Elitech®

ECS-180 Temperature Controller User Manual

1.Product General

1.1 product configuration description

Serial code	Relay				Sensor				Buzzer	Off Power detection
	Refrigeration	Defrost	Fan	Light/alarm	Cabinet temp	Evaporator/S2	Condensor/S3	Door switch/S4	B	V
A(30.05.05.00)S234.B	30	5/●	5/●	×	√	●	●	●	●	×
A(05.10.10.05)S234.B.V	5	10/●	10/●	5/●	√	●	●	●	●	●

Note:● represents optional,x represents no such configuration,√ represents fixed configuration, The number represents the relay contact capacity.

For example：30 represents the relay contact capacity is 30A，5/● represents the relay contact capacity is 5A and the one is optional.

1.2 Product application description

● ECS-180 temperature controller could be used in the middle and low temperature medicine cabinet, kitchen cabinet, supermarket split cabinet, air curtain cabinet, island counter, wine cabinet, etc.

● The controller adopts building block design concept and users could select defrost, fan, light/external alarm according to their demand.

● The function of evaporator sensor, condenser sensor, door switch, buzzer and off power detection is optional.

● Refrigeration relay output could reach to 30A/240VAC, which could directly drive single-phase 1.5Hp compressor.

● Large panel of color digital tube, work status symbol display, temperature display resolution is 0.1, the front panel waterproof level IP65.

● It has temperature sensor self-test function, and once test the failures, it has multiple protection and alarm methods.

● It has the function of one-key recovery, and the rear adopts the plug-in connection method to effectively simplify processing for equipment manufacturers.

● Temperature measuring unit could switch between Celsius and Fahrenheit.

● With the function of Synchronous defrost switch signal detection, and it could form the network of real-time clock Synchronous defrost.

● Cabinet temperature over limit alarm has two modes: absolute value and relative value.

● Light/external alarm relay could be selected by the software, and when select the function of external alarm relay, it could connect the remote alarm bell.

● If select to install standby power supply access unit, it could realize the function of off-power detection and alarm.

● With the complete control logic of hot-gas defrost start without the pressure difference in the refrigerant pipe, to prevent starting with the pressure, for the purpose of a longer compressor life.

2. Operation and display panel

3. Specification

1) Mounting size:(71mm)×(29mm) (max)
2) Product size :(78.5mm) × (34.5mm) × (82mm)

4. Technical parameters

1) Measuring range：-50℃～90℃ or -58℉～194℉（only when sensor calibration is set as 0）
2) Resolution：0.1℃ or 1℉
3) Accuracy：-40℃～50℃,±1℃,51℃～70℃,±2℃,others, ±3℃or -40℉～122℉,±2℉,123℉～158℉, ±4℉,others,±6℉
4) Controlling range：-50℃～85℃ or -58℉～185℉
5) Power supply: 220±10 %(VAC)
6) Power consumption：<3W
7) External standby power voltage: 7.0VDC～13.5VDC
8) Input: Cabinet sensor, evaporator sensor, condenser sensor, door switch (When door is open, sensor signal: normal open)
9) Output capacity:

Serial code	A(30.05.00.00)S234.B	A(05.10.10.05)S234.B.V
Refrigeration	30A/240VAC，directly drive 1.5HP compressor	5A/250VAC，
Defrost	5A/250VAC	10A/250VAC
Fan	5A/250VAC	5A/250VAC
Light/external alarm	None	10A/250VAC

10) Front panel waterproof level：IP65
11) Work ambient temperature：0℃～55℃
12) Storage temperature：-25℃～75℃
13) Relative humidity：20%～85%（non condensing）

5.Indicator light status description

Indicator light	Symbol	Status	Meaning
Setting	Set	ON	Parameter setting
		OFF	Status of temperature measuring and controlling
Refrigeration	❄	ON	Refrigeration work
		OFF	Refrigeration stop
		FLASH	Refrigeration time delay
Defrost	❅	ON	Defrost work
		OFF	Defrost stop
Fan	❀	ON	Fan work
		OFF	Fan stop
Defrost dripping	drip	ON	Start defrost dripping
		OFF	Stop defrost dripping
Door switch	🚪	ON	Cabinet door open
		OFF	Cabinet door close
Off power detection	⏻	ON	Controller power off

