# Elitech®

# EK-500 Series Temperature Controller User Manual

## Overview

EK-500 series are new microprocessor controllers with multiple status indicators to visualize operation conditions and wide operating voltage range for different regions. The controllers have cooling/heating, defrost, fan and other functions, mainly used for temperature control of refrigeration units, freezers, display cabinets, small and medium-sized cold rooms.Their copy card function provides convenience for rapid upload and download of parametervalues.The controllers also can access to the cloud platform viaElitech network module.

## Functions & Features

| Features | | Model | | | |
|---|---|---|---|---|---|
| | | EK-510 | EK-520 | EK-530 | EK-540 |
| Main functions | | ❄ ☀ 品 | ❄ ☀ 品 ❁ | ❄ ☀ 品 ❁ ❁ | ❄ ☀ 品 ❁ ❁ AUX |
| 4 Buttons[1] | | SET ⏻ ∧ ∨ | SET ⏻ ∧ ∨ | SET ⏻ ∧ ∨ | SET ☼/⏻ ∧ ∨ |
| Types of temperature | Room temperature | • | • | • | • |
| | Defrost temperature | – | • | • | • |
| | Condenser temperature (or critical temperature)[2] | – | ○ Optional | ○ Optional | ○ Optional |
| Fourth Input (Single choice)[2] | | Energy saving function Multi-function alarm Standby Thermal protection alarm Door switch | Energy saving function Multi-function alarm Standby Thermal protection alarm Door switch | Energy saving function Multi-function alarm Standby Thermal protection alarm Door switch | Energy saving function Multi-function alarm K4 relay output control Standby Thermal protection alarm Door switch |
| Display ℃ or ℉ | | • | • | • | • |
| Display decimal (temperature) | | • | • | • | • |
| Energy saving mode | | • | • | • | • |
| Rapid cooling/heating mode | | • | • | • | • |
| One-key energy saving mode | | • | • | • | • |
| One-key rapid cooling/heating mode | | • | • | • | • |
| Types of defrost | Electric | – | • | • | • |
| | Hot gas | – | • | • | • |
| | Defrost with compressor OFF | • | • | • | • |
| One-key room light switch | | – | – | – | • |
| Standby function | | • | • | • | • |
| Display delay of temperature changes | | • | • | • | • |
| Access password for parameter configuration | | • | • | • | • |
| Button lock | | • | • | • | • |
| Relay contact output rating | ❄ ( ☀ ) | 2Hp @ 240VAC 1Hp @ 120VAC ( 20A ) | 2Hp @ 240VAC 1Hp @ 120VAC ( 20A ) | 16A | 16A |
| | ❄ | – | 10A | 10A | 10A |
| | ❁ | – | – | 5A | 5A |
| | AUX | – | – | – | 5A |
| RS-485 interface | | • | • | • | • |
| Copy card function | | • | • | • | • |

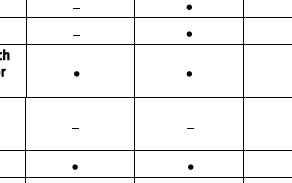
☞Note:
1. In this manual, the buttons ⏻ and ☼/⏻ indicate the same function. ⏻ applies for the models EK-510, EK-520 and EK-530 and ☼/⏻ for the model EK-540. Here we use the button ☼/⏻ to describe the same function.
2. Condenser temperature (or critical temperature) shares the same auxiliary input port with the fourth input, so they cannot be used simultaneously.

## Specifications

**Power supply:** 100~250VAC, 50/60Hz
**Total power consumption:** maximum 5W
**Temperature measuring range:** -50°C～120°C/ -58°F ~ 248°F
**Temperature accuracy:** ±1±0.5°C(-20°C～50°C)/±2°F(-4°F ~ 122°F); ±2°C/±3°F (others)
**Temperature control range:** -40°C～119°C / -40°F ~ 246.2°F
**Temperature resolution:** 0.1°C/1°C or 1°F
**Storage temperature:** -20°C～70°C / -4°F ~ 158°F
**Operating ambient temperature:** -10°C～60°C / 14°F ~ 140°F
**Sensor type:** NTC(10KΩ/25°C, B value = 3435K)
**Cable length (Sensor):** 2m (probe length included)
**Mounting size:** 71mm×29mm

