



KS 90-1 programmer KS 92-1 programmer

Universal Program Controller

- Up to 16 programs with 16 segments each
- 4 control (event) tracks
- Plain text program names
- BluePort® Front interface and BlueControl software
- Maintenance manager and error list
- Two universal inputs
- Day & Night display shows plain text and bargraphs
- Manual gain scheduling
- Self-Tuning to the setpoint without oscillation

advanced line

- ⊕ Universal continuous/switching version, i.e. reduced stocks
- ⊕ 100 ms cycle time, i.e. also suitable for fast control loops
- ⊕ 20 ms as shortest pulse-length
- ⊕ Two freely configurable analog output, e.g. as process value output
- ⊕ Customer-specific Linearization for all sensors
- ⊕ Settings can be blocked via password and internal switch for high security
- ⊕ Extended temperature range up to 60 °C allows mounting close to the process
- ⊕ Easy 2-point or offset measurement correction
- ⊕ Monitoring of heating current and output circuit
- ⊕ Emergency operation after sensor break by means of the „output hold“ function
- ⊕ Logical combination of digital outputs, e.g. for general alarm
- ⊕ RS 422/485 Modbus RTU interface
- ⊕ PROFIBUS-DP interface
- ⊕ Customer specific data-set
- ⊕ Built-in transmitter power supply
- ⊕ Splash-water proof front (IP 65)

APPLICATIONS

- chamber ovens
- melting and pot furnaces
- climatic and test chambers
- driers
- heat treatment
- test beds
- textile treatment (dyeing)
- glas industry (tempering)

DESCRIPTION

The program controller KS 9x-1 is intended for universal, precise, and cost-effective control tasks in all branches of industry. For this, the unit provides simple 2-point (on/off) control, continuous PID control, or 3-point stepping control. The process value signal is connected via a universal input. A supplementary analog input can be used for heating current measurement, as an external set-point inductor for position feedback measurement of motorized stepping controllers. The optional 3rd input is an universal input that can be used for several functions, e.g. temperature dependent setpoint correction or differential control.

Outputs

Every KS 9x-1 has four process outputs, either relays or up to 2 universal outputs that can be used for operating a solid-state relay, a continuous current/voltage output or to energize a two-wire transmitter. Optionally there are two additional optocoupler outputs.

Plug-in module

KS 9x-1 program controllers are built as plug-in modules. This enables them to be replaced very quickly without tools, and without disturbing the wiring.

Self-tuning during start-up and to the setpoint

This new function determines the optimum settings for fast line-out without overshoot. With three-point controller configuration, the „cooling“ parameters are determined separately, thus ensuring an optimum match to the process. By pushing a button the controller determines the best control parameters at the actual setpoint without oscillation, and a minimal deviation of the process value.

Customer specific data-set

A customer specific data-set can be generated and stored e.g. during commissioning. Later the operator can overwrite settings by resetting to the customer specific data-set.

Display and operation

The „day & night“ display of the KS 9x-1 is characterized by particularly high contrast in both dark and bright surroundings.

The status fields show operating conditions, control mode, and error messages reliably. The display is in plain text and can show various process values numerically or as a bargraph.

Front interface and Engineering Tools

Control parameter adjustment in seconds has now also been implemented in the KS 90 class of instruments. Via the BlueControl software incl. its simulation

functions, and especially the convenient BluePort® front panel interface, the required set-up for a specific control task can be determined without a detailed study of the operating instructions. Off cause almost all adjustments can be done comfortably over the instrument front. (see page , BlueControl)

Password protection

If required, access to the various operating levels can be protected with a password. Similarly, access to a complete level can be blocked.

TECHNICAL DATA

INPUTS

SURVEY OF THE INPUTS

| Input | Used for |
|---------------|---|
| INP1 | x1 (default process value) as INP2 |
| INP2 | Heating current, ext. set-point or ext. correction, position feedback Yp, 2nd process value x2, ext.correcting variable Y.E, input for additional limit signalling and indication |
| INP3 (option) | as for INP2 |
| di1 | Program run/stop, program reset, operation disabled, controller off, disabled |
| di2 | |
| di3 (option) | auto/manual function, reset of stored alarms, switch-over to ... second set-point SP.2, external set-point SP.E, fixed correcting variable Y2, ext. correcting variable Y.E, manual operation, parameter set 1 ↔ 2, process value INP1 ↔ X2 |

PROCESS VALUE INPUT INP1

| | |
|----------------------------|------------------------------|
| Resolution: | > 14 bit |
| Decimal point: | 0 to 3 decimals |
| Digital input filter: | adjustable 0,0...100,0 s |
| Scanning cycle: | 100 ms |
| Measured value correction: | 2-point or offset correction |
| Special (-linearization): | 15 segments |
| Standard table: | temperature sensor KTY 11-6 |

Thermocouples (Table 1)

