AMPROBE®

AM-250

Digital Multimeter

Users Manual

- Mode d'emploi
- Bedienungshandbuch
- Manual d'Uso
- Manual de uso

AMPROBE®

AM-250

Digital Multimeter

Users Manual

English

June 2010, Rev.2

Limited Warranty and Limitation of Liability

Your Amprobe product will be free from defects in material and workmanship for 1 year from the date of purchase. This warranty does not cover fuses, disposable batteries or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Amprobe's behalf. To obtain service during the warranty period, return the product with proof of purchase to an authorized Amprobe Test Tools Service Center or to an Amprobe dealer or distributor. See Repair Section for details. THIS WARRANTY IS YOUR ONLY REMEDY. ALL OTHER WARRANTIES - WHETHER EXPRESS, IMPLIED OR STAUTORY - INCLUDING IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, ARE HEREBY DISCLAIMED. MANUFACTURER SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY. Since some states or countries do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you.

Repair
All test tools returned for warranty or non-warranty repair or for calibration should be accompanied by the following: your name, company's name, address, telephone number, and proof of purchase. Additionally, please include a brief description of the problem or the service requested and include the test leads with the meter. Non-warranty repair or replacement charges should be remitted in the form of a check, a money order, credit card with expiration date, or a purchase order made payable to Amprobe® Test Tools.

In-Warranty Repairs and Replacement – All Countries

Please read the warranty statement and check your battery before requesting repair. During the warranty period any defective test tool can be returned to your Amprobe® Test Tools distributor for an exchange for the same or like product. Please check the

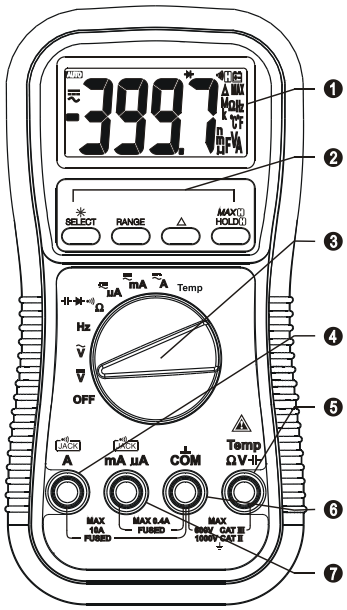
Additionally, in the United States and Canada In-Warranty repair and replacement units can also be sent to a Amprobe® Test Tools Service Center (see next page for address).

Non-Warranty Repairs and Replacement – US and Canada

Non-warranty repairs in the United States and Canada should be sent to a Amprobe® Test Tools Service Center. Call Amprobe® Test Tools or inquire at your point of purchase for current repair and replacement rates.

Non-Warranty Repairs and Replacement – Europe
European non-warranty units can be replaced by your Amprobe® Test Tools distributor

*(Correspondence only – no repair or replacement available from this address. European customers please contact your distributor.)customers please contact your distributor.)



1. 3-3/4 digits 4000 counts LCD display
2. Push-buttons for special functions & features
3. Selector to turn the Power On or Off and select a function
4. Input Jack (+) for 10A (20A for 30sec) current function
5. Input Jack (+) for all functions EXCEPT current (µA, mA, A) function
6. Common (Ground reference) Input Jack (-) for all functions
7. Input Jack (+) for milli-amp and micro-amp functions

CONTENTS

SYMBOLS

	Battery		Refer to the manual
	Double Insulated		Dangerous Voltage
~	Alternating Current		Earth Ground
⎓	Direct Current		Fuse
CE	Complies with EU directives		Conform to relevant Australian standards
	Do not dispose of this product as unsorted municipal waste		Underwriters Laboratories. [Note: Canadian and US.]
	Audible tone		

