

MPK-203x

Digital Micro-Ohmmeter

User's Guide

GU-1308

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Safety warnings


- Before to use 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 you begin the measurement verify the mains supply voltage compatibility.
 - The micro-ohmmeter must be connected to earth point, 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 point. The end connected to an earth point must be connected to the “C-” terminal.
 - Certified the measurement points in which will be connected all the terminals are free of any voltage in relation to earth point and between each other. Take in account that in a substation you will find in disconnected points high potential levels in relation to the earth point. Those potentials are caused by present electromagnetic fields and can be minimized following the indications in the paragraph before.
 - Make sure that the current connections are well connected as well as the C-clamp, to avoid undesirable heating.
 - Be careful when manipulating the current terminals in the instrument. You may get 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 you have pressed the Stop button.
 - The equipment must be kept dry and clean.
 - Never use the equipment if you suspect regarding its functionality. The equipment must to be put out of service (contact your distributor service department).
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This equipment should be used only by a trained and competent person, strictly applying suitable safety rules.

Used symbols

-  Caution, refer to User Guide.
-  Warning, hot surface. Be careful when handling.

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1. Description

The MPK-203x high-current micro-ohmmeter is a portable, microprocessor-controlled instrument. It has optimized filters and protections for measurements in electrical substations. Can be used to accurately measure very low contact resistances of high voltage circuit-breakers and switches, busbars, etc., with test currents up to 200 A. 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-arts signal amplification system, offset-free and of high long-term stability. Resistances readings are shown in the alphanumeric display with up to 4½ digits-resolution. It allows to measure resistances up to 20 mΩ, and the best resolution is 0.1 μΩ.

Test current may be adjusted by the operator and his value is measured using an analogue indicator (bargraph).

It has an internal memory for up to 200 readings. The serial data output (RS232) may be connected to a computer to download the stored values. The high-current generation system is based on modern technology that allows to significantly decrease both its weight (approx. 11 kg) and size. The cabinet is made of plastic material highly resistant to impacts and to environmental challenges. Internal thermal sensors in all sensitive components avoid any damage caused to the instrument due to 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 working both in the laboratory and out in the field.

2. Operating instructions

2.1. Operating principle

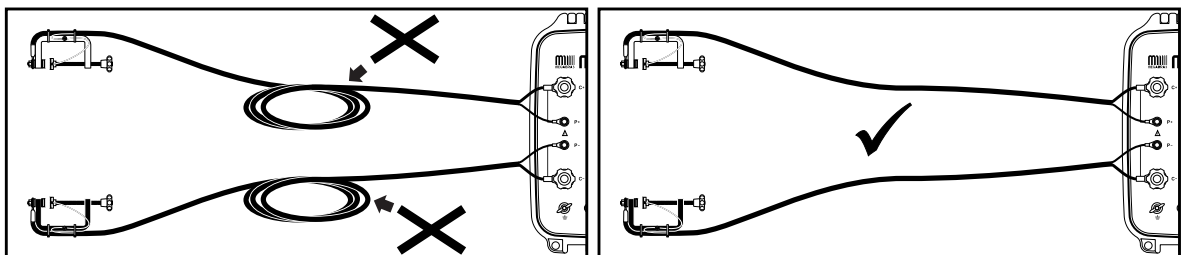
This device uses the Kelvin Bridge architecture, with four terminals, avoiding testing leads resistance to cause error during measurement. Test current may be chosen by the operator and the reading is obtained by comparison through internal high-stability standards. The result appears in the alphanumeric display which is very easy to read.

