SINEAX C 402
Alarm unit

for DC currents or DC voltages

CE 0102 Ex II (1) G

Application

The alarm unit **SINEAX C402** (Figures 1 and 2) is normally applied to monitor the limits of both current and voltage measurements. The status of the device is signalled remotely by a relay and locally by LED's. The electrical insulation between input, output relay contacts and the power supply conforms to IEC 1010. The value detected by the alarm unit is set on a potentiometer and measured at test sockets on the front of the unit.

The alarm unit 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/ EN 29 001.

Production QA is also certified according to guideline 94/9/EG.

*Fig. 1. SINEAX C 402-1 with 2 relay outputs with **1** changeover contact each, in housing **S17** clipped onto a top-hat rail.*

Features / Benefits

- With 2 alarm circuits
- 2 heavy current relay outputs with 1 or 2 changeover contacts each, acc. to housing version S17 or S35
- Analogous trip point adjusted by 12-turn potentiometer, adjusted trip point measurable on test sockets 0 … 1 V ≙ 0 … 100%
- Sense of relay action and associated LED's switchable by jumpers
- Electrical insulation between measuring input, contact outputs and power supply / Fulfils EN 61 010
- Non-standard user-specific ranges available
- AC/DC power supply / Universal
- Available in type of protection "Intrinsic safety" [EEx ia] IIC (see "Table 5: Data on explosion protection")
- Provision for either snapping the alarm unit onto top-hat rails or securing it with screws to a wall or panel

*Fig. 2. SINEAX C 402-4 with 2 relay outputs with **2** changeover contacts each, in housing **S35** screw hole mounting brackets pulled out.*

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Technical data

Measuring input

DC current:
Standard ranges
0…20 mA, 4…20 mA, ± 20 mA
Limits
0…0.1 to 0…50 mA
also live zero,
initial value > 0 to ≤ 50% of end value
– 0.1…0…+ 0.1 to
– 50…0…+ 50 mA
also bipolar asymmetric
R_i = 15 Ω

DC voltage:
Standard ranges
0…10 V, 2…10 V, ± 10 V
Limits
0…0.06 to 0…40, **Ex max. 30 V**
also live zero,
initial value > 0 to ≤ 50% of end value
– 0.06…0…+ 0.06 to
– 40…0…+ 40 V,
Ex max. – 30…0…+ 30 V
R_i = 100 kΩ

Overload capacity:
DC current
continuously 2-fold
DC voltage
continuously 2-fold

Contact outputs A1/A2

SINEAX in housing S17:
2 relay outputs,
1 potentialfree changeover contact per trip point

SINEAX in housing S35:
2 relay outputs,
2 potentialfree changeover contacts per trip point

Trip point type:
Switching function adjustable by jumpers ST2 and ST6 as low or high trip point (see Fig. 3)

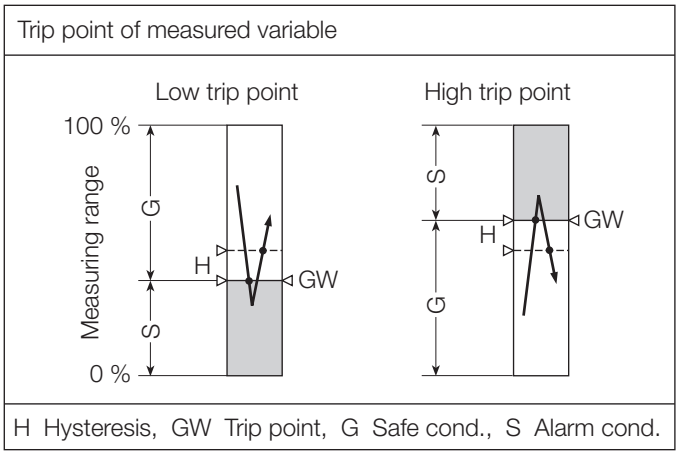

Fig. 3. Switching function, according to trip point type.

