Elitech®

EK–3030E Temperature Controller User Manual

General

This controller is a smart communication temperature controller used for temperature control of cold storage and heating devices. It could be connected to the internet as control terminal and could control and set parameters remotely. It has the function as below: measure, display and control temperature; temperature calibration; forced defrost; temperature over temperature alarm and sensor failure alarm; parameters preset and one key recovery; key lock function, dual–way digital input.

Communication protocol adopts MUDBUS protocol, TTL serial interface. Communication adapter card is optional to converse to 485 communication interface.

Dual–way sensor input: cabinet temperature sensor and defrost sensor. Two digital input.

Three way control output: Refrigeration/heating output, defrost and fan.

Technical parameters

1) Measuring range: −40℃ ～ 99℃
2) Controlling range: −40℃ ～ 85℃
3) Accuracy: −30℃ ～ 50℃, ±1℃ ±0.5dig; others, ±2℃ ±0.5dig
4) Resolution: 0.1℃
5) Mounting size: 71mm*29mm
6) Power supply: 220 ± 10%(VAC), 50/60Hz
7) Power consumption: <5W
8) Output capacity
Refrigeration: 10A/220VAC or 16A/220VAC, directly drive a single phase compressor 1HP
Defrost: 10A/220VAC
Fan: 10A/220VAC
One way buzzer alarm output
9) Work ambient temperature: −5℃ ～ 60℃; work ambient humidity: 10% ～ 90% non condensing
10) Storage temperature: −25℃ ～ 75℃
11) Senor type: NTC（10KΩ/25℃, B value 3435K ）
12) Sensor length: 2M

Operation and display panel

1、Operation and display panel

Display panel can display three digits, two status indicator (key lock and fan), four parameters descriptors (temp on , temp off , def cycle , def time) .

Under normal running status, all descriptors will not light; when enter the menu setting mode, the corresponding parameter descriptor lights. Under normal running status, if there is refrigeration/heating output, "On" descriptor lights; if defrost runs, "Def "descriptor lights.

2、Indicator light status description

Indicator light	Symbol	Status	Meaning
Key lock	🔒	OFF	Unlockedstatus
		ON	Key lock status
Refrigeration/Heatingoutput	On	ON	Outputwork
		OFF	Output stop
		FLASH	Outputtime delay
Defrost	Def	OFF	Defroststop
		Flash(slowly)	Defrosttime delay
		Flash(quickly)	Defrostdripping
		ON	Defrostwork
Fan	🌀	ON	Fanwork
		FLASH	Fantime delay
		OFF	Fanstop

3、Key description

There are in total six keys in the controller
❄ Forced defrost key   "Temp On"   "Temp Off" ;
⌃ UP key   ⌄ DOWN key   🔓 unlock key/OK

Operation instruction

1. Controller locking and unlocking
Under the status of controller locking, press 🔓 for one second, the controller will be unlocked, and at the same time, the buzzer beeps for about 0.5second. If no key operation in30seconds, the controller will lock automatically.

Under the normal running status, press "Temp On" (or "Temp Off"), the corresponding parameter descriptor lights, and it displays the value of "temp, on" (or "temp off") in the display window, which indicating that it has entered to the setup menu of "temp on" (or "temp off"), The parameters could be adjusted by pressing the keys " ⌃ " or " ⌄ " , and if the keys "⌃ " or "⌄" is kept pressed, the parameters could be adjusted quickly. In the setting mode, press and release the 🔓 key or no key operation in 30seconds, it will exit from setting mode and save the parameters.

Parameter descriptor	Description	Setting range	Default setting	Work mode	Note
Temp On Descriptor lights	Start temperature	Temp Off ～+85.0℃	10.0℃	Refrigeration	If cabinet temperature is higher than set temperature, refrigeration starts.
		−40.0 ℃ ～ Temp Off	−10.0℃	Heating	If cabinet temperature is lower than set temperature, heating starts.
Temp Off Descriptor lights	Stop temperature	−40.0 ℃ ～ Temp On	−10.0℃	Refrigeration	If cabinet temperature is lower than set temperature, refrigeration closes.
		Temp On ～+85.0℃	10.0℃	Heating	If cabinet temperature is higher than set temperature, heating closes.

