WEST
Control Solutions

PMA KS Vario
Modular PID control system

Overview

The highly modular temperature control system KS VARIO can manage up to 30 control loops and provide additional measurements. By selecting the right I/O-modules the system configuration can be composed to the exact needs of the application. Required interconnections are made automatically. KS VARIO is the perfect choice when precise temperature is essential for the application. Providing connectivity to the most used communication interfaces KS VARIO can easily connect to PLCs and other control equipment. KS vario supports: Modbus-RTU, Modbus-TCP, Profibus DP, Profinet, Devicenet, Ethernet IP and CANopen.

Besides the sophisticated PID control function KS VARIO also offers special features and monitoring functions for a variety of applications

Key Features

- Independent remote temperature control system with modular I/O and attractive additional features
- Supports the most commonly used communication interfaces
- Up to 60 analog I/Os and 320 digital I/Os
- Supports calibration with measured value correction
- 2 auto-tuning strategies available
- Synchronized heat-up
- Automatic start-up and boost functions
- Configurable response to sensor break error
- Heater current monitoring and loop alarm
- Transmitter supply
- Direct connection of pressure sensors

Description

A KS Vario system is built upon a base control module and a communication bus coupler module as a minimum and can be extended with aditional I/O extension modules. With its flexibility KS Vario is suitable for precise cost-effective temperature control tasks in various applications. KS Vario provides simple on/off control, DPID control, motorised stepping or master/slave control individual for each channel. Due to the modular system concept, any combination of input & output signals can be assembled.
The integrated monitoring of sensors, the entire control loop and heater current helps to easily identify and fix problems.

Modular, up to 30 channels

The base module of KS Vario is fitted with the necessary I/O for up to 8 control loops. Simply by plugging additional I/O modules into the system, a finely graduated expansion up to 30 control loops is possible. The maximum configuration allows up to 60 analog outputs, up to 34 analog inputs and up to 320 digital inputs or outputs to be processed.
Every system is connected to a field bus coupler, which also provides the supply voltage for the entire system.

Automatic inter-connections reduce installation time

The necessary modules of a Vario system are simply plugged together without the need for tools. All peripheral and data signals, as well as the supply voltages are connected automatically. The external 24 VDC system supply must only be connected to the bus coupler at one point.

Thanks to the plug-in spring clamp connectors for the I/O wiring, quick and simple module replacement is ensured. Identifying labels provide convenient I/O marking.

Engineering Tool "BlueControl"

The Configuration of KS Vario is done by means of the powerful and easy-to-use Engineering Tool "BlueControl", which is connected via a separate RS 232 interface on the KS Vario. Furthermore, BlueControl also allows convenient operation and monitoring of the control system, plus simulation functions for control mode and control loop.

Fast software update via BlueFlasher

Via the local RS 232 interface of the KS Vario, loading a software update into the controller's Flash EPROM is a simple matter.

Simple system configuration

Apart from a field bus coupler and the base controller, there is choice of some 20 different I/O modules for making up a KS Vario multi-controller system. BlueControl provides a very convenient way to configure and set-up a system.

The following I/O modularities are available:

Digital I/O: 2, 4, 8 and 16 channels

Analog I/O: 2, 4, and 8 channels

The KS vario automatically tests whether the system configuration assigned via BlueControl or field bus confirms with the modules actually connected.

See below for a list of available modules.

Flexible scan rates from 100 ms

The KS Vario system offers individual selection of scan rate. This allows high flexibility when adapting to the connected control loops. For example, the combination of fast mold heating with slow barrel heating presents no problems. The minimum adjustable scan rate is 100 ms.

Input circuit monitoring and output 'hold' on sensor break

In case of a fault in a measurement circuit, the built-in monitoring function ensures increased operational safety for the plant. The inputs are monitored for break, short circuit, and wrong polarity of sensor and leads.

If the monitor is triggered, the controller's output action can be defined as follows:

- Predefined output value
- Outputs disabled
- 'Hold' of mean output value

In order to continue with production in case of a sensor break, it is necessary to maintain the temperature at the last mean value of the output signal.

