EU1-T41 Manual

Main Function and Technique Index

Main Function:

☞ **Refrigeration Controlling (Refrigeration / heat):** temperature showing, temperature controlling, compressor start delay protection, temperature sensor error alarm, it can run periodically with the on-off rate and stop which has been set when the temperature sensor is broken.

☞ **Fan Controlling:** 7 fan running modes: fan ahead or delay start, delay stop, temperature controlling start and stop, time controlling start and stop, always on, always off, run or stop when defrosting.

☞ **Defrost Controlling:** 2 defrost modes (electric heat, hot gas), 3 defrost start mode (time alternation, accumulative compressor running time, real time clock), 2 defrost end mode (timing, controlled by both temperature and time), dripping, manual defrost, defrost sensor error alarm, high temperature alarm is forbidden when defrosting.

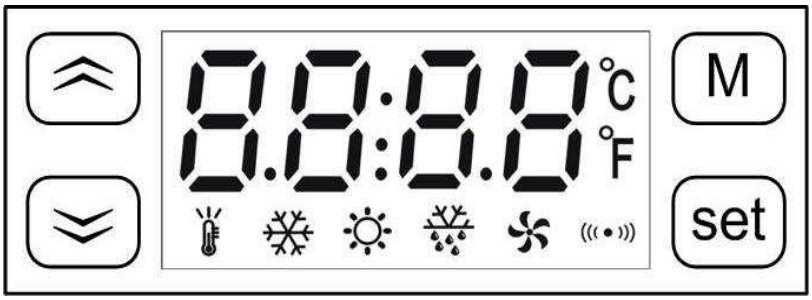
☞ **Real Time Clock (RTC):** Internal RTC, it is still running when power off, and it supplies an accurate time, used for real time defrost.

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% 50Hz (Refer to the wiring diagram)
- **Operating environment:** temperature -10℃～50℃, humidity≤85%.
- **Relay contact capability:** 8A/250VAC (pure resistive load)
- **Temperature sensor:** NTC R25=5kΩ, B (25/50) =3470K

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	Dripping or 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
A21	Inlet temperature sensor error	Open or short（showing "OPE" or "SHr"）
A22	Evaporator sensor error	Open or short（showing "OPE" or "SHr" when press the key "▼"）. If you don't need to use the evaporator sensor, you can use the F59 to close the alarm.
A23	Outlet temperature sensor error	Open or short（showing "OPE" or "SHr"）
A31	High temperature alarm	

A32	Low temperature alarm	
A33	Refrigerator temperature distributing abnormity alarm	
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 of inlet temperature sensor, 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, here the LED displays the setting temperature of outlet temperature sensor, then using "▲" key or "▼" key can change the parameter. 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 defrost manually?***

When in the state of displaying current temperature, press the key "▼" and hold it at least 5 seconds, then the controller enters the defrosting state. In defrosting state, press the key "▼" and hold it at least 5 seconds again, this can finish the defrosting forcibly.

☝ ***How to read the temperature of the outlet temperature sensor?***

When displaying current temperature, press "▲" key, Controller will display the temperature of outlet temperature sensor. Loose "▼" key, then return to current temperature, it is the temperature of inlet temperature sensor.

☝ ***How to read the temperature of the evaporator sensor?***

When displaying current temperature, press "▼" key, Controller will display the temperature of evaporator sensor. Loose "▼" key, then return to current temperature. Notice that if you press the key and hold it for 5 seconds, the controller will enter or exit the defrosting state forcibly.

☝ ***How to look over and adjust the real clock time?***

Press the key "Set" to enter the state of displaying time when in the state of displaying temperature. Press the key "Set" for some time to enter the state of adjusting time, and press the key "Set" to return to the state of displaying temperature.

In the state of adjusting time, the hour part of the LED flashes, and you can adjust the hour by using the key "▲" and "▼", then press the key "Set", and the minute part of the LED flashes, you can also use the key "▲" and "▼" to adjust the value, then press the key "Set" again to exit. Pressing the key "M" in the adjusting process means giving up and exiting, but the time will not be saved.

☝ ***How to refrigerate forcibly?***

When displaying current temperature, the temperature is between "setting temperature－temperature difference" 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 mode, and stop refrigeration when the temperature is below "setting temperature－temperature difference".

