EN - User's manual

CHAUVIN ARNOUX

CA 6652

Electric vehicle charging station tester

Measure up

Thank you for purchasing this **CA 6652 electric vehicle charging station tester**.

For best results from your instrument:
- **read** these operating instructions carefully,
- **comply** with the precautions for use.

	WARNING, risk of DANGER! The operator must refer to these instructions whenever this danger symbol appears.
	Equipment protected by double insulation.
	Information or useful tip.
	The product is declared recyclable following an analysis of the life cycle in accordance with standard ISO 14040.
	The CE marking indicates compliance with the European Low Voltage Directive, 2014/35/UE, the Electromagnetic Compatibility Directive, 2014/30/EU, and the Restriction of Hazardous Substances Directive, (RoHS 2011/65/UE and 2015/863/UE).
	The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2012/19/EU.

Definition of measurement categories

- Measurement category IV corresponds to measurements taken at the source of low-voltage installations.
  Example: power feeders, counters and protection devices.
- Measurement category III corresponds to measurements on building installations.
  Example: distribution panel, circuit-breakers, machines or fixed industrial devices.
- Measurement category II corresponds to measurements taken on circuits directly connected to low-voltage installations.
  Example: power supply to electro-domestic devices and portable tools.

PRECAUTIONS FOR USE

This instrument is compliant with safety standards IEC/EN 61010-2-030 and the leads are compliant with IEC/EN 61010-2-031, for voltages up to 300 V in category II.
Failure to observe the safety instructions may result in electric shock, fire, explosion, and destruction of the instrument and of the installations.

- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use. Sound knowledge and a keen awareness of electrical hazards are essential when using this instrument.
- If you use this instrument other than as specified, the protection it provides may be compromised, thereby endangering you.
- The tests can be performed only by an EVCI-qualified electrician or under the supervision of a qualified electrician. The qualified individual must be trained for the specific task.
- Do not use the instrument on networks of which the voltage or category exceeds those mentioned. The CA 6652 can be used only on 230 VAC/400 VAC charging stations.
- Do not use the instrument if it seems to be damaged, incomplete, or poorly closed.
- Before each use, check that the insulation on the cord, connector, and housing is in good condition. Any item of which the insulation is deteriorated (even partially) must be set aside for repair or scrapping.
- All troubleshooting and metrological checks must be done by competent, accredited personnel.

CONTENTS

1. PRESENTATION

1.1. DELIVERY CONDITION

The CA 6652 is delivered in a cardboard box containing:
- one carrying bag,
- one cable terminated by a type 2 connector,
- one multilingual quick start guide,
- one multilingual safety sheet,

For the accessories and spares, consult our web site:
www.chauvin-arnoux.com

1.2. FUNCTIONALITIES

Charging stations for electric cars must be tested after installation, then tested periodically when in service.

The CA 6652 electric vehicle charging station tester lets installers and maintenance technicians check the proper operation of electric car charging stations.

It lets them:
- Check the connections of the protective conductor.
- Simulate the connection of an electric vehicle to the charging station being tested.
  Different charging levels can be simulated (NC, 13A, 20A, 32A and 63A) along with different electric vehicle states (A, B, C, D).
- Simulate a fault: short circuit between CP (Control Pilot) and PE (protection conductor), short circuit by diode between CP and PE, open PE.
- Access the different points of the type 2 connector (L1, L2, L3, N, PE) and use them to perform tests.

With a multifunction tester connected to the CA 6652, you can:
- Make earth measurements,
- Perform RCD (differential) tests,
- Make insulation measurements,
- Make continuity measurements.

With an oscilloscope connected to the CA 6652, you can also observe the Control Pilot signal.

