Operating
Instructions

SIMEAS-T

SIEMENS

Transducer with auxiliary power

for direct voltage or direct current

7KG6131

Compact device for DIN rail mounting

Operating Instructions

A5E38679986E / RS-AC

Safety instructions

These operating instructions contain the information required for the proper usage of the products described therein. They are addressed to technically qualified personnel, who are specially trained or have otherwise obtained the relevant know-how in instrumentation and control engineering (in the following referred to as automation engineering). The knowledge and technically correct implementation of the safety instructions and warnings contained in this manual are required for safe installation and commissioning, as well as for safety during operation and maintenance of the described product. Only qualified personnel as stipulated overleaf have the specialized knowledge to interpret the general safety warnings and instructions of this documentation in every specific case and to implement them in practice.

These operating instructions are an integral part of the scope of delivery. For reasons of clarity, they do not include all details about all model of the product described, and also cannot take into account every conceivable type of installation, operation and maintenance. If you would like additional information, or if particular problems arise which are not covered in sufficient detail in the documentation, please ask for the necessary information from your local Siemens office, or contact the address on the back page of the operating instructions directly.

Furthermore, it should be noted that this product documentation is neither part of a previous or existing agreement, commitment, or legal relationship nor does it modify such a relationship in any way. All Siemens obligations derive from the respective sales contract, which also contains the complete and exclusive warranty agreement This warranty agreement is neither extended nor restricted by any statements in this manual.

The auxiliary power of the devices must be fused (overcurrent protection device) and be disengaged by a switch. This should be located near the device. All this must be implemented by the user.

⚠ WARNING!

When electrical devices are operated, certain parts necessarily conduct dangerous voltages. If the safety warnings are not heeded, severe injury or damage can occur. Only appropriately qualified persons are permitted to work on this equipment. Appropriate transport, storage, mounting, and installation, as well as careful operation and service, are essential for the error-free, safe and reliable operation of this equipment.

Modules and devices are tested with regard to their dielectric strength at 5.55kV/3.7 kV. Devices with voltages up to a maximum of 500 V (to ground) in the measuring circuit must demonstrate double isolation to the secondary circuits. Devices with voltages higher than 500 V (to ground) in the measuring circuit must demonstrate basic isolation against the secondary circuits. This must be observed during installation (section **10 Mounting and operation**) and use of the devices.

QUALIFIED PERSONNEL

Unqualified intervention in the device/system or failure to heed the safety warnings in this manual can lead to serious injury or material damage. Therefore, only suitably **qualified** personnel are permitted to service this device/system. Qualified personnel in the sense of the safety-related notices in these operating instructions or on the product itself are persons who

- are either familiar with the safety concepts of automation engineering as configuration personnel
- or have been trained to handle automation engineering equipment as operating personnel and are familiar with the content of these operating instructions
- or have been trained to repair such automation engineering equipment as repair and service personnel, or are authorized to commission, ground and label electric circuits and devices/systems according to the standards of safety engineering.

NOTICE!

Always use the correct version of the transducer for your application. Ensure that the operating data of your system corresponds to the values on the rating plate.

WARNING!

If you do not use the device in the manner described herein, the device protection may be impaired.

Operating Instructions

1 Area of application

The SIMEAS transducer for direct current or direct voltage with auxiliary power transforms the input current or input voltage into a load-independent direct output current or a load-independent direct output voltage.
Up to the maximum permissible load, multiple devices – such as recorders, displays, remote control systems, computers and controllers – can be connected and operated directly or via long-distance lines at the output. Input and output and auxiliary power are electrically isolated from each other.
The SIMEAS transducers must be installed in a closed system, such as a control cabinet.

