

## Handheld Micro Ohmmeters **RMO-H series**

- Handheld – only 0,95 kg / 2.1 lbs
- Powerful – regulated current up to 300 A DC
- Automatic test current ramp
- Operated by high-capacity battery
- Measuring range 0,1  $\mu\Omega$  – 3000 m $\Omega$
- Typical accuracy  $\pm$  (0,1 % rdg + 0,1 % FS)
- Both Sides Grounded Measurement



### Description

RMO-H series contain three models:

- **RMO-H1** (test current up to 100 A DC),
- **RMO-H2** (test current up to 220 A DC),
- **RMO-H3** (test current up to 300 A DC),

hereafter referred to as “RMO-H”.

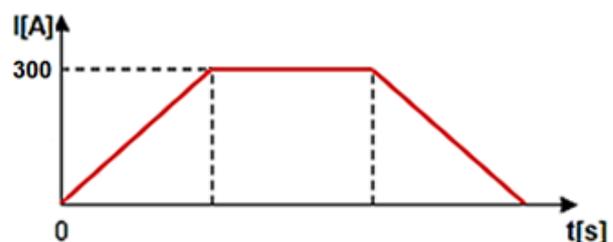
RMO-H is a handheld, battery operated Micro Ohmmeter based on a state of the art technology, using the most advanced battery and switch mode technique available today.

The high-capacity Li-Po battery enables generating a true DC ripple-free current. Two types of Li-Po batteries are available upon request – 4,1 V battery for use with short type cables and 7,1 V battery for use with longer cables (length  $\geq$  5 m). The test current is user selectable and generated in an automatic regulated test ramp.

### Application

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

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



During a test the RMO-H ramps with increasing current before measuring and decreasing current after the measurement. This significantly decreases magnetic transients.

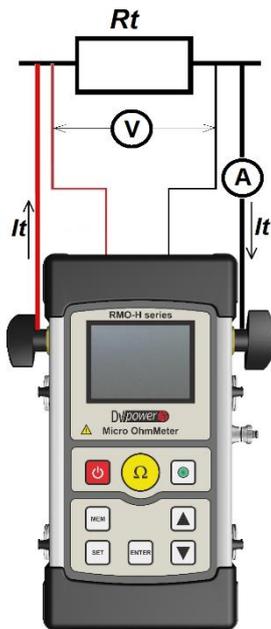
The RMO-H instrument can store internally up to 1000 measurements. The results are saved on the micro SD card. All measurements are time and date stamped.

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

The set is equipped with the overcurrent protection.

## Connecting RMO-H to test object

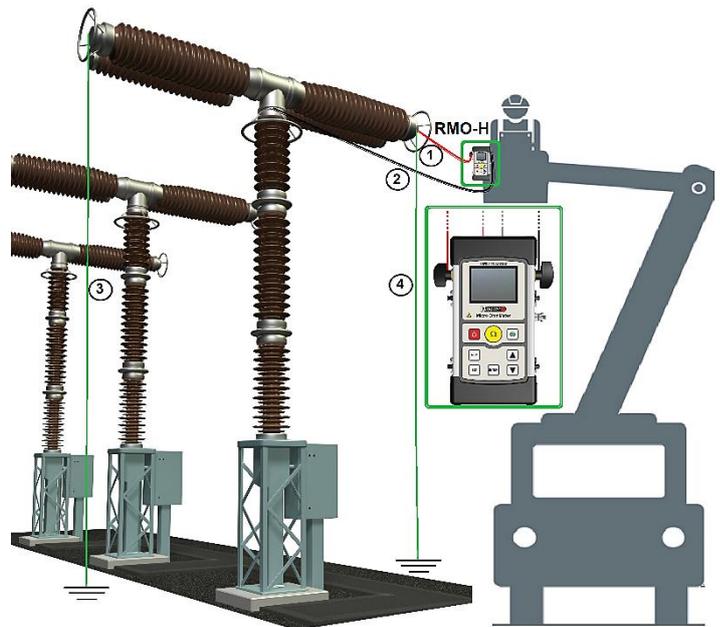
The connection diagram of the RMO-H devices corresponds to the Kelvin's (four point) measurement principle. The measuring cables from the "Voltage Sense" sockets are attached as close as possible to  $R_t$ , and in between the current feeding cables. That way, a resistance of both cables and clamps is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

## 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.

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

The high capacity Li-Po battery enables multiple measurements in the field/factory. Two types of Li-Po batteries are available upon request – 4,1 V battery for use with short type cables and 7,1 V battery for use with longer cables (length  $\geq 5$  m).

The instrument has a very high typical accuracy  $\pm (0,1\% \text{ rdg} + 0,1\% \text{ FS})$ , 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.

