RMO-C series
Micro Ohmmeters

- Powerful – up to 500 A DC
- 200 A DC continuous, 300 A up to 10 min
- Measuring range: 0,1 µΩ – 6 Ω
- Best resolution: 0,01 µΩ
- Typical accuracy: ± (0,1 % rdg + 0,1 % FS)
- Remote Control Unit (optional)
- Both Sides Grounded Unit (optional)
- *SINGLE / CONTIN / BSG / DTRtest* modes
- Portable and Lightweight – 14,6 kg / 32.1 lbs

Description

RMO-C series of Micro Ohmmeters (hereafter referred to as "RMO-C") contain 3 models: ***RMO200C, RMO300C*** *&* ***RMO500C.***

All RMO-C 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 (200 A for RMO200C, 300 A for RMO300C, up to 500 A for RMO500C model).

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

All RMO-C models have 200 A continuous load capacity at 25°C (77°F) ambient temperature. RMO300C & RMO500C models have maximum load capacity of 10 min at 300 A, at mentioned ambient temperature.

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

Using the DV-Win software, an operator can perform a test remotely from a PC (USB communication). When the device is used standalone, the results can be saved and downloaded from the RMO-C device to the USB flash drive, or directly transferred to PC with Bluetooth communication. DV-Win contains test reports wizard used for generating fully customized test reports.

The RMO-C instrument has four separate test modes:

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

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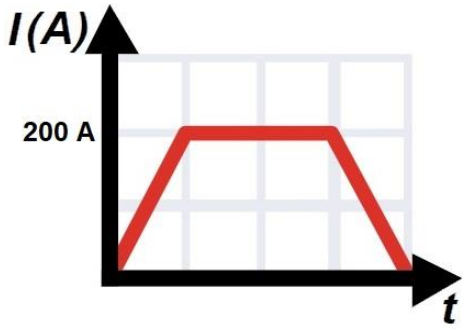
Single Test

The RMO-C 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 200 A test current.



Continuous Test

RMO-C 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	Continuous
300	10 min
400	50 s
500	30 s

The maximum test duration time refers to 25°C (77°F) ambient temperature.

To prevent overheating, certain duty cycles apply at test currents higher than 200 A.

BSG test

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

This BSG test mode is specially designed for Both Sides Grounded circuit breakers 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

The high-precision module is standard, built-in feature of RMO-C micro-ohmmeters and it provides an increased accuracy when measuring ultra-small resistance values (e.g. up to 20 µΩ). It offers a highly accurate contact resistance measurement: ± (0,1 % rdg + 0,1 % FS) accuracy at range up to 99,99 µΩ, with 0,01 µΩ resolution.

Having this capability, RMO-C devices are ideal for various applications where ultra-small values of non-inductive resistance is met, such as: inspections of generator circuit breakers, welding joints, GIS connection testing, etc.

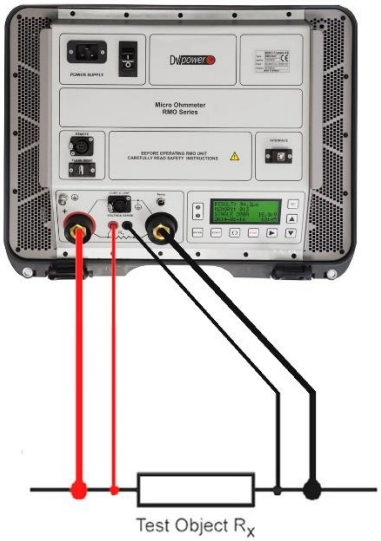
Application

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

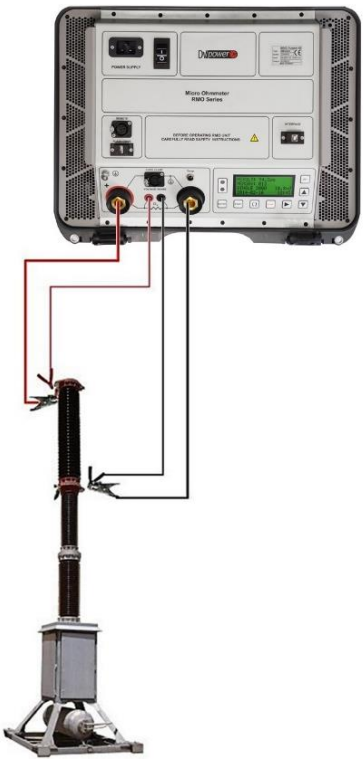
- High- and medium- voltage circuit breakers (live and dead tank)
- High- and medium- voltage disconnecting switches
- Gas Isolated Switchgears (GIS)
- High-current bus bar joints
- Cable splices
- Welding joints
- Fuses

