# 5800 Series

# DIGITAL MULTIMETER

## Owner's manual Model: 5800 Series

• Read this owner's manual thoroughly before use

## ⚠ WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as batteries or fuses. If the defect has been caused by a misuse or abnormal operating conditions, the repair will be billed at a nominal cost.

## SAFETY INFORMATION

The digital multimeter has been designed according to IEC-1010 concerning electronic measuring instruments with an overvoltage category (CAT II 600V) and pollution degree 1.

## ELECTRICAL SYMBOLS

~ AC (Alternating Current)

⎓ DC (Direct Current)

⚠ Important safety information. Refer to the manual.

Dangerous voltage may be present.

Earth ground

Fuse

CE Conforms to European Union directives

Double insulated

## ⚠ WARNING

To avoid possible electric shock or personal injury, follow these guidelines:

- Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- Do not use the meter if it operates abnormally. Protection may be impaired.

- When in doubt, have the meter serviced.
- Do not operate the meter around explosive gas, vapor, or dust.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When servicing the meter, use only specified replacement parts.
- Use with caution when working above 30VAC rms, 42V peak, or 60VDC. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- Remove the test leads from the meter before you open the battery door.
- Do not operate the meter with the battery door or portions of the cover removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator ("⊏+") appears.
- CAT Ⅱ- Measurement Category Ⅱ is for measurements performed on circuits directly connected to low voltage installation.(Examples are measurements on household appliances, portable tools and similar equipments.) Dot not use the meter for measurements within Measurement Categories Ⅲ and Ⅳ .

**CAUTION**

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:

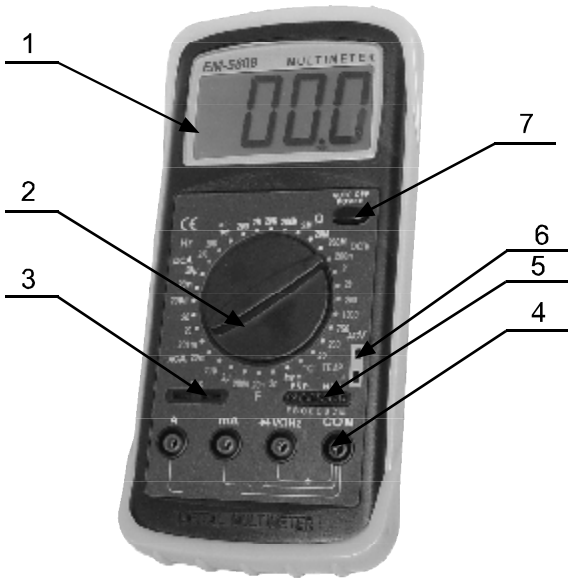
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Use the proper terminals, function, and range for your measurements.Before measuring current, check the meter's fuses and turn power OFF to the circuit before connecting the meter to the circuit.

- Before rotating the range switch to change functions, disconnect test leads from the circuit under test.
- Before attempting to insert transistors for testing, always be sure that the test leads have been disconnected from any measurement circuits.Remove test leads from the meter before opening the meter case.

## MAINTENANCE

- Before opening the case, always disconnect the test leads from all live circuits.
- To continue protection against fire, replace fuse only with the specified voltage and current ratings:
  F 250mA/250V (Fast Blown) ø5 × 20
  F 2A/250V (Fast Blown) ø5 × 20 (for 5801 only)
- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

## FRONT PANEL




1. LCD
2. Function \ Range Switch
3. Capacitance Measuring Socket
4. Input Jacks
5. Transistor hFE Testing Socket
6. Temperature Measuring Socket
7. Power Switch or Data-Hold button

## INTRODUCTION

The digital multimeter is a compact precision, battery operated, and 3 1/2 or 4 1/2 digit LCD digital instrument.

Superiority:

- High accuracy
- Digital height 27 mm
- Single 32-range rotary switch for FUNCTION and RANGE Selection, allows fast and convenient operation.
- Curvilinear mode soft case.
- Colored indication jack with full protection test leads.
- Auto power off function.