3. System menu setting
Under the normal running status, press 🔓 for more than 5seconds, and it will display parameter code "F1" in the temperature display window, which indicating that it has entered to the system setup menu. The parameter codes could be switched by pressing the keys " ⌃ " or "⌄ " , and press and release🔓 to display the corresponding parameter values.

The parameter could be adjusted by pressing the keys " ⌃ " or "⌄ " , and if the keys " ⌃ " or "⌄" is kept pressed, the parameters could be adjusted quickly. Press and release the key🔓 to save the modified parameter value and return to display parameter code.

In System menu setting status, press the key 🔓for 5seconds or no key operation in 30seconds, it will save the parameters and exit from system menu setting status.

If an error occurs when you save the parameters, it shows "Err" in the temperature display window, and it returns to the normal display status in 5 seconds.

In System setting status, press and hold " ❄ "key for more than 5 seconds, it will blinkingly display password setting. The hide menu is unavailable to access until a correct password is set. The password fixed value is " −15 " . Under System menu, press 🔓key for 3 seconds, or no key operation within 30 seconds, it will exit from system setting menu.

Parameter list

Parameters	Description	Setting range	Default value	Note
F1	Defrost time	1 ～ 120 Min	30 Min	Duration time during defrost
F2	Defrost cycle	0 ～ 120 Hour	6 Hour	The interval during two defrosts (Auto record every one hour)
F3	Defrost cycle calculation	0: Cumulative controller work time after power on 1 : Cumulative compressor work time after power on 2: Controlled by external defrost timer	1	If 2 is selected, defrost is started by external defrost timer; that is, Either H15 or H16 needs to be set as 6, if not, defrost function is cancelled.
F4	Dripping time after defrost	0 ～ 120min	3min	Time delay after finishing defrost

F5	Defrost type	0: Electric heating defrost 1: Hot gas defrost 2: wind defrost	0	Before hot gas defrost, the compressor stops for 3minutes then start defrost, to make sure the reliability of the system. After hot gas defrost, compressor starts after 2 minutes time delay.
F6	Defrost termination temperature	−40.0℃ ～ +50.0℃	10℃	If defrost sensor temperature is high than the set value, defrost stops and defrost is forbidden.
F7	Fan running mode	−180 ～ −1: Fan starts ahead of compressor 180 – 1(second) o: Fan and compressor run synchronically c: Fan runs continuously (no time delay after dripping) d: Fan runs continuously, stops during defrost and dripping 1 ～ 300: Fan starts behind compressor 1 ～ 300 (seconds)	0	
F8	Initial fan start time delay after dripping	0 ～ 300S	30S	Initial fan start time delay after dripping
F9	Compressor start time delay	0 ～ 10Min	0	Compress start minimum time interval from its last stop (include the compressor start time delay for the initial power on)
F10	Over temperature alarm time delay after power on	0 ～ 24 Hour	2 Hour	After power on, during this time range, there is no over temperature alarm signal
F11	Over temperature alarm	0 ～ 50.0℃	5.0℃	**Refrigeration mode:** If cabinet temperature is higher than "Temp On value + Over temperature alarm value" or lower than "Temp Off value – over temperature alarm value" , it alarms. **Heating mode:** If cabinet temperature is higher than "Temp Off value + Over temperature alarm value" or lower than "Temp On value – over temperature alarm value" , it alarms.
F12	Over temperature alarm time delay	0 ～ 120Min	10Min	Alarm won't occur until over temperature duration is longer than this parameter.