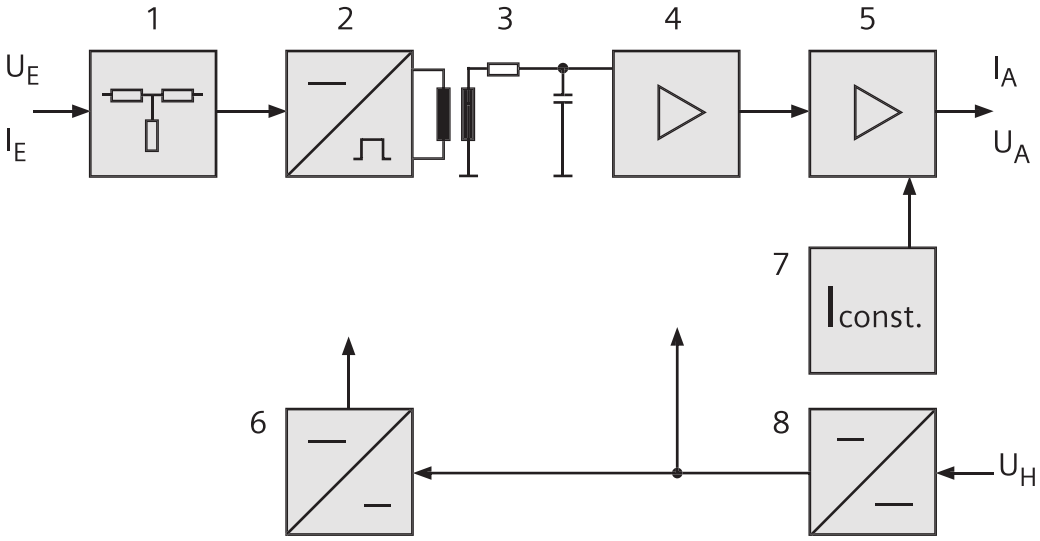
2 Performance characteristics

- Low price
- Extremely small dimensions
- Short delivery times, standard types from stock
- CE mark
- Immunity to EMC interference
- Compliance with relevant national and international standards
- High quality, long service life
- Electrical isolation at a high test voltage
- High measuring precision
- Powerful output signal circuits
- High system safety and reliability

3 Operating principle

The input voltage U_E is matched to the voltage duty cycle transformer (2) by resistors (1). The square wave signal it generates is transferred to the output side by the transformer (3), filtered, and processed with the amplifier (4). Corresponding to the characteristic curve, the output amplifier (5) supplies a load-independent direct current I_A or a load-independent direct voltage U_A proportional to the input value. Zero adjustment of the characteristic curve can be performed with the reference current I_{const}. The auxiliary power isolator (6) generates the electrically isolated power supply for the input circuit.
The $U_{H\sim}$ or U_{H-} auxiliary power is transformed by an alternating or direct voltage auxiliary power module (8) into the internal supply voltages.

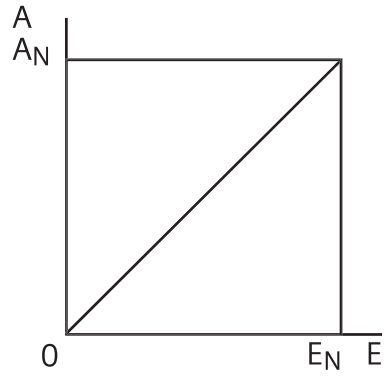
4 Overview circuit diagram

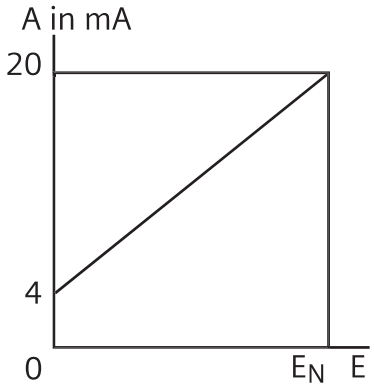


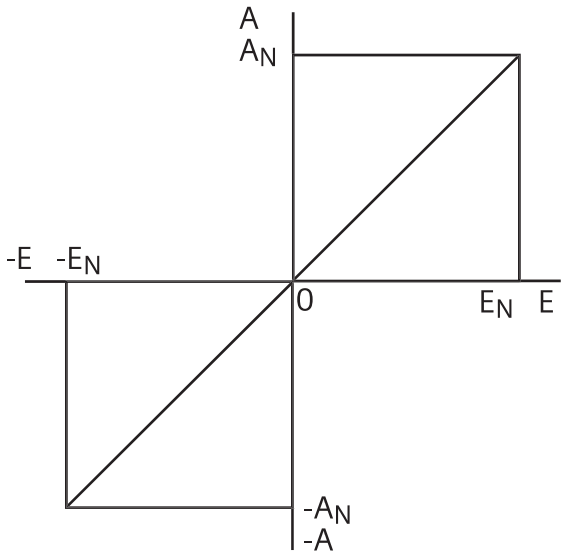
1 Input compensation using resistors
2 Voltage duty cycle transformer
3 Transformer
4 Amplifier
5 Output amplifier
6 Auxiliary power isolator
7 Constant voltage source
8 Auxiliary power module