2.2. ⚠ Use of test probes

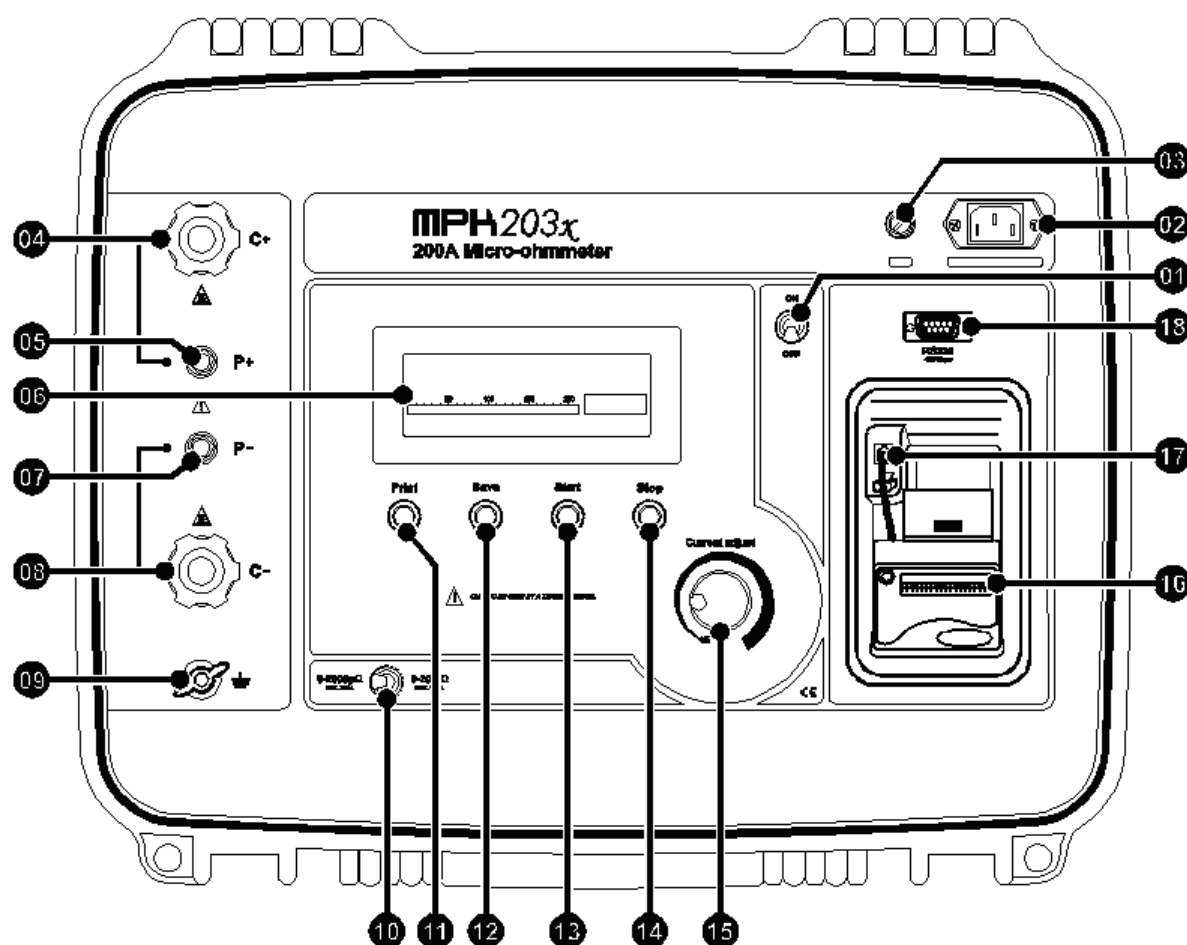
WARNING

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

- Make sure that the current connections are well connected as well as the C-clamps, to avoid undesirable heating.
- Attention when manipulating the current terminals of the instrument. You may get high temperatures in the current connections.
- Make sure that the cables are straight during the measurement to avoid overheating.



2.3. Control panel



- 01 On/Off switch.
- 02 Power cord connector.
- 03 Fuse.
- 04 Current output terminal (C+).
- 05 Potential terminal (P+).
- 06 Alphanumeric display.
- 07 Potential terminal (P-).
- 08 Current output terminal (C-).
- 09 Ground.
- 10 Range and test current selector
- 11 Print button.
- 12 Save button.
- 13 Start button.
- 14 Stop button.
- 15 Test current control.
- 16 Thermal printer.
- 17 Data output to connect the printer.
- 18 RS232 communication port.

