CE Installation instructions



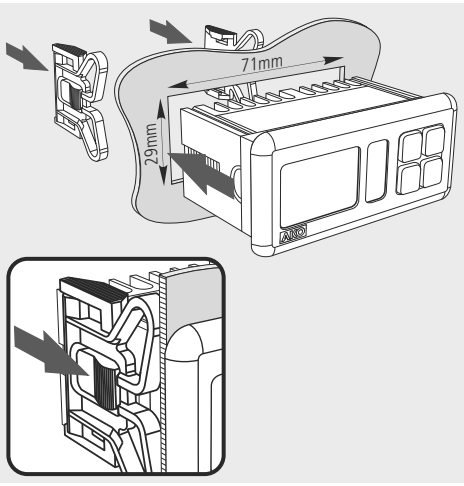
AKO-D14412 AKO-D14420 AKO-D14423
AKO-D14123-2-RC AKO-D14323-C
AKO-D14412-RC AKO-D14423-RC

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 at least 2 A, 230 V, 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^2.
-Connecting wires for the relay contacts should be sized 2.5 mm^2.
-Between -40 °C and +20 °C, if the probe NTC is prolonged till 1.000 m with a mínimum of cable 0,5 mm^2, 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)

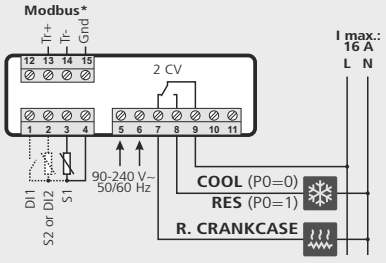
2- Installation



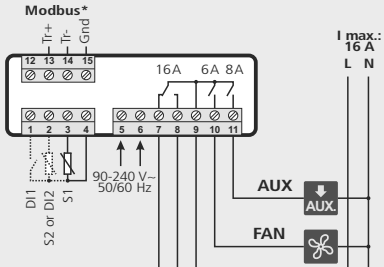
3- Wiring

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

AKO-D14123-2-RC



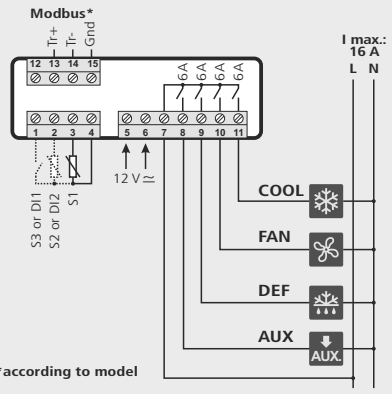
AKO-D14323-C



AUX. **AUX Relay** Function as per parameter P6

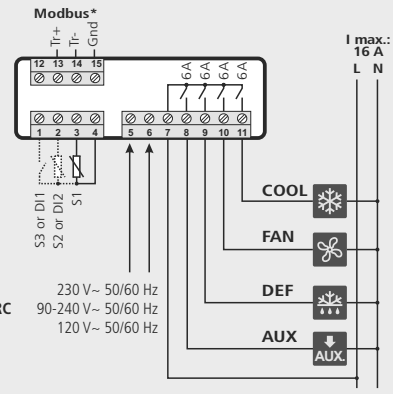
S1: Probe 1, temperature in the chamber or cabinet
S2/DI2: Probe 2, defrost or digital input 2 (as per P4)
S3/DI1: Probe 3, temperature of product / 2nd defrost, or digital input 1 (as per P4)
DI1: Digital Input 1

AKO-D14412 / D14412-RC



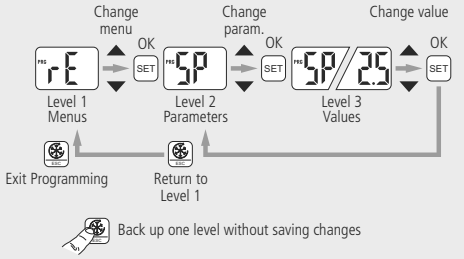
*according to model

AKO-D14423 / D14423-RC / D14420

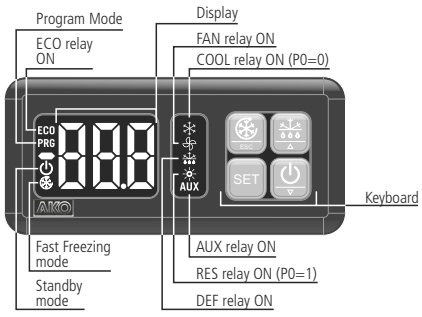


AKO-D14423	230 V~ 50/60 Hz
AKO-D14423-RC	90-240 V~ 50/60 Hz
AKO-D14420	120 V~ 50/60 Hz

Programming Menu (parameters)



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) (Set Point).
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.

