

Handheld Micro Ohmmeter **RMO-H**

Manual



Manual Version: M-RH00NN-300-EN

This Manual refers to the firmware version 1.0x

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1 Introduction

This Manual provides instructions on how to use the RMO-H instruments safely, properly and efficiently. The following instructions will help the user avoid unsafe situations, reduce maintenance costs and will ensure the reliability and durability of the RMO-H instruments.

The RMO-H must be used in accordance with all existing safety requirements and regulations based on national/local standards for accident prevention and environmental protection. In addition, the relevant international standards are listed in the “Technical Data” paragraph section of this document.

1.1 Safety Instructions

Safety is the responsibility of the user. Before operating the RMO-H, please read the following safety instructions carefully.

It is not recommended the RMO-H being used (or even turned on) without careful observation of the instructions listed in this Manual. The RMO-H should only be operated by trained and authorized personnel.

1.1.1 Safety Terms and Symbols

Terms in this Manual

These terms may appear in the Manual:

WARNING: Warning statements identify conditions or practices that could result in an injury or a loss of life.

CAUTION: Caution statements identify conditions or practices that could result in damage to this product or to the other property.

Terms on the Device

The following warning terms used in this document may appear on the device:

WARNING: indicates that a potential hazard may occur.

CAUTION: indicates that a potential damage may occur to the instrument or to the test object connected to the instrument.

Symbols on the Device

The following symbols may appear on the device:



Refer to Manual



Protective Earth Terminal

1.1.2 Terms of Use

- The RMO-H shall be used only if it is in a good technical condition. Its use shall be in accordance with local safety and industrial regulations. Adequate precautions must be taken to avoid any risks related to high voltages associated with this equipment and nearby objects.
- The RMO-H shall be used only for the application purposes described in the "Intended Use" section. The manufacturer and distributors are not liable for a damage resulting from the wrong usage. The user bears responsibility for not following the instructions defined in this document.
- Do not remove the protective casing of the RMO-H.
- All service and maintenance work must be performed by qualified personnel only.

1.1.3 Orderly Practices and Procedures

- The Manual shall always be available on the site where the RMO-H is used.
- Before using the RMO-H, all personnel (even personnel who only occasionally, or less frequently, work with the RMO-H) assigned to operate the RMO-H should read the operations Manual.
- Do not make any modifications, extensions, or adaptations to the RMO-H.
- Use the RMO-H only with the original accessories provided by the manufacturer.
- Use the RMO-H and its original accessories for the device's intended use only.

1.1.4 Device maintenance

Device should be kept in a clean condition to prevent excessive dust or other contaminants affecting its operation. It should be cleaned with water/isopropyl alcohol after noticing any dirt/contaminants on its surfaces.

1.1.5 Operator Qualifications

- Testing with the RMO-H should only be carried out by authorized and qualified personnel.
- While receiving training, instruction or education on the RMO-H device personnel should remain under the constant supervision of an experienced operator while working with the test set and the test object.

1.1.6 Safe Operating Procedures

- Before putting the RMO-H into operation, check the test set for any visible damage.
- Do not operate the RMO-H under wet or moist conditions (condensation).
- Do not operate the RMO-H if explosive gas or vapors are present.
- Only the external devices which meet the requirements for SELV equipment according to EN 60950 or IEC 60950 should be connected to the RMO-H through the serial interface.
- Removing the RMO-H protective casing will void the warranty. Any work inside the instrument without prior authorization from DV Power will also void the warranty.
- If the RMO-H seems to be malfunctioning, please contact the DV Power Support Team (refer to the "Manufacturer Contact Information" section) after previously checking the "Error Messages" section.

- Do not use the RMO-H without the extra protective ground cables supplied with the RMO-H. It must never be operated in a non-grounded configuration as this may result in an electrical shock to the user or damage the RMO-H. Always establish this connection first before establishing any other connections and remove this connection as the very last one.

1.2 Intended Use

The Micro Ohmmeter RMO-H is a portable, handheld device designed for measuring contact resistances of non-inductive test objects used in the electric power industry or similar branches.

It is employed for resistance measurement during manufacturing, commissioning and testing of:

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



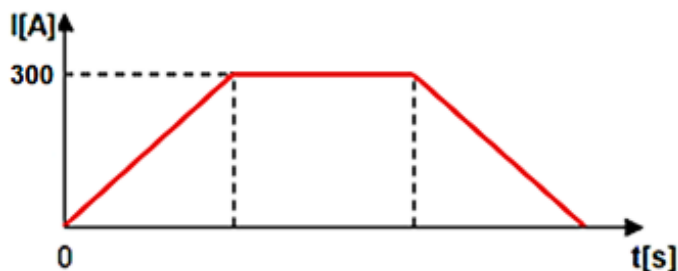
CAUTION: Any use of the RMO-H other than mentioned above is being considered improper and will void the warranty and exempt the manufacturer from its liability for repair or exchange.

2 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 300 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.

Figure 2-1:
Automatically
regulated test
current ramp



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 electro-magnetic interference in HV electric fields. This is achieved by very efficient filtration utilizing a proprietary hardware and software.