3. Display

Alphanumeric LCD display where the measurement result, the corresponding measuring unit, the elapsed time since the measurement started, the analogue indication by means of a bargraph and messages to the operator are displayed.

Messages to the operator

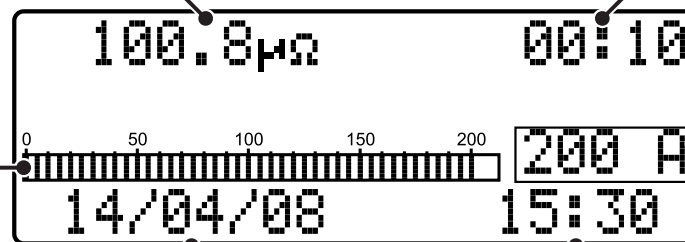
Test number

Measurement results

Elapsed time

Analogue
indication
(bargraph)

Date



Current

Time

Analogue bargraph

The equipment analogically indicates the current value through the bargraph.

Built-in chronometer

It features the elapsed time (in minutes and seconds) since 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.

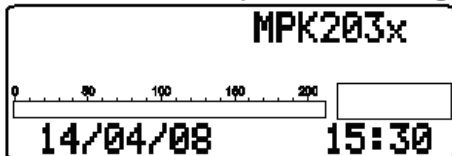
Test number

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.

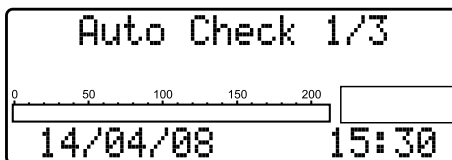
Model and serial number

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.

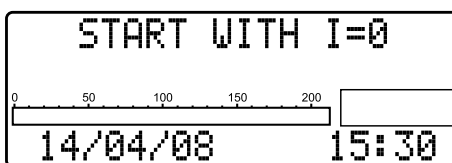
3.1. Display messages



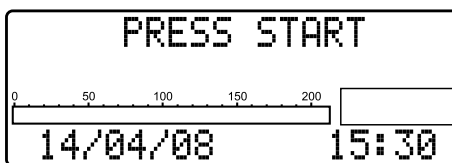
When turning the equipment on using the **On/Off** switch, this introduction message appears for a while.



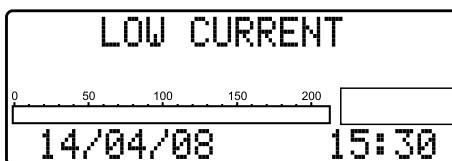
The equipment is carrying out some functional checkings.



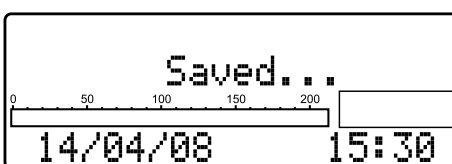
Warns the operator that to be able to start a test, the **Test current control** must be at the zero position (fully counter-clockwise). Otherwise, Start button will be inhibited.



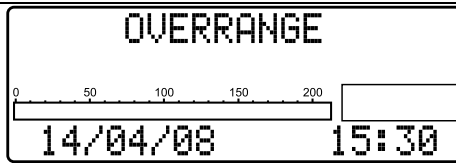
The equipment is ready to start a measurement, thus the operator has to press the **Start** button.



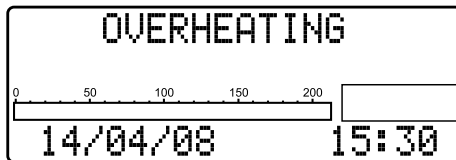
Indicates that the test current is not enough to carry out the reading. It appears at the beginning of each test and it keeps on being there up to the operator rotates the **Test current control** clockwise.



When pressing the **Save** button this message will be exhibited, indicating that the measured value was saved in the internal memory.



