Disclaimer
The manufacturer assumes no responsibility for any consequences resulting from the use or misuse of this product. Product specifications and manual content are subject to change without prior notice.

Part Number: 7603241
GTIN: 6298043998338

MarMonix®

MEG 4105

Digital Earth Resistance Tester

Instruction Manual

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Product Overview

The Marmonix MEG 4105 delivers accurate and reliable measurement of ground resistance and ground voltage. Controlled by a microcontroller, it supports both three-wire and two-wire methods, with ranges up to 2000 Ω and 200 V. Built to IEC 61010-1 CAT III 600 V standards, it features backlight display, data hold, battery detection, reinforced insulation, and overrange protection, making it ideal for testing grounding systems in power facilities, electrical equipment, and lightning protection devices.

Applications

The Marmonix MEG 4105 Digital Earth Resistance Tester is suitable for:

- Power distribution and transmission grounding systems
- Electrical wiring and equipment installation checks
- Lightning protection and surge protection systems
- Substation and utility grounding verification
- Industrial plants and factory grounding devices
- Railway and telecommunication grounding systems
- Laboratory testing of insulation and grounding materials
- Routine maintenance, safety audits, and compliance verification

Package Contents

- Digital Earth Resistance Tester — 1 pc
- 5 m Green Test Lead with Alligator Clip — 1 pc
- 10 m Yellow Test Lead with Alligator Clip — 1 pc
- 20 m Red Test Lead with Alligator Clip — 1 pc
- Auxiliary Ground Nails — 2 pcs
- No. 5 Alkaline Batteries — 6 pcs
- User Manual — 1 pc
- Strap / Leather Case — 1 pc
- Cloth Bag — 1 pc

Product Introduction

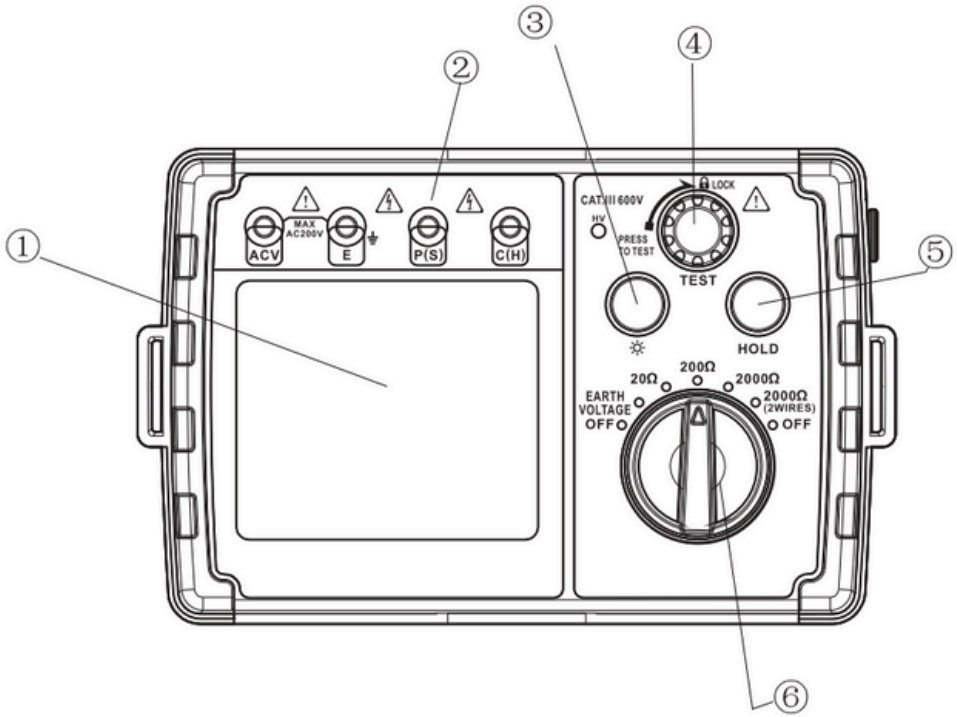
This instrument is controlled by an intelligent microcontroller, ensuring high accuracy and reliability. It is designed to measure the grounding resistance of power facility wiring, electrical equipment, lightning protection systems, and other grounding devices, as well as ground voltage. Note: The instrument is not suitable for harsh outdoor conditions such as rain or lightning.
It supports both two-wire and three-wire measurement methods, offering flexibility for different testing environments. With reinforced insulation, overload protection, and clear LCD display, the device ensures safe and dependable operation in professional applications.