2.1 Front Panel Components



Figure 2-2:
Front panel components

1 – LCD Display

TFT LCD 2.8 in (43,2 mm x 57,6 mm / 1.8 in x 2.3 in)

2 – Keyboard

Used to control the device

3 – Current output terminal (+)

4 – Current output terminal (–)

5 – Protective Earth Connector

Used for protection against parasitic currents or voltages

6 – Charger Connector

7 – Connectors for the voltage sense cables

(+) Standard banana connector (red)

(–) Standard banana connector (black)

8 – Remote control connector



Figure 2-3:
Voltage sense and remote
control connectors



CAUTION: For protection against parasitic currents or voltages, always connect the RMO-H protective earth connector to the protective earth (PE).

Please use only the manufacturer provided cable.

For safety reasons, always establish the protective earth connection before establishing any other connection, and remove this connection as the very last step.

Voltage terminals

Voltage sense cable terminal – connecting the voltage sense test cable.

Charger Connector

The connector for charging the internal battery.

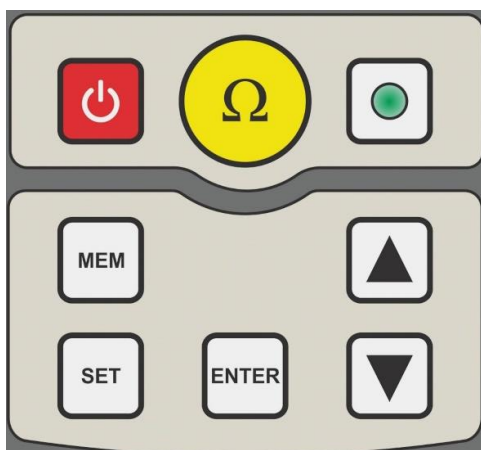
Operator Control

2.8 inches color touch-screen display

Displays the settings as well as the measured values during and after a test operation.

Keyboard

Figure 2-4:
Keyboard



Use this button to turn on/off the device.

Use the **Ω** button to start the test.

Use the **ENTER** button to confirm the defined test parameters, language, time, date and limits.

Use the **UP/DOWN** buttons to navigate through active menu.

Use the **MEM** button to go to Memory Menu.

Use the **SET** button to go to Settings Menu.

3. Getting Started

3.1 Connecting RMO-H to Test Object

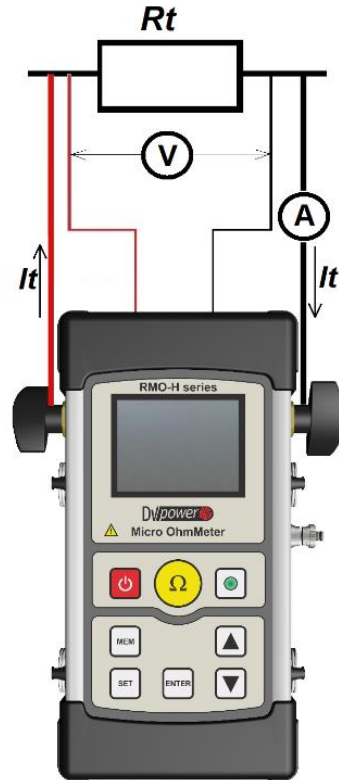


NOTE: Cables should be connected and removed to/from RMO-H device **ONLY** when the RMO-H is switched off.



CAUTION: Always connect the measuring cables to the RMO-H first and then to the test object; and when disconnecting, always disconnect the cables from the test object first and after that from the RMO-H. The grounding wire PE should be disconnected last. Failure to do this may result in a serious injury or even a loss of life.

Figure 3-1:
Connecting a test
object to RMO-H



With RMO-H turned off, connect RMO-H to the test object (R_t) in such a way that the measuring cables from the "Voltage Sense" input sockets are attached as close as possible to the test object R_x , and closer to R_t than the connection points of the current feeding cables. That way, resistance of both, cables and clamps is almost completely excluded from the resistance measurement.

Please pay attention to the polarity while connecting the measuring cables, otherwise the measurement results will be incorrect.

To maximize accuracy and measurement repeatability make sure that all clamps have a good connection to the test object and avoid any connection between Sense and Current clamps.

In case that combined current and sense cables are provided with the RMO-H device, the user only needs to connect the TTA clamps to the connection points. The resistance between these points will be measured by the device.

