

## RMO-G series

# Micro Ohmmeters

- Lightweight – from 8 to 11,5 kg /17.6 lbs to 25.4 lbs
- Powerful – test current up to 800 A DC
- Measuring range: 0,1  $\mu\Omega$  – 999,9 m $\Omega$  (up to 6  $\Omega$ )
- Best resolution: 0,01  $\mu\Omega$  (with built-in HP module)
- Typical accuracy:  $\pm$  (0,1 % rdg + 0,1 % FS)
- Remote Control Unit (optional)
- Both Sides Grounded Unit (optional)
- A built-in High Precision module (optional)
- *SINGLE / CONTIN / BSG / DTRtest* modes



### Description

RMO-G series of Micro Ohmmeters (hereafter referred to as “RMO-G”) contain 7 models: **RMO100G, RMO200G, RMO300G, RMO400G, RMO500G, RMO600G & RMO800G.**

All RMO-G models are based on a state of the art technology, using the most advanced switch mode technique available today. The main difference between these models is the maximum test current that can be generated (100 A for RMO100G, 200 A for RMO200G, ..., up to 800 A for RMO800G model).

RMO-G generates a true DC ripple-free current with automatically regulated test ramps. During a test the RMO-G ramps with increasing current before measuring and decreasing current after the measurement. This decrease influence of magnetic transients on measurements.

Maximum load capacity at 100 A is continuous for all RMO-G models at 25°C (77°F) ambient temperature.

The RMO-G instrument can store internally up to 500 measurements (resistance, voltage drop and test current values). All measurements are time and date stamped.

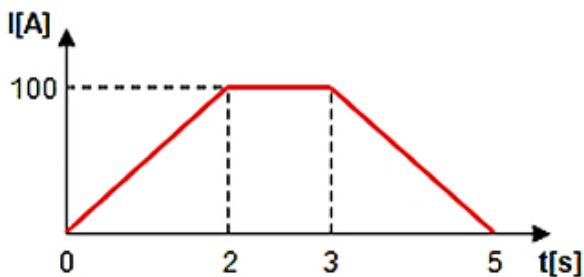
Communication between the RMO-G and a PC is through an USB (as standard) or an RS232 cable (as an option). Using the DV-Win software a test can be performed from a PC. The results can be obtained directly on the PC or downloaded from the RMO-G device. DV-Win contains test reports wizard used for generating fully customized test reports.

The RMO-G instrument has four separate test modes:

- SINGLE mode
- CONTIN mode
- BSG mode (*Both Sides Grounded*)
- DTRtest mode (*Dead Tank Resistance*)

## Single Test

The RMO-G instrument generates a filtered (true ripple-free) DC current and output it in an automatically regulated current ramp. By sloping the current up and down, magnetic transients are virtually eliminated. Below is an example of single test ramp for the 100 A current.



## Continuous Test

RMO-G can generate DC current continuously in predefined test durations, as presented in the table below.

Test current (A)	Maximum test duration time
5, 10, 20, 50, 100	Continuous
200	150 s
300	90 s
400	50 s
500	30 s
600	20 s
800	300 ms

\* at 25°C (77°F) ambient temperature.

\*\*in standard version CONTIN mode is available up to 600 A

To prevent overheating, certain duty cycles apply depending on the test current being used.

## BSG test

Grounding circuit breakers from both sides provides increased safety for testing personnel comparing with only one side grounding method.

This test mode is specially designed for **Both Sides Grounded** testing. A special current clamp meter supplied from the instrument is used for measuring the current through the groundings. The test setup is very simple (same as for the SINGLE test) and all calculations are made automatically by the device internal algorithm.

## DTRtest

Presence of current transformers (CT) on the dead tank circuit breakers may introduce errors during contact resistance measurement due to CT magnetizing process. For this reason, it is necessary to saturate a CT prior to measurement.

DTRtest menu is specially designed for resistance measurement of the dead tank circuit breakers. All calculations for detecting the saturated condition of CTs are done by internal algorithm. Accordingly, the process of measurement parameters setting and testing in this mode is very simple and does not differ much from live tank circuit breaker testing (in SINGLE / CONTIN test modes).

