

OWNER'S MANUAL

HH0308C

**AUTO-RANGING
DC/True RMS AC
DIGITAL MULTIMETER**

IMPORTANT!

Read and understand this manual before using the tester.
Failure to understand and comply with safety rules and operating instructions can result in serious or fatal injuries and/or property damage.

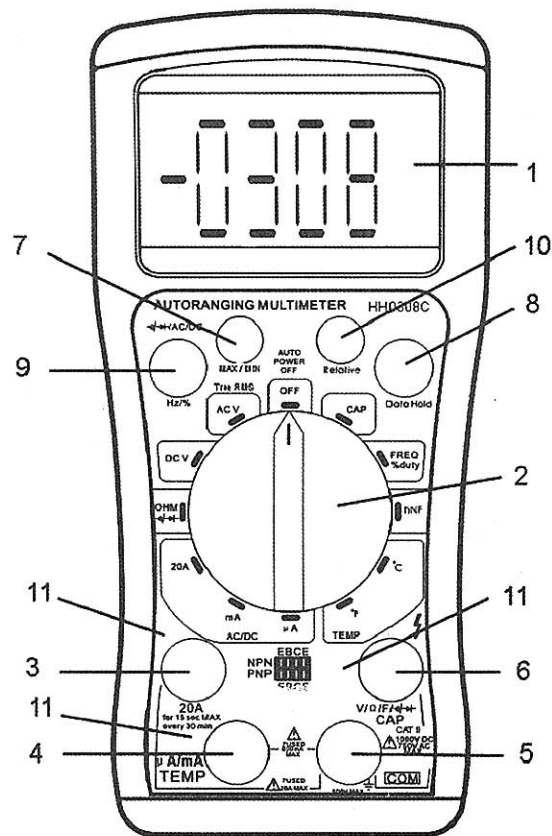


Fig. 1

Owner's Manual HH0308C Auto-Ranging DC/True RMS AC Digital Multimeter

1. DESCRIPTION

Thanks for choosing our product as your reliable tool.

The HH0308C auto-ranging digital multimeter is designed for measuring resistance, capacitance, DC/True RMS AC voltage, DC/True RMS AC current, frequency, duty cycle and temperature, testing diodes, transistors and checking continuity.

This meter is designed for indoor use at altitude up to 2000m, temperature between 5°C and 40°C, the maximum humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C and pollution degree 2.

The LCD display is clear and easy to read. The functions of auto-range, auto power shut-off, over-range protection and low battery indication provide you the maximum convenience.

2. SAFETY INSTRUCTIONS

This meter has been designed for safe use, complying with IEC61010.1 CAT II 1000V DC, but must be operated with caution. The rules listed below should be carefully followed for safe use.

- 2.1 NEVER operate this device when the back cover is open or not properly attached in its place.
- 2.2 Make sure that the insulation of leads is not damaged.
- 2.3 When BAT appears on the display, change both batteries to maintain accurate measurement.
- 2.4 NEVER apply voltage to the meter that exceeds the specified maximum: DC1000V or AC750V.
- 2.5 USE extreme caution when working with voltage over the 36V safe point.
- 2.6 NEVER change the position of the function switch during measuring.
- 2.7 CHOOSE the correct positions of all function switches before testing.
- 2.8 NEVER change any connection on the circuit board of the meter.
- 2.9 USE only damp cloth or mild detergent to clean the outside of the meter.
- 2.10 Safety Symbols:

Hazardous voltage

Read the manual first

Connect to common ground

This product is protected by DOUBLE INSULATION. Service of this meter should be performed by a professional person only. Otherwise the safety design of this meter could be compromised and severe injury or even death may result.

3. SPECIFICATIONS

3.1 GENERAL

- 3.1.1 Display: LCD
- 3.1.2 Maximum read: 5999 with auto polarity display (no sign for positive polarity).
- 3.1.3 Measuring method: A/D converter
- 3.1.4 Sampling speed: 3 times/sec.
- 3.1.5 Maximum common mode voltage: 500V AC/DC
- 3.1.6 Over range indication: Flashing number, audible signal sound or "OL" displayed
- 3.1.7 Relative measurement indication: "△" displayed.
- 3.1.8 Auto shut-off switch: Meter will be shut off after 30 minute from last use.
- 3.1.9 Low battery indication: "BAT" is displayed if battery voltage drops below operating voltage.
- 3.1.10 Operating environment: 5-35°C, Humidity <75%.
- 3.1.11 Storing environment: -10 to 50°C, Humidity <75%.
- 3.1.12 Power supply: Two "AAA" 1.5V batteries.
- 3.1.13 Size: 182mm X 88mm X 45mm.
- 3.1.14 Weight: 347g.
- 3.1.15 Fuse: 800mA/250V Fast, 15A/250V Fast.
- 3.1.16 Accessories included: This manual, one set of test leads, a K type temperature probe and two

