

INSTRUCTIONS FOR THE INSTALLATION AND USE OF:

Controllers with 3 relays
and up to 2 probes:AKO-14312, AKO-14323,
AKO-14530.

GENERAL DESCRIPTION:

They are suitable for refrigeration equipment, by controlling the refrigeration operation cycles (solenoid, compressor = **COOL** relay output), the operation of the evaporator fans (**FAN** relay output) and the defrost cycles by means of electric heat or hot gas bypass (**DEF** relay output).

It has two inputs, one to connect the probe for the cool room temperature to be controlled (**1 TEM**) and the second one to connect a probe for the evaporator temperature (**2 DEF**).

VERSIONS:

MODEL	FASTENING	RELÉS (Max. current)	POWER SUPPLY, 50/60Hz
AKO-14312	For panel	COOL: 8A* cosφ=1 (SPST NO) FAN: 5A* cosφ=1 (SPST NO) DEF: 8A* cosφ=1 (SPDT)	12V ≈ ±10%, 160 mA≈
AKO-14323	For panel	COOL: 8A* cosφ=1 (SPST NO) FAN: 5A* cosφ=1 (SPST NO) DEF: 8A* cosφ=1 (SPDT)	230V~ ±10%, 11,1 mA~
AKO-14530	For panel	In auxiliary power supply modules for DIN rail, AKO-15127 and AKO-15128	

* The current specified for each relay is its individual maximum, if more than one is connected, the sum current (COOL+FAN+DEF) should not exceed 12A.

TECHNICAL DATA:

Temperature range: -50°C to 99°C
NTC probe input: Ref. AKO-149xx
Controller accuracy: ±1°C
Probe tolerance at 25°C: ±0,4°C
Operating room temperature: 5°C to 40°C
Storage temperature: -30°C to 70°C

Control device classification:
 { -with independent mounting
 -with characteristic of automatic operation action,
 Type 1.B
 -to be used in clean situation
 -logical medium (software) class A

INSTALLATION:

Controller:

The controller should be installed in a place protected from vibration, water and corrosive gases, and where the room temperature does not exceed the values given in the technical data.

In order for the panel mounting units to be suitable having IP65 protection, the gasket between the apparatus and the panel cavity where it is to be mounted should be correctly installed.

Probe:

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

Connection:

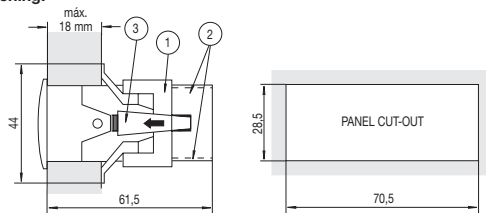
See diagram in the unit rating plate.

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

The power supply circuit should be connected with a minimum 2A, 230V switch located close to the unit. The cables enter at the rear and should be of the type H05W-F 2x0.5mm² or H05V-K 1x0.5mm².

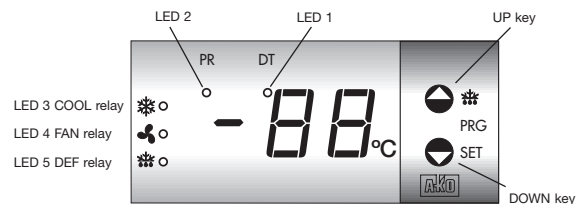
Section of connecting wires for relays contacts must be between 1mm² and 2,5 mm².

Fastening:



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**, the fasteners may be moved in the opposite direction to the arrow.

FRONT PANEL FUNCTIONS:



Functions:

UP key

When pressed for 5 seconds it will activate a manual defrost operation that will last for the programmed length of time.

When pressed for less than 5 seconds it will display probe 2 temperature

In programming, it raises the value that is being displayed.

In the AKO-14312 units, it mutes the acoustic alarm.

DOWN key

When pressed for 5 seconds, it will display the SET POINT temperature.

In programming, it lowers the value that is being displayed.

In the AKO-14312 units, it mutes the acoustic alarm.

Indicator LEDs:

LED 1 permanent: Indicates the last defrost terminated by time.