## High – Precision module (optional)

The high-precision module is newly developed optional built-in addition to our RMO-G micro-ohmmeters. It provides an increased precision and offers a highly accurate contact resistance measurement:  $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$  accuracy at range from 0,01  $\mu\Omega$  to 99,99  $\mu\Omega$ , with 0,01  $\mu\Omega$  resolution.

RMO-G devices with the built-in High Precision Module may be used for applications on very small resistance measurements of non-inductive test objects. This requirement is usually met at resistance inspections of generator circuit breakers, welding joints, GIS testing, etc.

## Application

Typical application is measuring resistance of non-inductive test objects:

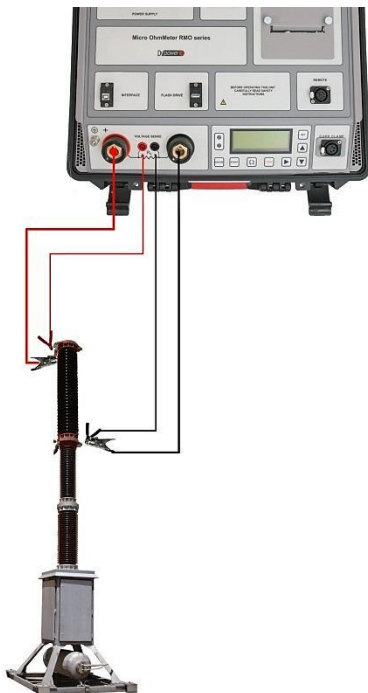
- High- and medium- voltage circuit breakers (live and dead tank)
- High- and medium- voltage disconnecting switches
- Gas Isolated Switchgears (GIS)
- High-current bus bar joints
- Cable splices
- Welding joints
- Fuses

## Connecting the Test Object to RMO-G

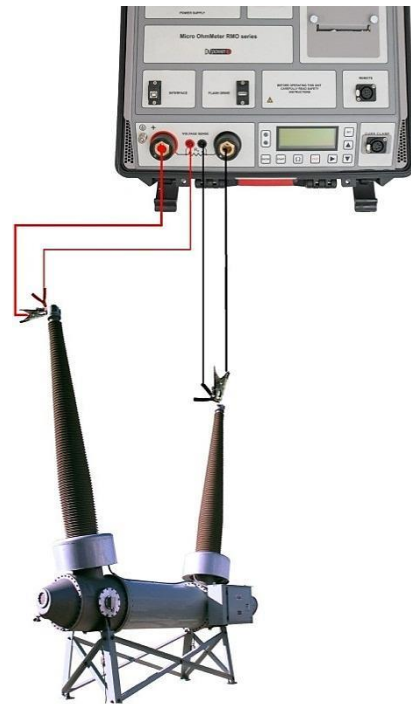
The connection diagram of the RMO-G devices corresponds to the Kelvin's (four point) measurement principle. The measuring cables from the "Voltage Sense" sockets are attached as close as possible to Rx, and in between the current feeding cables. That way, a resistance of both cables and clamps is almost completely excluded from the resistance measurement.



The connecting diagrams for the live tank and dead tank circuit breakers are presented in the following two figures:



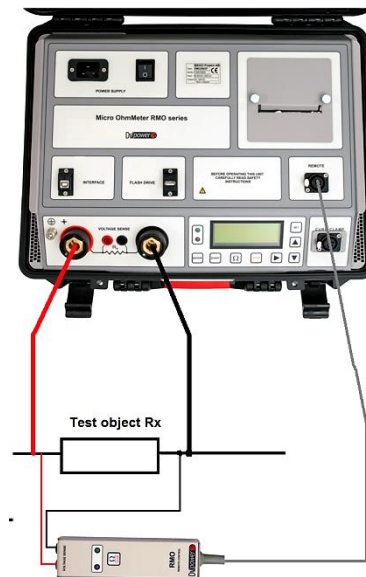
*RMO-G cable connection on live tank circuit breaker*



