GroundFlex® Field Kit

Tower Ground Resistance Testing System

Models 6472 & 6474

Reliable, Quick, and Accurate Comprehensive Ground Resistance Testing

Multifunction

- Ground resistance measurements on towers *(with 6474 option)*
- Ground resistivity *(Wenner and Schlumberger methods)*
- Ground resistance of electrodes with Fall-of-Potential
- Earth coupling
- Ground potential measurement
- Continuity/Resistance measurement
- Step and Touch potential

High Performance

- Analyze the impedance behavior of grounding systems at frequencies between 41 Hz to 5 kHz
- Wide measurement range for optimum resolution
- Rejection of interference voltages
- 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
- Recording of results
- Measures leakage current
- Measures stray voltage

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.

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

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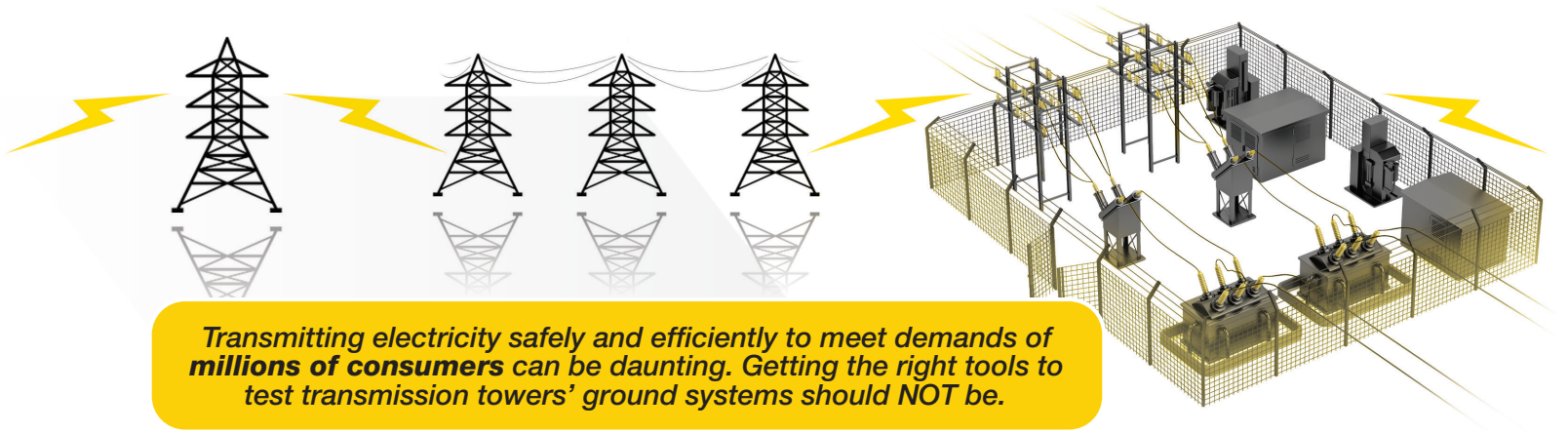
Now you can test energized Tower Systems!



