

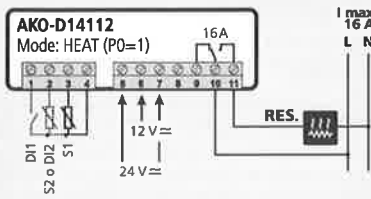
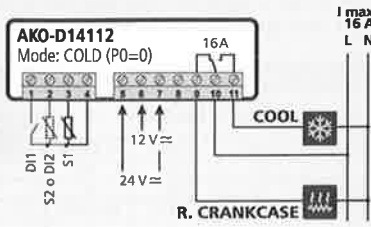
# Installation instructions



**AKO-D14112**   **AKO-D14212**   **AKO-D14312**  
**AKO-D14123-2**   **AKO-14220**   **AKO-D14223**  
**AKO-D14320**   **AKO-D14323**

## 3- Wiring

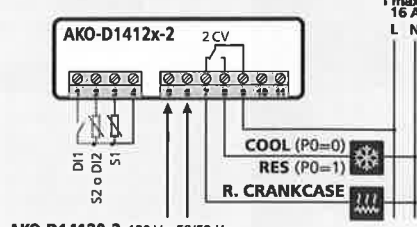
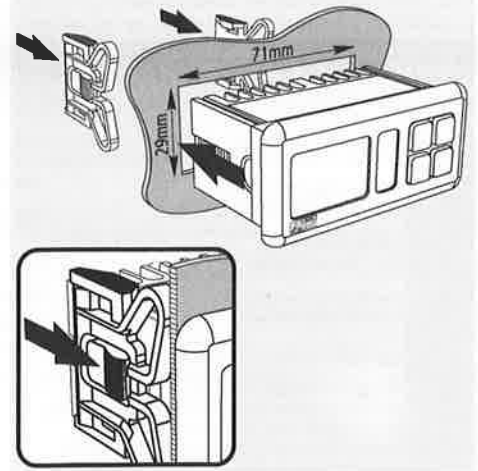
The probe and its cable should **NEVER** be installed in the same conduit as power, control or supply cables.



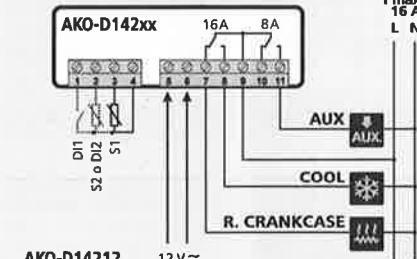
## 1- Warnings

- Using the equipment without following the manufacturer's instructions may affect the device's safety requirements. To ensure that the device operates correctly, only probes supplied by AKO should be used.
  - The unit must be installed in a location protected from vibrations, water and corrosive gases, where the ambient temperature does not exceed that shown in the technical data.
  - To ensure a correct reading, the probe must be situated in a location without any external heat influences except for the temperature which is being measured or controlled.
  - The power supply circuit must be provided with a main switch rated at least 2A, 230V, located close to the equipment. The cables will enter through the back and should be type H05VV-F or H05V-K.
  - The gauge will depend on local regulations, but should in no case be less than 1 mm<sup>2</sup>.
  - Connecting wires for the relay contacts should be sized 2.5 mm<sup>2</sup>.
  - Between -40 °C and +20 °C, if the probe NTC is prolonged till 1.000 m with a minimum of cable 0,5 mm<sup>2</sup>, the maximum deviation will be of 0,25 °C (extension cable for probe ref. **AKO-15586**)
- NOTE:** Equipment not compatible with **AKO-14917** (external communication module) and **AKO-14918** (programming key)