The KS Vario signals a sensor break via the field bus or an alarm output, so that the sensor can be replaced. As soon as the KS Vario detects a valid input value after replacement, controller operation is continued automatically.

Control loop monitoring (loop alarm)

The control loop monitoring function checks the functionality of the entire control loop. It detects if there is no change of the process value after a corresponding change of the output signal.

Measurement value correction

The correcting function is used to change or scale the measurement value. Especially convenient is the option for implementing the changes online via a screen display of the "BlueControl" Engineering Tool.

Alarm and safety functions, alarm outputs

The KS Vario offers comprehensive alarm processing functions. Arbitrary alarm signals can be assigned to max. 6 digital outputs. If several alarm signals are assigned to one output, the internal connections are made automatically.

The following alarm signals are available per channel:

- Relative measured value alarm for monitoring the control deviation (process value – setpoint)
- Absolute measured value alarm for monitoring limit values, independent of setpoint value.
- Relative measured value alarm with alarm suppression, i.e. the alarm is not triggered during start-up or setpoint changes.
- Loop alarm (control loop monitoring)
- Sensor fault alarm
- Heating current alarm

Heating current monitoring and alarm

One current transformer per max. 8 heating zones can be connected to the Vario system. Rectification of the transformer signal is done by the KS Vario controller or by the Vario I/O modules with heating current input.

Apart from measuring all the heating currents, every value is monitored for a minimum limit and for short circuit of the solid-state relay. If a limit is exceeded, this information is used to trigger a digital output or it is transferred to the field bus with an indication of the respective channel number.

Automatic heating current limit setting via trigger signal

The heater current limit values of all monitored zones can be set automatically by means of a "heating current trigger signal" (also directly via the BlueControl tool operating page). In this case, the heating current limit values are formed from the actual measured values minus a heating current tolerance: HC.tol. This parameter indicates the max. permissible deviation from the "normal" heating current process value in per cent (0...50).

Variations of the mains voltage are compensated during heating current measurement

To prevent variations in the mains voltage from affecting heater current limit detection, the KS Vario system is able to measure mains voltage (1 phase or all 3 phases separately). The measured mains supply values are compensated according to the adjustable reference value in the controller.

Controller & positioner operation

The KS Vario is configurable as a signaller, two or three-point controller, three-point controller with evaporative water cooling, master/slave operation, or for three-point stepping control. Similarly, it can be configured for continuous or split-range control. Furthermore, bumpless auto/manual switchover is provided. During manual operation, the positioning output can be set to any value or relative duty cycle.

Melt pressure measurement for extrusion plants

The KS Vario system has inputs for the direct connection of melt pressure sensors.

Second setpoint and ramp function
Via any of the digital inputs or the field bus, a second setpoint can be activated (e.g. for setpoint lowering).

By means of the setpoint gradient (ramp) function, which starts automatically during system start-up and after every change of the setpoint value, the function ramps up or down to the new setpoint value.

Synchronized heat-up
This 'automatic' temperature ramping function prevents thermal stresses within a group of heating zones. The KS Vario automatically detects the zone with the slowest heating gradient, and controls the gradient of all the other zones accordingly, until the set points are reached.
This happens independently of actual process values, i.e. zones that might already be warm are not heated until the other zones have reached the same value, after which they are heated together up to their respective setpoints.

Start-up circuit
High-performance heating elements with magnesium oxide insulation must be heated slowly, to remove any humidity and to prevent destruction.
With activated start-up circuit, the controller uses the adjusted start-up power limit (e.g. 40%) until reaching the start-up setpoint (e.g. 95°C).
For protection of the heating elements, the duty cycle is reduced to ¼ during start-up. The start-up setpoint (e.g. 95°C) is maintained during the selected start-up holding time. That followed, the controller uses the main setpoint W.

Boost function
The boost function briefly switches all the control loops to a higher setpoint, e.g. to remove scale from the nozzles during mold heat-up.

Self-tuning
This function is fitted as standard for automatic determination of the best control parameters. Self-tuning is started on demand via the field bus or the Engineering Tool, and uses the delay time Tu and the max. rate of change Vmax of the temperature control loop to calculate the optimum settings for fast line-out without overshoot.