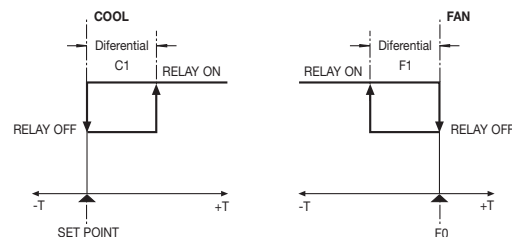
LED 2 permanent: Parameter-programming phase.
intermittent: SET POINT programming phase.

LED 3 permanent: COOL relay (compressor) energized.
intermittent: Because of the temperature detected at probe 1 TEM, the COOL relay should be energized, but due to some programmed parameter, it is not.

LED 4 permanent: FAN relay is energized.
intermittent: Because of the temperature detected at probe 2 DEF, the FAN relay should be energized, but due to some programmed parameter, it is not.

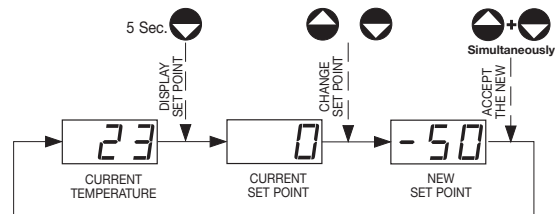
LED 5 permanent: DEF relay of defrost energized.

OPERATION AND CONTROL OF THE COOL AND FAN RELAYS:



ADJUSTING THE SET POINT TEMPERATURE:

The factory default SETTING OF THE TEMPERATURE (Set Point) is 0°C.



- Press the UP key for 5 seconds. The current SET POINT value will be displayed and LED "2" will flash.

- Press the UP or DOWN keys to adjust the SET POINT to the required value.

- Press the UP + DOWN keys simultaneously in order to set the new value. When this operation is performed, the display will return to the temperature indication status and LED "2" will stop flashing.

NOTE: If no key is pressed for 25 seconds during any of the previous steps, the controller will automatically return to the temperature indication status, without modifying the SET POINT value.

PROGRAMMING:

The parameters should only be programmed or modified by personnel who are fully acquainted with the operation and possibilities of the equipment where it is applied.

Parameter programming:

Level 1:

- Press the UP + DOWN keys simultaneously for 10 seconds. LED "2" should permanently light and the first parameter "C0" should appear on the display.

- Press the UP key to access the following parameter and the DOWN key to return to the previous parameter.

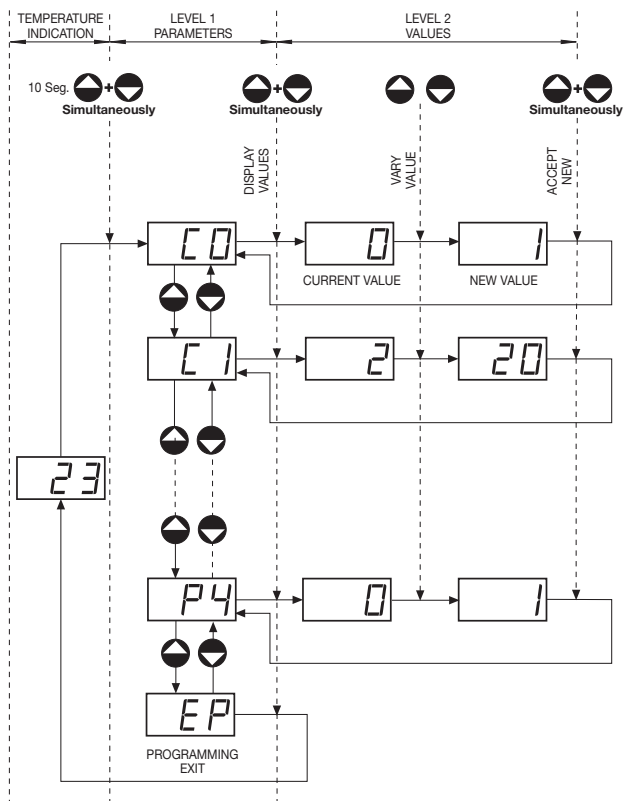
- By pressing the UP + DOWN keys simultaneously at the final parameter position, EP; the controller will return to the temperature indication situation and LED "2" will no longer be permanently lit.

