Operating Instructions
Universal Transmitter SINEAX V 604

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1. Read first and then …

The proper and safe operation of the device assumes that the Operating Instructions are **read** and the safety warnings given in the various Sections

8. Mounting

9. Electrical connections

10. Programming the transmitter

11. Commissioning

are **observed**.

The device should only be handled by appropriately trained personnel who are familiar with it and authorised to work in electrical installations.

The instrument must only be opened for the setting of the DIP switch, as described in section “10. Programming the transmitter”.

The guarantee is no longer valid if the instrument is further tampered with.

2. Scope of supply

Transmitter (1)
Order Code: Significance of the 2nd. and 3rd. digits
604-1 x x

1 Standard, measuring input not I.S., power supply 24... 60 V DC/AC
2 Standard, measuring input not I.S., power supply 85...230 V DC/AC
3 [EEx ia] IIC, measuring input I.S., power supply 24... 60 V DC/AC
4 [EEx ia] IIC, measuring input I.S., power supply 85...110 V DC / 85…230 V AC

2 Standard climatic rating; instrument with cold junction compensation
4 Extra climatic rating; instrument with cold junction compensation

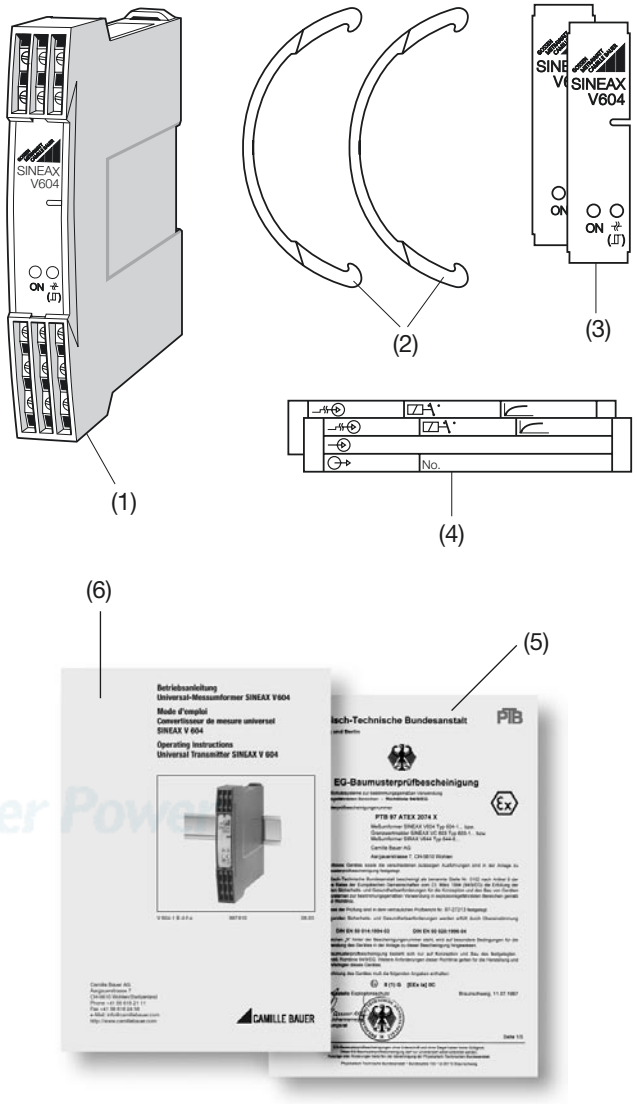

Fig. 1

2 **withdrawing handles (2)** (for withdrawing the device from its housing)
2 **Frontplates (3)** (for notes)
2 **Type labels (4)** (for recording the operating data after programming)
1 **Ex approval (5)** (only for Ex version devices)
1 **Operating Instructions (6)**

3. Overview of the parts

Figure 2 shows those parts of the transmitter of consequence for mounting, electrical connections, programming connections and other operations described in the Operating Instructions.

