SINEAX V 608
Programmable Two-wire Temperature Transmitter for RTD and TC Inputs

for rail mounting in housing K17

CE 0102 Ex II 2 (1) G

Application

SINEAX V 608 is a two-wire transmitter. It is designed for **measuring temperature in combination with thermocouples or resistance thermometers**. Thermocouple non-linearities are automatically compensated. The output signal is a current in the range 4…20 mA.

The input variable and measuring range are programmed with the aid of a PC and the corresponding software.

The sensor circuit is monitored for open and short-circuits and the output responds in a defined manner if one is detected.

The power supply (12…30 V DC) is connected together with the signal by the two leads connected to the measurement output (loop powered).

*Fig. 1. Measuring transmitter SINEAX V 608 in housing **K17** clipped onto a top-hat rail.*

Features / Benefits

- **Input variable and measuring range programmed using PC / Simplifies project planning and engineering, short delivery times, low stocking levels**

Measured variables	Measuring ranges Limits	Min. span	Max. span
Temperatures with resistance thermometers for **two, three** or **four-**wire connection			
Pt 100, IEC 60 751	– 200 to 850 °C	50 K	850 K
Ni 100, DIN 43 760	– 60 to 250 °C	50 K	250 K
Temperatures with thermocouples			
Type B, E, J, K, N, R, S, T acc. to IEC 60 584-1	acc. to type	2 mV	80 mV
Type L and U, DIN 43 710			
Type W5 Re/W26 Re, Type W3 Re/W25 Re acc. to ASTM E 988-90			

- **Two-wire transmitter for installation in the process environment**
- **Open and short-circuit sensor circuit supervision / Defined output response should the supervision pick up**
- **Programmable with or without power supply connection**
- **Compact design / Makes maximum use of available space**
- **Available in type of protection "Intrinsic safety" EEx ia IIC T6** (see "Table 5: Data on explosion protection")

Basic configuration:

Measuring input	Pt 100 for **three-**wire connection
Measuring range	0 … 600 °C
Measuring output:	4 … 20 mA, linearised with temperature
Open-circuit supervision:	Output 21.6 mA
Mains ripple suppression:	For frequency 50 Hz

Standard versions

The following versions are available as standard versions already programmed for the **basic** configuration. It is only necessary to quote the **Order No.:**

Table 1:

Version	Cold junction compensation	Order Code	**Order No.**
Standard, not electrically isolated	incorporated	608-810	141 515
EEx ia IIC T6, not electrically isolated		608-830	141 523

Please complete the Order Code 608-8.1. .... according to "Table 3: Specification and ordering information" for versions with user-specific input ranges.

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Programming

A PC, the programming cable PK 610 plus ancillary cable and the programming software V 600 *plus* are required to program the transmitter. (Details of the programming cable and the software are to be found in the separate data sheet: PK 610 Le.)

The connections between
«PC ↔ PK 610 ↔ SINEAX V 608» can be seen from Fig. 2. The transmitter can be programmed either with or without the power supply connected.

The software V 600 *plus* is supplied on one CD and runs under Windows 3.1x, 95, 98, NT and 2000.

The programming cable PK 610 adjusts the signal level between the PC and the transmitter SINEAX V 608.

The programming cable PK 610 is used for programming both standard and Ex versions.

It is possible to programme the temperature transmitter installed into the hazardous area.

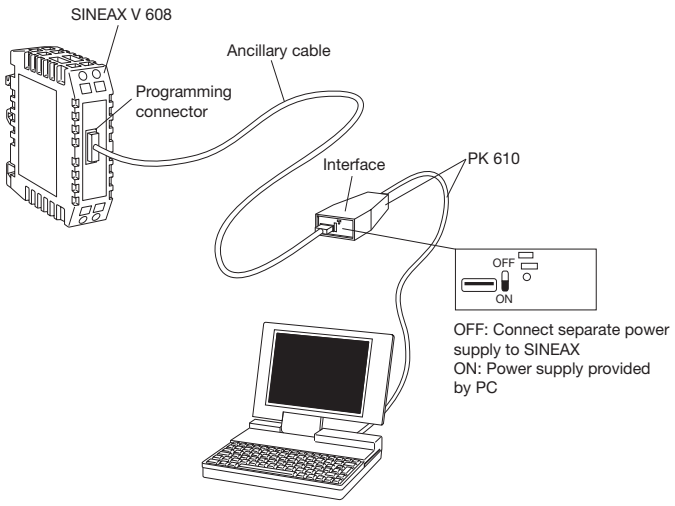


Fig. 2. Example of the set-up for programming a SINEAX V 608 without the power supply. For this case the switch on the interface must be set to "ON".