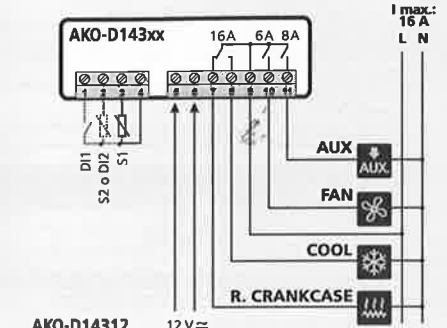
## 2- Installation



**AKO-D14120-2** 120 V~ 50/60 Hz  
**AKO-D14123-2** 230 V~ 50/60 Hz



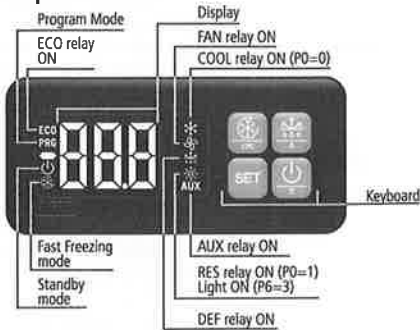
**AKO-D14212** 12 V~  
**AKO-D14220** 120 V~ 50/60 Hz  
**AKO-D14223** 230 V~ 50/60 Hz



**AKO-D14312** 12 V~  
**AKO-D14320** 120 V~ 50/60 Hz  
**AKO-D14323** 230 V~ 50/60 Hz

**AUX** Function as per parameter P6  
**S1:** Probe 1, temperature in the chamber or cabinet.  
**S2/DI2:** Probe 2, defrost or digital input 2 (as per P4)  
**DI1:** Digital Input 1

## 4- Operation



### ESC key /

Press for 5 seconds to start/stop Fast Freezing mode (rapid cooling).

In the programming menu, exit without saving parameter, return to previous level or exit programming.

### SET key

Press for 5 seconds to modify the set point (SP).

Press for 10 seconds to go to the programming menu.

In the programming menu, go to the level displayed or accept the new value while setting a parameter.

### Up key /

Pressing for 5 seconds starts/stops defrosting.

The programming menu, allows you to scroll through the various levels or, during the setting of a parameter, to change the value.

### Down key /

Pressing for 5 seconds activates Standby mode, pressing for 2 seconds returns the equipment to normal mode. In Standby mode, the equipment performs no actions and only the indicator is displayed on the screen.

The programming menu, allows you to scroll through the various levels or, during the setting of a parameter, to change the value.

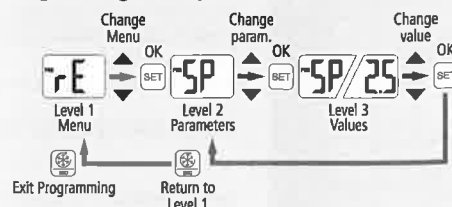
### 4.1- Access to set point and programming



#### Change set point (SP)



#### Programming Menu (parameters)



Back up one level without saving changes

## 5- Start-up

On power-up, the equipment will start up in Wizard mode (P3 / 1 flashing), press ▲ or ▼ to select the most appropriate application and press SET.

- |                 |                      |                          |
|-----------------|----------------------|--------------------------|
| 1: Multipurpose | 2: Frozen            | 3: Fruits and vegetables |
| 4: Fresh fish   | 5: Soft Drinks       | 6: Bottle racks          |
| 7: AC           | 8: Heat / Incubators |                          |

The wizard will configure the parameters of the equipment for the chosen application (see table "Default settings by application").

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 We reserve the right to supply materials which may be slightly different from those described in our Data Sheets. Updated information on our web site: [www.ako.com](http://www.ako.com)

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# 6 - Table of parameters and messages

Def. column shows factory-set default parameters. Those marked with \* are variable parameters depending on the application chosen in the wizard or the P3 parameter (see table "Default parameters by application"). If not indicated otherwise, the temperature values are in °C. (Equivalent values in °F)

