CE Temperature controller AKOCAM

AKOCAM is a solution for static or ventilated cold room stores.
It directly controls single-phase units with compressors of up to 2 PH.
These models control and record the temperature.
Depending on the model, they also have: A printer for printing data or graphs. An alarm for persons trapped inside, with an optical acoustic alarm, and a lamp for requesting help.

AKO-15613
AKO-15633

AKO-156131
AKO-156331

AKO-156332

1- Versions and references

MODEL	PRINTER	ALARM	CONTROL RELAYS (250V, cos φ=1)	POWER SUPPLY
AKO-15613	NO	NO	Cool: 16 A SPST Light: 16 A SPST Alarm: 8 A SPDT	230 V~ +10% -15% 50/60 Hz ± 3 Hz
AKO-156131	YES	NO	Cool: 16 A SPST Light: 16 A SPST Alarm: 8 A SPDT	100 - 240 V~ 50/60 Hz ± 3 Hz
AKO-15633	NO	NO	Cool: 16 A SPST Def: 16 A SPST Fan: 8 A SPDT Light: 16 A SPST Alarm: 8 A SPDT Aux: 16 A SPST	230 V~ +10% -15% 50/60 Hz ± 3 Hz
AKO-156331	YES	NO	Cool: 16 A SPST Def: 16 A SPST Fan: 8 A SPDT Light: 16 A SPST Alarm: 8 A SPDT Aux: 16 A SPST	100 - 240 V~ 50/60 Hz ± 3 Hz
AKO-156332	NO	YES	Cool: 16 A SPST Def: 16 A SPST Fan: 8 A SPDT Light: 16 A SPST Alarm: 8 A SPDT Aux: 16 A SPST	230 V~ +10% -15% 50/60 Hz ± 3 Hz

2- Technical data

Temperature range. . . . . -40.0 °C to +99.9 °C
Resolution, Set Point and differential. . . . . 0,1 °C
Thermometric accuracy . . . . . ± 1 °C s/ EN 12830 and EN 13485
Denomination . . . . . EN 12830, S, A, 1, -40 °C +40 °C; EN 13485, S, A, 1, -40 °C +40 °C
Probe tolerance at 25 °C . . . . . ± 0,4 °C
Input for probe AKO-149XX
Maximum input power . . . . . 24 VA
Working ambient temperature . . . . . 0 °C to 50 °C
Storage ambient temperature . . . . . -30 °C to 70 °C
Installation category: . . . . . II under EN 61010-1
Pollution degree . . . . . II under EN 61010-1
Double insulation between the power supply, the secondary circuit and the relay output.
Recorder autonomy in the event of a power failure. . . . . 48 Hours
Alarm autonomy in the event of a power failure . . . . . 10 Hours
Battery . . . . . Li-Polymer for recorder
Internal buzzer

3- Installation

The controller should be installed in a place protected from vibrations, water and corrosive gases, and where ambient temperature does not surpass the value specified in the technical data.
In order for the controllers to have IP65 protection degree, the gasket should be properly installed between the apparatus and the perimeter of the panel cut-out where it is to be fitted.
In order to give a correct reading, the probe should be installed in a place without heat influences other than the temperature that is to be measured or controlled.

3.1 Wall mounting

-Remove cover T from the equipment (Fig.1a or Fig. 1b).
-Open the equipment and separate the front part of the housing (Fig.2).
-Drill the holes for the glands that are necessary for the cables to pass through, guided by the pre-cut centres on the sides of the housing.
-Drill 3 holes for anchoring the housing at the centres indicated 1, 2, 3 (Fig.3a or 3b).
-Drill 3 holes in the wall, in accordance with the anchoring holes made previously in the equipment.
-Anchor the glands to the equipment.
-Insert and tighten the 3 screws+plug through the housing, on the 3 holes drilled in the wall.
-Insert the cables into the glands.
-Mount the front part on the housing (Fig.2).
-Insert and tighten screws D, E, F (Fig.1a or Fig. 1b)
-After connecting the cables based on the connection diagram, close cover T, insert and tighten screws A, B, C (Fig.1a or Fig.1b).