Trip point adjustment:
By 12-turn potentiometer ⦇ ⎍1 and ⦇ ⎍2 for GW1 and GW2
Adjusted trip point measurable on test sockets with separate voltmeter R_i > 10 MΩ,
0 … 1 V ≙ 0 … 100%
Test switch Ø 2 mm

Hysteresis:
Standard 1%,
between > 1 and 10% acc. to order

Energizing and de-energizing delays:
Standard 0.2 s
between 0.1 and 10 s acc. to order

Sense of relay action:
Adjustable by jumpers J4 and J8 (see Fig. 4)

Display of switching state:
GW1 and GW2 by yellow LED's ⎍1 and ⎍2 , display mode adjustable by jumpers J5 and J9 (see Fig. 4)

Contact rating:
AC: ≤ 2 A / 250 V (500 VA)
DC: ≤ 1 A / 0.1 … 250 V (30 W)
Gold flashed contacts silver alloy
(Relay approved by UL, CSA, TÜV, SEV)

Power supply H

AC/DC module (DC and 45…400 Hz)

Table 1: Nominal voltages and tolerance

Nominal voltage U_N	Tolerance	Instruments version
24... 60 V DC / AC	DC –15...+ 33% AC ± 15%	Standard (Non-Ex)
85...230 V [1] DC / AC		
24... 60 V DC / AC	DC – 15...+ 33% AC ± 15%	Type of protection "Intrinsic safety" [EEx ia] IIC
85...230 V AC	± 10%	
85...110 V DC	–15...+ 10%	

Power consumption: ≤ 1.2 W resp. ≤ 3 VA

Accuracy data (acc. to DIN/IEC 770)

Reference conditions: Ambient temperature 23 °C, ± 1 K

Accuracy of the pick-up value: Max. ± 1%

Repeatability of the setting: Max. ± 0.2%

Temperature influence: < ± 0.1% per 10 K

[1] *For power supplies > 125 V, the auxiliary circuit should include an external fuse with a rating ≤ 20 A DC.*

Installation data

Mechanical design:	Housing S17 resp. S35 Dimensions see Section "Dimensional drawings"
Material of housing:	Lexan 940 (polycarbonate) Flammability Class V-0 acc. to UL 94, self-extinguishing, non-dripping, free of halogen
Mounting:	For snapping onto top-hat rail (35 × 15 mm or 35 × 7.5 mm) acc. to EN 50 022 or directly onto a wall or panel using the pull-out screw hole brackets
Position of use:	Any
Electrical terminals:	DIN/VDE 0609 Screw terminals with wire guards, for light PVC wiring and max. 2 × 0.75 mm² or 1 × 2.5 mm²
Seismic test:	2 g acc. to EN 60 068-2-6
Shock:	50 g, 3 shocks in each of 6 directions acc. to EN 60 068-2-27
Weight:	Housing S17, approx. 180 g Housing S35, approx. 220 g

Electrical insulation: All circuits (measuring input / contact outputs / power supply) electrically insulated

Regulations

Electromagnetic compatibility:	The standards DIN EN 50 081-2 and DIN EN 50 082-2 are observed
Intrinsically safe:	Acc. to EN 50 020: 1996-04
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
Operating voltages:	< 300 V between all insulated circuits
Contamination level:	2
Overvoltage category acc. to IEC 664:	III for power supply II for measuring input and contact output
Double insulation:	– Power supply versus all other circuits – Measuring output versus output contacts
Test voltage:	50 Hz, 1 min. acc. to DIN EN 61 010-1 2300 V, Input versus outputs and outputs versus each other 3700 V, Power supply versus all circuits

Environmental conditions

Climatic rating:	Climate class 3Z acc. to VDI/VDE 3540
Commissioning temperature:	– 10 to + 55 °C
Operating temperature:	– 25 to + 55 °C, **Ex – 20** to + 55 °C
Storage temperature:	– 40 to + 70 °C
Annual mean relative humidity:	≤ 75%

Table 2: SINEAX alarm units in housing S17 as standard versions

Measuring input set to 0 … 20 mA resp. 0 … 10 V – acc. to external connection – (plug-in jumper J1 in position B2). Any of the standard ranges simply selected by positioning **plug-in jumpers J1**. Quoting the **order No.** is sufficient when ordering:

Instruments in standard (non-Ex) version

Standard input signals	Contact outputs A1 / A2	Power supply	Order Code	**Order No.**
0 … 20 mA / 0 … 10 V 4 … 20 mA / 2 … 10 V ± 20 mA / ± 10 V	2 relay outputs with 1 changeover contact each	24 … 60 V DC/AC	402 - 1102	128 646
		85 … 230 V DC/AC	402 - 1202	128 654

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Instruments in [EEx ia] IIC version, (input intrinsically safe)

Standard input signals	Contact outputs A1 / A2	Power supply	Order Code	**Order No.**
0 … 20 mA / 0 … 10 V 4 … 20 mA / 2 … 10 V ± 20 mA / ± 10 V	2 relay outputs with 1 changeover contact each	24 … 60 V DC/AC	402 - 1302	128 662
		85 … 110 V DC/ 85 … 230 V AC	402 - 1402	128 670

Please complete the Order Code 402 - 1... .... .. according to Table 4 for versions with user-specific configuration.

