

# Protective earth bonding resistance meters

## RMO-E series

- Lightweight – only 8 kg / 17.6 lbs
- Powerful 10 mA – 100\* A DC (60 A for RMO60E)
- Measuring range 0,1  $\mu\Omega$  – 20,00  $\Omega$
- Best resolution 0,1  $\mu\Omega$
- SINGLE and CONTIN modes
- Typical accuracy:  $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$



### Description

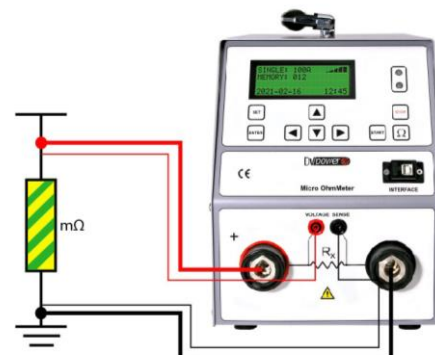
RMO-E series or Protective Earth Bonding Resistance Meters (hereafter referred to as “RMO-E”) contains two models: **RMO60E** and **RMO100E**. The main difference between these two models is the maximum test current that can be generated (60 A for RMO60E and 100 A for RMO100E model).

RMO-E is ideal for testing the resistance of the accessible conductors which are connected to the protective conductor terminal and could become hazardous live. **The test is described in 61010-1 IEC 2010 standard and specifies the following:**

- The resistance between the protective conductor terminal and each accessible part for which protective bonding is required should not exceed 0,1  $\Omega$ . Conformity is checked by applying a test current for 1 minute and then calculating resistance. The test current should be greater than 25 A, or twice the rated current for plug-connected equipment.
- The resistance of protective bonding for permanently connected equipment is checked by applying a test current of twice the value of the overcurrent protection for 1 minute, and the voltage should not exceed 10 V.

For both applications RMO-E can provide the right tool for verification of the integrity. Applying current up to the value of 100 A and the ability of RMO-E to provide in the CONTIN menu (continuous operation) test current for the pre-set test duration (equal or exceeding 1 min) - gives a user possibility to easily check the protective bonding/grounding of the equipment. The full load voltage up to 12V assures that the measurement is executed properly and that the result obtained (pass/fail classification) is accurate.

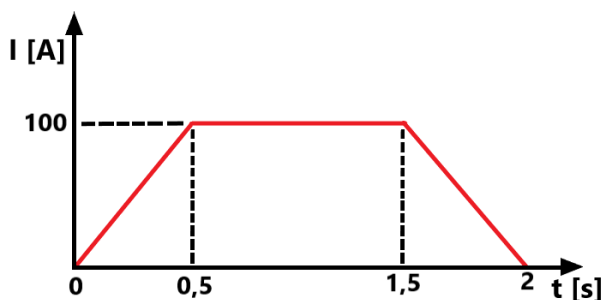
RMO-E generates true DC current with automatically regulated test ramps. During the test RMO-E ramps with increasing current before measuring and decreasing current after the measurement. This decreases the influence of magnetic transients.



## Single mode

The RMO-E instrument generates a filtered (true ripple-free) DC current and outputs it in an automatically regulated current ramp. By sloping the current up and down, magnetic transients are virtually eliminated.

Below is an example of a single test ramp for the 100 A current.



## CONTIN mode

RMO-E can generate a DC current continuously using the CONTIN mode. In this menu, the current can be chosen the same way as in the SINGLE mode, but the duration of the test can be preset. The test is started by pressing the *START* button. During the test, the results are constantly being updated on a display and can be stored in the new memory location with each press of the Omega button. Using DV-Win the results can be arranged as an Excel spreadsheet which can be later shown as a diagram and printed for a report.

### Pass/fail criteria

An additional feature is the pass/fail criteria implemented through the Rmax function. When this function is turned ON, the RMO-E device displays information if the measured resistance is higher than the set Rmax resistance value.

## Applications

A typical application of the RMO-E series is the continuity test of the protective bonding conductors to verify that all conductive parts that are exposed to user contacts are properly connected to the ground. The test set complies with IEC 61010-1 safety standard.