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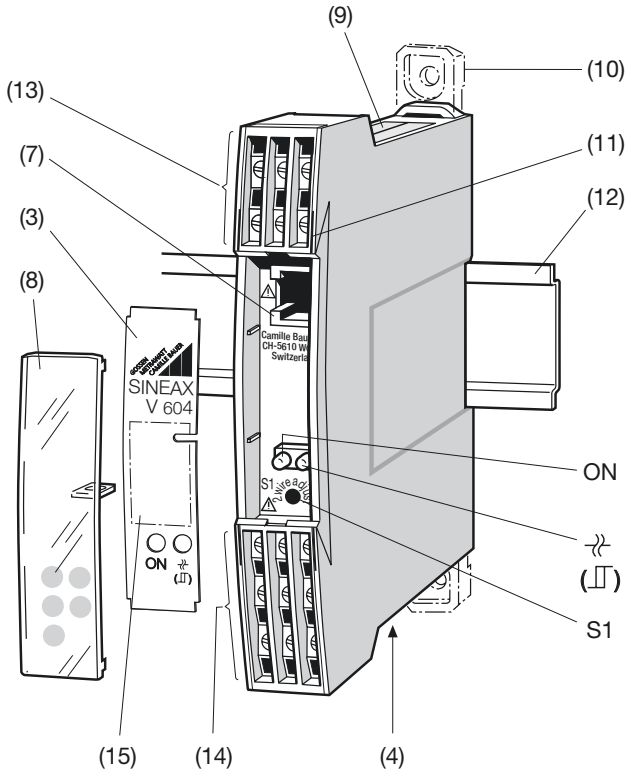


Fig. 2

(3) Front plate
(4) Type label (operating data)
(7) Programming connector
(8) Transparent cover
(9) Type label (device ratings)
(10) Fixing bracket
(11) Opening for withdrawing clip (for opening the housing)
(12) Top-hat rail 35×15 mm or 35×7.5 mm (EN 50 022)
(13) Terminals 1, 2, 6, 7, 11, 12 measuring input M
(14) Terminals 4, 9 measuring output A1
3, 8 measuring output A2
5, 10 power supply H
13, 14, 15 output contact K
(15) Space for notes
S1 Calibration button for automatically compensating the leads of two-wire resistance thermometer circuits
ON Green LED for signalling operating statuses
Red LED for open-circuit sensor supervision
or
as relay status signal (open-circuit sensor supervision not in operation)

4. Brief description

Resistance thermometers, thermo-couples, resistance sensors, potentiometers or DC current or voltage sources are connected to the programmable universal transmitter SINEAX V 604 which then converts the corresponding input signals into impressed current or voltage output signals.

Explosion-proof “intrinsically safe” [EEx ia] IIC versions approved for processing measured variables in explosion hazard zones rounds off this series of transmitters.

Baureihe des Messumformers.

The transmitter fulfils the protection requirements according to the EMC guideline (89/336/EWG). The device bears the CE symbol for EMC.

Measured variables and measuring ranges are programmed with the aid of a PC, a programming cable and the programming software. Specific measured variable data such as output signal, transmission characteristics, active direction and open-circuit sensor supervision data can also be programmed.

Transmitters supplied ex stock are configured as follows:

– Measuring input	**0...5 V DC**
– Measuring output	**0...20 mA linear** Fixed value 0% during 5 s after switching on
– Settling time	**0.7 s**
– Break monitoring	**Inactive**
– Mains ripple suppression	**50 Hz**
– Limit function	**Inactive**

5. Technical data

Measuring input

Measured variable M

The measured variable M and the measuring range can be programmed

Table 1: Measured variables and measuring ranges

Measured variables	Measuring ranges		
	Limits	Min. span	Max. span
DC voltages			
direct input	± 300 mV [1]	2 mV	300 mV
via voltage divider[2]	± 40 V[1]	300 mV	40 V
DC currents			
low current range	± 12 mA[1]	0.08 mA	12 mA
high current range	– 50 to + 100 mA[1]	0.75 mA	100 mA
Temperature monitored by two, three or four-wire resistance thermometers	– 200 to + 850 °C		
low resistance range	0...740 Ω[1]	8 Ω	740 Ω
high resistance range	0...5000 Ω[1]	40 Ω	5000 Ω
Temperature monitored by thermo-couples	– 270 to + 1820 °C	2 mV	300 mV
Variation of resistance of remote sensors/ potentiometers			
low resistance range	0...740 Ω[1]	8 Ω	740 Ω
high resistance range	0...5000 Ω[1]	40 Ω	5000 Ω

[1] Note permissible value of the ratio “full-scale value/span ≤ 20”.

[2] Max. **30 V** for **Ex** version with I.S. measuring input.

Measuring output ⊖►

Output signals A1 and A2

The output signals can be either load-independent DC currents I_A or DC voltages U_A. The desired mode is set on DIP switches and the setting range is programmed on a PC. A1 and A2 are not DC isolated and the same value is available at both outputs.