3.2 Panel Mounting (maximum panel thickness: 3mm)

-Remove cover T from the equipment (Fig.1a or Fig.1b).
-Open the equipment and separate the front part of the housing (Fig.2).
-Replace the joint installed at the front by the panelling joint, ensuring that it is in the right position.
-Make an opening in the panel with the dimensions indicated (Fig.4a or Fig.4b).
-Drill the holes for the glands that are necessary for the cables to pass through, guided by the pre-cut centres on the sides of the housing.
-Finish drilling holes G, H, J with a 4 mm bit (Fig.3a or Fig.3b).
-Anchor the glands to the equipment.
-Insert the cables into the glands.
-Join the front with the housing, through the panel and tighten the 45 mm screws through holes D, E, F, G H, J (Fig.3a or Fig.3b).
-After connecting the cables in accordance with the connection diagram, close cover T, and insert and tighten screws A, B, C (Fig.1a or Fig.1b).

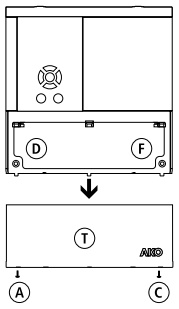


FIG.1a

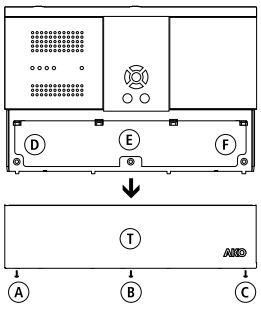


FIG.1b

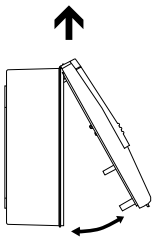


FIG.2

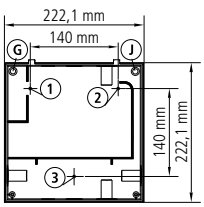


FIG.3a

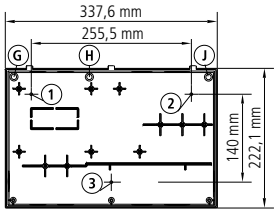


FIG.3b

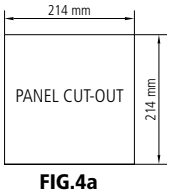


FIG.4a

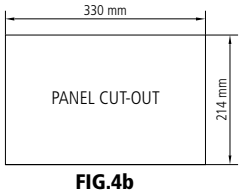


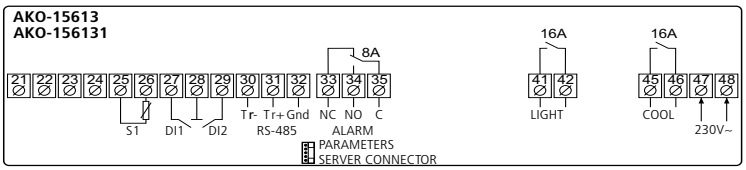
FIG.4b

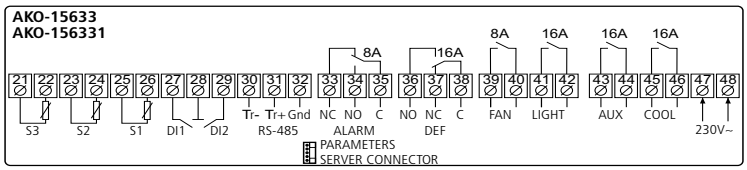
3.3- Lamp Mounting (on equipment that has an alarm indicating a person is trapped inside)

