INSTRUCTION MANUAL
使用說明書

CE

FG-72 / FG-102
DDS FUNCTION GENERATOR
數位合成信號函數波產生器

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DDS FUNCTION GENERATOR

SAFETY PRECAUTIONS:

WARRNING!

Normal use of test equipment exposes you a certain amount of danger from electrical shock. Because testing must sometimes be performed where exposed voltage is present. An electrical shock causing 10milliamps of current to pass through the heart will stop most humans heartbeats. A Voltage as low as 35V DC or ACrms should be considered dangerous and hazardous since it can produce a lethal current under certain conditions. Your normal work habits should include all accepted practices to prevent contact with exposed high voltage and to steer current away from your heart in case of accident contact with high voltage. You will significantly reduce the risk factor if you know and observe the following safety precaution.

(1)Don't expose high voltage needlessly. Remove housings and covers only when necessary. Turn off equipment while making test connections in high voltage circuits. Discharge high voltage capacitors after removing power.

(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 an insulated work surface on which to place equipment and make certain such surface are not damp or wet.

(4)Use the time proven “one hand in the pocket” technique while handling an instrument probe. Be particularly carful to avoid contacting a nearly metal object that could provide a good ground return path.

(5)When testing AC power equipment, remember that AC line voltage is usually present on some power input circuits such as the on-off switch, fuses, power transformer etc. any time the equipment is connected to an AC outlet, even if the equipment is turned off.

(6)Some equipment with a two-wire AC power cord, including some with polarized power plugs, is the “hot chassis” type. This includes most recent television receivers and audio equipment. A plastic wooden cabinet insulates the chassis to protect the customer. When the cabinet is removed for servicing, a serious shock hazard exists if the chassis is touched. Not only does this present a dangerous shock hazard, but damage to test equipment.

(7)On test instruments or any equipment with 3-wire AC power plug use only a 3-wire outlet, This is a safety feature to keep the housing or other exposed elements at earth groung.

1. FEATURES:

- FG-72/FG-102 is a 7MHz/10MHz DDS function generator with a 6-digits display. The function generator generates Sinusoidal, Triangular and Square waveforms. The type of selected by the push button.
- The frequency is selectable from 0.3Hz to 7MHz(FG-72)/10MHz(FG-102) by the Hz, KHz, MHz frequency select button. Easy to operate.
- All 3 waveforms, SINE, SQUARE, TRIANGULAR are with Max.7MHz(FG-72)/10MHz(FG-102) output.
- The Signal amplitude can be adjusted from 0.2V to 20Vp-p with no load conditions and 0.1V to 10Vp-p with a 50 ohm load termination.
- The main Output of all 3 waveforms has the provision of SYNC output signal (TTL level) when selected. Convenience to operate.
- The signal attenuate can be −20db or −40db.
- The Output wave form and frequency can be controlled by the front panel or by USB computer com port.
- An independent DC OFFSET switch variable control from +10V to −10V (no load) or +5V to −5V (50ohm load).
- USB input terminal for the computer operation.
- Frequency accuracy ±20ppm + 1 digit, after 1 year 5ppm.
- Adjustable Duty Cycle output.

2. SPECIFICATIONS:

(1) FREQUENCY CHARACTERISTICS:

FG-72/FG-102 use the Direct Digital Synthesis (DDS) technology to generates stable, high frequency, high resolution function output.

Waveforms: Sine, Square, Triangle

Sine Wave:

Harmonic Distortion:

-55dB to 200KHz, -30dB to 7M(FG-72)/10MHz(FG-102)

Flatness:

±0.3dB to 1MHz, ±3dB to 7M(FG-72)/10MHz(FG-102)

Triangle Wave:

Linearity:

≧98% to 100KHz, ≧90% to 7M(FG-72)/10MHz(FG-102)

Square Wave:

Symmetry:

±2% to 100KHz, ±10% to 7M(FG-72)/10MHz(FG-102)

Rise Time: ≦35 ns

Variable Duty Cycle: 20~80%(0.5Hz~3MHz)

SYNC Output:

Level: ≧3V to 7M(FG-72)/10MHz(FG-102)

Rise Time: ≦35 ns

Amplitude:

Max. Level: 20Vp-p(1MΩ load), 10Vp-p(50Ω load)

Min. Level: 20mVp-p(1MΩ load), 10mVp-p(50Ω load)

Range: 0.3Hz to 7MHz(FG-72)/10MHz(FG-102) in 3 ranges

Resolution: 0.3Hz

Accuracy: ±20ppm+1digit

Aging: 5ppm/year

Frequency Stability:

Output will change less than 10ppm for 15 minutes after switching ON and it will change less than 20ppm for 24 hours after switching ON.

(2)OUTPUT CHARACTERISTICS:

Impedance: 50 ohm±2%

Level:

Variable control from 20mVp-p to 20Vp-p (no load)

Or 10mVp-p to 10mp-p (50 ohm load)

Attenuation: -20dB±2%, -40db±2%

DC Offset:

Variable ±10V open circuit; ±5V into 50 ohm load.

Computer Control Mode.

When the unit enter Computer control mode. The LED will display "RS-232". The output of the unit will be controlled by computer program only.

(3) POWER SOURCE:

115V (110V – 120V) 50/60Hz, fuse 600mA;

230V (220V – 240V) 50/60Hz, fuse 300mA.

