GroundFlex® Field Kit

Tower Ground Resistance Testing System

Models 6472 & 6472

IP 53 Rated
cover closed

SAFETY 50V CAT IV RATING

AUTOMATIC REPORT GENERATION

Reliable, accurate and quick comprehensive ground resistance testing

Multi-function

- Ground resistance measurements on towers (with 6474 option)
- Ground resistivity (Wenner and Schlumberger methods)
- Multi-point ground testing
- Earth coupling
- Ground potential measurement
- Continuity / Resistance measurements
- Step and Touch Potential

High Performance

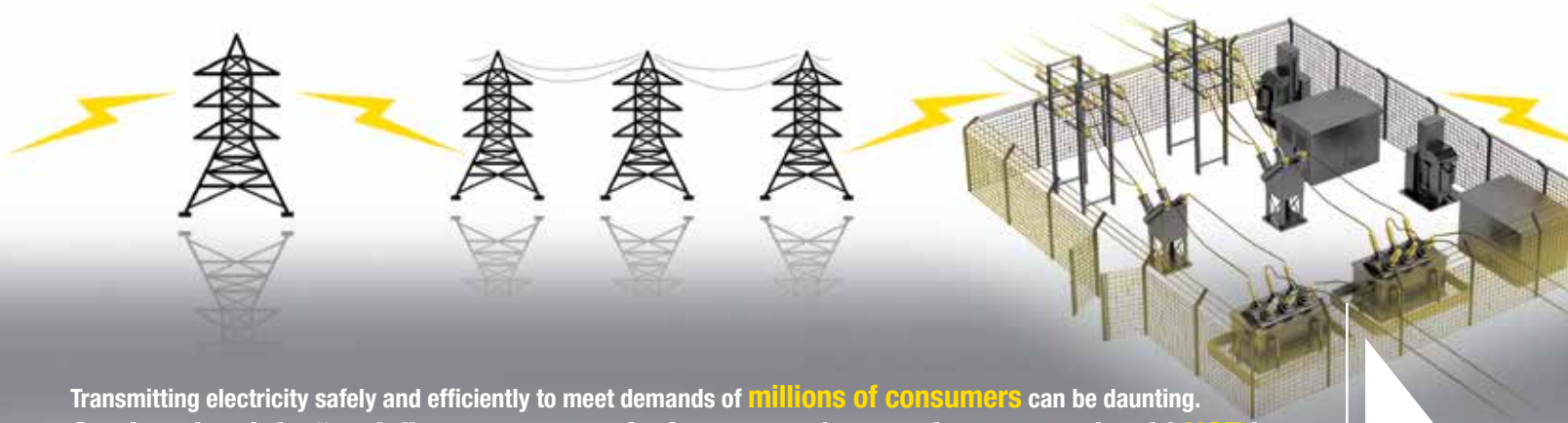
- Analyze the impedance behavior of grounding systems at frequencies between 41Hz to 5kHz
- Wide measurement range for optimum resolution
- Rejection of interference voltages up to 60Vpeak
- Automatic calculation of the ground coupling coefficient and ground resistivity
- Measurement and analysis of tower leg grounding
- Analyze the quality of the overhead ground conductor or bonding to the tower
- Recording of results
- Measures leakage current
- Measures stray voltage

Our products are backed by over 100 years of experience in test and measurement equipment, and encompass the latest international standards for quality and safety.

Technical Hotline: (800) 343-1391
www.aemc.com

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

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.

The **Model 6472** with companion **Model 6474 GroundFlex® Adapter** unit comprise a powerful high end ground resistance testing system.

This new and innovative system provides a cost effective method of accurately measuring the grounding resistance of power transmission, cellular, windmills and other towers without disconnecting or isolating the tower from other structures. This feature alone will save enough time and money to pay for itself in just a few months.

Flexible sensors measure leakage current down tower legs

Any tower with one to four legs can be tested. Measuring the current flow allows calculating the resistance of each leg and the total resistance to ground by measuring the leakage current through each leg. Flexible sensors wrapped around each leg of the tower provide an accurate high sensitivity measurement capable of determining values that other measuring techniques cannot. The quality of the overhead ground conductor can also be determined. This system can also measure all traditional ground testing measurements including three or four pole fall-of-potential, four pole soil resistivity, bonding and earth coupling. Tests can be conducted at selected frequencies from 41 to 5078Hz or swept across the full frequency range, ideal for profiling impedance needed to analyze the effects of a potential lightning strike. The system includes all necessary sensors, wires and reels, auxiliary electrodes and cables.

