

1. Product Overview

EPS-100 is a full-featured universal temperature controller designed for various refrigerators, freezers and cooling systems. It has the following features:

- Modular design for software and hardware can meet customized demands for input and output configurations.
- The hardware may drive up to 6 channels of loads.
- Optional accessories include defrost sensor, condenser sensor, door switch and buzzer.
- Cooling relay has 20A/240VAC output at maximum and may directly drive a 2HP/240VAC single-phase compressor.
- White LED display, various working status indicators, temperature display resolution 0.1°C/1°F.
- Suitable for tough environment such as kitchens owing to its vertical protection grade IP65 (front panel), included watertight structure for mounting holes, and an optional drip-proof cover.
- With temperature sensor self-test function, multiple protection and alarm modes are available if a fault has been detected.
- The functions of copy card and one key reset to default provide the manufacturer with convenience in production and after-sale service.
- Digital signals are user-defined and can meet various customized needs.
- Two alarm modes (in case cabinet temperature goes out of limits): absolute temperature or relative temperature.
- Buzzer may be after the digital signal is timed out.
- The buzzer will be forced to beep intermittently if the optional standby power supply Elitech microUPS is used during main power outage.
- Hot gas defrost delay protects the compressor from starting with pressure, thus lengthening its service life.
- Two classes of ECO-DOOR modes. The controller can automatically recognize Routine Mode, ECO Mode - class 1 and ECO Mode - class 2.
- The controller supports TTL/485 master-slave communication, similar to Modbus protocol.
- Elitech exclusive modules are optional to form 2G/4G/Wi-Fi networks. Supports base station/GPS positioning and Elitech Cloud service.
- The master can write/read the controller's parameters as well as read the controller's working and error status.
- The master can remotely synchronize/assign certain controller(s) to defrost, power on/off, turn on/off light, enter/exit ECO mode.
- External provided display TPM-950 can be added to match supermarket cabinets, cake and ice-cream showcases, etc.

2. Operation and Display Panel



Mounting size: 116.0 * 36.0mm Product size: 123 * 42 * 69mm(traditional fastening screws)
123 * 42 * 81mm(quick connect terminals)

3. Dimensions

Temperature measuring range: -50°C~90°C / -58°F~194°F (only when sensor calibration is set as 0)
Temperature control range: -50°C~85°C or -58°F~185°F
Temperature resolution: 0.1°C / 1°F
Temperature accuracy: ±1°C (-50°C~50°C), ±2°C (others)
Power voltage: 12VAC/115VAC/220VAC/230VAC
Overall power consumption: ≤ 5W (Max), grid fluctuation: ≤ ±10%
microUPS interface
Vertical protection grade (front panel): IP65; provided with watertight structure and backside drip-proof cover.
Operating/working temperature: 0°C~55°C
Storage environment: Temperature: -25°C~75°C; Humidity: 20%~85% (non-condensing)

4. Specifications

Indicator	Symbol	Status	Meaning
Set		ON	Set parameters
		OFF	Temperature measuring and controlling
Cooling		ON	Cooling active
		OFF	Cooling inactive
		Flash	Cooling delay
Fan		ON	Fan active
		OFF	Fan inactive
Defrost		ON	Defrost active
		OFF	Defrost inactive
Dripping		ON	Dripping active
		OFF	Dripping inactive
Set-point lock		ON	Cabinet temperature set-point is locked and unchangeable.
		OFF	Cabinet temperature set-point is unlocked and changeable.
Power supply		ON	AC power supply abnormal.
		OFF	AC power supply normal.
ECO mode - class 1	ECO1	ON	Class 1 - ECO mode
		OFF	Exit class 1 - ECO mode
ECO mode - class 2	ECO2	ON	Class 2 - ECO mode
		OFF	Exit class 2 - ECO mode
Door signal		ON	Door is open.
		OFF	Door is closed.

