

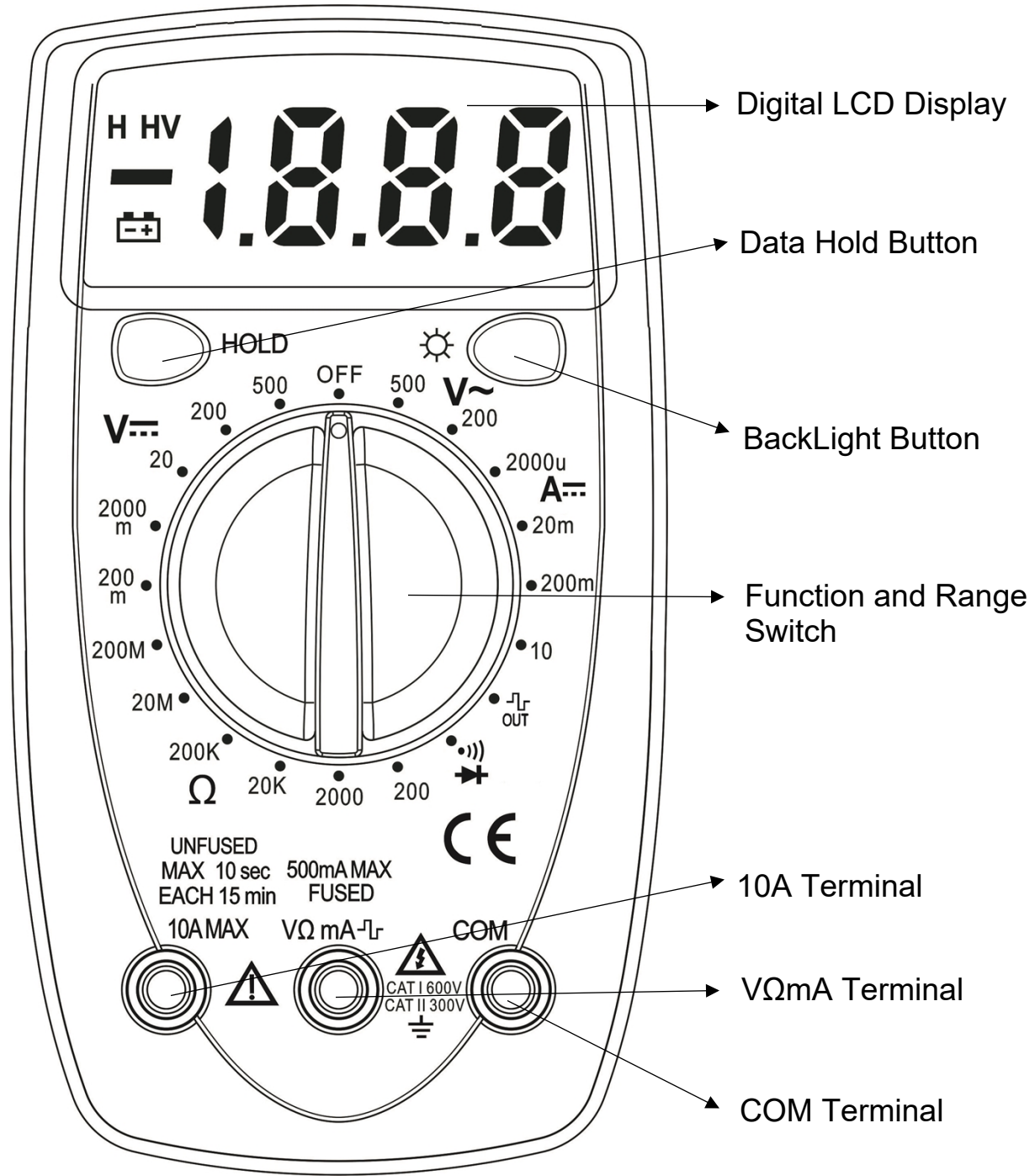
## **ASTROAI USER MANUAL DIGITAL MULTIMETER**

**NOTE:** Fully read and understand this manual before using this instrument.

**WARNING:** To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment being tested, adhere to the following rules:

- The meter cannot be used to test AC current and cannot be used to test AC voltage when the dial is located in the DC current range.
- Before using the Meter, inspect the exterior casing. Do not use the Meter if it is damaged or if all or part of the exterior casing is removed. Look for cracks or missing plastic. Pay special attention to the insulation around the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- The manual rotary switch should be placed in the correct position before measurement and should NOT be moved during measurement to prevent damage to the Meter.
- When the Meter is working at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken because there is a danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
- Do not use or store the Meter in a high-temperature environment, do not expose to high levels of humidity, or near strong magnetic fields. The performance of the Meter may deteriorate after dampening.
- When using the test leads, keep your fingers behind the finger guards.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes or hFE.
- Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Remove the connection between the testing leads and the circuit being tested, and turn the Meter power off before opening the Meter case.
- When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.
- The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.
- Clean using a soft cloth and mild detergent for the surface of the Meter. Do not use abrasive materials or solvents to prevent the surface of the Meter from corrosion and damage.
- Turn the Meter off when not in use and take out the battery when it is not going to be used for an extended period of time. Regularly check the battery as it may leak when it has not been used for some time. Replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

# DIGITAL MULTIMETER DIAGRAM



## **GETTING TO KNOW YOUR DEVICE**

### **Digital LCD Display**

Displays a variety of information including results from test measurements, low battery indicator, and error display. Comes with a backlight for easier reading in dim conditions.

### **Data Hold Button**

When taking measurements and recording results, it is often easier to use the data hold function to freeze the data being displayed on the digital display. Even when the test leads are removed from the measurement source, the results will continue to display to take easier notes. Press the Data Hold Button once to lock in the results, then press it again to reset the reading a "1" will be displayed until the probes are used to take the next reading.

