

# Installation instructions

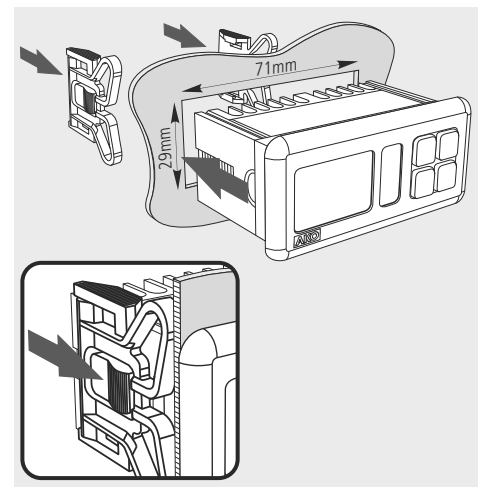


- AKO-D14112
- AKO-D14212
- AKO-D14312
- AKO-D14123-2
- AKO-14220
- AKO-D14223
- AKO-D14320
- AKO-D14323

## 1- Warnings

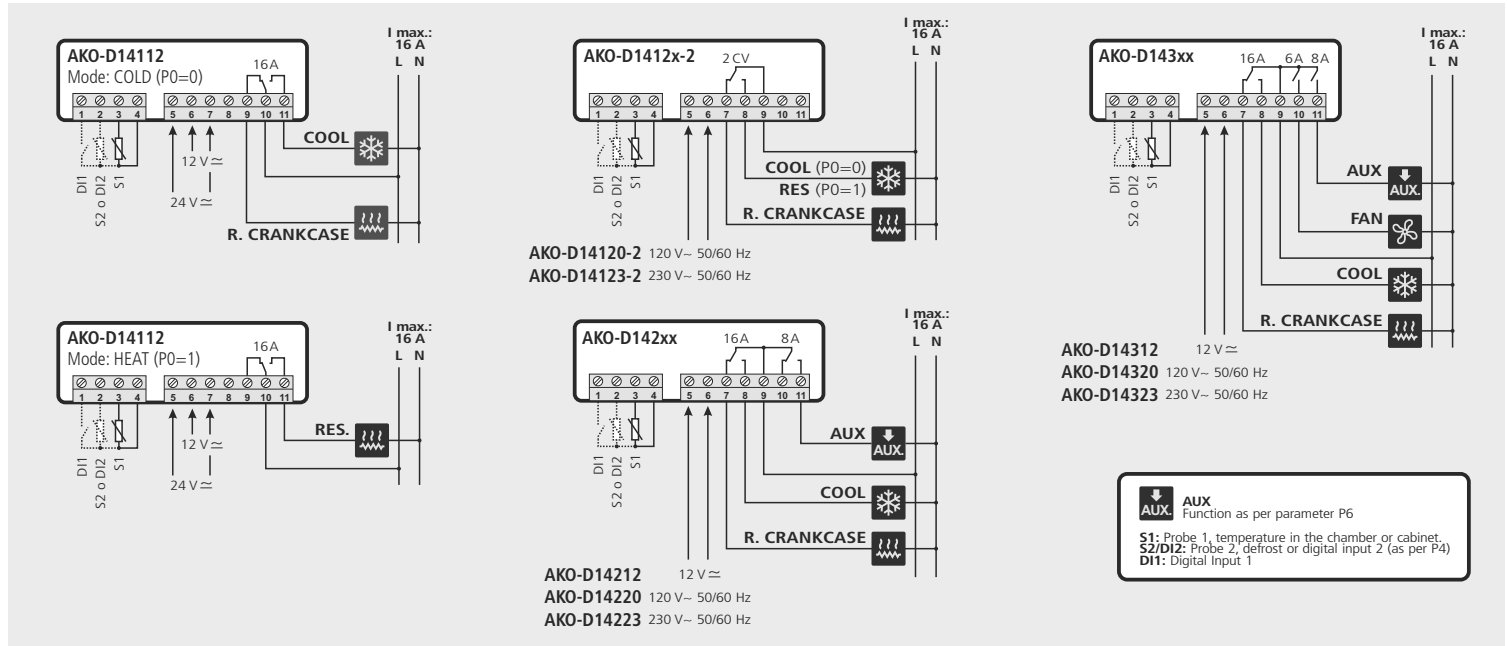
- Using the equipment without following the manufacturer's instructions may affect the device's safety requirements. To ensure that the device operates correctly, only probes supplied by AKO should be used.
  - The unit must be installed in a location protected from vibrations, water and corrosive gases, 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

