

***8120***

***FUNCTION GENERATOR***

***Operation Manual***

# ***8120 FUNCTION GENERATOR***

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

## **Safety Instruction**

- Before operating this product, please read carefully the safety symbols and definitions described here.
- This product complies with class I safety specifications.
- Installation category (overvoltage category): Class II.
- Before operating this product, please check the voltage requirements and specifications as described in this operating manual.
- Proper grounding refers to the proper connection from the grounding point of the power source to the grounding terminal of this product.

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## Safety Symbols

-  Earth (Ground) Terminal
-  Protective Conductor Terminal
- | ON(SUPPLY)
- OFF(SUPPLY)

## Warning

- Any grounding terminal or earth terminal can generate electrical conductivity that may harm or endanger the user.
- When operating this product, please place it in a well-ventilated environment.
- Do not place this product in an area that is directly exposed to sunlight or under high humidity.
- When you need to clean the outer surface of the product, use a clean and dry cloth.

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## **1. Overview**

The **8120** is a portable, bench type multi-purpose digital function generator / counter capable of producing 6 different waveforms. These are Sine, Square, Triangle, Pulse, Ramp and Sweep.

### **1.1 Introduction**

The **8120** has the following features:

- Frequency adjustable from 0.1Hz to 2MHz in 7 ranges.
- Output variable from 5mVp-p to 20Vp-p.
- Duty of ramp wave and pulse wave can be continuously variable between 20% and 80% with 50:50 calibrated switch. The frequency remains unchanged.
- DC offset from -10V to +10V can be added to all output waveforms.
- 6 digits, green 7-segment LED to display frequency.
- Built-in 100MHz frequency counter with 50mV sensitivity.
- Linear sweep or Log sweep is selectable with width up to 1000:1 and rate from 10mS to 5S.
- With V.C.F. (voltage control frequency) that allows the frequency to be controlled by an external voltage.
- Output with short circuit and external input protection.
- Passes EMC test (CE maked).
- Meets IEC-1010-1 (EN61010-1) safety requirements.

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## **1.2 Unpacking and Checking**

Your **8120** is packed in polyfoam to protect it during shipment. You should keep this material ,as well as the shipping box, in case the unit must be moved or shipped again.

The box should include the following items:

Model **8120** Digital Function Generator

Removable AC line cord

BNC to Alligator clip cable

Operation manual

Please check to see that all of the above items are included. You should contact your sales if anything is missing.

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## **2. Front and Rear Panels**

The following is an explanation of the function of each of the front and rear panel controls and connectors. You should refer to Figure 1 & Figure 2 for the location of each control / connector.

### **2.1 Front Panel**

*Figure 1 Front Panel*



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## **2.2 Rear Panel**

*Figure 2 Rear Panel*

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## **1. AMPLITUDE**

The amplitude of output waveform is variable. Turning the knob clockwise will increase the amplitude.

## **2. FUNCTION**

This bank of switches is used to select the output waveform. Only one of these switches can be depressed at a time.

## **3. FREQUENCY**

This knob is used to adjust the output frequency. The frequency is set by the setting of this knob and the **RANGE switch (4)** explained below.

## **4. RANGE / GATE TIME**

This bank of switches is used to select the frequency range produced. At the same time, the counter gate time is changed.

## **5. RAMP / PULSE**

This combination switch / adjustment is used to adjust the duty cycle of the square / pulse and triangle / ramp waveforms. When the knob is pushed in, the duty cycle is fixed at 50%. When pulled out, the duty cycle is adjustable between 20% and 80%, and the output frequency is unchanged.

## **6. ATTENUATION**

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When this push button is out, the signal is passed to the output unchanged. If the switch is depressed, the output signal is attenuated by -30dB.

## **7. DC OFFSET**

This knob allows a variable DC voltage between -10V to +10V to be added to the output signal. Note that the knob has to be pulled out for the offset to affect the signal. When the knob is pushed in, no offset voltage is added.

## **8. OUTPUT**

This BNC connector provides the output signal for all waveforms.

## **9. POWER ON**

This is the main power switch. It is a push on / push off type.