## Display & Operation

***Screen***




| No. | Function | ON | OFF | Flash |
|---|---|---|---|---|
| 1 | Cooling output | ON | OFF | Compressor protection (delay) or parameter setting |
| 2 | Defrost Output | ON | OFF | Dripping |
| 3 | Fan output | ON | OFF | - |
| 4 | Heating output | ON | OFF | - |
| 5 | Button lock | Buttons are locked | Buttons are unlocked | The buttons are still locked |
| 6 | Alarm | Alarming | No alarm | - |
| 7 | K4 relay output | ON | OFF | - |
| 8 | Network | - | - | Communicating |
| 9 | Energy saving mode | ON | OFF | - |
| 10 | Standby indicator | Standby | Operating | - |
| 11 | Maintenance | The unit requires maintenance | - | - |
| 12 | Fahrenheit | Temperature unit is ℉ | - | Rapid cooling or heating mode |
| 13 | Celsius | Temperature unit is ℃ | - | Rapid cooling or heating mode |
| 14 | Number | 4-digit number with a decimal separator | - | - |

### *Button lock*

If the indicator 🔒 shows on the screen, the buttons are locked. Touch and hold the SET button, 🔒 flashes for 3 seconds and disappears, indicating the buttons are unlocked.
The controller will automatically lock the buttons after 10 seconds of inactivity and displays 🔒 on the screen.

### *Standby*

When P85 = 1, the standby function is enabled.
Make sure the buttons unlocked and no procedures in progress, hold ☼/⏻ for 4 seconds, the screen will be turned off, the indicator ⏻ will light up and all outputs will shut down1, indicating the controller enters standby mode.
In standby mode, hold ☼/⏻ for 4 seconds to exit and then the controller enters normal operation[2].
Note:1. In standby mode, K4 relay output depends on parameter P78.
2. Once entering standby mode, the controller will clear all the previous statuses. After exiting standby mode, it will operate according to current temperature.

### *Mute buzzer*

When the controller detects a fault, the buzzer will beep continuously and display the fault message (see 7 Alarm Message). Touch any button to mute the buzzer.

### *Rapid Cooling in Manual Mode*

Make sure the buttons unlocked and no procedures in progress, P16=0 and P19=1, touch and release ∨ ,temperature unit indicator (**℃** or **℉**) will flash; see also parameters P17 and P18.

### *Rapid Heating in Manual Mode*

Make sure the buttons unlocked and no procedures in progress, P16=1 and P19=1, touch and release ∨,temperature unit indicator (**℃** or **℉**) will flash; see also parameters P17 and P18.

### *Energy Saving Function in Manual Mode*

Make sure the buttons unlocked and no procedures in progress, P16=0 and P19=2, touch and release ∨ and the indicator will flash; see also parameters P15, P59, P60 and P83.

### *Defrost Activation in Manual Mode*

Make sure the buttons unlocked and no procedures in progress, hold for 4 seconds to activate defrost.
☞Note:To activate this function, following two conditions have to be satisfied:
1. Evaporator sensor functions as a defrost probe (i.e., P08 = 1).
2. Evaporator temperature is below P32 set-point.

### *Room Light ON/OFF in Manual Mode (Only EK-540)*

Make sure the buttons unlocked and no procedures in progress, P77=0, touch and release ☼/⏻, the indicator AUX and K4 relay will be on; Touch and release ☼/⏻ again, AUX and K4 relay will be off.
In standby mode, set P78 to enable/disable room light on/off function.

### *Demister Heating in Manual Mode (Only EK-540)*

Make sure the buttons unlocked and no procedures in progress, P77=1, touch and release ☼/⏻, the indicator AUX and K4 relay will be on, indicating demister heating function is enabled; Touch and release ☼/⏻ again, AUX and K4 relay will be off. See also P81 for the duration of demister heating.

### *K4 Relay ON/OFF in Manual Mode (Only EK-540)*

Make sure the buttons unlocked and no procedures in progress, P77=2, touch and release ☼/⏻, the indicator AUX and K4 relay will be on; Touchand release ☼/⏻ again, AUX and K4 relay will be off.

## Other Information

### *Display*

When the controller is switched on and operating normally, it will display the value set by P10.
During defrost, the controller will display the value set by P36.
When the controller is in standby status, the screen will be off and the indicator ⏻ on.