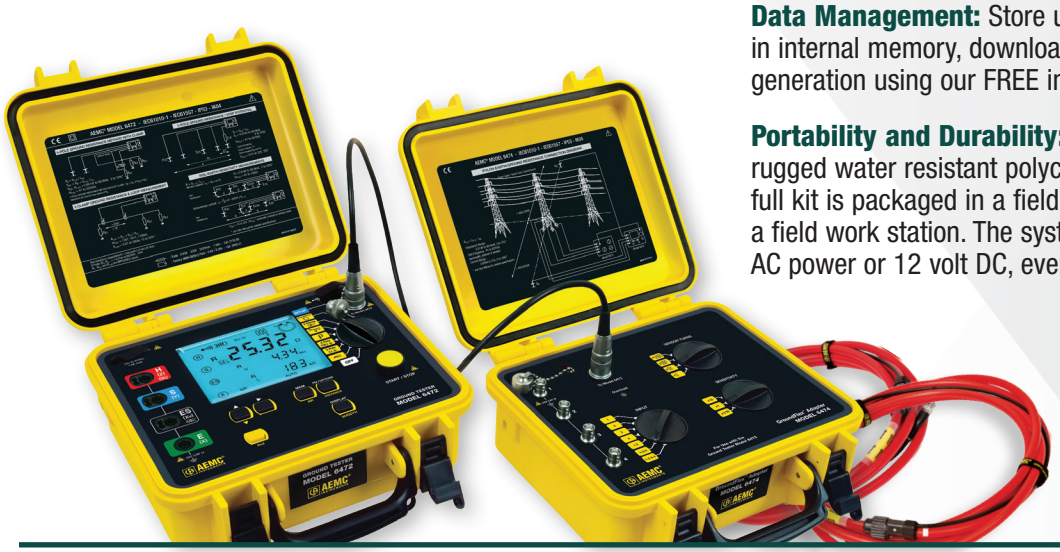
*Transmitting electricity safely and efficiently to meet demands of **millions of consumers** can be daunting. Getting the right tools to test transmission towers' ground systems should NOT be.*

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.



Exceptional Features for Unmatched Performance

Flexible Sensors: Any tower with one to four legs can be tested. Measuring the present live current and voltage allows for the passive resistance of the tower to be calculated for both individual legs and the total resistance of the structure. An active test can be performed to apply a known current into the tower for accurate resistance measurements. Flexible sensors wrapped around each leg of the tower provide an accurate high sensitivity measurement capable of determining values that other measuring techniques cannot.

Comprehensive Testing: This system can also measure all traditional ground testing measurements including 3- or 4-pole Fall-Of-Potential, 4-pole soil resistivity, continuity and earth coupling. Tests can be conducted at selected frequencies from (41 to 5078) Hz 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.

Data Management: Store up to 512 complete measurements in internal memory, downloadable for analysis and report generation using our FREE included DataView® software.

Portability and Durability: Each instrument is built into a rugged water resistant polycarbonate case. Additionally, the full kit is 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, even while being charged.

