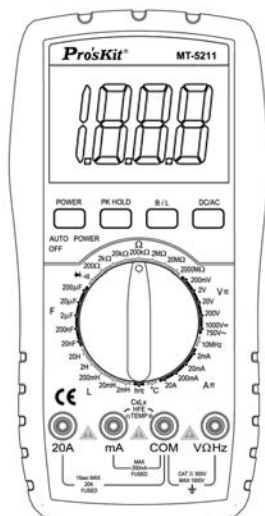


Pro'sKit®

MT-5211

3-1/2 Digital LCR Multimeter



User's Manual

1st Edition,

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OPERATION MANUAL

SUMMARIZE

The instrument is a stable digital multimeter driven by battery. It comes with 28mm high LCD to make reading more clear. Backlight display and overload protection make it convenient to use. This instrument features multi functions for measuring DCV, ACV, DCA, ACA, resistance, capacitance, inductance, diode, transistor, continuity, temperature and frequency. The instrument utilizes a dual-integral A/D converter as a key feature and is an excellent tool. It is portable and ideal for lab, factory and field use.

SAFETY NOTE

The meter meets the standards of IEC1010.

Please read the operation manual carefully before operation.

1. Do not input anything over a range limit.
2. Voltage below 36V is safe. To avoid electric shock, check whether the test leads are connected correctly, whether the insulation is good when measuring over 36DCV or 25ACV.
3. Remove the test leads when changing function and range.
4. To select correct function and range, make sure the range limit setting is correct. Start with higher limits and work down to correct level if uncertain.
5. Do not operate the meter if battery case and back cover is not properly fixed.
6. Do not input voltage when measuring resistance.
7. Remove test leads from test point and turn off the power before replacing battery and fuse.
8. SAFETY SYMBOLS

 "DANGEROUS VOLTAGE EXISTS ,


 GND ,  "DUAL INSULATION

 "THE OPERATOR MUST REFER TO THE MANUAL ,

 "LOW BATTERY

CHARACTERISTIC

1 GENERAL

- 1.1 Display: LCD displaying.
- 1.2 Max. displaying: 1999 (3 1/2 digit) auto polarity indication.
- 1.3 Measuring method: dual slope A/D conversion.
- 1.4 Sampling rate: approx. 3 times/second.
- 1.5 Over range indication: the MSD displays "OL" or "-OL".
- 1.6 Low battery indication:  appears.
- 1.7 Operation environment: (0~40) °C , R.H.<80% .
- 1.8 Power : One 9V 6F22 battery
- 1.9 Size: 189×97.5×35mm
- 1.10 Weight: approx. 390g (not includes battery)
- 1.11 Accessories: operation manual, holster, test leads (20A), Thermocouple (Banana type), transistor test socket.

2 TECHNICAL CHARACTERISTIC

2.1 Accuracy: $\pm(a\% \times \text{rdg} + d)$ at $(23 \pm 5)^\circ\text{C}$ · R.H. < 75% · one year guaranteed from the production date.

2.2 TECHNICAL DATA

2.2.1 DCV

RANGE	ACCURACY	RESOLUTION
200mV	$\pm(0.5\%+3)$	100uV
2V		1mV
20V		10mV
200V		100mV
1000V	$\pm(1.0\%+5)$	1V

Input resistance: All ranges: 10 M Ω

Overload protection: 250V DV or AC peak value at 200mV range. 1000V DC or AC peak value at other ranges.

2.2.2 ACV

Range	Accuracy	Resolution
200mV	$\pm(1.2\%+3)$	100uV
2V	$\pm(0.8\%+5)$	1mV
20V		10mV
200V		100mV
750V	$\pm(1.2\%+5)$	1V

Input impedance : All ranges 10M Ω

Overload protection : 250V DC or AC peak value at 200mV , 750V DC or AC peak value at other ranges.

Frequency response: (40-400) Hz for range 200V;
(40-100) Hz for range 750V;

Display: Sine wave RMS (AVG value response).

