Voltage Measuring Transducer for AC Voltage
MCR-VAC-UI-0-DC

1. Description

- 3-way electrical isolation
- TRMS measurement
- Adjustable voltage ranges
- ZERO/SPAN adjustment ±20%

Voltage transducers measure AC voltages in several signal ranges from 0…24 V AC to 0…370 V AC and convert them into standardized analog signals.

The input voltage ranges of input terminals ①…⑦ can be adjusted by ±20% using an adjustment potentiometer.

The input, output, and supply are electrically isolated from one another. Upon delivery, the voltage transducer is set to 0…24 V AC input and 0…10 V DC output and is ready for operation. If you set the device to other input/output values you must carry out a ZERO/ SPAN adjustment using the potentiometer on the front plate.

2. Method of Operation

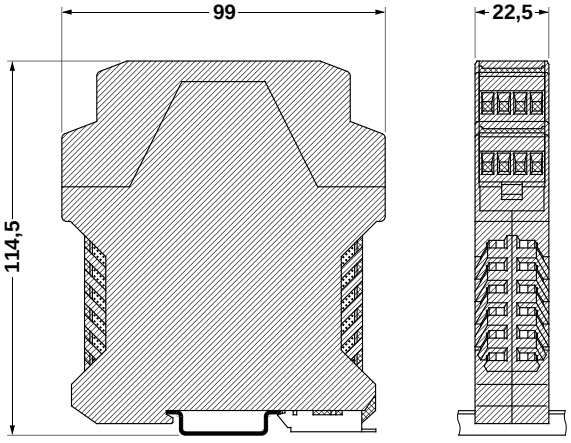
The input circuit divides the AC voltage at terminals ①…⑦. The resultant signal is transmitted electrically isolated to the output circuit. This forms the r.m.s. value and provides a standardized analog signal at the output.

3. Area of Application

When using the voltage transducer, ensure that the potential difference between terminal ①…⑦ and ground potential PE, and terminal ⑧ and ground potential PE does not exceed U_{rms} = 444 V (prerequisite for ungrounded circuits).

In AC voltage networks, this potential difference should not exceed U_{rms} = 250 V (prerequisite for grounded circuits).

If all of these conditions are met, **safe isolation** is provided between the input, output, and supply.



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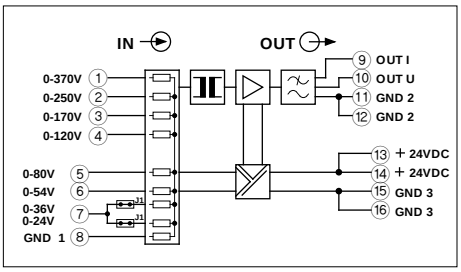
4. Technical Data



MCR-VAC-UI-0-DC

for converting AC voltages
from 0...20 V AC to 0...440 V AC

	rigid [mm²]	flexible	AWG
Connection data	0.2-2.5	0.2-2.5	24-14

Description	Output signal	Type	Order No.	Pcs. Pkt.
MCR voltage measuring transducer, for AC voltages from 0...20 V AC to 0...440 V AC	0...10 V/ 0(4)...20 mA	**MCR-VAC-UI-0-DC**	**28 11 10 3**	1

Technical Data

Input					
Input voltage range		0…370 V AC	0…250 V AC	0…170 V AC	0…120 V AC
Input resistance		370 kΩ	250 kΩ	170 kΩ	120 kΩ
Input voltage range		0 … 80 V AC	0 … 54 V AC	0 … 36 V AC	0 … 24 V AC
Input resistance		80 kΩ	54 kΩ	36 kΩ	24 kΩ
Adjustment options:	ZERO	±20%			
	SPAN	±20%			
Frequency response		45 Hz - 400 Hz			
Nominal voltage ungrounded:		440 V			
Nominal voltage to ground [1])		250 V			
Output					
Output signal	Voltage/current	0 … 10 V/0(4) … 20 mA			
Maximum output signal	Voltage/current	+15 V/+30 mA			
Load	Voltage/current	> 10 kΩ/< 500 Ω			
Ripple		< 50 mV_{pp}			
General Data					
Supply voltage		18.5 … 30.2 V DC			
Current consumption		< 45 mA			
Transmission error		< 1.5% of the final value			
Temperature coefficient		–			
Limit frequency (3 dB)		–			
Step-response (10 - 90%)		250 ms			
Test voltage:	Input/output	3.3 kV, 50 Hz, 1 minute			
	Power supply/output	1.0 kV, 50 Hz, 1 minute			
Ambient operating temperature range		-25°C to +60°C (-13°F to +140°F)			
Electromagnetic compatibility		CE Conformance with EMC Directive 89/336/EEC			
• Noise emission		EN 50 081-2			
• Immunity to interference		EN 50 082-2			