Functions

1. **Backlight and battery detection:** LCD backlight for low-light use; battery check prevents inaccurate readings.
2. **Data hold function:** Freezes results on screen for easy recording and review.
3. **Two-wire and three-wire measurement:** Choice of quick testing or high-precision measurement.
4. **Lead contact error warning:** Displays "---- Ω" if test leads are not properly connected.
5. **Over-range indication ("OL"):** Alerts when resistance or voltage exceeds range.
6. **Double insulation / reinforced insulation:** Complies with IEC 61010-1 for enhanced operator safety.
7. **Ground resistance measurement:** Accurate testing from 20 Ω to 2000 Ω.
8. **Ground voltage measurement:** Measures up to 200 V with AC/DC identification.
9. **Poor condition indication:** Warns of unstable measurement or bad connections.
10. **Portable, field-ready design:** Compact, battery-powered, and durable for on-site use.

Diagram of the product

(1) A Schematic Diagram



1. **LCD :** Displays measurement values and indicators.
2. **Test Lead Connection Port:** Input terminals for test leads.
3. **LIGHT :** Activates the LCD backlight.
4. **TEST Button:** Initiates measurement.
5. **HOLD:** Freezes the displayed reading.
6. **Function Selection Switch:** Selects measurement modes.

(2) Description of the symbols on the display unit

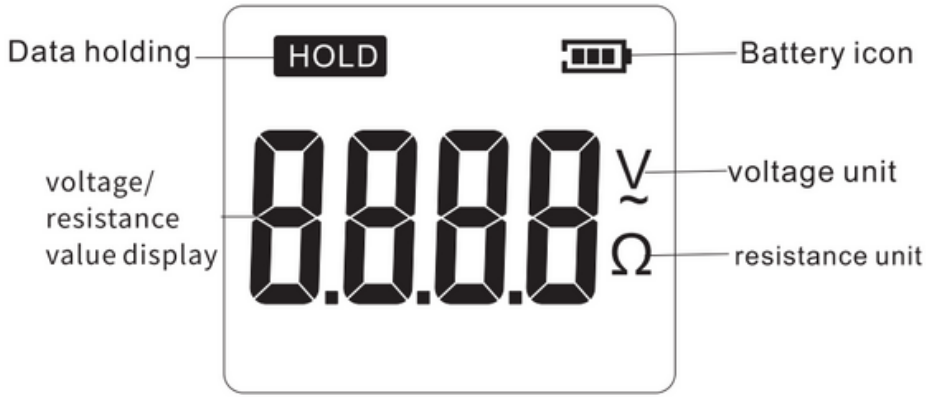


Figure2

The LCD display provides clear and intuitive information during operation:

- **Data Holding Indicator (HOLD):** Appears when the HOLD function is activated, showing that the displayed reading is frozen and will not update until HOLD is released.
- **Battery Icon:** Displays the current battery status. A low battery indication warns the user to replace or recharge power before measurements become unreliable.
- **Voltage/Resistance Value Display:** The central numeric section shows the measured value of either voltage or resistance, depending on the selected function.
- **Voltage Unit (V~):** Appears when the instrument is measuring AC/DC voltage.
- **Resistance Unit (Ω):** Appears when the instrument is measuring resistance values.

This layout ensures that users can quickly confirm measurement mode, read accurate values, and monitor power status, improving both safety and efficiency during operation.

Specifications

(1) Measurement Range and Measurement Error

(under conditions of 20 °C ± 5 °C and ≤ 75% RH)

Basic Function	Range	Accuracy	Resolution
Ground resistance	20Ω	±(2%+10)	0.01Ω
	200Ω	±(2%+3)	0.1Ω
	2000Ω	±(2%+3)	1Ω
	2000Ω (two wires)	±(2%+5)	1Ω
Ground voltage	200V	±(2%+5)	0.1V

- Auxiliary Grounding Resistance: 5000 Ω (Error: ±5%)
- Grounding Voltage: ≤10 V AC

(2) Application Standards

- IEC 61010-1 CAT III 600 V, Pollution Degree 2
- CAT I 5000 V, Pollution Degree 2
- IEC 61326-1 (EMC Standard)
- IEC 60529 (IP40 Protection)