### *Temperature Viewing*

Make sure the buttons unlocked and no procedures in progress, hold ∨ for 4 seconds, the screen will display the code Pb1. Touch and release ∨ or ∧ to switch codes and then touch SET again to check the corresponding temperature read by the probe.

| Code | Description |
|---|---|
| Pb1 | Room temperature |
| Pb2[1] | Evaporator temperature |
| Pb3[2] | If P09 = 1, condenser temperature; If P09 = 2, critical temperature. |

### *Exit Viewing Status*

Touch and release ☼/⏻ once or keep the buttons untouched for 10 seconds, the controller exits viewing status automatically.
☞Note: 1. If evaporator sensor is not used (P08=0), the code Pb2 will not be displayed.
2. If the fourth input function is to be a multifunction input (i.e. P09 = 0), code Pb3 will not be displayed.

### *Total Operating Hours of the Compressor (Only EK540)*

**To check the total operating hours of the compressor (CH)**
Make sure the buttons unlocked and no procedures in progress, hold ∨ for 4 seconds, the screen will display the code Pb1. Touch and release ∨ or ∧ to select the code CH and then touch and release SET to check the total operating hours of the compressor.
**To exit check status**
Touch ☼/⏻ once or keep the buttons untouched for 10 seconds, the controller exits check status automatically.
**To clear the total operating hours of the compressor (rCH)**
Make sure the buttons unlocked and no procedures in progress, hold ∨ for 4 seconds, the screen will display the code Pb1. Touch and release ∨ or ∧ to select the code rCH and then touch SET again, the screen will display 0. Touch and release ∨ or ∧ to adjust the value to 149, then touch SET again and the screen will display **----** for 4 seconds, indicating the total operating hours of the compressor has been cleared and then the controller exits automatically.

## Operation

### *Temperature Set-point (P01)Settings*

Make sure the buttons unlocked and no procedures in progress, touch and release SET, the indicator ❄ will flash. Touch ∨ or ∧ to set the desired value. Touch and release SET to exit and save the settings, or wait for 10 seconds the controller will automatically exit with the settings saved.

| Code | Description | Minimum | Maximum | Default | Unit |
|---|---|---|---|---|---|
| P01 | Temperature set-point | P13 | P14 | 0.0 | ℃/℉ |

## System Settings

**To access the procedure**
Make sure the buttons unlocked and noprocedures in progress, hold SET for 4 seconds, the screen will display the code PA and the indicator ❄ will flash. Touch and release SET, the screen will display 0. Touch and release ∨ or ∧ to adjust the value to P86 set-point (default 18). Touch SET again, the screen will display the code P01, indicating the controller has accessed the parameter la.
**To select a parameter**
Use the button ∨ or ∧ to select a parameter code.
**To set a parameter**
After selecting a parameter code, touch and release SET, the screen will display current parameter value. Use ∨ or ∧to change the value, then touch and release SET to return to parameter code.yer.
**To exit the procedure**
If the screen displays the parameter value, touch and release ☼/⏻ twice to exit system parameter settings;
If the screen displays the parameter code, touch and release ☼/⏻once to exit system parameter settings;
Or keep the buttons untouched for 10 seconds, the controller will exit system parameter settings automatically.
*Note:It defaults that the parameter settings are saved if the controller exits the procedure. The data will not be lost even the controller is powered off and switched on again.*

