DC Milli – Ohm Meter
微小電阻測試器

MR-30

INSTRUCTION MANUAL
使 用 說 明 書

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DC Milli – Ohm Meter

⚠ SAFETY PRECAUTIONS

Normal usage of the equipment exposes you to a certain amount of danger from electric shock. Testing must sometimes be performed where exposed voltage is present. A voltage as low as 35V DC or AC rms should be considered dangerous and hazardous. You will significantly reduce the risk factor if you know and observe the following safety precaution:

(1) Don't be exposed to high voltage needlessly. Remove housing and covers only when necessary.

(2) If possible, familiarize yourself with the equipment being tested and the location of its high voltage points. However, remember that high voltage may appear at unexpected points in defective equipment.

(3) Use an insulated floor material or a large insulated floor to stand on, and use an insulated work surface on which to place the equipment. Make certain that such surface is not damp or wet.

(4) Use the time proven "one-hand-in-the-pocket" technique while handling an instrument probe. Be particularly careful to avoid contacting metal objects which could be a good ground for return path.

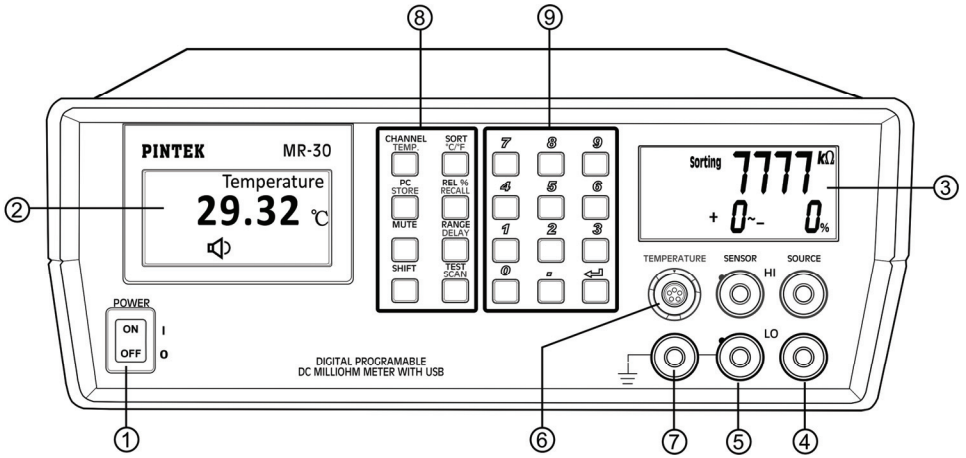
(5) On the AC power equipment. Remember that AC line voltage is usually present on some power input circuits such as the on-off switch, the fuse, and the power transformer, and any time the equipment is connected to an AC outlet, even if the equipment is turned off.

(6) On test instruments with 3-wire AC power plugs, use only a 3-wire outlet. This is a safety feature to keep the housing or other exposed elements at earth ground.

FEATURES

- Double LCD display
- 300,000 counts resolution
- Measurement range: 30mΩ~3MΩ
- 0.05% accuracy
- 20 standard user setting memory sets
- Sorting function and relative percentage function
- PASS/FAIL test result alarm
- Computer remote manual and auto scan function
- Manual and auto channel select
- Sampling rate: 30 sample/sec
- High resolution temperature compensation and measurement
- DUT four-wire method
- USB interface

Function Introduction of Front Panel



① **Power Switch:**

Push the switch “ON” will turn on both Major LCD and Minor LCD to indicate the power “ON”.

② **Major LCD:**

Major LCD will display the measurement result.

③ **Minor LCD:**

Minor LCD will display the value setting.

④ **Current Source Terminal:**

Source HI and Source LO terminals for resistance measurement.

⑤ **Measurement Terminal (Sensor Terminal)**

Sensor HI and Sensor LO terminals for resistance measurement.

⑥ **Temperature Terminal:**

The terminal for temperature measurement.

