

**UT-P40 AC/DC current probe**

**UT-P40 交流/直流 電流探測鉗**

## ■UT-P40



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**INSTRUCTION MANUAL**

**使用說明書**

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## 一般安全概述：

請仔細閱讀以下的安全防範措施以避免損傷並防止損壞這個產品或任何連接到它的產品。為了避免潛在的危險，請依所指示的方法使用這個產品。

只有合格的人員可以執行服務程序。

◆**避免火災或人身傷害。**

◆**正確的連接及拔除。** 在把探測鉗連結到要測試的電路前，請先把探測鉗輸出端連接到測量儀器上。先把探測鉗輸入端和地線從電路上拔除，才可把探測鉗從測量儀器上拔除。

\***注意：**請盡量避免測試裸露線，如需測裸露線的話請勿與測試端相接觸。

觀察所有的終端測定。為了避免火災或人身傷害，請觀察所有在產品上的數據及標記。在連接產品前請先閱讀手冊有關於進一步測定的資訊。

◆**正確的更換電池。** 只能使用正確的類型和指定的電池進行更換。


◆**沒有蓋子時請勿操作。** 蓋子或面板被去除時請勿操作這個產品。


◆**避免曝露的電路。** 通電時，不要觸摸曝露的連接及零件。

- ◆如有故障的疑慮，請勿操作。如果你懷疑產品有損壞，請合格的服務人員檢查。
- ◆在作業過程中必須確保所有的設備接地良好。
- ◆請勿在潮濕的情況下操作。
- ◆請勿在易燃的環境下操作。
- ◆保持產品表面乾淨、乾燥。

#### 安全聲明及標誌：

本手冊裡的名稱。這些名稱在本手冊中可能會出現。

 **注意。**警告聲明指出那些可能導致損傷或喪失生命的情況或做法。

 **小心警告。**小心警告指出那些可能導致這產品或其他所有物損壞的情況或做法。

**產品上的聲明。**這些聲明可能會出現在產品上：

**危險** 表示立即讀取標記時所造成的傷害。

**注意** 表示損傷危險不是立即的。

**小心** 表示對物產的傷害包括產品。

**產品上的標誌。**這些標誌可能會出現在產品上：

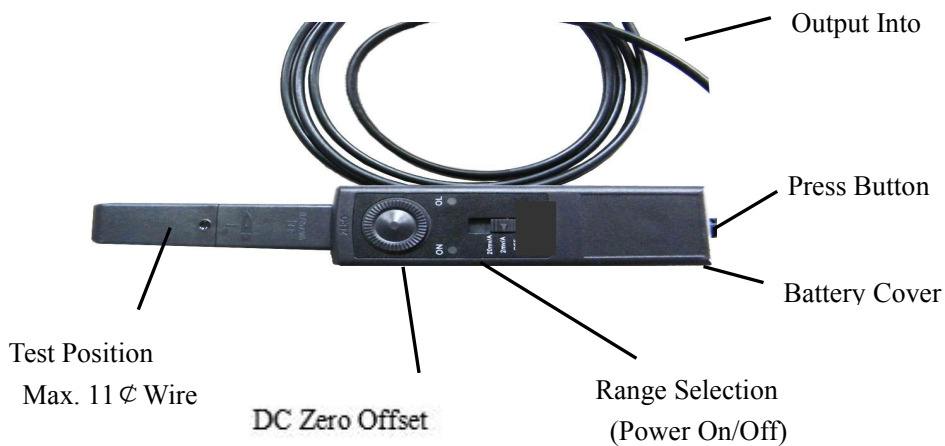
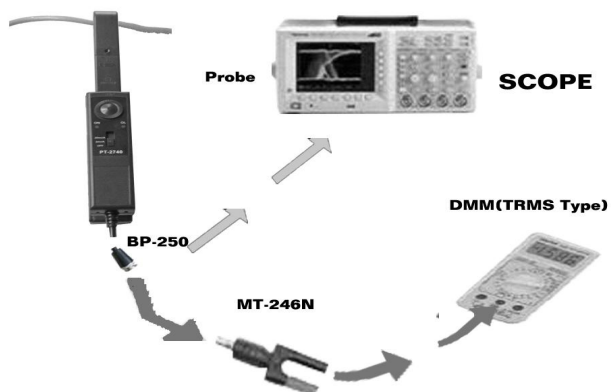
 警告符號

