



EVCA210

Electric vehicle charge-point adaptor

User guide

EN

This document is copyright of:

Megger Limited, Archcliffe Road, Dover, Kent CT17 9EN. ENGLAND
T +44 (0)1304 502101 F +44 (0)1304 207342 www.megger.com

Megger Ltd reserves the right to alter the specification of its products from time to time without notice. Although every effort is made to ensure the accuracy of the information contained within this document it is not warranted or represented by Megger Ltd. to be a complete and up - to - date description.

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

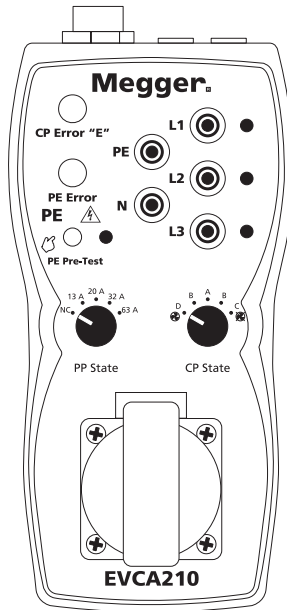
Hereby, Megger Instruments Limited declares that radio equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directive 2014/53/EU. Other equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directives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

1. Introduction

Thank you for purchasing the Megger EVCA210 (Electric Vehicle Charge-point Adaptor).



For your own safety and to get the maximum benefit from your instrument, please ensure that you read and understand the following safety warnings and instructions before using the instrument.

This user guide describes the operation and functions of the EVCA210 Electric Vehicle Charge-point Adaptor:

Megger Limited reserves the right to change the specification of these instruments at any time without notice.

Megger reserves the right to improve the content of this User Guide from time to time without notice. Megger reserves and retains the intellectual property rights of the content including the design, text, graphics, and logos in this User Guide. Any partial or complete reproduction or usage of the content is strictly prohibited. For the latest version of this User Guide visit: www.megger.com

To register this instrument go to: megger.com/register



2. Safety Warnings



Safety Warnings and Precautions must be read and understood before the instrument is used. They must be observed during use.

THE INSTRUMENT MUST BE USED ONLY BY SUITABLY TRAINED AND COMPETENT PERSONS.

- National Health and Safety Legislation requires users of this equipment and/or their employers to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury, such as inadvertent short circuits, so that safe working procedures can be followed.
- This instrument is internally protected against electrical damage when used for the purposes of testing electric vehicle charging points as defined herein. If used in a manner other than those defined in this user guide the protection capabilities could be impaired with potential risk to the operator and the instrument.
- Circuit connections and exposed-conductive-parts and other metalwork of an installation or equipment under test must not be touched during testing.
- The live phase indicators are an additional safety feature which may fail; therefore safe working practices must be observed.
- Check that all leads and plugs are in good order, clean and with no broken or cracked insulation before use.
- The instrument, lead and plug should not be used if any part is damaged.
- Any adaptors supplied with the instrument form part of the measuring circuit of the instrument. They must not be modified or changed in any way, or be used with any other electrical instrument or appliance.
- Replacement fuses must be of the correct type and rating. Failure to fit the correctly rated fuse may result in a safety hazard and may cause damage to the instrument in the event of an overload.
- If no voltage is present between the L and N of the terminals or between the L and N of the front mains plug socket when the EVCA210 is connected to the charging point, using the appropriate charging plug and the charging point is in charging mode, this may be because the EVCA210 internal fuse has blown.
- In the event of no neutral (N) connection, the phase indicator LED's will not light but phases may still be live.
- The PE Pre-Test must be carried out prior to any other testing. If this test fails, further testing must cease, and fault must be investigated and rectified before continuing as there may be a potentially high voltage present within the charging point and on the output terminals and therefore a high risk of electric shock to the operator and other persons nearby.
- Take precautions to ensure that terminals will not be short circuited.
- Connect only suitably rated leads and test equipment to the adapter.
- DO NOT leave this adapter connected to the charge point when testing is complete.