Standard ranges for I_A: 0...20 mA or 4...20 mA

External resistance I_{A1}: R_{ext} max. [kΩ] = $\frac{15\ V}{I_{AN}\ [mA]}$

resp. = $\frac{-\ 12\ V}{I_{AN}\ [mA]}$

I_{AN} = Full-scale output current value

External resistance I_{A2}: R_{ext} max. [kΩ] = $\frac{0{,}3\ V}{I_{AN}\ [mA]}$

Standard ranges U_A: 0...5, 1...5, 0...10 or 2...10 V

Load capacity U_{A1} / U_{A2}: R_{ext} [kΩ] ≥ $\frac{U_A\ [V]}{20\ mA}$

Power supply H ►◯

AC/DC power pack (DC and 45...400 Hz)

Table 2: Rated voltages and tolerances

Rated voltage U_N	Fuse	Tolerances	Instrument version
24 ... 60 V DC / AC	T 250 mA	DC – 15…+ 33% AC ± 15%	Standard (Non-Ex)
85 ... 230 V [1] DC / AC	T 100 mA		
24 ... 60 V DC / AC	T 160 mA	DC – 15…+ 33% AC ± 15%	Type of protection intrinsically safety [EEx ia] IIC
85 … 230 V AC	T 80 mA	± 15%	
85 ... 110 V DC	T 80 mA	– 15…+ 10%	

Power consumption: < 1.4 W resp. < 2.7 VA

Output contact K

The output contact can be used:

a) as an additional means of signalling operation of the open-circuit sensor supervision when the transmitter is used in conjunction with resistance thermometers, thermo-couples, resistance sensors and potentiometers.

b) to monitor the measured variable in relation to a limit or its rate-of-change where an additional means of signalling operation of the open-circuit sensor supervision (see "a") is considered unnecessary.

c) to monitor the measured variable in relation to a limit or its rate-of-change when measuring a DC voltage or a current.

Note on a): The relay has to be activated by programming its operating mode as "energised" or "de-energised".
Available operating modes are:
"Output at last value, relay energised"
"Output at last value, relay de-energised"
"Output at setting, relay energised"
"Output at setting, relay de-energised"
Relay pick-up/reset threshold:
1 to 15 kΩ, acc. to measuring mode and range

Note on b): The relay must be activated by programming:
"Output corr. to input variable, relay inactive"
The limit must also be programmed (see Section "Limit")

Note on c): It is only necessary to program the limit (see remarks on "b)" above)

Limit value

Limit value type: Programmable

– for monitoring the input variable in relation to a lower or upper limit between –10 and + 110%[2] (see left side of Fig. 3)

or

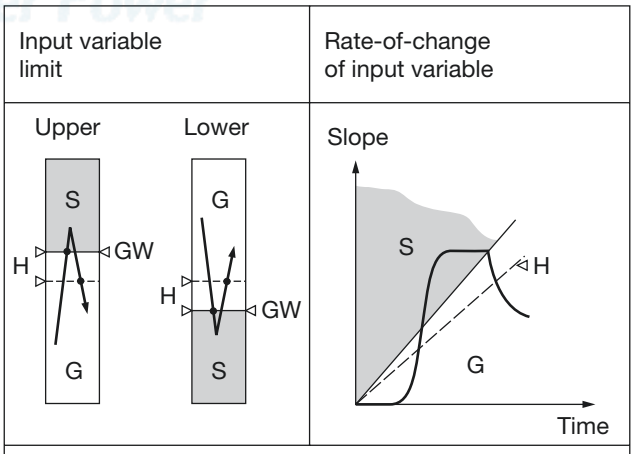
– for monitoring the rate-of-change of the input variable

Slope $\frac{\Delta\ \text{Measured variable}}{\Delta\ t}$

between ± 1 and ± 50%[2]/s (see right side of Fig. 3)

Hysteresis: Programmable from 0.5 to 100%[2] or 1 to 100%[2]/s

Operating and resetting delays: Programmable from 1 to 60 s



H hysteresis, GW limit value, G operation area, S failure area

Fig. 3

Light emitting diodes

Table 3: Red LED (☼ , (⎍) , fig. 2)

Operating modes	Red LED
Open-circuit sensor or lead	lit
Above or below limit[3]	lit / not lit (acc. to programming)

[1] Caution! Observe note in Section 9.3
[2] In relation to analogue output spans A1 and A2
[3] Only applies when the output contact K is used for monitoring the input variable in relation to a limit.