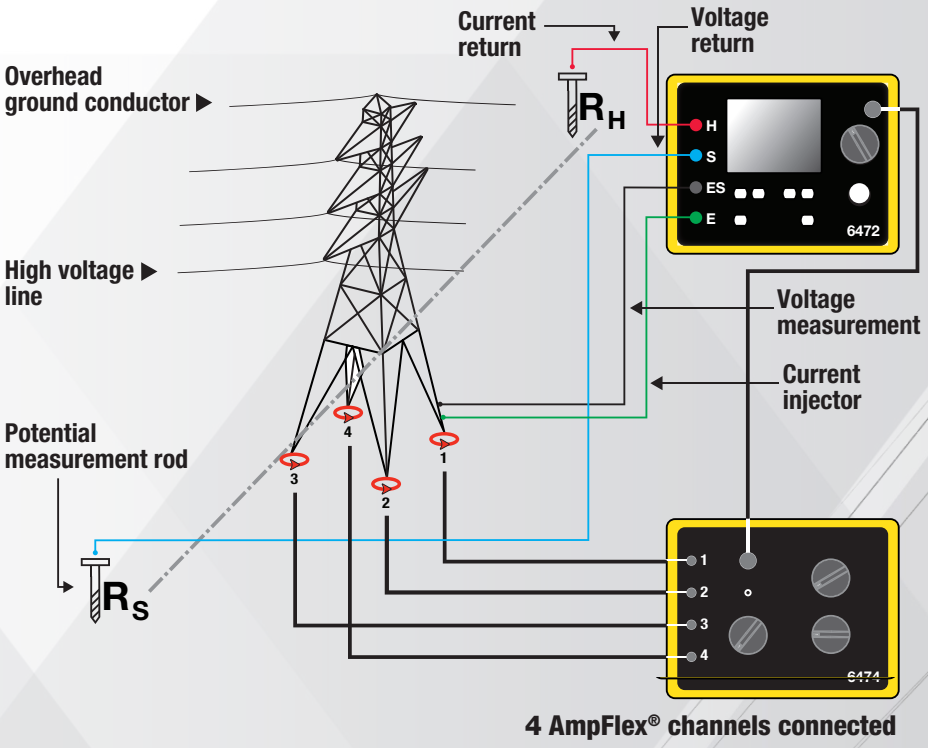
How It Works

How to Test Tower Ground System Using Models 6472 & 6474

Ground measurement on towers with overhead ground cable

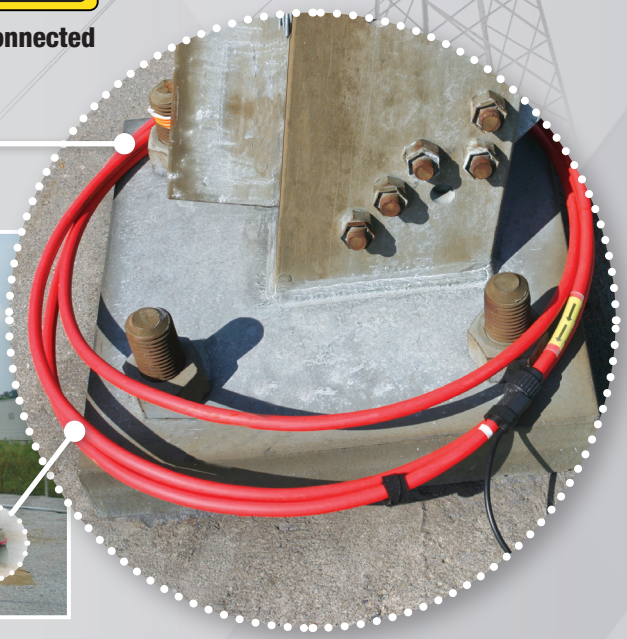
High voltage lines are usually equipped with an overhead ground conductor to allow lightning discharge to ground through the tower structure. Since the towers are all connected to this conductor, all the towers' resistances are in parallel. This means it is impossible to measure resistance of individual 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.



4 AmpFlex® channels connected

Flexible sensors measure leakage current down tower legs



Features

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

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

Point-to-Point
Continuity measurement 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 5078) Hz for optimum test accuracy in electrically noisy environments

Selectable Test Voltage
(10, 16, 32, or 60) V with up to 250 mA of test current

Optically Isolated USB
Protects connected computer equipment from potential fault current

Rechargeable NiMH Batteries
From wall charger or vehicle power *(can operate while charging)*

Auto Power OFF
Saves battery life

Automatic Recognition
All electrode connections and measurement of their resistance values

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

DataView®

AUTOMATIC REPORT GENERATION

Verifies Overhead Ground Conductor Connection
Of overhead ground conductors and tower legs to the grounding system

