Programmable AC Power Source

APS-7051/APS-7101

USER MANUAL

GW INSTEK

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Table of Contents

SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to ensure your safety and to keep the instrument in the best possible condition.

Safety Symbols

These safety symbols may appear in this manual or on the instrument.

⚠ WARNING	Warning: Identifies conditions or practices that could result in injury or loss of life.
⚠ CAUTION	Caution: Identifies conditions or practices that could result in damage to the APS-7000 or to other properties.
⚡	DANGER High Voltage
⚠	Attention Refer to the Manual
⏚	Protective Conductor Terminal
⏚	Earth (ground) Terminal

Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

Safety Guidelines

General Guideline

⚠ CAUTION

- Do not place any heavy object on the APS-7000.
- Avoid severe impact or rough handling that leads to damaging the APS-7000.
- Do not discharge static electricity to the APS-7000.
- Use only mating connectors, not bare wires, for the terminals.
- Do not block the cooling fan opening.
- Do not disassemble the APS-7000 unless you are qualified.

(Measurement categories) EN 61010-1:2010 specifies the measurement categories and their requirements as follows. The APS-7000 doesn't fall under category II, III or IV.

- Measurement category IV is for measurement performed at the source of low-voltage installation.
- Measurement category III is for measurement performed in the building installation.
- Measurement category II is for measurement performed on the circuits directly connected to the low voltage installation.
- 0 is for measurements performed on circuits not directly connected to Mains.

Power Supply

⚠ WARNING

- AC Input voltage range: 115/230 Vac ± 15%
- Frequency: 50/60Hz
- To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.

Cleaning the APS-7000	• Disconnect the power cord before cleaning. • Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid. • Do not use chemicals containing harsh material such as benzene, toluene, xylene, and acetone.
Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below) • Relative Humidity: 20%~ 80%, no condensation • Altitude: < 2000m • Temperature: 0°C to 40°C (Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The APS-7000 falls under degree 2. Pollution refers to "addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity". • Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence. • Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected. • Pollution degree 3: Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.
Storage environment	• Location: Indoor • Temperature: -10°C to 70°C • Relative Humidity: ≤80%, no condensation
Disposal	Do not dispose this instrument as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.

Power cord for the United Kingdom

When using the instrument in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons

⚠️WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	Earth	
Blue:	Neutral	
Brown:	Live (Phase)	

As the colours of the wires in main leads may not correspond with the coloured marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with either the letter E, the earth symbol ⏚ or coloured Green/Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, a cable of $0.75mm^2$ should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any exposed wiring from a cable, plug or connection that is engaged in a live socket is extremely hazardous. If a cable or plug is deemed hazardous, turn off the mains power and remove the cable, any fuses and fuse assemblies. All hazardous wiring must be immediately destroyed and replaced in accordance to the above standard.

GETTING STARTED

This chapter describes the power source in a nutshell, including its main features and front / rear panel introduction.

APS-7000 Series Overview

Series lineup

The APS-7000 series consists of 2 models, the APS-7051 and the APS-7101, differing only in capacity. Note that throughout the user manual, the term "APS-7000" refers to both the APS-7051 and APS-7101, unless stated otherwise.
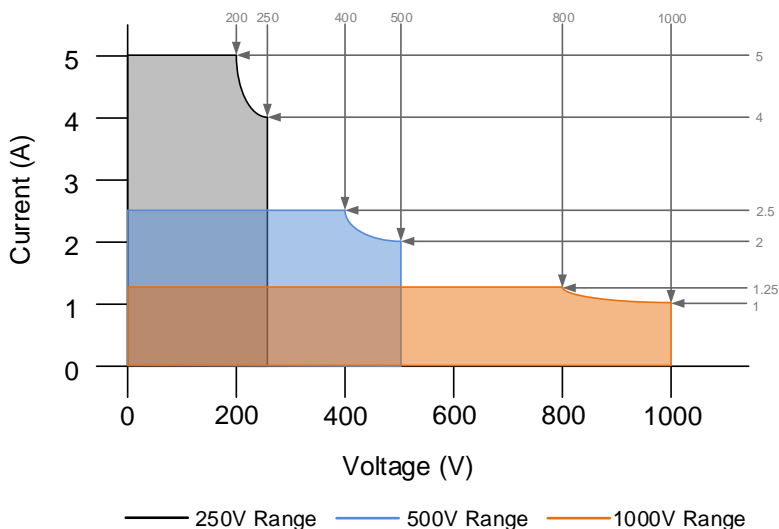
Model name	Max. Output Current	Power Rating	Output Voltage
APS-7051	2.5A/1.25A/0.63A	500VA	0~1000 Vrms
APS-7101	5.0A/2.5A/1.25A	1000VA	0~1000 Vrms

Operating Area

APS-7051 Output Operating Area
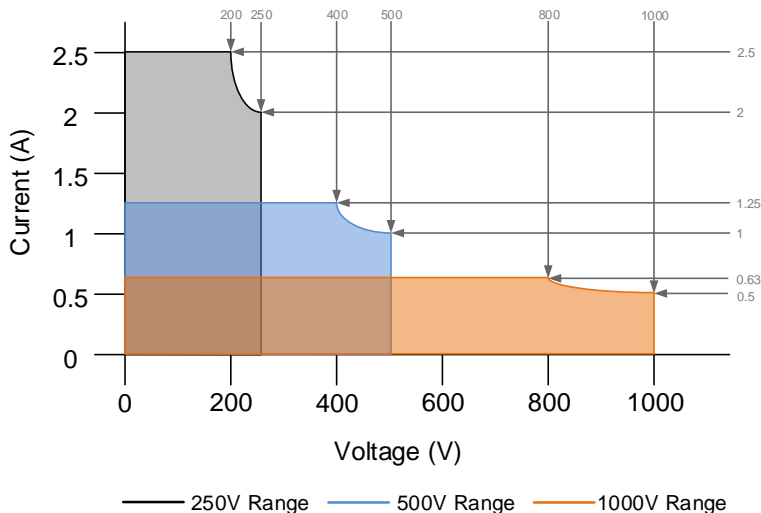
APS-7101 Output Operating Area

| 250V Range | 500V Range | 1000V Range |

Main Features

Performance	• Low output ripple and noise
	• Excellent and feature-rich measurement capacity
	• Standard maximum output voltage is 1000Vrms
	• Maximum frequency of 500Hz.

Features	• OCP, OPP and OTP protection
	• Variable voltage, frequency and current limiter
	• Test function to simulate line voltage and frequency variations
	• Large 4.3 inch TFT panel
	• Globally adjustable power inlet not restricted by the power supply environment
	• USB interface is equipped as standard with the

ability to upgrade the software.