Table 4: Green LED (ON, Fig. 2)

Operating status	Green LED
Switching on	Flashes at 1 Hz for 5 seconds after switching on power supply
Normal operation	Continuously lit
Out of range	Flashes at 1 Hz
Automatic lead compensating using calibration button (S1, fig. 2)	Flashes at 2 Hz
Open-circuit sensor	Flashes at 1 Hz
EEPROM data bit error (self-test error)	Flashes at 1 Hz
Power supply failure	Extinguished

Accuracy

Basic accuracy: Limit of error ≤ ± 0.2%

Ambient conditions

Commissioning temp.: – 10 to + 55 °C

Operating temperature: –25 to + 55 °C, Ex **–20** to + 55 °C

Storage temperature: – 40 to + 70 °C

Relative humidity of annual mean: ≤ 75% for standard climatic rating
≤ 95% for enhanced climatic rating

Altitude: 2000 m max.

Indoor use statement

Programming connector on the transmitter

Interface: RS 232 C

FCC-68 socket: 6/6 pin

Signal level: TTL (0/5 V)

Power consumption: Approx. 50 mW

6. Exchanging frontplates

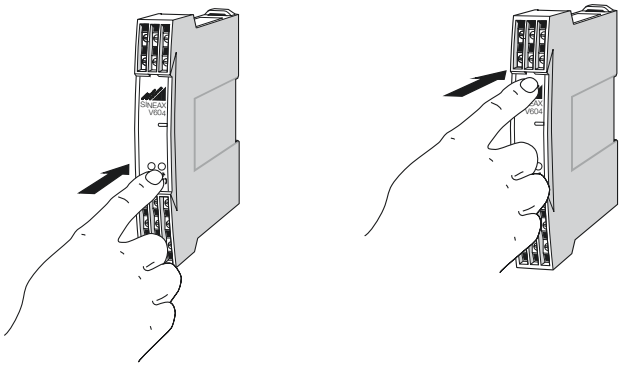


Fig. 4. Left: Removing the transparent cover
Right: Inserting the transparent cover.

Apply gentle pressure to the transparent cover as shown in Fig. 4 until pops out on the opposite side. The label in the cover can be replaced and used for notes.

After replacing the label in the transparent cover, the transparent cover can be snapped into the front of the device again. This is done by inserting it behind the edge at the bottom and pressing it gently down and to the rear with the finger until it snaps into place (right side of Fig. 4).

7. Withdrawing and inserting the device

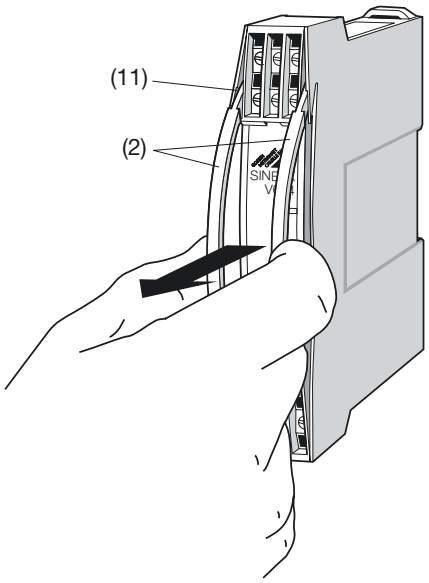


Fig. 5

Insert the withdrawing handles (2) into the openings (11) until they snap into place. Withdraw the front part together with the main PCB out of the housing.

To reassemble the unit, insert the front part together with the main PCB into the housing until the swallow-tailed sections engage in each other.

8. Mounting

The SINEAX V 604 can be mounted either on a top-hat rail or directly onto a wall or mounting plate.

> When deciding where to install the transmitter (measuring location), take care that the **limits** of the operating temperature **are kept**:
> – 25 and + 55 °C for standard instruments
> **– 20** and + 55 °C for instruments in **Ex** version!

8.1 Top-hat rail mounting

Simply clip the device onto the top-hat rail (EN 50 022) (see Fig. 6).

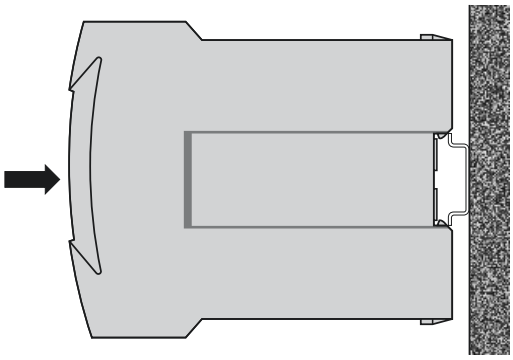


Fig. 6. Mounting on top-hat rails 35×15 or 35×7.5 mm.