Hide Parameter list

Parameters	Description	Setting range	Default value	Note

H15	Digital input 1 definition	± 6:start defrost ± 5:heating mode ± 4:Normal external alarm ± 3: emergency external alarm ± 2: Pressure switch alarm ± 1:Door switch alarm 0:Forbidden Positive number represents default normally open, close valid; Negative number represents default normally closed, open valid.	0	
H16	Digital input 2 definition		0	
A1	Normal external alarm time delay	0～240s	60s	
A2	Compressor/defroster/fan stop or not during normal alarm	0: no effect; 1: only compressor stops; 2: Compressor, defroster and fan all stop	0	
A3	Emergency external alarm time delay	0～240s	0	
A4	Compressor/defroster/fan stop or not during Emergency alarm	0: no effect; 1: only compressor stops; 2: Compressor, defroster and fan all stop	0	
A5	Door switch alarm time	0～240s	60s	
A6	Compressor and fan status during door open	0:no effect 1:Close fan 2:Close compressor 3:Close both fan and compressor	3	
A7	Fan stop time during door open	ON: Non stop; OFF: Not start before door closed; 1～240s: (stop time);	40s	If A6=0 or 2, this parameter is invalid.
A8	Pressure switch auto reset permission	0: Auto reset is forbidden; 1～5: Auto reset times	2	When the parameter is not 0, if pressure switch auto reset times exceeds the set times, then auto reset is not allowed. Power on the controller again, auto reset times will be recalculated.

4. Manual defrost
In the status of non–defrosting , non–defrost–dripping, non–parameter setting , and defrost cycle is not set to 0 and the defrost sensor temperature is less than the set defrost termination temperature (F6), press ❄ key for more than three seconds, it enters to manual defrost status, and the defrost working indicator lights and start defrosting.

In the defrost status (non–parameter setting status), press ❄ key for more than three seconds, it exits from defrost status, and the defrost working indicator flashes, defrost stops and start defrost dripping.

5. View defrost sensor temperature
Under the normal running status or lock status, press⌄ key, it displays defrost sensor temperature in the temperature display window. Release the key, it returns to the normal display status.

6. Buzzer alarm mute
Press any key to eliminate the alarm buzzer beeping, but the alarm indicator light will not be off until the alarm is released.

7. Parameter preset and one key recovery
In the key lock status, press "Temp On" key for more than 10 seconds, it displays "COP" for 3 seconds, within these three seconds, press 🔓 key to copy the current parameter setting as the factory preset data, and it displays "YES" , so that end-users could recover the controller parameters to the appropriate setting in case of emergency.

In the key lock status, press "Temp Off" key for more than 10 seconds, it displays "DON"3 seconds, within these three seconds, press🔓 key to recover to the factory preset parameter setting and it displays "YES" .

Note: Before recovering to factory preset parameter setting, to make sure that the parameters have previously backed up. Otherwise, it will recover to the factory default parameters.

Control output

1) Refrigeration control: Compressor startup condition (meet all the condition as below):
Compressor startup time exceeds the set compressor time delay;
Fan start time ahead of compressor meets the set time (Fan start time ahead of compressor is set as minus)
In the status of non–defrosting, non–defrost–dripping, when cabinet temperature ≥ set "Temp On" value or during hot gas defrost.
Compressor close condition (meet any of the conditions as below):
When cabinet temperature ≤ set "Temp Off" value;
When start electric–heating defrost;
When hot gas defrost stops;

2) Defrost control
Defrost startup condition (meet all the condition as below):
Defrost cycle is not set as 0;
Defrost sensor temperature is lower than the set defrost termination temperature;
When start "defrost cycle" , or forced defrost starts.
Defrost close condition: It is controlled by both temperature and time. After start defrosting, if defrost sensor temperature reaches "defrost termination temperature" , then defrost finishes and stop defrost. If defrost time is too long and exceeds "defrost time" , the controller will also stop defrost. If neither temperature nor time reaches the set value, it could exit from defrost status through manually pressing the key of "forced defrost" .
Defrost dripping time: The purpose of defrost dripping is to discharge the water accumulated during defrost in the evaporator. If the water could not be discharged timely, the water will be frozen again during refrigeration. Therefore, it is necessary to set a defrost dripping time to make sure a timely water discharge during defrost. During this period, the compressor does not start, and "defrost " working status indicator flashes at this time.

