

# Handheld Micro Ohmmeter **RMO-H**

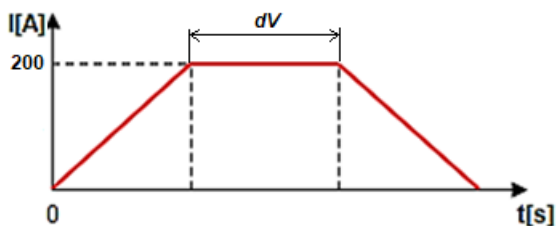
- Handheld – only 0,9 kg / 2.0 lbs
- Powerful – regulated current up to 260 A DC
- Automatic test current ramp
- Operated by high-capacity battery
- Measuring range 0,1  $\mu\Omega$  – 1000 m $\Omega$
- Typical accuracy  $\pm$  (0,2 % rdg + 0,2 % FS)
- Both Sides Grounded Measurement



## Description

RMO-H is a handheld Micro Ohmmeter based on a state of the art technology, using the most advanced battery and switch mode technique available today. RMO-H is the battery supplied device, independent from the mains power supply.

The high-capacity Li-Po battery enables generating a true DC ripple-free current up to 260 A. The test current is user selectable and generated in an automatic regulated test ramp. By sloping the current up and down, magnetic transients are virtually eliminated.



## Application

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

- High, middle and low voltage circuit breakers
- High, middle and low voltage disconnecting switches
- High-current bus bar joints
- Cable splices
- Welding joints

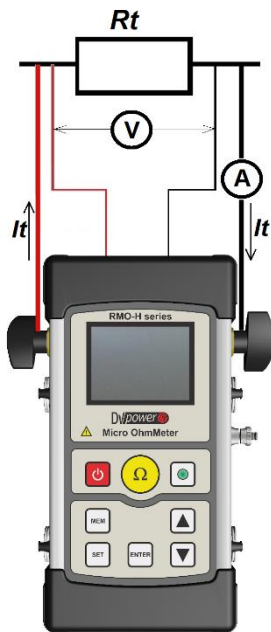
The RMO-H instrument can store internally up to 1000 measurements. The results are saved on the micro SD card. All measurements are time and date stamped.

DV-Win software enables download and analysis of the results, creating and exporting test reports in different formats, as well as full control of the test device. Communication between the RMO-H and a PC is through a Bluetooth connection.

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

## Connecting RMO-H to test object

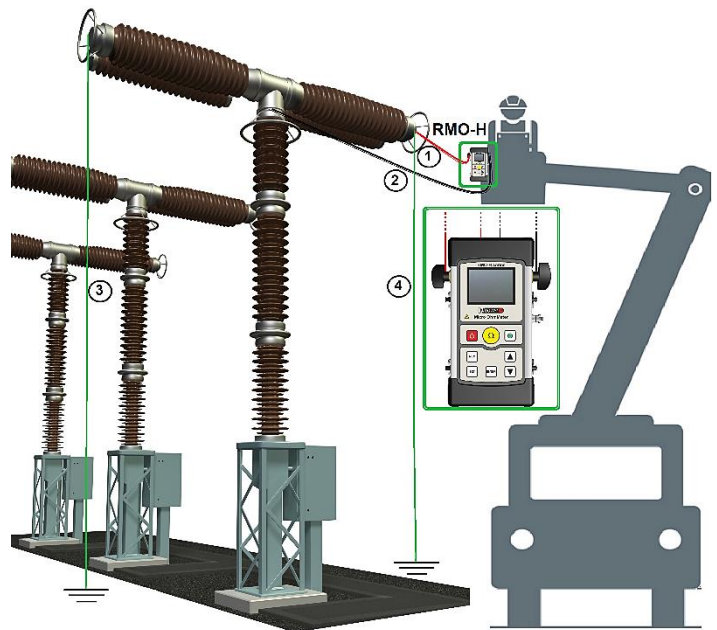
The connection diagram of the RMO-H devices corresponds to the Kelvin's (four point) measurement principle. The measuring cables from the "Voltage Sense" sockets are attached as close as possible to Rx, and in between the current feeding cables. That way, a resistance of both cables and clamps is almost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



For the contact resistance measurement of a medium voltage circuit breaker with the RMO-H it is convenient to use the cables with the same length. The cables with Kelvin probes (with trigger button) are specially designed for this application.