### **Backlight Button**

Use the backlight button to make the display even easier to read. Just press the backlight button once to turn the light on; it will slowly dim until it is completely off. If you need to use the light for longer, just press the button again while the light is dimming or after it has turned off and it will brighten back up to full capacity again. If you need to turn off the backlight quickly, moving the rotary switch to the OFF position will turn off the screen and backlight.

### **Function and Range Switch**

This device is what is known as a manual ranging multimeter, meaning that the user must select the correct range for measurement. Doing so is not difficult and doesn't have to be intimidating. If you know the function and range you are going to be measuring, simply turn the dial to that range to begin. If you are unsure which range you will be testing, begin at the highest range for that function, if the function comes back as reading zero or is bouncing between a very small number and zero, simply move the dial to the next highest level. Continue doing this until you have a satisfactory reading.

### **COM Terminal**

COM is short for "Common Terminal". This terminal is the plug on the right of the multimeter. Whenever you are using the multimeter, the black lead is going to be plugged into this terminal.













### **VΩmA Terminal**

This terminal is located in the middle of the multimeter and it is meant for taking most measurements, as long as the test does not exceed 200mA. The red plug will go in this terminal.

### **10A Terminal**

This terminal is located on the left side of the meter, it is meant for taking measurements where the current is over 200mA but below 10A. The red plug will go in this terminal. Be careful when using this terminal because of the amount of energy that is being put through it. Only expose the probes and multimeter to testing for 10 seconds at a time, and only apply this every 15 minutes. Doing this will prevent the multimeter from overloading or overheating.

## ELECTRICAL SYMBOLS

	AC (Alternating Current)		Low Battery
	DC (Direct Current)		Diode
	AC and DC		Fuse
	Earth Ground		Continuity Test
	Square Wave		Complies with EU directives
	Double Insulated		Warning

## GENERAL SPECIFICATIONS

Max Display:	LCD 3 ½ digits (1999 count) 0.6" high
Polarity:	Automatic, indicated negative, assumed positive.
Measure Method:	Double integral A/D switch implement
LCD Size:	49 x 17mm
Sampling Speed:	2 times per second
Over-Load Indication:	"1" is displayed
Operating Environment:	32~104 °F; 0~40 °C, at <80%RH
Storage Environment:	14~122 °F; -10~50 °C, at <85%RH
Power:	1 x 9V Battery NEDA 1604/6F22/006P
Static Electricity:	About 4mA
Product Size:	130 x 73 x 37mm
Product Net Weight:	145g (including battery)