6.Parameter list

Menu	Functions	Setting range	Default		℃/℉
			H1	H7	
		User menu			
St	Temperature set value	Lower limit～Upper limit	4℃	40℉	℃/℉
Po	Administrator menu Password	00～99（password is 55,unmodified）	00		/
		Administrator menu			
C1	Hysteresis value	0.5℃～9.0℃	4. 0℃	8℉	℃/℉
		1℉～20℉			
C2	Compressor start Min. interval	0～60	5	5	min
C3	Compressor initial start Min. interval	0～90	5	5	min
C4	Cabinet sensor calibration	-10.0℃～10.0℃	0. 0℃	0℉	℃/℉
		-20℉～20℉			

Menu	Functions	Setting range	Default H1	Default H7	℃/℉
C5	Temperature set lower limit	-50℃～temperature set value / -58℉～temperature set value	-2℃	28℉	℃/℉
C6	Temperature set upper limit	temperature set value～85℃ / temperature set value～185℉	22℃	72℉	℃/℉
C7	Max.standby time after finishing compressor start Min. interval (note①)	0～90 / 0:Max.standby time calculation is forbidden	9	9	min
C8	Refrigeration Min. running time	0～90 / 0: Refrigeration Min.running time calculation is forbidden	0	0	min
d1	Evaporator sensor selection	0: Disabled / 1: Enabled	1	1	/
d2	Evaporator sensor calibration	-10.0℃～10.0℃ / -20℉～20℉	0. 0℃	0℉	℃/℉
d3	Defrost cycle calculation	0: accumulated refrigeration time / 1: natural time	1	1	/
d4	Defrost cycle	0～90 / 0: Defrost forbidden	2	2	hour
d5	Defrost status display	0:Display cabinet temperature 1:Display dEF during defrost and defrost time delay, display cabinet temperature after finishing defrost time delay. 2:Always display dEF during defrost and defrost dripping 3:Always display start-defrost cabinet temperature during defrost and defrost dripping	2	2	/
d6	The maximum time of defrost	1～90	25	25	min
d7	Defrost termination temperature	0℃～50℃ / 32℉～122℉	12℃	54℉	℃/℉
d8	Dripping time after defrost	0～60 / 0: Defrost dripping time forbidden	2	2	min
d9	Cabinet temperature display time delay after defrost	0～90	10	10	min
d10	Time delay after defrost start	0～30 / 0:Defrost start time delay is canceled	10	10	min
d11	Defrost type	0:Electric heating defrost / 1:Hot gas defrost	0	0	/
F1	Fan running mode	0:Fan and compressor run or stop synchronically 1:Fan runs continuously, stops during defrost 2: Fan runs continuously, stops during defrost and defrost dripping 3: Fan runs continuously, stops during defrost, fan time delay after defrost	3	3	/
F2	Fan initial start time delay after electrified	0～60	4	4	min
F3	Fan start time delay after defrost	0～60 / 0: Fan time delay canceled	2	2	min
A1	Compressor run and stop in a proportional time after cabinet sensor failure	0:Cancel the mode of "Run/stop in a proportional time" 1:Start the mode of "Run/stop in a proportional time"	1	1	/
A2	Compressor stop time in the mode of "Run/stop in a proportional time"	1～60	5	5	min
A3	Compressor running time in the mode of "Run/stop in a proportional time"	1～60	30	30	min
A4	Buzzer alarm output switch	0: Buzzer output disabled / 1: Buzzer output enabled	1	1	/