When testing live tank HV circuit breakers with RMO-H a different cables length may be used. The short cable (red cable, 1,3 m) connects the RMO-H to the CB's bushing close to the test person and the device. The long cable (black cable, 3 or 5 m) is connected to a further away positioned bushing on the other side of the breaking point.



1. Short test leads (current and voltage sense cables labeled with red color)
2. Longer test lead (current and voltage sense cables labeled with black color)
3. Ground cable
4. Ground cable (used in case of Both Sides Grounded testing)

## Both Sides Grounded testing

The RMO-H device provides a safe measurement of circuit breakers with both terminals grounded. The connection diagram is the same as for the one-side-grounded circuit breakers.

Note:

*This type of measurement could be less accurate comparing to a one-side-grounding measurement, because of a small amount of the current that can flow through groundings.*

## Dead-tank circuit breakers testing

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 starting a measurement.

RMO-H is the only handheld micro ohmmeter in the market capable for the contact resistance measurement of dead-tank circuit breakers. This is enabled by generating a true DC ripple-free current in an automatic regulated test ramp with up to 10 s duration. The measurement is done when CTs are saturated. All calculations for detecting the saturated condition of CTs are done by internal algorithm. By sloping the current up and down, magnetic transients are virtually eliminated.

## Benefits and features

RMO-H is a handheld instrument ideal for a field and factory testing, with a very user-friendly interface. The user needs only a few clicks to set and start a preferred test. This is achieved with an intuitive keyboard and menu design.

## DV-Win software

\*included in the purchase price

DV-Win Software for the RMO-H device is an application set of tools based on the Windows operating system. It enables the two-way communication between the RMO-H device and a standard PC over the Bluetooth connection.

The main features of the software are:

- Download of the test results to a PC
- Analysis of the test results
- Saving the test results in different formats
- Test reports
- Control of the device in a test

Unlike other handheld micro ohmmeters available in the market, RMO-H device has regulated test current, generated in an automatic regulated test ramp. This enables the following unique features:

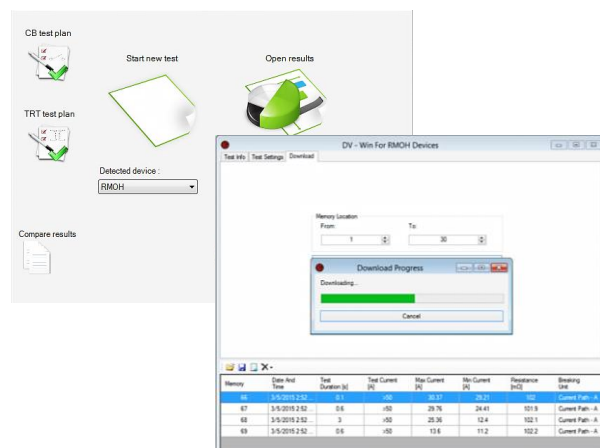
- User selectable test current
- A constant DC (ripple-free) current during the measurement
- Magnetic transients virtual elimination by sloping the current up and down

In addition, RMO-H is the only handheld micro ohmmeter which can generate a test current up to 10 s. This enables testing of the dead-tank circuit breakers.

The high capacity Li-Po battery (5600 mAh) enables multiple measurements with no need for recovery time between the tests.

The instrument has a very high typical accuracy  $\pm (0,2\% \text{ rdg} + 0,2\% \text{ FS})$ , with the best resolution of  $0,1 \mu\Omega$ .

The additional feature is the pass/fail criteria implemented through the  $R_{\text{max}}$  function. When this function is turned ON, the RMO-H device displays information if the measured resistance is higher than the set  $R_{\text{max}}$  resistance value.



## Technical data

### Battery

- Type 1 Cell – 5600 mAh Li-Po (User replaceable)
- Voltage 3,7 V
- Recharge time 2 hours

### AC Adapter

- Input voltage 90 – 264 V AC, 50/60 Hz
- Output voltage 12 V DC
- Output current 3 A

### Output data

- Regulated test current up to 260 A DC
- Output voltage (max) 3,7 V DC
- Test duration: selectable from 0,1 s to 10 s (10 s is recommended for dead-tank breakers)
- Number of measurements on fully charged batteries: typ. 1600 at  $I_t = 100$  A and 0,1 s

