INSTRUCTION MANUAL

MODEL

810

Digital Multimeters

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1. SPECIFICATIONS

1.1 General Specifications

Display	• 3¾-digital liquid crystal display (LCD) with a maximum reading of 3,999.
Polarity	• Automatic, (—) negative polarity indication.
Zero adjustment	• Automatic.
Overrange indication	• Highest digit of (OL) or (-OL) is displayed.
Low battery	• The (B) is displayed when the battery voltage drops below the operating voltage.
Peak Reading Hold	• Turning on the PKHOLD switch enables the peak hold feature and the (PH) being displayed.
Measurement rate	• 3 measurements per second, nominal.
Operating temperature	• 0°C to+50°C 0—70%RH.
Storage temperature	• —20°C to + 60°C, 0–80%RH with battery removed.
Accuracy	• Accuracy specifications at 23 ± 5°C, less than 75%RH.
Power	• Single, Standard 9-volt battery; NEDA 1604, JIS 006P IEC 6F 22.
Battery life (typical)	• 1 High-Power Zinc-Carbon Premium-200 hours.
Dimensions	• 6.3″ (16cm) long 3.3″ (8.4cm) wide 1″ (2.6cm) high.
Weight	• 9 ounces (250 grams) including. battery.
Accessories	• Test leads (pair), spare fuse, Battery, operators manual.

1.2 Electrical Specifications

● INTRODUCTION

Accuracies are ±(% reading plus number of digits). At 23±5°C, less than 75%RH.

● DC VOLTAGE

RANGE	400mV, 4V, 40V, 400V, 1000V
ACCURACY	ALL RANGE ±(0.5% RDG+1 DGT)
RESOLUTION	100μV TO 1V
INPUT IMPEDANCE	20MΩ
OL. PROTECTION	500VDC/350VAC FOR 15 SEC ON 400mV RANGE 1200VDC/800VAC ON OTHER RANGE.

● AC VOLTAGE

RANGE	400mV, 4V, 40V, 400V, 750V.
ACCURACY	400mV-400V @ 50-500HZ ±(1% RDG + 4 DGTS). 750V @ 50-500HZ, ±(1.5% RDG+4DGTS).
RESOLUTION	100μ V to 1V.
INPUT IMPEDANCE	20 MΩ
OL. PROTECTION	500VDC/350VAC FOR 15 SEC. ON 400mV RANGE 1200VDC/800VAC ON ALL OTHER RANGE.

● DC CURRENT

RANGE	40mA, 400mA, 10A
ACCURACY	10A RANGE, ±(2% RDG+3DGTS) OTHER RANGE, ±(1% RDG+1 DGT)
RESOLUTION	10μ A TO 10mA
VOLTAGE BURDEN	10A RANGE 700mV MAX.
OL. PROTECTION	10A INPUT, UNFUSE, UP TO 12A FOR 30 SEC.OTHER RANGE INPUT, 0.8A/250V FUSE.

● AC CURRENT

RANGE	40mA, 400mA, 10A.
ACCURACY	10A RANGE @ 50-500HZ, ±(2% RDG +4 DGTS) OTHER RANGE @50-500HZ, ±(1.2%RDG+4DGTS)
RESOLUTION	10μ A TO 10mA.
VOLTAGE BURDEN	10A RANGE 700mV MAX.
OL. PROTECTION	10A INPUT, UNFUSE, UP TO 12A FOR 30 SEC.OTHER RANGE INPUT, 0.8A/250V FUSE.

● RESISTANCE

RANGE	400Ω, 4KΩ, 40KΩ, 400KΩ, 4MΩ, 40MΩ, 400MΩ
ACCURACY	400Ω, ±5%RDG-10DGTS 40MΩ, ±3%RDG+3DGTS 400Ω, ±1%RDG+3DGTS OTHER RANGE ±0.8%RDG+1DGT
RESOLUTION	100mΩ TO 100KΩ.
OL. PROTECTION	500VAC/DC A DC 500 VDC/AC
TEST VOLTAGE	400Ω, 400MΩ, 3.2V MAX. OTHER RANGE, 0.3V MAX.

● DIODE TEST

TEST RANGE	1.0±0.6mA.
TEST VOLTAGE	3.2V MAX.

