

# Temperature controller up to three relays and two probes

Devices designed to display, control and regulate cooling generators (manual or automatic programmable defrosting).

## 1- Versions and references

MODEL	RELAYS	POWER SUPPLY, 50/60 Hz
<b>AKO-14212</b>	Cool: 16 A, 250 V, cos φ=1, SPST R2: 8 A, 250 V, cos φ=1, SPDT	12 V ≈±20%
<b>AKO-14220</b>	Cool: 16 A, 250 V, cos φ=1, SPST R2: 8 A, 250 V, cos φ=1, SPDT	120 V ~+8% -12%
<b>AKO-14223</b>	Cool: 16 A, 250 V, cos φ=1, SPST R2: 8 A, 250 V, cos φ=1, SPDT	230 V ~±10%
<b>AKO-14312</b>	Cool: 16 A, 250 V, cos φ=1, SPST Def: 8 A, 250 V, cos φ=1, SPDT Fan: 6 A, 250 V, cos φ=1, SPST	12 V ≈±20%
<b>AKO-14320</b>	Cool: 16 A, 250 V, cos φ=1, SPST Def: 8 A, 250 V, cos φ=1, SPDT Fan: 6 A, 250 V, cos φ=1, SPST	120 V ~+8% -12%
<b>AKO-14323</b>	Cool: 16 A, 250 V, cos φ=1, SPST Def: 8 A, 250 V, cos φ=1, SPDT Fan: 6 A, 250 V, cos φ=1, SPST	230 V ~±10%

## 2- Technical data

Temperature range: ..... -50,0°C to +99,9°C  
 Resolution, Set Point and differential: ..... 0,1 °C  
 Input for NTC probe: ..... **AKO-149XX**  
 Thermometric accuracy: ..... ± 1 °C  
 Probe tolerance at 25 °C: ..... ± 0,4 °C  
 Maximum input power: ..... 3 VA  
 Working ambient temperature: ..... -5 °C to 40 °C  
 Storage ambient temperature: ..... -30 °C to 70 °C  
 Control device classification: Integrated mounting, with characteristic of automatic operation Type 1.B action, to be used in a clean situation, logical medium (software) class A and continuous operation. Degree of contamination 2 on UNE-EN 60730-1  
 Double insulation between the power supply, the secondary circuit and the relay output.  
 Allocated pulse temperature: ..... 2500 V  
 Pressure ball test temperature: ..... 75 °C  
 Accessible parts: ..... 125 °C  
 Parts that position active elements: ..... 125 °C  
 Voltage and current declared by the EMC tests: AKO-14223, AKO-14323: 207 V, 17 mA  
 AKO-14212, AKO-14312: 9,6 V, 181 mA  
 AKO-14220, AKO-14320: 105 V, 36 mA  
 Current of radio jamming suppression test: ..... 270 mA

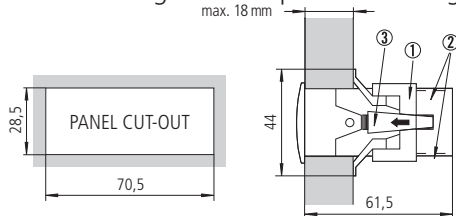
## 3- Installation

The controller should be installed in a place protected from vibrations, water and corrosive gases, and where ambient temperature does not surpass the value specified in the technical data.

In order for the controllers to have IP65 protection, the gasket should be properly installed between the apparatus and the perimeter of the panel cut-out where it is to be fitted.

In order to give a correct reading, the probe should be installed in a place without heat influences other than the temperature that is to be measured or controlled.

### 3.1 Fastening units for panel mounting:

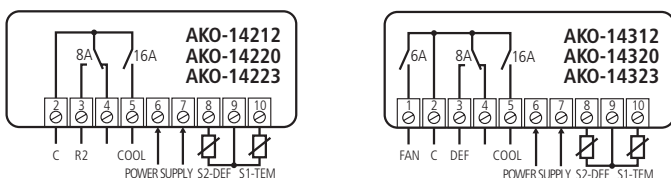


To fix the unit, place the fasteners **1** over the sliders **2** as shown in the figure. Move the fasteners in the direction of the arrow. By pressing tab **3** fasteners may be moved in the opposite direction of the arrow.

### 3.2 Connection:

The probe and its lead should **NEVER** be installed in ducting along with power, control or power supply wiring.

The power supply circuit should be connected with a minimum 2 A, 230 V, switch located close to the unit. Power supply cables should be H05VV-F 2x0,5 mm<sup>2</sup> or H05V-K 2x0,5 mm<sup>2</sup>. Section of connecting wires for relays contacts should be 2,5 mm<sup>2</sup>.



