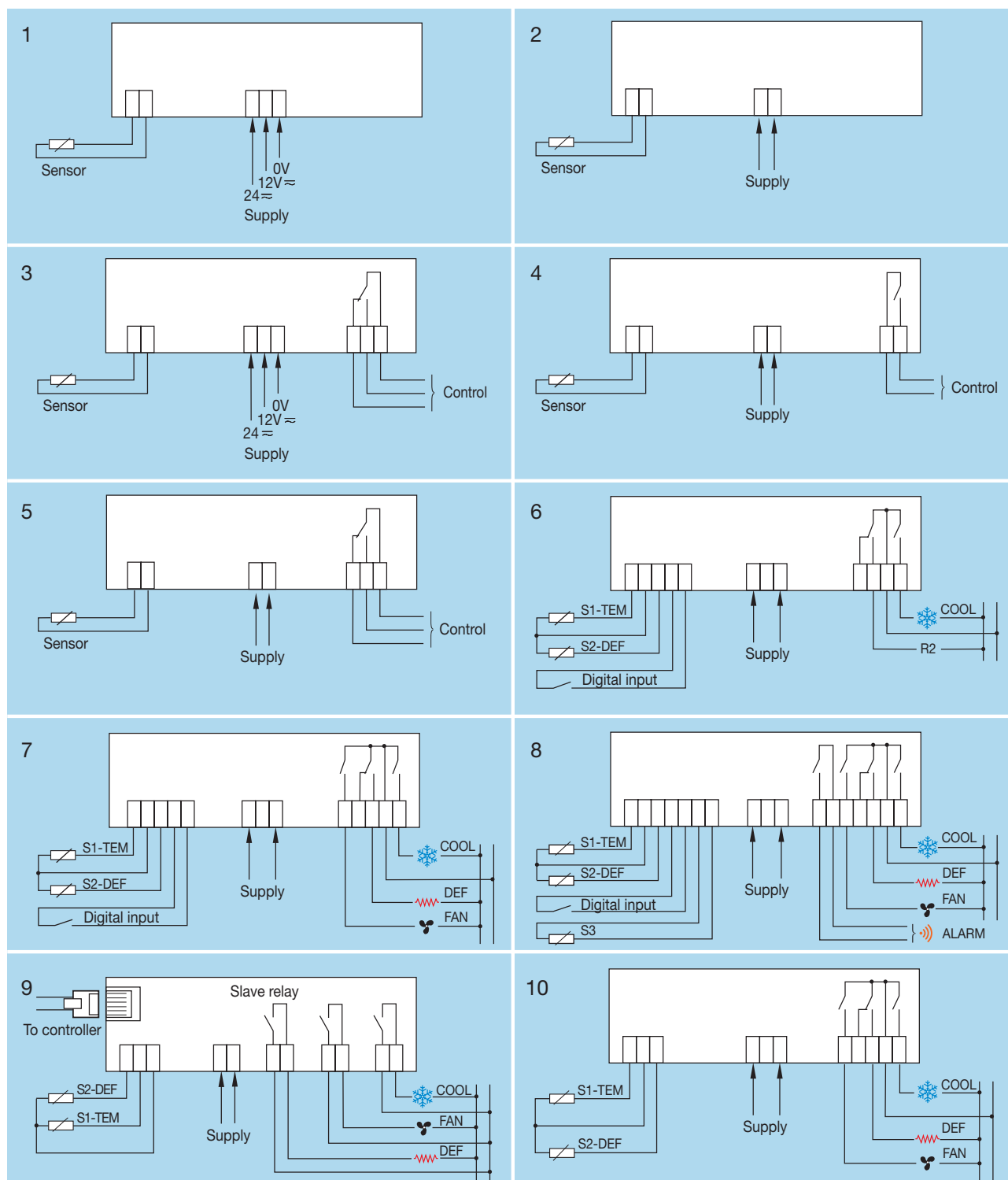


GENERAL TECHNICAL SPECIFICATIONS

Temperature range:	-50°C to +99°C
Sensor type:	NTC
Total accuracy (Sensor + controller):	±1°C
Sensor lead extension with cable AKO-15586 :	Max. decrease 0.35°C for each 100m
Operating ambient temperature range:	5°C to 50°C
Storage temperature range:	-30°C to 70°C
Installation category:	II in accordance with the CEI 664 standard

REFERENCE DIAGRAMS ON FOLLOWING PAGE

The following diagrams represent concepts, each controller includes its diagram with terminal numbering for correct connection.