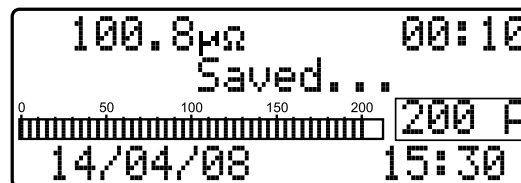
Indicates that the measured resistance is higher than the maximum value readable in the selected range.



Indicates that some part of the equipment has achieved the critical temperature. Thus the system will cut the high current generation.

4. Internal memory

This equipment can store up to 200 measured values in the internal memory. During a measurement, press the **Save** button to store a value.



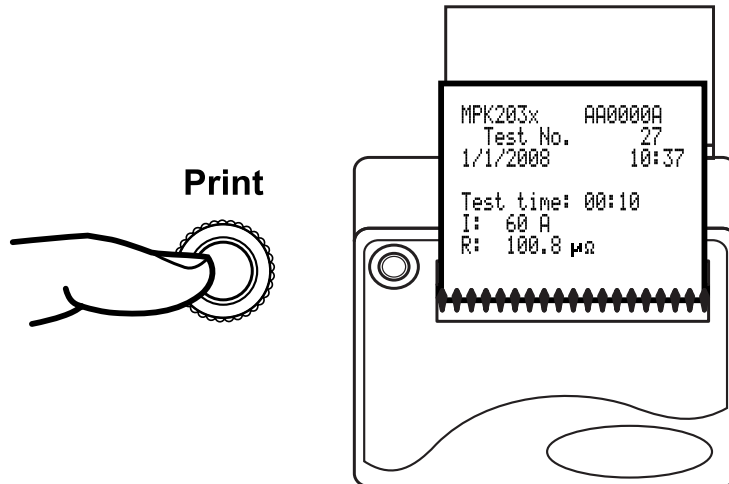
The equipment model and serial number, test number, date and time, elapsed time, test current and measured value will be stored.

5. Real time clock and calendar

In order to provide an easier identification of each test, the **MPK-203x** has a built-in real-time clock/calendar. Date and time must be adjusted with PC software (ask Sourcetricon-Team) that synchronizes the equipment with the PC clock.

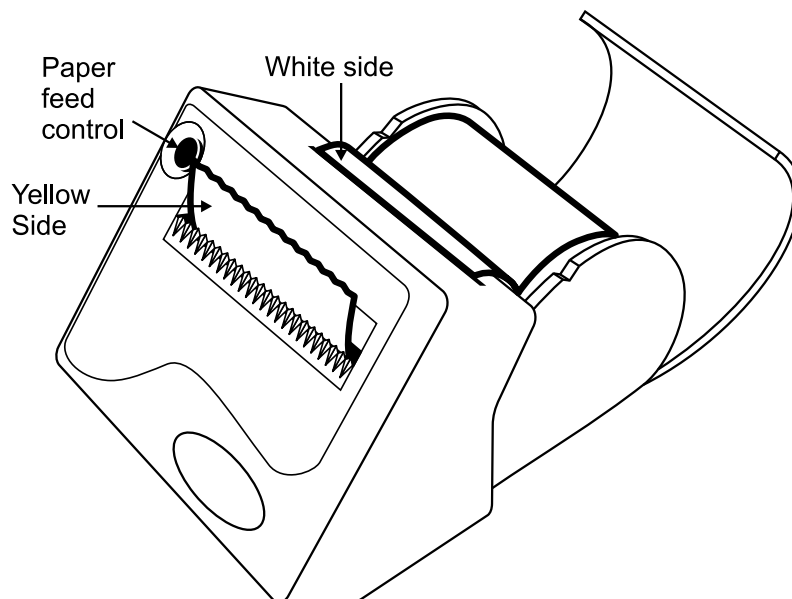
6. Built-in printer

This equipment has a built-in thermal printer. During a measurement, press the Print button in order to print the measured value exhibited in the display.



