

Microcomputer Temperature controller

ETC-03 Operation Instructions

1. General description:

ETC-03 is a temperature controller with off cycle defrosting suitable for refrigeration systems at medium temperature. One-channel output controls compressor; one-channel input measures the storage temperature, and NTC and PTC sensor switch; Celsius, Fahrenheit can be switched; Three menus may avoid unreasonable setting from the user; Support many kinds of digital input (door switch, external alarm, refrigeration/heating mode switching, pressure switch protection, etc.), and copy key operation.

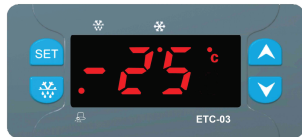
2. Specification:

- 2.1 Panel size: 75x34,5mm Depth is 58mm
- 2.2 Mounting size: 71x29mm

3. Technical parameters:

- 3.1 Temperature measuring and controlling range:
 - NTC -50°C~120°C/-58°F~248°F
 - PTC -50°C~150°C/-58°F~302°F
- 3.2 Resolution: NTC 1°C/1°F
PTC 1°C/1°F
- 3.3 Accuracy: NTC -50°C~70°C, ±1°C/±2°F ±0.5digit
PTC -50°C~100°C, ±3°C/±5°F ±0.5digit
- 3.4 Temperature calibration range: ±10°C/±18°F
- 3.5 Power supply: 220VAC+10%/-15%;
110VAC+10%/-10%, 50/60Hz (optional)
- 3.6 Power consumption: ≤3W
- 3.7 Relay output capacity: 16A/250VAC
Rated working current: 10A/250VAC
- 3.8 Environment temperature range: 0°C~60°C
- 3.9 Storing temperature: -20°C~70°C
- 3.10 Relative humidity: 20~85%(No condensate)

4. Controller panel:



4.1 Key function

| Items | Normal mode | Menu mode | Parameter adjustment mode |
|------------|---|----------------------------------|---|
| SET | Check set value or confirm the operation | Enter into parameters adjustment | Quit from parameters adjustment |
| SET+...3s | Enter into set value adjustment or clear up the Temp. alarm information | | |
| SET+...1s | Manual defrost | Menu items turn upward | Parameters increase by degrees |
| SET+...3s | Check exceeding Temp. Limit information or card upload | Menu items turn upward promptly | Parameters increase by degrees promptly |
| SET+...1s | Continuous cycle | Menu item turn downward | Parameter decrease by degrees |
| SET+...3s | Check exceeding Temp. Limit information | Menu item turn downward promptly | Parameter decrease by degrees promptly |
| SET+...10s | keyboard lock status switched | Adjust menu display layers | |
| SET+...3s | Enter into user menu | Enter into administrator menu | |
| SET+...10s | Enter into administrator menu | Quit from menu mode | |

4.2 Description of indicator lights

| Indicator light | Status | Function |
|-----------------|----------|---|
| ☼ | Light on | Compressor startup |
| ☼ | flash | Compressor start-up delay; Parameter adjustment mode |
| ☼ | Light on | Allow defrost to start |
| ☼ | flash | Defrost start-up delay; Dripping water |
| ☼+☼ | flash | Menu mode |
| ☼ | Light on | Exceeding temp. limit alarm happens or have the record of exceeding the limit |

5. Operation instruction:

- 5.1 Check temp. set value
 - ◆ Press and loosen SET to display the temp. set value
 - ◆ Press any key or wait for 5s to return to normal temp. displaying.

5.2 Modify temp. set value

- ◆ Press SET for more than 3s into parameter setting, and the parameters indicator light ☼ flashes.
 - ◆ Press ▲ or ▼ in order to adjust temp. set value.
 - ◆ Press SET to save the current parameters modification with flashed display. Return to display normal temp. 3s later
 - ◆ If no key operation in 15s, the machine saves the current parameters set value and return to display normal temp.
- ### 5.3 Check or cancel exceeding temp. limit records
- ◆ Press▲or▼and loosen, if there isn't temp. limit exceeding records, display the noA, and return to display normal temp. in 2s. Otherwise, display HAL (exceeding upper limit) /LAL (exceeding lower limit), the maximum temperature exceeding limit point, tIm, and exceeding temperature limit duration, then return to normal temperature display.
 - ◆ When display HAL/LAL, press SET for more than 3s and display rSt in flash and cancel the alarm records.
 - ◆ When exceeding time is less than 999min, the unit displays as MINUTE. While more than 999min, the unit displays as HOUR, and the second decimal point on the left lights on.

