



The AK96 is process controller with advanced features.

The user can choose among several types of inputs and outputs which makes it suitable for a wide range of applications.

### Applications

The **Akros** series is a family of instruments suited for critical applications where control stability is an issue. Due to its wide range of options, the AK96 becomes an universal process controller for all kind of industrial applications.

### General features

#### Universal input

Fully configurable input as thermocouple, RTD, current loop or voltage.

#### Configurable control output

The control output can be configured by the user as SPDT relay or DC pulses for SSR.

#### Alarms

It comes with one SPST relay alarm as standard and can be equipped with a second relay alarm as an option. The alarms action is fully configurable.

#### Operation mode

Automatic or Manual.

### Three control types

The user can select among three different control actions: ON/OFF, PID or PI+D (PI with automatic derivative action). PID and PI+D include two different autotuning algorithms.

#### Keylock

The instrument provides three levels of protection through the keylock function.

#### Wiring

The wiring is through screws in the rear of the case. The recommended terminal is the fork type.

### Optional features

- Fully configurable second alarm.
- Cooling output configurable as ON/OFF or proportional action.
- Linear control : 0..20mA , 4..20mA ( max. 500Ω )  
0..5Vcc , 0..10Vcc ( max. 20mA )
- 24Vdc power supply for current loop transmitter 20mA.
- Servomotor control output.
- Linear process retransmission:  
0..20mA , 4..20mA  
(max. 500Ω) user configurable range.  
0..5 Vcc , 0..10 Vcc  
(max. 20mA) user configurable range.
- Remote Set Point:  
0..20mA , 4..20mA , 0..5 Vcc , 0..10 Vcc  
User configurable range.
- MODBUS/RTU RS485 serial communications.
- Current transformer input  
This measurement allows to monitor the consumption of electrical heaters.
- Configurable digital input  
Keylock with 3 levels of protection, secondary set point or RUN/STOP.

### Specifications

#### Size

1 / 4 DIN 43700 (96x96 mm.), front removable.

#### Display

4 red 7 seg. Led, 13 mm for the process variable  
4 green 7 seg. Led, 10 mm for setpoint value

#### Thermocouple input (resolution 1°C/F)

User configurable:

J : 0..600° C (Fe-CuNi , IEC584)  
L : 0..600° C (Fe-CuNi , DIN43710)  
K : 0..1200° C (NiCr-NiAl , IEC584)  
N : 0..1200° C (NiCrSi-NiSi , IEC584)  
T : 0..400° C (Cu-CuNi , IEC584)  
R : 0..1600° C (Pt / 13%Rh-Pt , IEC584)  
S : 0..1600° C (Pt / 10%Rh-Pt , IEC584)

Cold junction accuracy: better than 0,5°C after 30 minutes

Sensor break protection: Full Scale

Accuracy: better than +/- 0,25% FSV +/-1 digit

Units: °C or °F

Resolution: 20000 points

## RTD Input

2 user configurable ranges: -99,9..200,0°C Pt100 (IEC751)  
0..600°C Pt100 (IEC751)

Configuration: 3 wires

Sensor break protection: Full scale

Units: °C o °F

Resolution: 1°C/F

Accuracy: better than +/- 0,3°C in the -99..200,0°C scale  
and +/- 1°C in the 0..600°C scale

## Current loop input

0..20mA o 4..20mA , user configurable.

Sensor break protection: Full scale.

Range: Selectable between -999 y 9999.

Decimal point: Selectable as XXX.X o XX.XX

Input impedance: 150Ω

## Voltage linear input

0..5Vcc o 0..10Vcc, user configurable.

Sensor break protection: Full scale.

Range: Selectable between -999 y 9999.

Decimal point: Selectable as XXX.X o XX.XX

Input impedance: > 1MΩ

## Salida de control

SPDT relay (2A@250 Vca, resistive load) or 9Vdc pulses ( open collector, max. 40 mA), user configurable.

- As an option:

Current loop output: 0..20mA , 4..20mA (500Ω max. load)  
0..5 Vcc , 0..10 Vcc (20mA max. load)

- Open / Close relays for servomotor (2 relays SPDT )  
(excludes the cooling output)

## Cooling output (option)

SPDT relay (2A@250 Vca) configurable as ON/OFF or proportional

## Servomotor control (option)

By means of 2 SPDT relays (2A@250 Vca) Open/Close.

