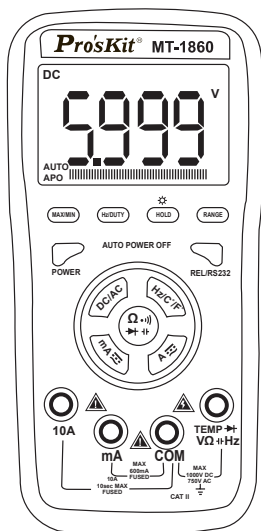


Pro'sKit®

Professional Digital Multimeter



MT-1860

User's Manual

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General

MT-1860 endowed with the key touching function instead of the traditional mechanical knobs, is a new type of 3 5/6 digital multimeter equipped with the LCD display device with the text height of 33mm which has the merits of visual display, easy operation, stable performance and high reliability. It can be used to measure DC voltage, AC voltage, DC current, AC current, resistance, capacitance, frequency, temperature, diode and make on-and-off test. Meanwhile, it is available for unit symbol display, data retention, the measurement of maximum and minimum value, automatic/manual range switching, automatic power off and alarm function. The complete machine takes a switching integrated circuit which can directly drive LCD microprocessor and double-integrating A/D and a digital display drive offering high resolution and high precision. Due to its complete functions, high measurement accuracy and convenient operation, the multimeter is the ideal tool in laboratory and factory as well as for radio fans and family.

Open-package Inspection

Open the package box and take out the meter, check carefully if the following accessories are absent or damaged. If there is any absence or damage, please contact the distributor immediately.

Digital Multimeter	1 PC
Instruction Manual	1 copy
Test Leads	1 pair
Temperature Probe (K-Thermocouple)	1 PC
PC Interface Cable	1 PC
Software Disk	1 PC
Holster	1 PC

Safety Note


In accordance with IEC1010 clause (the safety standard issued by International Electrotechnical Commission), MT-1860 is designed and produced according to the safety requirements of pollution level II.

Warning:

In order to avoid endangering the operator's safety, prior to the operation of the instrument, please read the instruction manual carefully, and conform to the safety warning information and operation instruction strictly to use the instrument.









1. When voltage above 30V, current above 10mA, AC power line with inductive load or power line during electric fluctuation is measured, please beware of electric shock.
2. Prior to measurement, check if the measurement function is in conformity with the

LCD display, and if the push button switch is at the trigger position. Check if the meter pen is contacted reliably, connected correctly, and grounded well and etc. In order to avoid electric shock.

3. Only if the meter is used with the matched meter pen, can it meet the requirement of safety standard. When the line of the meter pen is damaged, it is necessary to replace another one of the same model or the same electrical specification.
4. Don't use other unconfirmed or disapproved protector tube to replace the protector tube inside the meter. Only the protector tube of the same model or same specification can be replaced. Before the replacement, the meter pen must leave the measuring point and ensure there is no any signal at the input terminal.
5. Don't use other unconfirmed or disapproved battery to replace the battery inside the meter. Only the battery of the same model or same electrical specification can be replaced. Before the replacement, the meter pen must leave the measuring point and ensure there is no any signal at the input terminal.
6. When the electrical measurement is made, never let your body get in touch with the ground directly, and don't touch uncovered metal terminal, output port, lead clamp and etc. Where earth potential may exist. Dry clothes, rubber shoes, rubber cushion and other insulating material are usually used to keep your body insulated against the ground.
7. Don't store and use it in the high-temperature, high-humidity, inflammable and strong magnetic field environment.
8. It may do damage to the meter and endanger the operator's safety if the voltage value beyond the permitted ultimate voltage value is measured. The ultimate voltage value permitted for measurement is marked on the instrument panel, and never measure the value exceeding the standard. Don't input the ultimate value out of regulation in order to avoid electric shock and the damage to the meter.
9. When the meter pen is inserted into the current socket, don't measure any voltage for fear that the meter should be damaged and the operator's safety be endangered.
10. Don't try calibrating or repairing the meter. When it is indeed necessary for that, only the qualified professional personnel who have had special training or gained approval can make it.
11. During measurement, the requirement of measurement function must be in accordance with LCD display. Please be sure to disconnect the line of the meter pen with the measured object first and ensure there is no any input signal. It is forbidden to switch the function/range selection switch during measurement
12. When "  " is shown on LCD display, please replace battery immediately to ensure the measurement precision.
13. It is not allowed to insert the meter pen into the current terminal to measure voltage!

14. Please don't change the circuits of the meter freely for fear that the meter be damaged and the safety be endangered.

Description of Safety Symbols

	Warning!		Battery Under voltage
	High Voltage! Danger!		AC/DC
	Ground		In accordance with the instructions of European Trade Union
	Double Insulation		Fuse

Description of Instrument Panel and Push button Functions

1. Instrument model.

2. LCD display area.

3. Function button: Used to select various measurement functions.

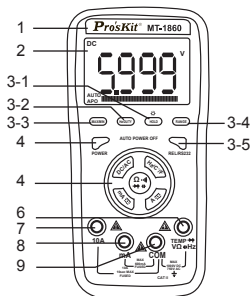
3-1 "Hold" backlight switch and reading-keeping switch. If the switch is pressed over 2 seconds, the backlight turns on. Further press the switch over 2 seconds, the backlight turns off or automatically turns off after 10 seconds.

Pressing the switch within 2 seconds could lock or unlock the data retention. Press the switch once to lock and press it again to unlock.


3-2 Hz/DUTY: Press the key in the gear of frequency can switch between the frequency and the Duty Cycle. Press the key in the gear of AC Voltage or AC Current can switch among the voltage, current, frequency and duty cycle.

3-3 MAX/MIN: The maximum value and minimum value.