Up to 512 complete measurements can be stored in internal memory for later downloading to a PC for analysis and report generation using the full featured DataView® software. Each instrument in the system is built into a rugged water resistant polycarbonate case. The full kit is additionally packaged in a field travel case which also serves as a field work station. The system can operate on batteries, AC power or 12 volt DC, and even while being charged.

HOW IT WORKS

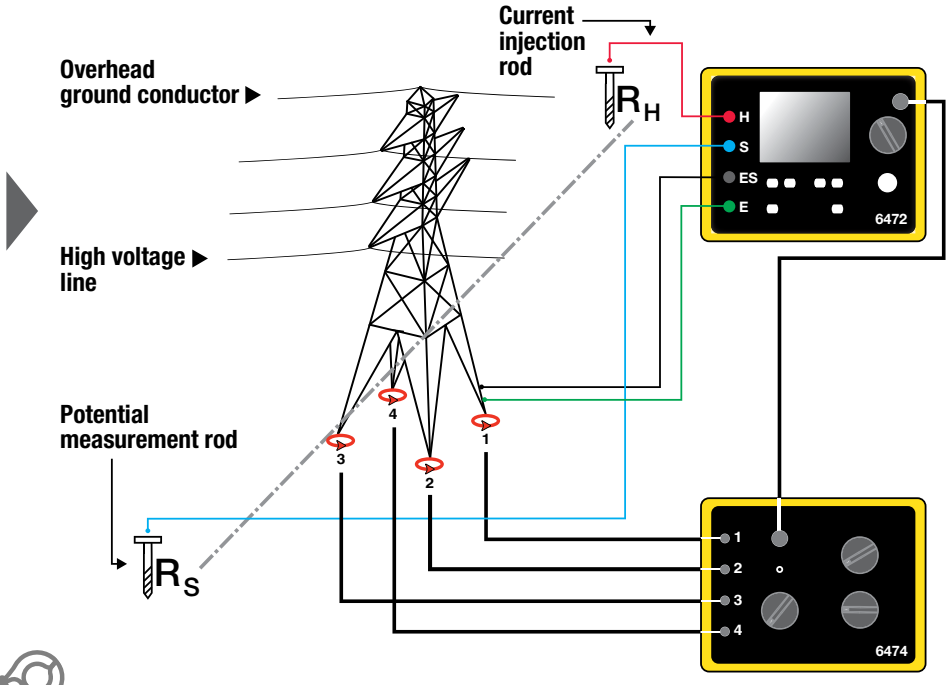
Models 6472 & 6474

Ground measurement on towers with overhead ground cable

High voltage lines are usually equipped with an overhead ground conductor to provide a neutral path and 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 3-Point methods unless the overhead ground conductor cable is disconnected. This is a dangerous, time-consuming and expensive operation.

HOW TO:

Test a tower ground system using Models 6472 & 6474



4 AmpFlex® channels connected

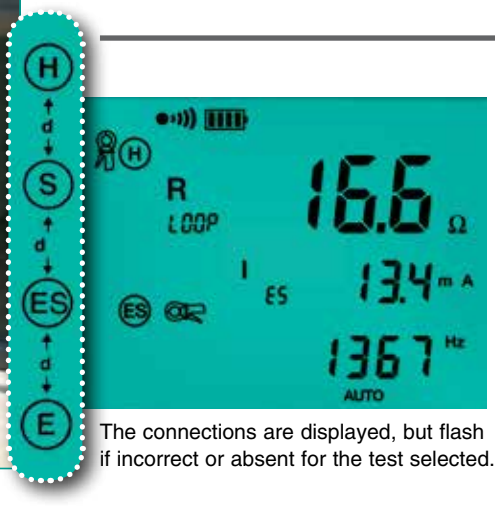
MODEL 6472:

2 Clamp method

also sold as accessories (Cat. #2135.72)

Ground resistance measurement using 2 Clamp stakeless method

Given a system with parallel ground connections, the Model 6472 is capable of accurately measuring ground resistance using 2 clamps only. The principle of this method involves placing 2 clamps around the ground conductor to be tested and connecting each to the instrument. One clamp injects a known signal (typically 32V/1367Hz) 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 connector.



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

No guess work. The display indicates which test lead connections are needed for the test selected.

