

# GroundFlex® Field Kit

Tower Ground Resistance Tester 6474 and  
Multifunction Earth Tester 6472-AU



*Our products are backed by over 130 years of experience in test and measurement equipment, and encompass the latest international standards for quality and safety.*

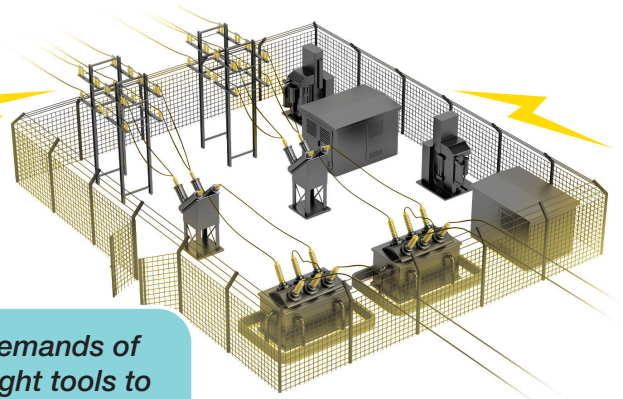
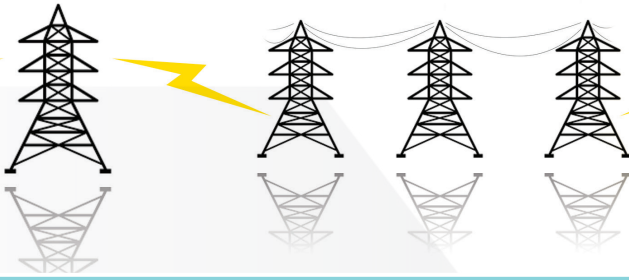
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# Now you can test energized Tower Systems!



Transmitting electricity safely and efficiently to meet demands of millions of consumers can be daunting. Getting the right tools to test transmission towers' ground systems should NOT be.

## Revolutionize Tower Grounding Assessment with Our Innovative Kit!

Power transmission towers play a critical role in meeting the demands of millions of consumers. Ensuring the safe and efficient flow of electricity requires cutting-edge tools, and we present the perfect solution: **The GroundFlex® Field Kit Tower Ground Resistance Testing System**.

**Model 6472** in conjunction with its companion **Model 6474 GroundFlex® Adapter**, forms an exceptionally robust and advanced ground resistance testing system. Test towers with one to four legs effortlessly, measuring current flow for precise resistance calculations — all **WITHOUT** disconnecting the overhead ground wire! This innovative system pays for itself in just a few months, offering a cost-efficient solution for power transmission, cellular, windmill, and other towers.

Choose the GroundFlex® Field Kit Tower Ground Resistance Testing System for unparalleled accuracy, efficiency, and cost savings in assessing the grounding resistance of vital towers. Elevate your testing capabilities with a system designed for the challenges of the modern electrical landscape.

## AEMC® Instruments Model 6472 Earth Tester is several earth testers in one.

- Earth Resistance of an isolated electrode
- Earth Resistance of a connected electrode without disconnection by the Selective method
- Earth Resistance of a connected electrode without disconnection by the Stakeless method
- Soil Resistivity directly in Ohm-m by either the Wenner or Schlumberger methods
- Earth Bond Resistance (*milli-ohmmeter*)
- External AC and DC voltage measurement

The Model 6472 distinguishes itself from other portable earth testers in that it has a test current of up to 250 mA improving its ability to make accurate and repeatable measurements even in Australia's challenging soil conditions.



# What's Included?



**The 6474/6472-AU is an Australian derivation of the standard European & US 6474/6472 GroundFlex® kit, developed in co-operation with Australian Power utilities and includes:**

- ▶ (4) GroundFlex® 5 m sensors
- ▶ (50/25) m test leads on A-frame reel for fast roll out and rewind. (100/50) m (*optional*)
- ▶ (4) Stainless steel helical stakes for strength, corrosion resistance and superior ground contact
- ▶ (2) Connecting leads and crocodile clips Cat IV, 600 V
- ▶ (2) Connecting and CT leads 4 m in length to reach pole transformer test points from ground
- ▶ (2) Heavy duty HPRC resin case with foam cut-outs accommodating instrument & accessories
- ▶ (1) 6472/6474 Connection lead
- ▶ (6) BNC extension leads
- ▶ (2) C-clamps
- ▶ (1) Optical USB cable
- ▶ (1) Power adapter and Australian power cord
- ▶ USB Drive with DataView® software & user manual for set up, data storage, real time display, analysis, report generation and system configuration
- ▶ Calibration certificates
- ▶ Optional 100 kA fused bridging lead with insulation piercing connectors for safe stakeless testing of HV earths when not bonded to LV earth.
- ▶ Optional (2) SR182 Current Probes for 2-clamp (*stakeless method*)

