Megger

MPCC230

Megger Pro Circuit Checker

User Guide

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EN
English

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For Patent information about this instrument refer to the following web site:
megger.com/patents

This manual supersedes all previous issues of this manual. Please ensure that you are using the most recent issue of this document. Destroy any copies that are of an older issue.

Declaration of Conformity

Hereby, Megger Instruments Limited declares that radio equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directive 2014/53/EU. Other equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directives 2014/30/EU and 2014/35/EU where they apply.

The full text of Megger Instruments EU declarations of conformity are available at the following internet address:

megger.com/company/about-us/eu-dofc

Contents

1. Introduction

MPCC230, the first multifunction checker in compact handled shape like a normal plug socket.

The range of individual tests allow the user to complete a range of electrical checking, routine maintenance and reporting using the Megger MPCC App, as well as aid in fault diagnostics.

In addition to the TRMS Voltage measurement this unique socket checking device can be perform wide range of tests easily by just plugging it into the circuit you want to check. Thanks to its supercapacitor there is no need to replace or re-charge batteries.

The advanced features make the MPCC230 an extremely comprehensive checker with its super bright colour TFT 1.77" display and internal memory to store results makes it easy to see and recall for later reporting or analysis. Perform RCD Type A, AC and F checks with 30 mA test current or conduct an RCD AUTO test with single press of a button. Check circuits Earth resistance and test touch voltage, measure loop impedance Zs (ZL-Pe) and Prospective Earth Fault Current (IPEFC) or quantify unwanted voltage harmonics to the 49th harmonic along with THD%.

Read the ensuing safety regulations attentively before using this device.

1.1 Company web site

Occasionally an information bulletin may be issued via the Megger web site. This may concern new accessories, new usage instructions or a software update. Please occasionally check on the Megger web site for anything applicable to your Megger instruments.

www.megger.com

2. Safety Warnings and Standards

These safety warnings must be read and understood before the instrument is used. Retain for future reference.

2.1 Warnings, Cautions and Notes

This user guide follows the internationally recognised definition. These instructions must be adhered to at all times.

Description
WARNING : Indicates a potentially dangerous situation which, if ignored, could lead to death, serious injury or health problems.
CAUTION : Indicates a situation which could lead to damage of the equipment or environment
NOTE : Indicates important instructions to be followed to perform the relevant process safely and efficiently.

2.2 Safety warnings

- Understand and follow the operating instructions carefully.
- No user serviceable parts inside.

This product is manufactured following IEC/EN61010-1, guidelines for safety installation testers. Follow this user manual for avoid damage the instruments:

- Do not measure in high humidity or wet environment.
- Do not use in highly flammable, explosive gas or vapour place.
- Avoid contact with metallic part that can be under voltage.
- Maximum Voltage input is 250 V. Do not connect the instrument to higher voltage. Permanent damage to the instruments and electrical shock can occur if you don't respect these guidelines.
- Extreme care must be taken when measuring above 50 V.
- The circuit checker must not be used if any part of it is damaged.
- Check for correct operation by testing a known voltage before and after use. Do not use it if misleading results are obtained.
- Warnings and precautions must be read and understood before a circuit checker is used. They must be observed during the operation of this circuit checker.
- Personal protective equipment should be used if there are ACCESSIBLE HAZARDOUS LIVE PARTS in the installation where measurement is to be carried out.
- Do not use on or around uninsulated hazardous live conductors where a potential to cause electric shock, electrical burns or arc flash exists.

2.2.1 Installation category definitions:

CAT IV - Measurement category IV: Equipment connected between the origin of the low-voltage mains supply and distribution panel.

CAT III -Measurement category III: Equipment connected between the distribution panel and electrical outlets.

CAT II - Measurement category II: Equipment connected between the electrical outlets and user's equipment.

Measurement equipment may be safely connected to circuits at the marked rating or lower. The connection rating is that of the lowest rated component in the measurement circuit.

