Tektronix DMM4020 Digital Multimeter

Tektronix DMM4020 Digital Multimeter User Manual

Contents

Tektronix

Tektronix DMM4020 Digital Multimeter

General Specifications

- Battery-powered, true-rms, autoranging digital multimeter
- 8000 counts LCD display with backlight
- Warranty: One-year from date of purchase

Mechanical Specifications

- Auto range and manual range selection
- Display of REL sinusoidal and nonsinusoidal ac waveforms
- Diode test, continuity test

Environmental Specifications

- Operating Temperature: XXXX°C to XXXX°C
- Storage Temperature: XXXX°C to XXXX°C

Electrical Specifications

- Voltage Frequency Converter (V.F.C)
- Duty cycle, temperature, frequency tests
- Analog bar graph display

Product Usage Instructions

Safety Information
Ensure to read all safety information in the manual before using the product to prevent accidents or damage.

Instrument Overview
The LCD display provides information on auto range selection, manual range selection, measurement of ac waveforms, diode test, continuity test, and more.

Square Waves Output
Instructions for battery measurement and NCV functionality.

V.F.C
Details on Voltage Frequency Converter functionality, secondary measurements display, duty cycle test, temperature test, frequency test, and more.

Maintenance
Guidelines on cleaning the product, replacing batteries, and fuses.

FAQ

Q: What does the warranty cover?
A: The warranty covers manufacturing defects for one year from the date of purchase. It does not cover fuses, disposable batteries, damage from misuse, neglect, alteration, contamination,or abnormal conditions of operation.

User Manual

Specifications are subject to change without notice.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Customers enjoy one-year warranty from the date of purchase.
This warranty does not cover fuses, disposable batteries, damage from misuse accident, neglect, alteration, contamination, or abnormal conditions of operation or handling, including failures caused by use outside of the product’s specifications, or normal wear and tear of mechanical components.

Introduction

This product is a battery-powered, true-rms, auto-ranging digital multimeter with a 8000 counts LCD display and a backlight.

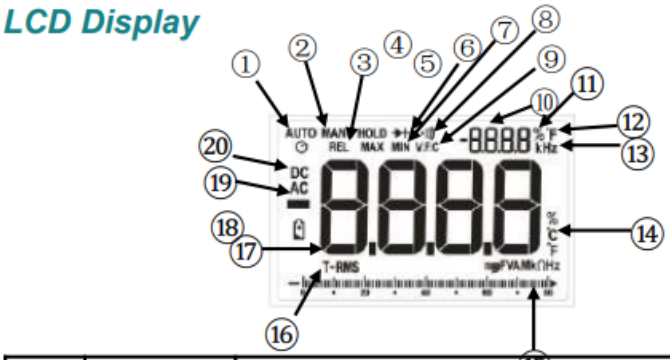
Safety Information
To avoid possible electrical shock, fire, or personal injury, please read all safety information before you use the product. Please use the product only as specified, or the protection supplied by the product can be compromised.

- Examine the case before you use the product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.
- The measurement must be made with correct input terminals and functions and within the allowable measuring range.
- Do not use the product around explosive gas, vapor, or in damp or wet environments.
- Keep fingers behind the finger guards on the probes.
- When the product has already been connected to the line being measured, do NOT touch the input terminal that is not in service.
- Disconnect the test leads from the circuit before changing the mode.
- When the voltage to be measured exceeds 36V DC or 25V AC, the operator shall be careful enough to avoid electric shock.

- Misuse of mode or range can lead to hazards, be cautious. “ OL ” will be shown on the display when the input is out of range.
- Low level of a battery will result in incorrect readings. Change the batteries when battery level is low. Do not make measurements when the battery door is not properly placed.