⑦ **Negative Terminal:**

This terminal has the same potential as earth, **but cannot be used as a substitute**.

⑧ **Key Pad:**

This key pad includes 0-9 keys and point key, enter keys.

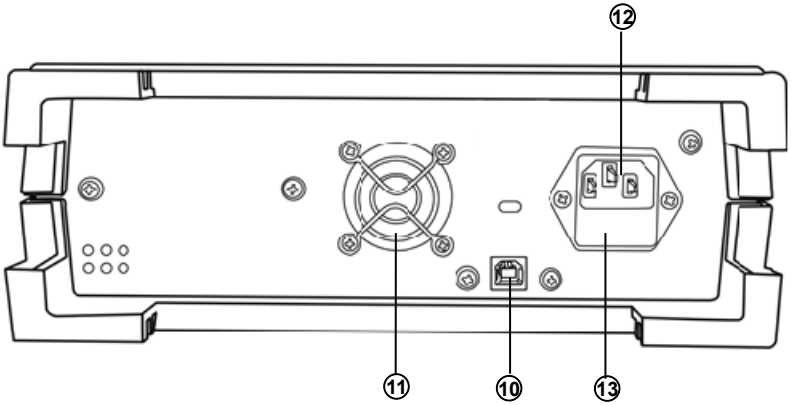
⑨ **Function Key**

These keys indicate Dual Functions.

In normal condition, the Keys will indication the black word function.

After pressing the shift key, the keys will indicate the blue function.

REAR PANEL DESCRIPTION



⑩ USB Terminal:

Connect MR-30 with your computer with USB cable for Remote operation.

⑪ DC Fan:

For cooling.

⑫ Input AC Power Socket and Fuse Plug:

The power input socket for the input line voltage (115 / 230V).

⑬ Fuse Socket:

The selection input line Voltage (115 / 230V) depends on the insert fuse plug. Refer to the Arrow marks on the fuse plug and the marks on the panel.

FUNCTION DESCRIPTION

(1) The "0 -9, & ·(POINT)" key:

Edit standard resistance and standard range value.

(2) The "ENTER" key:

Enter the standard resistance and standard range value.

(3) The "CHANNEL" key:

The **CHANNEL** key select "MANUAL/AUTO" mode.
In "AUTO" mode, Major LCD display "AUTO" and MR-30 select, resistance range automatically.

→ ~3MΩ→ ~300KΩ→ ~30KΩ→ 3KΩ→ ~300Ω→ ~30Ω→ ~3Ω → ~300mΩ→ ~30mΩ→

In "MANUAL" mode, if DUT is out of the input range, LCD will display "OL".

(4) The "SORT" key:

Press the **SORT** key enters sorting mode and edit the error range and the standard resistance value.

Press **SORT** key the first time, user can edits the +X% to –Y% error range. If user needs ± X% error range, press **SORT** key again (second time). After entered the error range, press **ENTER** key and then it will switch to edit standard resistance value.

(5) The "REL %" key:

The **REL %** key enter relative mode and edit use standard resistance value. After entered the standard resistance value, the relative mode will calculate the % (percentage) distinction resistance value between DUT and standard.

(6) The "RANGE" key:

The **RANGE** key changes the standard resistance value unit. The unit loop are MΩ→ KΩ→ Ω→ mΩ→ MΩ.

(7) The "PC" key:

The **PC** key actives the USB data transfer function. In PC function,

the MR-30 transfers the DUT value to the computer and receive command from computer.

(8) The "MUTE " key:

The **MUTE** key enables/disables the mute function. In MUTE function, the buzzer sound is turn off.

(9) The "TEST" key:

The **TEST** key compares the DUT resistance value with user standard resistance value in sorting mode. If DUT resistance value is inside the standard resistance error range, the minor LCD will display "PASS" and the MR-30 buzzer will beep sound. If DUT is out of the standard resistance error range, then the minor LCD will display "FAIL", and buzzer will beep twice sounds

(10) The "SHIFT" key:

The **SHIFT** key actives the external function.