## 4- Front panel functions

### LED COOL ❄️

**Permanent:** Cooling relay COOL (compressor) energised.

**Flashing:** Because of the temperature detected by Sensor 1 (TEM), the COOL relay should be energised, but is no due to a programmed parameter.

### LED Fan 🌀

**Permanent:** FAN relay energised.

**Flashing:** Because of the temperature detected by Sensor 2 (DEF), the FAN relay should be energised, but is not due to a programmed parameter.

### LED Def ❄️

**Permanent:** Indicates defrost in operation.

### LED Alarm (🔊)

**Permanent:** Alarm indicator enabled.

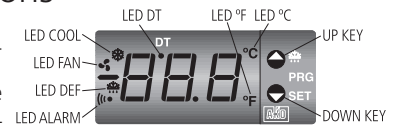
**Flashing:** Alarm detected, but display maintained.

### DT LED

Indicates last defrost ended by time.

### LED °C

**Permanent:** Degrees °C indicator.



**Flashing:** Programming phase.

### LED °F

**Permanent:** Degrees °F indicator.

**Flashing:** Programming phase.

### UP KEY ⬆️

- Press once to cancel the alarms, but they remain displayed.
- When pressed for at least 5 seconds, a manual defrost is started with programmed duration.
- In programming, it makes the displayed value increase.

### DOWN KEY ⬆️

- Press once to cancel the alarms, but they remain displayed.
- When pressed for at least 5 seconds, the SP Set Point temperature is displayed.
- In programming, it makes the displayed value reduce.

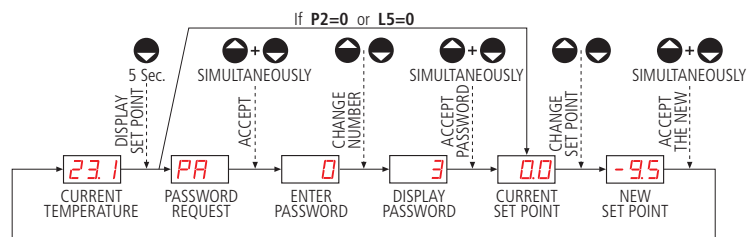
## 5- Adjustment and configuration

It should only be programmed or modified by personnel who are fully conversant with the equipment operation and possibilities.

### 5.1 Set Point temperature

The factory SET POINT default value is 0.0 °C.

- Press **UP** key for at least 5 seconds to DISPLAY SET POINT. It displays the CURRENT SET POINT value and LED °C or °F starts flashing.
- Press **UP** or **DOWN** keys to CHANGE SET POINT into the required value.
- Pressing **UP** + **DOWN** keys simultaneously to ACCEPT THE NEW SET POINT. The display returns to the CURRENT TEMPERATURE display status and LED °C or °F stops flashing.
- When **PA** is displayed, PASSWORD programmed in **L5** parameter of **"tid"** menu should be entered to access the CURRENT SET POINT.
- Press **UP** + **DOWN** keys simultaneously. 0 will be displayed to ENTER PASSWORD.
- Press **UP** or **DOWN** keys to CHANGE NUMBER and DISPLAY PASSWORD programmed.
- Press **UP** + **DOWN** keys simultaneously to ACCEPT PASSWORD. The CURRENT SET POINT value will be displayed and it can be already modified.



### 5.2 Parameters configuration

#### Level 1 Menus

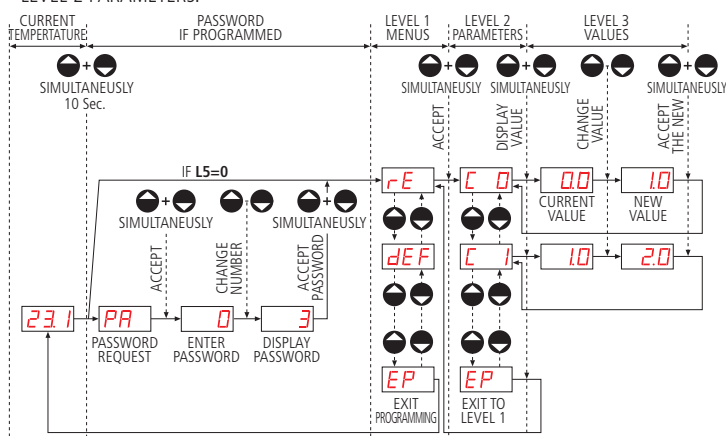
- Press simultaneously **UP** + **DOWN** keys for at least 10 seconds. LED °C or °F will be flashing, we are in the programming LEVEL 1 MENUS and the first menu "rE" is displayed.
- Press **UP** key to access the next menu and **DOWN** key to return to previous one.
- Pressing **UP** + **DOWN** keys in the last menu **EP**, the controller returns to the CURRENT TEMPERATURE display status and LED °C or °F will stop flashing
- When **PA** is displayed, PASSWORD programmed in **L5** of **"tid"** menu should be entered to access programming LEVEL 1 MENUS.
- Press **UP** + **DOWN** keys. 0 will be displayed to ENTER PASSWORD
- Press **UP** or **DOWN** keys to CHANGE NUMBER and DISPLAY PASSWORD programmed.
- Press **UP** + **DOWN** keys simultaneously to ACCEPT PASSWORD. The first menu "rE" will be displayed.