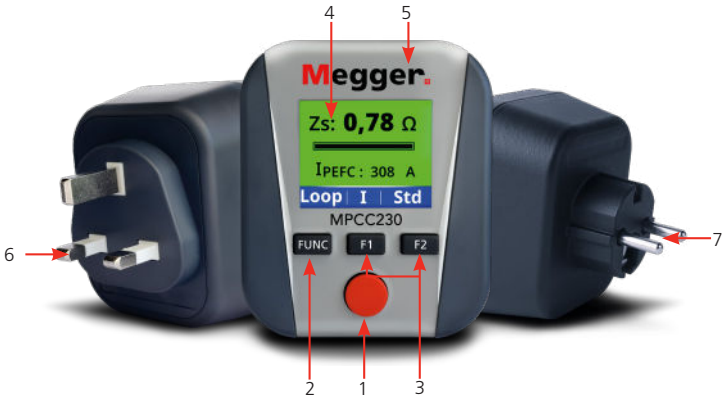
2.3 Safety, Hazard and Warning symbols on the instrument

This paragraph details the various safety and hazard icons on the instrument's outer case.

Icon	Description
	Warning: High Voltage, risk of electric shock
	Caution: Refer to user guide.
	Double/reinforced insulation throughout
	UK conformity. This equipment complies with current UK legislation
	EU conformity. Equipment complies with current EU directives.
	Conforms to relevant Australian Safety and EMC standards
	Prohibited to use for Electrical System which used the voltage above 250 V.
	Do not dispose of in the normal waste stream.

3. Instrument Overview

3.1 Instrument layout



Item	Description	Display
1	TEST button	Starts the RCD test or LOOP Resistance (no trip RCD).
2	Function button allow to select the measurement mode.	Socket Test / VOLT - RCD - LOOP - Harmonics / Memory.
3	Sub-function navigation	For test and read the memory or to analyse the harmonics value up to 49th.
4	Display TFT 1,77"	
5	Anti-scratch glass	
6	UK plug	
7	EU plug	

4. Operation

The MCPP230 will execute the following tests:

1. VOLT and Socket Test (Correct wiring of Plug)
2. Voltage measurement L-N , TRMS
3. Residual Current (RCD) type A, AC and F also in AUTO mode with TOUCH VOLTAGE measurement
4. Z LOOP (Earth resistance with touch voltage and impedance Zs (ZL-Pe) with prospective earth fault current)
5. Short circuit current
6. Voltage harmonics up to 49th
7. THD% (Total harmonics distortion)
8. Frequency of the fundamental Harmonics and up to 49th

Function can be selected through the dedicated FUNC button.

Sub-function features can be selected through the F1 and F2 buttons, for example for selecting the RCD type or evaluate different harmonics.

The instrument is powered from the line and due to the supercap technology can keep the power even when disconnected from the line. Fully charged, the supercap will allow ~45 seconds of use after switch off from the line. This allows the user to read the value after the RCD has tripped (with tripping time) or when it is difficult to read the display value.

Test results display GREEN when the measured value is correct in accordance with the local limitations or RED when the test has failed. In a failed SOCKET TEST, an alarm sounds.

4.1 Volt and socket test

This feature measures Voltage between phase and neutral and test the socket wiring in accordance to local requirement.

4.1.1 Operation

1. Plug the instruments into the socket and press the FUNC button to select the Voltage function.
2. Voltage between Phase and Neutral will be shown on the display
   - 2.1. If socket is correctly wired and touch voltage is <50 V (Fig 1). A green bar indicates every parameter is correct.
   - 2.2. If an error is detected due to the incorrect wiring, A red bar and alarm sound indicates an error with a code to explain (Fig 2 and 3).
   - 2.3. Frequency can be shown through F2 button.

