

# Modules

**Knick** ➤

## IsoAmp® 11000/12000



**The universal isolator.**

### The Models

Knick's IsoAmp® 11000/12000 series features a tried and tested range of powerful DC isolation amplifiers that have excellent specifications despite their small dimensions and have a symmetrical input with high common mode rejection.

### The Problems

When conventional unsymmetrical isolation amplifiers are used, measurement signal interferences can occur that seem inexplicable to the user at first. If, for example, there are several devices in a current output loop, an isolation amplifier can meet a LO output with its HI input which can cause the above-mentioned signal interferences.

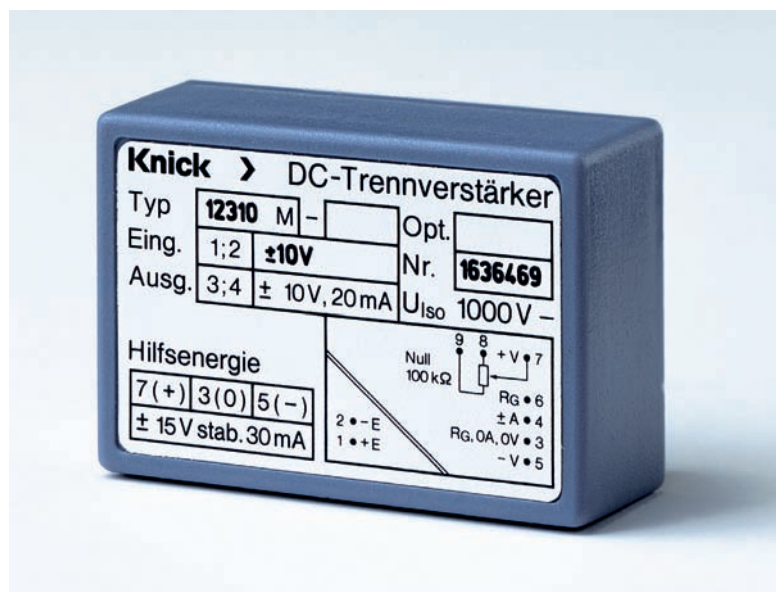
### The Inputs

On the Knick IsoAmp® 11000/12000 DC isolation amplifiers, the input is symmetrical, i. e. both input terminals can be exchanged without undesired effects on the common mode rejection.

Models with connections for external gain setting, nulling, and live-zero switching (0 ... 20 mA / 4 ... 20 mA) are available for special tasks.

### The Applications

The isolation amplifiers allow problem-free use, particularly for applications where small dimensions are required in conjunction with high isolation voltage, high accuracy, and maximum reliability.



