Operating
Instructions

SIMEAS-T

SIEMENS

Transducer with auxiliary power

for alternating voltage or alternating current (RMS)
with expanded start range
with expanded end range
with non-linear characteristic curve

7KG6106 and 7KG6113

Compact device for DIN rail mounting

Operating Instructions

A5E38679986B / RS-AB

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 further information or if particular problems arise which are not covered in sufficient detail in the documentation, please request the necessary information from your local Siemens office or contact the addresses on the back cover 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.

⚠ 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.
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 are trained to repair such automation equipment as commissioning 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.

A5E38679986B / RS-AB

Operating Instructions

1 Area of application

Transducers are used to convert different measured signals from high-voltage and low-voltage systems into proportional output variables. Areas of application are, for example

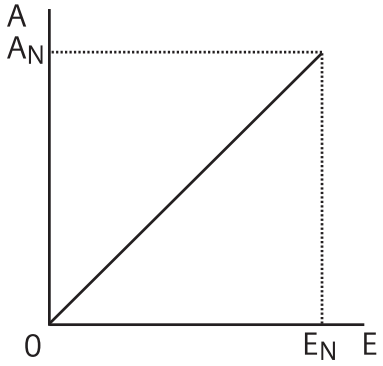
Power supply and distribution for areas in which measured signals must be sent over a large

distance. The active SIMEAS transducers convert the alternating input voltage or the alternating input current from the high-current power network (45 to 65Hz) 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 with auxiliary power supply are electrically isolated from each other.

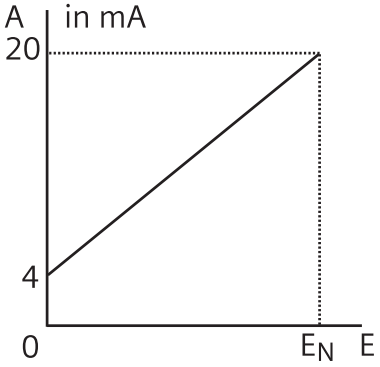
The SIMEAS transducers must be installed in a closed system, such as a control cabinet.