REFERENCES AND SPECIFICATIONS

Wall mounting installation



Installation with the slave relay for DIN 43880 rail mounting



Panel mounting installation



REFERENCES:

SPECIFICATIONS

[illegible]

SPECIFICATIONS

Diagram for previous page

2 Digits, from -50°C to + 99°C

3 Digit decimal pt. from -49,9°C to 99,9°C

Sensor 1, NTC 1,5m included, non-adjustable

Sensor 1, NTC 1,5m included, adjustable

Sensor 2, NTC not included

Sensor 3, NTC not included

Power supply	12V $\approx\pm 20\%$, 50/60Hz
--------------	---------------------------------

Power supply 12/24V $\approx\pm 10\%$, 50/60Hz

Power supply	230V~±10%, 50/60Hz
--------------	--------------------

Relay 1, Control (compressor) R 8(3)A, 250V, $\cos \varphi=1$, SPST

Relay 1, Control (compressor) R 8(3)A, 250V, $\cos \varphi=1$, SPDT switch

Relay 1, Control (compressor) R16(4)A, 250V, $\cos \varphi=1$,

Relay 1, Control (compressor) R16(4)A, 250V, $\cos \varphi=1$, SPDT switch

Relay 1, Control (compressor) R20(6)A, 250V, $\cos \varphi=1$,

Relay 1, Control (compressor) R 30 max.18(5)A, 250V, $\cos \varphi=1$, SPST

Relay 2, Defrost or fans R 8A, 250V, $\cos \varphi=1$, SPDT switch

Relay 2, Defrost	R 8A, 250V, $\cos \varphi=1$, SPDT switch
------------------	--

Relay 2, Defrost	R 8A, 250V, $\cos \varphi=1$, SPST
------------------	-------------------------------------

Relay 3, Fan	R 6A, 250V, $\cos \varphi=1$, SPST
--------------	-------------------------------------

Relay 3, Fan	R 8A, 250V, $\cos \varphi=1$, SPST
--------------	-------------------------------------

Relay 4, Alarm	R 6A, 250V, $\cos \varphi=1$, SPST
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Internal acoustic alarm

Digital input (for voltage-free contacts)

