

# MCR-VAC-UI-0-DC

## Voltage transducer for AC voltages



Data sheet  
100261\_en\_03

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### 1 Description

The MCR voltage transducer measures AC voltages in several signal ranges from 0 ... ±24 V AC to 0 ... ±370 V AC and converts them to standardized analog signals.

The input voltage ranges listed at input terminal blocks 1 to 7 can be varied by ±20% using a calibration potentiometer.

The input, output, and power supply are electrically isolated from one another. The voltage transducer is calibrated by default to 0 ... 24 V AC input and 0 ... 10 V DC output and is ready for operation when delivered. To use the device with other input or output variables, carry out a ZERO/SPAN adjustment using the potentiometers on the front.

#### 1.1 Features

- 3-way electrical isolation
- True r.m.s. value measurement
- Adjustable voltage ranges
- ZERO/SPAN adjustment ±20%

#### 1.2 Method of operation

The input circuit divides the AC voltage at terminal blocks 1 to 7. The resulting signal is electrically isolated and transmitted to the output circuit. This creates the true r.m.s. value and the signal is available at the output as a standardized analog signal.

#### 1.3 Field of application

When using the voltage transducer, please ensure that the potential difference between terminal blocks 1 to 7 to ground potential PE or terminal block 8 to ground potential PE  $U_{rms}$  does not exceed 440 V (this condition applies to circuits that are not grounded).

In AC voltage networks, this potential difference must not exceed  $U_{rms} = 250$  V (this condition applies to circuits that are grounded).

When these conditions are met, **safe isolation** is ensured between the input, output, and power supply.



Make sure you always use the latest documentation.

It can be downloaded from the product at [www.phoenixcontact.net/catalog](http://www.phoenixcontact.net/catalog).



This data sheet is valid for all products listed on the following page:

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### 3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
MCR voltage transducer, for AC voltages from 0...20 V AC to 0...440 V DC, output signal 0 ... 10 V/0(4) ... 20 mA	MCR-VAC-UI-0-DC	2811103	1

### 4 Technical data

#### Voltage measuring input

Input voltage range (input resistance)	0 ... 370 V AC (370 k $\Omega$ )
	0 ... 250 V AC (250 k $\Omega$ )
	0 ... 170 V AC (170 k $\Omega$ )
	0 ... 120 V AC (120 k $\Omega$ )
	0 ... 80 V AC (80 k $\Omega$ )
	0 ... 54 V AC (54 k $\Omega$ )
	0 ... 36 V AC (36 k $\Omega$ )
	0 ... 24 V AC (24 k $\Omega$ )

Maximum input voltage	440 V AC (not grounded) 250 V AC (to ground)
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When these values are observed, safe isolation (EN 50178/DIN EN 50178/VDE 0160) is ensured between the input, output, and power supply.

#### Voltage output

Voltage output signal	0 ... 10 V
Maximum voltage output signal	+15 V
Load/output load voltage output	> 10 k $\Omega$
Ripple	< 50 mV <sub>PP</sub>

#### Current output

Current output signal	0(4) ... 20 mA
Maximum current output signal	+30 mA
Load/output load voltage output	< 500 $\Omega$
Ripple	< 50 mV <sub>PP</sub>

#### Power supply

Supply voltage range	18.5 V DC ... 30.2 V DC
Maximum current consumption	< 45 mA

#### General data

Measuring principle	True r.m.s. value measurement
Maximum transmission error	< 1.5% (of final value)
Zero adjustment	±20%
Span adjustment	±20%
Step response (10 - 90%)	250 ms
Degree of protection	IP20
Pollution degree	2
Width x height x length	22.5 mm x 99 mm x 114.5 mm
Housing version	Polyamide PA, non-reinforced, green

**Connection data**

Conductor cross-section, solid	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross-section, stranded	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Stripping length	8 mm

**Safe isolation according to EN 50178**

Surge voltage category	III
Pollution degree	2
Input/output test voltage	3.3 kV (50 Hz, 1 min.)
Input/power supply test voltage	3.3 kV (50 Hz, 1 min.)
Output/power supply test voltage	1 kV (50 Hz, 1 min.)

**Rated insulation voltage**

Input/output	440 V AC, for ungrounded circuits 300 V AC, for grounded circuits
Output/power supply	50 V AC

**Ambient conditions**

Ambient temperature (operation)	-25°C ... +60°C
Ambient temperature (storage/transport)	-40°C ... +85°C, no condensation

**Conformance/approvals**

Conformance	CE-compliant
UL, USA/Canada	

**Conformance with EMC Directive 89/336/EEC****Noise immunity according to EN 61000-6-2**

Electrostatic discharge	EN 61000-4-2	8 kV air discharge
Electromagnetic HF field	EN 61000-4-3	
Amplitude modulation		3 V/m
Pulse modulation		3 V/m
Fast transients (burst)	EN 61000-4-4	Input/output/power supply: 2 kV/5 kHz
Surge current loads (surge)	EN 61000-4-5	Input/output: 2 kV/42 Ω Power supply: 0.5 kV/2 Ω
Conducted interference	EN 61000-4-6	Input/output/power supply: 10 V