## GENERAL SPECIFICATIONS

**Display:** 3 1/2 digit LCD with maximum reading of 1999 (model 5803/5804 is 4 1/2 digit with maximum reading of 19999)

**Measurement rate:** updates 2-3 /sec.

**Overrange indication:** Only figure "1" displayed on the LCD

Automatic negative("-") polarity indication.

Mark " ⊟+ " is displayed when the battery voltage drops below the operating voltage.

Mark " H " is displayed when selecting Data Hold function.

Full range over load protection.

Auto-zeroing in capacitance measurement.

**Auto Power-off:** The meter will be automatically cut off in about 15 minutes after the power is turned on. To turn on the meter again, just push the power switch twice again.

**Operating temperature:** 0˚C ~ +40˚C, 0~75%R.H.

**Storage temperature:** -10˚C+50˚C, 0~75%R.H.

**Power:** Single standard 9V battery (IEC 6F22, NEDA1604, or JIS 006P).

**Dimensions:** 200 × 93 × 50mm(L × W × H)

**Weight:** approx. 400g (including battery)

## SELECTION TABLES

| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
|---|---|---|---|---|---|---|---|---|
| DCV | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| ACV | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| DCA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| AVA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ω | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
|  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| hFE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CAP | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| TEMP | | | | | | | ✓ | ✓ |
| FREQ | | | ✓ | ✓ | | ✓ | | ✓ |
| Auto OFF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Data Hold | | | ✓ | ✓ | | | | |

## TECHNICAL SPECIFICATIONS

Accuracy is specified for a period of one year after calibration
and at 18˚C~28˚C (64˚F~82˚F) with relative humidity up to 75%.
Accuracy specifications take the form of:
±([% of Reading]+[Number of Least Significant Digits])

# 1.DCV

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **200mV** | ± (0.5%+1) | ± (0.5%+1) | ± (0.05%+3) | ± (0.1%+2) | ± (0.5%+1) | ± (0.5%+1) | ± (0.5%+1) | ± (0.5%+1) |
| **2V** | | | | | | | | |
| **20V** | | | | | | | | |
| **200V** | | | | | | | | |
| **1000V** | ± (0.8%+2) | ± (0.8%+2) | ± (0.1%+5) | ± (0.2%+5) | ± (0.8%+2) | ± (0.8%+2) | ± (0.8%+2) | ± (0.8%+2) |

Input impedance:10MΩ on all range

## 2.ACV

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **200mV** | ± (1.2%+3) | ± (1.2%+3) | ———— | ———— | ± (1.2%+3) | ———— | ± (1.2%+3) | ———— |
| **2V** | ± (0.8%+3) | ± (0.8%+3) | ± (0.8%+10) | ± (0.8%+15) | ± (0.8%+3) | ± (0.8%+3) | ± (0.8%+3) | ———— |
| **20V** | | | | | | | | ± (0.8%+3) |
| **200V** | | | | | | | | |
| **750V** | ± (1.2%+3) | ± (1.2%+3) | ± (1%+15) | ± (1.2%+3) | ± (1.2%+3) | ± (1.2%+3) | ± (1.2%+3) | ± (1.2%+3) |

Input impedance: 10MΩ

Frequency range:40~400Hz

## 3.DCA

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **20μA** | ± (2%+5) | ——— | ——— | ——— | ——— | ——— | ——— | ± (2%+5) |
| **200μA** | ± (0.5%+1) | | ± (0.5%+2) | ± (0.5%+2) | | | | ——— |
| **2mA** | | ± (0.8%+1) | | | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | |
| **20mA** | | | | | | | | ± (0.8%+1) |
| **200mA** | ± (1.2%+1) | ± (1.2%+1) | ± (0.75%+5) | ± (0.75%+5) | ± (1.2%+1) | ± (1.2%+1) | ± (1.2%+1) | ± (1.2%+1) |
| **2A** | | ——— | ——— | ——— | ——— | ——— | ——— | ——— |
| **20A** | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) | (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) |