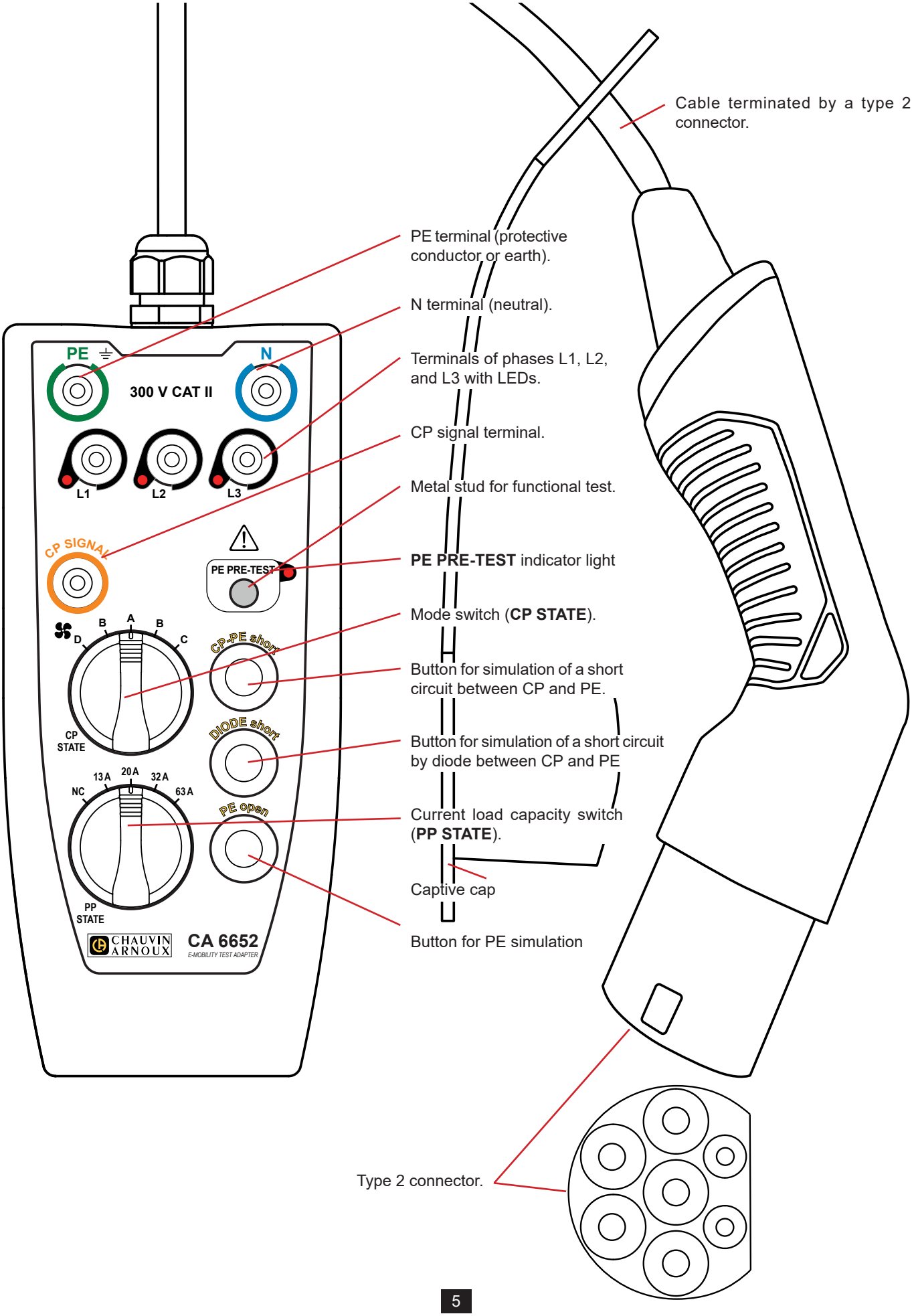
The CA 6652 is powered by the charging station it is testing.

The CA 6652 is intended for use in charging mode 3 with a type 2 connector. This means that the charging is controlled by the terminal.

The CA 6652 cannot be used to charge electric vehicles.

The operation of the CA 6652 satisfies the requirements of the following standards:
- IEC 61851-1: Electric vehicle conductive charging system - Part 1: General requirements,
- IEC 60364-7-722: Requirements for special installations or locations - Supplies for electric vehicles.

1.3. VIEW OF THE INSTRUMENT



2. USE

The tests must only be performed by or under the supervision of an EVCI-qualified electrician.

In France, decree no. 2017-26 of 12/01/2017 concerning charging infrastructure for electric vehicles imposes stringent requirements.

The EVCI-qualified electrician must comply with the rules and standards required for their work, and must not skip steps needed to ensure correct, safe use of the charging station.

The electrician must then document the tests in a test report, whether the tests are complete or not.

2.1. VISUAL INSPECTION

The test of the electric vehicle charging station must begin with a visual inspection of the station itself and the testing instrument.

2.1.1. INSPECTION OF THE CHARGING STATION

Check that it is installed in a suitable place.

Look for:
- damage to the structure,
- damage to the power cord,
- signs of overloading or improper use,
- inappropriate alterations,
- missing protective covers,
- dirt or corrosion that might impair safety.

Check:
- the presence of the required fans,
- the type 2 connector,
- tightness,
- the legibility of the texts,
- that the charging station's power supply voltage is between 230 and 400 VAC on the screen.

Any visible damage which might interfere mechanically or electrically with safe use of the station or might cause a fire must be repaired immediately..