Paper feed

The blue button, located in the left upper part of the printer body, is the Paper feed control. Press this key 3 times after the test is finished and before cutting the paper, in order to visualize the last lines.



This printer uses 37mm-wide thermal paper, which comes in a 33mm-diameter reel. The figure shown below indicates how to put the paper. Press the **paper feed control** (until the paper appears). To remove the old paper reel, cut the paper next to it and press the paper feed control. The removal used-reel operation must be carried out in this way due to the fact that the paper movement is in one-way only, that is, the paper can be moved in one direction only.

ATTENTION: Don't pull the paper, always use the Paper feed key. Never try to put the paper back into the printer. In any of these cases, the printer can be easily damaged.

7. Protections

Start with I = 0

Very quick variations of the current may cause damages to sensible items. In order to avoid them, the equipment has a protection that imposes to start the test with zero current. You can only start the measurement if the current adjust control is at the start of its course. If this were not the case, the **Start** button would be inhibited and the message would say **START WITH I=0**. If the operator sharply increases the test current by quickly rotating the **Test current control** clockwise, the equipment will impose a slow current growth, in order the current to softly come to the selected value.

Temperature protection

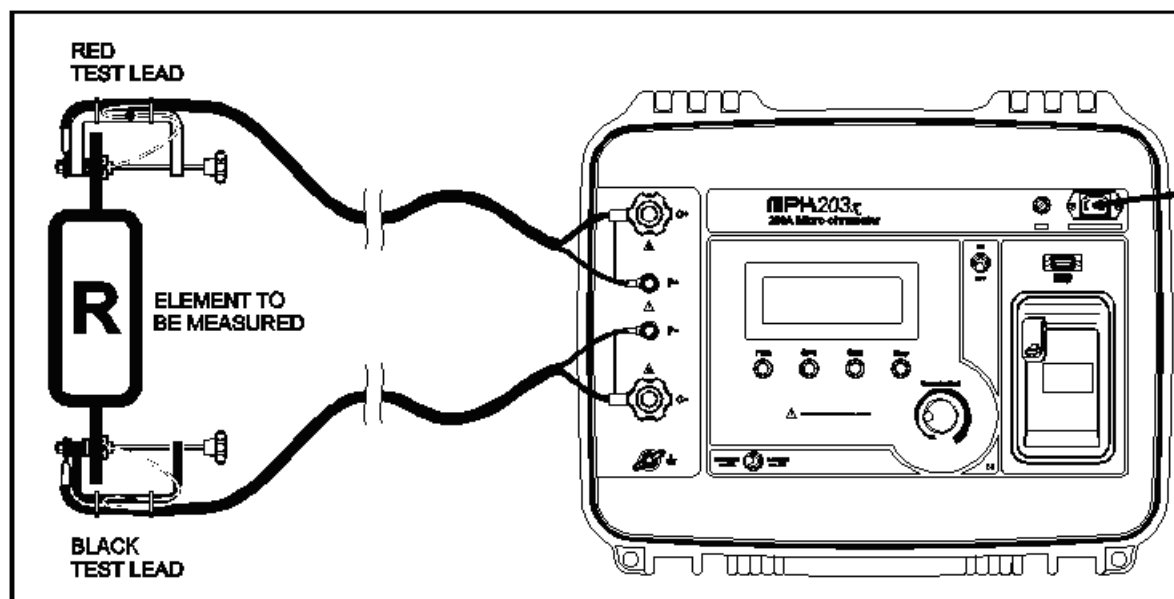
The time of **MPK-203x** continuous use is limited by thermal considerations. Some internal sensors measure the temperature of the sensitive parts and trigger the protection that will cut the current circulation, if any of them exceeds the limit temperature, thus avoiding any damage. The **OVERHEATING** message will appear in the display. Under these conditions, measurements will be inhibited up to the temperature decreases sufficiently.

8. Measurement

Warning

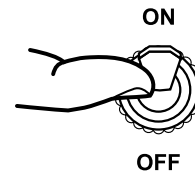
- Before to use this instrument the User's guide and Safety warnings must be read and understood.
- Safety procedures and rules for working near high voltage energized systems must be observed during the use of this equipment. The generated voltages and currents may be dangerous.

