

User's Guide

Phenix Technologies, Inc.

MRM 200

Digital micro-ohmmeter



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GU-1553

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Safety Warnings



CAUTION



HIGH VOLTAGE

- Before using this instrument, the User Guide and Safety warnings must be read and understood.
- Safety procedures and rules for working near high voltage energized systems must be observed during the use of this equipment. The generated voltages and currents may be dangerous.
- Before beginning the measurement, verify the mains supply voltage compatibility.
- The micro-ohmmeter must be connected to earth ground, through the green terminal or the power cord (both use the same point).
- During a circuit breaker measurement, its contacts must be closed and connected to an earth ground. The end connected to an earth ground must be connected to the “C-” terminal.
- Ensure that the measurement points which will be connected that all the terminals are free of any voltage in relation to earth ground and between each other. Take into account that in a substation you will find in disconnected points high potential levels in relation to the earth ground. Those potentials are caused by present electromagnetic fields and can be minimized following the indications in the paragraph above.
- Make sure that the current connections are tight as well as the C-clamp, to avoid undesirable heating.
- Be careful when manipulating the current terminals in the instrument. There may be high temperatures in the current connections.
- Never connect or disconnect the cables during a measurement. If you must modify any connection, it must be made after pressing the Stop button.
- The equipment must be kept dry and clean.
- Never use the equipment if there are questions regarding its functions. The equipment must be serviced (contact Phenix Technologies' Service Department).

This equipment should be used only by a trained and competent person, strictly applying suitable safety rules.

Symbols Used

	Caution, refer to User Guide.
	High Voltage, Danger
	Warning, hot surface. Be careful when handling.
	Equipment complies with current EU Directives.
	The rubbish bin with a line through it means that in the European Union, the product must undergo selective disposal for the recycling of electric and electronic material, in compliance with Directive WEEE 2002/96/EC.

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1.0 Description

The MRM 200 high-current micro-ohmmeter is a portable, digital instrument. It has optimized filters and protections for measurements in electrical substations. It is used to accurately measure very low contact resistances of high voltage circuit-breakers and switches, busbars, etc., with test currents from 5A up to 200A. It employs the 4 terminals-method (U/I measuring principle) to avoid errors caused by test leads and their contact resistances.

Measurement accuracy is guaranteed by a state-of-the-art signal amplification system, offset-free and of high long-term stability. Resistance readings are shown in the alphanumeric display with up to 4½ digits resolution.

It has an internal memory for up to 50 registers with 80 readings each. The data output (RS-232) may be connected to a computer to download the stored values.

The high-current generation system is based on modern technology that allowed a significant decrease to both its weight (approx. 24 lbs / 11kgs) and size. The cabinet is made of plastic material highly resistant to impacts and to environmental challenges. Internal thermal sensors in all sensitive components are designed to avoid damage caused by overheating.

This is strong but lightweight equipment, and may be easily carried by one person. It is water-resistant and can be used under severe weather conditions (IP54 with closed lid), offering an excellent performance both in the laboratory and out in the field.

2.0 Operating instructions

2.1 Operating principle

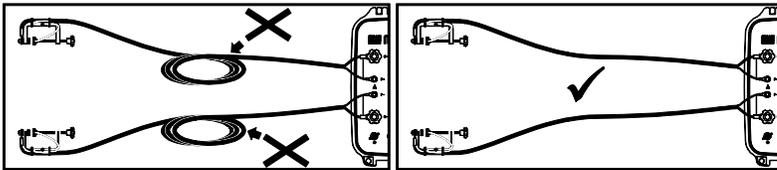
This device uses the Kelvin Bridge architecture, with four terminals, avoiding test leads resistance that cause errors during measurement. The operator chooses test current and the reading is obtained by comparison through internal high-stability standards. The result appears in the alphanumeric display.

