

MultiStage Regulators with 4-20mA and NTC input, 4 relays for controlling compressor stations, formatted for 70,5 x 28,5 mm panel cut-out

Devices designed to display, control and regulate compressor stations, with input for 4-20mA and NTC type sensors. Four outputs with relays can be configured for 4 single stages or 2 Multi-stages compressors. It also incorporates an output with changeover relay for alarm and six voltage free digital inputs, four for management of the thermal alarms of the different stages, one for high pressure alarm and another one for low pressure alarm.

1- Installation

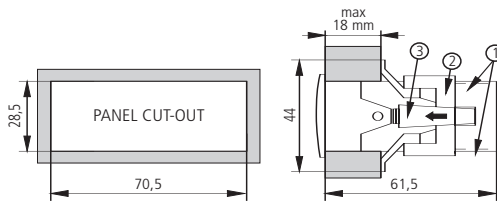
The controller should be installed in a place protected from vibrations, water and corrosive gases, and where ambient temperature does not surpass the value specified in the technical data.

In order for the controllers to have IP65 protection, the gasket should be properly installed between the apparatus and the perimeter of the panel cut-out where it is to be fitted. Supply the controller with an adequate outdoor transformer.

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

1.1- Panel Mounting

To fix the unit, place the fasteners 2 over the sliders 1 as shown in the figure. Move the fasteners in the direction of the arrow. By pressing tab 3 fasteners may be moved in the opposite direction of the arrow.



1.2- Connection

See diagram in the unit rating plate.

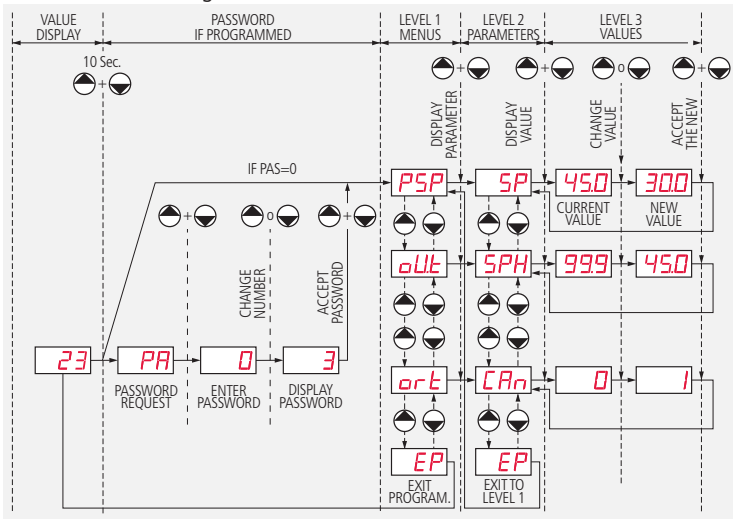
The probe and its lead should **NEVER** be installed in ducting along with power, control or power supply wiring.

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 mm² or H05V-K 1x0,5 mm². Section of connecting wires for relays contacts should range from 1 mm² to 2,5 mm².

2- Configuration

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

2.1 Parameters configuration



Level 1 Menu

- Press ▲ + ▼ keys simultaneously for at least 10 seconds. The LED "PR" will be flashing, we are in the programming LEVEL 1 MENUS and the first menu "PSP".
- Press ▲ key to access the next menu and ▼ key to return to the previous one.
- Pressing ▲ + ▼ keys simultaneously in the last menu EP, the controller returns to the VALUE DISPLAY status and LED "PR" will stop flashing.

When PA, is displayed, PASSWORD programmed in PAS parameter of CFo menu should be entered to access programming LEVEL 1 MENUS.

- Press ▲ + ▼ keys simultaneously. 0 will be displayed to ENTER PASSWORD.
- Press ▲ or ▼ keys to CHANGE NUMBER and DISPLAY PASSWORD programmed.
- Press ▲ + ▼ keys simultaneously to ACCEPT PASSWORD. The first menu "PSP" will be displayed.