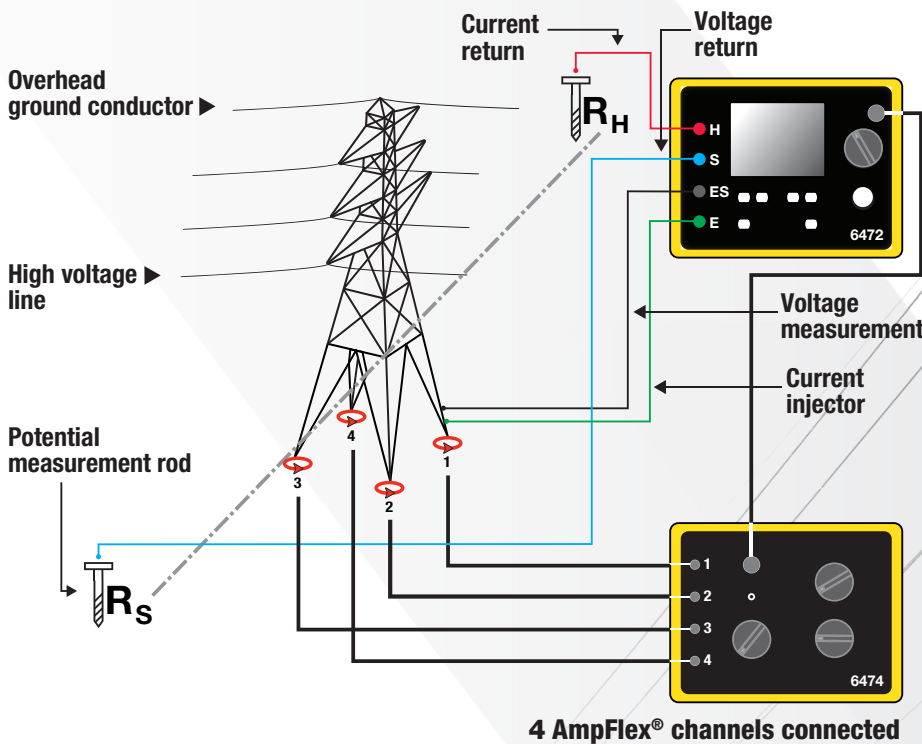
# How It Works

## How to Test Tower Ground System Using Models 6472 & 6474

### Ground measurement on towers with overhead ground cable

High voltage lines are usually equipped with an overhead ground conductor to allow lightning discharge to ground through the tower structure. Since the towers are all connected to this conductor, all the towers' resistances are in parallel. This means it is impossible to measure resistance of individual towers using traditional Fall-of-Potential methods unless the overhead ground conductor cable is disconnected. This is a dangerous, time-consuming and expensive operation.

With the GroundFlex® Field Kit Tower Ground Resistance Testing System, you can rest assured that you are working safely and efficiently. The system was designed to prioritize the safety of the workers in the field by enabling comprehensive ground resistance testing on energized towers, eliminating the need for tower isolation and minimizing risks associated with traditional testing methods.