## TECHNICAL SPECIFICATIONS

Accuracies are guaranteed for 1 year, with storage conditions of 23°C±5°C, less than 80%RH

### DC VOLTAGE

Range	Resolution	Accuracy	Overload Protection
200mV	100µV	± (0.5%+3)	220V rms AC
2000mV	1mV	± (0.8%+2)	500V DC / 500V rms
20V	10mV		
200V	100mV		
500V	1V	± (0.8%+3)	


### AC VOLTAGE

Range	Resolution	Accuracy	Overload Protection
200V	100mV	± (2.0%+10)	500V DC / 500V rms
500V	1V		

Response: Average response, calibrated in rms of a sine wave.

Frequency Range: 45Hz ~ 450Hz

### AUDIBLE CONTINUITY

Range	Description	Overload Protection
	Built-in buzzer sounds if resistance is less than 30±20Ω	15 second maximum exposure to 220V rms

### DC CURRENT

Range	Resolution	Accuracy	Overload Protection
2000µA	1µA	± (2.0%+5)	500mA, 250V fuse

20mA	10 $\mu$ A		
200mA	100 $\mu$ A		
10A	10mA	$\pm$ (2.5%+5)	unfused

Measured Voltage Drop: 200mV

## RESISTANCE

Range	Resolution	Accuracy	Overload Protection
200 $\Omega$	0.1 $\Omega$	$\pm$ (1.5%+5)	15 seconds maximum exposure to 220Vrms
2000 $\Omega$	1 $\Omega$	$\pm$ (1.0%+4)	
20K $\Omega$	10 $\Omega$		
200K $\Omega$	100 $\Omega$		
20M $\Omega$	10K $\Omega$	$\pm$ (1.0%+10)	
200M $\Omega$	100K $\Omega$	$\pm$ (1.0%+10)	

Maximum Open Circuit Voltage: 3V

## OPERATING INSTRUCTIONS

### DC & AC VOLTAGE MEASUREMENT

1. Connect the red test lead to the “V $\Omega$ mA” jack (center plug). Connect the black test lead to the “COM” jack (right plug).
2. Set the manual range switch to the desired Voltage position. The DC Voltage positions are on the left side of the range, marked with “V==”; the AC Voltage positions are located on the right side of the range, marked with “V~”.

**Note:** If you are measuring an unknown voltage, set the range switch to the highest range and reduce it until a satisfactory reading is obtained.

3. Turn the the device or circuit’s power to measure the voltage value. It will appear on the digital display along with the voltage polarity.

### DC CURRENT MEASUREMENT

1. Connect the red test lead to “V $\Omega$ mA” (center plug) and the black test lead to “COM” (right plug). For measurements between 200mA and 10A, connect the red test lead to “10A” (left plug).

**Note:** For 10A measurements, only take readings for up to 10 seconds, and allow 15 minutes between tests. This prevents the device from overloading and overheating.

2. Set the manual range switch to the desired DC Current position. The DC Current positions are located at the right side of the range of the range, marked with a yellow "A<sub>DC</sub>".

**Note:** If you are measuring an unknown current, set the range switch to the highest range and reduce it until a satisfactory reading is obtained.

3. Open the circuit being measured and connect the test leads in series with the load being measured. The results will appear on the digital display.
4. The "10A" function is designed for intermittent use only. Maximum contact time of the test leads with the circuit is 10 seconds.


## RESISTANCE MEASUREMENT

1. Connect the red test lead to "VΩmA" (center plug) and the black test lead to "COM" (right plug).
2. Set the manual range switch to the desired Resistance position. The Resistance positions are located at the bottom and bottom left of the range, marked with a yellow "Ω".


**Note:** If you are measuring an unknown Resistance, set the range switch to the highest range and reduce it until a satisfactory reading is obtained.

3. If the resistance being measured is connected to a circuit, turn off power and discharge all capacitors before measurement.
4. Connect test leads to circuit being measured and the results will show on the digital display.