(4) OPERATING ENVIRONMENT:

Temperature: 0℃~40℃
Humidity: 20%~80%

(5) STORAGE:

Temperature: -20℃ - 70℃
Humidity: 0% - 90%

(6) ACCESSORY:

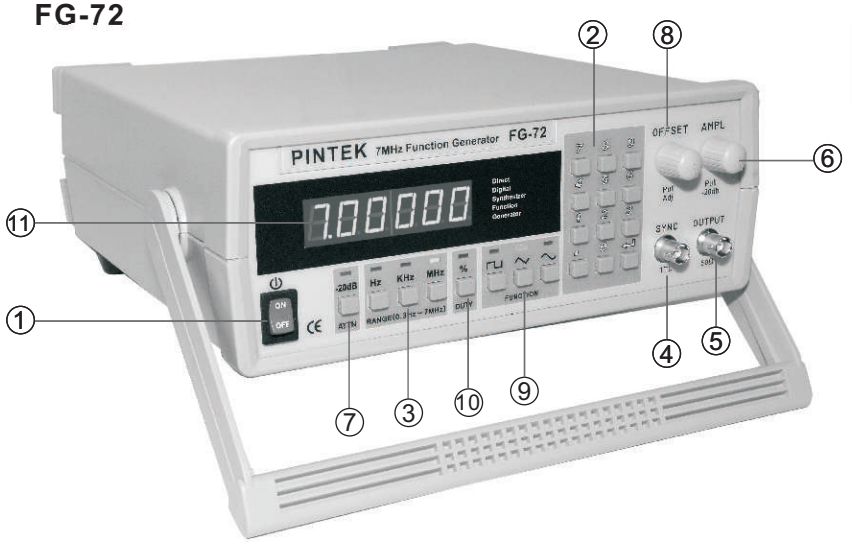
Power Cord, Output Lead(BP-251), BNC to BNC lead (BP-250), Software disk, User's Manual.

* Specifications and information contained in this manual are subject to change without notice.

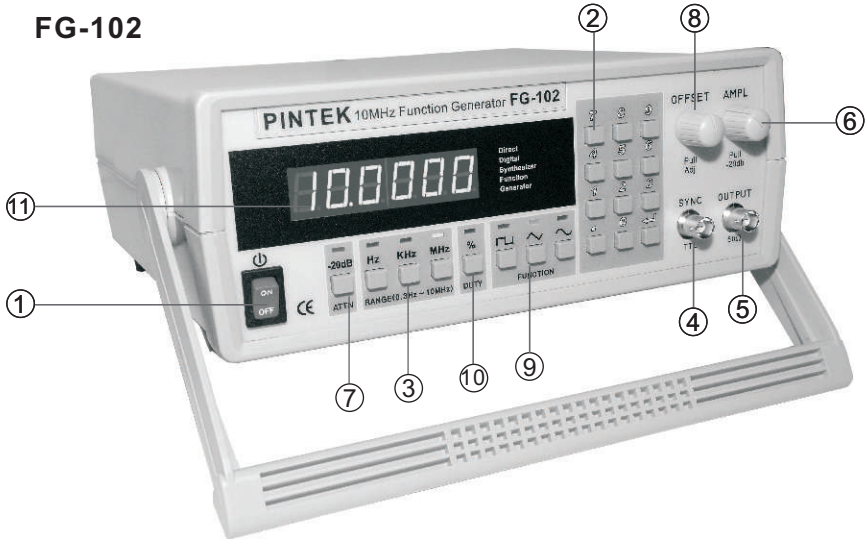
3. CONTROL AND INDICATIONS:

Front Panel:

FG-72



FG-102



① **Power Switch:**

Push the switch “ON” will light the LED ⑪ of the digits to indicate power “on”.

② **FREQUENCY CONTROL KEY:**

User can use these key (0-9 & point) to set the frequency value. The LED will Display the input number immediately.

③ **FREQUENCY RANGE SELECTION BUTTON:**

After Step finished step (2). Press the unit key Hz, KHz or MHZ.

Hz: The frequency value unit in “Hz”.

KHz: The frequency value unit in “KHz”.

MHz: The frequency value unit in “MHZ”.

④ **SYNC OUTPUT:**

The TTL level square signal OUTPUT synchronous with frequency of Main Output.

⑤ **MAIN OUTPUT:**

Function Output signal provides 0.3Hz to7MHz/10MHz. Depending on the step. 2 and 3 selected. The Max. Output impedance is 50 ohm.

⑥ **AMPLITUDE KNOB:**

The amplitude of signal can be adjusted from 0.2Vp-p to 20Vp-p at no load. Pull the Knob to attenuate the signal 10 times (-20dB).

⑦ **ATTENUATE KEY:**

Press this key. The output signal will be attenuated 10 times(-20dB). If combine this key with the step(6) pull the AMPL knob. The output signal will be attenuated 100 times(-40dB).

⑧ **DC OFFSET:**

This knob can apply a DC Offset to Main signal. Turn the Knob clockwise for Positive Offset and anti-clockwise for Negative Offset.

⑨ **FUNCTION SELECTOR BUTTON:**

3 button for waveform selection. Sin. Square, Triangle.

⑩ **DUTY CYCLE KEY:**

DUTY: The display are the "%" duty. When press "DUTY" button. The frequency display will twinkle. The user can input the duty cycle percentage value between 20%-80% as step(2). And press ENTER key to execute duty cycle adjustment.

If the equipment been under Duty Cycle already. Press the "DUTY" key double times. The DUTY mode will quit and return to the frequency display.