 雙層絕緣符號

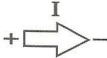




#### 準備啟動：

電流探測鉗 (圖 1)使一種通用示波器顯示 AC 及

DC 電流訊號至 30Amps Peak (21A RMS)。該電流探測鉗也可以用多功能電表進行 AC 和 DC 的數值測量(如下圖)，選購本公司附件 MT-246N (BNC-to-banana)接頭轉接器即可用于測量。



## 探測鉗控制及指示

控制及指示	描述
	<p>電流流動記號。箭頭顯示探測器的極性來測量電流的流動從正極到負極。</p>
	<p>零位調整。當沒有通電時，轉動來調整探測棒輸出端至零位。這也可以用在抵銷 DC 信號成分。測量 AC 數值時不須做零位調整除非你的機器無法離析 DC 部分。</p>
	<p>關閉/範圍開關。把開關從關閉滑至為 5mV/A 或 50mV/A 的範圍。無論選擇哪一個範圍，都會啟動探測器，綠色燈將亮起。如果燈沒有亮，請參考電池注解及安裝電池資料。</p>
	<p>電池顯示燈。當探測棒是開啟時，綠色的電池顯示燈將亮起。</p>
	<p>過載指示燈。如果測驗的數值超出選擇的範圍檔負載量，那紅色過載顯示燈將亮起並且連續閃爍警示。如可以，把探測棒調回 5mV/A 或者把探測棒移開電路。</p>

## 規格：

UT-P40 適用於任何品牌示波器上使用。

示波器必須先預熱至少 20 分鐘並用在溫度(10-30)與溼度(0-80)環境內。

**表 1: 產品規格**

尺寸	231 mm x67 mm x 36 mm
測量導體最大尺寸	10.3 mm
導線長度	200 cm
重量	310 g (不含電池重量)

**表 2: 環境特性**

工作時溫度	攝氏 0°C 到 + 50°C (華氏+32°F 到 + 122°F)
貯藏時溫度	攝氏 -20°C 到 + 80°C (華氏-4°F 到 176°F)
濕度	攝氏 0°C 到 40°C, 濕度 95% 攝氏 40°C to 50°C, 濕度 45%
汙染程度	2

## 基本操作

在使用探測棒前，必須安裝電池。



**注意。**不可把探測鉗夾在高於 600 V AC 伏特數的電路上。人身傷害或探測鉗損壞均有可能會發生。在連接到測試的電路前，都必須要把 UT-P40 電流測試鉗的輸出端連接到儀器上。

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1. 把電流測試鉗的 BNC 頭連接到示波器的輸入端。  
先設定示波器的頻道電壓輸入撥到到 DC 連結，電壓靈敏刻度調到 5m V/div.。
2. 要啟動電流測試鉗，把開關移至 5mV/A 或 50mV/A 的位置上。  
(※UT-P40 電流探測鉗有綠色的 LED 電源/電池顯示燈。如果 LED 燈沒有亮，請更換電池。)
3. 利用零位調整來設定零或補償探測鉗輸出端殘磁直流電荷。
4. 要連接測試鉗到電路需打開夾片端並夾住導體。  
※請注意。鉗子在“熱”和中性電線將會得到零的讀數  
(請記得要把測試鉗從導體上拔除前須先把它從電表或示波器上移除。)
5. 適當的調整測試鉗的檔位和示波器的 Time Base

以獲得清楚穩定的波形信號。要同時看到 AC 和 DC 電流，把示波器的輸入連結撥到 DC；當輸入連結撥到 AC 時，只會顯示 AC 電流。

6. 連接不同的量測機器所顯示出來的電流會有所不同。雖然 RMS 電流只能適用在低頻率電流波，但是瞬時峰值也可能是相當高的。
7. 恭喜你使用 UT-P40 它是含多功能的電流探測鉗，當你要連接到數字電錶使用時。請選購本公司附件 MT-246N (BNC-to-banana 轉接器) 連接至數字電錶使用。MT-246N 有防呆裝飾，你只要把黑色端接到電錶 COM (電錶印黑色)，然後紅色端接到 V $\Omega$  輸入端 (電錶印紅色) 即可。
8. 如只要測量 AC 電流，把數字電錶調整至測量 AC 的位置。
9. 要測量 DC 電流，把數字電錶調整至測量 DC 的位置。請注意測試鉗的電流箭頭以得到正確的極性讀數。
10. 如要增加 UT-P40 電流探測鉗的測量敏感度，把測量的電線從夾片中穿過多繞幾圈，參考圖 2。  
UT-P40 電流測試棒的敏感度是環繞夾片圈數的好幾倍。