2 Characteristic curves

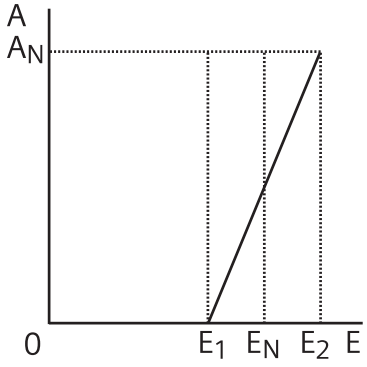
Alternating current and voltage



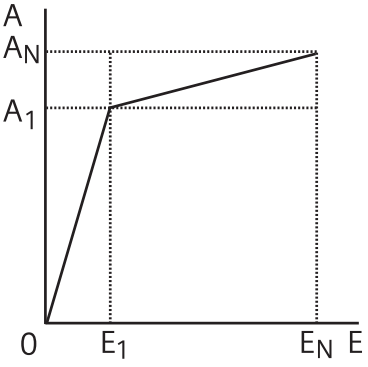
linear



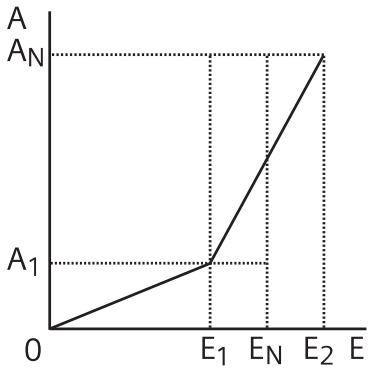
Live zero



expanded end range
suppressed start range



expanded start range
contracted end range



contracted start range
expanded end range

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

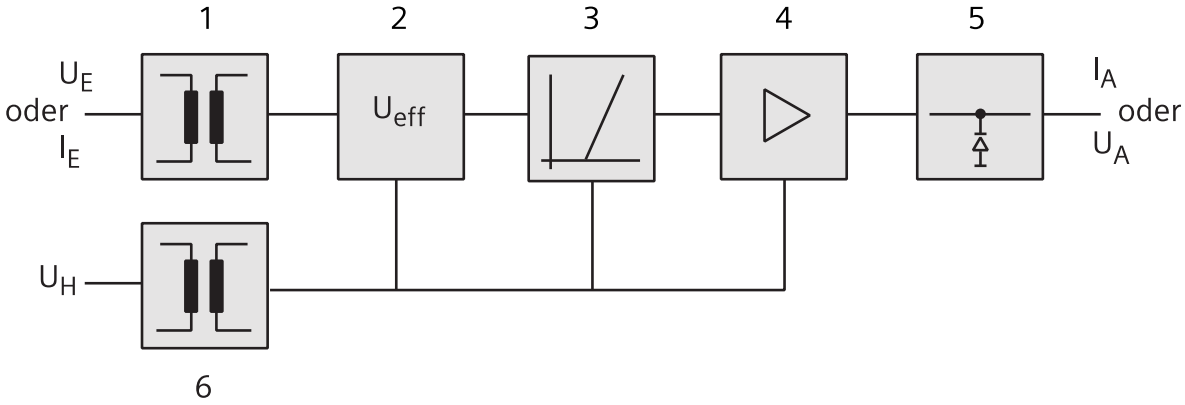
3 Performance characteristics

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

4 Operating principle

The transformer (1) transfers the input signal IE or UE to the effective value Direct voltage converter (2) which drives the output amplifier (4) via the expansion circuit (3). Fed by the auxiliary source (6), the output amplifier provides load-independent current IA or load-independent voltage UA proportional to the input value IE or UA . The protective circuit (5) protects the output against no-load and transient overvoltage.

5 Overview circuit diagram



1 Transformer
2 RMS direct voltage converter
3 Expansion circuit
4 Output amplifier
5 Protective circuit
6 Auxiliary power

6 Technical specifications

General input transducer Only for connecting to alternating voltage systems!	
Maximum voltage to earth	500 V ~
Power consumption of the measuring circuit	approx. 0.06 VA
Permissible modulation range	1.2 I_{EN} or 1.2 U_{EN}
Rated frequency f_{EN}	50 Hz, 60 Hz
Frequency range f_E	45 Hz to 65 Hz
Curve form	Sine, square, triangle, phase control
Crest factor	$i/I_{eff} \leq 2$, but $I \leq 2.1\ I_{EN}$ $T/U_{EN}\ I \leq 2$, but $\leq 2.1\ I_{EN}$
Input transducer **Alternating current**	
Standard rated currents I_{EN}	See ordering table
Measuring range in rated value I_{EN}	0 to I_{EN}
Continuous overload capacity	2 I_{EN}
Surge overload capacity for I_{EN} = 1 A; 1.2 A; 1.5 A; 2 A; 2.4 A; 2.5 A for I_{EN} = 5 A; 6 A; 7.5 A; 10 A	 100 A for 1s 200 A for 1s
Input transducer **Alternating voltage**	
Standard voltage U_{EN}	See ordering table
Special rated voltage U_{EN}	in the range from 40 to 500 V
Measuring range rated value U_{EN}	0 to U_{EN} 0 to 0.9 to 1.1 U_{EN} 0 to 0.85 to 1.15 U_{EN} 0 to 0.8 to 1.2 U_{EN}
Continuous overload capacity	1.5x U_{EN} but max. 600 V
Surge overload capacity	≤ 2x U_{EN} (5 surges 1s, in intervals of 5s)
Output Output signal bipolar, short-circuit proof and resistant to no-load operation, optionally load-independent direct current or load-independent direct voltage	
Standard rated current I_{AN}	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	0 to I_{AN} or 4-20 mA
Permissible modulation range	0 to 1.2 I_{AN}
max. possible modulation at R_B 15 V/I_{AN} and U_H = 80% U_{HN}	0 to 1.05 I_{AN}
Zero offset	In the range from 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}
Standard rated voltage U_{AN}	1 V, 10 V
Rated modulation range	0 to U_{AN}
Permissible modulation range	0 to 1.2 U_{AN}
Zero offset	In the range from 0 to U_{AN}
Short-circuit current	≤ 20 mA
Rated load R_{BUN}	U_{AN}/1 mA
Load current I_B	≤ 2 mA
Residual ripple I_{SS}/U_{SS}	≤ 0.5% SS of I_{AN} or U_{AN}
Setting time t_{gg}	≤ 350 ms