With three-point controller configuration, the "cooling" parameters are determined separately. Self-tuning also works with an activated start-up function. For applications with adjacent heating zones and strong thermal coupling, synchronous self-tuning can be started for the loops involved (max. 30). Synchronous self- tuning can be activated or disabled individually for every control loop. Up to 4 individual groups can be synchronized with this procedure.

Self-tuning at setpoint
This newly developed feature determines the optimum control parameters also at setpoint, either on request or automatically (following a detected tendency to hunt). The procedure works without oscillation, and with only a minimum variation of the controlled variable.

Control functions via digital inputs
Up to 8 digital inputs can be assigned for the following remote control functions for any of the control channels:
- Switch-over to a different set of parameters
- Disabling of all controllers
- Switch-over to 2nd setpoint
- Boost function for hot runners
- Auto/manual switch-over
- Data read-out via field bus

Signal assignment to digital outputs
Max. 60 digital outputs can be assigned to the following signals:
- Heating or cooling signal
- Any common alarm
- Remote control via field bus

Signal assignment to analog outputs
Max. 60 analog outputs can be assigned to the following signals:
- Control signal (heating and cooling)
- Control signal (only heating)
- Control signal (only cooling)
- Process value (transmitter function)
- Setpoint
- Remote control via field bus

Forcing
All unused digital and analog outputs can be 'forced' via the field bus. Similarly, all inputs can be read via the field bus.

Watchdog
The KS Vario is fitted with a hardware watchdog, that is triggered internally every 0,26 seconds.

TECHNICAL DATA
Base control module and channel extension modules

For other expansion modules, please refer to the relevant data sheets. A survey of the modules is given below.

VERSIONS OF THE CONTROL MODULE
KS VARIO T4/UTH
- 4 Thermocouple inputs
- 1 heating current input
- 8 digital outputs
- max. 4 control loops

KS VARIO T8/UTH:
- 8 Thermocouple inputs
- 1 heating current input
- 8 digital outputs
- max. 30 control loops

KS VARIO T4/RTD
- 4 Resistance inputs
- 1 heating current input
- 6 digital outputs
- max. 4 control loops

KS VARIO T6/RTD
- 6 Resistance inputs
- 1 heating current input
- 6 digital outputs
- max. 30 control loops

INPUTS
UTH Version

Thermocouples
Types L, J, K, N, S, and R to DIN IEC584

Type	Meas. range	Error
B	400...1820 °C	≤ 3 K
C	0...2315 °C	≤ 3 K
D	0...2315 °C	≤ 3 K
E	-100...1000 °C	≤ 3 K
J	-100...1200 °C	≤ 2 K
K	-100...1350 °C	≤ 2 K
L	-100... 900 °C	≤ 2 K
N	-100...1300 °C	≤ 2 K
R	0...1760 °C	≤ 3 K
S	0...1760 °C	≤ 3 K
T	-200...400 °C	≤ 2 K

Value display: in °C or °F
Resolution of A/D converter: ≥14 bits
Input resistance: ≥1 MΩ
TC break monitoring
Monitoring current: ≤ 1 µA
Configurable controller reaction on error
Polarity monitoring:
Responds when input signal is 30 K below range

Temperature compensation:
Internal or external Sensor
Additional error: ≤ 1 K/10 K change of terminal temperature

Permissible voltages between inputs: 1 VDC and 2 VAC

Permissible voltage between inputs and ground: 5 VAC

Direct voltage

Range:	0...70 mV linear
Input resistance:	≤ 1 MΩ
Error:	≤ 0,1 %

Input span scalable via measurement correction

RTD Version

Resistance thermometer
Pt 100 to DIN IEC 751

Range:	-200,0...850,0 ℃

With linearisation (temperature-linear)

Error:	≤ 1 K ±1 digit Resolution of A/D
converter:	>14 bits

Connection in three-wire technique without lead adjustment.
With two-wire connection, a calibrating resistor equal to the lead resistance must be fitted.

Lead resistance:	≤ 30 Ω
Sensor current:	≤ 0,3 mA

Input circuit monitoring for break in sensor or lead, or short circuit.

