METRAVI ERT-1602

METRAVI Pro ERT-1602 Earth Resistance and Soil Resistivity Tester User Manual

1. Introduction

The METRAVI Pro ERT-1602 is a sophisticated instrument designed for accurate measurement of earth resistance, soil resistivity, earth voltage, and AC voltage. Utilizing advanced technologies such as FFT (Fast Fourier Transform) and AFC (Automatic Frequency Control), this tester ensures high precision and reliability, even in environments with significant interference. It supports 2-wire, 3-wire, and 4-wire measurement methods, making it versatile for various applications. This manual provides comprehensive instructions for the safe and effective use of your ERT-1602.

Figure 1: Front view of the METRAVI Pro ERT-1602 Tester, showing the large LCD display and control panel.

2. Safety Information

To ensure safe operation and prevent damage to the instrument, please read and adhere to the following safety precautions:

- Always follow local and national safety codes.
- Do not operate the instrument if it appears damaged or if the insulation on test leads is compromised.
- Ensure proper grounding before making any connections.
- Avoid contact with live circuits. Always assume circuits are live until proven otherwise.
- Use only the specified test leads and accessories provided with the instrument.
- Do not exceed the maximum input ratings specified in the technical specifications.
- Keep the instrument dry and clean. Do not operate in explosive or wet environments.

- Refer to IEC61010-1 (CAT III 300V, CAT IV 150V, Pollution 2), IEC61010-031, IEC61557-1, IEC61557-5, and JJG 366-2004 safety standards for detailed guidelines.

3. Package Contents

Carefully unpack the instrument and verify that all items listed below are present and undamaged. If any items are missing or damaged, contact your supplier immediately.

- METRAVI Pro ERT-1602 Host Unit
- Aluminum Carrying Case
- USB Cable
- Instruction Manual
- Warranty Card
- Firmware CD
- Earth Rods (4 pcs)
- Simple Test Wires (various lengths)
- 10M Test Wires (2 pcs)
- 20M Test Wires (2 pcs)
- 9V Batteries (6 pcs, pre-installed or included separately)

Figure 2: Contents of the METRAVI Pro ERT-1602 package, including the main unit, test leads, earth rods, and carrying case.

4. Device Overview

The ERT-1602 features a robust design with a large LCD display for clear readings, a rotary switch for function selection, and dedicated buttons for various operations.

4.1 Front Panel Controls and Display

- **LCD Display:** Shows measurement values, units, and status indicators. Features a white backlight for visibility in low light.
- **Function Rotary Switch:** Selects measurement modes (P_{EARTH}/R_{EARTH}/V_{EARTH}/OFF).
- **START/TESTING Button:** Initiates a measurement.
- **SET Button:** Accesses settings or confirms selections.
- **MEM Button:** Accesses stored data.

- **CLR Button:** Clears data or settings.
- **Arrow Buttons (Up/Down):** Navigate menus or adjust parameters.
- **Backlight Button:** Activates/deactivates the display backlight.

4.2 Input Terminals and Ports

- **E, ES, P(S), C(H) Terminals:** For connecting test leads for 2-wire, 3-wire, and 4-wire measurements.
- **USB Port:** For data upload to a computer.

Figure 3: Side view of the METRAVI Pro ERT-1602, illustrating its physical dimensions.

5. Setup and Connection

5.1 Battery Installation

The ERT-1602 requires six 9V batteries. Ensure they are correctly installed according to the polarity markings in the

battery compartment. The instrument includes an auto power-off function to conserve battery life.

5.2 Connecting Test Leads

Always ensure the instrument is powered off before connecting or disconnecting test leads. Connect the test leads securely to the corresponding E, ES, P(S), and C(H) terminals on the device.

5.3 Measurement Methods

The ERT-1602 supports various measurement configurations:

- **2-Wire Method:** Suitable for simple earth resistance measurements where auxiliary earth resistance is low. Connect the E and P(S) terminals together and connect to the earth electrode. Connect the C(H) terminal to the earth electrode.
- **3-Wire Method:** A common method for earth resistance. Connect E to the earth electrode, P(S) to the potential auxiliary electrode, and C(H) to the current auxiliary electrode.
- **4-Wire Method (Wenner Method):** Used for precision earth resistance and soil resistivity measurements, minimizing the effect of test lead resistance. Connect E to the earth electrode, ES to the inner potential auxiliary electrode, P(S) to the outer potential auxiliary electrode, and C(H) to the current auxiliary electrode. For soil resistivity, ensure electrodes are equally spaced (distance 'a').

6. Operating Instructions

6.1 Powering On/Off

Rotate the Function Rotary Switch from the 'OFF' position to the desired measurement mode (P_{EARTH}, R_{EARTH}, V_{EARTH}) to power on the device. To power off, rotate the switch back to 'OFF'.