# Universal Isolation Amplifiers

Isolation Amplifiers  
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

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## ■ The Facts

**Symmetrical input** with high common mode rejection

**Excellent specifications**

**High isolation voltage**

**High output power**

**Optional external gain adjustment**  
with just one resistor

**Live-zero switching**  
(0 ... 20 mA / 4 ... 20 mA)

**Complete modules without external wiring**

**Miniature flat design for pcb mounting**

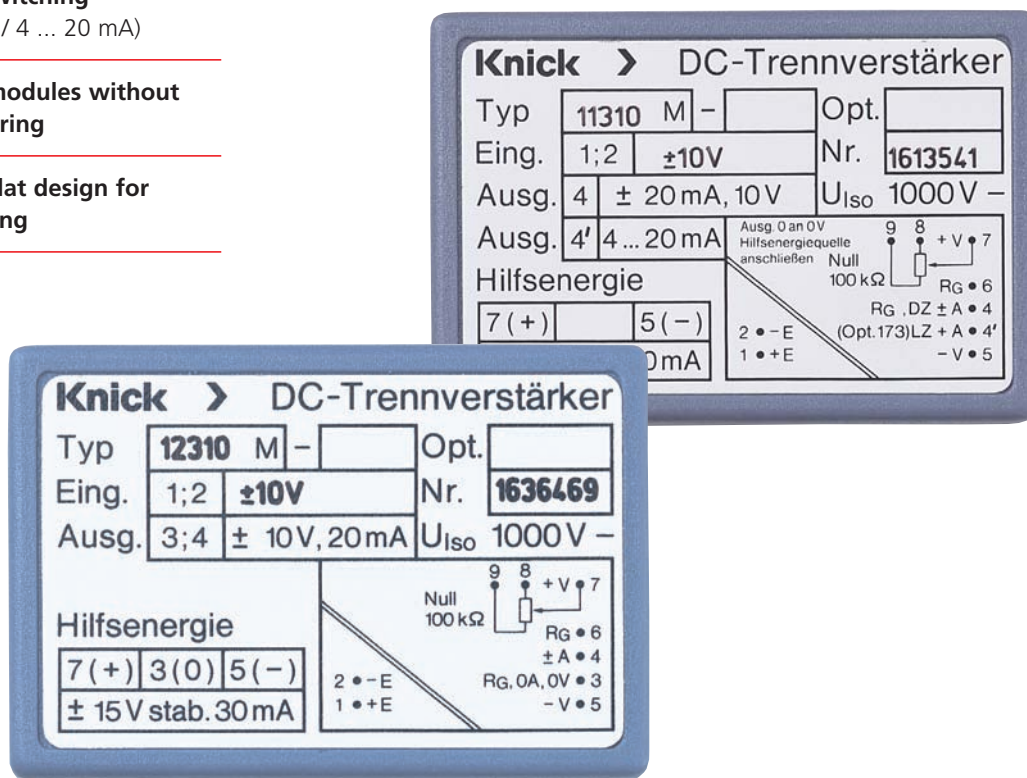
**High quality and reliability**

**100 % computer-aided production control and final inspection**

**5-year warranty**

**Warranty  
5 years!**

*Defects occurring within 5 years from delivery are remedied free of charge at our works (carriage and insurance paid by sender).*



## IsoAmp® 11000/12000

### ■ Product Line

Devices	Symmetrical input	Impressed output	Load capability	Order No.
IsoAmp® 11000/12000 Free wiring	up to $\pm 500$ mV Depending on wiring	$\pm 20$ mA	10 V <sup>1)</sup>	11001 M
	up to $\pm 500$ mV Depending on wiring	$\pm 10$ V <sup>1)</sup>	20 mA	12001 M
IsoAmp® 11000/12000 Fixed settings	$\pm 20$ mV	$\pm 20$ mA	10 V <sup>1)</sup>	11202 M
	$\pm 60$ mV			11206 M
	$\pm 150$ mV			11215 M
	$\pm 500$ mV			11250 M
	$\pm 10$ V			11310 M
	$\pm 20$ mA			11820 M
	$\pm 20$ mV	$\pm 10$ V	20 mA	12202 M
	$\pm 60$ mV			12206 M
	$\pm 150$ mV			12215 M
	$\pm 500$ mV			12250 M
	$\pm 10$ V			12310 M
	$\pm 20$ mA			12820 M

### Power supply

15 V DC

### Option

Output  $\pm 0 \dots 20$  mA and  $+4 \dots 20$  mA, selectable  
(at live-zero: unipolar input, additional error  $\pm 10$   $\mu$ A)

173

Gain error  $< 0.1$  % measured value (not for Model 11202)

04

1)  $\pm 10$  V or 20 V unipolar (note power supply!)

### ■ Specifications

#### Input data

Input

See Product Line

Input resistance

$> 1$  Mohm, for models with  $I_{in} \pm 20$  mA: 7.5 ohms

Overload

$V_{in} \leq 25$  V,  $I_{in} \leq 300$  mA

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## Specifications (continued)

### Output data

Output	See Product Line
Offset current <sup>3)</sup>	< 50 nA
Offset voltage <sup>3)</sup> Drift	< 500 $\mu$ V, external nulling < 5 $\mu$ V/month
Residual ripple	$\leq 10$ mV <sub>pp</sub>

### Transmission behavior

Gain error	< 0.2% meas. val., Option 04: 0.1% meas. val.
Cutoff frequency <sup>2)</sup>	> 1.5 ... 5 kHz –3 dB (20 mV ... 500 mV or 10 V); different values on request
Temperature coefficient <sup>3) 4)</sup>	< 1 nA/K, < 2 $\mu$ V/K (reference temperature 23 °C)

### Power supply

Power supply	$\pm 14.5$ ... 15.5 V DC, stabilized, approx. 30 mA for unipolar operation up to 20 V output voltage: –5, +25 V, stabilized
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### Isolation

