CAMILLE BAUER

SINEAX V604s
Programmable multifunctional transmitter

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

CE

SINEAX V604s 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)**
- **2 outputs (U and / or I)**
- **DC- energy meter - function (with S0 output)**
- **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**
- **Digital output (optional)**
- **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]	–600 … 600 V [1]	>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 Typ W5Re-W26Re	0 ... 2315 °C	135 K
TC Type W3Re-W25Re	0 ... 2315 °C	161 K

1) In case of anterior device versions, the measuring range or the overload capacity is only -300...300V.
Please check device version on the nameplate or with the PC software CB-Manager.

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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
Measuring range V (only in corresponding device type)	For limits see table1 Ri = 3 MΩ, continuous overload max. ±600 V [1]

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 following device types are available:

a) V604s 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.

b) V604s 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 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	<1% pp related to 20 mA

Direct voltage

Output range	± 10 V, range may be freely set
Load	max. 20 mA
Current limit	Approx. 30 mA
Limit	Adjustable, max. ±11 V
Residual ripple	<1% pp related to 10 V

Output settings

Limit
Gain/offset trimming
Inversion

Relay contact output

Variant Relay:

Contact	1 pole, normally open contact (NO)
Switching capacity	AC: 2 A / 250 V DC: 2 A / 30 V

Variant digital output:

Contact	Transistor, normally open contact (NO)
Switching capacity	max. 27VDC/27mA

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 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 limitvalues	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 or digital output, alarm LED, status 1

Meter and pulse output

Meter 1:

Number	1
Meter source	Measured variables for outputs 1 or 2
Settings	Mode (pos., neg.), unit (prefix, s/min/h), meter reset / set

Pulse output 1 (variant digital output)

Standard:	S0 interface according to IEC/EN 62053-31
Settings	Pulse duration (30...250ms), pulse rate
Signalling	Digital output

Sensor breakage and short circuit monitoring measuring input

Signalling	Relay contact or digital output, 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 or digital output	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	Relais 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 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
TC Type K, E, J, T, N, L, U	±0.1% ±0.4 K, measurement value > –100 °C
TC Type R, S	±0.1% ±2.4 K
TC Type B	±0.1% ±2.4 K, measurement value > 300°C
TC W5Re-W26Re, W3Re-W25Re	±0.1% ±2.0 K
DC voltage mV	±0.1% ±0.015 mV
DC voltage V	U ≤ 300V ±0.1% ±0.0045 V U > 300V +/-0.15%+0.0045V
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 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 condensation
Range of utilisation	Internal room up to 2000m above sea level

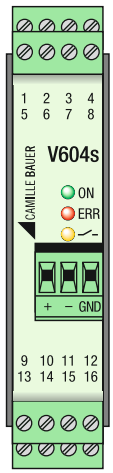
Installation details

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 50 022
Terminals	Pluggable, 2.5 mm^2 Front plug spring terminal 1.5 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	Reinforced insulation overvoltage category III operating 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 resp. digital output	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 (-)	+, -: polarity at digital output
Power supply	15 (+/~) 16 (–/~)	Note polarity at DC
Bus/ programming connection	+, –, GND	Front plug

Variant digital output:

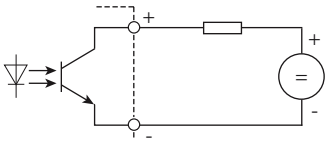
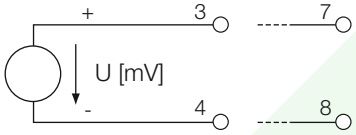
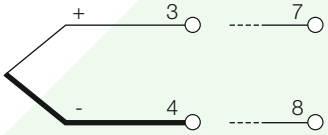
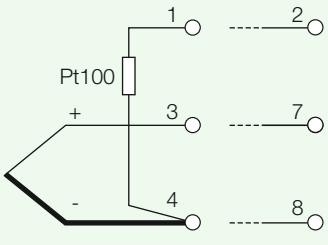
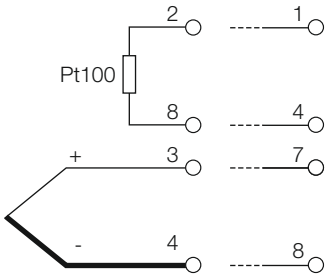
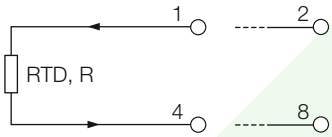
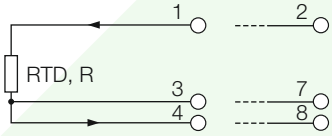
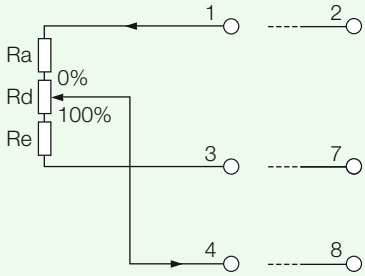
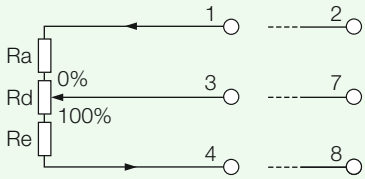
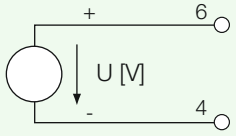


Table 2: Connection of inputs

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 voltage V (only in corresponding device type)		

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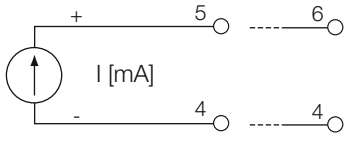
Type of measurement	Wiring	
	Input 1	Input 2
Direct current mA (Input 2 only in corresponding device type)		

Table 3: Measuring method combination options

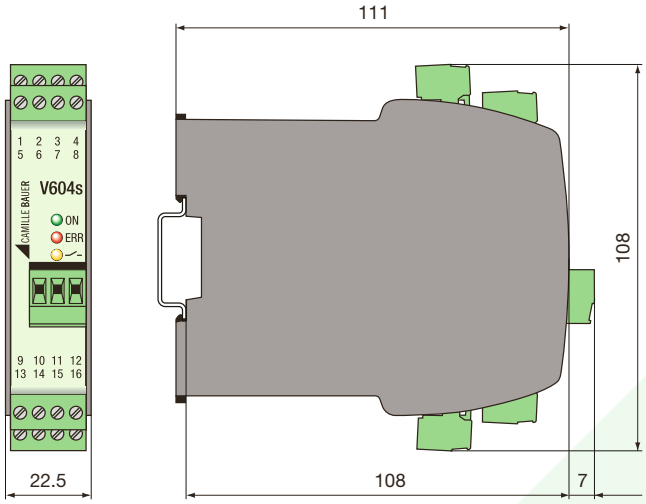
	Input 2 measuring method	U [mV]	U [V] 1	I [mA] 1	TC ext.	TC int.		R 2L	R 3L	RTD 2L	RTD 3L	I [mA] 2
		earthed			earthed	earthed						
Input 1 measuring method	**Terminals**	7,8	6,4	5,4	7,8	7,8	2,7,8	2,8	2,7,8	2,8	2,7,8	6,4
U [mV]	3,4	√	√	√	√	√	√	√	√	√	√	√
earthed		√			√	√						
U [V] 1	6,4	√		√	√	√	√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