## Alarm relay (2nd alarm as an option)

1 Alarm: SPST Relay (1A@250 VAC)

2 Alarms: SPST relays (1A@250 Vca)

## Transmitter supply (option)

24 Vcc (max. 22mA)

## Configurable digital input

Can be configured with several functions (RUN/STOP, Stop Ramp, Secondary SetPoint, Keylock)

## Power supply

85..265 Vac, 50/60 Hz, as option: 21..53 Vca/Vcc. Consumption: 8 VA

## Room Conditions

Operating: 0..50°C

Storage: -10..60°C

Humidity: 0..95 % HR without condensation

## Protection degree

IP50 in the front

## Case

ABS self extinguishing

## Dimensions and panel cut-out

96 x 96 x 98 mm., cutout: 94 x 91,5 mm. (+/- 0,5 mm)

## Weight

260 grs.

## CE conform (indust. & commercial environment)

Safety: EN61010

Immunity EMI: EN50082-1

EN61000-4-2, electrostatic discharges

EN61000-4-3, radiated fields

EN61000-4-4, burst

EN61000-4-5, surge

EN61000-4-6, injected currents

EN61000-4-8, magnetic field

EN61000-4-11, PQT

EMI emission: EN50081-1

EN55022-b, conducted

EN55022-b, radiated

Armonics: EN61000-3-2

Voltage fluctuations: EN61000-3-3

Internal events can be configured which can be used to stop the con-

## Events

troller (RUN/STOP), stop a ramp, Set Point change, swith to manual mode with an output percentage.

## Control types

### Ramp Function + PID

The AK96 can perform several types of ramps.

- Start up ramp: At the beginning of the process.

- Permanent ramp: Runs on every set point change.

Can be configured as UP, DOWN or both ramps. The configuration is done in units per minute (U/min).

### ON / OFF Control

When the controller is configured to work in ON / OFF mode, the controller output only takes two values: 100% when the process is under the setpoint and 0% when the process is over the setpoint.

In this working mode, the user must configure the activation-deactivation hysteresis value of the control output.

### PID Control

On the PID control mode, the controller output is the result of the three control actions added: Proporcional, Integral and Derivative. The controller output will vary from 0 to 100% as a result of this combination.

### PI+D Control

The PI+D control mode works very similar to the PID but in this case only the Pb (Proporcional Band) and Ti (Integral time) can be modified. The derivative action is automatic. This control action appears to be much more stable when the process is working on the limits of the controller's output variations such as 0..10% or 90..100%.

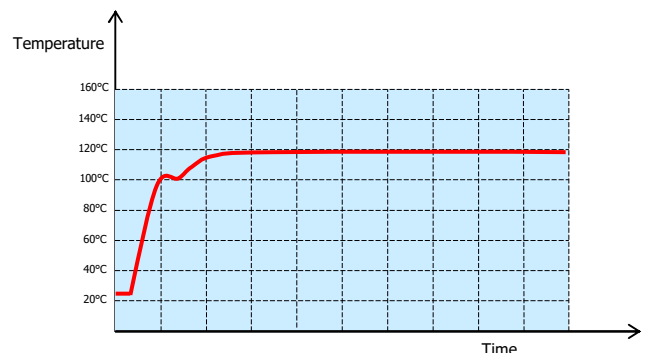
## Autotuning

The autotuning is used to determine the best Pb, Ti and Td values for each process.

### Step Response autotuning

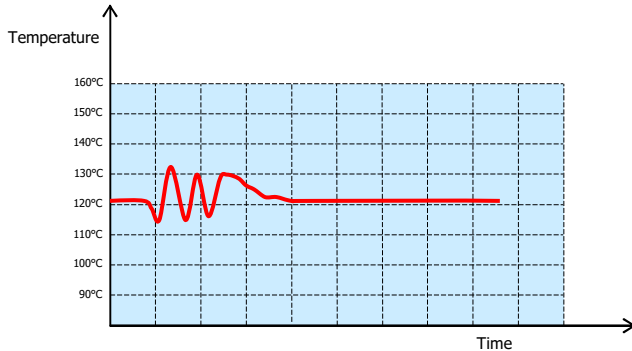
It is performed when the process is below the set point value and can only be activated when the process is under the 50% of this set point. This tuning consist on increasing the process value with an output of 100% and when it reaches the 80% of the set point, the output falls down to 0%.

Then the controller, will calculate the optimum PID parameters by measuring the overshoot and the response time.



## Relay Feedback autotuning

This type of autotuning has the advantage that is performed on the set point thus can be activated at any time. However, to perform the autotuning, the controller will create some overshoots and this might not be acceptable by the process.