Internal and external temperature compensation

| | |
|------------------------------|--------|
| Input impedance: | 1 MΩ |
| Effect of source resistance: | 1 μV/Ω |

Cold junction compensation

| | |
|-----------------------|---------|
| Max. additional error | ± 0,5 K |
|-----------------------|---------|

Sensor break monitoring

| | |
|--|------|
| Sensor current: | 1 μA |
| Operating sense configurable (see page) | |

Table 1 Thermocouple ranges

| Thermocouple | | Range | | Accuracy | Resolution (∅) |
|------------------|----------------|-----------------|------------------|----------|----------------|
| L | Fe-CuNi (DIN) | -100...900°C | -148...1652°F | ≤ 2 K | 0,1 K |
| J | Fe-CuNi | -100...1200°C | -148...2192°F | ≤ 2 K | 0,1 K |
| K | NiCr-Ni | -100...1350°C | -148...2462°F | ≤ 2 K | 0,2 K |
| N | Nicrosil/Nisil | -100...1300°C | -148...2372°F | ≤ 2 K | 0,2 K |
| S | PtRh-Pt 10% | 0...1760°C | 32...3200°F | ≤ 2 K | 0,2 K |
| R | PtRh-Pt 13% | 0...1760°C | 32...3200°F | ≤ 2 K | 0,2 K |
| T | Cu-CuNi | -200...400°C | -328...752°F | ≤ 2 K | 0,05 K |
| C | W5%Re-W26%Re | 0...2315°C | 32...4199°F | ≤ 2 K | 0,4 K |
| D | W3%Re-W25%Re | 0...2315°C | 32...4199°F | ≤ 2 K | 0,4 K |
| E | NiCr-CuNi | -100...1000°C | -148...1832°F | ≤ 2 K | 0,1 K |
| B ⁽¹⁾ | PtRh-Pt6% | 0(400)...1820°C | 32(752)...3308°F | ≤ 3 K | 0,3 K |
| | special | -25...75 mV | | ≤ 0,1 % | 0,01 % |

¹⁾ values applied above 400°C

Table 2 Resistance transducers

| Type | Sensor current | Range | | Accuracy | Resolution (∅) |
|-----------|----------------|--------------|---------------|----------|----------------|
| Pt100 | | -200...850°C | -328...1562°F | ≤ 1 K | 0,1 K |
| Pt1000 | | -200...200°C | -328...392°F | ≤ 2 K | 0,1 K |
| KTY 11-6* | | -50...150 °C | -58...302 °F | ≤ 2 K | 0,05 K |
| special | | 0...4500 Ω | | | |
| special | 0,2 mA | 0...450 Ω ** | | | |
| Poti | | 0...160 Ω ** | | ≤ 0,1 % | 0,01 % |
| Poti | | 0...450 Ω ** | | | |
| Poti | | 0...1600 Ω | | | |
| Poti | | 0...4500 Ω | | | |

* corresponds to special 0...4500 Ω

** lead resistance included

Table 3 Current and voltage

| Range | Input resistance | Accuracy | Resolution (∅) |
|---------------|------------------|----------|----------------|
| 0-10 Volt | ≈ 110 kΩ | ≤ 0,1 % | 0,6 mV |
| -2,5...115 mV | ≥ 1MΩ | ≤ 0,1 % | 6 μV |
| -25...1150 mV | ≥ 1MΩ | ≤ 0,1 % | 60 μV |
| 0-20 mA | 20 Ω | ≤ 0,1 % | 1,5 μA |

Special thermocouple

Together with the linearization, the measuring range -25...75mV can be used for connecting thermocouples that are not included in table 1.

Resistance thermometer

| | |
|------------------------|-------------------------|
| Connection: | 3-wire |
| Lead resistance: | max. 30 Ω |
| Input circuit monitor: | Break and short circuit |

Current and voltage signals

| | |
|--------------------------|---|
| Span start, end of span: | anywhere within measuring range |
| Scaling: | selectable -1999...9999 |
| Special linearization: | 15 segments, adaptable with BlueControl |
| Decimal point: | adjustable |
| Input circuit monitor: | 12,5% below span start (2mA, 1V) |

SUPPLEMENTARY INPUT INP2

| | |
|-----------------|----------|
| Resolution: | > 14 bit |
| Scanning cycle: | 100 ms |

Heating current measurement

via current transformer
 Measuring range: 0...50 mA AC
 Scaling: adjustable -1999..0,000..9999 A

Current measurement range

| | |
|------------------------|---|
| Input resistance | approx. 120 Ω |
| Span: | configurable within 0 to 20mA |
| Scaling: | adjustable -1999...9999 |
| Input circuit monitor: | 12,5% below span start (4...20mA → 2mA) |

Potentiometer

| | |
|------------------------|-------------|
| Ranges see Table 2 | |
| Connection: | 2-wire |
| Lead resistance: | max. 30 Ohm |
| Input circuit monitor: | Break |

SUPPLEMENTARY INPUT INP3 (OPTION)

Resolution: > 14 bit
Scanning cycle: 100 ms

Technical data as for INP1 except the 10V range.