# Elitech®

# EK-500 Series Temperature Controller User Manual

| Code | Description | Range | Default | Unit | EK510 | EK520 | EK530 | EK540 |
|---|---|---|---|---|---|---|---|---|
| P01 | Temperature set-point (1) | P13 - P14 | 0 | °C/°F | • | • | • | • |
| P00 | probe type 0 = PTC 1 = NTC | 0 - 1 | 1 | — | • | — | — | — |
| P02 | Room probe offset | -25 - 25 | 0 | °C/°F | • | • | • | • |
| P03 | Evaporator probe offset | -25 - 25 | 0 | °C/°F | | • | • | • |
| P04 | If P09 = 1, condenser probe offset;<br>If P09 = 2, critical temperature probe offset. | -25 - 25 | 0 | °C/°F | • | • | • | • |
| P06 | Decimal / Integer<br>0: Integer; 1: Decimal | 0 - 1 | 1 | — | • | • | • | • |
| P07 | Temperature unit (2)<br>0 = °C (resolution depends on parameter P06);<br>1 = °F (resolution: 1°F) | 0 - 1 | 0 | — | • | • | • | • |
| P08 | Evaporator probe function:<br>0 = absent probe;<br>1 = defrost probe and probe determining the activity of the evaporator fan;<br>2 = probe determining the activity of the evaporator fan | 0 - 2 | 1 | — | — | • | • | • |
| P09 | Auxiliary input (AUX/DI):<br>0 = multifunction input;<br>1 = condenser probe;<br>2 = critical temperature probe | 0 - 2 | 0 | — | • | • | • | • |
| P10 | Display during normal operation:<br>0 = room temperature;<br>1 = temperature set-point;<br>2 = evaporator temperature;<br>3 = if P09 = 0, "---"; if P09 = 1, condenser temperature; if P09 = 2, critical temperature;<br>4 = "---" | 0 - 4 | 0 | — | — | • | • | • |
| P11 | Display delay of temperature changes as detected by the probes | 0 - 250 | 5 | 0.1S | • | • | • | • |
| P12 | Temperature set-point differential; see also P20 | 0.1 - 15 | 2 | °C/°F | • | • | • | • |
| P13 | Minimum temperature set-point | -99 - P01 | -40 | °C/°F | • | • | • | • |
| P14 | Maximum temperature set-point | P01 - 99 | 50 | °C/°F | • | • | • | • |
| P15 | If P16 = 0, cooling starts when room temperature > P01+P15 in energy saving mode; cooling stops when room temperature < P01+P15-P12; see P71, P74 and P83. | 0 - 99 | 0 | °C/°F | • | • | • | • |
| P16 | Cooling / heating mode (4):<br>0 = cooling;<br>1 = heating | 0 - 1 | 0 | — | • | • | • | • |
| P17 | Temperature set-point offset in Rapid Cooling / Heating mode:<br>If P16= 0, P17 represents temperature set-point (P01) decrease during the Rapid Cooling mode; see also P18;<br>If P16 = 1, P17 represents temperature set-point (P01) increase during the Rapid Heating mode; see also P18. | 0 - 99 | 0 | °C/°F | • | • | • | • |
| P18 | Rapid cooling/heating duration:<br>If P16 = 0, P18 represents rapid cooling duration (only if P19 = 1); see also P17;<br>If P16 = 1, P18 represents rapid heating duration (only if P19 = 1); see also P17. | 0 - 240 | 30 | min | • | • | • | • |
| P19 | Touch and release ⌄ button:<br>0 = absent;<br>1 = Rapid Cooling mode if P16 = 0; Rapid Heating mode if P16 = 1;<br>2 = Energy saving mode (only if P16 = 0). | 0 - 2 | 0 | — | • | • | • | • |
| P20 | Temperature set-point differential type:<br>0 = asymmetric; 1 = symmetric | 0 - 1 | 1 | — | • | • | • | • |
| P21 | Compressor start delay after the controller is switched on (S) | 0 - 240 | 0 | min | • | • | • | • |
| P22 | Minimum compressor switch-off duration (6) | 0 - 240 | 3 | min | • | • | • | • |
| P23 | Minimum compressor switch-on duration | 0 - 240 | 0 | S | • | • | • | • |
| P24 | Compressor switch-off duration in case of a faulty room probe; (code Pr1); see also P25 | 0 - 240 | 10 | min | • | • | • | • |
| P25 | Compressor switch-on duration in case of a faulty room probe; (code Pr1); see also P24 | 0 - 240 | 10 | min | • | • | • | • |
| P26 | Condenser overheating alarm (code COH) (7) | 0-199 | 80 | °C/°F | — | — | — | • |
| P27 | Condenser temperature above which the compressor shut down alarm is activated (code CSd) | 0 - 199 | 90 | °C/°F | — | — | — | • |
| P28 | Compressor shut down alarm delay afterthe condenser overheating(code CSd) (8) | 0 - 15 | 1 | min | — | — | — | • |
| P29 | Compressor maintenance time;<br>0 = this function is disabled. | 0 - 999 | 0 | 10H | — | — | — | • |
| P30 | Defrost interval; 0 = defrost is disabled. | 0 - 99 | 8 | H | • | • | • | • |
| P31 | Types of defrost:<br>0 = Electric - during defrost the compressor will remain off and evaporator fan activity will depend on parameter P57;<br>1 = By hot gas - during defrost the compressor will be switched on and evaporator fan activity will depend on parameter P57;<br>2 = Defrost with compressor OFF - during defrost the compressor will remain off and the defrost output will remain deactivated; evaporator fan activity will depend on parameter P57. | 0 - 2 | 0 | — | — | • | • | • |
| P32 | Defrost stop temperature; see also P33. | -99 - 99 | 2 | °C/°F | — | • | • | • |
| P33 | If P33 = 0, defrost is disabled.<br>If P08 = 0 or 2, P33 represents defrost duration;<br>If P08 = 1, P33 represents maximum defrost duration; see also P32. | 0 - 99 | 30 | min | • | • | • | • |
| P34 | Defrost when controller is switched on (S); 1 = yes | 0 - 1 | 0 | — | — | • | • | • |
| P35 | Defrost start delay after the controller is switched on (S) | 0 - 99 | 0 | min | — | • | • | • |
| P36 | Display during defrost (only if P10 = 0): 0 = room temperature;<br>1 = when defrost is activated, if room temperature < P01+δt, it displays P01+δt; if room temperature > P01+δt, it displays room temperature. (9) (10);<br>2 = dEF | 0 - 2 | 1 | min | • | • | • | • |
| P37 | Dripping duration (during dripping the compressor will remain off and the defrost output will remain deactivated; if P42 = 0, evaporator fan activity will depend on parameter P57); If P42 ≠ 0, the evaporator fan will remain off.) | 0 - 15 | 2 | min | — | • | • | • |
| P38 | Defrost activation methods:<br>0 = at intervals - defrost will be activated once the controller has altogether been on for time P30.<br>1 = on compressor operating time - defrost will be activated once the compressor has altogether been on for time P30.<br>2 = at evaporator temperature - defrost will be activated when the evaporator temperature has remained below the temperature P39 for a total time of P30 (11). | 0 - 2 | 0 | — | • | • | • | • |
| P39 | Evaporator temperature is higher than P39, defrost interval counter is suspended (only if P38 = 2). | -99 - 99 | 0 | °C/°F | — | — | • | • |
| P40 | Defrost alarm is switched off once maximum defrost time limit has been reached (codedFd; only if P08 = 1 and evaporator probe is not faulty (code Pr2); 1 = enable this function | 0 - 1 | 0 | — | — | — | — | • |
| P41 | Minimum compressor operating time before defrost by hot gas is activated (only if P31 = 1) (12). | 0 - 99 | 0 | min | — | • | • | • |
| P42 | Pre-dripping duration (during dripping the compressor and fan will remain off, the defrost output will be activated). | 0 - 99 | 0 | min | — | | • | • |