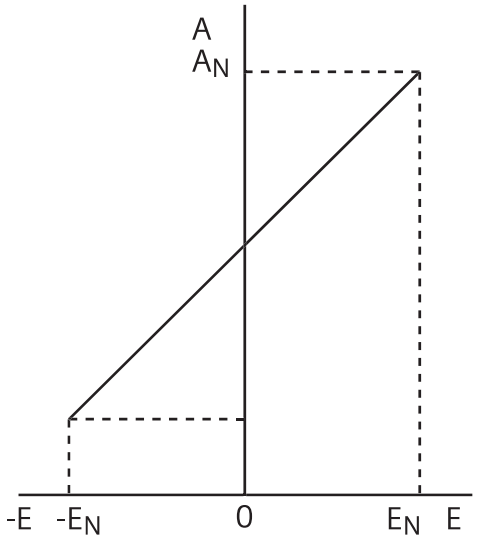
5 Characteristic curves

Direct current and direct voltage









A = output signal, DC (mA, V)
A_N = nominal output signal
E = input signal, DC (mA, V)
E_N = nominal input signal

6 Technical specifications

Input Only for connecting to direct voltage systems!	
Maximum input voltage	500/1000 V ⎓ see section Safety
Input transducer - Direct current	
Standard rated currents I_{EN}	1 mA; 2.5 mA; 5 mA; 10 mA; 20 mA
Special rated current I_{EN}	a value in the range from 1 mA to 100 mA
Rated modulation range	- I_{EN} to 0 to + I_{EN}
Permissible modulation range	-1.2 I_{EN} to 0 to +1.2 I_{EN}
Voltage drop at input at I_{EN}	500 mV ± 5%
Input transducer - Direct voltage	
Standard voltage U_{EN}	60 mV; 150 mV; 300 mV; 1 V; 10 V; 15 V; 25 V; 30 V; 60 V; 100 V; 150 V; 250 V; 300 V; 400 V; 500 V; 600 V; 800 V; 1000 V
Special rated voltage U_{EN}	a value in the range from 60 mV to 1000 V
Rated modulation range	- U_{EN} to 0 to + U_{EN}
Permissible modulation range	-1.2 U_{EN} to 0 to +1.2 U_{EN} but max. 1000 V
Input resistance R_E U_{EN} = 60 mV to 1 V U_{EN} > 1 V to 100 V U_{EN} > 100 V to 1000 V	 $R_E \geq 30$ kΩ/V $R_E \geq 10$ kΩ/V $R_E \geq 2$ kΩ/V
Output Output signal bipolar, short-circuit proof and resistant to no-load operation, optionally load-independent direct current or load-independent direct voltage	
Output transducer - Direct current	
Standard rated current I_{AN}	1 mA; 2.5 mA; 5 mA; 10 mA; 20 mA
Special rated current I_{AN}	in the range from ± 1 to ± 20 mA
Rated modulation range	- I_{AN} to 0 to + I_{AN} or 4 – 20 mA
Permissible modulation range	- 1.2 I_{AN} to 0 to + 1.2 I_{AN}
Zero offset	in the range from - I_{AN} to 0 to + I_{AN}
No-load voltage U_{AL}	≤ 30 V
Rated load R_{BIN}	7.5 V/ I_{AN}
Operating load R_B	0 to 15 V/ I_{AN}
Residual ripple U_{SS}	≤ 0.5% SS of U_{AN}
Setting time t_{gg}	≤ 50 ms (residual error = 1% of steady-state value)
Output transducer - Direct voltage	
Standard rated voltage U_{AN}	1 V; 10 V
Rated modulation range	0 to U_{AN}
Permissible modulation range	- 1.2 U_{AN} to 0 to + 1.2 U_{AN}
Zero offset	in the range from to 0 to U_{AN}
No-load voltage U_{AL}	≤ 30 V
Short-circuit current	≤ 25 mA
Rated load R_{BIN}	U_{AN} / 1 mA
Load current I_B	≤ 2 mA
Residual ripple I_{SS}	≤ 0.5% SS of I_{AN}
Setting time t_{gg}	≤ 50 ms (residual error = 1% of steady-state value)