## **10. SWEEP WIDTH**

10.1 Sweep width can be controlled from 1 to 1000 times.

10.2 When this knob is pushed in, the sweep is in **LINEAR** mode. When pulled out, the sweep is in **LOG** mode.

## **11. SWEEP RATE**

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11.1 When switch off, there is no sweep function.

11.2 When switch on, the sweep rate can be adjusted from 10mS to 5S.

## **12. FUNC / COUNT**

When the switch is out, the 6 digits **DISPLAY (13)** shows the generator frequency. When the switch is in, the **DISPLAY (13)** shows the input frequency of counter.

## **13. FREQUENCY DISPLAY**

This is a 6-digit 7-segment LED display that shows the output frequency of the main generator or the input frequency of the counter.

## **14. INDICATORS**

OVFL, GATE, KHz, Hz LEDs indicate frequency overflow, gate time and frequency units in KHz, Hz.

## **15. SYNC OUT**

This connector supplies a TTL compatible signal. The output is unaffected by either the **FUNCTION (2)** or **AMPLITUDE (1)** controls. The output frequency is the same as the of **OUTPUT signal (8)**.

## **16. V.C.F. IN**

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An external voltage from 0V DC to +5V DC can be input to control the output frequency up to 1000:1.

## **17. COUNT IN**

This is the input connector for the 100MHz frequency counter. **FUNC / COUNT switch (12)** must be depressed.

## **18. SWEEP OUT**

The sawtooth waveform controlling the sweep output can be taken out. The period of this sawtooth waveform is controlled by **SWEEP RATE (11)** from 10mS to 5S and the voltage is controlled by **SWEEP WIDTH (10)**.

## **19. POWER VOLTAGE SETTING SWITCH**

There are two power voltages 115V and 230V can be selected. Before applying power to your **8120**, make sure that this switch is correctly set for your power source.

## **20. POWER SOCKET WITH FUSE HOLDER**

There are two fuses put inside the **FUSE HOLDER**. One of them is for square use.

## **3. Operation**

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## 3.1 Instrument Turn-on

### WARNING

Before applying power to your **8120**, make sure that the **POWER VOLTAGE SETTING SWITCH (19)** is correctly set for your power source.

## 3.2 Main Generator

- A. Select the desired waveform using the **FUNCTION switch (2)**. To generate a ramp or pulse output, pull out the **RAMP / PULSE knob (5)** and set to the desired duty cycle.
- B. Set the desired frequency with the **FREQUENCY control dials (3)** and the **RANGE switches (4)**.
- C. Adjust the output amplitude with the **AMPLITUDE control (1)** to the desired level. If a very small signal is required, the **ATTENUATION switch (6)** can be depressed.
- D. Set DC offset voltage with the **DC OFFSET control (7)**.
- E. Use the **SYNC output terminal (15)** if TTL compatible lever is required.

## 3.3 Voltage Controlled Frequency

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Supply a trim voltage between 0V DC to +5V DC to **V.C.F. IN terminal (16)**. The output frequency will be varied over 1000:1.

## **3.4 Frequency Counter**

- A. Push in the **FUNC / COUNT switch (12)**.
- B. Apply input signal to **COUNT IN (17)**.
- C. Select **GATE TIME (4)** for best resolution.
- D. Use **ATTENUATION (6)** for large input signal to avoid damage to the instrument.

## **3.5 Sweep**

- A. Follow A, B, C, D Steps of **3.2 Main Generator** to set the desired waveform.
- B. The set frequency is the upper frequency of the sweep output.
- C. Turn on the **SWEEP RATE switch (11)** to start the sweep mode.
- D. Adjust the sweep rate from 10mS to 5S.
- E. Adjust the **SWEEP WIDTH switch (10)** to set the lower frequency of the sweep output.

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F. Pull out or push in the **SWEEP WIDTH switch (10)** to select **LOG** mode or **LINEAR** mode.

G. **LOG** mode means the frequency of sweep output changes in Logarithm curve and **LINEAR** mode means in Linear curve.