Level 2 Parameters

- In the desired menu of LEVEL 1 MENU, press keys ▲ + ▼ simultaneously. LEVEL 2 PARAMETERS programming is accessed. The first parameter of the selected menu is displayed on the screen.
- Press ▲ key to access the next parameter and ▼ key to return to the previous one.
- Pressing ▲ + ▼ keys simultaneously in the last parameter EP, the controller returns to the LEVEL 1 MENU.

Level 3 Values

- To DISPLAY CURRENT VALUE of any parameter, select the required one and press ▲ + ▼ keys simultaneously. Once it is displayed, you can CHANGE VALUE pressings ▲ or ▼ key.
- Press ▲ + ▼ keys simultaneously 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 VALUE DISPLAY status without modifying any of the parameters values.

3- Operation

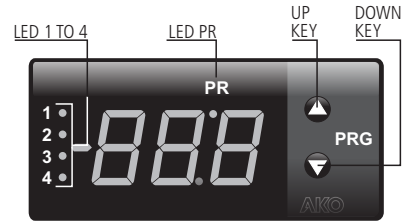
▲ key: In programming, it makes the displayed value increase.

▼ key: In programming, it makes the displayed value reduce. It disconnects the alarms once they have disappeared.

LED 1 to 4 Fixed: It indicates that the stage is activated.

LED 1 to 4 Flashing: It indicates that a safety timer is operating.

LED PR Flashing: Programming phase.



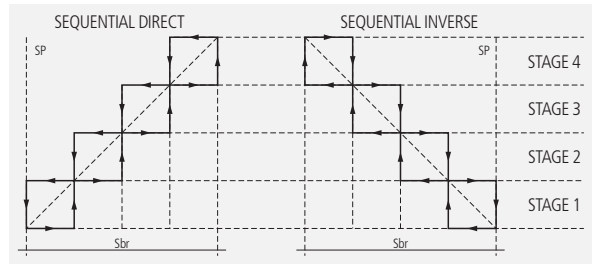
3.1 Relays control

The different stages will be controlled by equipment relays and the temperatures or pressures detected. The stages may be energized in function of the operating time (Balancing) or sequentially (Fixed)

In the balanced mode, the stage with smaller operating time starts, if the thermal alarm is not activated and a safety timing is not running.

The stage with greater operating time is disconnected if the safety times have passed.

In sequential mode, a stage with higher index is energized only if the stages with lower index are activated, and a stage with lower index goes out only if the stages with higher index are stopped.



Proportional mode: In this mode of operation the stages work in fixed points. These points can be obtained easily dividing the bandwidth of regulation "Sbr" between the number of defined stages "nUn".

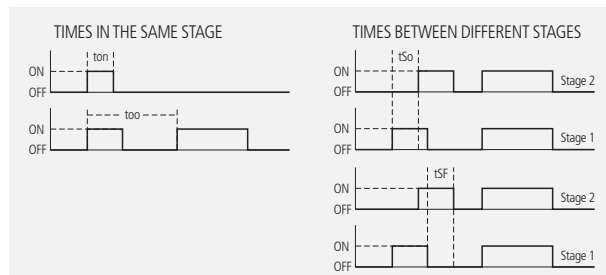
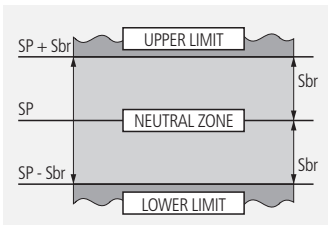
Neutral zone mode: In this operating mode, a neutral zone is defined, which corresponds to the area consisting of the "Sbr" adjustment bandwidth applied above and below the "SP" adjustment point.

Operation with neutral zone: When the controller reading is within the area defined as the neutral zone, none of the stages will be switched on or off; instead, the status existing just before entering this zone will be maintained.

If the neutral zone is exceeded at the upper limit, then stages will be switched on with the "tSo" time interval set between the following start-ups of the various stages.

If, on the other hand, the controller reading falls below the neutral zone lower limit, then stages will be switched off with the "tSf" time interval set between the following shutdowns of the various stages.