2.2.3 DCA

RANGE	ACCURACY	RESOLUTION
2mA	$\pm(0.8\%+3)$	1uA
20mA		10uA
200mA	$\pm(1.2\%+4)$	100uA
20A	$\pm(2.0\%+5)$	10mA

Max. Input volt drop: 200mV;

Max. input current: 20A (the test time should be within 10 seconds)

Overload protection: 0.2A/250V fast-blow fuse, 20A/250V quick-action fuse for range 20A.

2.2.4 ACA

RANGE	ACCURACY	RESOLUTION
2mA	$\pm(1.0\%+5)$	1uA
20mA		10uA
200mA	$\pm(2.0\%+5)$	100uA
20A	$\pm(3.0\%+10)$	10mA

Max measuring voltage drop : 200mV.

Max Input current: 20A (less than 10 seconds).

Overload protection : 0.2A/250V fast-blow fuse, 20A/250V quick-action fuse for range 20A.

Frequency response: 40Hz-200Hz.

Display: Sine wave RMS (AVG value response).

2.2.5 RESISTANCE (Ω)

RANGE	ACCURACY	RESOLUTION
200 Ω	$\pm(0.8\%+5)$	0.1 Ω
2K Ω	$\pm(0.8\%+3)$	1 Ω
20k Ω		10 Ω
200k Ω		100 Ω
2M Ω		1K Ω
20M Ω	$\pm(1.0\%+15)$	10k Ω
2000M Ω	$\pm(5.0\%(\text{reading}-10)+20)$	1M Ω

Open voltage: less than 3V.

Overload protection: 250V DC or AC peak value.

NOTE:

1. At 200 Ω range, the test leads should be short-circuited, and measure the lead to lead resistance, then, subtract from the real measurement.

2. It is normal to display 10M Ω when the test leads shorted in range 2000M Ω , it will not effect the accuracy and shall be subtracted from the value measured. For example: The object resistance is 1000M Ω , the reading value is 1010M Ω , then the correct value shall be 1010-10=1000M Ω

3. Lagged display of value is normal when measuring resistance higher than 1M Ω . Please wait until the display is stable.

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2.2.6 CAPACITANCE (C)

RANGE	ACCURACY	RESOLUTION
20nF	$\pm(2.5\%+20)$	10pF
200nF		100pF
2uF		1nF
20uF	$\pm(5.0\%+5)$	10nF
200uF		100nF

Testing frequency: 100Hz

Overload protection: 36V DC or AC peak value

2.2.7 INDUCTANCE (L)

RANGE	ACCURACY	RESOLUTION
2mH	$\pm(2.5\%+20)$	1uH
20mH		10uH
200mH		100uH
2H		1mH
20H		10mH

Testing frequency: 100Hz

Overload protection: 36V DC or AC peak value

2.2.8 TEMPERATURE (T)

RANGE	ACCURACY	RESOLUTION
(-20~1000) °C	$\pm(1.0\%+4)<400^{\circ}\text{C}$ $\pm(1.5\%+15)\geq 400^{\circ}\text{C}$	1°C

Banana type Thermocouple.


2.2.9 FREQUENCY (F)

RANGE	ACCURACY	RESOLUTION
2KHz	$\pm(1.0\%+10)$	1Hz
20KHz		10Hz
200kHz		100Hz
2000kHz		1KHz
10MHz		10KHz

Input senility: higher than 3.5Vpp-p

Overload protection: 250V DC or AC peak value(less than 10 seconds)

2.2.10 DIODE AND CONTINUITY TEST

Range	Displaying value	Test condition
	Positive voltage drop of diode	The positive DC current is approx. 1mA · negative voltage is approx. 3V
	Buzzer sounds , the resistance is less than $(70\pm 20)\Omega$	open voltage is approx. 3V

Overload protection: 250V DC or AC peak value

Warning: DO NOT input any voltage at this range for safety!

2.2.11 TRANSISTOR hFE data TEST

Range	Displaying value	Test condition
hFE NPN or PNP	0~1000	The base electrode current is approx 10uA, and Vce is approx 3V

3 OPERATION

3.1 Front panel description

3.1.1 LCD: display the measured value.

3.1.2 Power key: turn on/off the power.

3.1.3 HOLD: Pressing this key for hold measuring result. LCD show "PH" icon. Press again this key turn off data hold and "PH" icon disappear.