#### Level 2 Parameters

- In the desired menu of LEVEL 1 MENUS, press **UP** + **DOWN** keys simultaneously. LEVEL 2 PARAMETERS programming is accessed. The first parameter of the selected menu is displayed on the screen.
- Press **UP** key to access the next parameter and **DOWN** key to return to the previous one.
- Pressing **UP** + **DOWN** keys simultaneously in the last parameter **EP**, the controller returns to the LEVEL 1 MENUS.

### Level 3 Values

- To **DISPLAY** the CURRENT VALUE of any parameter, select the required one and press **+ +** keys simultaneously. Once it is displayed, you can **CHANGE VALUE**, pressing **+ -** or **- +** key.  
- Press **+ +** keys simultaneously to **ACCEPT THE NEW**. The programming returns to LEVEL 2 PARAMETERS.



**REMARK:** If no key is pressed for 25 seconds in either of the previous steps, the controller will automatically return to the CURRENT TEMPERATURE display status without modifying any of the parameters values.

## 6- Description of parameters and messages

Values in the Def. column are factory-set.

Level 1 Menus and Description					
rE	Level 2	Level 3	Description	Values	Min. Def. Max.
<b>REFRIGERATION control (Compressor)</b>					
C0			Sensor 1 calibration (Offset)	(°C/°F)	-20.0 0.0 20.0
C1			Sensor 1 differential (Hysteresis)	(°C/°F)	0.1 2.0 20.0
C2			Set Point upper limit (It cannot be set above this value)	(°C/°F)	C3 99.9 99.9
C3			Set Point lower limit (It cannot be set below this value)	(°C/°F)	-50.0 -50.0 C2
C4			Compressor protection delay type: 0=OFF/ON (From the last switch-off) 1=ON (At switch-on)		0 0 1
C5			Protection delay time (Value for the option selected in parameter C4)	(min.)	0 0 99
C7			"COOL" (Compressor) relay time in ON in case of faulty sensor 1 (If C7=0 and C8≠0, the relay will always be OFF disconnected)	(min.)	0 10 99
C8			"COOL" (Compressor) relay time in OFF in case of faulty sensor 1 (If C8=0 and C7≠0, the relay will always be ON connected)	(min.)	0 5 99
EP			Exit to Level 1		
<b>DEFROST control</b>					
d0			Defrost frequency (Elapsed time between 2 starts)	(h.)	0 6 99
d1			Defrost maximum duration	(min.)	0 30 99
d2			Type of message during defrost: (0=Current temperature display) (1=Defrost start temperature display) (2=Display dEF message)		0 2 2
d3			Message maximum duration (Time added at the end of defrost)(min.)		0 5 99
d4			Defrost final temperature by sensor 2 (If programmed in P4) In 2 relay versions, it operates if P6=0	(°C/°F)	-50.0 8.0 99.9
d5			Defrost start-up on equipment switch-on: (0=NO, first defrost according to d0) (1=YES, first defrost according to d6)		0 0 1
d6			Defrost start-up delay on equipment switch-on	(min.)	0 0 99
d7			Defrost type: (0=Electric heat) (1=Hot gas by-pass) To defrost by air in 2 relays, parameters P6 and F3 should be programmed		0 0 1
d8			Time calculation between defrost periods: (0=Total real time) (1=Compressor operation sum)		0 0 1
d9			Drip time, compressor stop and FAN/R2 relay off when defrost ends	(min.)	0 1 99
EP			Exit to Level 1		
<b>FANS control (Evaporator)</b>					
F0			Fans stop temperature by sensor 2 (If programmed in P4)	(°C/°F)	-50.0 4.0 99.9
F1			Sensor 2 differential	(°C/°F)	0.1 2.0 20.0
F2			Stop fans, when compressor stops?: In 2 relays versions, R2 operates if P6=1		0 0 1
F3			Fans status during defrost: (0=Off) (1=On)		0 0 1
F4			Start-up delay after defrost (Operates if it is higher than d9)	(min.)	0 3 99
EP			Exit to Level 1		