Instrument Overview

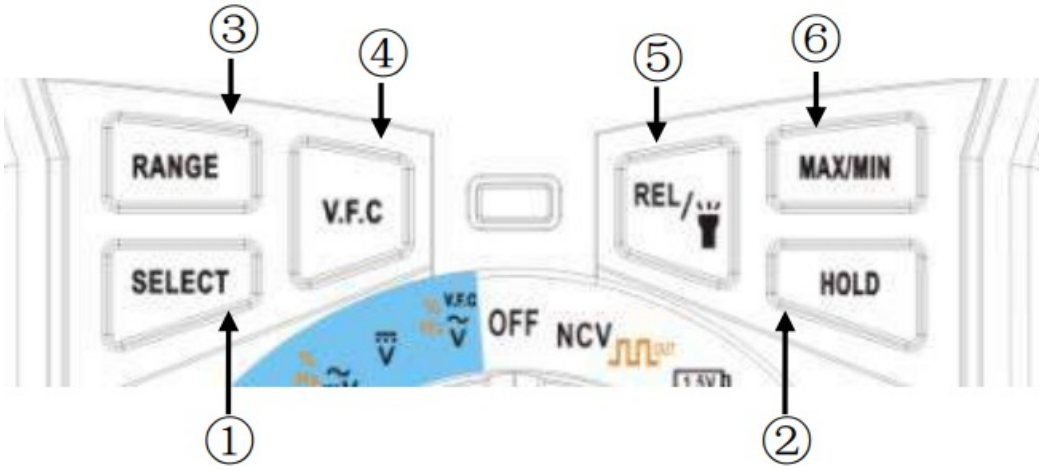
LCD Display



①	AUTO	Auto range. The product selects the range with the best resolution
②	MANUAL	Manual range. The user selects the range.
③	REL	The product measures both sinusoidal and nonsinusoidal ac waveforms accurately.
④	HOLD	Display freezes present reading
⑤	MAX	Display shows maximum reading.
⑥	⊣◁	Diode test.
⑦	MIN	Display shows minimum reading.
⑧	)))))	Continuity test.

⑨	V.F.C	Voltage Frequency Converter
⑩	-8.8.8.8	Secondary measurements display
⑪	%	Duty cycle test.
⑫	°F°C	Temperature test. (Fahrenheit or Celsius)
⑬	Hz	Frequency test. (Hertz)
⑭	°F°C	Temperature test. (Fahrenheit or Celsius)
⑮		Analog bar graph.
⑯	T-RMS	The product measures both sinusoidal and nonsinusoidal ac waveforms accurately.
⑰	-8.8.8.8	Primary measurement display.
⑱		Low battery. Replace batteries.
⑲	AC	Alternating current.
⑳	DC	Direct current.
nkMm		Measurement units.

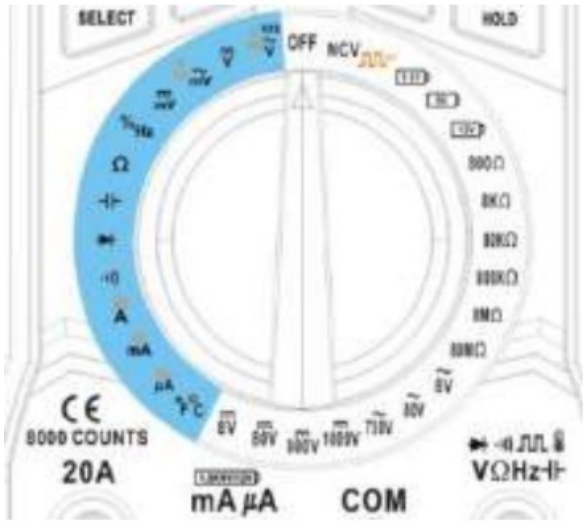
Function Buttons



①	Selects alternate measurement modes on a rotary switch setting, including: 1. Frequency/AC V 2. Frequency/AC mV 3. DC A/AC A 4. DC mA/AC mA 5. DC μA/AC μA 6. Square waves output
②	Push once to hold the current reading on the display; push again to continue normal operation.

③	Push this button once to enter the manual range mode. In manual range mode, each push increases the range; when the highest range is reached, the next push will lead to the lowest range. To exit the manual range mode, Long push for exit.
④	Push this button once to enter the V.F.C model. Push once more to exit the model.
⑤	Push this button to enter the relative mode. The product will store the present reading as a reference for subsequent readings. The display is zeroed, and the stored reading is subtracted from all subsequent readings. Push again to exit the relative mode. Push this button over 2 seconds, it will open the flashlight, long push again to turn off the flashlight
⑥	Push to toggle between the MAX and the MIN mode. To exit MAX/MIN mode, push the button for more than 2 seconds

Rotary Switch



OFF Turn off the product at this position.

