AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

techniCAL
eXpanding possibilities

# Models 6472 & 6474

## Reliable, accurate and quick for comprehensive earth testing

### MULTI-FUNCTION

- All types of earth resistance measurements: and ground measurement on towers (6474 option)
- Resistivity (Wenner and Schlumberger methods)
- Ground coupling
- Ground potential measurement
- Continuity / Resistance

**Ground and resistivity tester Adapter for** tower ground **measurements**

### HIGH PERFORMANCE

- Possibility of analyzing the frequency behavior of grounding systems (41 Hz to 5 kHz)
- Wide measurement range for optimum resolution
- Rejection of interference voltages up to 60 Vpeak
- Automatic calculation of the ground coupling coefficient and ground resistivity
- Measurement and analysis of tower leg grounding
- Recording of results

## A versatile instrument

The Model 6472 ground and resistivity tester can be used for quick, comprehensive testing of all grounding systems by gathering all the ground measurement functions in a single instrument. When used with the Model 6474, it also offers tower ground measurements, making it an essential tool for diagnosing and maintaining the grounding systems of all types of towers.

## New measurement concept

Unlike traditional earth testers, the Model 6472 offers the possibility of analyzing the frequency behavior of earthing systems thanks to its particularly extensive measurement frequency range (from 41 to 5,078 Hz).
The use of a high-frequency measurement signal makes it possible to assess the behaviour of an grounding system in the event of lightning.

## 2 operating modes for easy learning

**Automatic mode:**
A single key for simple handling:

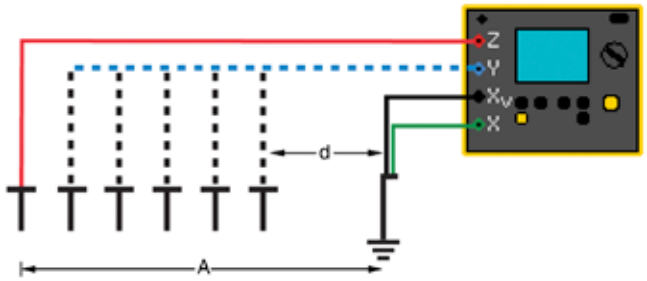
- function selection by rotary switch
- press on START / STOP button
- reading of the result

In this mode, the instrument carries out a default measurement at 128 Hz and chooses the most appropriate frequency in the event of interference voltages.

**Expert mode:**
Users can choose the required measurement parameters (specific measurement frequency, frequency scan, measurement voltage between H and S, etc.) and can access additional measurement results for more accurate interpretation.

**Automatic recognition of input connections:**
the connections are displayed and flash if incorrect or absent.


**4P MEASUREMENT METHOD**
*Do not connect the black cable if using the 3P method*



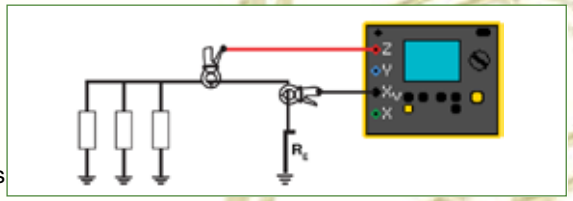

## 3P GROUND MEASUREMENT METHOD

The 3P method is the traditional method using rods to measure the resistance of an existing ground connection.
The Model 6472 can also be used to measure the resistances of the auxiliary rods RS (Y) and RH (Z), as well as any interference voltages, thus allowing more accurate interpretation of the measurement.
**Suitable for all types of measurement environments,** even the most difficult, it guarantees measurement of auxiliary rod resistances up to 100 kohm and interference voltages up to 60 Vpeak.

## 4P AND 4P SELECTIVE MEASUREMENT

The 4P measurement method is particularly well-suited to measuring very low ground resistance values.
In the event of several resistances set up in parallel, it is possible to combine this method with a clamp-on ammeter in order to carry out selective measurements. This "4P selective" method saves considerable time as it is no longer necessary to disconnect the ground resistance to be measured. Indeed, the clamp enables measurement of the current through the ground connection to be tested, thus avoiding the influence of the parallel ground connections.