2.2 Use of test probes

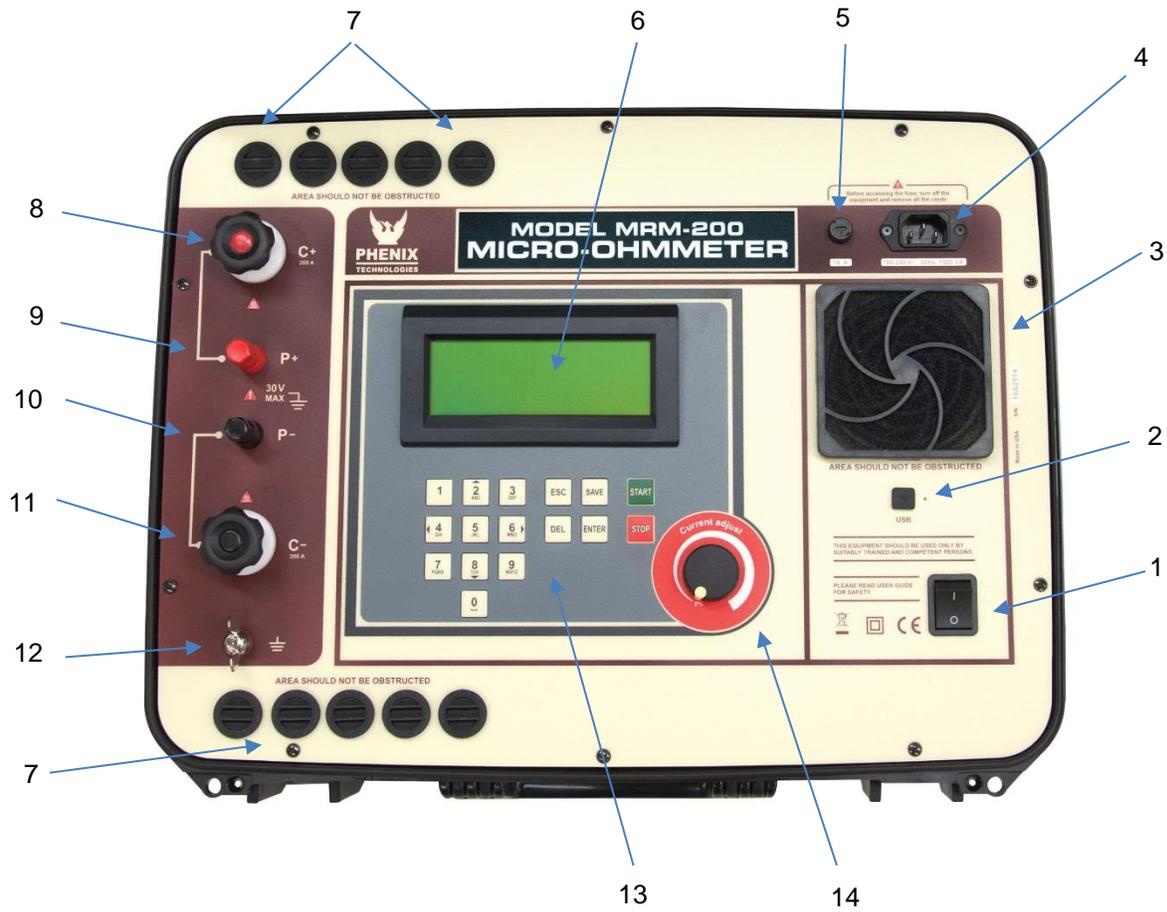
WARNING

Only use the test leads supplied with the equipment for measurement and calibration procedure.

- Ensure that the current connections and C-clamps are properly connected to avoid undesirable heating.
- Exercise caution when manipulating the current terminals of the instrument as high temperatures may occur in the current connections.
- Make sure that the cables are straight during the measurement to avoid overheating.



2.3 Control Panel



1. On/Off switch.
2. USB Connector
3. Fan
4. Power cord connector.
5. Fuse.
6. Alphanumeric display.
7. Cooling System
8. Current output terminal (C+).
9. Potential terminal (P+).
10. Potential terminal (P-).
11. Current output terminal (C-).
12. Ground
13. Keyboard.
14. Variable current control.

