiring Diagram

backwater temp
display temp
external alarm

GND

circulating

exhaust temp
defrost temp
tank temp

panel

pump
fan
valve

comp

L
N

power