6.2 Earth Resistance Measurement (R_{EARTH})

1. Select the R_{EARTH} position on the Function Rotary Switch.
2. Connect the test leads according to the 2-wire, 3-wire, or 4-wire method as required for your application.
3. Press the **START/TESTING** button to initiate the measurement.
4. The measured earth resistance value will be displayed on the LCD.
5. The instrument uses a rated current change-pole method with a measurement current of 20mA Max.

6.3 Soil Resistivity Measurement (P_{EARTH})

1. Select the P_{EARTH} position on the Function Rotary Switch.
2. Connect the test leads using the Wenner 4-pole measurement method, ensuring equal spacing 'a' between electrodes.
3. Press the **START/TESTING** button.
4. The soil resistivity (ρ) will be calculated and displayed. The formula used is $\rho = 2\pi aR$, where 'a' is the electrode spacing and 'R' is the measured resistance.

6.4 Earth Voltage Measurement (V_{EARTH})

1. Select the V_{EARTH} position on the Function Rotary Switch.
2. Connect the P(S) and ES terminals to the points where earth voltage is to be measured.
3. The instrument will display the average rectified earth voltage.

6.5 AC Voltage Measurement

The ERT-1602 can also measure AC voltage. This is typically done by selecting the V_{EARTH} mode and connecting the test leads across the AC voltage source. The instrument provides average rectified AC voltage readings.

6.6 Data Storage and Upload

The instrument features a data storage function. Press the**MEM** button to access stored data. Data can be uploaded to a computer via the USB interface using the provided software (on Firmware CD) for saving and printing.

6.7 Alarm Functions and Overload Protection

The ERT-1602 includes audio-visual alarms for various conditions and overload protection to safeguard the instrument and user. An 'Overflow Indication' will appear on the display if the measurement exceeds the selected range.

7. Maintenance

Proper maintenance ensures the longevity and accuracy of your ERT-1602.

- **Cleaning:** Wipe the instrument with a soft, damp cloth. Do not use abrasive cleaners or solvents.
- **Storage:** Store the instrument in its carrying case in a cool, dry place when not in use. Remove batteries if storing for extended periods to prevent leakage.
- **Battery Replacement:** Replace all six 9V batteries when the low battery indicator appears on the display. Ensure correct polarity.
- **Calibration:** Regular calibration by qualified personnel is recommended to maintain measurement accuracy.

8. Troubleshooting

If you encounter issues with your ERT-1602, refer to the following common problems and solutions:

- **Instrument does not power on:** Check battery installation and ensure batteries are not depleted.
- **No reading or unstable reading:** Verify all test lead connections are secure and correctly configured for the chosen measurement method. Check for broken or damaged test leads. Ensure auxiliary earth electrodes are properly driven into the ground.
- **'Overflow' indication:** The measured value exceeds the selected range. Switch to a higher range if available, or re-evaluate the test setup.
- **Inaccurate readings:** Ensure proper calibration. Check for strong electrical interference in the testing environment. The instrument's AFC technology helps, but extreme interference can still affect results.
- **Data upload failure:** Ensure the USB cable is correctly connected and the software is properly installed on your computer.

For issues not covered here, please contact customer support.

9. Technical Specifications

Parameter	Specification
Model Number	Metravi Pro ERT-1602

Parameter	Specification
Earth Resistance (R) Range	0.00Ω / 30.0Ω / 300.0Ω / 3000Ω / 3.00kΩ / 30.00kΩ
Earth Resistance Accuracy	±2%rdg ±3dgt
Earth Resistance Resolution	0.01Ω
Earth Voltage Range	0.0 ~ 600V AC
Earth Voltage Accuracy	±2%rdg ±3dgt
Earth Voltage Resolution	0.1V
Soil Resistivity (ρ) Range	0.00Ωm - 9000kΩm (ρ=2πaR, a: 1m-100m)
Soil Resistivity Resolution	0.01Ωm
Measurement Method (Earth Resistance)	Rated current change-pole method, 20mA Max.
Measurement Method (Soil Resistivity)	Wenner 4-pole measurement
Test Frequency	128Hz / 111Hz / 105Hz / 94Hz (AFC)
Display	Large LCD with white backlight and bar graph
Interface	USB (for data upload)
Power Source	6 x 9V batteries
Auto Power-off	Yes
Safety Standards	IEC61010-1 (CAT III 300V, CAT IV 150V, Pollution 2), IEC61010-031, IEC61557-1 (Earth resistance), IEC61557-5 (Soil resistivity), JJG 366-2004
Dimensions (LxWxH)	30.5 x 30.5 x 30.5 cm (approx. 12 x 12 x 12 inches)
Item Weight	2.5 kg (approx. 5.5 lbs)
Country of Origin	India

10. Warranty and Support

The METRAVI Pro ERT-1602 is manufactured by Metravi Instruments. For warranty claims, technical support, or service inquiries, please contact:

Manufacturer: Metravi Instruments
Email: servicing@metravi.com

Please retain your purchase receipt and warranty card for future reference. The warranty period is subject to the terms and conditions specified on the warranty card provided with the product.