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FREQUENCY COUNTER
USER MANUAL

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1. PRODUCT INTRODUCTION

The intelligent counters are measuring frequency and period from the range of 0.01Hz to 120MHz on channel A, and 50MHz to 1.3(2.7)GHz on channel B.

The products also provide special features of high resolution and sensitivity for value reading expediency.

2. TECHNICAL SPECIFICATIONS

CHANNEL A	
Range	Coupling AC DC FREQ A 30Hz to 120MHZ 0.01Hz to 120MHz PRID A 8ns to 30ms 8ns to 100s
Sensitivity (rms)	50mVrms Max. to 10kHz. 25mVrms Max. to 80MHz. 35mVrms Max. to 120MHz. (If frequency ＜ 10MHz, sensitivity figures are for 4 stable digits of reading.)
Coupling	AC or DC switchable.
Filter	Low pass, switchable in or out on channel A. 3dB point of nominally 100kHz.
Impedance	1MΩ nominal shunted by less than 40pF.
Attenuator	×1 or ×20 nominal.
Trigger Level	Variable between +2.5V DC and –2.5V DC.
Damage Level	AC & DC ×1 DC to 2.4kHz 250V(DC+AC rms) 2.4kHz to 100kHz 600kV rms Hz/ FREQ ＞100kHz 6V rms AC & DC × 20 DC to 20kHz 500V(DC+AC peak) 20kHz to 100kHz 10MV rms Hz/ FREQ. ＞100kHz 100V rms
CHANNEL B	
Range	50MHz to 1.3GHz (GFC-8131H) 50MHz to 2.7GHz (GFC-8270H)
Sensitivity	GFC-8131H GFC-8270H 25mVrms Max. to 80M Hz 25mVrms Max. to 80MHz 15mVrms Max. to 700MHz 15mVrms Max. to 1GHz 25mVrms Max. to 1GHz 25mVrms Max. to 2GHz 40mVrms Max. to 1.3GHz 50mVrms Max. to 2.7GHz

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Coupling	AC
Impedance	50Ω
Max. Input Level	3Vrms sine wave
General	
Resolution	Gate time displays at least 7 digits for 1s, 6 digits for 100ms, 5 digits for 10ms respectively. The maximum resolution for frequency measurement is 100nHz for 1Hz, and 0.1Hz for 100MHz input respectively, and for period measurement is 10nS for 1Hz, 0.1fs (f=10^{-15}) for 100MHz input respectively.
Time Base	Frequency----------10MHz Aging Rate----------1ppm per month Temperature----------5ppm, 23℃ ±5℃ Line Voltage--------- ±0.005ppm for ±10% variation
Accuracy	±Resolution ±Time base error.
Gate Time	Continuously vary from 10ms to 10s or 1 period of the input depending on whichever is greater.
Display	8 digits and overflow indicators
Operation Temperature	0℃~40℃
Operation Humidity	10~80% RH
Power Requirement	100/120/220/230 ±10%, 50/60Hz selectable internally. Max. consumption power is 15VA.
Dimension	Approx. 230(W) × 95(H) × 280(D) m/m.
Weight	Approx. 2.0 kgs.
Accessories	Instruction manual……× 1 Power cord……× 1 Test lead GTL-101 ……..× 1 GTL-110 ……..× 1

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3.PRECAUTIONS BEFORE OPERATION

3-1.Unpacking the Instrument

The instrument has been fully inspected and tested before shipping from the factory. Upon receiving the instrument, please unpack and inspect it to check if there is any damages caused during transportation. If any sign of damage is found, notify the bearer and/or the dealer immediately.

3-2.Checking the Line Voltage

The instrument can be applied any kind of line voltage shown in the table below. Please check the line voltage indicated in the label attached on the real panel to replace correct fuses.



WARNING. **To avoid electrical shock the power cord protective grounding conductor must be connected to ground.**

When line voltages are changed, replace the required fuses shown as below:

Line voltage	Range	Fuse	Line voltage	Range	Fuse
100V	90-110V	T200mA	220V	198-242V	T100mA
120V	108-132V	250V	230V	207-253V	250V



WARNING. **To avoid personal injury, disconnect the power cord before removing the fuse holder.**

3-3.Equipment Installation, and Operation

Ensure there is proper ventilation for the vents in the case. If this equipment is used not according to the sp ecification, the protection provided by the equipment may be impaired.

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4. PANEL INTRODUCTION

(1). Power ON/OFF — Power on or off by using the button.

(2). Reset — Restart counting by resetting counter to zero.

(3). FREQ A — Select frequency mode of operation for input A.

(4). PRID A — Select period mode of operation for input A.

