

SINEAX VC604s

Programmable Safety Value Converter

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



SINEAX VC604s 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
- Sensor connection without any external jumpers
- 2 inputs (e.g. for sensor redundancy or difference formation)
- 1 output (U 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
- 2 freely programmable relays with changeover contacts, e.g. for limit or alarm signalling
- AC/DC wide-range power supply unit
- Pluggable high-quality screw or spring cage terminals

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

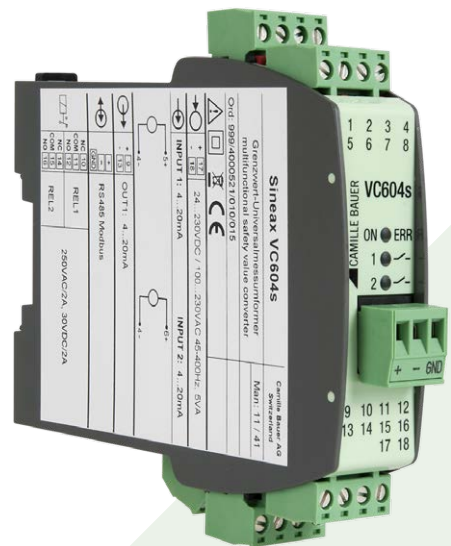


Table 1: Input variables, measuring ranges

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
TC Type J	-210 ... 1200 °C	39 K

Type of measurement	Measuring range	Minimum span
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 Type 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. $\pm 1200 \text{ mV}$

Measuring range V (only in corresponding device type) For limits see table 1
 $R_i = 1.4 \text{ M}\Omega$,
 continuous overload max. $\pm 300 \text{ V}$

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 measurement 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 with external 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 following device types are available:

- VC604s with measuring input for 1x direct current [mA] and 1x high direct voltage [V]
 The direct voltage [V] and direct current [mA] measuring methods can be allocated to Input 1 or Input 2 here.
- VC604s with measuring input for 2x direct current [mA]
 The different device types are firm and cannot be reprogrammed!

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 output

Direct current

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

Burden voltage max. 12 V

Open circuit voltage $< 18 \text{ V}$

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

Residual ripple $< 50 \mu\text{A pp}$ (after low pass 10 kHz)

Source resistance $> 5 \text{ M}\Omega$

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 $< 20 \text{ mV pp}$ (after low pass 10 kHz)

Source resistance $< 2 \Omega$

Output settings

Limitation

Gain/offset trimming

Inversion

Relay contact outputs

Contact 1 pole, changeover contact

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

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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 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

4

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)

Functions

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

Time delay

Adjustable 0...3600 s

Signalling

Relay contact, alarm LED, status 1, status 3

Sensor breakage and short circuit monitoring of 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

Time delay

Adjustable 0...60 s

Alarm LED "ERR "

Relay contact

With closed contact, the yellow LED shines, invertible alarmfunction

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%

Consumption

2.0 W resp. 5.5 VA

Displays at the instrument

LED	Color	Function
ON/ERR	green	Power on
	red	Alarm
	flashing	Communication active
1	yellow	Relay 1 on
2	yellow	Relay 2 on

Configuration, programming

Operation via 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 resp. not active, for voltage output: range 0...10 V, burden resistance >1 MΩ

Installation position

Vertically, detached

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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, measuring value > -100 °C
TC Type R, S	±0.1% ±2.4 K
TC Type B	±0.1% ±2.4 K, measuring 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 influence	±0.01%

Ambient conditions

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

Installation details

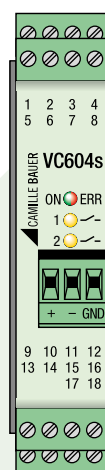
Design	Top-hat rail housing U4 Flammability class V-0 according to UL 94
Dimensions	See dimensional drawing
Assembly	For snap-on fastening on top-hat rail (35 x 15 mm or 35 x 7.5 mm) according to EN 50022
Terminals	Pluggable, 2.5 mm ² Front plug spring terminal 1.5 mm ²
Weight	150 g