Flexible sensors measure leakage current down tower legs

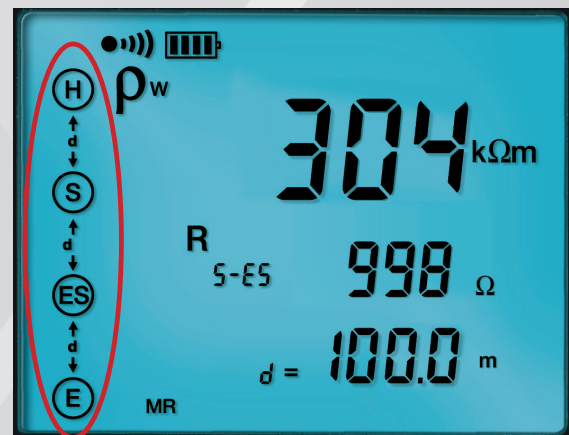


# Features

- ▶ Measures the Earth Resistance of steel towers and poles
- ▶ Just one measurement for towers, poles or structures with up to 4 legs
- ▶ Suitable for measuring the earth resistance of H-frames, tri-leg & communications towers
- ▶ Can be used on reinforced concrete poles bonded with overhead earth
- ▶ Tests with all other bonding in place
- ▶ No need to isolate the line or climb towers or structures
- ▶ Automatic check for correct connection
- ▶ Unaffected by any stray currents flowing in structures
- ▶ Static Test Indicates:
  - Leakage current present in the tower or pole
  - Indication of high resistance or disconnected overhead earth bond
  - Test stakes placed within potential gradient area of tower
- ▶ Measure earth resistance using 2-clamp (*stakeless method*) – No auxiliary stakes needed
- ▶ Measure earth resistance using single clamp (*selective method*)
- ▶ Measure earth resistance using 3-pole Fall of Potential method
- ▶ Measure Soil Resistivity with automatic calculation of  $\rho$  in Ohm-m using Wenner or Schlumberger methods
- ▶ Measure resistance (*earth bonding*) by 2 and 4-pole (*Kelvin*) DC resistance methods
- ▶ Automatic or manual selection of test frequency from (40 to 5078) Hz
- ▶ Selectable test voltage of (16 or 32) V
- ▶ Test current up to 250 mA
- ▶ All leads and connectors colour coded
- ▶ Automatic recognition of test stake connections and their resistance values
- ▶ Stores up to 512 complete test results in internal memory
- ▶ Rugged weather and dustproof case to IP53
- ▶ DataView® report generation software included

## Automatic recognition and display of input connections to match test

The connections are displayed and flash if incorrect or absent for the test selected.



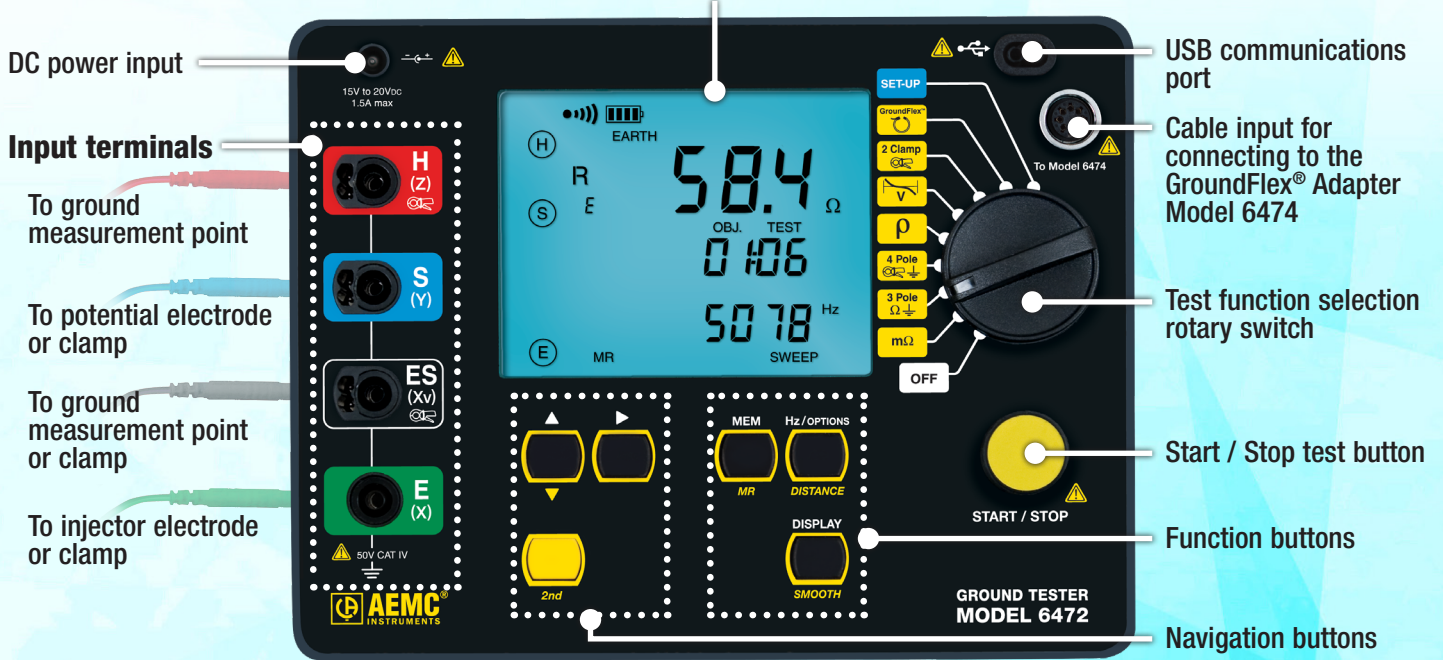
Test active towers safely **WITHOUT** disconnecting the overhead ground conductor!