✓ 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 the temperature of inlet temperature sensor	F14 – F13	0	℃/℉	The setting range is limited by F13 and F14
	F11	Setting the temperature of outlet temperature sensor	F14 – F13	0	℃/℉	The setting range is limited by F13 and F14

	F12	Temperature difference	0.1 – 20	1.0	℃/℉	Control the temperature difference, please refer to the temperature controlling
	F13	Max setting temperature	-58 - 302	302	℃/℉	Notice: the controller will follow the rule of F14<F10, 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	-58	℃/℉	
	F16	Max temperature difference of refrigerator temperature	0.1 – 49.9 OFF	10.0	℃/℉	
	F17	Delay of refrigerator temperature distributing abnormity alarm	0.1 – 99.9	0	min	
	F18	Evaporator sensor adjustment	-20 – 20	0.0	℃/℉	Adjust the evaporator sensor bias
	F19	Temp sensor adjustment	-20 – 20	0.0	℃/℉	Adjust the inlet temperature sensor & sensor 2 bias at the same time
Compressor	F20	Compressor delay when power on	0 -- 10	3	min	
	F21	Compressor delay time	0 -- 10	3	min	
	F22	Compressor running frequency when error	0 -- 100	0	%	Enable when the temperature sensor is error
	F23	Compressor on/off cycle when error	5 -- 999	60	min	
Defrosting	F31	Defrost alternation time (Enable when F35=1 and 2)	0.1 – 99.9	12	hour	
	F32	Defrost end temperature	0.0 – 100	15.0	℃/℉	
	F33	Defrost time	1 -- 99	30	min	
	F34	Dripping time	0 -- 99	5	min	
	F35	Defrost start mode	OFF 1 -- 3	1	-	OFF: defrost is off 1: time alternation start 2:time alternation start, the alternation is compressor accumulative running time 3: RTC start
	F36	Defrost stop mode	0 or 1	1	-	0:only controlled by time 1:controlled by both time and temp
	F37	Defrost heat mode	0 or 1	0	-	0: electric heat 1: hot gas
	F38	Fan state when defrosting	OFF or ON	OFF	-	OFF: fan off when defrosting ON : fan on when defrosting
Fan	F41	Fan mode	OFF 1 -- 6	1	-	OFF: fan off 1:follow the compressor state, fan delay start, delay stop 2:follow the compressor state, fan ahead start, delay stop 3:fan is controlled by the evaporator temp, start when low temp, stop when high temp 4: fan is controlled by the evaporator temp, start when high temp, stop when low temp 5:fan is on when the compressor is on, and times to start and stop when the compressor stops 6:fan always running
	F42	Fan ahead / delay start time	0 -- 999	30	sec	Enable when F41=1 and 2
	F43	Fan delay stop time	0 -- 999	0	sec	
	F44	Fan start temperature	-58 -- 302	-10	℃/℉	Enable when F41=3 and 4
	F45	Fan start temp difference	0.1 -- 50	5	℃/℉	
	F46	Fan start time	0 -- 999	5	min	Enable when F41=5
	F47	Fan stop time	0 -- 999	10	min	

	F57	Alarm output mode	0 -- 1	0	-	0: Always open, closed when alarm 1: Always closed, open when alarm
	F59	Whether use the evaporator sensor error alarm	YES / NO	YES	-	
RTC	F60	Set the RTC time	00：00—23：59		-	
	F61 | F66	6 Real Time defrost start time(Enable when F35=3)	00：00—23：59 OFF	OFF	-	OFF means not using
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
	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	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				

❄ Basic Operating Principle

Temperature controlling

Temperature controlling point is controlled by “setting temperature (F10,F11, or press the “set” key for some time to set)” and “temperature difference(F12)”.In refrigeration mode, the controller begins to refrigerate when the temperature of the inlet temperature sensor is over “setting temperature(F10) ＋ temperature difference” and the temperature of the outlet temperature sensor is over “setting temperature(F11) ＋ temperature difference”, and it stops refrigerating when the temperature of the inlet temperature sensor is under “setting temperature(F10) － temperature difference” and the outlet temperature sensor is under “setting temperature(F11) － temperature difference”.

Refrigerator temperature distributing abnormity alarm control

The temperature of inlet temperature sensor is T1, and the temperature of outlet temperature sensor is T3, when “T1-T3” > “Max temperature difference of refrigerator temperature (F16)”, and the duration > “Delay of refrigerator temperature distributing abnormity alarm (F17)”, alarm occurs, and the controller displays “A33” and gives alarm output. When “T1-T3” < “Max temperature difference of refrigerator temperature (F16)”, the controller resumes automatically.

Compressor delay when power on

The compressor delay when power on is set by F20, for example, 3 minutes, the controller does not start the compressor within 3 minutes after power on.

Compressor delay time

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

Compressor running timly when temperature sensor is error

When the temperature sensor is error, in order to avoid that the goods in the coldroom destroy, you can make the compressor continues to run with a setting on/off rate. It is set by F22 and F23, for example, F22=20, F23=50, that when the temperature sensor is error, the cycle is 50 minutes, and the compressor stops for 40 minutes and runs for 10 minutes.