Real time clock

Communications conector

REFERENCES AND PROGRAMMABLE PARAMETERS

AKO-14412, AKO-14423		4 relays, up to 3 sensors	Compressor + Defrost + fans + Alarms									
AKO-14312B, AKO-14323B		3 relays, up to 2 sensors	Compressor + Defrost + fans									
AKO-14530, AKO-14632		3 relays, up to 2 sensors	Compressor + Defrost + fans									
AKO-14212A, AKO-14223		2 relays, up to 2 sensors	Compressor + Defrost by electric heat or air									
AKO-14112, AKO-14123, AKO-14128, AKO-14129, AKO-14610, AKO-14611		1 relay, 1 sensor	Defrost by compressor stop									
AKO-14031		Adjustable thermometer										
AKO-14012, AKO-14023, AKO-14602		Thermometers										
PARAMETERS			VALUES									
	REFRIGERATION (Compressor)		Min.	Def.	Max.							
C0	Sensor 1 calibration (Offset)		-20°C	0°C	+20°C	•	•	•	•	•		
C1	Sensor 1 differential (Hysteresis)		1°C	2°C	20°C		•	•	•	•		
C2	Set point upper limit (it cannot be set above this value)		xx°C	99°C	99°C		•	•	•	•		
C3	Set point lower limit (it cannot be set below this value)		-50°C	-50°C	xx°C		•	•	•	•		
C4	Compressor protection delay type: 0=OFF/ON (from de last to switch-off) 1=ON (at swicht-on)		0	0	1		•	•	•	•		
C5	Protection delay time (value for the option selected for parameter C4)		0min	0min	99min		•	•	•	•		
C6	"COOL" relay status with faulty sensor 1 (1 relay equipment) 0=OFF/ON (average last 24 hours) 1=OFF/ON (to C7 and C8 program)		0	0	1		•					
C6	"COOL" relay status with faulty sensor 1 (2, 3, 4, relay equipment) 0=OFF 1=ON 2=OFF/ON (to C7 and C8 program)		0	1	2			•	•	•		
C7	"COOL"relay (compressor) ON time in in case of sensor 1 failure if C7=0 and C8 ≠ 0, the relay will always be OFF de-energised		0min	10min	99min		•	•	•	•		
C8	"COOL"relay (compressor) ON time in in case of sensor 1 failure if C8=0 and C7 ≠ 0, the relay will always be ON energised		0min	5min	99min		•	•	•	•		
	DEFROST		Min.	Def.	Max.							
d0	Elapsed time between 2 starts (1 relay equipment)		0h	1h	99h		•					
d0	Elapsed time between 2 starts (2, 3, 4, relays equipment)		0h	6h	99h			•	•	•		
d1	Maximum duration (1 relay equipment)		0min	0min	99min		•					
d1	Maximum duration (2, 3, 4 relays equipment)		0min	30min	99min			•	•	•		
d2	Type of message during defrost: (0=display the actual temp.) (1=display the defrost start temp.) (2=display the message dF or dEF)		0	2	2		•	•	•	•		
d3	Maximum time of message added at end of defrost		0min	5min	99min		•	•	•	•		
d4	Sensor 2 final defrost start temperature (if it is programmed in P4)		-50°C	8°C	99°C			•	•	•		
d5	Defrost on equipment switch on: (0=no, first defrost according d0) (1=yes, first defrost according d6)		0	0	1			•	•	•		
d6	Defrost start delay on equipment switch-off if d5=1		0min	0min	99min			•	•	•		
d7	Defrost type: 0=Electric heat 1=Hot gas bypass In 2-relay models for air defrosting, it is necessary to program F3		0	0	1			•	•	•		
d8	Time calculation between defrost periods: (0=Total real time) 1=Compressor operation sum)		0	0	1			•	•	•		
d9	Drip time, compressor stop and FAN/R2 relay off when defrost ends In 2-relay, R2 operates in all cases of P6		0min	1min	99min			•	•	•		
d10	1st defrost hour start time		0	off	23					•		
d11	2nd defrost hour start time		0	off	23					•		
d12	3rd defrost hour start time		0	off	23					•		
d13	4th defrost hour start time		0	off	23					•		
d14	5th defrost hour start time		0	off	23					•		
d15	6th defrost hour start time		0	off	23					•		
	FANS (Evaporator)		Min.	Def.	Max.							
F0	Sensor 2 fan stop temperatures (if it is programmed in P4)		-50°C	4°C	99°C			•	•	•		
F1	Sensor 2 (F0) differential for switching the FAN/R2 relay A1 and A2 Differential In 2-relay models if P6=1 and P4=1		1°C	2°C	50°C			•	•	•		
F2	Stop fans if compressor stops? (0=no) (1=yes) (In 2-relay if P6=1)		0	0	1			•		•		
F2	Stop fans if compressor stops? (0=yes) (1=no)		0	1	1				•			
F3	Fan status during defrost (0=stopped) (1=running)		0	0	1			•		•		
F3	Fan status during defrost (0=running) (1=stopped)		0	1	1				•			
F4	Start-up delay after defrost (applicable if greater than d9)		0min	3min	99min			•	•	•		
F5	Stop fan if door opens? (0=no) (1=yes)		0	0	1			•		•		