Auxiliary power U_H	
Rated input voltage U_{HN} – Direct voltage – Alternating voltage	 24-60 V; 110-220 V ⎓ 100; 115; 230 V ~; 50/60 Hz
Input range – Direct voltage – Alternating voltage	 ± 20% ± 20%
Power consumption – Direct voltage – Alternating voltage	with $U_H = U_{HN}$; typical value 3 W 3 VA
Errors and influencing effects The relative error information with signs "+" and "-"	
Errors in reference conditions	0.2% relative to A_N
Reference conditions – Input current I_E – Input voltage U_E – Auxiliary alternating voltage U_H – Auxiliary direct voltage U_H – Load – Ambient temperature T_U – Warm-up period – Interfering fields	 0 to I_{EN} 0 to U_{EN} U_{HN} ± 1%, THD ≤ 5% U_{HN} ± 1%, alternating component ≤ 2% R_{BIN} ± 1%, R_{BUN} ± 1% 23 °C ± 1 °C max. 15 min None
Influencing effects – of the ambient temperature – of the load for current output – of the load for voltage output – of the auxiliary power U_H =0.8 to 1.2 – of self-heating *During interference according to IEC 801-3 and IEC 801-6, an additional error can occur at certain frequencies.*	 ≤ 0.2% / 10 K ≤ 0.1% (for R_B = 15 V/I_{AN}) ≤ 10 mV (for $R_B = \infty$ to U_{AN} / 2 mA) ≤ 0.1% ≤ 0.3%
Other technical specifications	
Surge voltage UDE 0435, Part 303 with type test – input relative to output – input relative to auxiliary power – output relative to auxiliary power – on input and auxiliary power as normal mode voltage. – on output as normal mode voltage.	 T = 5 kV, 1.2/50 µsec, Ri = 500 Ω T = 5 kV, 1.2/50 µsec, Ri = 500 Ω T = 5 kV, 1.2/50 µsec, Ri = 500 Ω T = 5 kV, 1.2/50 µsec, Ri = 500 Ω T = 5 kV, 1.2/50 µsec, Ri = 500 Ω T = 500 V, 1.2/50 µsec, Ri = 500 Ω In each case, 3 shocks in both directions of polarity
Permissible ambient temperature according to IEC 68-2 / 1-3 – operating temperature range – functional temperature range – storage temperature range	 - 10°C to + 60 °C - 15°C to + 70 °C - 40°C to + 85 °C
Max. permissible humidity	90% rel. humidity, non-condensing
Mechanical strength	in accordance with DIN EN 61010 Part 1 Interference immunity class IK06 (1 J)
Max. operating altitude	2000 m above sea level

Safety in accordance with DIN EN 61010 Part 1	
Overvoltage category - with U_{EN} = 0 – 1000 V	 II
Measurement category - with U_{EN} = 0 – 1000 V	 II
Degree of pollution	2
Fire resistance class	V-0
electrically isolated	
Dielectric strength (test voltage) with type test – input relative to output – input relative to auxiliary power – output relative to auxiliary power	 U_{eff} = 5.5 kV, 50 Hz, sine U_{eff} = 5.5 kV, 50 Hz, sine U_{eff} = 3.7 kV, 50 Hz, sine
Electromagnetic compatibility	
Emitted interference according to EN 50081-1 – Radio interference field strength according to EN 55022 – RFI voltage according to EN 55011	 Cl. B Cl. B
Interference immunity according to EN 50082-2 – Immunity against electromagnetic fields according to EN61000-4-3 (IEC 801-3) – Discharge of static electricity ESD according to EN61000-4-2 (IEC 801-2) – Fast transients, asymmetric burst with capacitive coupling line in accordance with EN61000-4-4 (IEC 801-4)	 10 V/m 8 kV Inputs and outputs: 2 kV Power supply: 4 kV
RFI current (IEC 801-6)	10 V_{eff}