Address	Item	Description	Setting Range	Default	Unit
User Menu					
0	Set	Temperature set-point	C5~C6	4.0	°C
Admin Menu					
1	PA1	Admin password (universal password 125)	0~250	0	/
2	c1	Differential	0.5~9.9	4.0	°C
3	c2	Compressor start delay between last switch-off and the successive switch-on	0~60	5	min
4	c3	Compressor start delay after switch-on of the device	0~90	1	min
5	d4	Cabinet sensor calibration temperature 1.	-10.0~10.0	0.0	°C
6	c5	Low temperature set-point. Minimum possible set-point.		-2.0	°C
7	c6	High set-point. Maximum possible set-point.		22.0	°C
8	d1	Defrost sensor options: 0: Disable; 1: Enable	0/1	1	/
9	d2	Defrost sensor calibration temperature	-10.0~10.0	0.0	°C
10	d3	Defrost counting type: 0: Compressor running time; 1: Controller running time	0/1	1	/
11	d4	Defrost interval time: 0: Disable defrost	0~90	6	hour
12	d5	During defrost the panel displays: 0: cabinet temperature 1: dEF (during defrost); cabinet temperature (when dripping is active and d11 elapses). 2: cabinet temperature at defrost start (during defrost); cabinet temperature (when dripping is active and d11 elapses). 3: Temperature set-point (during defrost); cabinet temperature (when dripping is active and d11 elapses). 4: dEF (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active). 5: cabinet temperature at defrost start (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active). 6: temperature set-point (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active).	0~6	1	/
13	d6	Maximum defrost duration	1~90	25	min
14	d7	Defrost stop temperature	0~50	12	°C
15	d8	Dripping time after defrost	1~99	2	min
16	d9	Defrost start delay: 0: Disable	0~60	10	min
17	d10	Defrost mode: 0: Electric defrost; 1: Hot gas defrost	0/1	0	/
18	d11	Cabinet temperature display delay after defrost	0~90	30	min
19	d12	Defrost interval after switch-on of the device: Defrost starts immediately after switch-on of the device	0~99	1	hour
20	F1	Fan working mode: 0: Fan runs continuously. 1: Fan is controlled by cabinet sensor. 2: Fan is controlled by defrost sensor. 3: Fan runs together with compressor and stops during defrost and dripping; Fan is controlled by F5 if cooling is inactive. 4: Fan runs together with compressor and stops during defrost; Fan is controlled by F5 if cooling is inactive; Fan runs after F2 elapses if dripping is active. 5: Fan runs together with compressor; Fan is controlled by F5 if cooling is inactive; Fan stops if defrost starts and then runs again after F2 elapses. 6: If cooling is active, fan runs after F2 elapses; if cooling is inactive, fan stops.	0~6	0	/
21	F2	Fan start delay	0~60	3	min
22	F3	Fan start temperature	-50.0~90.0	2.0	°C
23	F4	Fan stop temperature differential	0.5~30.0	2.0	°C
24	F5	Fan runs if cooling is inactive: 0: No; 1: Yes	0/1	1	/
25	Loc	Cabinet temperature set-point lock: 0: Locked - cabinet temperature set-point cannot be modified; 1: Unlocked - cabinet temperature set-point can be modified.	0/1	0	/
26	Fg1	Auto defog for glass door: 0: Disable; 1: Enable	0/1	1	/
27	Fg2	Auto defog interval for glass door	1~240	120	min
28	Fg3	Auto defog duration for glass door	5~240	30	sec
29	A1	Duty cycle mode in the event of a faulty cabinet sensor: 0: Disable; 1: Enable	0/1	1	/
30	A2	Compressor off time in duty cycle mode	1~60	5	min
31	A3	Compressor on time in duty cycle mode	1~60	30	min
32	A4	Buzzer beep: 0: Disable; 1: Enable	0/1	1	/
33	A5	Low alarm temperature (cabinet)	-50.0~A6	-10.0	°C
34	A6	High alarm temperature (cabinet)	A5~85.0	24.0	°C
35	A7	Cabinet alarm delay	0~600	20	min
36	A8	Cabinet alarm delay after switch-on of the device	0~600	40	min
37	A9	High alarm offset	0.1~30.0	10.0	°C
38	A10	Low alarm offset	0.1~30.0	5.0	°C
39	A11	Alarm mode: 0: Absolute temperature point; 1: Temperature set-point + alarm offset	0/1	0	/
40	L01	Digital signal: 0: active at normally closed state; 1: active at normally open state	0/1	1	/
41	L02	Display when digital signals are active: 0: Cabinet temperature; 1: dor	0/1	1	/
42	L03	Cabinet temperature display delay after the digital signals become active and inactive (if the cabinet temperature reaches the temperature set-point within the set L03 value, the panel displays the real cabinet temperature)	0~120	5	min
43	L04	When digital signals are active, acoustic alarm outputs: 0: OFF; 1: ON	0/1	0	/
44	L05	When digital signals are active, fans output: 0: OFF; 1: No effect	0/1	1	/
45	L06	When digital signals are active, lights output: 0: No effect; 1: ON	0/1	1	/
46	L07	When digital signals are active, acoustic alarm delays	0~120	1	min
47	L08	Enable ECO-DOOR mode: 0: No; 1: Yes	0/1	1	/
48	L09	Detection time needed to enable ECO mode - class 1	1~240	30	min
49	L10	Temperature differential (ECO mode - class 1)	0.5~10.0	4.0	°C
50	L11	Detection time needed to enable ECO mode - class 2	1~480	120	min
51	L12	Temperature differential (ECO mode - class 2)	0.5~10.0	4.0	°C
52	L13	Actuation times to exit ECO mode - class 1	1~15	3	/
53	L14	Lighting mode in ECO 2: 0: OFF; 1: No effect	0/1	0	/
54	PA2	Set admin menu password	0~255	00	/
55	u1	Temperature unit select: °F/°C: 0: °F; 1: °C	0/1	01	/
56	Adr	Device address	1~127	01	/
57	uni	Group address	1~127	01	/