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	0.3% relative to A_N
Reference conditions – Input current I_E – Input voltage U_E – Frequency f_E – Curve form – Auxiliary alternating voltage U_H – Auxiliary direct voltage U_A – Load R_B – Ambient temperature T_U – Warm-up period – Interfering fields	 0 to I_{EN} 0 to U_{EN} f_{EN} ± 0.5% Sine, THD ≤ 5% U_{HN} ± 1%, THD ≤ 5% U_{HN} ± 1%, alternating component ± 2% R_{BIN} ± 1%, R_{BUN} ± 1% 23 °C ± 1 °C ≥ 15 min. None
Influencing effects – of the ambient temperature – of the frequency (45 to 65 Hz) – of the curve form – of the load with current output for R_B = 15 V/I_{AN} – of the load with voltage output for R_B = ∞ to U_{AN} / 1mA – 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 of max. 2.5% may occur at certain frequencies.	 ≤ 0.2% / 10K ≤ 0.04% / Hz ≤ 0.02% per 10% THD (crest factor ≤ 2) ≤ 0.1% ≤ 10 m V ≤ 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, output and auxiliary power 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 In each case, 3 surges 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	III
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 55022	 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 according to EN61000-4-4 (IEC 801-4) Inputs and outputs Power supply – Surge according to IEC 801-5 – RFI current according to IEC 801-6	 10 V/m 8 kV 2 kV 4 kV 10 V rms

7 Rating plate symbols

CE EU conformity marking

EAC TR Customs Union Certification of EAC

⚠ Notice – Observe warning information

Input

Output

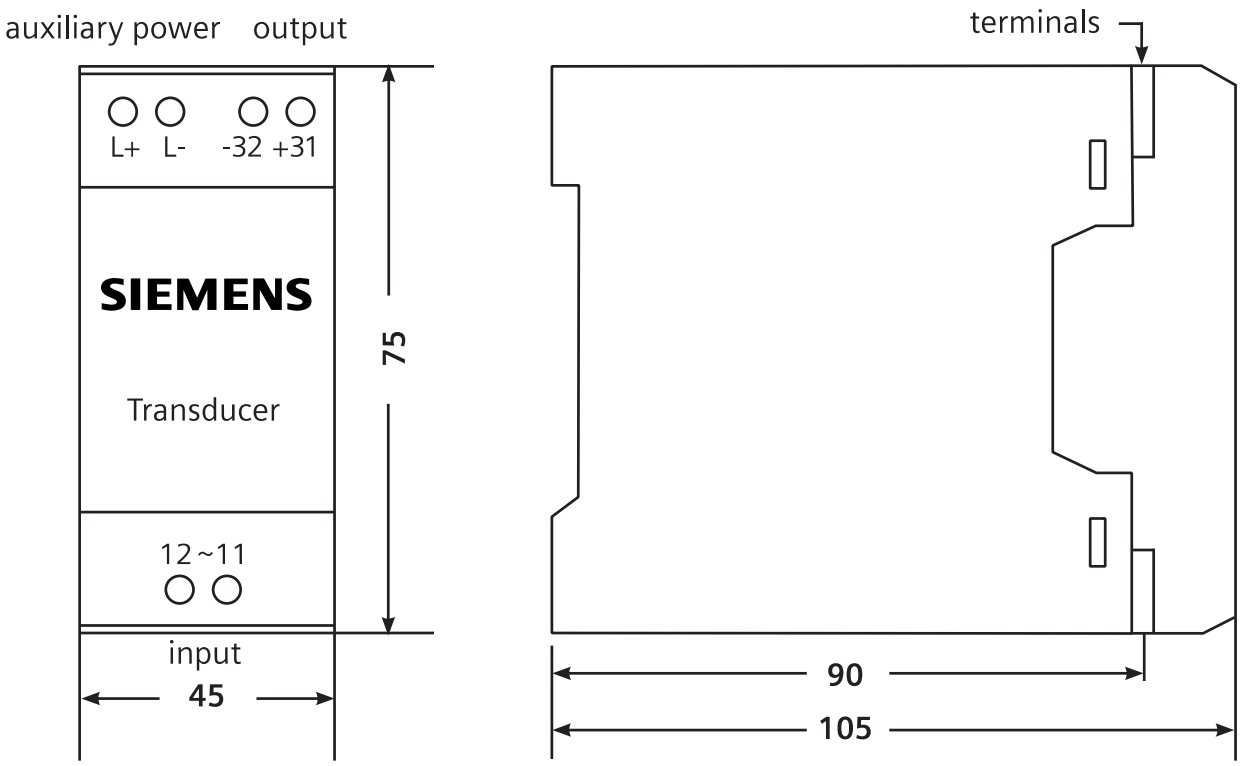
~ Alternating voltage or current

⎓ 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. 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: Auxiliary power supply:	 4 mm² 2.5 mm² 2.5 mm²



