USER GUIDE

MPCC230

Megger Pro Circuit Checker

Register → megger.com/register

User Guide
Product Information →

Support → megger.com/support

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/eu-dofc

Contents

1. Introduction

The Megger MPCC230 is a compact socket tester and circuit checker, in one unit.

It is designed to allow the user to test the correct wiring polarity of a socket as well as check the circuit earth loop and protective RCD during routine maintenance or inspection.

In addition, the condition of the mains voltage supply can be measured, along with frequency, and an indication of the total harmonic distortion displayed.

The advanced features make the MPC230 an invaluable circuit checker. Incorrect polarity is shown in detail and - because of the TFT colour display - indicated clearly by a red test bar.

With the ability to measure earth loop impedance on RCD protected circuits, as well as calculate the prospective earth fault current and show the touch voltage value, it aids routine inspection of an installation.

An auto-RCD test will confirm the operation of the protective device at measure the contact voltage value.

In addition, the MPCC230 will not only provide the TRMS supply voltage, but also indicate the total harmonic distortion measured and allow the user to identity which harmonics are present.

With a memory function capable of storing up to 64 loop impedance or RCD test values, these can be downloaded using the free app for simple report generation.

1.1 Company web site

Occasionally an information bulletin may be issued via the Megger web site. This may concern new accessories, new usage or user 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 internationally recognised definitions.

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 to avoid damaging the instrument:

- Do not use in high humidity or wet environment.
- Do not use in an explosive atmosphere.
- The maximum input voltage is 250 V. Connecting to higher voltages will cause permanent damage to the instrument and may give rise to the potential of electric shock.
- 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 the 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.

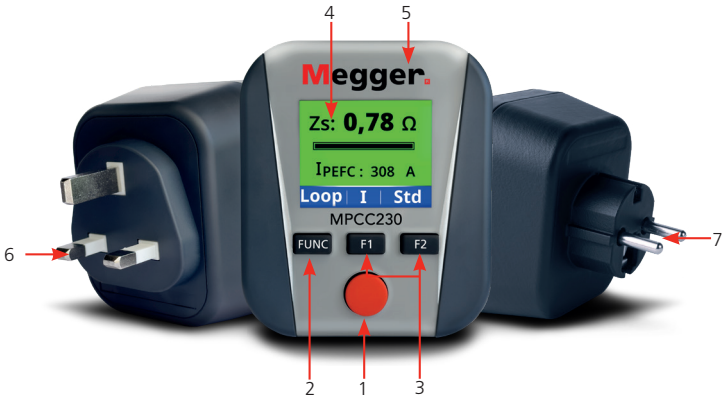
2.3 Safety, Hazard and Warning symbols on the instrument

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 for use on electrical systems 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 a test or selects memory download bar code
2	Function button to select the measurement mode.	Socket Test / VOLT - RCD - LOOP - Harmonics / Memory.
3	Sub-function navigation	Cycle through displayed features or memory values
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. Socket polarity
2. TRMS voltage and frequency
3. Protective device (RCD/RCBO) type A, AC and F
4. No-trip earth loop impedance
5. Prospective earth fault current and touch voltage
6. Voltage harmonics up to 50th
7. THD% (Total harmonics distortion)

Tests are selected by pressing the FUNC button.

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

The instrument is powered through the line input, but with the supercap technology, the display will remain visible. Fully charged, the supercap will allow ~45 seconds of use after switch off from the line. This allows the user to remove the unit and read the displayed result. This is useful, should the socket be mounted in a hard to access location.

4.1 Volt and socket test

This feature measures Voltage between phase and neutral and tests the socket wiring and polarity 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. Pressing the F2 button will cycle to the measured frequency and the units firmware and serial number. Pressing F1 cycles back to voltage.
   2.1. If the socket wiring is correct and the measured earth touch voltage is less than 50 V, a green bar indicates all parameters are correct.
   2.2. If an error occurs due to incorrect wiring or a high voltage detected on the earth, the bar will turn red and an audible alarm will sound. The unit will display the failed parameter on the screen (examples in Fig 2 and 3).

