### 3.2.12 DIODE TEST

| Measuring range | Resolution | Function |
|---|---|---|
| →\|← | 0.001V | Display approximate diode forward voltage value |

- Forward DC current is about 1mA
- Backward DC voltage is about 3.3V
- Overload protection: 250V DC or AC (RMS)

### 4.1 READING HOLD

1. During measurement, if reading hold is required, press “HOLD/BL” key and the value on the display will be locked. Press “HOLD/BL” key again to cancel reading hold state.

### 4.2 MANUAL MEASURING RANGE

1. RANGE key is automatic/manual measuring range key to trigger mode. The preset range is automatic measuring range. Press to switch to manual measuring range. In manual measuring range mode, click once to change to upper range. Continue to the top range, then continue to press this key to change to the bottom range, followed by recycling. If this key is pressed more than 2 seconds, it will switch back to automatic measuring range state.

Note: In capacitance and frequency measurement state, rhw manual measuring range key is invalid.

### 4.3 FREQUENCY/DUTY RATIO SWITCH

1. When meter is in AC voltage mode, if “Hz/%” key is pressed, the meter will measure Hz, and measure AC voltage, AC current signal frequency. Click “Hz/%” key again and meter will measure DUTY cycle, voltage and current signal duty ratio. If in HZ/DUTY position, pressing HZ % key will switch between HZ and DUTY by recycling.
2. If “Hz/%” key is pressed again, meter will revert to voltage, current measurement state.

Note: If meter is in maximum/minimum value measurement state, it can not switch to frequency, duty ratio measurement mode.

### 4.4 MAX/MIN MEASUREMENT CHOICE

1. Press “MAX/MIN” key to enter MAX mode, and always keep measurement maximum value; press “MAX/MIN” key again, to enter minimum value measurement state; press “MAX/MIN” key for the third time and the meter will display the difference of maximum and minimum value; press “MAX/MIN” key to repeat the above operations by recycling.
2. After entering MAX or MIN mode, meter will automatically save the measured maximum or minimum value.
3. If the user presses “MAX/MIN” key more than 2 sec, meter will restore normal measuring range.

Note:
a) When meter is in maximum/minimum value measurement state, it is in manual measuring range mode.
b) When meter is in frequency, duty ratio measurement state, it can not switch to maximum/ minimum value measurement mode.

### 4.5 FUNCTION SWITCH

1. In resistance mode, press **FUNC** key and meter will switch among resistance, diode and continuity detection by recycling.
2. In voltage and current mode, press **FUNC** key to switch between AC and DC.

### 4.6 REL/INRUSH MEASUREMENT

1. **REL/INRUSH** key is relative value measurement key. Pressing this key will enter relative value measurement mode. The current display value can be stored in the memory as reference value. When the user measures later, the display value is the difference for input value minus reference value. ie. **REL** (current reading)= Input value - Reference value.
2. The relative value measurement can only be performed in manual mode.

3. In AC current measurement state, press **REL/INRUSH** more than 2 seconds to enter surge measuring state.

### 4.7 BACKLIGHT AND CLAMP HEAD LIGHT

1. During measurement, if ambient light is too dark to read the display, press and hold “BL/HOLD” key to activate backlight. Backlight will automatically turn off after 30 seconds.
2. During this period, pressing “BL/ HOLD” key more than two seconds will turn OFF backlight.
3. In the current mode, meter will turn backlight and clamp head light on. Backlight uses an LED with high current draw. Backlight will turn off after 30 seconds. Using backlight often will shorten battery life.

Note: When battery voltage ≤ 7.2 V, the LCD displays “  ” under-voltage symbol. If using backlight and battery voltage drops below 7.2 V due to high working current, the  symbol may appear and measurement accuracy is not guaranteed. Continue to use meter normally without using the backlight. Do not replace battery until  symbol shows under normal conditions.

### 4.8 AUTOMATIC POWER-OFF

1. After powering on, and if meter isn’t used for 15 minutes, meter will enter suspended state, automatically powering off to save the battery. Within 1 minute before shutdown, buzzer will sound five times. Meter will then enter a dormant state.
2. After automatic power-off, press **FUNC** key, to turn meter on again.
3. Holding **FUNC** key when powering on cancels automatic power-off function.

# 4. OPERATING GUIDANCE

## 4.9 MEASUREMENT PREPARATION

1. Rotate the **Selector Switch** to turn on power. When battery voltage is low (about ≤ 7.2 V), LCD displays  symbol. Replace battery.
2. ⚠ means that voltage or current should not be more than the specified value to protect internal line from damage.
3. Set **Selector Switch** to required measuring function and range.
4. When connecting line, first connect common test line, then charged test line. When removing the line, remove charged test line first.

## 4.10 CURRENT MEASUREMENT

### ⚠ WARNING

**ELECTRIC SHOCK HAZARD. REMOVE PROBE FROM METER BEFORE MEASURING WITH CURRENT CLAMP.**

1. Set **Selector Switch** to position A. At this time, meter is in AC current measurement state. Choose appropriate measuring range.
2. If you want to measure DC current, press **FUNC** key to enter direct current measurement state.
3. Hold trigger, open clamp head, clip one lead of measurement circuit to be tested in the clamp.
4. Read current value on LCD display.