Galvanic isolation	3-port isolation between input, output and power supply
Test voltage	4 kV AC across input and output / power supply
Working voltages (basic insulation)	1000 V DC with overvoltage category II and pollution degree 3 according to EN 61010-1 For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

### Standards and approvals

EMC	European EMC regulations, according to directive 89/336/EEC
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### Other data

Ambient temperature	–10 ... +70 °C
Design	Module, encapsulated, see dimension drawings for measurements
Weight	Approx. 45 g

2) Current output up to 250 ohms load, models 11310 and 12310 up to 10 V<sub>pp</sub>

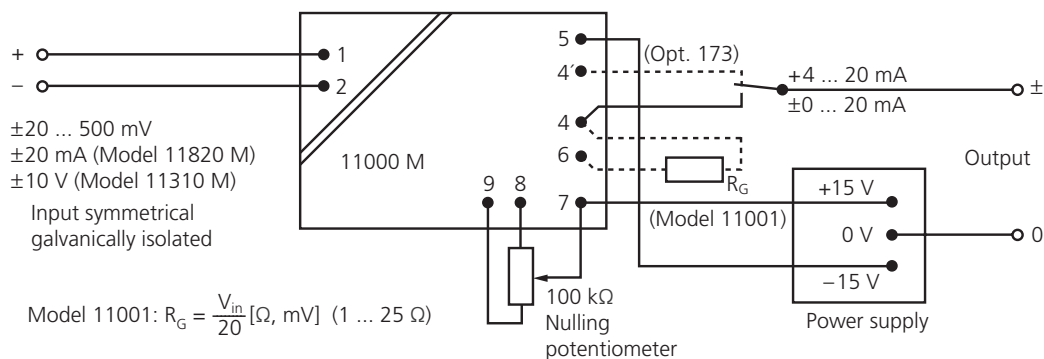
3) x 10 for models 11310, 12310

4) Offset set to zero

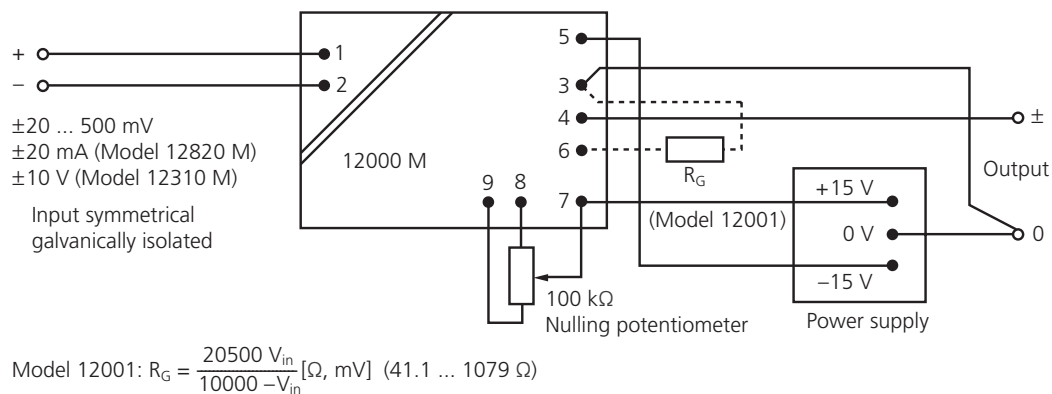
## IsoAmp® 11000/12000

### ■ Connection Diagrams

#### 11000 M Connection Diagram



#### 12000 M Connection Diagram

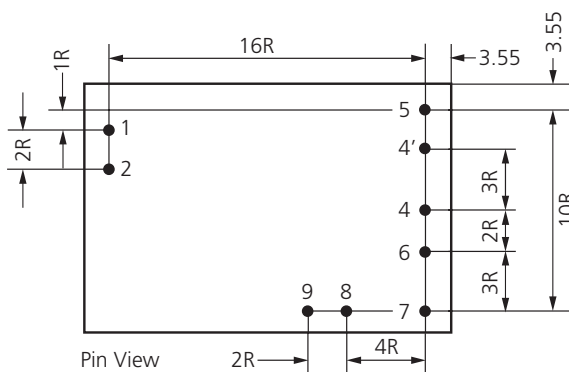





# Universal Isolation Amplifiers

Isolation Amplifiers Transmitters	Indicators	Process Analytics	Portable Meters	Laboratory Meters	Sensors	Fittings
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## ■ Dimension Drawings and Pin Assignments






