

# Expertise for Earths

Earth and Resistivity  
Testers

*Ground,  
earth electrode and  
coupling measurement  
using traditional rod  
methods*



- **3 testers in one:** resistivity, earth, coupling
- **Validation of measurement through automatic check:**  
3 lights indicate the presence of faults liable to impair measurement results
- **Heavy-duty on-site case** with cover for use on difficult grounds
- **Large LCD display with backlighting**

**R**obust and watertight, the C.A 6460 and C.A 6462 are easy-to-use instruments designed specially for use in the field. Wherever you need to install an electric ground connection or certify an existing one, the C.A 6460 and C.A 6462 help you perform accurate, reliable and quick diagnosis while providing the friendliest and safest test environment.

## COMPLETE AND WELL-DESIGNED TOOLS

Using the conventional rod-based method, the C.A 6460 and C.A 6462 measure resistivity ("4-wire" connections), ground resistances ("3-wire" connections) and coupling between electrically independent earth electrodes ("4-wire" connections).

They are equipped with 4 color-coded terminals for easy connection and a captive bar for changing from a 4-wire to a 3-wire measurement very quickly and easily.

Plus, the C.A 6462 is fitted with a rechargeable battery with an internal charger.

## MEASUREMENT AND ERROR DIAGNOSIS

Once the rods have been installed and connected (named E, ES, S and H), begin measurement by simply pressing the push-button. For maximum accuracy, the range and current selection is carried out automatically.

The measurement result and its unity are read directly on the large, backlit digital screen.

Three lights indicate any defect or interference liable to impair measurement results:

- red flashing FAULT LED (E-H): indicates a fault in the current circuit (voltage at terminals  $\geq 30$  V peak)
- red flashing HIGH RESISTANCE LED (ES-S): voltage circuit resistance too high ( $R \geq 50$  k $\Omega$ )
- red flashing HIGH NOISE LED (ES-S): voltage circuit noise  $\geq 13$  V peak

## VERY SAFE TO USE

When it comes to safety, the C.A 6460 and C.A 6462 meet the strictest of standards.

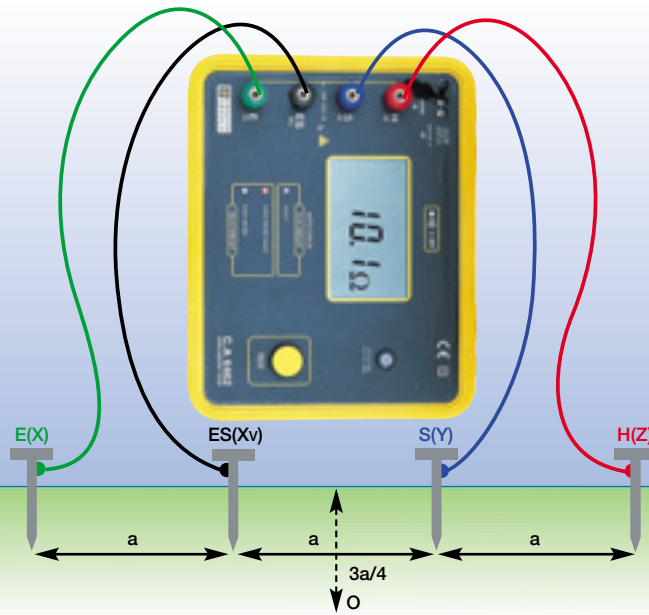
These instruments are very suitable to severe environments: parasitic voltages, high telluric currents, highly resistive auxiliary connections, etc.