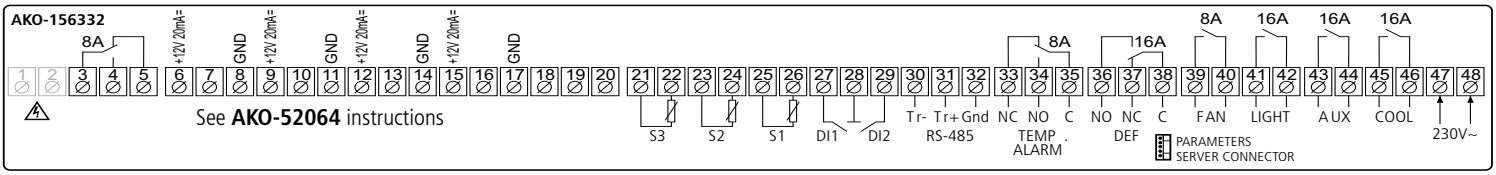
- See **AKO-52064** instructions

3.4 Connection

CONNECT THE BATTERIES PRIOR TO STARTING UP THE EQUIPMENT.







IMPORTANT: The function of every probe entry depends on its configuration (See table "Assignment of entries")

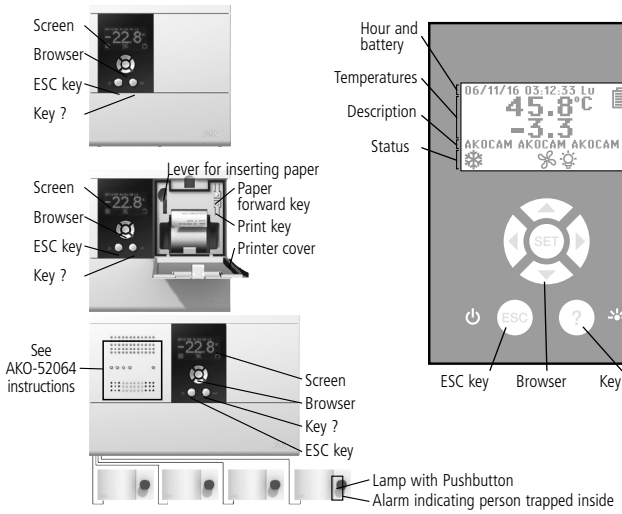
To obey EN12830 you must configure the control probe and the register probe seperatly.

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

Always disconnect the power supply when making the connections.

The power supply circuit should be connected with a minimum 2 A, 230 V, switch located close to the unit. Power supply cables should be H05VV-F 2x0,5 mm^2 or H05V-K 2x0,5 mm^2.

Section of connecting wires for relays contacts should be 2,5 mm^2.



4- Front panel functions

4.1 Hour and Battery

View hour in format: YY/MM/DD HH:MM:SS Day of the Week

Configurable in the menu: (CLOCK)

View the status of the equipment battery:

Battery flat Battery charging Battery charged

4.2 Temperatures

View the temperatures of the selected probes in °C or in °F

Configurable in the menu: (GENERAL STATUS)

4.3 Description

This allows a brief description of the facility to be inserted or a name to be given to the equipment.

Configurable by pressing the **SET** + ▶ keys for 5 seconds.

4.4 Status

View the status of the functions performed by the control.

COOL (Compressor)

Permanent: Cooling relay COOL (compressor) energised.

Flashing: Because of the temperature detected by probe 1, the COOL relay should be energises, but is not due to a programmed parameter.

FAN

Permanent:FAN relay energised.

Flashing: Because of the temperature detected by probe 2, the FAN relay should be energised, but is not due to a programmed parameter.

DEFROST

Permanent: Indicates defrost in operation.

DEFROST ENDED BY TIME

Permanent: Indicates last defrost ended by time.

CONTINUOUS CYCLE

Permanent: Indicates that the continuous cycle is active.

ALARM ON

Permanent: It means that an alarm has occurred

ALARMA OFF

Flashing: Indicates pressing of a pushbutton after the alarm indication. Alarm relay off.

LIGHTING

Permanent: Indicates that lighting is on.

ENERGY SAVING

Permanent: Indicates that energy saving function is on.

HACCP (Hazard Analysis and Critical Control Point)

Permanent: Indicates that HACCP function is on.

Flashing: HACCP alarm stored.

/ AUX (Auxiliary)

Flashing: AUX relay actuated by key.