8.2 Wall mounting

Drill 2 holes of approx. 4.5 mm diameter in the wall or panel as shown in the drilling pattern (Fig. 7).

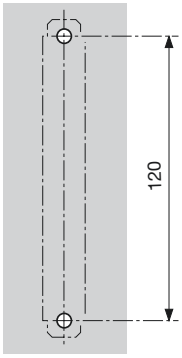


Fig. 7. Drilling pattern.

The wile pressing the latch (18) in the base of the device (Fig. 8, left), pull out the transmitter securing brackets (10).

Now secure the transmitter to the wall or panel using two 4 mm diameter screws.

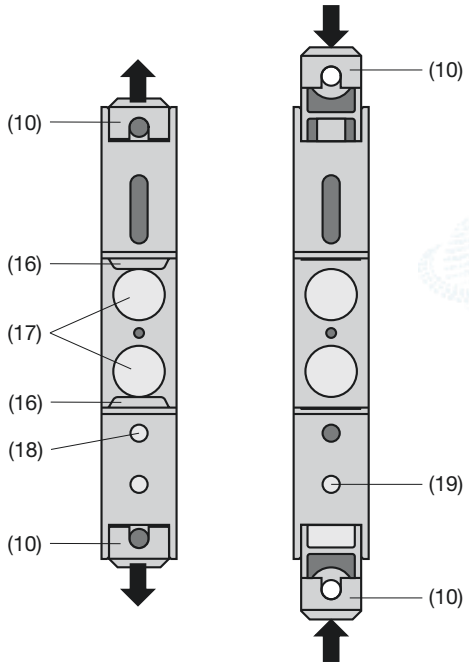


Fig. 8. Rear of device.

(10) Screw hole brackets
(16) Top-hat rail clip
(17) Rubber buffers
(18) Latch for pulling the screw hole brackets out
(19) Latch for pushing the screw hole brackets in

Note:
To return the brackets to their original positions, the latch (19) in the base of the device has to be depressed before applying pressure to the securing brackets (10) (see Fig. 8, right).

9. Electrical connections

The electrical connections are made to screw terminals which are easily accessible from the front of the transmitter (see Fig. 9) and can accommodate wire gauges up to 1 ×2,5 mm².

Make sure that the cables are not live when making the connections!

The 230 V power supply and 250 V contact output is potentially dangerous

Also note that …

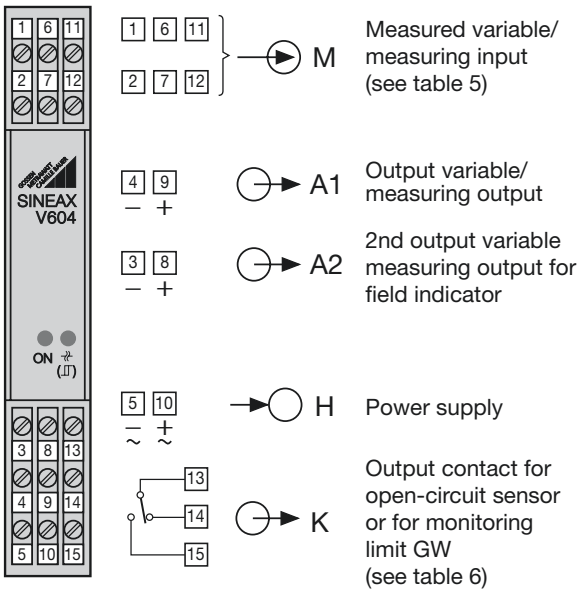
… the data required to carry out the prescribed measurement must correspond to those marked on the nameplate of SINEAX V 604 (⊖► measuring input M, ⊖► measuring outputs A1 and A2, ►◯ power supply H and ⊖► output contact K, see fig. 9)!

… the total loop resistance connected to the output (receiver plus leads) **does not** exceed the maximum permissible value $R_{ext.}$ see **"Measuring output"** in Section "5. Technical data" for the maximum values of $R_{ext.}$!

… the measurement input and output cables should be twisted pairs and run as far as possible away from heavy current cables!

In all other respects, observe all local regulations when selecting the type of electrical cable and installing them!