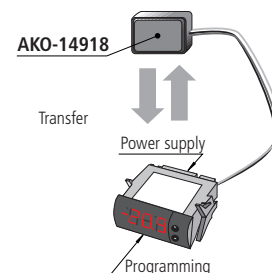
AL Level 2 ALARM control (Visual)					
	Level 3	Description	Values	Min. Def. Max.	
A0		Configuration of temperature alarms (0 = Relative to SP) (1 = Absolute)		0 0 1	
A1		Maximum alarm in sensor 1	(°C/°F)	A2 99.9 99.9	
A2		Minimum alarm in sensor 1	(°C/°F)	-50.0 -50.0 A1	
A3		Temperature alarm delay in the start-up (If programmed in A1, A2)	(min.)	0 0 120	
A4		Temperature alarm delay from the end of a defrost	(min.)	0 0 99	
A5		Temperature alarm delay from the moment at which they should operate due to temperature	(min.)	0 30 99	
A8		Signals if defrost ends due to maximum time: (0=Led DT OFF) (1=Led DT ON)		0 0 1	
A10		Differential Alarms Temperature A1 and A2	(°C/°F)	0.1 1.0 20.0	
EP		Exit to Level 1			
CnF Level 2 GENERAL STATUS					
	Level 3	Description	Values	Min. Def. Max.	
P1		Delay of all functions on power supply switch on	(min.)	0 0 99	
P2		Allocation of password to Set Point: (0=Without allocation) (1=With allocation of L5 password)		0 0 1	
P3		Initial parameters: (1=YES, configure to "Def" and exit programming)		0 0 1	
P4		Connected sensors: (1=Sensor 1) (2=Sensor 1 + Sensor 2)		1 1 2	
P5		Address for units with communication		0 0 126	
P6		Relay 2 (F2) function in 2 relay versions: (0=Defrost) (1=Fans control)		0 0 1	
P7		Temperature display mode: (0=Integers in °C) (1=One decimal in °C) (2=Integers in °F) (3=One decimal in °F)		0 1 3	
P8		Sensor to be displayed: (1=Sensor 1) (2=Sensor 2)		1 1 2	
EP		Exit to Level 1			
tid Level 2 ACCESS AND INFORMATION control					
	Level 3	Description	Values	Min. Def. Max.	
L5		Access password to parameters and information		0 0 99	
L6		Parameters transfer: (0=Disabled) (1=Send) (2=Receive)		0 0 2	
PU		Program version (Information)			
EP		Exit to Level 1			
EP		Exit programming			

**REMARK:** When time parameters are modified, the new values are applied when the current cycle is completed. In order for it to have an immediate effect, switch the controller off and then on again.

MESSAGES	
PA	Password request to enter programming parameters or SET POINT
dEF	It indicates defrosting is being carried out. In order to display "dEF" during defrosting, it is essential that parameter d2 is set to option 2.
AH	<b>Flashing with temperature</b> - Sensor 1 temperature exceeds the parameter programmed in A1
AL	<b>Flashing with temperature</b> - The Sensor 1 temperature is lower than the parameter programmed in A2
E1	Sensor 1 failure (Open circuit, crossed, temp.> 110°C or temp.<-55°C)
E2	Sensor 2 failure (Open circuit, crossed, temp.> 110°C or temp.<-55°C)
ES	Incorrect sensor configuration (See P4, P8)
EE	Memory failure

## 7- Parameters transfer

**Portable server**  
**AKO-14918** portable server, with no power supply, in which parameters programmed in a powered controller can be copied by transfer. Parameters can be transferred again from the server to other identical powered controllers.  
To transfer parameters, other servers are available for controllers that should be programmed identically in high quantity without power supply.



## 8- Maintenance

Clean the controller surface with a soft cloth, soap and water. Do not use abrasive detergents, petrol, alcohol or solvents.

## 9- Warnings

The use of the unit without observing the manufacturer's instructions may alter its safety qualification.

To ensure correct operation of the apparatus, only NTC type probes supplied by AKO should be used.

Between -40 °C and +20 °C, when the probe is extended up to 1.000 m with minimum 0,5 mm<sup>2</sup> cable, deviation will be less than 0.25 °C (Probe extension cable ref. **AKO-15586**).

**(\*)** The intensity specified for each relay is its maximum individual value; if more than one is connected, the intensity of the addition (COMPRESSOR + DEFROST + FAN) must not exceed the total maximum intensity specified in the rating plate.