FEATURES & KEY SPECIFICATIONS

3- and 4-Pole Fall-of-Potential
Measurement with manual or automatic frequency selection

4-Point Soil Resistivity
Measurement with automatic calculation of Rho (ρ) and user selection of the Wenner or Schlumberger test method

2- and 4-Wire DC Resistance
Measurement (Bond testing) with automatic polarity reversal

3-Pole Fall-of-Potential and Earth Coupling
Measurement determines the effect that adjacent grounding systems have on each other

Automatic/ Manual Frequency Selection
Scan from ***41 to 5078Hz*** for optimum test accuracy in electrically noisy environments

Selectable Test Voltage
16 or 32V with up to ***250mA*** of test current

Automatic Recognition
All electrode connections and measurement of their resistance values

Determines Bonding Condition
Of overhead ground conductors and tower legs to the grounding system

Auto Power OFF
Saves battery life

ELECTRICAL	3-POINT METHOD	4-POINT SELECTIVE METHOD	EARTH MEASUREMENT WITH 2 CLAMPS	SOIL RESISTIVITY	EARTH POTENTIAL MEASUREMENT	DC RESISTANCE MEASUREMENT	MEASUREMENTS WITH MODEL 6474
Range (Auto-Ranging)	0.01Ω to 99.9kΩ	0.001 to 99.99Ω	0.01 to 500Ω	0.01kΩ to 99.9Ω	0.01mV to 65.00V	0.001Ω to 99.9kΩ	0.001Ω to 99.99kΩ
Resolution	0.01 to 100Ω	0.001 to 10Ω	0.01 to 1Ω	0.01 to 100Ω	0.01 to 10mV	2 wires: 0.01 to 100Ω/ 4 wires: 0.001 to 10Ω	0.001 to 10Ω
Accuracy	± (2% + 1ct)	± (2% + 1ct)	± (10% + 1ct)	± (2% + 1ct)	± (5% + 1ct)	± (2% + 2cts)	± (5% + 1ct)
No-Load Voltage	16 or 32Vrms	16 or 32Vrms	16 or 32Vrms	16 or 32Vrms	16 or 32Vrms	± 16VDC	16 or 32Vrms
Measurement Frequency	41 to 5078Hz	41 to 5078Hz	Auto: 1367Hz Manual: 1367Hz, 1611Hz, 1758Hz	41 to 128Hz	41 to 128Hz	DC	41 to 5078Hz
Coupling Measurement	Yes	–	–	–	–	–	–
Auxiliary Rod Resistance Measurement	0.1Ω to 100kΩ	0.01Ω to 100kΩ	–	–	–	–	0.01Ω to 100kΩ
Voltage Interference	Maximum 60Vpeak					–	Maximum 60Vpeak
Soil Resistivity	–	–	–	Wenner and Schlumberger	–	–	–
Type of Measurement	3 wire	4 wire	–	4 wire	3 wire	2 wire or 4 wire	GroundFlex®
Measurement Current	up to 250mA	up to 250mA	–	–	up to 250mA	> 200mA DC	up to 250mA
MECHANICAL							
Memory / Communication	512-record memory / optical USB						
Dimensions/Weight	10.7 x 9.84 x 5.04" (272 x 250 x 128mm) / Model 6472: 3.2 kg / Model 6474: 2.3 kg						
Protection	IP53 (cover closed); UL94V0						
Electrical Safety	50V CAT IV, complies with IEC 61326-1 / IEC 61010 / IEC 61557-1-4-5						

Optically Isolated USB

Protects connected computer equipment from potential fault current

Remote Set Up

Operation of all measurements and automatic report generation using DataView® software

Rechargeable NiMH Batteries

From wall charger or vehicle power (can operate while charging)

Rugged Dustproof and Rainproof

Field case IP53 rated in closed position

IEC 61010-1
IEC 61557-1
IEC 60529
IEC 61326-1

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

CONSTRUCTION

Rotary Switches & Connections

Set-Up Position
SET-UP

For configuring all user programmable parameters.

GroundFlex® Measurement Position
GroundFlex™

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.

Two Clamp Position
2 Clamp

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

V Potential Measurement Position
V

Similar use to the three pole test method. The results are displayed as variation from reference in the test area selected – used for plotting potential variations in the test area.

Soil Resistivity Measurement Position
ρ

User selection of the Wenner or Schlumburger test methods with direct readout Ω-Meters or Ω-Feet.