3.2 Connecting RMO-H to Circuit Breaker

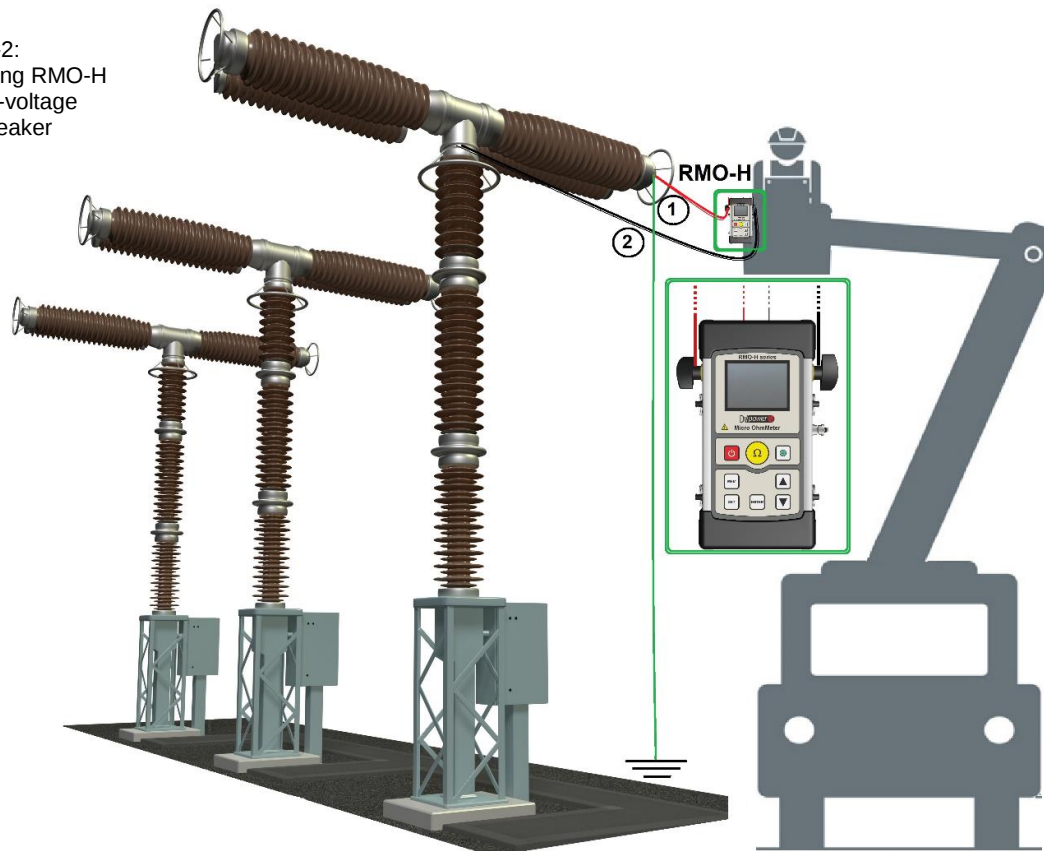
Before connecting the RMO-H to a circuit breaker make sure that:

- the breaker is disconnected or separated from its circuit on both sides of the breaker in accordance with the national safety regulations; **always comply with local safety regulations when using the RMO-H,**
- the breaker is properly grounded to a protective earth (PE),
- the RMO-H itself is properly grounded. To do so, connect the grounding screw of the RMO-H to a PE using only the manufacturer provided grounding cable.

When testing high-voltage circuit breakers with RMO-H, a different cable's length could be used. The short cable (red cable, 1,3 m) connects the RMO-H to the CB's bushing which is closer to the test person and the device, while long cable (black cable, 3 or 5 m) is connected to the distant bushing on the other side of the breaking point.

The connection diagram to a one-side grounded circuit breaker is illustrated in the figure below:

Figure 3-2:
Connecting RMO-H
to a high-voltage
circuit breaker



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)

When testing MV Circuit Breakers, it is convenient to use Current and Sense cables with Kelvin probes.

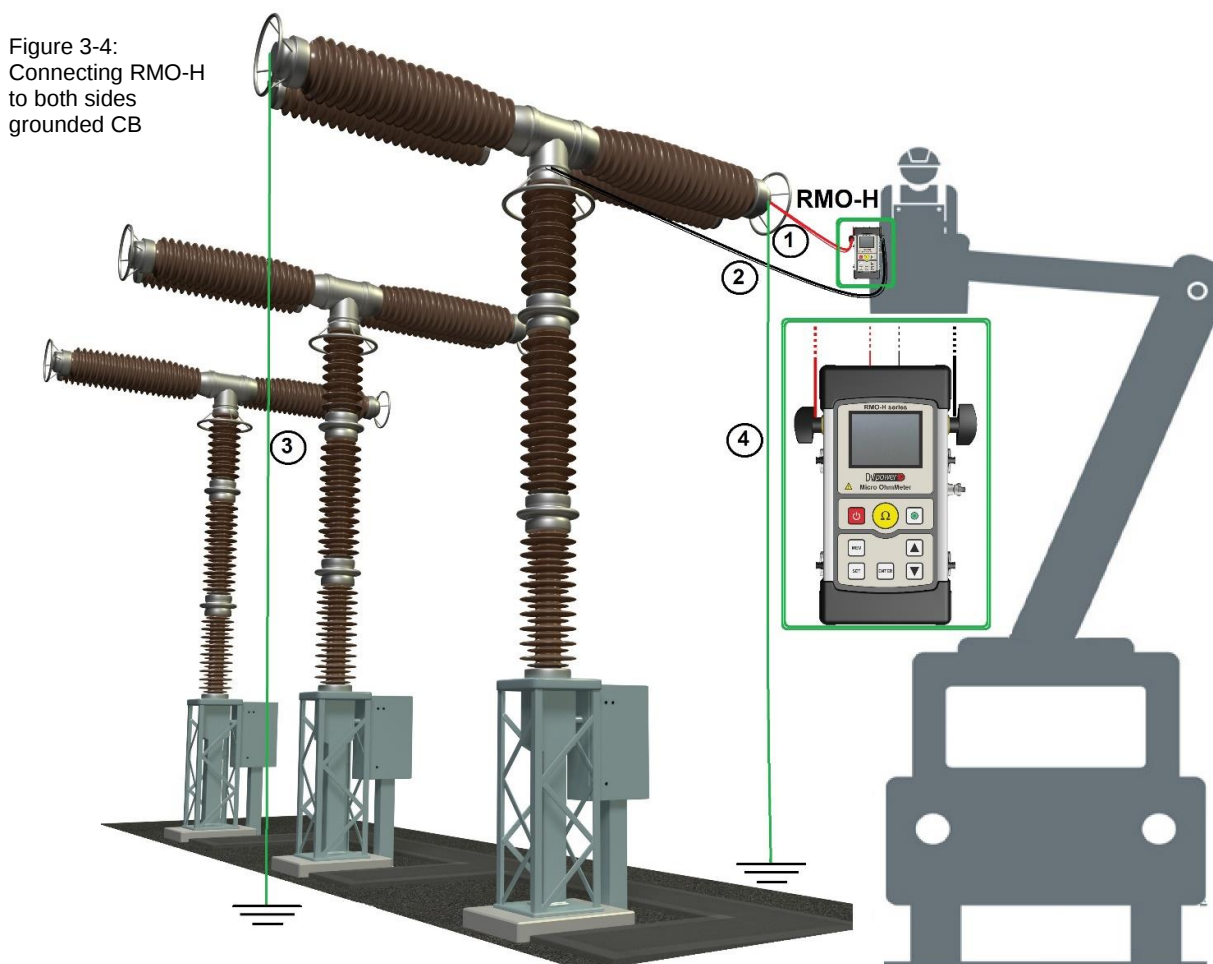
Figure 3-3:
Connecting RMO-H to
circuit breaker using
cables with Kelvin
probes