- The product automatically powers off after 15 minutes of inactivity.

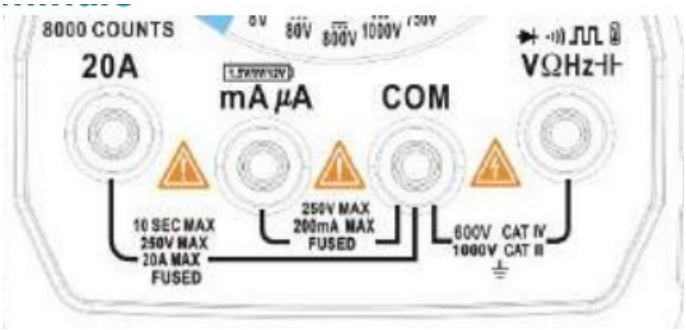
- The built-in beeper beeps 5 times 1 minute before auto power off.
- To restart the product from auto power off, press the HOLD button or turn the rotary switch back to the OFF position and then to a needed position.
- To disable the Auto Power Off function, hold down the SELECT button when turning on the product, you will hear five beeps if you have successfully disabled the function.

V.F.C	AC V≤750V, Frequency V.F.C
V	DC V≤1000V
mV	AC V （mV）≤800.0mV Frequency (Equal to Hz)
mV	DC V（mV）≤800.0mV
Hz	Frequency，Duty cycle：1%~99%。
Ω	Resistance：≤80MΩ。
⊣⊢	Capacitance：≤100mF。
▶|	Diode
•))	Continuity
A	DC A：≤20A。 AC A：≤20A。
mA	DC A：≤800.0mA。 AC A：≤800.0mA。
μA	DC A：≤800.0μA。 AC A：≤800.0μA。
°F °C	Celsius:-20~1000, Fahrenheit:-4~1832

8V	DC V：≤8V
80V	DC V：≤80V
800V	DC V：≤800V
1000V	DC V：≤1000V
750V	AC V：≤750V
80V	AC V：≤80V
8V	AC V：≤8V
80MΩ	Resistance：≤80MΩ
8MΩ	Resistance：≤8MΩ
800KΩ	Resistance：≤800KΩ
80KΩ	Resistance：≤80KΩ
8KΩ	Resistance：≤8KΩ
800Ω	Resistance：≤800Ω
12V	12V Battery test
9V	9V Battery test
1.5V	1.5V Battery test

OUT	Square waves output 50-5000Hz
NCV	Non-contact Voltage

Input Terminals



20A	Input terminal for AC/DC current measurements to 20A.
mA μA	Input terminal for AC/DC current measurements to 800mA. Input terminal for battery testing.
COM	Common (return) terminal for all measurements.
VΩHz⊣⊢	Input terminal for the measurements of: 1. AC/DC voltage 2. Resistance 3. Capacitance 4. Frequency 5. Temperature 6. Continuity 7. Diode 8. Duty cycle 9. Square waves output

Measurements Instruction
Measure AC/DC Voltage

1. Connect the black test lead to the COM Terminal and the red lead to the VΩHz⊣⊢ Terminal.
2. Turn the rotary switch to each manual range from 8V~1000V according to the votage you want to test. Or you can choose the auto-range for testing the voltage.
3. Touch the probes to the correct test points of the circuit to measure the voltage.
4. Read the measured voltage on the display.

- Do not measure voltage that exceeds the extremes as indicated in the Specifications.
- Do not touch high voltage circuit during measurements.

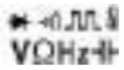
Measure AC/DC Current

1. Connect the black test lead to the COM Terminal and the red lead to the mA μA (MAX current is 800mA)Terminal or the 20A (MAX current is 20A)Terminal (choose based on the value of the current to be measured).
2. Turn the rotary switch to , A mA , μA according to the signal you want to test.

