

SINEAX V 624, Programmable Temperature Transmitter for RTD and TC inputs

for rail mounting in housing P12/17 or P12/17 St



Application

SINEAX V 624 (Fig. 1) is designed for measuring temperature in combination with thermocouples or resistance thermometers. Thermocouple non-linearities are automatically compensated.

The analog output signal is either an impressed current or superimposed voltage which is linearly proportional to temperature and can be processed by other devices for purposes of displaying, recording and/or regulating a constant.

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 transmitter fulfils all the important requirements and regulations concerning electromagnetic compatibility **EMC** and **Safety** (IEC 1010 resp. EN 61 010). It was developed and is manufactured and tested in strict accordance with the **quality assurance standard** ISO 9001.

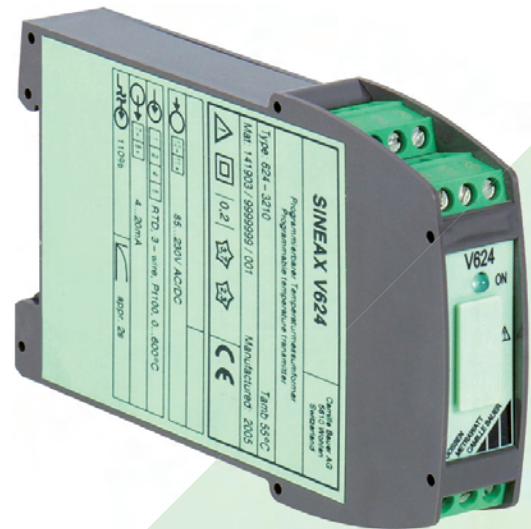


Fig. 1. Transmitter SINEAX V 624 in housing P12/17, terminals not pluggable.

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			
Pt100, IEC 60 751	- 200 to 850 °C	50 K	850 K
Ni100, 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			

- Electric isolation between input, output 2.3 kV and power supply 3.7 kV / Fulfils EN 61 010
- Wide DC, AC power pack tolerance / Universal

- Available in type of protection "Intrinsic safety" [EEx ia] IIC (see "Table 3: Data on explosion protection")
- Ex devices also directly programmable on site / No supplementary Ex interface needed
- Open and short-circuit sensor circuit supervision / Defined output response should the supervision pick up
- Programmable with or without power supply connection
- Housing only 17.5 mm wide (size P12/17 housing) / Low space requirement
- Other programmable parameters: specific measured variable data (e.g. **two, three** or **four-wire** connection for resistance thermometers, "internal" or "external" cold junction compensation of thermocouples etc.), **transmission mode, operating sense** (output signal directly or inversely proportional to the measured variable) and **open-circuit sensor supervision** (output signal assumes fixed preset value between -5 and 110%) / **Highly flexible solutions for measurement problems**
- Software calibration of beginning and end of output signal range
- Digital measured variable data available at the programming interface/ Simplifies commissioning, measured variable and signals can be viewed on PC in the field

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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 connection between "PC ↔ PK 610 ↔ SINEAX V 624" 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 624.

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

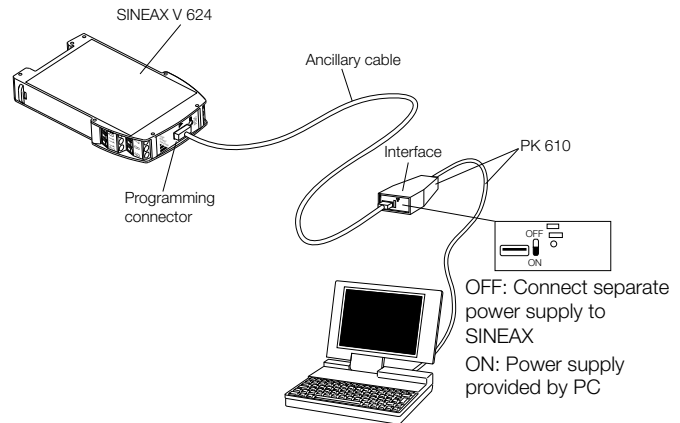


Fig. 2. Example of the set-up for programming a SINEAX V 624 in standard version without the power supply. For this case the switch on the interface must be set to "ON".

