

SINEAX VB604s

Programmable multifunctional transmitter with REMOTE I/O functionality

for direct currents, direct voltages, temperature sensors, teletransmitters or potentiometers



SINEAX VB604s is a multifunctional transmitter for top-hat rail assembly with the following main characteristics:

- Measurement of DC voltage, DC current, temperature (RTD, TC) and resistance
- Programmable remote I/O functionality. Readout of all input variables and internally calculated values via MODBUS. Simultaneously, the outputs and the relay may be controlled via MODBUS.
- Free selection as to whether the output variables are dependent on the input variables or whether the outputs are controlled independently of the inputs via MODBUS.
- Sensor connection without any external jumpers
- 2 inputs (e.g. for sensor redundancy or difference formation)
- 2 outputs (U and/or I)
- 2 inputs can be linked with each other and allocated to the 2 outputs which enables calculations and sensor monitoring (e.g. prognostic maintenance of sensors).
- System capability: Communication via Modbus interface
- Freely programmable relay, e.g. for limit or alarm signalling
- AC/DC wide-range power supply unit
- Pluggable high-quality screw or spring cage terminal

All settings of the instrument can be adapted to the measuring task by PC software. The software also serves visualising, commissioning and service



Table 1: Input variables, measuring ranges

Type of measurement	Measuring range	Minimum span
DC voltage [mV]	-1000 ... 1000 mV	2 mV
DC current [mA]	-50 ... 50 mA	0.2 mA
Resistance [Ω]	0 ... 5000 Ω	8 Ω
RTD Pt100	-200 ... 850 °C	20 K
RTD Ni100	-60 ... 250 °C	15 K
TC Type B	0 ... 1820 °C	635 K
TC Type E	-270 ... 1000 °C	34 K
TC Type J	-210 ... 1200 °C	39 K
TC Type K	-270 ... 1372 °C	50 K

Type of measurement	Measuring range	Minimum span
TC Type L	-200 ... 900 °C	38 K
TC Type N	-270 ... 1300 °C	74 K
TC Type R	-50 ... 1768 °C	259 K
TC Type S	-50 ... 1768 °C	265 K
TC Type T	-270 ... 400 °C	50 K
TC Type U	-200 ... 600 °C	49 K
TC Typ W5Re-W26Re	0 ... 2315 °C	135 K
TC Type W3Re-W25Re	0 ... 2315 °C	161 K

SINEAX VB604s

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Technical data

Measuring input 1

Direct voltage

Measuring range mV For limits see table 1
 $R_i > 10 \text{ M}\Omega$,
 continuous overload max. $\pm 1200 \text{ mV}$

Direct current

Measuring range mA For limits see table 1
 $R_i = 11 \Omega$,
 continuous overload max. $\pm 50 \text{ mA}$

Resistance thermometer RTD

Resistance measurm. types Pt100 (IEC 60751),
 adjustable Pt20...Pt1000
 Ni100 (DIN 43760),
 adjustable Ni50...Ni1000

Measuring range limits See table 1

Wiring 2, 3 or 4-wire connection

Measuring current 0.2 mA

Line resistance 30 Ω per line,
 in 2-wire connection adjustable or
 calibratable

Thermocouples TC

Thermocouples Type B, E, J, K, N, R, S, T
 (IEC 60584-1)
 Type L, U (DIN 43760)
 Type W5Re-W26Re, W3Re-
 W25Re (ASTM E988-90)

Measuring range limits See Table 1

Cold junction compensation Internal (with installed Pt100),
 with Pt100 on terminals or
 external with reference junction
 $-20 \dots 70 \text{ }^\circ\text{C}$

Resistance measurement, teletransmitter, potentiometer

Measuring range limits See table 1

Wiring 2, 3 or 4-wire connection

Resistance teletransmitter Type WF and WF DIN

Measuring current 0.2 mA

Line resistance 30 Ω per line,
 in 2-wire connection adjustable or
 calibratable

Measuring input 2

Direct current

Measuring range mA Same as measuring input 1

Direct voltage

Measuring range mV Same as measuring input 1

Resistance thermometer RTD

Same as measuring input 1 except:
 Wiring 2 or 3 wire connection

Thermocouples TC

Same as measuring input 1

Resistance measurement, teletransmitter, potentiometer

Same as measuring input 1 except:
 Wiring 2 or 3 wire connection

Please note

The measuring inputs 1 and 2 are galvanically connected. If 2 input sensors or input variables are used, observe combination options in Table 3 and circuit instructions contained in the operating instructions!