(3) Measurement Method

- Ground Voltage Measurement: Average response
- Ground Resistance Measurement: Test signal frequency approx. 820 Hz, test current approx. 3.2 mA (at 20 Ω)

(4) Working Environment

- Temperature: 5 °C ~ 40 °C
- Relative Humidity: ≤80% RH (no condensation and fog)
- Altitude: ≤2000 m

(5) Storage Conditions

- Temperature: -20 °C ~ 60 °C
- Relative Humidity: ≤70% RH (no condensation and fog)

(6) Power Supply

9 V supply (6 × 1.5 V No.5 alkaline batteries)

(7) Overload Protection

- Ground Resistance: 200 V AC (10 seconds)
- Ground Voltage: 400 V AC (30 seconds)

(8) Insulation Resistance

Between measurement circuit and case: ≥20 MΩ

(9) Dimensions

176 mm × 77 mm × 110 mm

Preparation Before Measurement

(1) Battery Check and Replacement

Set the function selection switch to Ground Voltage or Ground Resistance. If the low-battery icon appears on the LCD, replace the batteries immediately; otherwise, the instrument will not operate correctly.

Battery icon	Battery voltage
	>8.45V
	>7.72V
	>7V
	⩽7V

(2) Test Lead Connection

Before starting any measurement, ensure that each test lead plug is fully and firmly inserted into the corresponding test terminal. A loose or partial connection may result in unstable contact, leading to fluctuating readings, reduced accuracy, or false results. In addition, poor connections can increase the risk of intermittent sparks or unexpected voltage drops, which may compromise both measurement safety and instrument reliability. Always double-check the leads for proper fit before operating the tester.

Safety warning

⚠ **WARNING**

Electricity is hazardous and may cause serious injury or death. To ensure correct and safe use of this equipment, carefully read the safety warnings and regulations in this manual before operation, and strictly comply with them at all times.

The safety symbol used in this manual has three implications. Pay special attention to all instructions marked with this symbol.

⚠ **DANGER – Indicates conditions or operations that will likely result in serious or fatal injury.**

⚠ **WARNING – Indicates conditions or operations that may cause serious or fatal injury.**

⚠ **CAUTION – Indicates conditions or operations that may cause minor injury or damage to the instrument.**

Understanding and observing these distinctions is essential to ensure both operator safety and the proper functioning of the equipment.

⚠ DANGER

- **Do not perform measurements in flammable or explosive environments; sparks generated during use may cause an explosion.**
- **Never operate the instrument or handle test leads with wet hands or when the instrument is wet.**
- **Do not exceed the maximum allowable measurement range.**
- **Do not open the battery cover during measurement.**
- **Avoid contact with exposed wires while testing.**
- **Always return the function knob to the OFF position after completing measurements.**

⚠ WARNING

- **Operate the instrument only by trained and qualified personnel, and strictly within the conditions specified in this manual.**
- **Do not open the housing during testing. In case of failure, inspection and maintenance must be carried out by professional service staff.**
- **Do not replace the batteries when the instrument is wet.**
- **Ensure all test leads are securely connected to the instrument's test ports before operation.**
- **Always switch off the instrument before opening the battery compartment.**
- **If damage is observed (such as broken wires or cracked casing), stop using the instrument immediately.**
- **Do not replace parts or modify the instrument. For repairs, contact the authorized dealer.**

⚠ CAUTION

- **Before measurement, set the range switch to the correct position.**
- **After use, turn the function selector to OFF. If the instrument will not be used for an extended period, remove the batteries to prevent leakage and damage.**
- **If the instrument becomes wet, dry it thoroughly before storage.**
- **Do not store the instrument in high temperature, high humidity, or direct sunlight.**
- **Clean the instrument casing with a soft cloth moistened with water or a neutral detergent. Do not use abrasive materials or solvents.**

Implication of relevant icons of this instrument:

~	AC	⎓	DC
⏚	Grounding	⚠	There may be danger of electric shock
⧈	The instrument has double insulation or reinforced insulation		

The instrument uses standard safety symbols for clarity and protection. AC ( ) and DC (⎓) indicate measurement types, while the grounding symbol shows protective earth. The electric shock warning alerts users to potential hazards, and the double insulation symbol confirms reinforced protection in compliance with IEC safety standards.

