



Transducer without auxiliary power

for alternating current

for alternating voltage

for alternating voltage with expanded end range

7KG6111 and 7KG6101

Compact device for DIN rail mounting

Operating Instructions

A5E38679986C / 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.



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 the 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.

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Operating Instructions

1 Area of application

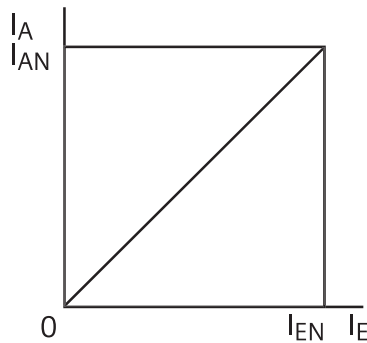
Transducers are used to convert different measured signals from high-voltage and low-voltage systems into proportional output variables. In the power supply and distribution industry, they are, for example, in areas where measured signals have to be transmitted over large distances.

The passive SIMEAS transducers convert the alternating input voltage or the alternating input current from the high-current power network (45 to 65 Hz) into a load-independent direct output current.

Up to the maximum permissible load, multiple devices – recorders, indicators, remote control systems, computers and controllers – can be serially connected and operated directly or via long-distance lines to the output. The inputs and outputs are electrically isolated. Auxiliary power supply is not needed.

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

2 Characteristic curves



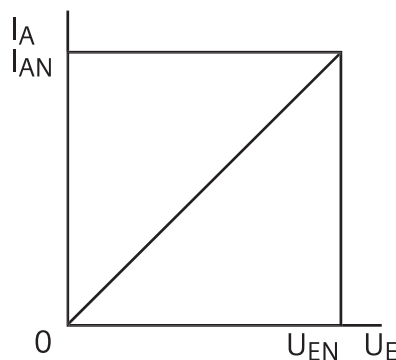
Alternating current

I_A = output current DC

I_E = input current AC

I_{AN} = nominal output current

I_{EN} = nominal input current



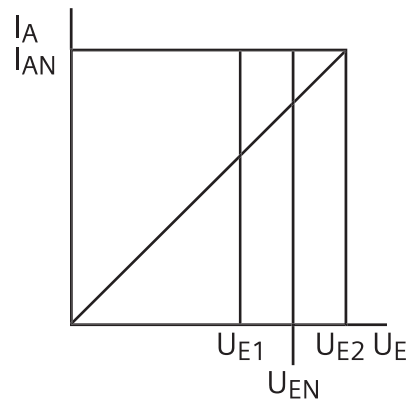
Alternating voltage

I_A = output current DC

U_E = input voltage AC

I_{AN} = nominal output current

U_{EN} = nominal input voltage



Alternating voltage with expanded end range

I_A = output current DC
 U_E = input voltage AC
 I_{AN} = nominal output current
 U_{EN} = nominal input voltage

3 Performance characteristics

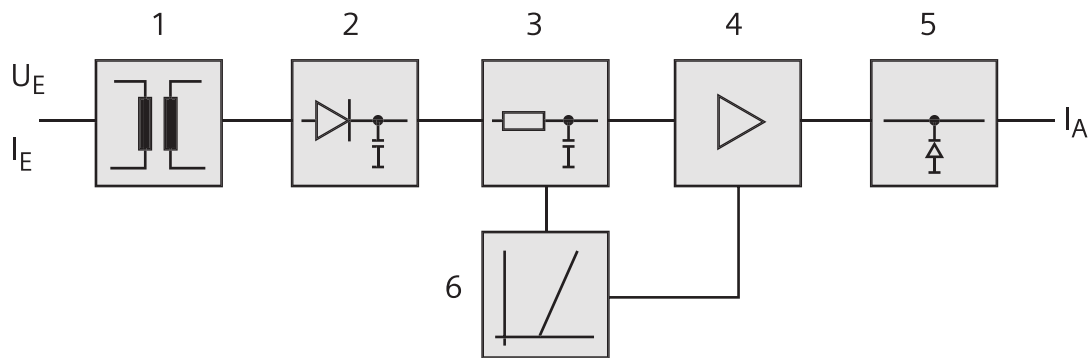
- High measuring precision
- Powerful output signal circuits
- High system safety and reliability
- CE mark
- Extremely high immunity to EMC interference
- Compliance with relevant national and international standards
- Electrical isolation at a high test voltage
- High quality, long service life
- Low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

4 Operating principle

The transformer (1) transfers the input signal I_E or U_E via the rectification and filtering (2) to the signal evaluation (3), which drives the output amplifier (4). Fed by smoothing, the output amplifier provides a load-independent current I_A proportional to the input value I_E or U_E . The protective circuit (5) protects the output against no-load and transient overvoltage.