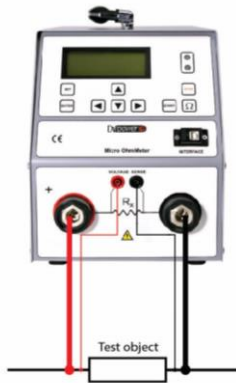
The protective conductor ensures that in the event of a failure, no dangerous voltage is present on the housing of the equipment. In such a case, a life-threatening current could flow through the user if the housing was touched. This could happen if the resistance of the protective conductor is too high. The protective conductor should therefore reduce or in the best case eliminate the danger to persons. Therefore, all internal and external protective conductor connections must be checked for perfect performance.

Another application is measuring the contact resistance of non-inductive test objects:

- High and medium voltage circuit breakers
- High and medium voltage disconnecting switches
- High-current bus bar joints
- Cable splices
- Welding joints
- Fuses

## Connecting RMO-E to a test object

The connection diagram of our RMO-E devices corresponds to Kelvin's (four-point) measurement principle. The measuring cables from the "Voltage Sense" terminals are attached as close as possible to the test object, and in between the current feeding cables. That way, the resistance of current cables and clamps is excluded from the resistance measurement.



The RMO-E instrument can store up to 500 measurements. All measurements are time and date stamped. Using DV-Win software a test can be performed from a PC, and the results can be obtained directly at a PC. Communication between RMO-E and PC is through USB or RS232 cable.

The set is equipped with thermal and overcurrent protection. The RMO-E has a very high ability to cancel electrostatic and electromagnetic interference in HV electric fields. It is achieved by very efficient filtration. The filtration is made utilizing proprietary hardware and software.

## DV-Win software

DV-Win software provides acquisition and analysis of the test results, as well as control of the RMO-E functions from a PC. The DV-Win also provides several advanced features as a supplement to multiple functions of RMO devices. Testing in Continuous mode is upgraded with a sample time feature which allows users to record test results in specific time intervals set in seconds.

- Full control of the device during the test
- Test reports are available in several formats
- Several filters for results download to PC
- Sampling time feature for CONTIN mode

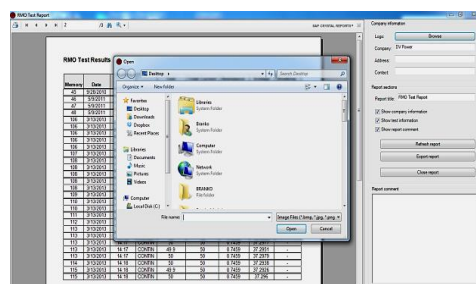
## Benefits and features

The main benefits and features of RMO-E devices are listed below:

- High output voltage\*  
*\*Enables use of thinner/longer test cables*
- The output current is filtered and has a ripple of less than 1 %
- The instrument has a very high typical accuracy  $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$
- The best resolution of RMO-E is  $0,1 \mu\Omega$
- Rmax feature (pass/fail criteria, enabled with the device and the DV-Win software)
- Built-in thermal printer (optional accessory)

After performed measurements, the results can be saved in various formats, and test reports can be generated or printed out. The results can also be downloaded from the device to the PC, by use of several different search filters.

For the RMO-E form of DV-Win software, there is a Help menu available, with detailed instructions and explanations of all functions and features.



## Technical data

### Mains power supply

- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz
- 12 A / 250 V, type F

### Output data

- Test current range:
  - RMO60E: 10 mA – 60 A DC
  - RMO100E: 10 mA – 100 A DC
- Full load voltage: up to 12 V DC
- Open circuit voltage: 25 V DC

### Measurement

- Resistance range 0,1  $\mu\Omega$  – 20,00  $\Omega$
- Resolution:
 

0,1 $\mu\Omega$ – 999,9 $\mu\Omega$	0,1 $\mu\Omega$
1,000 m $\Omega$ – 9,999 m $\Omega$	1,0 $\mu\Omega$
10,00 m $\Omega$ – 99,99 m $\Omega$	10 $\mu\Omega$
100,0 m $\Omega$ – 999,9 m $\Omega$	0,1 m $\Omega$
1,000 $\Omega$ – 9,999 $\Omega$	1 m $\Omega$
10,00 $\Omega$ – 20,00 $\Omega$	10 m $\Omega$
- Typical accuracy:  $\pm$  (0,1 % rdg + 0,1 % FS)

### Display

- LCD screen 20 characters by 4 lines. Display with backlight, visible in bright sunlight.