Menu	Functions	Setting range	Default H1	Default H7	℃/℉
A5	Cabinet temperature lower limit alarm value	-50℃～Cabinet temperature upper limit alarm value / -58℉～Cabinet temperature upper limit alarm value	-10℃	14℉	℃/℉
A6	Cabinet temperature upper limit alarm value	Cabinet temperature lower limit alarm value～85℃ / Cabinet temperature lower limit alarm value～185℉	24℃	75℉	℃/℉
A7	Cabinet over temperature alarm time delay	0～60	20	20	3min
A8	The initial cabinet over temperature alarm time delay after electrified	0～60	40	40	3min
A9	Over temperature alarm upper deviation	1℃～30℃ / 1℉～60℉	10℃	20℉	℃/℉
A10	Over temperature alarm lower deviation	1℃～30℃ / 1℉～60℉	5℃	10℉	℃/℉
A11	Over temperature alarm mode	0: Absolute temperature point 1:set value+ over temperature alarm deviation	0	0	/
A12	Light/Alarm relay selection	0:Light output / 1:Alarm output	0	0	/
do1	Control output of door switch	0:Doorswitch is canceled 1:Close fan during door open 2: Turn on the light when door open, turn off the light when door closed 3:Close fan and turn on the light when door open,Turn off the light when door closed 4: When door is open, it is the synchronous signal input of defrost, defrost will start.	0	0	/
do2	Buzzer response when door open	0:NO / 1:YES	0	0	/
cd1	Condenser sensor selection	0:Disabled / 1:Enabled	1	1	/
cd2	Condenser high temperature alarm start value	30℃～90℃ / 86℉～194℉	55℃	131℉	℃/℉
cd3	Lower hysteresis of condenser high temperature alarm	1℃～15℃ / 2℉～30℉	5℃	10℉	℃/℉
Hidden menu	Celsius /Fahrenheit selection (note②)	Fahrenheit Celsius	Celsius	Fahrenheit	/

Note①：Only valid when the cabinet sensor is in proper working。
Note②：After switch between Celsius /Fahrenheit, users need to adjust all related parameters t hemselves to make sure the correct parameter setting. Celsius /Fahrenheit switch could only be achieved by one-key recovery operation.

7. Keys Function

7.1 Keys description

Keys	Function
Set	Enter the status of parameter setting；Switch between menu and parameter；
☼	Adjust menu and parameters；Open/close light(only valid for the model with light control)
↺	View condenser sensor temperature; Adjust menu and parameters；Press more than10s to execute parameter one-key recovery
❄ Rst	View evaporator sensor temperature; Exit from parameter setting；Exit from one key recovery status; Press 3s to forced switch between refrigeration, defrost/defrost delay, defrost dripping

7.2 Keys operation

1）In the status of temperature measuring and controlling, press Set key for three seconds to enter user menu, it displays the code St, then press Set key again, display the value of St. It could be modified by pressing the key ☀ or ☾.

When it displays the code St，press the key ☀，display the code Po，then press Set key, display 00，at this time, press ☀ or ☾ to input the password of administrator menu.

Press Set key again to confirm the password input, and the controller will automatically verify the correctness of password. When it passes, it could select parameter items St、Po、C1、C2……Cd3 (that is, any parameter items both in the administrator menu and user manuals) by pressing the key ☀ or ☾. Or else, only the parameters items St and Po available, others could not be displayed.

When the parameter item is selected, press Set key to enter to the setting of the current item, press ☀ or ☾ to modify the value, and then press Set key to return to the menu.

Under the status of parameter setting, press ❄ key or no key operation within 30s, it will exit from parameter setting and automatically save the current parameter value.

Note: The password input of administrator menu only is valid for single entering. After exit from the parameter setting by pressing ❄, it needs to input the correct password again for next parameter adjustment.

2）Temperature viewing

In the status of temperature measuring and controlling, press ❄ to view the current evaporator sensor measured temperature value (note: evaporator sensor is enabled and works properly). Press ☾ to view the current condenser sensor measured temperature value (note: condenser sensor is enabled and works properly).

3) Manually forced operation

In the status of temperature measuring and controlling, press ❄ for three seconds to force the switch between refrigeration, defrost/defrost delay, defrost dripping. Press ☀ to open or close the light (Only valid when Light/alarm relay is used as light and there is no linkage between light control and door switch.)

4）Parameter recovery

In the status of temperature measuring and controlling，press the key ☾ for 10S，it displays the code H0 and enter to the operation of one-key recovery. It could continue to select the parameter recovery items by pressing ☾ key,and the selection range is H0～H7，and press key ❄ to execute the parameter recovery and then exit. If there is no parameter recovery operation within 30S, it will automatically exit from the mode without recovery of parameters.

（Note：This operation needs a stable power supply. If the power supply is abnormal, it needs to re-electrify the controller with stable power supply and execute the one-key recovery again.）

H0	Give up parameter recovery，no change of each parameter, no display of parameter recovery success code dr
H1	Recovery the parameter H1，recovery success display dr
H2	Recovery the parameter H2，recovery success display dr
H3	Recovery the parameter H3，recovery success display dr
H4	Recovery the parameter H4，recovery success display dr
H5	Recovery the parameter H5，recovery success display dr
H6	Recovery the parameter H6，recovery success display dr
H7	Recovery the parameter H7，recovery success display dr, Celsius switches to Fahrenheit Note: After switch, users need to adjust the related parameter values to make sure the correct parameter setting.