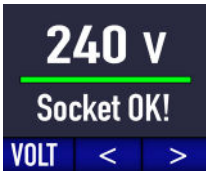


Fig. 1

Fig. 2

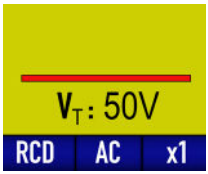


Fig. 3

Code displayed	Wiring error (bar is Red and sound alarm)	Solution
L-N	Phase - Neutral Reverse	Adjust the socket wiring
L-N	Phase - Earth Reverse	Adjust the socket wiring
L-PE	Open Neutral	Connect Neutral wire
NO PE	No Earth	Check Earth connection
V_T>50V	Touch Voltage >50V	Dangerous Voltage on Earth

4.2 RCD (residual current device)

This feature allows RCD testing in accordance with EC/EN 61557-6, with tripping time and voltage contact. Test current of 30 mA is injected through the Earth/Ground for type A , AC and F.

4.2.1 Test mode:

- x½ IΔn Test with 15 mA
- x1 IΔn Test with 30 mA
- x5 IΔn Test with 150 mA
- AUTO Test sequence x½ 0° and 180° ➔ x1 0° and 180° ➔ x5 0° and 180°

4.2.2 RCD x½, x1, x5 and Auto Operation

1. Plug the instruments into the socket and press the FUNC button to select the RCD function.
2. Press the F1 button to select the type of RCD and F2 button to select the current (x½, x1, x5 or Auto).
3. Press and hold the RED test button for 3 seconds to start the test.
4. Tripping Time is shown on the display.
   - 4.1. Green bar means the test is performed correctly, V_T is the contact voltage (Fig 4).
   - 4.2. If touch voltage is >50 V the RCD tripping test will be stopped and the bar will RED display to show tripping time is higher than the limit standard (Fig 5). V_T is the Touch Voltage.

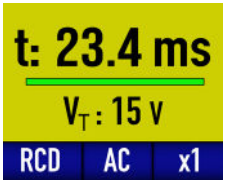


Fig. 4

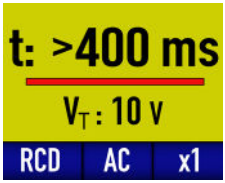


Fig. 5

4.2.3 RCD AUTO function

1. Plug the instrument in the socket and press FUNC button to select the RCD function.
2. Press the F1 button to select the type of RCD and F2 button to select AUTO.
3. Press the RED test button to start the test.
4. The instruments will execute all tests in sequence, reset the RCD between each step.
   - AUTO mode consist of 6 test in the following sequence:

STEP 1	IΔn x½ 0°	OK IF >1000 ms
STEP 2	IΔn x½ 180°	OK IF >1000 ms
STEP 3	IΔn x1 0°	OK IF <300 ms
STEP 4	IΔn x1 180°	OK IF <300 ms
STEP 5	IΔn x5 0°	OK IF <40 ms
STEP 6	IΔn x5 180°	OK IF <40 ms

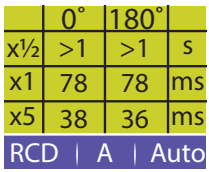


Fig 6

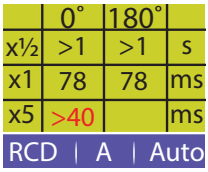


fig 7

5. RCD Tripping Time is shown on the display in ms for every STEP.
   - 5.1. Passed trip time results are displayed in GREEN (Fig 6).
   - 5.2. Failed trip times will be displayed in red (Fig 7) and the test will be stopped.

4.3 LOOP

The measurement is performed according to IEC/EN61557-3.

Loop test measures the impedance between Phase and Earth/Ground without a RCD trip.

4.3.1 Test modes:

- V — Earth Resistance (Ω) and Touch Voltage (V) (Fig.8)
- I — Measures Impedance Zs (Z L-Pe) (Ω) and IPEFC Prospective Earth Fault Current (Fig.9)
- Std — Test with 15 mA nominal current
- Low — Test with 6 mA. Use this setup if during the test the RCD trip due to the presence of leakage current in the electric system under test.