Table 3: SINEAX alarm units in housing S35 as standard versions

Measuring input set to 0 … 20 mA resp. 0 … 10 V – acc. to external connection – (plug-in jumper J1 in position B2). Any of the standard ranges simply selected by positioning **plug-in jumpers J1**. Quoting the **order No.** is sufficient when ordering:

Instruments in standard (non-Ex) version

Standard input signals	Contact outputs A1 / A2	Power supply	Order Code	**Order No.**
0 … 20 mA / 0 … 10 V 4 … 20 mA / 2 … 10 V ± 20 mA / ± 10 V	2 relay outputs with 2 changeover contacts each	24 … 60 V DC/AC	402 - 4103	128 729
		85 … 230 V DC/AC	402 - 4203	128 737

Instruments in version [EEx ia] IIC (input intrinsically safe)

Standard input signals	Contact outputs A1 / A2	Power supply	Order Code	**Order No.**
0 … 20 mA / 0 … 10 V 4 … 20 mA / 2 … 10 V ± 20 mA / ± 10 V	2 relay outputs with 2 changeover contacts each	24 … 60 V DC/AC	402 - 4303	128 745
		85 … 110 V DC/ 85 … 230 V AC	402 - 4403	128 753

Please complete the Order Code 402 - 4... .... .. according to Table 4 for versions with user-specific configuration.

Basic configuration of the standard versions

For functional control: Trip point GW1 set to 30%, GW2 set to 70%.
Hysteresis: 1%
Energizing and deenergizing delays: 0.2 s

Further details for switching function (trip point type), sense of relay action and LED's see on the next page!

Basic configuration of the standard versions

Switching function (trip point type)

Trip point	Switching function (trip point type)	Jumpers ST 2	Jumpers ST 6	Position
⎍2 GW 2	higher			a
⎍1 GW 1	lower			b

Sense of relay action

Operating status	Relay	Operating sense	Jumpers J4	Jumpers J8	Position
Safe condition	⎍2 GW 2	Relay energized			b
	⎍1 GW 1				b

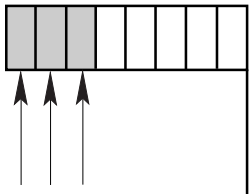
Operating sense of LED's

Operating status	LED's	Operating sense	Jumpers J5	Jumpers J9	Position
Alarm condition	⎍2 GW 2	LED lit-up			b
	⎍1 GW 1				b

Arrangement of the jumpers on PCB and further details for the configuration see section "Configuration" and Fig. 4.

Table 4: Coding of the variants (see also "Table 2 and 3: Standard versions")

Order Code **402 –**			
Features, Selection		*SCODE	no-go
1. Mechanical design			
1) Housing S17 for rail and wall mounting		A	
4) Housing S35 for rail and wall mounting		B	
2. Version	**/ Power supply**		
1) Standard,	/ 24 … 60 V DC/AC		
2) Standard,	/ 85 … 230 V DC/AC		
3) [EEx ia] IIC, input circuit intrinsically safe	/ 24 … 60 V DC/AC		
4) [EEx ia] IIC, input circuit intrinsically safe	/ 85 … 110 V DC 85 … 230 V AC		
3. Measuring input			
0) 0…20 mA / 0…10 V, zero point changeable			
9) Non-standard	[V]		
Z) Non-standard	[mA]		
Line 9: [V] 0…0.06 to 0…≤ 40 V, **(Ex max. 30 V)**, also live zero, Initial value > 0 to ≤ 50% of end value [V] – 0.06…+ 0.06 to – 40…+ 40 V, **(Ex max. – 30…+ 30),** also bipolar asymmetric Line Z: [mA] 0…0.1 to 0…50 mA, also live zero, Initial value > 0 to ≤ 50% of end value [mA] – 0.1…+ 0.1 to – 50…+ 50 mA, also bipolar asymmetric			



