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 Menus

- Press \( \uparrow \) + \( \downarrow \) 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 \( \uparrow \) key to access the next menu and \( \downarrow \) key to return to the previous one.
- Pressing \( \uparrow \) + \( \downarrow \) 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 \( \uparrow \) + \( \downarrow \) keys simultaneously. 0 will be displayed to ENTER PASSWORD.
- Press \( \uparrow \) or \( \downarrow \) keys to CHANGE NUMBER and DISPLAY PASSWORD programmed.
- Press \( \uparrow \) + \( \downarrow \) keys simultaneously to ACCEPT PASSWORD. The first menu "PSP" will be displayed.

Level 2 Parameters

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

Level 3 Values

- To DISPLAY CURRENT VALUE of any parameter, select the required one and press \( \uparrow \) + \( \downarrow \) keys simultaneously. Once it is displayed, you can CHANGE VALUE pressing \( \uparrow \) or \( \downarrow \) key.
- Press \( \uparrow \) + \( \downarrow \) 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

\( \uparrow \) key: In programming, it makes the displayed value increase.

\( \downarrow \) 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.

Proporcional 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 "tSf" 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 "dSn" 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.
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 teleprocessing... 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 are extended with minimum 0,5 mm3 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.)

### 4-20mA Probe

- **Configurable range:** from -99.9 to 99.9
- **Input impedance signals 4-20mA:** 51Ω

#### Level 3 Parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Values</th>
<th>Min.</th>
<th>Def.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nDn</strong></td>
<td>1</td>
<td>4</td>
<td>6</td>
<td></td>
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<tr>
<td><strong>nSP</strong></td>
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<td></td>
<td></td>
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<td>99.9</td>
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<td><strong>nSPL</strong></td>
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<td>99.9</td>
<td></td>
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<td>99.9</td>
<td></td>
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<tr>
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<tr>
<td><strong>nAHL</strong></td>
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<tr>
<td><strong>nAHL</strong></td>
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</tbody>
</table>

**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 while the operation 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.

#### Level 2 Parameters

### Alarm Parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Values</th>
<th>Min.</th>
<th>Def.</th>
<th>Max.</th>
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</thead>
<tbody>
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<tr>
<td><strong>nALL</strong></td>
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<td>99.9</td>
<td>99.9</td>
<td></td>
</tr>
<tr>
<td><strong>nAHL</strong></td>
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<td>99.9</td>
<td>99.9</td>
<td></td>
</tr>
<tr>
<td>Number of active output stages (1= active stages), (4 = 2 stages with NC contacts), (8= 2 stages with NC contacts). (6 = 2 stages with NC contacts), (6 = 2 stages with NC contacts)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 while the 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.

### 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 4-20mA:**
- **NTC accuracy:** ± 1°C
- **Maximum input power:** 3VA
- **Working ambient temperature:** 5°C to 90°C
- **Storage ambient temperature:** -30°C to 70°C
- **Control device classification:** incorporated independent mounting, with characteristic of automatic operation Type 1.8 action, to be used in a clean situation, logical medium (software) class A and continuous operation.
- **Degree of contamination:** II on UNE-EN 60730-1
- **Double insulation between the power supply, the secondary circuit and the relay output:**
- **Allocated pulse temperature:** 800V
- **Pressure ball test temperature:**
- **Accessible parts:** 75°C
- **Parts that position active elements:** 125°C
- **Voltage and current declared by the EMC tests:** 12V 230mA
- **Current of radio jamming suppression test:** 270mA
- **Relay R1 to R4:** SPDT, 2A, 250V, cosφ=1
- **ALARM relay (RL):** SPDT, 2A, 250V, cosφ=1
- **Power supply:** 12V ~ 50/60Hz

### 8- Accessories

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