# Input and User Interfaces

## Model 6472

Large, electroluminescent backlit liquid crystal display



DC power input

Input terminals

To ground measurement point

To potential electrode or clamp

To ground measurement point or clamp

To injector electrode or clamp

USB communications port

Cable input for connecting to the GroundFlex® Adapter Model 6474

Test function selection rotary switch

Start / Stop test button

Function buttons

Navigation buttons

## Model 6474



BNC Connections

Used for connecting the GroundFlex® sensors to the Model 6474 amplifier

Input Rotary Switch

Used for selecting a specific tower leg to test or the sum of all legs

Cable input for connecting to Model 6472

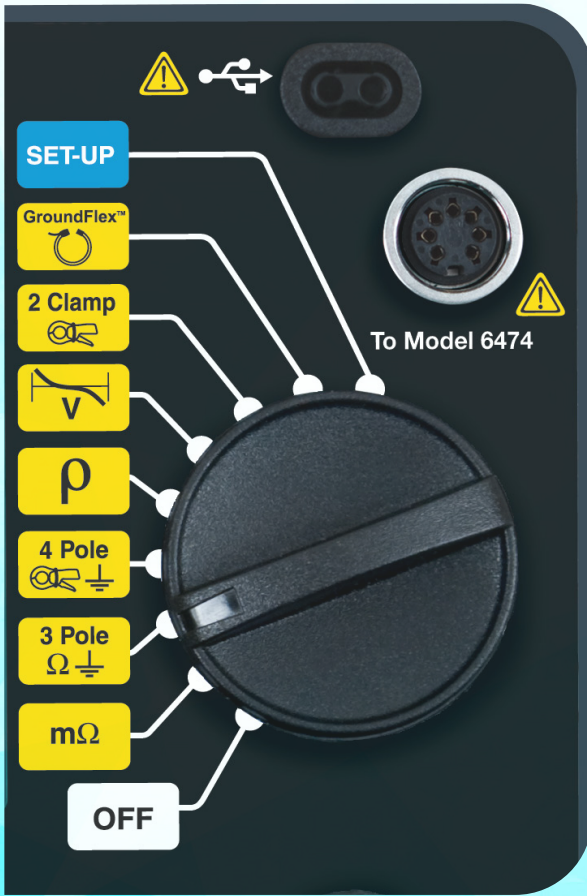
Sensor Turns Rotary Switch

Used to match the amplifier module to the number of turns a GroundFlex® sensor is wrapped around a tower leg (more turns provides a stronger measurement signal)

Sensitivity Rotary Switch

Provides the ability to adjust the gain based on signal output from GroundFlex® sensors to improve the accuracy and quality of the measurement

# Model 6472 Rotary Switch



## SET-UP

### Set Up Position

For configuring all user programmable parameters.

### GroundFlex® Measurement Position



Used to measure the ground resistance of tower legs without the need to remove the overhead ground conductor (*energized or de-energized*). Also used to identify poor ground connections of an individual tower leg and for bonding of the overhead ground conductor.

### 2 Clamp



### Two Clamp Position

Used for measuring ground resistance using two current clamps. Eliminates the need for auxiliary rods.



### V Potential Measurement Position

Performs a potential ratio test comparing the applied test voltage to measured voltage on the S auxiliary electrode. Used for determining the possibility of varying voltages around an electrode.



### Soil Resistivity Measurement Position

User selection of the Wenner or Schlumberger test methods with direct readout  $\Omega$ -Meters.



### 4-Pole Ground Resistance Measurement Position

Used for measuring very low ground resistances eliminating test lead resistance from the measurement. Provides up to 10 times the sensitivity of the 3-pole method. Also used for selective Fall-of-Potential measurement using one clamp to test bonded ground electrodes without the need of isolation.



### 3-Pole Ground Resistance Measurement Position

Performs 3 Pole Fall-of-potential and similar tests to measure the resistance to earth of single or small electrode systems.



### DC Resistance Measurement Position

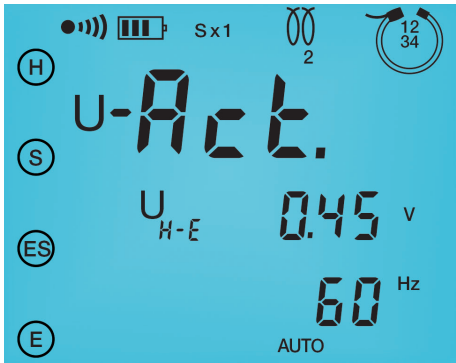
Measures bond resistance using either two lead or four lead Kelvin system with a DC test current up to 200 mA using automatic polarity reversal for better accuracy.