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

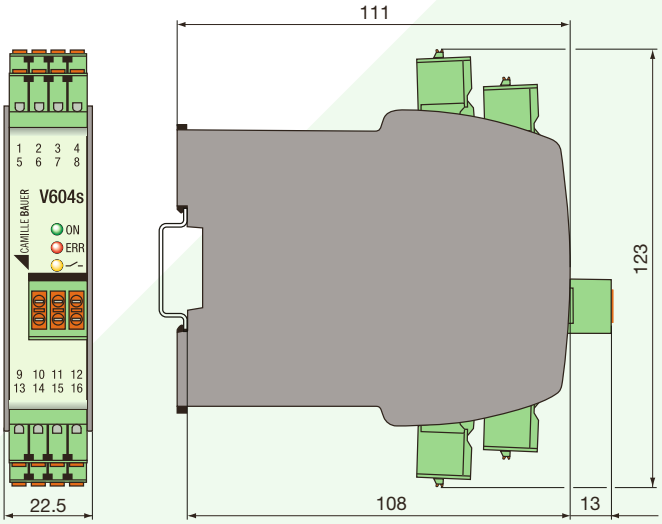
2 Selectable only in device type 2x direct current [mA]

Dimensional drawing

Screw terminals



Spring cage terminals



Scope of supply

1 SINEAX V604s
1 Safety Instructions 168 501
1 Software and Docu-CD 156 027

Accessories

USB-RS485 converter
(for programming the V604s) Article No. 163 189

Ordering details

Standard versions

The following transmitter types programmed in basic configuration are available as standard versions. An indication of the article number is sufficient:

Version Configuration	Article No.
Device versions for high DC voltages: DC voltages of up to 600VDC can be measured at one input. In addition, mV, RTD, TC and resistance measurements are possible at both inputs. At one input mA. The device is supplied with screw terminals and a limit value relay. The following configuration is preset: Input 1: 0…1000 mV / Input 2: not used Output 1: 4…20 mA / Output 2: not used	168329
Device version without a high DC input: Contrary to the version for high voltages, mA signals can be processed simultaneously at both inputs of this device version. In addition, mV, RTD, TC and resistance measurements are possible. The device is supplied with screw terminals and a limit value relay. The following configuration is preset: Input 1: 4…20 mA / Input 2: 4…20 mA Output 1: 4…20 mA / Output 2: 4…20 mA	169624

Please note:

This are two hardware platforms.
A SINEAX V604s with high DC Voltage cannot be configured to 2 x mA inputs afterwards, just as a SINEAX V604s with 2 x mA cannot measure a high DC Voltage.

V604s, Programmable	604s
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

V604s, Programmable	604s
Features, Selection	
5. Configuration	
Basic configuration: Hardware layout for measuring mA at both inputs. Voltage >1 VDC up to 300 VDC is not possible. Configured: Input 1: 4…20 mA / Input 2: 4…20 mA Output 1: 4…20 mA / Output 2: 4…20 mA	G
Programmed to order	A
6. Mains ripple suppression	
50Hz	1
60Hz	2
7. Input 1	
mV – Input (range –1000 … 1000 mV) [mV]: _____	A
V – Input (range –600 … 600 V) [V]: _____	B
mA – Input (range –50 … 50 mA) [mA]: _____	C
Thermocouple (internal compensation)	D
Resistance thermometer 2-wire	E
Resistance thermometer 3-wire	F
Resistance thermometer 4-wire	G
Resistance sensor 2-wire	H
Resistance sensor 3-wire	J
Resistance sensor 4-wire	K
mV – Input: minimum span 2 mV	
V – Input: minimum span >1 V	
mA – Input: minimum span 0,2 mA	
8. Sensor Type Input 1	
Not used	0
Type B (Range 0 … 1820 °C) [°C]: _____	A
Type E (Range –270 … 1000 °C) [°C]: _____	B
Type J (Range –210 … 1200 °C) [°C]: _____	C
Type K (Range –270 … 1372 °C) [°C]: _____	D
Type L (Range –200 … 900 °C) [°C]: _____	E
Type N (Range –270 … 1300 °C) [°C]: _____	F
Type R (Range –50 … 1768 °C) [°C]: _____	G
Type S (Range –50 … 1768 °C) [°C]: _____	H
Type T (Range –270 … 400 °C) [°C]: _____	J