Measuring Voltage drop:200mV

## 4.ACA

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **20μA** | ± (3%+7) | ——— | ——— | ——— | ——— | ——— | ——— | ——— |
| **200μA** | ± (1.8%+3) | | | | | | | |
| **2mA** | ± (1%+3) | ± (1%+3) | ± (0.8%+10) | ± (0.8%+10) | ± (1%+3) | ± (1%+3) | ± (1%+3) | |
| **20mA** | | | | | | | | ± (1%+3) |
| **200mA** | ± (1.8%+3) | ± (1.8%+3) | | | ± (1.8%+3) | ± (1.8%+3) | ± (1.8%+3) | ± (1.8%+3) |
| **2A** | | ——— | ——— | ——— | ——— | ——— | ——— | ——— |
| **20A** | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) | ± (2%+5) |

Measuring Voltage drop: 200mV Frequency range: 40~400Hz

## 5.CAPACITANCE

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **2nF** | ——— | ± (2.5%+3) | ± (2.5%+3) | ± (2.5%+3) | ± (2.5%+3) | ± (2.5%+3) | ± (2.5%+3) | ± (2.5%+3) |
| **20nF** | | | | | | | | |
| **200nF** | | | | | | | | |
| **2μF** | | | | | | | | |
| **20μF** | | | | | | | | |

## 6.OHM

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **200Ω** | ± (0.8%+3) | ± (0.8%+3) | ± (0.2%+5) | ± (0.2%+5) | ± (0.8%+3) | ± (0.8%+3) | ± (0.8%+3) | ± (0.8%+3) |
| **2kΩ** | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) | ± (0.8%+1) |
| **20kΩ** | | | | | | | | |
| **200kΩ** | | | | | | | | |
| **2MΩ** | | | | | | | | |
| **20MΩ** | ± (1%+2) | ± (1%+2) | ± (0.5%+5) | ± (1%+5) | ± (1%+2) | ± (1%+2) | ± (1%+2) | ± (1%+2) |
| **200MΩ** | ——— | ± (5%+1) | ——— | ——— | ± (5%+10) | ——— | ± (5%+10) | ± (5%+10) |

## 7.TEMPERATURE(EM5807 & EM5808 only)

| Range | Accuracy | |
|---|---|---|
| | EM5807 | EM5808 |
| 0˚C~400˚C | ± (0.75%+3) | ± (0.75%+3) |
| 400˚C~1000˚C | ± (1.5%+15) | ± (1.5%+15) |

With K-type thermocouple wire

## 8.FREQUENCYTEST

| Range | Accuracy | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | EM5801 | EM5802 | EM5803 | EM5804 | EM5805 | EM5806 | EM5807 | EM5808 |
| **2KHz** | ——— | ——— | ——— | | ——— | ± (1.5%+5) | ——— | ± (1.5%+5) |
| **20KHz** | | | ± (1.5%+3) | ± (1.5%+5) | | | | |

## OPERATING INSTRUCTIONS

### DC VOLTAGE MEASUREMENT

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 V⎓ range. If the voltage to be measured is not known beforehand, set the range switch to the highest range and then turn it down range by range until satisfactory resolution is obtained.
3. Connect the test leads to the source or load to be measured.
4. Read the voltage value displayed on the LCD along with the polarity of the red test lead.

### AC VOLTAGE MEASUREMENT

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 V~ range. If the voltage to be measured is not known beforehand, set the range switch to the highest range and then turn it down range by range until satisfactory resolution is obtained.
3. Connect the test leads to the source or load to be measured.
4. Read the voltage value displayed on the LCD.