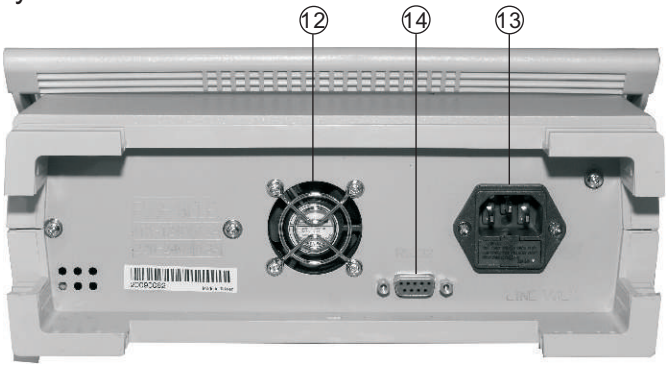
NOTE: The duty cycle adjustment mode only work under SQUARE WAVE form and the frequency must be lower than 3MHz.

⑪ **DISPLAY:**

The LED ⑪ will display "1.00000KHz" after switch on. If the user input the frequency value as step(2) and (3). The LED will glitter until the user press "ENTER" key to execute it.

If the LED display "Er- 02, 03, 04, or 05" means the user have input the error message. The display will keep about 3 sec. and return to the former display.

Rear Pane:



⑫ **DC Fan:**

For cooling purpose. 40mm Fan is provided on rear panel.

⑬ **Input AC Power Selector and Fuse:**

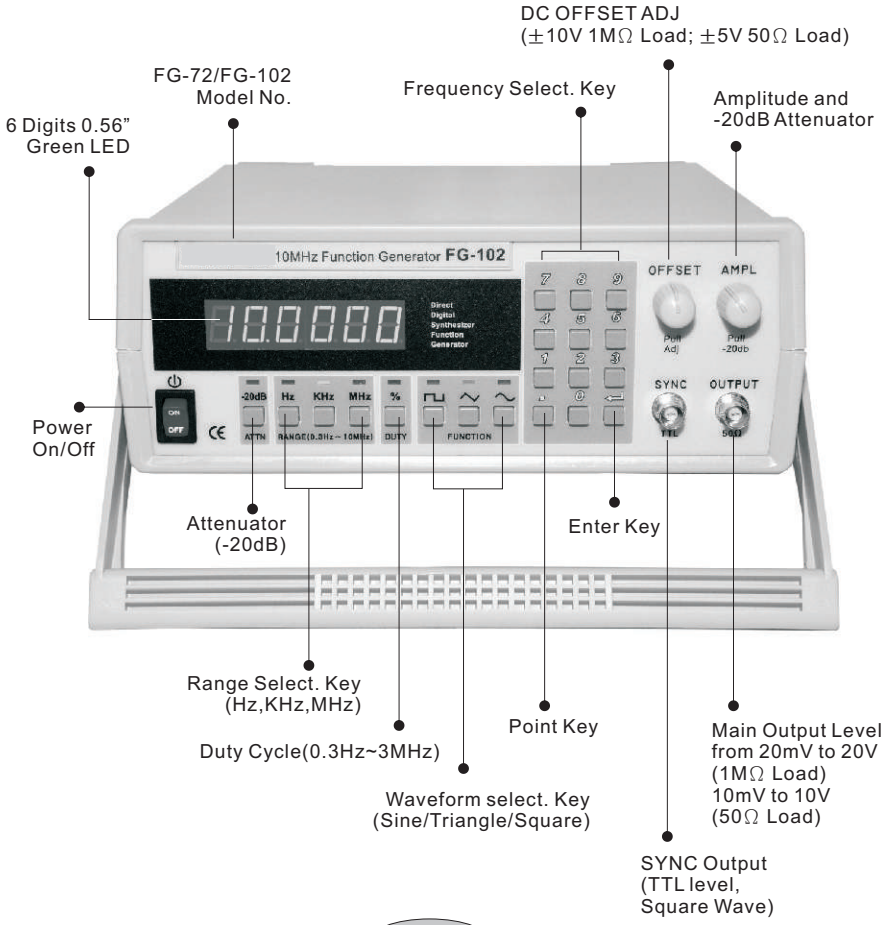
On the rear side of instrument. Power Input socket id provided. The socket has fuse plug which is used for fuse replacement and input line voltage selection. The selection of input voltage (115V/230VAC) depends on the insert fuse plug, Refer to the Arrow marks on fuse plug and the mark on the panel.

⑭ RS-232 or USB INPUT terminal:

(1)Setup the accessory " FG-102.EXE" software disk on your computer. The setup program will guide program installation. FG-102 program support below OS system. Windows 9x, Window ME, Window XP.

(2)Enter the FG control format. FG program will confirm com port, if com 1 been used, FG program will select com 2.

4. OPERATION:



Before applying power to the unit, make sure that input voltage setting is correct and the ventilation holes are not blocked. Ensure the Ventilation Fan is working well.

It is necessary to inspect the generated signal with an oscilloscope before connecting it to any electronic circuit. Hence use of oscilloscope is mentioned in the procedure.

Turn On the instrument with power On switch ① provided on the front panel. The display LED ⑪ will light as per present settings.

A. FUNCTION GENERATOR OUTPUT:

(1)Select the type wave form required by push the FUNCTION button ⑨.

(2)Connect Main Output signal to CH1 of oscilloscope and SYNC Output signal to Channel 2 of oscilloscope. Set the trigger source of oscilloscope at CH 2.