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Order Code **402 –**			
Features, Selection	*SCODE	no-go	
4. Trip points / contact outputs			
2) 2 trip points, 1 changeover contact per trip point		B	2 . . . . .
3) 2 trip points, 2 changeover contacts per trip point		A	3 . . . . .
5. Trip point 1, type, hysteresis			
1) Low alarm, hysteresis 1%			. 1 . . . . .
2) Low alarm, hysteresis [%]			. 2 . . . . .
3) High alarm, hysteresis 1%			. 3 . . . . .
4) High alarm, hysteresis [%]			. 4 . . . . .
Lines 2 and 4: hysteresis [%] > 1.0 to 10			
6. Trip point 1, energizing/deenergizing delay			
1) Energizing/deenergizing 0.2 s			. . 1 . . . .
2) Energizing/deenergizing [s]			. . 2 . . . .
3) Energizing 0.2 s/deenergizing [s]			. . 3 . . . .
4) Deenergizing 0.2 s/energizing [s]			. . 4 . . . .
Lines 2 to 4: switching delay [s] 0.10 to 10			
7. Trip point 1, sense of action			
1) Relay energized: alarm condition / LED lit-up: alarm condition			. . . 1 . . .
2) Relay energized: alarm condition / LED lit-up: safe condition			. . . 2 . . .
3) Relay energized: safe condition / LED lit-up: alarm condition			. . . 3 . . .
4) Relay energized: safe condition / LED lit-up: safe condition			. . . 4 . . .
8. Trip point 2, type, hysteresis			
1) Low alarm, hysteresis 1%			. . . . 1 . .
2) Low alarm, hysteresis [%]			. . . . 2 . .
3) High alarm, hysteresis 1%			. . . . 3 . .
4) High alarm, hysteresis [%]			. . . . 4 . .
Lines 2 and 4: hysteresis [%] > 1.0 to 10			
9. Trip point 2, energizing/deenergizing delay			
1) Energizing/deenergizing 0.2 s			. . . . . 1 .
2) Energizing/deenergizing [s]			. . . . . 2 .
3) Energizing 0.2 s/deenergizing [s]			. . . . . 3 .
4) Deenergizing 0.2 s/energizing [s]			. . . . . 4 .
Lines 2 to 4: switching delay [s] 0.10 to 10			
10. Trip point 2, sense of action			
1) Relay energized: alarm condition / LED lit-up: alarm condition			. . . . . 1 .
2) Relay energized: alarm condition / LED lit-up: safe condition			. . . . . 2 .
3) Relay energized: safe condition / LED lit-up: alarm condition			. . . . . 3 .
4) Relay energized: safe condition / LED lit-up: safe condition			. . . . . 4 .

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

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

Order Code	Type of protection	Input	Output	Type examination certificate	Mounting location of the instrument
402-1... 402-4...	[EEx ia] IIC	**U_o = 6 V** **I_o = 63 µA** **L_i = 20 µH** **C_i = 20 nF** only for connection to certified intrinsically safe circuits with following maximum values: **U_o = 30 V**	U_m = 253 V AC resp. 125 V DC	PTB 97 ATEX 2192	**Outside** the hazardous area

Configuration

The instrument has to be opened before it can be configured.

Input standard ranges

The measuring output can be configured by inserting the plug-in jumper **J1** in position "**B1, B2** or **B3**".

Measuring input →	Plug-in jumper J1
4 … 20 mA / 2 … 10 V	 B1
0 … 20 mA / 0 … 10 V	 B2
± 20 mA / ± 10 V	 B3

Type of measuring input (current or voltage signal)

Choice of terminals determines whether the alarm unit input monitors a current or a voltage.

Measuring input →	Terminals
Current [mA]	1 – 6 I +
Voltage [V]	1 – 11 U +

Switching function (trip point type)

The positions of the plug-in jumpers ST 2 and ST 6 determine the operating mode of the alarm unit (minimum or maximum limit).

Trip point	Trip point type	Plug-in jumpers ST 2	Plug-in jumpers ST 6	Position
⎍2 GW 2	higher			a
	lower			b
⎍1 GW 1	higher			a
	lower			b

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Sense of relay action

The sense of relay action can be set with the aid of plug-in jumpers J4 and J8.

Operating status	Relay	Operating sense	Jumpers J4	Jumpers J8	Position
Alarm condition	GW 2	Relay energized			a
Safe condition					b
Alarm condition	GW 1				a
Safe condition					b

Operating sense of LED's

The operating sense can be set with the aid of plug-in jumpers J5 and J9.