Press the function button and enter MAX mode, in which the maximum value is held; press the button again to enter MIN mode, in which the minimum value is held. After the MAX/MIN mode is entered, the display device indicates the MAX/MIN value. No analog bar display and auto power off function in this working environment. Press



down MAX/MIN button for 2 seconds, and then exit from MAX or MIN test.

- 3-4 Range: Automatic/Manual Range Switch. Pre-set it to automatic range when the device starts up, then switch it to manual range. In the mode of manual range, press the "RANGE" button once, it will skip to the previous shift. When it goes to the highest shift, it goes back to the lowest shift when the button is pressed again. The procedure repeats again in the same order. Press the button over 2 seconds, it will exit from manual range and enter the state of automatic range measurement.
- 3-5 REL: Relative Value Measurement. Press this key to show the relative value measurement, press again to cancel the relative value measurement. The procedure repeats in the same order. Press this key over 2 seconds, it will switch to RS232, which can be showed on the LCD screen and the RS232 data transmission is thus open. Further press the key over 2 seconds, the RS232 icon disappears on the LCD screen. Now the RS232 data transmission terminates. The procedure repeats.
4. "POWER" is the power switch.
5. Function Selection Button.
6.  Input Port: Measure the positive input terminal of voltage, frequency, resistance, capacitance, diode as well as on-and-off test, and insert red meter pen.
7. 10A current input jack: Measure the positive input terminal of 10A shift AC/DC current, and insert red meter pen.
8. mA input port: Measure the positive input terminal of AC/DC.
9. COM input port: Measure the negative input terminal, and insert black meter pen.

Other Functions

1. Automatic power off


After the meter is stopped for 15 minutes, it will cut off power automatically (power off), and then enter the dormant (power off) state. The built-in buzzer will send out warning tone in one minute before it powers off. If you want to restart power (power on), please press the power switch. If you want to cancel automatic power-off, please press "REL" key over 2 seconds until the RS232 symbol appears. Meanwhile the "APO" symbol will be also turned off.

Property

1. General features

1-1. Display mode: LCD

1-2. Maximum display: 5999.3 5/6 display automatic polarity display and unit display.

- 1-3. Analog bar. 30 times/sec, display of 61 analog bars.
- 1-4. Measurement mode: dual integration A/D conversion.
- 1-5. Sampling rate: About 3 time/sec.
- 1-6. Over range: Display "OL"
- 1-7. Low voltage display: about 2.4v, the symbol  displayed.
- 1-8. Working temperature: 0~40°C
- 1-9. Storage temperature: -10~50°C, relative humidity <80%
- 1-10. Power: Two 1.5v batteries ("AAA" batteries)
- 1-11. Volume (Dimensions): 185mm×91mm×49mm (Length x width x height)
- 1-12. Weight: About 410g (including battery)

2. Technical features

- 2-1. Accuracy: $\pm(a\% \text{ reading} + d \text{ digits})$, the ambient temperature for ensuring accuracy: 23 \pm 5°C, relative humidity <75%.
- 2-2. The warranty period of calibration is one year from ex-factory date.

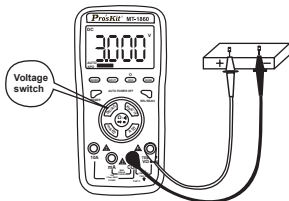
DC Voltage (DCV)

1. Press "AC/DC", select automatic measurement of DC voltage., and respectively plug in the red and black meter pens into the terminals of "VΩHz" and "COM", as shown in the following diagram.
2. The initial state of the meter is the DC voltage automatic measurement mode, which shows the symbols of "DC" "AUTO" "APO". Press "RANGE" is to select manual range mode; Press "MAX/MIN" once to show the Max measurement value. Press "MAX/MIN" again to show the Min measurement value. Press "MAX/MIN" over 2 seconds is to cancel the measurement of the MAX/MIN value.
3. Touch the measuring point with the meter measuring pen and connect it in parallel to the circuit being tested, and the polarity of the red meter pen wire and the tested voltage value are spontaneously displayed on the display.

Caution:

- a) Voltages over DC1000V or AC750V cannot be tested.
- b) When measuring high voltages, special precautions must be taken to avoid electrical shock. When measurement is completed, immediately disconnect the meter pen and the measured circuit.
- c) In case "OL" is displayed for manual range mode, it indicated the range has been exceeded and it is necessary to select higher range mode to complete this measurement.

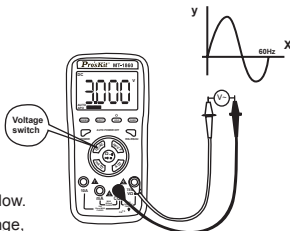
Range	Accuracy	Resolution
600mV	$\pm(0.5\%+4d)$	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	$\pm(1.0\%+4d)$	1V



- Input impedance: 600mV range>60M Ω , the others are 10M Ω . Overload protection: 1000VDC or 750V alternative peak.

AC Voltage (ACV)

1. Circularly press the "AC/DC" key until it selects the AC Voltage automatic measurement mode. Meanwhile, the symbol "AC", "AUTO", "APO" will appear on the LCD. Respectively plug in the red and black meter pens into the terminals of "TEMP Hz" and "com". See the picture re below.
2. The initial state of the meter is automatic range, which shows "AUTO" symbol. Press the "Range" key and switch it to manual range mode. In the AC mode of automatic/manual range, the frequency/ duty cycle can be measured by pressing "Hz/DUTY". However, the frequency response now is low, which is suitable for the measurement of high voltage and low frequency in the environment of magnetic field interference such as 220V/50Hz-400Hz, 380V/50Hz-400Hz.



⚠ Caution:

Voltages over DC1000V or AC750V cannot be tested. In case "OL" is displayed for manual range mode, it indicated the range has been exceeded and it is necessary to select higher range mode to complete this measurement.