Rugged Dustproof and Rainproof
Field case IP53 rated in closed position

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

Specifications

IP 53 cover closed | 50 V CAT IV | CE | ⧈

	3-Point Method	4-Point Selective Method	Ground Measurement with 2 clamps	Soil Resistivity	Earth Potential Measurement	DC Resistance Measurement	Measurements with Model 6474
ELECTRICAL							
Range (Auto-Ranging)	0.09 Ω to 99.9 kΩ	0.011 Ω to 99.99 kΩ	(0.1 to 500) Ω	0.01 Ω to 99.9 kΩ	0.01 mV to 65.00 V	0.02 Ω to 99.99 kΩ	0.067 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 to 10) mV	**2 wires**: (0.01 to 100) Ω **4 wires**: (0.001 to 10) Ω	(0.001 to 10) Ω
Accuracy	± (2 % + 1 ct)		± (10 % + 1 ct)	± (2 % + 1 ct)	± (5 % + 1 ct)	± (2 % + 2 cts)	± (5 % + 1 ct)
No-Load Voltage	(10, 16, 32 or 60) Vrms *(Not applicable with 2-clamp method)*					± 16 VDC	(10, 16, 32 or 60) Vrms
Measurement Frequency	(41 to 5078) Hz		**Auto**: 1611 Hz **Manual**: (128, 1367, 1611, or 1758) Hz	(41 to 128) Hz	(41 to 5078) Hz	DC	(41 to 5078) Hz
Coupling Measurement	Yes	–					
Auxiliary Rod Resistance Measurement	0.14 Ω to 99,9 kΩ		–				0.14 Ω to 99,9 kΩ
Voltage Interference	Maximum 60 V peak						
Soil Resistivity	–			Wenner and Schlumberger	–		
Type of Measurement	3 wires	4 wires	2 clamps	4 wires	3 wires	2 or 4 wires	GroundFlex®
Measurement Current	> 200 mAAC		< 26 ARMS (w/ SR182) < 5 ARMS (w/ MN82)	> 200 mAAC		> 200 mADC	> 200 mAAC
MECHANICAL							
Memory/ Communication	512 record memory / Optically isolated USB						
Dimensions/ Weight	(10.7 x 9.84 x 5.04) in (272 x 250 x 128) mm / **Model 6472**: 7.1 lb (3.2 kg) / **Model 6474**: 5.1 lb (2.3 kg)						
SAFETY							
Safety Rating	50 V CAT IV, complies with IEC 61326-1 / IEC 61010 / IEC 61557-1-4-5						