(3)Set the output frequency of the signal by the Frequency Control Key②. The display shows the number immediately. If the input number is more than 6 digit number. The unit will clear all the 6 digits but keep the last digit number and start again.

(4)Press the frequency unit button are in Hz, KHz or MHz ③ to set the value of the input digit number of step 3. And press enter key. The output of the FG will be the new output.

[NOTE] Before the user have press the Enter Key. The LED will glitter and the output of the unit will keep the same as the old output.

(5)Adjust the amplitude of the signal Amplitude Knob⑥ . Pull the Knob if the signal is to be attenuated 10 times (-20db). Or push the Point button⑦ and then the Enter button at the same time. if the signal is to be attenuated 10 times (-20db). NOTE, if the AMPL knob ⑥ is under PULL (-20db) position at the same time. The signal will be attenuated 100 times.

(6)Set the DC Offset of the signal by OFFSET knob ⑧ to the require level (-10V to +10V).

Check the impedance of the load before connecting (50 ohm Max.)

B. USB CONTROL:

(1)Open the FG-72/FG-102 program disk and execute setup.

(2)The setup program will guide program installation. FG-72/FG-102 program support below OS system, Windows 9X, Windows ME, Windows XP.

(3)FG program will confirm com port, if com 1 been used, it'll select com 2.

(4)Enter the FG control format. Fig 1 will display on your computer.

(5)Connect the USB terminal of FG-72/FG-102 and your computer by your PC USB lead.

(6)The FG-72/FG-102 LED ⑪ will display “RS-232” and the unit will enter the Com Port Mode. And will be controlled by the computer only. The output will be according to the command from the computer. If you'll return to the front panel control. Switch off the FG and disconnect the USB lead. And then switch ON the unit again.

(7)USB operation. (refer. Fig.1)

(a)Click the " Clear" Ⓓ to clear the frequency value on the screen Ⓐ .

(b)Click the number panel Ⓔ to input the frequency value.

(c)Select the unit of the frequency input, Hz, KHz, MHZ Ⓕ .

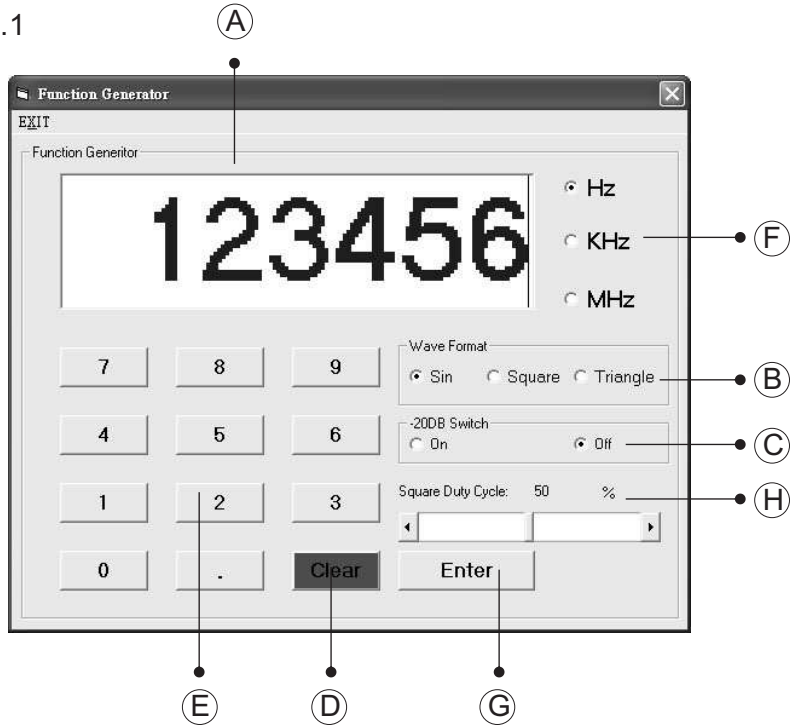
(d)Select the output wave from Ⓑ .

(e)Select the attenuate on or off Ⓒ.

(f)Select Duty Cycle value Ⓗ.

(g)Check the display if it are correct. Click the "Enter" Ⓖ to setting the command. The output of FG-102 will be depended on the command.

Fig.1



5. MAINTENANCE:

A. PREVENTIVE MAINTENANCE:

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

(1)Never place heavy objects on the instrument.

(2)Never place a hot soldering iron on or near the instrument.

(3)Never insert wires, pins or other metal object into ventilation fan.

(4)Never move or pull the instrument with power cord or output lead. Especially never move instrument when power cord or output lead is connected.

(5)Do not obstruct the ventilation holes in the rear panel. As this will increase the internal temperature.

(6)Do not operate the instrument with the cover removed unless you are a qualified service technician.

(7)Clean and check the calibration of the instrument on a regular basis to keep the instrument looking nice and working well.

(8)Remove any dirt, dust and grime whenever they become noticeable on the Outside cover with a soft cloth moistened with a mild cleaning solution.

B. FUSE REPLACEMENT:

If the fuse blows, the LED ⑪ will not light 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.

(1)Remove the fuse holder assembly as follows.

(2)Unplug the power cord from as of the instrument.

(3)Insert a small screwdriver in fuse holder slot (located between fuse holder and receptacle).

(4)Change the fuse and re-insert the holder.

[NOTE]

When re-inserting fuse holder, be sure that the fuse is installed so that the correct line voltage is selected.

