

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 $\pm 20\%$

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 $\pm 20\%$ 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

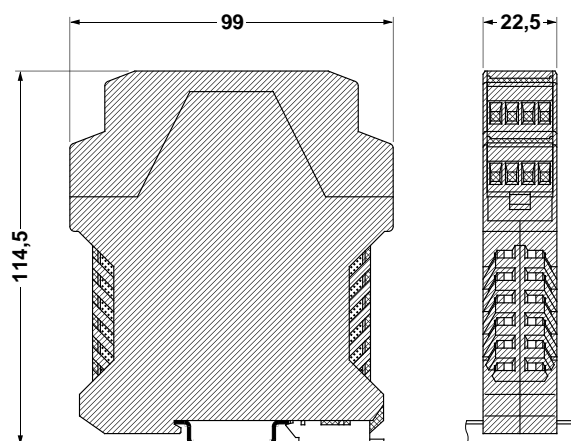
The input circuit divides the AC voltage at terminals ①...⑦. The resultant signal is transmitted electrically isolated to the output circuit. This forms the r.m.s. value and provides a standardized analog signal at the output.

3. Area of Application

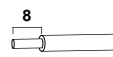
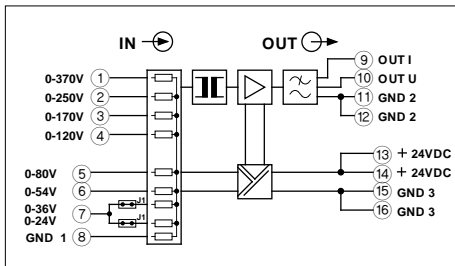
When using the voltage transducer, ensure that the potential difference between terminal ①...⑦ and ground potential PE, and terminal ⑧ and ground potential PE does not exceed $U_{rms} = 444 \text{ V}$ (prerequisite for ungrounded circuits).

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

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



4. Technical Data



rigid flexible
[mm²] AWG

Connection data	0.2-2.5	0.2-2.5	24-14
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MCR-VAC-UI-0-DC
for converting AC voltages
from 0...20 V AC to 0...440 V AC



Description	Output signal
MCR voltage measuring transducer, for AC voltages from 0...20 V AC to 0...440 V AC	0...10 V/ 0(4)...20 mA

Type	Order No.	Pcs. Pkt.
MCR-VAC-UI-0-DC	28 11 10 3	1

Technical Data

Input

Input voltage range	ZERO
Input resistance	SPAN
Input voltage range	
Input resistance	
Adjustment options:	
Frequency response	
Nominal voltage ungrounded:	
Nominal voltage to ground ¹⁾	

0...370 V AC	0...250 V AC	0...170 V AC	0...120 V AC
370 kΩ	250 kΩ	170 kΩ	120 kΩ
0 ... 80 V AC	0 ... 54 V AC	0 ... 36 V AC	0 ... 24 V AC
80 kΩ	54 kΩ	36 kΩ	24 kΩ
±20%			
±20%			
45 Hz - 400 Hz			
440 V			
250 V			

Output

Output signal	Voltage/current
Maximum output signal	Voltage/current
Load	Voltage/current
Ripple	

0 ... 10 V/0(4) ... 20 mA
+15 V/+30 mA
> 10 kΩ / < 500 Ω
< 50 mV _{pp}

General Data

Supply voltage	Input/output
Current consumption	Power supply/output
Transmission error	
Temperature coefficient	
Limit frequency (3 dB)	
Step-response (10 - 90%)	
Test voltage:	
Ambient operating temperature range	
Electromagnetic compatibility	
• Noise emission	
• Immunity to interference	

18.5 ... 30.2 V DC
< 45 mA
< 1.5% of the final value
-
-
250 ms
3.3 kV, 50 Hz, 1 minute
1.0 kV, 50 Hz, 1 minute
-25°C to +60°C (-13°F to +140°F)
CE Conformance with EMC Directive 89/336/EEC
EN 50 081-2
EN 50 082-2