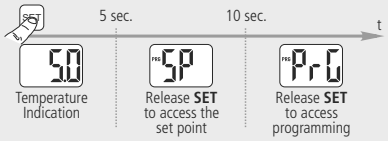
Up key ▲ /

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.

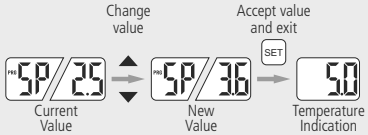
Down key ▼ / ⏻

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)



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").

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 (Inl)

	1 Multipurpose	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 (211°F)	-
F3	1	0	1	1	1	1	1	-
P0	0	0	0	0	0	0	0	1

AKO ELECTROMECANICA, S.A.L.
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**

AKO
Av. Roquetes, 30-38
08812 Sant Pere de Ribes
Barcelona (España)
Tel. (34) 938 142 700
Fax (34) 938 934 054
www.ako.com
ako@ako.com

User Manual available at
www.ako.com

35D14232 REV.07 2016

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"). Unless otherwise stated, temperatures are expressed in °C.

AKO-D14412, AKO-D14412-RC, AKO-D14420, AKO-D14423, AKO-D14423-RC
AKO-D14323-C
AKO-D14123-2-RC

Level 1		Menus and description								
rE	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)	●	●	●
			With PTC		-	150 (302°F)	●	●	●
	C0	Calibrating probe 1 (Offset)	(°C/°F)	-20.0	0.0	20.0	●	●	●
	C1	Probe 1 differential (Histeresis)	(°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)	C3	99 (210°F)	99 (210°F)	●	●	●
			With PTC		-	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/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 y 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**=Currentl 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 (In two-relay equipment, P6 must be programmed to zero)		0	0	1		●	●
	d8	Calculated time between defrost periods: **0**=Total actual time; **1** =Sum of times the compressor is on		0	0	1	●	●	●
	d9	Drip time at end of defrost (compressor and fans off) (if P4 ≠ 1)	(min.)	0	1	255	●	●	●
	d10	1st defrost start time (RTC required)	(h.)	00	Off	23	●		●
	d11	2nd defrost start time (RTC required)	(h.)	00	Off	23	●		●
	d12	3rd defrost start time (RTC required)	(h.)	00	Off	23	●		●
	d13	4th defrost start time (RTC required)	(h.)	00	Off	23	●		●
	d14	5th defrost start time (RTC required)	(h.)	00	Off	23	●		●
	d15	6th defrost start time (RTC required)	(h.)	00	Off	23	●		●
	EP	Exit 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)	A2	99,9 (211°F)	99,9 (211°F)	●	●	●
			With PTC		-	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=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	●	●	●
	P4	Selection of type of inputs **1**=1 probe + 2 digital inputs; **2**=2 probes +1 digital input; **3**=3 probes (1)			1	1	3	●	●	●
	P5	MODBUS address			1	1	255	●	●	●

AKO-D14412, AKO-D14412-RC, AKO-D14420, AKO-D14423, AKO-D14423-RC
AKO-D14323-C
AKO-D14123-2-RC

Level 1		Menus and description							
	P6	Configuration of AUX relay **1**=Defrost / 2nd Defrost (1) **2**=Alarm **3**=Light **4**=Pump down (1) **5**=Master Defrost(1)	0	1	5		●	●
	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**=visualization 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	●	●	●
	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**= Low pressure switch (1) **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	●	●	●
	P14	Maximum start-up time after pump down ((Values between 1 and 9 seconds are not accepted) (Sec.)	1	0	120			●
	P15	Maximum pump down time (min.)	0	0	15			●
	P19	Lights in ECO Mode (P6=3) 0=ON; 1=OFF	0	0	1		●	●
	EP	Exit Level 1				●	●	●
rtC	Level 2	REAL TIME CLOCK Parameters (RTC required)						
	Level 3	Description	Values	Min.	Def.	Max.			
	r1	Clock configuration: HOUR	(h.)	0	0	23	●		●
	r2	Clock configuration: MINUTES	(min.)	0	0	59	●		●
	EP	Exit 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 Level 1					●	●	●
EP	Exit Programming						●	●	●