⚠Warning and Percautions

- Do not operate the meter in explosive gas (material),combustible gas(material) steam or filled with dust.
- To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.
- To avoid electrical shock hazard, observe the proper safety precautions when working with voltages above 60 VDC or 30 VAC rms.
- These voltage levels pose a potential shock hazard to the user.
- Do not touch test lead tips or the circuit being tested while power is applied to the circuit being measured.
- Keep your fingers behind the finger guards of the test leads during measurement.
- Inspect test leads, connectors, and probes for damaged insulation or exposed metal before using the instrument.
- If any defects are found, replace them immediately.
- Do not measure any current that exceeds the current rating of the protection fuse.
- Do not attempt a current measurement to any circuit where the open circuit voltage is above the protection fuse voltage rating. S
- uspected open circuit voltage should be checked with voltage functions. Never attempt a voltage measurement with the test lead inserted into the µA/mA or A input jack.
- Only replace the blown fuse with the proper rating as specified in this manual.
- Disconnect the test leads from the test points before changing functions. Always set the instrument to the highest range and work downward for an unknown value when using manual ranging mode.
- To avoid electrical shock, disconnect the meter from any circuit, remove the test leads from the input jacks and turn OFF the meter before opening the case. Do not operate with open case.

UNPACKING AND INSPECTION

Your shipping carton should include:

1 AM-250

2 Test Leads

2 Battery (SIZE AAA, 1.5V)

1 User's Manual

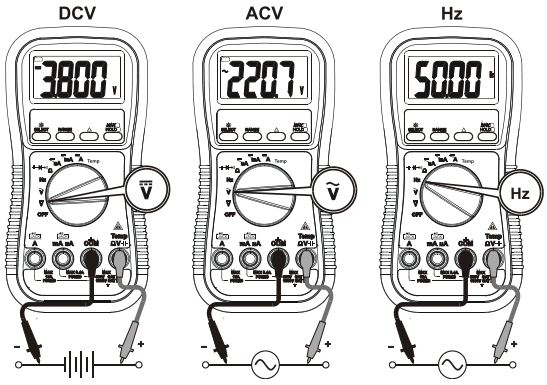
If any of the items are damaged or missing, return the complete package to the place of purchase for an exchange.

INTRODUCTION

Multimeter AM-250 can be used to measure voltage, resistance, capacitance, frequency, current and temperature; It is an electronic measuring instrument that combines several measurement functions in one unit. AM-250 multimeter is a portable hand-held device useful for basic fault finding and field service work or a bench instrument which can measure to a very high degree of accuracy. It can be used to troubleshoot electrical problems in a wide array of industrial and household devices such as batteries, motor controls, appliances, power supplies, and wiring systems.

OPERATION

DC Voltage, AC Voltage, & Hz Frequency functions



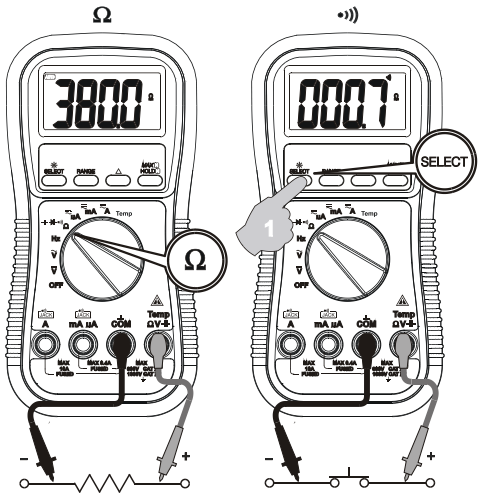
Note:

1) AC 400.0mV range selection is by RANGE button manually, and is specified from AC 10mV and up.

2) DC 400.0mV range is designed with 1000MΩ high input impedance for least current drain in measuring small signals, and can cope better with most commercially available voltage output transducers and adapters. The non-zero display reading is normal when the meter inputs are open circuit, which will not affect actual measurement accuracy. Open input is actually a floating condition, which is not a zero-volt-input condition. The meter will show zero or close to zero reading when the inputs are shorted.

Ω Resistance, and •)) Continuity functions

Defaults at Ω. Press SELECT button momentarily to select •)) Continuity function which is convenient for checking wiring connections and operation of switches. A continuous beep tone indicates a complete wire.



