



# KS 4

## Multiple temperature controller

**4 x DPID-heating-controller**  
**also config. as signaller, positioner or digital indicator**  
**selftuning of single channels or groups**  
**opto isolated input for setpoint lowering**  
**2 alarms for each channel**

economy line

### GENERAL

The microcomputer-based KS 4 ensures high-accuracy multi-loop temperature control at a low price. Featuring a set-point lowering function and two alarms, the unit is particularly suitable for temperature control of plastics processing machinery, machine tools, packaging machines, tempering units and other similar thermal processes. Self-tuning ensures very short start-up times.

### DESCRIPTION

Each of the 4 control loops can be considered as a completely independent controller with the following functions:

#### Input circuit monitor

If the input circuit is defective, a built-in input circuit monitor ensures increased system operating safety. The output action is "upscale" and the outputs are switched off. The input circuit monitor is triggered by wrong sensor polarity or break.

#### Controller and positioner functions

KS 4 can be configured as a signaller, a positioner or a two-point controller. In manual mode, the positioning output can be adjusted for any duty cycle.

#### Alarm functions

The alarm outputs are controlled by alarm triggering. Monitoring is provided for process value (absolute alarm) and control deviation (relative alarm). An absolute alarm can be triggered by any value, a relative alarm is always by an adjustable amount lower than the set-point.

For each of the 4 controllers, an absolute alarm and a relative alarm are possible. Each alarm group connected to an output is configured internally as an "OR" function.

#### a) Relative measured value alarm

for minimum temperature monitoring, e.g. for enabling machine functions

#### b) Absolute measured value alarm

for limit monitoring (independent of set-point).

#### Second set-point

By means of an external control signal, a second set-point can be activated in common for all 4 controllers (e.g. standby set-point, which can be used also when starting after mains recovery).

#### Self-tuning

Self-tuning for automatic determination of the best control parameters is fitted as standard. Self-tuning is started by pressing a key combination and calculates the optimum parameters for fast line-out to the set-point without overshoot from delay time  $T_u$  and max. rate of change  $V_{max}$ . For calculating optimum parameters with interactive control loops, self-tuning can be started synchronously for all required channels. Enabling or disabling each control loop for self-tuning are possible at parameter level.

#### Outputs

In total, the multiple-temperature controller is provided with 6 opto-isolated outputs:  
4 controller outputs and 2 alarm outputs.

All outputs are of the "open-collector" type, protected against short circuit and need a separate 24 V DC supply.

#### Controller outputs

The outputs are firmly allocated to the controllers.

The controller output switching status is displayed by a blinking point on each display. By adjusting the set-point below the min. limit (all outputs as in de-energized condition), the controller outputs can be switched off.

#### Alarm outputs

For each of the four controllers, the two alarm outputs of KS 4 are connected internally as "OR functions":

1. relative alarm: adjustable by the specified value below the set-point.
2. absolute alarm: activated at a fixed temperature value – which is mostly above the set-point.

### TECHNICAL DATA

#### INPUTS

##### Thermocouples

Type L,J,K, DIN IEC 584  
Ranges: 0 ... 900 °C (type L and J)  
0...1350 °C (type K)  
Display in °C or °F  
Measurement error: up to 700°C:  
1K±1digit >700°C: 3K±1digit  
Input resistance:  $\geq 1M\Omega$   
Break monitor: sensor current  $\leq 1 \mu A$   
Output action: upscale  
Polarity monitor: responds when the input signal is by 30°C below span start.  
Temperature compensation: built-in  
The compensating lead must be taken up to the controller terminals.

Additional error:  $\leq 1\text{ K} / 10\text{ K}$  change of terminal temperature  
Permissible DC voltage between inputs: 1 V  
Permissible AC voltage between inputs: 2 V  
Permissible voltage between inputs and ground: 5V  
Cycle time: approx. 1s.

#### **Digital input**

Opto-isolated  
Rated voltage 24 VDC external  
Current sink (IEC 1131 type 1)  
Logic „0“ = -3...5 V  
Logic „1“ = 15...30 V  
Current requirement approx. 5 mA

#### **OUTPUTS**

Short-circuit proof "open collector outputs  
Positive-switching (grounded load)  
Output voltage range: 18 V - 30 V DC  
(\*) to DIN 19240  
Nominal output current: < 70 mA  
Voltage drop at full load: 0,3V typ.  
1 V max.