(11) The "TEMP" key (SHIFT+CHANNEL):

The **TEMP** key enables/disables temperature detection.

NOTE: In TEMP function, resistor terminal is disabled.

(12) The "STORE" key (SHIFT+PC):

The **STORE** key edits the user value. In store function, user can select memory setting address from 1 to 20.

(13) The "RECALL" key (SHIFT+REL %):

The **RECALL** key activates the user value recall function. In recall function, user can select memory setting address from 1 to 20.

(14) The "DELAY" key (SHIFT+REANG):

The **DELAY** key edits the scan delay time. Delay time ranges from 1 to 10000 seconds.

(15) The "SCAN" key (SHIFT+TEST):

The **SCAN** key activates the auto scan function. In auto scan function, after each delay time, MR-30 will measure the DUT resistance and compare it with the standard value range then return the PASS/ FAIL result.

DISPLAY DESCRIPTION

(1) Main LCD:

The Main LCD will display the following:

OL: Over Load, DUT is out of input range.

: Mute Mode Enabled

: Mute Mode Disabled

Shift: Shift Mode Enabled

1234567890: DUT resistance value

Ω: DUT resistance unit

Delay: Indicates MR-30 in operation mode

(2) Minor LCD:

0 – 9: shows edit standard resistance and the standard range value.
Pass / Fail: Indicates whether the DUT resistance value is inside the standard resistance value or out of the standard value.

OPERATION

(1) Resistance measure:

MR-30 uses 4 wire connector measurement DUT resistance.

- Source HI: The Source HI terminal supply measures current. It is connected to the DUT + side.
- Source LO: Source LO terminal receive measuring current. It is connected to the DUT – side.
- Sense HI: The Sense HI terminal measures positive electrode.
- Sense Lo: The Sense LO terminal measures negative electrode.
- GND: If DUT has large metallic area and do not connect to either terminals, then connect it to GND.

- The resistance value will change while connecting or disconnecting the test. Therefore, please wait for 1 minute in order to obtain an accurate value.

(2) Temperature measure:

MR-30 uses 4 wire high sensitive temperature probe.

- Connect the temperature probe to the Temperature connector.
- Press **Temp** (SHIFT + CHANNEL) key to enable temperature mode.

MAINTANCE

(1) Preventive Maintenance:

Please follow the following preventive steps to ensure the proper operation of your instrument.

- Never place heavy object on the instrument.
- Never place a hot soldering iron on or near the instrument.
- Never insert wires, pins or other metal objects into the ventilation fan.
- Never move or pull the instrument with the power cord or the input lead.

  Especially never move the instrument when the power cord is connected.
- Do not obstruct the ventilation holes on the rear panel.
- Clean and check the calibration of the instrument regularly to keep the instrument looking nice and working well.

(2) Fuse Replacement:

If the fuse blows up, both LCDs will not light up and the instrument will not operate. Replace only with the correct value fuse.
The fuse is located on the rear panel adjacent to the power cord receptacle.

- Unplug the power cord from the instrument.
- Insert a small screwdriver in the fuse holder solt (located between the fuse holder and the receptacle).
- Change the fuse and re-insert the holder.

NOTE:

When re-inserting the fuse holder, ensure that the correct line voltage is selected.

(3) CLEANING:

Remove any dirt, dust and grime whenever they become noticeable.

Clean the outside cover with a soft cloth moistened with a mild cleaning solution.

SPECIFICATIONS

Conditions Background: The specifications are applicable under the following conditions:

- Operation temperature of 20°C to 28°C.
- Relative humidity of 15% - 80%.
- The instrument requires 30 minute warm-up time to achieve rated accuracy.
- The power cord protective grounding conductor must be connected to the ground.
- The resistance value will change while connecting or disconnecting the test. Therefore, please wait for 1 minute in order to obtain an accurate value.