3.3 Connecting RMO-H to Both Sides Grounded (BSG) Circuit Breaker

The RMO-H device provides a safer measurement approach to the breakers with both terminals grounded. The connection method for both sides grounded circuit breakers is the same as for one side grounded circuit breakers. This type of a measurement could provide less accurate results comparing to a traditional one side grounding measurement, because of a small amount of current that can flow through groundings. The inaccuracy depends of the resistance of the grounding loop. The measured resistance of the circuit breaker mains contacts can be corrected if the resistance of the grounding loop is known (or measured). The procedure is described in Application Note originally published by DV Power (IBEKO Power AB) in Year 2011: *"Main contact resistance measurement of a Circuit breaker with both sides grounded (BSG)"*.

The connection diagrams of the RMO-H device applied to both sides grounded circuit breaker is presented in the following figure.



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)



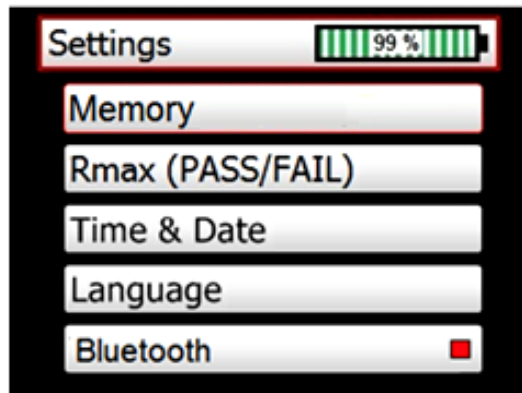
NOTE: The connection diagram for measurement in Both Sides Grounded conditions is the same as for one side grounded circuit breaker.

3.4 Settings

If the RMO-H device is turned ON for the first time, or some additional system settings are required, pressing the **SET** button will invoke the **Settings** menu, as illustrated below.

In the **Settings** menu Memory, Limits, Time & Date, Language parameters can be modified. In addition, the Bluetooth option can be enabled/disabled. The **UP** and **DOWN** buttons are used for navigation and the **ENTER** button for entering the selected submenu.

Figure 3-5:
The **Settings** Menu

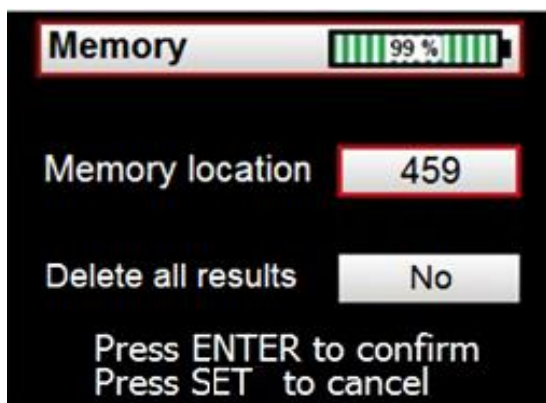


Setting Memory

To set default memory location on RMO-H, please use **ENTER** button to activate the **Memory** menu. In the **Memory** menu, use **UP** and **DOWN** buttons to change values (status) in the selected fields.

ENTER button is used to confirm and **SET** button to cancel selected values (status).