2.1.2. INSPECTION OF THE INSTRUMENT

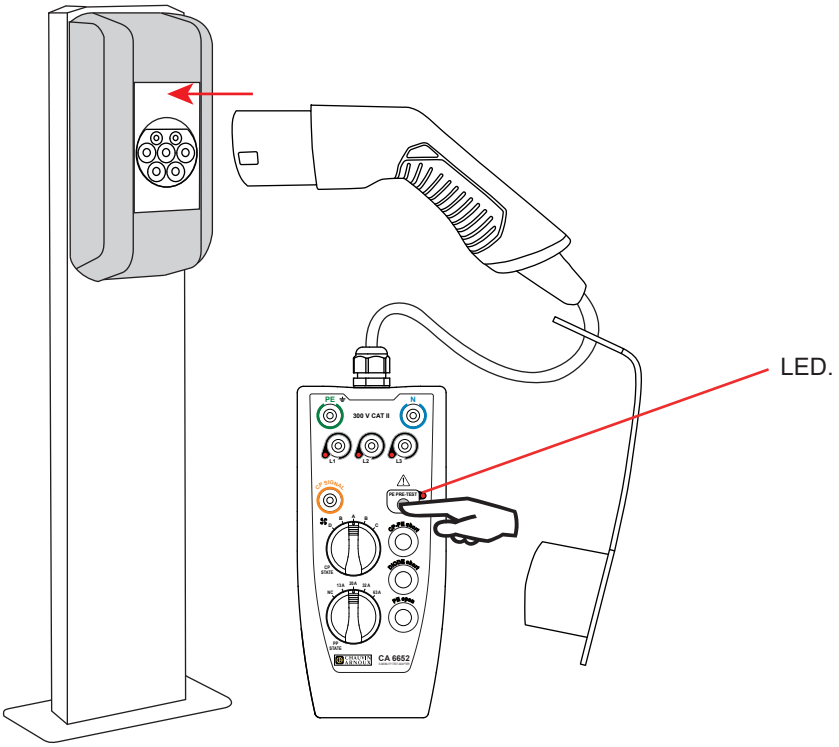
Check that the environmental conditions are compatible with correct use.

Check:
- the condition of the instrument (not damaged, incomplete, or incorrectly closed),
- the condition of the housing, the socket and the insulation on the lead,
- the connections: the terminals, the cable and the connector,
- the markings on the instrument and the connecting cable (300V CAT II).

2.2. FUNCTIONAL TEST

The functional test involves verifying that the protective conductor (PE) is correctly earthed and that its voltage with respect to earth is zero.

- Connect the type 2 connector to the EV charging station.
- Place your bare finger on the **PE PRE-TEST** metal stud.



If the voltage of the PE in relation to earth is not zero, the LED lights up. The tests must then be stopped and the charging station must be repaired.

2.3. FAULT SIMULATION

Once the functional test has been carried out successfully, perform a fault simulation

2.3.1. SHORT CIRCUIT BETWEEN CP AND PE

Pressing the **CP-PE short** button simulates a short circuit between the CP signal and the PE protection conductor for 3 seconds.

The charging station must lock for 30 seconds. The station indicates that it is locked. The charging process underway is stopped. After 30 seconds, the station reports that no fault is present and unlocks.

This test must be performed on each charging mode: A, B, C and D .

2.3.2. SHORT CIRCUIT BY DIODE BETWEEN CP AND PE

Pressing the **DIODE short** button simulates a short circuit by diode between the CP signal and the PE protective conductor. The duration of this fault is the same as the length of the button press.

The charging station must deactivate within 30 seconds. The station indicates that it is locked. The charging process underway is stopped. After 30 seconds, the station reports that no fault is present and unlocks.

This test must be performed on each charging mode: A, B, C and D .

2.3.3. PE OPEN

Pressing the **PE open** button simulates disconnection of the PE protective conductor.

The charging station must deactivate within 100 ms. The station is locked and only an EVCI approved installer can reactivate it.

If any of these 3 faults fails to lock the station, the tests must be stopped and the station must be repaired.

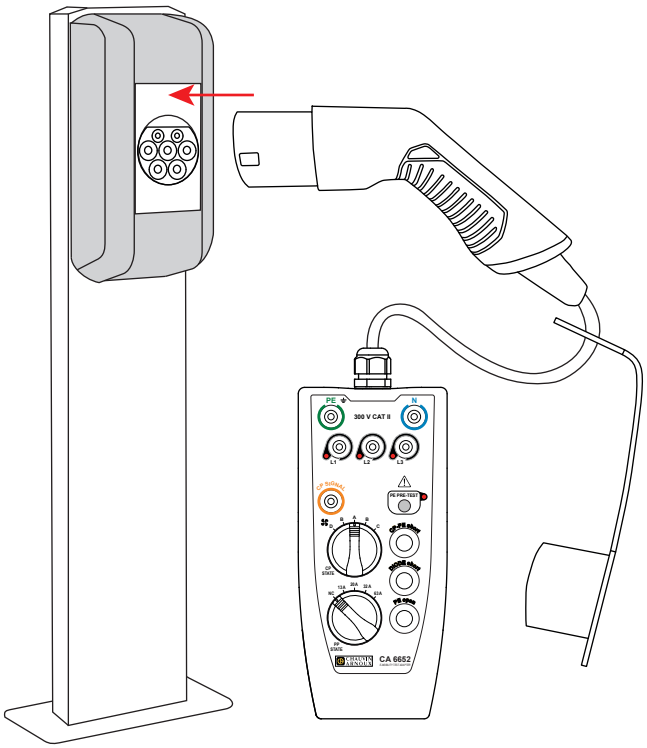
2.4. ELECTRICAL SAFETY VERIFICATION

To check the electrical safety of the charging station of an electric vehicle, you must have a multifunction tester (for example CA 6117, CA 6131, CA 6133 or MX535).