AKO-D14312, AKO-D14320, AKO-D14323 AKO-D14212, AKO-D14220, AKO-D14223 AKO-D14112, AKO-D14123-2						
Level 1 Menu and description						
FE	Level 2	Control				
	Level 3	Description	Values	Min.	Def.	Max.
	SP	Temperature Adjustment (Set Point) (limits depending on probe type)	With NTC (°C/°F)	-50 (-58°F)	* 99 (210°F)	150 (302°F)
	C0	Calibrating probe 1 (Offset)	(°C/°F)	-20.0	0.0	20.0
	C1	Probe 1 differential (Hysteresis)	(°C/°F)	0.1	2.0	20.0
	C2	Upper blocking of the set point (cannot be set above this value)	With NTC (°C/°F) With PTC	C3	99 (210°F) 150 (302°F)	99 (210°F) 150 (302°F)
	C3	Lower blocking of the set point (cannot be set below this value)	(°C/°F)	-50 (-58°F)	-50 (-58°F)	C2
	C4	Type of delay for protection of the compressor: 0=OFF/ON (since the last disconnection); 1=ON (since start-up/reset); 2=OFF/ON/ON-OFF (since the last shut-down/start-up)		0	0	2
	C5	Protection delay time (value of the option selected in parameter C4)	(min.)	0	0	120
	C6	Status of COOL relay with probe fault 0=OFF; 1=ON; 2=Average based on last 24 hours prior to probe fault; 3=ON-OFF as prog. C7 and C8 (in heat mode always OFF)		0	0	3
	C7	Time relay ON in case of faulty probe (if C7=0 and C8≠0, the relay will always be OFF deenergised)	(min.)	0	10	120
	C8	Time relay OFF in case of fault of probe 1 (if C8=0 and C7≠0, the relay will always be ON energised)	(min.)	0	5	120
	C9	Maximum duration of fast freezing mode (0=off)	(h.)	0	24	48
	C10	Change set point (SP) in fast freezing mode, when it reaches this point (SP + C10) returns to normal. (SP + C10 ≥ C3) (0=OFF)	(°C/°F)	0	-50 (-58°F)	C3-SP
	C11	Length of inactivity at digital input to activate ECO mode (Only if P10 or P11=1 and P0=0) (0=OFF)	(h.)	0	2	24
	C12	Change set point (SP) in ECO mode (SP + C12 ≤ C2) (0=off)	(°C/°F)	0	2	C2-SP
	EP	Exit to Level 1				
dEF	Level 2 DEFROST Control (if P0=0 Direct, Cold)					
	Level 3	Description	Values	Min.	Def.	Max.
	d0	Defrost frequency (Time between two starts)	(h.)	0	* 96	
	d1	Maximum defrost duration (0=defrost deactivated)	(min.)	0	* 255	
	d2	Type of message during defrost: 0=Current temperature; 1=Temperature at start of defrost; 2=Display dEF message		0	2	2
	d3	Maximum duration of message (time added at the end of the defrost)	(min.)	0	5	255
	d4	Defrost end temperature (probe 2) (if P4 ≠ 1)	(°C/°F)	-50 (-58°F)	8 (46°F)	99.9 (211°F)
	d5	Defrost on equipment start-up 0=NO, First defrost as per d0, 1=YES, First defrost as per d6		0	0	1
	d6	Defrost start delay on equipment start-up	(min.)	0	0	255
	d7	Defrost type: 0=Resistors, 1=Inverted cycle, 2=Fan / air (In two-relay equipment, P6 must be programmed to zero), 3=Compressor off		0	0	3
	d8	Calculated time between defrost periods: 0=Total actual time; 1=Sum of times the compressor is on		0	0	1
	d9	Drp time at end of defrost (compressor and fans off) (if P4 ≠ 1)	(min.)	0	1	255
	EP	Exit to Level 1				
FAN	Level 2 FAN control (Evaporator) In 2-relay models P6 must be set to 0					
	Level 3	Description	Values	Min.	Def.	Max.
	F0	Fan shut-down temperature as per probe 2 (if P4 ≠ 1)	(°C/°F)	-50 (-58°F)	* 99.9 (211°F)	
	F1	Probe 2 differential (if P4 ≠ 1)	(°C/°F)	0.1	2.0	20.0
	F2	Stop fans when stopping compressor 0=No, 1=Yes		0	1	1
	F3	Fan status during defrost: 0=Off; 1=On		0	* 1	
	F4	Starting delay after defrost (if F3=0) Will only operate if it is higher than d9	(min.)	0	3	99
	F5	Stop fans on opening the door 0=No, 1=Yes (Requires a digital input configured as port P10 or P11=1)		0	0	1
	EP	Exit to Level 1				
AL	Level 2 ALARMS 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 probe 1 (must be greater than SP)	With NTC (°C/°F) With PTC	A2	99.9 (211°F) 150 (302°F)	99.9 (211°F)
	A2	Minimum alarm probe 1 (must be less than SP)	(°C/°F)	-50 (-58°F)	-50 (-58°F)	A1
	A3	Temperature alarm delay during start-up	(min.)	0	0	120
	A4	Temperature alarm delay after completion of a defrost	(min.)	0	0	99
	A5	Temperature alarm delay after reaching the value of A1 or A2	(min.)	0	30	99
	A6	External alarm delay when receiving digital input signal (P10 or P11=2 or 3)	(min.)	0	0	120
	A7	Desactivation delay of the external alarm when the signal of the digital input disappears (P10 or P11=2 or 3)	(min.)	0	0	120
	A8	Show warning if defrost is terminated by time-out 0=No, 1=Yes		0	0	1
	A9	Alarm relay polarity 0=Relay ON in alarm (OFF no alarm) 1=Relay OFF on alarm (ON with no alarm)		0	0	1
	A10	Temperature Alarm Differential (A1 and A2)	(°C/°F)	0.1	1.0	20.0
	A12	Door open alarm delay (if P10 or P11=1)	(min.)	0	2	120
	EP	Exit to Level 1				
CNF	Level 2 General status					
	Level 3	Description	Values	Min.	Def.	Max.
	P0	Type of operation 0=Direct, Cold; 1=Inverted, Heat		0	* 1	
	P1	Delay of all functions on receiving electrical power	(min.)	0	0	255
	P2	Access code (password) functions 0=Inactive; 1=Block access to parameters; 2=Keyboard lock		0	0	2
	P3	Set the default parameters according to the type of application (see accompanying table) 1=Multi-purpose 2=Frozen 3=Fruit and Vegetables 4=Fresh Fish 5=Soft Drinks 6=Bottle Racks 7=AC 8=Heat/Incubators		1		8
	P4	Selection of type of input 1=1 probe + 2 digital inputs, 2=2 probes + 1 digital input		1	1	2
	P5	Address (only systems with built-in communications)		0	1	255
	P6	Configuration of AUX relay 1=defrost 2=Alarm 3=Light 0=Fan (only 2-relay equipment)		0	1	3