4.3.2 LOOP test operation

1. Plug the instruments into the socket and press the FUNC button to select the LOOP function.
2. Press the F1 button to select V or I and F2 button to select TEST STD or LOW.
3. Press and hold the RED test button for 3 seconds to start the test.

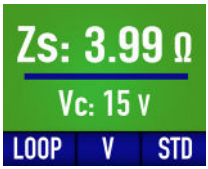


fig 8

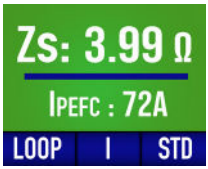


fig 9

WARNING : During the LOOP measurement, if the SUPERCAP is not fully charged, the display may switch off or decrease the intensity, however the measurement will be performed and shown at the end.

4.3.3 LOOP TT and TN

Z line - PE impedance measurement

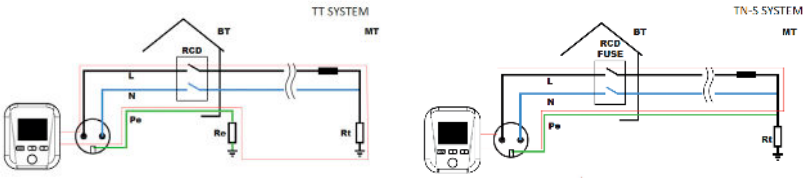
Z: Global Earth Resistance

V_T: Touch Voltage

NOTE : Limit for earth ground resistance is defined as:

$$R_T \leq \frac{V_T}{I\Delta n}$$

V_T: Touch Voltage Limit (50 V to 25 V)
IΔn: Nominal RCD current



Impedance measurement Zs L-pe in TNS system

Z: Fault Earth Impedance L-Pe

IPEFC Prospective Earth Fault Current (for checking protective devices installed within a circuit are rated at the correct breaking capacity)

4.4 HAR voltage harmonics

This function checks Voltage quality and harmonics up to 49th.

4.4.1 Test mode:

- Fund — Fundamental harmonic h1 (shown in red), frequency (~50 Hz) and THD% Indicates the total harmonic distortion of the voltage supply (Fig.10).
- h2....h50 — VOLTAGE value TRMS of selected harmonics (shown in red), frequency and percentage (%) compared to Fundamental harmonic h1 50 Hz (Fig.11)

4.4.2 Harmonics function

1. Plug the instruments into the socket and press the FUNC button to select "HAR" function.
2. Press the F1 and F2 buttons to select harmonics value required

It is possible to disconnect the instrument from the power supply to read and analyse the measurements, until the SUPERCAP is discharged (approx 60 second when fully charged).

fig 10

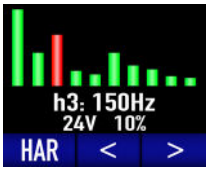


fig 11

4.5 MEM Memory / REPORT

The instrument automatically saves RCD and LOOP measurement to the internal memory.

It is possible to store 64 consecutive measurement results. The results will be organized in chronological order with the last measurement saved in the first free CELL in ascending order (1… 64) for day of use.

4.5.1 Operation

1. Plug the instruments into the socket and press the FUNC button to select MEM page.
2. Press F1/F2 buttons to move through the saved data
3. Press both simultaneously to clear the internal memory.
4. Press FUNC to clear memory or F2 to cancel

4.5.2 Report create

5. Press the RED button to generate the QR CODE. (Fig.12)
6. Scan the QR CODE with your smart phone using the Megger Pro Circuit Checker App. All saved measurements will be included in a REPORT with the possibility of exporting in pdf or csv.
7. Download the Megger Pro Circuit Checker App for iOS and Android devices on the Google Play or Apple App store.

fig 12

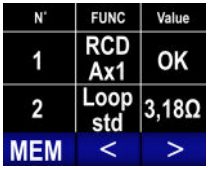


fig 13

4.5.3 MEMORY

8. Column N ° indicates the measurement number (Fig. 13). The FUNC column indicates the saved measurement with its settings. The Value column indicates the outcome of the measurement.
9. The result of the RCD measurement is indicated:
   9.1. GREEN if the result has passed the test.
   9.2. RED if the result has not passed the test.