Installation category definitions

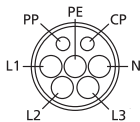
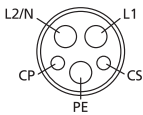
CAT IV Measurement category IV: Equipment connected between the origin of the low-voltage mains supply outside the building and the consumer unit.

CAT III Measurement category III: Equipment connected between the consumer unit and the electrical outlets.

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

Symbols used on the instrument

	Caution: risk of electric shock
	Caution: risk of danger – consult the user instructions
	Equipment protected throughout by Double Insulation (Class II)
	Equipment complies with relevant EU Directives
	Equipment complies with relevant EU Directives
	Do not dispose of in the normal waste stream
	Earth (ground)



3. General Description

Type 1 Plug Type 2 Plug Terminations

Case contents

- 1 x EVCA210 Electric Vehicle Charge-point Adaptor with fixed 32 A Type 2 EV charging plug
- Type 1 to Type 2 plug adaptor (EVCA210-UK Only)
- Zip-up carry case
- Quick start guide

The Electric Vehicle Charge-point Adaptor, EVCA210, is a compact and portable unit, designed to allow the electrical contractor to test the function and safety of AC Mode 3 Electric Vehicle charge points and has been specifically designed to allow testing of charging points in accordance with the IEC/EN 61851-1 and IEC/HD 60364-7-722 standards, in combination with suitable test instruments.



**EV Type 1
Charging Plug
(EVCA210-UK only)**



**EV Type 2
Charging Plug**

Required electrical tests are as follows:

1. Visual Inspection
2. Continuity of protective conductors and bonding
3. Insulation resistances
4. Earth loop impedance
5. RCD operation
6. Phase sequence (on 3-phase systems)

Required function tests to include:

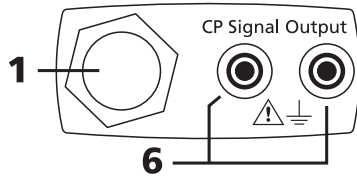
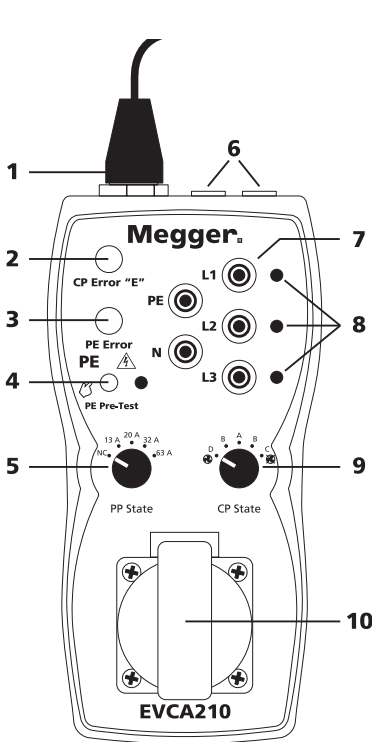
1. Error handling (Earth fault)
2. Communication
3. Vehicle state
4. Mechanical locking of plug
5. Other tests as appropriate

All leads supplied with the EVCA210 form part of the measuring circuit of the adaptor and must not be modified or changed in any way.

The EVCA210 has the following operational features:

- PE Pre-Test to test for the presence of dangerous voltages at the PE terminal, prior to undertaking any testing, via a touch button electrode with LED lamp indication.
- Live phase-neutral indication of all three phases via LED lamps.
- Rotary switch providing PP State (Proximity Pilot) for EV vehicle presence and current state simulation - NC, 13 A, 20 A, 32 A and 63 A.
- Rotary switch providing CP State (Control Pilot) for simulation of EV status - A, B, C and D (C and D both vented and un-vented).
- Push button for CP (Control Pilot) Error "E" simulation (CP signal short-circuited to PE)
- Push button for PE Error (Earth Fault) simulation.
- Five 4 mm ports for connection of suitable test instrument leads (PE, N, L1, L2 and L3)
- PLUG socket for simple test instrument lead connection.
- CP (Control Pilot) signal test sockets. Two 4 mm ports for connection to an oscilloscope.