CONTROL INPUTS DI1, DI2

Configurable as direct or inverse switch or push-button!
Connection of a potential-free contact suitable for switching „dry“ circuits.

Switched voltage: 5 V
Switched current: 100 µA

CONTROL INPUTS DI2, DI3 (OPTION)

The digital input di2 located on the A-card and di2 located on the option card are or-linked.

Configurable as switch or push-button!
Optocoupler input for active triggering

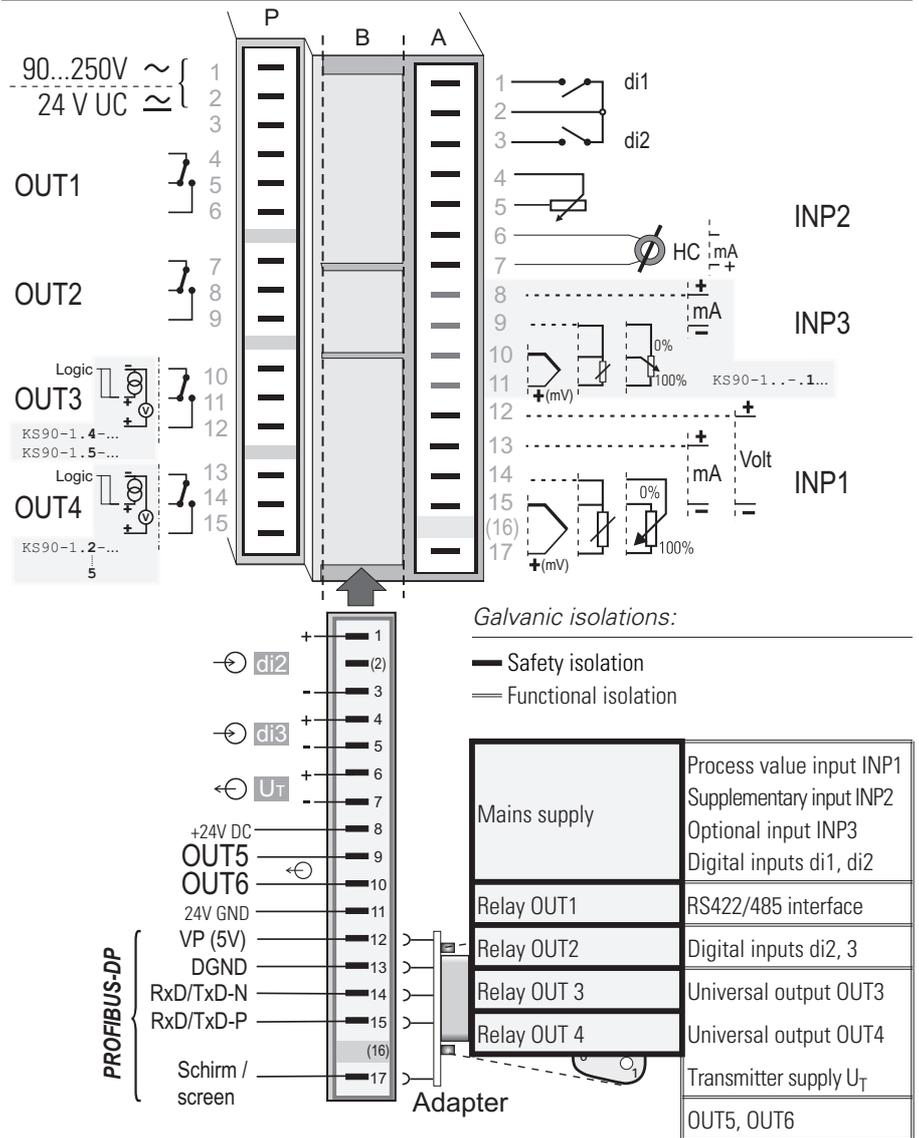
Nominal voltage: 24 V DC, external
Current sink (IEC 1131 Type 1)
Logic „0“: -3...5 V
Logic „1“: 15...30 V
Current requirement: approx. 5 mA

TRANSMITTER SUPPLY U_T (OPTION)

Output: 22 mA / 18 V

The analog outputs OUT3/OUT4 and the transmitter supply U have different voltage potentials. Therefore, with analog outputs, you must not set up an external galvanic connection between OUT3/4 and U.