Configurable controller reaction on error

Resistive input, linear
Range: 0...450 Ω, without linearisation
Connection in three-wire technique without lead adjustment.
With two-wire connection, a calibrating resistor must be fitted.

Sensor current:	≤ 0,3 mA

Input circuit monitoring for break in sensor or lead.

Scan rate
100ms, 200ms, 400ms, ...
Selectable per channel

Heater current input, heater current monitoring
Current summing principle (1 current transformer for max. 8 heaters).
Connection of conventional current transformers.

Input span:	0...50 mA AC
Input resistance:	approx. 170 Ω

e.g. PMA standard current transformer 0...50A / 0...50 mA AC

Solid State Relay short circuit detection
Threshold value of the short-circuit monitor: 1,5 % of selected span (e.g. 0,45 A with a span of 30,0 A)
Optional compensation of mains voltage variations for heater current monitoring. Separate for every phase
The mains voltage is measured via a converter module (accessory) and must be connected to an analog input module (e.g. VARIO AI 2/SF)

CONFIGURATION INTERFACE
To connect PC with setup software or local operator terminal
Type: RS 232
Address and baudrate adjustable
Max. cable length: 3 m

OUTPUTS
Logic outputs
Depending on version (RTD or UTH), 6 or 8 outputs are available for connecting solid-state relays or as alarm outputs.

Outputs are short-circuit proof, and switch 24 VDC (grounded load).
Nominal range of switched output voltage: 18...30 VDC to DIN 19 240.

Nominal output current:	70 mA
Voltage drop across output at full load:	
	0,6 V typical, 1 V max.

POWER SUPPLY (provided by bus module)

Analog supply:	24 V ≤ 30 mA
Logic supply:	7,5 V ≤ 150 mA
	via potential routing
Segment supply:	24 V DC ≤ 500mA via
	potential routing

Protection class III (protective low voltage).

CONTROL FUNCTIONS
Configurable as:
- Signaller with 1 or 2 outputs
- Two-point DPID controller
- Three-point DPID/DPID controller
- Three-point DPID/DPID controller with output algorithm for evaporative water cooling (extruders)
- Split-range controller
- Continuous controller
- Positioner function with manual operation of three-point controller
- Three-point stepping controller
- Master/slave controller

Supporting functions
- Self-tuning function
- Start-up function
- Synchronized heat-up
- Boost function

ALARM FUNCTIONS
Output: logic signal or via interface
The following alarms are configurable for every control loop:
- relative or absolute measured value alarm
- relative measured value alarm with alarm suppression
- Sensor break alarm
- Heating current alarm
- Control loop alarm

STATUS DISPLAYS
- Display LEDs for:
- Bus diagnostics
- Run
- Self-tuning
- Alarm
- Error message

PROGRAM MEMORY
Flash EPROM
Firmware update via BlueFlasher utility

ENVIRONMENTAL CONDITIONS
Permissible Temperatures

Ambient temperature (operation):	0...55 °C Ambient
Temperature (storage/transport):	-25...85 °C

Humidity
Humidity (operation):
75 % on average; 85 % occasionally; no condensation
Humidity (storage/transport) 75%, on average; 85%, occasionally.
No condensation

INFLUENCING FACTORS

Power supply effect
None. In case of mains failure, the configuration data are stored in a non- volatile EEPROM.

Vibration test
Sinusoidal vibrations according to IEC 60068-2-6; EN 60068-2-6
5g load, 2 hours for each space direction

Shock test
According to IEC 60068-2-27; EN 60068-2-27
25g load for 11 ms, half sinusoidal wave, three shocks in each space direction and orientation

ELECTROMAGNETIC COMPATIBILITY
Noise Immunity Test according to EN 50082-2

Electrostatic discharge (ESD) according EN 61000-4-2 / IEC 61000-4-2
 - Criterion B
 - 6 kV contact discharge
 - 8 kV air discharge

Electromagnetic fields according EN 61000-4-3, IEC 61000-4-3
 - Criterion B
Influencing factor max. 1% of the range in the frequency-range of 400-1000MHz (only RTD-versions)
 - Field strength: 10 V/m