2.4.1. MAINS POWER TEST

This test serves to check that the charging station is correctly supplied.

- Set the current load capacity switch (**PP STATE**) to **N.C.** and the mode switch (**CP STATE**) to **C** or **D**.
- Connect the type 2 connector to the charging station of the electric vehicle.



If the charging station is supplied at 230V single-phase, only one of the three LEDs, L1, L2, or L3, lights.

If the charging station is supplied at 400V three-phase, all three LEDs light.

The station is unpowered.
Correct the fault in order to be able to continue the tests.

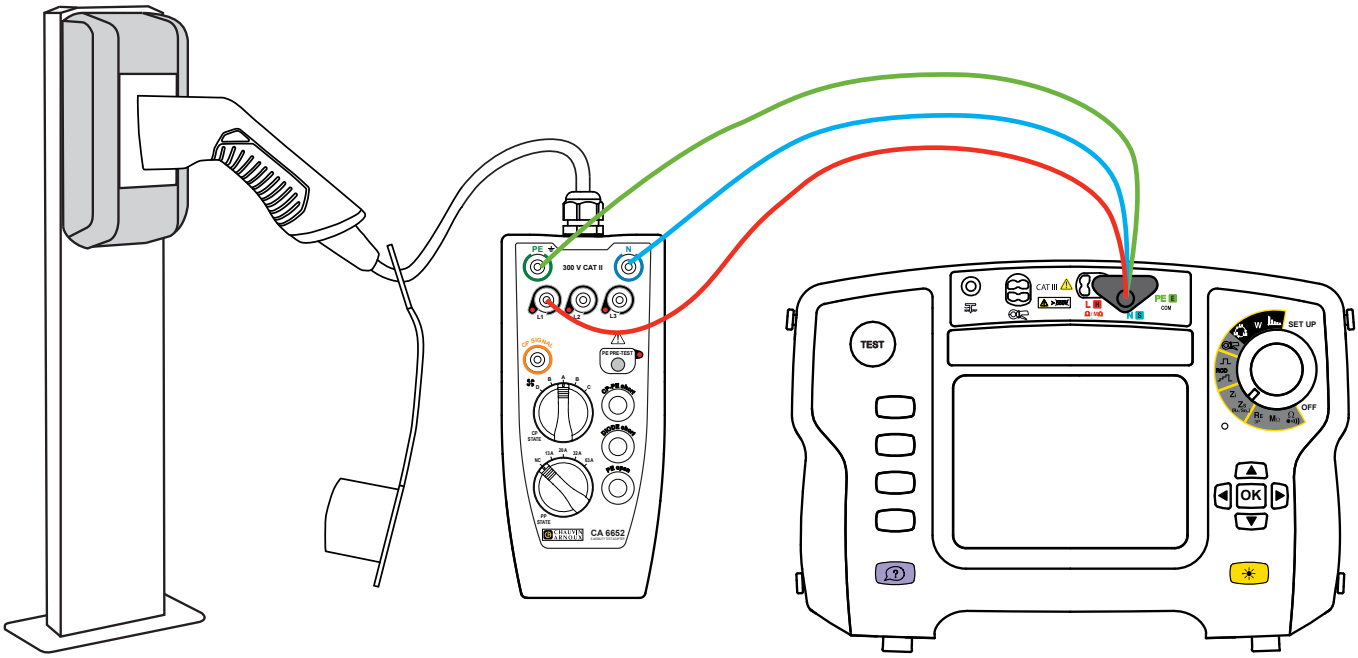
The L1, L2 and L3 LEDs cannot be used to determine the phase order.

If the conductors are correctly connected, you can continue the electrical safety tests.

2.4.2. EARTH VERIFICATION

This measurement serves to check the connection of the charging station to earth.

- Set the charging cable current load capacity switch (**PP STATE**) to **N.C.** and the mode switch (**CP STATE**) to **A** (earth measurement with no voltage) or **C** or **D** (measurement of loop impedance with voltage).
- Connect the installation tester to the CA 6652 via the L1, L2, L3, and N or PE terminals.
  - Red wire to the phase (L1, L2 or L3).
  - Blue wire to N.
  - Green wire to PE.



Do not connect an electric load to the CA 6652 terminals.

- Make a loop measurement without tripping. For this, refer to the operating instructions of the multifunction tester.

The loop impedance must be less than 100Ω (per the NFC 15100 or IEC 60364 standard).