Technical data

Measuring input ⊕

Temperature with resistance thermometers

Measuring range limits:	See table 4
Resistance types:	Type Pt 100 (IEC 60 751) Type Ni 100 (DIN 43 760) other sensor types configurables
Measuring current:	≤ 0.20 mA
Standard circuit:	1 resistance thermometer for **two-, three-** or **four-**wire connection
Input resistance:	R_i > 10 MΩ
Lead resistance:	≤ 30 Ω per lead

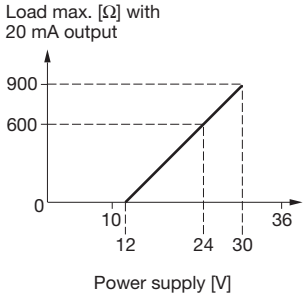
Temperature with thermocouple

Measuring range limits:	See table 4
Thermocouple pairs:	Type B: Pt30Rh-Pt6Rh (IEC 584) Type E: NiCr-CuNi (IEC 584) Type J: Fe-CuNi (IEC 584) Type K: NiCr-Ni (IEC 584) Type L: Fe-CuNi (DIN 43710) Type N: NiCrSi-NiSi (IEC 584) Type R: Pt13Rh-Pt (IEC 584) Type S: Pt10Rh-Pt (IEC 584) Type T: Cu-CuNi (IEC 584) Type U: Cu-CuNi (DIN 43710) Type W5 Re/W26 Re (ASTM Type W3 Re/W25 Re E 988-90)
Standard circuit:	1 thermocouple, **internal** cold junction compensation with built-in Pt 100 or 1 thermocouple, **external** cold junction compensation
Input resistance:	Ri > 10 MΩ
Cold junction compensation:	Internal or external
Internal:	With built-in Pt 100 or with Pt 100 connected to the terminals
External:	Via cold junction thermostat 0 … 60 °C, configurable

Measuring output ⊖

(output/powering circuit)

Output signal I_A:	Impressed DC current, **linear with temperature**
Standard range:	4...20 mA, 2-wire technique
External resistance (load):	R_{ext} max. [kΩ] = (Power supply [V] – 12 V) / (max. output current [mA])



Residual ripple in output current:	< 1% p.p.

Tableau 2: Response time

Measuring mode	Open sensor circuit	Short-circuit	Possible response times approx. [s]						
TC int. comp.	active	–	1.5	2.5	3.5	6.5	11	20.5	40
TC int. comp.	off	–	1.5	2.5	3.5	6.5	13.5	24.5	49.5
TC ext. comp.	active	–	1.5	2.5	3.5	6.5	11	20.5	40
TC ext. comp.	off	–	1.5	2.5	4	6.5	13.5	24.5	48.5
RTD 2L	active	–	2	2.5	3	5	9.5	17.5	33.5
RTD 3L, 4L	active	active	2	2.5	4	6.5	11.5	21	40.5
RTD 2L,3L,4L	off	off	1.5	2.5	3.5	7.5	14	26.5	50.5

Programming connector

Interface: Serial interface

Accuracy data (acc. to EN/IEC 60 770-1)

Reference value: Measuring span

Basic accuracy: Error limits ≤ ± 0.2% at reference conditions

Reference conditions

Ambient temperature 23 °C

Power supply 18 V DC

Output burden 250 Ω

Settings Pt100, 3-wire, 0…600 °C

Additional errors (additive)

Low measuring ranges

Voltage measurement	± 5 µV at measuring spans < 10 mV
Resistance thermometer	± 0.3 K at measuring spans < 400°C
Thermocouple	
Type U, T, L, J, K, E	± 0.1 K at measuring spans < 200°C
Type N	± 0.13 K at meas. spans < 320 °C
Type S, R	± 0.42 K at meas. spans < 1000 °C
Type B	± 0.6 K at meas. spans < 1400 °C