C. SERVICE INFORMATION:

Some of the common problems that may occur and remedy to put back the instrument in a working condition as fast as possible are given bellow.

When the unit is not turning ON:

Check if the power ON/OFF switch is turned ON. If not, then check the power cord. Please make sure that the power cord is properly connected to the unit. Please also check the main switch. And ensure that the AC supply at your site is the same as the one mentioned at the rear chassis of the unit. For further help call the service personnel.

D. CLEANING:

Remove any dirt, dust and grime whenever they become noticeable cleaning the outside cover with a soft cloth moistened with a mild cleaning solution.

FG-72/FG-102

數位合成信號函數波產生器

使用安全須知:

注意!

日常生活中使用任何的電器產品都有可能會有觸電的危險。根據醫學報導,只要10mA的電流通過心臟, 都有可能造成生命的危險。因此, 我們將35V DC或35 V AC rms 以上都視為危險電壓, 如使用不當都會影響生命安全。因此, 請特別注意下列事項, 以確保您自身的安全。

1.非必要時, 請避免靠近高壓電源, 只在需要使用時才能將高壓電的遮蔽蓋打開。測試高壓電路前, 也必須先將電源切斷, 待測試棒接妥後, 再打開電源。如果有高壓電容, 在測試中會充電, 因此斷電後, 也須另外進行放電步驟。

2.儘可能先熟悉設備中高壓電的位置, 這是避免觸電的方法之一, 但是在故障的設備中, 高壓電可能會亂竄, 因此任何地方都有危險性。

3.修理設備時, 請在絕緣地板上或是有大塊面積的絕緣材料上工作, 並注意是否潮濕或破損。

4.在測量電路時, 請習慣用單手操作, 另一隻手請放在口袋中且勿接觸機器本身或其它導體, 這樣可以避免電流通過心臟。

5.使用AC電源設備時, 更應注意自身的安全保護。因為AC電源會隨著導體電線等傳遞, 就算將電源開關撥到OFF, 某些地方仍然會帶電,如變壓器、電源開關等, 除非將插頭確實移開插座才能完全斷電。

6. 大部分的儀器設備所配用的電源線有3個接觸端子, 其中一個端子是接地, 可以避免設備的外殼帶電, 但是也有一些例如家電設備等裝置只配用2個接觸端子的電源線, 但大部分都會有塑膠外殼作為絕緣保護; 當需要維修測試,必須除去塑膠外殼時, 請特別注意其危險性。

7.當使用3線電源插頭時, 請勿將接地端拆除, 因為只有將接地線牢牢接妥才能避免機殼漏電。

一. 特點:

- FG-72/FG-102是爲DDS函數波產生器, 有6位數的LED顯示, 它能產生正弦波、三角波、方波, 可經由按鍵開關控制。
- 輸出頻率可從0.3Hz到7MHz(FG-72)/10MHz(FG-102)由Hz, KHz, MHz 3個按鍵開關控制, 操作非常容易。
- 所有3種波形: 正弦波、三角波、方波, 最高頻率均能達到7MHz(FG-72)/10MHz(FG-102)。
- 輸出信號在無載時爲20mV到20Vp-p, 接50Ω負載時爲10mV至10Vp-p, 全程可調式。
- 在主要輸出3種波形的同時均能同步輸出TTL方波信號, 非常方便。
- 輸出信號衰減-20dB二組, 最高可衰減-40dB。
- 輸出信號的頻率及波形或衰減開關(-20dB)可從面板控制或經由USB由電腦控制。
- DC OFFSET爲固定或可調式, 從+10V到-10V(無載)或+5V到-5V(50Ω負載)。
- 設有USB接點以方便連接電腦控制。
- 頻率的準確率爲±20PPM +1 digit, 每年誤差爲5PPM。
- 隨機附贈應用程式光碟與USB連接線, 非常方便學術論文撰寫。
- 可調變工作週期: 20~80%(0.5Hz~3MHz)

二. 規格:

(1) 頻率:

FG-72/FG-102是爲直接數位合成技術(DDS)而開發完成, 其輸出信號具有穩定度高、解析度高以及頻率範圍大等特性。其產生的三種波形分別敘述如下:

1-1 正弦波:

失眞度:
-55dB至200KHz, -30dB至7MHz(FG-72)/10MHz(FG-102)
平坦度:
±0.3dB至1MHz, ±3dB至7MHz(FG-72)/10MHz(FG-102)

1-2 三角波:

線性:
≧98%至100KHz,≧90%至7MHz(FG-72)/10MHz(FG-102)

1-3 方波:

對稱性:
±2%至100KHz,±10%至7MHz(FG-72)/10MHz(FG-102)
上升時間: ≦ 35ns
可調變工作週期: 20%~80(0.5Hz~3MHz)

1-4 同步輸出:

位準: ≧3V至7MHz(FG-72)/10MHz(FG-102)
上升時間: ≦ 35ns

1-5 振幅:

最高位準: 20Vp-p(1MΩ負載),10Vp-p(50Ω負載)
最小位準: 20mVp-p(1MΩ負載),10mVp-p(50Ω負載)

1-6 檔位:

0.3Hz至7MHz(FG-72)/10MHz(FG-102), 分成3個檔位, 有獨立按鍵, 方便操作。

1-7 頻率穩定度:
從20mVp-p至20Vp-p(無載)，或10mVp-p至10Vp-p(50Ω負載)，可任意調整振幅，不會影響頻率的穩定度。

1-8 解析度: 0.3Hz

1-9 精確度: ±20PPM+1位數

1-10 老化度: 5 PPM/1年

1-11 衰減:
-20dB±2% 或 -40dB±2%(二組-20dB衰減器同時開啓)