Neutral zone operation can also be reversed by activating inverse operation by means of the "drm" parameter, so that stages will be switched off if the upper limit is exceeded and switched on when the reading falls below the lower limit.

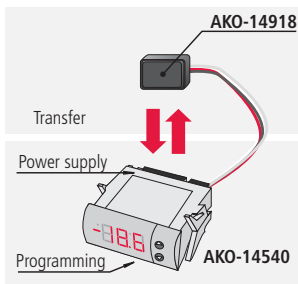


REMARK: Stage switch on/off must respect the safety times, which can be configured by the user.

4- Accessories

PORTABLE SERVER

AKO-14918 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.



COMMUNICATIONS

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 (requires AKO-14917). This makes a centralised system for display, logging, alarms, remote teleprocessin...

AKO-5004

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

5- Maintenance and Warnings

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

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 °C and +20 °C, when probes is extended with minimum 0,5 mm² up to 1000 m cable, deviation will be less than 0,25 °C (Sensor prolongation cable ref. **AKO-15586**).

6- Parameters and messages (Values in the Def. column are factory-set.)

Level 1 Menus and Description					
SPCF	Level 2	Set Point parameters			
	Level 3	Description	Values	Min.	Def. Max.
	SP	Set Point selection	SPL	45.0	SPH
	SPH	Set Point upper limit (It cannot be set above this value)	SPL	99.9	99.9
	SPL	Set Point lower limit (It cannot be set below this value)	99.9	99.9	SPH
	Sbr	Regulation bandwidth	0.0	2.0	50.0
	SPd	Stop value for pump down	-99.9	0	99.9
	tPd	Max. time duration of pump down (value x 10) (0 = pump down deactivated)	(Sec.)	0	0 255
	CAn	Sensor calibration (Offset)	-20.0	0.0	20.0
	EP	Exit to Level 1			
oUt	Level 2	Output Parameters			
	nUn	Number of active output stages (1-4 = active stages), (5 = 2 stages with NO contacts), (6 = 2 stages with NC contacts) * Outputs R1 and R3 to start up compressors, R2 and R4 outputs to stages (see Figure 1).	1	4	6
	SEc	Operating mode (0=Balancing, in function of the operating time) (1=Sequential. The last one to enter is the first to leave)	0	0	1
	drn	Type of operation (0= Direct), (1= Reverse)	0	0	1
	nPC	Operation mode. (0= Neutral zone), (1= Proportional)	0	0	1
	ton	Minimum operating time of stage once activated x 10	(Sec.)	0	0 255
	too	Minimum time between activations of a same stage x 10	(Sec.)	0	0 255
	tSo	Time between activations of different stages	(Sec.)	0	0 255
	tSF	Time between disconnection of the different stages	(Sec.)	0	0 255
	nUE	Number of active output stages with probe error	0	0	nUn
	EP	Exit to Level 1			
CFo	Level 2	Configuration Parameters			
	HES	Maximum scale value (20mA)	-99.9	99.9	99.9
	LES	Minimum scale value (4mA)	-99.9	-99.9	99.9
	PbS	Sensor type selection (0= 4-20 mA), (1= NTC)	0	0	1
	rES	Display mode (0= Integers), (1= One decimal), (2= Two decimals 4-20mA mode only)	0	0	1
	CAd	Address for units with communication	0	0	255
	PAS	Access password to parameters and information	0	0	255
	Ptr	Parameters transfer (0= Disabled), (1= Send), (2= Receive)	0	0	2
	PU	Program version (Information)			
	PdE	Initial parameters (1= Yes, configure to "Def" and exit programming)	0	0	1
	EP	Exit to Level 1			
ALA	Level 2	Alarm Parameters			
	AHL	Analogic high pressure alarm	-99.9	99.9	99.9
	ALL	Analogic low pressure alarm	-99.9	-99.9	99.9
	Adi	Alarm differential	0.1	1.0	20.0
	AdE	Alarm delay from the moment at which they should enabled	(Sec.)	0	0 255
	Ado	Alarm delay at start-up	(min.)	0	0 255
	nHP	Number of high pressure alarms allowed per hour in digital input N°5 configured as high pressure alarm if 5=0 (If the define value is exceeded, manual cancellation of the alarm is necessary) (0=Automatic cancellation of the alarm when event disappears)	0	0	255
	EP	Exit to Level 1			