REFERENCES AND PROGRAMMABLE PARAMETERS

AKO-14412, AKO-14423		4 relays, up to 3 sensors	Compressor + Defrost + fans + Alarms							
AKO-14312B, AKO-14323B		3 relays, up to 2 sensors	Compressor + Defrost + fans							
AKO-14530, AKO-14632		3 relays, up to 2 sensors	Compressor + Defrost + fans							
AKO-14212A, AKO-14223		2 relays, up to 2 sensors	Compressor + Defrost by electric heat or air							
AKO-14112, AKO-14123, AKO-14128, AKO-14129, AKO-14610, AKO-14031		1 relay, 1 sensor	Defrost by compressor stop							
		Adjustable thermometer								
AKO-14012, AKO-14023, AKO-14602		Thermometers								
PARAMETERS					VALUES					
🔊	ALARMS (Visual, acoustic or relay)				Min.	Def.	Max.			
A1	Maximum, °C above the Set Point in sensor 1				0=off	0=off	99°C		•	•
A2	Minimum, °C below the Set Point in sensor 1				0=off	0=off	99°C		•	•
A3	Start-up temperature alarm delay (if programmed in A1, A2)				0=off	0=off	120min		•	•
A4	Temp. alarm delay from end of defrost				0=off	0=off	99min		•	•
A5	Temp. alarm delay from the temperature at which they operate				0=off	30min	99min		•	•
A6	Temp. alarm delay from digital input disable (door if P9=1)				0=off	0=off	126min		•	•
A7	Temp. alarm delay from digital input enable (door if P9=1)				0=off	0=off	126min		•	•
A8	Alarms if defrost ends for maximum time: (0=no) (1=yes)				0	0	1		•	•
A9	Relay 4 alarm polarity configuration: (0=with alarm relay ON) (1=with alarm relay OFF)				0	0	1			•
!	OTHER FEATURES				Min.	Def.	Max.			
P0	Type of operation: (0=Cold) (1=Heat)				0	0	1	•		
P1	Relay for all function on power supply switch on				0min	0min	99min	•	•	•
P2	Programmed parameter block : (1=yes, block) (0=no, unblock)				0	0	1	•	•	•
P3	Initial parameters: (1= yes, configure to "Def" and exit progr.)				0	0	1	•	•	•
P4	Connected sensors: (1=Sensor 1) (2=Sensor 1+Sensor 2) (3=Sensor 1 +Sensor 2 +Sensor 3)				1	2	3		•	•
P4	Connected sensors: (0=Sensor 1) (1=Sensor 1+Sensor 2)				0	1	1			•
P5	Adress for equipment with communication				0	0	126		•	•
P6	Relay 2 (R2) function: (0=defrost by electric heat) (1=fan control)				0	0	1		•	
P7	Temperature display mode: (0=Whole) (1=One decimal)				0	0	1		•	•
P8	Displayed sensor: (1=Sensor 1) (2=Sensor 2) (3=Sensor 3)				1	1	3		•	•
P9	Digital input configuration: (0=disabled) (1=door) (2=external alarm)				0	0	2		•	•
P10	Contact with open door or disabled alarm: (0=open) (1=closed)				0	0	1		•	•
P11	Transfer parameters: (0=disabled) (1=send) (2=receive)				0	0	2		•	•
P12	Program version (information)								•	•
r1	Clock configuration, Hour				0	x	23			•
r2	Clock configuration, Minute				0	x	59			•
EP	Exit programming								•	•
MESSAGES										
dF	Fixed - Indicates defrost is being carried out. In order to display “dF” o“dEF” when defrosting, it is essential that parameter d2 is set to option 2.								•	•
AE	Intermittent with temperature- External alarm (if P9=2)								•	•
AH	Intermittent with temperature- The sensor 1 temperature is between 99°C< temp.<110°C or exceeds the parameter temperature programmed in C2								•	
AH	Intermittent with temperature- The sensor 1 temperature exceeds that programmed in A1								•	•
AL	Intermittent with temperature- The sensor 1 temperature is lower than that programmed in C3								•	
AL	Intermittent with temperature- The sensor 1 temperature is lower than that programmed in A2								•	•
Ar	Intermittent with temperature- Low-charge clock battery or non-programmed clock alarm									•
E1	Sensor 1 failure (open circuit, crossed, temp.> 110°C ó temp.<-55°C)							•	•	•
E2	Sensor 2 failure (open circuit, crossed, temp.> 110°C ó temp.<-55°C)								•	•
E3	Sensor 3 failure (open circuit, crossed, temp.> 110°C ó temp.<-55°C)									•
E5	Incorrect sensor configuration (see P4, P8)								•	•
EE	Memory failure							•	•	•
	Messages E2 and E3 are displayed if P4 has been suitable programmed. Equipment operation under these conditions is the same as if P4 had been programmed with option 1								•	•

