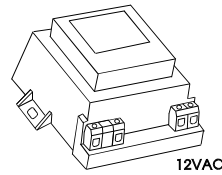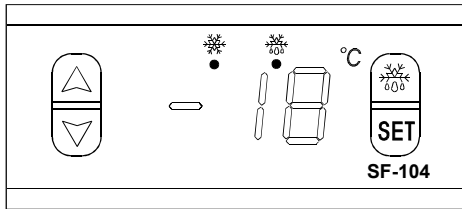# Model: SF-104 Digital Temperature Controller

Transformer

Features of Function

- Mini-sized and integrated intelligent control and applicable to the compressor of one HP.
- Temperature Display/ Temperature Control/ Manual, automatic defrost by electric heater or hot gas /Evap. Fan Control/High,Low temperature alarm/ Value Storing/ Self Testing /Parameter Locking

Specifications

1. Output of the outside sealed transformer:AC12V(one transformer matched with one temp. controller)
2. Temperature sensor: NTC, Double sensors(for cold-room temp.&defrost control),2m(L)
3. Range of temperature displayed : －45～45℃(－40~120℉);   Accuracy:±1℃ (±2℉)
4. Range of set temperature: －45～45℃ (－40~120℉);   Factory default :0℃ (±32℉)
5. Dimension:77(Length)×35(Width)×60(Depth)mm
   Mounting hole dimension:71(Length)×29(Width)mm
6. Temperature of the operating environment:－10～60℃ Relative Humidity:20%~90%(Non-condensing)
7. Output contact capacity:
- Compressor: N.O. 20A/250VAC
  (applicable to 1 HP Compressor,if more it needs to connect an AC contactor)
- Defrost: N.O.10A/250VAC (applicable to 1KW load, if more it needs to connect an AC contactor)
- Evap. Fan: N.O. 5A/250VAC

Front Panel Operation

1 . Set temperature
- 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 10 seconds, the cold room temperature will be displayed.
2. Manual start/stop defrost: Press 🔆 button and hold for 6 seconds to defrost or stop defrost.
3. Display the evap. Temperature : Press △ button and hold for 6 seconds, the evap. Temp. is displayed., after 10 seconds the cold room temp. is resumed to be displayed.
4. Refrigeration LED: During refrigeration, the LED is on; When the cold room temp. is constant, the LED is off; During the delay start, the LED flashes.
5. Defrost LED: during defrosting, the LED is on; When it stops defrosting, the LED is off. During the delay display of defrost, the LED flashes.
6. Parameter setup
- Press SET button and hold for 6 seconds to enter the parameter setup mode while E1 flashes.
- Press again SET button to select sequentially from the parameters : E2,E3,E4,E5,E6,F1,F2~C4.
- Press △ or ▽ button, the value of parameter will be displayed and can be modified and stored.
- If no more button is pressed within 10 seconds, it will return to normal operation mode.

Parameter	Function	Set range	Default	Parameter	Function	Set range	Default
E1	Lower setpoint limit	－45℃ ～Set temp. －40℉	－35℃ －31℉	F3	Defrost termination temp.	0～20℃ 32～68 ℉	8℃ 46℉
E2	Higher setpoint limit	Set temp.～ 45℃ 120℉	20℃ 68℉	F4	Display during defrost	0=Normal display 1 = Last value before defrost	0
E3	Temp. hysteresis	1～10℃ 1～18 ℉	4℃ 7 ℉	F5	Fan operating function	0= Parallel with comp. 1 = Continuous running except defrost	0
E4	Comp.start delay time	0～10Min	2Min				
E5	Offset on room temp.	－5～5 ℃ / ℉	0	C1	Temperature unit	0=℃ 1= ℉	0
E6	Offset on evap. Temp.	－5～5 ℃ / ℉	0	C2	High temperature alarm	0~40℃/℉ above setpoint	20
F0	Defrost function	0=Electric heater 1=Hot gas	0	C3	Low temperature alarm	0～40℃/℉ below setpoint	－20
F1	Max. Defrost duration	1～60Min	20Min				
F2	Defrost interval time	0～24Hr	6Hr	C4	Alarm time delay	1～90Min	60Min

7. The factory default resumption: press ▽ button for 1 second and then press △ button simultaneously for 6 seconds, the indicator flashes , all parameters will be resumed as same as factory defaults. After 10 seconds, it returns to the normal operation.