7 Rating plate symbols

CE EU conformity marking

EAC TR Customs Union Certification of EAC

⚠ Notice – Observe warning information

Input

Output

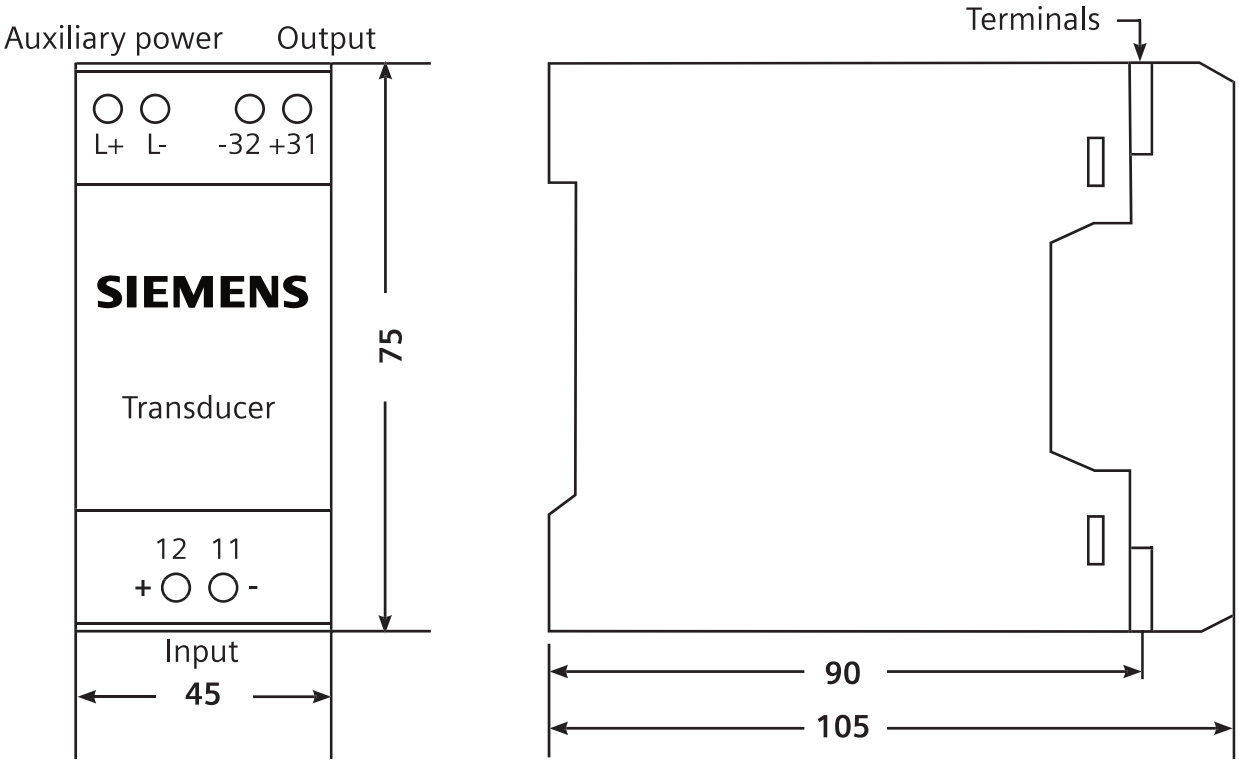
~ Alternating voltage or current

⎓ Direct voltage or current

8 Description

The transducers in the enclosure are permanently wired and tested functional units. They have a snap-on mounting for a 35 mm standard mounting rail according to DIN EN 50022. Inputs and outputs can be safely connected to the screw terminals. The devices are silicone-free, halogen-free and flame-resistant. The balancing potentiometers are accessible after the modules have been removed from the enclosure.

Weight:	approx. 0.33 kg
Degree of protection: Enclosure: Terminals:	DIN VDE 0470 T.1 / EN 60529 IP40 IP20
Connection: Screw terminals Input: Output:	 4 mm² 2.5 mm²



9 Ordering data

Name	Order no.	Code
Device	7KG 6 1 3 1 - 1 ☐ ☐ ☐ ☐	
Direct rated input voltage	U_{EN}	
	- 60 mV to 60 mV	**A**
	-150 mV to 150 mV	**B**
	-300 mV to 300 mV	**C**
	-1 V to 1 V	**L**
	-10 V to 10 V	**M**
	-15 V to 15 V	**D**
	-25 V to 25 V	**F**
	-30 V to 30 V	**X**
	-150 V to 150 V	**P**
	-250 V to 250 V	**Q**
	-300 V to 300 V	**U**
	-400 V to 400 V	**R**
	-500 V to 500 V	**S**
	-600 V to 600 V	**T**
	-800 V to 800 V	**V**
	-1000 V to 1000 V	**W**
Direct rated input current	I_{EN}	
	- 1 mA to 1 mA	**E**
	-2.5 mA to 2.5 mA	**G**
	-5 mA to 5 mA	**H**
	-10 mA to 10 mA	**J**
	-20 mA to 20 mA	**K**
	4 mA to 20 mA	**N**
Direct output current	I_{AN}	
	- 1 mA to 1 mA	**E**
	-2.5 mA to 2.5 mA	**G**
	-5 mA to 5 mA	**H**
	-10 mA to 10 mA	**J**
	-20 mA to 20 mA	**K**
	4 mA to 20 mA	**N**
Direct output voltage	U_{AN}	
	-1 V to 1 V	**L**
	-10 V to 10 V	**M**

Name	Order no.	Code
Device	7KG 6 1 3 1 - 1 ☐ ☐ ☐ ☐	

Zero point position

Input		Output	
0 mA, V	=	0 mA, V	**1**
0 mA, V	=	4 mA	**2**
0 mA, V	=	12 mA	**3**
4 mA	=	0 mA, V	**4**
12 mA	=	0 mA, V	5

Auxiliary power

24 - 60 V DC	**1**
110 - 220 V DC	**4**
100 V AC, 45 to 65 Hz	**5**
115 V AC, 45 to 65 Hz	**6**
230 V AC, 45 to 65 Hz	**7**

Notice

Not all possible combinations are available

10 Mounting and operation

WARNING!

When electrical devices are operated, certain parts necessarily conduct dangerous voltages. Failure to heed the operating notices can therefore lead to serious injury or property damage.
The device should only be mounted and electrically connected by appropriately qualified personnel. In particular, all warning notices must be observed.