## GROUND LOOP MEASUREMENT WITH 2 CLAMPS

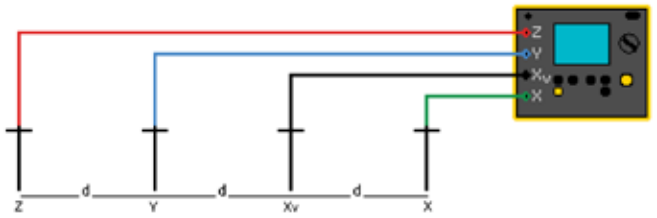



In the event of a system with parallel ground connections, the Model 6472 is capable of accurately measuring an ground resistance using clamps only. The principle of this method involves placing 2 clamps around the ground conductor to be tested and connecting them each to the instrument. One clamp injects a known signal ( 32 V / 1367 Hz) while the other clamp measures the current circulating in the loop. This method saves considerable time when ground testing because it is no longer necessary to set up auxiliary rods or to disconnect the ground connections.

## GROUND COUPLING MEASUREMENT

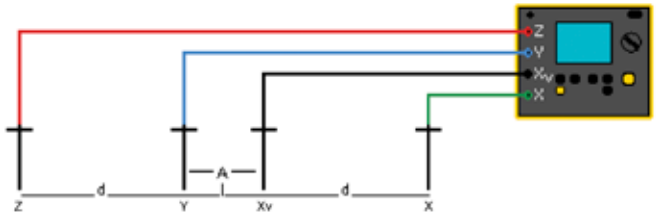
The operator performs 3 successive measurements (2 traditional ground measurements using the 3P method – $R_1$ & $R_2$ – and 1 ground measurement using the 2P method – $R_{1-2}$). The Model 6472 then automatically calculates the coupling resistance: $Rc = (R_1 + R_2 - R_{1-2}) / 2$.

**WENNER METHOD**




*Wenner method:*
*the distances between the 4 rods are identical:*
$d\ \rho W = 2.\pi.d.R_{S\text{-}SE}$

**SCHLUMBERGER METHOD**




*Schlumberger method:*
*the distance between the 2 central rods S & ES is A*
*the distance between the 2 outside rods E & H is 2d*
$\rho S = (\pi.(d^2\text{-}A^2/4).R_{S\text{-}SE})\ /4$

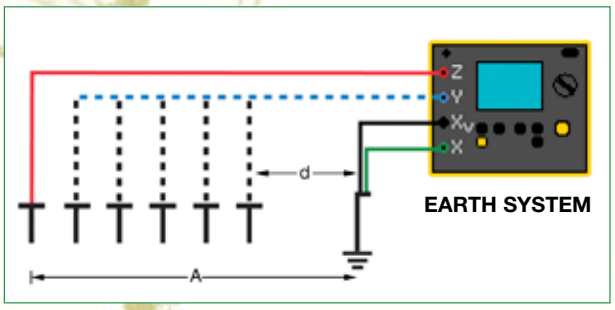
## GROUND RESISTIVITY MEASUREMENT

When it is possible to choose the position of the ground connection, resistivity measurement helps to assess the ground and thus determine the place where the earth resistance will be lowest (optimization of construction costs).

The Model 6472 automatically calculates the resistivity of the ground (ρ) using the Wenner or Schlumberger method, as soon as the distances used between the rods have been entered. The resistances of the rods $R_E$, $R_{ES}$, $R_S$ and $R_H$ can also be measured.