**Note:**

1. Clamping two or more leads of circuit to be tested simultaneously will not give correct measuring results.
2. To get accurate readings, connect lead to be tested at center of current clamp.
3. ⚠ indicates that maximum input AC current is 1000 A
4. To improve measurement precision, in DC current measurement state, if LCD display is not zero, press **REL** to return to zero, then measure.

### 4.11 VOLTAGE MEASUREMENT

## ⚠ WARNING

**ELECTRIC SHOCK HAZARD. PAY SPECIAL ATTENTION TO AVOID SHOCK WHEN MEASURING HIGH VOLTAGE. DO NOT INPUT VOLTAGE MORE THAN AC750 RMS.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack, choose appropriate measuring range.
2. Place **Selector Switch** to AC voltage V or mV position. At this time, meter is in the DC voltage measurement state. To measure AC voltage, press **FUNC** key to enter AC voltage measurement state.
3. Connect probe with voltage source or both ends of load in parallel for measurement.
4. Read the voltage on the LCD.

Note:

1. In small voltage measuring range, probe is not connected with circuit to be tested and meter may have fluctuating readings, which is normal and caused by the meter's high sensitivity. When meter is connected with circuit to be tested, you will get actual measured value.
2. In relative measurement mode, automatic measuring range is invalid.
3. ⚠ Indicates maximum input AC current is 750V AC or 1000V DC Maximum input voltage is mode mV is 600 mV DC or AC.
4. If readings measured by meter are more than 750C RMS AC, a "beep" alarm will sound.

## 4.12 FREQUENCY AND DUTY RATIO MEASUREMENT

### A) Clamp head measuring frequency (through AC current):

**⚠ WARNING**
**ELECTRIC SHOCK HAZARD. REMOVE PROBE FROM METER BEFORE MEASURING WITH CURRENT CLAMP.**

1. Set **Selector Switch** to position A .
2. Hold trigger, open clamp head, clip one lead of measurement circuit to be tested in the clamp.
3. Press **Hz/%** key to switch to frequency measuring state.
4. Read current value on the LCD display.
5. Pressing **Hz/%** again enters duty ratio measuring state.

Note:
1. Clamping two or more leads of circuit to be tested simultaneously will not get correct measuring results.
2. Frequency measurement range is 10Hz~1kHz the frequency to be tested is less than 10Hz, or if frequency is higher than 10 kHz, accuracy is not guarantee
3. Duty ratio measuring range is 10 ~ 95%.
4. "⚠ "means that maximum input current is 1000A AC (RMS).

### B) In Voltage Measurement Mode:

**⚠ WARNING**
**ELECTRIC SHOCK HAZARD. PAY SPECIAL ATTENTION TO AVOID SHOCK WHEN MEASURING HIGH VOLTAGE. DO NOT INPUT VOLTAGE MORE THAN AC 750 RMS.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Place **Selector Switch** to V or mV position, press **FUNC** to enter AC voltage measurement state.
3. Press **Hz/%** key to switch to frequency measuring state.

4. Connect probe with signal or both ends of load in parallel for measurement.
5. VRead on LCD.
6. Pressing **Hz/%** again enters duty ratio measuring state.

Note:
1. Frequency measurement range is 10Hz~1kHz When the frequency to be tested is less than 10Hz,the LCD will show 00.0 Measuring frequency higher than 10kHz is possible, but accuracy is not guaranteed.
2. Duty ratio measuring range is 10 ~ 95%.
3. ⚠ means maximum input voltage is 750V AC (RMS).

**C) In HZ/DUTY Measurement Mode:**

## ⚠ WARNING

**PAY SPECIAL ATTENTION TO AVOID SHOCK WHEN MEASURING HIGH VOLTAGE. DO NOT INPUT VOLTAGE MORE THAN AC 250V RMS.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Set **Selector Switch** to position **HZ**.
3. Connect probe with signal or both ends of load in parallel for measurement.
4. Read LCD.
5. Press **Hz/%** again to enter duty ratio measuring state.

Note:
1. Frequency measurement range is 10Hz~1kHz When frequency to be tested is more than 10Hz, LCD will show 00.0. Measuring frequency higher than 10 kHz is possible, but accuracy is not guaranteed.

### 4.13 RESISTANCE TEST

## ⚠ WARNING

**ELECTRIC SHOCK HAZARD. WHEN MEASURING CIRCUIT IMPEDANCE, DETERMINE THAT THE POWER SUPPLY IS DISCONNECTED AND THE CAPACITOR IN THE CIRCUIT IS COMPLETELY DISCHARGED.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Place **Selector Switch** to Ω position. At this time, meter is in the measurement state.
3. Connect probe to the both ends of resistor or circuit to be tested for measurement.
4. LCD will show readings.