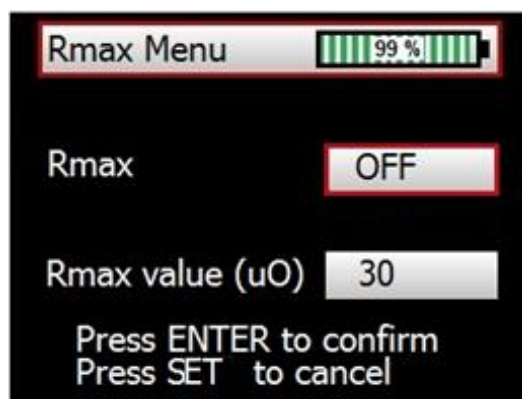
Figure 3-6:
The **Memory** screen



Setting Rmax

To set RMO-H's Rmax value, please use the **RIGHT** button, and then **ENTER** button to select the **Set Rmax** menu.

Figure 3-7:
The **Rmax** screen



In the **Rmax** menu, define the status of **Rmax** (**On** or **Off**) and the assigned value of resistance. Using **UP/DOWN** buttons select **Off** (Figure 3-7) or **On** option in order to DISABLE/ENABLE Rmax function. Press **ENTER** to confirm and change cursor on Rmax value field. Using **UP/DOWN** buttons in *Rmax value field* select a desired value between 1 $\mu\Omega$ and 1999 $\mu\Omega$. The default value is 100 $\mu\Omega$. When the device is turned off and then turned on, the RMO-H remembers the last saved setting of an Rmax value and a status. Once these parameters are defined, press **ENTER** to return to the **Settings** menu.

Setting Time & Date

To set RMO-H's date and time, please use the **UP/DOWN** buttons, and then **ENTER** button to select the **Time & Date** menu.

Figure 3-8:
The **Time & Date** screen



Change the values in the selected fields with the **UP/DOWN** buttons and use **ENTER** button to confirm set values.

One of three different date formats can be selected:

1. YY-MM-DD
2. DD-MM-YY
3. MM-DD-YY

Pressing **ENTER** to confirm, returns you to the **Settings** menu.

Pressing **SET** to cancel, returns also to the **Settings** menu, but without saved Time & Date settings.

Setting Language

To set RMO-H's language, please use the **UP/DOWN** buttons, and then **ENTER** button to select the **Set Language** menu.

Figure 3-9:
The **Language** screen

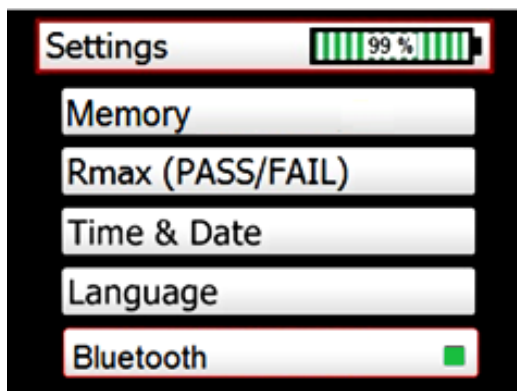


If the user is satisfied with the values, all the selections can be confirmed by pressing **ENTER**.

Setting Bluetooth (ON/OFF)

To activate the Bluetooth option, press the **ENTER** button when the "Bluetooth" field is selected. When Bluetooth is activated, the screen looks like in the figure below (green colored status):

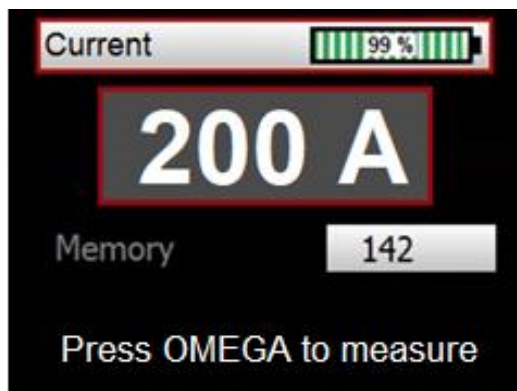
Figure 3-10:
The **Bluetooth** activation



3.5 Measuring with RMO-H

The start screen for setting the measurement parameters is presented in the figure below:

Figure 3-11:
Setting the test current in start screen



User can set the test current by using **UP/DOWN** buttons. No additional setting is needed for starting the test. The measurement can start by pressing the Ω button or with the trigger button on the Kelvin probes.

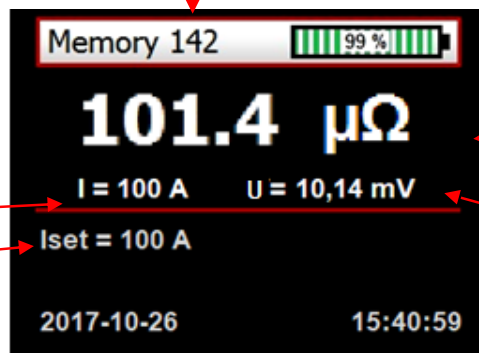
Once a test is finished, the RMO-H automatically changes to the **Result** menu to display the test results. The **Result** menu provides the result memory location, measured resistance value, measured test current and voltage, as well as the parameters set for the test (set test current).