inP	Level 2	Digital Input Parameters			
	ibP	Digital input polarity. Thermal switch stage 1 to 4 (0= error closed contact), (1= error open contact)	0	0	1
	i5P	Digital input polarity. Thermal switch stage 5 (0= Closed contact), (1= Open contact)	0	0	1
	i6P	Digital input polarity. Thermal switch stage 6 (0= Closed contact), (1= Open contact)	0	0	1
	i5F	Digital input N°5 configuration (0= Digital high pressure alarm), (1= External alarm)	0	0	1
	i6F	Digital input configuration N°6: (0= Dilita low pressure alarm), (1= Activates Set Point variation USI), (2= Remote disconnection ON-OFF)	0	0	2
	id5	Digital input N°5 enabling delay	(Sec.)	0	0 255
	id6	Digital input N°6 enabling delay	(Sec.)	0	0 255
	USI	Set point variation. SP alternative	-99.9	47.0	99.9
	tSI	USI variation length	(min.)	0	0 255
	EP	Exit to Level 1			
nrt	Level 2	Operating Times			
	1rt	Displays stage N°1 Run-Time	(h.)	0	0 999
	2rt	Displays stage N°2 Run-Time	(h.)	0	0 999
	3rt	Displays stage N°3 Run-Time	(h.)	0	0 999
	4rt	Displays stage N°4 Run-Time	(h.)	0	0 999
	EP	Exit to Level 1			
	EP	Exit programming			
MESSAGES					
	PA	Password request to enter programming parameters			
	ALH	The Sensor value exceeds the parameter programmed in AHL			
	ALL	The Sensor value is lower than the parameter programmed in ALL			
	EA1	Digital input N°1 active			
	EA2	Digital input N°2 active			
	EA3	Digital input N°3 active			
	EA4	Digital input N°4 active			
	EA5	Digital input N°5 active. Extern alarm			
	HPA	Digital input N°5 active. High pressure alarm			
	LPA	Digital input N°6 active. Low pressure alarm			
	OFF	Digital input N°6 active. Remote disconnection			
	E1	Sensor failure (Open circuit, crossed, out-of-scale value)			
	EEE	Memory failure			
	PdA	Pump down timed-out			

REMARK: When the operating time of one of the stages arrives to 999 hours, the counters of all the stages turn to 0. To manually set the counter of a stage at 0, keys ▲ + ▼ have to be pressed simultaneously meanwhile operating time of that stage is displayed.

When time and alarm 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.

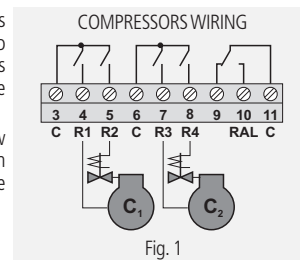


Fig. 1

7- Technical data

4-20mA Probe:

Configurable range.....from -99.9 to 99.9

Input impedance signals 4-20mA.....51Ω

NTC Probe:

Temperature range.....-50°C to 105 °C

Resolution, adjustment (NTC and 4-20mA).....0,1

4-20mA accuracy.....± 1%

Display of two decimals in mode 4-20 mA.

NTC accuracy.....± 1 °C

Maximum input power3 VA

Working ambient temperature.....5 °C to 50 °C

Storage ambient temperature-30 °C to 70 °C

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

Degree of contaminationII on UNE-EN 60730-1

Double insulation between the power supply, the secondary circuit and the relay output.

Allocated pulse temperature800V

Pressure ball test temperature:

Accessible parts.....75 °C

Parts that position active elements125 °C

Voltage and current declared by the EMC tests.....12V, 230mA

Current of radio jamming suppression test.....270mA

Relay R1 to R4SPST, 2A, 250V, cosφ=1

ALARMA relay (RAL)SPDT, 2A, 250V, cosφ=1

Power supply12V~ 50/60 Hz