● HFE TEST

BASE DC CURRENT	10μA
VCE	2.8V±0.4V
RANGE	0 TO 1000

● CAPACITANCE

RANGE	4nF, 40nF, 400nF, 4μF, 40μF.
ACCURACY	ALL RANGE ±(3% RDG+10 DGTS)
TEST FREQUENCY	400HZ
TEST VOLTAGE	50mV
RESOLUTION	1PF TO 10nF.

● FREQUENCY MEASUREMENT

RANGE	AUTORANGE (4K-2M HZ)
INPUT SENSITIVITY	50mV RMS.
ACCURACY	±(1%RDG+2DGTS)
OL. PROTECTION	500V DC/AC
EFFECT READING	10HZ MIN

● LOGIC MEASUREMENT:

LOGIC TYPE	TTL
INPUT IMPEDANCE	120KΩ ±10KΩ
LOGIC THRESHOLD	LOGIC 1: 2.4V±0.2V
	LOGIC 0: 0.7V±0.2V
FREQUENCY RESPONSE	20MHz
DETECTABLE PULSE WIDTH	25nS, MIN
OL. PROTECTION	50V DC/AC

2. OPERATION

2.1 DC Voltage Measurement

1. Connect red test lead to V-Ω input connector and black test lead to COM input connector.
2. Set Function/Range switch to desired DC and V position. If magnitude of voltage is not known, set switch to the highest range and reduce until a satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Connect test leads to the device or circuit being measured.
5. Turn on power to the device or circuit being measured. Voltage value will appear on the digital display along with the voltage polarity.
6. Turn off power to the device or circuit being tested and discharge all capacitors prior to disconnecting test leads.

2.2 AC Voltage Measurements

1. Connect red test lead to V-Ω input connector and black test lead to COM input connector.
2. Set Function/Range Switch to desired AC and V position. If magnitude of voltage is not known, set switch to highest range and reduce until a satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Connect the test leads to device or circuit being measured.
5. Turn one power to the device or circuit being measured. Voltage value will appear on digital display.
6. Turn off power to the device or circuit being tested and discharge all capacitors prior to disconnecting test leads.

2.3 DC Current Measurement

1. Connect red test lead to the mA input connector for current

measurements up to 400 milliamperes. Connect black lead to the COM input connector.
2. Set Function/Range Switch to desired DC and A position. If magnitude of current is not known, set switch to highest range and reduce until a satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which current is to be measured.
5. Turn on power to the circuit being tested.
6. Read current value on digital display.
7. Turn off all power to the circuit being tested and discharge all capacitors.
8. Disconnect test leads from circuit and reconnect circuit that was being tested.

2.4 AC Current Measurement

1. Connect red test lead to the mA input connect for current measurements up to 400 milliamperes. Connect black lead to the COM input connector.
2. Set Function/Range Switch to desired AC and A position. If magnitude of current is not known, set switch to highest range and reduce until a satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which current is to be measured.
5. Turn on power to the circuit being tested.
6. Read current value on digital display.
7. Turn off all power to the circuit being tested and discharge all capacitors.
8. Disconnect test leads from circuit and reconnect circuit that was being tested.

2.5 Resistance Measurements

All resistance ranges on the multimeter are low-power ohms except for the 200-ohm range. The low power ohm allows accurate measurements of in-circuit resistance, as test voltage is below that necessary to turn

on a diode junction. Note: In the 400Ω range, the continuity beeper function is activated.

1. Connected red test lead to the V-Ω input connector and black test lead to the COM input connector.
2. Set Function/Range Switch to desired Ω position. If magnitude of resistance is not known, set switch to highest range and reduce until satisfactory reading is obtained.
3. If the resistance being measured is connected to a circuit, turn off power to the circuit being tested and discharge all capacitors.
4. Connect test leads to the circuit being measured. When measuring high resistance, be sure not to contact adjacent points even if insulated, because some insulators have a relatively low insulation resistance, causing the measured resistance to be lower than the actual resistance.
5. Read resistance value on digital display If a high resistance value is shunted by a large value of capacitance, allow digital to stabilize.

NOTE

A. All resistance ranges on the DMM, except the 400Ω range, are low-power ohms. This allows accurate measurements of in-circuit resistance because the test voltage is below that necessary to activate a diode junction.

2.6 Diode and Transistor Test Measurements

The special Diode Test Function allows relative measurements of forward voltage drops across diodes and transistor junctions. This function also permits measurement of in-circuit semiconductor junctions.