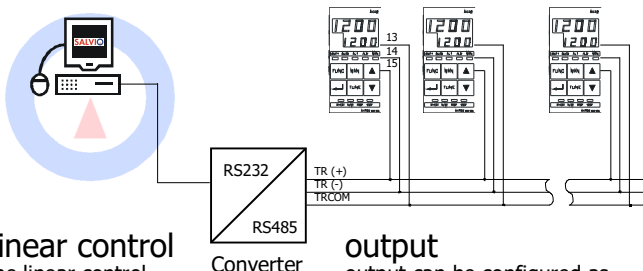


## Options

### Serial communications

Allows the link of up to 255 units for multizone applications through MODBUS/RTU™ protocol. The communications interface is RS485 (isolated), 2 wires + common, half duplex.

**SENSO** offers the **Akrosoft** software to configure all instruments. There is an specific instructions manual for the communications protocol.



### Linear control

The linear control Direct or Reverse

0..20 mA ( 500Ω max)  
4..20 mA ( 500Ω max)

### output

output can be configured as action. Selectable as:  
0..5 Vcc ( 20 mA max)  
0..10 Vcc ( 20 mA max)

### Linear retransmission

The linear retransmission can be configured as Direct or Reverse. The range of retransmission can be also programmed by the user. Selectable as:

0..20 mA ( 500Ω max)  
4..20 mA ( 500Ω max)

0..5 Vcc ( 20 mA max)  
0..10 Vcc ( 20 mA max)

### Remote Setpoint input

The range of the Remote Setpoint can be programmed by the user. Selectable as:

0..20 mA ( 500Ω max)  
4..20 mA ( 500Ω max)

0..5 Vcc ( 20 mA max)  
0..10 Vcc ( 20 mA max)

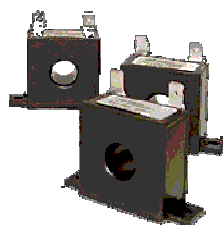
### Transmitter supply

The model AK96 can provide a 24Vdc supply for an external transmitter.

### Current transformer

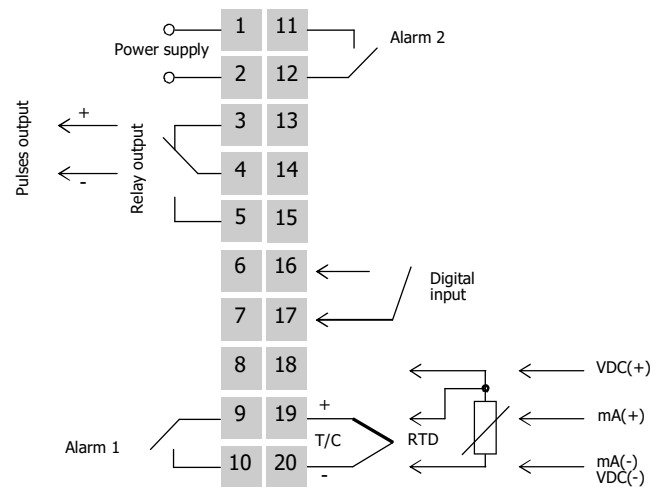
The AK96 can have a CT input to monitor the heating elements consumption.

The available transformer ranges to be connected to the AK96 are 25 and 50 Amp.