2.4.3. PROTECTIVE RCD VERIFICATION

After checking the connection to earth, check the operation of the RCD (Residual Current Device).

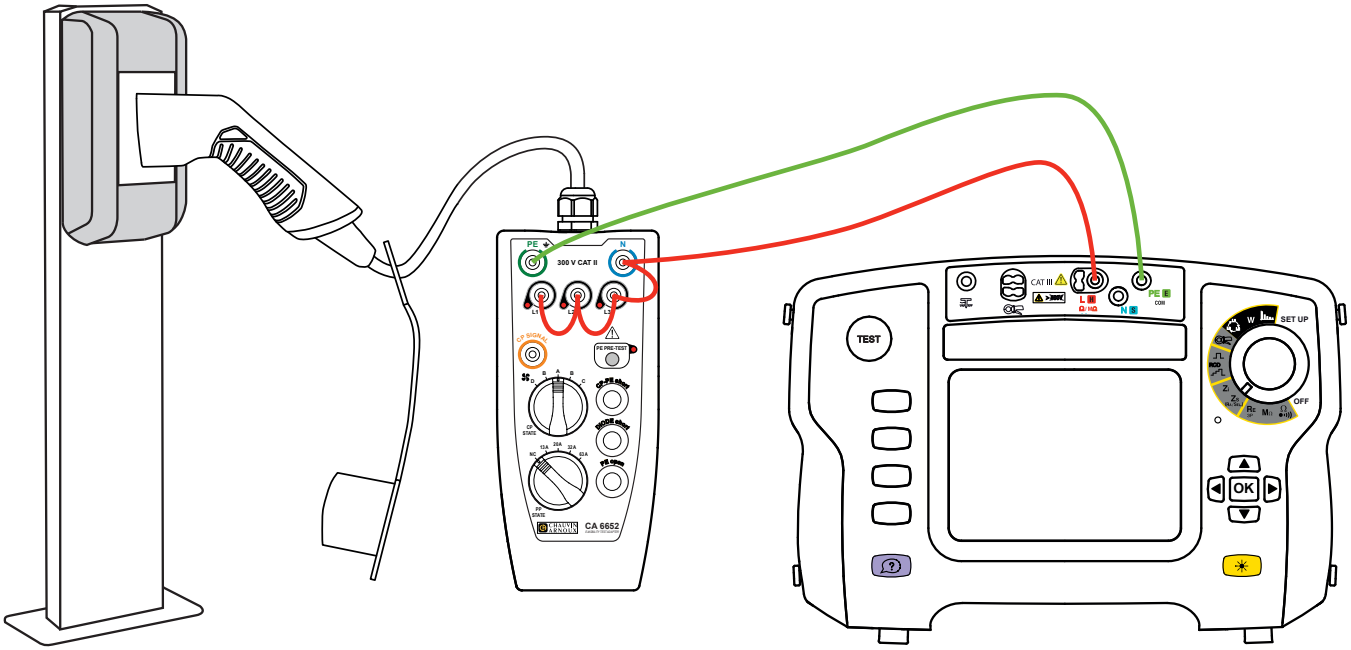
- Connect the multifunction tester in the same way as for an earth measurement.
- Perform an RCD test in ramp mode. For this, refer to the operating instructions of the multifunction tester. The RCD must be tripped.
- In the case of a three-phase network, reset the RCD and repeat the test with the red wire connected to phase L2. Then repeat with phase L3.

At the end of the test, leave the RCD open in order to perform the no-voltage insulation test.

2.4.4. INSULATION MEASUREMENT

This test must be performed with no voltage present. None of the LEDs on the CA 6652 must be lit.