Operating status	LED's	Operating sense	Jumpers J5	Jumpers J9	Position
Alarm condition	⎍2 GW 2	LED lit-up			b
Safe condition					a
Alarm condition	⎍1 GW 1				b
Safe condition					a

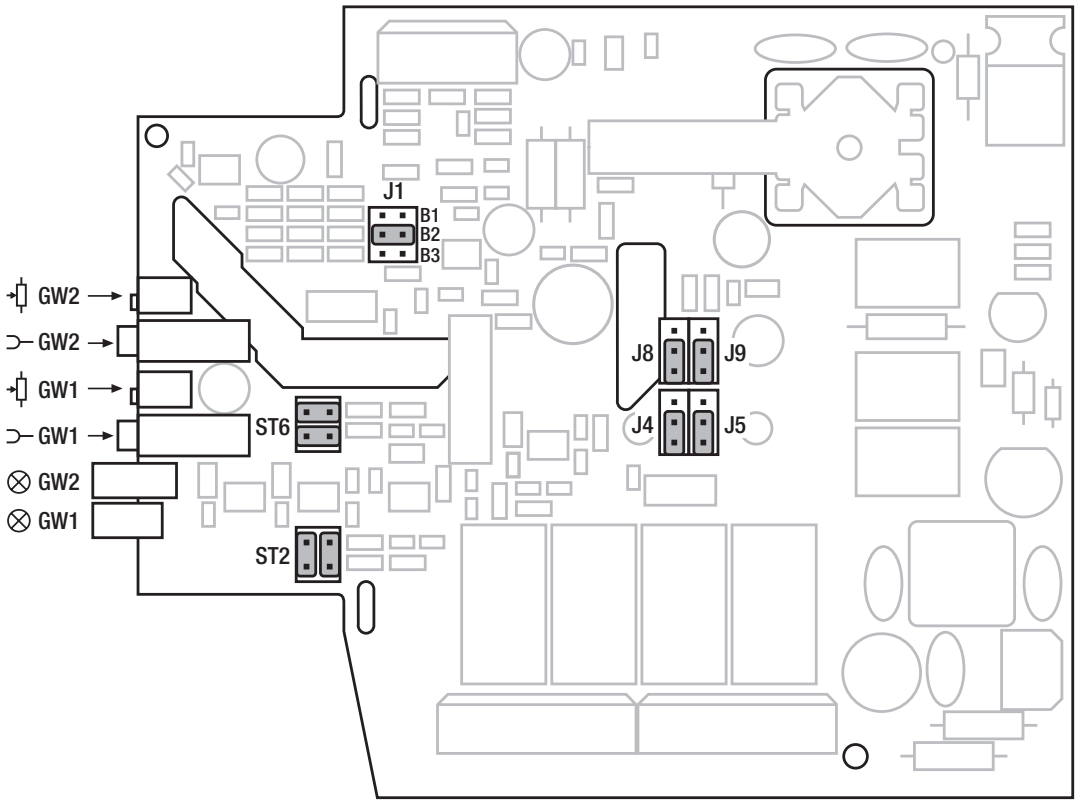
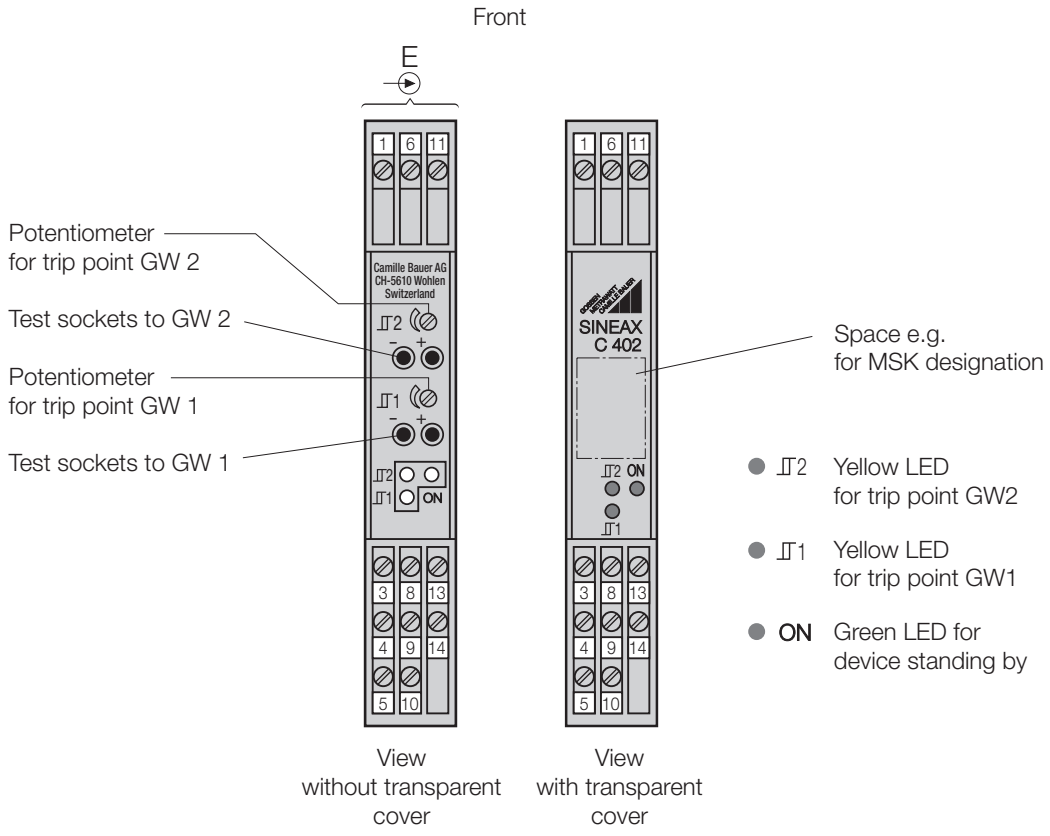
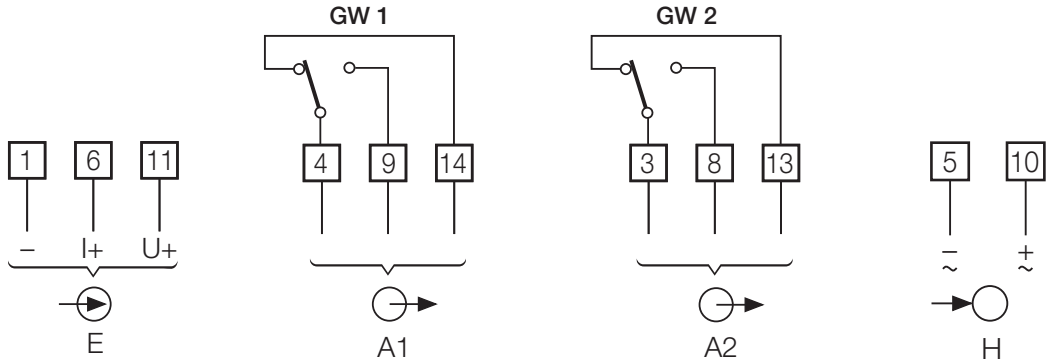