5. Maintenance

NOTE : There are no user replaceable parts within this product.

5.1 General maintenance

Ensure the unit is kept clean and dry after use.

Store in protective case when not in use.

Unit should be checked before use for damage. Any test leads or adaptors should also be checked before use for damage and continuity.

5.2 Cleaning

Disconnect from mains power / charger.

Wipe the instrument with a clean cloth dampened with either water or isopropyl alcohol (IPA).

6. Specifications

RCD IEC/EN61557-6

Test voltage L-PE 190 to 250 V - Frequency 50 Hz ±5%

RCD type	IΔn	Resolution	Accuracy IΔn
AC, A, F, Time	30 mA	<0.1 IΔn 0.1 ms	± (0.0% + 5% IΔn) ±2 ms + 2 dgt)

Loop IEC/EN61557-3

No-trip earth loop impedance test voltage: 190 to 250 V (line-PE)

Standard mode test current 15 mA

Range (Ω)	Resolution (Ω)	Accuracy
0.01 to 9.99	0.01	± (5.0% + 8 dgt)
10 to 99.9	0.1	± (2.0% + 8 dgt)
100 to 999	1	± (2.0% + 8 dgt)
LOW mode test current 6 mA		± (7.0% + 10 dgt)

AC TRMS Voltage (Phase - Neutral)

Allow crest factor: 1.5 Frequency : 42 to 69.0 Hz

Range (V)	Resolution (V)	Accuracy
120 to 250	1	± (1.0% + 3 dgt)

Frequency

Range (Hz)	Resolution (Hz)	Accuracy
42 to 69	0.1	± (2.0% + 1 dgt)

Voltage Harmonics

1 to 50th Harmonic voltages are zeroed if value <0.8 V

Range (V)	Resolution (V)	Accuracy
0.8 to 250	0.1	± (3.0% + 5 dgt)

Socket Test

No Earth - Phase neutral reverse - Phase earth reverse - V N-Pe > 50 V

INPUT

Measurement category:	CAT II 250 V to ground
Max Input:	250 VAC

General reference standards

Product type standard	IEC/EN61557-3 IEC/EN61557-6 IEC 61557-1
Safety of measuring instruments	IEC/EN61010-1 IEC/EN61010-2-2017
EMC	IEC/EN61326-1

Display and memory

Features	TFT colour graphic LCD
Memory safety section	64 results

Specifications

Working environment conditions

Reference temperature	5ºC to 23ºC
Working temperature	5ºC to 40ºC
Allowed relative humidity	<80%RH
Storage temperature	-10ºC to 60ºC
Storage humidity	<80%RH

Mechanical features

Dimensions	81.5 x 70 x 83 mm
Weight	110 g

7. Calibration, Repair and Warranty

Megger operate fully traceable calibration and repair facilities to make sure your instrument continues to provide
the high standard of performance and workmanship that is expected. These facilities are complemented by a worldwide network of approved repair and calibration companies, which offer excellent in-service care for your Megger products.

For service requirements for Megger instruments contact:

Megger Limited Archcliffe Road Dover Kent CT17 9EN **U.K.** Tel: +44 (0) 1304 502 243 Fax: +44 (0) 1304 207 342	OR	**Megger Valley Forge** 400 Opportunity Way Phoenixville PA 19460 **U.S.A.** Tel: +1 610 676 8579 Fax: +1 610 676 8625

If the protection of an instrument has been impaired it should not be used, but sent for repair by suitably trained and qualified personnel. The protection is likely to be impaired if, for example, the instrument shows visible damage, fails to perform the intended measurements, has been subjected to prolonged storage under unfavourable conditions, or has been exposed to severe transport stresses.

