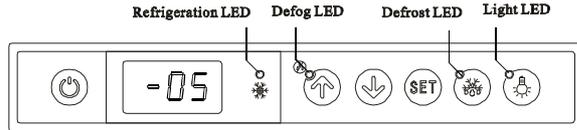


Model: SF-285 Digital Temperature Controller



Features of Function

- It is an intelligent controller and applicable to the compressor of one HP. (Include 1HP)
- Temperature Display / Temperature Control / Manual, automatic defrost / Evap. Fan control
High, low temperature alarm/ Time, temp. To end defrost/Value Storing/Self Testing /Parameter Locking

Specifications

1. Power supply input: 230VAC
2. Temperature sensor: NTC, double sensors(cold room and defrost control) Length: according to customer request
3. Range of temperature display: $-45\sim 120^{\circ}\text{C}$ ($-49\sim 248^{\circ}\text{F}$) Accuracy: $\pm 1^{\circ}\text{C}$ / $\pm 2^{\circ}\text{F}$
4. Range of set temperature: E1~E2 Factory default : -30°C / -22°F
5. Dimension: 178(Length) \times 31(Width) \times 34(Depth)mm
Mounting hole dimension: 172(Length) \times 26(Width)mm
6. Temperature of the operating environment: $-10\sim 60^{\circ}\text{C}$ ($14\sim 140^{\circ}\text{F}$)
Relative Humidity: 20%~90% (Non-condensing)
7. Relay output contact capacity
 - Compressor 1, 2: N. O. 30A/250VAC
 - Evap. Fan: N. O. 10A/250VAC • Light: N. O. 10A/250VAC • Defog: N. O. 10A/250VAC
 - Defrost heater: N. O. 10A/250VAC (Customer attach mechanical heat protection switch by themselves)

Front Panel Operation

1. Set temperature (compressor stop temperature) adjustment
 - Press **SET** button, the set temperature is displayed.
 - Press **▲** or **▼** button to modify and store the displayed value. Press **SET** button to exit the adjustment and display the cold-room temperature. If no more button is pressed within 6 seconds, the cold-room temperature will be displayed. (Set temperature adjustment range: parameter E1~E2)
2. Manual start/stop defrost: Press **☼** button and hold for 6 seconds to defrost or stop defrost.
3. Display the evap. Sensor temperature: Press **☼** for once to flash display the evap. Sensor temperature, after 6 seconds, the cold room temperature will resumed to be displayed.
4. Refrigerating LED: During refrigeration, the LED is on; When the cold room temp. is constant, the LED is off; During the delay process, the LED flashes.
5. Defrost LED: during defrosting, the LED is on; During the delay display after defrost, the LED flashes.
6. Light control: Press **☼** button for once to turn on or turn off the light, when it is off, it can still be operated.
7. Defog control: Press **▲** for once to connect or disconnect the defog heater, when power on, the defog will be started automatically, and disconnect when power off.
8. Long press **Ⓜ** button for 3 seconds to turn off , all the control outputs stopped, “---” will be displayed, press the for once to re-start.
9. When first time power on, press **▼** button for once to cancel compressor delay and start the compressor to refrigerate immediately..
10. Check the condenser cleaning accumulated time: Long press **▲** for 6 seconds, flash display the accumulated power on operation days.
11. Condenser cleaning alarm control: long press **SET** and **▲** for 6 seconds, can turn off or turn on the alarm function, flash display OFF or On (Factory default is On)
12. Parameter setup
 - Press **SET** button and hold for 6 seconds to enter the parameter setup mode.
 - Press again **SET** button to select the parameters from E1, E2~P1, E1.
 - Press **▲** or **▼** button, the value of parameter will be displayed and can be modified and stored.
 - If no more button is pressed within 6 seconds, it will exit and store the new values.
13. The customer default resumption: press **▲** button and **▼** button simultaneously for 6 seconds, "888 " is displayed and flashes, at this time will resume to factory defaults. It will return to normal operation after 6 seconds.
14. Parameters Locking
Press **▼** button and hold for 6 seconds to lock the parameters if "OFF" is displayed, or to unlock if "ON" is displayed. Parameters can be displayed only and can not be modified if locked, but the set temperature adjustment is still active. (The factory default is "ON")
15. Customer factory setting revision: Press **SET** to adjust the set temperature well. Long press **SET** for 6 seconds to enter parameter setting and adjust the parameters well, long press **SET** again for 6 seconds, COP will be displayed, the revised the saved set temperature and parameters are factory settings.
16. Resume original factory default: when power on, long press **Ⓜ** and **▼** at the same time and not let go for 6 seconds, CLE will flash displayed.

Parameter	Function	Set range	Default	Parameter	Function	Set range	Default
E1	Lower set point limit	-49°F -45°C ~ set temp.	-22°F -30°C	F3	Defrost termination temp.	32~104 °F 00~40°C	77°F 25°C
E2	Higher set point limit	Set temp. ~ 113°F 45°C	05°F -15°C	F4	Display during defrost	00=Normal display 01 = Last value before defrost 02=display DEF	02
E3	Temp. hysteresis	02~36 °F 01~20°C	07°F 04°C	F5	Fan control	00=Parallel with comp.(stop when defrost) 01 = Continuous running (stop when defrost) 02= Parallel with comp. (Start when defrost) 03=keep running(start when defrost)	01
E4	Comp. Start delay time	00~10min	3mi n	F6	Dripping time	00~20min	03mi n
E5	Offset on room temp.	-36~36 °F -20~20°C	00°F 00°C	C1	High temp. alarm	C2~ 113°F 45°C	07°F -14°C
E6	Offset on evap. temp.	-36~36 °F -20~20°C	00°F 00°C	C2	Low temp. alarm	-49°F ~C1 -45°C	-24°F -31°C
F0	Defrost type	00=electric heat 01=hot gas 02=defrost by turning off comp.	01	C3	Alarm hysteresis	02~36 °F 01~20°C	04°F 02°C
F1	Max. Defrost duration	01~60min	15mi n	C4	Alarm delay time	00~90min	90mi n
F2	Defrost interval time	00~24hr	6hr	CF	Temperature unit	°C=Celsius °F=Fahrenheit	°C
				P1	Condenser cleaning alarm time	01~60days	30days

