D144H002 Ed.08 GB

CE Thermometers and temperature controllers

User Manual

1.- Introduction

The Darwin controller range is particularly suitable for controlling refrigerating equipment, wall units, islands, cabinets, electrical panels, etc.

The wide range of models available ensures the best solution for each application.

The small **SLIM** models have been developed for applications where little space is available for the controller.

STANDARD models are specifically designed for applications requiring a considerable number of output relays, high load switching power and various functions with keypad shortcuts.

EXTENDED FRAME models incorporate two switches for additional functions. Ideal for controlling the turning on/off of the cabinet, lights, etc.

Information displayed on the high-brightness screen has been grouped according to functionality. A first large display shows the temperature and operating messages. The second display shows icons for the various outputs.

The built-in gasket on the front panel (Only AKO-D14xxx models) afford the unit a high degree of IP protection and new features have been added which allow more efficient refrigeration management, thus saving energy.

The menu settings are optimized for fast and intuitive programming and may be pre-programmed according to the application for faster start-up.

Available Models

SLIM thermometers: Ideal for applications where only the temperature needs to be shown.

- **AKO-D14012, AKO-D14023.**

STANDARD thermometers: They have the same features as the SLIM thermostats, but include MODBUS communication.

- **AKO-D14023-C.**

SLIM thermostats: They include a relay which is mainly to control positive services (temperature above 3 °C). They have defrost by compressor stop but can operate in Cooling or Heating mode.

- **AKO-D14120, AKO-D14123, AKO-D10123***

STANDARD thermostats: As well as the features of the SLIM thermostats, they can include a 2 CV relay, clock in real time or communications (depending on the model).

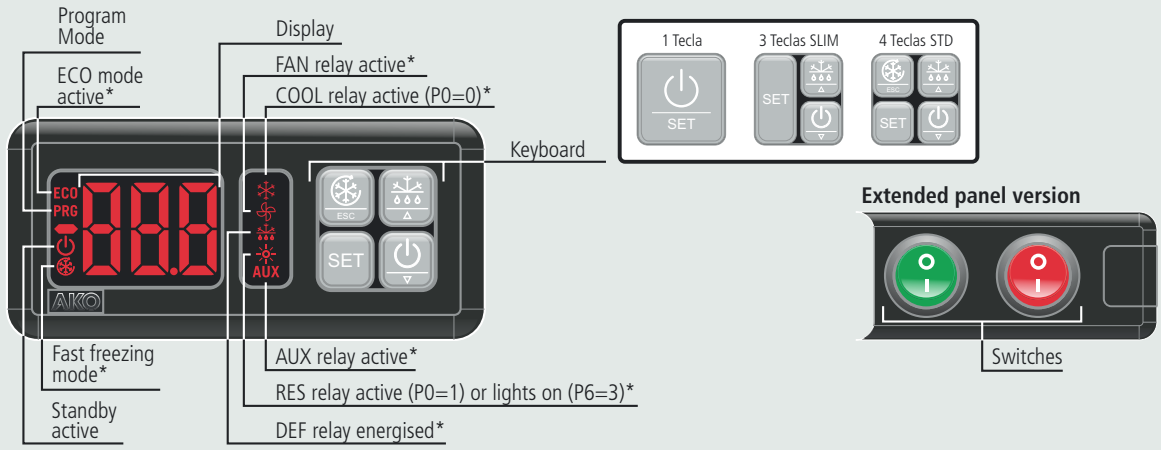
- **AKO-D14112, AKO-D14123-2, AKO-D14123-2-RC**

STANDARD controllers: They can have 2 to 4 relays, have communications, clock in real time and advanced control functions. Their application depends on the no. of relays.

- 2 relés: Designed to control positive services (above 3 °C). Defrost by air or resistors.
  - **AKO-D14212, AKO-D14220, AKO-D14223, AKO-D10223***
- 3 relés: Designed to control positive services (above 3 °C). Defrost by resistors or cycle reversal.
  - **AKO-D14312, AKO-D14320, AKO-D14323, AKO-D14323-C, AKO-D10323***
- 4 relés: Designed to control positive or negative services. Defrost by resistors or cycle reversal. Configurable auxiliary relay.
  - **AKO-D14412, AKO-D14412-RC, AKO-D14420, AKO-D14423, AKO-D14423-RC, AKO-D14423-P, AKO-D14423-P-RC**

* They have an extended frame and two auxiliary switches.

2.- Description



*Depending on model

Flashing lights indicate that the function in question should be activated by temperature, but is not due to a conflicting timing or protection parameter.

2.1.- Keypad functions

Thermometers

Press for 5 seconds to activate Standby mode; press for 2 seconds to return the equipment to normal mode. In Standby mode, the equipment performs no actions and only the ⏻ indicator is displayed on the screen .

Press for 10 seconds to go to the programming menu.

Press for 5 seconds in the programming menu to access the level displayed on the screen or, during the setting of a parameter, accepts the new value.

In the programming menu, a short press allows you to scroll through the various levels or, during the setting of a parameter, to increment the value. When upper limit is reached, it will start again from the lower limit.