Interface cable for connecting the GroundFlex® Adapter Model 6474 to the 6472

# Functional Displays

## Present Live Voltage Measurement



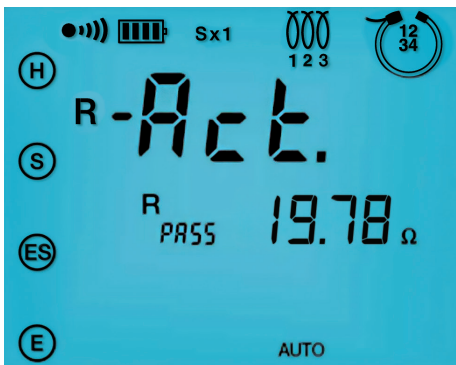
Live voltage is measured between the tower and the measurement auxiliary electrode to ensure accurate testing by verifying the electrodes distance is sufficient.

## Leakage Current Measurement



Leakage current can be displayed for each leg of the tower plus the summation of all legs together.

## Passive Resistance Measurement



Passive resistance of the tower is calculated using leakage current and present voltage.

## Sweep Mode Test



Sweep mode tests allow for multiple test frequencies to be used in succession. Data from sweep mode tests are automatically stored in the instrument and can be plotted to profile impedance values that may be incurred due to lightning.

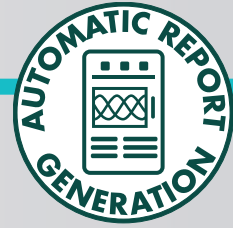
## Tower Leg Measurement



Displays resistance to earth of individual legs or sum of all tower legs.

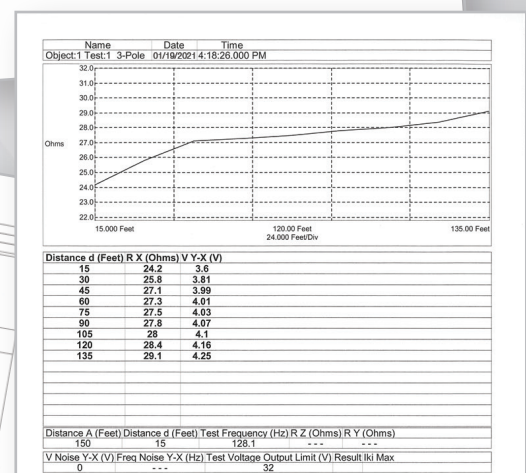
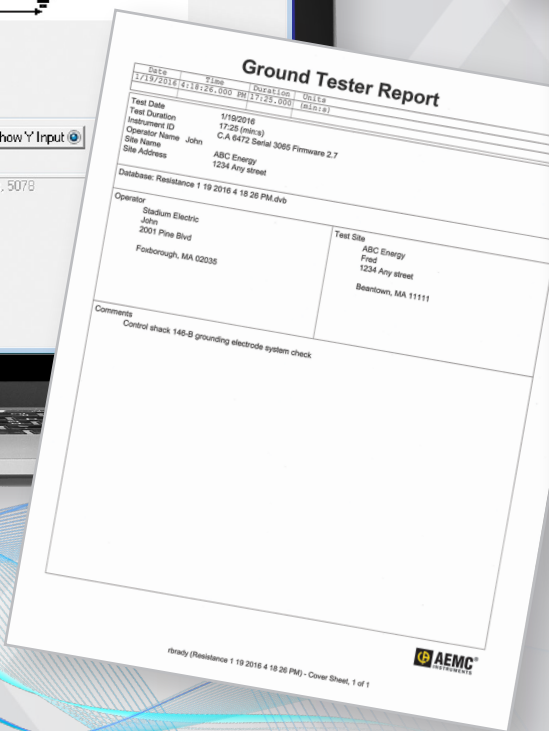
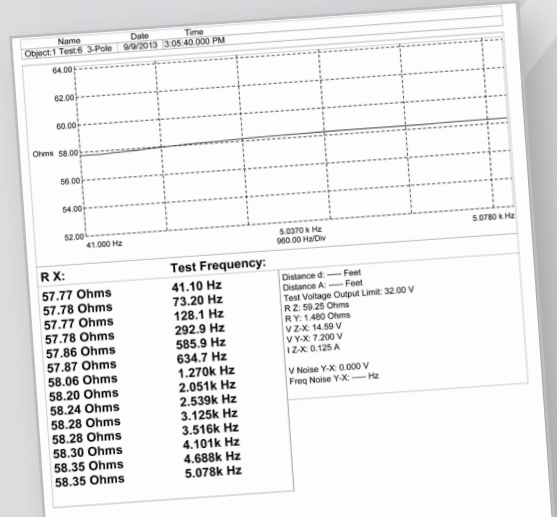
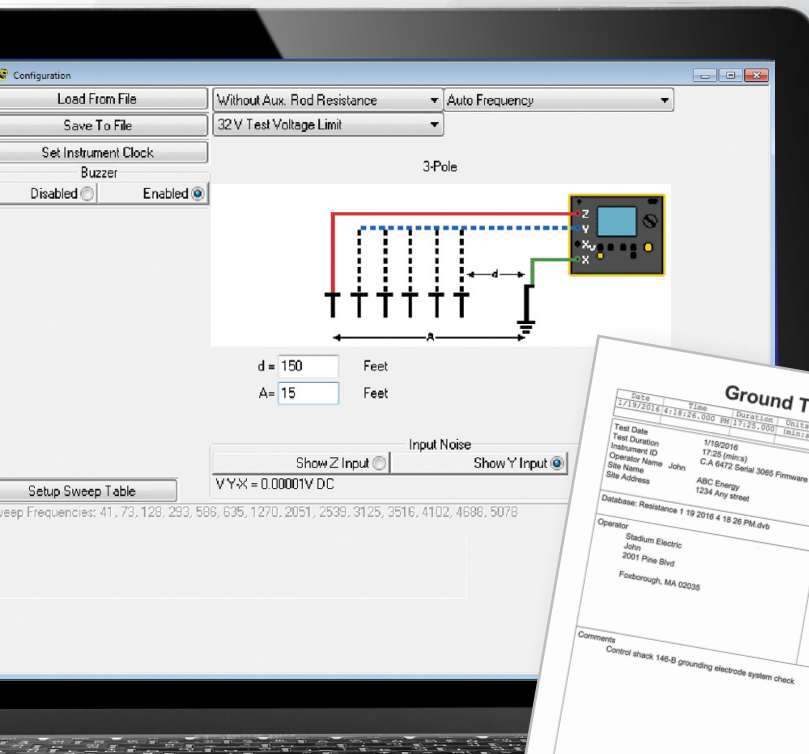