*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

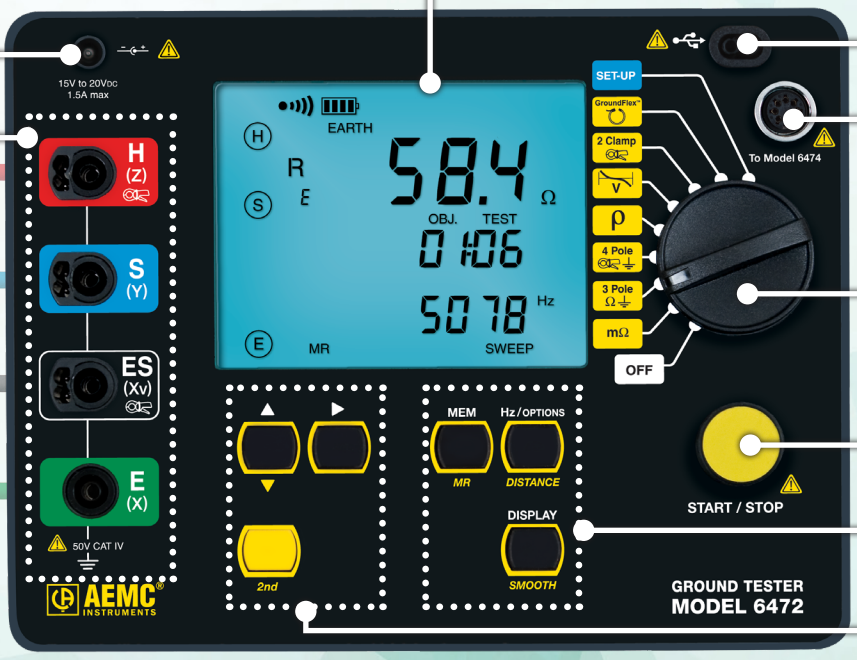
Input terminals

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

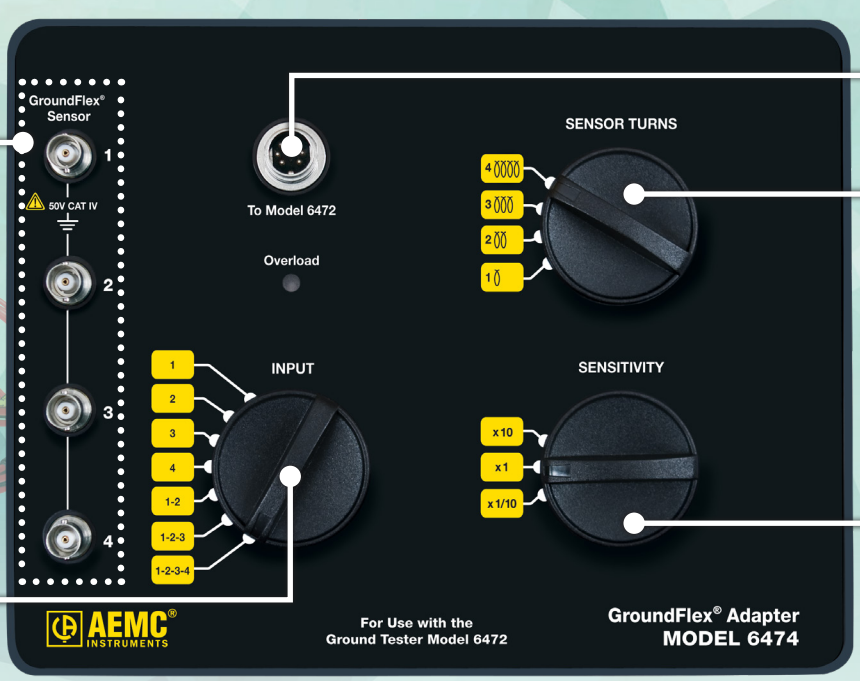
Model 6474

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®

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

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.

ρ

Soil Resistivity Measurement Position

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

4 Pole

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 Ω

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.

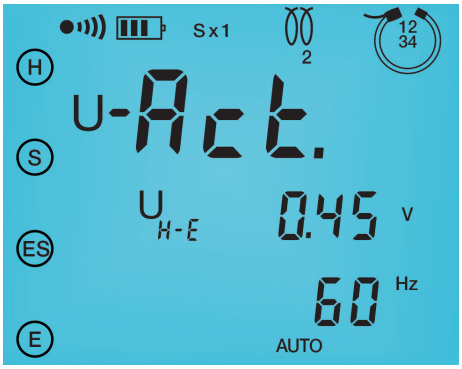
mΩ

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.

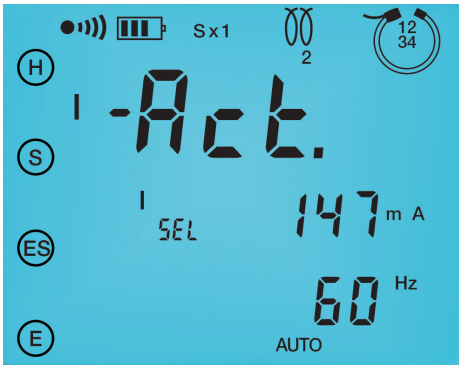
Functional Displays

Present Live Voltage Measurement



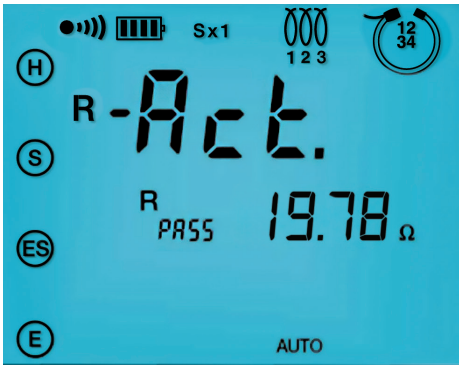
Live voltage is measured between the tower and the measurement auxillary electrode to ensure accurate testing by verifying the electrodes distance is sufficient.

Leakage Current Measurement



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

Passive Resistance Measurement

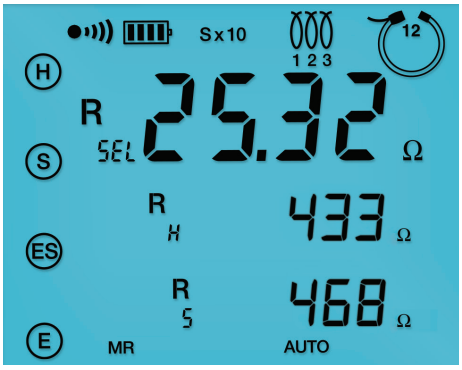


Passive resistance of the tower is calculated using leakage current and present voltage.