- Only 88mm (2U) case height.

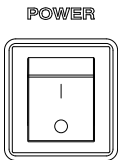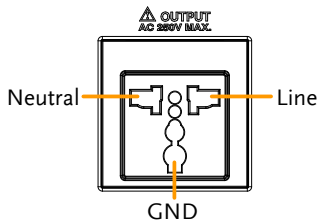| Interface	• USB host

Accessories

Standard Accessories	Part number	Description
	CD ROM	User manual
	Region dependent	Type I Power cord (APS-7051)
	Region dependent	Type II Power cord (APS-7101)
	62PS-7K0SC701 x1 5302-01613001 x1	Mains terminal cover set (APS-7051)
	62PS-7K0SC401 x1 5302-01613001 x2	Mains terminal cover set (APS-7101)
Optional Accessories	Part number	Description
	GRA-423	APS-7000 rack mount kit
	APS-001	GPIB interface card
	APS-002	RS-232 / USB interface card
Download	Name	Description
	gw_aps.inf	USB driver

Appearance

Front Panel

APS-7051, APS-7101

Power switch	Front voltage output socket	Display mode key	Menu, Test, Preset keys	Arrow keys, Scroll wheel

LCD display

Function keys   Keypad

USB A port   Output key

Voltage, Frequency & Current settings and limits

Range, Shift, Cancel, Enter, Lock keys
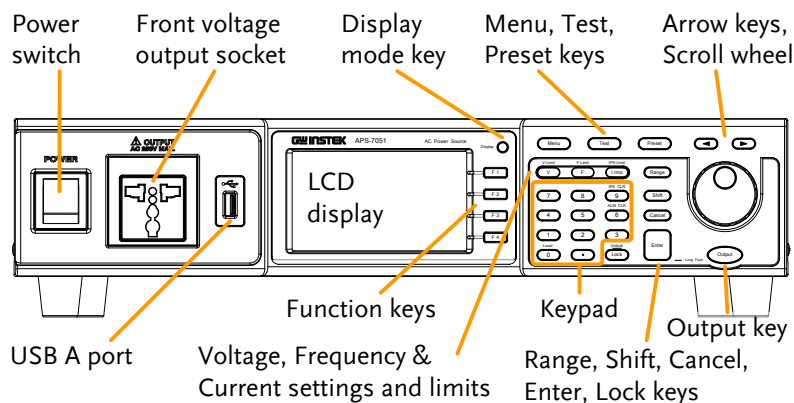
Item	Description
Power Switch	POWER — Turns on the mains power.
Front Voltage Output Socket	OUTPUT AC 250V MAX. Neutral — Line — GND — Output voltage terminal using a regional universal plug. There is a Euro and a Universal regional plug.

⚠ CAUTION — For voltages exceeding 250Vrms, please use the rear output terminal.
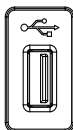
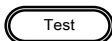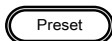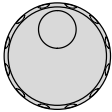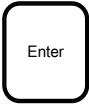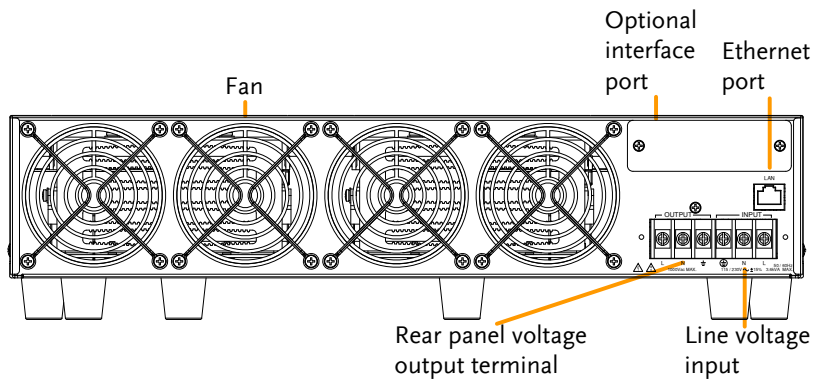| USB A Port		The USB port is used for upgrading software.
LCD Screen		Displays the measured values or menu system.
Display Mode Select Key	Display	Selects between Standard mode and Simple mode.
Function Keys	F 1	Assigned to the functions displayed on the right-hand side of the screen.
Menu Key	Menu	Enters the Main menu or goes back to one of the display modes.
Test Key	Test	Puts the instrument into the Test mode.
Preset Key	Preset	Puts the instrument into Preset mode.
Arrow Keys	◁ ▷	The arrow keys are used to select the digit power of a value that is being edited.
V	V-Limit / V	Used for setting the output voltage.
V-Limit	(Shift + V)	Used for setting the output voltage limit value.
F	F-Limit / F	Used for setting the output frequency.
F-Limit	(Shift + F)	Used for setting the output frequency limit value.
I rms	IPK-Limit / I rms	Used for setting the maximum output current.
IPK-Limit	(Shift + I rms)	Used to set the peak output current limit value.
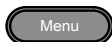
Range Key	Range	Switches between the 155V and 310V ranges.
Scroll Wheel		Used to navigate menu items or for incrementing/decrementing values one step at a time.
Lock Key	Unlock Lock	Locks the number pad to prevent accidentally changing panel settings.
Unlock Key	(Long press)	Disables the key lock.
Enter Key	Enter	Confirms selections / settings
Cancel Key	Cancel	Clears entries that are made in the number entry dialog when a value is edited using the arrow keys or the scroll wheel.
		The Cancel key can also be used to cancel function setting menus or dialogs.
Shift Key	Shift	Turns on the shift state, which enables shortcut operations.
Output Key	Output	Turns the output on or off.
Number Pad	7 8 9 IPK CLR 4 5 6 ALM CLR 1 2 3 0 Local · Unlock Lock	Used to enter values.
Local Mode	(Shift + 0)	Switches operation back to local mode from remote mode.
ALM CLR	(Shift + 6)	Clears alarms.
IPK CLR	(Shift + 9)	Clears peak current hold.