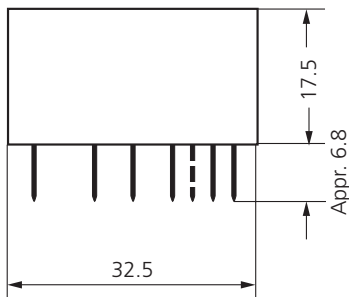
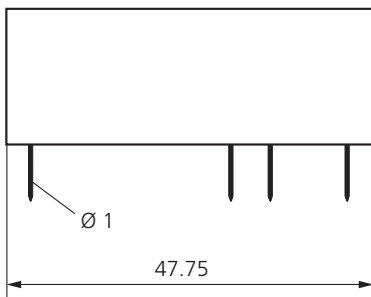
- 1 Input +
- 2 Input -
- 4 Output  $\pm 0 \dots 20 \text{ mA}$ ,  $R_G$
- 4 Output  $+ 4 \dots 20 \text{ mA}$  (Opt. 173)
- 5 Power supply -
- 6  $R_G$  (Model 11 001)
- 7  Nulling Power supply +
- 8  potentiometer
- 9  100 k $\Omega$

Connect 0 output to 0 V power supply



R = Spacing = 2.54  
Pin View

- 1 Input +
- 2 Input -
- 3 Output 0, Power supply 0 V,  $R_G$
- 4 Output  $\pm$
- 5 Power supply -
- 6  $R_G$  (Model 12 001)
- 7  Nulling Power supply +
- 8  potentiometer
- 9  100 k $\Omega$



All dimensions in mm!

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**For transmission and conversion of impressed signals.**

## IsoAmp® 3000/4000



The DC isolation amplifiers of the IsoAmp® 3000/4000 series transmit and convert impressed 0(4) ... 20 mA or 0 ... 10 V standard signals according to our German patent DBP 34 12 843 with a high level of accuracy.

They provide Safe Isolation and high insulation from input to output to power supply.

### The Advantages

The control range extends into the negative values and allows strict linear transmission in the zero range. Compared with conventional unipolar amplifiers, this has a great advantage: The often asymptotic setting of the zero point, for example, when calibrating with a sensor, is ruled out.

The transmission error is unusually low. The reason for this is mainly a negative feedback circuit that is incorporated in the electrical isolation. It has no sensing resistor with 1:1 transmission and just one sensing resistor for current/voltage conversion. Differentiated signal return allows the circuit to remain stable even with strong complex loads.

The components required in conventional concepts for matching amplifiers and resistor networks are omitted. The reliability is accordingly high.

The computer-aided production control and final inspection ensure high and constant quality. The full encapsulation guarantees maximum safety and reliability even in extreme conditions.

### The Applications

The devices can be used for many galvanic isolation applications, for example:

- in measuring and control engineering
- for linking measurement signals to different potentials
- for removal of double ground compensation currents
- for isolation of dangerous touch voltages
- for computer interfacing
- for increase of load voltage and decoupled signal transmission

The DC isolation amplifier is available as a module for universal 24 V AC/DC current supply for use on printed circuit boards.

For Safe Isolation according to EN 61140, the required clearance and creepage distances should be taken into consideration.

### The Models

#### IsoAmp® 3820

transforms the input current 1:1 into an impressed output current without negative feedback resistors by means of negative-feedback current transformation.

#### IsoAmp® 4820

converts the input current 2:1 into an impressed output voltage with just one precision resistor after current transformation.

#### IsoAmp® 3310

converts the input voltage 3:1 into an impressed output current with just one precision resistor after voltage transformation.

#### IsoAmp® 4310

converts the input voltage 1:1 into an impressed output voltage without negative-feedback resistors after voltage transformation.