FRONT PANEL FUNCTIONS



Increase button

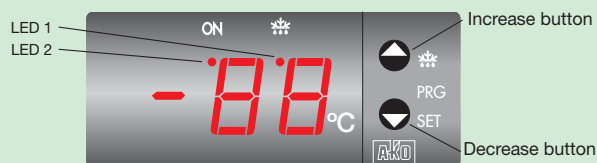
- When pressed for at least 5 seconds, a manual defrost is started with programmed duration.
- In programming, it increases the value being displayed.
- In 2, 3 and 4 relay models, it cancels the alarms, but they remain displayed.



Decrease button

- When pressed for at least 5 seconds, it displays the SET POINT temperature value.
- In programming, it decreases the value being displayed.
- In 2, 3 and 4 relay models, it cancels the alarms, but they remain displayed.

MODELS WITH 1 RELAY:

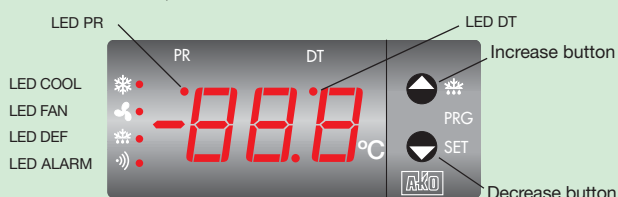


LED 1 Permanent: Indicates defrost in operation.

LED 2 Permanent: Indicates compressor relay is ON.

Flashing: Set Point or parameter programming phase.

MODELS WITH 2, 3 AND 4 RELAYS:



LED DT Permanent: Indicates last defrost ended by time.

LED PR Flashing: Set Point or parameter programming phase.

LED COOL Permanent: Cooling relay COOL (compressor) energised.
Flashing: Because of the temperature detected by Sensor 1 (TEM), the COOL relay should be energised, but is not due to a programmed parameter.

LED FAN Permanent: FAN relay energised.
Flashing: Because of the temperature detected by Sensor 2 (DEF), the FAN relay should be energised, but is not due to a programmed parameter

LED DEF Permanent: Indicates defrost in operation.

LED ALARM Permanent: ALARM relay energised (or acoustic alarm).
Flashing: Alarm detected, relay de-energised, but display maintained.

- When the key is pressed for at least 5 seconds, it displays the current SET POINT and LED 2/PR flashes.
- Pressing the or keys permits the SET POINT to be adjusted to the required value.
- Pressing the and keys simultaneously sets the new value. When this operation is carried out, the display will return to the current temperature and LED 2/PR will cease flashing.

Adjusting thermometer ref. AKO-14031 calibration

Pressing the two keys simultaneously for at least 10 seconds displays the calibration value (default = 0°C). Each press of the keys or will change the temperature display by 1°C between -20°C and +20°C. The two keys should be pressed simultaneously again in order to accept the new value.

PARAMETERS

The parameters should only be programmed or modified by personnel who are fully conversant with the operation and possibilities of the equipment.