3. Press SELECT to toggle between AC/DC.
4. Break the circuit path to be measured, connect the test leads across the break and apply power.
5. Read the measured current on the display.

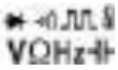
- Do not measure current that exceeds the extremes as indicated in the Specifications  .
- Use the 20A Terminal and the Mode when you are measuring an unknown current  . Then switch  to the mA μA Terminal and the Mode or the Mode if necessary.
- Do not input voltage at this setting.

Measure Resistance

1. Connect the black test lead to the COM Terminal and the test lead to the  Terminal.
2. Turn the rotary switch to each range from 800Ω~80MΩ, Or you can tuen the rotaty switch to  model.
3. Touch the probes to the desired test points of the circuit to measure the resistance.
4. Read the measured resistance on the display.

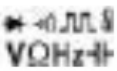
- Disconnect circuit power and discharge all capacitors before you test resistance.
- Do not input voltage at this setting.

Test for Continuity

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to 
3. Touch the probes to the desired test points of the circuit.
4. The built-in beeper will beep when the resistance is lower than 50Ω, which indicates a short circuit.

- Do not input voltage at this setting.

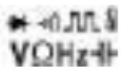
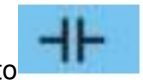
Test Diodes

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to 
3. Connect the red probe to the anode side and the black probe to the cathode side of the diode being tested.
4. Read the forward bias voltage value on the display.
5. If the polarity of the test leads is reversed with diode polarity or the diode is broken, the display reading shows “

"OL".

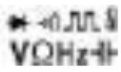
- Do not input voltage at this setting.
- Disconnect circuit power and discharge all capacitors before you test diode.

Measure Capacitance

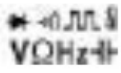
1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to 
3. Connect the red probe to the anode side and the black probe to the cathode side of the capacitor being tested.
4. Read the measured capacitance value on the display once the reading is stablized.

Disconnect circuit power and discharge all capacitors before you test capacitance.

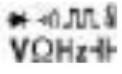
Measure Frequency

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to  (applies to high frequency with low voltage); or turn the rotary switch to  , press SELECT once to toggle to the Frequency Mode (applies to low frequency with high voltage).
3. Touch the probes to the desired test points.
4. Read the measured frequency value on the display.

Measure Duty Cycle

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to  , press the Hz % button once to toggle to the Duty Cycle Mode .
3. Touch the probes to the desired test points.
4. Read the measured duty cycle value on the display.

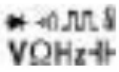
Measure Temperature

1. Connect the black thermocouple probe to the COM Terminal and the red probe to the  Terminal.
2. Turn the rotary switch to  , and the display will show the room temperature, to toggle between °C/°F, press SELECT button.
3. Touch the probes to the desired test points.

4. Read the measured temperature on the display.

- Do not input voltage at this setting.

Square Wave Output

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal.
2. Turn the rotary switch to  , and the default output frequency is 50Hz. To change the output frequency, press the SEL button.
3. Touch the probes to the desired test points.

- Do not input voltage at this setting.

Battery Measurement

1. Connect the red lead into the  terminal,and the black lead into the COM terminal.
2. When you test the batteries, You can change the range between 1.5v, 9v, and 12v.

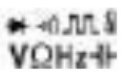
Battery test	1.5V	9V	12V
load Current	10mA	10mA	10mA

3. Connect the probes to the positive and negative poles of the battery, then you can read the voltage on the screen. Or you can judge the voltage according to the color of central lighting

Test NCV

1. Keep pushing the NCV button .
2. Hold the product and move it around, the built-in beeper will beep when the inner sensor detects AC voltage nearby. The stronger the voltage is, the quicker the beeper beeps.

Test V.F.C

1. Connect the black test lead to the COM Terminal and the red lead to the  Terminal
2. Turn the rotary switch to  , push once to enter the V.F.C mode. Touch the probes to the desired test points, read the voltage on display.

Maintenance

Beyond replacing batteries and fuses, do not attempt to repair or service the product unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

Clean the Product
Wipe the product with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

- Remove the input signals before you clean the product.