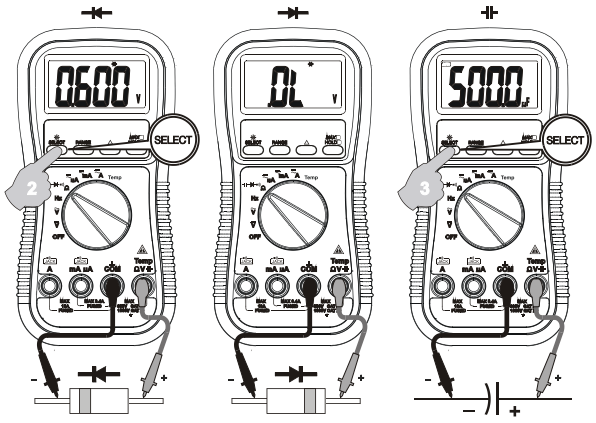
⚠ ***Caution***

Using Resistance, Continuity, Diode or Capacitance function in a live circuit will produce false results and may damage the instrument. In many cases the suspected component must be disconnected from the circuit to obtain an accurate measurement reading.

Diode test,Capacitance functions

Defaults at Ω. Press SELECT button momentarily 2 times to select Diode test function. Normal forward voltage drop (forward biased) for a good silicon diode is between 0.400V to 0.900V. A reading higher than that indicates a leaky diode (defective). A zero reading indicates a shorted diode (defective). An OL indicates an open diode (defective). Reverse the test leads connections (reverse biased) across the diode. The digital display shows OL if the diode is good. Any other readings indicate the diode is resistive or shorted (defective).

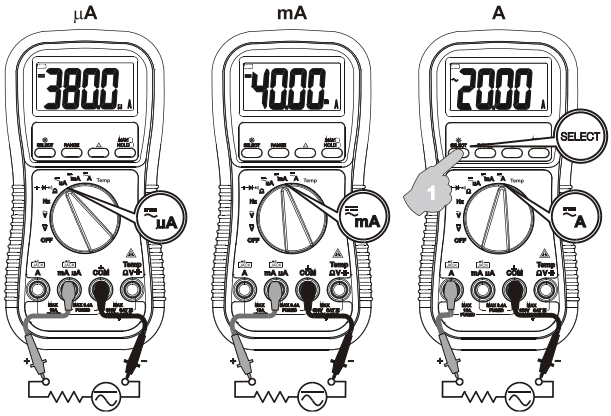
Defaults at Ω. Press SELECT button momentarily 3 times to select Capacitance function. Relative zero Δ mode can be used to zero out the parasitic capacitance of the leads and the internal protection circuitry of the meter when measuring low capacitance in the order of Pico Farad (pF).



> ⚠ ***Caution***
>
> Discharge capacitors before making any measurement. Large value capacitors should be discharged through an appropriate resistance load

µA, mA, and A Current functions

Default at DC. Press SELECT button momentarily to select AC.



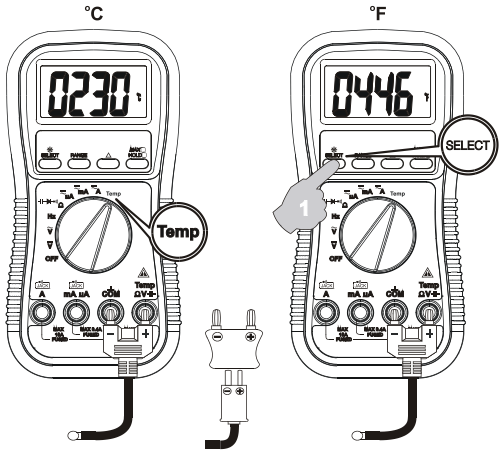
> ⚠ ***Caution***
>
> When measuring a 3-phase system, special attention should be taken to the phase-to-phase voltage which is significantly higher than the phase-to-earth voltage. To avoid exceeding the voltage rating of the protection fuse(s) accidentally, always consider the phase-to-phase voltage as the working voltage for the protection fuse(s).

Beep-Jack™ Input Warning

The meter beeps to warn the user against possible damage to the meter due to improper connections to the µA, mA, or A input jacks when other function (like voltage function) is selected.

Temperature function

Be sure to insert the banana plug type-K temperature bead probe Bkp60 (Optional purchase) with correct + − polarities. Defaults at degree C (Celsius). Press SELECT button momentarily to select degree F (Fahrenheit). You can also use a plug adapter (Optional purchase) with banana pins to type-K socket to



Relative zero Δ mode

Relative zero Δ mode allows the user to offset the meter consecutive measurements with the displaying reading as the reference value. The display will now show readings relative to the stored reference value. That is, display = reading - stored value. Press the Δ button momentarily to activate or to exit relative zero mode.