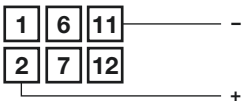
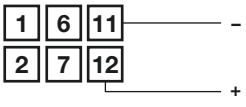
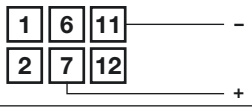
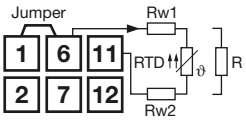
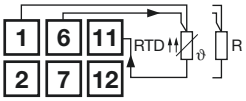
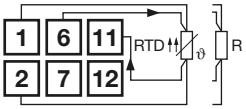
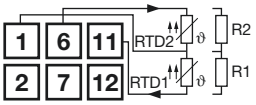
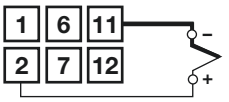
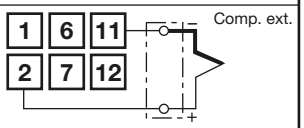
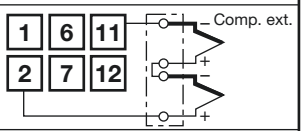
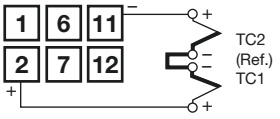
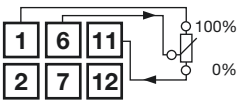
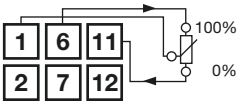
In the case of **«Intrinsically safe»** explosion-proof [EEx ia] IIC, the supplementary information given on the type examination certification, the EN 60 079-14, and also local regulations applicable to electrical installation in explosion hazard areas must be taken into account!



9.1 Alternative measurement connections

Connect the measuring leads to suit the application as given in Table 5.

Table 5: Measuring input

Measuring mode / application	Measuring range limits	Measuring span	No	Connecting diagram Terminal arrangement
DC voltage (direct input)	– 300...0...+300 mV	2...300 mV	1	
DC voltage (input via voltage divider)	– 40...0...+40 V **(Ex max. 30 V)**	0.3...40 V	2	
DC current	– 12...0... +12 mA/ – 50...0...+100 mA	0.08... 12 mA/ 0.75...100 mA	3	
Resistance thermometer RTD or resistance measurement R, **two-wire connection** Rw1 + Rw2 ≤ 60 Ω	0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	4	
Resistance thermometer RTD or resistance measurement R, **three-wire connection** $R_{Ltg.}$ ≤ 30 Ω per wire	0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	5	
Resistance thermometer RTD or resistance measurement R, **four-wire connection** $R_{Ltg.}$ ≤ 30 Ω per wire	0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	6	
2 identical three-wire resistance transmitters RTD for deriving the difference $R_{Ltg.}$ ≤ 30 Ω per wire	RTD1 - RTD2 0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	7	
Thermo-couple TC Cold junction compensation internal	– 300...0...+300 mV	2...300 mV	8	
Thermo-couple TC Cold junction compensation external	– 300...0...+300 mV	2...300 mV	9	
Thermo-couple TC in a summation circuit for deriving the mean temperature	– 300...0...+300 mV	2...300 mV	10	
Thermo-couple TC in a differential circuit for deriving the mean temperature	TC1 - TC2 – 300...0...+300 mV	2...300 mV	11	
Resistance transmitter WF $R_{Ltg.}$ ≤ 30 Ω per wire	0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	12	
Resistance transmitter WF DIN $R_{Ltg.}$ ≤ 30 Ω per wire	0... 740 Ω / 0...5000 Ω	8... 740 Ω / 40...5000 Ω	13	

Notes

9.1.1 Connection to thermo-couples (connection diagram No. 8)

With instruments programmed for thermocouple connection with internal cold junction compensation, compensating leads must be used from the thermocouple to the SINEAX V 604.

No line balancing is required.

9.1.2 Connection to resistance thermometers or potentiometer

9.1.2.1 Two-wire connection (connection diagram No. 4)

Terminals **1 und 6** must be connected in the case of a two-wire measurement. The influence of the lead resistance is compensated automatically by a lead resistance measuring circuit. This is done by shorting the sensor and pressing the **calibration button S1** (located behind the front cover, see Fig. 2) for at least 3 seconds. Wait until the green LED (stand-by signal) no longer flashes. Remove the short-circuit from across the sensor.

9.1.2.2 Three-wire connection (connection diagram No. 5)

It is assumed that the three leads of a three-wire connection have identical resistances and no compensation is necessary. The lead resistance must not be greater than 30 Ω per lead.

9.1.2.3 Four-wire connection (connection diagram No. 6)

The four-wire measurement is independent of lead resistance within wide limits and therefore no compensation is necessary. The lead resistance must not be greater than 30 Ω per lead.