Replace the Batteries

When “  ” is shown on the display, batteries shall be replaced as below:

1. Remove the test leads and turn off the product before replacing the batteries.
2. Loosen the screw on the battery door and remove the battery door.
3. Replace the used batteries with new batteries of the same type.
4. Place the battery door back and fasten the screw.

Replace the Fuses
When a fuse is blown or do not work properly, it shall be replaced as below:

1. Remove the test leads and turn off the product before replacing the fuse.
2. Loosen the four screws on the back cover and the screw on the battery door, then remove the battery door and the back cover.
3. Replace the fuse with a new fuse of the same type.
4. Place the back cover and the battery door back and fasten the screws.

Specifications

General Specifications		
Display (LCD)		8000 counts
Ranging		Auto/Manual
Material		ABS/PVC
Update Rate		3 times/second
Ture RMS		√
Data Hold		√
Backlight		√
Low Battery Indication		√
Auto Power Off		√
Mechanical Specifications		
Dimension		176*91*47mm
Weight		330g
Battery Type		1.5V AA Battery * 3
Warranty		One year
Environmental Specifications		
Operating	Temperature	0~40℃
	Humidity	75%
Storage	Temperature	-20~60℃
	Humidity	80%

Electrical Specifications

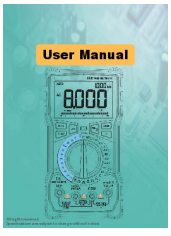
Function	*Range*	*Resolution*	*Accuracy*
DC Voltage (V) (mV)	800.0mV	0.1mV	±(0.5%+3)
	8.000V	0.001V	
	80.00V	0.01V	
	800.0V	0.1V	
	1000V	1V	
AC Voltage (V) (mV)	800.0mV	0.1mV	±(1.0%+3)
	8.000V	0.001V	
	80.00V	0.01V	
	750V	1V	
DC Current (A)	8.000A	0.001A	±(1.2%+3)
	20.00A	0.01A	

Function	*Range*	*Resolution*	*Accuracy*
DC Current (mA)	8.000mA	0.001mA	±(1.2%+3)
	80.00mA	0.01mA	
	800.0mA	0.1mA	
DC Current (μA)	800.0μA	0.1μA	
	8000μA	1μA	
AC Current (A)	8.000A	0.001A	±(1.5%+3)
	20.00A	0.01A	
AC Current (mA)	8.000mA	0.001mA	
	80.00mA	0.01mA	
	800.0mA	0.1mA	
AC Current (μA)	800.0μA	0.1μA	
	8000μA	1μA	
Resistance	800.0Ω	0.1Ω	±(0.5%+3)
	8.000kΩ	0.001kΩ	
	80.00kΩ	0.01kΩ	
	800.0kΩ	0.1kΩ	
	8.000MΩ	0.001MΩ	
	80.00MΩ	0.01MΩ	±(1.5%+3)

Function	*Range*	*Resolution*	*Accuracy*
Capacitance	9.999nF	0.001nF	±(5.0%+20)
	99.99nF	0.01nF	±(2.0%+5)
	999.9nF	0.1nF	
	9.999μF	0.001μF	
	99.99μF	0.01μF	
	999.9μF	0.1μF	
	9.999mF	0.001mF	±(5.0%+5)
	99.99mF	0.01mF	
Frequency	9.999Hz	0.001Hz	±(0.1%+2)
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	9.999kHz	0.001kHz	
	99.99kHz	0.01kHz	
	999.9kHz	0.1kHz	
	9.999MHz	0.001MHz	
Duty Cycle	1%~99%	0.1%	±(0.1%+2)

Function	*Range*	*Resolution*	*Accuracy*
Temperature	(-20~1000)℃	1℃	±(2.5%+5
	(-4~1832)℉	1℉	
Diode	√		
Continuity	√		
Square wave output	50Hz~5000Hz		

Documents / Resources

	Tektronix DMM4020 Digital Multimeter [pdf] User Manual DMM4020 Digital Multimeter, DMM4020, Digital Multimeter, Multimeter

References

- **User Manual**