



# APS-1102

## PROGRAMMABLE AC/DC POWER SOURCE

### FEATURES

- 5.7" Large LCD Display
- Output Capacity : 750VA (for AC 100V Input)/1kVA (for AC 200V Input)
- Output Modes : AC and AC+DC Combined with any of the four signal sources
- Signal Sources : Internal (INT), External(EXT), Internal + External(ADD) and Synchronization (SYNC)
- Arbitrary Waveform Power Output
- Power Amplifier of External Signal
- Measurement Functions : Voltage, Current, Power, Frequency, Power Factor, CF, and Harmonic Current
- Capacitor Input Load Supported
- Sequence Function Allows Programming of Output Patterns
- Limiter Function (Upper/Lower Limits Function)
- 30 Sets of SAVE/RECALL Memories
- Output On/Off Switch
- USB (USBTMC) Standard for Remote Control

**GW INSTEK**

Made to Measure Since 1975

## APS-1102 INTRODUCTION

The APS-1102 is not only in the role as a precision AC/DC power supply but also a powerful analyzer, containing abundant features for the testing and characteristic analysis of power supplies, electronic devices, components and modules. Besides providing AC/DC power, APS-1102 also allows free programming of outputs for the simulation of a power source with abnormal variations. The instantaneous interruption, frequency sweeping, voltage sweeping and arbitrary waveforms of power source can be easily generated in accordance with the test requirements. The output function includes two main modes, AC and AC + DC. Each mode can be combined with any of the four signal sources, internal(INT), external(EXT), internal + external(ADD), and synchronization, to give an ultimate flexibility of power source setting.

The measurement functions, including Voltage, Current, Power, Frequency, Load power factor, Load crest factor and Harmonic current, are provided to monitor the output status in a real time manner. The measurement of Inrush Current, which occurs during power-on of a capacitor load, can be done easily. All these measurement readings and settings are displayed on a 5.7"LCD screen simultaneously. APS-1102 includes a multi-functional and user-friendly software, which supports the remote control of panel operations, Sequence editing and execution, Arbitrary waveform editing and transfer, and Data logging via USB interface.

A universal AC power outlet is available on the front panel to accommodate almost all types of plugs used in most of the countries. With the capacity of 1kVA power and weighting of 20 lbs, APS-1102 provides powerful test and analysis features all in a comparatively compact and light-weight box.

### A. OUTPUT MODES

The power output function of APS-1102 includes AC and AC+DC main modes. Each mode can be combined with one of the signal sources, including internal, external, internal + external, and external synchronization, to provide a powerful tool for the generation of a power source with abnormal variations.

#### Output of Arbitrary Waveforms

Arbitrary waveforms can be edited on the PC and transferred via USB interface to APS-1102 as the internal signal source for power output. 16 sets of waveform memory with 4k words waveform length each are available for arbitrary waveform generation and storage.

#### Amplifier of External Signal

The APS-1102 can be used as an amplifier for the external signal to generate output power source. By selecting the external signal source mode (AC-EXT or AC+DC-EXT) and connect the external signal to the external signal input/external sync signal input terminal (EXT SIG IN/EXT SYNC IN), APS-1102 generate the power output according to the waveform of the external signal input.

#### Power output synchronization with External Signal

The externally synchronized oscillation of APS-1102 allows the output power source to be frequency-synchronized with the external signal at TTL level in the frequency range from 40Hz to 500Hz.

