CAMILLE BAUER

SINEAX VQ604s
Programmable multifunctional transmitter with very fast setting times

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

CE

SINEAX VQ604s is a multifunctional transmitter for top-hat rail assembly with the following main characteristics:

- **Fast measurement of DC voltage, DC current, temperature (RTD, TC) and resistance**
- **Setting time up to 10 ms**
- **Sensor connection without any external jumpers**
- **2 inputs (e.g. for sensor redundancy or difference formation)**
- **2 outputs (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 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

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Technical data

Measuring input 1

Direct voltage

Measuring range mV	For limits see table 1 Ri > 10 MΩ, continuous overload max. ±1200 mV

Direct current

Measuring range mA	For limits see table 1 Ri = 11 Ω, continuous overload max. ±50 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 external with reference junction –20…70 °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 (only in corresponding device type)	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	± 20 mA, range may be freely set
Burden voltage	max. 12 V
Open circuit voltage	< 20 V
Limit	Adjustable, max. ±22 mA
Residual ripple	<0.2 mA pp (After low pass 10 kHz)

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

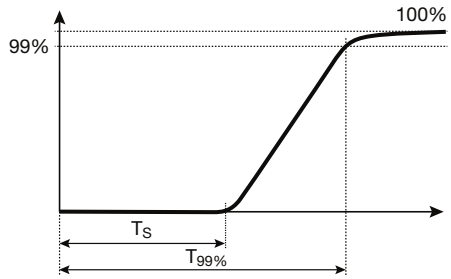
Interface, protocol	RS-485, Modbus RTU
Baudrate	9.6...115.2 kBaud, adjustable

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 0,01…30 s, depending on the device configuration (see Specified time/setting time)

Specified time/setting time

The setting time ($t_{99\%}$) is provided for the respective parameter and is applicable to both inputs. The longer this time is, the better the filtration of measuring fluctuations can be effected.



The minimum setting time depends on the following settings:

– Number of active inputs
– Type of measurement
– Selected (line) frequency (line hum suppression)
– Sensor error monitoring (breakage, short circuit)

The following table shows the minimum setting times with an active measuring input:

Type of measurement	Error monitoring	Minimum setting time [ms]
Voltage [mV]	–	10
Current [mA]	–	10
Thermocouple internally compensated	Breakage	97
Resistance [Ω] 2L	Breakage Short circuit	23
Resistance [Ω] 3L, WF, WF-DIN	Breakage Short circuit	110
Resistance [Ω] 4L	Breakage Short circuit	106

Using the CB-Manager configuration software (free download at www.camillebauer.com) the minimum setting time can be calculated with any possible configuration and frequency.

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)

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

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

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»

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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 50 ms Input 2, output 2, relay, monitoring off or not active
Installation position:	Vertically, detached

Basic accuracy

At reference conditions	±0.2%

Other types of measurement and input ranges:

RTD Pt100, Ni100	±0.2% ±0.3 K
Resistance measurement	±0,2% ±0.1 Ω
TC Type K, E, J, T, N, L, U	±0.2% ±0.4 K, measurement value > –100 °C
TC Type R, S	±0.2% ±2.4 K
TC Type B	±0.2% ±2.4 K, measurement value > 300°C
TC W5Re-W26Re, W3Re-W25Re	±0.2% ±2.0 K
DC voltage mV	±0.2% ±0.015 mV
DC current mA	±0.2% ±0.0015 mA

Additional error (additive)

High range minimum value (Minimum value >40% of maximum value):	±0.2% of maximum value
Small output range	±0.2% * (reference range / new range)
Cold junction compensation internal	typical ±3 to 5 K
Mains frequency >50 Hz	in resistance measurement and RTD: ±0.05 %

Influencing factors

Ambient temperature	±0.2% per 10 K at reference conditions 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 dew
Range of utilisation	Internal room up to 2000m above sea level

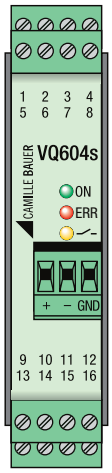
Installation details

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 mm^2
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 (–/~)	Note polarity at DC
Bus/ programming connection	+, –, GND	Front plug

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!