Connecting the Test Object to RMO-C

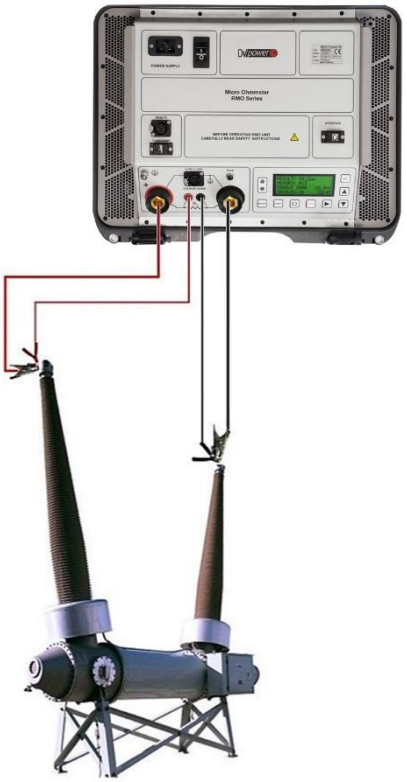
The connection diagram of the RMO-C devices corresponds to the Kelvin's (four point) measurement principle. The measuring cables from the "Voltage Sense" sockets are attached as close as possible to Rx, and in between the current feeding cables. That way, a resistance of both cables and clamps is almost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



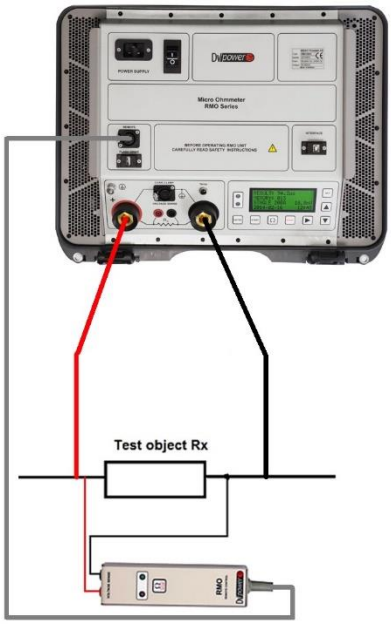
RMO-C cable connection on live tank circuit breaker



RMO-C cable connection on dead tank circuit breaker

Remote Control Unit

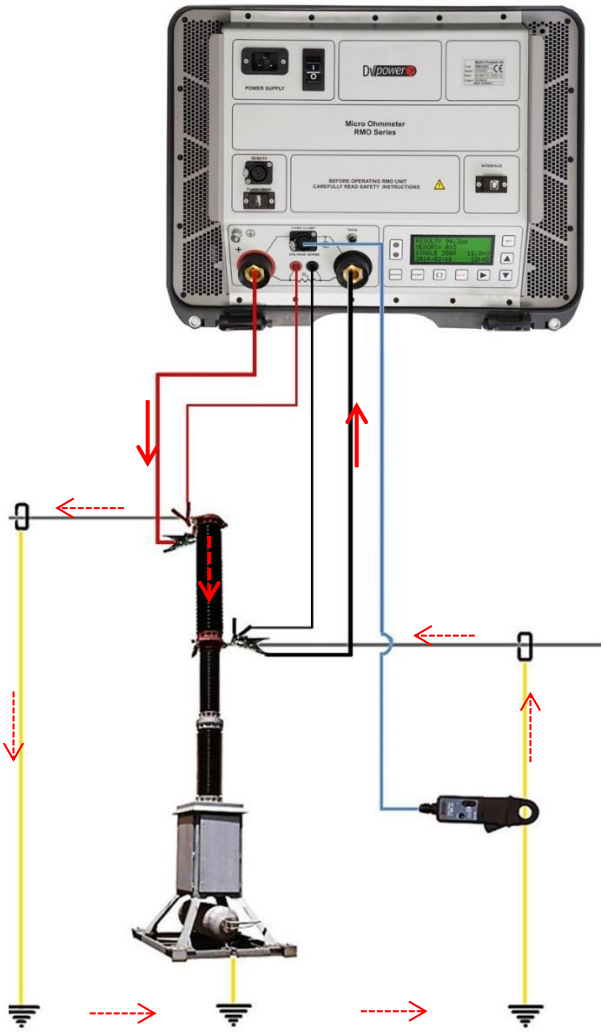
The RMO Remote Control Unit is an optional control unit that is used to start and stop the tests from a remote location, away from the actual RMO-C.



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-C to a Both Sides Grounded Circuit Breaker

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



Total current generated from the RMO

Current through circuit breaker

Current through groundings

Using the RMO-C 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-C device will measure the current through the ground circuit connection and add this value to the selected test current value to provide the selected test current through the test object.