4 Pole Earth Resistance Measurement Position
4 Pole

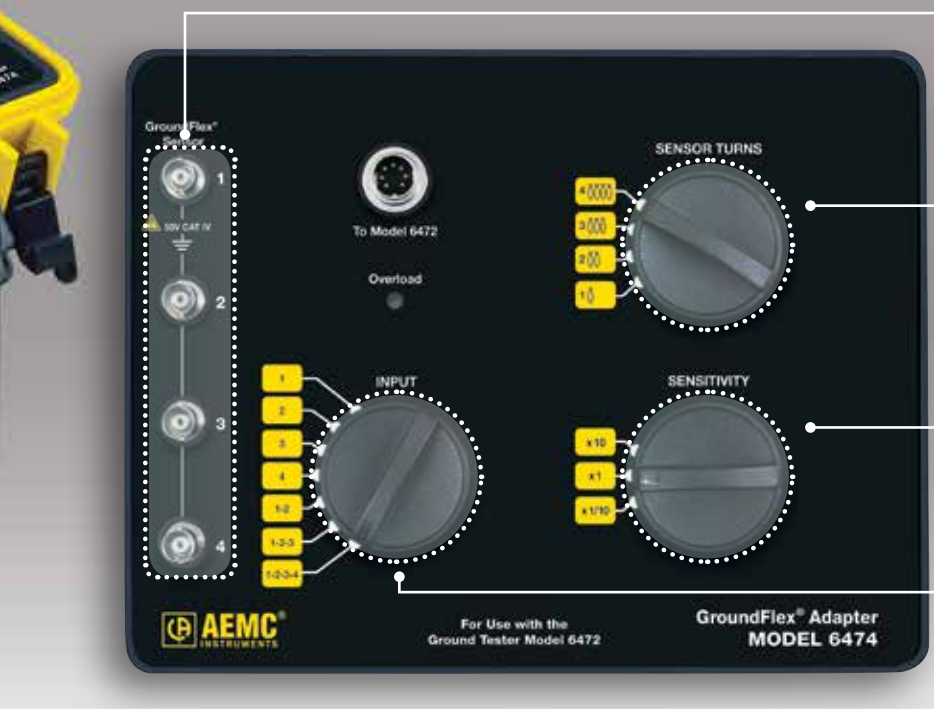
Used for measuring very low ground resistances eliminating test lead resistance from the measurement. Provides up to 10 times the sensitivity of the three pole method. Also used for selective Fall-of-Potential measurement using one clamp to test multiple ground points.

3 Pole Earth Resistance Measurement Position
3 Pole Ω

Used for traditional Fall-of-Potential testing using two auxiliary electrodes.

DC Resistance Measurement Position
mΩ

Measures bond resistance using either two lead or four lead Kelvin system with a test currents up to 250mA.



BNC Connections

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

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 (up to 4) 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.

Input Rotary Switch

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

FUNCTIONAL DISPLAYS

4-Point Bond Test

The 4-Point (Kelvin sensing) Bond test shows lead connections, bond resistance test results, test voltage and current.

3-Point Fall-of-Potential Test

The 3-Point Fall-of-Potential test displays test lead connection, grounding system resistance and test electrode resistances. Test voltage, current or frequency can also be displayed with a button press.

Two Clamp Test

Conduct ground resistance tests using two clamps, eliminating the need for installing auxiliary rods.

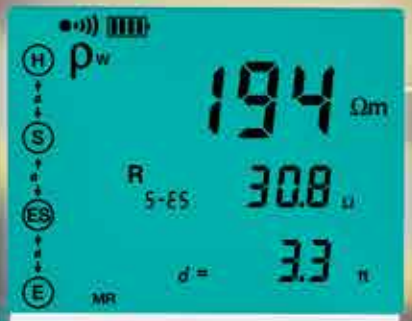
Tower Leg Measurement

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

Schlumberger Test

The Schlumberger test displays test lead connection, soil resistivity test results (ρ) and electrode spacing.

Wenner Test



The Wenner test displays test lead connection, soil resistivity test results (ρ), electrode spacing and resistance.

TEST MODES

AUTO

In this mode the instrument performs an initial measurement at 128Hz and then scans and chooses the most appropriate frequency in the event of interference to provide a clean and accurate test result.

SWEEP

Automatic measurements at up to 14 preselected frequencies between 41 and 5078Hz allowing a graph of impedance as a function of frequency to be plotted. Frequencies used can be user selected or using the DataView® software.

MANUAL

User chooses the measurement frequency to be used. Choices are from 41 to 5078Hz.
Selection can be accomplished from the front panel or DataView® software.

EARTH COUPLING

Determines effects of two independent grounding systems on each other. Helps to identify the possibility of a fault occurring in one system that can cause a potential rise in the other system. A unique testing method provided by AEMC®.