9 Ordering data

Ordering data for alternating voltage (G) MUU

Name	Order no.											Code
Device 7KG	6	1	0	6	-						-	B
Input signal E_N												
Rated frequency f_{EN}					50 Hz	**2**						
					60 Hz	**3**						
Rated input voltage					U_{EN}							
					40 V		**K**					
					100 / √3 V		**A**					
					60 V		**L**					
					110 / √3 V		**B**					
					120 / √3 V		**C**					
					132 / √3 V		**D**					
					100 V		**E**					
					110 V		**F**					
					120 V		**J**					
					132 V		**N**					
					150 V		**P**					
					220 V		**G**					
					230 V		**W**					
					240 V		**V**					
					250 V		**Q**					
					300 V		**U**					
					380 V		**H**					
					400 V		**R**					
					500 V		**S**					
Output signal range					I_{AN} / U_{AN}							
					0 to 2.5 mA DC			**G**				
					0 to 5 mA DC			**H**				
					0 to 10 mA DC			**J**				
					0 to 20 mA DC			**K**				
					(Live Zero) 4 to 20 mA DC			**N**	**2**			
					0 to 1 V DC			**L**				
					0 to 10 V DC			**M**				
Zero point position												
Measuring range zero = zero signal									**1**			

Continued: Ordering data for alternating voltage (G) MUU

Name	Order no.		Code
Device	7KG 6 1 0 6 - ☐ ☐ ☐ ☐ ☐ - ☐ B		
Auxiliary power			
	24 to 60 V DC	**1**	
	110 to 220 V DC	**4**	
	100 V AC, 50/60 Hz	**5**	
	115 V AC, 50/60 Hz	**6**	
	230 V AC, 50/60 Hz	**7**	
Measuring range			
Measuring range linear	0 to U_{EN}	**0**	
expanded start range	0 to 0.05 to U_{EN} ≙ 0 to 0.8 to I_{AN} / U_{AN}	**1**	
	0 to 0.1 to U_{EN} ≙ 0 to 0.8 to I_{AN} / U_{AN}	**2**	
expanded end range	0 to 0.9 to 1.1 U_{EN} ≙ 0 to 0.2 to I_{AN} / U_{AN}	**3**	
	0 to 0.85 to 1.15 U_{EN} ≙ 0 to 0.2 to I_{AN} / U_{AN}	**4**	
	0 to 0.8 to 1.2 U_{EN} ≙ 0 to 0.2 to I_{AN} / U_{AN}	**5**	
Suppressed start range	0 to 0.9 to 1.1 U_{EN} ≙ 0 to 0 to I_{AN} / U_{AN}	**6**	
	0 to 0.85 to 1.15 U_{EN} ≙ 0 to 0 to I_{AN} / U_{AN}	**7**	
	0 to 0.8 to 1.2 U_{EN} ≙ 0 to 0 to I_{AN} / U_{AN}	**8**	

Notice

Not all possible combinations are available

Ordering data for alternating current (G) MUI

Name	Order no.										Code
Device	7KG	6	1	1	3	-					- 0 B	
Input signal E_N						↑						
Rated frequency f_{EN}		50 Hz				**2**						
		60 Hz				**3**						HiY
Rated input current		I_{EN}					↑					
		1.0 A					**A**					
		1.2 A					**B**					
		1.5 A					**K**					
		2.0 A					**C**					
		2.4 A					**D**					
		2.5 A					**L**					
		5.0 A					**E**					
		6.0 A					**F**					
		7.5 A					**G**					
		10 A					**J**					
Output signal range		I_{AN} / U_{AN}						↑				
		0 to 2.5 mA DC						**G**				
		0 to 5 mA DC						**H**				
		0 to 10 mA DC						**J**				
		0 to 20 mA DC						**K**				
	(Live Zero)	4 to 20 mA DC						**N**	**2**			
		0 to 1 V DC						**L**				
		0 to 10 V DC						**M**				
Zero point position									↑			
Measuring range zero = zero signal									**1**			
Auxiliary power										↑		
		19.2 to 72 V DC								**1**		
		88 to 264 V DC								**4**		
		100 V AC, 50/60 Hz								**5**		
		115 V AC, 50/60 Hz								**6**		
		230 V AC, 50/60 Hz								**7**		
Measuring range											↑	
Measuring range linear		0 to U_{EN}									**0**	

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

- Before installing the device, check for external damage. In case of damage, the device may not be installed, connected and operated.
- 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 III 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.