5.4 Enter into menu or modify the menu layer

- ◆ Press SET + ▼ for more than 3s into user menu, and under this menu press SET + ▼ for more than 10s into administrator menu.
- ◆ After entering into menu mode, it will display the first menu item which can be displayed, menu-mode indicator light flickers ☼ + ☼. If there isn't menu item could be displayed, display noP.
- ◆ Under the administrator menu, press SET and hold on, then press ▼ in order to confirm whether the current menu items is in user menu or not. If the current menu item can display in user menu, the second decimal point on the left will light on.
- ◆ Press SET+ ▲ or wait for 15s without key operation, the machine returns to the normal temp. display.

5.5 Modify the parameters set value

- ◆ When under the menu mode, press SET to display the parameter. And the parameter adjustment indicator light ☼ flashes.
- ◆ Press ▲ or ▼ to adjust parameters
- ◆ Press SET to save the current modified parameters and the display flashes. It will display the next menu item in 3s.
- ◆ If no key operation in 15s, the machine stores the current parameters set value and returns to display normal temp. automatically.

5.6 Manual defrost

- ◆ Press ☼ for more than 3s, if there is no external urgent alarm or pressure switch alarm at present and the Maximum Length for Defrost time MdF is not ZERO, the manual defrost function can be started in one temperature sampling cycle.

5.7 Continuous cycle

- ◆ Press ▲ for more than 3s, if there is no external urgent alarm or pressure switch alarm at present and the continuous cycle CCT is not ZERO, the machine will enter into continuous cycle mode in one temperature sampling cycle. And at the moment, the third decimal point on the left is on or flashes along with the display screen.
- ◆ Compressor can still work continuously in CCT, not restricted by storage temperature.
- ◆ Press ▲ for more than 3s to enforce to quit from continuous cycle in one temperature sampling cycle.

5.8 Key-board lock

- ◆ Press ▲+▼ for more than 3s to flash display PoF and will return to normal temperature display in 3s, at this time, the key board is locked. Other keystroke are invalid except the set value checking, exceeding temp. limits and key-board unlock functions.
- ◆ Under key-board locked mode, press ▲+ ▼ for more than 3s to flash display Pon and will return to normal temperature display in 3s, at this time, the key board is unlocked.

5.9 Upload the parameters in the controller to the copy card

- ◆ When the controller normally works, plug in copy card and then press ▲ to display UPL, awaiting confirmation of parameter uploading.
- ◆ Press SET to flash display UPL and upload the parameters in the controller into the copy card, otherwise, the machine will return to normal temperature display in 3s
- ◆ The machine displays End and returns to normal temperature display in 2s after successful uploading.
- ◆ The machine flash displays Err and returns to normal temperature display in 5s if failure.

5.10 Download the parameters in the copy card to the controller

- ◆ Plug into the copy card after turning off the controller and then restart it, if the product info in the copy card is the same as that in the controller, then download the

parameters in the copy card to the controller.

- ◆ The machine displays End after successful downloading and normally works in 2s.
- ◆ The machine flash displays Err till remove the copy card if failure.

6. Control output:

6.1 Compressor

Under normal working status, if the storage temperature P1 is higher or equal than the set value SET + differential Hy, the compressor starts; if the storage temperature is lower than the set value SET, the compressor stops. When the controller turns into heating mode due to digit input, if the storage temperature P1 is lower than the set value SET, the compressor starts, if it is higher than the set value SET + differential Hy, the compressor stops.

When the storage temperature sensor is invalid, the compressor will work as the set Con and CoF time.

Defrost is unavailable during continuous cycle CCT. When the continuous cycle CCT runs out or enforced to stop, defrost will start.