High initial value (Additional error = Factor · Initial value)

	Factor
Voltage measurement	± 0.1 µV / mV
Resistance thermometer	± 0.00075 K / °C
Thermocouple	
Type U, T, L, J, K, E	± 0.0006 K / °C
Type N	± 0.0008 K / °C
Type S, R	± 0.0025 K / °C
Type B	± 0.0036 K / °C

Influence of lead resistance at resistance thermometer ± 0.01% per Ω

Internal cold junction compensation ± 0.5 K

Linearisation ± 0.3%

Influencing factors

Temperature ≤ ± (0.15% + 0.15 K) per 10 K with temperature measurement
≤ ± (0.15% + 12 µV) per 10 K with voltage measurement

Power supply influence (power supply on terminals) ≤ ± 0.005% per V

Long-time drift ≤ ± 0.1%

Common and transverse mode influence ≤ ± 0.2%

Open and short-circuit sensor circuit supervision

Signalling modes: Output signal programmable to …
… the value the output had immediately prior to the open or short-circuit (hold value)
… a value between 4 and 21.6 mA

Power supply →◯

DC voltage: Supply
12...30 V DC
max. residual ripple 1% p.p.
(supply must not fall below 12 V)
Protected against wrong polarity

Installation data

Housing: Housing K17 for rail mounting
Dimensions see section “Dimensional drawings”

Material of housing: Polyamide
Flammability Class V2 acc. to UL 94, self-extinguishing, non-dripping, free of halogen

Mounting: For snapping
– onto rail G acc. to EN 50 035 – G32
or
– onto top-hat rail acc. to EN 50 022 (35 × 15 mm or 35 × 7.5 mm)

Standards

Electromagnetic compatibility: The standards EN 50 081-2 and EN 50 082-2 are observed

Intrinsically safe: Acc. to EN 50 020

Protection (acc. to IEC 529 resp. EN 60 529): Housing IP 40
Terminals IP 20

Electrical standards: Acc. to IEC 1010 resp. EN 61 010

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Ambient conditions

Climatic rating:	IEC 60 068-2-1/2/3
Ambient temperature range:	– 25 to + 80 °C at NEx and Ex (T4) at Ex (T6) dependent of P_i, see EC-type-examination Certificate
Storage temperature range:	– 40 to + 80 °C
Annual mean relative humidity:	≤ 75%, no moisture condensation

Table 3: Specification and ordering information (see also Table 1: Standard versions)

Order Code **608 -**			
Features, Selection	*SCODE	no-go	
1. Housing			
8) Housing K17 for rail mounting			8 . . . . .
2. Version			
1) Standard, not electrically isolated			. 1 . . . . .
3) EEx ia IIC T6, not electrically isolated			. 3 . . . . .
3. Configuration			
0) **Basic** configuration, programmed (Pt 100, three-wire, 0…600 °C)	G		. . 0 . . . .
1) Programmed to order			. . 1 . . . .
Line 0: All types with basic configuration are available as standard versions, see table 1, specification complete! Line 1: The following features 4 to 11 must be fully specified!			
4. Measuring unit			
1) Temperatures in °C			. . . 1 . . .
2) Temperatures in °F		G	. . . 2 . . .
3) Temperatures in K		G	. . . 3 . . .
5. Measuring mode, input connection			
Thermocouple			
1) Internal cold junction compensation, with built-in Pt 100	T	G	. . . . 1 . .
2) External cold junction compensation t_K	T	G	. . . . 2 . .
Resistance thermometer			
3) Two-wire connection, R_L [Ω]	R	G	. . . . 3 . .
4) Three-wire connection, R_L ≤ 30 Ω/wire	R		. . . . 4 . .
5) Four-wire connection, R_L ≤ 30 Ω/wire	R	G	. . . . 5 . .
Line 2: Specify external cold junction temperature t_K (in °C, °F or K, acc. to specification in Feature 4) any value between 0 and 60 °C or equivalent Line 3: Specify total lead resistance R_L [Ω], any value between 0 and 60 Ω			

Table 3: “Specification and ordering information” continued on next page!