## Data Analysis and Reporting Software



**FREE DataView® software** provides a convenient way to configure and control ground resistance tests from your computer. Through the use of clear and easy-to-use tabbed dialog boxes, all of the Model 6472 functions can be configured and tests can then be initiated. Results can be displayed in real-time and stored in your PC. Standard and customized reports can be printed along with the operator's comments and analysis.

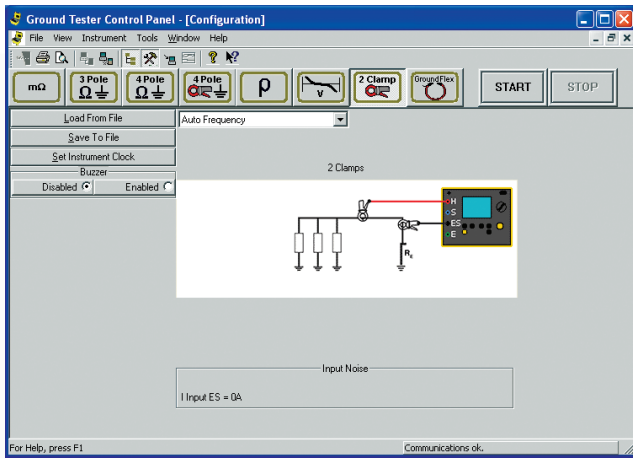
- ▶ Run tests and analyze real-time data from your PC
- ▶ Configure all test functions and parameters from your PC
- ▶ Customize views, templates and reports to your exact needs
- ▶ Create and store a complete library of configurations that can be used with the Ground Resistance Tester as needed
- ▶ Display Fall-of-Potential plots, tabular listings of test results, resistance vs. frequency plots, soil resistivity and bonding tests
- ▶ Print reports using standard or custom templates you design
- ▶ Free updates available on our website: [www.aemc.com](http://www.aemc.com)



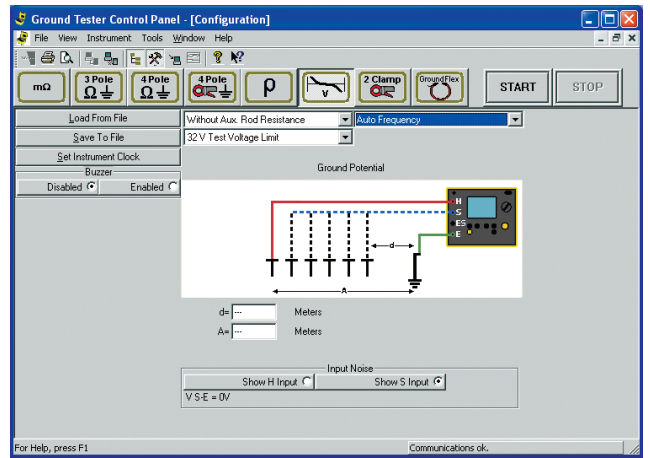
Typical reports showing Fall-of-Potential plot using DataView® software.