Memory position that holds the results

Figure 3-12:
The **Result** menu
showing the test results
obtained in Single test

Test current reached

Test current set



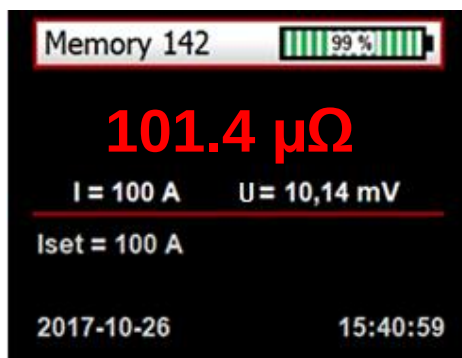
*Measured resistance
of test object*

*Measured voltage drop
at test object*

3.5.1 Test Results with Rmax Function Enabled

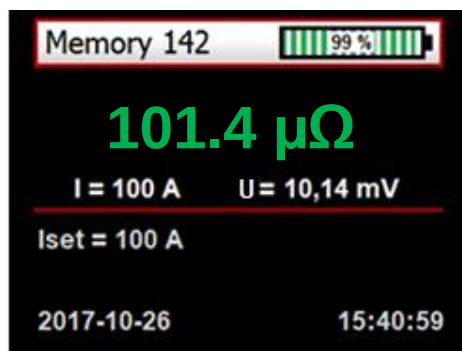
If the **Rmax** menu is set to option **ON**, once the test is finished, RMO-H automatically changes to the **Rmax** to display the test results. In case the measured resistance is equal to or greater than maximum assigned value, the result will be displayed in “red” color, as presented in the figure below:

Figure 3-13:
The **Rmax** showing
the test results



In case the measured resistance is lower than set R_{max} value the result will be displayed in “green” color, as presented in the figure below:

Figure 3-14:
The **Rmax** showing
the test results



The default value for R_{max} is 100 $\mu\Omega$. When the device is turned off and then turned on, the RMO-H remembers the last saved setting of an R_{max} value and a status.

3.6 Measurement parameters

The table below provides RMO-H device accuracy parameters under the maximal test current per the range being used.

Table 3-1 *Measurement parameters for RMO-H*

Range	Recommended Test Current	Nominal Resistance	Full Range Display	Resolution	Typical accuracy
1	100 A – 300 A	1 mΩ	999,9 μΩ	0,1 μΩ	± 0,1 % rdg ± 0,1 % FS
2	50 A - 200 A	10 mΩ	9,999 mΩ	1 μΩ	± 0,1 % rdg ± 0,1 % FS
3	50 A - 100 A	20 mΩ	20,00 mΩ	10 μΩ	± 0,1 % rdg ± 0,1 % FS
4	20 A - 50 A	50 mΩ	50,00 mΩ	10 μΩ	± 0,1 % rdg ± 0,1 % FS
5	10 A - 20 A	100 mΩ	99,99 mΩ	10 μΩ	± 0,1 % rdg ± 0,1 % FS
6	5 A - 10 A	500 mΩ	500,0 mΩ	0,1 mΩ	± 0,1 % rdg ± 0,1 % FS
7	1 A - 5 A	1 Ω	999,9 mΩ	0,1 mΩ	± 0,1 % rdg ± 0,1 % FS
8	1 A – 5 A	2 Ω	2000 mΩ	1 mΩ	± 0,1 % rdg ± 0,1 % FS

**The measurement parameters stated in the table are valid at the rated battery voltage (3,7 V), + 25 °C ambient temperature and use of recommended accessories.*

4 Error Messages

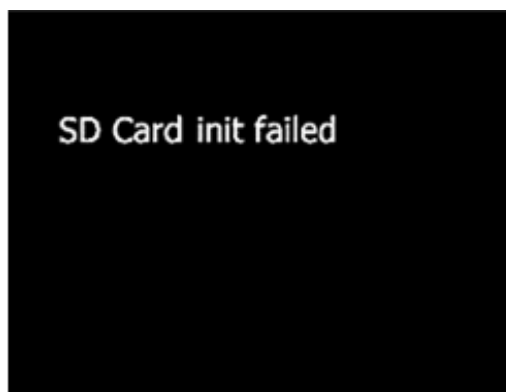
Any operational error is indicated by an error status message.

4.1 Error Message "SD Card Initiation Failed"

The RMO-H device has a built-in SD card. The SD card is used to store internal device information and is not accessible to the user.

The SD cards are initialized during the device startup stage. If there is no SD card in the SD card slot, or if the initialization is not successful, the following message will be displayed. In case the message is frequently displayed, please contact the DV Power Customer Support Department.

Figure 4-1:
Error message
"SD Card init failed"

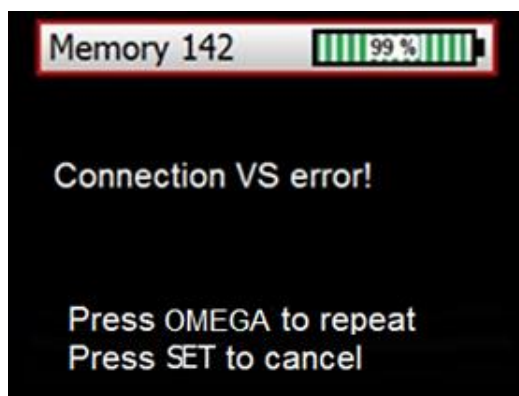


The device will display the message for three seconds and return to the Main Menu.