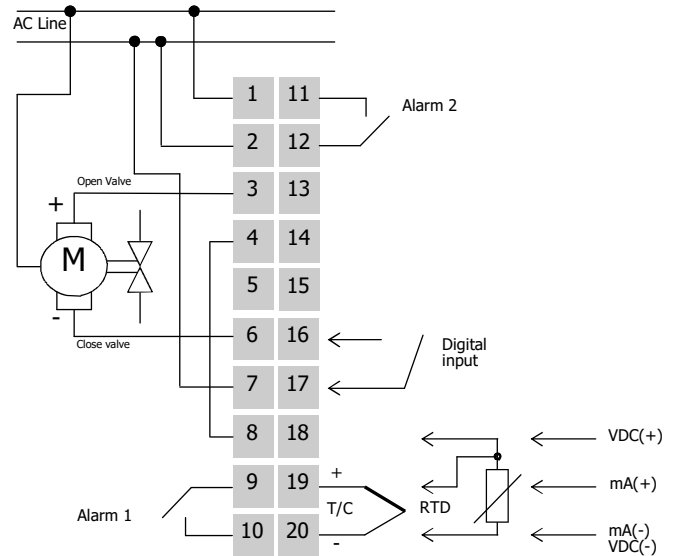


## Wiring example

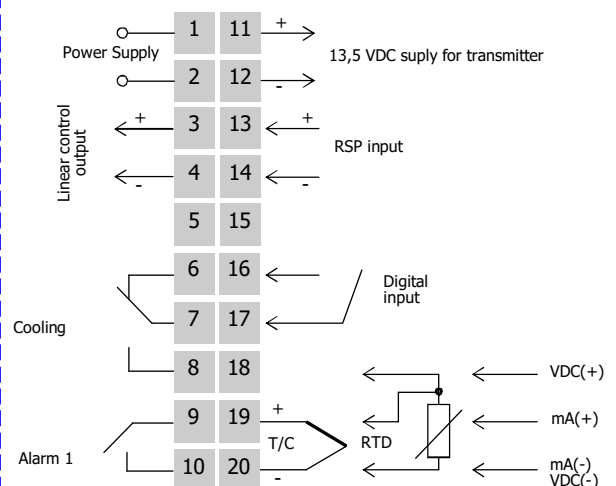
### Basic Wiring



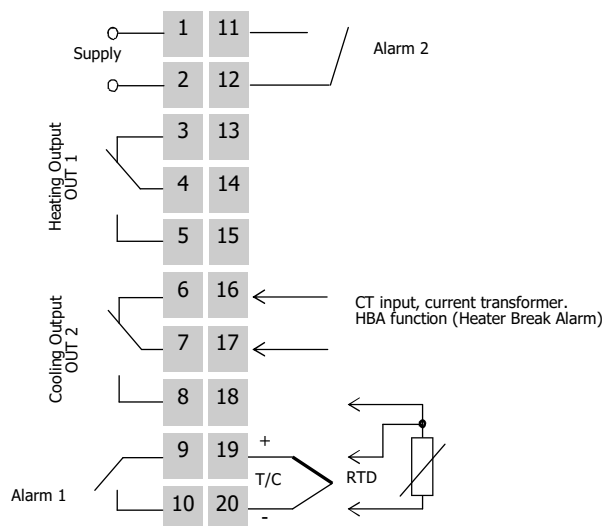
### Servomotor control wiring



### Some options wiring



Current transformer wiring (Plastic Extrusion)



Ordering guide

Model	Input	Control output	Base Options	Auxiliar Output (*)	Options	Interface	Power Supply
	<b>T</b> : Temperature (T/C or RTD) <b>U</b> : Universal	<b>1</b> : Relay or Vdc pulses <b>3</b> : 0..20 mA (*) <b>4</b> : 4..20 mA (*) <b>5</b> : Servomotor <b>6</b> : 0..5 Vcc (*) <b>7</b> : 0..10 Vcc (*) (*) Only xx1_ and xx2_	<b>1</b> : One alarm <b>2</b> : Two alarms with Common point <b>3</b> : PID cooling + 1 Alarm <b>4</b> : PID cooling + 2 Alarms	<b>0</b> : No Options <b>3</b> : 0..20 mA <b>4</b> : 4..20 mA <b>6</b> : 0..5 Vdc <b>7</b> : 0..10 Vdc <b>8</b> : DIN (Digital Input) <b>9</b> : Trasmmitter Power Supply 24 Vdc (*) Excludes Alarm 2	<b>N</b> : No options <b>T</b> : CT, current transformer <b>D</b> : DIN (Digital Input) <b>V</b> : Trasmmitter Power Supply 24 Vdc	<b>0</b> : No option <b>2</b> : RS485 <b>3</b> : RSP, 0..20 mA <b>4</b> : RSP, 4..20 mA <b>6</b> : RSP, 0..5 Vdc <b>7</b> : RSP, 0..10 Vdc RSP: Remote Set Point	<b>1</b> : 85..265 Vac 50/60 Hz <b>2</b> : 21..53 Vac/Vdc
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(\*) Linear control output excludes analog retransmission

Example: **AK96-U148T21**, Universal input, control output + cooling + 2 alarms, digital input, current transformer, RS485 communications, 85..265 Vca power supply.

Accessories:

**TF7025**: 25 Amp. Toroidal transformer.

**TF7050**: 50 Amp. Toroidal transformer.

Other SENSO references

Process indicators



Custom software and electronics



Temperature sensor



Pressure transducers



Where to find us ?

Few words about us

SENSO is a company based in Mataró at 30Km north of the Barcelona area.

Our activity is electronic instrumentation and sensors for temperature and pressure measurement and control.

We have also a good reputation on plastic injection moulding systems.

You will find us at:

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