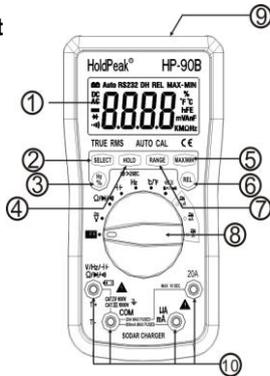


# 90B 6000 DIGITS AUTO CAL DIGITAL MULTIMETER OPERATOR'S MANUAL

## 1. Overview

The multimeter is characterized by slim size, portable, stable performance and anti-dropping capacity. Using 6000 digits LCD monitor with character 22mm high, they offer clear readings. With overall circuitry design centering on large-scale IC A/D converters in conjunction and over-load protection circuit, the meters give excellent performance and exquisite making as a handy utility instrument. The meters can be used to measure DC & AC voltage, DC & AC current, resistance, capacitor, Frequency, positive diode voltage fall, Battery power, Temperature and Continuity.

## 2. Panel Layout



- ① LCD Display: 6000 digits, full function symbol display
- ② SELECT key: This key work on the "CAP" range, Push the key to choose resistance, diode, continuity test, on the voltag or current range, change to DC/AC, and °C/°F range, change to °C/°F
- ③ Hz/DUTY Key: In "ACV/ACA" or "Hz" range, push the key, you can measure the Hz, push again, can measure the duty.
- ④ HOLD/ Back Light key: In any range, push the key, the present display value will be locked and the "H" symbol will appear, push it again to exit HOLD and the "H" symbol disappear. Press "HOLD" button more than 2 seconds, the back light will light, press it more than 2 seconds again, the back light will light off.
- ⑤ MAX/MIN key: Push the key to select MAX mode, push it again to change MIN mode, push once again to change max-min, press the key for more than 2 seconds to go back auto range mode. And Push the key to change manual range mode. But in Hz/Duty and Capacitance measurement, it can not use.
- ⑥ REL Key: Pressing this button, the meter enters relative measuring mode, "REL" is displayed on the LCD and the present reading becomes the reference value and displayed on the display. Relative measurement  $REL\Delta = \text{measurement value} - \text{Reference value}$ .
- ⑦ RANGE Key: Pressing this button, the meter enters manual range mode, press it more than 2 seconds again, return to auto mode
- ⑧ Rotary Switch: use this switch to select functions and ranges
- ⑨ Illuminative window
- ⑩ V  $\Omega$  Input Jack, 10A Input Jack, mA Input Jack, COM Input Jack

## 3. Safety Information

3-1 The meters are designed according to IEC-1010 concerning electronic measuring instruments with an over-voltage category 600V (CAT IV)/1000V (CAT III) and pollution 2.

3-2 Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.

3-3 safety symbols:

important safety information, refer to the operating manual.

Dangerous voltage may be presence.

Double insulation (protection Class II)

## 4. Special Cautions for Operation

4-1 The meters can be safe only according to standard procedures when used in conjunctions with the supplied test leads. To replace damaged test leads with only the same model or same electric specifications.

4-2 To avoid risk of electric shock, do not use the meters before the cover is in place.

4-3 The Rotary switch should be right position for the testing.

4-4 To avoid electric shock and damaging the instruments, the input signals are forbidden to exceed the specified limits.

4-5 When measuring TV set or switched power, attention should be paid to the possible pulses that may bring destruction to the circuit.

4-6 Rotary switch position is forbidden to be changed at random during measurement.

4-7 Take caution against shock in the course of measuring voltage higher than DC 60V & AC 30V.

4-8 Protection fuse should be replaced only with same type and same specification.

4-9 After operation is finished, set function switch at OFF range to save battery power.

4-10 If the meter is without usage for long time, take out battery to avoid damage by battery leakage.

## 5. GENERAL SPECIFICATIONS

5-1 Max Voltage between input terminal and Earth Ground: CAT IV 600V

5-2 Over-range Indication: display "OL" for the significant digit.

5-3 Automatic display of negative polarity " - "

5-4 Low Battery Indication: displayed

5-5 Max LCD display: 6000 digits; capacitor, Frequency range: 9999 digits

5-6 auto ranges

5-7 Fuse protection: F-800mA/1000V ( $\varnothing$ 6x32mm) F-10A/1000V ( $\varnothing$ 10x38mm)

5-8 Power Supply: 9V Zinc-carbon battery

5-9 auto power-off: 15minites, Push SELECT Key, Atuo power Off disable;

5-10 Operating Temp.: 0°C to 40°C (relative humidity <85%)

5-11 Storage Temp.: -10°C to 50°C (relative humidity <85%)

5-12 Guaranteed precision Temp.: 23±5 °C (relative humidity <70%)

5-13 Dimension: 193×88×41mm

Weight: approx.320g (including battery)

## 6. Testing Specifications

Accuracy is specified for a period of year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 70%.