Backlighted display

Press the SELECT button for 1 second or more to turn on or off the display backlight function.

Manual or Auto-ranging

Press the RANGE button momentarily to select manual-ranging mode, and the meter will remain in the range it was in, the LCD symbol AUTO turns off. Press the button momentarily again to step through the ranges. Press and hold the button for 1 second or more to resume auto-ranging mode.
Note: Manual ranging mode feature is not available in Hz & Cx functions.

HOLD H

The hold feature freezes the display for later view. Press the HOLD H button momentarily to activate or to exit the hold feature.

MAX H

The max feature compares and displays the measured maximum value as fast as 25ms in a single range, and with automatic up range capability. Press the MAX H button for 1 second or more to activate or to exit the max feature in the voltage or current functions.

Sleep Mode

The meter will enter a low power consumption sleep mode automatically to extend battery life after approximately 30 minutes of no rotary-switch or push button operations. To wake up the meter from sleep mode, press any buttons momentarily or turn the rotary-switch to an adjacent position. Always set the rotary-switch to the OFF position manually when the meter is not in use.

SPECIFICATIONS

General Specifications
Display : 3-3/4 digits 4000 counts LCD display
Polarity : Automatic
Update Rate : 3 per second nominal
Operating Temperature : 0°C to 40°C /32 to 104°F
Relative Humidity : Maximum relative humidity 80% for temperature up to 31°C /88°F decreasing linearly to 50% relative humidity at 40°C /104°F
Altitude: Operating below 2000m
Pollution degree: 2
Storage Temperature: -20°C to 60°C /-4°F to 140°F, < 80% R.H.
(with battery removed)

Temperature Coefficient: nominal 0.15 x (specified accuracy)/°C @(0°C -18°C or 28°C -40°C), or otherwise specified
Sensing: Average sensing for AM-250.

Compliance:
The meter (all versions) is protected, against the users, by double insulation per CSA C22.2 No. 1010-1-92, EN61010-1(1995) and IEC61010-1(1995) to CAT II 1000V & CAT III 600V.

Protection-reinforced CE Terminals (to COM) ratings:
V : Category II 1000 Volts AC & DC, and Category III 600 Volts AC & DC.

A / mA and µA : Category III 500 Volts AC and 300 Volts DC.

EMC: Meets EN61326-1:2006 (EN55022, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4, , EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11)

In an RF field of 3V/m:
Capacitance function is not specified
AC 4.000V range: Total Accuracy = Specified Accuracy + 700 digits
AC 400.0µA range: Total Accuracy = Specified Accuracy + 300 digits
Other function ranges: Total Accuracy = Specified Accuracy + 40 digits
Performance above 3V/m is not specified

Overload Protections:
µA & mA : 0.63A/500V, IR200kA, F Fuse;
A: 12.5A/500V, IR20kA, F Fuse;
V: 1050Vrms, 1450Vpeak;
Ω, & Others: 600VDC/VAC rms
Transient protection: 6.5kV (1.2/50µs surge)
Power Supply: 1.5V AAA Size (NEDA 24G or IEC R03) battery X 2
Power Consumption: 3.2 mA typical
Low Battery: Below approx. 2.4V
Sleep Mode Timing: Idle for 30 minutes
Sleep Mode Consumption: 300µA typical for AM-250; 360µA typical for AM-270
Dimension: L193mm X W97mm X H46 (7.60 X 3.82 X 1.81 IN)
Weight: 370 g (0.816lb)
Special Features: 25ms Max Hold; Data Hold; Relative zero mode; Beep-jack™ input warning; Back-lighted display

CENELEC DIRECTIVES
The instruments conform to CENELEC Low-voltage directive 73/23/EEC and Electromagnetic compatibility directive 89/336/EEC

CE - EMC: Conforms to EN61326-1. This product complies with requirements of the following European Community Directives: 89/ 336/ EEC (Electromagnetic Compatibility) and 73/ 23/ EEC (Low Voltage) as amended by 93/ 68/ EEC (CE Marking). However, electrical noise or intense electromagnetic fields in the vicinity of the equipment may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading results when making measurements in the presence of electronic interference.

