

AVO300 Series Digital Multimeters

USER MANUAL

MANUAL DE L'UTILISATEUR

BEDIENUNGSANLEITUNG

MANUAL DEL USUARIO

 **SAFETY WARNINGS**

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

- Do not use in wet environments
- Measurements beyond the maximum selected range must not be attempted.
- Extreme care must be taken when measuring above 50 V, especially on live bus-bars.
- To measure voltage, the instrument must not be switched to a current or resistance range, or to the diode check or buzzer position.
- Circuits must be de-energised and isolated before carrying out resistance tests.
- The rotary selector switch must only be turned after removing test connections.
- All external voltages must be disconnected from the instrument before removing the battery.
- Test leads and prods must be in good order, clean, and with no broken or cracked insulation.
- UK Safety Authorities recommend the use of fused test leads when measuring voltage on high energy systems.
- Replacement fuses must be of the correct type and rating.
- The instrument must not be used if any part of it is damaged.
- Check for correct instrument operation by testing a known voltage before and after use. Do not use if misleading results are obtained.
- Warnings and precautions must be read and understood before an instrument is used. They must be observed during the operation of this instrument.

NOTE

THE INSTRUMENT MUST ONLY BE USED BY SUITABLY TRAINED AND COMPETENT PERSONS.

Users of this equipment and/or their employers are reminded that National Health and Safety Legislation requires them to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury such as inadvertent short circuits. Where the assessments show that the risk is significant then the use of fused test leads may be appropriate.

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Symbols used on the instrument are:



Caution: risk of electric shock



Caution: refer to accompanying notes



Equipment protected throughout by Double Insulation (Class II)



Equipment complies with current EU directives.



Equipment complies with 'C tick' requirements

INTRODUCTION

Thank you for purchasing one of the Megger AVO300 series digital multimeters.




For your own safety and to get the maximum benefit from your instrument, please ensure that you read and understand the following safety warnings and instructions before attempting to use the instrument.

This user guide describes the operation and functions of the following AVO300 series of digital multimeters.

AVO300

AVO310

SYMBOLS AND ANNUNCIATORS

	Continuity
BAT	Low Battery
	Diode test
HOLD	Data Hold
AUTO	AutoRanging
AC Alternating	Current or Voltage
DC	Direct Current or Voltage
MAX/MIN	Stores the highest or lowest measurement
	Backlight
V	Volts
A, mA, uA	Current range

OPERATION

To turn on the instrument turn the range knob from the OFF position to any measurement range.

Note: For best battery life ALWAYS turn the function switch to the OFF position when the meter is not in use. These meters have an Auto OFF that automatically shuts the meter OFF if left switched on. AVO300:15 minutes, AVO310: 30 minutes.

Note: On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilize and give a proper measurement when connected to a circuit.

MODE button

To select AC or DC measurement when in Amps, mA or uA ranges.

HOLD button

The HOLD function allows the meter to "freeze" a measurement for later reference.

1. Press the HOLD button to "freeze" the reading on the indicator. The "HOLD" message will be appear in the display.
2. Press the HOLD button again to return to normal operation.

BACKLIGHT button (AVO310 only)

1. Press the BACKLIGHT button to switch on the display light.
2. Press the BACKLIGHT button again to exit the light mode.

MAX/MIN button (AVO310 only)

The MAX/MIN function allows the meter to capture the highest or lowest measurement for later reference.

1. Press the MAX/MIN button to begin measurement. The indicator "MAX" or MIN will appear in the display.
2. If the "MAX MIN" messages are flashing, the instrument is in MAX/MIN mode but not recording, press the MAX/MIN button to select a mode.
3. To return to normal AUTO measurement mode, hold down the MAX/MIN button for 2 seconds.

DC VOLTAGE MEASUREMENTS

1. Set the function switch to the V DC position ("mV" will appear in the display).
2. Insert the black test lead plug into the negative (COM) jack and the red test lead plug into the positive (V) jack.
3. Connect the test probe tips to the circuit under test. Be sure to observe the correct polarity (red lead to positive, black lead to negative).
4. Read the voltage in the display. The display will indicate the proper decimal point and value. If the polarity is reversed, the display will show (-) minus before the value.

