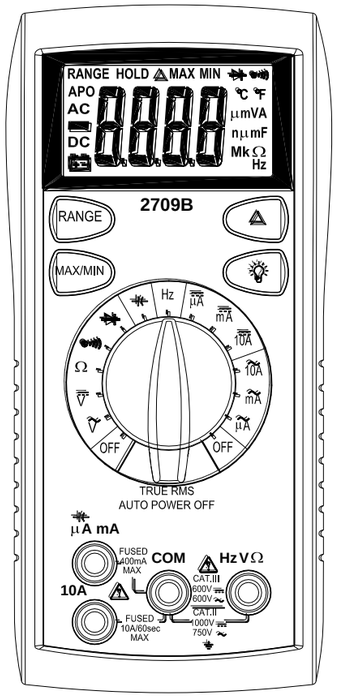
OPERATING INSTRUCTIONS
MODEL 2709B
DIGITAL MULTIMETER



SAFETY INFORMATION

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

Use the meter only as specified in this manual or the protection provided by the meter might be impaired.

Test the meter on a known voltage before using it to determine if hazardous voltage is present.

Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.

Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.

Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.

Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.

When using the probes, keep your fingers behind the finger guards on the probes.

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: 3¾ digit liquid crystal display (LCD) with a maximum reading of 6600.
Polarity: Automatic, positive implied, negative polarity indication.
Overrange: (OL) or (-OL) is displayed.
Zero: Automatic.
Low battery indication: The "🔋" is displayed when the battery voltage drops below the operating level.
Measurement rate: 2 times per second, nominal.
Auto power off: Approx. 30 minutes.
Operating environment: 0℃ to 50℃ at < 70% relative humidity.
Storage temperature: -20℃ to 60℃, 0 to 80% relative humidity.
Accuracy: Stated accuracy at 23℃ ±5℃, < 75% relative humidity.
Temperature Coefficient: 0.1 x (specified accuracy) per ℃. (℃ to 18℃, 28℃ to 50℃).
Altitude: 6561.7 feet (2000m).
Power: Single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.
Battery life: 150 hours typical with carbon-zinc.
Dimensions: 165mm (H) x78mm (W) x42.5mm (D).
Weight: Approx. 10.0 oz. (285g) including holster.
Accessories: One set test leads, one spare fuse, 9V battery (installed), and Operating Instructions.

DC VOLTS

Ranges: 660mV, 6.6V, 66V, 660V, 1000V
Resolution: 0.1mV
Accuracy: ± (0 . 5 % r d g + 2 d g t s)
Input impedance: 660mV: >100MΩ; 6.6V: 10MΩ; 66V ~ 1000V: 9.1MΩ
Overload protection: 1000VDC or 750VAC rms

AC VOLTS (TRUE RMS) (50Hz - 500Hz)

Ranges: 660mV, 6.6V, 66V, 660V, 750V
Resolution: 0.1mV
Accuracy: ± (1.5% rdg + 8 dgts) 50 ~60Hz on 660mV range
± (1.5% rdg + 8 dgts) on 6.6V to 660V ranges
± (2.0% rdg + 8 dgts) on 750V range
Crest factor: ≤3
Input impedance: 660mV: >100MΩ; 6.6V: 10MΩ; 66V ~ 750V: 9.1MΩ
Overload protection: 1000VDC or 750VAC rms

CURRENT

Ranges: 660uA, 6600uA, 66mA, 400mA, 10A
Resolution: 0.1uA
DC accuracy:
± (1.5% rdg + 2 dgts) on 660uA to 400mA ranges
± (3.0% rdg + 3 dgts) on 10A range
AC accuracy: (TRUE RMS) (50Hz ~ 500Hz)
± (2.0% rdg + 10 dgts) on 660uA to 400mA ranges
± (3.5% rdg + 10 dgts) on 10A range
Crest factor: ≤3
Voltage burden: 0.4V on 660uA, 66mA, 10A ranges
2V on 6600uA, 400mA ranges
Input protection: 0.5A/500V fast blow ceramic fuse
10A/600V fast blow ceramic fuse
10A Input: 10A for 60 seconds maximum followed by a 10 minute cooling period

RESISTANCE

Ranges: 660Ω, 6.6kΩ, 66kΩ, 660kΩ, 6.6MΩ, 66MΩ
Resolution: 0.1Ω
Accuracy:
± (1.2% rdg + 5dgts) on 660Ω to 660kΩ ranges
± (2.0% rdg + 5 dgt) on 6.6MΩ range
± (3.5% rdg + 5 dgt) on 66MΩ range
Open circuit volts: -0.45Vdc (-1.2Vdc on 660Ω range)
Overload protection: 500VDC or AC rms

CAPACITANCE

Ranges: 6.6nF, 66nF, 660nF, 6.6uF, 66uF, 660uF, 6.6mF, 66mF
Resolution: 1PF
Accuracy:
± (3.0% rdg + 30 dgts) on 6.6nF range
± (3.0% rdg + 5 dgts) on 66nF to 660uF ranges
± (5.0% rdg + 20 dgts) on 6.6mF, 66mF ranges
Overload protection: 500VDC or AC rms