/ AUX (Auxiliary)

Flashing: AUX relay actuated by digital input.

/ AUX (Auxiliary)

Flashing: AUX relay indicating whether the equipment is connected or disconnected.

/ AUX (Auxiliary)

Flashing: AUX relay operating as a second defrosting device.

/ AUX (Auxiliary)

Flashing: AUX relay operating as PUMP DOWN

/ AUX (Auxiliary)

Flashing: Auxiliary relay active copying relay status for compressor.

4.5 Browser

The key function help screen appears after any key on the browser is pressed

UP key ▲

-When pressed for 5 seconds, manual defrost is activated/deactivated for the programmed duration.

-In programming, it moves the selection upwards.

-In programming, it makes the displayed value increase

LEFT key ◀

-Press to actuate / deactuate the AUX relay.

-In programming, it moves the selection to the left.

DOWN key ▼

-When pressed for at least 5 seconds, the SP Set Point temperature is displayed.

-In programming, it moves the selection downwards.

-In programming, it makes the displayed value reduce.

RIGHT key ▶

-When pressed for at least 5 seconds, it activates the CONTINUOUS CYCLE during the time for which it has been programmed.

-Pressing during 5 secondes with the CONTINUOUS CYCLE active, it interrupts the process inmediately.

-In programming, it moves the selection to the right.

SET-key

-When pressed for at least 5 seconds the parameters folder screen is displayed.

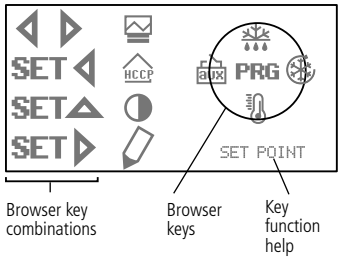
-In programming, it accepts the programmed new value.

ESC / key

-Accepts the alarms and disconnects alarm outputs.

-Pressing during 5 seconds it turns off the unit leaving it in STAND-BY. The display shows m when the unit is disconnected.

-In programming, it permits leaving a parameter without accepting the changes, return to the previous menu and exit programming.



? / Key

-By pressing, it turns on/off the lighting relay. The lighting key continues operating even if the unit is on mode.

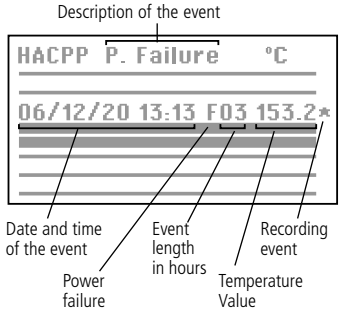
-In programming, the parameter or selected function help screen is displayed.

SET + ▲ keys (CONTRAST)

-When pressed for at least 5 seconds, the screen contrast can be adjusted. Once inside the contrast adjustment screen, press ▲ or ▼ to increase or reduce the contrast.

SET + ◀ keys (HACCP)

-When pressed for at least 5 seconds, the HACCP (Hazard Analysis and Critical Control Point) events recorder is accessed.



SET + ▶ keys (DESCRIPTION, EDIT TEXT)

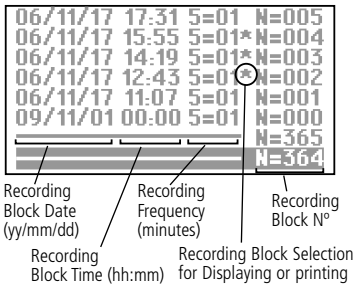
- When pressed for at least 5 seconds, it permits the user to enter a brief description of the facility or give a name to the equipment.

To edit the description press by selecting the character to be entered using the browser keys and press **SET**. Select ▶ in the screen to move the character to be entered to the right or ◀, to the left. Select ▱ to erase a character that has been incorrectly entered. Press 🖫, to save the description.

◀ + ▶ keys (RECORDER)

When pressed for at least 5 seconds the data recorder is accessed.

-The recorder stores the data in 366 blocks of 96 data recorders in each block. There must be at least one probe configurated as record probe. (See table "Assignment of entries")



-Select the desired block using the browser keys. The block is selected by *.