| Code | Description | Range | Default | Unit | EK510 | EK520 | EK530 | EK540 |
|---|---|---|---|---|---|---|---|---|
| P48 | Low temperature alarm:<br>Room temperature < P01 - P48, low temperature alarm is triggered (code AL); see also P54;<br>0 = low temperature alarm disabled | 0 - 99 | 10 | °C/°F | | • | • | • |
| P49 | High temperature alarm:<br>Room temperature > P01 + P49, high temperature alarm is triggered (code AH); see also P54;<br>0 = high temperature alarm disabled | 0 - 99 | 10 | °C/°F | • | • | • | • |
| P50 | Delay in high temperature alarm (code AH) after the controller is switched on (S) | 0 - 99 | 12 | min | • | • | • | • |
| P51 | High and low alarm delay (code AL, AH) | 0 - 240 | 15 | min | • | • | • | • |
| P52 | Delay in high temperature alarm (code AH) after evaporator fan is switched off (13) | 0 - 240 | 15 | min | | | • | • |
| P53 | Delay in high temperature alarm (code AH) after door switch input is reset (14) | 0 - 240 | 15 | min | • | • | • | • |
| P54 | Alarm differential of P48 and P49 | 0 - 15 | 2 | °C/°F | • | • | • | • |
| P55 | Evaporator fan activity during normal operation: 0 = off;<br>1 = on; see also P59, P60, P74 and P83 (15); 2 = in parallel with the compressor; see also P59, P60, P62, P65, P66, P74 和 P83 (16); 3 = depending on P56; see also P59, P60, P74 and P83 (17) (18);<br>4 = off if the compressor is switched off, depending on P56 if the compressor is switched on; see also P59, P60, P74 and P83 (17) (19). | 0 - 4 | 3 | — | — | — | • | • |
| P56 | Evaporator fan switch-off temperature (only if P55 = 3 or 4) (7) Evaporator temperature above (if P16=0) or below (if P16=1) P56, evaporator fan is switched off. | -99 - 99 | -1 | °C/°F | — | — | • | • |
| P57 | Evaporator fan activity during defrost and dripping:<br>0 = off;<br>1 = on;<br>2 = depending on P55. | 0 - 2 | 0 | — | — | — | • | • |
| P58 | Maximum duration of evaporator fan stop; see also P61 (during evaporator fan stop, the compressor remains on, defrost output will remain deactivated). | 0 - 15 | 2 | min | — | — | • | • |
| P59 | Duration of the evaporator fan switch-off in ENERGY SAVING mode; see also P60, P71, P74 and P83. | 0 - 240 | 30 | S | — | — | • | • |
| P60 | Duration of the evaporator fan switch-on in ENERGY SAVING mode; see also P59, P71, P74 and P83. | 0 - 240 | 30 | S | — | — | • | • |
| P61 | Evaporator restart:<br>if evaporator temperature < P01 + P61); see also P58. | -99 - 99 | 5 | °C/°F | — | — | • | • |
| P62 | Evaporator fan stop delay after the compressor is switched off (only if P55 = 2). | 0 - 240 | 10 | s | — | — | • | • |
| P63 | Condenser fan switch-on temperature: if condenser temperature > P63, condenser fan is switched on, (7) (20) (21) | 0 - 99 | 15 | °C/°F | — | — | — | • |
| P64 | Condenser fan stop delay after the compressor is switched off (only if P55 = 2). | 0 - 240 | 30 | 10s | — | — | — | • |
| P65 | Duration of evaporator fan operation (only if P55 = 2) when the compressor is switched off; see also P61. | 0 - 240 | 10 | s | — | — | • | • |
| P66 | Duration of evaporator fan stop (only if P55 = 2) when the compressor is switched off; see also P61. | 0 - 240 | 10 | s | — | — | • | • |
| P67 | Effect caused by the activation of the door switch input; see also P69, P71: 0 = no effect;<br>1 = the compressor and evaporator fan will be switched off (the maximum duration depending on P70 or until 5 seconds of input reset) (22);<br>2 = evaporator fan will be switched off (the maximum duration depending on P70 or until 5 seconds of input reset);<br>3 = room lighting will be switched on (until 10 seconds after input reset);<br>4 = the compressor and evaporator fan will be switched off and room lighting switched on (the maximum duration depending on P70 or after 5 seconds of input reset); the room lighting will be switched on (until 10 seconds after input reset) (22);<br>5 = evaporator fan will be switched off (the maximum duration depending on P70 or evaporator fan will be switched off until 5 seconds of input reset) and the room lighting will be switched on (until 10 seconds after input reset) (22). | 0 - 5 | 5 | — | • | • | • | • |