With an alternating voltage transducer with expanded end range, the expansion circuit (6) of the measuring range is adjusted

5 Overview circuit diagram



- 1 Transformer
- 2 Rectification, filtering
- 3 Signal evaluation
- 4 Output amplifier
- 5 Protective circuit
- 6 Expansion circuit

6 Technical specifications

Input	
Only for connecting to alternating voltage systems!	
Maximum voltage to earth	500 V ~
Power consumption of the measuring circuit	0.3 VA with $I_{AN} = 2.5 \text{ mA}$ 0.4 VA with $I_{AN} = 5 \text{ mA}$ 0.6 VA with $I_{AN} = 10 \text{ mA}$ 0.9 VA with $I_{AN} = 20 \text{ mA}$
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
Input transducer	
Alternating current	
Standard rated currents I_{EN}	See ordering table
Continuous overload capacity for $I_{EN} = 1 \text{ A}$; 1.2 A for $I_{EN} = 1.5 \text{ A}$ for $I_{EN} = 2 \text{ A}$; 2.4 A for $I_{EN} = 2.5 \text{ A}$ for $I_{EN} = 5 \text{ A}$; 6 A for $I_{EN} = 7.5 \text{ A}$ for $I_{EN} = 10 \text{ A}$	2 A 3 A 4 A 5 A 10 A 12 A 15 A
Surge overload capacity for $I_{EN} = 1 \text{ A}$; 1.2 A; 1.5 A; for $I_{EN} = 2 \text{ A}$; 2.4 A; 2.5 A for $I_{EN} = 5 \text{ A}$; 6 A; 7.5 A; 10 A	50 A for 1 s 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
Continuous overload capacity	$1.5 \times U_{EN}$ but max. 600 V
Surge overload capacity	$\leq 2 \times U_{EN}$ (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}
Permissible modulation range	0 to $1.2 I_{AN}$
No-load voltage U_{AL}	$\leq 30 \text{ V}$
Rated load R_{BIN}	$7.5 \text{ V}/I_{AN}$
Operating load R_B	0 to $15 \text{ V}/I_{AN}$
Residual ripple I_{SS}	$\leq 0.5\%$ SS of I_{AN}
Setting time t_{gg} – Transducer alternating current – Transducer alternating voltage	$\leq 1 \text{ s}$ $\leq 0.4 \text{ s}$

Errors and influencing effects	
The relative error information with signs "+" and "-"	
Errors in reference conditions	0.5% relative to I _{AN}
Reference conditions – Input current I _E – Input voltage U _E – Frequency f _E – Curve form – Load R _B – Ambient temperature T _U – Warm-up period	0.05 I _{EN} to I _{EN} 0.2 U _{EN} to U _{EN} f _{EN} ± 1% Sine, THD ≤ 0.2% R _{BN} ± 1% 23 °C ± 1 °C max. 15 min at f _N
Influencing effects – of the input voltage of U _{EN} to 1.2 U _{EN} – of the input current of 0 to 0.05 I _{EN} – of the input current of > 0.05 I _{EN} to 1.2 I _{EN} – of the ambient temperature – of the frequency (45 to 65 Hz) – of the harmonics (only 3rd harmonic) – of load – of self-heating – Interfering fields	≤ 0.4% ≤ 0.5% ≤ 0.1% ≤ 0.3% / 10 K ≤ 0.03% / Hz ≤ 0.33% THD ≤ 0.2% at change of load from 0 Ω to 15 V/I _{AN} ≤ 0.3% None
Other technical specifications	
Surge voltage UDE 0435, Part 303 with type test – input relative to output – on input and output as normal mode voltage.	T = 5 kV, 1.2/50 µsec, R _i = 500 Ω T = 5 kV, 1.2/50 µsec, R _i = 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	II
Degree of pollution	2
Fire resistance class	V-0
Electromagnetic compatibility	
Emitted interference according to EN 50081-1 – Radio interference field strength according to EN 55022	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 2 kV 4 kV