### 6-1 DC Voltage

range	resolution	accuracy
600mV	0.1mV	±(1.2% of rdg + 5 digit)
6V	1mV	±(0.8% of rdg + 5 digits)
60V	10mV	±(0.8% of rdg + 5 digits)
600V	100mV	±(0.8% of rdg + 5 digits)
1000V	1V	±(1.5% of rdg + 10 digits)

-- Input Impedence: 10M $\Omega$ , 60mV, 600mV range > 100 M $\Omega$

-- Overload protection: 250V for 400mV range, DC 1000V or AC 750V for other ranges

### 6-2 AC Voltage (True RMS)

Range	Resolution	Accuracy	Sensitivity
600mV	0.1mV	±(2.5% of rdg + 15 digit)	40HZ-1KHZ
6V	1mV	±1.0% of rdg + 10 digits	40HZ-400HZ
60V	10mV	±1.0% of rdg + 10 digits	40HZ-400HZ
600V	100mV	±1.0% of rdg + 10 digits	40HZ-400HZ
750V	1V	±1.0% of rdg + 10 digits	40HZ-400HZ

1. input impedance : > 10M $\Omega$ ; 60mV, 600mV range > 100 M $\Omega$

2. Overload protect : 250V for 400mV range, DC 1000V or AC 750V for other ranges

### 6-3 DC Current

range	Resolution	accuracy
600uA	0.1uA	±(1.0% of rdg + 5 digits)
6000uA	1uA	±(1.0% of rdg + 5 digits)
60mA	10uA	±(1.0% of rdg + 5 digits)
600mA	100uA	±(1.0% of rdg + 5 digits)
6A	1mA	±(1.5% of rdg + 5 digits)
10A	10mA	±(1.5% of rdg + 5 digits)

Overload protection:

4A & 10A ranges: F10A/1000V fuse

Other ranges: F500mA/1000V fuse

10A up to 10 seconds

### 6-4 AC Current

range	Resolution	accuracy
600uA	0.1uA	±(1.5% of rdg + 10 digits)
6000uA	1uA	±(1.5% of rdg + 10 digits)
60mA	10uA	±(1.5% of rdg + 10 digits)
600mA	100uA	±(1.5% of rdg + 10 digits)
6A	1mA	±(2.0% of rdg + 10 digits)
10A	10mA	±(2.0% of rdg + 20 digits)

Overload protection:

6A & 10A ranges: F10A/1000V fuse

Other ranges: F800mA/1000V fuse

10A up to 10 seconds

Frequency Range: 40 to 1KHz

### 6-5 Resistance

range	Resolution	accuracy
600 $\Omega$	0.1 $\Omega$	±(1.2% of rdg + 10 digits)
6K $\Omega$	1 $\Omega$	±(1.2% of rdg + 5 digits)
60K $\Omega$	10 $\Omega$	±(1.2% of rdg + 5 digits)
600K $\Omega$	100 $\Omega$	±(1.2% of rdg + 5 digits)
6M $\Omega$	1K $\Omega$	±(1.5% of rdg + 10 digits)
60M $\Omega$	10K $\Omega$	±(2.5% of rdg + 10 digits)

-- over-load protection: 600V effective value

### 6-7 Capacitor

range	Resolution	accuracy
9.999nF	0.001nF	±(3.0% of rdg + 20 digits)
99.99nF	1pF	±(2.5% of rdg + 10 digits)
999.9nF	0.1nF	±(2.5% of rdg + 10 digits)
9.999uF	1nF	±(2.5% of rdg + 10 digits)
99.99uF	10nF	±(3.0% of rdg + 10 digits)
999.9uF	0.1uF	±(3.0% of rdg + 25 digits)
9.999mF	1uF	±(3.5% of rdg + 25 digits)
99.99mF	10uF	±(3.5% of rdg + 25 digits)

-- over-load protection: 600V effective value

### 6-8 Frequency Testing

range	resolution	Accuracy
9.999Hz	0.001Hz	±(0.5% of rdg + 15 digits)
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999kHz	1Hz	