(5) FREQ B — Select frequency mode of operation for input B.

(6). Gate Time(LED) — When Gate time LED is on, the counter's main gate circuit is open and the measurement is in processing.

(7). Gate Time(KNOB) — Select variable measurement time from 10ms to 10s continuously (minimum=1 period of the input signal). The display value can be hold by pulling the knob until it is pushed back.

(8). TRIG LEVEL (LED) — Indicate the input signal above or below the trigger level by setting on the TRIG LEVEL.

(9). TRIG LEVEL (KNOB) — Pull the knob, the TRIGGER LEVEL control will be variable over ±2.5V × ATT and push the knob to proceed auto-set function.

(10) LPF/ON — Insert a 100kHz low pass filter into input A.

(11) ATT ×1/×20 — Select attenuation for input A
×1 Directly connect input signal to input amplifiers.
×20 Attenuate input signal by a factor of 20.

(12) COUP DC/AC — Select DC or AC coupling for input A.

(13) INPUT A — Input BNC for input A

(14) INPUT B — Input BNC for input B.

(15) S — The unit of displayed data is second (S).

(16) Hz — The unit of displayed data is Hertz (Hz).

(17) Exponent (LED) — Indicate the value of the measurement exponent as shown below:
k=1000 M=1,000,000 G=1,000,000,000
m=1/1000 μ=1/1,000,000 n=1/1,000,000,000

(18) DISPLAY(LED) — 8 digits red LED display.

(19) OVFL(LED) — OVFL (overflow) indicator shows that one or more of the most significant digits are not displayed.

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- **Front Panel**

Fig. 1 Front panel

5. APPLICATION

(1) Signal Measurements

Frequency range between 0.01Hz and 120MHz, press FREQ A switch, then connect input signal to the channel A input BNC.

Frequency range between 50MHz and 1.3(2.7) GHz, press FREQ B switch, then connect input signal to the channel B input BNC.

Press “PRID” switch to select period mode of operation for signal on input A.

(2) Gate Time Settings

The instruments features continuously adjustable gate time selection from 10ms to 10s or one period of input, depending on whichever is longer. The GATE TIME adjustment affects the sampling rate and the resolution of the reading.

Turn the knob counterclockwise for updating faster reading, or turn it clockwise for more resolution (digital display).

Pulling out the GATE TIME knob to freeze the latest displayed reading for being written down. Then return the counter to normal operation by pressing back the knob.

When the instrument is starting measurement, the LED indicator above the GATE TIME knob will light. In normal operation, it will blink at a rate setting by GATE TIME knob.

(3) Trigger Level Adjustment

Adjust the trigger voltage of channel A input signal by pulling and turning the TRIG LEVEL knob for triggering. The trigger voltage is variable over ±2.5V×ATT setting.

If push the knob, it can be functioned as auto -triggering.(this knob is only available for channel A.)

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(4) LP FILTER

An unstable reading is caused from measuring noise of low frequency signals on channel A. The LP FILTER minimizes high frequency noise, permitting the counter to measure only the desired low frequency component.

For more stable reading, insert a 100kHz low pass filter into the channel A input circuit by pushing in the LP FILTER button.

(5) Attenuator

An attenuator is provided in the channel A input circuit for measuring large signals and for providing additional overload protection.

Reduce the input signal by 20 times by pushing in the ATT button. It is recommended that when measuring signals of unknown amplitude, this button should be pushed in for protection. If the amplitude is too low, the button can be released for greater sensitivity.

6. MAINTENENCE

The following instructions are executed by qualified personnel only. To avoid electrical shock, do not perform any servicing other than the operating instructions unless you are qualified to do so.

6-1.Standard method for calibration

(1) Input offset voltage adjustment

Push the TRIG LEVEL knob and turn it to the central position.

Connect a 10MHz sine wave to channel A input BNC.

Adjust SVR102 and decrease amplitude of 10MHz sine (typically 20mVrms) to the minimum allowable to maintain display.

(2) Standard oscillator adjustment

Connect a standard reference frequency (10MHz, temperature stability ＜0.2ppm) to channel A input.

Adjust the GATE TIME control for 8 digital display.

Adjust SVC201 for the most accurate display of the reference frequency.

(3) Hysteresis Bias voltage adjustment

Set the LP FILTER to ON and set the COUP to DC position. Push the TRIG LEVEL knob and turn it to the central position.

Connect a 1Hz sine wave 30mVrms to channel A input BNC. Adjust SVR103 to the minimum allowable to maintain display.

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6-2.Cleaning

To clean the instrument, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument because it may leak into the cabinet and cause damage.

Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents. Do not use abrasive cleaners on any portion of the instrument.

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