# Isolation Amplifiers for Standard Signals

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## ■ The Facts

### Safe Isolation according to EN 61140

Protection of maintenance staff  
and subsequent devices against  
non-permitted high voltages

### 3-port isolation

Protection against incorrect  
measurements or damage to the  
equipment due to parasitic  
voltages

### Decoupled

No load effect on the  
signal source

### Maximum reliability

No maintenance work, therefore  
the related costs are not incurred

### Full encapsulation

Reliable functioning also in  
aggressive atmospheres or with  
considerable mechanical loading,  
for example, due to vibrations

### High accuracy

No distortion of measurement  
signal

### Simple live zero/dead zero switching option

Multiple application possibilities  
due to optional switching of  
input or output 0 ... 20 mA,  
4 ... 20 mA

### 5-year warranty

**Warranty  
5 years!**

*Defects occurring within 5 years  
from delivery are remedied free of  
charge at our works (carriage and  
insurance paid by sender).*



## IsoAmp® 3000/4000

### ■ Product Line

Devices	Order No.
IsoAmp® 3000/4000 Input: 0 ... 20 mA, output: 0 ... 20 mA Input: 0 ... 20 mA, output: 0 ... 10 V	3820 Mh 4820 Mh
IsoAmp® 3000/4000 Input: 0 ... 10 V, output: 0 ... 20 mA Input: 0 ... 10 V, output: 0 ... 10 V	3310 Mg 4310 Mg
Power supply	
24 V AC/DC	
Options	
Input 0 ... 20 mA or 4 ... 20 mA, switchable	250 <sup>1)</sup>
Output 0 ... 20 mA or 4 ... 20 mA, switchable	251 <sup>1)</sup>
Accessories	
Inspection Certificate 3.1 B according to EN 10204	ZU 0267
Inspection Certificate 3.1 B according to EN 10204, with description and results from inspections	ZU 0268

1) Options 250 and 251 cannot be combined; additional error at output:  $\pm 10 \mu\text{A}$ , with Model 4820:  $\pm 10 \text{ mV}$

### ■ Selection Aid

		Output		
		0 ... 20 mA	0 ... 20 mA/ 4 ... 20 mA <sup>2)</sup>	0 ... 10 V
Input	0 ... 20 mA	3820 Mh	3820 Mh Opt. 251	4820 Mh
	0 / 4 ... 20 mA <sup>2)</sup>	3820 Mh Opt. 250	3820 Mh <sup>3)</sup>	4820 Mh Opt. 250
	0 ... 10 V	3310 Mg	3310 Mg opt. 251	4310 Mg

2) Switchable

3) 1:1 transmission

# Isolation Amplifiers for Standard Signals

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## ■ Specifications

Input data	3820 Mh	4820 Mh	3310 Mg	4310 Mg
Input <sup>1)</sup>	0 ... 20 mA impressed current Option 250: 0/4 ... 20 mA, switchable <sup>2)</sup>		0 ... 10 V	
Input resistance	–		> 5 Mohms	> 2 Mohms
Input voltage drop	Approx. 100 mV With open output: approx. 750 mV Upon power failure: approx. 750 mV		Approx. 150 mV Upon power failure: approx. 750 mV	
Offset current <sup>3)</sup>	–		< 500 nA ± 10 nA/K	< 1 µA ± 10 nA/K
Overload	≤ 300 mA Limited to 750 mV by diode		≤ 100 mA Limited to 13 V by suppressor diode	
Output data	3820 Mh	4820 Mh	3310 Mg	4310 Mg
Output <sup>1)</sup>	0 ... 20 mA, 14 V <sup>4)</sup> Option 251: 0/4 ... 20 mA selectable <sup>2)</sup>	0 ... 10 V, 10 mA	0 ... 20 mA, 10 V Option 251: 0/4 ... 20 mA selectable <sup>2)</sup>	0 ... 10 V, 20 mA
Offset	< 2 µA	< 2 mV	< 5 µA	< 2 mV
Residual ripple	< 10 mV <sub>pp</sub>			
Transmission error	0.01 % meas. val.	0.1 % meas. val.	0.1 % meas. val.	0.02 % meas. val.
Cutoff frequency	5 kHz, –3 dB	10 kHz, –3 dB/ V <sub>out</sub> ≤ 3 V <sub>pp</sub> ; 3 kHz, –3 dB/ V <sub>out</sub> ≤ 10 V <sub>pp</sub>	10 kHz, –3 dB	10 kHz, –3 dB/ V <sub>out</sub> ≤ 3 V <sub>pp</sub> ; 3 kHz, –3 dB/ V <sub>out</sub> ≤ 10 V <sub>pp</sub>
Temperature coefficient <sup>3)</sup>	< 10 nA/K	< 40 µV/K 0.0025 %/K m. val.	< 100 nA/K 0.0025 %/K m. val.	< 40 µV/K
Power supply				
Power supply	24 V AC/DC AC: –15 % +10 %, 48 ... 500 Hz, approx. 1.3 VA DC: –15 % +20%, approx. 0.6 VA			