Fig. 1

Fig. 2

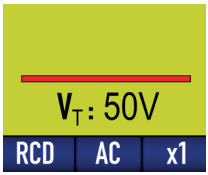


Fig. 3

Code displayed	Wiring error (bar is Red and sound alarm)	Solution
L-N	Phase - Neutral Reverse	Correct the socket wiring
L-N	Phase - Earth Reverse	Correct 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 carries out an RCD test, with both measured tripping times and contact voltage results displayed.

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. The trip time and contact voltage results are shown on the display.
   - 4.1. A green bar indicates the trip time and contact voltage are within specification (Fig 4).
   - 4.2. If the trip time exceeds the predefined pass levels (refer to table in Auto RCD section below) or the contact voltage >50 V, a red bar is shown, indicating a fail.

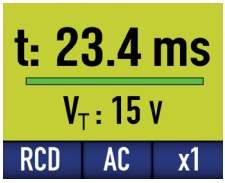


Fig. 4

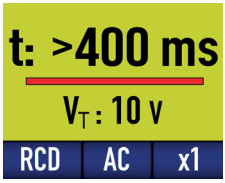


Fig. 5

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

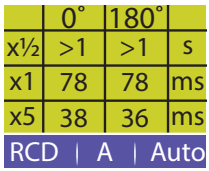


Fig 6

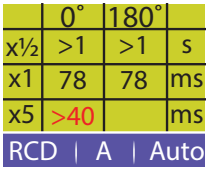


fig 7

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

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

CAUTION : The MPCC230 uses a low current no-trip loop test method. However, this DOES NOT guarantee an RCD will not trip. Accumulative or highly sensitive RCDs or RCBOs may still trip, so care should be taken to ensure that a loss of supply will not cause a hazardous situation to arise.

4.3.1 Test modes:

- V — Measures Impedance Zs (Z L-Pe) (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

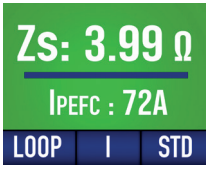


fig 9

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.

4.4 HAR voltage harmonics

This function checks the quality of the line voltage with regards to harmonics.

4.4.1 Test mode:

- Fund — Indicates the fundamental on the bar graph and displays the measured voltage and frequency. Total harmonic distorion (THD) is diaplayd as a percentage (Fig. 10).
- h2....h50 — Shows the selected harmonic on the bar graph in red, along with the measured voltage and frequency. A harmonic distortion %, compared to the fundamental, is also displayed

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 45 second when fully charged).

fig 10

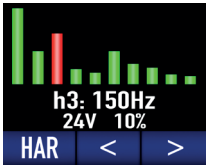


fig 11

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 cell.

4.5.1 Operation

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

4.5.2 Download the App

Download the Megger Pro Circuit Checker App to a mobile device:

4.5.3 Report create

5. In MEM mode, press the RED button to generate a results QR code on the display (Fig.12)
6. With the Megger Pro Circuit Checker App running on your mobile device, select "Scan QR". All saved measurements will be imported to the App and displayed in a simple report. This can then be exported in either PDF or csv format. All saved measurements will be included in a REPORT with the possibility of exporting in pdf or csv.

fig 12

N°	FUNC	Value
1	RCD Ax1	OK
2	Loop std	3,18Ω
MEM	<	>

fig 13

4.5.4 MEMORY

7. Fig. 13 shown the MEM results display. Column N° is the internal memory cell number. FUNC shows the test type and Value indicates the measured result.
8. For saved RCD measurements, a pass or fail value is shown as either GREEN or RED:
   8.1. GREEN if the result has passed the test.
   8.2. 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.

5.2 Cleaning

Disconnect from mains power.

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

6. Specifications

RCD Test

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 Impedance Test

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

1st 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 -
Voltage N-Pe > 50 V

INPUT

Measurement category: CAT II 250 V to ground

Max Input: 250 VAC

General reference standards

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

Working environment conditions

Reference temperature 5°C to 23°C

Specifications

Working temperature	5ºC to 40ºC
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, MIT220).
   - Serial number (Found on the VOLT screen by pressing F2 twice or shown on the rear of the instrument).
   - Reason for return (for example, repair required)).
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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