H. Example:

Width            Sweep        : 100Hz ~ 100KHz

Rate            Sweep        : 500mS

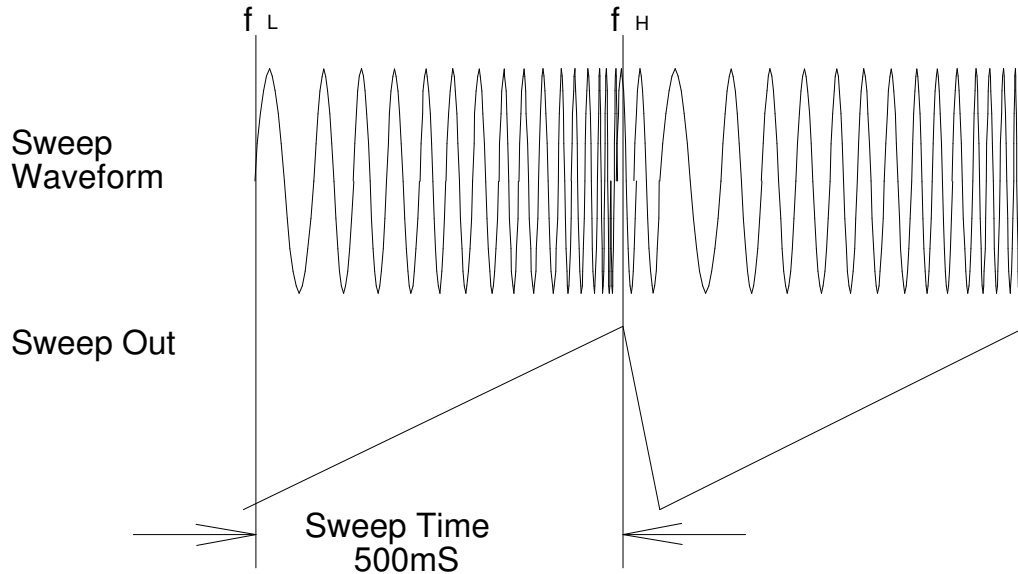
Type            Sweep        : Linear or Logarithm

1. Set the frequency to 100KHz.
2. Turn on the **SWEEP RATE switch (11)** to start the sweep mode. Monitoring the sawtooth waveform of **SWEEP OUT (18)** and adjust the **SWEEP RATE (11)** to meet 500mS.
3. Pull out or push in the **SWEEP WIDTH switch (10)** to select **LOG** mode or **LINEAR** mode.
4. Adjust the **SWEEP WIDTH switch (10)** to let the waveform sweep from 100Hz to 100KHz.



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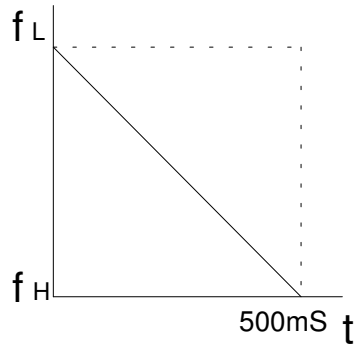


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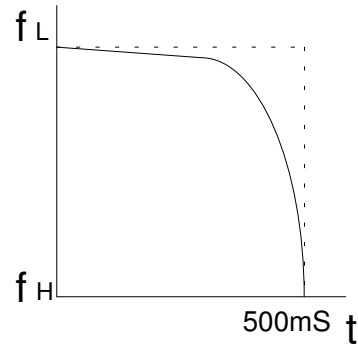
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Sweep Width

$$1000 = \frac{f_H}{f_L} = \frac{100\text{KHz}}{100\text{Hz}}$$



Linear curve



Logarithm curve

4. Operation Cautions

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Please observe the following when operating your **8120** Function Generator:

1. To assure operation within the published specifications, allow the unit to warm up and stabilize for at least 20 minutes.
2. Failure to observe the operating procedure listed below will result in damage to the unit and void your warranty.
3. Do not supply more than 10 Volts (DC+AC peak) into:
  - OUTPUT terminal (8) [Protected to 30 Volts (DC+AC peak)]**
  - V.C.F. IN terminal (16)**
  - SYNC OUT terminal (15)**

## **5. Maintenance**

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## **5.1 Cleanness**

Please clean outer casing with dry cloth and do not release the outer casing except maintenance staffs.

## **5.2 Changing the Fuse**

The fuse is located inside the **POWER SOCKET WITH FUSE HOLDER (20)** (refer to Figure 2). You need to change the fuse when:

- the fuse is blown out
- you change the **POWER** voltage

In any case, replace the fuse with one of the same rating. Refer to Table 1 for the type of fuse used for different input voltage.