Technical data

Measuring input →

Temperature with resistance thermometers

Measuring range limits:	See table 7
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:	$R_i > 10 \text{ M}\Omega$
Lead resistance:	≤ 30 Ω per lead

Temperature with thermocouple

Measuring range limits:	See table 7
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:	$R_i > 10 \text{ M}\Omega$

Cold junction compensation:

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 →

DC current*:	Programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA
Burden voltage:	12 V
Open-circuit voltage:	< 20 V
External resistance:	$R_{\text{ext max. [k}\Omega]} = \frac{12 \text{ V}}{I_{\text{AN [mA]}}$ I_{AN} = Output current end value
Residual ripple:	< 1.0% p.p., DC ... 10 kHz
DC voltage*:	Programmable between 0 and 10 resp. 10 and 0 V minimum span 1 V
Short-circuit current:	≤ 50 mA
External resistance:	$R_{\text{ext min. [k}\Omega]} \geq \frac{U_{\text{AN [V]}}}{5 \text{ mA}}$ U_{AN} = Output voltage end value
Residual ripple:	< 1.0% p.p., DC ... 10 kHz

* The output variable (current or voltage) is not re-programmable!

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Table 1: Response time

Measuring mode	Open sensor	Short-circuit	Possible response times approx. [s]						
			*)	Option					
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

*) Standard values, also valid for basic configuration

Programming connector

interface: Serial interface

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

Reference value: Measuring span

Basic accuracy: Error limits $\leq \pm 0.2\%$ at reference conditions

Reference conditions

Ambient temperature 23 °C

Power supply 24 V DC $\pm 10\%$ and 230 V AC $\pm 10\%$

Output burden Current 300 Ω
Voltage 4 k Ω

Settings Pt100, 3-wire, 0...600 °C

Additional errors (additive)

Low measuring ranges

Voltage measurement $\pm 5 \mu\text{V}$
at measuring spans $< 10 \text{ mV}$

Resistance thermometer $\pm 0.3 \text{ K}$
at measuring spans $< 400 \text{ }^\circ\text{C}$

Thermocouple

Type U, T, L, J, K, E $\pm 0.1 \text{ K}$
at measuring spans $< 200 \text{ }^\circ\text{C}$

Type N $\pm 0.13 \text{ K}$
at measuring spans $< 320 \text{ }^\circ\text{C}$

Type S, R $\pm 0.42 \text{ K}$
at measuring spans $< 1000 \text{ }^\circ\text{C}$

Type B $\pm 0.6 \text{ K}$
at measuring spans $< 1400 \text{ }^\circ\text{C}$

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

Voltage measurement $\pm 0.1 \mu\text{V} / \text{mV}$

Resistance thermometer $\pm 0.00075 \text{ K} / \text{ }^\circ\text{C}$

Thermocouple

Type U, T, L, J, K, E $\pm 0.0006 \text{ K} / \text{ }^\circ\text{C}$

Type N $\pm 0.0008 \text{ K} / \text{ }^\circ\text{C}$

Type S, R $\pm 0.0025 \text{ K} / \text{ }^\circ\text{C}$

Type B $\pm 0.0036 \text{ K} / \text{ }^\circ\text{C}$

Influence of lead resistance at resistance thermometer $\pm 0.01\%$ per Ω

Internal cold junction compensation $\pm 0.5 \text{ K}$ at 23 °C, $\pm 0.25 \text{ K}/10 \text{ K}$

Linearisation $\pm 0.3\%$

If hardware output end value / output span > 1.25
 $\pm \left(\frac{20 \text{ mA resp. } 10 \text{ V}}{\text{output span}} \cdot 0.07\% \right)$

Example:

Hardware output end value 20 mA
New configuration 14 ... 16 mA
Additional error =

$$\pm \left(\frac{20 \text{ mA}}{2 \text{ mA}} \cdot 0.07\% \right) = 0.7\%$$

Influencing factors

Temperature $\leq \pm (0.15\% + 0.15 \text{ K})$ per 10 K with temperature measurement
 $\leq \pm (0.15\% + 12 \mu\text{V})$ per 10 K with voltage measurement

Long-time drift $\leq \pm 0.1\%$

Common and transverse mode influence $\leq \pm 0.2\%$

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 -5 and 110% of the output span

Power supply $\rightarrow \text{O}$

DC, AC power pack (DC or 45 ... 400 Hz)