AC VOLTAGE MEASUREMENTS

1. Set the function switch to the V AC position.
2. Insert the black test lead plug into the negative (COM) jack and the red test lead plug into the positive (V) jack.
3. Connect the test probe tips to the circuit under test.
4. Read the voltage in the display. The display will indicate the proper

decimal point, value and symbol (AC, V, etc.).

DC CURRENT MEASUREMENT

CAUTION: Do not make current measurements on the 10A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead plug into the negative (COM) jack.
2. For current measurements up to 4000 μ A DC, set the function switch to the μ A position and insert the red test lead plug into the (μ A) jack.
3. For current measurements up to 400 mA DC, set the function switch to the mA range and insert the red test lead plug into the (mA) jack.
4. For current measurements up to 10 A DC, set the function switch to the A position and insert the red test lead plug into the 10 A jack.
5. Press the AC/DC button until "DC" appears in the display.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Connect the black test probe to the negative side of the circuit. Connect the red test probe to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display. The display will indicate the proper decimal point, value and symbol.
10. Remove power from circuit before disconnecting test leads

AC CURRENT MEASUREMENT

CAUTION: Do not make current measurements on the 10 A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead plug into the negative (COM) socket.
2. For current measurements up to 10 A, set the function switch to the A position and insert the red test lead plug into the (10 A) jack.
3. For current measurements up to 400 mA, set the function switch to the mA range and insert the red test lead plug into the (mA) jack.
4. For current measurements up to 10 A AC, set the function switch to the A position and insert the red test lead plug into the 10 A jack.
5. Press the MODE button. The measurement mode will change between AC or DC as required.
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Connect the black test probe to the negative side of the circuit. Connect the red test probe to the positive side of the circuit.
8. Apply power to the circuit. Read the current in the display. The display will indicate the proper decimal point, value and symbol.
11. Remove power from circuit before disconnecting test leads

RESISTANCE [Ω] MEASUREMENT

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.


1. Set the function switch to the Ω position.
2. Insert the black test lead plug into the negative (COM) socket and the

red test lead plug into the positive Ω jack.

3. Connect the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
4. Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.



CONTINUITY CHECK

WARNING: To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the range switch to the Ω position.
2. Insert the black lead plug into the COM socket and the red test lead plug into the  positive socket.
3. Connect the test probe tips to the circuit or wire you wish to check.
4. If the resistance is less than 30 Ω , the audible signal will sound. The display will also show the actual resistance in ohms.

DIODE TEST

WARNING: To avoid electric shock, do not test any diode that has voltage on it.

1. Set the function switch  to the position.
2. Insert the black test lead plug into the COM socket and the red test lead plug into the  socket.
3. Connect the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
4. Reverse the probe polarity by switching probe position. Note this reading.

SPECIFICATIONS

5. The diode or junction can be evaluated as follows:

A. If one reading shows a value and the other reading shows OL, the diode is good.

B. If both readings show OL, the device is open.

C. If both readings are very small or zero, the device is shorted.

NOTE: The value indicated in the display during the diode check is the forward voltage.

Insulation:	Class 2, Double insulation.
Overvoltage category:	(AVO300/310) 600V CATIII or 1000V CATII
Display	
AVO300:	4000 counts LCD display, 25.4mm high
AVO310:	4000 counts LCD display, 20mm high
Backlight:	AVO310 only
Polarity:	Automatic, (-) negative polarity indication.
Over-range:	"OL" mark indication.
Low battery indication:	A Battery symbol is displayed when the battery voltage drops below the operating level.
Measurement rate:	2 times per second nominal.
Auto power off	
AVO300:	Meter automatically shuts down after approx. 15 minutes of inactivity.
AVO310:	Meter automatically shuts down after approx. 30 minutes of inactivity.
Operating environment:	-10°C to 50°C (14°F to 122°F) at <70% relative humidity.
Storage temperature:	-30°C to 60°C (-4°F to 140°F) at < 80% relative humidity.