Rear Panel

APS-7051

Optional interface port   Ethernet port

Fan   Line voltage input

Rear panel voltage output terminal

APS-7101

Optional interface port   Ethernet port

Fan

Rear panel voltage output terminal   Line voltage input
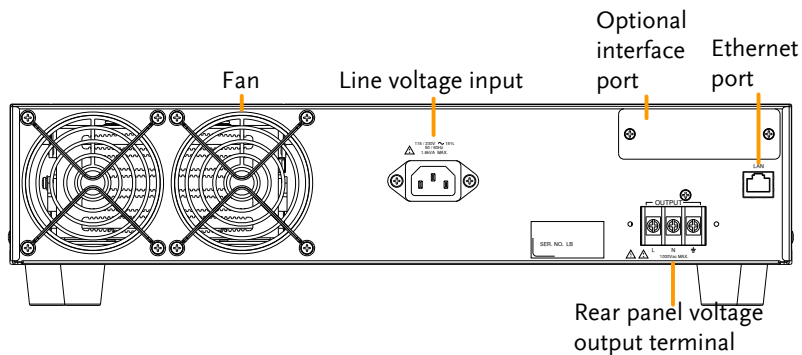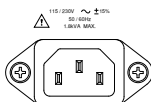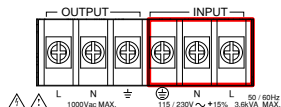
Line Voltage Input	Voltage Input: 115/230±15% VAC; Line frequency: 50Hz/60 Hz (Automatically switchable)

APS-7051   APS-7101
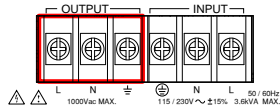
Rear Voltage Output Socket	Output voltage terminal.

APS-7051   APS-7101
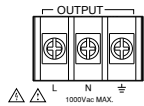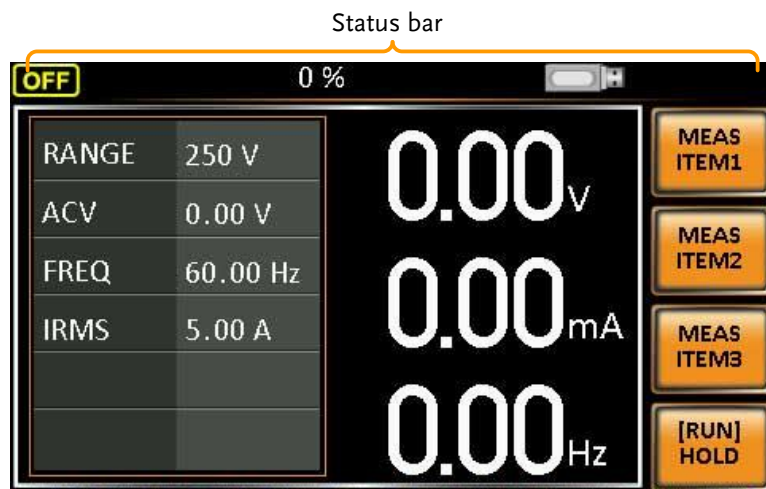
FAN	Temperature controlled fan.
Ethernet Port	
Optional Interface Slot	Optional GPIB communication, RS-232/USB B communication and RS-232 communication.

Status Bar Icons

Status bar

OFF , ON	Indicates if the output is ON or OFF.
50%	Indicates the output power as a percentage of full scale.
ALM	The alarm icon will appear on the status bar when one of the protection functions are tripped. Applies to Over Power, Over Irms, Over Ipeak and Over Temperature protection.
(USB)	Indicates that a USB drive is detected in the front panel host port.
(lock)	Indicates that the panel lock is active.

OPERATION

Set Up

Line Voltage Connection (APS-7101)

Background	The APS-7101 is equipped with an input power terminal that can accept 115V/230V ± 15%. To connect or replace the power cord (GW Instek part number: APS-7101: 4300-31000101, use the procedure below:
⚠Warning	The following procedure should only be attempted by competent persons. Ensure the AC power cord is not connected to power.
Removal	1. Turn off the power switch.
APS-7101	2. Unscrew the power cord strain relief on the rear output socket. 3. Remove the 2 screws holding the power cord cover and remove.
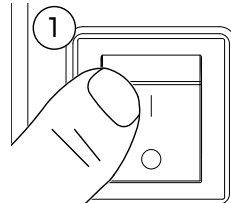
APS-7101
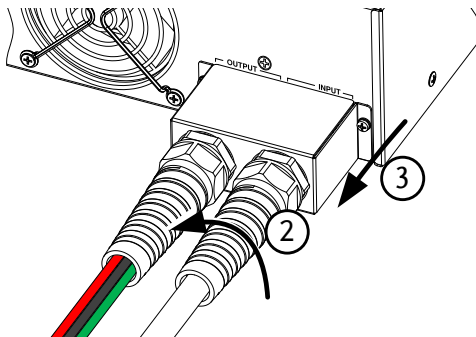
4. Remove the AC power cord wires.
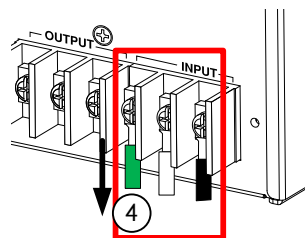
⚠ CAUTION   The power line inputs for the APS-7101 are on the outer cluster of terminals.

The terminals to the inner of the panel are the rear panel outputs.

Installation

1. Connect the AC power cord wires to the AC input terminals.

- White/Blue → Neutral (N)
- Green/Green-yellow→GND ($\perp$)
- Black/Brown → Line (L)
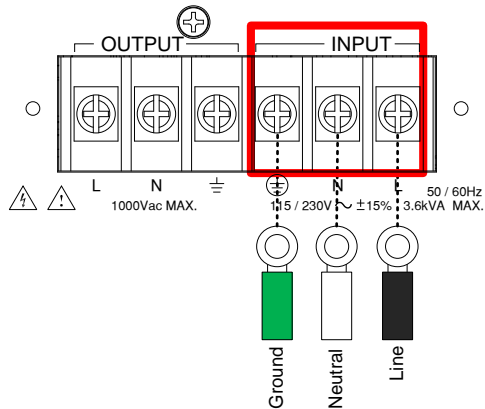
2. Re-install the power cord cover.

3. Screw the power cord strain relief back onto the cover.
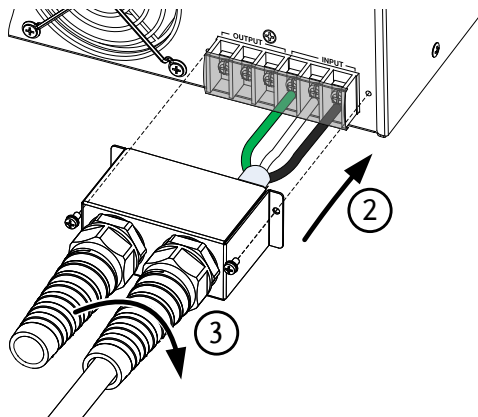
Power Up

Steps
4. Socket type: Connect the power cord to the rear panel socket.
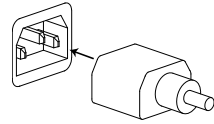
Input Power Terminal:
Connect the power cord to the input power terminals.