CE

Conformance With EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC

EMC (Electromagnetic Compatibility)		
Noise immunity in accordance with EN 50082-2, EN 50082-1		
• Electrostatic discharge (ESD)	EN 61000-4-2	8 kV air discharge [2]
• Electromagnetic HF field		
Amplitude modulation	ENV 50140	3 V/m [1]
Pulse modulation	ENV 50140	3 V/m [1]
• Fast transients (burst)	EN 61000-4-4	Input/output/supply 2 kV/5 kHz [2]
• Surge current loads (surge)	EN 61000-4-5	Input/output: 2 kV/42 Ω [2] Supply: 0.5 kV/2 Ω [2]
• Conducted interference	EN 61000-4-6	Input/output/supply 10 V [1]
Noise emission in accordance with EN 50081	EN 55011	Class A

EN 61000 corresponds to IEC 1000/
EN 55011 corresponds to CISPR11

[1] Criterion A: Normal operating characteristics within the specified limits.

[2] Criterion B: Temporary adverse effects on the operating characteristics, which the device corrects automatically.

Class A: Industrial application, without special installation measures

Voltage Measuring Transducer for AC Voltage MCR-VAC-UI-0-DC

① ZERO/SPAN potentiometer

② Plug-in screw-cage terminal blocks

③ Housing cover, can be removed to set the jumpers

④ Metal lock for fastening on the DIN rail

⑤ Plug-in screw-cage terminal block

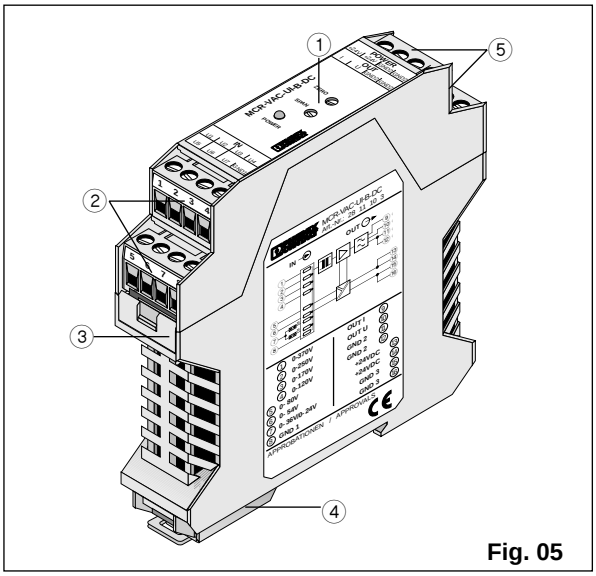


Fig. 05

5. Connection Notes

Caution: Never carry out work when the power is turned on, this is highly dangerous.

Table 1:
Selecting the input voltage range (see also Fig. 08)

Input Voltage	Adjustment Range (±20%) [V AC]	Input Terminal	Jumper/ Setting
0...370 V	(296 - 444)	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 **Factory setting**

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

5.1. Opening the Device (Fig. 06)

The locked housing cover is released on both sides using a screwdriver ①. The housing cover and electronics can now be pulled out about 3 cm (1.181 in.) ②.

5.2. Jumper Setting (Fig. 07/08)

Insert the jumpers in the desired positions to set the input voltage (Fig. 08) and current output (Fig. 07).

Table 2:
Selecting the standard output signal (Fig. 07)

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

Finally, close the housing until it engages with a click.

Every time the input or output range is modified, a ZERO/SPAN adjustment **must** be carried out.