Relative humidity: 90% (0°C to 30°C); 75% (30°C to 40°C);
45% (40°C to 50°C)

For inside use, max height:

Operating: 3000 m

Storage: 10,000 m

Pollution degree: 2

Safety

The instrument complies with IEC61010-1 and IEC 61010-031

Power: One 9 V battery, NEDA 1604, IEC 6F22.

Dimensions: 182 (H) x 82 (W) x 55 (D) mm

Weight: Approx. 375g.

EMC

IEC61326-1

Operational uncertainties: Refer to www.megger.com

Accuracy

Accuracy is given at 18°C to 28°C (65°F to 83°F), less than 70% RH

DC Voltage (Auto-ranging)

Range	Resolution	Accuracy
400.0 mV	0.1 mV	±0.5% of rdg ±2 digits
4.000 V	1 mV	
40.00 V	10 mV	
400.0 V	100 mV	±0.8% of rdg ±2 digits
1000 V	1 V	
		±1% of rdg ±2 digits

Input Impedance: 7.8 MΩ.

Maximum Input: 1000 V dc

AC Voltage (Auto-ranging)

Range	Resolution	Accuracy
400.0 mV (AV0310 only)	0.1 mV	±1% of rdg ±5 digits
4.000 V	1 mV	
40.00 V	10 mV	
400.0 V	100 mV	±1.5% of rdg ±5 digits
1000 V	1 V	

400 mV (AV0310 only)

Input Impedance: 7.8 MΩ.

AC Response: 50Hz 60Hz

Maximum Input: 1000 V AC rms.

DC Current (Auto-ranging)

Range	Resolution	Accuracy
400.0 μA	0.1 μA	$\pm 1.0\%$ of rdg ± 3 digits
4000 μA	1 μA	
40.00 mA	10 μA	
300.0 mA	100 μA	
10 A	10 mA	$\pm 2.5\%$ of rdg ± 3 digits

Overload Protection: 0.5 A/1000 V and 10 A/1000 V fuse.

Maximum Input: 4000 μA DC on μA range
 400 mA DC on mA range
 10 A DC on 10 A range

AC Current (Auto-ranging)

Range	Resolution	Accuracy
400.0 μA	0.1 μA	$\pm 1.5\%$ of rdg ± 5 digits
4000 μA	1 μA	
40.00 mA	10 μA	
300.0 mA	100 μA	
10 A	10 mA	$\pm 3.0\%$ of rdg ± 5 digits

Overload Protection: 0.5 A/1000 V and 10 A/1000 V fuse.

AC Response: 50 Hz to 400 Hz

Maximum Input: 4000 μA AC rms on μA
 400 mA AC rms on mA
 10 A AC rms on 10 A range.

Resistance [Ω] (Auto-ranging)

Range	Resolution	Accuracy
400.0 Ω	0.1 Ω	$\pm 0.8\%$ of rdg ± 5 digits
4.000 k Ω	1 Ω	$\pm 0.8\%$ of rdg ± 2 digits
40.00 k Ω	10 Ω	$\pm 3\%$ of rdg ± 8 digits
400.0 k Ω	100 Ω	
4.000 M Ω	1 k Ω	
40.00 M Ω	10 k Ω	

Input Protection: 1000 V DC or 1000 V AC rms.

AVO300: Diode Test

Test current	Resolution	Accuracy
0.3 mA typical/Open <1.5 V	1 mV	$\pm 10\%$ of rdg ± 5 digits

Open circuit voltage: 1.5 V DC typical

Overload protection: 1000 V DC or 1000 V AC rms.

BATTERY AND FUSE REPLACEMENT

AVO310: Diode Test

Test current	Resolution	Accuracy
1 mA typical/Open MAX.3 V	1 mV	$\pm 10\%$ of rdg ± 5 digits

Open circuit voltage: MAX. 3 V DC

Overload protection: 1000 V DC or 1000 V AC rms.