5. Press the POWER key. The splash screen will appear momentarily before the continuous mode screen appears with the settings loaded.

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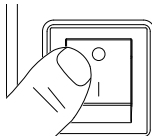
⚠ CAUTION

The power supply takes around 10 seconds to fully turn on and shutdown.

Do not turn the power on and off quickly.

Output Terminals

Background	The output terminals can be output from either the front panel or from the rear panel. The outputs are limited to 2.5A/1.25A/0.63A (APS-7051) or 5A/2.5A/1.25A (APS-7101).
Supported plugs	Multi-region terminal Socket
	Supported Standards:
	• IEC, North America, Japan.
⚠ WARNING	Dangerous voltages. Ensure that the power to the instrument is disabled before handling the power supply output terminals. Failing to do so may lead to electric shock.
Front Panel Output Connection	1. The front panel has a multi-region power socket depending on the socket type.
	2. Insert the plug from the DUT into the socket.
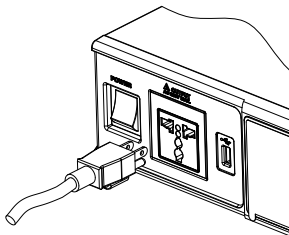
3. Turn the power on. The AC power supply is now ready to power the DUT.

Rear Panel Output Connection

The rear panel output is used to supply higher power DUTs. The rear panel output connection is similar to the universal rear panel line input connection on the APS-7101.

1. Disconnect the unit from the mains power socket and turn the power switch off.

2. Unscrew the power cord strain relief.

3. Remove the 2 screws holding the power cord cover and remove.

APS-7051
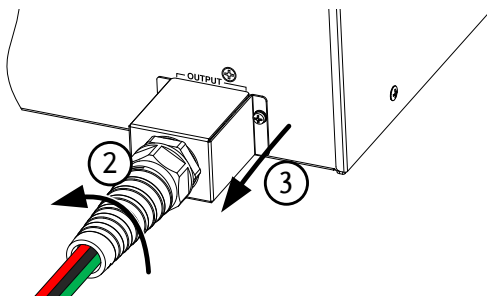
APS-7101
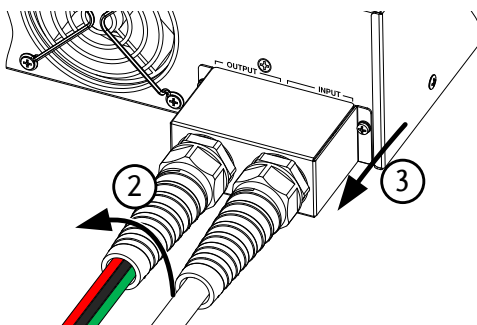
⚠ CAUTION

For the APS-7101, there is a single bank for the input and output terminals. Ensure the correct terminals are connected. The APS-7051 only has a single bank of output terminals on the rear panel.

Installation   4. Connect the output AC power cord wires to
                        the output terminals.

                    •   Black → Neutral (N)
                    •   Green → GND (⏚)
                    •   Red → Line (L)
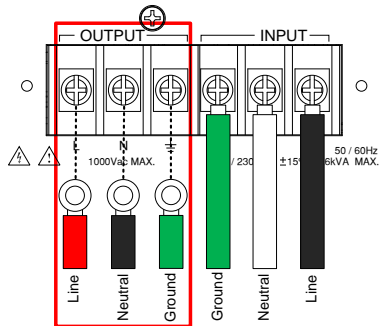
                    APS-7101 shown. The input terminals are already
                    connected and shows which output terminals are
                    to be connected.

                    5. Re-install the power cord cover.

                    6. Screw the power cord strain relief back onto
                        the power cord cover.

APS-7101
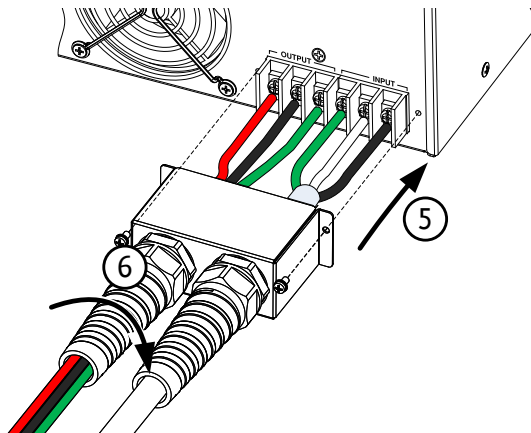
APS-7051
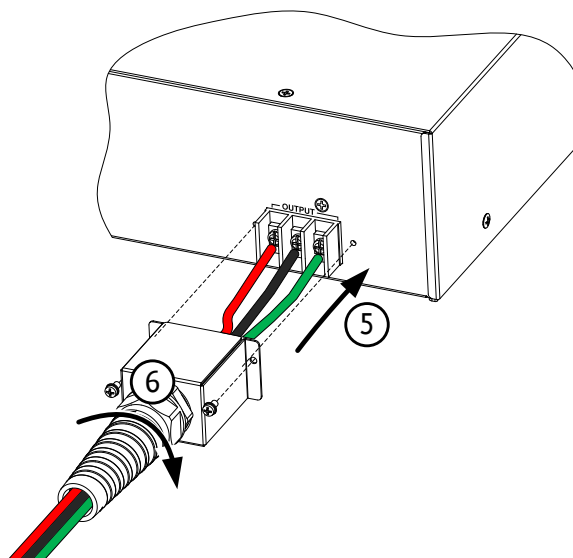
7. Turn the power on. The AC power supply is now ready to power the DUT.

Installing the Optional Hardware Modules

Background	There are a number of optional modules that can be installed for remote control.

Optional Modules	APS-001	GPIB Interface card
	APS-002	RS-232/USB CDC interface card

⚠ WARNING	Dangerous voltages. Ensure that the power to the instrument is disabled before handling the power supply output terminals. Failing to do so may lead to electric shock.

⚠ CAUTION	Ensure the power is off before installing any of the optional modules.

