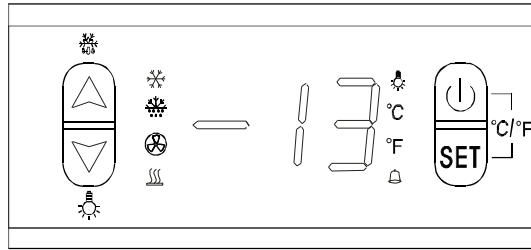


Model: SF-138 Digital Temperature Controller



Features of Function

- Temperature Control/ Manual, automatic defrost/ Evap. Fan control/Value Storing/ Self Testing

Specifications

1. Temperature sensor: NTC (B=3380, 10K=25°C), 1 pc (cold-room), 2 meters (Neither positive nor negative)
2. Range of temperature displayed: $-45^{\circ}\text{C}\sim 120^{\circ}\text{C}$ ($-49\sim 248^{\circ}\text{F}$); Accuracy: $\pm 1^{\circ}\text{C}$ ($\pm 2^{\circ}\text{F}$)
3. Range of set temperature: $-45^{\circ}\text{C}\sim 45^{\circ}\text{C}$ ($-49\sim 113^{\circ}\text{F}$); Factory default: 04°C (39°F)
4. Dimension: $77(\text{Length})\times 35(\text{Width})\times 30(\text{Depth})\text{mm}$
Mounting hole dimension: $71(\text{Length})\times 29(\text{Width})\text{mm}$
5. Temperature of the operating environment: $-10^{\circ}\text{C}\sim 60^{\circ}\text{C}$ ($14\sim 140^{\circ}\text{F}$)
Relative Humidity: $20\%\sim 90\%$ (Non-condensing)
6. Relay output contact capacity:
 - Compressor: N. O. 20A
 - Fan: 12VDC/0.18A
 - Light: 12VDC/50mA

Front Panel Operation

1. Set temperature (compressor stop temperature) adjustment
 - Press **SET** button, the set temperature is flash displayed.
 - Press **△** or **▽** button to modify and store the displayed value. Press **SET** button to exit the adjustment status 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. Press **△** button for once to flash display 2L, it will resume normal display after 6 seconds.
3. Refrigeration 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.
4. Evap. Fan LED: When the fan work, the LED is on; when the fan stops running, the LED is off.
5. Press **▽** button for once to start or stop the light.
6. Long press **⏻** button and **SET** button for 1 second to switch the Celsius and Fahrenheit degree for once.
7. Power switch: Long press **⏻** button for 3 seconds, all the control outputs stopped (the light is not affected), and will display ---. Press **⏻** button for 1 second to start up, and display the cold-room temperature.
8. 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.... A2, A3.
 - Press **△** or **▽** button, the values of parameter will be displayed and can be modified.
 - If no more button is pressed within 6 seconds will exit and store the new values.
9. The factory default resumption: press **△** button and **▽** button simultaneously for 6 seconds, the indicator flash display 888, all parameters and set temperature will be resumed as factory defaults at this time. After 6 seconds, it will return to normal operation.
10. Lock parameters
In normal operating, press **▽** button and hold for 6 seconds to lock the parameters if LOC is displayed, or to unlock if OP is displayed. Parameters can be displayed only and can not be modified if locked, but the adjustment of the set temp. is active.(The factory default is OP)

Parameter	Function	Set range	Default	Parameter	Function	Set range	Default
E1	Lower set point limit	-49°F ~ Set temp. -45°C ~ Set temp.	23°F -5°C	F5	Evap. Fan starting mode	00=Parallel with comp. (Stop when defrost) 01=Continuous running (Stop when defrost) 02=Parallel with comp. (Start when defrost) 03=Continuous running (Start when defrost)	01
E2	Higher set point limit	Set temp. ~ 113°F 45°C	75°F 24°C				
E3	Temp. hysteresis	02 ~ 18°F 01 ~ 10°C	05°F 03°C				
E4	Comp. Start delay time	00 ~ 10Min	03Min				
E5	Offset on room temp.	-18 ~ 18°F -10 ~ 10°C	00°F 00°C	H1	High temp. Alarm value	H2 ~ 113°F 45°C	86°F 30°C
E6	Offset on Evap. Temp.	-18 ~ 18°F -10 ~ 10°C	00°F 00°C	H2	Low temp. Alarm value	-40°F / °C ~ H1.	5°F -15°C
F1	Max. Defrost duration	01 ~ 60Min	20Min	H3	Alarm delay time	00 ~ 120Min	30Min
F2	Defrost interval time	00 ~ 24Hr	4Hr	A1	Cold-room temp. Display mode	00=Normal display 01=Locking slowly display	01
F3	Defrost termination temp.	32 ~ 113°F 00 ~ 45°C	54°F 12°C				
F4	Display during defrost	00=Normal display 01=Last value before defrost	01	A2	Door switch control	00=there is not 01=there is	01
				A3	Set temp. Adjustment mode	00=set temp. Adjustable 01=set temp. Can be checked only, unadjustable	00

Function detail

1. Temperature control

(When first time power on, press button for once can cancel delay and enter automatic control mode)

- The compressor starts operating when cold room temperature \geq (set temperature + hysteresis), and will be off when cold room temperature \leq set temperature.
- 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. Defrost function

- After working a defrost interval will automatic enter the defrost status. The defrost LED is on, the compressor stops. After defrost duration, will exit defrost status, after 2 minutes dripping time, if the cold-room temperature is higher than (set temp. + Temperature hysteresis E3), the compressor starts.
- When defrost interval is set to 00, the automatic defrost function will be cancelled.