Benefits and features

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

- 200 A DC continuous current capability for all RMO-C models.
- Maximum load capacity of 10 min at 300 A test current for RMO300C & RMO500C.
- Very high output voltage which enables two main advantages:
  1. Wider resistance measurement ranges @Imax (e.g. up to 37 mΩ at 200 A with use of 2 x 5 m/35 mm^2 cables)
  2. 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 ± (0,1 % rdg + 0,1 % FS).
- The best resolution of RMO-C is 0,01 µΩ at 99,99 µΩ range, followed by 0,1 µΩ resolution at 999,9 µΩ range.

Several advanced features are available as standard/optional accessories:

- Rmax feature – pass/fail criteria
- USB or RS232 & Bluetooth communication
- USB flash drive for additional results storage
- DTRtest mode – a special mode for Dead Tank circuit breakers testing
- A built-in High Precision module provides highly accurate measurements on ultra-low resistance values, with 0,01 µΩ resolution.

DV-Win software

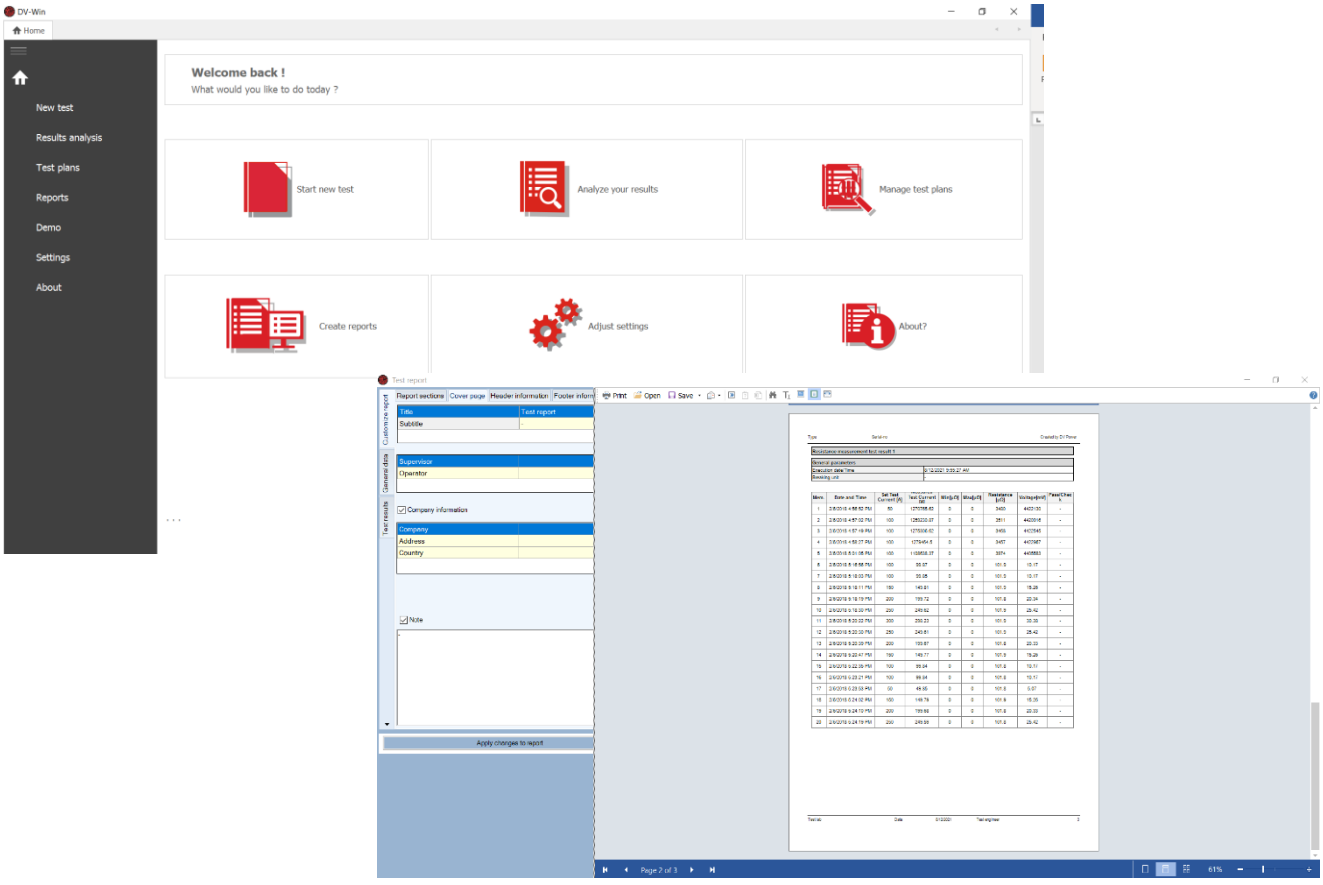
DV-Win software provides acquisition and analysis of the test results, as well as control of all the RMO-C functions from a PC. The DV-Win also provides several advanced features as a supplement to multiple functions of RMO-C devices. Testing in Continuous mode is upgraded with a sample time feature 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-C 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
- Several filters for results download to PC
- Sampling time feature for CONTIN mode
- Test reports available in several format