1) Transmission of negative signals up to approx. –3 % full scale

2) Options 250 and 251 cannot be combined.

3) Reference temperature for TC specifications: 23 °C

4) Options 250 and 251: 12 V

## IsoAmp® 3000/4000

### Specifications (continued)

#### Isolation

Galvanic isolation	3-port isolation between input, output and power supply
Test voltage	4 kV AC (input / output / power supply)
Working voltages (basic insulation)	1000 V DC with overvoltage category II and pollution degree 3 according to EN 61010-1. For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.
Protection against electric shock	Safe Isolation according to EN 61140 by reinforced insulation in accordance with EN 61010-1. For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

#### Standards and approvals

Surge withstand	5 kV, 1.2/50 µs according to IEC 255-4
EMC	European EMC regulations, 89/336/EEC directive <sup>5)</sup>

#### Other data

Ambient temperature	Operation: -10 ... +70 °C Transport and storage: -30 ... +80 °C
Design	Height: Mg module (Models 3310/4310): 19 mm, Mh module (Models 3820/4820): 15.9 mm See dimension drawings for further measurements
Weight	Approx. 45 g

<sup>5)</sup> Deviations are possible while there is interference

# Isolation Amplifiers for Standard Signals

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## ■ Terminal Assignments for Options 250 and 251

Model	Option	Input <sup>*)</sup>	Output	Output connection	Jumper (output)
3820	250	0 ... 20 mA	0 ... 20 mA	2 – 4	3 – 4
		4 ... 20 mA	0 ... 20 mA	2 – 4	
3820	251	0 ... 20 mA	0 ... 20 mA	2 – 4	
		0 ... 20 mA	4 ... 20 mA	3 – 4	
4820	250	0 ... 20 mA	0 ... 10 V	2 – 4	3 – 4
		4 ... 20 mA	0 ... 10 V	2 – 4	
3310	251	0 ... 10 V	0 ... 20 mA	2 – 4	
		0 ... 10 V	4 ... 20 mA	3 – 4	