Installation   1. Turn off the power switch.
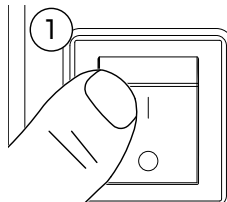
2. Unscrew the two screws holding the options panel plate.
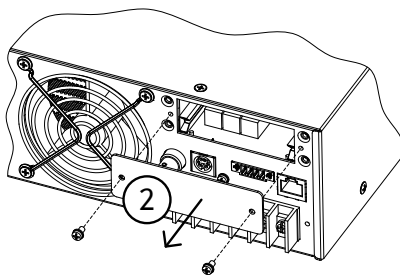
APS-7101 shown

3. Slide the module PCB onto the rails on the inside of the module slot.

4. Secure the module with the screws that were removed from step 2.
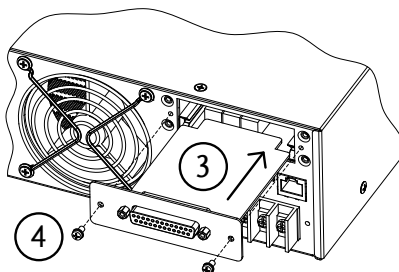
APS-7101 shown

5. The module will be recognized upon startup.

Using the Rack Mount Kit

Background
The APS-7000 series has an optional Rack Mount Kit (GW Instek part number: GRA-423). The APS-7051 and APS-7101 are designed to fit into a 2U rack height. Please see your distributor for further rack mount details.

Rack mount diagram
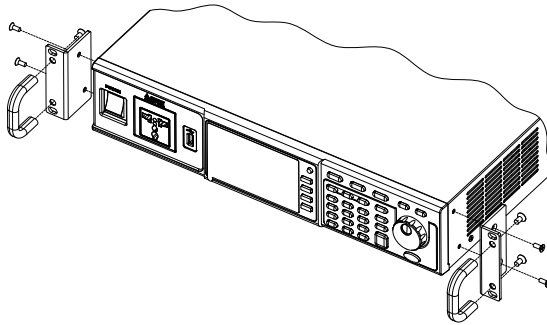
⚠ CAUTION
Ensure adequate ventilation is provided when using the rack mount. Ensure that a gap of at least 50mm is given for the side air intakes. Failure to do so may cause the instrument to overheat.

How to Use the Instrument

Background
The APS-7000 AC power supplies generally use the scroll wheel, arrow keys and Enter keys to edit numerical values or to select menu options.

Menu navigation is performed using the menu keys and function keys on the front panel.

The following section will explain some of these concepts in detail.

Selecting Menu Items

1. Turn the scroll wheel to select parameters in menus and lists. The selected parameter will be highlighted in orange. The scroll wheel is also used to increment/decrement setting values.
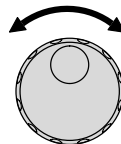
2. Press the Enter key to edit the parameter or to enter the selected menu.

Enter

Example

Selected parameter

MENU

1. System Information | Buzzer: ON
2. MISC Configuration | SCPI Emulation: Gw
3. LAN
4. Rear USB
5. Serial Port
6. GPIB
7. LCD Configuration
8. Default Setting
9. Special Function
10. Save/Recall Files
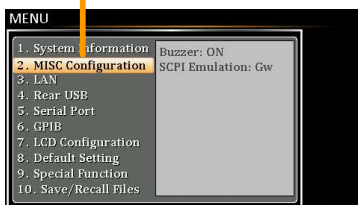
The following is an example of the menu list that appears when the Menu key is pressed.

Using the Keypad to edit parameter values

When editing a value the keypad can be used to directly enter the desired value.

1. Type the value of the parameter using the keypad.

IPK CLR
7 8 9
ALM CLR
4 5 6
1 2 3
Local   Unlock
0 • Lock
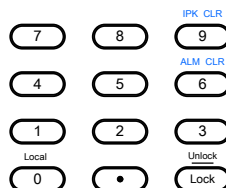
2. Press the Enter key to confirm the edit.

Enter

Example
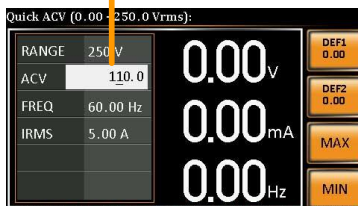
Parameter

Using the Arrow Keys and Scroll wheel to edit parameter values

Use the arrow keys to select a digit power and then use the scroll wheel to edit the value by that power.

1. Use the arrow keys to move the cursor to the digit of the desired power.

2. Turn the scroll wheel to edit the value by the resolution of the selected digit.
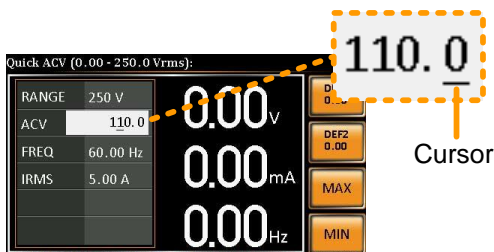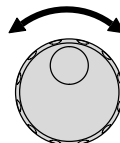
Cursor

3. Repeat the steps above for all the relevant digits.

4. Press the Enter key to confirm the edit.

Enter

⚠ Note	By default the cursor starts at the lowest power digit.

Using the Function Keys

The function keys (F1 ~ F4) are quick settings keys, the function of which depends on the current menu or operation.

1. Press the function key that corresponds to the setting directly to its left.

2. The setting or parameter is immediately executed.

Function keys

Corresponding quick settings
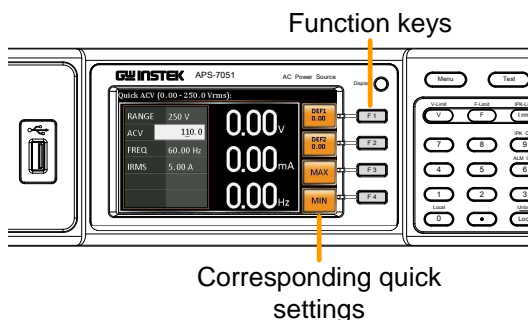
3. Repeat the steps above for all the relevant digits.

Reset to Default Settings

Background

The default settings can be restored from the Menu key settings. See page 94 for the default factory settings.

Steps

1. Press the *Menu* key. The Menu settings will appear on the display. `Menu`

2. Use the scroll wheel to go to item 8, *Default Setting*.

3. Press *Enter* x2 to restore the default settings.

Default settings

View System Version and Serial Number

Background   The Menu>System Information setting
                    displays the serial number and version
                    number.

Steps   1. Press the Menu key. The Menu   [Menu]
                       setting will appear on the display.

                    2. The system information should now be listed
                       on the display.

                       If not, use the scroll wheel to go to item 1,
                       System Information.

System Information
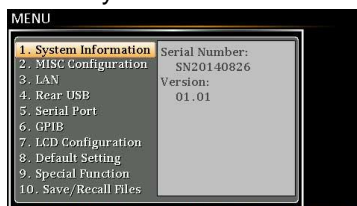
LCD Configuration

Background	The LCD Configuration setting sets the brightness, contrast and saturation level of the LCD display.

Steps	1. Press the *Menu* key. The Menu settings will appear on the display. [Menu]
	2. Use the scroll wheel to go to item 7, *LCD Configuration* and press *Enter.*
	3. Set the brightness, contrast and saturation.