Electrical connections:



Galvanic isolations:

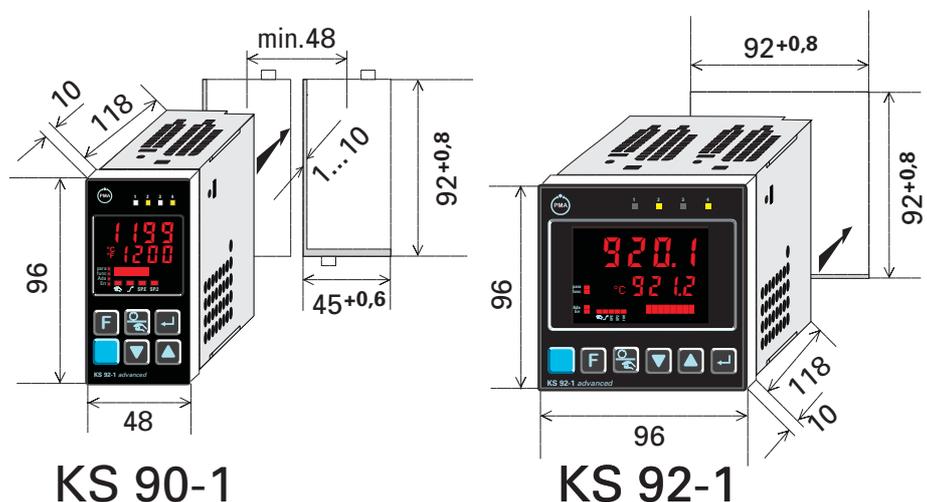
— Safety isolation
= Functional isolation

OUTPUTS

SURVEY OF THE OUTPUTS

| Output | Used for |
|--------------------------|---|
| OUT1,2 (relays) | Control output heating/cooling or Open/Close, limit contacts, alarms, control (event) tracks, program end, operator call * |
| OUT3,4 (relays or logic) | as OUT1 and OUT2 |
| OUT3,4 (continuous) | Control output, process value, measured values INP1/2/3, set-point, control deviation, position feedback Y _p , transmitter supply 13 V / 22 mA |
| OUT5 OUT6 (Optocoupler) | as OUT1 and OUT2 |

Dimensions (mm):



* All logic signals can be OR-linked !

RELAY OUTPUTS OUT1..OUT4

Contacts: Potential-free changeover contact
 Max. contact rating: 500 VA, 250 VAC, 2A at 48...62 Hz, resistive load
 Min. contact rating: 6 V, 1 mA AC/DC
 Duty cycle electric: for $I = 1A/2A: \geq 800,000 / 500,000$ ($\alpha \sim 250V /$ (resistive load))

Note:
 If the relays operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive switch-off voltage peaks.

OUT3, OUT4 AS UNIVERSAL OUTPUT

Galvanically isolated from the inputs.

Freely scalable
 Resolution: 11 bit
 DA-converter limiting frequency T_{90} : 50 ms
 Limiting frequency of the complete continuous controller: > 2 Hz

Current output

0/4...20 mA, configurable.
 Signal range: 0...approx. 22 mA
 Load: 500
 Load effect: none
 Resolution: 22 μ A (0,1%)
 Error: 40 μ A (0,2%)

Voltage output

0/2...10V, configurable
 Signal range: 0...11 V
 Load: ≥ 2 k Ω
 Load effect: none
 Resolution: 11 mV (0,1%)
 Error: 20 mV (0,2%)

