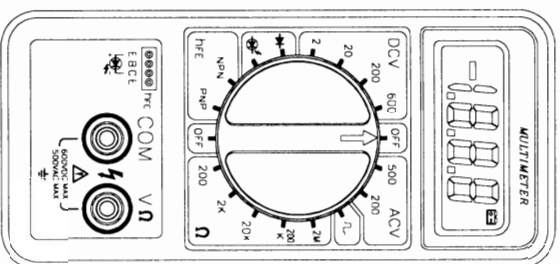


OPERATING INSTRUCTIONS

MODEL 10

DIGITAL MULTIMETER



SAFETY INFORMATION

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

1. Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
2. This meter is not recommended for high voltage industrial use; for example, not for measurements of 440 VAC or 600 VAC industrial power mains. The unit is intended for use with low energy circuits to 500VAC/600VDC or high energy circuit to 250 VAC or DC. Accidental misuse by connection across a high voltage, high energy power source when the meter is set up for mA measurement may be very hazardous.
3. Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.
5. When using the probes, keep your fingers behind the finger guards on the probes.
6. Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.

SPECIFICATIONS

Display: 3½ digit liquid crystal display (LCD) with a maximum reading of 1999.

Polarity: Automatic, positive implied, negative polarity indication.

Overrange: (1) or (-1) is displayed.

Zero: Automatic.

Low battery indication: the "E" is displayed when the battery voltage drops below the operating level.

Measurement rate: 2.5 times per second, nominal.

Operating Environment: 0°C to 50°C at < 70% relative humidity.

Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.

Accuracy: Stated accuracy at 23°C ± 5°C, < 75% relative humidity.

Power: single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.

Battery life: 300 hours typical with carbon-zinc.

Dimensions: 151 mm (H) x 70 mm (W) x 38 mm (D).

Weight: Approx. 7 oz. (200g) including battery.

Accessories: One pair test leads, 9V battery (installed) and Operating Instructions.

Voltage Measurements

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired Voltage type (AC or DC) and range. If magnitude of voltage is not known, set switch to the highest range and reduce until a satisfactory reading is obtained.
3. Connect the test leads to the device or circuit being measured.
4. For dc, a (-) sign is displayed for negative polarity; positive polarity is implied.

Resistance Measurements

1. Set the Function/Range switch to the desired resistance range.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
4. Connect the test leads to the points of measurements and read the value from the display

Signal Output

1. Set the Function/Range switch to the "Ω" position.
2. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
3. Connect the test leads to the points of signal input.

Diode Tests

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the "→" position.
3. Turn off power to the circuit under test. External voltage across the components causes invalid readings.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, "1" is displayed. If the diode is shorted, "000" or another number is displayed.
6. If the diode is open, "1" is displayed in both directions.
7. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1kΩ. In this case the diode must be disconnected from the circuit for accurate testing.

Transistor Gain Measurements

1. Set the Function/Range switch to the desired hFE range (PNP or NPN type transistor).
2. Never apply an external voltage to the hFE sockets. Damage to the meter may result.
3. Plug the transistor directly into the hFE socket. The sockets are labeled E, B, and C for emitter, base, and collector.
4. Read the transistor hFE (dc gain) directly from the display

DC VOLTS

Ranges: 2V, 20V, 200V, 600V

Resolution: 1mV

Accuracy: ±(1.5% rdg + 1 dgt)

Input Impedance: 1MΩ

Overload protection: 600VDC or 500VAC rms

AC VOLTS (50Hz - 500Hz)

Ranges: 200V, 500V

Resolution: 100mV

Accuracy: ±(2.9% rdg + 4dgt)

Input Impedance: 450KΩ

Overload protection: 600VDC or 500VAC rms

RESISTANCE

Ranges: 200Ω, 2KΩ, 20KΩ, 200KΩ, 2MΩ

Resolution: 100mΩ

Accuracy: ±(1.5% rdg + 3dgt) on 200Ω range ±(1.5% rdg + 1 dgt) on 2KΩ to 2MΩ ranges

Open circuit volts: 0.3Vdc (3.0Vdc on 200Ω range)

Overload protection: 500VDC or AC rms

SIGNAL OUTPUT

Signal: +3V, -0.5V square wave, 50% duty.

Frequency: 50Hz approx.

Output Impedance: 120KΩ.

Input Protection: 500Vdc/ac rms.

Led Test

1. Set the Function/Range switch to the "→" position.

2. Never apply an external voltage to the LED socket. Damage to the meter may result.

3. Plug the LED directly into the LED socket. The socket are labeled +, - for LED polarized.

MAINTENANCE

WARNING

Remove test leads before changing battery or performing any servicing.

Battery Replacement

Power is supplied by a 9 volt "transistor" battery, (NEDA 1604, IEC 6F22). The "E" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the front case. Remove the battery from battery contacts.

LED TEST

Accuracy: ±(3%/rdg + 3dgt)

Resolution: 10mV.

Test current: 10mA ± 0.1mA

Test voltage: < 5V.

DIODE TEST

Test current: 1.0mA ± 0.6mA

Accuracy: ±(3.0%/rdg + 3dgt)

Open circuit volts: 3.3Vdc typical

Overload protection: 500VDC or AC rms

TRANSISTOR hFE

Ranges: 0 - 1000

Base current: 10μA, Ade approx. (Vce=3.0Vdc)

OPERATION

Before taking any measurements, read the Safety Information Section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.



MODEL:10 CALIBRATION PROCEDURE

The procedure should be performed at an ambient temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, and at a relative humidity of less than 75 % .

A. DCV Calibration

- Set the range to the “200mv” position .
- Set the output of the DC calibrator for $190\text{mv} \pm 0.02\%$. and connect it to “V- Ω ” , and “COM” input jacks .
- Slowly adjust the “R47” until the display reads $190.0\text{mv} \pm 1$ digit .
- Carefully inspect the other DCV ranges, your reading should be within the specification of instruction manual .
- There is no adjustable parts for the ACV range, your reading should be within the specification of instruction manual .

B.DCA Calibration

- Set the range to the “10A” position .
- Set the output of the DC calibrator for $1.9\text{A} \pm 0.02\%$. and connect it to the “10A” , and “COM” input jacks .
- Adjust “Shunt resistance” until the display reads 1.9A,if the reading is over 1.9A, add solder onto Shunt resistance , on the contrary the reading is under 1.9A, shave away some of solder from it ,carefully inspect the other ranges , your reading should be within the specification of instruction manual .