Resistance	Accuracy	≦30mΩ	0.1% + 6	
		>30mΩ	0.05% + 6	
Range	30mΩ, 300mΩ, 3Ω, 30Ω, 300Ω, 3KΩ, 30KΩ, 300KΩ, 3MΩ			
Measurement	Four-terminal method			
Sort Range	±9999%, +99 ~ -9999%			
Buzzer	Mute, Pass, Fail			
Over Range	“OL” indication			
Range	**Resolution**	**Measure Current**	**Accuracy**	**Open-Terminal Voltage**
~30mΩ	1μΩ	1A	±0.1% + 6	~1.2V
~300mΩ	10μΩ	100mA	±0.05% + 6	~1.2V
~3Ω	100μΩ	100mA	±0.05% + 6	~1.2V
~30Ω	1mΩ	10mA	±0.05% + 6	~4.5V
~300Ω	10mΩ	1mA	±0.05% + 6	~4.5V
~3KΩ	100mΩ	100μA	±0.05% + 6	~4.5V
~30KΩ	1Ω	100μA	±0.05% + 6	~4.5V
~300KΩ	10Ω	10μA	±0.05% + 6	~4.5V
~3MΩ	100Ω	1μA	±0.05% + 6	~4.5V
Delay Time	0.1~9999 S			
Temperature Sensor	Accuracy	0.3%+3°C		
Memory	20 sets of memories			
Operation Environment	Temperature	0°C to 40°C		
	Humidity	20% to 80%		
Storage Environment	Temperature	-20°C to 70°C		
	Humidity	0% to 90%		
Power	AC 115V/230V ± 10 % 50/60Hz			

MR-30

微小電阻測試器

⚠ 使用安全須知

設備在正常的使用下將讓您暴露於一定份量的觸電危險中。有時測試必須在暴露的電壓下執行。就算是如 35V DC 或 AC rms 這樣低的電壓也應被視爲危險和有害的。如果您知道並遵守以下的安全預防措施，將可以大大地減少風險因素。

(1) 只在必要時拆下外殼及蓋子，以減少暴露於高電壓下。

(2) 如果可能的話，請讓自己熟悉被測試的設備及高電壓點的位置。但是請記住，高電壓可能會出現在有缺陷的設備。

(3) 請站在絕緣地板材料或大型絕緣地板上，並將設備放置於絕緣工作臺上。請確保這種表面不是潮濕的。

(4) 當使用探測儀器時，要特別注意避免接觸到金屬物體，因爲這可能提供良好的電流返回路徑。

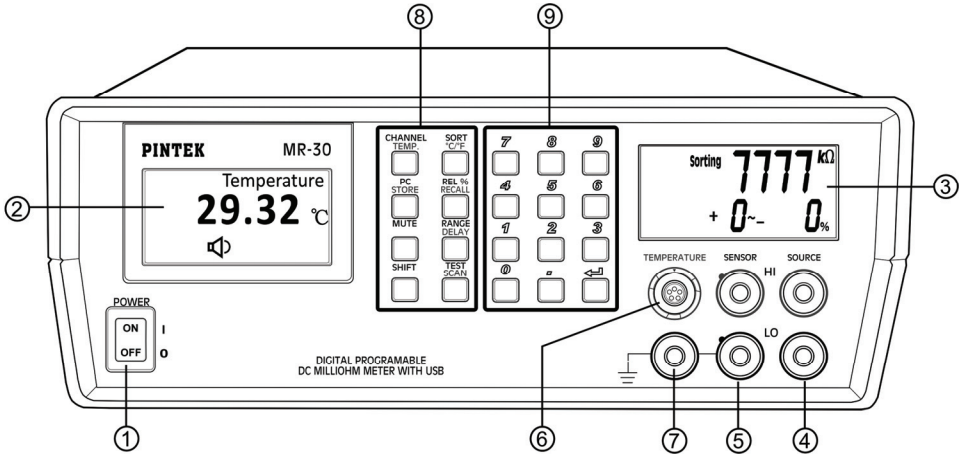
(5) 交流電源設備。請記住，AC 線路電壓通常存在於一些電力輸入電路裡，如開關、保險絲、電源變壓器和當設備被連接到交流電源插座上的任何時間時，即使該設備是處於關閉狀態。