**NOTE :** Unplug the power cord before you change the fuse.

## **5.3 Changing the Input Voltage**

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To change the voltage, follow these steps:

1. Use a flathead screwdriver to switch the **POWER VOLTAGE SETTING SWITCH (19)** (refer to Figure 2) to meet the correct **POWER** voltage.
2. Refer to the correct fuse rating on Table 1. Use a flathead screwdriver to open the **cover of POWER SOCKET WITH FUSE HOLDER (14)** and change the correct fuse.

Model	Fuse Time-Delay Type 5x20mm	
	115V	230V
8120	T160mA/250V	T125mA/250V

Table 1 Fuse Specification

## 5.4 Environment

Operating : +5°C ~ +40°C

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temperature

Operating moisture : 80% (+5°C ~ +31°C), 50% (+31°C ~ +40°C)

Storage temperature : -20°C ~ +70°C

Storage moisture : under 80%

We here declare the functional specification for EMS Verification (IEC 801-3) of our **8120** signal generator and **8120** optional counter unsuitable IEC801-3 and EN55011 standards.

It should be considered insignificant and acceptable that some disturbance of frequency shift, less than 5% or crosstalk may happen, but self-recoverable. That means such a situation is within our specification and should be considered as normal performance within the specification limit.

## **6. Specifications**

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ITEM	8120
<b>MAIN OUTPUT</b>	
<b>Frequency Range</b>	0.1Hz to 2MHz in 7 Ranges
<b>Waveforms</b>	Sine, Square, Triangle, Ramp, Pulse, Sweep
<b>Amplitude</b>	20 Vp-p, Open; [Output protected up to 30V (DC+AC)]
<b>Attenuator</b>	0dB, -30dB
<b>Output Impedance</b>	50Ω+ 10%
<b>DC Offset</b>	+10V ~ -10V (Open)
<b>Duty Control</b>	80:20 to 20:80 Continuously Variable with 50:50 calibrated switch (Frequency unchanged)
<b>Frequency Accuracy</b>	Counter accuracy
<b>Distortion</b>	<1%, 10Hz ~ 100KHz
<b>Rise / Fall Time</b>	<100nS
<b>V.C.F.</b>	0 to +5V Control frequency to 1000:1
<b>Safety Requirements</b>	Meets IEC-1010-1 (EN 61010-1)
<b>EMC Requirements</b>	Yes
<b>SYNC OUTPUT</b>	
<b>Rise Time</b>	<25nS

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<b>Level</b>	>3Vp-p (Open), 20 TTL Load
<b>SWEEP OUTPUT</b>	
<b>Type</b>	Linear, Log
<b>Width</b>	>1000:1, continuously variable
<b>Rate</b>	From 10mS to 5S, continuously variable
<b>Ramp Output</b>	Yes
<b>FREQUENCY COUNTER</b>	
<b>Display</b>	6 Digits 0.4" Green LED display with Hz, KHz, GATE, OVFL LED
<b>Mode</b>	Func / Count
<b>Attenuator</b>	0dB, -30dB
<b>Accuracy</b>	+ (Time base accuracy+1 count)
<b>Time Base</b>	10MHz± 10ppm (23°C± 5°C)
<b>Resolution</b>	0.1Hz, 1Hz, 10Hz, 100Hz, 1KHz
<b>Gate Time</b>	10S, 1S, 0.1S, 0.01S
<b>Range</b>	10Hz to 100MHz
<b>Sensitivity</b>	≤25mVrms (10Hz to 10MHz), ≤50mVrms (10MHz to 100MHz)
<b>Maximum Input</b>	150Vrms
<b>Input Impedance</b>	1MΩ // 100pF



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<b>POWER</b>	ACV 115 / 230. + 10% . 60 / 50 Hz
<b>DIMENSION</b>	
<b>Machine (mm)</b>	262(W)x85(H)x260(D)
<b>Package (mm)</b>	387(W)x192(H)x347(D)
<b>Gross Weight</b>	2.85Kg
<b>Net Weight</b>	2.0Kg
<b>Accessories</b>	ACS-003 BNC to alligator clip cable x 1, Operation manual x 1

