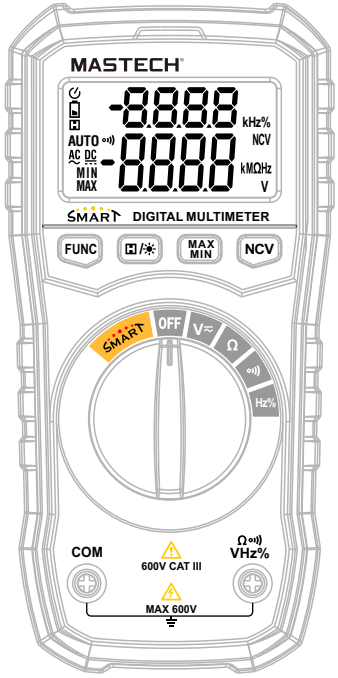
MASTECH®

MS8301D
MS8303D

Digital Multimeter
User's Manual



CAT III
600V

CE

C ETL LISTED US
Intertek

MASTECH®

CONTENTS

CONTENTS

MASTECH®

Overview

⚠WARNING

To avoid electric shock or personal injury, please read “safety information” and “warning and related notes” carefully before using the meter.

⚠WARNING

The special attention should be paid when using the meter because the improper usage may cause electric shock and damage the meter .
The safety measures in common safety regulations and operating instruction should be complied with when using.
In order to make fully use of its functions and ensure safe operations please comply with the usage in this section carefully.

This meter is a small hand-held, safe and reliable 3.5" digital auto measuring range multi-meter with stable performance and novel structure. It can be used to measure AC/DC voltage, resistance, frequency, duty ratio, continuity and non-contact voltage tests. It is an ideal maintenance tool easily carried by a large number of users.

Safety Instructions

This digital multi-meter has been designed according to International Electro Safety Standard EN 61010-1, EN 61010-2-030, EN 61010-2-033 concerning safety requirements for electronic measuring instrumentsand hand-held digital multi-meters. It meets the requirements for CAT III 600V of EN 61010-1. EN 61010-2-030, EN 61010-2-033 and grade 2 for pollution.

- Users should use the meter strictly according to the provisions of this manual. Otherwise, the warranty for the meter may become invalid.
- The warnings in the user manual are used to remind users of possible danger or dangerous action.
- The notes in the user manual are used to remind users of possible meter damage or condition or action of measured object.

Safe Working Habits

To avoid possible electric shock or personal injury as well as damage to the meter or measured objects, please use the meter according to the following procedures methods:

- Check the case before using the meter. Don't use the meter with damaged case. Check to see if the case is cracked or lacks plastic parts. Please pay special attention to the joint insulating layer.
- Check to see if the test wire has insulation damage or bare metal. Check test wire continuity. If the wire is damaged, please replace it with a new one before using the meter.

MASTECH®

- Measure known voltage with the meter to verify that the meter is working properly. If the meter is working abnormally, stop using it immediately. A protective device may be damaged. If there is any doubt, please have the meter inspected by a qualified technician.
- Do not test voltage exceeding rated voltage marked on the meter.
- When testing voltage exceeding 30V AC voltage RMS, 42V AC peak or 60V DC, be particularly careful to avoid electric shock.
- When measuring, use correct jack, and select the proper function and measuring range.
- Do not use the meter in explosive gas, vapor or dusty environments.
- When using the probe, fingers should be behind the probe protection device.
- Before measuring resistance, continuity, first turn off power and discharge all high voltage capacitors.
- If the meter is not used in accordance with the instructions, the meter's safety protective function may become invalid.
- When opening the case (or part of the case), turn the meter off.
- When the battery low voltage indicator " " becomes lit, replace the battery at once. A low battery will cause meter reading errors and may result in electric shock or personal injury.
- Before opening the case or the battery cover, remove the test wire from the meter.
- When maintaining the meter, use replacement parts specified by the factory.

⚠WARNING

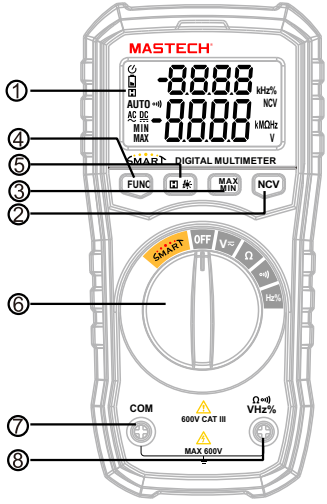
Measure known voltage with the meter to verify that the meter is working properly. If the meter is working abnormally, stop using it immediately. A protective device may be damaged. If there is any doubt, please have the meter inspected by a qualified technician.