Contrast(%)   1 ~ 100% (Default=50%)

Brightness(%)   1 ~ 100% (Default=50%)

Saturation(%)   1 ~ 100% (Default=50%)

Exit	4. Press *Exit[F4]* to exit from the Ramp Control settings. [EXIT]

Default Settings	5. Press *Default[F3]* to set all the LCD settings to 50%.
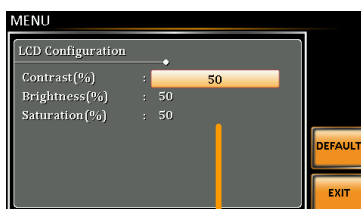
Default settings

LCD settings

Buzzer

The Buzzer setting turns the buzzer sound on or off for key presses and alarms.

Steps
1. Press the *Menu* key. The Menu setting will appear on the display.

    [Menu]

2. Use the scroll wheel to go to item 2, *MISC Configuration* and press *Enter*.

3. Go to the *Buzzer* setting using the scroll wheel and press *Enter*. Turn the setting on or off and press *Enter* again to confirm.

Buzzer	ON, OFF

Exit
4. Press *Exit[F4]* to exit from the MISC Configuration settings.

    [EXIT]

Example
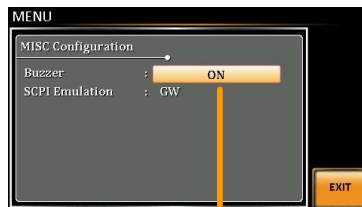
Settings

USB Driver Installation

Background	If the USB Type B interface is to be used for remote control, the USB driver needs to be installed.

⚠ Note

The USB driver, GW_APS.inf, is located on the CD Rom that accompanied this user manual. Alternatively the driver can be downloaded from the GW Instek website.

For information on the USB interface, see page 71.

Steps

1. Connect the rear panel USB -B port on the APS-7000 to the PC using a USB Type A to B cable.

2. Go the Windows Device Manager.

   For Windows 7:
   Start > Control Panel > Hardware and Sound > Device Manager

3. The APS-7000 will be located under *Other Devices* in the hardware tree. Right-click the *APS-7XXX* and choose *Update Driver Software*.
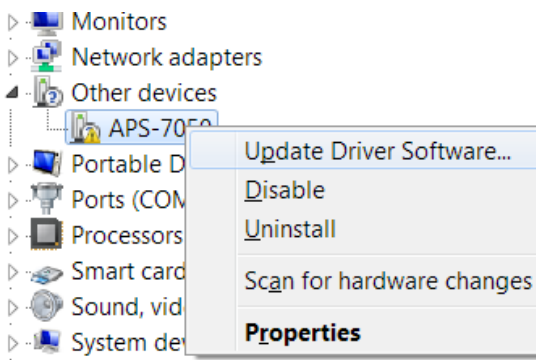
4. From the hardware wizard choose *Browse my computer driver software*.
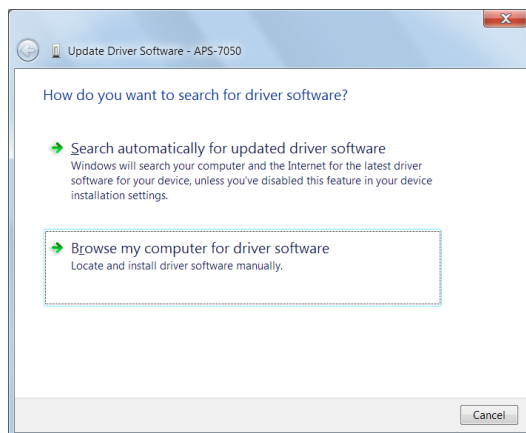
5. Set the file path to the location of the USB driver, click Next and finish the driver installation.
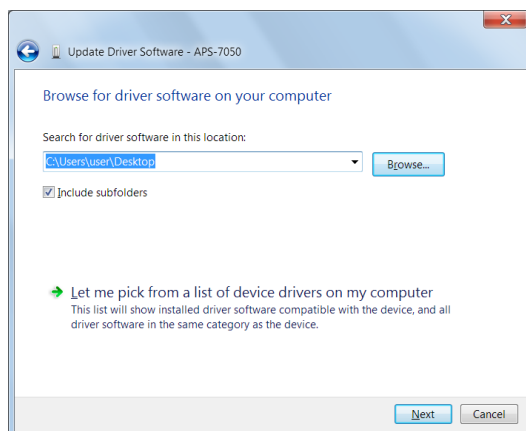
6. In APS-7000 will now be located in the *Ports*
   node of the hardware tree in the Windows
   Device Manager if the driver installation was
   successful.
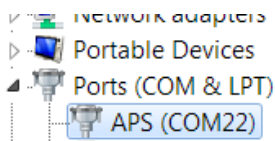
Basic Operation

This section describes the basic operations required to operate the power supply.

- Setting the Voltage Range → from page 40
- Setting the Voltage Limit → from page 41
- Setting the Output Voltage → from page 42
- Setting the Frequency Limit → page 43
- Setting the Output Frequency → page 44
- Setting the Peak Current Limit → from page 45
- Setting the Current RMS Level → from page 48
- Clearing the Alarm → from page 51
- Setting the Display mode → from page 52
- Panel lock → from page 54
- Turning the Output on/off → from page 55

Before operating the power supply, please see the Getting Started chapter, page 8.

Setting the Voltage Range

Background	The Range setting determines the general outlet voltage range. The ranges available correspond to common mains output voltage standards.
Steps	1. Press Range to access the Range menu.　　　(Range)
	2. Set the voltage range with the scroll wheel or with the F1 ~ F4 soft-keys.

Range	AUTO, 1000V, 500V, 250V

3. Press Enter to confirm the Range setting.

Range setting | Soft-key settings

	F1
	F2
	F3
	F4
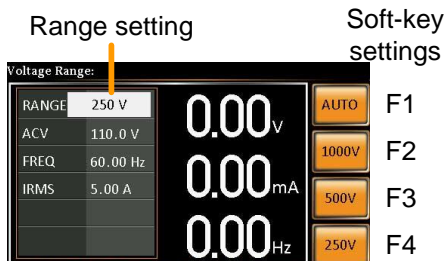
⚠ Note   If the range is changed from 250V to 1000V, the Irms and IPK values will automatically be changed to a lower value. If the range is changed from 1000V to 250V, the Irms and IPK values remain the same.

If the voltage range is changed when the output is on, the output will be automatically turned off.

Setting the Voltage Limit

Background   Setting the voltage limit allows the output voltage to be set to any level within the voltage limit (V Limit) range.