| P69 | Delay in signaling of door switch input alarm (code id);<br>-1 = the alarm will be disabled. | -1 - 120 | 30 | min | • | • | • | • |
| P70 | maximum duration of the effect caused by the activation of the door switch input alarm (code id) on the compressor and evaporator fan;<br>-1 = the effect will last until the input is deactivated | -1 - 120 | 15 | min | • | • | • | • |
| P71 | Effect caused by the activation of the fourth input, see also P09: 0 = no effect;<br>1 = energy saving function; see also P15;<br>2 = multifunction input alarm (code iA) ; see also P73;<br>3 = auxiliary output;<br>4 = controller in standby mode;<br>5 =compressor thermal protection alarm (code Cth); see also P73;<br>6 = controller thermal protection alarm (code th); see also P73;<br>7 = door switch. | 0 - 7 | 2 | — | • | • | • | • |
| P72 | Types of the fourth input contact (AUX/DI):<br>0 = normally open (active input with closed contact);<br>1 = normally closed (active input with open contact) | 0 - 1 | 0 | — | • | • | • | • |
| P73 | The delay in signaling multifunction input alarm (code iA) if P71 = 2; -1 = the alarm will be disabled;<br>compressor switch-on delay after reset of compressor thermal protection alarm (code Cth) and controllerthermal protection alarm (code th) if P71 = 5 or 6. | -1 - 120 | 0 | min | • | • | • | • |
| P74 | Energy saving mode standby time:<br>Time that must elapse in absence of door switch input activation (after the room temperature has reached the working set-point and before the energy savingfunction is activated); see also P15, P59, P60 and P83;<br>0 = the function will disabled. | 0 - 999 | 0 | min | — | — | — | • |
| P77 | Definitions of K4 digital output (23):<br>0 = room lights, see P67, P78;<br>1 = demister heating function, see P81;<br>2 = auxiliary output, see P71, P78;<br>3 = alarm output;<br>4 = neutral area heating elements, see P82;<br>5 = door heating elements;<br>6 = condenser fan, see P09, P63, P64;<br>7 = ON/standby output, see P85. | 0 - 7 | 0 | — | — | — | — | • |
| P78 | Room lights on/off and auxiliary output:<br>in manual mode when the controller is switched off (standby mode);<br>1 = yes; 0 = no | 0 - 1 | 0 | — | — | — | — | • |
| P80 | Temperature set-point of door heating elements:<br>Room temperature below which the door heating elements are switched on (7). | -99 - 99 | -1 | °C/°F | — | — | — | • |
| P81 | Duration of demister heating | 1 - 120 | 5 | min | — | — | — | • |
| P82 | Temperature set-point of neutral area heating elements:<br>room temperature below which the neutral area heating elements are switched on (P01 + P82) (7) | -99 - 99 | -5 | °C/°F | — | — | — | • |
| P83 | Maximum duration of the energy saving function activated in manual mode due to the effect of absence of door switch input activation; see also P15, P59, P60 and P74.<br>0 = the function will last until the input is deactivated again. | 0 - 999 | 0 | min | — | — | — | • |
| P85 | Power button activation: 1 = yes | 0 - 1 | 1 | — | • | • | • | • |
| P86 | Access password for parameter configuration:<br>0 = no password required. | -99 - 999 | 18 | — | • | • | • | • |
| P87 | RS-485 communication address | 1 - 247 | 1 | — | • | • | • | • |