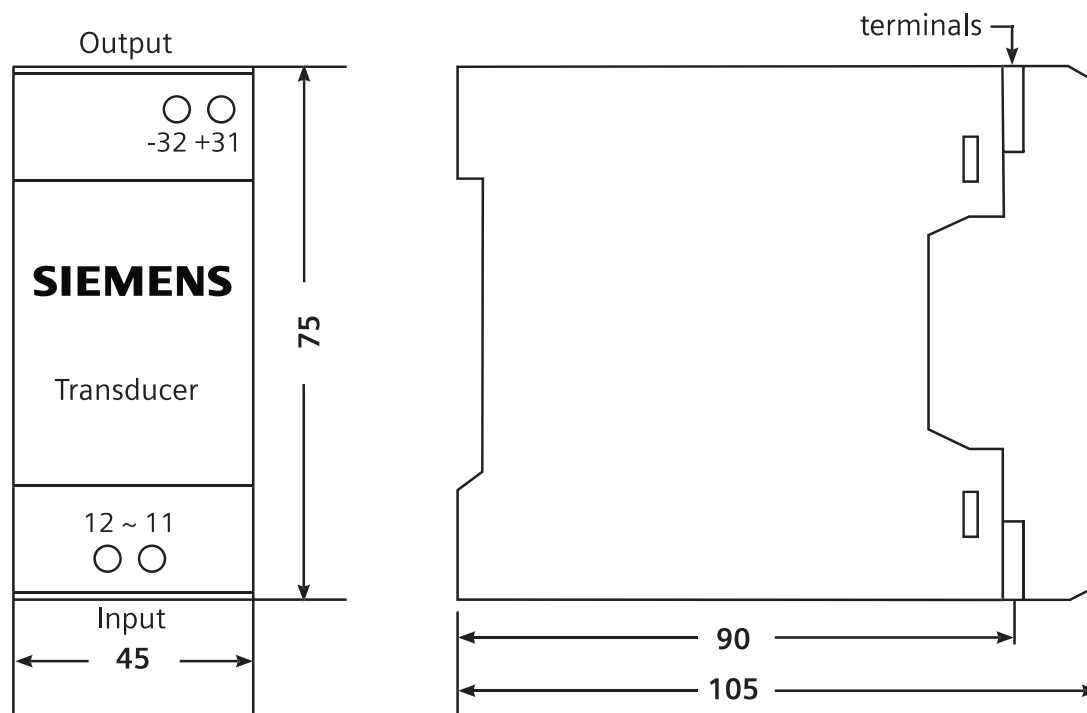
7 Rating plate symbols

- CE EU conformity marking
 ENEC TR Customs Union Certification of EAC
 ⚠ Notice – Observe warning information
 ⊕ Input
 ⊖ Output
 ~ Alternating 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 can be accessed after removing the enclosure cover.

Weight:	approx. 0.28 kg
Degree of protection:	DIN VDE 0470 T.1 / EN 60529
Enclosure:	IP40
Terminals:	IP20
Connection: Screw terminals	
Input:	4 mm ²
Output:	2.5 mm ²



9 Ordering data

Ordering data for alternating voltage (G) MUU

Name	Order no.	Code
Device	7KG 6 1 0 1 - 1 	
Input signal E_N		
Rated frequency f _{EN}	50 Hz ↑ 2 60 Hz ↑ 3	
Rated input voltage	U _{EN} 40 V ↑ K 100 / $\sqrt{3}$ V ↑ A 60 V ↑ L 110 / $\sqrt{3}$ V ↑ B 120 / $\sqrt{3}$ V ↑ C 132 / $\sqrt{3}$ 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} 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	
Number of channels		
1-channel		1
Measuring range		
0 to U _{EN}		0
0 to 0.9 to 1.1 U _{EN} $\triangleq$ 0 to 0 to I _{AN}		6
0 to 0.85 to 1.15 U _{EN} $\triangleq$ 0 to 0 to I _{AN}		7
0 to 0.8 to 1.2 U _{EN} $\triangleq$ 0 to 0 to I _{AN}		8

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 mm² or 4 mm².
- 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.
- 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 option for the output current and load voltage. Before connecting an ammeter to the output side of the transducer, the primary side 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): 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.