Note:

1. When input end is open, LCD shows "0L" out-of-range state.
2. When resistance to be tested > 1MΩ, the meter reading will be stable after a few seconds, which is normal for high resistance readings.

### 4.14 DIODE TEST

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Set **Selector Switch** to Ω
3. Press **FUNC** key to switch to → measuring state.
4. Connect red probe to diode anode and connect black probe to diode cathode.
5. Read the LCD.

Note:

1. Meter will show approximation of diode forward voltage drop.
2. If probe has reverse connection or probe is open, LCD will show "0L".

### 4.15 CIRCUIT CONTINUITY TEST

## ⚠ WARNING

**ELECTRIC SHOCK HAZARD. WHEN MEASURING CIRCUIT CONTINUITY, DETERMINE THAT THE POWER SUPPLY IS DISCONNECTED AND THE CAPACITOR IN THE CIRCUIT IS COMPLETELY DISCHARGED.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Set **Selector Switch** to Ω
3. Press **FUNC** key to switch to circuit continuity measuring state.
4. Connect probe to both ends of circuit to be tested.
5. If resistance of circuit to be measured is less than 30Ω, a buzzer may sound.
6. Read circuit resistance value on the LCD.

Note: If probe is open or circuits resistance to be tested is more than 600Ω, display will show “0L”.

### 4.16 CAPACITANCE MEASUREMENT

## ⚠ WARNING

**ELECTRIC SHOCK HAZARD. TO AVOID ELECTRIC SHOCK, BEFORE MEASURING CAPACITANCE, DISCHARGE CAPACITANCE COMPLETELY.**

1. Insert black probe to **COM** jack, insert red probe to **INPUT** jack.
2. Set **Selector Switch** to .
3. After discharging capacitance completely, connect probe to both ends of capacitor to be tested.
4. Read capacitance on the LCD.

Note: To improve accuracy below 10nF measuring value, subtract the distributed capacitance of meter and cable.

### 4.17 SURGE CURRENT MEASUREMENT

## ⚠ WARNING

**ELECTRIC SHOCK HAZARD. REMOVE THE PROBE FROM THE METER BEFORE MEASURING WITH CURRENT CLAMP.**

**4.10.1** Set **Selector Switch** to position A.

**4.10.2** Hold trigger, open clamp head, clip one lead of measurement circuit to be tested in the clamp.

**4.10.3** Press **REL/INRUSH** key more than 2 sec. to enter surge current measurement mode. LCD will show "- - - -", until motor start is detected. Meter shows and keeps surge current value.

**4.10.4** Read current surge value on LCD display.

Note:

1. Clamping two or more leads of circuit to be tested simultaneously will not get correct measuring results.
2. To get accurate reading, connect lead to be tested at center of current clamp.
3. In manual measuring range mode, if LCD shows "OL", which indicates over-range, choose a higher measuring range.
4. In manual measuring range mode, if you do not know value to be measured in advance, choose highest measuring range.
5. " ⚠ "means maximum input current is 1000A AC (RMS).

### 4.18 NCV MEASUREMENT

1. Turn **Selector Switch** to **NCV**.
2. Place meter top close to the conductor. When test voltage is greater than 110 VAC (RMS) when meter is close to conductor, meter induction voltage indicator will turn on and buzzer will sound.

# 5. MAINTENANCE

Note:
1. Even if no indication, voltage may exist still. Do not use non-contact voltage detector to judge whether there is voltage in the wire. Detection operation could be affected by socket design, insulation thickness, type and other factors.
2. When inputting voltage on meter input terminal, due to existence of induced voltage, voltage induction indicator also may light.
3. External sources of interference (such as flashlight, motor, etc.) may incorrectly trigger non-contact voltage detection.

## 5.1 CALIBRATION

This meter should be recalibrated annually( within a temperature range of 65°F to 83°F (18°C to 28°C) and relative humidity less than 75%) .

## 5.2 BATTERY REPLACEMENT

### ⚠ WARNING

**TO AVOID ELECTRIC SHOCK, MAKE SURE THAT THE TEST LEADS HAVE BEEN CLEARLY MOVE AWAY FROM THE CIRCUIT UNDER MEASUREMENT BEFORE OPENING THE BATTERY COVER.**

1. When  appears, battery should be replaced immediately.
2. Remove screw from battery cover.
3. Replace battery.
4. Replace battery cover and screw.

**Note:** Do not reverse battery polarity.

## 5.3 PROBE REPLACEMENT

Replace test leads if damaged or worn.

### ⚠ WARNING

**USE MEETS EN 61010-031 STANDARD, RATED CAT III 1000V, OR BETTER TEST LEADS.**

### ⚠ WARNING

**TO AVOID ELECTRIC SHOCK, MAKE SURE THE PROBES ARE DISCONNECTED FROM THE MEASURED CIRCUIT BEFORE REMOVING THE REAR COVER. MAKE SURE THE REAR COVER IS TIGHTLY SCREWED BEFORE USING THE INSTRUMENT.**