Auto defrosting principle

The controller has 4 defrost start modes which can be selected（F35）:

OFF: Defrost is off.

1. Time alternation: the controller will start defrost according to the setting alternation time which can

be set in “Defrost alternation time (F31)”.

2. Accumulative compressor running time: if compressor accumulative running time reaches the time which set in “defrost alternation time (F31)”, the controller starts defrost.

3. RTC start: the controller turns on defrost according to the actual time (for example, 6:00 AM), 6 points can be set at most (F61-F66), in this mode, “defrost alternation time (F31)” does nothing.

The controller has 2 defrost end modes which can be selected（F36）:

0: time control: the defrost time can be set by F33, the controller will stop defrosting when it reaches the defrost time.

1: controlled by both time and temperature: the controller will check the defrost effect through evaporator sensor after starting defrost, If the sensor temperature reaches the “Defrost end temperature (F32)”, the controller will turn off defrosting, if the defrost time is longer than “defrost end time (F33)”, the defrosting will be turned off forcibly.

You can select 2 defrost heat modes (F37):

0: electric heat: the compressor stops and the defrost output is turned on (the defrost output controls the electric heater);

1: hot gas: the compressor and defrost output is turned on (the defrost output controls the valve).

Dripping

A dripping time can be set (F34). For example, set the dripping water with 5 minutes, after finishing defrosting, in 5 minutes, compressor doesn’t run, in this state, “Defrost” indicator light will flash. But in two conditions the controller can’t enter the dripping state: one is finishing the defrosting manually, and the other is defrosting temperature sensor’s error.

About fan controlling

Fan has 7 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 is controlled by the evaporator temperature, start when low temperature, stop when high temperature (F44, F45), the fan starts when the evaporator temperature is below F44 and stop when the evaporator temperature is over F44＋F45.

4: fan is controlled by the evaporator temperature, start when high temperature, stop when low temperature (F44, F45), the fan starts when the evaporator temperature is over F44 and stop when the evaporator temperature is below F44－F45.

5: fan is on when the compressor is on, and times to start and stop when the compressor is off, the on/off time is set by F46 and F47, in other words, on for F46 minutes and off for F47 minutes.

6: 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.

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.

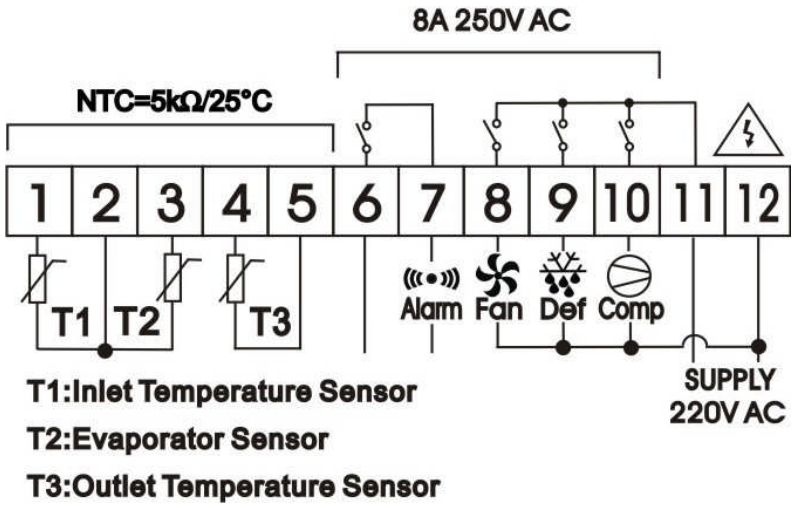
Alarm output

The controller has one separate alarm output, and when the states below occur, the alarm output contact will act.

1. Temperature sensor error;
2. Refrigerator temperature distributing abnormity;
3. Evaporator sensor error (the parameter F59 can turn off this alarm);

Alarm output can be set to 2 modes (F57): always open or always closed. In “always open” mode, alarm output contact opens when it is normal, and closes when alarm occurs; in “always closed” mode, alarm output contact closes when it is normal, and opens when alarm occurs.

Wiring Diagram:



Notice:

1. **Please read the guide carefully before using, and set the parameter accurately.**
2. **The evaporator sensor must be fixed on the air return pipe of the evaporator, and if you don't use the evaporator sensor, please set the F59 to NO, or the controller will generate alarm.**
3. **Please use the temperature sensors which are supplied by our company.**
4. **The RTC power of the controller is supplies by super capacitance, and the RTC can run for 3 days when power cut, if the power cut time is over 3 days, you may adjust the RTC again.**