Order Code **608 -**			
Features, Selection	*SCODE	no-go	
6. Sensor type / measuring range			
Sensor type / beginning…end value of measuring range			
1) RTD Pt 100 Range		T	1 . . . . .
2) RTD Ni 100 Range		GT	2 . . . . .
3) RTD Pt … [Ω] Range		GT	3 . . . . .
4) RTD Ni … [Ω] Range		GT	4 . . . . .
B) TC Type B Range		GR	B . . . . .
E) TC Type E Range		GR	E . . . . .
J) TC Type J Range		GR	J . . . . .
K) TC Type K Range		GR	K . . . . .
L) TC Type L Range		GR	L . . . . .
N) TC Type N Range		GR	N . . . . .
R) TC Type R Range		GR	R . . . . .
S) TC Type S Range		GR	S . . . . .
T) TC Type T Range		GR	T . . . . .
U) TC Type U Range		GR	U . . . . .
W) TC W5-W26Re Range		GR	W . . . . .
X) TC W3-W25Re Range		GR	X . . . . .
Specify measuring range in [°C], [°F] or [K]; refer to table 4 for the operating limits for each type of sensor.			
Lines 3 and 4: Specify resistance in Ω- at 0 °C, any value between 50 and 4000 Ω			
7. Output characteristic			
0) Standard 4 … 20 mA			. 0 . . . . .
1) Inversely 20 … 4 mA		G	. 1 . . . . .
8. Open and short-circuit sensor signalling			
Output response for an open or short-circuit* sensor			
0) Output 21.6 mA			. . 0 . . . .
1) Output [mA]		G	. . 1 . . . .
2) Hold output at last value		G	. . 2 . . . .
A) No signal		G	. . A . . . .
Line 1: Any value between 4 and < 21.6 mA			
** The short-circuit signal is only active for the RTD measuring mode ≥ 100 Ω at 0 °C and three or four-wire connection*			
9. Output time response			
0) Standard setting time approx. 2 s			. . . 0 . . .
9) Setting time [s]		G	. . . 9 . . .
Line 9: Admissible values see Table 2			
10. Mains ripple suppression			
0) Frequency 50 Hz			. . . . 0 . .
1) Frequency 60 Hz		G	. . . . 1 . .
11. Test certificate			
0) Without test certificate			. . . . . 0 .
D) Test certificate in German		G	. . . . . D .
E) Test certificate in English		G	. . . . . E .

** Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "SCODE".*

Table 4: Temperature measuring ranges

Measuring ranges [°C]	Resistance thermometers		Thermocouples											
	Pt100	Ni100	B	E	J	K	L	N	R	S	T	U	C [1]	D [2]
0… 40	X			X	X		X							
0... 50	X	X		X	X	X	X				X	X		
0... 60	X	X		X	X	X	X				X	X		
0... 80	X	X		X	X	X	X	X			X	X		
0... 100	X	X		X	X	X	X	X			X	X		
0... 120	X	X		X	X	X	X	X			X	X		
0... 150	X	X		X	X	X	X	X			X	X	X	
0... 200	X	X		X	X	X	X	X			X	X	X	X
0... 250	X	X		X	X	X	X	X			X	X	X	X
0... 300	X			X	X	X	X	X	X	X	X	X	X	X
0... 400	X			X	X	X	X	X	X	X	X	X	X	X
0... 500	X			X	X	X	X	X	X	X		X	X	X
0... 600	X			X	X	X	X	X	X	X		X	X	X
0... 800	X		X	X	X	X	X	X	X	X			X	X
0... 900			X	X	X	X	X	X	X	X			X	X
0...1000			X	X	X	X		X	X	X			X	X
0...1200			X		X	X		X	X	X			X	X
0...1500			X						X	X			X	X
0...1600			X						X	X			X	X
0...1800			X										X	X
0...2000													X	X
50... 150	X	X		X	X	X	X	X			X	X		
100... 300	X			X	X	X	X	X			X	X	X	X
200... 500	X			X	X	X	X	X	X	X		X	X	X
300... 600	X			X	X	X	X	X	X	X		X	X	X
600... 900			X	X	X	X	X	X	X	X			X	X
600...1000			X	X	X	X		X	X	X			X	X
900...1200			X		X	X		X	X	X			X	X
600...1600			X						X	X			X	X
600...1800			X										X	X
−10... 40	X	X		X	X	X	X					X		
−30... 60	X	X		X	X	X	X	X			X	X		
Measuring range limits [°C]	−200 to 850	−60 to 250	0 to 1820	−270 to 1000	−210 to 1200	−270 to 1372	−200 to 900	−270 to 1300	−50 to 1769	−50 to 1769	−270 to 400	−200 to 600	0 to 2315	0 to 2315
	ΔR min. 15 Ω at final value [3] ≤ 400 Ω ΔR min. 150 Ω at final value > 400 Ω max. final value 4000 Ω $\frac{\text{initial value}}{\Delta R} \leq 10$		ΔU min 2 mV, max. 80 mV $\frac{\text{Initial value}}{\Delta U} \leq 10$											