Note: ① After switch between Celsius / Fahrenheit, users need to adjust the values of all related parameters to ensure correct parameter settings.

7. Keys

7.1 Key Description

Symbol	Function
	View and modify cabinet temperature set-point Press and hold for 3 seconds to enter parameter settings Switch between the menu and parameter
	Scroll up menu items or increase parameter values Press and hold for 3 seconds to upload data to copy card
	Scroll down menu items or decrease parameter values Press and hold for 3 seconds to download data from copy card
	View the value read by the defrost sensor Exit parameter settings Press and hold for 3 seconds to force switch between cooling, defrost/defrost delay and dripping.
	Turn on/off light Press and hold for 1 second to force auto defog on/off
	Press and hold for 3 seconds to turn on/off the controller
	Press and hold for 10 seconds to activate one key reset to default

7.2 Key Operations

1) View and modify cabinet temperature set-point
a. Under temperature measuring and controlling status, press and release key, the set indicator will light and the panel will display cabinet temperature set-point. Users may view and modify the cabinet temperature set-point.
b. If LOC=0, the symbol will light and cabinet temperature set-point cannot be modified.
c. If LOC=1, the symbol will be off and cabinet temperature set-point can be modified by using or key.
d. Press key or keep the controller inactive for 30 seconds, the controller will exit cabinet temperature viewing/modifying status with the current temperature set-point automatically saved.
2) Set parameters
a. Under temperature measuring and controlling status, press the key for 3 seconds, the set indicator will light and the panel will display the parameter item PA1, the admin password. Correct password is required if users want to enter the admin menu.
b. Press key, the panel will display 00. Users can enter the controller's admin menu password by pressing or key. After the password entered (please make sure the password is fully entered), press key, the controller will automatically verify the password. Once the password has been verified (entering admin menu), the panel will display c1. Press or key to select parameter c1, c2, ..., u1, i.e. any parameter from user menu and admin menu; Otherwise, the controller will remain on PA1 parameter and will not display other parameters.
c. After a parameter is selected, press key to set its value. Use or key to adjust the value, then press key again to return to menu option status.
d. Under parameter setting status, press key or keep the controller inactive for 30 seconds to exit settings with the parameter set-point saved automatically.
Note: ① Admin menu password can be set via parameter PA2.
② If PA2 is set to 0, i.e. no password is required when entering admin menu. Under temperature measuring and controlling status, press key for 3 seconds, the panel will display c1 directly.
③ Users may use universal password 125 to enter admin menu if PA2 value is forgotten.
④ The admin menu password is valid for once. After exiting parameter settings by pressing or keeping the controller inactive for 30 seconds, correct password is required again before adjusting parameters.
3) Reset parameters
a. Under temperature measuring and controlling status, press both and keys for 3 seconds, the panel will display rST and the parameter values will be reset to defaults.
b. Two copies of the parameters (i.e. current parameters and the default parameters) will be automatically backed up in the controller when they are downloaded from the copy card to the controller.
c. The first copy (i.e. current parameters) is used for controlling and the second (the default parameters) for parameter reset.
d. If users need to modify the second copy, just connect the copy card to the controller and download data.
4) View the value read by the defrost sensor
Under temperature measuring and controlling status, press key to view the measured temperature by the defrost sensor.
5) Manual force operation
a. Under temperature measuring and controlling status, press and hold key for 3 seconds to switch the status between cooling, defrost/defrost delay and dripping.
b. Under temperature measuring and controlling status, press key to turn on or off the light (Refer to 9.4 for detailed instructions).
c. Under temperature measuring and controlling status, press and hold key for 1 second to enable or disable auto defog for glass door function.
6) Power on/off
a. Under temperature measuring and controlling status, press and hold key for 3 seconds, the controller will be turned off and shut down all the outputs and the panel will display ---.
b. Press and hold key for 3 seconds, the controller will be powered on.
c. When the controller is off, press key, the light can be turned on or off and other keys are disabled at this time.