GROUNDFLEX® TEST METHOD

Test ground resistance of energized or de-energized towers WITHOUT disconnecting the overhead ground conductor (OGC)

= major time and money saver and safety improvement

Test tower leg ground resistance
(individually and total)

Test leakage current through tower legs

Test the overhead ground conductor connectivity

Measure stray voltage

Test at frequencies up to 5kHz to profile impedance, important to characterize for lightning strike

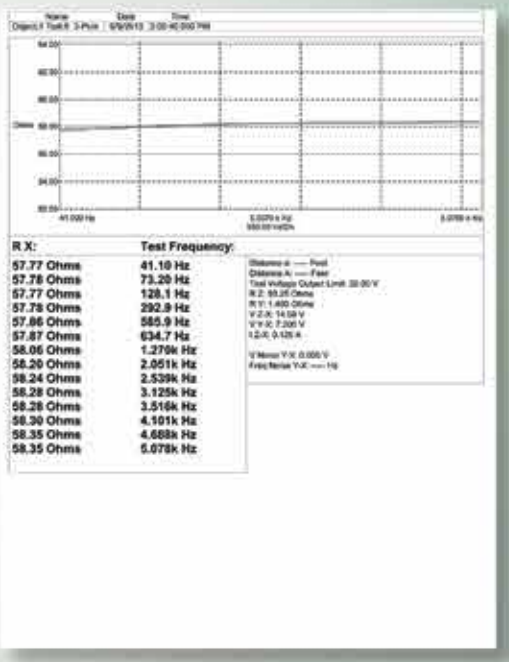
Determine if corrosion or broken ground connection has occurred on any leg of the tower or the OGC