Fig. 4. Position of the plug-in jumpers, potentiometers, test sockets and LED's (standard versions as supplied).

Electrical connections SINEAX C 402-1 in housing S17





Energized: 4 – 9
Deenergized: 4 – 14

Energized: 3 – 8
Deenergized: 3 – 13

E = Measuring input
A1, A2 = Output contacts for monitoring the trip points GW 1, GW 2
H = Power supply

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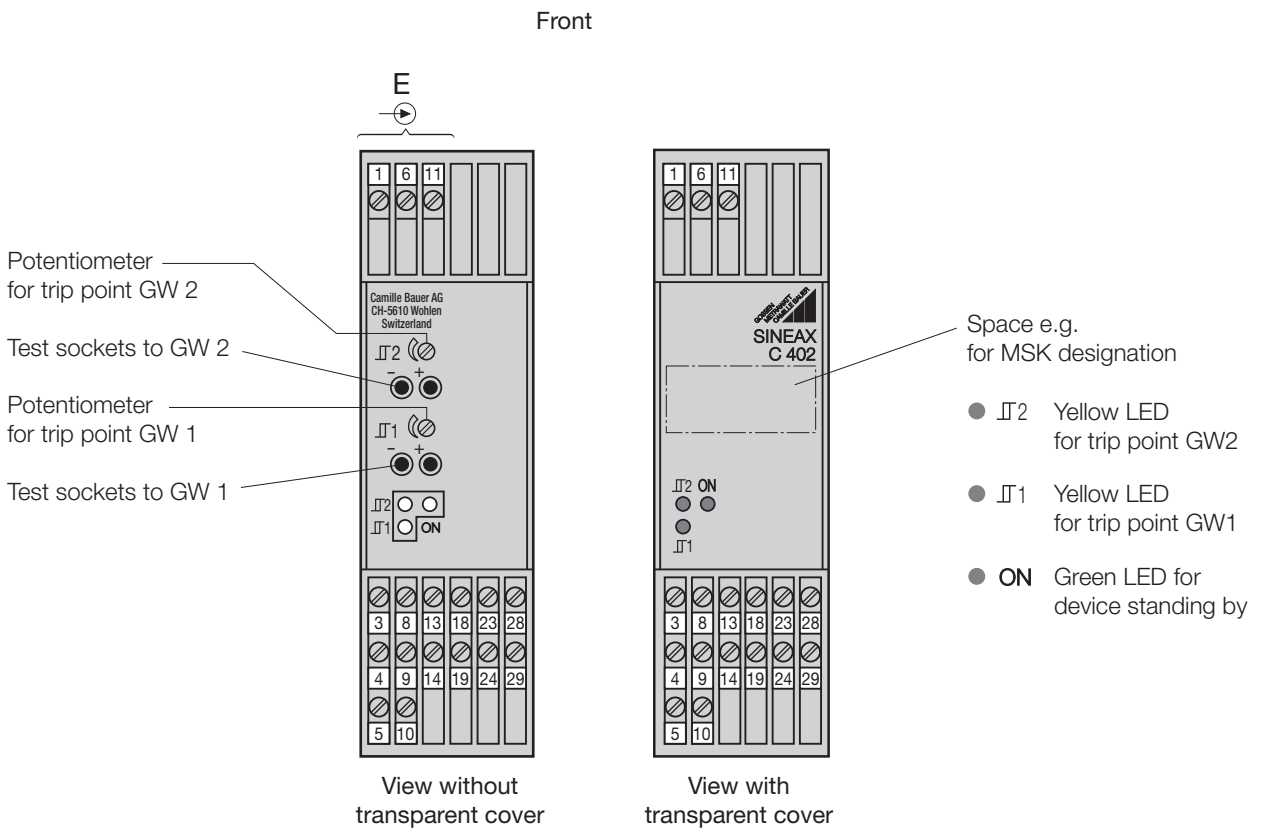
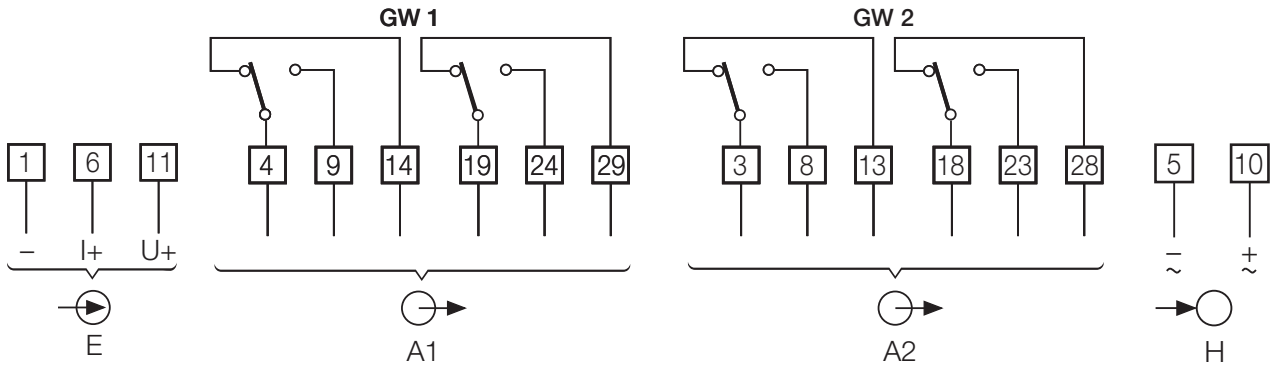
Electrical connections SINEAX C 402-4 in housing S35





Energizing: 4 – 9 and 19 – 24
Deenergizing: 4 – 14 and 19 – 29

Energizing: 3 – 8 and 18 – 23
Deenergizing: 3 – 13 and 18 – 28

E = Measuring input
A1, A2 = Output contacts for monitoring the trip points GW 1, GW 2
H = Power supply