1-12 直流抵補(DC OFFSET):
開路時±10V, 50Ω負載時±5V可調式，可選擇固定式裝置。

(2) 電腦控制介面:
當本機在選擇電腦控制方式操作時，在LED顯示器上會出現“RS-232”字樣。本機輸出只能由電腦指令控制，面板的按鍵式開關將完全失去作用，但2個類比式旋鈕仍能輔助輸出。

(3) 電源:
115V(100~120V)50/60Hz, 電源保險絲用600mA,
230V(200~240V)50/60Hz, 電源保險絲用300mA。

(4) 操作環境:
溫度: 0° C~40° C
溼度: 20% RH ~80%RH

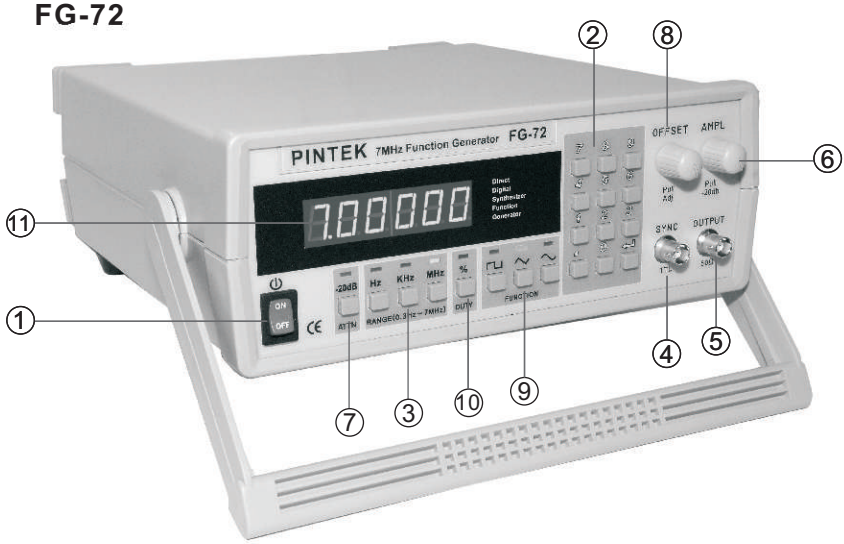
(5) 儲存環境:
溫度: -20° C~70° C
溼度: 0% RH ~90%RH

(6) 附件:
電源線, 信號輸出線(BP-251)，BNC對BNC同軸纜線(BP-250)，應用軟體光碟片, 操作手冊。

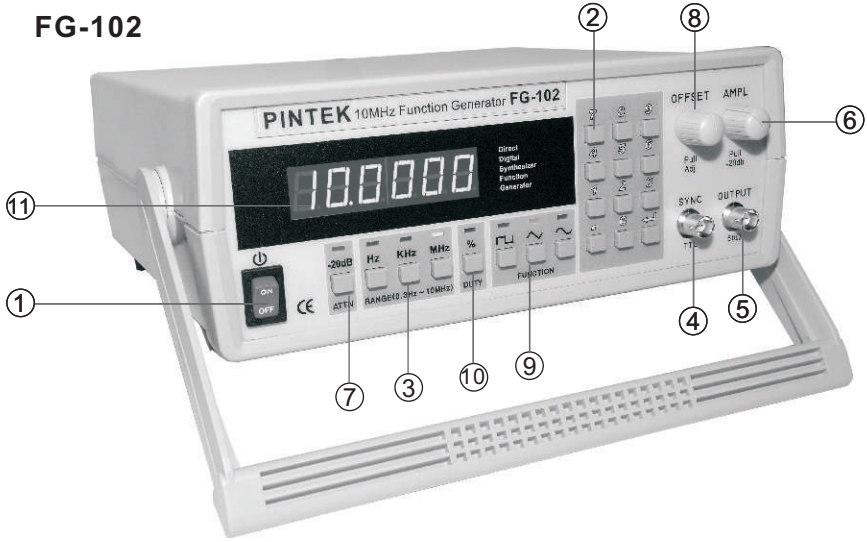
三. 操作步驟及顯示說明(請對照下圖指示號碼):

前面板:

FG-72



FG-102



① 電源開關按鍵:
打開此開關按鍵時, ⑪ LED會亮燈, 代表已經通電。

② 頻率數字選擇按鍵:
依所需的頻率數字按下0~9以及小數點按鍵,此時⑪ LED會立刻顯示數字。

③ 頻率檔位選擇按鍵:
依所需頻率數字完成(2)步驟之輸入後,再按下所要之單位 Hz, KHz, MHz 。
Hz: 輸出之頻率爲Hz單位。
KHz: 輸出之頻率爲KHz單位。
MHz : 輸出之頻率爲MHz 單位。

④ 同步輸出:
TTL位準信號, 輸出信號的相位與主輸出同步, 也可與主輸出信號同時使用。

⑤ 主輸出:
所輸出之信號依使用者所設定之波型選擇, 振幅大小, 以及頻率設定;頻率範圍從0.3Hz~7MHz(FG-72)/10MHz(FG-102), 最大

⑥ 振幅20Vp-p(無載), 10Vp-p(50Ω負載),輸出阻抗固定在50Ω。

振幅放大旋鈕(含類比式衰減開關):
此旋鈕功能爲控制輸出信號的振幅大小, 同時還附設衰減開關(-20dB) , 只需拉出此旋鈕, 衰減開關將被啓動, 衰減量剛好爲10倍。