Measurement methods

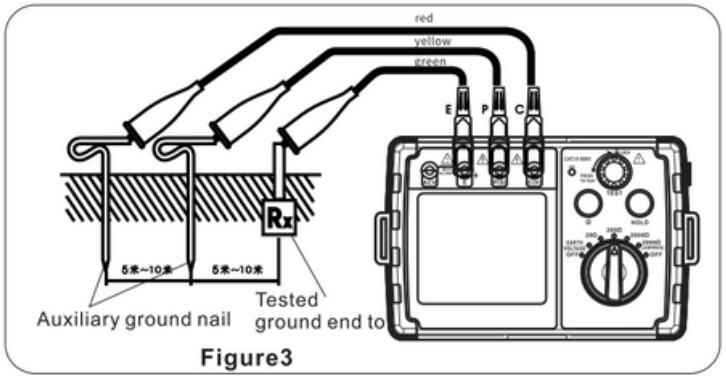
⚠ Caveat

During ground resistance testing, the instrument generates a maximum voltage of approximately 50 V between the E–C terminals. Do not touch exposed metal parts of the test leads or auxiliary ground nails to avoid electric shock.

(1) Accurate Measurement (using standard test leads)

1. Ground Electrode Installation: Drive the P and C ground nails firmly into the soil, aligning them and the equipment under test in a straight line, spaced 5–10 meters apart. (Ensure nails are inserted into wet soil; if dry, add sufficient water. Stones or sand must also be wetted. In urban areas where concrete prevents pile insertion, place two 25 × 25 cm steel plates—or auxiliary ground nails—flat on the surface, cover with a wet towel, and pour water to form an electrode. Measurement can then proceed normally.)

2. Ground Voltage Test: Rotate the function switch to the ground voltage range. Insert test leads into V and E terminals only, then connect to the test point. The LCD displays the ground voltage. (Do not press the TEST button during this procedure.) If the measured value exceeds 10 V, shut down relevant electrical equipment and repeat the ground resistance test once the ground voltage decreases, as higher values may reduce measurement accuracy.



C:Auxiliary electrode
P: Point electrode
E:tested electrical end

Figure3

⚠ Caveat

The ground voltage test must only be carried out using the V and E terminals. The C and P terminals must remain disconnected; otherwise, the instrument may be damaged or pose a safety hazard. Always verify connections before applying power. Ensure test leads are in good condition, with insulation intact, to avoid accidental contact with exposed conductors.

3. Ground Resistance Test: Set the function selector to the 2000 Ω range (maximum gear) and press the TEST button. The LCD will display the ground resistance value. If the result is below 200 Ω, switch to the 20 Ω range to improve accuracy. Measurements can be taken sequentially across ranges, but always select the appropriate gear to ensure precise readings. When the TEST button is pressed, its indicator illuminates, confirming the instrument is in active test mode.

Additional Operating Notes:

- If the C or E terminal has poor contact, if auxiliary ground resistance is excessively high (e.g., >32 kΩ in the 20 Ω range), or if the test loop is open, the LCD displays "---- Ω." In this situation, check all connections, soil condition, and grounding quality of the auxiliary electrodes.
- If the measured value exceeds the range capacity (e.g., >32 kΩ for 20 Ω, >43 kΩ for 200 Ω, or >65 kΩ for 2000 Ω), the LCD displays "OL" (over range). Selecting the correct range after verifying soil conditions will restore accurate results.
- Auxiliary ground nails must be free of rust, oil, or contamination. Clean them thoroughly before insertion. A bent or damaged nail will compromise test accuracy.
- When testing in dry or sandy soil, add water around the auxiliary nails to improve conductivity. In urban environments with concrete or asphalt surfaces, place flat steel plates (e.g., 25 × 25 cm) on the surface with wet cloths beneath to simulate reliable electrodes.
- Avoid running tests near high-voltage lines or strong electromagnetic fields, as these can induce error in sensitive resistance measurements.
- Always disconnect the test leads after measurement and store them properly to prevent damage or corrosion.

4. Data Hold Function: During measurement, press the HOLD key to freeze the current reading, and the HOLD symbol will appear on the display. Press the key again to release the hold function and resume live measurement.

5. Backlight: Press the Backlight button to activate the display illumination. Pressing it again switches the backlight off, conserving battery power when lighting is not required.