Table 2: Rated voltages and permissible variations

Nominal voltages U_N	Tolerance	Instruments Version
24... 60 V DC/AC	DC $-15\% + 33\%$ AC $\pm 15\%$	Standard (Non-Ex)
85...230 V ¹ DC/AC		
24... 60 V DC/AC	DC $-15\% + 33\%$ AC $\pm 15\%$	Type of protection "Intrinsic safety" [Ex ia] IIC
85...230 V AC		
85...110 V DC		

Installation data: $\leq 1.0 \text{ W}$ resp. $\leq 2.1 \text{ VA}$

Installation data

Housing: Housing **P12/17** and **P12/17 St**
Dimensions see section "Dimensional drawings"

¹An external supply fuse must be provided for DC supply voltages $> 125 \text{ V}$!

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Material of housing:	Lexan 940 (polycarbonate) Flammability class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen	Operating voltages:	< 300 V between all insulated cir- cuits
Mounting:	For snapping onto top-hat rail (35 x 15 mm or 35 x 7.5 mm) acc. to EN 50 022	Pollution degree:	2
Mounting position:	Any	Installation category acc. to IEC 664:	III for power supply II for measuring input and measuring output
Terminals:	PHOENIX screw terminals with wire guards for 0.14 mm ² to 2.5 mm ²	Double insulation:	– Power supply versus all circuits – Measuring input versus measuring output
Weight:	Approx. 0.1 kg	Test voltage:	Power supply versus: – all 3.7 kV, 50 Hz, 1 min. Measuring input versus: – measuring output 2.3 kV, 50 Hz, 1 min.
Electrical insulation:	All circuits (measuring input/mea- suring output/power supply) are electrically insulated		

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

Ambient conditions

Climatic rating:	IEC 60 068-2-1/2/3
Ambient temperature range:	–25 to +55 °C
Storage temperature range:	–40 to +70 °C
Annual mean relative humidity:	≤ 75%, no moisture condensation
Altitude:	2000 m max.
Indoor use statement!	

Table 3: Data on explosion protection  **II (1) GD**

Order Code	Type of protection "Intrinsic safety" Marking		Certificate	Mounting location of instruments
	Instrument	Measuring input		
624-33/34/93/94	[EEx ia] IIC	EEx ia IIC	EC-type-examination Certificate ZELM 00 ATEX 0027	Outside the hazardous area

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 4: Instruments in standard (non-Ex) version (measuring circuit not intrinsically safe)

Measuring input programmable for RTD and TC inputs	Measuring output*	Power supply	Connecting screw terminals	Order Code	Order No.
RTD: Pt 100, Ni 100 TC: Types B, E, J, K, L, N, R, S, T and U W5/W26 Re W3/W25 Re	4 ... 20 mA programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA	24 ... 60 V DC/AC	not pluggable	624 – 3110	141 896
		85 ... 230 V DC/AC		624 – 3210	141 903
		24 ... 60 V DC/AC	pluggable	624 – 9110	143 412
		85 ... 230 V DC/AC		624 – 9210	143 420

* The output variable (current or voltage) is not re-programmable!

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Table 5: instruments in [EEx ia] IIC version (measuring circuit intrinsically safe)

Measuring input programmable for RTD and TC inputs	Measuring output*	Power supply	Connecting screw terminals	Order Code	Order No.
RTD: Pt 100, Ni 100 TC: Types B, E, J, K, L, N, R, S, T and U W5/W26 Re W3/W25 Re	4 ... 20 mA programmable between 0 and 20 resp. 20 and 0 mA minimum span 2 mA	24 ... 60 V DC/AC	not pluggable	624 – 3310	141 911
		85 ... 110 V DC 85 ... 230 V AC		624 – 3410	141 929
		24 ... 60 V DC/AC	pluggable	624 – 9310	143 438
		85 ... 110 V DC/ 85 ... 230 V AC		624 – 9410	143 446

* The output variable (current or voltage) is not re-programmed!