4.2 Error Message "Connection VS"

If one of the "Voltage Sense" cables is disconnected from the test object, or from the test set at the start of the test, the error message "Connection VS" is displayed.

Figure 4-2:
Disconnection of a
"Voltage Sense" cable
and corresponding
error message

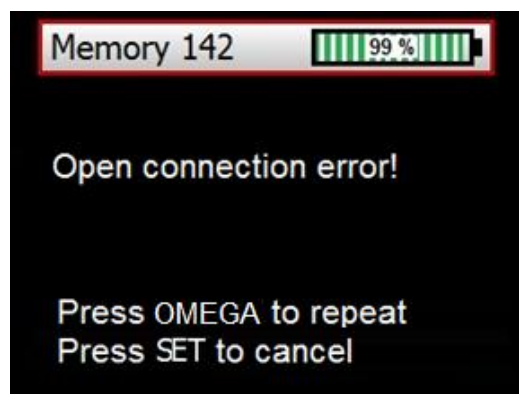


NOTE: Voltage Sense cables disconnection, occurred during the test, will provide an erroneous result. The display will not show this as an error message.

4.3 Error Message "Open Connection"

If one of RMO-H Current Cables ("+" or "-") is disconnected, from the test set or from the test object at the start or during the test, the error message "Open Connection" is displayed.

Figure 4-4:
Disconnection of the
current cables and
corresponding error
message



Note: The error message "Open Connection" can be displayed not only in case one of the current cables is disconnected, but also in case of high test resistance due to bad contact. It is recommended to clean the contact surface of the circuit breaker terminal before testing with the RMO-H device.

5 Troubleshooting

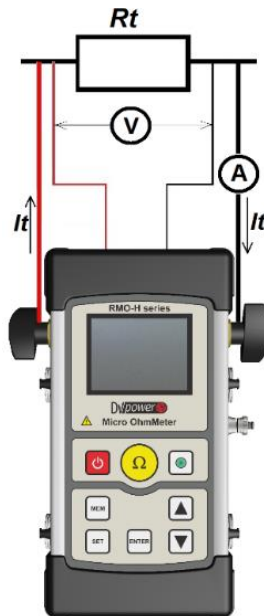
If it is suspected the device is presenting inaccurate results, the following tests should be performed:

5.1 Measurement Accuracy Check

If it is suspected that the device is presenting inaccurate results, the accuracy check described below should be performed:

1. Connect the RMO-H instrument with the test shunt $100\ \mu\Omega$, as it is shown in the Figure 5.1.
2. Turn ON the RMO-H instrument.
3. Perform tests with 100 A, 150 A and 200 A test currents.
4. Repeat the same procedure with the test shunt $1\ \text{m}\Omega$.
5. If it is suspected that the instrument is measuring inaccurately, please send e-mail to DV Power support team (support@dv-power.com) with the following information:
 - Declared test shunt resistance value,
 - Declared accuracy of the test shunt
 - Result measured with the instrument (resistance, voltage drop and generated current).

Figure 5-1:
Connection scheme



5.2 Battery check

If it is suspected that the device is having battery issue or if it is not possible to turn ON the RMO-H instrument, procedure described below should be performed:

1. Turn ON the RMO-H instrument.
2. Connect the RMO-H instrument to the charger.
3. Check if the battery is charging (charging is illustrated in the battery symbol – upper right part of the display)
4. If it is not possible to turn ON the RMO-H, connect it to the charger and again try to turn ON the instrument.
5. If the instrument is able to turn ON when it is connected to the charger, wait until the battery is fully charged.
6. Disconnect the charger and again try to turn ON the instrument.
7. If the instrument is able to turn ON, the battery is working properly.

6 Customer Service

Before calling or sending an e-mail to Customer Service for assistance, please perform the following steps:

1. Check all cable connections.
2. Try the test on another instrument, if available.
3. Perform the troubleshoot procedure.
4. Have the following information available:
 - Instrument serial numbers, hardware configuration, and software revision
 - Exact description of the problem, including the test object information, error messages and the sequence of events before it appeared
 - List of solutions that have been tried

The Customer Support Department can be reached at:

Local support (Sweden): +46 8 731 78 24

International support: +46 70 0925 000

E-mail: support@dv-power.com



Note: Email communication is preferred for support issues, since the case is then documented and traceable. Also, the time zone problems and issues with occupied telephones do not occur.

7 Packing the Instrument for Shipment

If you need to send the instrument to DV Power for servicing, please contact the DV Power Customer Service for return instructions at:

Local support (Sweden): +46 8 731 78 24

International support: +46 70 0925 000

E-mail: support@dv-power.com



Note: DV Power is not responsible for shipping damage. Please protect each instrument from shipping and handling hazards carefully. Please ensure protective covers are securely in place. Instruments should be sent to DV Power freight pre-paid, unless other arrangements have been authorized in advance by DV Power Customer Service.

To prepare an instrument for shipment, please follow these instructions:

1. Disconnect and remove all external cables. Do not include manuals and cables, unless recommended by DV Power Customer Service.
2. Reuse the original packing material if it is available. If it is not, pack the instrument for shipment according to the instructions for fragile electronic equipment. It is recommended use two-wall minimum corrugated cardboard box with a minimum 5 cm (2 inch) thick poly foam padding, or a wooden crate with minimum of 5 cm (2 inch) thick poly foam padding all around.

