

KS 800 Multiple temperature controller

8-channel controller in housing for rail mounting
CAN/ CANopen, PROFIBUS-DP, DeviceNet, RS 485/422
Connection of Engineering Tool or local operation
Self-Tuning to the setpoint without oscillation
Automatic start-up circuit
Switch-over to output "hold" on sensor break
Monitoring for heating current and actuator
3 configurable alarm outputs or relays
8 analog outputs (option)
Direct connection of melt pressure sensors (option)

advanced line

GENERAL

The microprocessor-controlled KS 800 ensures precise, low-cost multi-loop control of temperature, and features an interface for bus or field-bus. Standard functions such as "set-point lowering" and "heating/cooling with four alarms" make the KS 800 ideally suited for temperature control of plastics processing machines, heated moulds, packaging machines, tempering units, and other similar thermal processes.

Furthermore, with high-power heating elements (e.g. in hot-runner moulds), the selectable functions "output hold" in case of sensor break, and "start-up circuit" ensure increased element life and prevent interruptions during Production. The self-tuning feature guarantees very short start-up times.

For implementing continuous and split-range controllers, the KS 800 can be fitted with 8 additional analog control outputs.

DESCRIPTION

The following description is based on the fact that every one of the 8 control loops contains a completely independent controller.

Input circuit monitoring

In case of a fault in sensor or leads, the built-in monitor provides increased operational safety. The controller output ac-

tion after monitor triggering can be configured for:

- downscale (min. output)
- upscale (max. output)
- outputs switched off
- switch-over to average output value

Thermocouple input

The monitor is triggered by wrong sensor polarity or TC break.

Resistive input

The input is monitored for a break or a short circuit in the sensor and leads.

Measurement value correction for thermocouples, Pt 100, linear input

The correcting function is used to change or scale the measurement value.

It can be applied either for zero offset (b) or for gain adjustment (m), or both, according to the equation " $mx + b$ ". For this, the controller computes the values for m and b from two input values (x_{1in} , x_{2in}) and two set-points (x_{1out} , x_{2out}).

Easy calibration is possible online via an operating page of the engineering tool.

Heating current monitoring and alarm

The KS 800 has an input for an external current transformer, whereby rectification of the input signal is done on board. All the connected heating leads of the KS 800's controllers are passed through the current transformer.

If the monitoring function has been activated, the heating outputs of all the con-

trol loops are switched on briefly in succession, and the heating current is measured. If the measured current is lower than a defined limit value, this information can be signalled to one of the alarm outputs or transmitted via the field bus.

Similarly, the heating output can be monitored for a short-circuited actuator (SSR). In this case, the heating current is measured when the heating output is switched off. If the measured current exceeds 3% of the selected range, an alarm is triggered.

In addition to checking for exceeded heating current limits, the actuator (solid state relays) is checked for short circuit. With the outputs switched off, the heating current must not exceed 1.5% of the selected heating current measuring range. With detected errors, the relevant channel number is also output by KS 800.

Leakage current monitoring

Heating elements with a high leakage current (e.g. due to penetrated moisture) are detected by this circuit.

Monitoring is carried out with the heating output switched off. An external current relay monitors the difference between the phase currents and the current in the neutral lead. If the difference exceeds a pre-defined value of 10...100 mA, the system transmits a 24 V DC alarm signal to the controller module.

Through cyclical activation of the heating circuits and corresponding scanning, a single current relay can be used for all 8



KS 816

Multiple transmitter & temperature controller



16-channel transmitter/controller in housing for rail mounting

CAN/CANopen, PROFIBUS-DP, RS 485/422

16 individually configurable universal inputs for $\pm 0...10\text{ V}$, $0...20\text{ mA}$, thermocouples, Pt 100

Comprehensive software functions: self-tuning, start-up circuit, set-point gradients, etc.

Controller outputs via (field) bus

Connection of Engineering Tool or local operating terminal

GENERAL

The microprocessor-controlled KS 816 ensures precise, low-cost multi-loop control of temperature, and features an interface for bus or field-bus.

In addition, it can be used as a freely configurable field-bus transmitter with universal inputs for standard signals, thermocouples, and Pt 100 signals.

Standard functions such as „set-point lowering“ and „heating/cooling with four alarms“ make the KS 816 ideally suited for temperature control of plastics processing machines, heated moulds, packaging machines, tempering units, and other similar thermal processes. Furthermore, with high-power heating elements (e.g. in hot-runner moulds), the selectable functions „output hold“ in case of sensor break, and „start-up circuit“ ensure increased element life and prevent interruptions during production. The self-tuning feature guarantees very short start-up times.