(6) 當使用 3 線 AC 電源插頭的測試儀器時，只能使用一個 3 線插座。這是一項安全功能，以保持機殼或其他暴露因素等的接地狀況。

產品特點

- 雙液晶顯示
- 300,000 計數的解析度
- 測量範圍: 30mΩ ~ 3MΩ
- 精準度: 0.05%
- 20個標準使用設置內存設置
- 排序功能和相對百分比功能
- 通過/失敗測試結果警報提醒
- 電腦遠端手動和自動掃描功能
- 手動和自動頻道選擇
- 採樣速率: 30樣本/秒
- 高解析度溫度補償和測量
- DUT四線方法
- USB介面

前面板功能解說



① **電源開關:**

按下開關"ON"，主要LCD和小LCD燈亮表示電源已打開。

② **主要的液晶顯示器:** 顯示測量數值。

③ **小的液晶顯示器:** 顯示數值設置。

④ **電流源正負接頭:** 端子電阻測量的電流源"HI"和"LO"接頭。

⑤ **測量正負接頭（感應器接頭）:**

端子電阻測量的感應器"HI"和"LO"接頭。

⑥ **溫度接頭:** 溫度測量接頭。

⑦ **負端:**

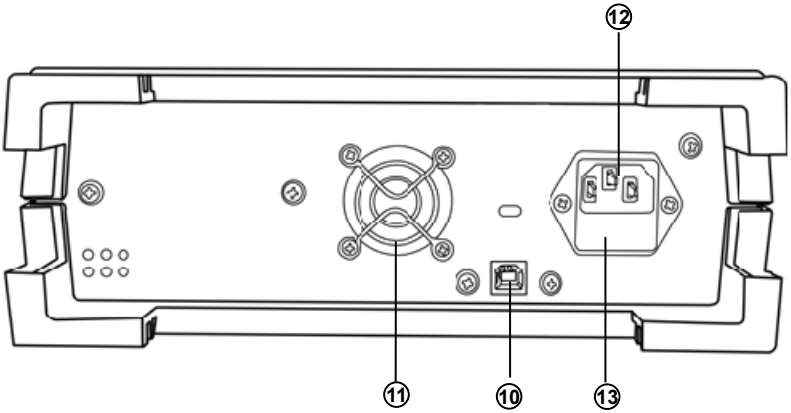
此接頭跟地線有著相同的作用，但不能作爲替代品。

⑧ **功能鍵:**

在正常的條件下，按鍵是表示黑色字體的功能。按下位移鍵(SHIFT)後，按鍵則爲藍色字體的功能。

⑨ **鍵盤:** 包括0-9數字鍵和小數點鍵，以及輸入鍵。

後面板功能解說



⑩ **USB接頭:**

此USB電纜可連接MR-30與電腦進行遠端操作。

⑪ **直流風扇:** 冷卻用。

⑫ **輸入端 AC電源插座和保險絲插頭:**

爲輸入線路電壓的電源輸入插座 (115 / 230V)。

⑬ **保險絲插座:**

請參閱保險絲插頭上的箭頭標記和面板上的標記，選擇輸入的電壓線(115 / 230V)插入保險絲插頭。

按鍵功能說明

(1) 0-9 & .（小數點）按鍵:

用於編輯標準電阻和標準範圍值。

(2) “ENTER”輸入按鍵:

輸入標準電阻和標準範圍內的值。

(3) “CHANNEL”頻道按鍵:

按**“CHANNEL”**鍵可選擇**手動/自動**模式。
在"**自動**"模式中，主要LCD會顯示"AITO"，而MR-30將自動選擇電阻範圍→ ~3MΩ→ ~300KΩ→ ~30KΩ→ 3KΩ→ ~300Ω→ ~30Ω→ ~3Ω→ ~300mΩ→ ~30mΩ→
在"**手動**"模式中，如果超出DUT的輸入範圍，主要LCD會顯示"OL"。

(4) “SORT”排序按鍵:

按“**SORT**”排序按鍵進入排序模式，可編輯誤差範圍和標準電阻值。
按一次“**SORT**”排序按鍵，使用者可以編輯 + X %至 — Y %的誤差範圍。如果使用者需要的是 ± X %誤差範圍，請再按一次此按鍵。當輸入誤差範圍後，按下“**ENTER**”輸入按鍵後，則切換到編輯標準電阻值。

(5) “REL %”按鍵:

“**REL %**”按鍵進入相對模式並編輯標準電阻值。當輸入標準電阻值後，相對模式將計算DUT和標準之間的%（百分比）區別電阻值。

(6) “RANGE”範圍按鍵:

按“**RANGE**”範圍按鍵可更改標準電阻值單位。
單位迴圈爲 MΩ→ KΩ→ Ω→ mΩ→ MΩ。

(7) “PC”按鍵:

按“**PC**”按鍵啓動USB 資料傳輸功能。在 PC 功能時，MR-30會將目前的 DUT值傳輸到電腦，或者接收電腦傳輸的指令動作.

(8) “MUTE ”靜音按鍵:

按**“MUTE ”**靜音按鍵可開啓/關閉靜音功能。當靜音功能開啓時，蜂鳴器聲是關閉的。

(9) “TEST”測試按鍵:

此鍵是用來比較在排序模式時的DUT電阻值與使用者標準電阻值的。如果被測器件的DUT電阻值是在標準電阻的誤差範圍內，小LCD會顯示" **PASS(通過)**"而MR-30的蜂鳴器會發出嗶聲。如果DUT在標準電阻值的誤差範圍外，小LCD會顯示" **FAIL(失敗)**"而蜂鳴器將發出兩次嗶聲。

(10) “SHIFT”按鍵:

按下“**SHIFT**”按鍵啓動外部功能。

(11) “TEMP”溫度按鍵(SHIFT+CHANNEL):

按下“**TEMP**”溫度按鍵可開啓/關閉溫度檢測。
注意! 在TEMP功能啓用時，電阻器終端處於關閉狀態。

(12) “STORE”儲存按鍵(SHIFT+PC):

按下“**STORE**”儲存按鍵可編輯使用者的數值。在儲存功能中，使用者可以選擇編輯記憶體設置的位址從1到20。

(13) “RECALL”恢復按鍵 (SHIFT+REL %):

按下“**RECALL**”恢復按鍵可啓動使用者數值恢復功能。在恢復功能，使用者可以從選擇記憶體設置裡的地址，從1到20。.

(14) “DELAY”延遲按鍵 (SHIFT+REANG):

按下“**DELAY**”延遲按鍵可延遲鍵編輯延遲掃描時間。延遲時間範圍從1到10000秒。

(15) “SCAN”掃描按鍵 (SHIFT+TEST):

按下“**SCAN**”掃描按鍵可啓動自動掃描功能。在自動掃描功能下，每個延遲時間後，MR-30將測量DUT電阻並比較它與標準值的範圍，然後回報通過/失敗的結果。.

顯示資料說明

(1) 主要的液晶顯示器:

主要LCD會顯示以下資料:

OL: 超過負荷，DUT超出輸入範圍。

🔇: 啓用靜音模式

🔊: 關閉靜音模式

Shift: 啓用SHIFT模式

1234567890: DUT電阻值

Ω: DUT電阻單位

Delay: 表示MR-30在操作模式下

(2) 小液晶顯示器:

0 – 9: 顯示編輯標準電阻和標準範圍值。
Pass(通過) / Fail(失敗): 指示 DUT 電阻值是否在標準電阻值內或超出標準值。

操作說明

(1) 電阻測量: MR-30使用4線連接器測量DUT阻抗。

- **HI來源:** HI來源端子測量電流源。它連接到DUT的+側。
- **LO來源:** LO來源端子接收測量電流。它連接到DUT的 – 側。
- **HI感應:** HI感應端子測量正電極。
- **LO感應:** LO感應端子測量負電極。
- **GND:**