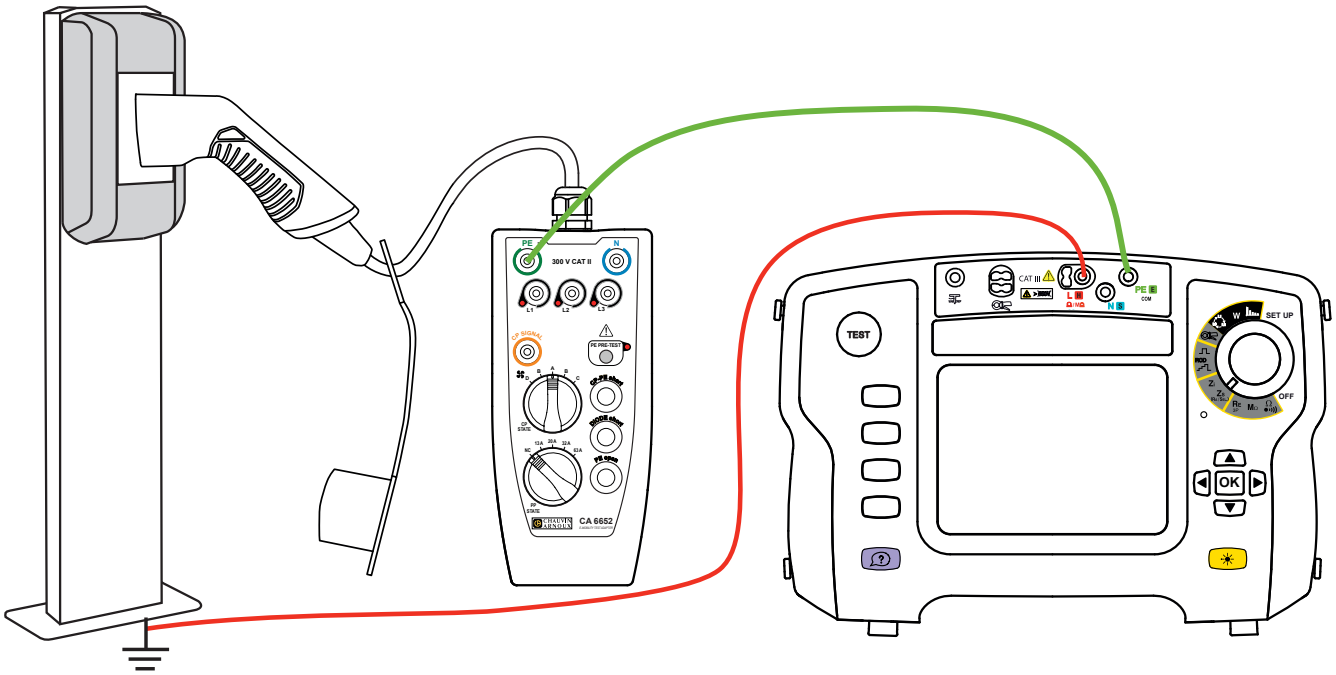
- Connect the L1, L2, L3, and N terminals together and perform an insulation measurement in relation to the PE conductor. For this, refer to the operating instructions of the multifunction tester.



The insulation resistance must be greater than 500kΩ for a 230V single-phase network and greater than 1MΩ for a 400V three-phase network.

2.4.5. CONTINUITY MEASUREMENT

This test must be performed with no voltage. None of the LEDs on the CA 6652 must be lit.



- Connect the PE terminal and the earth of the installation powering the charging station to the multifunction tester and make a continuity measurement.
  Refer to the operating instructions of the multifunction tester.

Do not forget to reset the RCD at the end of the test.

2.5. VERIFICATION OF THE CHARGING STATION OPERATION

Before starting this test, redo a functional test (PE check).

2.5.1. SIMULATION OF A VEHICLE

- Set the current load capacity switch (**PP STATE**) to **N.C.**
- The voltages and resistances given below are for guidance.

Mode switch (CP STATE)	Simulated vehicle	
A	Vehicle disconnected	The charging station delivers no energy. ■ CP-PE voltage: ±12V at 1kHz ■ CP-PE resistance: infinite
B	Vehicle connected	The charging station delivers no energy. ■ CP-PE voltage: +9V/-12V at 1kHz ■ CP-PE resistance: 2,740Ω
C	Vehicle charging without ventilation	The charging station delivers energy. ■ CP-PE voltage: +6V/-12V at 1kHz ■ CP-PE resistance: 913Ω
D	Vehicle charging with ventilation of the terminal.	The charging station delivers energy. ■ CP-PE voltage: +3V/-12V at 1kHz ■ CP-PE resistance: 246Ω

To simulate charging without ventilation, execute the sequence A, B, C.
To simulate charging with ventilation of the charging station, execute the sequence A, B, D.

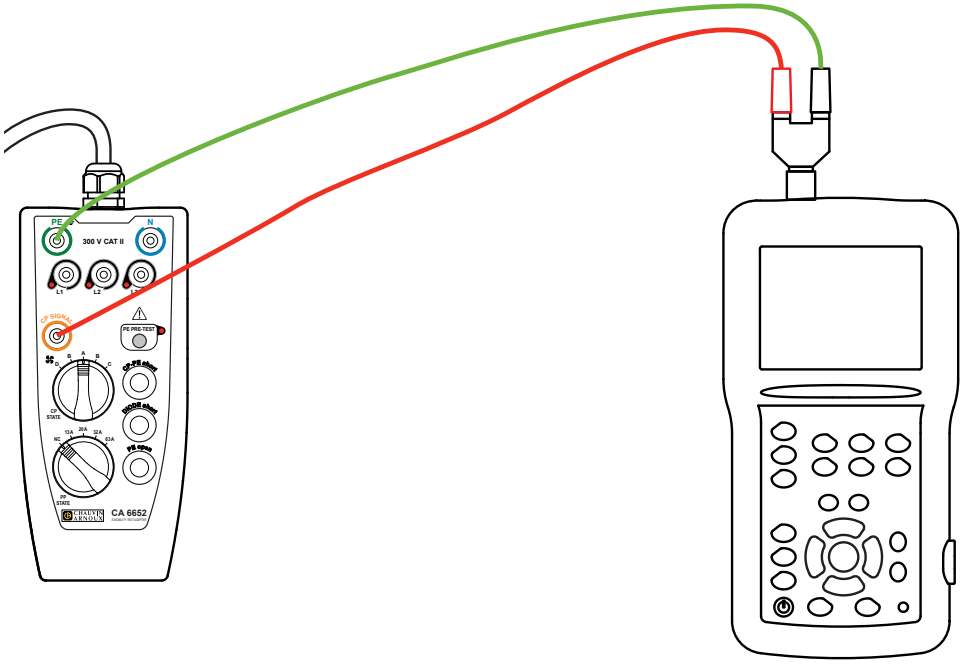
- Set the mode switch (**CP STATE**) to **C** or **D**.