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.

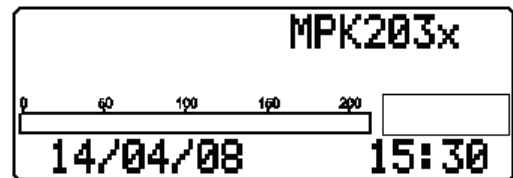
- Switch the equipment On using the **On/Off** switch.



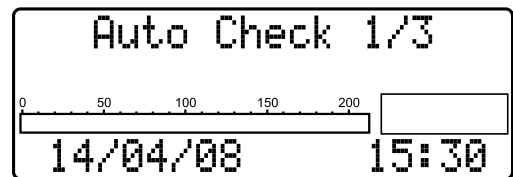
- Using the **Range selector**, choose the range and the current to use.



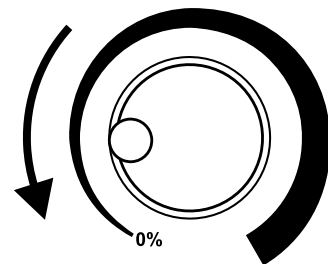
- An introduction message appears for a while.



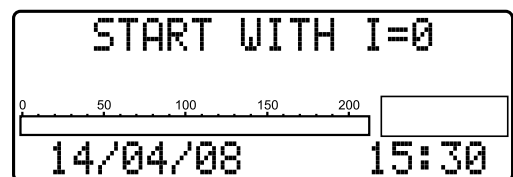
- The equipment will make some functional checkings. During this process the display shows the message:



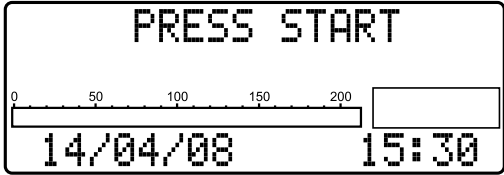
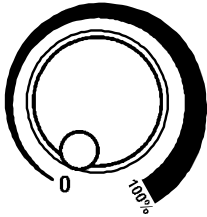
- Be sure that the **Test current control** is at the start position (counter-clockwise completely rotated).



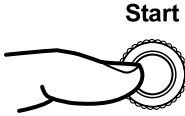
Otherwise, Start button will be inhibited and the display will show the message:



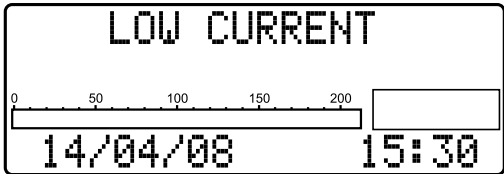
8. The **PRESS START** message will appear showing that measurement can be started.



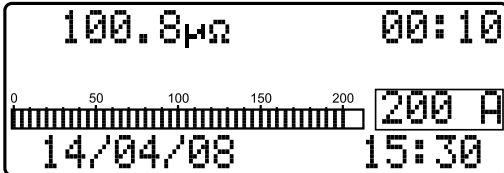
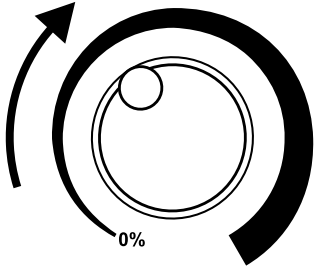
9. Press the **Start** button.



The **LOW CURRENT** message will turn up:



10. Turning the **Test current control** clockwise, increase current until obtaining the desired value.



11. The lowest current for measuring is 10% of the range nominal value. It is important to consider that the measurement errors increase while test current decreases. The error is specified for test currents higher than 80%.

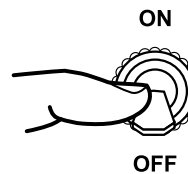
12. The value can be stored in the internal memory by pressing the button **Save**.