Technical data

Mains power supply

- Connection according to IEC/EN60320-1; C320
- Mains supply: 90 V – 264 V AC
- Frequency: 50 / 60 Hz
- Circuit Breaker with thermal overload protection: 20A / 240V AC
- Designed according to UL 1077 standard (Supplementary Protectors for Use in Electrical Equipment)
- For primary protection of the electrical panel, a circuit breaker according to the UL 489 standard shall be used

Output data

- Test current ranges (from 0 to Imax):

Model	*Current*	*Max. load capacity*
RMO200C	200 A	Continuous
RMO300C	300 A	10 min
RMO500C	500 A	30 s

- Full Load Voltages:

Main supply voltage	*Output current*	*Maximum ouput voltage*
230 V AC	300 A	8,2 V DC
	200 A	8,6 V DC
115 V AC	300 A	7,2 V DC
	200 A	7,5 V DC

Measurement

- Resistance range:
  0,1 µΩ – 999,9 mΩ ***expandable up to 6 Ω***
- Resolution

0,01 – 99.99 µΩ	0,01 µΩ
100,0 – 999,9 µΩ	0,1 µΩ
1,000 mΩ – 9,999 mΩ	1 µΩ
10,00 mΩ – 99,99 mΩ	10 µΩ
100,0 mΩ – 999,9 mΩ	0,1 mΩ
*1,000 Ω – 6,000 Ω	1 mΩ

- Typical accuracy ± (0,1 % rdg + 0,1 % FS)

Display

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

Interface

- RMO-C is equipped with an USB / RS232 port (connection to an external PC)
- Bluetooth communication
- USB flash drive port

Test Result Storage

- RMO-C can store up to 500 measurements

Dimensions and weight

- Dimensions (W x H x D):
  503 x 406 x 193 mm / 19.8 x 15.9 x 7.6 in
- Weight: 14,6 kg / 32.1 lbs

Environmental protection

- Ingress protection rating: IP67 *with closed lid

Environmental conditions

- Operating temperature:
  -20 ºC - +55 ºC / -4 ºF - +131 ºF
- Storage & transportation:
  -40 ºC - +70 ºC / -40 ºF - +158 ºF
- Relative humidity 0 - 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 DV Power official website (https://www.dv-power.com/register/)

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

Accessories

Current cables

Extension current cables

Voltage sense cables

Current clamp (powered by RMO-C)

Test shunt

Cable bag

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

Order info

Instrument with included accessories	Article No
Micro Ohmmeter RMO200C	RMO200C-N-02
Micro Ohmmeter RMO300C	RMO300C-N-02
Micro Ohmmeter RMO500C	RMO500C-N-02
– **DV-Win PC software including USB cable** – **Mains power cable** – **Ground (PE) cable** – **Transport bag**	

Standard accessories	Article No
Current cables 2 x 5 m, 35 mm² with battery clamps (B1) ***for RMO200C & 300C***	C2-05-35VMB1
Current cables 2 x 5 m, 50 mm² with battery clamps (B3) ***for RMO500C***	C2-05-50VMB3
Sense cables 2 x 5 m with alligator clamps	S2-05-02BPA2
Cable bag	CABLE-BAG-00

Optional accessories	Article No
Cable plastic case – medium size	CABLE-CAS-02
Cable plastic case with wheels – large size	CABLE-CAS-W3
Test shunt 100 µΩ (600 A/60 mV)	SHUNT-600-MK
Current cables 2 x 10 m, 35 mm² with battery clamps	C2-10-25VMB1
Current cables 2 x 10 m, 50 mm² with battery clamps	C2-10-50VMB3
Current cables 2 x 10 m, 70 mm² with battery clamps	C2-10-70VMB3
Current cables 2 x 10 m, 70 mm² with alligator clamps	C2-10-70VMA4
Current cables 2 x 10 m, 70 mm² with C clamps	C2-10-VMC0
Current extension cable 2 x 5 m, 35 mm²	E2-05-35VMVM
Current extension cable 2 x 10 m, 50 mm²	E2-10-50VMVM
Sense cables 2 x 10 m with alligator clamps	S2-10-02BPA2
Sense cables 2 x 15 m with alligator clamps	S2-15-02BPA2
Remote control unit	RMORCU-09-00
Remote control test probes (one with trig button)	RMO-RCTP-TB0
Current clamp 30/300 A power supplied from the instrument with extension 5 m (Both Sides Grounded Unit)	CACL-0300-06

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