⑦ 衰減開關按鍵:
按下此按鍵, 輸出信號將衰減成10分之1(-20dB), 此時如果 "AMPL" ⑥ 旋鈕同時拉出, 則輸出信號會衰減100倍。

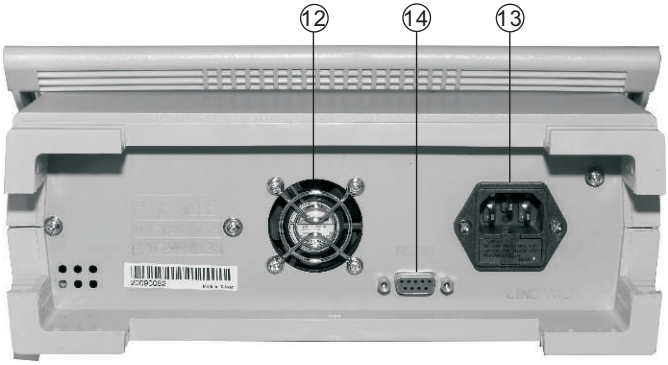
⑧ DC OFFSET 旋鈕:
此旋鈕爲控制主輸出信號的直流抵補偏移, 順時鐘爲正偏移, 逆時鐘爲負偏移。

⑨ 函數波型選擇按鍵:
共有3個按鍵,代表3個對應的波形,分別爲: 正弦波,三角波,方波。

⑩ 工作週期按序:
工作週期: 以"%"爲單位顯示。
按下"DUTY"按鍵, LED顯示器會閃爍, 使用者可輸入所需之數值20-80%, 然後按下"ENTER"按鍵輸出所要之工作週期。
如果重複按下二次"DUTY"按鍵, 則回到正常頻率輸出模式。

⑪ 頻率顯示LED:
6位數顯示頻率; 開機時, LED會顯示"1.00000"KHz, 當完成步驟(2)和(3)後LED會閃爍, 直到按下 "ENTER" 按鍵以執行使用者之指令, 如果LED顯示"Er-02, 03, 04, 05"表示輸入指令錯誤, LED會顯示3秒後回到上次所顯示之數字, 錯誤訊息如下所示:
Er 02: 輸入之數字太大
Er 03: 輸入之數字太小
Er 04: 輸入完成後等待太久未按"ENTER"按鍵
Er 05: 工作週期之頻率高於3MHz

後蓋:



⑫ 散熱風扇:
直徑4公分, 正方形體, 滾珠軸承, 大風量, 負責本機之散熱工作。

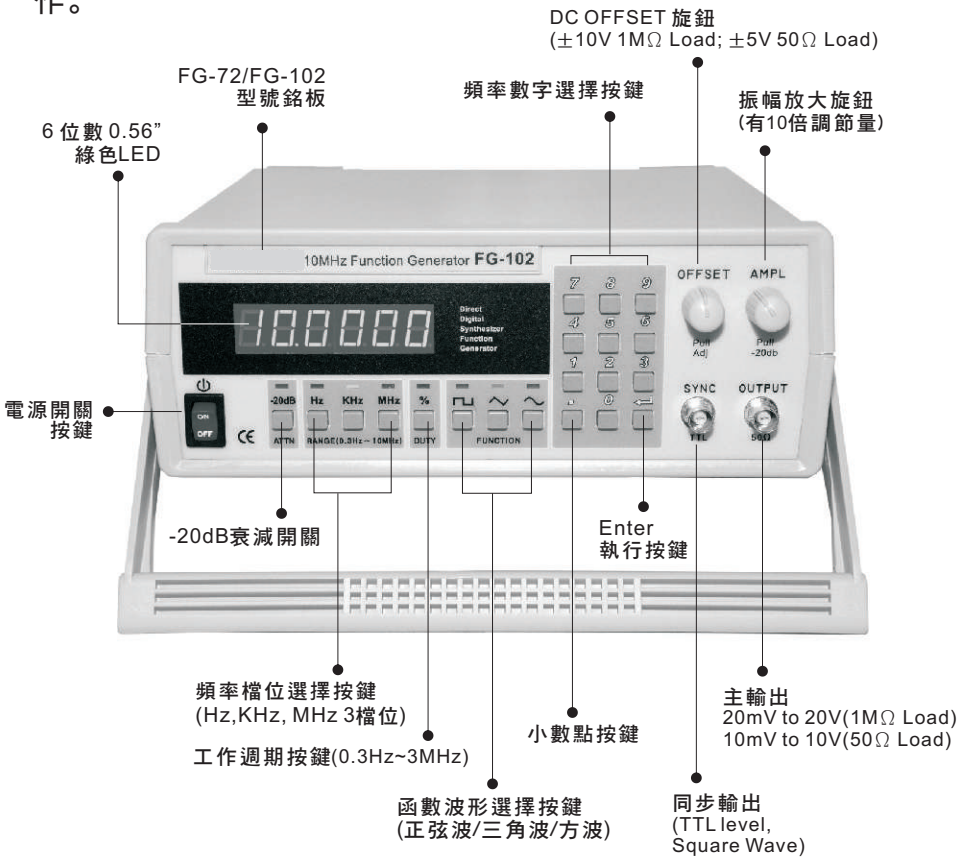
⑬ 電源插座:
此電源插座內附有保險絲, 並可依當地電源電壓選擇115V或230V, 請依指定電壓插入方向, 並配合指定的額定值保險絲, 115V時指定使用600mA, 230V時指定使用300mA。