8. Control output

8.1 Compressor：

Normal status：When the cabinet temperature is higher than the set temperature(St) +hysteresis(C1) , and finish the compressor start Min. interval, the compress will start；

When the cabinet temperature is lower than the set temperature (St), and the continuous refrigeration running time is larger than C8, the compressor will close.

When the cabinet temperature is between the set temperature(St) and the temperature of the set temperature(St) +hysteresis(C1), if the refrigeration is closed, then after finishing compressor start Min. interval and Max.standby time after finishing compressor start Min. interval   (C7), the refrigeration will start.

Note: Compressor start Min.interval is calculated by Compressor initial start Min. interval (C3) after it is electrified for the first time, and it will be calculated by Compressor start Min. interval (C2) in the future.

Cabinet temperature sensor failure：

A1=0, cancel the function of "Run/stop in a proportional time" , the compressor closes；

A1=1, open the function of "Run/stop in a proportional time", the compressor will run in cycle according to the proportion (Refrigeration running time A3 and refrigeration stop time A2).

8.2 Defrost

1）d4 = 0，Defrost is forbidden.

2）d4 ≠ 0，when it is not in the state of defrost nor defrost dripping：

① Evaporator sensor is enabled（d1 = 1），and evaporator sensor temperature is higher than Defrost termination temperature（d7），then defrost could not be started.

② Evaporator sensor is enabled（d1 = 1）and evaporator sensor temperature is lower than Defrost termination temperature（d7）or evaporator sensor is disabled（d1 = 0）（Any of the following conditions could start defrost）：

a、When defrost cycle（d4）finishes running，defrost is started；

Note：Defrost cycle is calculated according to the selected natural time（d3 = 1）or accumulated refrigeration time(d3 = 0)；

b、Hold and press ❄ for three seconds，start defrost；

c、If the door switch is as synchronous signal input of defrost (d01 = 4) ,the door open is the external synchronous defrost signal, the defrost is started.

Note：When finish time delay after defrost start（d10），there will be an output of defrost。

3）In the state of defrost（Any of the following condition could close defrost）：

① Evaporator sensor is enabled（d1 = 1），and evaporator sensor temperature is higher than defrost termination temperature（d7），defrost is closed；

② When finish running the maximum time of defrost（d6），defrost is closed；

③ Hold and press ❄ for three seconds，defrost is closed；

4）After defrost, it enters the state of defrost dripping, and within dripping time after defrost(d8), refrigeration output is forbidden. The dripping will be discharged during this time period. After finishing dripping time after defrost, it enters to the status of refrigeration cycle.

Note: Defrost status display

d5=0: Display cabinet temperature

d5=1:Display dEF during defrost and defrost time delay, display cabinet temperature after finishing defrost time delay.

d5=2:Always display dEF during defrost and defrost dripping

d5=3:Always display start-defrost cabinet temperature during defrost and defrost dripping

Defrost type:

d11=0:Electric heating defrost

d11=1:Hot gas defrost

8.3 Fan：

Fan running mode：

1）Fan and compressor run or stop synchronically；

2）Fan runs continuously, stops during defrost；

3）Fan runs continuously, stops during defrost and defrost dripping；

4）Fan runs continuously, stops during defrost, fan starts when finish time delay after defrost(F3)；

When the door switch parameter is selected as 1 or 3, when the cabinet door is open, fan will be close. And when the door is closed, fan will recover to the working state before door open.

Note：Fan will not be permitted to run until finish Fan initial start time delay after electrified（F2）.

8.4 Light

do1=0 or 1：press ☀ to open the light, and press ☀ again to close the light.

do1=2 or 3：When door open, the light will be opened, and when close the door, light will be closed.

Note：A12 = 0，Light/Alarm relay will be used as light relay, and light relay will pick-up when the light opens, disconnect when the light closes.