OUT3, OUT4 used as transmitter supply

Output: 22 mA / 13 V

OUT3 used as logic output

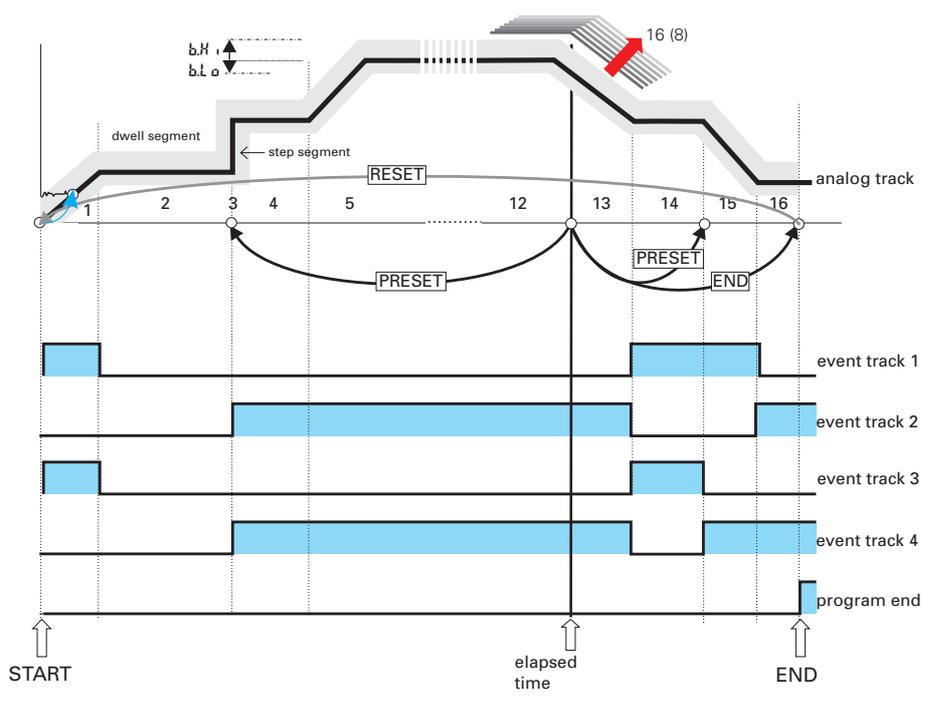
Load 500 0/ 20 mA
 Load > 500 0/> 13 V

OUTPUTS OUT5, OUT6 (OPTIONAL)

Galvanically isolated opto-coupler outputs.

Grounded load:
 common positive control voltage.
 Output rating: 18...32 VDC; =70 mA
 Internal voltage drop: =1 V with I_{max}
 Protective circuit: built-in against short circuit, reversed polarity.
 Node: For inductive load a free-wheel diode has to be connected externally.

Programmer functions:



FUNCTIONS

PROGRAMMER

programs: 8 or 16 (depending on version)
 control (event) 4
 tracks: 4
 segments: 15 each
 types of segments: ramp (setpoint and time)
 ramp (setpoint and ramp)
 dwell segment (dwell time)
 step segment (with limit monitoring suppression)
 end segment

All types of segments can be combined with "wait at the end and operator call".

time base: configurable hours:minutes or minutes:seconds

max. segment duration: 9999 hours = 1 year 51 days

max. programm duration: 16 x 9999 hours = > 18 years

ramp: 0,01°C/h (/min) to 9999°C/h (/min)

program names: 8 characters, adjustable with BlueControl Software

bandwidth control: upper and lower bandwidth (b.L. α , b.H. γ) configurable for each program

CONTROLLER

Control behaviour

- Signaler with asymmetric adjustable switching differential (ON/OFF controller)
- PID controller (2-point and continuous)
- Delta / Star / Off or 2-point controller with switch over from partial to full load
- 2 x PID (heating/cooling)
- 3-point stepping controller with or without position feedback
- Continuous controller with internal positioner (stepping controller)

Two parameter sets for manual gain scheduling. Self-tuning control parameters or adjustable manually via front keys or BlueControl software.

Behaviour with 2- and 3-point controllers

- *Standard behaviour:*
 For precise matching of the required output value at the output signal limits, the controller changes the cycle times for heating and cooling automatically and continuously.
- *With constant cycle times:*
 The length of the shortest heating and cooling pulse is adjustable >20ms.

Set-point functions

- Adjustable set-point gradient (rate) 0,01...9999 °C/min
- Set-point control
- Program control

- Programm control with external correction
- Set-point/cascade control
- Set-point/cascade control with external correction

Process value calculation

- Standart ($x_{eff} = INP1$)
- Ratio ($INP1/X2$)
- Difference ($INP1-X2$)
- Max ($INP1, X2$)*
- Min ($INP1, X2$)*
- Mean value ($INP1, X2$)*
- Switch-over between INP1 and X2

* applicable if redundant sensors are necessary. Control works with the remaining sensors, if one of them fails.

Behaviour with sensor break or short circuit:

- Control outputs switched off
- Switch-over to a safe output value
- Switch-over to a mean output value
- With the measured value functions min, max and mean value, control is continued with the remaining measured value.

SPECIAL FUNCTIONS

Modbus Master

The KS 9x-1 can be configured as Modbus Master. This enables it to transmit user-specified signals or parameters cyclically to all connected Slave controllers. For example, the following applications are possible:

- Digital setpoint broadcast (→ Bild)
- Set-point shifting relative to the set-point adjusted in the Slave
- matching of control parameters, limit contacts, etc.
- Limiting the output value (override control OVC)
- ...

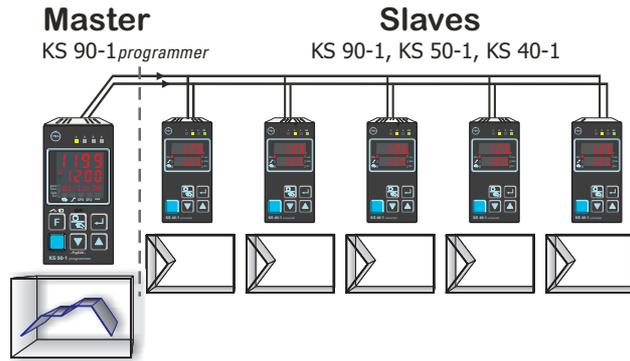
LIMIT SIGNALLING FUNCTIONS

Max., Min. or Max./Min. monitoring with adjustable hysteresis.