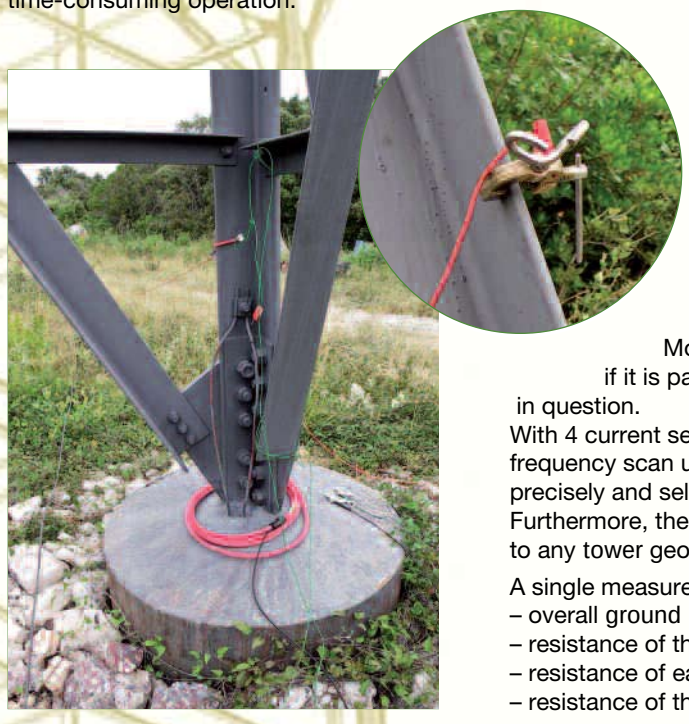
## GROUND POTENTIAL MEASUREMENT

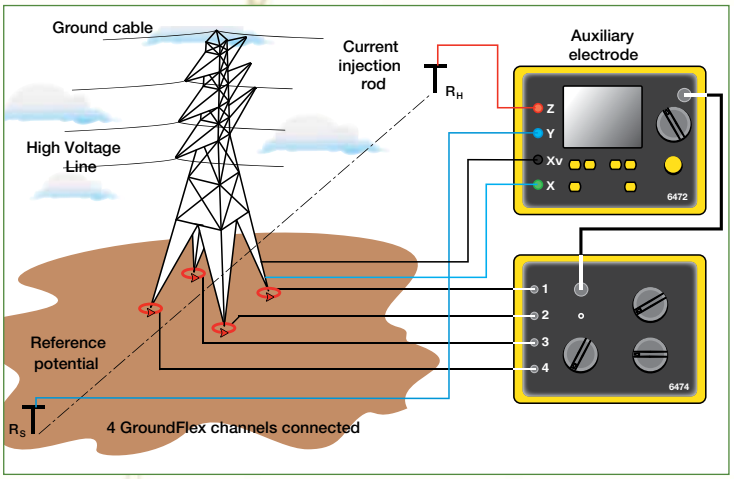
This measurement can be used to determine the value of the potential as a function of distance. By performing several measurements with different distances (d), it is thus possible to track the change in potential around an grounding system.




## GROUND MEASUREMENT ON PYLONS WITH GROUND CABLE

High-voltage lines are usually equipped with an ground cable to allow lightning to discharge to earth via the pylons. As all the pylons are connected to this conductor, all the tower's ground resistances are in parallel. This means that it is impossible to measure tower resistance using traditional 3P methods unless the earth cable is disconnected, which is a dangerous and time-consuming operation.






Used in conjunction with the Model 6474 vectorial processing unit, the Model 6472 offers the possibility of measuring a tower's ground resistance even if it is part of a parallel ground network, by selective measurement of the tower in question.
With 4 current sensors (Groundflex™) positioned around the footings of the tower and a frequency scan up to 5 kHz, it is possible to measure the earth impedance of the tower precisely and selectively.
Furthermore, the use of flexible sensors means that this concept can be adapted to any tower geometry.

A single measurement is sufficient to acquire all the essential quantities:
– overall ground resistance of the line
– resistance of the tower under consideration
– resistance of each tower footing
– resistance of the ground cable between towers

## ELECTRICAL SPECIFICATIONS

| | 3P Method | 4P / 4P Selective Method | Earth Measurement with 2 Clamps | Resistivity | Earth Potential Measurement | DC Resistance Measurement | Measurements with C.A 6474 |
|---|---|---|---|---|---|---|---|
| **Range** | 0.01 Ω to 99.9 kΩ | 0.001 Ω to 99.99 Ω | 0.01 Ω to 500 Ω | 0.01 kΩ to 99.9 kΩ | 0.01 mV to 65.00 V | 0.001 Ω to 99.9 kΩ | 0.001 Ω to 99.99 kΩ |
| **Resolution** | 0.01 to 100 Ω | 0.001 to 10 Ω | 0.01 to 1 Ω | 0.01 to 100 Ω | 0.01 mV to 10 mV | 2 wires: 0.01 Ω to 100 Ω/ 4 wires: 0.001 Ω to 10 Ω | 0.001 to 10 Ω |
| **Accuracy** | ± (2% + 1 count) | ± (2% + 1 count) | ± (10% + 1 count) | ± (2% + 1 count) | ± (5% + 1 count) | ± (2% + 2 counts) | ± (5% + 1count) |
| **No-Load Voltage** | 16 or 32Vrms | 16 or 32 Vrms | 16 or 32 Vrms | 16 or 32Vrms | 16 or 32 Vrms | ±16 VDC | 16 or 32 Vrms |
| **Measurement Frequency** | 41 to 5,078 Hz | 41 to 5,078 Hz | Auto: 1,367 Hz Manual: 1,367 Hz, 1,611 Hz, 1,758 Hz | 41 to 128 Hz | 41 to 128 Hz | DC | 41 to 5078 Hz |
| **Coupling Measurement** | yes | – | – | – | – | – | – |
| **Auxiliary Rod Resistance Measurement** | 0.1 Ω to 100 kΩ | 0.01 Ω to 100 kΩ | – | – | – | – | 0.01 Ω to 100 kΩ |
| **Voltage Interference** | maximum 60 Vpeak | | | | | – | maximum 60 Vpeak |
| **Test Method** | – | – | – | Wenner and Schlumberger with automatic calculation | – | – | – |
| **Type of Measurement** | 3 wires | 4 wires | – | 4 wires | 3 wires | 2 wires or 4 wires | – |
| **Measurement Current** | – | – | – | – | – | > 200 mA DC | – |