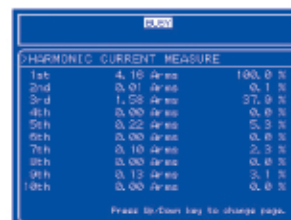
### B. MEASUREMENT FUNCTIONS

The APS-1102 is equipped with the following measurement functions

- Voltage (RMS, Average DC, Peak)
- Current (RMS, Average DC, Peak, Peak hold)
- Power (Effective, Reactive, Apparent)
- Synchronization frequency (external synchronization)
- Load power factor
- Load crest factor
- Harmonic current (50/60Hz fundamental, up to 40th harmonics)



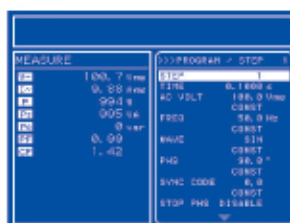
Measurement Results and Setting Values



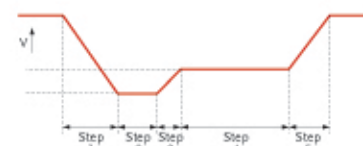
Measurement of Output Harmonic Current

### C. SEQUENCE OPERATION

In the Sequence Operation programming, DC, sine waves, square waves, and 16 arbitrary waveforms captured via USB interface, can be used as components for sequence editing. Among the total 255 sequence steps, as maximum capacity, the waveform, level, and time duration can be set, and constant / keep / sweep can be chosen in each individual step. APS-1102 is also equipped with other functions, such as the branching to a specified step during a sequence operation. All the data of start, stop, or hold of a sequence operation are saved into the sequence memory to perform the Sequence Operation automatically.



Setting Screen for the Sequence Function (set for each step)



Voltage fluctuation test pattern

### D. APPLICATION FIELDS

- R & D and Testing of wide variety but small quantity power supply manufacturers
- R & D and Testing of wide variety and compact consumer device manufacturers
- Testing of battery-powered modules
- Used as the power source for relay and switch characteristic testing
- Used as the power source for product inspection lines of devices in wide variety
- Used as the power source for LCD or battery formation



## E. UNIQUE FEATURES

### Inrush Current Measurement and Inrush Current Limiter

For an electronic device containing a capacitor type rectifier, an inrush current, which is larger than the rated current of the device, may flow through the power line immediately after the device is turned on. APS-1102, with peak current hold capability, is able to measure this short time inrush current. On the other hand, the large inrush current flows through the power line may cause the voltage drop, so the electronic device should be able to limit this effect to a certain extent. APS-1102 can supply four times as large peak current as the rated current to support this test.

The output current can be limited by setting the maximum output current(peak/average current) in advance, so the prototypes can be protected from abnormal current damage during development evaluation. However, to measure the inrush current of a completed product, the peak current limiter should be set at the maximum value to get a correct measurement result.

### Harmonic Current Measurement Function

Switching power sources are widely used in both consumer and industrial electrical products in today's market. With the capacitor type rectifier, the switching power source has its disadvantages using an input AC source carrying significant amount of harmonic current. When a large amount of harmonic current flows through the power source line, the switching power supply in the device may experience operation faults caused by the voltage distortion, which can lead to transformer overheat and possibly result in a hazardous accident. APS-1102 includes a harmonic current measuring function, which can be performed under AC-INT mode at the fundamental wave setting (panel frequency setting) of either 50 Hz or 60 Hz. Absolute values of harmonic current in RMS and the harmonic to fundamental ratios up to the 40th harmonics(2 kHz at 50 Hz fundamental)can be measured and displayed.