4. General operating instructions



1. Type 2 plug cable entry
2. CP Error "E" button
3. PE Error (Earth fault) button
4. PE Pre-Test touch pad and PE Pre-Test warning LED
5. PP State rotary selector switch
6. CP Signal output terminals (4 mm)
7. Measuring terminals PE, N, L1, L2, L3 (4 mm)
8. Phase indicator LEDs for L1, L2, L3 terminals
9. CP State rotary selector switch
10. Mains plug socket* (Test purposes only / Maximum 10 A)

	Front mains socket =
*EVCA210-UK	UK 13 Ā socket
*EVCA210	Schuko socket (CEE 7/3)
*EVCA210-CH	Type J (SEV 1011)
EVCA210-AU	Type I (AS 3112)

The EVCA210 is designed to test the function and safety of charging points mode 3 for AC charging. This adaptor allows you to conduct tests using appropriate test instruments such as appropriate Megger MFT Multifunction testers. With this adaptor, charging points can be tested in accordance with IEC/EN 61851-1 and IEC/HD 60364-7-722.

Before carrying out testing with this adaptor, the operator should be familiar with all relevant standards associated with the tests being undertaken.

The Megger EVCA210 test adaptor is designed to simulate the connection of an electrical vehicle to the charging point under test.

Connection of the EVCA210 adaptor to a charging point triggers the charging process in the charging point with the Control Pilot (CP) switch on the adaptor selecting the appropriate charging mode.

The following charging capabilities can be simulated: N/C (No Connection), 13 A, 20 A, 32 A and 63 A, as well as all the possible electrical vehicle modes A, B, C (un-vented) and D (vented), via the selection switches.

Also provided are 4 mm connection ports L1, L2, L3, N, PE and CP signal terminals to which appropriate measuring equipment can be connected for further testing. Charging points should be tested as part of the initial installation and checked periodically.

The Megger EVCA210 has available two connection cables with the following plug options:

Type 2 connector plug - for charging points with panel mounted socket outlet or fixed cable with Type 2 vehicle socket connector

Type 1 connector plug* - for charging points with fixed cable and Type 1 vehicle socket connector (Example Mitsubishi PHEV).

***Note:** The Type 2 to Type 1 adaptor is supplied as standard with the EVCA210-UK only.

5. Connecting the EVCA210 test adaptor to the charging Point

1. Connect the Type 2 to Type 1 adaptor if required.
2. Connect EVCA210 to the charging point to be tested using chosen charging plug cable.

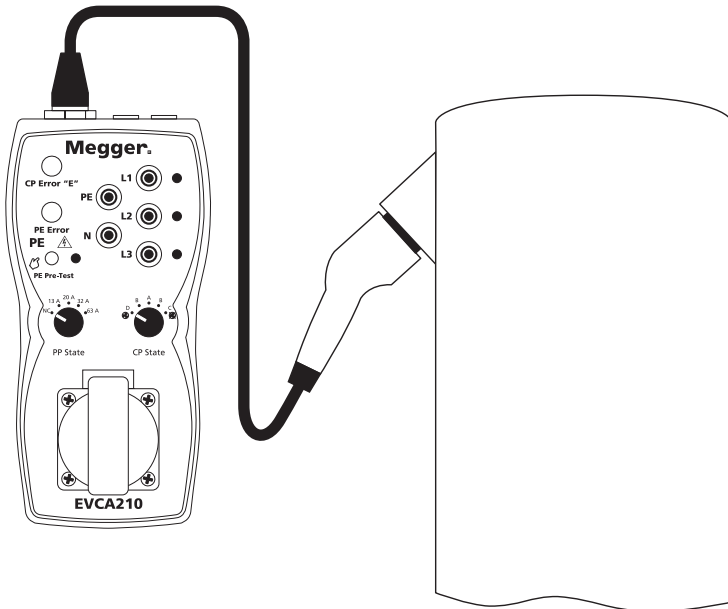
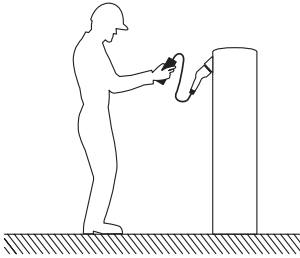


Fig 1: EVCA210 adaptor connection to the charging point.