Steps   1. Press *Shift* + *V* to access the Volt Limit menu.
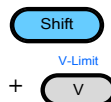
2. Set the voltage limit with the scroll wheel or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the limit to the maximum and minimum, respectively.

| Range | 10% of full range ~ full range |
| Soft-keys | MAX, MIN |

3. Press *Enter* to confirm the voltage limit setting.

Volt Limit

Min/Max settings

F3

F4
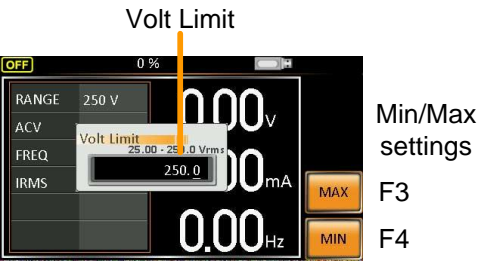
| | Note | Each voltage range (250V, 500V, 1000V) has an independent voltage limit. |

Setting the Output Voltage

| Background | The voltage setting sets the voltage level of the power supply. |

| | Note | Before setting the power supply voltage level, set the voltage range and voltage limit. |

| Steps | 1. Press the V key. The ACV parameter will be editable. |

V-Limit

V

2. Set the voltage with the scroll wheel/keypad or with the F1 ~ F4 soft-keys.

| Range | 0 volts ~ full range |
| Soft-keys | DEF1, DEF2, MAX, MIN |

3. Press *Enter* to confirm the voltage setting.

| Preset Settings | The DEF1 and DEF2 preset settings are user defined settings. By default they are set to 0.00 volts. The MAX and MIN soft-keys set the voltage to the maximum and minimum, respectively. |

4. Press the *V* key and set the desired voltage with the scroll wheel/keypad.

Range	0 volts ~ full scale of voltage range

5. Press and hold the DEF1 or DEF2 soft-key until "Saved to DEF1/2" is displayed. This will save the voltage setting to the DEF1 or DEF2 soft-key.

⚠ Note — Trying to set the voltage outside of the voltage limit/range will result in a voltage setting error being displayed on the screen.

The voltage level can be set when the output is on.

Example

Voltage setting   Preset voltage settings
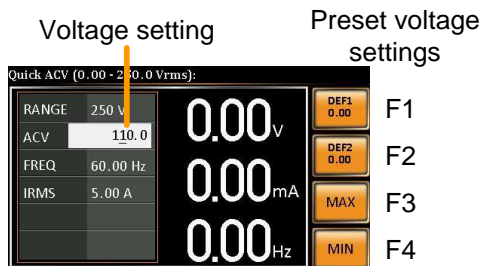
Setting the Frequency Limit

Background — Setting the frequency limit allows the frequency output to be set to any level within the limit range.

Steps — 1. Press *Shift* + *F* to access the Freq Limit menu.
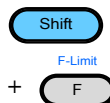
2. Set the frequency limit with the scroll wheel/keypad or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the frequency limit to the maximum and minimum, respectively.

Range	45.00 ~ 500.0Hz
Soft-keys	MAX, MIN

3. Press *Enter* to confirm the limit setting.

Example

Freq Limit

Min/Max settings

F3

F4

Setting the Output Frequency

The frequency setting sets the frequency of the output.

Background   Before setting the frequency, set the frequency limit.

Steps   1. Press the *F* key. The FREQ parameter will be editable.

F-Limit

F

2. Set the frequency with the scroll wheel/keypad or with the F1 ~ F4 soft-keys.

Range	45.00 ~ 500.0Hz
Soft-keys	DEF1, DEF2, MAX, MIN

3. Press *Enter* to confirm the frequency setting.

Preset Settings   The DEF1 and DEF2 preset settings are user
                      defined settings. By default they are set to
                      50.00Hz and 60.00Hz, respectively. The MAX
                      and MIN soft-keys set the frequency to the
                      maximum and minimum, respectively.

4. Press the *F* key and set the desired frequency
   with the scroll wheel/keypad.

Range	45.00 ~ 500.0Hz

5. Press and hold the DEF1 or DEF2 soft-key until
   "Saved to DEF1/2" is displayed. This will save
   the frequency setting to the DEF1 or DEF2 soft-
   key.

Example   Frequency setting   Preset frequency
                                                    settings

Quick Freq (45.00 - 00.0 Hz):

RANGE	250 V
ACV	0.00 V
FREQ	60.00
IRMS	5.00 A

0.00 v
0.00 mA
0.00 Hz

DEF1 50.00 — F1
DEF2 60.00 — F2
MAX — F3
MIN — F4
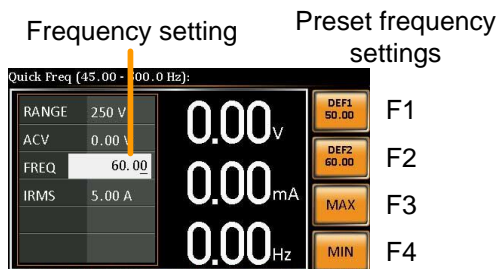
⚠ Note   Trying to set the frequency outside of the frequency
                     limit will result in a frequency setting error being
                     displayed on the screen.

                     The frequency can be set when the output is on.

Setting the Peak Current Limit

Background   Setting the peak current limit sets a limit on the
                      current that can be sourced by the power
                      supply.

⚠ Note	When the peak current limit is tripped, an alarm will sound. Press Shift + 9 to clear the Ipk alarm.
	Shift+6 can also clear the Ipk alarm. See page 51 for details.

Steps

1. Press *Shift + I* rms to access the Ipeak menu.

   ┌──────────┐
   │ Shift   │
   └──────────┘
        IPK-Limit
   + ┌──────────┐
      │ I rms   │
      └──────────┘
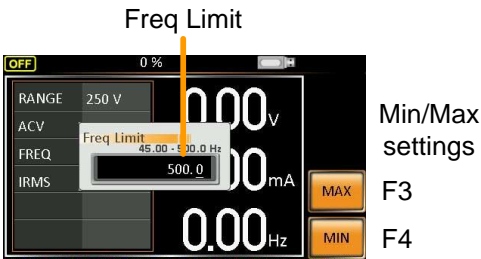
2. Set the peak current with the scroll wheel/keypad or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the peak current to the maximum and minimum, respectively.