3.0 Display

The alphanumeric LCD displays the measurement result, the corresponding measuring unit, the elapsed time since the measurement started, and messages to the operator.



Built-in chronometer

It features the elapsed time (in minutes and seconds) when test current is applied.

Real time clock

It has a real time clock with date, hours and minutes indication, to make identification of tests recorded in paper or in memory easier.

Test number

Tests are automatically numbered by the equipment to make their identification easier. The test number is printed at the beginning of each test and it is stored in memory.

Model and serial number

At the beginning of each test, the equipment model, as well its serial number, are registered, making it possible to relate the obtained results with their respective equipment Calibration Certificate.

3.1 Display Messages

<pre>MEGABRAS MPK215e</pre>	<p>When turning the equipment on using the On/Off switch, this introduction message appears.</p>
<pre>Auto Check 1/3</pre>	<p>The equipment is carrying out functional verifications.</p>
<pre>No Name START (100A 120s) or Press 1 to Setup 02/01/11 16:18</pre>	<p>Main screen where a test can be started, or to set a new one.</p>
<pre>Edit Record Name: -</pre>	<p>Screen to edit the record name.</p>
<pre>CURRENT (100A) 1 - 50A 2 - 100A 3 - 150A 4 - 200A 5 - MANUAL</pre>	<p>Screen to select the test current.</p>
<pre>TIME OF TEST _99 sec Min = 5s Max = 120s</pre>	<p>Screen to setup test duration.</p>
<pre>LOW CURRENT I= 5.0A TIME:003/120s 02/01/11 16:18</pre>	<p>Indicates that the test current is not enough to carry out the reading.</p>

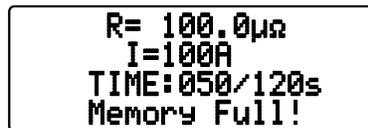
<pre> R=OVERRANGE I=200A TIME:004/120s 02/01/11 16:18 </pre>	<p>Indicates that the measured resistance is higher than the maximum value readable in the selected range.</p>
<pre> R= 100.0μΩ I=100A Overheating 02/01/11 16:18 </pre>	<p>Indicates that some part of the equipment has achieved the critical temperature. The system will cut the high current generation.</p>
<pre> R= 100.0μΩ I=100A PROTECTION ACTIVATED 02/01/11 16:18 </pre>	<p>Display indicates that the security protection of the equipment was turned on.</p>
<pre> R= 1.000Ω I= 7.0A (max) TIME:004/120s 02/01/11 16:18 </pre>	<p>The message (max) indicates that the test current value shown in the display is the maximum value possible according with the measured resistance value.</p>

4.0 Internal memory

This equipment can store up to 50 records with 80 readings each. Each register works like a folder where all readings saved will be stored in until the operator creates another folder (record). To save a measured value, press the  button.



The model and serial number, register name, test number, date and time, elapsed time, current and resistance value will be stored. The percentage of free memory will be displayed. When the memory is full, download all the registers and erase the equipment memory (use MegaLogg2 software).



5.0 Printer (not available)

In order to enable the printing function press  key.

ATTENTION: The printer is not available for this equipment release.

6.0 Protections

Current ramp

The device creates a ramp to smoothly reach the selected current value.

Temperature protection

The duration time of **MRM 200** continuous use is limited by thermal considerations. Internal sensors measure the temperature of the sensitive parts and trigger protection to cut the current circulation, if any of them exceeds the limit temperature, thus avoiding damage. The OVERHEATING message will appear in the display. Under these conditions, measurements will be inhibited until the temperature decreases sufficiently.