3.1.4 B/L key: turn on/off hold backlight.

3.1.5 DC/AC: select DC/ AC mode

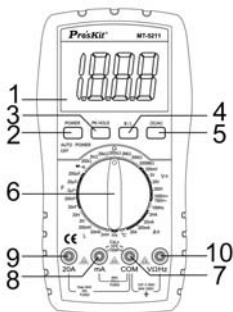
3.1.6 Range knob: selecting measuring function and range.

3.1.7 GND. ground, "+" input jack of capacitance (Cx), inductance (Lx), transistor and temperature.

3.1.8 "+" pole jack for current lower than 200mA; "-" cathode input for capacitance (Cx), inductance (Lx), transistor and temperature.

3.1.9 20A current test jack.

3.1.10 "+" pole jack of voltage , resistance and frequency.



3.2 VOLTAGE MEASUREMENT

3.2.1 Insert the black test lead to "COM" jack, the red one to V/ Ω /Hz jack.

3.2.2 Set the range knob to "V" range, If the measured voltage is unsure beforehand, set the range knob to the highest range, then reduce it gradually until get the highest resolutions readings.

3.2.3 Press DC/AC key to select DC or AC measuring mode.

3.2.4 Apply the test leads to the test point the LCD displays the measured voltage value.

NOTE:

a. If LCD displays "OL", it means over range, set the range knob to a higher range.

b. Do not input a voltage over 1000V DCA or 750V ACV, the test

- c. Do not touch a high voltage circuit when measuring high voltage.

3.3 CURRENT MEASUREMENT

- 3.3.1 Insert the black test lead into "COM" jack, the red one to "mA" or "20A" jack.
- 3.3.2 Set the range knob to "A: range, If the measured current is unsure beforehand, set the range knob to the highest range, then reduce it gradually until get the highest resolution readings.
- 3.3.3 Press DC/AC key to select DC or AC testing mode.
- 3.3.4 Connect the test leads to the circuit under test, the LCD displays the measured voltage value.

NOTE:

- a. If LCD displays "OL", it means over range, set the range knob to a higher range.
- b. When measuring current, mA socket should not exceed 200mA, 20A jack should not exceed 20A (test time should be less than 10 sec.), the test leads should be off the test point when switching the function and range.

3.4 RESISTANCE MEASUREMENT

- 3.4.1 Insert the black test lead to "COM" jack and the red one to "V/ Ω /Hz" jack.
- 3.4.2 Set the range knob to a proper resistance range; connect the test leads across to the resistance being measured.

NOTE:

- a. If the resistance value being measured exceeds the max value of the range selected, LCD displays "OL", set the range knob to a higher range. When the resistance is over 1M Ω , the meter may take a few seconds to stabilize. This is normal for high resistance readings.
- b. When input terminal is in open circuit, overload displays.
- c. When measuring in-line resistance, be sure that power is off and all capacitors are discharged completely.
- d. Do not input any voltage at this range.

3.5 CAPACITANCE MEASUREMENT

- 3.5.1 Set the range knob to a proper capacitance range and insert the red test lead to "mA" jack and the black one to "COM" jack
- 3.5.2 connect the test leads to the capacitor being measured (note: the polarity of red test lead is "-") .

NOTE:

- a. If the capacitance value being measured exceeds the max value of the range selected, LCD displays "OL". set the range knob to the highest range, then reduce it gradually until get the highest resolutions readings
- b. Before measuring, LCD display might not be zero; the residual reading will decrease gradually and should be disregarded.
- c. When measuring large capacitance, LCD may display an unstable value due to creep age or breaking.
- d. Discharge all capacitors completely before capacitance measurement to avoid damage.
- e. Do not input any volt at this range.