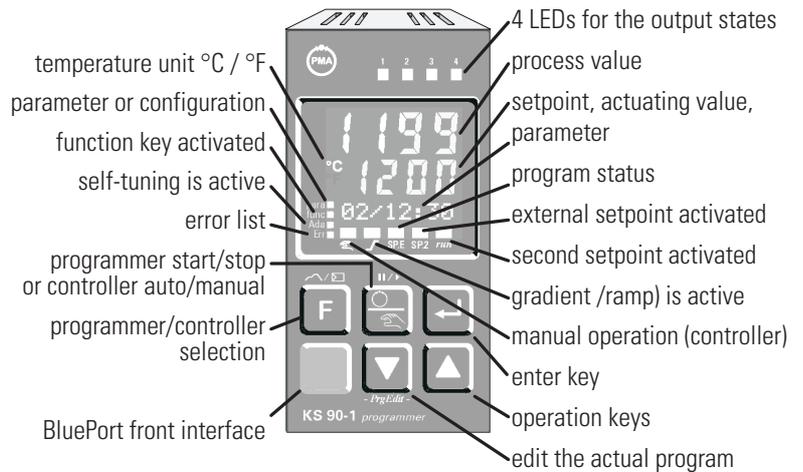
Signals which can be monitored:

- Process value
- Control deviation
- Control deviation with suppression during start-up or set-point changes
- Effective set-point
- Output signal Y
- Input values of INP1, INP2, INP3
- Difference INP1 - X2. This function allows to detect aged thermocouples. During a step segment limit monitoring is suppressed!

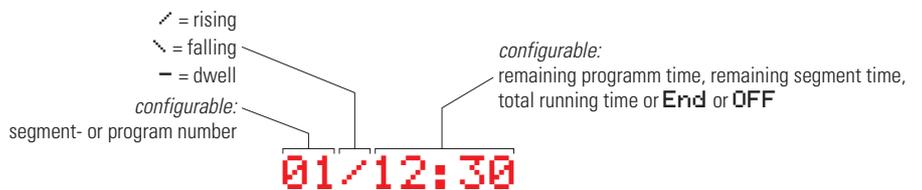
Modbus Master function sends the setpoint to the slave controllers:



Display and operation:



Programmer status indication:



Functions

- Input signal monitoring
- Input signal monitoring with latch (reset via front key or digital input)
- Rate of change monitoring (1/min)
- Adjustable discriminator time of 0...9999 seconds

Several limit signals or alarms can be OR-linked before being output. Applications: Release of a brake with motor actuators, general alarms, etc.

ALARMS

Heating current alarm

- Overload and short circuit
 - Open circuit and short circuit
- Limit value adjustable 0...9999 A

Control loop alarm

Automatic detection if there is no response of the process to a change of output value.

Sensor break or short circuit

Depending on selected input type, the input signal is monitored for break and short circuit.

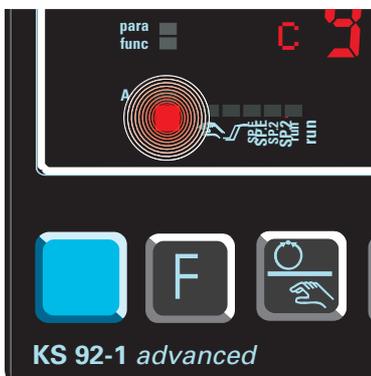
MAINTENANCE MANAGER

Display of error signals, warnings, and latched limit messages in the error list. Signals are latched, and can be reset manually.

Possible signals in the error list:

Sensor break, short circuit, reversed polarity
Heating current alarm
Control loop alarm
Fault during self-tuning
latched limit messages
Re-calibration warning
Maintenance interval of actuator
Internal fault (RAM, EEPROM, ...)

Flashing Error symbol indicates active alarm in the error list:



OPERATION AND DISPLAY

Display KS 90-1 programmer

Integrated day&night display

process value: 4 x 7 segment 10,5 mm
lower display: 4 x 7 segment 7,8 mm
text display: 8-character dot matrix used for displaying e.g. the program status

Display KS 92-1 programmer

LCD display module with red backlighting

process value: 4 x 7 segment 15,2 mm
lower display: 4 x 7 segment 10,8 mm
text display: 8-character dot matrix used for displaying e.g. the program status

Operating functions

The functions of the -key are configurable:

| Function |  |
|--|---|
| Y.2 (2nd output value) | X |
| SP.E (external setpoint) | X |
| Manual operation | X |
| C.OFF (controller function off) | X |
| Reset of latched limits and error list | X |

Several functions can be combined e.g. SP.2 and parameter set switch-over (gain scheduling) with only one key.