# Typical DataView® Control Panels

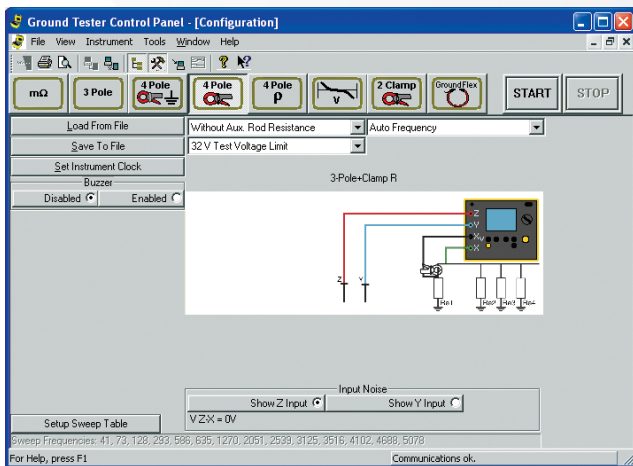
## 2 Clamp Method Setup



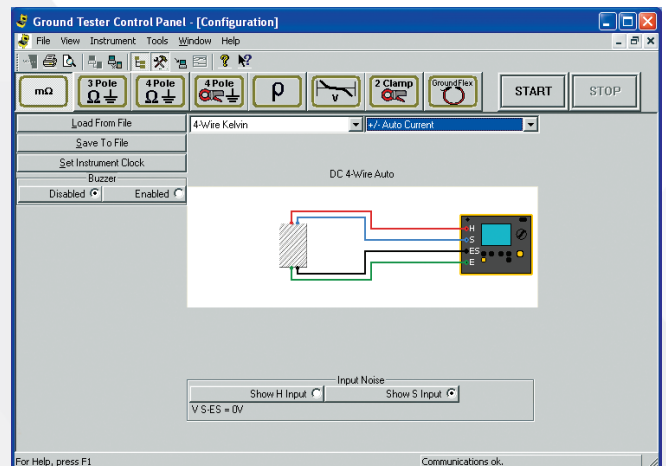
## Fall-of-Potential, Step-Touch Potential



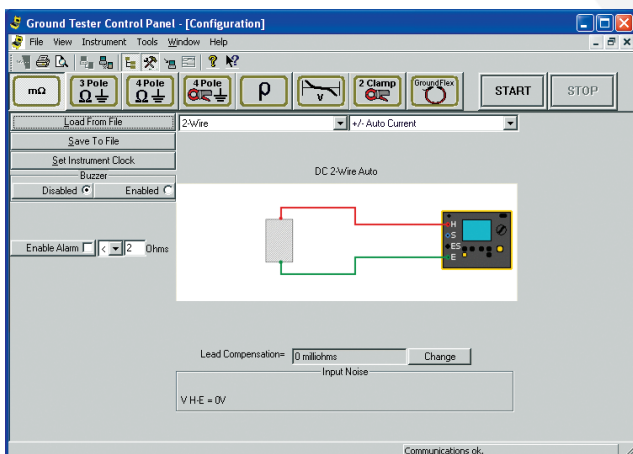
## Selective 3-Point Testing of Multiple Rods



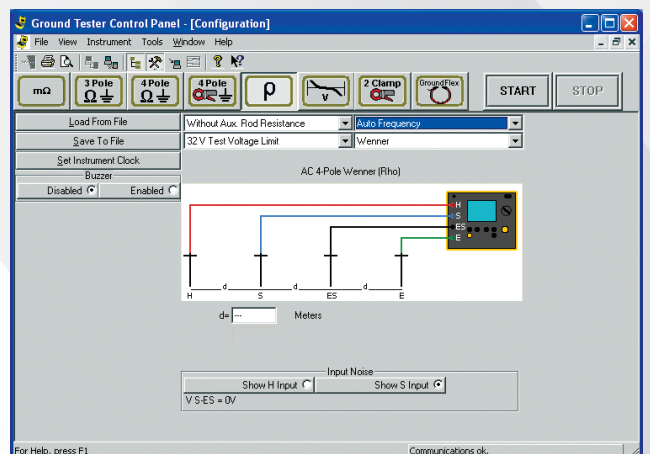
## 4-Point Bonding For Very Low Resistance