# USE / APPLICATIONS:

## ■ Ground resistivity measurement with the "Wenner method" (4-rod method)

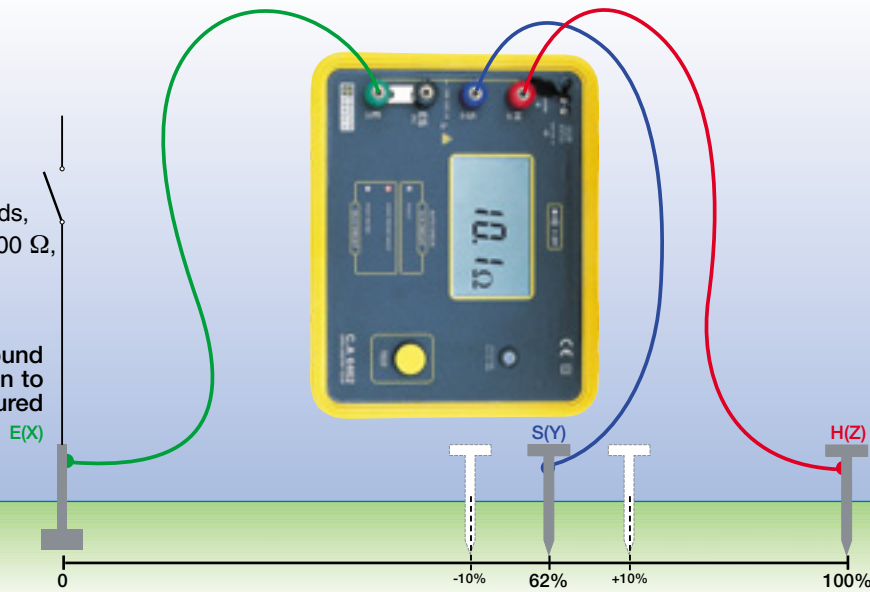
Depending on the soil's properties, this measurement defines the best positions, depth and geometry necessary for installing electric ground connections.



## ■ Ground connection resistance measurement with the "TAGG method" (62 % method)

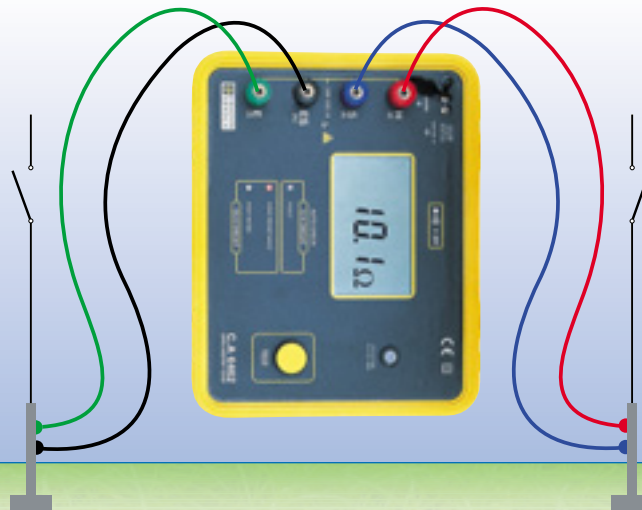
This method, using 2 auxiliary rods, measures up to 2000 Ω, even in worst-case conditions.

Ground connection to be measured  
E(X)



## ■ Coupling measurement between two earths

4-wire measurements are considered better than 2-wire because they free you from cord resistance, which is often too high.



# TECHNICAL SPECIFICATIONS:

## MEASUREMENT CHARACTERISTICS

- Measurement from 0 to 2000  $\Omega$  within three automatic ranges

Measurement range	Resolution	Test current	Accuracy
0.00...19.99 $\Omega$	0.01 $\Omega$	10 mA	$\pm 2\% \pm 1$ pt
20.00...199.9 $\Omega$	0.1 $\Omega$	1 mA	$\pm 2\% \pm 1$ pt
200.0...1999 $\Omega$	1 $\Omega$	0.1 mA	$\pm 2\% \pm 3$ pt

- Measurement frequency: 128 Hz
- Open circuit voltage  $\leq 42$  V peak
- Conditions for use:  $-10\text{ }^{\circ}\text{C} \dots +55\text{ }^{\circ}\text{C} / 20\% \dots 90\% \text{ RH}$
- Response time: between 4 and 8 seconds depending on measurement conditions

## OTHER FEATURES

- Power supply

C.A 6460	C.A 6462
8 alkaline 1.5 V LR14 batteries or same-size rechargeable NiMH or NiCd storage batteries	Rechargeable NiMH battery (life: 6 h for a load at 80 %)

- Average charge life under permanent control

C.A 6460	C.A 6462
4,500 measurements of 15 s	1,180 measurements of 15 s

- Watertight IP 53 case
- Dimensions: 273 x 247 x 127 mm
- Weight: about 2.8 kg (C.A 6460) and about 3.3 kg (C.A 6462)

## COMPLIANCE TO STANDARDS

- Electric safety: double insulation device, according to NF EN 61010 / IEC 61557
- EMC: EN 61 000-3, EN 61 000-4

# TO ORDER

C.A 6460	C.A 6462
delivered with batteries and user's manual in 5 languages	delivered with 2 m European-type mains supply lead and user's manual in 5 languages
<b>P01.1265.01</b>	<b>P01.1265.02</b>

## ACCESSORIES:



### Standard Earth / Resistivity Kit

**P01.1018.23**

Shoulder bag with 4 straight rods, 2 extractors, 2 reels (30 m of red cord, 30 m of blue cord), 3 m of green cord, 3 m of black cord and 1 hammer.