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8. Lock parameters

In normal operating,press ▽ button and hold for 10 seconds to lock the parameters if "OFF" is displayed (No modification is allowed),or to unlock if "ON" is displayed. Parameter can be displayed only and can not be modified if locked, but the adjustment of the set temp. is still active.(the factory default is "ON")

Function details

1. Temperature control
- After the delay time,the compressor starts operating when cold room temperature $\geq$ (set temp.+ Hysteresis), and will be off when cold-room temperature $\leq$ set temp.
- To protect the compressor, it can re-start unless the time when the compressor stops every time is longer than the delay time (Parameter E4).

2. Defrosting Functions
- Electric heating defrost: The defrost LED and the heater turns on, the compressor stops. The heater will be disconnected after the defrost duration ends.After two minutes dripping time , it will exit the defrost status and start the compressor. After two minutes delay time the evaporation fan will run.
- Hot gas defrost : The defrost LED and valve will turn on . When the defrost duration ends, the compressor stops. After two minutes delay the valve will turn off , compressor will restart-up,after two minute the fan will run.
- Enter the defrost status: It defrosts and heats only if the temp. of the evap. sensor is less than the defrost termination temperature (Parameter F3).
- Exit the defrost status: When the temperature of the evap. Sensor is over the defrost termination temp. or the defrost duration end ,it will exit the defrost status.
  When the duration of defrost is se tot "00" , the function of automatic defrost will be cancelled.

3. Display during defrost
- When setting the parameter F4=1, the room temperature is locked during defrost, and the last value before defrost is displayed. When defrost ends, normal display will be resumed after 20 minutes delay of room temperature display (or set temp.is reached). The defrost LED flashes during the delay.
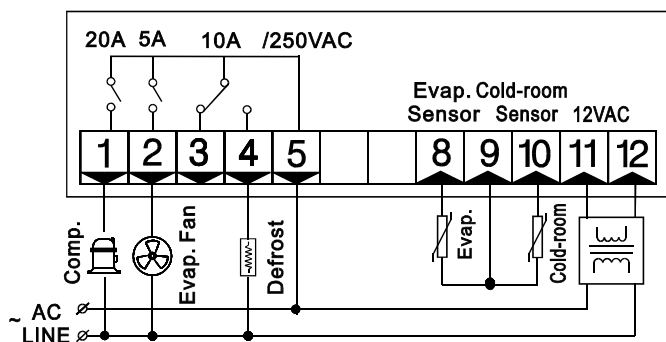
4. The alarm function
- When the power is on and after the compressor turns off , the alarm function is set.
- When the cold-room temperature is higher than (set temp.+ C2) or lower than (set temp.— C3）, it will alarm after the delay time(E4) and the display will flash. The buzzer will sound. The sound can be cancelled by pressing random key.

5. Abnormal work mode
- When room sensor is short-circuited or overheated (more than45℃ /120℉) "HH" is displayed; When room sensor is open-circuiedt or temperature is too low (less than −45℃/—40℉) "LL" is displayed. At that time the compressor operates automatically by the cycle of 45 minutes on and 15 minutes off.
- When evap. sensor fails or over the displayed range, the defrost termination will be just controlled by the defrost duration. (Parameter F1)

6. Circuit Diagram

Notes for Installation

1. Sensor 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 installation the sensor shall be placed with the head upward and the wire downward; The evaporator sensor must be installed between the fins of the evaporator in the area, where probably the ice is the thickest. Don't place the evaporator sensor near the electric heater.
3. The temperature controller can not be installed in the area with water drops.

Accessories for the temperature controller

1. One attached transformer
2. Two temperature sensors
3. One installation stand
4. One cover panel and 1 Φ 3×10mm screw

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