The KS 816 does not have control outputs in the usual sense. Its output signals are made available on the field bus as % duty cycle and binary signals (on/off). For the control of heating elements, PMA provides remote power output modules that are also operated via a field bus.

DESCRIPTION

The following description is based on the fact that every one of the 16 control loops contains a completely independent controller or transmitter.

Input circuit monitoring

In case of a fault in sensor or leads, the built-in monitor provides increased operational safety. The controller output action (on the bus) after monitor triggering can be configured for:

- upscale (max. output)
- downscale (min. output)
- outputs switched off
- switch-over to average output value

Thermocouple input

The monitor is triggered by wrong sensor polarity or TC break.

Resistive input

The input is monitored for a break or a short circuit in the sensor and leads.

Measurement value correction for all inputs

The correcting function is used to change or scale the measurement value. It can be applied either for zero offset (b) or for gain adjustment (m), or both, according to the equation: „mx + b“.

For this, the controller computes the values for m and b from two input values (x_{1in} , x_{2in}), two output values (x_{1out} , x_{2out}), and two reference points.

Controller and positioner functions

Apart from operating as a transmitter, the KS 816 is configurable as a signaller, a two-point or three-point controller, a cascade controller or as a three-point stepping controller.

All versions feature auto/manual switch-over, also via the interface. In manual operation, the output has an adjustable duty cycle of 0...100%. With cascaded operation, the slave controllers can also be operated as positioners, whereby the positioning signal is defined from the output of the master controller ($Y_{slave} = m \times Y_{master}$).

Alarm functions

Triggered alarms can be scanned via the field-bus. The monitored signals are process value x, control deviation xw, and output signal y or set-point w. Furthermore, 4 limit values (2 low alarms and 2 high alarms) can be adjusted for every control loop. Apart from channel-specific alarm status bytes, there are 3 common alarm bits that can be used to signal the following configurable alarm functions for each control loop:

- Relative alarm** for monitoring the control deviation (relative to set-point)
- Absolute alarm** for limit monitoring (independent of set-point)
- Relative alarm** with alarm suppression. (Alarm is not triggered during start-up or after set-point changes.)
- Sensor fault alarm**

The 3 common alarms are also signalled by means of 3 LEDs.



KS 108 *easy*

Compact automation unit for industrial control and process technology

Combines control, sequencing, and operation

Comprehensive function library with integrated operator dialogs

BlueDesign® graphical engineering tool

Function block diagrams

Process graphics

Commissioning

Flexible I/O systems

RL400 and vario I/O



- ❖ Compact, robust hardware
- ❖ Touch-screen operation
- ❖ Bright TFT colour display
- ❖ Multiple interfaces: front USB, CAN, RS 232, RS 485, Ethernet
- ❖ Other interfaces optional
- ❖ Function library: controller, programmer, datalogger, trend, ...
- ❖ Simple, confident operation using ready-made operating displays and parametrizing dialogs
- ❖ Integrated graphics editor for customized displays
- ❖ Convenient tools: BlueDesign and PMATune
- ❖ Self-tuning function for PID controllers
- ❖ Access to datalogger files via USB and network
- ❖ Fast, efficient data exchange between visualization and function level
- ❖ Simple update of firmware and user program via USB stick
- ❖ Remote diagnostics via BlueDesign
- ❖ Comprehensive debugging functions in BlueDesign for testing the Engineering
- ❖ Simulation of device operation

APPLICATIONS

- Industrial furnaces
- Heat treatment plants
- Driers
- Test stands
- Process technology
- Machine building

DESCRIPTION

General

The automation unit **KS 108 *easy*** is a practice-oriented combination of:

- Industrial & process controller
- PLC
- Visualization and operation
- Measurement data recording (datalogger, trend)
- Communication.

Together with the recommended VARIO and/or RL400 input/output systems, this results in a complete automation solution.

By means of the proven function blocks of the PMA library, highly functional and reliable Engineerings are generated in the shortest time.

Automatically generated operating dialogs, arranged in a predefined menu structure, provide access to all relevant parameters and data without additional programming. This greatly reduces the time required for projecting and testing.

The pages of the standard operating menu can be called directly and at any time from user-generated process graphics.

BlueDesign support plant commissioning, maintenance, and servicing. Moreover, this tool also provides simple, online access to process data and parameters during operation.