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.
- 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. This disconnecting mechanism has to meet the requirements of IEC 60947-1 and IEC 60947-3.
- The total load, including the cables, must not exceed the value stated in the technical specifications.
- The pin assignment is shown in the section **8 Description**.
- **The performed installation must be tested according to EN 61439.**

Notes for the fuses to be used:
For devices that are supplied with AC auxiliary energy, a 100 mA time-lag fuse according to IEC 60127-2 must be connected upstream in the control cabinet installation.
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 option 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 the output signal 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.

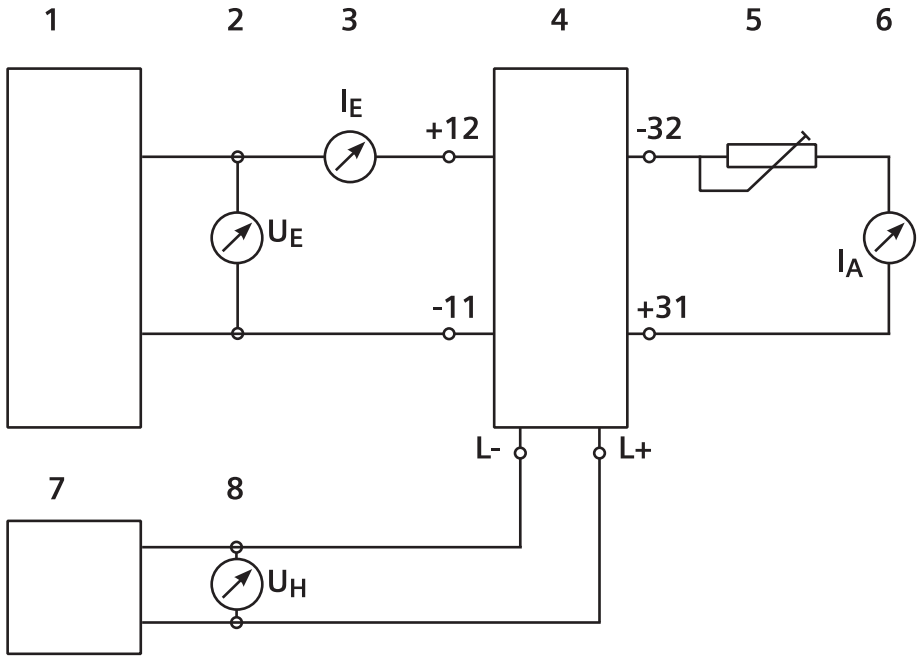
The transducer has to be opened and the modules removed for calibration. After disconnecting the external electrical power cables, the enclosure cover is removed and the modules pulled out. The circuit from the following modules:

- Measuring module G34932-F1800-H2
- Connection module G34932-F1801-H2
- Power supply module G34932-F1802-H2

The trim potentiometers are located on the measuring module.

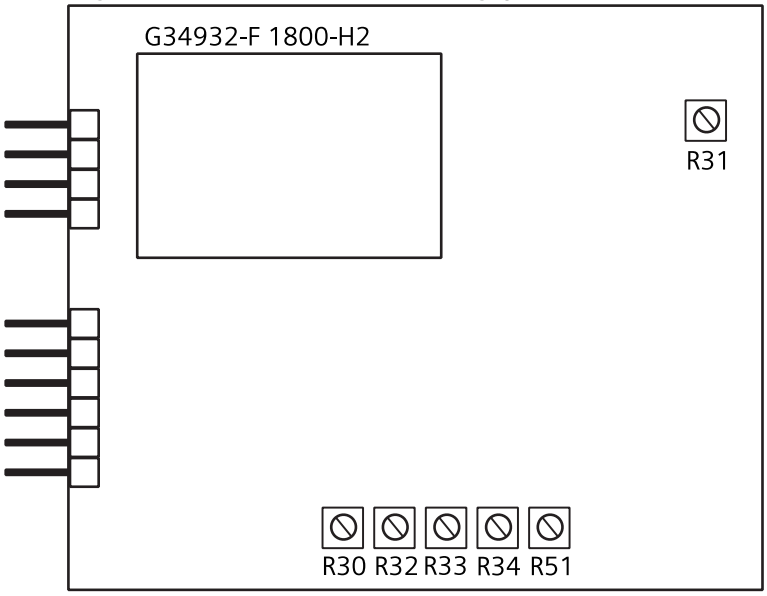
Greater care is required when working on open modules because there may be dangerous voltages on the rear of the measuring and power supply modules. The rear sides of the modules should therefore be covered by suitable means.