10.1 Installation

- The installation location must be as free of vibrations as possible. The permissible ambient temperature (operating or functional temperature) must be observed (see technical specifications).
- Operation outside the functional temperature range can lead to erroneous measurements and failure of the transducer.
- Plastic enclosure, overvoltage category II in accordance with DIN EN 61010 Part 1.
- Screw terminals for maximum 2.5 mm^2 or 4 mm^2.
- The transducer must be mounted on a 35 mm DIN rail (in accordance with DIN EN 50022). The DIN rail must be mounted horizontally.
- The devices are only approved for operation in closed enclosures and cabinets

10.2 Connection

The regulations for the construction of high voltage installations must be observed when carrying out the electrical installation.

- If multiple receivers are used, for example recorders, displays, remote terminal units, computers or controllers, these devices must be connected in series with the current output of the transducer (ensure correct polarity). For transducers with voltage output, the receivers are connected in parallel to this.
- The auxiliary power connection must be protected in accordance with the line voltage.
- A switch or circuit breaker must be installed in the building installation, this must be suitably arranged and easily accessible for the user and labeled as the disconnecting mechanism for the device.
- The total load, including the cables, must not exceed the value stated in the technical specifications.
- The pin assignment is shown in section **8 Description**.
- **The performed installation must be tested according to EN 61439.**

Notes for the fuses to be used:
Appropriate protection must be provided for the measuring circuits during the installation:

- Current measuring circuits: the fuse must prevent the values presented in the table **6 Technical specifications** from being exceeded.
- Voltage measuring circuits: the fuse must limit the current to 100 mA, be suitably arranged and be easily accessible to the user.

10.3 Installation material

Measuring circuits: The connection of the measuring circuit must be made with cables that have demonstrated double isolation for the highest voltage occurring in the measuring circuit.
Secondary circuits: For devices in which the highest voltage of the measuring circuit is 500 V, cables with basic isolation in relation to the maximum voltage in each secondary circuit suffice.
For devices with voltages that exceed 500 V in the measuring circuit, the isolation of the cable in the secondary circuits must correspond to a basic isolation for the highest voltage occurring in the measuring circuit.

11 Commissioning

First ensure that the operating data matches the values on the rating plate. No changes may be made on the transducer. After a warm-up time of 15 minutes, the transducer is ready for operation and keeps within the error limits.

- Measurement options for the output current and load voltage: Before connecting an ammeter to the output side of the transducer, the auxiliary power should be switched off because the voltage at terminals 31 and 32 rises to a maximum of 30 V DC during the interruption of the output current I_A.
- Measurement of the output current (output signal I_A): Disconnect the line from terminal 31(+) or 32(-), and connect the ammeter in series there.
- Measurement of the load voltage (output signal I_A) or output voltage U_A: Connect voltmeter to terminals 31(+) and 32(-).

12 Maintenance

The output signal can be tested in a laboratory six months after commissioning and subsequently every two years (section "Calibrating and testing"). The device has to be opened for this. Apart from that, the transducer requires no maintenance.

WARNING!

The device contains no fuses to be changed by the user.

13 Calibrating and testing

WARNING!

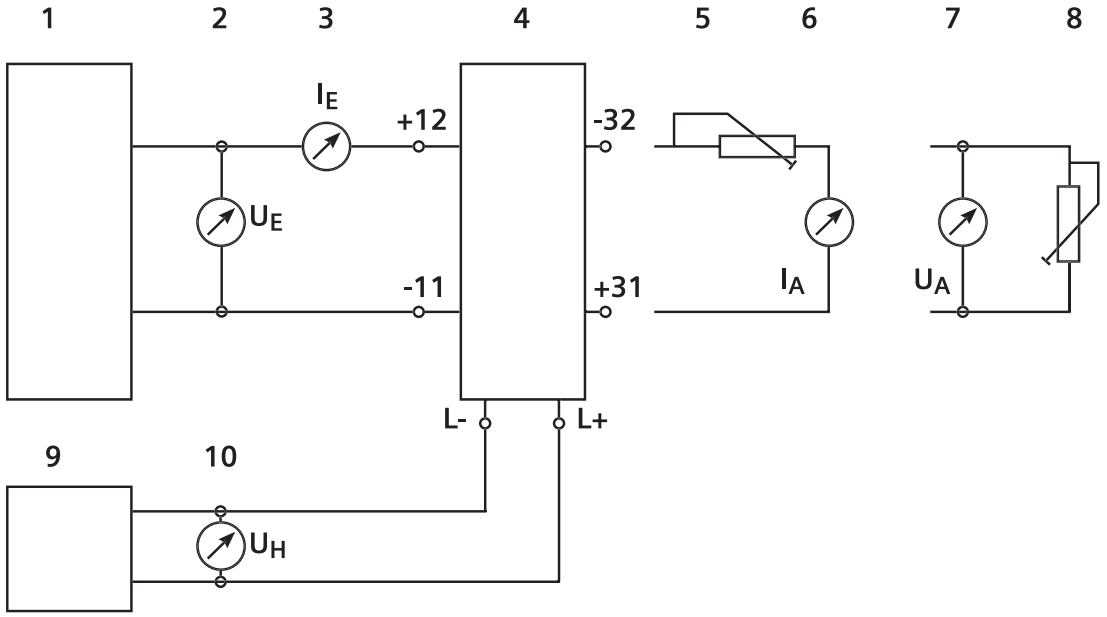
The work must be done in accordance with the specifications and performance instructions of accident prevention regulation VBG 4.0. in particular 8. "Permissible discrepancies while working on active parts". A suitable electrical tool must be used.