Thermostats and Controllers

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.

(Only STANDARD controllers)

Press for 5 seconds, allows changing the set point (SP).

Pressing for 10 seconds goes to the programming menu.

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

Press for 5 seconds to start/stop Fast Freezing mode.

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

Press for 5 seconds, activates standby mode.

Pressing for two seconds, the device returns to normal.

In Standby mode, the equipment performs no actions and only the ⏻ indicator is displayed on the screen..

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

IMPORTANT: If you have configured the access code function as a key lock (P2=2) when you initiate any function (defrost, fast freezing, access to programming, etc.) you will be prompted to enter the access code programmed into L5. If the code entered is not correct, the unit will display the temperature without opening the requested function.

2.2.- Display messages

	Flashing 0: Access code (Password) request You must enter the access code configured on L5 to execute the requested function (p. 9 and 23). See also parameter P2 (p. 28)
	Probe 1, 2 or 3 faulty (open circuit, crossover or temperature outside the probe limits; **NTC**: -50 To 99 °C; **PTC**: -50 To 150 °C).
	Indicates a defrost is underway. After defrosting, the message will continue to be displayed during the time specified in parameter d3 (see Chapter 4.2).
	Alternating with temperature: Maximum temperature in control probe alarm. Temperature set in A1 has been reached (p. 17 and 18) (Activates alarm relay)
	Alternating with temperature: Minimum temperature in control probe alarm. Temperature set in A2 has been reached (p. 17 and 18) (Activates alarm relay)
	Alternating with temperature: External alarm activated (by digital input) (p. 17 and 18) (Activates alarm relay)
	Alternating with temperature: Severe external alarm activated (by digital input) (p. 17) (Activates alarm relay)
	Alternating with temperature: Defrost alarm time-out. Displayed when a defrost ends after the maximum time elapsed as defined in parameter d1. (p. 17) (Does not activate alarm relay)
	Alternating with temperature: Door open alarm. Shown if the door remains open longer than specified in parameter A12 (p. 17 and 18) (Does not activate alarm relay)
	Alternating with temperature: Pump down malfunction error (Stop). (p. 17) (Does not activate alarm relay)
	Alternating with temperature: Pump down malfunction error (Start-up). (p. 17) (Does not activate alarm relay)
	Alternating with temperature: Clock battery discharged or clock deprogrammed (Does not activate alarm relay)

2.3- Versions and part numbers

MODELS	POWER SUPPLY	PROBES	DIGITAL INPUTS	FORMAT	RELAYS	COMMUNICATION	RTC	ECO MODE
AKO-D14012	12/24V	1 (NTC/PTC)	-	SLIM	0	NO	NO	NO
AKO-D14023	230V	1 (NTC/PTC)	-	SLIM	0	NO	NO	NO
AKO-D14023-C	90-240V	1 (NTC/PTC)	-	STANDARD	0	YES	NO	NO
AKO-D14112	12/24V	Up to 2 (NTC/PTC)	Up to 2	STANDARD	1	NO	NO	YES
AKO-D14120	120V	1 (NTC/PTC)	-	SLIM	1	NO	NO	NO
AKO-D14123	230V	1 (NTC/PTC)	-	SLIM	1	NO	NO	NO
AKO-D14123-2	230V	Up to 2 (NTC/PTC)	Up to 2	STANDARD	1	NO	NO	YES
AKO-D14123-2-RC	90-240V	Up to2 (NTC/PTC)	Up to 2	STANDARD	1	YES	YES	YES
AKO-D14212	12V	Up to2 (NTC/PTC)	Up to 2	STANDARD	2	NO	NO	YES
AKO-D14220	120V	Up to2 (NTC/PTC)	Up to 2	STANDARD	2	NO	NO	YES
AKO-D14223	230V	Up to2 (NTC/PTC)	Up to 2	STANDARD	2	NO	NO	YES
AKO-D14312	12V	Up to2 (NTC/PTC)	Up to 2	STANDARD	3	NO	NO	YES
AKO-D14320	120V	Up to2 (NTC/PTC)	Up to 2	STANDARD	3	NO	NO	YES
AKO-D14323	230V	Up to2 (NTC/PTC)	Up to 2	STANDARD	3	NO	NO	YES
AKO-D14323-C	90-240V	Up to2 (NTC/PTC)	Up to 2	STANDARD	3	YES	NO	YES
AKO-D14412	12V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	NO	NO	YES
AKO-D14412-RC	12V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	YES	YES	YES
AKO-D14220	120V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	NO	NO	YES
AKO-D14423	230V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	NO	NO	YES
AKO-D14423-RC	90-240V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	YES	YES	YES
AKO-D14423-P	90-240V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	NO	NO	YES
AKO-D14423-P-RC	90-240V	Up to 3 (NTC/PTC)	Up to 3	STANDARD	4	YES	YES	YES
AKO-D10123	230V	1 (NTC/PTC)	-	EXTENDED PANEL	1	NO	NO	NO
AKO-D10223	230V	Up to 2 (NTC/PTC)	Up to 2	EXTENDED PANEL	2	NO	NO	YES
AKO-D10323	230V	Up to 2 (NTC/PTC)	Up to 2	EXTENDED PANEL	3	NO	NO	YES