FREQUENCY

Ranges: 660Hz, 6.6k, 66k, 660k, 6.6M, 66MHz
Resolution: 0.1Hz
Accuracy: ± (0.1% rdg + 3 dgts)
Sensitivity: 10Hz ~ 6.6MHz: >2.5V rms, 6.6MHz ~ 66MHz: >2.5V rms <5V rms
Minimum pulse width: > 25ns
Duty cycle limits: > 30% and < 70%
Overload protection: 500VDC or AC rms

DIODE TEST

Test current: 1.2mA (approximate)
Accuracy: ±(3.0% rdg + 3 dgts)
Resolution: 1mV
Audible indication: <0.03V
Open circuit volts: 3.5Vdc typical
Overload protection: 500VDC or AC rms

CONTINUITY

Audible indication: Less than 30Ω
Response time: 100ms
Overload protection: 500VDC or AC rms

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.

Input Warning Beeper

The meter has a beeper that warns the user when the test lead is in the current jack while the meter is switched to make a voltage measurement. Another safety feature to protect the meter and you.

MAX / MIN

The "MAX" displays the maximum value of measurements. The "MIN" displays the minimum value of measurements. The "MAX/MIN" appears and flashes in the LCD to display the value that is being measured now. After finishing the measurement, press MAX/MIN button for more than 2 seconds to exit.

Relative Δ

Press (Δ) button to enter the Relative mode. The (Δ) annunciator is displayed, and residual value on the display is subtracted and stored as a reference value. In the Relative mode, the value shown on the display is always the difference between the stored reference value and the present reading. Press (Δ) button again to exit the relative mode.

Backlight

Press the ☼ button to activate the backlight for approximately 60 second.

Manually Selecting Range

The meter also has a manual range mode. In manual range, you select and lock the meter in a range. To manually select a range:
Press [RANGE] button to hold the selected range. Subsequently pressing the [RANGE] button will select each range in sequence from the lowest to highest range. Hold the button for 2 seconds to return to the Autorange Mode.

Voltage Measurements

1.Connect the red test lead to "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.

Current Measurements

1.Connect the red test lead to the (uA, mA or 10A) jack and the black test lead to the "COM" jack.
2.Set the Function/Range switch to the DC or AC ranges.
3.Remove power from the circuit under test and open the normal circuit path where the measurement is to be taken. Connect the meter in series with the circuit.
4. Apply power and read the value from the display.

Resistance Measurements

1.Set the Function/Range switch to the desired resistance range.
2.Reove 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.

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, "OL" is displayed. If the diode is shorted, "000" or another number is displayed.
6. If the diode is open, "OL" is displayed in both directions.
7. Audible Indication: Less than 0.03V.

Continuity Measurements

1.Set the Function switch to the 🔊 position.
2.Turn off power to the circuit under test. External Voltage across the components causes invalid reading.
3.Connect the test leads to the two points at which continuity is to be tested. The buzzer will sound if the resistance is less than approximately 30Ω.

Capacitance Measurements

1. Set the Function/Range switch to the desired capacitance range.
2.Connect the red test lead to the "uA mA" jack and the black test lead to the "COM "jack.
3.Touch the probes to the capacitor. Observe polarity when measuring polarized capacitors.
4. Read the capacitance directly from the display.
5. Discharge the capacitor before taking capacitance measurements.
6.When the capacitor to be tested is connected, if "dISC" symbol indicates on LCD, it means there is voltage existing in the tested capacitor and need to be discharged before testing.
7.For maximum accuracy, step to the desired range in manual ranging, then press the Relative Δ button to zero out test lead capacitance before the measurement.

Frequency Measurements

1. Set the Function/Range switch to the "Hz" 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 point of measurement and read the frequency from the display.

Auto Power Off

1. Auto power off: approx. 30 minutes.
2. After auto power off, press any button to restart the meter, and the reading of measurement will be maintained in the display.

Cancellation of Auto Power Off Feature:

Press and hold the (RANGE) button while rotating function switch from off to any position to turn the meter on. The auto power off feature is disabled.
Note "APO" annunciator is missing from the LCD**.**

MAINTENANCE

WARNING
Remove test leads before changing battery or fuse or performing any servicing.

Battery Replacement

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

Fuse Replacement

If no current measurements are possible. Check for a blown overload protection fuse. For access to fuses, remove the three screws from the back of the meter and lift off the front case. Replace F1 only with the original type 0.5A/500V, fast acting ceramic fuse, 6.35x32mm Replace F2 only with the original type 10A/600V, fast acting ceramic fuse, 6.35x25.4mm.

Cleaning

Wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

CE

Safety: Conforms to IEC61010-1 (EN61010-1), CATII 1000V, CATIII 600V, Class II, Pollution degree 2 Indoor use.
CATII: Is for measurements performed on circuits directly connected to the low-voltage installation.
CAT III: Is for measurements performed in the building installation.
EMC: Conforms to EN61326.

The symbols used on this instrument are:
⚠ Caution, refer to accompanying documents
⧈ Equipment protected throughout by Double insulation (Class II)
~ Alternating current
⎓ Direct current
⏚ Ground