*RMO-G cable connection on dead tank circuit breaker*

## Remote Control Unit

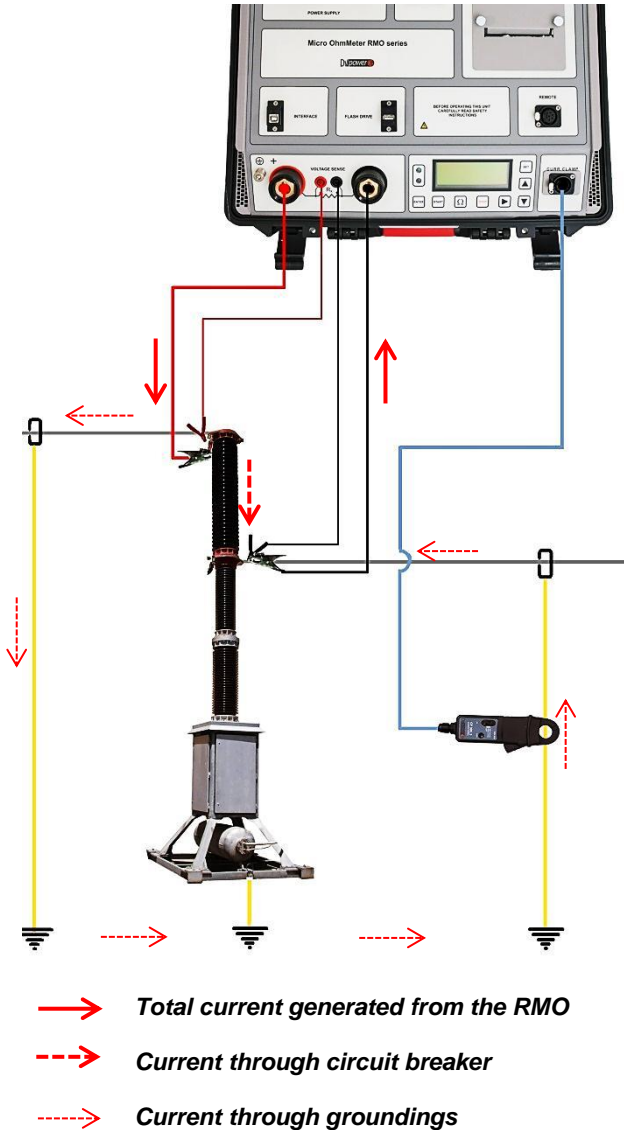
The RMO Remote Control Unit is an optional control unit that is used to start and stop the tests from a remote location, away from the actual RMO-G.



Provided that, for a series of tests, the same test current is fed through the test object, multiple measurements can be carried out with the RMO Remote Control Unit.

## Connecting RMO-G to a Both Sides Grounded Circuit Breaker

Using RMO-G with both sides grounded option it is possible to make safer measurement of breakers with both terminals of the breaker grounded.



Using the RMO-G with a current clamp-meter is an additional safety feature. Measurement of a circuit breaker contact resistance is done with both sides of the breaker grounded.

The RMO-G device will measure the current through the ground circuit connection and add this value to the selected test current value in order to provide the selected test current through the test object.

## Benefits and features

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

- Very high output power (output voltage multiplied with output current) enables two main advantages:
  1. Wide resistance measurement range even when very high currents are used.
  2. Use of thinner/longer test cables, depending of the customer requirement.  
e.g. RMO100G can use 20 m current cables with cross-section of only 16 mm<sup>2</sup> for testing circuit breakers with 100 A test current.
- The output current is filtered and has a ripple of less than 1 %.
- Maximum load capacity at 100 A is continuous for all RMO-G models at 25°C (77°F) ambient temperature.
- The instrument has a very high typical accuracy  $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$ .
- The best resolution of RMO-G is 0,01  $\mu\Omega$  at 99,99  $\mu\Omega$  range (in case of built-in High Precision module).

