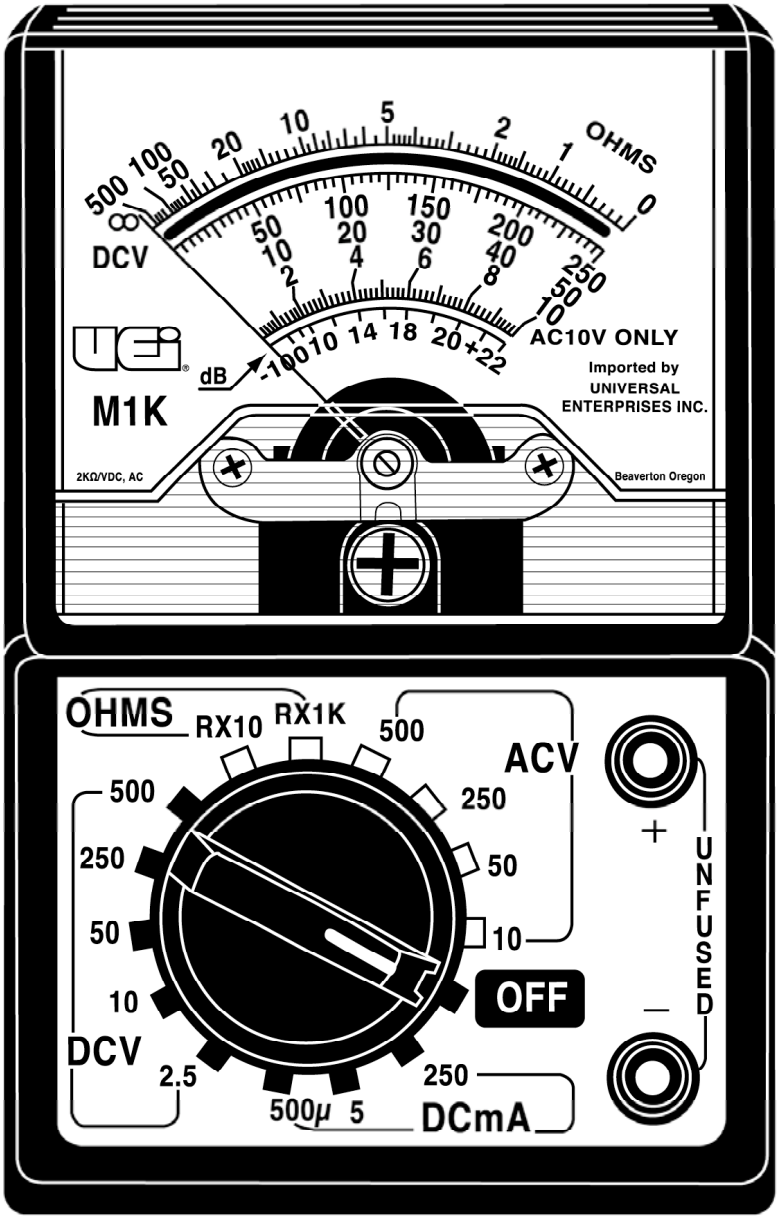
INSTRUCTION MANUAL

M1K

Analog Multimeter



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Introduction

The M1K gives you an easy and economical way to troubleshooting electrical circuits. Its nine voltage scales give you high resolution all the way up to 500 volts AC or DC while its milliamps and microamps feature lets you check thermocouple and control circuits.

Features include

- 14 ranges
- 500 Volts AC and DC
- Resistance to 500 kilohms
- DC milliamps
- Decibel measurements
- Color-coded and mirrored scale plate

Safety Notes

Before using this meter, read all safety information carefully. In this manual the word **"WARNING"** is used to indicate conditions or actions that may pose physical hazards to the user. The word **"CAUTION"** is used to indicate conditions or actions that may damage this instrument.

- Always follow industry standard safety practices including protective clothing, gloves and safety glasses when appropriate
- Do not attempt to measure any voltage that exceeds the categorybased rating of this meter
- Do not attempt to use this meter if either the meter or the test leads have been damaged. Turn it in for repair at a qualified repair facility
- Ensure meter leads are fully seated by making a quick continuity check of the leads prior to making voltage measurements
- Keep your fingers away from the test lead's metal probe contacts when making measurements. Always grip the leads behind the finger guards molded into the probes
- Use a current clamp adapter when measuring current that may exceed 10 amps. See the accessories in UEi's full-line catalog
- Do not open the meter to replace batteries or fuses while the probes are connected

Operating Instructions

AC Voltage

Insert one test lead in the (**+**) jack. Insert the other test lead in the (**-**) jack. Set the function switch to the appropriate AC voltage.

NOTE: *Always start with the 500V range if unsure of the magnitude of voltage present.*

CAUTION!

Always remove the test leads from the circuit under test before disconnecting from front panel of M1K.