6. Testing a Charging Point



The PE Pre-Test is an integral safety feature of the EVCA210 adaptor. It allows the operator to test the PE conductor for possible presence of a dangerous voltage, prior to testing the charge point.

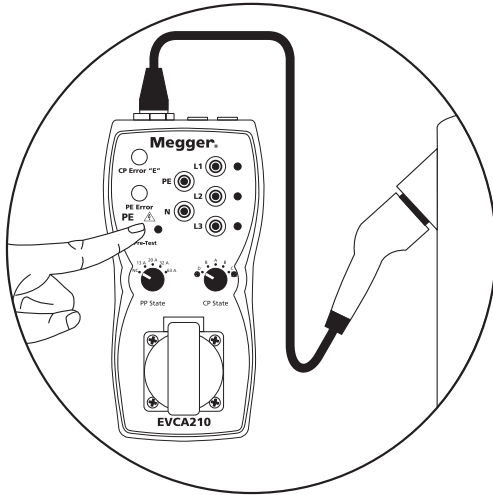
Under normal conditions, the PE conductor is connected to earth and therefore no hazardous voltage should be present. Should a fault condition occur e.g. if the PE conductor is connected to a phase or any insulation within the EVCA210 or associated plugs and cables has been damaged, then a hazardous situation may arise.

With the EVCA210 adaptor connected to the charging point, touch the PE Pre-test button with a bare finger. If the LED indicator illuminates, then there is a dangerous voltage present on the PE conductor. Stop testing immediately and investigate the circuit and rectify before continuing. Do not touch any metal parts while performing this test.

Possible faults are:

Voltage present on PE (e.g. connected to phase)

PE Missing or disconnected



If the operator is isolated from ground through rubber matting or wearing gloves etc. the touch-test result will be unreliable and an alternative method should be employed to confirm the PE connection.

7. Electrical Testing

The EVCA210 gives the operator the ability to connect their electrical test equipment to the charging point under test, in a controlled and safe manner, and to undertake the electrical safety testing of the charge point and its associated circuits. With the correct cable connected and the EVCA210 CP and PP settings correctly set (see below for details), the operator can connect either single or multifunction test equipment to the adaptor to undertake the following live tests:

- Earth loop impedance
- RCD operation
- Phase sequence
- Proximity Pilot - PP State

8. Proximity Pilot – PP-Status

With the EVCA210 adaptor connected to the charging point, use the PP State rotary switch to simulate any of the listed current capabilities of a charging cable.

Selection of cable current capability
NC (No Cable)
13 A
20 A
32 A
63 A

Note: The EVCA210 does load the circuit but will not draw significant current for this measurement.

9. Control Pilot – CP State

With the EVCA210 adaptor connected to the charging point, use the CP State rotary switch to select different simulated vehicle states.

Selection of Vehicle State	Vehicle State
A	Electric vehicle not connected
B	Electric vehicle connected, not ready to charge
C	Electric vehicle connected – ready to charge (ventilation not required)
D	Electric vehicle connected – ready to charge, (ventilation required)

4 mm CP Signal output ports are located on the top of the EVCA210.

These terminals are connected to the CP and PE conductors of the charging point. The green 4mm terminal is connected to PE.

For details of the communication protocol please refer to IEC 61851-1 and any documentation provided by the manufacturer of the charging point under test.

CP Error “E”

With the CP state set to either C or D (EV connected and ready to charge) and the PP state set to any setting except NC, by pressing the CP Error “E” button, a CP error is safely simulated. The pending charging process should stop immediately and new charging processes prevented.

10. PE Error - Earth Fault simulation

With the CP state set to either C or D (EV connected and ready to charge) and the PP state set to any setting except NC, by pressing the PE Error button, a disconnection of the PE conductor is simulated. The pending charging process should stop immediately and new charging processes are prevented.

11. Phase indicators

There are three LED lamps (L1, L2 and L3), one for each phase. When the EVCA210 adaptor is connected to the charging point, the LED indicators will illuminate when phase voltages are detected with respect to neutral.

Notes:

In the case of no neutral (N) conductor the LED indicators will not indicate voltage on the L1, L2 or L3 conductors.