Fast transients (burst) according EN 61000-4-4 / IEC 61000-4-4
 - Criterion B
 - Remote bus: 2 kV
 - Voltage supply 2 kV
 - I/O cables: 2 kV
 - Criterion A
 - All interfaces: 1 kV

Surge voltage according EN 61000-4-5/ IEC 61000-4-5
 - Criterion B
 - AC supply lines: 2.0 kV/4.0 kV (symmetrical/ asymmetrical)
 - DC supply lines: 0.5 kV/0.5 kV (symmetrical/ asymmetrical)
 - Signal lines: 1.0 kV/2.0 kV (symmetrical/ asymmetrical)

Conducted interference according EN 61000-4-6, IEC 61000-4-6
 - Criterion A
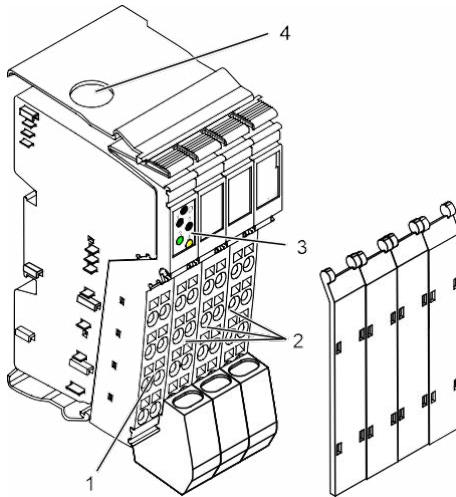 - Test voltage 10 V

Noise Emission Test According to EN 50081-2
Noise emission of housing:
EN 55011 Class A

GENERAL
Housing
Dimensions (W x L x H):
48,8 x 71,5 x 120 mm

Drawing: KS vario T8/UTH

1   Outputs
2   Inputs
3   Diagnostic- and status-display
4   RS232-interface

Protection mode
IP 20

Protection class
Class 3 to IEC 60 536 (VDE 0106)

CE marking
Fulfils the European Directives for electromagnetic compatibility and low voltage.

Certificates
UL listing, CSA certification

Electrical connections
Screwless spring-clamp connector strips

Mounting method
Clip-on rail mounting ('top-hat' rails to DIN EN 50 022)

Weight
Approx. 122 g (without connector strips)

Housing material
Basic material: Crastin PA6.6, self- extinguishing (V0)

Accessories supplied
Connector strips Label for inscriptions Mounting instructions

SETUP UTILITY
BlueControl (Engineering Tool)
PC-based program for configuration, parameter setting, and operation (commissioning) of the KS Vario system. All settings are stored, and can be printed on request.
Moreover, a powerful data acquisition module with trend graphics is available.

Simulation
The built-in simulation serves to test the controller settings, but can also be used for general training and observing the inter- action between controller and process.

Online measurement value correction Calibration of the entire input circuit is possible with just a few mouse clicks.

System configurator
Selection of KS Vario bus coupler and I/O modules.

Hardware requirements
A configurator cable is required for connecting to the KS Vario system (Accessories).

Updates and demonstration software www.west-cs.com

Functionality BlueControl-Engineering-Tool	Mini	Standard	Expert
Setting of parameters and configurations	yes	yes	yes
Controller & control loop simulation	yes	yes	yes
Download: transfer of an Engineering to the controller	yes	yes	yes
Online mode / Visualization	only SIM	yes	yes
Upload: read-out of an Engineering from the controller	only SIM	yes	yes
File, save Engineering	no	yes	yes
Print function	no	yes	yes
Online documentation / Help	yes	yes	yes
Implementation of measured value correction	no	yes	yes
Data acquisition and trend recording	only SIM	yes	yes
System configurator	yes	yes	yes
Enhanced simulation functionality (laplace...)	no	no	yes