### Prestige Earth / Resistivity Kit

**P01.1018.25**

Compartmentalized rigid bag with space for the tester, including 4 T-rods, 4 reels (100 m of red cord, 60 m of blue cord, 10 m of green cord and 20 m of black cord) and a hammer.

## REPLACEMENT PARTS:



- 1.5 V alkaline LR14 battery (pack of 2) **P01.2960.27**
- 9.6 V – 3.5 AH NIMH storage battery **P01.2960.21**
- European mains lead **P01.2961.74**
- GB mains lead **P01.2952.53**
- HPC 0.1A fuse (pack of 10) **P01.2970.12**

**New earth and resistivity testers:  
comprehensive, accurate and suitable for all-terrain use**

**C.A 6470N      TERCA 3**

**INDUSTRY & HOUSING**

**4 in 1** : *Earth • Resistivity • Coupling • Continuity*



**Earth  
and resistivity  
testers**



**C.A 6471**

**INDUSTRY**

**5 in 1** : *Earth • Selective earth • Resistivity  
• Coupling • Continuity*

**Measurement of earth networks  
in parallel without disconnecting  
the earth and without rods.**

- Possibility of selecting the measurement frequency
- Automatic calculation of resistivity and coupling

# C.A 6470N TERCA 3 & C.A 6471

- **Multi-function testers**
  - 3-pole and 4-pole measurements
  - Selective 4-pole measurements, 2 clamps (C.A 6471 only)
  - Resistivity (Wenner + Schlumberger methods),
  - Earth coupling,
  - Continuity & resistance
- **Measurements possible even with highly resistive soils**
- **Improved measurement quality due to high rejection of disturbance voltages**
- **Excellent accuracy and resolution**
- **Standard software for data recovery and processing of the results**

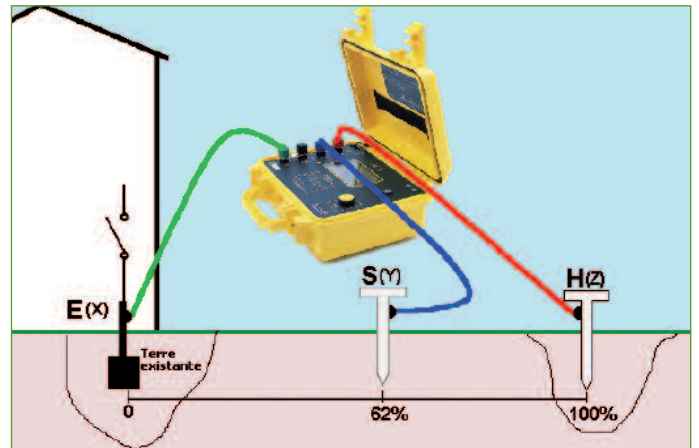


## EARTH MEASUREMENTS

### EARTH MEASUREMENT WITH 3P METHOD

The 3P method is the traditional method using rods to measure the resistance of an existing earth connection. The C.A 6470N & C.A 6471 can also be used to measure the resistances of the auxiliary rods RS and RH, as well as any disturbance voltages.

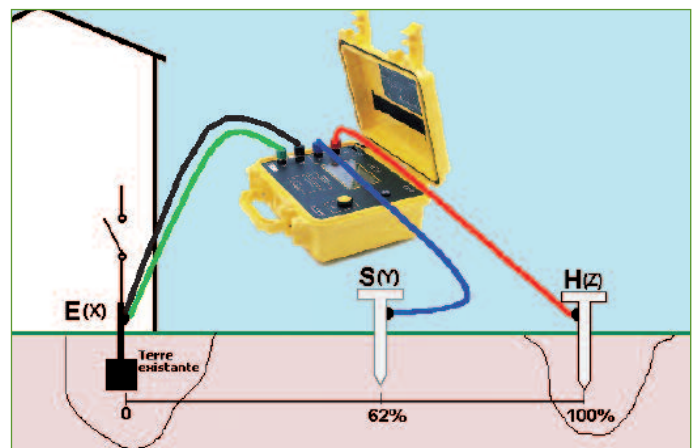
Suitable for all types of measurement environments, even the most difficult, this method guarantees measurement of auxiliary-rod resistances up to 100 k $\Omega$  and disturbance voltages of 60 Vpeak.



### 4P AND SELECTIVE 4P EARTH MEASUREMENT

The 4P measurement method is particularly suitable for measuring very low earth resistances.