**Noise emission according to EN 61000-6-4**

Noise emission according to EN 61000-6-4	EN 55011	Class A
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### 5 Block diagram

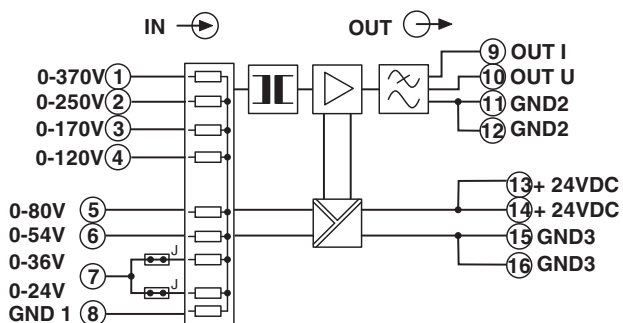


Figure 1 Block diagram for the MCR-VAC-UI-0-DC

### 6 Safety notes



**CAUTION**

Installation, operation, and maintenance may only be carried out by qualified electricians. When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.



**CAUTION: Electrostatic discharge**

The module contains components that can be damaged or destroyed by electrostatic discharge. When handling the module, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.

### 7 Structure

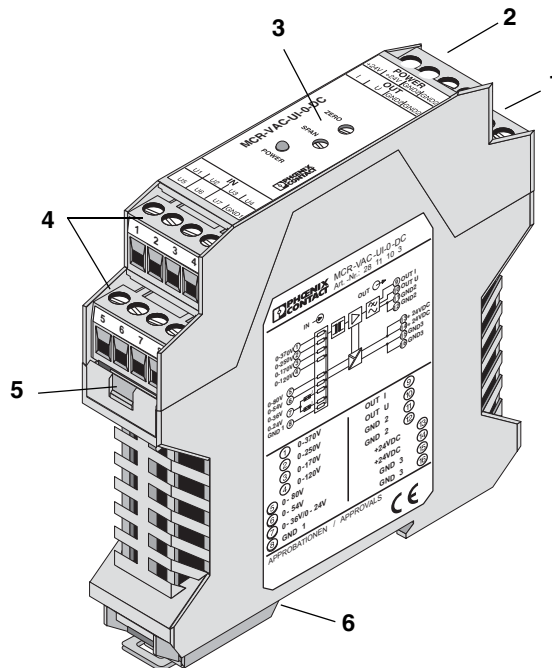


Figure 2 Location of the elements

- 1 Supply voltage
- 2 Output
- 3 Potentiometer for adjustment
- 4 Inputs
- 5 Upper part of the housing can be removed to set the jumpers
- 6 Universal snap-on foot for EN DIN rails

## 8 Installation

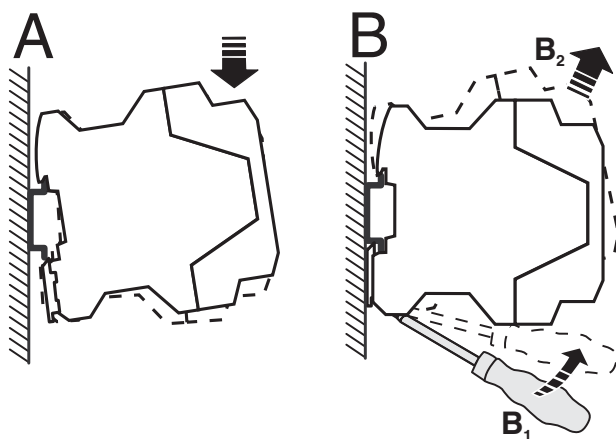


Figure 3 Mounting/removal

The assignment of the connection terminal blocks is shown in the block diagram. The module can be snapped onto all 35 mm DIN rails according to EN 60715.

Install the module in suitable housing to meet the requirements for the protection class.

### Screw connection

Insert the wire into the corresponding connection terminal block.

Use a screwdriver to tighten the screw in the opening above the connection terminal block.

## 9 Configuration

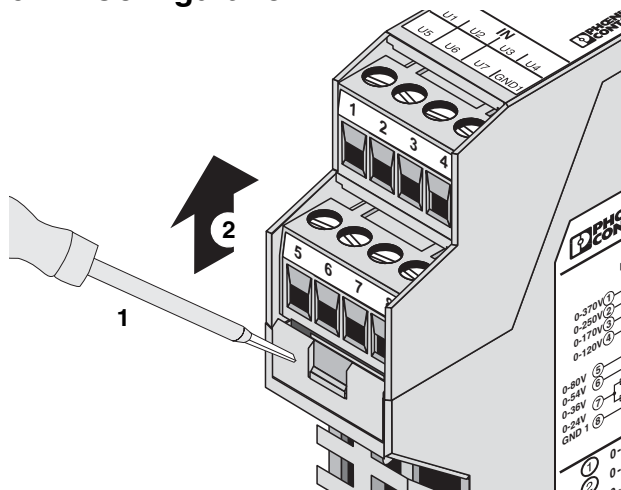


Figure 4 Opening the housing



### WARNING: Risk of electric shock

Never carry out work when voltage is present.