-Press the ▶ key to add the previous block to be displayed or printed to the selection.

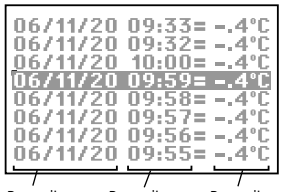
-Press the ◀ key to eliminate the block that is not required to be displayed or printed from the selection.

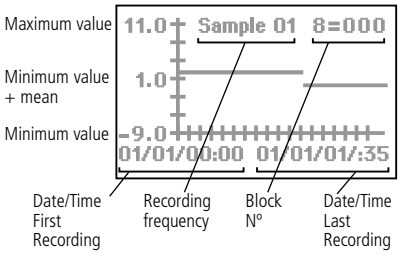
-Press the **SET** key to accept the blocks selection.

Notes: Only consecutive blocks with the same recorder frequency can be selected.

The register frequency is configured through the parameters menu 🔧, specifically, the **Recorder Frequency parameter**.

-Select 🗁 to view the 96 data recorder





-For equipment with a printer: Press the 🖶, key to print out the graph.

-Select 🖻 to view the 96 data recorder graph.

⊙ key (Paper forward) (For equipment with a printer).

-Open the printer lid. Press the key to enable the paper to enter the printer while reloading the paper.

🖶 key (Print) (For equipment with a printer).

-Open the printer lid. Press the key to print out the recorded data or the graph.

Level permitting the paper to be inserted (For equipment with a printer).

-Open the printer lid. Pull the lever and insert the paper, following the directions on the label on the printer lid.

5- Adjustment and configuration

It should only be programmed or modified by personnel who are fully conversant with the equipment operation and possibilities

5.1 Set Point temperature

The factory SET POINT default value is 0.0 °C

-Press ▼ key for at least 5 seconds to display SET POINT. It displays the current SET POINT value.

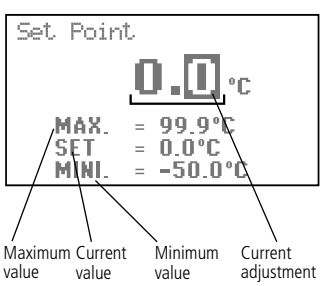
-Press the browser keys to change the Set Point to the required value.

-Press **SET** key to accept the new SET POINT. The display returns to the current temperature display status

When **PASSWORD** is displayed, PASSWORD programmed in PASSWORD parameter of 🔧 menu should be entered to access the current SET POINT.

-Press the browser keys to enter the programmed (Password).

-Press **SET** key to accept password. The current SET POINT value will be displayed and it can be already modified.



5.2 Parameters configuration

Level 1 Menus

-Press the **SET** key for 5 seconds to view the MENUS.

-Press the browser keys to select the menu.

-Press the **SET** key to access the parameters of the selected menu. If **PASSWORD,** appears, enter the access code (Password) programmed in the **ACCES CODE** parameter of the menu 🔧 to access the current adjustment (Set Point).

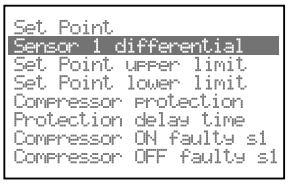
-Press the browser keys to enter the programmed code (Password).

-Press the **SET** key to accept the code. The menus that can be modified will appear.

Level 2 Parameters

-In the desired menu of level 1 MENUS, press **SET.** key. Level 2 PARAMETERS programming is accessed. The first parameter of the selected menu is displayed on the screen.

-Press the navigation keys to select the parameter.

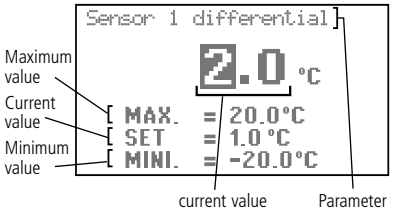


Level 3 Values

-To display the current value of any parameter, select the required one and press **SET.** key simultaneously. Once it is displayed, press the browser keys to change the value.