If there are several resistances connected in parallel, it is possible to use the instrument with a clamp-on ammeter to carry out **selective measurements**, in order to avoid the effect of the parallel earth connections. This "selective 4P" measurement method saves considerable time because it is no longer necessary to disconnect the earth resistance before measuring it.



The 4P measurement method is more accurate and can be used to measure low earth resistances. The results obtained with this measurement method are ideal for the requirements of energy distributors such as EDF.



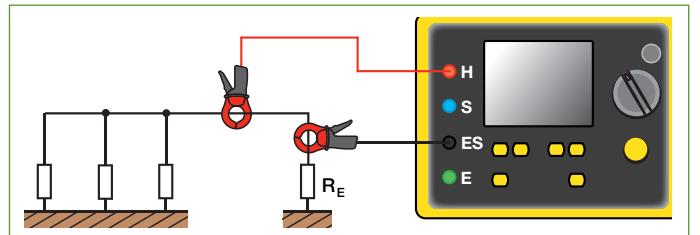
## EARTH LOOP MEASUREMENT WITH 2 CLAMPS

In the event of a system with parallel earth connections, 2 clamp-on ammeters can be used with the C.A 6470N & C.A 6471 to provide accurate earth resistance measurements.

The principle of this method involves placing 2 clamps around the earth conductor tested and connecting each of them to the instrument. One clamp injects a known signal (32 V / 1367 Hz) while the other clamp measures the current flowing in the loop.

This method **saves considerable time** when earth testing because it is no longer necessary to set up auxiliary rods

or disconnect the earth connections, which is often time-consuming

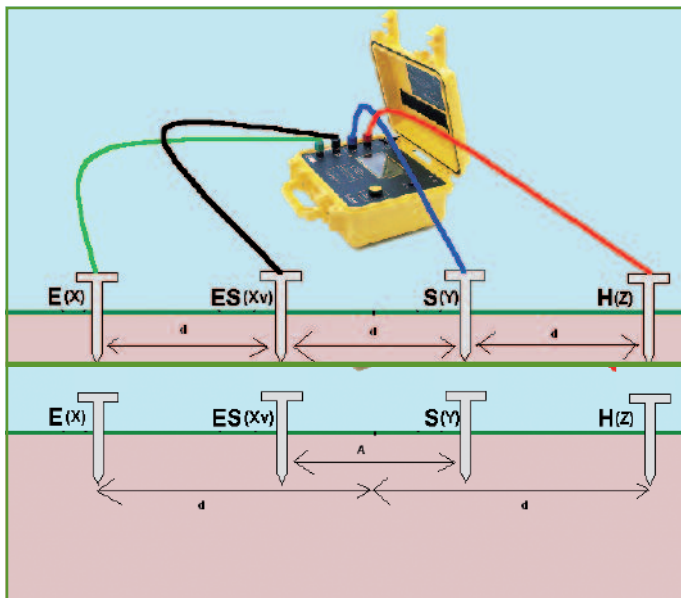


## MEASUREMENT OF EARTH COUPLING

To estimate the reciprocal influence of 2 normally unrelated earth resistances, you must calculate the coupling coefficient, which should be as low as possible. The operator takes 3 successive measurements (2 classic

earth measurements using the classic 3P - R1 & R2 method, and 1 earth measurement using the 2P - R1-2 method. The instrument then **automatically** calculates the coupling resistance:  $R_c = (R_1 + R_2 - R_{1-2}) / 2$ .

## SOIL RESISTIVITY MEASUREMENT



**Wenner method:**  
the distances between the 4 rods are identical: (d)  
 $R = 2 \cdot \rho \cdot d \cdot RS-SE$

**Schlumberger method:**  
the distance between the 2 central rods S & ES is A  
the distance between the 2 outer rods E & H is 2d  
 $R_S = \rho \cdot (d^2 - A^2/4) \cdot RS-SE / A$

When it is possible to choose the position of the earth connection, resistivity measurements can be used to check the soil and determine where the earth resistance will be lowest (optimization of building costs).

The C.A 6472 **automatically** calculates soil resistivity using the Wenner or Schlumberger methods as soon as the distances between the rods have been entered.

The resistances of the rods RE, RES, RS and RH can also be measured.