99.99kHz	10Hz	
999.9kHz	100Hz	
9.999MHz	1kHz	

**Duty cycle:** 1%~99% Accuracy:  $\pm 0.5$

-- Overload Protection: 600V DC or rms AC, Sensitivity: Range of input voltage: 1.5V~10V, If input voltage over range, need adjust

### 6-9 Temperature (NiCr-NiSi sensor)

range	resolution	Accuracy
-4~1832°F	1°F	$\pm (3\% \text{ of rdg} + 5 \text{ digits})$
-20~1000°C	1°C	$\pm (3\% \text{ of rdg} + 3 \text{ digits})$

-- over-load Protection: 600V DC or rms AC

### 6-10 Diode Test

range	resolution	Function
$\rightarrow$	1mV	Display: read approximate forward voltage of diode

-- over-load Protection: 250V effective value, forward DC current: approximate 1.5mA Reversed DC voltage: approximate 3.0V

### 6-11 Continuity

range	Function
$\rightarrow$	Built-in buzzer will sound if resistance is lower than 50Ω

-- over-load protection: 250V effective value  
open circuit voltage: approximate 1.0V

### 6.12 Battery Power Test

Range	Accuracy	Test Condition
$\rightarrow$	$\pm (1.5\% \text{ of rdg} + 5 \text{ digits})$	Loading Current: Approx. 25mA

Overload protection: DC/AC PEAK 15V

Battery voltage: 1.5V~12V

## 7. OPERATING INSTRUCTIONS

### 7-1 Measuring DC Voltage

- 7-1-1 Connect the black test lead to **COM** jack and the red to **VΩHz** jack.
- 7-1-2 Set the rotary switch at the desired  $V_{DC}$  range position.
- 7-1-3 Connect test leads across the source or load under measurement.
- 7-1-4 You can get reading from LCD. The polarity of the red lead connection will be indicated along with the voltage value.

#### NOTE:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only 'OL' is displayed, it indicates over-range situation and the higher range has to be selected.
3. " $\Delta$ " means you can't input the voltage more than 1000V, it's possible to show higher voltage, but it may destroy the inner circuit or pose a shock.
4. Be cautious against shock when measuring high Voltage.

### 7-2 Measuring AC Voltage

- 7-2-1 Connect the black test lead to COM jack and the red to **VΩHz** jack.
- 7-2-2 Set the rotary switch at the desired  $V_{AC}$  range position.
- 7-2-3 Connect test leads across the source or load under measurement.
- 7-2-4 You can get reading from LCD.

#### NOTE:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only 'OL' is displayed, it indicates over-range situation and the higher range has to be selected.
3. " $\Delta$ " means you can't input the voltage more than 750V, it's possible to show higher voltage, but it may destroy the inner circuit or pose a shock.
4. Be cautious against shock when measuring high Voltage.

### 7-3 Measuring DC & AC Current

- 7-3-1 Connect the black test lead to **COM** jack and the red to the **μA mA** jack for a maximum 600mA current, for a maximum 6A or 10A current, move the red lead to the 10A jack.
- 7-3-2 Set the rotary switch at the desired  $\mu A$  & mA & 10A range position, it shows symbol for testing DC current, if you want to test AC current, push 'select' button switch.
- 7-3-3 Connect test leads in series with the load under measurement.
- 7-3-4 You can get reading from LCD. The polarity of the red lead connection will be indicated along with the DC current value.

#### NOTE:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only 'OL' is displayed, it indicates over-range situation and the higher range has to be selected.
3. " $\Delta$ " means the socket mA's maximum current is 600mA and 10A's maximum current is 10A, over current will destroy the fuse.

### 7-4 Measuring Resistance

- 7-4-1 Connect the black test lead to **COM** jack and the red to **VΩHz** jack.
- 7-4-2 Set the rotary switch at the desired  $\Omega$  range position.
- 7-4-3 Connect test leads across the resistance under measurement.
- 7-4-4 You can get reading from LCD.

#### NOTE:

1. When only 'OL' is displayed, it indicates over-range situation and the higher range has to be selected.
2. For measuring resistance above 1MΩ, the meter may take a few seconds to get stable reading.
3. When the input is not connected, i.e. at open circuit, the figure 'OL' will be displayed for the over-range condition.
4. When checking in-circuit resistance, be sure the circuit under test has all power

removed and that all capacitors have been discharged fully.

5. the value scale to be measured is unknown beforehand, set the range selector at the highest position.