### Measurement

- Resistance range 0 – 1000 m $\Omega$
- Resolution
 

0,1 – 999,9 $\mu\Omega$	0,1 $\mu\Omega$
1,000 – 9,999 m $\Omega$	0,001 m $\Omega$
10,00 – 99,99 m $\Omega$	0,01 m $\Omega$
100,0 – 1000 m $\Omega$	0,1 m $\Omega$
- Typical accuracy  $\pm (0,2 \% \text{ rdg} + 0,2 \% \text{ FS})$ ;

### CE – marking

EMC	2004/108/EC
LVD	2006/95/EC

### Memory

- Internal: 2 GB SD Card
- RMO-H can store up to 1000 measurements

### Interface

- Bluetooth: Device to PC connection

### Real time clock

- Precision:  $\pm 5$  seconds per month
- Calendar: 100 year with a leap year detection
- Time retention: 10+ years (battery removed)

### Environment conditions

- Operating temperature: -10  $^{\circ}\text{C}$  - +55  $^{\circ}\text{C}$  / +14  $^{\circ}\text{F}$  - +131  $^{\circ}\text{F}$
- Storage & transportation temperature: -40  $^{\circ}\text{C}$  - +70  $^{\circ}\text{C}$  / -40  $^{\circ}\text{F}$  - +158  $^{\circ}\text{F}$
- Humidity 5 % - 95 % relative humidity
- Pollution degree 2
- Insulation category II

### Environmental protection (IP rating)

- Device: IP54
- Device in plastic case: IP67 (closed lid)

### Dimensions and Weight

- Dimensions (L x W x D): 226 mm x 116 mm x 50 mm  
8.9 in x 4.5 in x 1.9 in
- Weight: 0,9 kg / 2.0 lbs.

### Warranty

- Three years

### Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: Directive 2014/35/EU (CE conform) Standard EN61010-1
- EMC: Directive 2014/30/EU (CE conform) Standard EN 61326-1:2006
- CAN/CSA-C22.2 No. 61010-1, 2<sup>nd</sup> edition

All specifications herein are valid at ambient temperature of + 25  $^{\circ}\text{C}$  and recommended accessories.  
The device accuracy check and calibration should be done only with use of the standard current cables (provided along with the device) and the following sense cable set: „voltage sense cable set 2 x 2 m 2,5 mm<sup>2</sup> with banana plugs“ (Article number: S2-02-02BPBP), which is also part of the recommended accessories set. Specifications are subject to change without notice.



**Current cables and Sense cables with TTA clamps (combined)**

**Current cables with battery clamps  
Sense cables with alligator clamps**

**Transport case with included device accessories and cables**



**Current cables and Sense cable with Kelvin probes**

**Power supply adapter**

**Screws for current cables connectors and Carrying strap**

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

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

## Order info

Instrument with included accessories	Article No
Handheld Micro Ohmmeter RMO-H	RMOHN00-N-00
DV-Win PC software including mini USB cable	
Transport case	
Rubber holster, Carrying strap and Belt clip	
Ground (PE) cable	
Recommended accessories	Article No
Current cables 1,3 m and 3 m 16 mm <sup>2</sup> and Sense cables 1,3 m and 3 m with TTA clamps	CS-13-16CLWC
Voltage sense cable set 2 x 2 m 2,5 mm <sup>2</sup> with banana plugs	S2-02-02BPBP
Power supply adapter	PWR-ADP1A-EU
Optional accessories	Article No
Current cables 2 x 1,3 m 10 mm <sup>2</sup> and Sense cables 2 x 1,3 m with TTA clamps	CS-11-10CLWC
Current cables 1,3 m and 5 m 25 mm <sup>2</sup> and Sense cables 1,3 m and 5 m with TTA clamps	CS-15-25CLWC
Current cables 2 x 1,3 m 10 mm <sup>2</sup> and Sense cables 2 x 1,3 m with Kelvin probes (one with trigger button)	CS-11-10CLKP
Current cables 2 x 1,3 m 10 mm <sup>2</sup> with battery clamps (B1)	C-101-10CLB1
Current cables 1,3 m and 3 m 16 mm <sup>2</sup> with battery clamps (B1)	C-103-16CLB1
Current cables 1,3 m and 5 m 25 mm <sup>2</sup> with battery clamps (B1)	C-105-25CLB1
Sense cables 2 x 1,3 m with alligator clamps (A2)	S-101-02BPA2
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-103-02BPA2
Sense cables 1,3 m and 5 m with alligator clamps (A2)	S-105-02BPA2
Test shunt 100 μΩ (600 A/60 mV)	SHUNT-600-MK

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