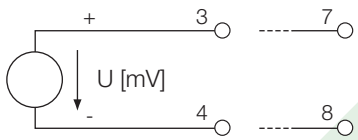
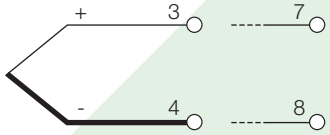
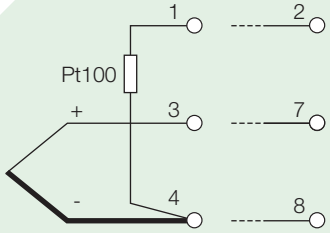
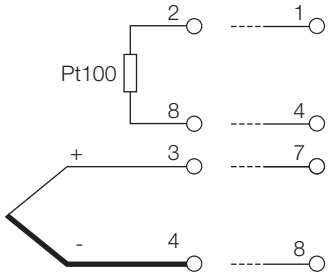
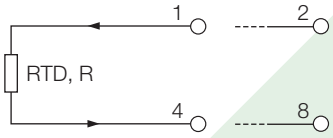
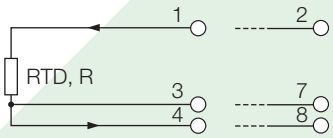
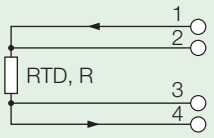
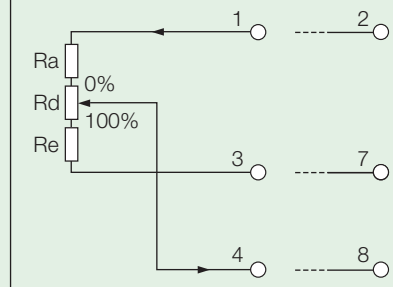
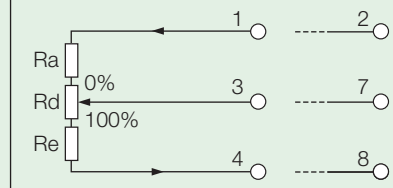
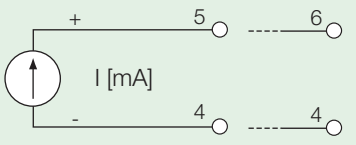
Type of measurement	Wiring	
	Input 1	Input 2
Direct voltage mV		
Thermocouple with external cold junction thermostat or internally compensated		
Thermocouple with Pt100 at the terminals at the same input		
Thermocouple with Pt100 at the terminals at the other input		
Resistance thermometer or resistance measurement 2-wire		
Resistance thermometer or resistance measurement 3-wire		
Resistance thermometer or resistance measurement 4-wire		
Resistance-teletransmitter WF		
Resistance-teletransmitter WF-DIN		
Direct current mA		

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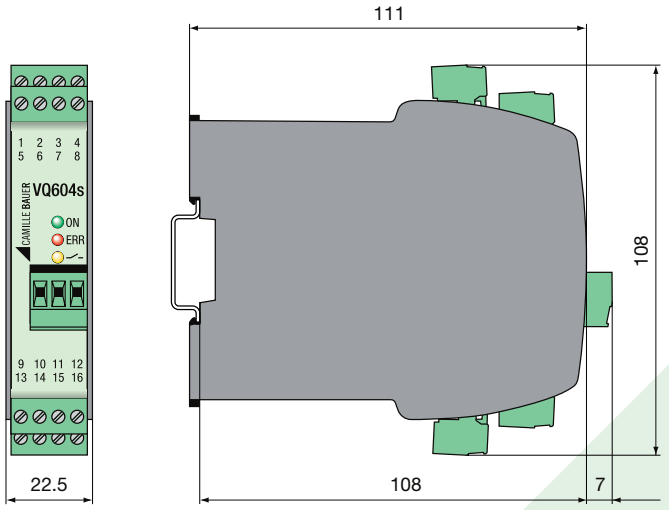
Table 3: Measuring method combination options

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

Dimensional drawing



Ordering details

V604s, Programmable	Q604s
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	Input 1 and 2: 4…20mA Output 1 and 2: 4…20mA

Scope of supply

1 SINEAX VQ604s
1 Safety Instructions 168 501
1 Software and Docu-CD 156 027

Accessories

USB-RS485 converter
(for programming the VQ604s) Article No. 163 189

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