例如：50mV/A X5 圈=250mV/A

**\*產品規格見 表 1**

**\*環境特性見 表 2**





表 1-1: 電氣特性

電流範圍	5mV/A ; 50mV/A
典型 DC 精確度	$\pm 2\%$ $\pm 0.4A$ at 50mV/A (0.4A to 10 A p-p range)
	$\pm 2\%$ $\pm 1A$ at 5mV/A (1A to 60 A p-p range)
最大工作電流	60A
頻率範圍	DC to 100KHz (-3 dB)
典型的上升時間	3.5uS
噪音 (Max)	2mV pk-pk
電池類型	9V 乾電池

**表 1-2: 電壓及電流測定**

Rating 測定	Maximum working current (A) 最大工作電流 (A)		Maximum Working voltage (V) 最大工作電壓	Maximum floating voltage (V) 最大浮游電壓
	Range (範圍) 5mV/A	Range (範圍) 50mV/A		
DC	30	5	600	600
DC + peak AC	30	5	600	600
AC peak	30	5	600	600
AC peak-peak	60	10	1200	-
RMS CAT	21	3.5	600	600
RMS	21	3.5	600	600
RMS CAT I	21	3.5	600	600

## 保養:

用這部分的資料來確保正確維護你的 UT-P40 AC/DC 電流探測鉗。

### 1. 關於乾電池的使用與注意事項:

UT-P40 測試鉗用一顆長方形 9V 的電池。本機屬高耗電產品，請指定使用鹼性電池。

當 UT-P40 的電池持續消耗著，可能會發生重大的增益錯誤。綠色的 LED 燈將會持續的亮著直到電池降到 6.5V。

如果測試棒有偵測到誤差，請立即更換新電池。

當長時間（1 週以上）不使用本產品時，建議將乾電池取出，因為乾電池會產生漏液，乾電池的電解液將會銹蝕電路板，造成重大損壞，此外乾電池屬高污染工業，因為乾電池的品質，我們無法掌控。

## **2. 安裝電池**

- (1) 把測試鉗從電路上移開。
- (2) 把側蓋板螺絲鬆開，就可看到乾電池，順便安裝（或更換）乾電池。
- (3) 觀察極性的同時，請把新的鹼性電池裝進指定的鈕扣接頭，並且將乾電池放置在指定的位置。
- (4) 把蓋子蓋上並輕輕的把螺絲鎖緊。

## **3. 清潔：**

用微濕軟布沾點溫和的清潔液及水來清理電流探測鉗的外表。要清理核心，把夾片打開並用沾了異丙醇的棉布來清洗露出的表面。用輕油來潤滑夾片的齒合面。

不要用溶劑或研磨劑清洗。不要把電流探頭浸入液體中。

## **4. 裝運的準備：**

本公司有設計 UT-P40 專用的包裝箱，方便收納與裝運，請勿任意丟棄。

## **General Safety Instructions:**

Read the following safety instructions to avoid injury and prevent damage to this product or any products connected to it. Use this product only as specified.

Only qualified personnel should perform service procedures.

### **To Avoid Fire or Personal Injury**

#### **Connect and Disconnect Properly.**

Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement Instrument.

#### **Observe All Terminal Ratings.**

To avoid fire or shock hazard, observe all rating and markings on the product. Consult the instruction manual for further ratings information before making connections to the product.

#### **Replace Batteries Properly.**

Replace batteries only with the proper type and rating specified.

#### **Do Not Operate Without Covers.**

Do not operate this product without the covers or panels.

**Avoid Exposed Circuitry.**

Do not touch exposed connections and components when power is present.

**Do Not Operate With Suspected Failures.**

If you suspect there is damage to this product, have it inspected by qualified service personnel.

**Do Not Operate in Wet/Damp Conditions.**

**Do Not Operate in an Explosive Atmosphere.**

**Keep Product Surfaces Clean and Dry.**

**Safety Terms and Symbols:**

**Terms in This Manual.**

These terms may appear in this manual.