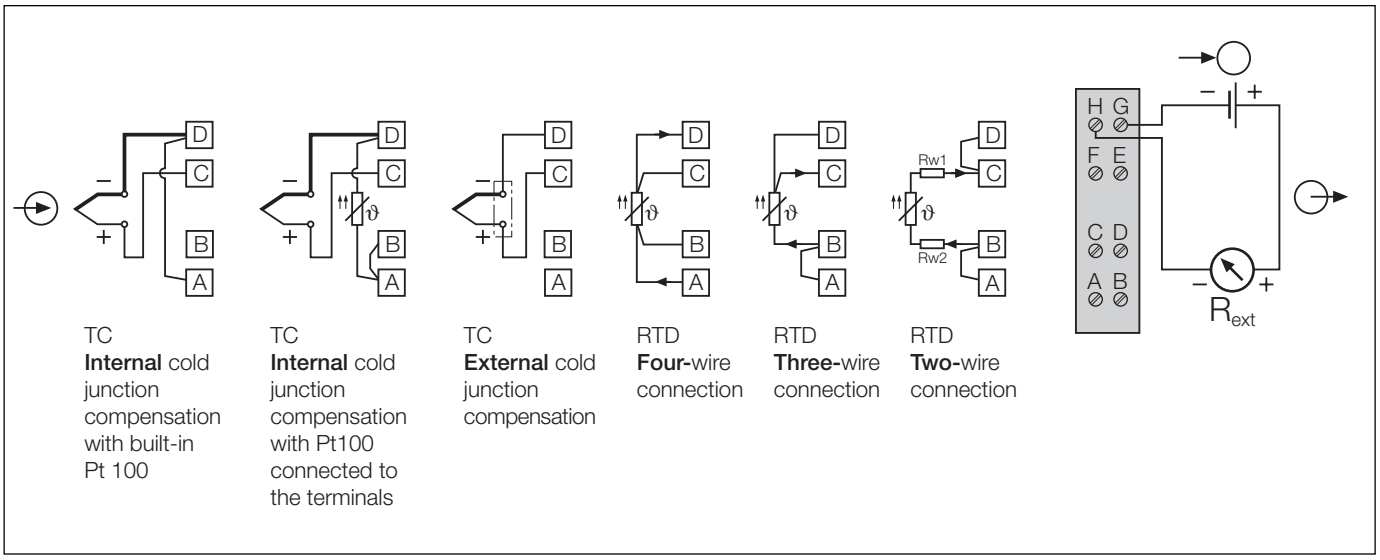
[1] W5 Re W26 Re (ASTM E 988-90)
[2] W3 Re W25 Re (ASTM E 988-90)
[3] For two-wire connection, the final value is made up of the measured final value [Ω] plus the total resistance of the leads.