A(30.05.05.00)S234.B   No configuration of light relay。

8.5 Internal Alarm

Temperature sensor failure alarm：

When cabinet sensor fails，the digital tube display E1；

When evaporator sensor fails, the digital tube display E2；

When condenser sensor fails, the digital tube display E3；

Condenser high temperature alarm：If the condenser sensor is selected, when the condenser temperature is higher than the condenser high temperature alarm start value, it will alarm and display cH.While it will not have an effect on the control output. When the temperature falls back to (the condenser high temperature alarm value-condenser high temperature alarm lower hysteresis), the alarm is released.

Cabinet over temperature alarm：When the cabinet temperature is higher than the cabinet temperature upper limit alarm value(A11=0) or higher than (set value+ over temperature alarm upper deviation: A11=1), and cabinet over temperature alarm time delay or the initial cabinet over temperature alarm time delay after electrified has been finished, the digital tube will display rH，and the alarm will not be released until the temperature is lower than the cabinet temperature upper limit alarm value(A11=0) or lower than (set value+ over temperature alarm upper deviation: A11=1)；When the cabinet temperature is lower than the cabinet temperature lower limit alarm value(A11=0) or lower than (set value- over temperature alarm lower deviation: A11=1), and cabinet over temperature alarm time delay or the initial cabinet over temperature alarm time delay after electrified has been finished, the digital tube will display rL，and the alarm will not be released until the temperature is higher than the cabinet temperature lower limit alarm value or (set value- over temperature alarm lower deviation: A11=1).

If the buzzer is selected as 1，when there is alarm, door open(do2 is set as 1) or power supply is disconnected(now it is powered by standby power supply, A(30.05.05.00)S234.B has no such configuration）, the buzzer beeps；When all alarm is released, door is closed(do2 is set as 1) and there is normal power supply, the buzzer mutes, or press any key to mute the alarm.

Alarm code	Alarm reason
E1	Cabinet temperature sensor failure
E2	Evaporator sensor failure
E3	Condenser sensor failure
cH	Condenser high temperature alarm
rH	Cabinet high temperature alarm
rL	Cabinet low temperature alarm

8.6 External alarm output (A12=1)

The external alarm relay will pick up when there is alarm or door is open (do2 is set as 1), and it will disconnect when all alarm is released and the door is closed (do2 is set as 1).

Note: **A (30.05.05.00) S234.B has no configuration of external alarm relay.**

8.7 Standby power supply

When it is supplied by standby power, it will close the control output of compressor, fan, defroster and light/external alarm, but the controller will display the sensor measured temperature normally, and normally keep all alarm status. If the controller is electrified again, the compressor, defroster, fan and light will work according the mode of initial electrification.

Note: the voltage range of external power supply is **7.0～13.5VDC，and the controller will be damaged if it is connected with the standby power supply beyond the range. Please do not exceed this range**!

**A (30.05.05.00) S234.B has no such configuration of standby power supply.**

8.8 The table of controller output status

Defrost type / System status	Electric heating defrost	Hot gas defrost
Refrigeration output	Compressor start	Compressor start
	Electric heating close	Four-valves close
Defrost time delay	Compressor stop	Compressor stop
	Electric heating close	Four-valves open
Defrost output	Compressor stop	Compressor start
	Electric heating open	Four-valves open
Defrost dripping	Compressor stop	Compressor stop
	Electric heating close	Four-valves open

9. Wiring diagram
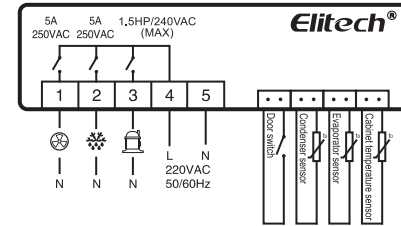
A (30.05.05.00) S234.B
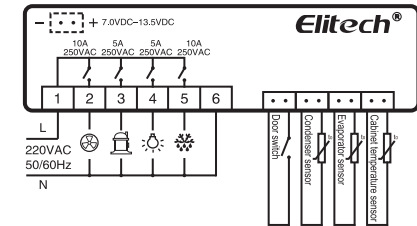
A (05.10.10.05) S234.B.V

10. 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.

3) When connect the standby power supply, it should connect the isolation safety power supply. Before connection, it is necessary to check whether the standby power voltage range meets the requirement of the controller, or else, it might cause the accident of insulation level drop of controller, the parts burning, or the electric shock, etc.

★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.