After electrified, the compressor will start as per the output delay at start-up odS. Under normal working, the compressor will start as per the Anti-Short Circuit Delay AC. 6.2 Defrost

When neither the defrost cycles IdF nor defrost time MdF is ZERO, the controller can start defrosting according to defrosting cycle IdF which has set or after continuous cycle. Manual defrost and external digit input to start defrosting are allowed when defrost time MdF is not ZERO.

According to the set display type dFd when defrosting, the controller's display modes are as ff. during defrosting:

- dFd=r: Real-time and direct display of storage temperature;
- dFd=i: Display of the storage temperature at the beginning of defrosting;
- dFd=SET: Display of the set value SET;
- dFd=dEF: Display of the character dEF.

When dFd is set as it, the machine displays the storage temperature at the beginning of defrosting both during defrost and water dripping. If the storage temperature P1 is always higher than the storage temperature at the beginning of defrosting when defrosting and water dripping, then after water dripping, the machine will not recover to display the normal temperature until the delay time parameter dAd runs out or the storage temperature P1 is lower than the storage temperature at the beginning of defrosting.

After defrosting, the dripping water produced during defrosting will be discharged during Draining Time Fdt.

Refrigeration output is forbidden during defrosting and water dripping.

After the controller electrified, it needs to firstly run out Output Delay at Start-up odS. After running out of odS, defrost will start after finishing defrosting cycle. The defrost cycle is calculated as per the accumulative time after electrified.

6.3 Alarm when exceeding temperature limits

When the Temperature Alarm Configuration ALC is set as rE, the parameters AUA and ALA are invalid;

When the Temperature Alarm Configuration ALC is set as rE, the exceeding temperature upper limit alarming is SET + AUr, and the exceeding temperature lower alarming is SET-ALr;

When the Temperature Alarm Configuration ALC is set as AbS, the parameters AUr and ALr are invalid;

When the Temperature Alarm Configuration ALC is set as AbS, the Maximum Temperature Alarm is AUA, the Minimum Temperature Alarm is ALA.

When the storage temperature P1 is higher than the alarming temperature's upper limit or lower than the alarming temperature's lower limit and the alarming delay time has run out, the machine will flash display HA(exceed upper limit)/LA (exceed lower limit) and will record the exceeding temperature alarming information after the storage temperature returns to normal.

After the controller electrified, the alarming output will run as per the Delay of Temperature Alarm at Start-up (dAo) and then according to the Temperature Alarm Delay (ALd) after running out of dAo. There is no new alarming information during defrosting or within 20 minutes after defrosting.

7. Digital input:

Digital input can be set by i1P: open valid or closed valid The function of digital input can be set by the parameter i1F: i1F=EAL: Normal external alarm, the machine will display EA alarming information after did time but this will have no effect on the output.

i1F=bAL: Urgent external alarm, the machine will display CA alarming information after did time and close all the output. i1F=PAL: Pressure switch alarm, each digital input can

close all the output. The machine will display CA alarming information and lock the controller after nPS times digital input during did time. The controller will return to normal only if re-electrify.

i1F=dor: Door switch alarm; according to parameter odC, digital input operation to turn off the compressor, the machine will display dA alarming info after did time.

i1F=dEF: Start-up defrosting once.

i1F=Htr: Heating/Reverse direction movement

i1F=no: Digital input invalid.