Range	Accuracy	Resolution
6V	$\pm(0.8\%+10d)$	1mV
60V		10mV
600V		100mV
750V	$\pm(1.0\%+6d)$	1V

- Input impedance: 10M Ω .
- Overload protection: 1000VDC or 750V alternating peak.
- Display: Mean value response (calibrated with sine wave).
- Frequency response: (40-400)Hz.
- Duty Cycle Display: (0.1%-99.9%).

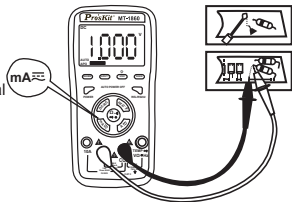
DC Current (DCA)

1. Press the "mA" button or "A" button.

Plug the black meter pen into the terminal of "COM" and the red meter pen into the terminal of "mA" or "10A". See the picture below.

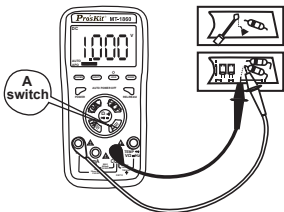
2. Circularly press the "mA" button or "A" button. Select automatic DC 600mA and 10A current to test. The "DC", "AUTO", "APO" symbols will appear on the LCD screen.

3. In case "OL" is displayed on the display, it indicates the current being measured has exceed the current range, and please select higher ranges for measurements.



Caution:

- a) At the 10A mode, current bigger than 10A cannot be measured, and at mA mode, the current bigger than 600 mA cannot be measured. Otherwise this will lead to the burning of the fuse or damage the instrument.
- b) When the meter pen is plugged in the input terminal of the current, it is strictly prohibited to have the meter pen connected in parallel on any circuits.



Range	Accuracy	Resolution
60mA	$\pm(1.0\%+10d)$	10 μ A
600mA		100 μ A
6A	$\pm(1.2\%+10d)$	1mA
10A		10mA

- The maximum input current: 10A (not exceeding 15s)
- Overload protection: 0.6A/250V fuse; 10A/250V fuse.

AC Current (ACA)

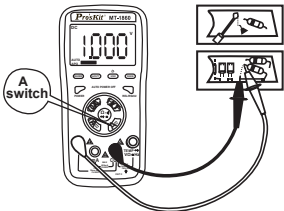
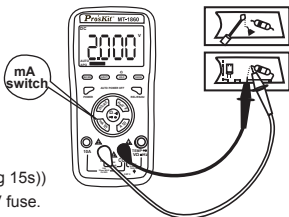
1. Press the "mA" button or "A" button. Plug the black meter pen into the hole of "COM" and the red meter pen into the hole of "mA" or "10A". See the picture below.
2. Circularly press the "mA" button or "A" button. Select automatic AC 600mA and 10A current to test. The "AC", "AUTO", "APO" symbols will appear on the LCD screen.
3. In case "OL" is displayed on the display, it indicates the current being measured has exceeded the current range, and please select higher ranges for measurements.

Caution:

- a) At the 10A mode, current bigger than 10A cannot be measured, and at mA mode, the current bigger than 600 mA cannot be measured. Otherwise this will lead to the burning of the fuse or damage the instrument.
- b) When the meter pens plugged in the input terminal of the current, it is strictly prohibited to have the meter pen connected in parallel on any circuits.

Range	Accuracy	Resolution
60mA	$\pm(1.5\%+10d)$	10 μ A
600mA		100 μ A
6A	$\pm(2.5\%+15d)$	1mA
10A		10mA

- The maximum input current: 10A (not exceeding 15s)
- Overload protection: 0.6A/250V fuse; 10A/250V fuse.
- Frequency response: 40~400Hz.
- Duty Cycle Display: (0.1%-99.9%).



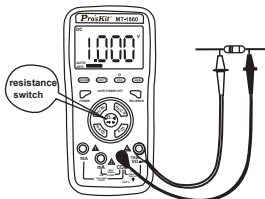
Resistance

1. Press the " Ω " button, and respectively plug the red and black meter pens into the holes of "TEMP" and "COM".
2. Circularly press " Ω " button and select resistance measurement. Meanwhile, a cor-

responding symbol will appear on the LCD screen. In automatic resistance measurement mode, you could select manual measurement by pressing "Range".

Caution:

- When measuring the capacity, all the powers within the tested circuits must be disconnected and the capacitance shall be sufficiently discharged.
- When measuring the resistance, any occurrence of voltage may lead to inaccurate readings, and if the 250V protection voltage is exceeded, it may damage the meter or threaten the safety of the user.
- When the range of 600Ω is in use, first short-circuit the meter pens and measure the resistance of the lead wires and then deduct it in the actual measurement.



Range	Accuracy	Resolution
600Ω	±(0.8%+5d)	0.1Ω
6kΩ	±(0.8%+4d)	1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ		1kΩ
60MΩ	±(1.2%+10d)	10kΩ

- Open circuit voltage: 600mV.
- Overload protection: 250V DC or AC peak values.

Diode and On-and-Off Test

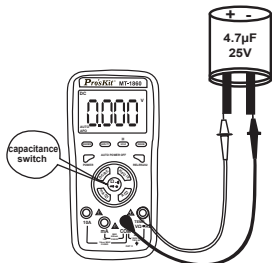
- Press " $\Omega \rightarrow$ " button and respectively plug the red and black pens into " $\overset{\text{TEMP}}{\text{V}\Omega\text{Hz}}$ " and "COM".
- Circularly press " $\Omega \rightarrow$ " button to select the diode or buzzer measurement. In Diode mode, LCD screen displays " ∇ " and voltage symbol, and the buzzer symbol " Ω " is also displayed on the screen.
- Connect the red meter pen to the positive of the diode, the black meter pen to the negative of the diode.

Caution:

- In case the diode is open circuit or the polarities are connected reversely, "OL" will

Range	Accuracy	Resolution
40nF	$\pm(5.0\%+30d)$	10pF
400nF	$\pm(3.5\%+8d)$	100pF
4 μ F		1nF
40 μ F		10nF
200 μ F	$\pm(5.0\%+10d)$	100nF

- Overload protection: 250V DC or AC peak value.



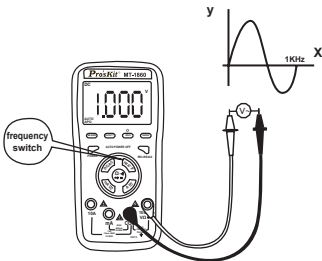
Frequency (Hz)

1. Press "Hz/C/F" button to conduct frequency measurement.
Respectively plug in the meter pen into "V Ω Hz" and "COM".
2. Have the testing end of the meter pen connected in parallel with the signal sources to be measured and read the results from the display. (Note: No analog bar will be displayed in this mode)
3. When testing frequency, press "Hz/DUTY" once to conduct duty cycle measurement.
Press "Hz/DUTY" once more to enter the frequency status.
4. Read the current results from the display.

⚠ Caution:

- a) Do not input signals higher than 60V, otherwise it may damage the instrument and pose dangers to human safety.
- b) After all the measurements are completed, it is necessary to disconnect the meter pen and the tested circuit.

Range	Accuracy	Resolution
10Hz	$\pm(0.3\%+2d)$	0.001Hz
100Hz		0.01Hz
1000Hz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1kHz
20MHz		10kHz



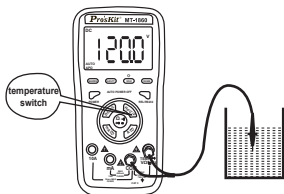
- Input sensitivity: 1.5V effective value. Overload protection: 250VDC or alternating peak

Temperature Measurement

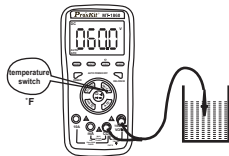
1. Press “Hz / °C / °F” button over 2 seconds, select temperature mode for celsius measurement. Meanwhile, the temperature symbol will be displayed. Further press “Hz / °C / °F”, it will be displayed as Fahrenheit. The procedure repeats in the same order. To exit from temperature measurement, press “Hz / °C / °F” button over 2 seconds.
2. Respectively plug the positive input end and negative insertion end of temperature probe into the terminals of “TEMP \rightarrow $\frac{V\Omega}{\mu Hz}$ ” and “COM”.
3. Put the induction end of temperature probe on the surface of the tested object. See the picture on the right.
4. Read the current testing results from the display.

⚠ Caution:

- a) When the input end is open circuit, it indicates normal temperature.
- b) Do not change the temperature sensor at random, otherwise the accuracy of measurement can not be guaranteed.
- c) Do not input voltage in temperature mode, otherwise the meter may be damaged.



Range	Accuracy	Resolution
-20°C~400°C	$\pm(1.0\%+50d)$	0.1°C
400°C~1000°C	$\pm(1.5\%+15d)$	1°C
0°F~1832°F	$\pm(1.0\%+50d)<750^\circ F$	0.1°F
	$\pm(1.5\%+15d)\geq 750^\circ F$	1°F




- K-Thermocouple (Nickel-chromium - nickel silicon) banana probe.

Communication Connection

1. Select setup to conduct installation according to the corresponding instrument models indicated by the disk in the package.
2. Connect the instrument to computer by USB cable.
3. Press “RS232/REL” over 2 seconds and the “RS232/REL” symbol will be displayed on screen.
4. Once the testing data is transmitted to computer, you could start recording, analyzing, processing and printing the data. For more details, please kindly refer to instructions in the software.

Instrument Maintenance

This instrument is a sophisticated instrument and the user shall not modify the electric circuit at will.

1. Cautions should be taken to water prevention, dust-prevention and fall prevention.
2. It shall not be stored in such environments as high temperature, high humidity and strong electromagnetic field.
3. Please use wet cloth and mild detergent to clean the exterior of the instrument and do not use such strong solvents as abrasives and alcohol.
4. In case it is not used for a prolonged period of time, the battery shall be removed so as to avoid the battery leakage from corroding the instrument.
5. Pay attention to the status of battery use, and when the LCD displays a flashing "" symbol, the battery shall be replaced.

The steps are as follows:

1. Loosen the screw on the back cover that secures the battery door and exit the battery door.
2. Remove the 3V batteries and replace them with two new ones. Although a 3V battery of any standard can be used, but in order to lengthen the service life, alkaline batteries should be used.
3. Mount the battery door and tighten the screw;
4. Replacement of fuse: The steps are as the above. When replacing the fuse, please use the fuse of the same size and type.

Precaution:

1. Do not connect DC or AC peak voltages higher than 1000V.
2. Don not measure voltage value on the current mode, resistance mode, diode mode and buzzer mode.
3. When the battery has not been mounted properly or the back cover has not been tightened, please do not use this meter.
4. Prior to the replacement of battery or fuse, please remove the measuring pen from the measuring point and switch off the meter.

- This Instruction is subjected to change without any further notice.
- The content of this Instruction is considered correct, and in case readers find any errors and missing parts, please contact the manufacturer.
- The Company shall not be held liable for any accidents and hazards resulted from the mal-operations by the user.
- The function elaborated by this Instruction shall not be taken as the reasons for using the product for special purpose

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一、概述

MT-1860是一種新型的數位多用表，用按鍵觸發的方式代替傳統的機械旋鈕方式、顯示直觀、操作方便、性能穩定、高可靠性、3 5/6數位多用表，儀錶採用33mm字高LCD顯示器，可用來測量直流電壓、交流電壓、直流電流、交流電流、電阻、電容、頻率、溫度、二極體及通斷測試，同時還有單位符號顯示、資料保持、最大最小、測量、自動/手動量程轉換、自動斷電及報警功能。整機採用了一個能直接驅動LCD微處理器和雙積分A/D轉換積體電路，一個提供高分辨力、高精度的數位顯示驅動，該表功能齊全，測量準確度高，使用方便，是實驗室、工廠、無線電愛好者及家庭的理想工具。

二、開箱檢查

打開包裝箱取出儀錶，仔細檢查以下附件是否缺少或損壞，如有缺少或損壞請立即與經銷商聯繫。

數字多用表	一台
使用說明書	一本
表筆	一付
溫度探頭（ K型熱電偶 ）	一條
PC介面電纜	一根
軟體光碟	一張
鱷魚夾	一套
防震套	一個
合格證	一張
皮盒	一個


三、安全注意事項

MT-1860符合IEC1010條款（國際電工委員會頒佈的安全標準）。使用污染等級 II 的安全要求進行設計和生產。









警告：

為避免危及使用者的安全，在使用儀錶之前請仔細閱讀本使用手冊，並嚴格遵守安全警告資訊和操作說明來使用本儀錶。

1. 在測量30V以上電壓，測量10mA以上電流，測量帶電感負載的交流電力線，測量電力波動期間的交流電力線時，謹防電擊。
2. 測量前，檢查測量功能是否與LCD上顯示相符，按鍵開關是否置觸發，要檢查表筆是否可靠接觸，是否正確連接、是否絕緣良好等，以避免電擊。
3. 儀錶只有和所配備的表筆一起使用才符合安全標準要求。如表筆線破損時，必須更換上同樣型號或者相同電氣規格的表筆線。
4. 不要使用其他未經確認或未認可的保險管來更換儀錶內部的保險管。只能換上同樣型

- 號或相同規格的保險管。更換前,表筆必須離開被測量點,確保輸入端無任何信號。
- 不要使用其他未經確認或未認可的電池來更換儀錶內的電池。只能換上同型號或相同電氣規格的電池。更換前,表筆必須離開被測量點,確保輸入端無任何信號。
 - 在進行電氣測量時,身體切勿直接接觸大地,不要接觸可能存在地電勢裸露的金屬端子、輸出口、引線夾等。通常使用乾燥的衣服、膠鞋、膠墊以及其他絕緣材料,保持你的身體與大地絕緣。
 - 不要在高溫、高濕、易燃、易爆和強磁場環境中存放及使用。
 - 測量超過儀錶所允許的極限電壓值有可能損壞儀錶和危及使用者的安全。在儀錶面板上標有儀錶所允許測量的極限電壓值,切勿測量超過此標準的安全值,請勿輸入超過規定的極限值,以防電擊和損壞儀錶。
 - 當表筆線插入電流插座時切勿測量任何電壓以免損壞儀錶和危及使用者的安全。
 - 不要嘗試校準或維修儀錶。的確有需要時必須有專門培訓或認可的有資格專業人員才能進行。
 - 在測量時,待測功能要求必須與LCD顯示一致,請一定要先將表筆線與被測物件斷開,確保輸入端沒任何信號輸入。嚴禁在測量進行中轉換功能/量程選擇開關。
 - 當LCD顯示“ ”時,請及時更換電池以確保測量精度。
 - 不允許表筆插在電流端子去測量電壓!
 - 請不要隨意改變儀錶線路,以免損壞儀錶和危及安全。

四、安全符號說明

	警告!		電池欠壓
	高壓!危險!		交直流
	大地		符合歐洲工會指令
	雙重絕緣		保險絲

五、儀錶面板及按鍵功能說明

1. 儀錶型號

2. LCD屏顯示區。

3. 功能按鍵：用於選擇各種測量功能。

3-1. “HOLD” 背光開關及讀數保持開關，長按“HOLD”鍵，觸發時間大於2秒，背光開啓，再觸發時間大於2秒，背光關閉，或10秒鐘後背光自動關閉，觸發時間小於2秒為資料保持的鎖定與解除，按一次鎖定，再按一次解除。

3-2. Hz/DUTY：頻率/占空比選擇鍵，在頻率檔位元按此鍵可以在頻率和占空比之切換；在交流電壓或交流電流檔位按此鍵可以在電壓或/頻率/占空比之間切換。

3-3. MAX/MIN：最大值/最小值，按下此功能，進入MAX模式，此模式保持測量的最大值；再按此鍵進入MIN模式，此模式保持最小值，進入MAX/MIN模式後，顯示器保持最大值或最小值。在此工作環境下無類比棒條顯示和自動關機功能，按MAX/MIN鍵2秒後，退出MAX或MIN測量模式。

3-4. RANGE：自動/手動量程切換，開機時預設為自動量程，按一下切換為手動量程，在手動量程模式下，每按一下往上跳一檔，到最高檔時再按此鍵又跳到最低檔，依次輪回。如按此鍵超過2秒則切換回到自動量程。頻率及電容檔沒有手動量程。

3-6. REL：相對值測量，按一下此鍵為相對值測量，再按一次取消相對值測量，以此輪回，如按此鍵超過2秒則切換到RS232，LCD屏上有RS232顯示，此時為RS232資料輸出打開，如再按此鍵超過2秒則RS232在LCD屏上消失，此時關閉RS232資料輸出，以此輪回。

4. “POWER”為電源開關。

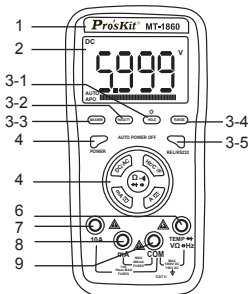
5. 功能選擇按鍵。

6. “ $\frac{TEMP}{V\Omega \leftrightarrow Hz}$ ”輸入插孔：測量電壓、溫度、頻率、電阻、電容、二極體以及通斷測試的正輸入端，插入紅表筆。

7. 10A電流輸入插孔：測量交直流電流10A檔的正輸入端，插入紅表筆。

8. mA輸入孔：測量交直流正輸入端。

9. COM輸入孔：負輸入端，插入黑表筆。



六 其他功能


1. 自動斷電

當儀錶停止使用15分鐘後，儀錶便自動斷電（關機），然後進入睡眠（關機）狀態，斷電前一分鐘內置蜂鳴器會發出響聲，若要重新啟動電源（開機），請按電源開關鍵，若要取

消自動關機，按“REL”鍵大於兩秒，有“RS232”符號出現，可取消自動關機，同時也關閉“APO”符號。

七、特性


· 一般特性

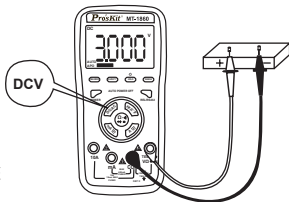
- 1-1. 顯示方式：液晶顯示
- 1-2. 最大顯示：5999、3 5/6位元自動極性顯示和單位顯示
- 1-3. 模擬條30次/秒，61段類比條顯示
- 1-4. 測量方式：雙積分式A/D轉換
- 1-5. 採樣速率：約每秒3次
- 1-6. 過量程顯示：顯示“OL”
- 1-7. 低電壓顯示：約為2.4V，有“ ”符號出現
- 1-8. 工作環境：0~40°C，相對濕度<80%
- 1-9. 儲存環境：-10~50°C，相對濕度<80%
- 1-10. 電 源：兩節1.5V電池（“AAA”電池）
- 1-11. 體積（尺寸）：185mm×91mm×49mm（長×寬×高）
- 1-12. 重 量：約410g（包括電池）

· 技術特性

- 2-1. 準確度：±（a%讀數+ d數位），保證準確度環境溫度23±5°C，相對濕度<75%，
- 2-2. 校準保證期從出廠日起為一年。

八、直流電壓（DCV）

1. 觸發“AC/DC”，選擇直流電壓自動測量，將紅黑表筆分別插入“TEMP  ”和“COM”孔中，如下圖。
2. 儀錶的起始狀態為直流電壓自動測量模式，顯示“DC”“AUTO”“APO”符號，按“RANGE”為手動量程方式，按“MAX/MIN”為當前最大測量值，再按“MAX/MIN”為當前最小測量值，長按“MAX/MIN”大於兩秒取消最大值與最小值測量。
3. 將測試表筆接觸測試點並聯到被測電路上，紅色表筆線的極性和被測電壓值將同時顯示在顯示幕幕上。



注意：

- a) 不能測量高於DC1000V或AC750V的電壓。
- b) 在測量高壓時，特別注意避免觸電。在測試完後表筆立即與被測電路斷開。

- c) 手動量程方式如LCD顯示“OL”，表明已經超過量程，須選擇更高的量程檔位來完成此次測量。

量 程	準確度	分辨力
600mV	$\pm(0.5\%+4d)$	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	$\pm(1.0\%+4d)$	1V

- 輸入阻抗：600mV量程 $>60M\Omega$ ，其餘為 $10M\Omega$ 。超載保護：1000V直流或750V交流峰值。

九、交流電壓(ACV)

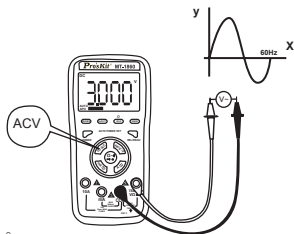
- 迴圈觸發“AC/DC”鍵，直到選擇交流電壓自動測量檔，同時LCD屏上顯示“AC”，“AUTO”，“APO”。將紅黑表筆分別插入“TEMP $\frac{V}{\Omega}$ Hz”和“COM”孔中，如下圖。
- 儀錶的起始狀態為自動量程，顯示“AUTO”符號，按“RANGE”鍵，轉換為手動量程方式。在自動或手動交流模式下按“Hz/DUTY”可測量頻率/占空比，但此時頻率低，適用於磁場干擾環境下的高壓低頻測量，如220V/50Hz-400Hz, 380V/50Hz-400Hz。

⚠注意：

- a) 不能測量高於DC1000V或AC750V的電壓。手動量程方式如LCD顯示“OL”，表明已經超過量程，須選擇更高的量程檔位來完成此次測量。

量 程	準確度	分辨力
6V	$\pm(0.8\%+10d)$	1mV
60V		10mV
600V		100mV
750V	$\pm(1.0\%+6d)$	1V

- 輸入阻抗： $10M\Omega$ 。
- 超載保護：1000V直流或750V交流峰值。
- 顯示：平均值響應（以正弦波有效值校準）。
- 頻率回應：(40-400)Hz。
- 占空比顯示：(0.1%-99.9%)。

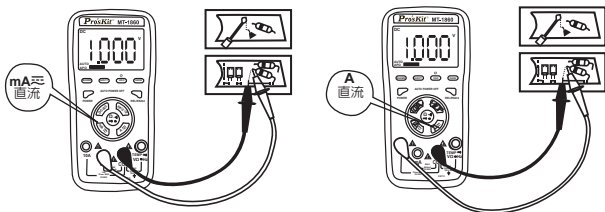


十、直流電流(DCA)

1. 觸發“mA”或“A”鍵，將黑表筆插入“COM”孔中，紅表筆插入“mA”或“10A”孔中，如下圖。
2. 迴圈觸發“mA”或“A”鍵，選擇自動直流600mA及10A電流測量，LCD屏上有“DC”、“AUTO”、“APO”符號顯示。
3. 如果顯示幕上顯示“OL”，表示被測量電流已超過當前量程，請選擇更高的量程來測量。

⚠注意：

- a) 在10A檔不能測量大於10A的電流，“mA”檔不能測量大於600mA的電流，否則會將保險絲燒斷或損壞儀錶。
- b) 當表筆插在電流輸入端時，嚴禁將表筆並聯在任何電路上。



量 程	準確度	分辨力
60mA	$\pm(1.0\%+10d)$	10 μ A
600mA		100 μ A
6A	$\pm(1.2\%+10d)$	1mA
10A		10mA

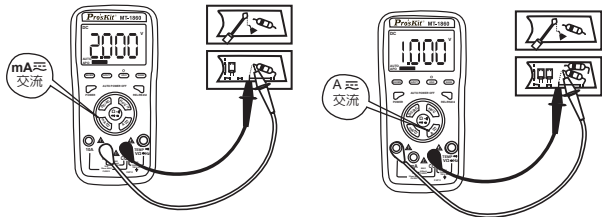
- 最大輸入電流：10A（不超過15秒）
- 超載保護：0.6A/250V保險絲；10A/250V保險絲。

交流電流(ACA)

1. 觸發“mA”或“A”鍵，將黑表筆插入“COM”孔中，紅表筆插入“mA”或“10A”孔中。
2. 迴圈觸發“mA”或“A”鍵，選擇自動交流600mA及10A電流測量，LCD屏上有“AC”、“AUTO”、“APO”符號顯示。
3. 如果顯示幕上顯示“OL”，表示被測量電流已超過當前量程，請選擇更高的量程來測量。

⚠ 注意：

- 在10A檔不能測量大於10A的電流，“mA”檔不能測量大於600mA的電流，否則會將保險絲燒斷或損壞儀錶。
- 當表筆插在電流輸入端時，嚴禁將表筆並聯在任何電路上。

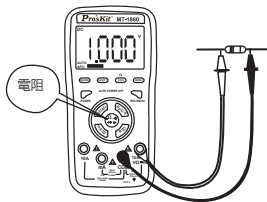


量 程	準確度	分辨力
60mA	$\pm(1.5\%+10d)$	10 μ A
600mA		100 μ A
6A	$\pm(2.5\%+15d)$	1mA
10A		10mA

- 最大輸入電流：10A（不超過15秒）
- 超載保護：0.6A/250V保險絲；10A/250V保險絲。
- 頻率回應：40-400Hz。占空比顯示：(0.1%-99.9%)。

十二、電阻 (Ω)

- 觸發“ Ω ”鍵，將紅黑表筆分別插入“TEMP $\frac{V}{\Omega}$ Hz”和“COM”。
- 迴圈觸發“ $\frac{\Omega}{\text{Hz}}$ ”鍵，選擇電阻測量，同時LCD顯示幕上有相應的符號顯示，在自動電阻檔測量狀態下，按“RANGE”可選擇手動測量。



⚠ 注意：

- 測電阻時，必須先將被測電路內所有的電源關斷，並將所有的電容充分放電。
- 在測量電阻時，任何電壓的出現都會引起測量讀數不准，如果超過250V保護電壓，則有可能損壞和危及使用者的安全。

c) 在使用600Ω量程時，應先將表筆短路，測得引線電阻，然後在實測中減去。

量 程	準確度	分辨力
600Ω	$\pm(0.8\%+5d)$	0.1Ω
6kΩ	$\pm(0.8\%+4d)$	1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ		1kΩ
60MΩ	$\pm(1.2\%+10d)$	10kΩ

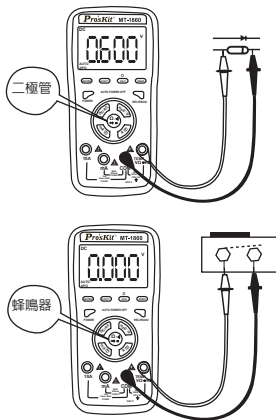
- 開路電壓：600mV。
- 超載保護：250V直流或交流峰值。

十三、二極體及通斷測試

1. 按“ Ω ”鍵，將紅黑表筆分別插入“TEMP/VΩ/Hz”和“COM”。
2. 迴圈觸發“ Ω ”鍵選擇二極體、蜂鳴器檔測量。二極體檔時，LCD屏顯示“ ∇ ”及電壓符號，蜂鳴器有“ Ω ”符號顯示。
3. 紅色表筆接到二極體的正極，黑色表筆接到二極體的負極。

⚠注意：

- a) 如果二極體開路或極性接反時，顯示幕上將顯示“OL”。
- b) 檢查二極體時，必須先將被測線路內所有的電源斷開，並將所有的電容充分放電。
- c) 在完成測量之後，要立即斷開表筆與被測電路的連接。



量 程	顯 示 值	測 試 條 件
∇	二極體正向壓降	正向直流電流約1.0mA，反向電壓約3.0V
\bullet)))	蜂鳴器發聲長響，測試兩點電阻約30Ω	開路電壓約1.2V

超載保護：250V直流或交流峰值。

十四、電容(C)

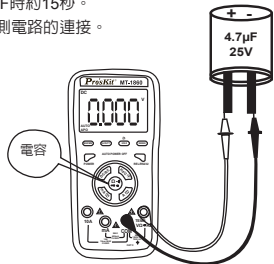
1. 按“ $\Omega \cdot \text{Hz}$ ”鍵，將紅黑表筆分別插入“TEMP $\Omega \cdot \text{Hz}$ ”和“COM”。
2. 迴圈觸發“ $\Omega \cdot \text{Hz}$ ”鍵選擇電容的自動測量。同時LCD顯示幕上有相應的電容符號顯示，電容檔無手動量程和類比棒條顯示。