### Interface

- RMO-E is equipped with USB port or RS232 interface (optional)
- Bluetooth communication module (optional)

### Test Result Storage

- RMO-E can store up to 500 measurements

### Printer (optional)

- Thermal printer
- Paper width 58 mm / 2.3 in

### Environmental conditions

- Operating temperature: -20  $^{\circ}\text{C}$  - +55  $^{\circ}\text{C}$  / -4  $^{\circ}\text{F}$  - +131  $^{\circ}\text{F}$
- Storage & transportation: -40  $^{\circ}\text{C}$  - +70  $^{\circ}\text{C}$  / -40  $^{\circ}\text{F}$  - +158  $^{\circ}\text{F}$
- Humidity: up to 95 % relative humidity

### Dimensions and weight

- Dimensions (W x H x D):  
198 mm x 255 mm x 380 mm  
7,8 in x 10 in x 15 in
- Weight: 8 kg / 17.6 lbs

### Environmental protection

- Ingress protection rating: IP50

### Warranty

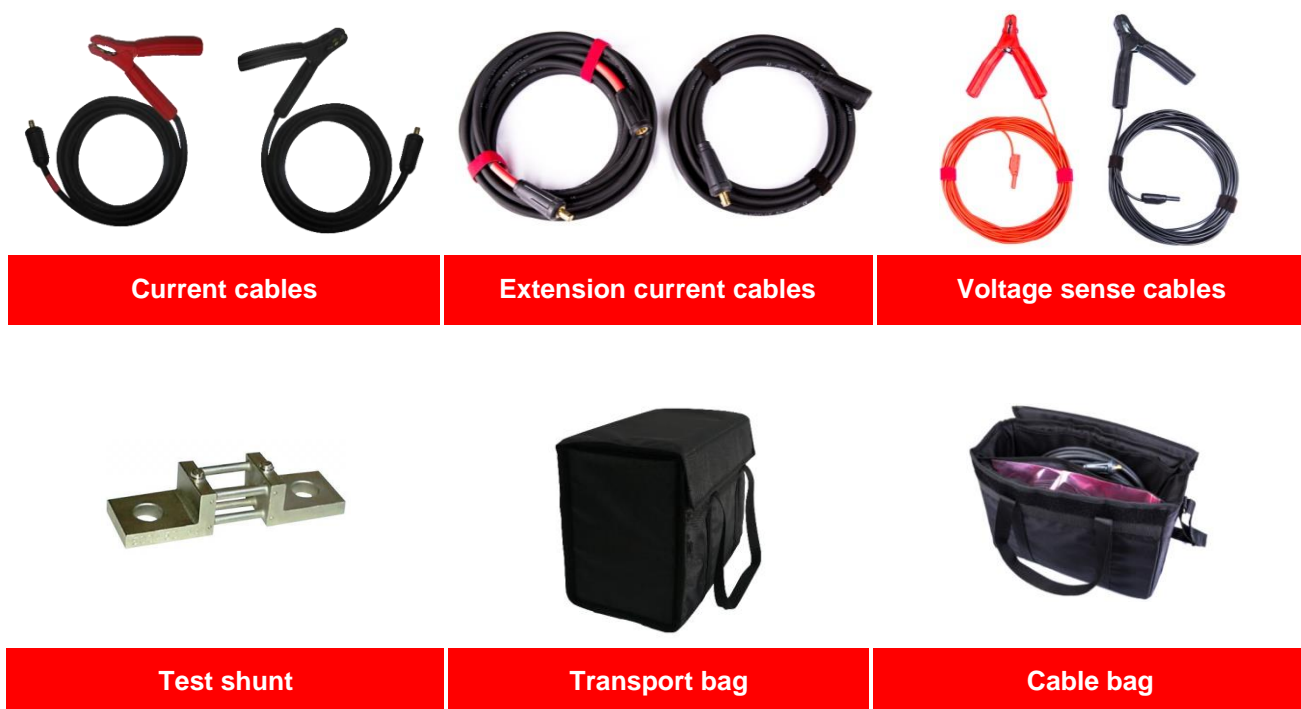
- 3 years + additional 1 (one) year upon registration on DV Power official website ([www.dv-power.com](http://www.dv-power.com))

### Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: Directive 2014/35/EU (CE conform) Applicable standards, for a class I instrument, pollution degree 2, Installation category II: IEC EN 61010-1
- EMC: Directive 2014/30/EU (CE conform) Applicable standard: EN 61326-1
- CAN/CSA-C22.2 No. 61010-1, 2nd edition, including Amendment 1

*All specifications herein are valid at ambient temperature of + 25  $^{\circ}\text{C}$  and recommended accessories. Specifications are subject to change without notice*

## Accessories



## Order info

<b>RMO60E instrument with included accessories</b>	<b>Article No</b>
<b>Protective earth bonding resistance meter RMO60E</b> <ul style="list-style-type: none"> <li>– DV-Win PC software</li> <li>– Mains Power and Ground (PE) cable</li> <li>– USB cable</li> <li>– Transport bag</li> </ul>	<b>RMO060E-N-02</b>
<b>RMO100E instrument with included accessories</b>	<b>Article No</b>
<b>Protective earth bonding resistance meter RMO100E</b> <ul style="list-style-type: none"> <li>– DV-Win PC software</li> <li>– Mains Power and Ground (PE) cable</li> <li>– USB cable</li> <li>– Transport bag</li> </ul>	<b>RMO100E-N-02</b>
<b>Standard accessories</b>	<b>Article No</b>
Current cables 2 x 5 m 10 mm <sup>2</sup> with alligator clamps (A3) *	C2-05-10LMA3
Sense cables 2 x 5 m with alligator clips (A2)	S2-05-02BPA2
Current cables 2 x 5 m 16 mm <sup>2</sup> with alligator clamps (A3) **	C2-05-16LMA3
<b>Optional accessories</b>	<b>Article No</b>
Current cables 2 x 10 m 16 mm <sup>2</sup> with alligator clamps (A3)	C2-10-16LMA3
Current cables 2 x 5 m 16 mm <sup>2</sup> with battery clamps (B1)	C2-05-16LMB1
Current cables 2 x 10 m 16 mm <sup>2</sup> with battery clamps (B1)	C2-10-16LMB1
Current cables 2 x 15 m 25 mm <sup>2</sup> with battery clamps (B1)	C2-15-25LMB1
Current cables 2 x 5 m 10 mm <sup>2</sup> and Sense cables 2 x 5 m with TTA clamps *	CS-05-10LMWC
Current cables 2 x 10 m 10 mm <sup>2</sup> and Sense cables	CS-10-10LMWC

2 x 10 m with TTA clamps *	
Current cables 2 x 15 m 16 mm <sup>2</sup> and Sense cables 2 x 15 m with TTA clamps *	CS-15-16LMWC
Extension cables 2 x 5 m 16 mm <sup>2</sup>	E2-05-16LMLF
Extension cables 2 x 10 m 16 mm <sup>2</sup>	E2-10-16LMLF
Sense cables 2 x 5 m with alligator clamps (A1)	S2-05-02BPA1
Sense cables 2 x 10 m with alligator clamps (A1)	S2-10-02BPA1
Sense cables 2 x 15 m with alligator clamps (A1)	S2-15-02BPA1
Sense cables 2 x 10 m with alligator clamps (A2)	S2-10-02BPA2
Sense cables 2 x 15 m with alligator clamps (A2)	S2-15-02BPA2
Extension sense cables 2 x 5 m	E2-05-02BPBP
Extension sense cables 2 x 10 m	E2-10-02BPBP
Test Shunt 150 A / 150 mV	SHUNT-150-MK
Thermal printer 58 mm (built-in)	PRINT-058-01
Thermal paper roll 58 mm	PRINT-058-RO
Cable bag	CABLE-BAG-00
Cable plastic case - medium size	CABLE-CAS-02
Cable plastic case with wheels - medium size	CABLE-CAS-W2
Transport bag for instruments in metal housing	TRBAG-M00-01

\* for RMO60E

\*\* for RMO100E

### **B-RMOXX0E-316-EN**

Date published: 2024-07-19.

**Subject to change without notice.**