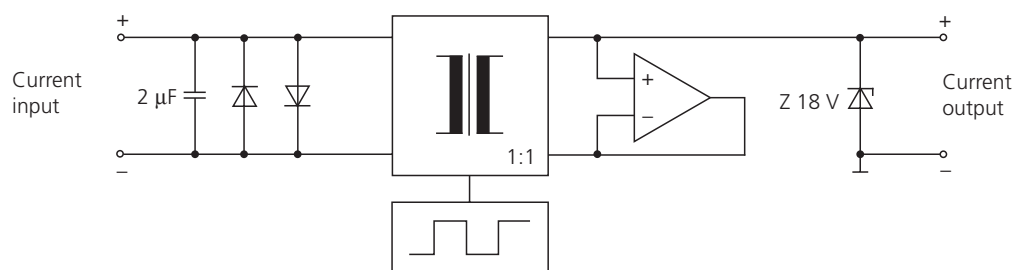
<sup>\*)</sup> See dimension drawing

# Modules

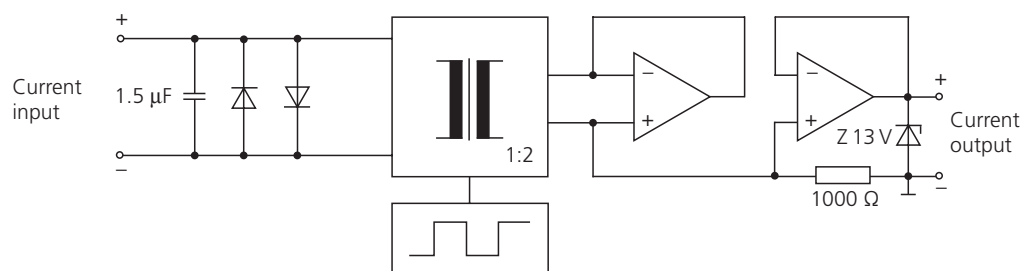
## IsoAmp® 3000/4000

### ■ Block Diagrams

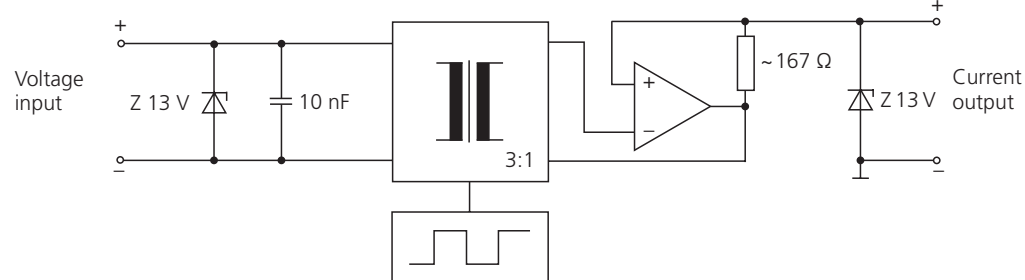
#### Model 3820



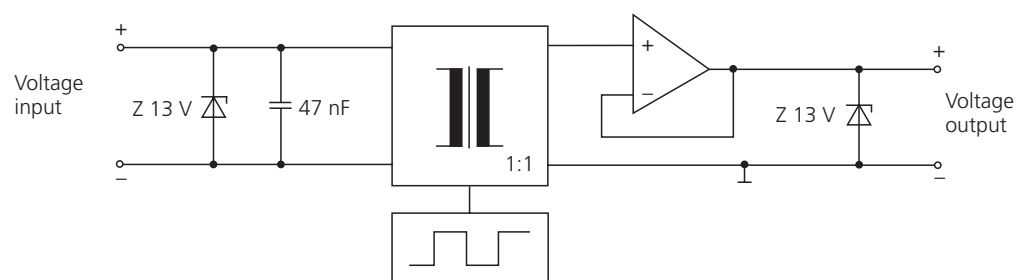
#### Model 4820



#### Model 3310



#### Model 4310

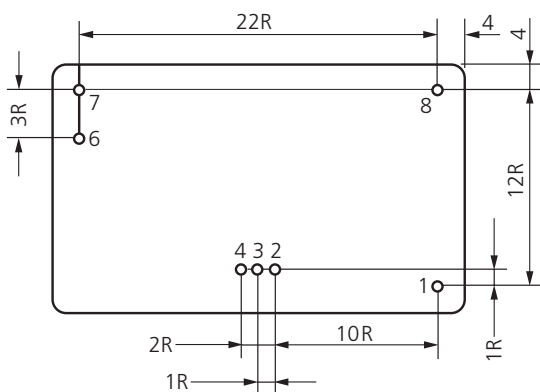


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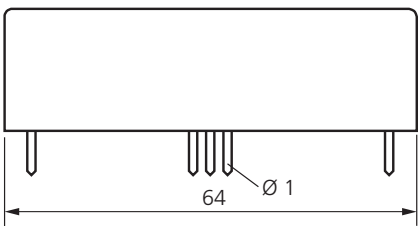
Isolation Amplifiers Transmitters	Indicators	Process Analytics	Portable Meters	Laboratory Meters	Sensors	Fittings
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## ■ Dimension Drawings and Pin Assignments

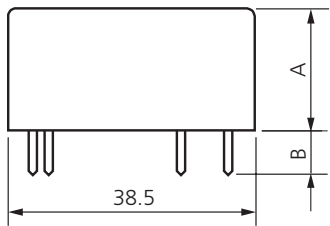


Pin View



- 1 Power supply +
  - 2 Output +
  - 3 Output +, Jumper
  - 4 Output -, Jumper
  - 6 Input -
  - 7 Input +
  - 8 Power supply -
- R = Spacing = 2.54

	Mg	Mh
A	19	15.9
B	appr. 6.8	appr. 9.8



All dimensions in mm!