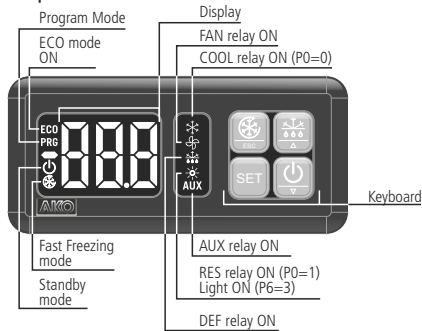


## 3- Wiring

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



## 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.

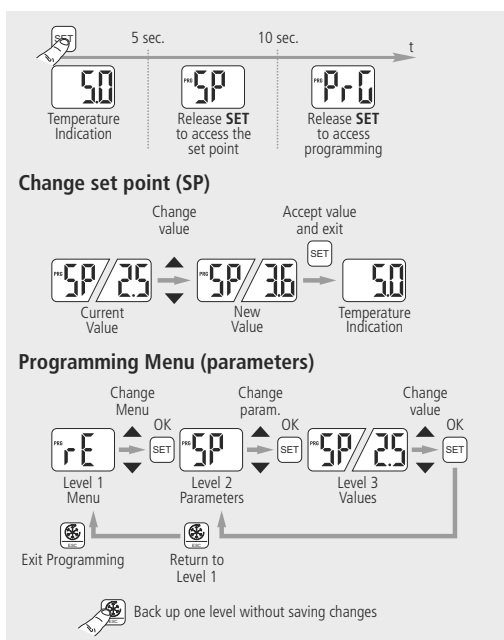
### Up key /

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



## 5- Start-up

On power-up, the equipment will start up in Wizard mode (In / 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").

Information on our web site: [www.ako.com](http://www.ako.com)  
 We reserve the right to supply materials which may be slightly different from those described in our Data Sheets. Updated  
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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 Menus and description						
Level 2 Control						
rE	Level 3	Description	Values	Min.	Def.	Max.
	SP	Temperature Adjustment (Set Point) (limits depending on probe type)	With NTC (°C/°F) With PTC	-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=OFF-ON/OFF (since the last shut-down /start-up)		0	0	1
	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		0	2	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	255
	d1	Maximum defrost duration (0=defrost deactivated)	(min.)	0	* 255	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	Dip time at end of defrost (compressor and fans off) (if P4 ≠ 1)	(min.)	0	1	255
	EP	Exit to Level 1				
FANn 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)	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	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) 150 (302°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 / Severe external alarm delay when receiving digital input signal (P10 or P11=2 or 3)	(min.)	0	0	120
	A7	Deactivation delay of the external alarm / Severe 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=2)	(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	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
	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
	P7	Temperature display mode 0=Whole in °C 1=One decimal in °C 2=Whole in °F 3=One decimal in °F		0	1	3
	P8	Probe to be displayed (as per parameter P4) 0=visualisation of all the probes in sequence; 1=Probe 1; 2=Probe 2; 3=Probe 3 (1)		1	1	2
	P9	Selection of probe type 0=NTC; 1=PTC		0	0	1

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Level 1 Menus and description						
Level 2 Access and information control						
	Level 3	Description	Values	Min.	Def.	Max.
	P10	Configuring digital input 1 0=Off 1=Door contact 2=External alarm 3=Severe external alarm 4=Slave defrost 5=Act. ECO mode by pushbutton 6=Act. Fast Freezing 7= Not used 8=Remote defrost 9=Act. ECO mode by switch		0	0	9
	P11	Configuring digital input 2 0=Off 1=Door contact 2=External alarm 3=Severe external alarm 4=Slave defrost 5=Act. ECO mode by pushbutton 6=Act. Fast Freezing 7= Not used 8=Remote defrost 9=Act. ECO mode by switch		0	0	9
	P12	Digital input polarity 1=0=Energised on closed contact, 1=Energised on open contact		0	0	1
	P13	Digital input polarity 2=0=Energised on closed contact, 1=Energised on open contact		0	0	1
	P19	Lights in ECO Mode (P6=3) 0=ON; 1=OFF		0	0	1
	EP	Exit to Level 1				
tid 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 (In)								
	1	2	3	4	5	6	7	8
	Multipurpose	Frozen	Fruits and vegetables	Fresh fish	Soft Drinks	Bottle Racks	AC	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		
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 2 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  
 ..... 1 input NTC/PTC + 2 digitised input

Relay COOL AKO-D14123-2 2 CV ..... (EN60730-1: 16(10)A 250V~)  
 Other models 16A ..... (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 ..... 75 °C  
 Accessible parts ..... 125 °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