☞ *Note:*

*(1) The temperature unit depends on P07.*
*(2) Adjust temperature related parameters accordingly after parameter P07 is set.*
*(4)If parameter P16 is set to 1, the energy saving mode and defrost management will be switched off; see also parameter P56.*
*(5) After recovered from the standby mode, the controller will start after P21 elapses.*
*(6) The time set by parameter P22 is counted also when the controller is in standby mode.*
*(7) The overheating differential of parameter P28 is 2.0℃/4℉ (constant).*
*(8) If the compressor is switched on, condenser temperature is already above P27 set-point, parameter P28 will not take effect.*
*(9) The δt value depends on parameter P20 ( δt = P12 if P20 = 0; δt = P12/2 if P20 = 1).*
*(10) The display restores normal operation when, at the end of the dripping, room temperature falls below the value that locked the display (or if a temperature alarm is triggered).*
*(11) If parameter P08 is set to 0 or 2, the controller will function as if parameter P38 were set to 0.*
*(12) When defrost is activated, the operating duration of the compressor is less than the time set by parameter P41, the compressor will remain on for P41 to elapse, then the defrost will be activated.*
*(13) During defrost and dripping, evaporator fan will be off and high temperature alarm is absent, provided that it was triggered after defrost activation.*
*(14) During activation of the door switch input, high temperature alarm takes no effect. The alarm will be signaled after the deactivation of the input.*
*(15) Parameters P59 and P60 have effect when the compressor is off.*
*(16) Parameters P59 and P60 have effect when the compressor is on.*
*(17) If parameter P08 is set to 0, the controller will function as if parameter P55 were set to 2.*
*(18) Parameters P59 and P60 have effect when evaporator temperature is below parameter P56set-point.*
*(19) Parameters P59 and P60 have effect when the compressor is on and evaporator temperature is below parameter P56set-point.*
*(20) If parameter P09 is set to 0 or 2, condenser fan will operate in parallel with the compressor.*
*(21) Condenser fan is switched on and then the compressor is on. When condenser temperature falls below parameter P63 set-point, condenser fan will be switched off and then the compressor will be off.*
*(22) The compressor remains off for 10 seconds after the activation of the door switch input; if the input is activated during defrost or when the evaporator fan is off, the activation will not have any effect on the compressor.*
*(23) To avoid damaging the connected loads, please set the parameter when the controller is in standby mode.*