## DIODE MEASUREMENT

1. Connect the red test lead to "VΩmA" (center plug) and the black test lead to "COM" (right plug).
2. Set the manual range switch to "  ", located on the bottom right of the dial.
3. Connect the red test lead to the anode of the diode to be measured and black test lead to cathode.
4. The forward voltage drop in mV will be displayed. If the diode is reversed, an error will read "1" on the device screen.

## AUDIBLE CONTINUITY TEST

1. Connect the red test lead to "VΩmA" (center plug) and the black test lead to "COM" (right plug).
2. Set the manual range switch to "  ", located on the bottom right of the dial.
3. Connect the test leads to two points on the circuit being tested. If the resistance is lower than  $30\Omega \pm 20\Omega$ , the buzzer will sound.

## TEST SIGNAL USE


1. RANGE switch to "  " range.

2. A test signal (50Hz) will appear between "VΩmA" and "COM" jacks, the output voltage is approximately 5V p-p with 50KΩ impedance.

### **BATTERY TEST**

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩmA" jack.
2. According to the different type of the battery (1.5V, 9V, 12V) to be tested, set the range switch to the desired DC Voltage range.
3. Connect the test leads to the battery to be tested. The red lead will touch the positive end of the battery, the black lead will touch the negative end.
4. The DC Voltage measurement of the battery will be displayed.

### **BATTERY AND FUSE REPLACEMENT**

If the low battery indicator "  " appears on the multimeter's screen, replace the battery immediately.

To replace the battery:

1. Remove the screw at the top of the back of the multimeter. Remove the battery cover.
2. Remove the old battery and replace it with a new 9V battery.
3. Put the battery cover back on and put the screw securely back into place.

The fuse rarely needs to be replaced. If the fuse blows it is almost always due to operator error.

To test if the fuse needs to be replaced, use the following steps:

1. Remove the test leads from the multimeter.
2. Turn the rotary switch to the 200mA position.
3. Use another multimeter to measure the resistance of the "VΩmA" terminal to the "COM" terminal.
  - If the fuse is still functional, the reading should display between 0Ω and 10Ω.
  - If the display indicates an overload, replace the fuse and test again.

To replace the old fuse:

1. Remove the screw on the top of the multimeter's back. Then remove the battery from the battery terminal.
2. Remove the two screws at the bottom of the multimeter's back.
3. Remove the rubber bumper running along the outside of the multimeter, then separate the housing from the multimeter. Doing so should reveal the multimeter's circuit board.
4. Find the fuse on the board. It will be located on the left side of the board. Remove the fuse and replace it with a new one rated 500mA/250V.
5. Put the housing back together and put the rubber bumper back around the multimeter. Replace the battery and screws back into the meter.

### **ADDITIONAL MAINTENANCE**



Beyond replacing the batteries and fuses, do not attempt to repair or service your multimeter unless you are qualified to do so and have the necessary calibration, performance testing and service instruments. The recommended calibration cycle is 12 months.

To clean the terminals:

1. Turn the rotary dial to the OFF position and remove the test leads and battery.
2. Shake out any dirt that may be in the terminals, soak a new swab with isopropyl alcohol and work around the inside of each input terminal.
3. Use a new swab to apply a light coat of fine machine oil to the inside of each terminal.

### **INCLUDED ACCESSORIES**

- User manual
- Set of test leads
- Multi-Function Socket (DT33A only)
- TP01 K-type thermoelectric couple (DT33A & DT33C only)
- 9-volt battery, NEDA 1604 6F22 type.

### **1 Year Warranty Limited Warranty From AstroAI**

Each AstroAI Digital Multimeter will be free from defects in material and workmanship for its lifetime. This warranty does not cover fuses, disposable batteries and damage from neglect, misuse, contamination, alteration, accident, or abnormal conditions of operation or handling, including overvoltage failures caused by use outside the Multimeter's specified rating, or normal wear and tear of mechanical components. This warranty covers the original purchaser only and is not transferable.

If this product is defective, please contact AstroAI Customer Support at [support@astroai.com](mailto:support@astroai.com).