3. Temperature display

- When parameter A1=01, the temperature will display slowly: with the speed of one degree every 30 seconds to reach the actual temperature, and do not affect the compressor working normally.
- When started up, and after the actual temperature reach the set temperature for once, only if the cold room temperature is within the range of (set temp. + parameter E3+1), will display the set temperature, otherwise the temperature will display in low speed.

4. Display during defrost

- When setting parameter F4=0, the cold room temperature will display normally.
- When setting 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 of room temp. Display. If (parameter A1=01), the cold-room temperature will display slowly, the defrost LED flashes during the locking delay process.

5. Fan control

- When parameter F5=01, the Evap. Fan power on and keep working. (Stop when defrost)
- The condenser fan work synchronized with the compressor.

6. Door switch control

- When parameter A2=01, when detect the door is open, the Evap. Fan stops, the light is on, at this time, when (parameter A1=01), will lock the cold-room temperature display; if the door is not closed for more than one minute, the buzzer sound, press random button to cancel the sound; if the door is not closed for more than 10 minutes, the light will turn off automatically; until the door is closed for 5 minutes, then the temperature will display in low speed. (Door switch line open-circuited=door close status; door switch line short-circuited=door open status.)

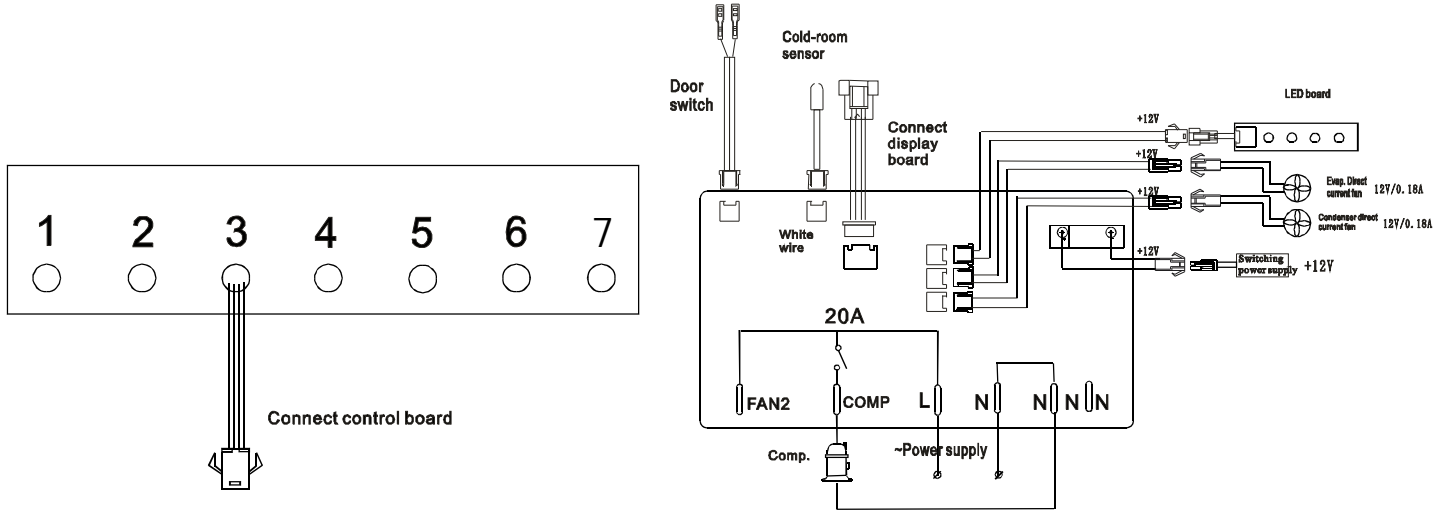
7. High low temperature over limit alarm

- After the compressor turning on and off normally for once, can enter the alarm status.
- When cold-room temperature is higher than H1 parameter set value, and pass alarm delay time (parameter H3), will flash and display the cold-room temperature and exit the defrost status. When the cold room temperature is lower than H2 parameter set value, and pass the alarm delay time (parameter H3), will flash and display the cold-room temperature, the buzzer sound, press random button to cancel the sound.

8. Abnormal work mode

Error code	Instruction	Operation
1H	Cold-room sensor short-circuited or high temp. Over limit (more than 120°C/248°F)	After the compressor stops for 15 minutes and then work for 30 minutes in cycle; the buzzer sound, press random button to cancel the sound.
1L	Cold-room sensor open-circuited or low temperature over limit (less than -45°C/-49°F)	
2H	Evap. Sensor short-circuited or high temperature over limit (more than 120°C/248°F)	Defrost will only affected by defrost interval time.
2L	Evap. Sensor open-circuited or low temperature over limit (lower than -45°C/-49°F)	

9. 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 probe shall be placed with head upward and the wire downward. The evaporator probe must be installed between the find of the evaporator in the area, where probably the ice is the thickest. Do not place the evaporator probe near the electric heater.
3. In case of long-distance probe installation from the controller, the probe 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.

Accessories for the temperature controller

1. One temperature sensor
2. One installation stand
3. Four connecting wires