Electric Symbols

⚠	Important safety information. Read the manual.
⚠	High voltage with danger.
⏚	Ground.
⧈	Double Insulation (Class II safety equipment).
CE	Accord with the related EU laws and regulations
~	AC voltage
⎓	DC Voltage
c ETL us Intertek	CONFORMS TO UL STD 61010-1, 61010-2-030 and 61010-2-033, CERTIFIED TO CSA STD C22. 2 NO. 61010-1, 61010-2-030 and 61010-2-033

Meter Instructions

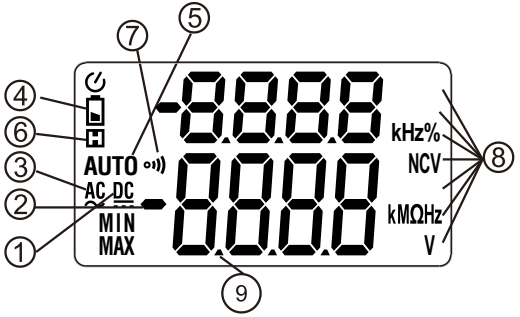
Meter Appearance



(1) LCD display
(2) NCV key
(3) MAX/MIN Key
(4) FUNC Key
(5) Data hold /backlight key
(6) Rotary switch

(7) All common input jacks for measuring (connected with the black test probe).
(8) Positive input jack of voltage, resistance, capacitance, temperature, frequency/duty ratio, and continuity (connected with the red test probe)

Display



(1)Direct voltage indicator
(2) Numerical value polarity indicator (negative sign)
(3) Alternating voltage indicator
(4)Battery low-voltage indicator
(5)Automatic measuring range indicator
(6) Data hold indicator
(7) Continuity measurement indicator
(8) Measurement unit
(9) Measurement display value

Keys Operation

SMART Key

Move the rotary switch to the **"SMART"** position the default mode is **"AC Voltage" "DC Voltage" "Resistance"** or **"Continuity"**, connect the test leads cross the circut or load to be measured, It will Automatic judgement on the display.
AC Voltage or DC Voltage, or Continuity or Resistance, are measured simultaneously.

Hold/Backlight Key

Press " H/☼" to hold the current reading on the display. Press the key again to release the hold .Press "H/☼" for 2 seconds to turn on the backlight.Press the key for 2 seconds again to manually turn off the backlight.

FUNC Key (select)

Press to switch between functions or between AC/DC voltage.

MAX/MIN Key

Press**"MAX/MIN"**Key, the display will show the maxinum reading value among measuring data, and the **"MAX"**symbol appears on the display, press the button again, the **"MIN"** symbol appears on the display and will show the minqum reading value among measuring data, press the button a third time to return to normal mode.

NCV Key

Press the **"NCV"** key down in any mode and the meter will activate the non-contact voltage

detection. Hold the meter up to a voltage source and the buzzer will sound and the NCV indicator will light up if voltage is detected. Release the **"NCV"** key to stop NCV detection.

Automatic Power-Off Function

In the measurement process, if there is no activity by the function key or function selection switch for 15 minutes, the meter will automatically shutdown (sleep state). Press **" FUNC"** key to power on and the automatic shutdown function will be cancelled.

Measuring Operation

AC/DC Voltage Measurement:

① Rotate function selection switch to voltage measurement position.
② Press **"FUNC"** key to select AC or DC voltage
③ Connect black and red test probe to COM input jack and respectively.
④ Read the measured value from LCD display. When measuring AC or DC voltage, the display will simultaneously show the voltage polarity which is connected with red test probe.

⚠WARNING
Don't measure any RMS voltage higher than 600V DC or AC, to prevent injury or damage to meterand equipment.

Resistance measurement:

① Rotate function selection switch to resistance measurement position, and turn off the power to the circuit to be tested
② Connect black and red test probe to COM input jack and respectively.
③ Measure the resistance of circuit to be tested with other ends of test probes.
④ Read the resistance value from LCD display. If it is overload, **"OL"** will display on the LCD display

Here are some tips for measuring resistance:

- The resistance measured on a circuit is usually different from the rated value of resistance. This is because the test current of the meter will flow through all possible channels between test probes.
- When measuring low resistance, to ensure accuracy, make a short circuit between the test probes and read the resistance value of the short circuit. This resistance value should be subtracted after measuring the resistance to be tested.
- When there is no input (for example, open circuit), the display will show **"OL"**, which means that the measured value is out of range.

⚠WARNING
When measuring resistance or circuit continuity, to avoid injury or meter damage, turn off the power to the circuit and discharge all capacitors.

Continuity Measurement:

① Rotate function selection switch to continuity measurement position, and turn off the power to the circuit to be tested
② Connect black and red test probe to COM input jack and respectively.
③ Measure the circuit to be tested with other ends of test probes.
④ If the measured circuit resistance is less than about 40Ω, the buzzer will sound continuously.

> ⚠**WARNING**
>
> **When measuring resistance or circuit continuity, to avoid injury or meter damage, turn off the power to the circuit to be measured and discharge all capacitors.**

Non-Contact Voltage (NCV)

Hold down the **"NCV"** key and move the tip of the clamp toward the conductor under test. If the detected voltage is ≥ 110V AC (rms), the NCV indicator will flash and the buzzer will beep.