Product safety, regulations

Electromagnetic compatibility	EN 61000-6-2 / 61000-6-4
Ingress protection (acc. EN 60529)	Housing IP 40 terminal IP20
Electric design	Acc. EN 61010
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 285 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	9 (+), 13 (-)	
Relay contacts relay 1 relay 2	nc com no 10 11 12 14 15 16	In dead voltage condition nc and com are connected
Power supply	17 (+/-) 18 (-/-)	Note polarity at DC
Bus/ programming con- nection	+, -, GND	Front plug



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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		
Resistance thermometer or resistance measurement 4-wire		

Type of measurement	Wiring	
	Input 1	Input 2
Resistance-teletransmitter WF		
Resistance-teletransmitter WF-DIN		
Direct voltage V (only in corresponding device type)		
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 [V] 1	I [mA] 1	TC ext.	TC int.	R 2L	R 3L	RTD 2L	RTD 3L	I [mA] 2	
		earthed			earthed	earthed						
Terminals	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] 1	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	✓			✓							

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

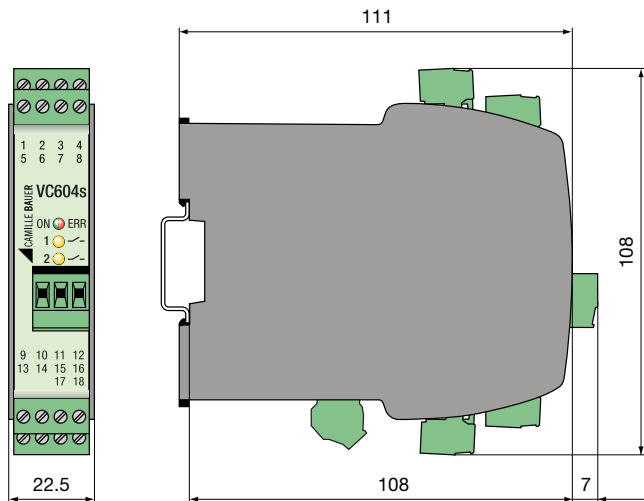
2 Selectable only in device type 2x direct current [mA]

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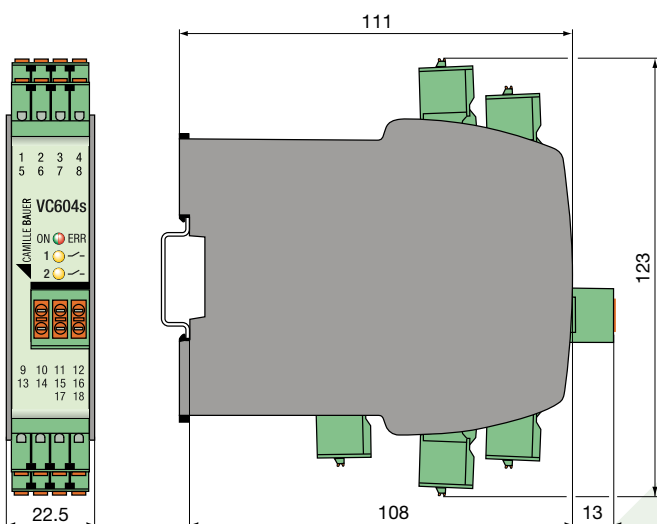
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Dimensional drawing

Screw terminals



Spring cage terminals



Ordering details

VC604s, Programmable	C604s
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 Version without high DC input in basic configuration Contrary to the version for high voltages, mA signals can be processed at both inputs simultaneously in this version. In addition, mV, RTD, TC and resistance measurements are possible. Configured: Input 1: 4...20 mA / Input 2: 4...20 mA Output 1: 4...20 mA / Output 2: not used	G
Version for DC voltages up to 300V in basic configuration DC voltages up to 300V DC can be measured at one input. In addition, mV, RTD, TC and resistance measurements are possible at both inputs. mA at one input. Configured: Input 1: 0...1000 mV DC / Input 2: not used Output 1: 4...20 mA / Output 2: not used	S

Scope of supply

- 1 SINEAX VC604s
- 1 Safety Instructions 170 217
- 1 Software and Docu-CD 156027

Accessories

USB-RS485 converter
(for programming the VC604s) Article No. 163 189

Please note:

This are two hardware platforms.
A SINEAX VC604s with high DC Voltage cannot be configured to 2 x mA inputs afterwards, just as a SINEAX VC604s with 2 x mA cannot measure a high DC Voltage.

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