⚠注意：

- a) 在測電容時，必須先將被測線路內所有的電源斷開，並將所有的電容充分放電。
- b) 在測量大電容時，需要較長的時間，在100 μF 時約15秒。
- c) 在完成所有的測量後，要立即斷開表筆與被測電路的連接。

量 程	準確度	分辨力
40nF	$\pm(5.0\%+30\text{d})$	10pF
400nF	$\pm(3.5\%+8\text{d})$	100pF
4 μF		1nF
40 μF		10nF
200 μF	$\pm(5.0\%+10\text{d})$	100nF

· 超載保護：250V直流或交流峰值。



十五、頻率(Hz)

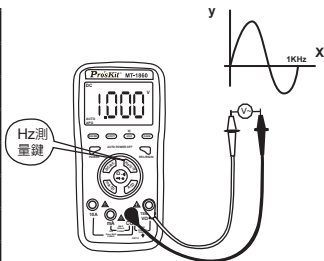
1. 觸發“Hz/C/F”鍵為頻率檔測量，將紅黑表筆分別插入“TEMP $\Omega \cdot \text{Hz}$ ”和“COM”。
2. 將表筆線的測試端並聯到待測信號源上，從顯示幕上讀出結果（注意：該檔無類比棒條顯示）。
3. 在進行頻率測量時，按一次“Hz/DUTY”鍵進入占空比測量狀態，再按一次“Hz/DUTY”鍵進入頻率測量狀態。
4. 從顯示幕上讀出當前的結果。

⚠注意：

- a) 不要輸入高於60V的信號，否則可能損壞儀錶並危及使用者安全。
- b) 在完成所有的測量後，要立即斷開表筆與被測電路。

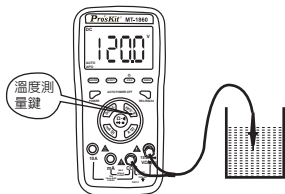
量 程	準 確 度	分 辨 力
10Hz	±(0.3%+2d)	0.001Hz
100Hz		0.01Hz
1000Hz		1Hz
10kHz		10Hz
100kHz		100Hz
1MHz		1kHz
20MHz		10kHz

- 輸入靈敏度：1.5V有效值。
- 超載保護：250V直流或交流峰值。



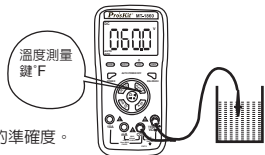
十六、溫度測量

1. 長按“Hz/C/F”鍵大於兩秒，選擇溫度檔攝氏度測量，同時有溫度符號顯示，再觸發“Hz/C/F”為華氏度顯示，依次迴圈，要退出溫度測量，長按“Hz/C/F”鍵大於兩秒。
2. 將溫度探頭的正輸入端與負插入端分別插入“TEMP+”和“COM”孔中。
3. 將溫度探頭的感應端置於被測物件的表面上，如右圖的水中
4. 從顯示幕上讀出當前測量結果。



⚠ 注意：

- a) 當輸入端開路時，顯示常溫。
- b) 請勿隨便更換溫度感測器，否則將不能保證測量的準確度。
- c) 嚴禁在溫度檔輸入電壓，否則有損壞儀錶的危險！



量 程	準 確 度	分 辨 力
-20°C~400°C	±(1.0%+50d)	0.1°C
400°C~1000°C	±(1.5%+15d)	1°C
0°F~1832°F	±(1.0%+50d)<750°F	0.1°F
	±(1.5%+15d)≥750°F	1°F


K型熱電偶（鎳鉻－鎳硅）香蕉探頭。

十七、通訊連接

1. 按包裝所提供的光碟對應儀錶的型號,選擇setup.exe的文件安裝。
2. 將儀錶通過USB電腦介面線與電腦連接好。
3. 長按“RS232/REL”大於兩秒,螢幕上有“RS232”符號顯示。
4. 測量的資料傳輸到電腦,此時可以對資料進行記錄、分析、處理和列印等。詳細請參考軟體中的說明

十八、儀錶保養

該儀錶是一台精密儀器,使用者不要隨意更改電路。

1. 請注意防水,防塵、防摔。
2. 不宜在高溫高濕、易燃易爆和強磁場的環境下存放、使用儀錶。
3. 請使用濕布和溫和的清潔劑清潔儀錶外表,不要使用研磨劑及酒精等烈性溶劑。
4. 如果長時間不使用,應取出電池,防止電池漏液腐蝕儀錶。
5. 注意電池使用情況,當LCD上出現“ ”符號閃爍時,應更換電池。

步驟如下:

- a). 擰出後蓋上固定電池的螺絲,退出電池門;
- b). 取下3V電池,換上兩個新的電池,雖然任何標準3V電池都可使用,但為加長使用時間,最好使用鹼性電池。
- c). 裝上電池門,上緊螺絲。
- d). 保險絲更換:步驟同上。更換保險絲時,請使用規格、型號相同的保險絲。

注意:

1. 不要將高於1000V直流或交流峰值電壓接入。
2. 不要在電流檔、電阻檔、二極體檔和蜂鳴器檔上去測量電壓值。
3. 在電池沒有裝好或後蓋沒有上緊時,請不要使用此表。
4. 在更換電池或保險絲前,請將測試表筆從測試點移開,並關機。

- 本說明書如有改變,恕不另行通知
- 本說明書的內容被認為是正確的,若用戶發現有錯誤、遺漏等,請與生產廠家聯繫。
- 本公司不承擔由於用戶錯誤操作所引起的事務和危害。
- 本說明書所講述的功能,不作為將產品用做特殊用途的理由。

Pro'sKit[®]



Certificate Number : TW98/12323QA

寶工實業股份有限公司
PROKIT'S INDUSTRIES CO., LTD.

<http://www.prokits.com.tw>

E-mail : pk@mail.prokits.com.tw