 **WARNING.**

Warning statements identify conditions or practices that could result in injury or loss of life.

 **CAUTION.**

Caution statements identify conditions or practices that could result in damage to this product or other property.

**Terms on the Product.**

These terms may appear on the product.

## **DANGER**

Indicates an injury hazard immediately accessible as you read the marking.

**WARNING** indicates an injury hazard not immediately accessible as you read the marking.

## **CAUTION**

Indicates a hazard to property including the product.

### **Symbols on the Product.**

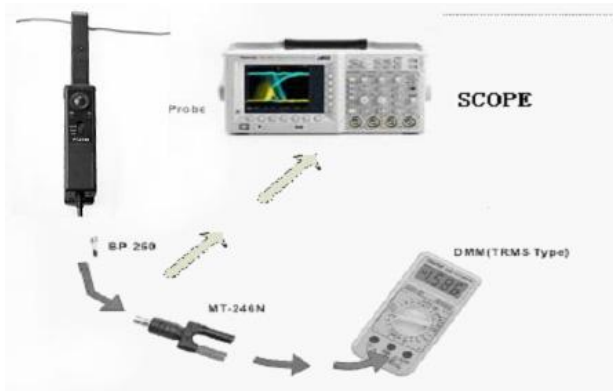
These symbols may appear on the product: Attention refer to operation Instructions.



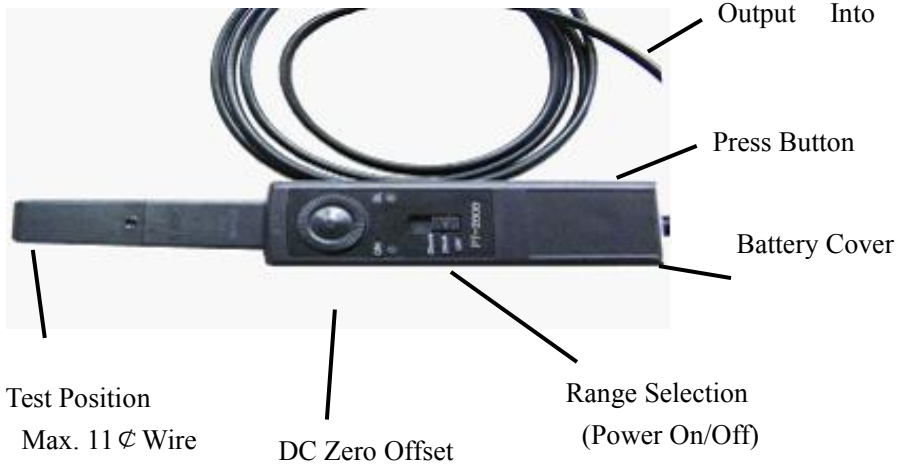
This instrument has double insulation.

### **Getting Started:**

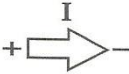




The current probe enables a general purpose oscilloscope to display AC and DC current signals up to 30 amps Peak (21A RMS). The current probe can also make AC and DC measurements with a multimeter by using the recommended accessory MT-246N (BNC-to-banana) plug adapter.



PIC 1



## Shows the controls and indicators on the

Control/Indicator	Description
	<p><b>Current flow symbol.</b> The arrow shows the probe's polarity convention for measuring current flowing from positive to negative.</p>
	<p><b>Zero adjustment.</b> Rotate to adjust the probe output to zero when there is no current present. It may also be used to offset a DC signal component. Zeroing is not needed for AC measurements unless your instrument cannot isolate a DC component (if present).</p>
	<p><b>OFF/Range switch.</b> Slide the switch from OFF to either the 5 mV/A or 50mV/A range. When either range is selected, the probe is turned on, and the green battery indicator lights. If the indicator does not light, see Battery Notes and Battery Installation.</p>
	<p><b>Battery indicator.</b> The green battery indicator lights when the probe is turned on. For more information, see Battery Notes and Battery Installation .</p>
	<p><b>Overload indicator.</b> The red overload indicator lights if the measured signal is greater than the selected range capacity. Switch the probe to 5 mV/A if possible, or remove the probe from the circuit.</p>



These characteristics apply to an adjusted UT-P40 AC/DC Current Probe installed on an oscilloscope of any brand. The oscilloscope must be warmed up for at least 20 minutes and be in an environment with the temperature at 10°C~30°C and the humidity at 0~80.