13 Calibrating and testing

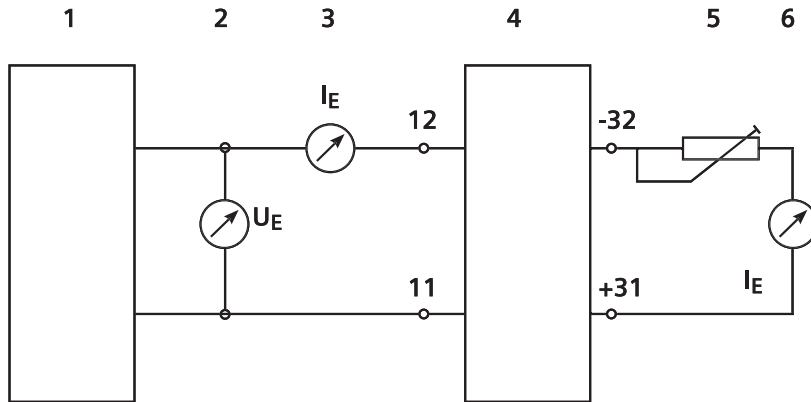


WARNING!

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 for calibration.

Test circuit for voltage and current transducers
(with terminal designations of the 1-channel compact device)



- 1 Alternating voltage encoder (THD $\leq 1\%$) 0 to 600 V or
Alternating current encoder (THD $\leq 1\%$) range 0 to 10 A
- 2 Voltmeter, class 0.01
- 3 Ammeter, class 0.01, $R_i \leq 0.1 \Omega$
- 4 Test specimen, voltage or current transducer
- 5 Decade resistor 0 to 20 k Ω
- 6 Ammeter, class 0.01, $R_i \leq 10 \Omega$

Calibration of the voltage transducer

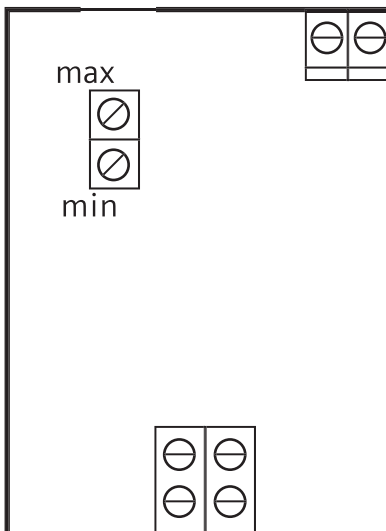
Start value

Feed $U_E = 0.2 U_{EN} \pm 0.05\% U_{EN}$, with trim potentiometer "min" set the output value $I_A = 0.2 I_{AN} \pm 0.2\% I_{AN}$.

Full-scale value

Feed $U_E = U_{EN} \pm 0.05\% U_{EN}$, set the output end value $I_A = I_{AN} \pm 0.2\% I_{AN}$ with trim potentiometer "max".

Repeat start and full-scale value calibration until the specified tolerances are achieved.



Calibration of the voltage 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 to I_{AN}

Start value

Feed $U_E = 0.8 U_{EN} \pm 0.05\% U_{EN}$, set the output value $I_A = 0 + 0.1\% I_{AN}$ with trim potentiometer "min".

Full-scale value

Feed $U_E = 1.2 U_{EN} \pm 0.05\% U_{EN}$, set the output value $I_A = I_{AN} \pm 0.1\% I_{AN}$ with trim potentiometer "max".

Check start and full-scale values, repeat calibration if necessary.

To set the potentiometer, refer to the previous schematic diagram.

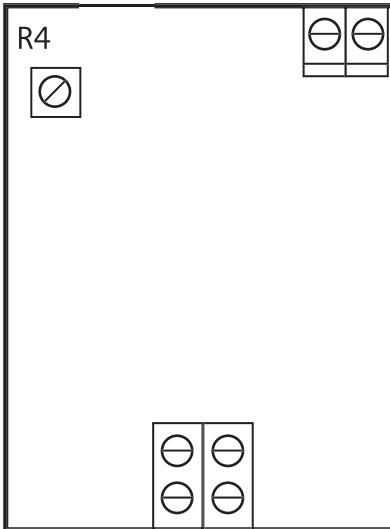
Calibration of the current transducer

Full-scale value

(this is the only calibration required)

Feed $E_I = I_{EN} \pm 0.1\% E_{EN}$, set the output value

$I_A = I_{AN} \pm 0.2\% E_{AN}$ with trim potentiometer R4.



Contact

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- 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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