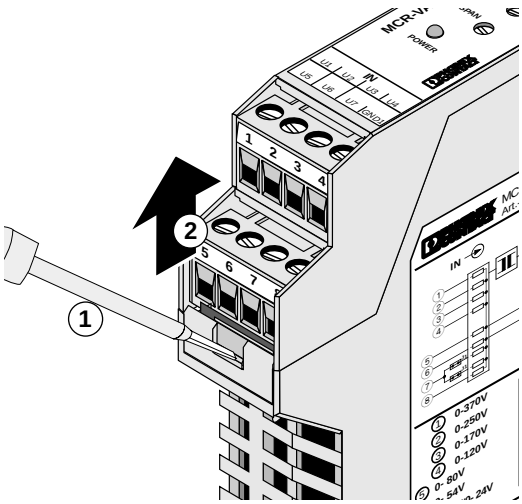


Fig. 06

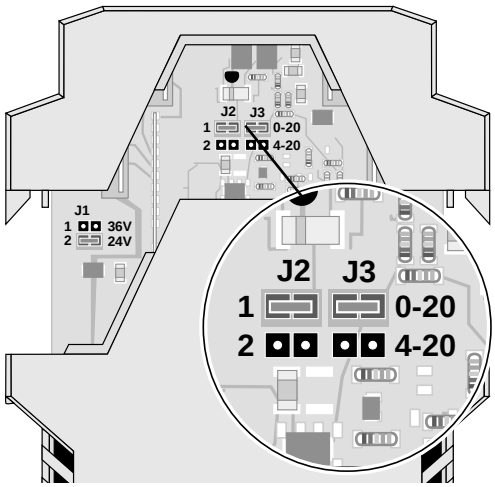


Fig. 07

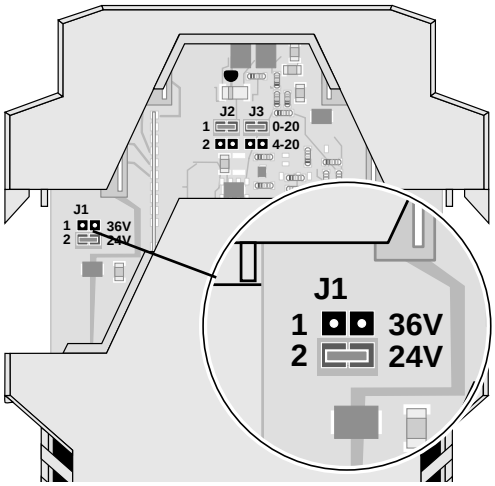


Fig. 08

6. ZERO/SPAN Adjustment

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

Upon delivery, the module is set to 0-24 V input and 0…10 V output.

Two potentiometers are available on the front side of the module for adjustment (Fig. 09):
ZERO: Zero point adjustment
SPAN: Final value adjustment

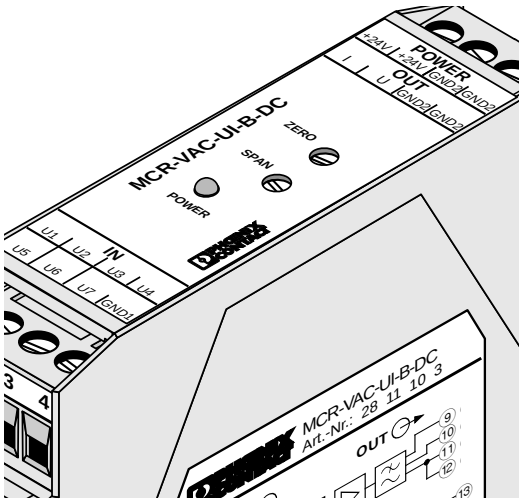


Fig. 09

d) Zero point adjustment

- Connect a calibration source to the input terminals ($U_{(1-7)}$ and GND1) and specify a voltage of 0 mV.
- Set the output signal value using the **ZERO** potentiometer.
  Voltage output (0…10 V): U_{OUT} = 0 V
  Current output (0…20 mA): I_{OUT} = 0 mA
  Current output (4…20 mA): I_{OUT} = 4 mA

b) Final value adjustment

- Use the calibration source to specify the maximum voltage used in the framework of the input voltage range (table 1).
- Set the output signal value (U_{OUT} = 10 V and I_{OUT} = 20 mA) using the **SPAN** potentiometer.