Load capacity switch (PP STATE)	PP-PE resistance
N.C.	infinite
13A	1,500kΩ
20A	680Ω
32A	220Ω
63A	100Ω

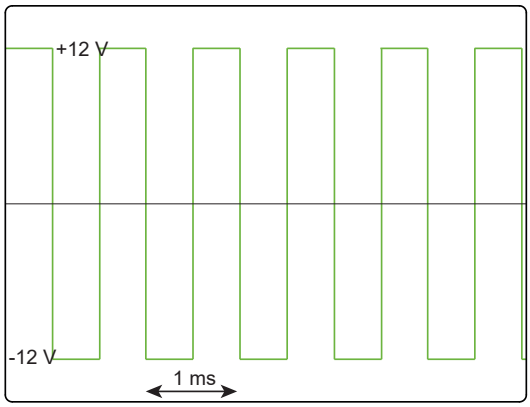
2.5.2. SIGNAL VERIFICATION

To check the signal, you must have a Handscope type oscilloscope.

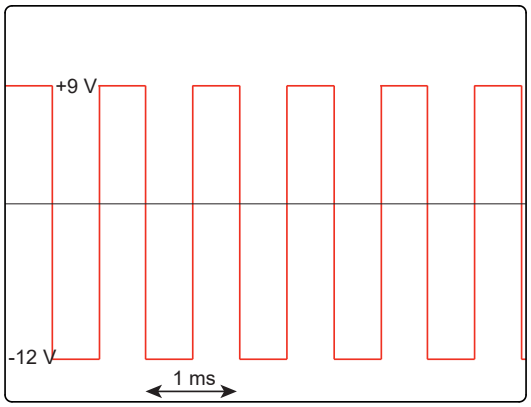
- Connect the oscilloscope between the **SIGNAL** and **PE** terminals.



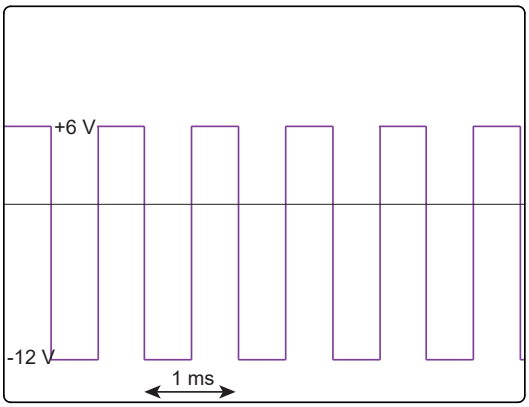
When the current load capacity switch (**PP STATE**) is set to **N.C**., the signals are shaped as follows:



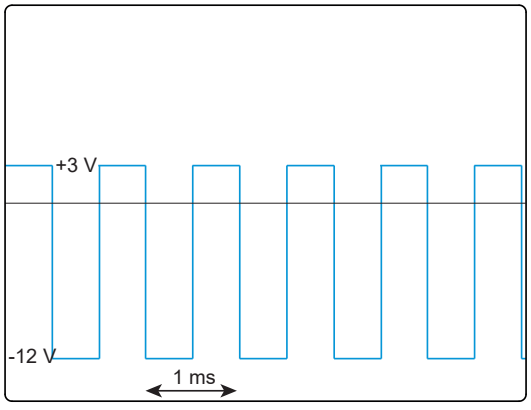
CP STATE switch set to A.



CP STATE switch set to B.



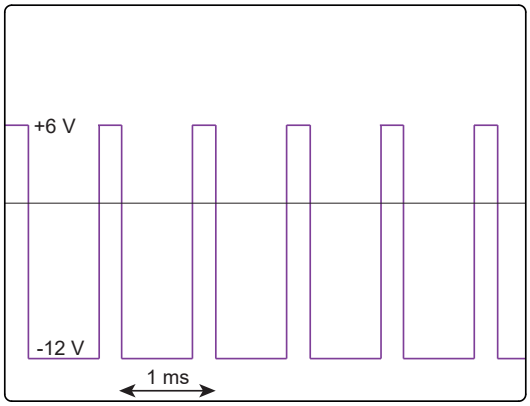
CP STATE switch set to C.