3.2 SPECIFICATIONS

Function	Range	Resolution	Accuracy
DC Voltage (V DC)	6V	1mV	$\pm(0.3\% \text{ rdg} + 3 \text{ dgts})$
	60V	10mV	
	600V	100mV	
	1000V	1V	
AC Voltage (V AC)	6V	1mV	$\pm(1\% \text{ rdg} + 8 \text{ dgts})$
	60V	10mV	
	600V	100mV	
	750V	1V	
DC Current (A DC)	600 μ A	0.1 μ A	$\pm(0.8\% \text{ rdg} + 5 \text{ dgts})$
	6000 μ A	1 μ A	
	60mA	10 μ A	
	600mA	100 μ A	$\pm(2\% \text{ rdg} + 5 \text{ dgts})$
	6A	1mA	
	20A	10mA	
AC Current (A AC)	600 μ A	0.1 μ A	$\pm(1.2\% \text{ rdg} + 8 \text{ dgts})$
	6000 μ A	1 μ A	
	60mA	10 μ A	
	600mA	100 μ A	$\pm(2\% \text{ rdg} + 8 \text{ dgts})$
	6A	1mA	
	20A	10mA	
Resistance	600 Ω	0.1 Ω	$\pm(0.5\% \text{ rdg} + 5 \text{ dgts})$
	6k Ω	1 Ω	
	60k Ω	10 Ω	
	600k Ω	100 Ω	$\pm(2\% \text{ rdg} + 10 \text{ dgts})$
	6M Ω	1k Ω	
	60M Ω	10k Ω	
Frequency (Auto Range)	11Hz to 600kHz	0.1Hz	$\pm(0.1\% \text{ rdg} + 3 \text{ dgts})$
		1Hz	
		10Hz	
		100Hz	
		1kHz	
Duty Cycle	0.1%~99.9%	0.1%	$\pm(1.2\% \text{ rdg} + 2 \text{ dgts})$ pulse width: 100 μ s~100ms
TEMP °C	-20°C~300°C	1°C	$\pm 4^\circ\text{C}$
TEMP °F	-4° F~572° F	1°F	$\pm 6^\circ\text{F}$
Capacitance (Auto Range)	60nF	0.01nF	$\pm(10\% \text{ rdg} + 25 \text{ dgts})$ $\pm(2.5\% \text{ rdg} + 10 \text{ dgts})$
	600nF	0.1nF	
	6 μ F	1nF	
	60 μ F	10nF	
	100 μ F	100nF	

The VAC and AAC ranges are specified from 5% to 100% of the range.

Input Impedance – 10M Ω (AC/DC measurement).

Diode Test – reads approximate forward voltage, test current of 1mA maximum.

Continuity Check – Audible signal will sound if the resistance is less than 40 Ω \pm 10 Ω .

Transistor Test – reads approximate hFE value of transistor under test.

Understand the AC zero input.

When measuring the AC voltage and current, the meter is calculating the input and converting it to the data that the LCD can display. The converter needs a certain level of the input voltage to make the measurement. This level is 5% of the ranges for this meter. So that, the non-zero digits that are displayed on the meter (especially the True RMS meter) when the test leads are open or are shorted are normal. This will not affect the specified AC accuracy above 5% of the ranges.

4. OPERATION

4.1 Diagram (Fig. 1)

1. LCD Display.
2. Function Selector
Use to select the desired measurement or OFF.
3. 20A Input Jack
Plug-in connection for the red (positive) lead for 20A measurements only.
4. mA/μA TEMP Input Jack
Plug-in connection for the red (positive) lead for temperature and current measurements up to 400mA only.
5. COM Input Jack
Plug-in connection for the black (negative) lead for all measurements.
6. V/Ω/FI/Hz/CAP Input Jack
Plug-in connection for the red (positive) lead for voltage, capacitance, frequency, resistor, continuity and diode check.
7. MAX / MIN button
Use to manually select the desired display.
8. Data Hold button
Use to hold a reading. When this button is pressed, the data being displayed will be frozen in the display and a DH will appear. Changes in the input signals will not change the display. It can be used in all measurement modes. Press the button again to release this function and the DH will disappear.
9. AC/DC Hz% button
In the OHM mode, use this button to choose between continuity check or diode test or resistance test.
In the A AC and D DC mode, use this button to choose between A AC and D DC ranges.
In the FREQ mode, use this button to choose between frequency test and duty test.
10. Relative button
This is a very convenient function button. It is used for measuring the different (relative) value between parts and the reference.
Ex. During the measurement of a +5V standard DC voltage, press this button once, the value on the display will be changed from +5V to 0V.
Disconnect the test lead from the source (-5V will be displayed on the LCD).
If you measure a +4.5VDC source, the LCD will display -0.5V. This is indicating that the value you measured is 0.5V lower than the standard value.
11. Auto Test Lead Insert Indication LED.
Patented New technology exclusively used for our products.
The bright LED indicates the right jack to be used related to the selected function and range.
The LED will shut off after the test lead is fully inserted into the indicated jack. If the test lead is inserted into a wrong jack, the LED will flash and the buzzer will sound.