<b>Size</b>	231 mm x67 mm x 36 mm
<b>Maximum Conductor</b>	10.3 mm
<b>Cable Length</b>	200 cm
<b>Weight</b>	310 g (without battery)

### **Environmental Characteristics**

<b>Temperature</b>	0°C to +50°C (+32°F to +122°F)
<b>Storage temperature</b>	-20°C to +80°C (-4°F to +176°F)
<b>Humidity</b>	0°C to 40°C, 95% humidity 40°C to 50°C, 45% humidity
<b>Pollution Degree</b>	2

## **Basic Operation:**

Before using the probe, the batteries must be installed.

### **WARNING!**

**Do not clamp the probe onto circuits with voltages greater than 600 VAC. Personal injury or damage to the probe may result. Always connect the UT-P40 current probe output to the instrument before clamping onto the circuit under test.**

1. First connect the current probe BNC connector to BP-250 (double BNC connection cable) then connect to oscilloscope input. Start by setting the oscilloscope voltage input channel to DC volts, and the voltage sensitivity scale to 5m V/div.
2. Move the OFF/ Range switch to the 5 mV/A or 50 mV/A position to turn on the probe. (※The UT-P40 current probe has a green LED power/battery indicator. If the LED does not light, replace the battery or use specified power adaptor.)
3. Use the ZERO adjustment to zero or offset the probe output detection of residual magnetic DC charges.
4. Connect the probe to the circuit by opening the jaws and clamping around the conductor. See Figure 2.

***NOTE. Clamping around both the “hot” and***

***neutral wires may give you a zero reading. (Remember to unclamp the probe from the conductor before disconnecting it from your meter or instrument).***

5. Adjust the probe channel and oscilloscope's time base as necessary to get a clear and stable view of the signal. Set the oscilloscope input to DC volts to see both the AC and DC currents; set the channel to AC to see the AC current only.

6. The current drawn by different devices look much different than that of others. While the RMS current can only be used in low frequency current, the momentary peaks may be quite high. Figure 3 shows the difference between the line current drawn by a resistive load and a motor controller.

7. Congratulations on your purchase of the UT-P40, a multifunctional current probe. When connecting to a digital meter, use the recommended MT-246N (BNC-to-banana adapter). Connect the black lead to the meter COM (black letters on the meter), and the red lead to the  $V\Omega$  input (red letters on the meter).

8. To measure only AC current, set the meter to measure AC volts.

9.To measure DC current, set the meter to measure DC volts. Note the current convention arrow on the probe to get the proper polarity reading.

10.To increase the measurement sensitivity of the UT-P40 current probe, loop additional turns of the wire under test through the jaws. See Figure 4.

The sensitivity of the UT-P40 current probe is multiplied times the number of loops in the jaws. For example:  
 $50\text{mV/A} \times 5\text{turns} = 250\text{mV/A}$



## Electrical Characteristics

<b>Current Range</b>	5mV/A ; 50mV/A
<b>DC Accuracy, typical</b>	±2% ±0.4A at 50mV/A
	(0.4A to 10 A p-p range)
	±2% ± 1A at 5mV/A
	(1A to 60 A p-p range)
<b>Maximum Working Current</b>	60A
<b>Frequency Range</b>	DC to 100KHz (-3 dB)
<b>Rise time,typical</b>	2.5uS
<b>Noise(Max)</b>	2mV pk-pk
<b>Battery</b>	9V battery

## Voltage and current ratings

	<b>Maximum working current(A)</b>		<b>Maximum Working voltage (V)</b>	<b>Maximum floating voltage (V)</b>
<b>Rating</b>	Range 5mV/A	Range 50mV/A	Maximum Working voltage (V)	Maximum floating voltage (V)
<b>DC</b>	30	5	600	600
<b>DC +peak AC</b>	30	5	600	600
<b>AC peak</b>	30	5	600	600
<b>AC peak-peak</b>	60	10	1200	-
<b>RMS CAT</b>	21	3.5	600	600
<b>RMS</b>	21	3.5	600	600
<b>RMS CAT I</b>	21	3.5	600	600