8. Parameter List:

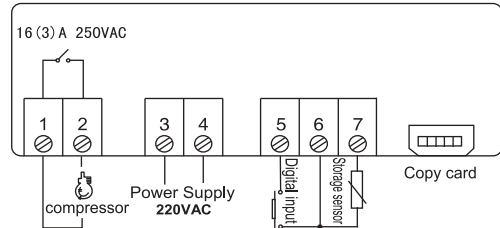
| Menu | Menu items | Setting range | Unit | Default |
|------------|--|--|------------|------------|
| SEt | Temp. Set Point | LS-US | °C/°F | 3°C |
| Hy | Differential | 1°C~26°C 1°F~46°F | °C/°F | 2°C |
| LS | Minimum Set Point | -50°C~ SET -58°F~ SET | °C/°F | -50°C |
| US | Maximum Set Point | SET -150°C SET -302°F | °C/°F | 110°C |
| ot | Storage Sensor Calibration | -10°C~10°C -18°F~18°F | °C/°F | 0°C |
| odS | Output Delay at Start-up | 0~255min | min | 1 min |
| AC | Compressor Anti-shortcircuit delay | 0~50min | min | 1 min |
| CCt | Continuous Cycle | 0.0~24.0h | hour.10min | 0.0h |
| Con | Compressor ON time with storage-sensor error | 0~255min | min | 15min |
| CoF | Compressor OFF time with storage-sensor error | 0~255min | min | 30min |
| CF | Temp. unit | °C: Celsius °F: Fahrenheit | | °C |
| idF | Interval between Defrost Cycles | 0h~120h | h | 8h |
| MdF | Maximum time for Defrost | 0~255min | min | 20min |
| dFd | Display mode during defrost | SEt :Set value rt :Real-time and direct display of Room temp. it :Room temp. at defrost start-up dEF :dEFcharacter | | it |
| dAd | Maximum Display delay after Defrost | 0~255min | min | 30min |
| Fdt | Draining time after defrost | 0~255min | min | 0min |
| ALC | Temp. Alarm Configuration | rE :Relative AbS :Absolute | | AbS |
| AUr | Relative mode: Temp. alarm upper differential/ Temp. alarm upper limit | 0°C~50°C 0°F~90°F | °C/°F | 50°C |
| ALr | Relative mode: Temp. alarm lower differential/ Temp. alarm lower limit | 0°C~50°C 0°F~90°F | °C/°F | 0°C |
| AUA | Absolute mode: emp. alarm upper differential/ Temp. alarm upper limit | ALA-150°C ALA-302°F | °C/°F | 110°C |
| ALA | Absolute mode: emp. alarm upper differential/ Temp. alarm upper limit | -50°C~AUA -58°F~AUA | °C/°F | -50°C |
| ALd | Temp. Alarm Delay | 0~255min | min | 15min |
| dAo | Delay of Temp. Alarm at Start-up | 0.0~24.0h | hour.10min | 1.3h |
| i1P | Digital Input 1 polarity | CL :Cosed valid oP :Open valid | | CL |
| i1F | Digital Input 1 Function | dEF :Start defrost Htr :Heating mode EAL :Normal External Alarm bAL :Urgent External Alarm PAL :Pressure Switch Alarm dor :Door Switch Alarm no :Forbid | | dor |
| did | Digital Input Alarm Delay/ Pressure Switch maximum detect cycle | 0~255min | min | 15min |
| nPS | Number of activation of Pressure Switch | 1~15 | | 15 |
| odC | Compressor and fan status when Open Door | no : No effect CPr : Comp. OFF | | CPr |
| PbC | Sensor Type | ntC : NTC sensor PtC : PTC sensor | | ntC |
| rEL | Software version | --- | | --- |
| Ptb | Parameter code | 0~25.5 | | --- |

NOTE:Parts of the shadow only display in administrator menu.

9. Alarming description:

| Code | Reason | Output |
|------|--|---------------------------------|
| P1 | Storage temperature sensor error | Compressor works as Con and CoF |
| HA | Alarm when storage temperature exceeds upper limit | --- |
| LA | Alarm when storage temperature exceeds lower limit | --- |
| dA | Door switch operation, door open | Per odC to set operation mode |
| EA | External alarm | --- |
| CA | Urgent alarm or pressure switch alarm | Close all the output |
| Er | Copy card error or parameter save error | --- |

10. wiring diagram:



11. Safety regulations:

★ Danger:

1. Strictly distinguish the sensor down-lead, power wire and output relay interface from one another, prohibit wrong connections or overloading the relay.
2. All connections should be modified under electricity cut-off state.

★ Warning:

Prohibit using the machine in water or under the environment of over damp, high temperature, strong electromagnetism interference or strong corrosion.

★ Caution:

1. The power supply should conform to the one labeled on the machine, and ensure the stability of the power voltage;
2. Sensor down-leads and power wires should be kept for a proper distance to avoid possible interference.

Appendix 1 Character Set:

