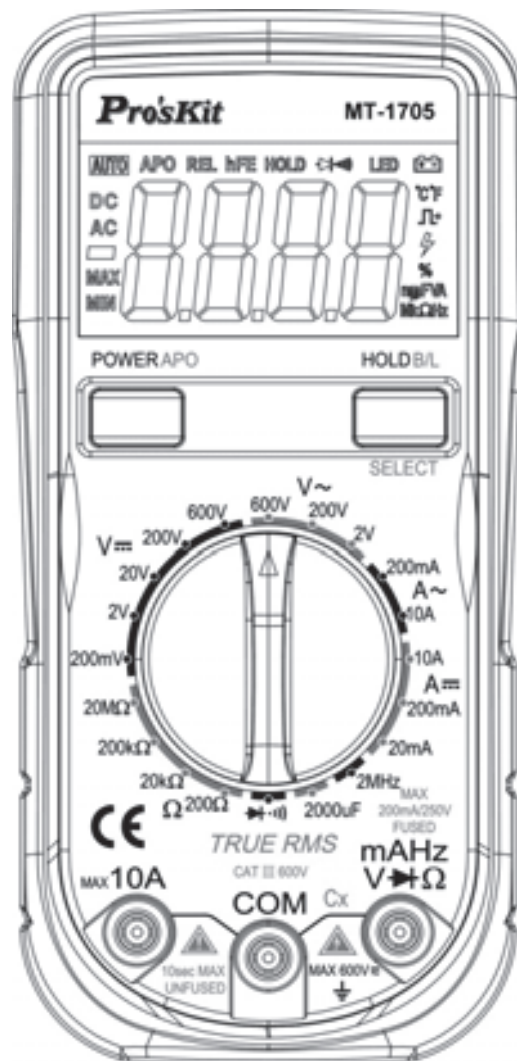


Pro'sKit®

MT-1705

3-1/2 True-RMS Multimeter



User's Manual

1st Edition,

©2014 Copyright by Prokit's Industries Co., Ltd.

OPERATION MANUAL

SUMMARIZE

The instrument is a stable digital multimeter driven by battery. It comes with 20mm 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, diode, continuity 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 1/2digit) 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”.
- 1.6 Low battery indication: “” appears.
- 1.7 Operation environment: (0~40) °C, R.H.<80% .
- 1.8 Power: 1.5V AAA×2pcs
- 1.9 Size: 150×73.5×35mm
- 1.10 Weight: approx. 170g (not includes battery) .
- 1.11 Accessories: operation manual, holster, test leads.

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
600V	$\pm(1.0\%+10)$	1V

Input resistance: All ranges: 10 M Ω

Overload protection: 250V DV or AC peak value at 200mV range.
600V DC or AC peak value at other ranges.

2.2.2 ACV True RMS measurement

Range	Accuracy		Resolution
	40Hz-200Hz	200Hz-1kHz	
2v	$\pm(0.8\%+5)$	$\pm(0.8\%+5)$ sine and triangular wave	1mV
200v			$\pm(8.0\%+15)$ other wave
600V	$\pm(1.2\%+10)$	$\pm(1.2\%+10)$ sine and triangular wave	

Input impedance: All ranges 10M Ω

Overload protection: 250V DC or AC peak value at 200mV ,
600V DC or AC peak value at other ranges.

Frequency response: 40Hz-1kHz

Display: True RMS

2.2.3 DCA

RANGE	ACCURACY	RESOLUTION
20mA	$\pm(1.2\%+8)$	10uA
200mA		100uA
10A	$\pm(2.0\%+5)$	10mA

Max. input volt drop: 200mV;

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

Overload protection: 0.2A/250V fast-blow fuse, no protection at 10A.

2.2.4 ACA True RMS measurement

Range	Accuracy		Resolution
	40Hz-200Hz	200Hz-1kHz	
200mA	$\pm(1.5\%+15)$	$\pm(1.5\%+15)$ sine and triangular wave	100uA
10A	$\pm(3.0\%+10)$	$\pm(3.0\%+10)$ sine and triangular wave	10mA

Max. measuring voltage drop: 200mV.

Max. input current: 10A (less than 10 seconds).

Overload protection: 0.2A/250V fuse; no protection at 10A.

Frequency response: 40Hz-1kHz.

Display: True RMS

2.2.5 RESISTANCE (Ω)

RANGE	ACCURACY	RESOLUTION
200 Ω	$\pm(0.8\%+5)$	0.1 Ω
20k Ω	$\pm(0.8\%+3)$	10 Ω
200k Ω		100 Ω
20M Ω	$\pm(1.0\%+25)$	10k 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 for reading to be slow when measured value is above 1M Ω , please read it after the display value stabilizes.

2.2.6 CAPACITANCE (C)

RANGE	ACCURACY	RESOLUTION
20nF	$\pm(3.5\%+20)$	10pF
200nF		100pF
2uF		1nF
20uF	$\pm(5.0\%+10)$	10nF
200uF		100nF
2000uF		1uF

Overload protection: 250V DC or AC peak value

NOTE: when over range, it can keep on measuring, "OL" will not show on LCD and the value is for reference only

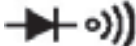
2.2.7 FREQUENCY

RANGE	ACCURACY	RESOLUTION
10Hz	$\pm(1.0\%+10)$	0.001Hz
100Hz		0.01Hz
1kHz		0.1Hz
10kHz		1Hz
100kHz		10Hz
2MHz		100Hz

Input sensitivity:1V RMS , overload protection : 250V DC or AC peak value(less than 15 seconds)

NOTE: when over range, it can keep on measuring, "OL" will not show on LCD and the value is for reference only

2.2.8 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 $(50\pm 20)\Omega$	open voltage is approx. 3V

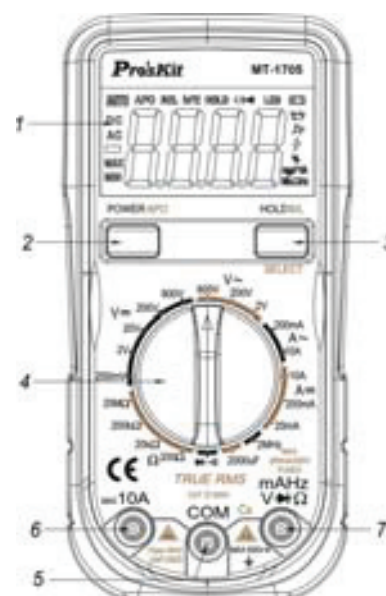
Overload protection: 250V DC or AC peak value

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

3 OPERATION

3.1 Front panel description

- 3.1.1 LCD: display the measured value.
- 3.1.2 Power/auto power off key: turn on/off the power and auto power off.
- 3.1.3 Hold/backlight/function selecting key: turn on/off hold and backlight key.
- 3.1.4 Range knob: selecting measuring function and range .
- 3.1.5 GND.
- 3.1.6 10A current test jack.
- 3.1.7 "+" pole jack of voltage 、 resistance、 diode、 capacitance and resistance.



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 a proper DCV/ACV range, If the measured

voltage is unsure beforehand, set the range knob to the highest range, then reduce it gradually until get the highest resolution readings.

3.2.3 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 600V DCA or 600V ACV, the test leads should be off the test point when switching the function and range.
- 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 “10A”jack.

3.3.2 Set the range knob to a proper DC or AC mA/A range, If the measured voltage is unsure beforehand, set the range knob to the highest range, then reduce it gradually until get the highest resolution readings.

3.3.3 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 hole should not exceed 200mA,10A hole should not exceed 10A(test time should be less than 10 sec.)

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 1MΩ, 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 Insert the red test lead to “V/Ω/Hz” terminal and the black one to “COM” jack.

3.5.2 Set the range knob to a proper capacitance range, connect the test leads to the capacitor being measured (note: the polarity of red test lead is “+”).

NOTE:

- If the resistance value being measured exceeds the max value of the range selected, LCD displays "OL".
- Before measuring, LCD display might not be zero, the residual reading will decrease gradually and should be disregarded.
- When measuring large capacitance, LCD may display an unstable value due to creepage or breaking.
- Discharge all capacitors completely before capacitance measurement to avoid damage.
- Do not input any volt at this range.
- This range is for automatic range test, measuring the range from 10nF to 2000uF.
- UNIT: 1mF=1000uF 1uF =1000nF 1nF=1000pF

3.6 FREQUENCY MEASUREMENT

3.6.1 Apply the test lead or shield to cable to “COM” or “V/Ω/Hz” terminal.


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

NOTE:

- When input is 10Vrms or less, a reading is possible but maybe over-range.
- Shielded cable is recommended when measuring small signals under noisy conditions.
- Be careful when measuring high volt circuit.
- Do not input a voltage over DC 250V or AC peak factor to avoid damage to the meter.
- This range is for automatic range test, Measuring the range from 10Hz to 2MHz

3.7 DIODE AND CONTINUITY TEST

3.7.1 Insert the black test lead to “COM” terminal and the red one to “V/Ω/Hz” jack(Note: the polarity of red test lead is“+”).

3.7.2 Set the range knob to “” range, connect the test leads to the diode being measured, reading is the approximation of the diode positive volt drop.

3.7.3 Connect the test leads to two points of the measured circuit, if buzzer sounds, the resistance is lower than approx. (50±20) Ω.

3.8 DATA HOLD

Press the “HOLD/BL”, LCD displays “HOLD”, the present value is held on LCD, press it again, the function is cancelled.

3.9 AUTO POWER-OFF

After not working about 15minutes, the meter will be changed to sleep mode. Press “POWER APO” key for 2 seconds to restart the power. Press the “POWER APO” key for 2 seconds to cancel the function of auto power off and “APO” icon will disappear from LCD; press it again for 2 seconds to restart the auto power off function and “APO” appears on LCD.

3.10 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.

3.11 BACKLIGHT INDICATION

Press “POWER BL” key to turn on the backlight; press it again to turn off. If the meter stops working more than 15sec, the backlight will auto power off.


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