Test circuit for voltage and current transducers
(example for current output).



1	Alternating voltage encoder (THD ≤ 1%) 0 to 600 V or Alternating current encoder (THD ≤ 1%) range 0 to 10 A
2	Voltmeter, class 0.01 (for voltage input)
3	Ammeter, class 0.01, Ri ≤ 0.1 Ω (for current input)
4	Test specimen, voltage or current transducer
5	Decade resistor 0 to 20 kΩ
6	Ammeter, class 0.01, Ri ≤ 10 Ω
7	Alternating and direct voltage encoder
8	Voltmeter

Arrangement of the balancing potentiometers



Transducer with linear characteristic curve from 0 to A_N

Full-scale value

Feed $E = E_N \pm 0.05\% E_N$, set output end value with trim potentiometer **R33**
Set $A = A_N \pm 0.2\% A_N$. Check intermediate values.

Transducer with linear characteristic curve from I_A 4 mA to 20 mA

4 mA

only connect auxiliary power, input (short terminals 11 and 12) and
set the output value A = 4 mA ± 0.2% A_N with trim potentiometer **R34**.

20 mA

Feed $E = E_N \pm 0.05\% E_N$, set output end value with trim potentiometer **R33**
Set A = 20 mA ± A_N . Check intermediate values.

Transducer with expanded end range and suppressed start range

Example: Transducer with range:
0 to 0.8 to 1.2 E_N ≙ 0 to 0 to A_N

Start value

Feed $U_E = 0.8\ U_{EN} \pm 0.05\%$, set the output end value with trim potentiometer **R32**
Set $A = 0\ A_N + 0.1\%\ I_{AN}$.

Full-scale value

Feed = 1.2 $E_N \pm 0.05\% E_N$, set output value with trim potentiometer **R33**
Set $A = A_N \pm 0.1\ \% A_N$.
Check start and full-scale values, repeat calibration if necessary.

Transducer with expanded start range and suppressed end range

Example: Transducer with range:
0 to 0.05 to U_{EN} ≙ 0 to 0.8 to A_N

Basic settings

R32: Stop left
R33: Stop right

Break point

Feed $U_E = 0.05\ U_{EN} \pm 0.05\%\ U_{EN}$, set the output value with trim potentiometer **R51**
Set $A = 0.8\ A_N \pm 0.05\%\ A_N$.
Then turn trim potentiometer **R32** to the right until the output value A increases.

Full-scale value

Feed $U_E = U_{EN} \pm 0.05\%\ U_{EN}$, set the
output value $A = A_N \pm 0.05\%\ A_N$ with trim potentiometer **R33**.

Transducer with suppressed start range and expanded end range

Example: Transducer with range:
0 to 0.8 to 1.2 U_{EN} ≙ 0 to 0.2 to A_N

Basic settings

R32: Stop left
R33: Stop right

Break point

Feed $U_E = 0.8\ U_{EN} \pm 0.05\%\ U_{EN}$, set
the output value $A = 0.2\ A_N \pm 0.05\%\ A_N$ with trim potentiometer **R51**.
Then turn trim potentiometer **R32** to the right until the output value A increases.

Full-scale value

Feed $U_E = 1.2\ U_{EN} \pm 0.05\%\ U_{EN}$, set
the output value $A = A_N \pm 0.05\%\ A_N$ with trim potentiometer **R33**.

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.

Technical Support: Siemens Industry Online Support

You can contact Technical Support for about the products described as follows:

- Telefon: + 49 (0) 911 895 7222
- E-Mail (mailto:technical-assistance@siemens.com)
- Homepage (http://support.automation.siemens.com)

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