DataView® SOFTWARE

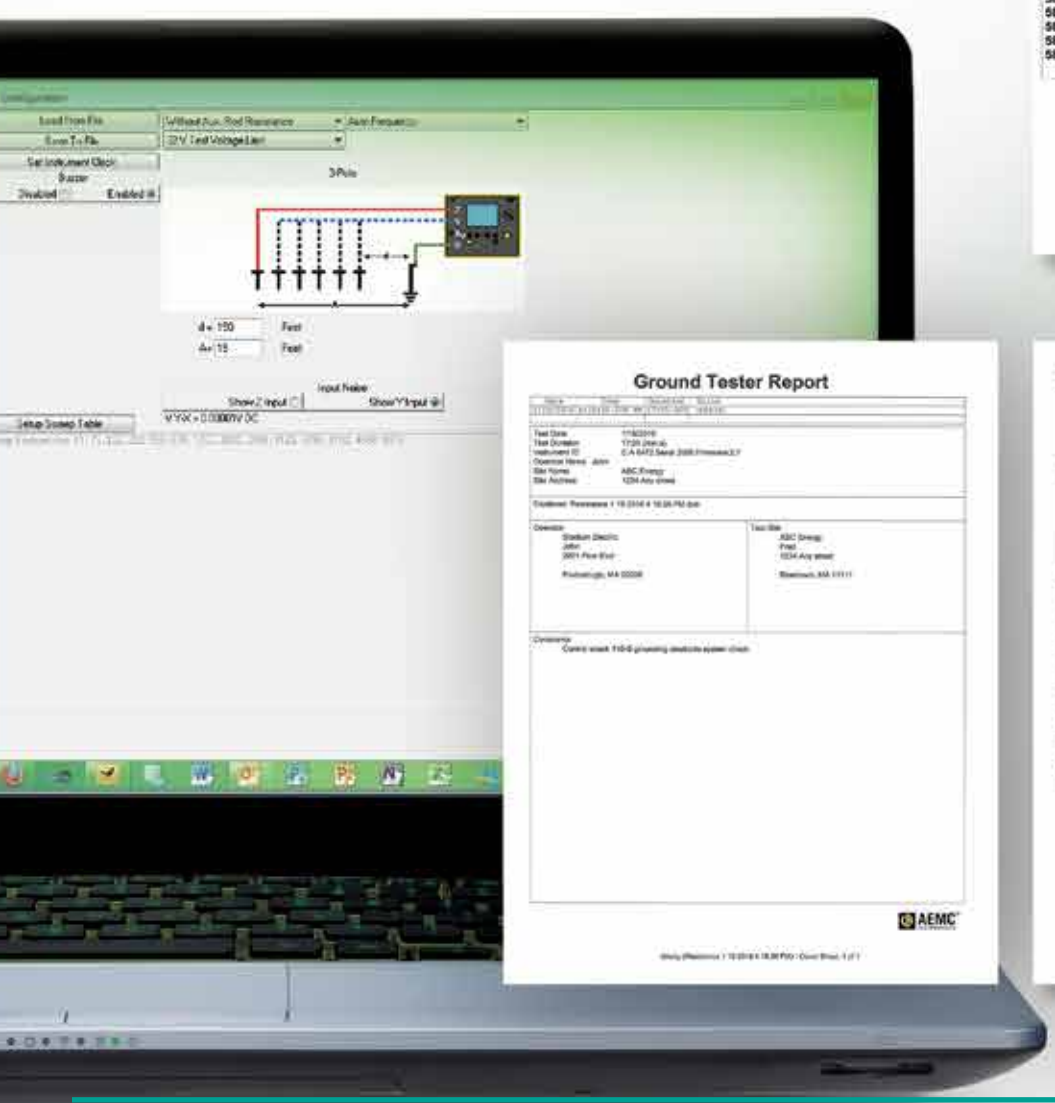
Data Analysis and Reporting Software

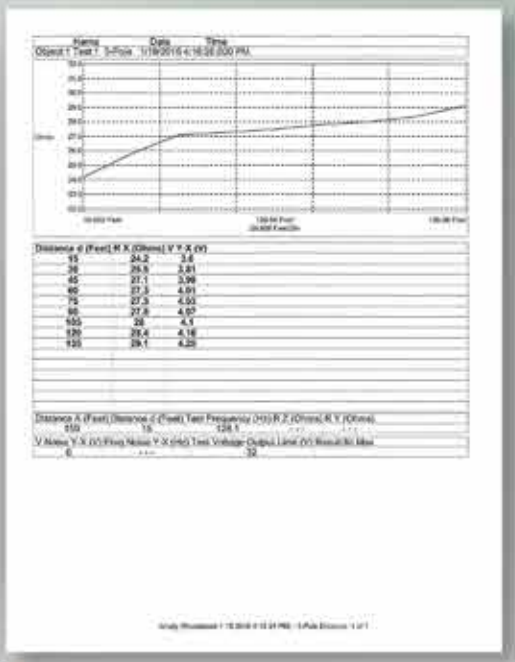
FREE DataView® software provides a convenient way to configure and control ground resistance tests from your computer. Through the use of clear and easy-to-use tabbed dialog boxes, all of the Model 6472 functions can be configured and tests can then be initiated. Results can be displayed in real-time 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 are available through our website *www.aemc.com***



Impedance vs. frequency plot





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

WHAT'S INCLUDED?

GroundFlex® System Models 6472 & 6474

Includes GroundFlex® Adapter Model 6474, four GroundFlex® sensors (5m) with twelve color-coded rings, connection lead, two extension leads on H reel (black/green) with matching color alligator clips, one extra black and green alligator clip, six BNC extension leads, calibration loop, three C-clamps, field carrying case with wheels and handle, one inverter 12VDC to 120VAC 200 watt (vehicle use), USB stick supplied with DataView® software and user manual.

Cat. #2136.03

Includes Ground Resistance Tester Model 6472 Kit 500 ft Cat. #2135.54

ORDERING INFORMATION

Ground Resistance Tester Model 6472 Kit (500 ft) 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.	**Cat. #2135.54**
GroundFlex® Field Kit Model 6474 Includes GroundFlex® Adapter Model 6474, four GroundFlex® sensors (5m) with twelve color-coded rings, connection lead, two extension leads on H reel (black/green) with color-coded alligator clips, one extra black and green alligator clip, six BNC extension leads, calibration loop, three C-clamps, carrying case with wheels and handle for meters, one inverter 12VDC to 120VAC 200 watt (vehicle use) and user manual.	**Cat. #2136.03**
GroundFlex® Adapter Model 6474 w/{1} 10M GroundFlex® Includes GroundFlex® Adapter Model 6474, one GroundFlex® sensor (10m), twelve color-coded rings, connection lead, two extension leads on H reel (black/green) with color-coded alligator clips, one extra green and black alligator clip, one BNC extension lead, calibration loop, three C-clamps, one inverter 12VDC to 120VAC 200 watt (vehicle use), carrying case with wheels and handle for meters, and user manual.	**Cat. #2136.04**
GroundFlex® Field Kit (Model 6474 & {1} 10M GroundFlex® w/Ground Tester Model 6472 Kit 500 ft (Includes Cat. #2136.04 & Cat. #2135.54)	**Cat. #2136.05**

www.aemc.com

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