### NOTE: Module damage due to excess voltage

If the voltage signal exceeds the voltage range specified at the input signal terminal block by more than 15%, the input circuit may be damaged.

### 9.1 Selecting the input voltage range

Input voltage	Adjustment range ( $\pm 20\%$ ) [V AC]	Input terminal block	Jumper/setting
0 ... 370 V	(296 ... 440)	1	
0 ... 250 V	(200 ... 300)	2	
0 ... 170 V	(136 ... 204)	3	
0 ... 120 V	(96 ... 144)	4	
0 ... 80 V	(64 ... 96)	5	
0 ... 54 V	(43 ... 65)	6	
0 ... 36 V	(28 ... 43)	7	J1/setting 1
0 ... 24 V	(19 ... 29)	7	J1/setting 2 (default setting)

9.2 Opening the module

- Using a screwdriver, release the locked upper part of the housing on both sides (1). The upper part of the housing and the electronics can now be pulled out approximately 3 cm (2) (see Figure 4 on page 6).

9.3 Jumper settings

- Insert the jumpers in slots J1 ... J3 according to the required input voltage and the current output.

Input voltage:

Input	Jumper	Position
36 V	J1	1
24 V	J1	2

Current output:

Output	Jumper	Position
0 ... 10 V	J2/J3	1
0 ... 20 mA	J2/J3	1
4 ... 20 mA	J2/J3	2

- Close the housing again until it engages with a click.



Carry out a ZERO/SPAN adjustment each time the input or output range is changed.

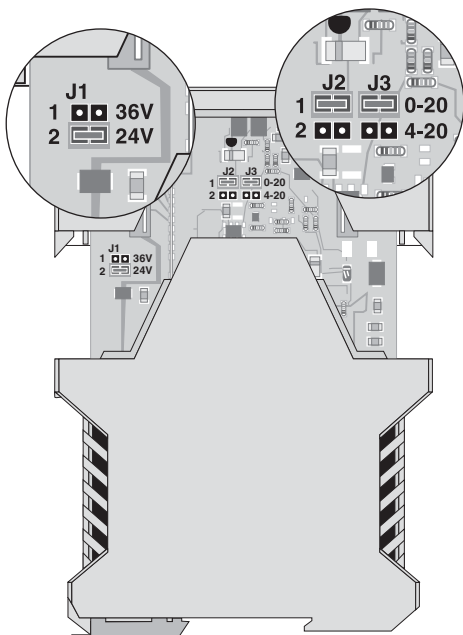


Figure 5 Location of jumpers J1 ... J3

10 ZERO/SPAN adjustment

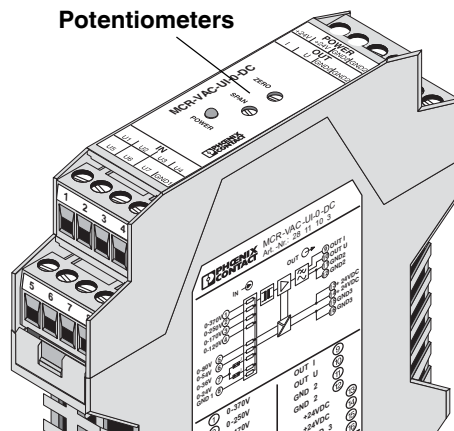


Figure 6 Location of the potentiometers



Allow the module to warm up for 4 minutes before starting the adjustment procedure.

The module is calibrated by default to 0 ... 24 V input and 0 ... 10 V output.

There are two potentiometers on the front of the module for the adjustment:

- ZERO: Zero point adjustment
- SPAN: Final value adjustment

10.1 Zero point adjustment (ZERO)

- Connect a calibration device to the input terminal blocks (U<sub>(1-7)</sub> and GND1) and specify a voltage of 0 mV.
- Set the output signal value using the ZERO potentiometer:
  - Voltage output (0 ... 10 V): U<sub>OUT</sub> = 0 V
  - Current output (0 ... 20 mA): I<sub>OUT</sub> = 0 mA
  - Current output (4 ... 20 mA): I<sub>OUT</sub> = 4 mA

10.2 Final value adjustment (SPAN)

- Use the calibration device to specify the maximum voltage used within the input voltage range (see "Selecting the input voltage range" on page 6).
- Set the output signal value (U<sub>OUT</sub> = 10 V or I<sub>OUT</sub> = 20 mA) using the SPAN potentiometer.



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