Table 5: Data on explosion protection ⟨Ex⟩ II 2 (1) G

Order Code	Type of protection Marking	Electrical data acc. to Certificate Sensor input	Output	Certificate	Mounting location
608 - 83	EEx ia IIC T6	U_o = 6 V I_o = 15 mA P_o = 39 mW C_o = 990 nF L_o = 5 mH	U_i = 30 V I_i = 160 mA P_i = max. 1 W* $C_i \approx 0$ $L_i \approx 0$	EX-type-examination Certificate ZELM 01 ATEX 0052	**Within** the hazardous area, zone 1 and 2**

** Ambient temperature Ex: – 25 °C … max. 57 °C (dependent on P_i, see EC-type-examination Certificate)*
*** It is permissible for the sensor circuit to enter Zone 0, however, EN 50 284 and any applicable national standards must be observed.*

Electrical connections



TC **Internal** cold junction compensation with built-in Pt 100

TC **Internal** cold junction compensation with Pt100 connected to the terminals

TC **External** cold junction compensation

RTD **Four-**wire connection

RTD **Three-**wire connection

RTD **Two-**wire connection

= Measuring input

= Two-wire measuring output (measuring circuit) (4 … 20 mA signal)

= Power supply 12 … 30 V DC

Standard accessories

1 Operating Instructions in German, French and English
1 Type examination certificate (only for “intrinsically safe” explosion-proof devices)

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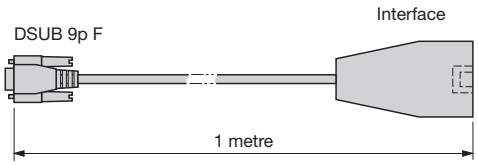
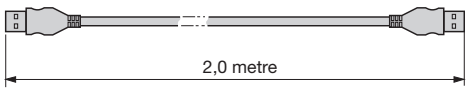
Table 6: Accessories and spare parts

Description	Order No.
Programming cable PK 610 	137 887
Ancillary cable SINEAX Type V 608 	141 416
Configuration Software V 600 *plus* for SINEAX V 608, VK 616 and V 624 Windows 3.1x, 95, 98, NT and 2000 on CD in German, English, French, Spanish, Italian and Dutch **(Download free of charge under http://www.gmc-instruments.com)** In addition, the CD contains all configuration programmes presently available for Camille Bauer products.	146 557
Operating Instructions V 608-8 Bd in German	141 953
Operating Instructions V 608-8 Bf in French	142 068
Operating Instructions V 608-8 Be in English	142 117

Dimensional drawings

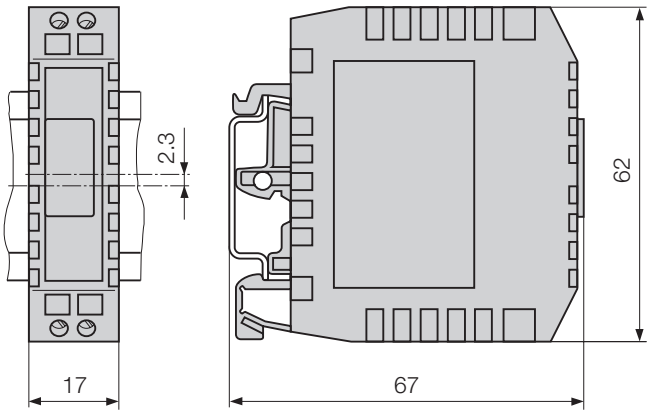


*Fig. 3. SINEAX V 608 in housing **K17** clipped onto a top-hat rail EN 50 022 – 35 x 7.5.*

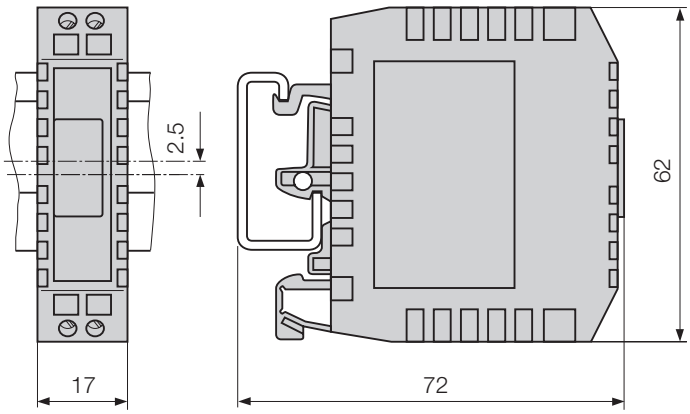


*Fig. 4. SINEAX V 608 in housing **K17** clipped onto a rail "G" EN 50 035 – G32.*

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