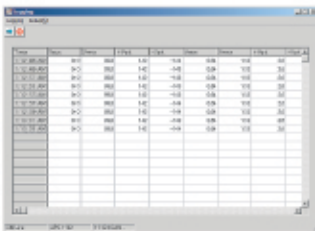
## F. APPLICATION EXAMPLES

- DC to DC converter verification:  
As in the general environment the input source of DC to DC converter couldn't be a perfect DC. It may contain some AC ripples riding on a DC source due the simple rectifier and filtering circuit used in the consumer products. As of this, AC+DC source is used as the simulation of input power to do the characteristic verification of DC to DC converter.
- Transformer verification: Ideally the voltage flows through transformer should be a pure AC, however, in the general environment it may also contain a DC component, which may cause magnetic saturation of the transformer and therefore reduce its efficiency. AC +DC source is the simulation of such power environment.
- Capacitor verification: The main function of a capacitor is to block the DC voltage and connect the AC voltage in most of the circuits. The DC voltage imposed on the Capacitor, however, will generate extra heat and gradually degrade the function of the capacitor. AC +DC source could be used to test the durability and reliability of a capacitor.
- LCD formation: APS-1102 provides various types of power source that suits the application of the formation of LCD panel in the manufacturing process. The power source could be AC or AC + DC at various levels of output. Formation is an important process to format the liquid crystal cells inside the panel, so the polarity of the crystal cells could be well-arranged to become functional.

## G. REMOTE CONTROL SOFTWARE

APS-1102 includes a multi-functional and user-friendly software, which supports the remote control of panel operations, Sequence editing and execution, Arbitrary waveform editing and transfer, and Data logging. The remote control software is included to perform the following functions via USB interface :

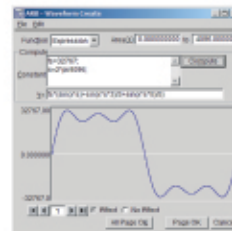
A. Data logging , B. Sequence editing and execution, C. Arbitrary waveform editing and transfer, D. Remote control of panel operations



A. Logging of Measurement Values



B. Sequence Editing

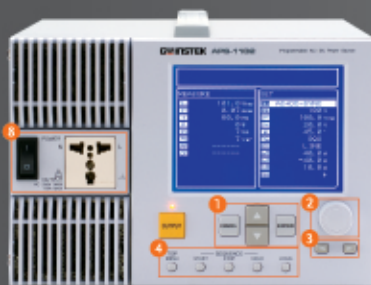


C. Creation of Arbitrary Waveform



D. Remote Control Screen

## PANEL INTRODUCTION



1. Function Keys
2. Modify Knob
3. Digit Key
4. Shortcut Keys
5. External Sync Signal Input Connector
6. USB Connector
7. External Control I/O Connector
8. Output Outlet