DC Voltage

Insert the black test lead in the "**-**" jack. Insert the red test lead in the "**+**" jack. Set the function switch to the appropriate DC voltage. The red test lead is connected to the positive voltage point. The black test lead is connected to the negative voltage point.

NOTE: *Always start with the 500V range if unsure of the magnitude of voltage present.*

CAUTION!

Always remove the test leads from the circuit under test before disconnecting from front panel of M1K.

Direct Current

The M1K may be used to measure direct current up to a maximum of 250 mA (0.250 Amps). To do this, the M1K must be connected in series with the wire, or circuit element, in which the current is to be measured. Remove power to the circuit under test before connecting the M1K. Set the function switch to the appropriate "**mA**" position. Insert the black test lead in the "**-**" jack on the M1K and connect it to the ground, or low voltage, side of the circuit under test. Insert the red test lead in the "**+**" jack on the M1K and connect it to the high voltage side of the circuit under test. Apply power to the circuit under test.

Resistance

CAUTION!

Always remove the power to any circuit in which resistance measurements are to be made.

The M1K uses an internal battery to supply power to the circuit under test. Access to the battery is provided by removing the single screw in the back of the case and removing the case back. Observe polarity marking on battery.

Set the function switch to the appropriate OHMS setting Rx10 or Rx1K. Insert one test lead in the "**-**" jack and the other test lead in the "**+**" jack. touch the free ends of the test leads together and note that the pointer will swing to the right side of the pointer will swing to the right side of the scale. (*Note: If the pointer does not move all the way to the right the battery may be weak and need replacing. If no reading can be made, check battery*). Use the "**OHM ADJ**" knob on the left side of the instrument to set the pointer to zero on the green meter scale. This completes the calibration of the resistance measuring circuit. This test should be performed each time resistance tests are to be made to assure that the "**OHM ADJ**" knob has not been inadvertently moved.

To make the resistance measurement, connect the free ends of the test leads across the element to be measured. The measured resistance value will be the green numeral on the resistance scale times the resistance multiplier. For example, if the function switch is on Rx10 and the pointer is on the numeral 20, the resistance is 200 ohms (10 x 20 = 200).

dB Ratio Measurement

For some applications, output voltage and audio frequency voltage are measured in terms of decibels. To measure decibels read the dB arc after proceeding to instructions for AC voltage. The dB scale is calibrated for direct reading when the selector switch is set to the 10 V AC range.

Testing Diodes / Transistors

A simple check of diode and transistor quality may be made with the M1K. using the same test procedure as for measuring resistance, connect one test lead to one end of the diode and the other test lead to the other end of the diode. Note the resistance reading. Then reverse the test leads and again note the reading.

If the two readings differ by a factor of ten then the diode, (or transistor junction) is probably good. If the two readings are approximately the same then the diode is shorted. If the reading cannot be obtained in either direction, the diode is probably open.

Maintenance

Periodic Service

WARNING!

Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the meter. This could alter the protection from electrical shock and personal injury this meter provides to the operator. Perform only those maintenance tasks that you are qualified to do.

These guidelines will help you attain long and reliable service from your meter:

- Calibrate your meter annually to ensure it meets original performance specifications
- Keep your meter dry. If it gets wet, wipe dry immediately. Liquids can degrade electronic circuits
- Whenever practical, keep the meter away from dust and dirt that can cause premature wear
- Although your meter is built to withstand the rigors of daily use, it can be damaged by severe impacts. Use reasonable caution when using and storing the meter

Cleaning

Periodically clean your meter's case using a damp cloth. **DO NOT** use abrasive, flammable liquids, cleaning solvents, or strong detergents as they may damage the finish, impair safety, or affect the reliability of the structural components.

Clean the input terminals as follows:

1. Turn the meter off and remove all test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with alcohol and work the swab around in each terminal.

Battery Replacement

The internal 1.5V battery affects only the OHMS function. It should be replaced when it is no longer possible to zero the pointer with the "**OHM ADJ**" control. Remove battery if the M1K is not to be used for a long period of time. Remove single screw in rear of case for access to battery. Observe polarity.

Mechanical Zero Adjust

The pointer should indicate 0 at the left hand edge of the scale with no input and the M1K placed face up on a flat surface.

To reset pointer, carefully adjust clear plastic screw located in meter face.

Specifications

AC Voltage	±5% of full scale 0 - 10, 50, 250, 500V
DC Voltage	±4% of full scale 0 - 2.5, 10, 50, 250, 500V
Direct Current	±4% of full scale 0 - 500µA, 5mA, 250mA
Resistance	±4% of scale length 0 - 5K, 500KΩ
Internal Battery	1.5V, size "AA"

Optional Accessories

Test leads (set) ATL85
Alligator clip adapters . . . . . .AAC
Battery 1.5V, size "AA" AB1

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Limited Warranty

The M1K is warranted to be free from defects in materials and workmanship for a period of three years from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

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This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

PLEASE
RECYCLE