⑭ USB插座:

將本機附件之應用軟體光碟片放入電腦的光碟機, 執行安裝完畢後, 再將USB連接線接上, 本機的所有數位式按鍵將全部改由電腦(PC)軟體程式控制, 包括頻率數字選擇按鍵、範圍按鍵、波型選擇按鍵以及一組輸出衰減開關等, 以方便進行遠端電腦遙控。

四. 操作說明:

注意! 在接上電源以前請再次確認電壓值設定是否正確, 散熱風散是否有異物阻擋, 同時請注意觀測用的示波器是否已正常工作。



A. 面板按鍵操作:

(1)按下電源開關按鍵。

(2)設定所需之波形。

(3)連接主輸出BNC到示波器之CH1，同步輸出連接到示波器之CH2，將示波器之觸發源設定在CH2。

(4)設定所需之輸出頻率數字。當按下數字鍵輸入數字時，LED會立刻顯示，最多爲6位數，然後按下“Enter”執行按鍵。

(註：如果輸入之數字超過6位數時，所有數字將會自動清除，只留下最後鍵入之數字。)

(5)設定頻率單位,依步驟(4)所鍵入之數字設定頻率單位爲Hz，KHz或MHz，如單位不變則按下"Enter"執行輸出所指定的頻率。

[注意!]在按下“Enter”執行按鍵前，LED會保持閃爍狀態，同時，所有輸出信號均爲上次所設定之信號。

(6)調整放大旋鈕以設定輸出振幅大小。如需衰減10倍(-20dB)則開啓此旋鈕⑥，或者，先按下小數點“.”，再按下“Enter”執行按鍵，此時輸出會衰減10倍，此時如放大旋鈕⑥也被開啓，則輸出振幅將會衰減100倍(-40dB)。

(7)直流電壓抵補旋鈕⑧，可調整直流偏移(DC OFFSET)，順時針方向爲正電壓偏移，逆時針方向爲負電壓偏移；偏移電壓爲±10V(無載)或±5V(50Ω負載)。

B. USB操作控制:

(1)將附件應用軟體光碟片安裝至電腦。

(2)此軟體可支援OS系統, Windows 9X, Windows ME, Windows XP。

(3)如電腦之Com Port 1已在使用, 軟體會自動選擇Com Port 2。

(4)軟體安裝完畢於執行時, 電腦螢幕會顯示出如圖1.所示畫面。

(5)電腦插上USB連接線並與本機後蓋的USB插座連接。

(6)LED顯示"*RS-232*"字樣, 此時本機所有的面板控制按鍵均會失效; 如果想回歸面板操作, 必須關掉電源, 同時移除USB連接線再重新開啓電源(Reset)即可。

(7)USB操作(請參考圖1)

(a)點選 "Clear" Ⓓ 以清除Ⓐ所顯示之數字。

(b)在鍵盤畫面 Ⓔ 上點選數字, 或是將游標移到Ⓐ處, 從電腦鍵盤上直接輸入所需數字。

(c)選擇Hz, KHz或MHz 頻率單位 Ⓕ。

(d)選擇輸出波型 Ⓑ。

(e)點選"ON"或"OFF" Ⓒ 選擇是否衰減10倍。

(f)選擇工作週期數值 Ⓗ 。

(g)確認所設定之數值無誤後, 點選"**Enter**" Ⓖ 執行, 函數波產生器將依上述指令輸出設定值。

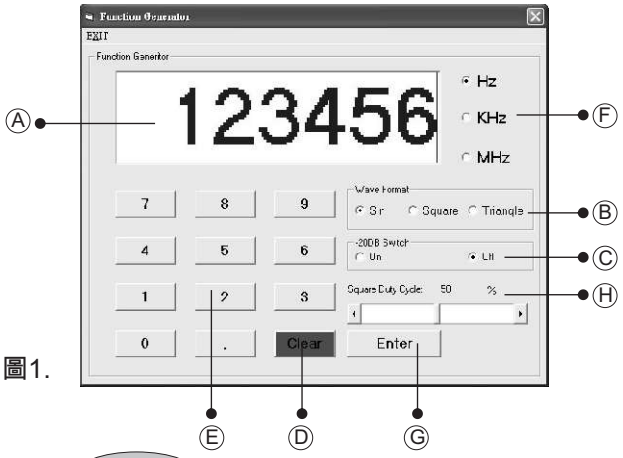


圖1.

五. 維護與保養:

1.注意事項:

(1)請勿在機器上面放置重物。
(2)請勿在機器上面或附近放至發熱物體。
(3)請勿將任何細線或針狀物插入散熱風扇孔。
(4)請勿拉扯電源線或測試線來移動機器, 尤其是供電狀態下。
(5)請勿將散熱風扇孔阻擋。
(6)機器使用中請勿將上蓋打開。
(7)請定期校正機器以保持準確性。
(8)請保持機器清潔。

2.保險絲替換:

當機器接上電源並開機後, LED無法顯示時, 請更換保險絲。
(1)移去電源線, 斷開電源。
(2)以小一字起子掀開保險絲座蓋(在本機電源插座上)。
(3)取出舊的保險絲並換上新的正確保險絲。
(4)蓋回保險絲座。
(5)重新接上電源線, 開機即可。
(如機器仍無法正常操作, 請與指定之經銷商聯絡。)