**Reminder: soil resistivity (?) calculation methods**

		C.A 6470N	C.A 6471
<b>3P method</b>	Range	0.01 Ω to 99.9 kΩ	
	Resolution	0.01 to 100 Ω	
	Measurement frequency	41 to 512 Hz	
	Coupling measurement	yes	
<b>4P method</b>	Range	0.001 to 99.99 kΩ	
	Resolution	0.001 to 10 Ω	
	<b>Selective 4P</b>	-	yes
<b>Earth measurement with 2 clamps</b>	Range	-	0.01 to 500 Ω
	Resolution	-	0.01 to 1 Ω
	Measurement frequency	-	Auto: 1,367 Hz Manual: 128 Hz, 1,367 Hz, 1,611 Hz, 1,758 Hz
<b>Resistivity</b>	Test method	Wenner and Schlumberger with automatic calculation	
	Range	0.01 to 99.9 kΩ	
	Measurement frequency	41 to 128 Hz	
<b>DC resistance measurement</b>	Type of measurement	2 wires or 4 wires	
	Range	0,12 Ω à 99,9 kΩ	0,001 Ω à 99,9 kΩ
	Measurement current	> 200 mA DC	
<b>Memory</b>	512 memory locations		
<b>Communication</b>	optical / USB link		
<b>Dimensions / weight</b>	272 x 250 x 128 mm / 3 kg		
<b>Electrical safety</b>	50 V CAT IV		

## STATE AT DELIVERY

### • C.A 6470N ..... P01126506

Delivered with 1 external mains charger, data export software + optical / USB communication lead, 5 operating manuals (one per language) on CD-ROM, 5 simplified operating manuals, each in a different language, 5 descriptive labels, each in a different language

### • C.A 6471 ..... P01126505

Delivered with 1 external mains charger, data export software + optical / USB communication lead, 2 C182 clamps with 2 safety leads, 5 operating manuals (one per language) on CD-ROM, 5 simplified operating manuals, each in a different language, 5 descriptive labels, each in a different language, 1 carrying bag.

## ACCESSORIES / SPARES

- Adapter for battery recharging on vehicle cigarette lighter ..... P01102036
- GB mains power cable ..... P01295253
- Set of 10 fuses: type F 0.63 A - 250 V - 5x20 mm - 1.5 kA ..... AT0094
- Adapter for battery recharging from mains ..... P01102035
- Battery pack ..... P01296021
- Optical / RS communication cable ..... P01295252
- Optical / USB communication cable ..... HX0056-Z
- Earth kit for 3P method, 50 m ..... P01102021  
Comprising 2 T-shaped rods, 2 reels of cable (50 m red, 50 m blue), 1 cable winder (10 m green), 1 mallet, 5 spade lug / Ø 4 mm banana plug adapters, 1 carrying bag
- Earth kit for 3P method, 100 m ..... P01102022  
Comprising 2 T-shaped rods, 2 reels of cable (100 m red, 100 m blue), 1 cable winder (10 m green), 1 mallet, 5 spade lug / Ø 4 mm banana plug adapters, 1 carrying bag
- Earth kit for 3P method, 150 m ..... P01102023  
Comprising 2 T-shaped rods, 2 reels of cable (150 m red, 150 m blue), 1 cable winder (10 m green), 1 mallet, 5 spade lug / Ø 4 mm banana plug adapters, 1 carrying bag
- Earth and resistivity kit, 100 m ..... P01102024  
Comprising 4 T-shaped rods, 4 reels of cable (100 m red, 100 m blue, 100 m green, 30 m black), 1 cable winder (10 m green), 1 mallet, 5 spade lug / Ø 4 mm banana plug adapters, 1 prestige carrying bag with specially-designed compartment for the C.A 647x.
- Earth and resistivity kit, 150 m ..... P01102025  
Comprising 4 T-shaped rods, 4 reels of cable (150 m red, 150 m blue, 100 m green, 30 m black), 1 cable winder (10 m green), 1 mallet, 5 spade lug / Ø 4 mm banana plug adapters, 1 prestige carrying bag with specially-designed compartment for the C.A 647x.
- Additional resistivity kit (100 m) ..... P01102030  
(standard carrying bag containing 2 reels of cable (100 m green, 30 m black) and 2 T-rods)
- C.A647X continuity kit (mΩ position) ..... P01102037  
Comprising 4 cables 1.5 m long terminated by Ø 4 mm banana plugs, 4 crocodile clips, 2 test probes, DC / DC adapter + 5 m connection cable for vehicle cigarette lighter.
- DataView PC software ..... P01102058

### FOR THE C.A 6471 ONLY

- MN82 clamp (diam. 20 mm)  
(delivered with 1 cable 2 m long for ES terminal connection) ..... P01120452
- C182 terminal (diam. 20 mm)  
(delivered with 1 cable 2 m long for ES terminal connection) ..... P01120333

For assistance and ordering