3.6 INDUCTANCE MEASUREMENT

3.6.1 Set the range knob to a proper inductance range and insert the red test lead to "mA" jack and the black one to "COM" jack

3.6.2 Connect the test leads to the inductor being measured.

NOTE:

- a. If the inductance value being measured exceeds the max value of the range selected, LCD displays "OL". set the range knob to the highest range, then reduce it gradually until get the highest resolutions readings
- b. It will get different measuring result when measure inductors are different resistance.
- c. If set the range to 2mH, short test leads to get the inductance then measure and subtract the value from measuring result.
- d. Don't set the range knob to higher range when measuring lower inductor that will cause unstable measuring result.

3.7 TEMPERATURE MEASUREMENT

- a. Set range knob " $^{\circ}\text{C}$ ". and insert the thermal couple black test lead to "mA" jack and the red one to "COM" jack
- b. Connect the leads to work-point where wanted to take temperature. The value will be displayed on LCD ($^{\circ}\text{C}$).

NOTE:

- a. If the temperature being measured exceeds the max value of the range selected, LCD displays "OL".
- b. Don't change the thermal couple from the other source except Pro'skit that will affect accuracy.
- c. Don't input voltage form thermal couple when measure temperature.

3.8 FREQUENCY MEASUREMENT

3.8.1 Apply the test lead or shield to cable to "COM" or " $\text{V}/\Omega/\text{Hz}$ " jack.

3.8.2 Switch the knob to frequency range, and connect the test leads across the signal source or the measured load.

NOTE:

- a. When input is 10Vrms or less, a reading is possible but maybe over-range.
- b. Shielded cable is recommended when measuring small signals under noisy conditions.
- c. Be careful when measuring high volt circuit.
- d. Do not input a voltage over DC 250V or AC peak factor to avoid damage to the meter.

3.9 Transistor hFE

- 3.9.1 Turn the range switch to "hFE" position;
- 3.9.2 Insert test leads into "mA" and "com" jack. Please pay attention to the polarity, as the "com" for positive and "mA" for negative.
- 3.9.3 To determine the transistor's type, NPN or PNP, insert the emitting, base and collector electrode into the corresponding jacks in testing accessory

3.10 DIODE AND CONTINUITY TEST

- 3.10.1 Insert the black test lead to "COM" jack and the red one to "V/ Ω /Hz" jack (Note: the polarity of red test lead is "+").
- 3.10.2 Set the range knob to " \rightarrow " range, connect the test leads to the diode being measured, reading is the approximation of the diode positive volt drop.
- 3.10.3 Connect the test leads to two points of the measured circuit, if buzzer sounds, the resistance is lower than approx. (70 ± 20) Ω .

3.11 DATA HOLD

Press the "HOLD", LCD displays "HOLD", the present value is held on LCD, press it again, the function is cancelled.

3.12 AUTO POWER OFF

After about (20 ± 10) minutes meter not being used, it will be power off automatically and enter into dormant status, and press "POWER" again for two times to turn on power

3.13 POWER ON/OFF

Press "POWER APO" key for 2 seconds to turn on the power and the meter is in working mode, Press "POWER APO" key again to turn it off.


3.14 BACKLIGHT INDICATION

Press "B/L" key to turn on the backlight. After 10 seconds, the backlight will be turn down automatically.

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4 MAINTENANCE

DO NOT tamper with the circuit it's a precision meter and should only be serviced by factory personnel.

- 4.1 Do not operate or store the instrument in high temperature or high humidity place and do not work closed to flammability substance or explosive or strong magnetic field.
- 4.2 Use the damp cloth and soft solvent to clean the meter; do not use abrasive and alcohol.
- 4.3 If not operated for a long time, take out the battery.
 - 4.3.1 When LCD displays "" symbol, replace the battery as below:
 - 4.3.1.1 Take out of the holster and drop out the battery case.
 - 4.3.1.2 Take out the battery and replace a new one. It's better to use alkaline battery for long time use.
 - 4.3.1.3 Fix the battery case and replace the holster.
 - 4.3.2 Replacing fuse
Please use the same type and specification fuse as replacement.

5 TROUBLE SHOOTING

If the meter does not work properly, check the meter as follows:

CONDITIONS	WAY TO SOLVE
NO DISPLAYING	● Power is off ● Replace battery
 symbol displays	● Replace battery
NO CURRENT INPUT	● Replace fuse
BIG ERROR	● Replace battery

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