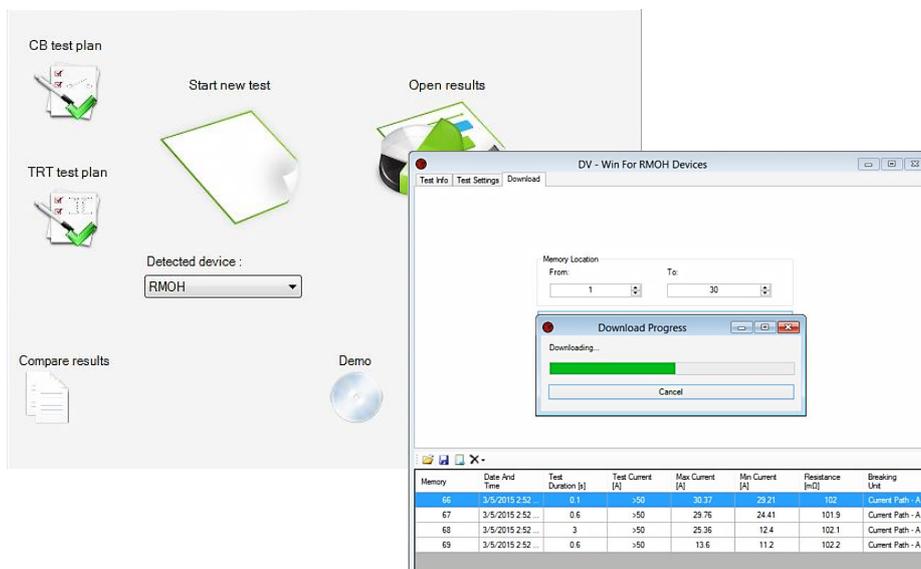
## DV-Win software

\*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



## Technical data

### Battery

- Type Li-Po (User replaceable)
- 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

- Test current:
  - RMO-H1: up to 100 A DC (regulated)
  - RMO-H2: up to 220 A DC (regulated)
  - RMO-H3: up to 300 A DC (regulated)

### Measurement

- Resistance range 0 – 3000 mΩ
- Resolution
 

0,1 – 999,9 μΩ	0,1 μΩ
1,000 – 9,999 mΩ	0,001 mΩ
10,00 – 99,99 mΩ	0,01 mΩ
100,0 – 999,9 mΩ	0,1 mΩ
1000 – 3000 mΩ	1 mΩ
- Typical accuracy\*
  - ± (0,1 % rdg + 0,1 % FS) - up to 1 Ω range
  - ± (0,25 % rdg + 0,25 % FS) - from 1 Ω to 3 Ω

*\*Accuracy is valid under the maximal test current per the range being used (as defined in the Section 3.6 – Measurement parameters in the RMO-H's Manual)*

### 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: ±5 seconds per month
- Calendar: 100 year with a leap year detection
- Time retention: 10+ years (battery removed)

### Environment conditions

- Operating temperature: -10 °C - +55 °C / +14 °F - +131 °F
- Storage & transportation temperature: -40 °C - +70 °C / -40 °F - +158 °F
- Humidity: 5 % - 95 % relative humidity, non-condensing

### 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: 0,95 kg / 2.1 lbs

### Warranty

- Three years

### Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6
- 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 the rated battery voltage (or higher output voltage), ambient temperature of + 25 °C and recommended accessories. 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



Power supply adapter (car charger)

## Order info

- **RMO-H1 model** (up to 100 A DC)

Instrument with included accessories	Article No
Handheld Micro Ohmmeter RMO-H1	RMOH100-N-00
<ul style="list-style-type: none"> <li>- USB with DV-Win PC software</li> <li>- Ground (PE) cable</li> <li>- Carrying belts</li> <li>- Plastic transport case</li> </ul>	
Power supply adapter 3 A EU	PWR-ADP3A-EU

Recommended accessories RMO-H1	Article No
Current and sense cables 1,3 m with TTA clamps	CS2-1Z3-10CLWC

Optional accessories RMO-H1	Article No
Current and sense cables 1,3 m with Kelvin probes	CS2-1Z3-10CLKP
Current and sense cables 1,3 m (red) and 3 m (black) with TTA clamps	CS-1Z33-10CLWC
Current and sense cables 1,3 m (red) and 5 m (black) with TTA clamps	CS-1Z35-10CLWC
Current and sense cables 5 m with TTA clamps	CS2-05-10CLWC
Current cables 2 x 1,3 m with battery clamps	C2-1Z3-10CLB1
Sense cables 2 x 1,3 m with alligator clamps (A2)	S2-1Z3-02BPA2

Current cables 1,3 m and 3 m with battery clamps	C-1Z33-10CLB1
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-1Z33-02BPA2
Current cables 1,3 m and 5 m with battery clamps	C-1Z35-10CLB1
Sense cables 1,3 m and 5 m with alligator clamps (A2)	S-1Z35-02BPA2
Current cables 2 x 5 m with battery clamps	C2-05-10CLB1
Sense cables 2 x 5 m with alligator clamps (A2)	S2-05-02BPA2
Current cables 2 x 10 m with battery clamps	C2-10-16CLB1
Sense cables 2 x 10 m with alligator clamps (A2)	S2-10-02BPA2
Test shunt 240 $\mu\Omega$ (250 A/60 mV)	SHUNT-240-MK
Test shunt 1 m $\Omega$ (150 A/150 mV)	SHUNT-150-MK
Power supply adapter (car charger)	PWR-ADP3-CC0