The meter (all versions) is protected, against the users, by double insulation per CSA C22.2 No. 1010-1-92, EN61010-1(1995) and IEC61010-1(1995) to CAT II 1000V & CAT III 600V.

Protection-reinforced CE version Terminals (to COM) ratings:

V :Category II 1000 Volts AC & DC, and Category III 600 Volts AC & DC.
A / mAμA :Category III 500 Volts AC and 300 Volts DC.

PER IEC61010 OVERVOLTAGE INSTALLATION CATEGORY

OVERVOLTAGE CATEGORY II
Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.Note – Examples include household, office, and laboratory appliances.

OVERVOLTAGE CATEGORY III
Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.

Note – Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

Electrical Specifications
Accuracy is ±(% reading digits + number of digits) or otherwise specified, at 23°C +/-5°C & less than 75% R.H.
Models AM-270 True RMS accuracy of ACV & ACA is specified from 5 % (10% for AC400.0mV range) to 100 % of range, or otherwise specified. Maximum Crest Factor < 1.75 : 1 at full scale & < 3.5 : 1 at half scale, and with frequency components within the specified frequency bandwidth for non-sinusoidal waveforms

DC Voltage

Range	Accuracy
400.0 mV	0.3% + 4d
4.000V, 40.00V, 400.0V	0.5% + 3d
1000V	1.0% + 4d

NMRR:>50dB @ 50/60Hz
CMRR:>120dB @ DC, 50/60Hz, Rs=1kΩ
Input Impedance: 10MΩ, 30pF nominal
(1000MΩ for 400.0mV range)

Type-K Temperature

Range	Accuracy*
-20 °C to 300 °C	2% + 3 °C
-4 °F to 572 °F	2% + 6 °F

*Type-K thermocouple range & accuracy not included

AC Voltage

Range	Accuracy*
50Hz -- 500Hz	
400.0mV*	4.0% + 5d
4.000V, 40.00V, 400.0V	1.5% + 5d
1000V	4.0% + 5d

CMRR:>60dB @ DC to 60Hz, Rs=1kΩ
Input Impedance: 10MΩ, 30pF nominal
*Selection by Range button manually, and is specified from AC 10mV (AC 40mV for True RMS models AM-270) and up

Max Hold (Voltage & Current)
Specified accuracy ± 50 digits for changes > 25ms in duration

DC Current

Range	Accuracy	Burden Voltage
400.0µA	2.0% + 5d	0.15mV/µA
4000µA	1.2% + 3d	0.15mV/µA
40.00mA	2.0% + 5d	3.3mV/mA
400.0mA	1.2% + 3d	3.3mV/mA
4.000A	2.0% + 5d	0.03V/A
10.00A*	1.2% + 3d	0.03V/A

*10A continuous, 20A for 30 second max with 5 minutes cool down interval

AC Current

Range	Accuracy*	Burden Voltage
50Hz -- 500Hz		
400.0µA	2.0% + 6d	0.15mV/µA
4000µA	1.5% + 4d	0.15mV/µA
40.00mA	2.0% + 6d	3.3mV/mA
400.0mA	1.7% + 4d	3.3mV/mA
4.000A	2.0% + 6d	0.03V/A
10.00A*	1.8% + 4d	0.03V/A

*10A continuous, 20A for 30 second max with 5 minutes cool down interval

Ohms

Range	Accuracy
400.0Ω	0.8% + 6d
4.000kΩ, 40.00kΩ, 400.0kΩ	0.6% + 4d
4.000MΩ	1.0% + 4d
40.00MΩ	2.0% + 4d

Open Circuit Voltage : 0.4VDC typical
Audible Continuity Tester
Audible threshold : between 10Ω and 120Ω

Capacitance

Range*	Accuracy**
500.0nF, 5.000µF, 50.00µF, 500.0µF, 3000µF	3.5%*** + 6d

*Additional 50.00nF range accuracy is not specified
**Accuracies with film capacitor or better
***Specified with battery voltage above 2.8V (approximately half full battery). Accuracy decreases gradually to 12% at low battery warning voltage of approximately 2.4V