Function details

1. Temperature Control

- After turning on for the delay time, the compressor starts operating when cold-room temperature \geq (set temperature + temp. Hysteresis E3), and will be off when cold-room temperature \leq set temperature. (When start up, the compressor 1 connected first, and after 5 seconds delay, compressor 2 connected. When stops, the two compressors disconnected at the same time.)
- To protect the compressor, it can not be re-started unless the time when the compressor stops every time is longer than the delay time (Parameter E4).

2. Defrost way: When F0=0, is electric heat defrost. When F0=1, is hot gas defrost. When F0=2, is defrost by turning off compressor.

- Electric heat defrost: When defrost, the compressor stops, the heater connected, the defrost LED is on. When defrost ends, the heater will be disconnected. After F6 dripping time, it will exit defrost state and start the compressor. After 1 minute delay the fan works.
- Hot gas defrost: Enter defrost, the defrost LED is on, the switch valve and compressor connected. When defrost ends, the compressor stops. After F6 dripping time, the switch valve disconnected, the compressor start, after 1 minute the fan works.
- Defrost by turning off comp.: When defrost, the compressor and defrost relay stop, the defrost LED is on. When defrost ends, the defrost LED flashes. After F6 dripping time, it will exit defrost state and start the compressor.
- After 1 minute delay, the fan will work.
- Enter defrost condition: Only when the evap. Sensor temperature is lower than defrost termination temperature (F3) can enter defrost.
- Exit defrost condition: When evap. Sensor temperature is more than defrost termination temperature or defrost duration ends, it will exit defrost state.
- When defrost interval is set to 00, the automatic defrost function will be cancelled.

3. Display during defrost

- When setting the parameter F4=1, the room temp. is locked during defrost, and the last value before defrost is displayed. When defrost ends, normal display will be resumed after 20 minutes delay or (when the cold-room temperature is lower than the set temperature). The defrost LED flashes during the delay process.

4. High, low temperature over limit alarm

- High temperature alarm: After the first time turning off, when cold room temperature \geq high temperature alarm C1, and pass alarm delay time (C4), will alternate display HI and the cold room temperature. When the cold room temperature \leq high temperature alarm (C1-C3), the high temperature alarm will stop.
- Low temperature alarm: When cold room temperature \leq low temperature alarm value C2, and pass alarm delay time (C4), will alternate display L0 and cold room temperature. When cold room temperature \geq (C2+C3), the low temperature alarm will stop.

- When alarm, the buzzer sound, press random button to cancel the sound.

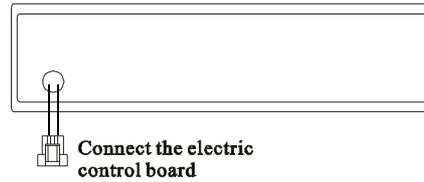
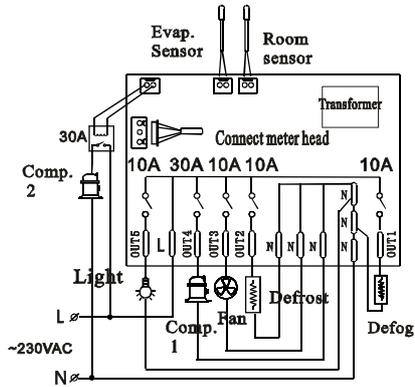
5. Condenser cleaning alarm: When the accumulated power on time is more than P1, the buzzer will sound, alternate display cold room temperature and Cln. At this time, press random button to cancel the sound, after 2 minutes it will exit the alarm, the accumulated time will be cleared and will recount, it will resume normal display. During alarm state power off or shut down, when next time power on will keep alarming.

- Alarm test: When turning on the condenser cleaning alarm function, when power on within 10 seconds, long press  and  for 6 seconds, flash display tes, the previous accumulated time will be cleared. After 5 minutes, will start the alarm.

6. Abnormal work mode

- When the room sensor is short-circuited or overheated (more than 120°C/248°F) "HH" will be displayed; When the room sensor is open-circuited or temperature is too low (less than -45°C/-49°F) "LL" will be displayed. At that time the compressor works automatically by the cycle of 30 minutes on and 15 minutes off.
- When evap. Sensor short-circuited, open-circuited, over limit, the defrost termination state will only controlled by the defrost duration.

7. Circuit Diagram



Instruction:

When F0=0, OUT2 controls the heater.
 When F0=1, OUT2 controls the switch valve.

Notes for Installation

1. The sensor cable leads must be kept separately from main voltage wires in order to avoid high frequency noise induced. Separate the power supply of the loads from the power supply of the controller.
2. When install the sensor, it shall be placed with the head upward and the wire downward. The evap. sensor should be placed in the evaporator metal where the ice is the thickest, and keep away from the heater.
3. In case of long-distance sensor installation from the controller, the sensor cable may be prolonged up to 100 m max. without any re-calibration.
4. The temperature controller can not be installed in the area with water drops.
5. The temperature controller can not be installed in the corrosive and strong electromagnetic pulse interference places.

Accessories for the temperature controller

1. Two temperature sensors
2. One data connecting wire
3. One red black external connecting compressor 2 cores wire
4. One external relay