8.1 Upload (copy the parameters in the controller to the copy card)
1) Use keys to set the controller parameters.
2) Insert the copy card, press key until the panel displays "up".
3) Plug out the copy card and power on the controller again.
8.2 Download (copy the parameters in the copy card to the controller)
1) Insert the copy card, press key until the panel displays "do".
2) Plug out the copy card and power on the controller again.
Note: ① If the panel displays "Er", programming fails. Please check whether the copy card is connected stably and then repeat above operations.
② If the panel displays "EP", the data in copy card disagrees with controller model and causes programming failure. Find a correct copy card and repeat above operations, or upload data to the copy card again and repeat above operations.
③ In the course of uploading/downloading data, make sure the power supply is stable and copy card is connected properly. Please do not plug out the copy card before the operation is completely finished.
④ CRC check is executed during uploading and downloading data in copy card.

9.1 Cooling

1) Cabinet sensor is normal.
a. Cooling starts when the cabinet temperature > temperature set-point (SET) + differential (c1), and compressor delay must elapse.
b. Cooling stops when the cabinet temperature < temperature set-point (SET)
Note: Compressor start delay is calculated per c3 (compressor start delay after switch-on of the device) after the controller is energized for the first time, and it will be calculated per c2 (compressor start delay between last switch-off and the successive switch-on) later on.
2) Cabinet temperature sensor is faulty.
a. When A1=0, i.e. compressor run in duty cycle mode is disabled, cooling stops.
b. When A1=1, i.e. compressor run in duty cycle mode is enabled, cooling runs in duty cycle according to the set A3 (compressor on time in duty cycle mode) and A2 (compressor off time in duty cycle mode).
9.2 Defrost
1) d4=0, i.e. defrost is disabled.
a. Defrost 0, neither defrosting nor dripping statue:
a. Defrost sensor is enabled (d1=1), and the temperature read by defrost sensor ≥ defrost stop temperature (d7), defrost cannot start.
b. When defrost sensor is enabled (d1=1) and the temperature read by defrost sensor < defrost stop temperature (d7), or defrost sensor is disabled (d1=0), defrost can be started if any one of the following conditions is met:
① Defrost interval time (d4) elapses;
② Press and hold key for 3 seconds;
Note: ① Defrost interval time is counted per controller running time (d3=1) or compressor running time (d3=0).
② When defrost start delay (d9) elapses, defrost outputs.
3) During defrost, defrost can be stopped if any of the following conditions is met:
a. Defrost sensor is enabled (d1=1), and the temperature read by defrost sensor > defrost stop temperature (d7);
b. Maximum defrost duration (d6) elapses;
c. Press and hold key for 3 seconds.
4) In dripping status, cooling is disabled within dripping time (d8) for the drips to drain during this period. After d8 elapses, it enters the status of cooling cycle.
5) Display during defrost
d5=0: actual cabinet temperature (during defrosting);
d5=1: dEF (during defrost); cabinet temperature (when dripping is active and d11 elapses).
d5=2: cabinet temperature at defrost start (during defrosting); cabinet temperature (when dripping is active and d11 elapses);
d5=3: cabinet temperature set-point (during defrost); cabinet temperature (when dripping is active and d11 elapses);
d5=4: dEF (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active);
d5=5: cabinet temperature at defrost start (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active);
d5=6: 4: cabinet temperature set-point (during defrost); cabinet temperature (if cabinet temperature ≤ temperature set-point after dripping is active).
6) Defrost mode
There are two types of defrost modes, electric defrost (d10=0) and hot gas defrost (d10=1)
9.3 Fan
Six Fan working modes are available.
1) F1=0: Fan runs continuously
2) F1=1: Fan is controlled by cabinet sensor.
a. Fan runs when cabinet sensor temperature < fan start temperature (F3).
b. Fan stops when cabinet sensor temperature > fan start temperature (F3) + Fan stop temperature differential (F4).
c. Fan and compressor run or stop simultaneously in case cabinet temperature sensor fails.
3) F1=2: Fan is controlled by defrost sensor.
a. Defrost sensor is enabled (d1=1) and normal:
Fan runs when cabinet sensor temperature < Fan start temperature (F3).
Fan stops when cabinet sensor temperature > fan start temperature (F3) + Fan stop temperature differential (F4).
b. Fan and compressor run or stop simultaneously in case defrost sensor is disabled (d1=0) or cabinet temperature sensor fails.
4) F1=3: Fan runs together with compressor and stops during defrost and dripping; Fan is controlled by F5 if cooling is inactive.
5) F1=4: Fan runs together with compressor and stops during defrost; Fan is controlled by F5 if cooling is inactive; Fan runs after F2 elapses if dripping is active. (If F2 > d8(defrost drip time), the F2 parameter is invalid)
6) F1=5: Fan runs together with compressor; Fan is controlled by F5 if cooling is inactive; Fan stops if defrost starts and then runs again after F2 elapses. (If F2 > d9 + d6 + d8, the F2 parameter is invalid)
7) F1=6: If cooling is active, fan runs after F2 elapses; if cooling is inactive, fan stops.
Note: When L05=0, the door is open and the fan is enabled. After the door is closed, the fan restores to the status before the door was open. When L05=1, the fan's working status will not be affected if the door is open.
9.4 Light
1) L06=0: the light is only controlled by key. Press to turn on/off the light. 2) L06=1:
a. when door switch is inactive (the door is closed), the light is controlled by key. Press key to turn on/off the light.
b. when door switch is active (the door is open), the light is turned on automatically. It will not be controlled by key. When door switch is inactive again (the door is closed), the light restores to the status before the door was open.
3) In ECO2 mode, if L14=0, light output will be disabled automatically.
4) When the controller was turned off, the light only can be turned on or off by key, and other rules of the light are invalid.
9.5 Defog
1) Fg1=0: to auto defog the glass door is disabled. Users can manually turn on the heating wire for glass door by pressing key for 1 second. The heating wire will automatically turn off after auto defog duration (Fg3) elapses. Users can also press key for 1 second to force the heating wire turned off.