## Alarm Message

| No. | Code | Description | Solution | Main Effect |
|---|---|---|---|---|
| 1 | Pr1 | Room probe faulty | Check the sensor wiring;<br>Replace the sensor | The compressor operation depends on P24 and P25 |
| 2 | Pr2 | Evaporator probe faulty | Check the sensor wiring;Replace the sensor | If P08 = 1, defrost time depends on parameter P33;<br>If P08 = 1 and P38 = 2, the controller will function as if parameter P38 were set to 0;If P08= 1 or 2, and P55 = 3 or 4, the controller will function as if P55 were set to 2.<br>Alarm outputs are activated |
| 3 | Pr3 | Condenser probe or critical temperature probe faulty | Check the sensor wiring;Replace the sensor | If P09 = 1,CoH and CSdalarms are absent, and condenser fan will operate in parallel with the compressor |
| 4 | AL | Low temperature alarm | Check room temperature;Check parameter P48 | Alarm output is activated |
| 5 | AH | High temperature alarm | Check room temperature;Check parameter P49 | Alarm output is activated |
| 6 | id | Door switch input alarm | Check input;Check parameter P67 and P72 | Alarm output is activated and depends on P67 set-point |
| 7 | iA | Multifunction input alarm | Check input;Check parameters P71 and P72 | Alarm output is activated and depends on P67 set-point |
| 8 | CoH | Condenser overheating alarm | Check condenser temperature;Check parameter P26 | Alarm output is activated and condenser fan is switched on |
| 9 | CSd | Compressor switch-off alarm | Check condenser temperature;Check parameter P27;Restart the controller;Cut off power supply and clean the condenser if the condenser temperature is still above the P27 set-point | Compressor will be switched off;Alarm output is activated;Condenser fan is switched on |
| 10 | Cth | Compressor thermal protection alarm | Check input;See also parameters P71 and P72 | Cut off all outputs;Alarm output is activated |
| 11 | th | Controllerthermal protection alarm | Check input;See also parameters P71 and P72 | Cut off all outputs;Alarm output is activated |
| 12 | dFd | Defrost alarm is switched off once maximum defrost time limit has bee reached | Check evaporator probe;Check parameters P32, P33 and P40 | The controller operates normally |

☞ *Note:When the alarm is canceled, the controller will automatically restore to normal operation, except the following:*
*1. The alarms CSd and th can only be canceled by restarting the controller.*
*2. The dFd alarm can be canceled by touching any button.*

## MODBUS-RTU RS485 Communication

The system adopts the communication protocol of MODBUS-RTU slave mode. Baud rate: 9600,parity: none, data length: 8 bit, stop bit: 1. It supports MODBUS-RTU command 03 (read holding register) and 06 (write single register).

## Copy Card Function

**Copy parameter values from the copy card to the controller**

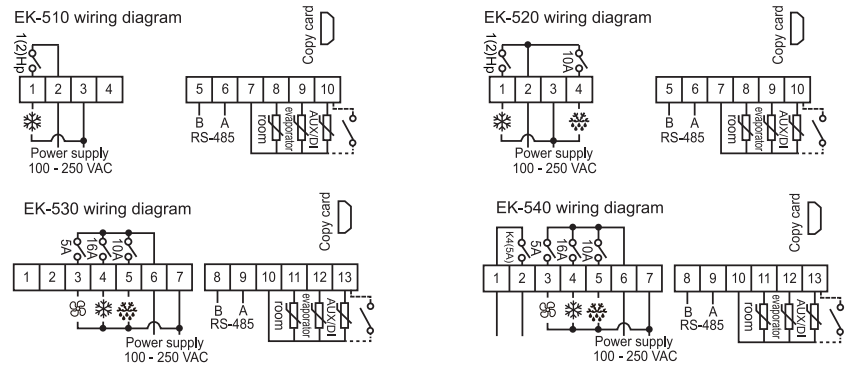
Before the controller is powered on, insert the copy card into the interface on the side of the controller, then power on the controller, it will automatically copy the data from the copy card. Code dly shows to indicate copy success and dln shows to indicate copy failure.

Make sure the controller not powered, the buttons unlocked and no procedures in progress, hold SET for 4 seconds, the screen will display the code PA. Touch and release ⌄ or ⌃ to select the code CoP and then touch SET, the screen will display the code UL. Touch and release ⌄ or ⌃ to select the code dL and then touch SET again and wait for 3 seconds. The code y shows to indicate copy success and n shows to indicate copy failure. The controller will operate normally after 2 seconds.

**Copy parameter values from the controller to the copy card**

Make sure the controller not powered, the buttons unlocked and no procedures in progress, hold SET for 4 seconds, the screen will display the code PA. Touch and release ⌄ or ⌃ to select the code CoP and then touch SET, the screen will display the code UL. Touch and release SET again and wait for 3 seconds. The code y shows to indicate copy success and n shows to indicate copy failure.The controller will operate normally after 2 seconds.

## Wiring Diagram





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