Basic configuration:	Measuring input:	Resistance thermometer Pt 100
	Connection mode:	Three-wire connection
	Measuring range:	0 ... 600 °C
	Measuring output:	4 ... 20 mA
	Open-circuit supervision:	Output 21.6 mA
	Response time:	Approx. 1.5/2 s (table 1)
	Mains ripple suppression:	For frequency 50 Hz

Table 6: Specification and ordering information (see also Tables 4 and 5: Standard versions)

Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX V 624	Order Code V 624 - xxxx xxxx xxxx		624 –
Features, Selection			
1. Housing			
Housing P12/17 for rail mounting, connecting screw terminals not pluggable			3
Housing P12/17 St for rail mounting, connecting screw terminals pluggable			9
2. Version / Power supply			
Standard / 24 ... 60 V DC/AC			1
Standard / 85 ... 230 V DC/AC			2
[EEx ia] IIC / 24 ... 60 V DC/AC			3
[EEx ia] IIC / 85 ... 110 V DC / 230 V AC			4
3. Output variable			
Current, end value max. 20 mA			1
Voltage, end value max. 10 V			2
4. Configuration			
Basic configuration programmed (Pt100, three-wire, 0 ... 600 °C) All types with basic configuration are available as standard versions, see table 4 and 5, specification complete!	G		0
Configured to order The following features 5 to 12 must be fully specified!			1
5. Measuring unit			
Temperatures in °C			1
Temperatures in °F		G	2
Temperatures in K		G	3

SINEAX V 624, Programmable Temperature Transmitter for RTD and TC inputs

Description	*Blocking code	no-go with blocking code	Article No./ Feature
SINEAX V 624 Order Code V 624 - xxxx xxxx xxxx			624 –
Features, Selection			
6. Measuring mode, input connection			
Thermocouple			
Internal cold junction compensation, with built-in Pt100	T	G	1
External cold junction compensation t_k <input type="text"/>	T	G	2
Specify external cold junction temperature t_k (in °C, °F or K, acc. to specification in Feature 5), any value between 0 and 60 °C or equivalent			
Resistance thermometer			
Two-wire connection, R_L <input type="text"/> [Ω]	R	G	3
Specify total lead resistance R_L [Ω], any value between 0 and 60 Ω			
Three-wire connection, $R_L \leq 30 \Omega$ /wire	R		4
Four-wire connection, $R_L \leq 30 \Omega$ /wire	R	G	5
7. Sensor type / measuring range			
Sensor type / beginning ... end value of measuring range			
RTD PT 100 Range <input type="text"/>		T	1
RTD Ni 100 Range <input type="text"/>		GT	2
RTD Pt ... [Ω] Range <input type="text"/>		GT	3
RTD Ni ... [Ω] Range <input type="text"/>		GT	4
TC Type B Range <input type="text"/>		GR	B
TC Type E Range <input type="text"/>		GR	E
TC Type J Range <input type="text"/>		GR	J
TC Type K Range <input type="text"/>		GR	K
TC Type L Range <input type="text"/>		GR	L
TC Type N Range <input type="text"/>		GR	N
TC Typ R Range <input type="text"/>		GR	R
TC Typ S Range <input type="text"/>		GR	S
TC Type T Range <input type="text"/>		GR	T
TC Type U Range <input type="text"/>		GR	U
TC W5-W26Re Range <input type="text"/>		GR	W
TC W3-W25Re Range <input type="text"/>		GR	X
Specify measuring range in [°C], [°F] or [K]; refer to table 7 for the operating limits for each type of sensors. Lines 3 and 4: Specify resistance in Ω at 0 °C, any value between 50 and 1000 Ω			
8. Output characteristic			
20 ... 100% end value			0
0 ... 100% end value			1
Inversely 100 ... 20% end value		G	2
Inversely 100 ... 0% end value		G	3