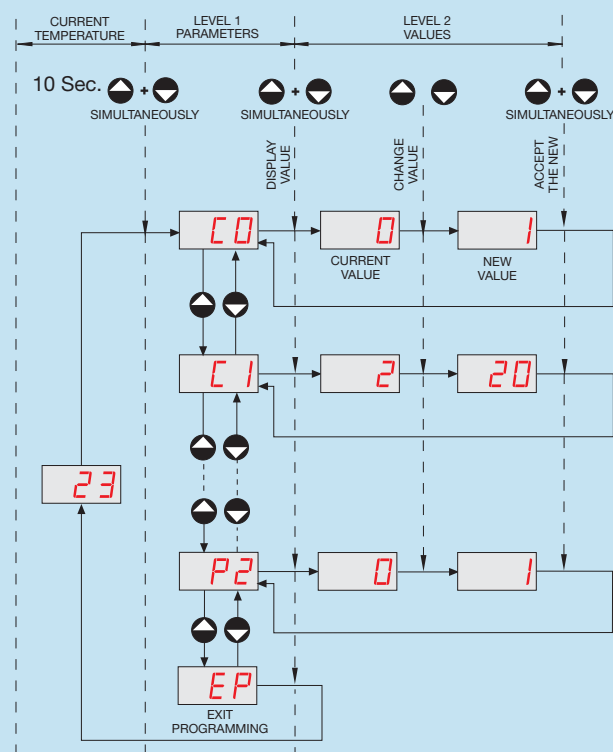
LEVEL 1 PARAMETERS:

- Pressing the and keys simultaneously for at least 10 seconds will cause LED 2/PR to indicate the programming phase and the first parameter "C0" will appear on the display.
- Pressing the key accesses the next parameter and the key will produce a return to the previous parameter.
- If the and keys are simultaneously pressed in the last parameter "EP", the controller will return to the temperature display situation and the LED 2/PR will cease to indicate the programming phase

LEVEL 2 VALUES:

- In order to display the current value of any parameter, the keys and should be simultaneously pressed with the required parameter selected. Once it is displayed, it can be modified by pressing the or keys.
- Pressing the and keys simultaneously sets the new value. When this operation is performed, the programming returns to Level 1 (parameters).

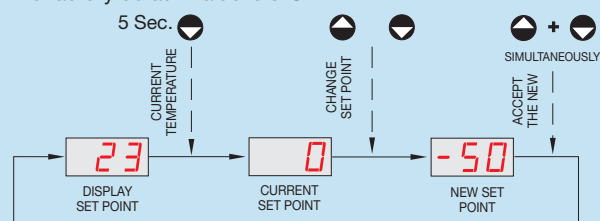
NOTE: If a key is not pressed for 25 seconds in any of the previous steps, then the equipment will automatically return to the current temperature display situation without modifying any of the values.



PROGRAMMING

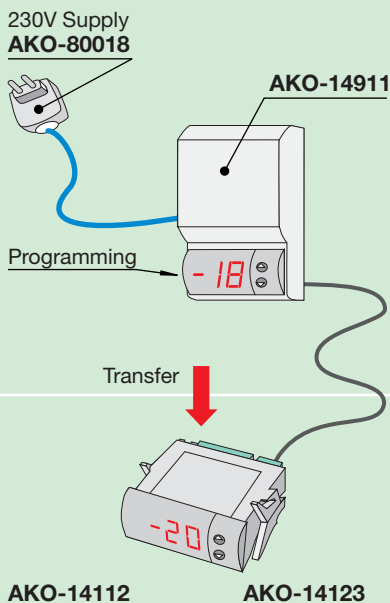
ADJUSTING THE SET POINT TEMPERATURE

The factory default value is 0°C.