## MECHANICAL SPECIFICATIONS

| | |
|---|---|
| **Memory/Communication** | 512-record memory / optical link/USB |
| **Dimensions / Weight** | 272x250x128 mm / C.A 6472: 3.2 kg / C.A 6474: 2.3 kg |
| **Protection Rating** | IP 53 |
| **Electrical Safety** | CAT IV 50 V, complies with IEC 61326-1 / IEC 61010 / IEC 61557-1-4-5 |

# ORDERING INFORMATION

**Ground Resistance Tester Model 6472 ..... Cat. #2135.51**
*Includes rechargeable NiMH batteries, optical USB cable, power adapter 110/240V with power cord 115V US, DataView® software, ground tester workbook CD, carrying bag for meter, product warranty and registration card and a user manual.*

**Ground Resistance Tester Model 6472 Kit (150 ft) ..... Cat. #2135.52**
*Includes meter, rechargeable NiMH batteries, optical USB cable, power adapter 110/240V with power cord 115V US, two 150 ft color-coded leads on spools (red/blue), one 30 ft lead (green), two T-shaped auxiliary ground electrodes, set of five spaded lugs, one 100 ft AEMC® tape measure, DataView® software, ground tester workbook CD, carrying bag for meter, carrying bag for kit, product warranty and registration card and a user manual.*

**Ground Resistance Tester Model 6472 Kit (300 ft) ..... Cat. #2135.53**
*Includes meter, rechargeable NiMH batteries, optical USB cable, power adapter 110/240V with power cord 115V US, two 300 ft color-coded leads on spools (red/blue), two 100 ft color-coded leads (hand-tied, green/black), four T-shaped auxiliary ground electrodes, set of five spaded lugs, one 100 ft AEMC® tape measure, DataView® software, ground tester workbook CD, carrying bag for meter, carrying bag for kit, product warranty and registration card and a user manual.*

**Ground Resistance Tester Model 6472 Kit (500 ft) ..... Cat. #2135.54**
*Includes meter, rechargeable NiMH batteries, optical USB cable, power adapter 110/240V with power cord 115V US, two 500 ft color-coded leads on spools (red/blue), two 100 ft color-coded leads (hand-tied, green/black), one 30 ft lead (green), four T-shaped auxiliary ground electrodes, set of five spaded lugs, one 100 ft AEMC® tape measure, DataView® software, ground tester workbook CD, carrying bag for meter, carrying bag for kit, product warranty and registration card and a user manual.*

**GroundFlex™ Adapter Model 6474 ..... Cat. #2136.01**
*Includes the GroundFlex™ Adapter Model 6474, four GroundFlex™ sensors (5m/16ft) with twelve color-coded rings, connection lead, two extension leads on H reel (black/green) with color-coded alligator clips, six BNC extension leads, calibration loop, three C-clamps, carrying case for meter and a user manual.*

**GroundFlex™ Field Kit (Model 6472 and 6474) ..... Cat. #2136.03**
*Includes the GroundFlex™ Adapter Model 6474 (Cat. #2136.01 above), Ground Resistance Tester Model 6472, rechargeable NiMH batteries, optical USB cable, power adapter 110/240V with power cord 115V US, two 500 ft color-coded leads on spools (red/blue), two 100 ft color-coded leads (hand-tied, green/black), one 30 ft lead (green), four T-shaped auxiliary ground electrodes, set of five spaded lugs, one 100 ft AEMC® tape measure, DataView® software, ground tester workbook CD, carrying bag for meter, carrying bag for kit, hard carrying case, product warranty and registration card and a user manual.*