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

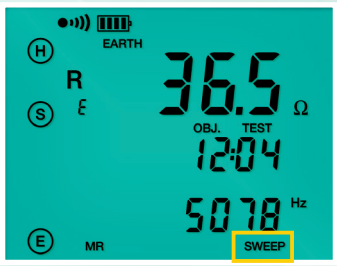


Displays resistance to earth of individual legs or sum of all tower legs.

Test Modes

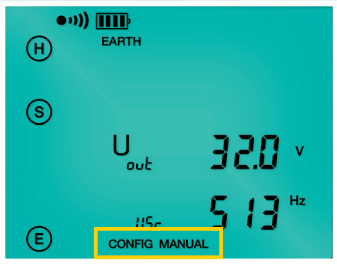
AUTO

In this mode the instrument performs an initial measurement at 128 Hz 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 5078) Hz allowing a graph of impedance as a function of frequency to be plotted. Frequencies used can be user selected or using the DataView® software.

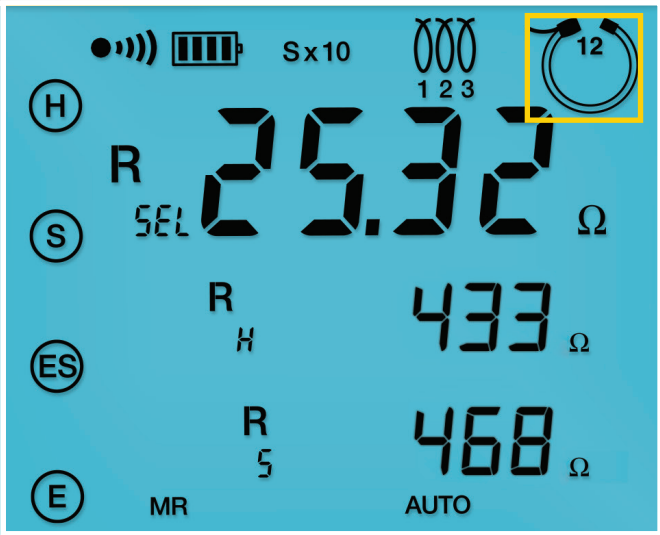


MANUAL

User chooses the measurement frequency to be used. Choices are from (41 to 5078) Hz. 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® Instruments.



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 live voltage**
- **Test at frequencies up to 5 kHz** 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®

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***

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

What's Included?

GroundFlex® Field Kit Model 6474 *(CAT. #2136.03)* includes:

- Ground Resistance Tester Model 6472 Kit - 500 ft
  - Model 6472
  - (2) 500 ft color-coded leads on spools (red/blue)
  - (2) 100 ft color-coded leads (hand-tied, green/black)
  - (1) 30 ft lead (green)
  - (2) 5 ft color-coded leads (red/blue)
  - (1) 110/240 V power adapter with US power cord
  - (1) Optical USB cable
  - (4) T-shaped auxiliary ground electrodes
  - Set of (5) spaded lugs
  - (1) 100 ft AEMC® Instruments tape measure
  - Rechargeable NiMH battery pack
  - USB drive with DataView® software, ground tester workbook, and user manual
- GroundFlex® Adapter Model 6474
- (4) GroundFlex® sensors (5 m)
- (12) Color-coded rings
- (1) Connection lead
- (2) Extension leads on H reel (green/black) with color-coded alligator clips
- (1) Extra green and black alligator clip
- (2) BNC extension leads
- (1) Calibration loop
- (3) C-clamps
- Set of (2) reel caddy
- (1) Inverter 12 VDC to 120 VAC 200 watt (vehicle use)
- Carrying case with wheels and handle for meters
- User manual

Optional Accessory:

- **CAT. #2135.87** GroundFlex® 10 m sensor for testing monopoles up to 30 ft in diameter

***NOTE**: The GroundFlex® Adapter Model 6474 only operates in combination with the Ground Tester Model 6472.*

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