Note

1)Do not rely solely on NCV detection to determine the presence of voltage. Detection can be affected by socket design, insulation thickness, or other factors.
2)Interference from outside sources could accidentally trigger the NCV detector.

General Specifications

- Operating environment and condition: 600V CAT III, pollution grade: II.
- Elevation < 2000 m
- Environment temperature and humidity: 0~40°C, <80% RH (do not use meter when temperature <10°C).
- Storage temperature and humidity: -10~60°C, <70% RH (remove the battery).
- Temperature coefficient: 0.1xAccuracy/°C (<18°C or >28°C).
- The maximum allowable voltage between measurement end and ground: 600V DC or 600V AC RMS.
- Sampling rate: about 3 times/s.
- Display: 3 3/4 bits of digit LCD display(4000 counts).
- Over-range indication: LCD will show "OL".
- Low battery indication: When the battery voltage is lower than the normal operating voltage, " " will display on the LCD display.
- Input polarity indication: automatically display "-" symbol.
- Power supply: AAA 1.5Vx2 batteries.
- Dimension(LxWxH): 149x74x44mm
- Weight: about 230g.

Accuracy Indicators

Accuracy: ±(% of reading + digits) with one year of warranty.

Reference conditions: environmental temperature is from 18°C~28°C, relative humidity is not more than 80%.

DC Voltage

Measuring range	Resolution	Accuracy
6V	0.01V	±(0.5% of reading+3 digits)
60V	0.1V	
600V	1V	

Input impedance: 10MΩ
Maximum input voltage: 600V DC or AC (RMS)

AC Voltage

Measuring range	Resolution	Accuracy
6V	0.01V	±(0.8% of reading+5 digits)
60V	0.1V	
600V	1V	

Input impedance: 10MΩ
Maximum input voltage: 600V DC or AC (RMS)
Frequency response:45Hz~65Hz

Resistance

Measuring range	Resolution	Accuracy
2KΩ	0.001KΩ	±(0.8% of reading+3 digits)
20KΩ	0.01KΩ	
200KΩ	0.01KΩ	
2MΩ	0.001MΩ	
10MΩ	0.01MΩ	±(1.0% of reading+5 digits)

Overload protection:250V DC or AC (RMS)

MASTECH®

Continuity Measurement

Function	Measuring range	Resolution	Accuracy
	When built-in buzzer sounds, the resistance to be tested is less than 40Ω		Open circuit voltage: about 0.4V

- Open circuit voltage: approx. 0.4V
- Overload protection: 250V DC or AC rms

Frequency

Through grade HZ/DUTY:

Measuring range	Resolution	Accuracy
60Hz	0.1Hz	±(1.0% of reading+5 digits)
600Hz	1Hz	
3kHz	10Hz	

- Overload protection:600V AC RMS
- The input voltage range:≥2V (input voltage will increase when the frequency to be measured increases).

Duty Ratio

Measuring range	Resolution	Accuracy
10%~90%	1%	±2%

Through grade HZ/DUTY:
- Frequency response:40~3KHz
- The input voltage range: ≥2V AC RMS (input voltage will increase when the frequency to be measured increases)
- Maximum input voltage:600V AC RMS

Maintenance

This section provides basic maintenance information, including instructions for the battery. Do not try to repair the meter unless you are an experienced maintenance person with the relevant calibration, performance testing and maintenance data.

General Maintenance

⚠WARNING

To avoid injury or damage to the meter, don't wet the inner parts of the meter. Before opening the case or battery cover, remove the connecting cable between the test probe and the input signal.

Regularly clean the meter case with damp cloth and a small amount of detergent. Do not use abrasives or chemical solvents. If the input jack becomes dirty or wet, it may affect the measurement readings.

To clean input socket:

① Turn off the meter and pull out all the test probes from the input jack.

② Remove all dirt from the jacks.

③ Apply detergent or lubricant to a new cotton ball (such as WD-40).

④ Clean each jack with a cotton ball and lubricant to prevent contamination by moisture in the socket.

Replacing The Batteries

⚠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 of the meter.

⚠WARNING

Do not mix old and new batteries. Do not mix alkaline, standard (carbon-zinc), or rechargeable (ni-cad, ni-mh, etc) batteries.

If the sign " ▭ " appears, it means that the batteries should be replaced.
Loosen the fixing screw of the battery cover and remove it.
Replace the exhausted batteries with new ones.
Put the battery cover back and fix it again to its origin form.

Note:
Do not reverse the poles of the batteries.

Replace test leads
If insulation on leads is damaged, replace test leads.

⚠WARNING

Use meet EN 61010-031 standard, rated CAT III 600V, 10A or better test leads.

R-00-05-2083