## SPECIFICATIONS

<b>MAXIMUM OUTPUT CAPACITY</b>	<b>AC Input (100 ~ 180V) Input (180 ~ 250V)</b> <b>DC Input (100 ~ 180V) Input (180 ~ 250V)</b>	750VA 1000VA 750W 1000W																														
<b>OUTPUT VOLTAGE</b>	<b>AC 100V 200V</b> <b>DC 100V 200V</b>	0.0V ~ 135.0V 0.0V ~ 270.0V -190.0V ~ +190.0V -380.0V ~ +380.0V																														
<b>OUTPUT MAX. CURRENT</b>	<b>AC 100V 200V</b> <b>DC 100V 200V</b>	10A 5A 10A 5A																														
<b>OUTPUT MAXIMUM PEAK CURRENTS</b>	<b>100V 200V</b>	40Apk 20Apk																														
<b>FREQUENCY</b>	<b>Setting Range Setting Accuracy</b>	1.0Hz ~ 550.0Hz ±100ppm																														
<b>WAVEFORM</b>	<b>SINE WAVE SQUARE WAVE ARBITRARY WAVE (Up To 16 Types Can Be Saved) Output Voltage Distortion Rate</b>	0.5% MAX(50Hz/60Hz)																														
<b>LINE VOLTAGE REGULATION</b>	0.2% MAXIMUM	Power input voltage 100V/120V/230V, no load ,rated output																														
<b>LOAD VOLTAGE REGULATION RATE</b>	0.5% MAXIMUM	At output terminal under no load and rated resistance load																														
<b>MEASUREMENT</b>	<b>Frequency Counter RMS Volt-Meter(AC+DC)</b> <b>RMS Amp-Meter(AC+DC) Wattage Meter Load Power Factor Measurement Load Crest Factor Measurement External Synchronization Frequency Measurement Phase When Output Is On</b>	<table border="1"> <thead> <tr> <th>RANGE</th> <th>RESOLUTION</th> <th>ACCURACY</th> </tr> </thead> <tbody> <tr> <td>1.0 ~ 550.0 Hz</td> <td>0.1Hz</td> <td>±100ppm(1Hz to 550Hz, 23±5°C)</td> </tr> <tr> <td>Full Scale 100V : 225.0Vrms</td> <td>0.1Vrms</td> <td>±0.5% of the full scale(at 23±5°C)</td> </tr> <tr> <td>Full Scale 200V : 450.0Vrms</td> <td>0.1Vrms</td> <td>±0.5% of the full scale(at 23±5°C)</td> </tr> <tr> <td>Full Scale 15.00A</td> <td>0.01Arms</td> <td>±1.0% of the full scale(at 23±5°C)</td> </tr> <tr> <td>Full Scale 1200W</td> <td>1W</td> <td>±2% of the full scale(at 23±5°C)</td> </tr> <tr> <td>0.00 ~ 1.00</td> <td>0.01</td> <td></td> </tr> <tr> <td>0.00 ~ 50.00</td> <td>0.01</td> <td></td> </tr> <tr> <td>38.0 ~ 525.0Hz</td> <td>0.1Hz</td> <td>±0.2Hz</td> </tr> <tr> <td>0.0°C ~ 359.9°C</td> <td>0.1°C</td> <td></td> </tr> </tbody> </table>	RANGE	RESOLUTION	ACCURACY	1.0 ~ 550.0 Hz	0.1Hz	±100ppm(1Hz to 550Hz, 23±5°C)	Full Scale 100V : 225.0Vrms	0.1Vrms	±0.5% of the full scale(at 23±5°C)	Full Scale 200V : 450.0Vrms	0.1Vrms	±0.5% of the full scale(at 23±5°C)	Full Scale 15.00A	0.01Arms	±1.0% of the full scale(at 23±5°C)	Full Scale 1200W	1W	±2% of the full scale(at 23±5°C)	0.00 ~ 1.00	0.01		0.00 ~ 50.00	0.01		38.0 ~ 525.0Hz	0.1Hz	±0.2Hz	0.0°C ~ 359.9°C	0.1°C	
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<b>OUTPUT MODE</b>	ACINT Mode    AC + DC - INT Mode    AC - ADD Mode    AC + DC - ADD Mode AC - EXT Mode    AC + DC - EXT Mode    AC - SYNC Mode    AC + DC - SYNC Mode																															
<b>MEMORY</b>	Store/Recall 30 sets																															
<b>POWER SOURCE</b>	AC100V ~ 230V ±10% ; 50Hz / 60Hz ±2Hz																															
<b>POWER CONSUMPTION/FACTOR</b>	1.4kVA max / 0.95min (AC100V) ; 0.9min (AC200V)																															
<b>INTERFACE</b>	USB(USBTMC) Standard																															
<b>DIMENSIONS &amp; WEIGHT</b>	258(W) X 176(H) X 440(D) ; Approx. 9.5 kg																															

Specifications subject to change without notice. PS-1102GD1DH

## ORDERING INFORMATION

**APS-1102** 1kVA Programmable AC/DC Power Source

### ACCESSORIES

User Manual x 1, Power Cord x 2, Ferrite Core (for USB Cord),  
CD-ROM (Remote Control Software) x 1

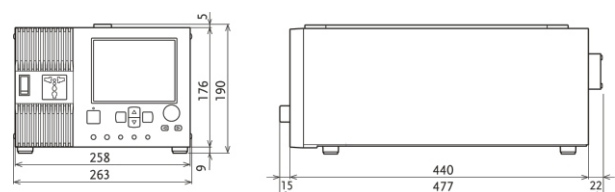
### OPTIONAL ACCESSORIES

**GRA-409** Rack Adapter Panel

### FREE DOWNLOAD

Remote Control Software  
LabView Driver

## OUTLINE DRAWINGS



unit : mm

Global Headquarters

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