Level 2:

- In order to display the current value of any parameter, move to the required one and press the UP + DOWN keys simultaneously. Once it has been displayed, it may be modified by pressing the UP or DOWN keys.

- Press the UP + DOWN keys simultaneously in order to set the new value. When this operation is performed, the programming will return to level 1 (parameters).

NOTE: If no key is pressed for 25 seconds during any of the previous steps, the controller will automatically return to the temperature-indicating situation, without modifying the parameter values.



PARAMETER DESCRIPTION:**In order to program the Set Point, see
ADJUSTING THE SET POINT TEMPERATURE**

The values in the DEF column are factory-set, and will return to these values if a reset is performed by means of the P3 programming parameter. In such a case, the parameters will automatically take on the values listed in the DEF column.

The parameters are divided into five groups in accordance with how they mainly affect:

- Cooling control (compressor).
- Defrost control (electric heat / hot gas bypass).
- Evaporator fan control.
- Temperature alarm control.
- General equipment status.

The probes corresponding to:

Probe 1: For the room temperature to be controlled

Probe 2: For the evaporator temperature

COOLING CONTROL PARAMETERS (COMPRESSOR, ...)

PARAMETER	DESCRIPTION	RANGE		VALUE DEF.
		MIN.	MAX.	
C0	Probe 1 calibration (Offset) Temperature increase / decrease that is added to the temperature detected by the thermostat in order to adjust the probe to the true value.	-20°C	+20°C	0°C
C1	Probe 1 differential (hysteresis) Temperature increase above that indicated by the SET POINT so that the relay energizes.	1°C	20°C	2°C
C2	Maximum SET POINT limiter It is not possible to fix a SET POINT above this value.	xx°C	99°C	99°C
C3	Minimum SET POINT limiter It is not possible to fix a SET POINT below this value.	-50°C	xx°C	-50°C
C4	Type of delay for compressor protection 0=(OFF/ON): Delay to relay energizing since its last deenergizing. 1=(ON): Delay to relay energizing since the temperature order energize it.	0	1	0
C5	Protection delay time Numerical value for the option selected at parameter C4.	0 min.	99 min.	0 min.
C6	COOL relay status with probe 1 failure. 0=OFF 1=ON 2=OFF/ON operating sequence in accordance with that programmed at C7 and C8.	0	2	1
C7	Time that COOL relay is ON in case of probe 1 failure. The period during which the controller remains with the COOL relay energized (ON), (example, compressor functioning). Programming C7=0 and C8=0, the relay is always de-energized (OFF).	0 min.	99 min.	10 min.
C8	Time that COOL relay is OFF in case of probe 1 failure. The period during which the controller remains with the COOL relay de-energized (OFF), (example, compressor stopped). Programming C8=0 and C7=0, the relay is always energized (ON).	0 min.	99 min.	5 min.

DEFROST CONTROL PARAMETERS (ELECTRIC HEAT OR HOT GAS BYPASS)

d0	Defrost frequency Time between 2 defrost starts.	0 h	99 h	6 h
d1	Defrost duration During this time, LED 5, defrost indicator, will be lit. If the defrost operation by temperature has not been completed when this time period elapses, it will be terminated by time, and LED 1, "DT" will be permanently lit.	0 min.	99 min.	30 min.
d2	Type of message during defrost 0=The controller will display the true temperature 1=The controller will display the initial defrost temperature 2=The controller will display the "def" message	0	2	2
d3	Maximum added message time after defrost At the end of this delay the controller will return to the situation of displaying the temperature.	0 min	99 min	5 min.
d4	Final defrost temperature by probe 2	-50°C	99°C	8°C
d5	Defrost on equipment switch-on? 0=no, the first defrost will be performed in accordance with d0 1=yes, the first defrost will be performed in accordance with d6	0	1	0
d6	Defrost start-up delay on equipment switch-on If d5 is set to 1=yes, the first defrost will be carried out at the end of the minutes set by parameter d6.	0 min.	99 min.	0 min.

d7	Defrost type 0=Electric heat (DEF Relay = on, COOL Relay = off). 1=Hot Gas bypass (DEF Relay = on, COOL Relay = on).	0	1	0
d8	Calculation of time between defrost periods 0=Real-time total 1=Sum of compressor operating time.	0	1	0
d9	Drip time Time during which the compressor and fans remain off at the end of defrost.	0 min.	99 min.	1 min.