(2) Simple Measurement (using supplied test leads)

When auxiliary ground nails cannot be used, exposed low-resistance grounding points can serve as electrodes. Suitable alternatives include metal sinks, water pipes, common electrical grounds, or building grounding terminals. In such cases, the 2-wire method (using the E terminal and combined P & C terminals) may be applied. The connection layout is shown in Figure 4.

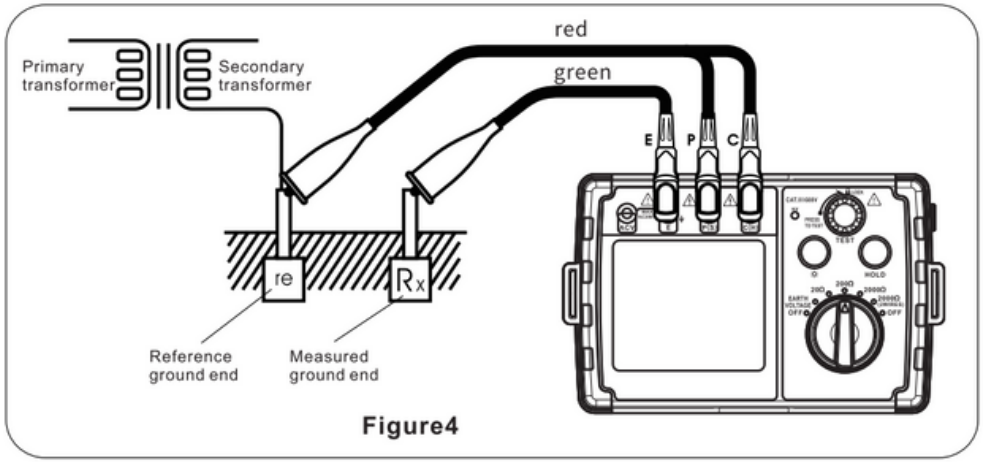


Figure4

When this method is applied, the P and C terminals are effectively shorted together.

⚠ **DANGER**
When using a commercial power system ground point as the reference electrode, exercise extreme caution to avoid electrical hazards.

Maintenance

(1) Battery Replacement

(Refer to Figure 5 on page 14)

When the low-voltage indicator appears, replace the batteries promptly using the following steps:

1. Power off the instrument and disconnect any attached test leads.
2. Unscrew the single screw at the bottom of the battery compartment and open the cover.
3. Replace all six batteries with new ones, ensuring correct polarity alignment.
4. Reinstall the battery cover and tighten the screw securely.

If the instrument will not be used for an extended period, remove the batteries to prevent leakage and corrosion of the compartment and contacts.

(2) Case Cleaning

Do not use alcohol, diluents, or other corrosive agents on the instrument case, as they may damage the housing and viewing window. For cleaning, gently wipe the case with a damp cloth.

(3) Moisture Protection

Prevent the instrument from exposure to water or excessive humidity.

(4) Service Contact

If any of the following issues occur, contact the after-sales service department of our company's marketing division or authorized agents:

1. Damage to instrument components.
2. LCD malfunction or abnormal display.
3. Excessive measurement error under normal operation.
4. Button failure or irregular response.

(5) Repair

For repair, send the instrument to qualified maintenance personnel or an authorized service center.

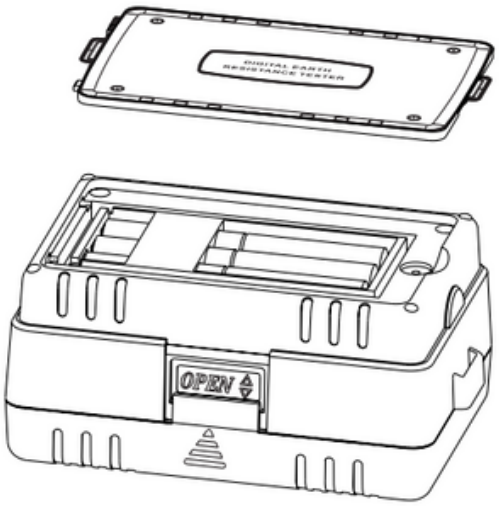


Figure5

Special Statement

- Used batteries must be disposed of in compliance with local laws and regulations.
- The company assumes no liability for any indirect or derivative consequences resulting from the use of this product.
- The company reserves the right to update or modify product design, specifications, and documentation without prior notice.