Available modules to configure a KS vario system

Name	Order-no.	Function
Fieldbus Coupler		
KS VARIO BK DP/V1	KSVC-101-00111	Vario Profibus bus terminal module, Standard-Profibus-DP and extension DP/V1, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK CAN	KSVC-101-00121	Vario CANopen bus terminal module, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK ETH	KSVC-101-00131	Vario ETHERNET Mod/TCP bus terminal module, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK IP	KSVC-101-00181	Vario ETHERNET IP bus terminal module, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK DN	KSVC-101-00141	Vario DeviceNet bus terminal module, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK MOD	KSVC-101-00151	Vario-Modbus bus terminal module, 24 V DC, spring-clamp connection, labeling field
KS VARIO BK PN	KSVC-101-00171	Vario-Profinet bus terminal module, 24 V DC, spring-clamp connection, labeling field
Control Module (base)		
KS VARIO T4/RTD	KSVC-104-x0331	Vario temperature controller, 4-channel, spring-clamp connection, labeling field, 4 inputs, RTD (resistance element), 3 wire connection + screening, 6 outputs 24 V DC, 1 heating current input, I/O extensible
KS VARIO T4/UTH	KSVC-104-x0431	Vario temperature controller, 4-channel, spring-clamp connection, labeling field, 4 inputs, TC (thermocouples), 2 wire connection + screening, 8 outputs 24 V DC, 1 heating current input, I/O extensible
KS VARIO T6/RTD	KSVC-104-x0341	Vario temperature controller, up to 30-channel, spring-clamp connection, labeling field, 6 inputs, RTD (resistance element), 3 wire connection + screening, 6 outputs 24 V DC, 1 heating current input, I/O extensible up to 30 channels
KS VARIO T8/UTH	KSVC-104-x0441	Vario temperature controller, up to 30-channel, spring-clamp connection, labeling field, 8 inputs, TC (thermocouples), 2 wire connection + screening, 8 outputs 24 V DC, 1 heating current input, I/O extensible up to 30 channels Version for: 0... Profibus, Modbus, Ethernet, Profinet 1... DeviceNet 2... CANopen
Digital Inputs		
VARIO DI 2/24	KSVC-102-00121	Vario digital input module, input terminal block, spring-clamp connection, labeling field, 2 inputs, 24 V DC, 4-wire connection
VARIO DI 4/24	KSVC-102-00131	Vario digital input module, input terminal block, spring-clamp connection, labeling field, 3 inputs, 24 V DC, 3-wire connection
VARIO DI 8/24	KSVC-102-00141	Vario digital input module, input terminal block, spring-clamp connection, labeling field, 8 inputs, 24 V DC, 4-wire connection
Digital Outputs		
VARIO DO 2/24	KSVC-102-00221	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 2 outputs, 24 V DC, 500 mA, 4-wire connection
VARIO DO 2/24	KSVC-102-00231	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 4 outputs, 24 V DC, 500 mA, 3-wire connection
VARIO DO 8/24	KSVC-102-00241	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 8 outputs, 24 V DC, 500 mA, 4-wire connection
VARIO DO 16/24	KSVC-102-00251	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 16 outputs, 24 V DC, 500 mA, 3-wire connection
Relay Outputs		
VARIO DO 1/230	KSVC-102-01211	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 1 relay changeover contact (hard gold plated), 5 - 253 V AC, 3 A
VARIO DO 4/230	KSVC-102-01231	Vario digital output module, output terminal block, spring-clamp connection, labeling field, 4 relay changeover contacts (hard gold plated), 5 - 253 V AC, 3 A
Analog Inputs		
VARIO AI 2/SF	KSVC-103-00121	Vario analog input module, input terminal block, spring-clamp connection, labeling field, 2 inputs, 0-20 mA, 4-20 mA, ±20 mA, 0-10 V, ±10 V, 2-wire connection
VARIO AI 8/SF	KSVC-103-00141	Vario analog input module, input terminal block, spring-clamp connection, labeling field, 8 inputs, 0-20 mA, 4-20 mA, ±20 mA, 0-10 V, ±10 V, (additional 0-40 mA, ±40 mA, 0-5 V, ±5 V, 0-25 V, ±25 V, 0-50 V), 2-wire connection
VARIO RTD 2	KSVC-103-00321	Vario analog input module, input terminal block, spring-clamp connection, labeling field, 2 inputs, RTD (resistance element), 2-, 3-, 4-wire connection
VARIO UTH 2	KSVC-103-00421	Vario analog input module, input terminal block, spring-clamp connection, labeling field, 2 inputs, TC (thermocouples), 2-wire connection
Analog Outputs		
VARIO AO 1/SF	KSVC-103-00211	Vario analog output module, spring-clamp connection, labeling field, 1 output 0-20 mA, 4-20 mA, 0-10 V, 2-wire connection
VARIO AO 2/U/BP	KSVC-103-00221	Vario analog output module, output terminal block, spring-clamp connection, labeling field, 2 outputs 0-10 V, ±10 V, 2-wire connection
VARIO AO 4/I	KSVC-103-00231	Vario analog output module, spring-clamp connection, 4 outputs 4..20mA, 2-wire connection