3) Fan control
Fan is controlled by compressor time
−180 ～−1: Fan starts ahead of compressor 180 ～ 1S
0: Fan and compressor run synchronically
c: Fan runs continuously
d: Fan runs continuously, stops during defrost and dripping
1 ～ 300: Fan starts behind compressor1 ～ 300S

4) Alarm output
The controller has one way buzzer alarm output. In the running status, when the following conditions occur, the buzzer beeps:
When the cabinet sensor fails, it displays the fault code E1 in the temperature display window, the controller will run in the fixed pattern: the compressor stops for 30 minutes, then runs for 15 minutes. After cabinet sensor failure is released, it enters to the normal temperature control mode and exits from the fixed compressor start/stop mode.
Defrost sensor fails, it alternately displays the fault code E2 and the current cabinet temperature in the temperature display window; the controller controls according to the set defrost cycle and defrost time. When the defrost sensor failure is released, it enters to the dual–control mode by both time and temperature.
If the cabinet sensor and defrost sensor fail simultaneously, it alternately displays the fault code E1 and E2 in the temperature display window;
When cabinet temperature ≥ " Temp On value" + "over temperature alarm value" and the duration ≥ "over temperature alarm time delay " and " Over temperature alarm time delay after power on " , high temperature alarm occurs, it alternately displays the current cabinet temperature and the fault code HA in the temperature display window. When cabinet temperature < "Temp On value" + "over temperature alarm value", high temperature alarm is cancelled.
When cabinet temperature ≤ " Temp Off value" – "over temperature alarm value" and the duration ≥ "temperature alarm time delay " and " Over temperature alarm time delay after power on ", low temperature alarm occurs, it alternately displays the current cabinet temperature and the fault code LA in the temperature display window. When cabinet temperature > " Temp Off value" – " over temperature alarm value", low temperature alarm is cancelled.

5) Communication function
TTL serial interface. Communication adapter card is optional to converse to 485 communication interface.
Communication protocol adopts MUDBUS–RTU protocol.

6) Digital switch input
Two way digital switch input could be set in different function through parameters "H15" and "H16" .
Start defrost: When F3=2 (controlled by external defrost timer) and digital input valid, and meet the conditions of defrost, start defrosting.
Heating mode: When digital input is valid, it switches to heating mode; when digital input is invalid, it recovers to refrigeration mode.
Normal external alarm: When the digital input is valid, after finish the time delay of parameter A1, if the digital input is still valid, it displays the alarm information EA, and all relay output status is determined by parameter A2. If the digital input is invalid, alarm will stop immediately.
Emergency external alarm: When the digital input is valid, after finish the time delay of parameter A3, if the digital input is still valid, it displays the alarm information CA, and all relay output status is determined by parameter A4. If the digital input is invalid, alarm will stop immediately.
Pressure switch alarm: When the digital input is valid, it displays alarm information CA, all replay output are close. When digital input is invalid, it will automatically reset according to parameter A8 and A9.
Door switch alarm: When the digital input is valid, after finish the time delay of parameter A5, if the digital input is still valid, it displays the alarm information "dor", and compressor and fan output status are determined by parameter A6 and A7 . If the digital input is invalid, alarm will stop immediately.

4、Manual defrost

EK-3030E   Elitech®

Jiangsu Jingchuang Electronics Co.,Ltd.   0302 1 5
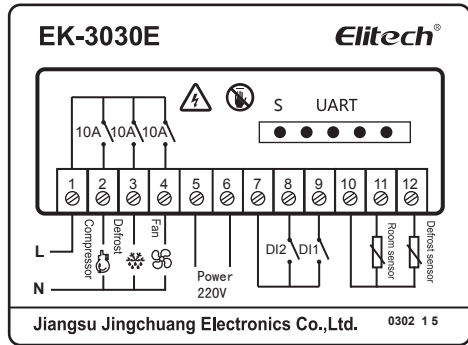
5、Safety rules

★Danger:
1. Strictly distinguish the power wire, relay output, sensor down–lead and data line, and the relay could not be overloaded.
2. Prohibit connecting the wire terminals without electricity cut–off.
★Warning:
Prohibit using this unit under the environment of over damp, high temp., strong electromagnetism interference or strong corrosion.
★Notice:
1. The power supply should conform to the voltage value indicated in the instruction, and make sure a steady power supply.
2. To avoid the possible interference, the sensor down–lead/data line and power wire should be kept in a proper distance.
3. When evaporator sensor is installed, the sensor should be well connected with the copper tube which is 5cm away from evaporator inlet.

V1.0