(1): Only available on **AKO-D144xx** and **AKO-D144xx-RC**

MESSAGES				
L5	Access code (Password) request	D		
dEF	Indicates a defrost is underway. (Only if parameter d2=2)	D		S
E1	Probe 1 faulty (open circuit, crossover or temperature outside the probe limits)	D	A	S
E2	Probe 2 faulty (open circuit, crossover or temperature outside the probe limits)	D	A	S
E3	Probe 3 faulty (open circuit, crossover or temperature outside the probe limits)	D	A	S
AH	**Flashing:** maximum temperature alarm on probe 1 (A1)	D	A	S
AL	**Flashing:** minimum temperature alarm on probe 1 (A2)	D	A	S
AE	External alarm activated (only if parameter P10 or P11=2)	D	A	S
AES	Severe external alarm activated (only if parameter P10 or P11=3)	D	A	S
Adt	Defrost time-out alarm (only if parameter A8=1)	D		S
PAb	Door open alarm (Only if P10 or P11=1 and as per time at A12)	D		S
Pd	Pump down malfunction error (Stop).	D		S
LP	Pump down malfunction error (Start-up).	D		S
Ar	Clock battery discharged or clock deprogrammed	D		S

D: Displays the message on the display, **A:** Activates the alarm relay (if available).
S: Message expressed in the software **AKONet**

7- Technical specifications

Power supply **AKO-D14412** . . . . . 12 V≃ ±20% 2 VA
AKO-D14412-RC . . . . . 12 V≃ ±20% 3 VA
AKO-D14420 . . . . . 120 V~ +8% -12% 50/60 Hz 4 VA
AKO-D14123-2-RC/D14423-RC/D14323-C . . . . . 90-240 V ~ 50/60 Hz 7 VA
AKO-D14423 . . . . . 230 V ~ 50/60 Hz 3,75 VA
Maximum Voltage SELV circuits . . . . . 20 V
Comunication . . . . . Modbus RTU RS485
Inputs (According to P4) . . . . . 3 NTC/PTC inputs (Sólo AKO-D14412-RC y AKO-D14423-RC)
. . . . . 2 NTC/PTC inputs + 1 digitised input
. . . . . 1 NTC/PTC input + 2 digitised input
Relay 2 CV . . . . . (EN60730-1: 16(10) A 250 V~)
Relay 16 A . . . . . (EN60730-1: 12(9) A 250 V~)
Relay 6 A . . . . . (EN60730-1: 5(4) A 250 V~)
Relay 8 A . . . . . (EN60730-1: 8(4) A 250 V~)
Number of relay operations . . . . . EN60730-1: 100.000 operations
Types of probe . . . . . NTC **AKO-149xx** / PTC **AKO-1558xx**
Measurement range NTC . . . . . -50,0 °C to +99,9 °C (-58,0 °F to 211 °F)
PTC. . . . . -50,0 °C to +150 °C (-58,0 °F to 302 °F)
Resolution -50 to 100 °C. . . . . 0,1 °C
> 100 °C . . . . . 1 °C
Working environment . . . . . -10 to 50 °C, humidity <90 %
Ambient storage humidity . . . . . -30 to 70 °C, humidity <90 %
Class of protection - front panell IP65
Fixation . . . . . Panel-mounted with anchors
Panel cutout dimensions . . . . . 71 x 29 mm
Front panel dimensions . . . . . 79 x 38 mm
Depth . . . . . 61 mm
Connections. . . . . Connections via 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 . . . . . 2500 V
Temperature during ball-pressure test Accessible parts . . . . . 75 °C
Parts which position active elements . . . . . 125 °C
Voltage and current as per EMC test
AKO-D14123-2-RC/D14423/D14423-RC/D14323-C. . . . . 207 V, 17 mA
AKO-D14420 . . . . . 105 V, 36 mA
AKO-D14412/D14412-RC . . . . . 9,6 V, 181 mA
Current of radio jamming supression tests . . . . . 270 mA