Dimensional drawings

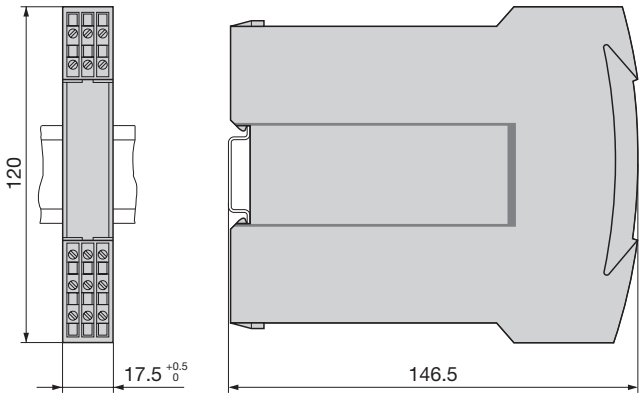


*Fig. 5. SINEAX C 402-1 in housing **S17** clipped onto a top-hat rail (35 × 15 mm or 35 × 7.5 mm, acc. to EN 50 022).*

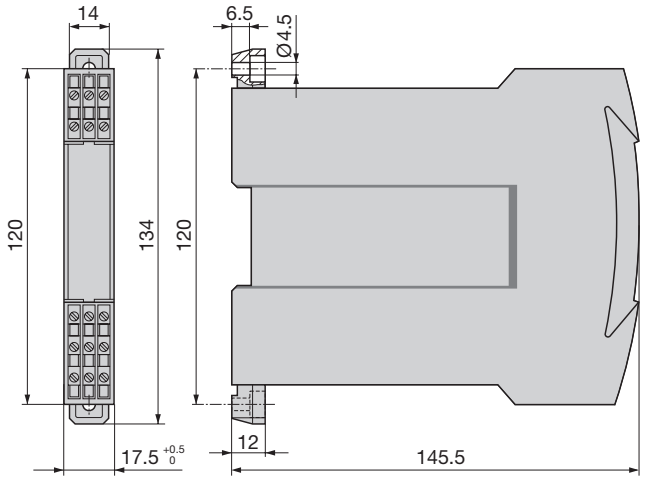


*Fig. 6. SINEAX C 402-1 in housing **S17**, screw hole mounting brackets pulled out.*

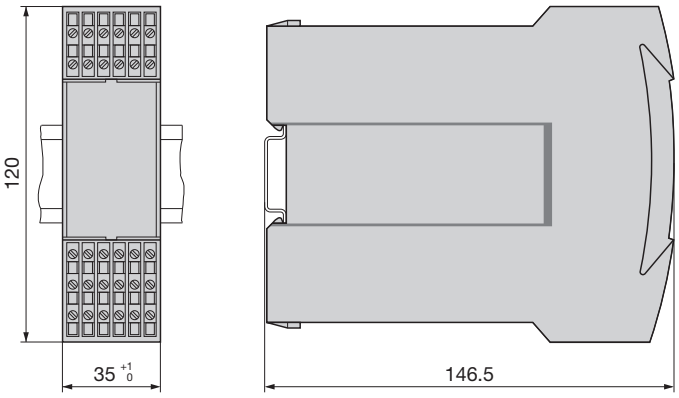


*Fig. 7. SINEAX C 402-4 in housing **S35** clipped onto a top-hat rail (35 × 15 mm or 35 × 7.5 mm, acc. to EN 50 022).*

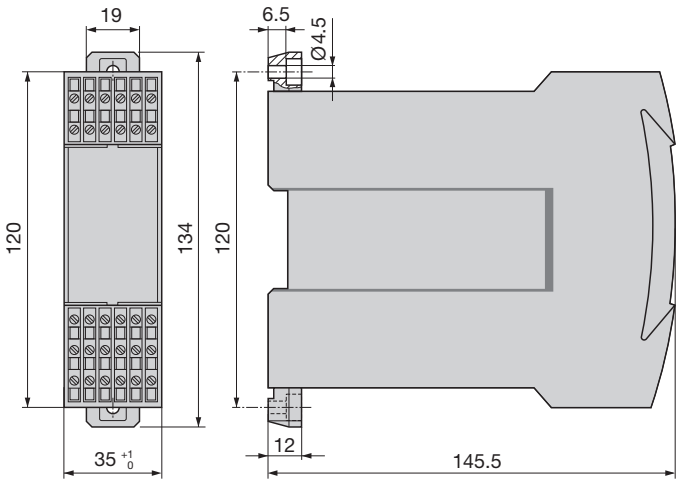


*Fig. 8. SINEAX C 402-4 in housing **S35**, screw hole mounting brackets pulled out.*

Standard accessories

1 Operating Instructions in three languages: German, French, English
2 Withdrawing handle (for opening the housing)
2 Labels (under transparent cover)
1 Type Examination Certificate (for instruments in type of protection “Intrinsically safe” only)

SINEAX C 402
Alarm unit

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