AKO-D14312, AKO-D14320, AKO-D14323 AKO-D14212, AKO-D14220, AKO-D14223 AKO-D14112, AKO-D14123-2						
Level 1 Menu and description						
P7	Temperature display mode	0=Whole in °C 2=Whole in °F	1=One decimal in °C 3=One decimal in °F	0	1	3
P8	Probe to be displayed (as per parameter P4)			0	1	2
P9	Visualization of all the probes in sequence; 1=Probe 1; 2=Probe 2; 3=Probe 3 (1)			0	0	1
P10	Selection of probe type 0=NTC; 1=PTC			0	0	1
P11	Configuring digital input 1 2=External alarm 3=Severe external alarm 5=Act. modo ECO 6=Act. Fast Freezing (if C9≠0)	0=Off 1=Door contact 3=Severe external alarm 4=Slave defrost		0	0	6
P12	Configuring digital input 2 2=External alarm 3=Severe external alarm 5=Act. modo ECO 6=Act. Fast Freezing (if C9≠0)	0=Off 1=Door contact 3=Severe external alarm 4=Slave defrost		0	0	6
P13	Digital input polarity 1 0=Energised on closed contact, 1=Energised on open contact			0	0	1
EP	Digital input polarity 2 0=Energised on closed contact, 1=Energised on open contact			0	0	1
EP	Exit to Level 1					
td	Level 2 Access and information control					
	Level 3	Description	Values	Min.	Def.	Max.
L5	Access code (Password)			0	-	99
PU	Program version (Information)			-	-	
Pr	Program revision (Information)			-	-	
EP	Exit to Level 1					
EP	Exit Programming					



**WARNING:** The default parameters by type of application have been defined for the most common applications. Check that these parameters are suitable for your installation.