### DC CURRENT MEASUREMENT

1. Connect the black test lead to the "COM" jack and the red test lead to the "mA" jack (to "A" jack for 5801). While the current to be measured is between 200mA (2A for 5801) and 20A, remove the red test lead to the "20A" jack.
2. Set the Function/Range switch to the desired A⎓ range. If the current to be measured is not known beforehand, set the range switch to the highest range and then turn it down range by range until satisfactory resolution is obtained.
3. Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
4. Read the current value displayed on the LCD along with the polarity of the red test lead.

## AC CURRENT MEASUREMENT

1. Connect the black test lead to the "COM" jack and the red test lead to the "mA" jack (to "A" jack for 5801). While the current to be measured is between 200mA (2A for 5801) and 20A, remove the red test lead to the "20A" jack.
2. Set the Function/Range switch to the desired A~ range. If the current to be measured is not known beforehand, set the range switch to the highest range and then turn it down range by range until satisfactory resolution is obtained.
3. Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
4. Read the current value displayed on the LCD.

## RESISTANCE MEASUREMENT

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 " Ω " range.
3. Connect the test leads to the resistor to be measured and read the value displayed on the LCD.

## Note

- For resistance about 1MΩ and above, the meter may take a few seconds to stabilize. This is normal for high resistance readings.
- In range 200MΩ, it is normal that number 1000 is displayed on the LCD when the test leads is shorted, and the number must be subtracted from the reading while making measurement.

## CAPACITANCE MEASUREMENT

1. Set theFunction/Range switch to the desired Cx range.
2. Before inserting the capacitor to be measured into the capacitance measuring socket, be sure that the capacitor has been fully discharged.
3. Insert the capacitor to be measured into the capacitance measuring socket.

4. Read the capacitance value displayed on the LCD.

## DIODE TEST

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack. (The polarity of the red test lead is positive "+").
2. Set the Function/Range switch to " ⊣◀ " range.
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode. The approximate forward voltage drop of the diode will be displayed on the LCD. If the connection is reversed, only figure "1" will be shown.

## AUDIBLE CONTINUITY TEST

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 " •)) " range.
3. Connect the test leads to the two terminals of the circuit to be tested. If the resistance is less than about 30Ω, the built-in buzzer will sound.

## TRANSISTOR TEST

1. Set the Function/Range switch to "hFE" range.
2. Determine whether the transistor to be tested is NPN or PNP, and locate the E, B, C leads. Insert the leads into the proper holes of the hFE socket on the front panel.
3. Read the approximate hFE value at the test condition of base current 10μA and Vce 2.8V.

## FREQUENCY MEASUREMENT

1. Set theFunction/Range switch to the "KHz" range.
2. Connect the black test lead to the "COM" jack and the red test lead to the "VΩ " jack.
3. Connect the test leads to the source or load to be measured.
4. Read the frequency value displayed on the LCD.

## TEMPERATURE MEASUREMENT

1. Insert the K type thermocouple to the temperature jack.
2. Set the Function/Range switch to the " ˚C " range.
3. Connect the K type thermocouple to the object to be measured.
4. Read the temperature value displayed on the LCD.

## AUTO POWER-OFF

The function of auto power-off extends the life of the battery by turning the meter off if the range switch has not been operated for about 15 minutes. To turn the meter on again, just rotate the range switch or press the power switch.

## BATTERY & FUSE REPLACEMENT

- If "⊏±" appears on the LCD, it indicates that the battery should be replaced. To replace the battery, open the case, and replace the exhausted battery with the ratings specified: 9V, NEDA 1604 or 6F22, and then close the case.
- The fuse rarely needs to be replaced and is blown as a result of the operator's error. To replace the fuse, open the case, and replace the blown fuse with the ratings specified: F 250mA/250V (F 2A/250V for 5801 only), and then close the case.

## ACCESSORIES

Users Manual ---------- 1 copy
Test Leads ---------- 1 pair
9V Battery (NEDA 1604 or 6F22) ----------1 piece
K-type thermocouple (for model 5807/5808 only) -------- 1 piece