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



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)

- Electromagnetic HF field
 - Amplitude modulation
 - Pulse modulation

- Fast transients (burst)

- Surge current loads (surge)

- Conducted interference

Noise emission in accordance with EN 50081

EN 61000-4-2	8 kV air discharge ²⁾
ENV 50140	3 V/m ¹⁾
ENV 50140	3 V/m ¹⁾
EN 61000-4-4	Input/output/supply 2 kV/5 kHz ²⁾
EN 61000-4-5	Input/output: 2 kV/42 Ω ²⁾ Supply: 0.5 kV/2 Ω ²⁾
EN 61000-4-6	Input/output/supply 10 V ¹⁾
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

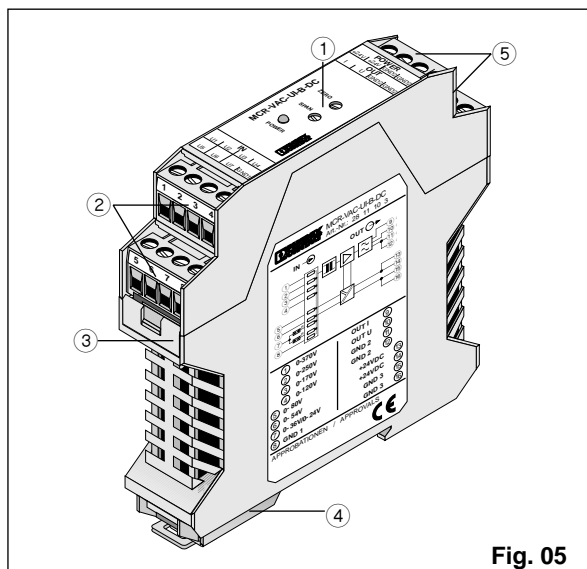


Fig. 05

5. Connection Notes

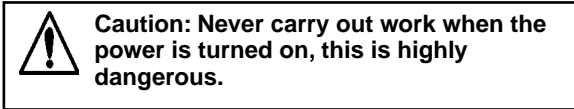
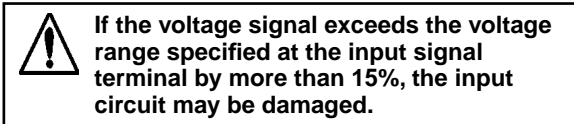


Table 1:
Selecting the input voltage range (see also Fig. 08)

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



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.