Several advanced features are available as standard/optional accessories:

- Rmax feature – pass/fail criteria
- Built-in thermal printer (*optional*)
- USB or RS232 communication port
- Bluetooth communication (*optional*)
- DTRtest mode – a special mode for Dead Tank circuit breakers testing
- A built-in High Precision module (available as option) – provides an increased precision and offers a highly accurate contact resistance measurement in the range from 1  $\mu\Omega$  to 30  $\mu\Omega$ , with 0,01  $\mu\Omega$  resolution.

## DV-Win software

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

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

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

## DV-Win Main Features

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

The screenshot displays the DV-Win software interface. At the top, a 'Welcome back!' message is shown. Below it, a dashboard contains six main action buttons: 'Start new test', 'Analyze your results', 'Manage test plans', 'Create reports', 'Adjust settings', and 'About?'. A sidebar on the left lists navigation options: Home, New test, Results analysis, Test plans, Reports, Demo, Settings, and About.

In the foreground, a 'Test report' window is open, showing a table of test results. The table has columns for 'Time', 'Status', 'Set Total', 'Current', 'Min', 'Max', 'Avg', 'StdDev', 'Min/Max', 'Min/Max', 'Min/Max', and 'Min/Max'. The data rows show various test parameters and their corresponding values.

Time	Status	Set Total	Current	Min	Max	Avg	StdDev	Min/Max	Min/Max	Min/Max	Min/Max
1	2023/9/14 07:00 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
2	2023/9/14 07:02 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
3	2023/9/14 07:04 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
4	2023/9/14 07:07 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
5	2023/9/14 07:10 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
6	2023/9/14 07:13 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
7	2023/9/14 07:16 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
8	2023/9/14 07:19 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
9	2023/9/14 07:22 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
10	2023/9/14 07:25 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
11	2023/9/14 07:28 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
12	2023/9/14 07:31 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
13	2023/9/14 07:34 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
14	2023/9/14 07:37 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
15	2023/9/14 07:40 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
16	2023/9/14 07:43 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
17	2023/9/14 07:46 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
18	2023/9/14 07:49 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-
19	2023/9/14 07:52 PM	100	127000.00	0	0	3400	4401.00	-	-	-	-
20	2023/9/14 07:55 PM	100	128100.00	0	0	3811	4401.00	-	-	-	-



### Environmental protection

- Ingress protection rating: IP67 \*with closed lid

### Environmental conditions

- Operating temperature:  
-20 °C - +55 °C / -4 °F - +131 °F
- Storage & transportation:  
-40 °C - +70 °C / -40 °F - +158 °F
- Relative humidity 5% - 95%, non-condensing
- Altitude: up to 2000 m

### Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Low Voltage Directive: 2014/35/EU (CE conform), EN 61010-1
- EMC Directive 2014/30/EU (CE conform) (Former 2004/108/EC)  
Applicable standard: IEC/EN 61326-1
- CAN/CSA-C22.2 No.61010-1, 2nd edition, including Amendment 1

### Warranty

- 3 Years + additional 1 (one) year upon registration on [www.dv-power.com](http://www.dv-power.com)

**All specifications herein are valid at ambient temperature of + 25 °C and standard accessories. Specifications are subject to change without notice.**

### Accessories



**Current cables**



**Extension current cables**



**Voltage sense cables**



**Current clamp 30/300A power supplied from the instrument**



**Test shunt**



**Plastic transport case & Cable bag**



\* Besides battery clamps, current cables are also available with C clamps or with alligator clamps (as option)

\*\* Besides isolated alligator (A2) clamps, sense cables are also available with semi-isolated alligator (A1) or with TTA clamps (as option)

### Recommended cross-sections for RMO-G models:

CROSS SECTION/ LENGHT	16 mm <sup>2</sup>	25 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	70 mm <sup>2</sup>	95 mm <sup>2</sup>
5 m	RMO100G	RMO200G	RMO300G & RMO400G	RMO500G & RMO600G	-	RMO800G
10 m	RMO100G	RMO200G	RMO300G & RMO400G	RMO500G & RMO600G	-	RMO800G
15 m	-	RMO100G	RMO200G	RMO300G & RMO400G	RMO500G & RMO600G	-