2.4.- Maintenance

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

2.5.- Precautions

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

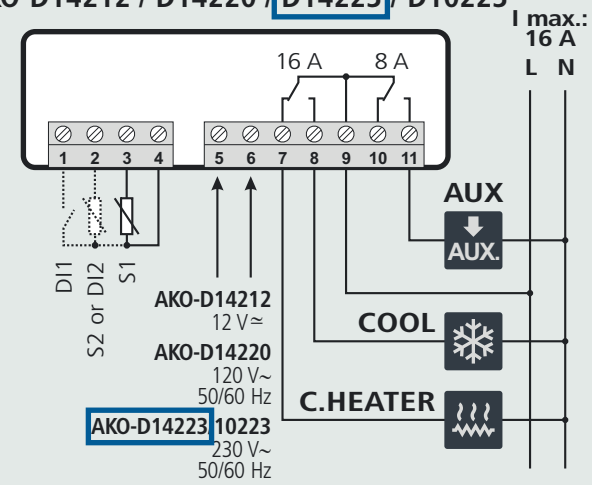
The power supply circuit must be provided with a main switch rated at least 2 A, 230 V, located close to the equipment. The cables will enter through the back and should be type H05VV-F or H05V-K. The gauge will depend on local regulations, but should in no case be less than 1 mm^2.

The relay contact connecting cables should be 1 to 2.5 mm^2 and the common cable should always be 2.5 mm^2. Halogen-free cables are recommended.

Between -40 °C and +20 °C, if the NTC probe is extended up to 1,000 m with minimum 0.5 mm^2 wire, the maximum deviation will be 0.25 °C (Wire for probe extension ref. **AKO-15586**).

5.3.- 2-relay controller

STANDARD **AKO-D14212 / D14220 / D14223 / D10223**



8.- Technical specifications

Power supply **AKO-D14012/D14112** . . . . . 12/24 V≃ ±20% 2.5 VA
AKO-D14212/D14312/D14412 . . . . . 12 V≃ ±20% 2 VA
AKO-D14412-RC . . . . . 12 V≃ ±20% 3 VA
AKO-D14120/D14220/D14320/D14420 . . . . . 120 V~ +8 % - 12 % 50/60 Hz 4 VA
AKO-D14023/D14024/D14123/D14123-2/D14124/D14125/D10123 . 230 V~ ±10 % 50/60 Hz 3.5 VA
AKO-D14223/D14323/D10223/D10323/D14423 . . . . . 230 V~ ±10 % 50/60 Hz 3.75 VA
AKO- D14123-2-RC/D14323-C/D14423-RC/D14423-P/D14423-P-RC . . . . . 90-240 V~ 50/60 Hz 7 VA
AKO-D14023-C . . . . . 90-240 V~ 50/60 Hz 6 VA

Maximum Voltage SELV circuits . . . . . 20 V

Communication (Subject to availability) . . . . . Modbus RTU Rs485

Inputs (According to P4)

AKO-D14012/D14023/D14023-C/D14024/D14120/D14123/D14124/D14125/D10123 . . . . . 1 input NTC/PTC

AKO-D14112/D14123-2/D14123-2-RC/D14212/D14220/D14223/ D14312/D14320/D14323/D14323-C/D10223/D10323 . . . . . 2 inputs NTC/PTC + 1 digitised input
. . . . . 1 input NTC/PTC + 2 digitised inputs

AKO-D14412/D14412-RC/D14420/D14423/D14423-RC/D14423-P/D14423-P-RC . . . . . 3 inputs NTC/PTC
. . . . . 2 inputs NTC/PTC + 1 digitised input
. . . . . 1 input NTC/PTC + 2 digitised inputs

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 . . . . . 0,1 °C

Working environment . . . . . -10 to 50 °C, humidity <90 %

Ambient storage humidity . . . . . -30 to 70 °C, humidity <90 %

Class of protection - fronta panel **AKO-D10123/D10223/D10323** IP50
Other models IP65

Fixation . . . . . Panel-mounted with anchors

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 . . . . . 2500 V

Temperature during ball-pressure test
Accessible parts . . . . . 75 °C
Parts which position active elements . . . . . 125 °C

Voltage and current as per EMC tests

AKO-D14012/D14112/AKO-D14212/D14312/D14412/D14412-RC . . . . . 9,6 V, 181 mA
AKO-D14120/D14220/D14320/D14420 . . . . . 105 V, 36 mA
AKO-D14023/D14024/D14123/D14123-2/D14124/D14125/D14223/D14323/ D14023-C/D14123-2-RC/D14323-C/D14423/D14423-RC/D14423-P/D14423-P-RC/ D10123/D10223/D10323 . . . . . 207 V, 17 mA

Current of radio jamming supression tests . . . . . 270 mA