LED indicators cannot be used for phase sequence testing or indication.

If the charging point has a single-phase output, only one LED (L1) will illuminate.

12. Plug socket

The mains plug socket on the EVCA210 is intended for measuring purposes only. It is connected to the L1, N and PE terminals of the charge point, so appropriate test instruments may be connected to the mains plug socket for testing. In addition, this socket gives the ability to check any electric power meter monitoring the charge point is working and/or counting correctly (load test). Therefore, an external load may be connected, but for measuring purposes only. The maximum current is limited to 10 A. The EVCA210 is protected against overload with a 10 A fuse.

With the EVCA connected to the charging point:

- Line – Provides connection to L1 phase of charging point output plug/socket only
- Neutral – Provides connection to Neutral pin charging point output plug/socket
- Earth – Provides connection to Earth pin of charging point output plug/socket

The type of mains socket depends on the version of the EVCA210 Adaptor purchased:

EVCA210-UK	Front mains socket = UK 13A socket
EVCA210	Front mains socket = Schuko socket (CEE 7/3)
EVCA210-CH	Front mains socket = Type J (SEV 1011)
EVCA210-AU	Front mains socket = Type I (AS 3112)

13. 4 mm Measuring Terminals L1, L2, L3, N and PE

These are directly connected to the L1, L2, L3, N and PE conductors of the tested charging point via the connection cable. These ports are to be used ONLY for measuring purposes using an appropriate test instrument. No load should be connected across any of the terminals.

With the EVCA connected to the charging point using one of the two available charging plugs:

- L1 – Provides connection to L1 phase of the charging point output plug/socket
- L2 – Provides connection to L2 phase of the charging point output plug/socket
- L3 – Provides connection to L3 phase of the charging point output plug/socket
- N – Provides connection to Neutral of the charging point output plug/socket
- E – Provides connection to Protective Earth of the charging point output plug/socket

14. Load Test

The front mounted mains plug socket can be used to provide a load to check any energy measuring equipment monitoring the electric vehicle charging point under test is working/counting correctly. With the CP state set to either C or D (EV connected and ready to charge) and the PP state set to any setting except NC, an external load may be connected to the mains plug socket, with a maximum current of 10A, for short durations. The EVCA210 is protected against overload by a 10 A fuse.

15. Maintenance

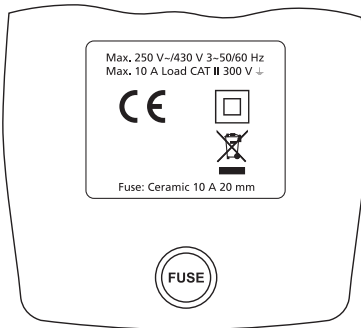
Should the EVCA210 adaptor be used as detailed in this user manual, no special maintenance is required. However, if functional errors occur during normal operation, contact your local Megger Repair Centre for assistance.

16. Fuse Replacement

If no voltage is present between the L and N of the 4 mm terminals or between the L and N of the front mains plug socket when the EVCA210 is connected to the charging point and the charging point is in charging mode, this may be because the EVCA210 internal fuse has blown.

Prior to replacement of the defective fuse, the EVCA210 adaptor must be disconnected from all measuring circuits and the connection cable must be disconnected from the charging point.

Use only fuses specified and rated as follows: Ceramic 10 A/250 V (5 mm x 20 mm).



Use of uncertified fuses is prohibited.

If a fuse has blown (due to overload, fault or misconnection) follow the steps below for replacement:

1. Unscrew the fuse holder cap using an appropriate screwdriver.
2. Remove the fuse and replace it with a new one.
3. Replace the fuse holder cap.

If new fuses continue to blow, this may indicate a fault within the EVCA210 adapter; contact your local Megger Repair Centre for service.