Analog outputs 1 and 2

The two outputs are galvanically connected and have a common earth. Voltage and current output software-configurable.

Direct current

Output range $\pm 20 \text{ mA}$,
 range may be freely set

Burden voltage max. 12 V

Open circuit voltage $< 20 \text{ V}$

Limit Adjustable, max. $\pm 22 \text{ mA}$

Residual ripple $< 1\% \text{ pp}$ related to 20 mA

Direct voltage

Output range $\pm 10 \text{ V}$,
 range may be freely set

Load max. 20 mA

Current limit Approx. 30 mA

Limit Adjustable, max. $\pm 11 \text{ V}$

Residual ripple $< 1\% \text{ pp}$ related to 10 V

Output settings

Limit
 Gain/offset trimming
 Inversion

Relay contact output

Contact 1 pole, normally open contact (NO)

Switching capacity AC: 2 A / 250 V
 DC: 2 A / 30 V

Bus/programming connection

Interface, protocol RS-485, Modbus RTU

Baudrate 9.6...115.2 kBaud, adjustable

Transmission behaviour

Measured quantities for the outputs

- Input 1
- Input 2
- Input 1 + input 2
- Input 1 – input 2
- Input 2 – input 1
- Input 1 · input 2
- Minimum value, maximum value or mean value of input 1 and input 2
- Sensor redundancy Input 1 or input 2

SINEAX VB604s

Programmable multifunctional transmitter with REMOTE I/O functionality

Transmission functions Linear, Absolute amount, scaling (gain/ offset), magnifier function (zoom)
user-specific via basic value table (24 basic values per measured variable)

Settling time: Adjustable 1...30 s

Limit values and monitoring

Number of limit values 2

Measured variable for the limit values

- Input 1
- Input 2
- Measured variable for outputs
- Input 1 – input 2 (e.g. drift monitoring in case of 2 sensors)
- Input 2 – input 1 (e.g. drift monitoring in case of 2 sensors)
- Meter 1

Functions Absolute amount
Gradient dx/dt (e.g. temperature gradient monitoring)

Time delay Adjustable 0...3600 s

Signalling Relay contact, alarm LED, status 1

Meter

Number 1

Meter source Measured variables for outputs 1 or 2

Settings Mode (pos., neg.), unit (prefix, s/min/h), meter reset / set

Sensor breakage and short circuit monitoring measuring input

Signalling Relay contact, alarm LED, status 1
Output value in case of a fault

Signalling to alarm LED In case of a sensor error, the defective input (1 or 2) is signalled by the number of flashes of the alarm LED (1x or 2x).
In case of a failure at both inputs: Alarm LED does not flash.

Other monitoring operations

Drift monitoring Monitoring of measured value difference between 2 input sensors for a certain period of time (e.g. due to different sensor response times).
If the limit value is exceeded for this time, an alarm is signalled. (See limit values 1 and 2)

Sensor redundancy Measurement with 2 temperature sensors; if sensor 1 fails (fault) sensor 2 is activated for bridging (see measuring quantities for outputs)

Alarm signalling

Relay contact With closed contact, the yellow LED shines, invertible alarmfunction

Alarm LED Time delay Adjustable 0...60 s


Output value in case of a fault For sensor breakage and short circuit, value adjustable –10...110%

Power supply

Rated voltage UN	Tolerance
24...230 V DC	±15%
100...230 V AC, 50...400 Hz	±15%

Power consumption >3 W or 7 VA

Displays at the instrument

LED	Color	Function
ON	green	Power on
	green flashing	Communication activ
ERR	red	Alarm
	yellow	Relay on

Configuration, programming

Operation with PC software «CB-Manager»

Accuracies (according to EN/IEC 60770-1)

Reference conditions

Ambient temperature 23 °C ± 2 K

Power supply 24 V DC

Reference value Span

Settings Input 1: Direct voltage mV, 0...1000 mV
Output 1: 4...20 mA, burden resistance 300 Ω
Mains frequency 50 Hz, Setting time 1 s
Input 2, output 2, relay, monitoring off or not active, for voltage output: range 0...10 V, burden resistance 2 kΩ