The transducer has to be opened and the modules removed for calibration.
After disconnecting the external electrical power cables, the enclosure cover is removed and the modules pulled out. The circuitry comprises the following modules:
– Measuring module G34924-J1003-L1
– Connection module G34932-F1801-L1
– Power supply module G34932-F1802-L1

The trim potentiometers are located on the measuring module.

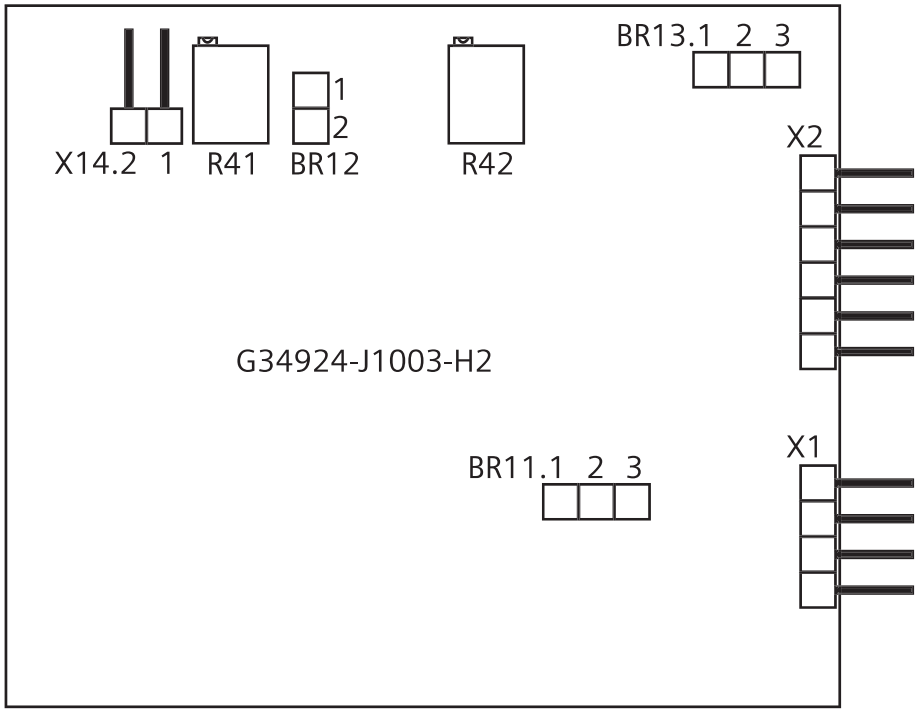
Greater care is required when working on open modules because there may be dangerous voltages on the rear side of the measuring and power supply modules. The rear of the modules should therefore be covered by suitable means.

Test circuit for voltage and current transducers



1 Direct voltage encoder 0 to 1000 V or
Direct current encoder 0 to 30 mA
2 Voltmeter, class 0.01
3 Ammeter, class 0.01, Ri ≤ 10 Ω
4 Test specimen, voltage or current transducer
5 Decade resistor 0 to 20 kΩ
6 Ammeter, class 0.01, Ri ≤ 10 Ω
7 Voltmeter, class 0.01
8 Decade resistor 0 to 20 kΩ
9 Alternating or direct voltage encoder
10 Voltmeter

Arrangement of the balancing potentiometers and bridges on the measuring module.



current output	**BR13.1 – BR13.2:**	**open**
	BR13.2 – BR13.3:	**closed**
voltage output	**BR13.1 – BR13.2:**	**closed**
	BR13.2 – BR13.3:	**open**

Transducer with linear characteristic curve

Input and output unipolar or
Input and output symmetric bipolar

BR11.1 – BR11.2 : open
BR11.2 – BR11.3 : open
BR12.1 – BR12.2 : open
X14.1 – X14.2: closed

Zero point calibration

Feed E = 0 ± 0.05% E_N or jumper input (terminals 11 and 12), set output value A = 0 ± 0.1% A_N with trim potentiometer R41.