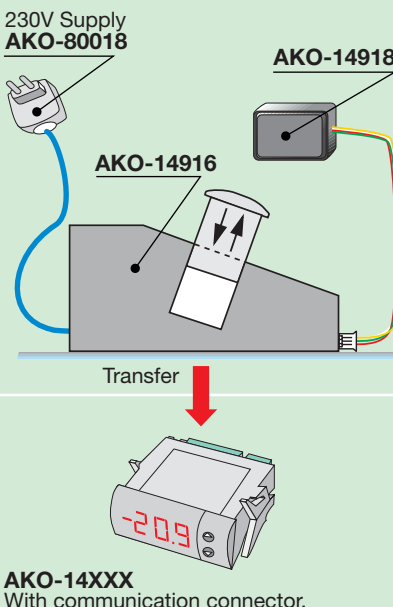


PARAMETERS TRANSFER SERVERS**AKO-14911**

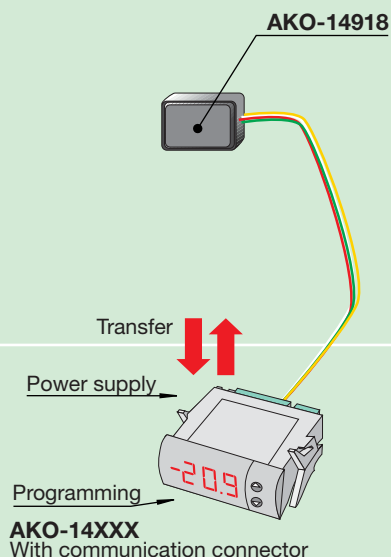
This is connected by means of the **AKO-80018**, 230/12V, to the power supply and it is programmed with the parameters that can be transferred to the **AKO-14112** and **AKO-14123** units without these having to be powered.

**AKO-14916**

Tabletop server which is connected by means of the **AKO-80018**, 230/12V, to the power supply. Permit to transfer parameters previously recorded in one server **AKO-14918**, to the other controllers with communication connector without these having to be powered.

**AKO-14918**

A portable server without supply to which, the parameters programmed in powered units with communication connector can be copied. The parameters may then be transferred from the server to other identical powered units.

**COMMUNICATION**

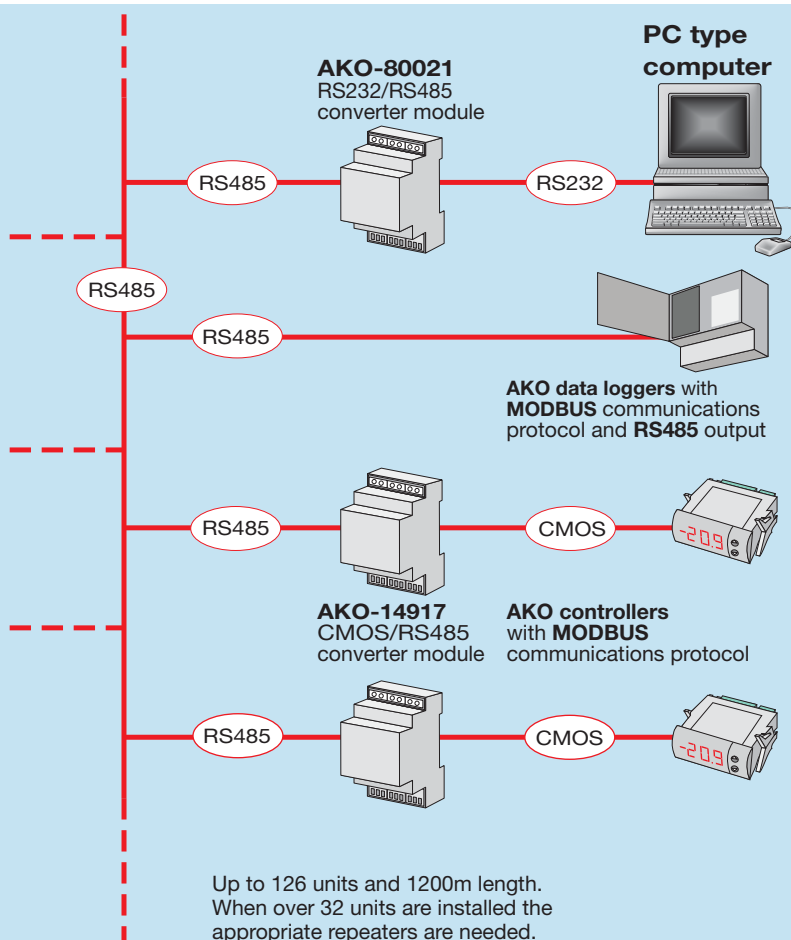
The units provided with a communications connector, permit data transmission and reception using the standard **MODBUS** protocol and to carry out management from PC software. This makes a centralised system for display, logging, alarms, remote teleprocessing ...

AKO-5003

Software for controllers and data loggers using a PC type computer.

On request software with:

- External alarms by telephone, fax or internet.
- Display boards.
- Power management.
- PLC management.
- Remote teleprocessing.