17. Specification

Input voltage	Up to 250 V (single phase system) / up to 430 V (three phase system),
Input Frequency	50/60 Hz,
Type 2 to Type 1 Adaptor	Type 1 AC charging mode 3, suitable to IEC 62196-2 type 1 or SAE J1772 with vehicle connector (Type 1, 5P single-phase)
Type 2 Charging Plug	Type 2 AC charging mode 3, suitable to IEC 62196-2 type 2 socket outlet or fixed cable with vehicle connector (Type 2, 7P three-phase)
PE Pre-Test	Yes - Button
PP Simulation	NC, 13 A, 20 A, 32 A, 63 A
CP States	A, B, C, D
CP Error "E"	Yes
PE Error (Earth fault)	Yes
Measuring Ports	Max. 250/430 V AC, CAT II 250 V, max. 10 A L1, L2, L3, N and PE
Mains socket	Max. 250 V AC, CAT II 250 V, max. 10 A,
Note: Do not load mains socket simultaneously with measuring ports!	
CP Signal output Ports	Approx. +/-12 V, CAT 0 (under normal condition)
Measurement category	CAT II 250 V
Altitude above sea level.	2000 m max.
Dimensions (W x H x L)	109 mm x 227 mm x 63 mm (without connection cable and test cable)
Weight	Approx: 780 g
CE directive	Low Voltage Directive LVD 2014/35/EU
Safety	IEC/EN 61010-1:2010 IEC/EN 61010-2-030:2010
Working temperature	0 °C to +40 °C
Storage temperature	-10 °C to +50 °C
Working humidity	10 % to 85% relative humidity w/o condensation
Fuse Rating	Ceramic 10 A/250 V (5 mm x 20 mm)
Product manufactured in China	

18. Maintenance

Do not open the adapter case. It contains no user-serviceable parts. Repair or servicing should be performed only by qualified personnel.

19. Cleaning

Should the EVCA210 or charging plugs require cleaning they can be wiped down using a damp cloth and mild detergent.

- Never clean the adaptor or plugs when connected to any measurement circuit.
- Never clean the adaptor or plugs when connected to any test equipment.
- Never use a solvent based cleaner.
- Never use the adaptor or plugs until they have dried completely.

20. WEEE Directive

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

Megger is registered in the UK as a Producer of Electrical and Electronic equipment. The registration No is; WEE/DJ2235XR.

Users of Megger products in the UK may dispose of them at the end of their useful life by contacting B2B Compliance at www.b2bcompliance.org.uk or by telephone on 01691 676124.

Users of Megger products in other regions should contact their local Megger office or distributor.

21. Warranty (3 years)

This product is warranted to the original purchaser against defects in material and workmanship for three years from the date of purchase. During this warranty, the manufacturer will either replace or repair the defective unit, subject to verification of the defect or malfunction.

This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorised repair, alteration, contamination, or abnormal conditions of operation or handling.

Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. The manufacturer shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you.

Megger Limited
Archcliffe Road
Dover
Kent

CT17 9EN

Tel: +44 (0) 1304 502 101
Fax: +44 (0) 1304 207 342
www.megger.com

Local Sales office

Megger Limited
Archcliffe Road
Dover
Kent
CT17 9EN
ENGLAND
T. +44 (0)1 304 502101
F. +44 (0)1 304 207342

Manufacturing sites

Megger Limited
Archcliffe Road
Dover
Kent
CT17 9EN
ENGLAND
T. +44 (0)1 304 502101
F. +44 (0)1 304 207342

Megger GmbH
Obere Zeil 2 61440
Oberursel,
GERMANY
T. +49 06171 92987 0
F. +49 06171 92987 19

Megger Valley Forge
400 Opportunity Way
Phoenixville
PA, 19460
USA
T. +1 610 676 8500
F. +1 610 676 8610

Megger USA – Dallas
4545 West Davis Street
Dallas TX 75237
USA
T. 800 723 2861 (USA only)
T. +1 214 333 3201
F. +1 214 331 7399
E. USsales@megger.com

Megger AB
Rinkebyvägen 19, Box 724,
SE-182 17 DANDERYD
SWEDEN
T. +46 08 510 195 00
E. seinfo@megger.com

Megger USA – Fort Collins
4812 McMurry Avenue
Suite 100
Fort Collins CO 80525
USA
T. +1 970 282 1200

This instrument is manufactured in China.

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

Megger is a registered trademark

The Bluetooth[®] word mark and logos are registered trademarks owned by Bluetooth SIG, Inc., and is used under licence.