Hz Frequency

Range*	Accuracy**
50.00Hz, 500.0Hz, 5.000kHz, 50.00kHz, 500.0kHz, 1.000MHz	0.5%+4d

*Additional 5.000Hz range accuracy & sensitivity are not specified
**Accuracy is specified at < 20VAC rms
Input Signal: Square wave with duty cycle > 40% & < 70%; or Sine wave Vrms AC
Sensitivity:
10Hz--20Hz : > Sine 0.9Vrms;
20Hz--500kHz: > 2.6Vp; or Sine 1.9Vrms;
500kHz--1MHz: > 4.2Vp; or Sine 3Vrms
Update Rate: 2 per second nominal

Diode Tester

Open Circuit Voltage	Test Current (Typical)
< 1.6 VDC	0.25mA

MAINTENANCE AND REPAIR

If there appears to be a malfunction during the operation of the meter, the following steps should be performed in order to isolate the cause of the problem.

1.Check the battery. Replace the battery immediately when the "⊟" symbol appears on the LCD.

2.Review the operating instructions for possible mistakes in operating procedure.

Except for the replacement of the battery, repair of the meter should be performed only by a Factory Authorized Service Center or by other qualified instrument service personnel. The front panel and case can be cleaned with a mild solution of detergent and water. Apply sparingly with a soft cloth and allow to dry completely before using. Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. If the meter is not to be used for periods of longer than 60 days, remove the batteries and store them separately

Trouble Shooting

If the instrument fails to operate, check batteries and test leads etc., and replace as necessary. Double check operating procedure as described in this user's manual.

If the instrument voltage-resistance input terminal has subjected to high voltage transient (caused by lightning or switching surge to the system) by accident or abnormal conditions of operation, the series fusible resistors will be blown off (become high impedance) like fuses to protect the user and the instrument. Most measuring functions through this terminal will then be open circuit. The series fusible resistors and the spark gaps should then be replaced by qualified technician. Refer to the LIMITED WARRANTY section for obtaining warranty or repairing service.

Battery and Fuse replacement

Battery use:

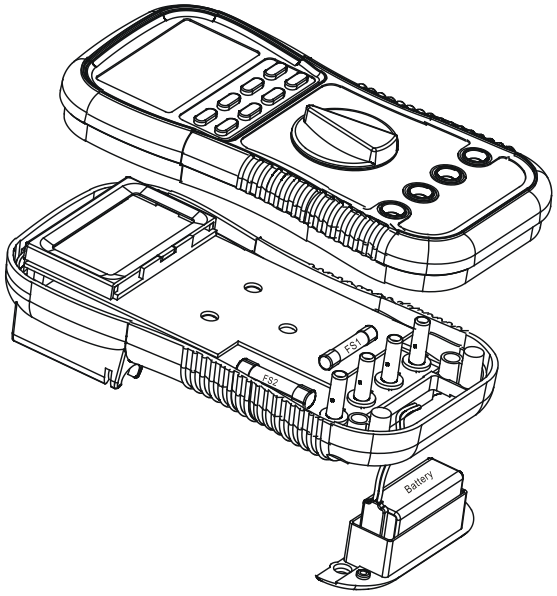
Standard 1.5V AAA Size (NEDA 24G or IEC R03) battery X 2

Fuse (FS1) for μA and mA current input: 0.63A/500V, IR 150kA, F fuse (FA-6x32/.63);

Fuse (FS2) for A current input: 12.5A/500V, IR 20kA, F fuse (FA-12.5A/500V);

Battery replacement:
Loosen the 2 screws from the battery access door of the case bottom. Lift the battery access door and thus the battery compartment up. Replace the battery. Re-fasten the screws.

Fuse replacement:
Loosen the 4 screws from the case bottom. Lift the end of the case bottom nearest the input jacks until it unsnaps from the case top. Replace the blown fuse(s) and/or the battery. Replace the case bottom, and ensure that all the gaskets are properly seated and the two snaps on the case top (near the LCD side) are engaged. Re-fasten the screws.



Visit www.Amprobe.com for
- Catalog
- Application notes
- Product specifications
- User manuals

Please Recycle