-Press **SET** key to accept the new value. The programming returns to LEVEL 2 PARAMETERS.

REMARK: If no key is pressed for 25 seconds in either of the previous steps, the controller will automatically return to the CURRENT TEMPERATURE display status without modifying any of the parameters values.



6- Description of parameters and messages

Values in the **Def.** column are factory-set.

AKO-15613, AKO-156131 (3 Relays)
AKO-15633, AKO-156331, AKO-156332 (6 Relays)

Level 1	Menus and Description						
❄	Level 2	REFRIGERATION control (Compressor)					
	Level 3 Description	Values	Min.	Def.	Max.		
	Set Point	(°C/°F)	-40,0	0,0	99,9	●	●
	Probe 1 differential (Hysteresis)	(°C/°F)	0,1	1,0	20,0	●	●
	Calibration of probe 1	(°C/°F)	-20,0	0,0	20,0	●	●
	Set Point upper limit (It cannot be set above this value)	(°C/°F)	-40,0	99,9	320	●	●
	Set Point lower limit (It cannot be set below this value)	(°C/°F)	-40,0	-40,0	320	●	●
	Compressor protection delay type: OFF/ON (From the last switch-off) ON (At switch-on)			off/on		●	●
	Compressor protection delay time	(min.)	0	0	255	●	●
	"COOL" (Compressor) relay time in ON in case of faulty probe 1 (If 0 the relay will always be OFF disconnected)	(min.)	0	10	255	●	●
	"COOL" (Compressor) relay time in OFF in case of faulty probe 1 (If 0 the relay will always be ON connected)	(min.)	0	5	255	●	●
	Compressor stops when opening door? (No=Connected) (Yes=Disconnected)			No		●	●
❄	Level 2	DEFROST control					
	Level 3 Description	Values	Min.	Def.	Max.		
	Defrost type: (Electrical heater) (Reverse cycle)			EH		●	
	Defrost count (Frequency) (Compressor operation sum) (RTC: Real time clock)			Fre.		●	●
	Defrost frequency Elapsed time between 2 starts	(h.)	0	6	120	●	●
	Defrost maximum duration	(min.)	0	30	255		
	Type of message during defrost: (Current temperature display) (Defrost start temperature display) (Display DEFROST message)			DEF.		●	●
	Message maximum duration Time added at the end of defrost	(min.)	0	5	255	●	●
	Defrost final temperature by probe 2 If probe 2 is programmed	(°C/°F)	-40,0	8,0	99,9	●	
	Defrost start-up on equipment switch-on:			No		●	●
	Defrost start-up delay on equipment switch-on	(min.)	0	0	255	●	●
	Signals if defrost ends due to maximum time			No		●	
	Drip time, compressor stops and FAN relay off when defrost ends	(min.)	0	1	255	●	●

AKO-15613, AKO-156131 (3 Relays)
AKO-15633, AKO-156331, AKO-156332 (6 Relays)