### 7-5 Measuring Capacitor

- 7-5-1 Connect the black test lead to **COM** jack and the red to **-II-** jack.
- 7-5-2 Set the rotary switch at the desired "II" range position.
- 7-5-3 Before inserting capacitor under measurement into capacitance testing socket, be sure that the capacitor has been discharged fully.
- 7-5-4 You can get reading from LCD.

#### Caution:

- a) Capacitors should be discharged before being tested.
- b) When testing large capacitance, it will take longer time before the final indication (For 1uF~99.99mF range, it will take about 4~7 seconds).
- c) When testing small capacitance ( $\leq 1\mu F$ ), to assure the measurement accuracy, first press "REL", then go on measuring.  
Max. input over-load: 250V rms < 10sec

### 7-6 Measuring Frequency

- 7-6-1 Connect the black test lead to **COM** jack and the red to **Hz** jack.
- 7-6-2 Set the rotary switch at the Hz range position.
- 7-6-3 Connect test leads across the source or load under measurement.
- 7-6-4 You can get a reading from LCD.

### 7-7 Temperature measurement

- 7-7-1 Connect the black test lead of the sensor to **T-** socket and the red test lead to the **T+** socket.
- 7-7-2 Set the selector switch to " $^{\circ}C/^{\circ}F$ " position.
- 7-7-3 Put the sensor probe into the temperature field under measurement.
- 7-7-4 Read the result from the LCD panel.

NOTE: Max. input over-load: 250V rms < 10sec

- A. The temperature function shows the random number at ordinary times, must insert the thermocouple in temperature test hole while examining temperature.
- B. This meter inclosure WRNM-010 type contact thermocouple limit temperature is 250  $^{\circ}C$  (300  $^{\circ}C$  shortly);
- C. Please don't change the thermocouple at will, otherwise we can't guarantee to measure accuracy; Please don't importing the voltage in the temperature function.
- D. Please use special probe for test high temperature.

### 7-8 Diode Testing

- 7-8-1 Connect the black test lead to COM jack and the red to  $\rightarrow$  jack. (the polarity of red lead is '+')
- 7-8-2 Set the rotary switch at the  $\Omega \rightarrow \rightarrow$  range position, push 'SELECT' button switch until symbol of  $\rightarrow$  is displayed on LCD.
- 7-8-3 Connect the red lead to the anode and the black lead to the cathode of the diode under testing.
- 7-8-4 You can get a reading from LCD.

#### NOTE:

1. The meter will show approximate forward voltage drop of the diode.
2. If the lead connections is reversed, only 'OL' will be displayed.

### 7-9 Continuity Testing

- 7-9-1 Connect the black test lead to COM jack and the red to  $\rightarrow$  jack.
- 7-9-2 Set the rotary switch at the  $\Omega \rightarrow \rightarrow$  range position, push 'SELECT' button switch until symbol of  $\rightarrow$  is displayed on LCD.
- 7-9-3 Connect test leads across two points of the circuit under testing.
- 7-9-4 If continuity exists (i.e. resistance less than about 50Ω), buzzer will sound.

#### NOTE:

- If the input open circuit, the figure 'OL' will be displayed.  
Circuit under measurement should be power-off,  
otherwise, any load signal can make the buzzer sound.

### 7-10 Battery Power Test

- 7-10-1 Set the FUNCTION switch to the " $\rightarrow$ " range
- 7-10-2 Connect the BLACK test lead to "COM" jack and the RED test lead to the "VΩ" jack.
- 7-10-3 Connect the BLACK test lead to the cathode and the RED test lead to the anode of the battery under testing.
- 7-10-4 The LCD display Voltage of battery by testing with load

### 8. Maintenance

- 8-1 Before attempting to remove the battery door or open the case, be sure that test leads have been disconnected from measurement circuit top avoid electric shock hazard.
- 8-2 To avoid electrical shock, remove test leads from measurement circuits before replacing the fuse. For protection against fire, replace fuses only with specified ratings: F-800mA/1000V fuse or F-10A/1000V
- 8-3 Your must replace the test leads if the lead is exposed, and should adopt the leads with the same specifications as origin.
- 8-4 Use only moist fabric or small amount of detergent but not chemical solution for cleaning.
- 8-5 Do not use the meter before the back cover is properly closed and screw secured. Upon any abnormality, stop operation immediately and send the meter for maintenance.
- 8-6 Please take out the battery when not using for a long time.

### 9. Accessories

- [1] Test Leads: electric rating 1000V 10A
- [2] Fuse: F-800mA/1000V F-10A/1000V
- [3] 'K' type Thermocouple
- [4] Operator's Manual