Audible continuity

Audible threshold: AVO300: Less than 10 Ω to 30 Ω

Test current: MAX. 0.3 mA

AVO310: Less than 35 Ω Test current MAX. 1.5 mA

Overload protection: 1000 V DC or 1000 V AC rms.

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery door.

1. When the batteries become exhausted or drop below the operating voltage, the battery warning symbol will appear in the LCD display. The battery should be replaced.
2. Follow instructions for installing battery. See the battery installation section of this manual.
3. Dispose of the old battery properly.

WARNING: To avoid electric shock, do not operate your meter with the battery cover removed.

BATTERY INSTALLATION

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.

Do not operate the instrument with the battery cover removed

1. Disconnect the test leads from the meter.
2. Open the battery cover by loosening the screw using a cross head screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery cover back in place. Secure with the two screws.

NOTE: If your meter does not work properly, check the fuses and battery to make sure that they are still good and that they are properly inserted.

ACCESSORIES

REPLACING THE FUSES

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the fuse/battery cover.

1. Disconnect the test leads from the meter and any item under test.
2. Open the fuse door by loosening the screw on the door using a cross head screwdriver.
3. Remove the old fuse from its holder by gently pulling it out.
4. Install the new fuse into the holder.
5. Always use a fuse of the proper size and value (0.5 A/1000 V fast blow for the 400 mA range, 10 A/1000 V fast blow for the 10 A range).
6. Put the fuse door back in place. Insert the screw and tighten it securely.

WARNING: To avoid electric shock, do not operate your meter until the fuse door is in place and fastened securely.

Included accessories

Standard Red/Black lead set with test probes

Optional Accessories

Standard lead set with test probes and croc clips 6220-779

Fused lead set with test probes and croc clips 6220-789

REPAIR AND WARRANTY

The instrument contains static sensitive devices, and care must be taken in handling the printed circuit board. If an instrument's protection has been impaired it should not be used, but sent for repair by suitably trained and qualified personnel. The protection is likely to be impaired if for example; it shows visible damage; fails to perform the intended measurements; has been subjected to prolonged storage under unfavourable conditions, or has been subjected to severe transport stresses.

NEW INSTRUMENTS ARE GUARANTEED FOR 3 YEARS FROM THE DATE OF PURCHASE BY THE USER.

Note: Any unauthorized prior repair or adjustment will automatically invalidate the Warranty.

INSTRUMENT REPAIR AND SPARE PARTS

For service requirements for Megger Instruments **contact:**

Megger Limited	or	Megger
Archcliffe Road		Valley Forge Corporate Centre
Dover		2621 Van Buren Avenue
Kent CT17 9EN		Norristown PA 19403
England.		U.S.A.

Tel: +44 (0) 1304 502 243 Tel: +1 610 676 8579

Fax: +44 (0) 1304 207 342 Fax: +1 610 676 8625

or an approved repair company.

Returning and Instrument for Repair

If it is necessary to return an instrument for repair, a Returns Authorisation number must first be obtained by contacting one of the addresses shown. You will be asked to provide key information, such as the instrument serial number and fault reported when the number is issued. This will enable the Service Department to prepare in advance for the receipt of your instrument, and to provide the best possible service to you.

The Returns Authorisation number should be clearly marked on the outside of the product packaging, and on any related correspondence. The instrument should be sent, freight paid to the appropriate address. If appropriate a copies of the original purchase invoice and of the packing note, should be sent simultaneously by airmail to expedite clearance through customs.

For instruments requiring repair outside the warranty period a repair estimate will be submitted to the sender, if required, before work on the instrument commences.

Approved Repair Companies

A number of independent instrument repair companies have been authorised for repair work on most Megger instruments, using genuine Megger spare parts. A list of approved companies is available from the UK address shown on this page. Spare parts are also available.