Level 2 / Level 3	Description	Values	Min.	Def.	Max.		
Level 2	**FANS control (Evaporator)**						
Level 3	Fans stop temperature by probe 2 If probe 2 is programmed	(ºC/ºF)	-40,0	4,0	99,9	•	
Level 3	Probe 2 differential	(ºC/ºF)	0,1	1,0	20,0	•	
Level 3	Stop fans, when compressor stops? (No=Connected) (Yes=Disconnected)			No		•	
Level 3	Fans status during defrost Connected Disconnected			Disc.		•	
Level 3	Start-up delay after defrost Operates if it is higher than Drip Time	(min.)	0	3	255	•	
Level 3	Stop fans if the door opens? (No=Connected) (Yes=Disconnected)			No		•	
Level 2	**ALARM control (Visual)**						
Level 3	Configuration of temperature alarms (Relative to SP) (Absolute)			SP		•	•
Level 3	Maximum alarm in probe 1	(ºC/ºF)	-40,0	50,0	320	•	•
Level 3	Minimum alarm in probe 1	(ºC/ºF)	-40,0	50,0	320	•	•
Level 3	Differential Alarms Temperature	(ºC/ºF)	0,1	1,0	20,0	•	•
Level 3	Temperature alarm delay from the moment at which they should operate due to temperature	(min.)	0	30	255	•	•
Level 3	Temperature alarm delay in the start-up	(min.)	0	0	255	•	•
Level 3	Temperature alarm delay from the end of a defrost	(min.)	0	0	255	•	•
Level 3	Temperature alarm delay from digital input disabling If programmed as "Door contact"	(min.)	0	0	255	•	•
Level 3	Temperature alarm delay from digital input enabling If programmed as "Door contact"	(min.)	0	0	255	•	•
Level 3	Alarm Relay State (Connected) (Disconnected)			Con.		•	•
Level 2	**DIGITAL INPUTS**						
Level 3	Digital Input Nº1 configuration (Disabled) (Door Contact) (External alarm) (Severe external alarm) (Remote defrost) (Remote Energy saving) (Auxiliary activation) (Low pressure input) (Thermostat control)			Dis.		•	•
Level 3	Alarm delay of digital Input Nº 1	(min.)	0	0	255	•	•
Level 3	Polarity of digital input Nº1 Normally Open Normally Closed			NC.		•	•
Level 3	Digital Input Nº2 configuration (Disabled) (Door Contact) (External alarm) (Severe external alarm) (Remote defrost) (Remote Energy saving) (Auxiliary activation) (Low pressure input) (Thermostat control)			Dis.		•	•
Level 3	Alarm delay of digital Input Nº 2	(min.)	0	0	255	•	•
Level 3	Polarity of digital input Nº2 Normally Open Normally Closed			NC.		•	•
Level 3	Inact. with door open (time)	(min.)	0	0	255	•	
Level 3	Cold room light timing	(min.)	0	0	255	•	
Level 2	**AUX RELAY**						
Level 3	AUX relay configuration (Disabled) (Activated by key) (Activated by input) (Equal state of equipment) (Second Defrost) (Pump down control) (Equal compressor state)			Dis.		•	
Level 3	Defrost 2 maximum duration	(min.)	0	30	255	•	
Level 3	Defrost 2 final temperature	(ºC/ºF)	-40.0	8.0	99.9	•	
Level 3	Defrost 2 probe (Disabled) (Probe 2) (Probe 3)			Dis.		•	
Level 3	Pump down duration	(sec.)	1	30	1800	•	
Level 3	Pump down On delay	(sec.)	0	60	60	•	
Level 2	**GENERAL STATUS**						
Level 3	Access password to parameters and Set Point		0	0	99	•	•
Level 3	Allocation of password to Set Point			No		•	•
Level 3	Initial parameters: (YES, configure to "Def" and exit programming)			No		•	•
Level 3	Registry interval	(min.)	0	15	60	•	•
Level 3	Address for units with communication		0	1	255	•	•
Level 3	Parameters transfer (Disabled) (Send) (Receive)			Dis.		•	•
Level 3	Connected probes (Probe 1) (Probe 1 + 2) (Probe 1 + 3) (Probe 1,2 + 3)			S1		•	
Level 3	Probe to be displayed		1	1	3	•	
Level 3	Display mode (1 probe + clock) (1 probe + text) (Connected probes + clock + text)			1SC		•	•
Level 3	Temperature display unit		ºC	ºC	ºF	•	•
Level 3	Decimal point			Yes		•	•
Level 3	Probe setting (TEM at S1/REG at S3), (TEM and REG at S3) (See table "Assignment of entries")			TEM at S1		•	•
Level 3	Delay of all functions on power supply switch on	(min.)	0	0	255	•	•
Level 3	Program version (Information)					•	•
Level 2	**CONTINUOUS CYCLE**						
Level 3	Continuous cycle duration	(h.)	0	1	24	•	•