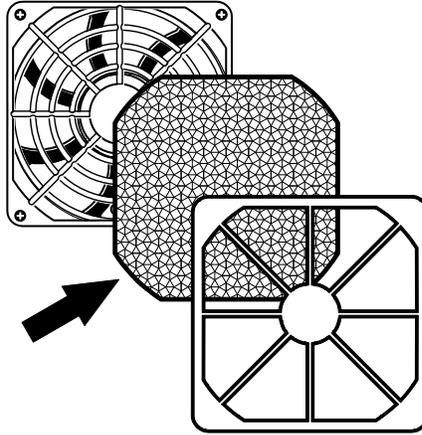
Safety Protections

The equipment has an intelligent security system designed to protect components during the test. When this protection is activated, the display "PROTECTION ACTIVATED" message appears. In this case check the connections, making sure the cables are securely attached to the terminals of the equipment and the test point. After checking that there is effective contact, try to perform the test again. If the message persists, contact the Phenix Service Department.

7.0 Cooling system

The MRM-200 has a cooling system that allows it to perform a large number of consecutive tests without activating the thermal protection. Under normal environmental conditions, the unit will perform up to 30 consecutive tests with duration of 1 minute and 1 minute interval. This interval is usually used for repositioning the test lead to another test point.

The cooling system filter must be replaced periodically. Changing the filter can be easily performed. Pull the grid up, replace the filter and place the grid again in the panel.



NOTE: The lack of filter maintenance can decrease the cooling efficiency and thus the amount of consecutive tests.

Only use filters supplied by Phenix Technologies.

8.0 Test setup

On the main screen, press the **1** key to configure the test.



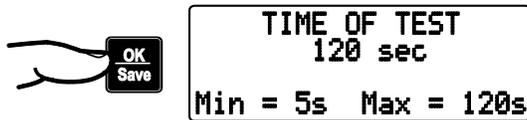
On the next screen use the keyboard to enter a name for the record (group of tests) and press the **OK Save** key to save. To switch between uppercase and lowercase letters, quickly press the **1** key twice. To cancel the operation, press **ESC** button.



All the measured values saved will be associated with this name until the operator changes the record name. Select the test current with the keys **1** **2** **3** **4** or press **5** to manually adjust. Press the **OK Save** button to save.



Set the test duration using the keypad and press the **OK Save** button to save:



The display will return to the main screen. The equipment is configured to perform a test.

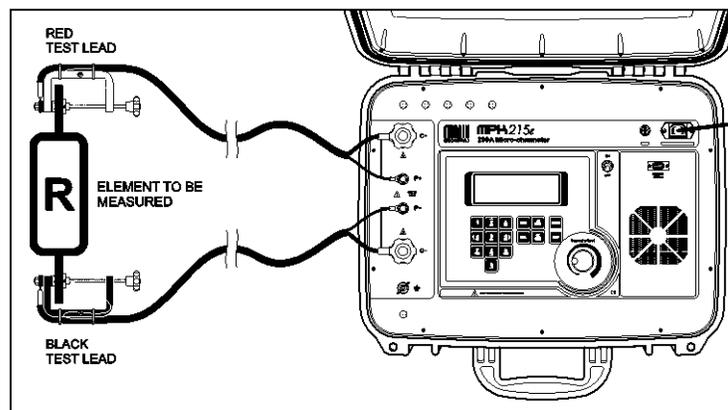
```
OBJECT 1
START (200A 120s)
or Press 1 to Setup
02/01/11 16:18
```

8.1 Measurement

WARNING

- Before using this instrument, READ the User's Guide and Safety warnings to understand operating functions.
 - Safety procedures and rules for working near high voltage energized systems must be observed during the use of this equipment. The generated voltages and currents may be dangerous.
-

1. The equipment should be connected to the mains supply.
2. Before turning the equipment on, connect the test probes to the item to be measured and to the front panel terminals.



The test leads in the drawings are only for illustration.