  如果DUT具有較大的金屬面積，也不連接到任意終端，請將其連接到GND。

- 在連接或切斷測試時，電阻值將會有所改變。因此，請等待 1 分鐘以獲得準確的數值。

(2) 溫度測量: MR- 30使用4線高靈敏度的溫度探頭。

- 將溫度探頭連接到溫度連接器。
- 按下**“TEMP”溫度按鍵**(SHIFT+CHANNEL)來開啓溫度模式。

日常保養與清潔

(1) 預防性維修:

請按照以下的預防措施，以確保儀器的正確運行。

- 切勿將重物放置在儀器上。
- 切勿將熱烙鐵擺放在儀器的上面或附近。
- 切勿將電線、針或其它金屬物體插入通風風扇裡。
- 請勿用電源線或輸入線來移動或拉動儀器，尤其是當連接上電源線時，切勿移動儀器。
- 不要阻礙後面板上的通風孔。
- 定期清理和檢查儀器的校準，以維持儀器外觀的狀況、運作良好。

(2) 更換保險絲:

如果保險絲壞了，兩個液晶顯示器都不會亮，而且儀器將無法運作。替換請用正確規格的保險絲。保險絲位於後面板上相鄰的電源線插座。

- 從儀器上拔下電源線。
- 在保險絲座中插入小螺絲刀（位於保險絲座和插座之間）。
- 更換保險絲並重新插入支架。

注意!

當重新插入保險絲座時，確保選擇了正確的線路電壓。

(3) 清潔:

請先拔除電源線,，並用軟布沾中性清潔劑清潔在儀器外殼上的髒汙、灰塵和污垢。

規格

本儀器規格適用在下列條件下：

- 1 年校準循環。
- 操作溫度爲20°C至28°C。
- 相應的濕度爲15%-80%。
- 儀器需要先預熱30分鐘來達到檢定的精準度。
- 電源線保護接地導體必須連接到地面。
- 在連接或切斷測試時，電阻值將會有所改變。因此，請等待1分鐘以獲得準確的數值。

電阻	準確度	≦30mΩ	0.1% + 6	
		>30mΩ	0.05% + 6	
檔位	30mΩ, 300mΩ, 3Ω, 30Ω, 300Ω, 3KΩ, 30KΩ, 300KΩ, 3MΩ			
測量	四端子			
排序範圍	±9999%, +99 ~ -9999%			
蜂鳴器響聲	靜音(無聲)/ 通過(嗶 1 聲) / 失敗(嗶 2 聲)			
Over Range	“OL”顯示			
範圍	**解析度**	**測量電流**	**精準度**	**開放端電壓**
~30mΩ	1μΩ	1A	±0.1% + 6	~1.2V
~300mΩ	10μΩ	100mA	±0.05% + 6	~1.2V
~3Ω	100μΩ	100mA	±0.05% + 6	~1.2V
~30Ω	1mΩ	10mA	±0.05% + 6	~4.5V
~300Ω	10mΩ	1mA	±0.05% + 6	~4.5V
~3KΩ	100mΩ	100μA	±0.05% + 6	~4.5V
~30KΩ	1Ω	100μA	±0.05% + 6	~4.5V
~300KΩ	10Ω	10μA	±0.05% + 6	~4.5V
~3MΩ	100Ω	1μA	±0.05% + 6	~4.5V
延遲時間	0.1~9999 S			
溫度感應器	精準度	0.3%+3°C		
記憶體	20 組記憶體			
操作環境	溫度	0°C to 40°C		
	濕度	20% to 80%		
貯藏	溫度	-20°C to 70°C		
	濕度	0% to 90%		
電源	AC 115V/230V ± 10 % 50/60Hz			

TINSE05 Ver.00

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