AKO-15613, AKO-156131 (3 Relays)
AKO-15633, AKO-156331, AKO-156332 (6 Relays)

Level 2 / Level 3	Description	Values	Min.	Def.	Max.		
Level 2	**ENERGY SAVING**						
Level 3	Set Point during energy saving	(ºC/ºF)	-40,0	0	320	•	•
Level 3	Energy saving duration	(h.)	0	0	24	•	•
Level 2	**HACCP**						
Level 3	Delay in registering a event after a temperature alarm	(min.)	0	1	255	•	•
Level 2	**LANGUAGE**						
Level 3	English					•	•
Level 2	**CLOCK**						
Level 3	Date (Year Month Day)					•	•
Level 3	Hour (Week_Day Hour Minute)					•	•
Level 3	Defrost 1 (Day Hour Minute)					•	•
Level 3	Defrost 2 (Day Hour Minute)					•	•
Level 3	Defrost 3 (Day Hour Minute)					•	•
Level 3	Defrost 4 (Day Hour Minute)					•	•
Level 3	Defrost 5 (Day Hour Minute)					•	•
Level 3	Defrost 6 (Day Hour Minute)					•	•
Level 3	Defrost 7 (Day Hour Minute)					•	•
Level 3	Defrost 8 (Day Hour Minute)					•	•
Level 3	Energy saving Start (Day Hour Minute)					•	•

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

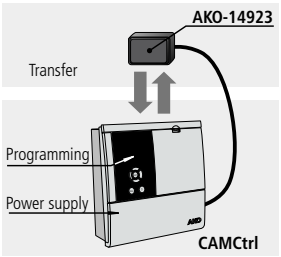
MESSAGES	
PASSWORD	Password request to enter programming parameters or SET POINT
DEFROST	It indicates defrosting is being carried out.
EXTERNAL ALARM	Flashing with temperature
SEVERE EXT.ALARM	Flashing with temperature
ALARM HIGH TEMP.	**Flashing with temperature** - probe 1 temperature exceeds the parameter programmed in Maximum alarm in probe 1.
ALARM LOW TEMP.	**Flashing with temperature** - The probe 1 temperature is lower than the parameter programmed in Minimum alarm in probe 1
ALARM LOW PRESSURE	**Flashing with temperature** - Low pressure switch error with compressor On
probe 1, 2 or 3 FAILURE	probe 1, 2 ou 3 failure (Open circuit, crossed temp.> 110ºC or temp.<-55ºC)

ASSIGNMENT OF ENTRIES ACCORDING TO CONFIG. OF PROBE

PROBE CONFIGURATION				
	TEM at S1/REG at S3 (According to EN12830)			Connectors
	Probe 1	Control, alarms and HACCP probe	Input S1	25 and 26
	Probe 2	Defrost probe (or 2º defrost)	Input S2	23 and 24
	Probe 3	Registry probe (or 2º defrost)	Input S3	21 and 22
	TEM+REG at S3			Connectors
	Probe 1	Control, alarms, HACCP and registry probe	Input S3	21 and 22
	Probe 2	Defrost probe (or 2º defrost)	Input S2	23 and 24
	Probe 3	Product core probe (or 2º defrost)	Input S1	25 and 26

7- Accessories

AKO-14923 portable server, with no power supply, in which parameters programmed in a powered controller can be copied by transfer. Parameters can be transferred again from the server to other identical powered controllers.



8- Maintenance

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

Equipment including rechargeable electrical batteries:
This unit includes batteries which must be replaced when the device's autonomy time is below the indicated in the specifications. At the end of the unit's service life the batteries should be disposed of at a selective refuse collection site or returned to the manufacturer.

9- Warnings

The use of the unit without observing the manufacturer's instructions may alter its safety qualification. To ensure correct operation of the apparatus, only NTC type probes supplied by AKO should be used. Between -40 ºC and +20 ºC, when the probe is extended up to 1.000 m with minimum 0,5 mm^2 cable, deviation will be less than 0.25 ºC (Probe extension cable ref. **AKO-15586**)

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