2) Fg1=1: to auto defog the glass door is enabled. The heating wire for glass door runs per the value of auto defog interval (Fg2) and auto defog duration (Fg3). Users can also manually turn on/off the heating wire.

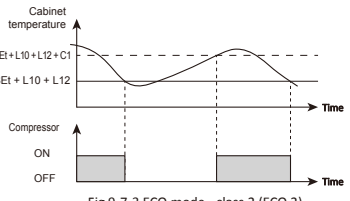
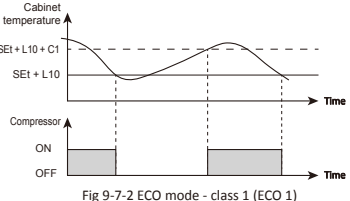
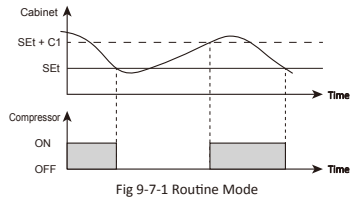
9.6 Internal alarm

1) Sensor fault alarm:
If cabinet sensor fails, the panel will display E01; if defrost sensor fails, the panel will display E02.
2) High/Low cabinet temperature alarm:
a. A11=0, the alarm mode is based on absolute temperature point.
When cabinet temperature > high alarm temperature (A6) and cabinet alarm delay elapses, the panel will display rH. When cabinet temperature < A6, alarm will be released.
When cabinet temperature < low alarm temperature (A5) and cabinet alarm delay elapses, the panel will display rL. When cabinet temperature > A5, alarm will be released.
b. A11=1, the alarm mode is based on set-point + alarm offset.
When cabinet temperature > temperature set-point (SET) + high alarm offset (A9) and cabinet alarm delay elapses, the panel will display rH. When cabinet temperature < SET + A9, alarm will be released.
When cabinet temperature < SET - low alarm offset (A10), and cabinet alarm delay elapses, the panel will display rL. When cabinet temperature > SET - A10, alarm will be released.
Note: Cabinet alarm delay is counted per A8 (cabinet alarm delay after switch-on of the device) after the controller is powered on, and it will be counted per A7 (cabinet alarm delay) later on.
3) If buzzer beep is disabled (A4=0): buzzer will mute except that the microUPS works during main power outage. If buzzer beep is enabled (A4=1): buzzer will beep when an alarm is triggered. When all alarms are released, buzzer will mute and users can also press any key to mute it.
4) L04=1, i.e. when digital signals are active, acoustic alarm outputs, the buzzer beeps after acoustic alarm delay (L07) elapses. L04=0, buzzer mutes.
5) If the standby power supply Elitech microUPS works during main power outage, the buzzer will beep at 4s/1s interval. The buzzer cannot be muted whether A4=1 or A4=0. The alarm can be removed only when the main power is restored.
6) Alarm code

