

SINEAX VB 604s

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 terminals

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 voltage [V]	-300 ... 300 V	>1 V
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

Type of measurement	Measuring range	Minimum span
TC Type J	-210 ... 1200 °C	39 K
TC Type K	-270 ... 1372 °C	50 K
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

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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,
 external with reference junction
 thermostat $-20...70 \text{ }^\circ\text{C}$

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 following device types are available:

a) VB604s with measuring input for 2x direct current [mA]

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 $< 1\%$ pp related to 20 mA

Direct voltage

Output range $\pm 10 \text{ V}$,
 range may be freely set
 max. 20 mA

Load Current limit
 Approx. 30 mA

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

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

Output settings

Limit

Gain/offset trimming

Inversion

Relay contact output

Contact 1 pole, normally open contact

Switching capacity AC: 2 A / 250 V AC
 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

Transmission function	Linear, user-specific via basic value table (24 basic values per measured variable)
Settling time:	Adjustable 1...30 s

Limit values and monitoring

Limit values 1 and 2

Number	2
Measured variable for the limit values	<ul style="list-style-type: none"> • 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)
Functions	Absolute amount Gradient dx/dt (e.g. temperature gradient monitoring)
Time delay	Adjustable 0...3600 s
Signalling	Relay contact, alarm LED, status 1

Sensor breakage and short circuit monitoring measuring input

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

Drift monitoring	Monitoring of measured value difference between 2 input sen- sors 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
Alarm LED	
Time delay	Adjustable 0...60 s
Output value in case of a fault	For sensor breakage and short cir- cuit, value adjustable -10...110%

Power supply

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

Displays at the instrument

LEDs in front plate	
Power ON:	Green LED, the LED flashes if the device is addressed via the inter- face.
Relay contact:	Yellow LED
Alarm:	Red LED

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, monitor- ing off or not active, for voltage output: range 0...10 V, burden resistance 2 kΩ

Basic accuracy

At reference conditions	±0.1%
<i>Other types of measurement and input ranges:</i>	
RTD Pt100, Ni100	±0.1% ±0.2 K
Resistance measurement	±0.1% ±0.1 Ω
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)

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Cold junction compensation internal ± 3 K

Influencing factors

Ambient temperature $\pm 0.1\%$ per 10 K at reference conditions
other settings: basic accuracy and additional errors per 10 K

Long-term drift $\pm 0.1\%$

Common mode/ series mode influence $\pm 0.2\%$

Ambient conditions

Operating temperature $-25 \dots +55$ °C

Storage temperature $-40 \dots +70$ °C

Relative humidity

Annual average $\leq 75\%$, no dew

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 50 022

Terminals Pluggable, 2.5 mm²

Weight 0.14 kg

Product safety, regulations

Electromagnetic compatibility	EN 61 000-6-2 / 61 000-6-4
Ingress protection (acc. IEC 529 or EN 60 529)	Housing IP 40 terminal IP20
Electric design	Acc. IEC or EN 61 010
Degree of pollution	2
Between power supply and all circuits and between the measuring input (1 + 2) and all circuits	Reinforced insulation overvoltage category III Working voltage 300 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 60 068-2-1/-2/-3 EN 60 068-2-27 Shock: 50g, 11ms, sawtooth, half-sine EN 60 068-2-6 Vibration: 0.15mm/2g, 10...150Hz, 10 cycles

Electric connections

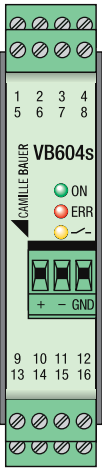
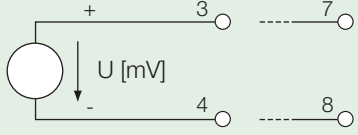
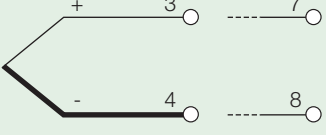
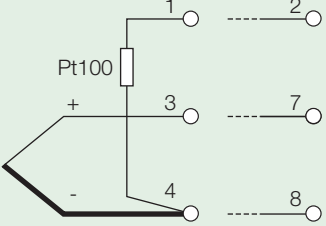
	Circuit	Terminal	Remarks
	Measuring input	1 to 8	See table 2
	Output 1 Output 2	11 (+), 12 (-) 10 (+), 12 (-)	
	Relay contacts	9, 13	
	Power supply	15 (+/~) 16 (-/~)	
	Bus/ programming connection	+, -, GND	Front plug connection

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		

Type of measurement	Wiring	
	Input 1	Input 2
Thermocouple with Pt100 at the terminals at the other input		
Resistance thermometer or resistance measurement 2-wire		
Resistance thermometer or resistance measurement 3-wire		
Resistance thermometer or resistance measurement 4-wire		
Resistance-teletransmitter WF		
Resistance-teletransmitter WF-DIN		
Direct current mA (Input 2 only in corresponding device type)		

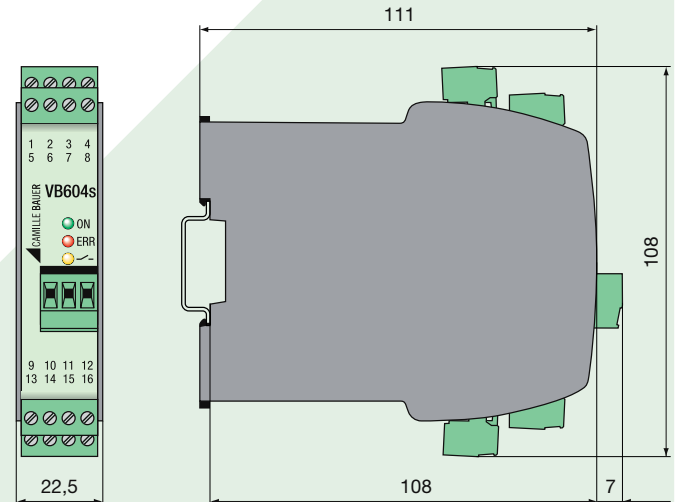
Table 3: Measuring method combination options

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

1 Selectable only in device type 1x direct current [mA] and 1x high voltage [V]

2 Selectable only in device type 2x direct current [mA]

Dimensional drawing



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

SINEAX VB 604s

Ordering details

Standard versions

VB604s, Programmable	B604s
Features, Selection	
1. Mechanical design Top-hat rail housing	1
2. Version Standard	1
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, with measuring for 2x direct current [mA]	Input 1 and 2: 4...20mA Output 1 and 2: 4...20mA



CAMILLE BAUER

Rely on us.

Camille Bauer AG
Aargauerstrasse 7
CH-5610 Wohlen / Switzerland

Phone: +41 56 618 21 11

Fax: +41 56 618 35 35

info@camillebauer.com

www.camillebauer.com