## Bonding



## Soil Resistivity



# Specifications

<b>2 CLAMP METHOD</b>	
Range	(0.1 to 500) $\Omega$
Resolution	(0.01 to 1) $\Omega$
Measurement Frequency	Auto: 1611 Hz Manual: (128, 1367, 1611, 1758) Hz
<b>3-POLE METHOD</b>	
Range ( <i>auto ranging</i> )	0.01 $\Omega$ to 99.9 k $\Omega$
Resolution	(0.01 to 100) $\Omega$
Test Voltage	(16 or 32) V RMS
Resistance Measurement Frequency	(41 to 5078) Hz automatic or user selectable
Test Current	250 mA max.
Accuracy	$\pm 2\%$ reading + 1 count @128 Hz
<b>SOIL RESISTIVITY</b>	
Test Methods	Wenner or Schlumberger with automatic calculation in $\Omega$ -metres
Range ( <i>auto ranging</i> )	(0.01 to 99.9) k $\Omega$ $\rho$ max 999 k $\Omega$ -m
Resolution	(0.01 to 100) $\Omega$
Test Voltage	(16 or 32) V RMS
Resistance Measurement Frequency	(41 to 128) Hz automatic or user selectable
<b>EXTERNAL VOLTAGE MEASUREMENT</b>	
Range ( <i>auto ranging</i> )	(0.1 to 65) V AC/DC to 440 Hz
Accuracy	$\pm 2\%$ reading + 1 count
<b>RESISTANCE MEASUREMENT (<i>Bond Testing</i>)</b>	
Measurement Type	2-pole with lead resistance compensation or 4-pole Kelvin
Range ( <i>auto ranging</i> )	2-pole 0.02 $\Omega$ to 99.9 k $\Omega$ 4-pole 0.02 $\Omega$ to 99.99 k $\Omega$
Accuracy	$\pm 2\%$ reading + 2 counts
Test Voltage	16 V DC (+/- or auto polarity)
Test Current	250 mA max.
<b>MEASUREMENT WITH 6474</b>	
Range ( <i>auto ranging</i> )	0.001 $\Omega$ to 99.99 k $\Omega$
Resolution	(0.001 to 10) $\Omega$
Accuracy	$\pm 5\%$ reading + 1 count
Test Voltage	(16 or 32) V RMS
Resistance Measurement Frequency	(41 to 5078) Hz automatic or user selectable
Test Current	250 mA max.
<b>DATA STORAGE</b>	
Memory Capacity	512 test results
Communication	Optically isolated USB
<b>POWER SOURCE</b>	
Battery Type	9.6 V NiMh rechargeable battery pack
Recharging	(110 / 230) V external charger with 18 V DC 1.9 A output or 12 V DC
<b>DIMENSIONS/ WEIGHT</b>	
6472	(272 x 250 x 128) mm, 3.2 Kg
6474	(272 x 250 x 128) mm, 2.3 kG
6472 Hard Case external dimensions	(620 x 520 x 275) mm
6474 Hard Case external dimensions	(543 x 419 x 218) mm

# AEMC® Instruments Family of Products

## Earth Testers



Empower your electrical infrastructure with AEMC® Instruments state-of-the-art Ground Resistance Testers. We recognize the critical importance of accurate ground resistance measurement to prevent costly downtime from service interruptions caused by poor grounds. That's why we present one of the most extensive and user-friendly selections of ground resistance testers in the industry.

## Power Quality



We understand the crucial role professionals play in troubleshooting and benchmarking power quality issues over time. That's why our user-friendly, rugged, and powerful line of portable power quality analyzers, power and energy loggers, and meters have been designed to improve your power management experience. Identify power, quality, and energy waste in your facility effortlessly and prevent costly power issues before they arise

## Insulation Resistance Testers



Ensure the longevity of your equipment and safeguard against unplanned shutdowns with AEMC® Instruments comprehensive range of Megohmmeters. We understand the critical need for accurate assessment of insulation on wire and motor windings to prevent damage to valuable equipment and ensure personnel safety. That's why our Megohmmeters are designed to meet your diverse needs, offering test voltages ranging from 10 V to 15 kV (model dependent) and capable of measuring insulation resistances from 0.010 MΩ to 30 TΩ.

## Micro-Ohmmeters



Unlock precision in electrical diagnostics with AEMC® Instruments Micro-Ohmmeters. We recognize the fundamental need for accurate measurement of low and very low electrical resistance values to pinpoint issues in electrical wiring and diagnose the root cause of component or circuit failures.

## Transformer Ratiometer



AEMC® Instruments cutting-edge portable Digital Transformer Ratiometers (DTR®) are designed with safety in mind for on-site testing of power transformers, VT/PTs, and current transformers CT turn ratios with easy setup. Precision in setup, polarized H and X input cable connectors eliminates errors in setup inaccurate and reliable results.

To learn more visit: [aemc.com](http://aemc.com)

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