Installation position Vertically, detached

Basic accuracy

At reference conditions ±0.1%

Other types of measurement and input ranges:

RTD Pt100, Ni100 ±0.1% ±0.2 K

Resistance measurement ±0,1% ±0.1 Ω

SINEAX VB604s

Programmable multifunctional transmitter with REMOTE I/O functionality

TC Type K, E, J, T, N, L, U	±0.1% ±0.4 K, meas. value > -100 °C
TC Type R, S	±0.1% ±2.4 K
TC Type B	±0.1% ±2.4 K, meas. value > 300°C
TC W5Re-W26Re, W3Re-W25Re	±0.1% ±2.0 K
DC voltage mV	±0.1% ±0.015 mV
DC voltage V	±0.1% ±0.0045 V
DC current mA	±0.1% ±0.0015 mA

Additional error (additive)

High range minimum value (Minimum value >40% of maximum value):	±0.1% of maximum value
Small output range	±0.1% * (reference range / new range)
Cold junction compensation internal	±3 K
Magnifier function	± Zoom factor x (basic accuracy + additional error) Zoom factor = measured variable range / zoom range

Influencing factors

Ambient temperature	±0.1% per 10 K at reference con- ditions other settings: basic accuracy and additional errors per 10 K
Long-term drift	±0.1%
Common mode/ series mode influence	±0.2%

Ambient conditions

Operating temperature	-25 ... +55 °C
Storage temperature	-40 ... +70 °C
Relative humidity	≤75%, no condensation
Range of utilisation	Internal room up to 2000m above sea level

Installation details

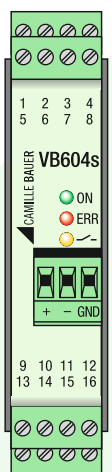
Design	Top-hat rail housing U4 Combustibility class V-0 according to UL 94
Dimensions	See dimensional drawing
Assembly	For snap-on fastening on top-hat rail (35 x 15 mm or 35 x 7.5 mm) according to EN 50022
Terminals	Pluggable, 2.5 mm ² Front plug spring terminal 1.5mm ²
Weight	0.14 kg

Product safety, regulations

Electromagnetic compatibility	EN 61000-6-2 / 61000-6-4
Ingress protection (acc. IEC 529 or EN 60529)	Housing IP 40 terminal IP20

Electric design	Acc. IEC or EN 61010
Degree of pollution	2
Between power supply and all circuits	Reinforced insulation overvoltage category III Working voltage 300 V Test voltage 3.7 kV AC rms
Between the measuring input (1+2) and all circuits	Reinforced insulation overvoltage category III operating voltage 300 V overvoltage category II operating voltage 600 V test voltage 3.7 kV AC rms
Between output (1 + 2) and relay contact	Reinforced insulation overvoltage category II Working voltage 300 V Test voltage 2.3 kV AC rms
Between output (1 + 2) and the bus connection	Functional insulation Working voltage <50 V Test voltage 0.5 kV AC rms
Environmental tests	EN 60068-2-1/-2/-3 EN 60068-2-27 Shock: 50g, 11ms, sawtooth, half-sine EN 60068-2-6 Vibration: 0.15mm/2g, 10...150Hz, 10 cycles

Electric connections

	Circuit	Terminal	Remarks
	Measuring input	1 to 8	See table 2
	Output 1 Output 2	11 (+), 12 (-) 10 (+), 12 (-)	
Relay contacts	9, 13		
Power supply	15 (+/-) 16 (-/-)	Note polarity at DC	
Bus/ programming connection	+, -, GND	Front plug connection	

SINEAX VB604s

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Table 2: Connection of inputs

Please note: If 2 input sensors or input variables are used, observe combination options in Table 3 and circuit instructions contained in the operating instructions!