13. Press the red button **Stop** in order to finish the measurement.



14. Finally, when finishing measurements, turn the equipment off using the **On/Off** switch.



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

9. 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:

*Fusível Schurter, model SPT 5 x 20 (Time-lag) 8A/250V.
High breaking capacity.*

10. Technical support

Technical support / repair for your equipment can be obtained by contacting SOURCETRONIC:

e-mail: info@sourcetric.com
www.sourcetric.com

11. Technical specifications

Test currents	: 100 A, 200 A (True DC). Each current may be continuously adjustable from 0 to 100%
Resistance ranges	: 0-1999 $\mu\Omega$ (test current: up to 200 A). 0-19.99 m Ω (test current: up to 100 A).
Reading resolution	: 0.1 $\mu\Omega$ for R < 200 $\mu\Omega$. 1 $\mu\Omega$ for R < 2000 $\mu\Omega$. 10 $\mu\Omega$ for R < 20 m Ω .
Output voltage	: 3.5 Vdc @ 200 A. 4.5 Vdc @ 100 A. 5.8 Vdc (without load).
Maximum load resistance	: 10 m Ω @ 200 A. 30 m Ω @ 100 A.
Measurement principle	: Four-terminal, Kelvin-type.
Continuous operation time	: At 200 A this equipment may be used continuously for approx. 1 minutes before the thermal protection activates. At 100 A this equipment may be used continuously for approx. 15 minutes before the thermal protection activates.
Thermal protection	: Protects all sensitive components, avoiding any damage due to overheating.
Basic accuracy	: $\pm 0.5\%$ of reading ± 2 digits.
Advanced features	: Digital direct reading of very low resistances in the alphanumerical display, with up to 4½ digits. Very fast and accurate measurements.
Internal memory	: For up to 200 measured values.
Serial data output	: RS232 @ 4800 bps. Suitable for data collection in an external serial printer, computer or data-logger.
Environmental protection	: IP54 with closed lid.
Safety class	: Meets the requirements of IEC 61010-1:1990, IEC 61010-1:1992 amendment 2.
Power supply	: 220 - 240 V~ 50 Hz.

Operating temperature range	: -5°C to 50°C
Storage temperature range	: -25°C to 65°C
Humidity range	: 95% RH (non condensing)
Equipment weight	: Approx. 11 kg.
Dimensions	: 502 x 394 x 190 mm
Accessories	: 2 Combined current and potential leads. 1 Ground cable. 1 Power cord. 1 RS232 cable. 1 Case for the accessories. 1 User guide.

Subject to technical change without notice.

12. Warranty

SOURCETRONIC warrants to the original purchaser that each equipment it manufactures will be free from defects in material and workmanship under normal use and service. The warranty period is valid for 12 months, and begins on the date of shipment. The manufacturer's warranty does not apply to any product or accessories which, in the manufacturer's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation and handling.

To obtain warranty service, send the equipment, with a description of the difficult, shipping and insurance prepaid, to SOURCETRONIC. The manufacturer assumes no risk for damage in transit. SOURCETRONIC will, at its option, repair or replace the defective equipment free of charge or refund your purchase price. However, if SOURCETRONIC determines that the failure was caused by misuse, alteration, accident or abnormal condition or handling, you will be charged for the repair and the repaired equipment will be returned to you transportation prepaid.

This warranty is exclusive and is instead of all other warranties, express or implied, including but not limited to any implied warranty or merchantability or fitness for a particular purpose or use. SOURCETRONIC will not be responsible for any special, indirect, incidental, or consequential damages or loss of data, whether in contract, or otherwise.

Liability limitation

The liability for malfunctioning of the equipment is limited to the application of the warranty pursuant to the aforementioned provisions. The manufacturer does not take any responsibility for any eventual damage due to the use or impossibility to the use of the equipment such as the loss of memory data, accidents in the field, loss of profit, etc.

For application or operation assistance or information on SOURCETRONIC products, contact:

SOURCETRONIC

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