9.2 Measuring output leads

Connect the output leads for output A1 to terminals 4 (–) and 9 (+) and for output A2 (field indicator) to terminals 3 (–) and 8 (+) as shown in Fig. 9.

Note: The maximum permissible external resistance R_{ext} max of the transmitter must not be exceeded (see Section "5. Technical data").

9.3 Connecting the power supply

Connect the power supply to terminals 5 (≃) and 10 (⏚) as shown in Fig. 9.

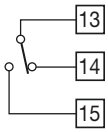
A two-pole switch must be included in the supply connection where facility for switching SINEAX V 604 off is desired.

Note: An external supply fuse must be provided for DC supply voltages > 125 V.

9.4 Connecting the output contact

Connect the output contact signalling leads to terminals 13, 14 and 15 (see Fig. 9 and Table 6).

Table 6

Contact output K	Material	Contact rating
	Gold flashed silver alloy	AC: ≤ 2 A/250 V (500 VA) DC: ≤ 1 A, 0.1…250 V (30 W)

Terminals 13 and 14 are connected in the event of a power supply failure.

10. Programming the transmitter

A PC, the programming cable PRKAB 600 and the programming software VC 600 are needed to program the transmitter.



1. It is not permitted to use the programming cable PRKAB 600 for programming devices of other manufacture.
2. (This point only applies to the "intrinsically safe»" [EEx ia] IIC version of the SINEAX V 604 transmitter)

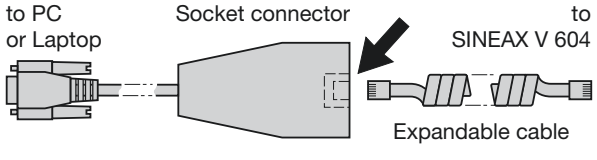
   The programming connector (7) is not electrically insulated from the intrinsically safe measuring input circuit. It is therefore essential to observe the following:

   – Programming may only be performed using the programming cable PRKAB 600 (certificate Ex: PTB 97 ATEX 2082 U).

   – The voltage applied to the FCC connector must not exceed 253 V. For this reason, no devices may be connected to the input circuit of the V 604 that have a supply > 253 V. Pay special attention to this when measuring DC voltages with NLB686 numbers. Note that in this case the component certificate is void. We also recommend that for safety, the Ex symbol should be crossed out to make it invalid.

   – The programming connector (7) max only be used briefly.

   – The plug connector between the socket connector and the expandable cable (see arrow on the diagram) **must not be withdrawn** when the expandable cable is connected to the programming instrument. For this reason, the expandable cable must be plugged into the socket connector before establishing the connection between the device and the PC.



Of the programmable details listed in section «4. Brief description», **one** parameter – the **output signal** – has to be determined by PC programming as well as mechanical setting on the **transmitter**:

… the output signal **range** by PC

… the **type** of output has to be set by DIP switch on the instrument.

For the setting of the DIP switch, the main PCB must be withdrawn from the transmitter housing (see Section "7. Withdrawing and inserting the device") and setting the DIP switches as shown in Table 7. **The eight DIP switches are located at the outer right on the conventional component side of the PCB.**

Table 7:

DIP switches	Type of output signal
	load-independent current
	load-independent voltage

11. Commissioning

Switch on the measuring input and the power supply. The green LED flashes for 5 seconds after switching on and then lights continuously.

The power supply unit must be capable of supplying a brief current surge when switching on. The transmitter presents a low impedance at the instant of switching which requires a current I_{start} of …

… $I_{start} \geq 160$ mA for the version with a power supply range of 24 – 60 V DC/AC

or

… $I_{start} \geq 35$ mA for the version with a power supply range of 85 – 230 V DC/AC

12. Maintenance

No maintenance is required.

13. Releasing the transmitter

Release the transmitter from a top-hat rail as shown in Fig. 10.