Construction

The **KS 108 *easy*** is a highly compact device designed for mounting e.g. in control panels.

The computer core consists of a 'low power' processor, which operates without the need for active cooling.

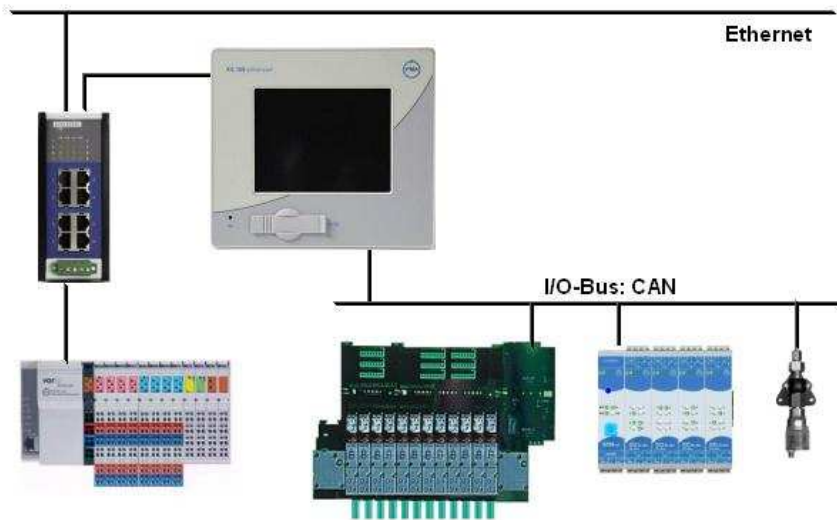
The Engineering is stored in a non-volatile Flash memory. Thanks to this design, the device's hardware is particularly robust for a long service life.

All of the numerous interfaces are easily accessible at the rear of the unit.

An SD memory card socket at the side of the unit permits memory expansion for data acquisition purposes.

Detailed images with a resolution of 320 x 240 pixels are provided by a TFT colour display. The display features excellent readability and brightness, plus long-life background lighting.

Moreover, the resistive touch feature permits direct operation via the screen. No other operating panels or terminals are required.



Powerful debugging functions considerably reduce the testing phase and commissioning of an Engineering.

- Online parametrization of function blocks.
- Versatile display options for process values.
- Pre-defined values for function block inputs.

User interface of the KS 108 easy

For operable function blocks, the PMA library automatically provides the associated dialogs. Moreover, the HMI editor enables freely-designed displays to be generated.

- Menus can be individually adapted to the process and to the needs of operators in numerous languages.
- Undesirable settings or switchovers are prevented by disabling certain operations in specific situations. Access is protected with a password or a control signal.
- Language selection simplifies the changeover from commissioning to the user's language (e.g. recipe names).
- Event-driven display of operating pages.
- Chaining of operating pages (e.g. programmer outputs).

Similarly, certain standard operating pages support more complex tasks:

- Operating pages of multi-output programmers are linked to the subsequent pages.
- Cascaded controller configuration is visualized by means of an overlapping operating page.
- An extension page permits every controller to be optimized.
- All alarms are displayed in a list on a separate page. Important alarms can be linked to an acknowledgement function.
- Up to 6 analog and 12 digital signals per block can be visualized above a time axis in a trend display.
- Data acquisition of up to 6 analog and 12 digital signals per block is handled by Logging function blocks. Data is stored on an SD card, and can be copied onto a USB stick.

BlueDesign graphics editor

BlueDesign is a PC-based graphics editor used to generate Engineerings. Various structuring aids are provided to improve layout transparency.

- Breakdown of the Engineering in up to 15 programs, each of which runs in a selectable cycle and with adjustable priority.
- Macros used to encapsulate repeated and established functions in a practically unlimited nesting depth.
- Export and import of macros permits the reuse of generated and tested functions in other projects.
- Within a program or macro, arbitrary function blocks can be positioned anywhere on the worksheet, and 'wired' according to their function.

- The definition of variables simplifies 'wiring' of comprehensive Engineerings, and provides access to global information.
- Lists of variables can be exported and imported in the form of text files. This enables them to be generated and modified with external text editors.

Apart from the standard operating displays, the on-board HMI editor can be used to create additional plant and process graphics to meet individual operating and display requirements.

In this way, the automation unit KS 108 easy is given a customer-specific 'look' with displays and terminology that are familiar to the operators.