Type of measurement	Wiring	
	Input 1	Input 2
Direct voltage mV		
Thermocouple with external cold junction thermostat or internally compensated		
Thermocouple with Pt100 at the terminals at the same input		
Thermocouple with Pt100 at the terminals at the other input		
Resistance thermometer or resistance measurement 2-wire		
Resistance thermometer or resistance measurement 3-wire		

Type of measurement	Wiring	
	Input 1	Input 2
Resistance thermometer or resistance measurement 4-wire		
Resistance-teletransmitter WF		
Resistance-teletransmitter WF-DIN		
Direct current mA		

Table 3: Measuring method combination options

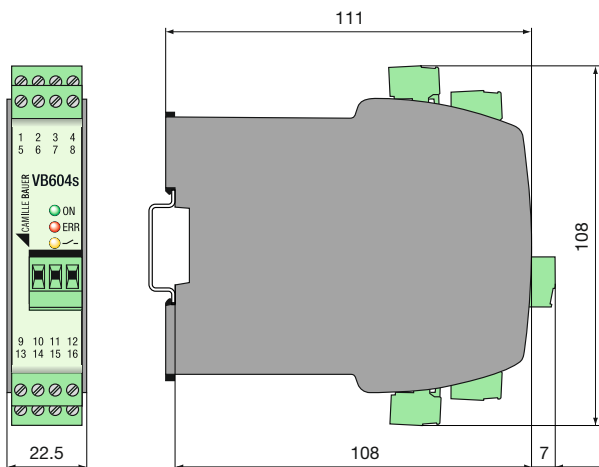
Input 1 measuring method	Input 2 measuring method	U [mV]	TC ext.	TC int.	R 2L	R 3L	RTD 2L	RTD 3L	I [mA]	
		U [mV]	TC ext.	TC int.	R 2L	R 3L	RTD 2L	RTD 3L	I [mA]	
Terminals	Terminals	7,8	7,8	7,8	2,7,8	2,8	2,7,8	2,8	2,7,8	6,4
U [mV]	earthed	3,4	✓	✓	✓	✓	✓	✓	✓	✓
I [mA]	earthed	5,4	✓	✓	✓	✓	✓	✓	✓	✓
TC ext.	earthed	3,4	✓	✓	✓	✓	✓	✓	✓	✓
TC int.	earthed	3,4	✓	✓	✓	✓	✓	✓	✓	✓
		1,3,4	✓	✓	✓	✓	✓	✓	✓	✓
R 2L		1,4	✓	✓	✓	✓	✓	✓	✓	✓
R 3L		1,3,4	✓	✓	✓	✓	✓	✓	✓	✓
R 4L		1,2,3,4	✓	✓						
RTD 2L		1,4	✓	✓	✓	✓	✓	✓	✓	✓
RTD 3L		1,3,4	✓	✓	✓	✓	✓	✓	✓	✓
WF		1,3,4	✓	✓	✓	✓	✓	✓	✓	✓
WF_DIN		1,3,4	✓	✓	✓	✓	✓	✓	✓	✓
RTD 4L		1,2,3,4	✓	✓						

SINEAX VB604s

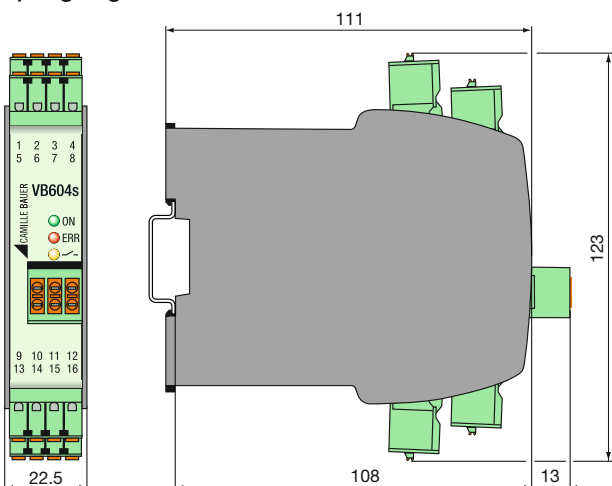
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Dimensional drawing

Screw terminal



Spring cage terminal



Scope of supply

- 1 SINEAX VB604s
- 1 Safety Instructions 168501
- 1 Software and Docu-CD 156027

Accessories

USB-RS485 converter
(for programming the VB604s)

Article No. 163 189

Ordering details

Standard versions

VB604s, Programmable	B604s	
Features, Selection		
1. Mechanical design Top-hat rail housing	1	
2. Version	Standard with screw terminals	1
	Standard with spring cage terminals	2
3. Climatic rating Standard climatic rating	1	
4. Test certificate	without test certificate	0
	with test certificate German	D
	with test certificate English	E
5. Configuration Basic configuration	G	

Basic configurations

Type	Basic configuration
Standard	Input 1 and 2: 4...20mA Output 1 and 2: 4...20mA

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