- **RMO-H2 model** (up to 220 A DC)

Instrument with included accessories	Article No
Handheld Micro Ohmmeter RMO-H2	RMOH220-N-00
<ul style="list-style-type: none"> <li>- USB with DV-Win PC software</li> <li>- Ground (PE) cable</li> <li>- Carrying belts</li> <li>- Plastic transport case</li> </ul>	
Power supply adapter 3 A EU	PWR-ADP3A-EU

Recommended accessories RMO-H2	Article No
Current and sense cables 1,3 m with TTA clamps (220 A rated)	CS2-1Z3-10CLWC

Optional accessories RMO-H2	Article No
Current and sense cables 1,3 m with Kelvin probes	CS2-1Z3-10CLKP
Current and sense cables 1,3 m (red) and 3 m (black) with TTA clamps	CS-1Z33-16CLWC
Current and sense cables 1,3 m (red) and 5 m (black) with TTA clamps	CS-1Z35-16CLWC
Current and sense cables 1,3 m (red) and 10 m (black) with TTA clamps	CS-1Z310-16CLWC
Current and sense cables 5 m with TTA clamps	CS2-05-10CLWC
Current cables 2 x 1,3 m with battery clamps	C2-1Z3-10CLB1
Sense cables 2 x 1,3 m with alligator clamps (A2)	S2-1Z3-02BPA2
Current cables 1,3 m and 3 m with battery clamps	C-1Z33-10CLB1
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-1Z33-02BPA2
Current cables 1,3 m and 5 m with battery clamps	C-1Z35-16CLB1
Sense cables 1,3 m and 5 m with alligator clamps (A2)	S-1Z35-02BPA2
Current cables 1,3 m and 10 m with battery clamps	C-1Z310-35CLB1
Sense cables 1,3 m and 10 m with alligator clamps (A2)	S-1Z310-02BPA2
Current cables 2 x 5 m with battery clamps	C2-05-10CLB1
Sense cables 2 x 5 m with alligator clamps (A2)	S2-05-02BPA2
Current cables 2 x 10 m with battery clamps	C2-10-16CLB1
Sense cables 2 x 10 m with alligator clamps (A2)	S2-10-02BPA2
Test shunt 240 $\mu\Omega$ (250 A/60 mV)	SHUNT-240-MK
Test shunt 1 m $\Omega$ (150 A/150 mV)	SHUNT-150-MK
Power supply adapter (car charger)	PWR-ADP3-CC0

- **RMO-H3 model** (up to 300 A DC)

Instrument with included accessories	Article No
Handheld Micro Ohmmeter RMO-H3	RMOH300-N-00
<ul style="list-style-type: none"> <li>- USB with DV-Win PC software</li> <li>- Ground (PE) cable</li> <li>- Carrying belts</li> <li>- Plastic transport case</li> </ul>	
Power supply adapter 3 A EU	PWR-ADP3A-EU

Recommended accessories RMO-H3	Article No
Current and sense cables 1,3 m with TTA clamps (300 A rated)	CS2-1Z3-25CLWC

Optional accessories RMO-H3	Article No
Current and sense cables 1,3 m with Kelvin probes	CS2-1Z3-16CLKP
Current and sense cables 1,3 m (red) and 3 m (black) with TTA clamps	CS-1Z33-25CLWC
Current and sense cables 1,3 m (red) and 5 m (black) with TTA clamps	CS-1Z35-25CLWC
Current and sense cables 1,3 m (red) and 10 m (black) with TTA clamps	CS-1Z310-16CLWC
Current and sense cables 5 m with TTA clamps	CS2-05-10CLWC
Current cables 2 x 1,3 m with battery clamps (300 A rated)	C2-1Z3-25CLB1
Sense cables 2 x 1,3 m with alligator clamps (A2)	S2-1Z3-02BPA2
Current cables 1,3 m and 3 m with battery clamps	C-1Z33-25CLB1
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-1Z33-02BPA2
Current cables 1,3 m and 5 m with battery clamps	C-1Z35-25CLB1
Sense cables 1,3 m and 5 m with alligator clamps (A2)	S-1Z35-02BPA2
Current cables 2 x 3 m with battery clamps (300 A rated)	C2-03-50CLB1
Sense cables 2 x 3 m with alligator clamps (A2)	S2-05-02BPA2
Current cables 1,3 m and 10 m with battery clamps	C-1Z310-16CLB1
Sense cables 1,3 m and 10 m with alligator clamps (A2)	S-1Z310-02BPA2
Current cables 2 x 5 m with battery clamps	C2-05-10CLB1
Sense cables 2 x 5 m with alligator clamps (A2)	S2-05-02BPA2
Current cables 2 x 10 m with battery clamps	C2-10-16CLB1
Sense cables 2 x 10 m with alligator clamps (A2)	S2-10-02BPA2
Test shunt 240 $\mu\Omega$ (250 A/60 mV)	SHUNT-240-MK
Test shunt 1 m $\Omega$ (150 A/150 mV)	SHUNT-150-MK
Power supply adapter (car charger)	PWR-ADP3-CC0