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V604s, Programmable	604s
Features, Selection	
Type U (Range –200 … 600 °C) [°C]: _____	K
Type W5Re-W26Re (Range 0 … 2315 °C) [°C]: _____	L
Type W3Re-W25Re (Range 0 … 2315 °C) [°C]: _____	M
RTD Pt 100 (Range -200 … 850 °C) [°C]: _____	N
RTD Pt 1000 (Range -200 … 850 °C) [°C]: _____	O
RTD Ni 100 (Range -60 … 250 °C) [°C]: _____	P
RTD Ni 1000 (Range -60 … 250 °C) [°C]: _____	Q
Resistor (Range 0 … 5000 Ω) [W]: _____	R
Type B: minimum Span 635 K	
Type E: minimum Span 34 K	
Type J: minimum Span 39 K	
Type K: minimum Span 50 K	
Type L: minimum Span 38 K	
Type N: minimum Span 74 K	
Type R: minimum Span 259 K	
Type S: minimum Span 265 K	
Type T: minimum Span 50 K	
Type U: minimum Span 49 K	
Type W5Re-W26Re: minimum Span 135 K	
Type W3Re-W25Re: minimum Span 161 K	
RTD Pt 100: minimum Span 20 K	
RTD Pt 1000: minimum Span 20 K	
RTD Ni 100: minimum Span 15 K	
RTD Ni 1000: minimum Span 15 K	
Resistor: minimum Span 8	
9. Input 2	
Not used	0
mV – Input (Range –1000 … 1000 mV) [mV]: _____	A
mA – Input (Range –50 … 50 mA) [mA]: _____	C
Thermocouple (internal compensation)	D
Resistance thermometer 2-wire	E
Resistance thermometer 3-wire	F
Resistance sensor 2-wire	H
Resistance sensor 3-wire	J
mV – Input: minimum Span 2 mV	
mA – Input: minimum Span 0,2 mA	

V604s, Programmable	604s
Features, Selection	
10. Sensor Type Input 2	
Not used	0
Type B (Range 0 … 1820 °C) [°C]: _____	A
Type E (Range –270 … 1000 °C) [°C]: _____	B
Type J (Range –210 … 1200 °C) [°C]: _____	C
Type K (Range –270 … 1372 °C) [°C]: _____	D
Type L (Range –200 … 900 °C) [°C]: _____	E
Type N (Range –270 … 1300 °C) [°C]: _____	F
Type R (Range –50 … 1768 °C) [°C]: _____	G
Type S (Range –50 … 1768 °C) [°C]: _____	H
Type T (Range –270 … 400 °C) [°C]: _____	J
Type U (Range –200 … 600 °C) [°C]: _____	K
Type W5Re-W26Re (Range 0 … 2315 °C) [°C]: _____	L
Type W3Re-W25Re (Range 0 … 2315 °C) [°C]: _____	M
RTD Pt 100 (Range -200 … 850 °C) [°C]: _____	N
RTD Pt 1000 (Range -200 … 850 °C) [°C]: _____	O
RTD Ni 100 (Range -60 … 250 °C) [°C]: _____	P
RTD Ni 1000 (Range -60 … 250 °C) [°C]: _____	Q
Resistor (Range 0 … 5000 Ω) [W]: _____	R
minimum Span ditto Sensor Type Input 1	
11. Output signal / Measuring output 1	
current (Range –20 … 20 mA) [mA]: _____	1
voltage (Range –10 … 10 V) [V]: _____	2
12. Output signal / Measuring output 2	
Not used	0
current (Range –20 … 20 mA) [mA]: _____	1
voltage (Range –10 … 10 V) [V]: _____	2

SINEAX V604s
Programmable multifunctional transmitter

V604s, Programmable		604s
Features, Selection		
13.	**Relay contact output**	
	Relay, normally open contact (NO), AC: 2A/250V, DC: 2A/30V	1
	Digital output for fast pulse (S0) Umax / Imax: 27VDC / 27mA	2

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

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