Code	Meaning
E01	Cabinet temperature sensor fails.
E02	Defrost sensor fails.
rH	High cabinet temperature alarm
rL	Low cabinet temperature alarm
Er	Copy card programming fails.
EP	The data in copy card disagrees with controller model, causing programming failure.
rSt	Reset to default success.
dEF	Defrost in progress
FgS	Defog active
FgC	Defog inactive
dor	Door is open.
---	The code displayed to indicate the controller is powered off by pressing key.

9.7 ECO-DOOR mode

The controller features ECO-DOOR mode: ECO 1 and ECO 2, which can be automatically switched between or to routine mode per settings. Users may define temperature control points for different modes as needed.
1) When ECO-DOOR mode is disabled (L08=0), the controller controls cabinet temperature per Fig 9-7-1.
2) When ECO-DOOR mode is enabled (L08=1):
a) Enter ECO mode - class 1
- After the controller is powered on and digital signals are inactive (i.e. the door is closed), the controller will record the door opening times and the door closed time from zero. ECO mode - class 1 and class 2 are disabled (hereinafter called normal status). The controller controls the cabinet temperature per Fig 9-7-1.
- When the controller is in normal status and the door closed time has not reached the detection time needed to enable ECO mode - class 1 (L09), if digital signals are detected active (i.e. the door is open), the controller will immediately stop counting door closed time. When digital signals are inactive (i.e. the door is closed), the controller will zero the door opening times and door closed time and record again from zero.
- When the controller is in normal status and the door closed time has reached the detection time needed to enable ECO mode - class 1 (L09), the controller enters ECO mode - class 1 (ECO 1).
- After entering the ECO mode - class 1, the controller will zero the door opening times and door closed time and record again from zero. The controller controls cabinet temperature per Fig 9-7-2.
b) Exit ECO mode - class 1
- When the controller is in ECO mode - class 1, if digital signals are detected active (i.e. the door is open) and then inactive (i.e. the door is closed), the controller will add 1 to door opening times, then zero door closed time and record again.
- When the controller is in ECO mode - class 1 and the door opening time has reached the actuation times to exit ECO mode - class 1 (L13), the controller will exit ECO mode - class 1 and enter normal status. The cabinet temperature is controlled per Fig 9-7-1.
c) Enter ECO mode - class 2
- When the controller is in ECO mode - class 1 and the door closed time has reached the detection time needed to enable ECO mode - class 2 (L11), the controller enters ECO mode - class 2 (ECO 2).
- After entering the ECO mode - class 2, the controller will zero the door opening times and record again. The controller controls cabinet temperature per Fig 9-7-3.
d) Exit ECO mode - class 2
- When the controller is in ECO mode - class 2, if digital signals are detected active (i.e. the door is open), the controller will immediately exit ECO mode - class 2 and enter ECO mode - class 1. The door opening times and door closed time will be zeroed and recorded again.
Note: If the controller, after power outage, is powered on again and enters normal status, the door opening times and closed time will be recorded from zero.
e) Exit ECO mode by remote control
- When the controller receives the command from the master to exit ECO mode, it will immediately exit the current mode ECO1 or ECO2 and enter routine mode.



eps-100	C1x	C2x	D1x	D2x	Fg1x	Fg2x	Fg3x	Fg4x	Fg5x	Fg6x	Fg7x	Fg8x	Fg9x	Fg10x	Fg11x	Fg12x	Fg13x	Fg14x	Fg15x	Fg16x	Fg17x	Fg18x	Fg19x	Fg20x	Fg21x	Fg22x
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