POWER SUPPLY

Depending on version:

AC SUPPLY

Voltage: 90...260 VAC
Frequency: 48...62 Hz
Power consumption approx. 8 VA

UNIVERSAL SUPPLY 24 V UC

AC voltage: 20,4...26,4 VAC
Frequency: 48...62 Hz
DC voltage: 18...31 V DC
Power consumption: approx. 8 VA (W)

BEHAVIOUR WITH POWER FAILURE

Configuration, parameters, and adjusted set-points, control mode:
Non-volatile storage in EEPROM

BLUEPORT® FRONT INTERFACE

Connection of PC via PC adapter (see „Accessories“). The BlueControl software is used to configure, set parameters, and operate the KS 9x-1.

BUS INTERFACE (OPTION)

RS 422/485 INTERFACE

Galvanically isolated
Physical: RS 422/485
Protocol: Modbus RTU
Transmission speed: 2400, 4800, 9600, 19.200 bits/s
Address range: 00...99
Number of controllers per bus: 32
Repeaters must be used to connect more controllers.

PROFIBUS DP

➤ see data sheet 9499-737-44813

ENVIRONMENTAL CONDITIONS

Protection modes

Front panel: IP 65
Housing: IP 20
Terminals: IP 00

Permissible temperatures

For specified accuracy: 0...60°C
Warm-up time: < 15 minutes
Temperature effect: < 100ppm/K
For operation: -20...65°C
For storage: -40...70°C

Humidity

75% yearly average, no condensation

Shock and vibration

DIN EN 60068-2-6

Frequency: 10...150 Hz
Unit in operation: 1g or 0,075 mm
Unit not in operation: 2g or 0,15 mm

DIN EN 60068-2-27

Shock: 15g
Duration: 11ms

Electromagnetic compatibility

Complies with EN 61 326-1

- Complies with the immunity requirements for continuous, unattended operation
- Complies with the emission requirements class B for rural areas
- Surge disturbances may increase the measurement error and lead to error messages

GENERAL

Housing

Material: Makrolon 9415, flame-retardant
Flammability class: UL 94 V0, self-extinguishing

Plug-in module, inserted from the front

Safety tests

Complies with EN 61010-1 (VDE 0411-1):
Over voltage category II
Contamination class 2
Working voltage range 300 VAC
Protection class II

Certifications

cULus-certification

(Type 1, indoor use)
File: E 208286

GOST-R Certificate(on request):

For each shipment to the russian federation and GUS-states, an authenticated certificate is to be delivered with the GOST-R certified controllers (KS4x-1, KS5x-1, KS9x-1, one certificate per shipment - 9499-047-14465).

Electrical connections

Depending on version:

- Flat-pin connectors 1 x 6,3 mm or 2 x 2,8 mm to DIN 46 244
- Screw terminals for conductor cross-section from 0,5 to 2,5 mm²

Mounting

Panel mounting with two fixing clamps at top/bottom or left/right
Close mounting possible

Mounting position: not critical
Weight: 0,27 kg (9.52 oz)

Accessories supplied with unit

Operating instructions
2 fixing clamps

ACCESSORY EQUIPMENT

BlueControl (Engineering Tool)

PC-based program for configuring, setting parameters, and operating (commissioning) the KS 9x-1 programmer. Moreover, all the settings are saved, and can be printed on demand. Depending on version, a powerful data acquisition module is available, complete with trend graphics.

Visibility mask

The BlueControl software can be used to blind out parameters in the instrument. Thus, only allowed parameters can be changed on side. Safety relevant parameters are invisible!

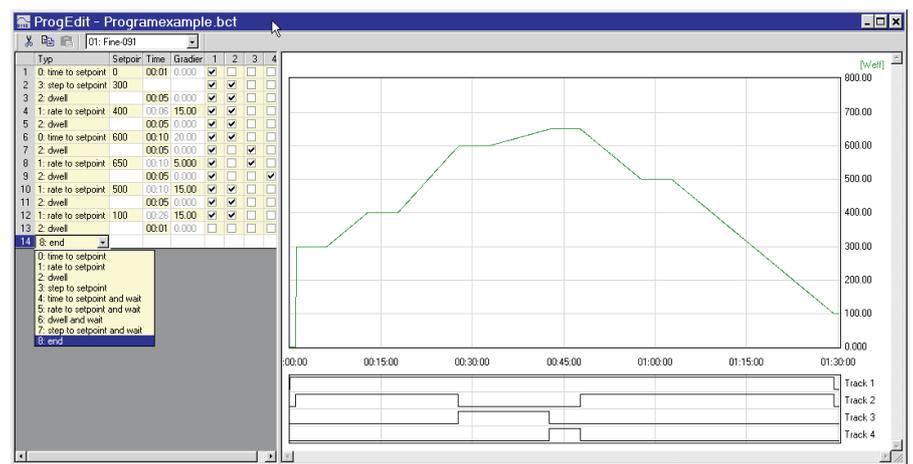
Two parameters are blinded out:

| Name | Description | Visible |
|-------|------------------------|-------------------------------------|
| Setp | Setpoint | <input checked="" type="checkbox"/> |
| SP.LU | lower setpoint range | <input type="checkbox"/> |
| SP.Hi | upper setpoint range | <input type="checkbox"/> |
| SP.2 | 2nd setpoint | <input checked="" type="checkbox"/> |
| r.SP | setpoint ramp [/min] | <input checked="" type="checkbox"/> |
| t.SP | timer dwell time [min] | <input checked="" type="checkbox"/> |