8 Technical Data

Battery

- Type: 1 Cell – 5600 mAh Li-Po
(User replaceable)
- Nominal 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

- Test current: up to 300 A DC
(regulated, user selectable)
- Output voltage: 3,7 V DC nominal (4,1 V max)

Measurement

- Resistance range: 0 – 2000 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 – 2000 mΩ	1 mΩ
- Typical accuracy*: $\pm (0,1 \% \text{ rdg} + 0,1 \% \text{ FS})$;
- Guaranteed accuracy*: $\pm (0,2 \% \text{ rdg} + 0,2 \% \text{ FS})$;

**valid under the maximum test current per the range being used.*

CE – marking

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

Data storage and transfer

Interface

- Bluetooth: Device to PC connection

Internal Memory

- Internal: 2 GB SD Card
- Results storage: 1000 measurements

Display

- Type: TFT LCD 2.8 in
- Viewing Area: 43,2 mm x 57,6 mm / 1.8 in x 2.3 in
- Resolution: 320 x 240 pixels

Real Time clock

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

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.
- Dimensions (transport case): 405 mm x 165 mm x 330 mm
(W x H x D) 15.94 in x 6.5 in x 12.99 in

**Transport case includes device and accessories*

Mechanical Protection

- Ingress Protection Rating: IP54

Environmental conditions

- Operating temperature: -10 °C - +55 °C / +14 °F - +131 °F
- Storage & transportation: -40 °C - +70°C / -40 °F - +158 °F
- Humidity: 5 % - 95 % relative humidity, non-condensing
- Installation/overvoltage category: II
- Pollution degree: 2

Low Voltage Directive

Directive 2014/35/EU (CE conform)
Applicable standards, for a class I instrument, pollution degree 2, Installation category II: IEC EN 61010-1

Electromagnetic Compatibility (EMC)

Directive 2014/30/EU (CE conform)
Applicable standard: EN 61326-1

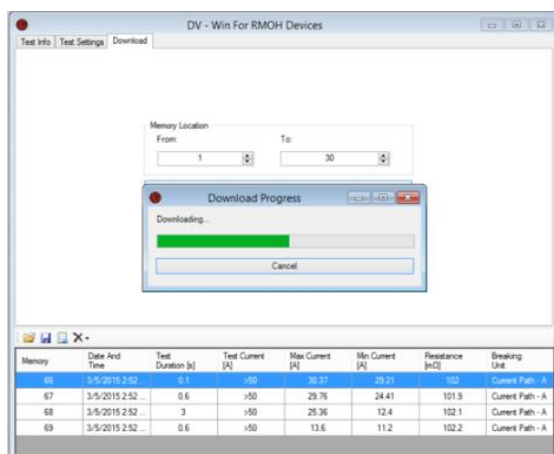
***All specifications herein are valid at the rated battery voltage (3,7 V) or higher, ambient temperature of + 25 °C and use of recommended accessories.
Specifications are subject to change without notice.***

9 Instrument & Accessories

Instrument with included accessories	Article No
Handheld Micro Ohmmeter RMO-H - DV-Win PC software - Ground (PE) cable - Carrying belts - Plastic transport case – small size	RMOHN00-N-00
Recommended accessories	Article No
Current and sense cables 1,3 m with TTA clamps (300 A rated)	CS2-1Z3-25CLWC
Power supply adapter EU 3 A	PWR-ADP3A-EU
Optional accessories	Article No
Current and sense cables 1,3 m with Kelvin probes (270 A rated)	CS2-1Z3-16CLKP
Current and sense cables 1,3 m (red) and 3 m (black) with TTA clamps (270 A rated)	CS-1Z33-25CLWC
Current and sense cables 1,3 m (red) and 3 m (black) with TTA clamps (290 A rated)	CS-1Z33-35CLWC
Current and sense cables 1,3 m (red) and 5 m (black) with TTA clamps (240 A rated)	CS-1Z35-25CLWC
Current and sense cables 1,3 m (red) and 10 m (black) with TTA clamps (220 A rated)	CS-1Z310-35CLWC
Current cables 2 x 1,3 m 25 mm ² 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 25 mm ² with battery clamps (270 A rated)	C-1Z33-25CLB1
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-1Z33-02BPA2
Current cables 1,3 m and 3 m 35 mm ² with battery clamps (290 A rated)	C-1Z33-35CLB1
Sense cables 1,3 m and 3 m with alligator clamps (A2)	S-1Z33-02BPA2
Current cables 1,3 m and 5 m 25 mm ² with battery clamps (240 A rated)	C-1Z35-25CLB1
Sense cables 1,3 m and 5 m with alligator clamps (A2)	S-1Z35-02BPA2
Test shunt 240 $\mu\Omega$ (250 A/60 mV)	SHUNT-240-MK
Test shunt 1 m Ω (150 A/150 mV)	SHUNT-150-MK
Power supply adapter (car charger)	PWR-ADP3-CC0

DV-Win software

*included in the purchase price



- Saving the test results in different formats
- Test reports generating after the test
- Printing and Exporting the test reports in different formats
- Several filters for results download to PC

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