New instruments are covered by a **two year warranty** from the date of purchase by the User, the second year being conditional on the free registration of the product on www.megger.com. You will need to log in, or first register and then login to register your product. The second year warranty covers faults, but not recalibration of the instrument which is only warranted for one year. Any unauthorised prior repair or adjustment will automatically invalidate the warranty.

These products contain no User repairable parts and if defective should be returned to your supplier in original packaging or packed so that it is protected from damage during transit. Damage in transit is not covered by this warranty and replacement / repair is chargeable.

Megger warrants this instrument to be free from defects in materials and workmanship, where the equipment is used for its proper purpose. The warranty is limited to making good this instrument (which shall be returned intact, carriage paid, and on examination shall disclose to their satisfaction to have been defective as claimed).
Any unauthorised prior repair or adjustment will invalidate the warranty. Misuse of the instrument, from connection to excessive voltages, fitting incorrect fuses, or by other misuse is excluded from the warranty. The instrument calibration is warranted for one year.

This Warranty does not affect your statutory rights under any applicable law in force, or your contractual rights arising from a sale and purchase contract for the product. You may assert your rights at your sole discretion.

7.1 Calibration, Service and Spare Parts

For service requirements for Megger Instruments contact **Megger** or your local distributor or authorised repair centre.

Megger operates fully traceable calibration and repair facilities, to make sure your instrument continues to provide the high standard of performance and workmanship you expect. These facilities are complemented by a worldwide network of approved repair and calibration companies to offer excellent in-service care for your Megger products.

See the **last page** of this User Guide for Megger contact details.

To find your local Authorised Service Centre email Megger on **ukrepairs@megger.com** and give details of your location.

7.2 Approved Repair Companies

A number of independent instrument repair companies have been approved to do repair work on most Megger instruments, complete with genuine Megger spare parts.

Consult the Appointed Distributor / Agent about spare parts, repair facilities and advice.

7.3 Return procedure

WARNING : Remove the battery cells before shipping this instrument.

UK and USA Service Centres

1. When an instrument requires recalibration, or in the event of a repair being necessary, a Returns Authorisation (RA) number must first be obtained from one of the addresses shown above. The following information is to be provided to enable the Service Department to prepare in advance for receipt of your instrument and to provide the best possible service to you:
   - Model (for example, MFT2100).
   - Serial number (found on the display under settings, device information, or on the rear cover and by the batteries or on the calibration certificate).
   - Reason for return (for example, calibration required, or repair).
   - Details of the fault if the instrument is to be repaired.
2. Make a note of the RA number. A returns label can be emailed or faxed to you if required.
3. Pack the instrument carefully to prevent damage in transit.
4. Before the instrument is sent to Megger, freight paid, make sure that the returns label is attached or that the RA number is clearly marked on the outside of the package and on any correspondence. Copies of the original purchase invoice and packing note should be sent simultaneously by airmail to expedite clearance through customs. In the case of instruments which require repair outside the warranty period, an immediate quotation can be provided when obtaining the RA number.
5. Track the progress online at **www.megger.com**.

8. Decommissioning

8.1 WEEE Directive

The crossed out wheeled bin symbol placed on Megger products is a reminder not to dispose of the product at the end of its life with general waste.

Megger is registered in the UK as a Producer of Electrical and Electronic Equipment. The Registration No is WEE/ HE0146QT.

For further information about disposal of the product consult your local Megger company or distributor or visit your local Megger website.

8.2 Battery disposal

The crossed out wheeled bin symbol placed on a battery is a reminder not to dispose of batteries with general waste when they reach the end of their usable life.

For disposal of batteries in other parts of the EU contact your local Megger branch or distributor.

Megger is registered in the UK as a producer of batteries (registration No.: BPRN00142).

For further information see www.megger.com

9. Worldwide Sales Offices

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UK	T. +44 (0)1 304 502101	E. UKsales@megger.com
USA – Dallas	T. +1 214 333 3201	E. USsales@megger.com
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This instrument is manufactured in Italy.

The company reserves the right to change the specification or design without prior notice.

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