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Electrical connections

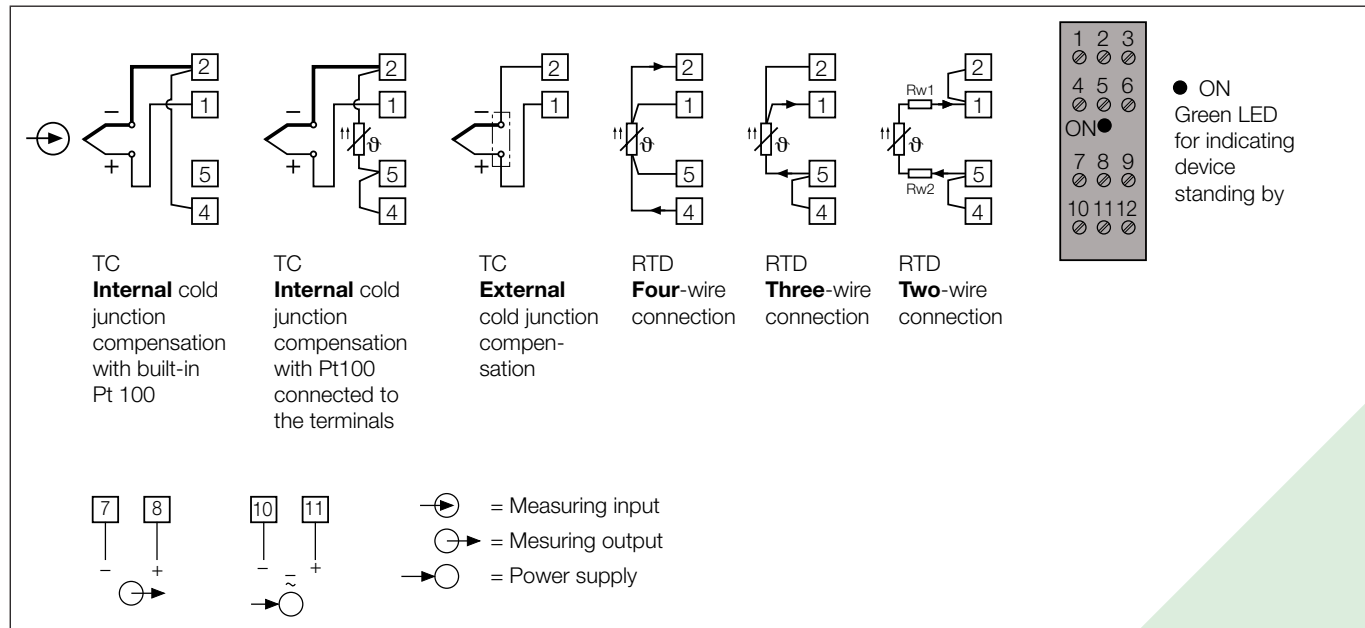


Table 8: Accessories and spare parts

Description		Order No.
Programming cable PK 610		137 887
Ancillary cable SINEAX Type V 624		141 416
Configuration Software V 600 <i>plus</i> 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.camillebauer.com) In addition, the CD contains all configuration programmes presently available for Camille Bauer products		146 557
Operating Instructions V 624 Bd in German		141 995
Operating Instructions V 624 Bf in French		142 109
Operating Instructions V 624 Be in English		142 159

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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Dimensional drawings

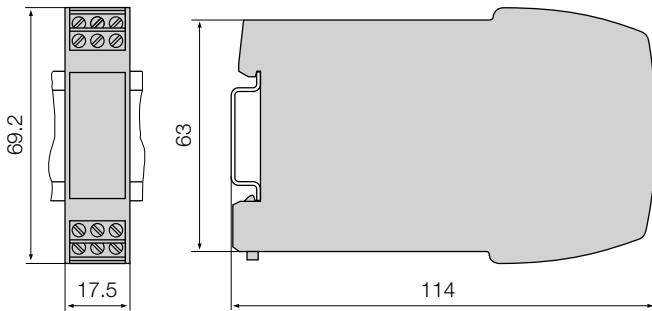


Fig. 3. SINEAX V 624 in housing **P12/17** clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm, acc. to EN 50 022), connecting screw terminals not pluggable.

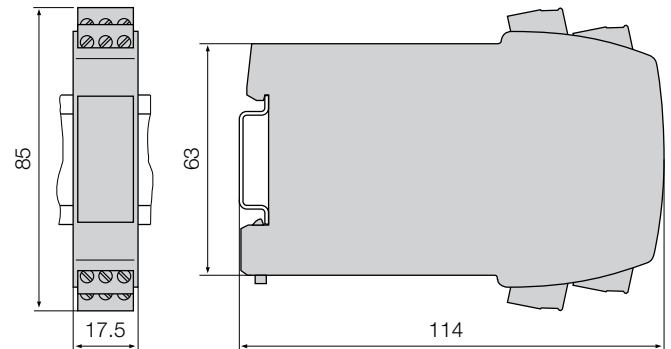


Fig. 4. SINEAX V 624 in housing **P12/17 St** clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm, acc. to EN 50 022), connecting screw terminals pluggable.

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