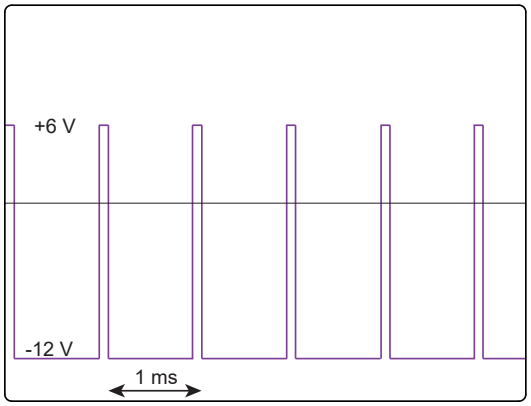


CP STATE switch set to D.

When the mode switch (**CP STATE**) is set to **C** or **D** and the current load capacity switch (**PP STATE**) is not set to **N.C.**, the signal uses pulse width modulation (PWM) to indicate the available charging current (13A, 20A, 32A or 63A).

The signals then take the following forms:





For more details of the communication protocol, please refer to standard IEC 61851-1 and the documentation from the manufacturer of the charging station.

2.6. TEST REPORT

The tests must be documented.

If a charging station is hazardous, this must be clearly indicated on the station, and the organization responsible for the station and the electricity supplier must be notified in writing.

The test report must contain:
- a list of the items inspected visually,
- the results of each measurement and each test,
- any changes made to the charging station.

The station must bear a label indicating: Tested per standards XXX.

A test report compliant with this standard will soon be available for the CA 6116N and CA 6117 via the DataView® application software.

3. TECHNICAL SPECIFICATIONS

3.1. REFERENCE CONDITIONS

Quantity of influence	Reference values
Temperature	23±5°C
Relative Humidity	20 to 75%RH
Supply voltage	230 V single-phase 400 V three-phase
Frequency of the measured signal	50Hz

3.2. ELECTRICAL CHARACTERISTICS

Type 2 connector: 32A, 3PH+N+PE, type E-2201, 200/346V-240/415V

3.3. POWER SUPPLY

The CA 6652 is powered by the charging station being tested via the type 2 connector.

3.4. ENVIRONMENTAL CONDITIONS

For indoor use or outdoor use without rain.

Operating range	-20 to +55°C, 95%RH (from 0 to 40°C) without condensation
Storage	-20 to +70°C, 90%RH (from -10 to +40°C) without condensation 80%RH (from 40 to 60°C)
Pollution degree	2
Altitude	<2,000m

3.5. CONSTRUCTION SPECIFICATIONS

Dimensions of the housing (L x W x H)	221 x 100 x 44mm
Dimensions of the type 2 connector	approximately 240 x Ø 58mm
Length of the cable	approximately 60cm
Weight	approximately 850g
Ingress protection	IP40 per IEC 60529, in operation, with all terminals connected. IP54 per IEC 60529, not in operation, with the type 2 plug protection cap in place.

3.6. COMPLIANCE WITH INTERNATIONAL STANDARDS

The instrument is compliant with standards IEC/EN 61010-2-030 and the leads are compliant with IEC/EN 61010-2-031: 300V Category II, degree of pollution 2.

Instrument with double insulation ⧈.

3.7. ELECTROMAGNETIC COMPATIBILITY (CEM)

Emission and immunity in an industrial environment per IEC/EN 61326-1.

4. MAINTENANCE

⚠ The instrument has no parts replaceable by personnel who are not trained and approved. Any unauthorized repair or replacement of a part with an “equivalent” may seriously impair safety.

4.1. CLEANING

Disconnect the unit completely.

Use a soft cloth, dampened with soapy water. Rinse with a damp cloth and dry rapidly with a dry cloth or forced air. Do not use alcohol, solvents, or hydrocarbons.

5. WARRANTY

Except as otherwise stated, our warranty is valid for **three years** starting from the date on which the equipment was sold. Extract from our General Conditions of Sale provided on request.
www.group.chauvin-arnoux.com/en/general-terms-of-sale

The warranty does not apply in the following cases :

- Inappropriate use of the equipment or use with incompatible equipment;
- Modifications made to the equipment without the explicit permission of the manufacturer’s technical staff;
- Work done on the device by a person not approved by the manufacturer;
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user’s manual;
- Damage caused by shocks, falls, or floods.

FRANCE
Chauvin Arnoux
12-16 rue Sarah Bernhardt
92600 Asnières-sur-Seine
Tél : +33 1 44 85 44 85
Fax : +33 1 46 27 73 89
info@chauvin-arnoux.com
www.chauvin-arnoux.com

INTERNATIONAL
Chauvin Arnoux
Tél : +33 1 44 85 44 38
Fax : +33 1 46 27 95 69

Our international contacts
www.chauvin-arnoux.com/contacts

CHAUVIN ARNOUX