DEFAULT SETTINGS BY APPLICATION (P3)								
	1 Multi-purpose	2 Frozen	3 Fruits and vegetables	4 Fresh fish	5 Soft Drinks	6 Bottle Racks	7 AC	8 Heat/Incubators
SP	2 (35,6°F)	-18 (-0,4°F)	10 (50°F)	0 (32°F)	3 (37,4°F)	12 (53,6°F)	21 (69,8°F)	37 (98,6°F)
d0	4	4	4	4	24	24	96	-
d1	20	20	20	20	20	20	0	-
F0	8 (46°F)	0 (32°F)	30 (86°F)	8 (46°F)	8 (46°F)	30 (86°F)	99 (210°F)	-
F3	1	0	1	1	1	1	1	-
P0	0	0	0	0	0	0	0	1

MESSAGES		
	Description	D/A
L5	Access code (Password) request	D
dEF	Indicates a defrost is underway. (Only if parameter d2=2)	D
E1	Probe 1 faulty (open circuit, crossover, NTC temp. >99°C or <-50 °C PTC temp. >150 °C or <-50 °C) - (equivalent limits in °F)	D A
E2	Probe 1 faulty (open circuit, crossover, NTC temp. >99°C or <-50 °C PTC temp. >150 °C or <-50 °C) - (equivalent limits in °F)	D A
AH	Flashing: maximum temperature alarm on probe 1 (A1)	D A
AL	Flashing: minimum temperature alarm on probe 1 (A2)	D A
AE	External alarm activated (only if parameter P10 or P11=2)	D A
AES	Severe external alarm activated (only if parameter P10 or P11=3)	D A
Adt	Defrost time-out alarm (only if parameter A8=1)	D
PAb	Door open alarm (Only if P10 or P11=1 and as per time at A12)	D

D: Displays the message on the display, A: Activates the alarm relay (if available).

## 7- Technical specifications

Power supply	AKO-D14112..... 12/24V ± ±20% 2.5 VA
	AKO-D14123-2..... 230V ± ±10% 50/60 Hz 3.5 VA
	AKO-D14220/D14320/D14120-2..... 120V ± +8% -12% 50/60 Hz 4 VA
	AKO-D14223/D14323..... 230V ± ±10% 50/60 Hz 3.75 VA
	AKO-D14212/D14312..... 12V ± ±20% 2 VA
Maximum Voltage SELV circuits	..... 20V
Inputs (According to P4)	..... 2 input NTC/PTC + 1 digitised input (PTC only AKO-D141xx) ..... 1 input NTC/PTC + 2 digitised input (PTC only AKO-D141xx)
Relay COOL	AKO-D14123-2 2 CV (EN60730-1: 16(10)A 250V~) Other models 16 A (EN60730-1: 12(9)A 250V~)
Relay FAN 6A	(EN60730-1: 5(4)A 250V~)
Relay AUX 8A	(EN60730-1: 8(4)A 250V~)
Number of relay operations	EN60730-1: 100.000 operations
Types of probe	NTC AKO-149xx / PTC AKO-1558xx
Measurement range NTC	-50,0 °C a +99,9 °C (-58,0 °F a 211 °F)
	PTC -50,0 °C a +150 °C (-58,0 °F a 302 °F)
Resolution	..... 0,1 °C
Working environment	..... -10 a 50 °C, humidity <90 %
Ambient storage humidity	..... -30 a 70 °C, humidity <90 %
Class of protection - front panel	..... IP65
Fixation	..... Panel-mounted with anchors
Panel cutout dimensions	..... 71 x 29 mm
Front panel dimensions	..... 79 x 38 mm
Depth	..... 61 mm
Connections	..... Screw terminals for cables up to 2.5 mm²
Rating of control device: built-in, automatic operation feature Type 1.B, for use in clean environments, Class A software and continuous operation. Pollution classification 2 s/ UNE-EN 60730-1.	
Double insulation between supply, secondary circuit and relay output.	
Rated pulse voltage	..... 2500V
Temperature during ball-pressure test	Accessible parts..... 75 °C Parts which position active elements..... 125 °C
Voltage and current as per EMC tests	AKO-D14123-2/D14223/D14323..... 207V, 17 mA AKO-D14220/D14320/D14120-2..... 105V, 36 mA AKO-D14112/D14212/D14312..... 9,6V, 181 mA
Current of radio jamming suppression tests	..... 270 mA