Full-scale value

Feed E = E_N ± 0.05% E_N, set the output end value A = A_N ± 0.1% A_N with trim potentiometer R42.
Check intermediate values.
With a bipolar input and output, feed in positive and negative values and check the symmetry.

Transducer with linear characteristic curve

Input symmetric bipolar -E_N to 0 to +E_N
Output unipolar 0 to +AN

BR11.1 – BR11.2 : open
BR11.2 – BR11.3 : closed
BR12.1 – BR12.2 : open
X14.1 – X14.2: closed

Zero point calibration

Feed E = -E_N ± 0.05% E_N, set output value A = 0 ± 0.1% A_N with trim potentiometer R41.

Full-scale value

Feed E = + E_N ± 0.05% E_N, set output end value A = A_N ± 0.1% A_N with trim potentiometer R42. Check intermediate values.

Transducer with linear characteristic curve

Input unipolar 0 to +E_N
Output unipolar +4 mA to +20 mA

BR11.1 – BR11.2 : open
BR11.2 – BR11.3 : open
BR12.1 – BR12.2 : closed

Zero point calibration

X14.1 – X14.2: closed
Feed E = 0 ± 0.05% E_N, or short input (terminals 11 and 12),
set output value A = 0 ± 0.1% A_N with trim potentiometer R41.

16 mA

X14.1 – X14.2: closed
Feed E = E_N ± 0.05% E_N, set output value A = 16 mA ± 0.1% A_N with trim potentiometer R42.

20 mA

X14.1 – X14.2: open
Feed E = E_N ± 0.05% E_N, set output value A = 20 mA ± 0.1% A_N with trim potentiometer R41. Check intermediate values.

Transducer with linear characteristic curve

Input symmetric bipolar -E_N to 0 to +E_N
Output unipolar +4 mA to +12 mA to +20 mA

BR11.1 – BR11.2 : open
BR11.2 – BR11.3 : closed
BR12.1 – BR12.2 : closed

Zero point calibration

X14.1 – X14.2: closed
Feed E = -E_N ± 0.05% E_N, set output value A = 0 ± 0.1% A_N with trim potentiometer R41.

16 mA

X14.1 – X14.2: closed
Feed E = + E_N ± 0.05% E_N, set output value A = 16 mA ± 0.1 % A_N with trim potentiometer R42.

20 mA

X14.1 – X14.2: open
Feed E = + E_N ± 0.05% E_N, set output value A = 20 mA ± 0.1% A_N with trim potentiometer R41.
Check intermediate values.

Transducer with linear characteristic curve

Input unipolar +4 mA to + 20 mA
Output unipolar 0 to +A_N

BR11.1 – BR11.2 : closed
BR11.2 – BR11.3 : open
BR12.1 – BR12.2 : open
X14.1 – X14.2: closed

Zero point calibration

Feed E = 4 mA ± 0.05% E_N, set output value A = 0 ± 0.1% A_N with trim potentiometer R41.

Full-scale value

Feed E = 20 mA ± 0.05% E_N, set output end value A = A_N ± 0.1% A_N with trim potentiometer R42.
Check intermediate values.

Transducer with linear characteristic curve

Input unipolar +4 mA to +12 to +20 mA
Output symmetric bipolar -20 mA to 0 to +20 mA

BR11.1 – BR11.2 : closed BR11.2 – BR11.3 : open
BR12.1 – BR12.2 : open

1. Zero adjustment

X14.1 – X14.2: open
Feed E = +4 mA ± 0.05%, set output value A = 0 mA ± 0.1% with trim potentiometer R41.

Set output value

X14.1 – X14.2: open
Feed E = +12 mA ± 0.05%, set output value A = +20 mA ± 0.1% with trim potentiometer R42.

2. Zero adjustment

X14.1 – X14.2: closed
Feed E = +12 mA ± 0.05%,set output value A = 0 mA ± 0.1% with trim potentiometer R41.

Check output value

X14.1 – X14.2: closed
Feed E = +20 mA ± 0.05%,
Check output value A = +20 mA ± 0.1%.
Feed E = +4 mA ± 0.05%,
Check output value A = -20 mA ± 0.1%.
Check intermediate values.

Contact

Please talk to your Siemens contact (http://www.siemens.com/automation/partner) at one of our agencies or local offices if you have any questions about the products described here and do not find the answers in this manual.

Siemens Industry Online Support

On the Internet, you will find various services on the support homepage (http://support.automation.siemens.com):

- The right documents for you via the product-related search functions
- Online form for a support request
- Your local contact person
- information about on-site service, repairs, spare parts.
- A forum where users and specialists exchange experiences worldwide.
- The newsletter, which constantly provides you with the latest information about your products.

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