2.6.1 Diode Tests

1. Connect red test lead to the V-Ω input connector and black test lead to the COM input connector.
2. Set Function/Range Switch to the diode test position.
3. If the semiconductor junction being measured is connected to a circuit,

turn off power to circuit being tested and discharge all capacitors.

4. Connect test leads to the device.
5. Read forward value on digital display.
6. If the digital display reads overrange (1). reverse the lead connections. The placement of the test leads when the forward reading is displayed indicates the orientation of the diode. The read lead is positive and the black leads is negative. If overrange (1) is displayed with both lead connections, the junction is open. If a low-reading (less than 1,000) is obtained with both lead connections, the junction is shorted internally or (if junction is measured in a circuit) the junction is shunted by a resistance less than 1KΩ. In the latter case the junction must be disconnected from the circuit in order to verify its operation.

2.6.2 Transistor Junction Tests

1. Bipolar transistors can be tested in the same manner as diode junctions formed between the base and emitter and the base and collector of the transistor. Measurement between the collector and emitter also should be made to determine if a short is present.

2.7 Capacitance Measurements

1. Set the function/range switch to the desired capacitance range.
2. Short the leads of the capacitor to be tested together to insure that there is no charge on the capacitor.
3. Insert the capacitor leads into the capacitor test socket. Note that there are two groups of the holes. One lead must be inserted into one hole of group one, and the other lead must be inserted into one of the holes of group two.
4. Read the capacitance value in the display.

2.8 Continuity Measurements

1. Set the selectors switch to the 400Ω position.
2. Continuity between probe tips will be indicated by the audible beeper when resistance is below ~~100Ω~~ 30'7 Ω

2.9 Frequency Measurement

1. Connect the red lead to the "Hz" jack and the black lead to the "COM" jack.
2. Set the RANGE switch to the desired "Hz" position.
3. Connect test leads to device or circuit to be measured.
4. Read frequency on Digital Display.

2.10 Logic Measurement

1. Connect the red lead to the "LOG + " jack and the black lead to the "LOG – " jack.
2. Set the RANGE switch to the logic position.
3. Connect the red lead to the point to be tested and the black lead to the common buss of the logic circuit. If the circuit is in the Logic 1 state, the high (▲) indicator will appear, if it is in the Logic 0 state, the low (▼) will appear on the Digital Display.

3. OPERATOR MAINTENANCE

3.1 Troubleshooting

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.
2. Review the operating instructions for possible mistakes in operating procedure.
3. Inspect and test the Test Probes for a broken or intermittent connection.
4. Inspect and test the fuse. If it is necessary to replace the fuse, be sure to install one of the proper current value.

3.2 Battery and Fuse Replacement

WARNING

To prevent electrical shock hazard, turn off the multimeter and any device or circuit under test and disconnect the test leads before removing the-battery hatch or the rear cover.

3.2.1 Battery Replacement

1. Remove the battery cover by gently sliding it towards the bottom of the meter.
2. Remove and disconnect the old battery from the meter and replace with a new unit. Wind the excell lead length once around the battery clip. Install the battery and replace the battery cover.

CAUTION

Failure to turn off the multimeter before installing the battery could result in damage to the instrument and to the battery if the battery is conncted incorrectly to the multimeter.

3.2.2 Fuse Replacement

1. Remove the battery cover by gently sliding it towards the bottom of the meter.
2. Remove the old fuse and replace with a new fuse of the proper rating. The Model 335 requires a 0.25 amp, 250 volt fuse while the Model 318, 318B and 325 use fuses rated at 0.8 amps, 250 volts.

WARNING

To prevent fire, use a replacement fuse of the proper rating as shown in section (3.2.2.) above.

SAFETY RULES

Warning

This tester has been designed with safety in mind. However. no design can completely protect against incorrect use. Electrical circuits can be dangerous when lack of caution or poor safety practices are used.

Read The Manual

Read this Instruction Manual carefully and completely.

Voltages and currents within the capability of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester. Do not exceed the limits of the tester.

Safety Check

Double check the switch setting, and lead connections before making measurements.

Disconnect the tester or turn off the power before changing switch positions.

Do not connect to circuits with voltage present when switch is in any ohms or current position.

When replacing fuses, use only specified type fuses and insert in correct fuse holder.

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before connecting test probes to it. Be sure there is no voltage present you touch the circuit.

Do not use cracked or broken test leads.

Distribution Circuits

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high enery circuit when set to a low resistance range, a current range, or any other low impedance range, the circuit is virtually shorted.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.