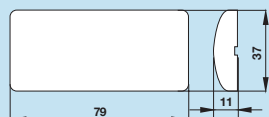
ACCESSORIES

Front protector



AKO-14910

In transparent plastic for panel mounting units

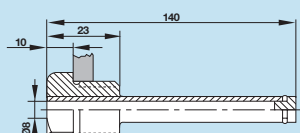


Sheath for housing sensors in tanks



AKO-155908

Stainless steel material

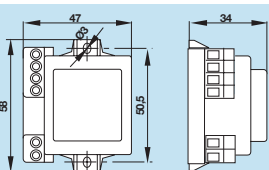


Power supply transformer



AKO-15590

120-230/12V, 3VA

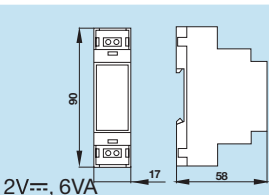


Power supply converter



AKO-15589

14 to 30V~/12V=, 6VA



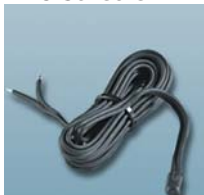
Sensor extension cable



AKO-15586

3 x 0,5mm² cable with insulation + copper braid + PVC sheath.

NTC Sensors



AKO-14901

L=1,5m

AKO-14902

L=2,0m

AKO-14903

L=3,0m

AKO-14906

L=6,0m

Modified polyolefin sheath and cable

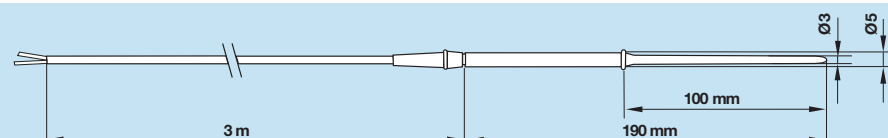


Tapered probe NTC sensor



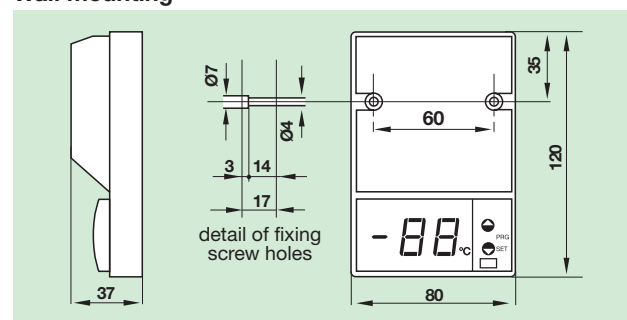
AKO-14915

Stainless steel tapered probe with 3m silicone cable

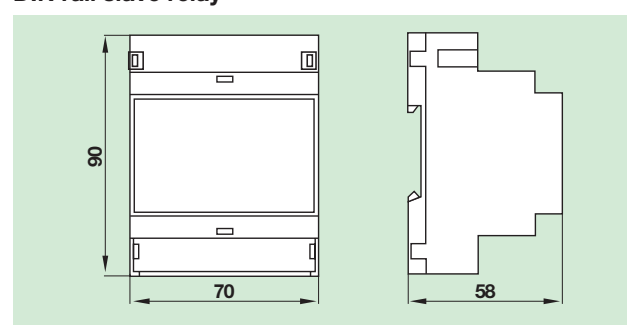


DIMENSIONS

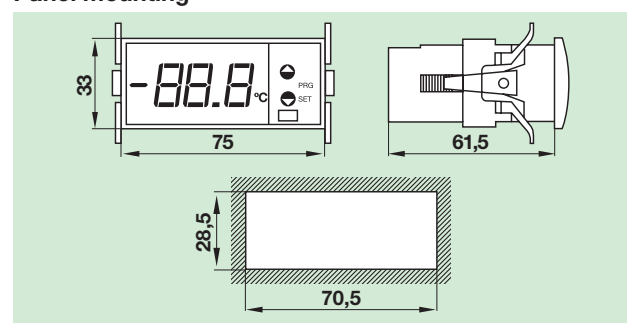
Wall mounting



DIN rail slave relay



Panel mounting



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