BlueControl, versions and functionality:

| Functionality | Mini | Basic | Expert |
|--|----------|-------|--------|
| parameter and configuration setting | yes | yes | yes |
| controller and loop simulation | yes | yes | yes |
| download: transfer of an engineering to the controller | yes | yes | yes |
| online mode / visualization | SIM only | yes | yes |
| defining an application specific linearization | yes | yes | yes |
| configuration in the extended operating level | yes | yes | yes |
| upload: reading an engineering from the controller | SIM only | yes | yes |
| basic diagnostic functions | no | no | yes |
| saving data file and engineering | no | yes | yes |
| printer function | no | yes | yes |
| online documentation, help | yes | yes | yes |
| implementation of measurement value correction | yes | yes | yes |
| data acquisition and trend display | SIM only | yes | yes |
| wizard function | yes | yes | yes |
| extended simulation | no | no | yes |
| customer-specific default data-set | no | no | yes |
| programeditor (KS 90-1programmer only) | no | no | yes |

The programeditor in the BlueControl expert version:



Simulation

The built-in simulation serves to test the controller settings, but can also be used for general training and observing the interaction between controller and control loop.

Software requirements

Windows 95/98/NT/2000.

Configurations that can only be implemented via the BlueControl software (not via the front-panel keys):

- Generating 8-bit program names
- Customer-specific linearizations
- Activating customer specific data-set
- Enable „forcing“ for inputs/outputs
- Adjustment of limits for operating hours and switching cycles
- Switch-over to 60 Hz mains frequency
- Master/slave configuration

- Disable operator actions and operating levels, plus password definition
- Prevent automatic optimization of cycle times T1, T2

Hardware requirements:

A PC adapter (see „Accessories“) is required for connecting the controller.

Updates and demo software can be downloaded from:
www.pma-online.de

ORDERING INFORMATION

| | K | S | 9 | 0 | 1 | | | | | | | 00 |
|---|---|---|---|---|----|---|---|---|---|---|---|----|
| KS 90-1 Format 48 x 96 | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| KS 92-1 Format 96 x 96 | | | | | 2 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Flat-pin connectors | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Screw terminals | | | | | 1 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 90..250V AC, 4 relays | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 24VAC / 18..30VDC, 4 relays | | | | | 1 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 90..250V AC, 3 relays + mA/logic | | | | | 2 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 24VAC / 18..30VDC, 3 relays +mA/logic | | | | | 3 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 90..250V AC, 2 relays + 2xmA/logic | | | | | 4 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| 24VAC / 18..30VDC, 2 relays + 2xmA/logic | | | | | 5 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| no option | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| RS422/485 + U _T + di ₂ , di ₃ + OUT5, OUT6 | | | | | 1 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| PROFIBUS-DP + U _T + di ₂ /di ₃ + OUT5/OUT6 | | | | | 2 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| INP1 and INP2 | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| INP1, INP2 and INP3 | | | | | 1 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Program controller with 8 programs | | | | | 1 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Program controller with 16 programs | | | | | 2 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Standard configuration | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Configuration to specification | | | | | 9 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| no manual | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| manual german | | | | | D | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| manual english | | | | | E | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| manual french | | | | | F | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Standard | | | | | 0 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| cULus certified (with screw terminals only) | | | | | U | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| GOST-R certified (incl. operating manual) | | | | | R | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Unit / front according to customer specification | | | | | XX | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |

ACCESSORIES

| Description | Order no. |
|--|--|
| Current converter 50A AC | 9404-407-50001 |
| PC adapter, for connecting the BlueControl software to the BluePort® | 9407-998-00001 |
| Standard rail adapter | 9407-998-00061 |
| Operating manual KS 9x-1 | English 9499-040-62911 German 9499-040-62918 French 9499-040-62932 |
| Operating manual KS 9x-1dp | English 9499-040-66111 German 9499-040-66118 |
| BlueControl Mini | English/ German/ French www.pma-online.de |
| BlueControl Basic | English/ German/ French 9407-999-11001 |
| BlueControl Expert | English/ German/ French 9407-999-11011 |
| Datasheet KS 9x-1 | English 9498-737-40613 German 9498-737-40633 |
| Datasheet KS 9x-1dp | English 9498-737-44813 German 9498-737-44833 |
| Engineering set KS 9x-1 PROFIBUS | English 9407-999-10501 German 9407-999-10511 |
| Sub-D connector for flat-pin connectors | 9407-998-07001 |
| Sub-D connector for screw terminals | 9407-998-07011 |



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