4.2 Operating Instructions

4.2.1 DC Voltage Measurement

1. Set the function switch to the position of V DC, the LED above the jack (V/Ω/FI/Hz/CAP) will shine.
 2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V/Ω/FI/Hz/CAP).
NOTE: The meter will be in Auto-ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down.
 3. Touch the test lead tips to the circuit under test.
 4. The value and polarity of the voltage will appear on the display.
- CAUTION:** If OL shows on the display, disconnect the test lead from circuit immediately to avoid damaging the meter.

Never apply the voltage over 1000 V.

Use extreme caution when working with high voltage.

Never connect test lead with circuit when changing the position of function switch.

4.2.2 AC Voltage Measurement

1. Set the function switch to the position of V AC, the LED above the jack (V/Ω/FI/Hz/CAP) will shine.
 2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V/Ω/FI/Hz/CAP).
NOTE: The meter will be in Auto ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down.
 3. Touch the test lead tips to the circuit under test.
 4. The TRMS value of the voltage will appear on the display.
- CAUTION:** If OL shows on the display, disconnect the test lead from circuit immediately to avoid damaging the meter.
Never apply the voltage over 750 V.
Use extreme caution when working with high voltage.
Never connect test lead with circuit when changing the position of function switch.

4.2.3 DC Current Measurement

1. Set the function switch to the position of AC/DC, the LED above the jack (mA/μA TEMP) will shine.
 2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (mA/μA TEMP).
For current measurements from 600mA to 20A, insert the red test lead banana plug into the jack (20A). Set the function switch to 20A.
NOTE: The meter will be in Auto-ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down. In the 20A range, use of the Range-H Pushbutton will not change the range, it only changes the decimal point.
 3. Remove power from the circuit under test. Then open up the circuit at the point where you wish to measure current.
 4. Touch the black test lead tips to the negative side of the circuit. Touch the red test lead tips to the positive side of the circuit.
 5. Apply power to the circuit.
 6. The value and polarity of the Current will appear on the display.
- CAUTION:** If OL shows on the display, disconnect the test lead from circuit immediately to avoid damaging the meter.
Never connect test lead with circuit when changing the position of function switch.
Do not make current measurements on the 20A scale for longer than 15 seconds every 30 minutes. Exceeding 15 seconds may cause damage to the meter and for the test leads.

4.2.4 AC Current Measurement

1. Set the function switch to the position of AC/DC A, the LED above the jack (mA/μA TEMP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (mA/μA TEMP).
For current measurements from 600mA to 20A, insert the red test lead banana plug into the jack (20A). Set the function switch to 20A.
NOTE: The meter will be in Auto ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down. In the 20A range, use of the Range-H Pushbutton will not change the range it only changes the decimal point. Remove power from the circuit under test. Then open up the circuit

at the point where you wish to measure current.

3. Touch one of the test lead tips to each side of the open circuit. Apply power to the circuit.
4. Apply power to the circuit.
5. The TRMS value of the Current will appear on the display.

CAUTION: If OL shows on the display, disconnect the test lead from circuit immediately to avoid damaging the meter.

Never connect test lead with circuit when changing the position of function switch. Do not make current measurements on the 20A scale for longer than 15 seconds every 30 minutes. Exceeding 15 seconds may cause damage to the meter and/or the test leads.

4.2.5 Resistance Measurement

1. Set the function switch to the position of OHMS Ω , the LED above the jack (V Ω I/F Ω CAP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
3. Check if the AUTO, OL and M Ω appear in the display.
4. Touch the test probe tips across the resistor under test, read the value on the display. (If the resistor is part of the circuit, it is necessary to disconnect one end of the resistor to avoid the unwanted interference from the rest of the circuit).

NOTE: The meter will be in Auto ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down.

CAUTION: Never measuring the resistor that has voltage on it.

4.2.6 Diode Check

1. Set the function switch to the position of OHMS Ω , the LED above the jack (V Ω I/F Ω CAP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
3. Press the Ω button until OL and \rightarrow appear in the display.
4. Touch the test probe tips across the diode under test, read the value on the display.
5. Reverse the test probes' measuring positions across the diode and read the value.
6. The result may as follow:

6.1. If one reading is around 0.5 and the other reading is OL, the diode is good.

6.2. If both readings are OL, the diode is open.

6.3. If both readings are 0 or very small number, the diode is shorted.

(If the diode is part of the circuit, it is necessary to disconnect one end of the diode to avoid the unwanted interference from the rest of the circuit).