3. Turn-On the equipment using the **On/Off** switch.



4. An introductory message appears.

```
MEGABRAS MPK215e
```

5. The equipment will make some functional verifications. During this process the display shows the message:

```
Auto Check 1/3
```

6. To start the test, press **START** key.

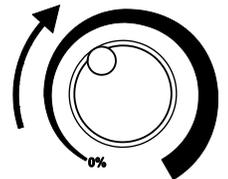
```
OBJECT 1  
START (100A 120s)  
or Press 1 to Setup  
02/01/11 16:18
```

7. The record name and test number will be displayed.

```
OBJECT 1  
Test number: 1
```

8. If the manual current adjust was selected, use the Test Current Control to select the desired current.

```
R= 100.0µΩ  
I=100A  
TIME:035/120s  
02/01/11 16:18
```



9. The display will show the value of measured resistance (R), the value of the applied current (I), the elapsed time / maximum time (in seconds), and the date and time.

```
R= 100.0µΩ  
I=100A  
TIME:035/120s  
02/01/11 16:18
```

10. The value can be stored in the internal memory by pressing the  button.
11. Press the  button in order to finish the measurement.
12. Press the  button to start a new test or the  button to return to the main screen.
13. Do not turn off the equipment with the **On/Off** switch without having pressed the  button before.
14. After finishing measurements, turn the equipment off using the **On/Off** switch.



CAUTION: Do not connect or disconnect the test leads during the measurement.

8.2 MegaLogg2 Software

This software makes communication between the equipment and a computer with Windows system easier. It permits synchronizing the date and time of the equipment internal clock with the computer clock, transferring the stored date, clearing the memory, and generating test reports, etc.

9.0 Replacement Fuse

To check the instrument **fuse**, remove it with a screwdriver. If the fuse is ruptured, replace it by another with the following specifications:

***Fuse Schurter, model SPT 5 x 20 (Time-lag) 15A/250V.
High breaking capacity.***

10.0 Technical Support

Technical support / repair for your equipment can be obtained by contacting the Service Department at Phenix Technologies.

Phenix Technologies Service Department

75 Speicher Drive
Accident, MD 21520

Ph: (301) 746-8118
Fax: (301) 895-5570
e-mail: info@phenixtech.com
www.phenixtech.com

11.0 Technical Specifications

Test currents	: From 5A up to 200 A (True DC). Test current may be adjusted in steps of 0.2 A from 5 A up to 20 A and steps of 1 A from 20 A to 20 A
Resistance ranges	: 0.1 $\mu\Omega$ up to 2 m Ω , with a resolution of 0,1 $\mu\Omega$. 2 m Ω up to 200 m Ω , with a resolution of 100 $\mu\Omega$. 200 m Ω up to 1 Ω , with a resolution of 1 m Ω .
Measurement principle	: Four-terminal, Kelvin-type.
Protections	: Overcurrent, short-circuit, and overheating.
Programmable test time	: Allows setup of the test time from 5 seconds up to 120 seconds.
Basic accuracy	: ± 1 % of reading.
Advanced features	: Digital direct reading of very low resistance in the alphanumeric display, with up to 4½ digits. (Very fast and accurate measurements.)
Internal memory	: Capacity to store 50 registers with 80 readings each.
Interface	: RS232
Environmental protection	: IP54 with closed lid.
Safety class	: Meets the requirements of IEC 61010-1.
Power supply	: Mains: 100-240 V~ 60 Hz.
Operating temperature range	: 0°C to 50°C (32° - 122° F)
Storage temperature range	: -10°C to 60°C. (14° - 140° F)
Humidity range	: 95% RH (non condensing)
Equipment weight	: Approx. 11 kg. (24 lbs.)
Dimensions	: 502 x 394 x 190 mm (19 ¾ x 15 ½ x 7 ½ in.)
Accessories	: 2 Combined test leads (current and potential), clamp type "C" (sargent). 1 Power cord. 1 Ground cable. 1 Communication cable. 1 License to use the software MegaLogg2. 1 Case for the accessories. 1 User guide.

Subject to technical change without notice.