Notation	Order. no	Function
Loop Extensions		
VARIO UTH 4-DO8	KSVC-103-00431	Vario I/O-module, spring-clamp connection, labeling field, 4 inputs, TC (thermocouples), 2 wire connection + screening, 8 outputs 24 V DC, 1 heating current input
VARIO RTD 6-DO6	KSVC-103-00341	Vario I/O-module, spring-clamp connection, labeling field, 6 inputs, RTD (resistance element), 3 wire connection + screening, 6 outputs 24 V DC, 1 heating current input
VARIO UTH 8-DO8	KSVC-103-00441	Vario I/O-module, spring-clamp connection, labeling field, 8 inputs, TC (thermocouples), 2 wire connection + screening, 8 outputs 24 V DC, 1 heating current input
Transmitter power supply		
VARIO CO 2/U	KSVC-103-02221	Vario power supply module, spring-clamp connection, labeling field, 2 outputs, 10V constant, 2 x 30mA (or 1 x 60mA)
Section power supply		
VARIO PWR IN/24	KSVC-105-00001	Vario power supply / segmentation module spring-clamp connection, labeling field, 24V DC, without fuse
Operating Panels for KS Vario		
KSvarioBT	KSVC-111-02151	Full graphic Touch-Operating Panel with control software for KS vario with MODBUS Interface
Modbuscable RS485	KSVC-119-00021	RS485 cable between KsvarioBT and Modbuscoupler KS VARIO BK MOD, lenght: 5 meters
Modbuscable RS232	KSVC-119-00011	Field proofed RS232 cable between KsvarioBT and KS vario Controllers (engineering port), lenght: 3 meters

ORDERING DATA FOR ACCESSORIES

General VARIO-accessories

End clamp (1 per unit)	KSVC-109-00011
CAN/DeviceNet connector with 2 cable entries, D-Sub, screw terminal connection	KSVC-109-00191
Universal ground terminal block (1 per unit)	KSVC-109-00021
Coding profil (100 per unit)	KSVC-109-00031
Zack markers for labeling modules (10 per unit)	KSVC-109-00041
Screw driver according DIN 5264 (for spring-clamp terminals)	KSVC-109-00051
Labeling field, snap in, breadth: 2 (10 per unit)	KSVC-109-00061
Labeling field, snap in, breadth: 8 (10 per unit)	KSVC-109-00071
Labeling sheets for labeling field, breadth: 2 (72 per unit)	KSVC-109-00081
Labeling sheets for labeling field, breadth: 8 (5 x 15 per unit)	KSVC-109-00091
Spring-clamp terminals, grey (10 per unit)	KSVC-109-00201
Spring-clamp terminals, grey, with shield connection (5 per unit)	KSVC-109-00111

Tools

BlueControl Basic (Engineering-Tool)	German/English	KSVC-109-10001
BlueControl Expert (Engineering-Tool)	German/English	KSVC-109-10011
RS232-interface cable for BlueControl		KSVC-109-00101

Current transformer

Current transformer, 50 A	KSVC-109-10001
3-phase current transformer, 3 x 15/30 A	KSVC-109-10011
Current transformer with adjustable transmission ratio 25..150A	KSVC-109-00101
3- Phase current transformer with adjustable transmission ratio 25..150A	KSVC-109-31031
Line-voltage transmitter	KSVC-109-30001

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