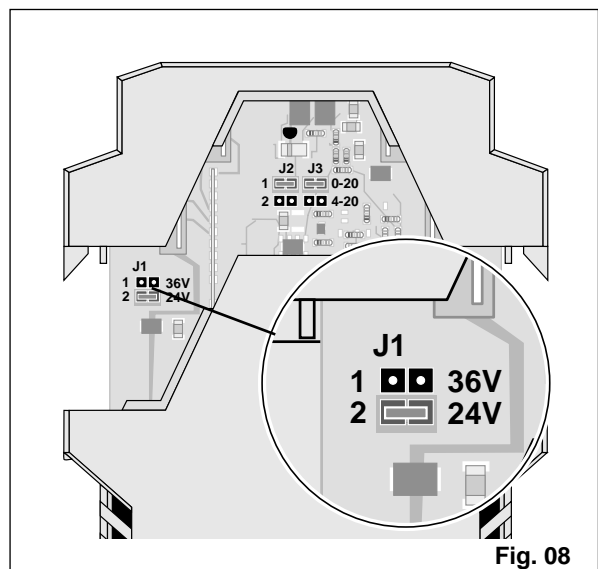
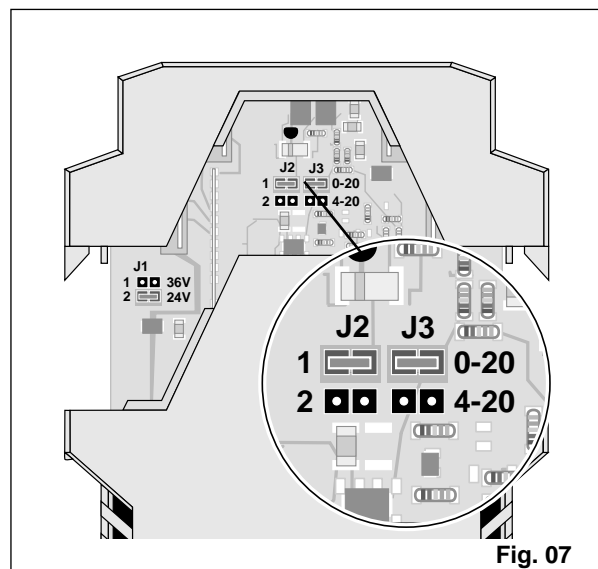
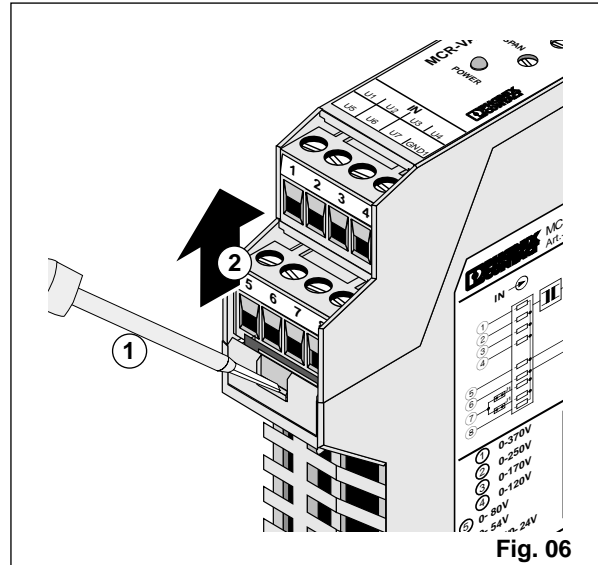
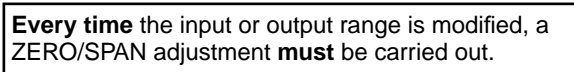
5.2. Jumper Setting (Fig. 07/08)

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.



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

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): $U_{OUT} = 0\text{ V}$

Current output (0...20 mA): $I_{OUT} = 0\text{ mA}$

Current output (4...20 mA): $I_{OUT} = 4\text{ mA}$

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 ($U_{OUT} = 10\text{ V}$ and $I_{OUT} = 20\text{ mA}$) using the **SPAN** potentiometer.

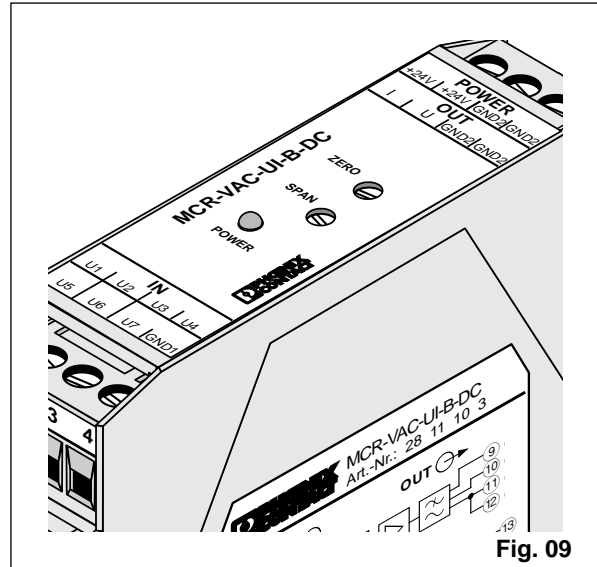


Fig. 09