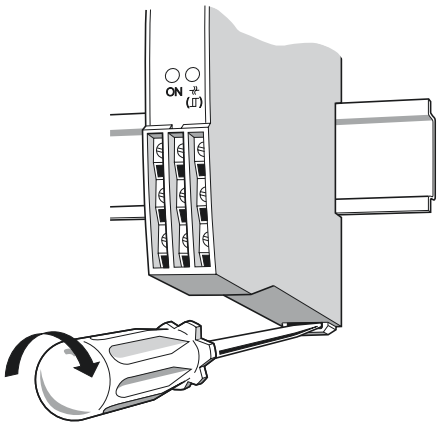


Fig. 10

14. Dimensional drawings

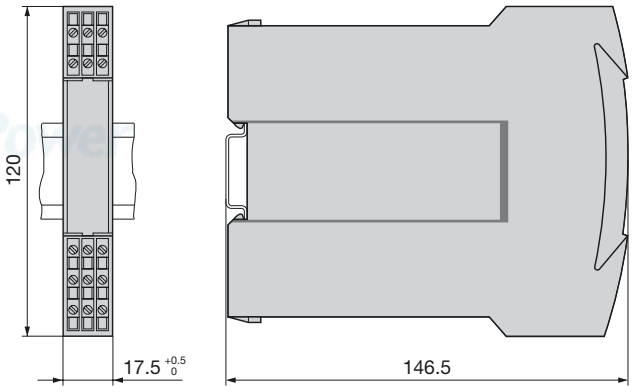


Fig. 11. Transmitter clipped onto a top-hat rail (35 × 15 mm or 35 × 7.5 mm) acc. to EN 50 022.

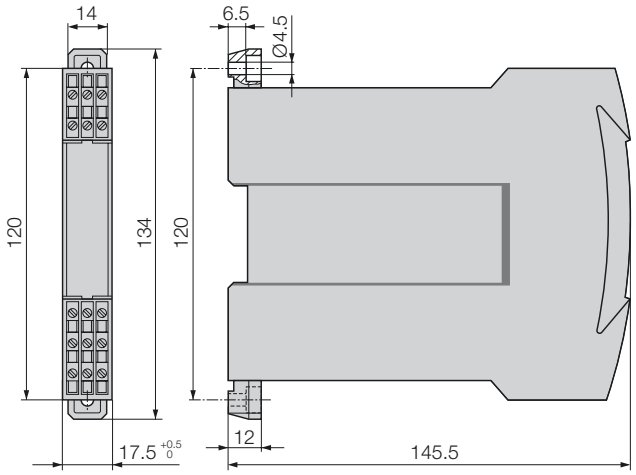


Fig. 12. Transmitter with the screw hole brackets pulled out for wall mounting.

15. Konformitätserklärung / Certificat de conformité / Declaration of conformity

CE

EG - KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY

GOSSEN METRAWATT CAMILLE BAUER

Dokument-Nr./ Document.No.: V604.DOC

Hersteller/ Manufacturer: **Camille Bauer AG** Switzerland

Anschrift / Address: **Aargauerstrasse 7** **CH-5610 Wohlen**

Produktbezeichnung/ Product name: **Programmierbarer Universal-Messumformer** Programmable universal transmitter

Typ / Type: **SINEAX V 604**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein, nachgewiesen durch die Einhaltung folgender Normen:

The above mentioned product has been manufactured according to the regulations of the following European directives proven through compliance with the following standards:

Nr. / No.	Richtlinie / Directive
89/336/EWG 89/336/EEC	Elektromagnetische Verträglichkeit - EMV - Richtlinie Electromagnetic compatibility -EMC directive

EMV / EMC	Fachgrundnorm / Generic Standard	Messverfahren / Measurement methods
Störaussendung / Emission	EN 50 081-2 : 1993	EN 55011 : 1992
Störfestigkeit / Immunity	EN 50 082-2 : 1994	IEC 1000-4-2 : 1991 IEC 1000-4-3 : 1995 IEC 1000-4-4 : 1988 IEC 1000-4-5 : 1995 IEC 1000-4-6 : 1995 IEC 1000-4-11:1995

Nr. / No.	Richtlinie / Directive
73/23/EWG 73/23/EEC	Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen - Niederspannungsrichtlinie - CE-Kennzeichnung : 95 Electrical equipment for use within certain voltage limits - Low Voltage Directive - Attachment of CE mark : 95

EN/Norm/Standard	IEC/Norm/Standard
EN 61 010-1 : 1993	IEC 1010-1 : 1990 + A1 : 1992

Die explosionsgeschützte Ausführung dieses Produkts stimmt mit der Europäischen Richtlinie 94/9/EG überein.
The explosion protected variant of this product has been manufactured according the European directive 94/9.

Ort, Datum / Place, date: Wohlen, den 9. November 2000

Unterschrift / Signature: M.Ulrich

Leiter Entwicklung

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentationen sind zu beachten.

This declaration certifies compliance with the above mentioned directives but does not include a property assurance.
The safety notes given in the product documentations, which are part of the supply, must be observed.