EVAPORATOR FAN CONTROL PARAMETERS

F0	Fan stop temperature by probe 2	-50°C	99°C	4°C
F1	Probe 2 differential (and alarms) Temperature decrease below probe 2 stop (F0) so that the FAN relay switches.	1°C	50°C	2°C
F2	Operation with compressor stopped If F2 is set to 0=no, then the fans will remain off when the compressor is stopped. This has no effect during defrost.	0	1	1
F3	Stopped during defrost? If F3 is set to 1=yes, then the fans remain off during defrost.	0	1	1
F4	Delay start-up after defrost Time during which the fans remain off at the end of defrost (if is higher than d9).	0 min.	99 min.	3 min.

TEMPERATURE ALARM CONTROL PARAMETERS

A1	Probe 1 maximum temperature alarm relative to the Set Point. Alarm temperature, above Set Point, at which the equipment will display message AH (and activate the acoustic alarm in the case of AKO-14312).	0=off	99°C	0=off
A2	Probe 1 minimum temperature alarm relative to the Set Point. Alarm temperature, below Set Point, at which the equipment will display message AL (and activate the acoustic alarm in the case of AKO-14312).	0=off	99°C	0=off
A3	Delay for all the alarms at start-up. If programmed alarms are detected in A1 and A2, the alarms are activated after equipment start-up when the number of minutes set in A3 expire.	0=off	120 min.	0=off
A4	Delay for all the alarms after defrost Time during which the alarms are deactivated at the end of defrost.	0=off	99 min.	0=off
A5	Alarm delay Time during which the alarms are deactivated from when the temperature commands activation until they are actually activated.	0=off	99 min.	30 min.

GENERAL EQUIPMENT STATUS PARAMETERS

P1	Delay for all functions Delay for all functions when the apparatus receives electric power.	0 min.	99 min.	0 min.
P2	Blocking programmed parameters 1=yes, option that blocks the possibility of modifying the programmed parameters. 0=no, option to cancel the previous one.	0	1	0
P3	Return to initial parameters 1=yes, configures all the equipment parameters with the values held in the DEF column of these instructions and immediately exits programming.		1	
P4	Probe 2 connected? In the situation where evaporator probe operation is not required, program this parameter to 0.	0=no	1=yes	1=yes
EP	Exit programming			

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

OPERATIONAL MESSAGES:

DISPLAY	STATUS	DESCRIPTION
def	Fixed	Indicates that defrost is being performed. In order for "def" to appear in the display during defrost the d2 parameter should be set to option 2.
AH	Intermittent with temperature	The temperature read by probe 1 exceeds the "probe 1 maximum temperature alarm", which is programmed for parameter A1.
AL	Intermittent with temperature	The temperature read by probe 1 is lower than the "probe 1 minimum temperature alarm", which is programmed for parameter A2.
E1	Fixed	Probe 1 failure (open circuit, shorted, temperature > 110°C or temperature < -55°C). The equipment continues to perform manual and/or programmed defrost cycles. Automatic return after open probes without any need to disconnect the equipment for the mains power.
E2	Fixed or intermittent with E1	Probe 2 failure (open circuit, shorted, temperature > 110°C or temperature < -55°C). Message E2 is not displayed if programming parameter P4 is set to 0. When message E2 is displayed, probe 1 temperature continues to be displayed intermittently. The operation of the equipment under these conditions is the same as if parameter P4 had been programmed with option 0 (probe 2 not connected). Automatic return after open probes without any need to disconnect the equipment for the mains power.
E1/E2	Intermittent	Equipment operation is the same as for section E1.
EE	Fixed	Memory failure.

MAINTENANCE:

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

WARNINGS:

If this equipment is used without respecting the manufacturer's instructions, then the safety requirements might be changed.

Between -40°C and +20°C, when probe is extended with minimum 0,5 mm² up to 1000 m cable, deviation will be of 0,25°C.

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