**Note:** Maximum current that RMO800G can generate with 10 m/ 95 mm<sup>2</sup> cables is 700 A

## Order info

Instrument with included accessories	Article No
Micro Ohmmeter RMO100G	RMO100G-N-03
Micro Ohmmeter RMO200G	RMO200G-N-03
Micro Ohmmeter RMO300G	RMO200G-N-03
Micro Ohmmeter RMO400G	RMO200G-N-03
Micro Ohmmeter RMO500G	RMO200G-N-03
Micro Ohmmeter RMO600G	RMO200G-N-03
Micro Ohmmeter RMO800G	RMO800G-N-03
<ul style="list-style-type: none"> <li>- DV-Win PC software</li> <li>- Mains power cable</li> <li>- Ground (PE) cable</li> <li>- USB cable</li> <li>- Plastic transport case                             <ul style="list-style-type: none"> <li>• Small size for RMO100G/200G/300G/400G/500G without built-in thermal printer</li> <li>• Medium size for RMO600G/RMO800G and all RMO-G with built-in thermal printer</li> </ul> </li> </ul>	

Standard accessories	Article No
Current cables 2 x 5 m, *XX mm <sup>2</sup> with battery clamps	C2-05-XXYMBY**
Sense cables 2 x 5 m with alligator clamps	S2-05-02BPA2
Cable bag	CABLE-BAG-00

Optional accessories	Article No
Plastic transport case – small size <i>*RMO100G/200G/300G/400G/500G without built-in thermal printer</i>	PLCAS-P00-01
Plastic transport case – medium size <i>*RMO600G/RMO800G and all RMO-G with built-in thermal printer</i>	PLCAS-P00-02
Cable plastic case – medium size	CABLE-CAS-02
Test shunt 100 μΩ (600 A/60 mV)	SHUNT-600-MK
Current cables 2 x 10 m, *XX mm <sup>2</sup> with battery clamps (700 A rated)	C2-10-XXYMBY**
Current cables 2 x 15 m, *XX mm <sup>2</sup> with battery clamps	C2-15-XXYMBY**
Current extension cable 2 x 10 m, *XX mm <sup>2</sup>	E2-10-XXYMYF
Current cables 2 x 10 m 70 mm <sup>2</sup> with battery clamps	C2-10-70VMB3
Current cables 2 x 10 m 70 mm <sup>2</sup> with alligator clamps	C2-10-70VMA4
Current cables 2 x 10 m 70 mm <sup>2</sup> with C clamps	C2-10-70VMC0
Sense cables, extension 2 x 10 m	E2-10-02BPBP
Sense cables 2 x 10 m with alligator clamps	S2-10-02BPA2
Sense cables 2 x 15 m with alligator clamps	S2-15-02BPA2
Thermal printer 58 mm (built-in)	PRINT-058-01
Thermal paper roll 58 mm (2.3 in)	PRINT-058-RO
<b>High Precision Module (built-in)</b>	<b>RMO-HPMM-DG0</b>
<b>Remote control unit</b>	<b>RMORCU-09-00</b>
<b>Remote control test probes (one with trig button)</b>	<b>RMO-RCTP-TB0</b>
<b>Current clamp 30/300 A power supplied from the instrument with extension 5 m (Both Sides Grounded Unit)</b>	<b>CACL-0300-06</b>

\*XX - Cross-section of current cables varies, depending of the output power of the model.

\*\*YMBY – For RMO100G and RMO200G without built-in thermal printer: YMBY=LMB1;

For RMO100G and RMO200G with built-in thermal printer and for other models: YMBY=VMB3

e.g.

For RMO200G without built-in thermal printer, the article number for current cables 10 m/25 mm<sup>2</sup> cross-section is C2-10-25LMB1

For RMO600G, the article number for current cables 5m/50 mm<sup>2</sup> is C2-05-50VMB3 and for 5 m/35 mm<sup>2</sup> AN is C2-05-35VMB3.

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