#### **POWER SUPPLY**

1. 230V 48...62Hz  
Power consumption: approx. 5 VA

2. 24 V DC (for the outputs)  
Voltage range 18 V to 30 VDC  
(\*) Power consumption: approx. 0,1W  
(KS 4) The SSR power consumption must be taken into account additionally.  
The protective low-voltage conditions are met.

#### **CONTROL BEHAVIOUR**

Configurable as:  
Signaller, positioner or two-point controller with DPID behaviour (Different control behaviours are possible by switching off the relevant parameters.)  
Positioner operation with 0 ... 100% duty cycle

#### **Control parameters**

Self-adjusting or adjustable parameters;  
Switching difference as signaller: 1K

#### **ALARM FUNCTIONS**

Alarm 1: relative measured value alarm  
Alarm 2: absolute measured value alarm  
The output level is low with exceeded alarm temperature.

Sensor break alarm: Sbr is displayed and the relevant output is switched off.

\*) The SSR voltage limits must not be exceeded.

#### **SET-POINT**

The min. and max. set-point adjustment range is selectable within the TC measuring range limits

#### **DISPLAYS**

For process value and set-point display, each controller is provided with a separate, red 3-digit 7-segment LED display, digit height 13 mm. When values > 999 are displayed, units are suppressed.

Status point LED for the output switching status

#### **PROGRAM MEMORY**

EPROM

#### **ENVIRONMENTAL CONDITIONS**

Permissible temperatures:  
For specified accuracy 0...50°C  
For operation 0...60°C  
Storage/transport -20...60°C

#### **Climatic category:**

KUF to DIN 40 040  
Relative humidity:  $\leq 75\%$  yearly average, no condensation

#### **INFLUENCING FACTORS**

##### **Power supply**

Without effect. No data loss in case of power failure (storage in EEPROM).

##### **Shock and vibration**

Vibration: test Fc  
to DIN 68-2-6 (10...150Hz)  
Unit in operation: 1g or 0,075 mm  
Unit not in operation: 2g or 0,15mm

Shock test Ea  
to DIN IEC 68-2-27 (15g, 11ms)

#### **ELECTROMAGNETIC COMPATIBILITY**

The following data are applicable to a KS 4 installed in a metal housing.

##### **Electromagnetic immunity (complies with EN 50082-2)**

##### **Electrostatic discharge**

IEC 801-2  
Air discharge: 8 kV  
Contact discharge: 4 kV

##### **High-frequency magnetic field**

ENV 50 140 (IEC 801-3)  
80...1000 MHz, 10 V/m

##### **HF interference on leads**

ENV 50141 (IEC 801-6)  
0,15...80 MHz, 10 V  
Effect  $\leq 13\text{ K}$

#### **Low-frequency magnetic field**

IEC 1000-4-8  
50 Hz, 30 A/m

#### **Fast pulse trains (burst)**

IEC 801-4, 2 kV applied to supply voltage and signal leads

#### **High-energy single pulses (surge)**

IEC 801-5, Test voltage applied to the following leads: Supply leads: 1 kV symmetric, 2 kV asymmetric. Signal leads: 0,5 kV symmetric, 1 kV asymmetric

#### **ELECTROMAGNETIC RADIATION**

(complies with EN 50081-1)

#### **GENERAL**

##### **Dimensions**

L x W: 225 x 120 mm  
Depth behind panel: 48 mm

##### **Protection mode**

(to DIN 40 050/IEC 529)  
Rear: IP 00  
Front: IP 54  
The protection mode must be ensured by installation.

##### **CE -marking**

Not provided, must be ensured due to the integration by the manufacturer.

##### **Electrical safety**

Meets EN 61010-1 (VDE 0411-1)  
Overvoltage category III  
Contamination class 2  
Working voltage range 300V  
Protection class I

##### **Electrical connections**

Flat-pin connectors per contact for 1 x 6,3 x 0,8 or 2 x 2,8 x 0,8  
Connectors must be insulated!!!  
Max. 24 flat-pin connectors are required.

##### **Mounting method**

In metal control cabinets

##### **Dimensions**

Front-panel display: 120 x 225 mm  
Depth behind panel: 48 mm

##### **Mounting position**

uncritical

##### **Weight**

approx. 0,5 kg

##### **Accessories**

Instruction manual

#### **ORDERING DATA**

4-channel temperature controller  
Order number: 9404 437 41001



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