CAUTION: Never measuring the device that has voltage on it.

4.2.7 Transistor Check

1. Set the function switch to the position of hFE.
2. Determine whether the transistor is NPN or PNP and identify the emitter, base and collector leads. Insert the leads in the proper holes in the hFE socket.
3. The display will read approximate hFE Value based on the test condition of 10 μ A DC base current and Vce of approximately 1.5VDC.

4.2.8 Continuity Check

1. Set the function switch to the position of OHMS Ω , the LED above the jack (V Ω I/F Ω CAP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
3. Press the Ω button until OL and \rightarrow appear in the display.
4. Touch the test probe tips across the device under test.
5. If the resistance is less than 20 Ω , the audible signal will sound.

(If the resistor is part of the circuit, it is necessary to disconnect one end of the resistor to avoid the unwanted interference from the rest of the circuit).

CAUTION: Never measuring the device that has voltage on it.

4.2.9 Capacitance Measurement

1. Discharge the capacitor being tested before starting the measurement.
2. Set the function switch to the position of CAP, the LED above the jack (V Ω I/F Ω CAP) will shine.
3. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
NOTE: The meter will be in Auto ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down.
4. Touch the test probe tips across the device under test. (The red probe to Positive and the black to Negative).
5. Read the value and unit shown on the display. If OL displayed, the value of the capacitor is over the maximum range of the meter.

4.2.10 Frequency Measurement

1. Set the function switch to the position of FREQ, the LED above the jack (V Ω I/F Ω CAP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
NOTE: The meter will be in Auto ranging. If you wish to manually set the range, do so following instructions in the Description (4.1 Diagram item7) section of this manual. For manual ranging, start at the highest range and work down.
3. Press the FREQ % duty button once, the "Hz" will appear on the display.
4. Touch the test probe tips across the device under test.
5. Read the value and unit shown on the display.
CAUTION: Never inputting the voltage over 250V AC/DC!

4.2.11 Duty Cycle Measurement

1. Set the function switch to the position of FREQ, the LED above the jack (V Ω I/F Ω CAP) will shine.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V Ω I/F Ω CAP).
3. Press the Hz% button twice, the "%" will appear on the display.
4. Touch the test probe tips across the circuit under test.
5. The duty cycle and % will be shown on the display.
CAUTION: Never inputting the voltage over 250V AC/DC!

4.2.12 Temperature Measurement (with special K-Type temperature probe Colluck Model KTP-2)

1. Set the function switch to the position of TEMP.
If you wish to measure temperatures in $^{\circ}$ F, set the function switch to the $^{\circ}$ F range. If you wish to measure temperatures in $^{\circ}$ C, set the function switch to the $^{\circ}$ C range.
2. Insert the banana plug of temperature probe marked "-" into the negative (-) jack (COM) and the banana plug of temperature probe marked "+" into the positive (+) jack (mA μ A TEMP).
3. Touch the Temperature Probe Head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (About 30 seconds).
4. Read the temperature on the display. The digital reading will indicate the proper decimal point and value.
CAUTION: (1) Do not measure temperatures of metal parts when any voltage is present on them.
(2) Use only special K-type temperature probe Colluck Model KTP-2.

4.2.13 Relative Value Measurement

During the measurement of the reference or base value, press the Relative button.

The "Δ" will show on the display and the Value will be stored in memory as a reference for future use. At the following measurement, the display will only show the different value between the measured device and base unit. To cancel this function, press the "REL" button until "Δ" disappeared on display.

5. Maintenance

Read and understand all Safety Instructions and Operating Instructions before use this meter.

Always keep the meter dry.

Never use the meter that is damaged by dropping or any other force.

Clean the meter with a damp cloth only.

Remove the batteries if the meter will not be used for a long period of time.

6. Changing or removing batteries

6.1 If the "E3" shows on the display, the batteries should be replaced.

6.2 Use only flash and correct type batteries to replace the old set.

6.3 Switch the meter to OFF position and remove the test lead from any source of voltage.

6.4 Remove the screw on the back of the meter, then remove the back cover.

6.5 Remove the old batteries and insert a pair of new and same type batteries in the right place.

6.6 Replace the back cover and tight the screw.

6.7 Dispose the old batteries properly.

7. Changing Fuses (800mA/250V Fast)

7.1 Switch the meter to OFF position and remove the test lead from any source of voltage.

7.2 Remove the screw on the back of the meter, then remove the back cover.

7.3 Remove the batteries then remove the dead fuses.

7.4 Insert the new fuses and repack the batteries in the right place.

7.5 Replace the back cover and tight the screw.

7.6 In case that the 15A/250V Fast fuse needs to be changed do it by a professional person only.