Range	10% ~ 100% peak current value. The peak current value depends on the selected voltage range.
Soft-keys	MAX, MIN

3. Press *Enter* to confirm the peak current setting.

Example

Ipeak

Min/Max settings

F3

F4

Delay Time
Settings

The Delay Time setting essentially defines how long the measurement of the peak current must be sustained for before it is recognized. By default the delay time is turned off.
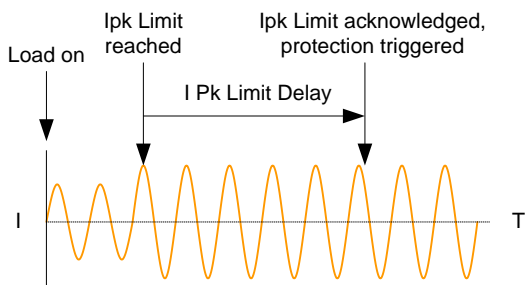
1. Press *Shift* + *I rms* and then press *DELAY[F2]*.

2. Set the desired delay time with the scroll wheel/keypad or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the delay time to the maximum and minimum, respectively.

Range	0(off) ~ 10 seconds
Soft-keys	MAX, MIN

3. Press *Enter* to confirm the delay time setting.

Example

Delay Time

Min/Max
settings

F3

F4

IPK Measurement
Range Settings

The IPK Range settings allow you to manually set the peak current measurement range. By default this setting is set to AUTO.

47

1. Press Shift + I rms and then press IPK Range[F1].

2. Set the desired range with the scroll wheel.

Range	AUTO, 0.28A, 1.4A, 14A, 70A

3. Press *Enter* to confirm the IPK Range setting.

Example

IPK Range settings
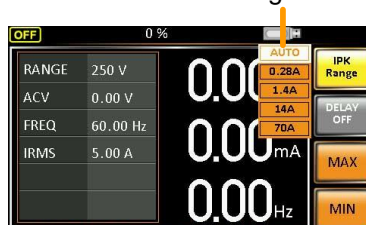
Setting the Current RMS Level

Background   The I rms setting sets the root mean square current.

Steps   1. Press *I rms* to access the I rms menu.
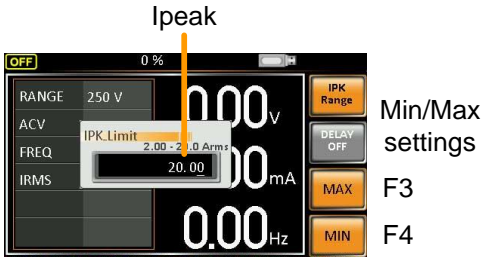
Ipk-Limit
[I rms]

2. Set the I rms level with the scroll wheel/keypad or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the I rms level to the maximum and minimum, respectively.

Range	0.00 ~ full scale A (dependant on the voltage range)
Soft-keys	MAX, MIN

3. Press *Enter* to confirm the current setting.

Example

Irms

Min/Max
settings

F3

F4
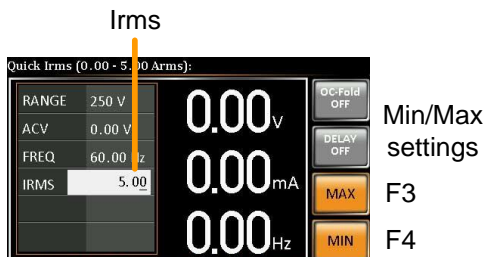
⚠ Note	Setting the I rms level to 0.00 will disable OCP.
	Setting I rms to 0A is dangerous.

I rms Delay Time
Settings

The Delay Time setting defines how long the I rms measurement must be sustained for before it is recognized. By default the I rms delay time is turned off.
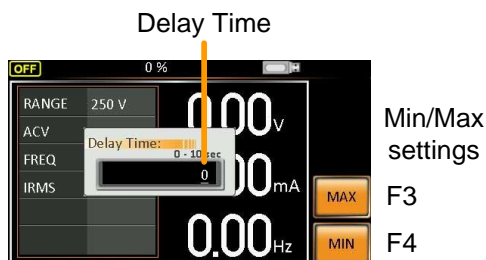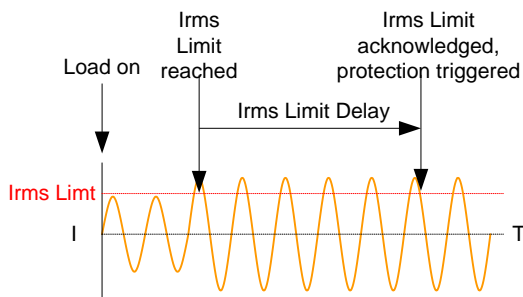

4. Press *I rms* and then press *DELAY[F2]*.

5. Set the desired delay time with the scroll wheel/keypad or with the F3 ~ F4 soft-keys. The MAX and MIN soft-keys set the delay time to the maximum and minimum, respectively.

Range	0(off) ~ 10 seconds
Soft-keys	MAX, MIN

6. Press *Enter* to confirm the delay time setting.

Example

Delay Time

Min/Max
settings

F3

F4
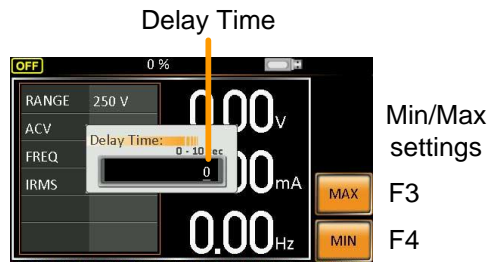
OC Fold Settings   The over current fold back settings allow the
APS-7000 to work as either a constant voltage
source or a constant current source.

While the unit is sourcing less current than the
Irms current limit, the APS-7000 will act as a
constant voltage source. In this mode, the
voltage level will remain constant while the
current level may vary. This is the normal
operating mode.

When the current level reaches the Irms limit,
the APS-7000 will act as a constant current
source. In this mode the current is constant and
the voltage level varies. When the current
subsides below the Irms limit again, the unit
will again act as a constant voltage source.
When OC Fold is turned off, the APS-7000 will
act as a current limiting power source when the
Irms limit has been reached.
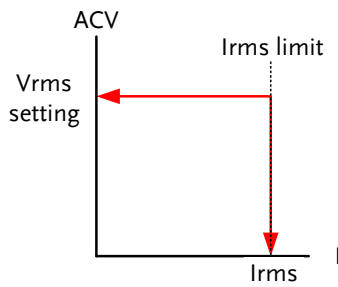
⚠️ Note   OC-FOLD can only be active when the I rms level is greater than 0.

7. Press *I rms* and then press *OC-FOLD[F1]* toggle the OC-Fold function on or off.

OC-Fold setting
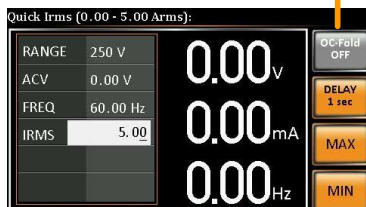
Alarm Clear

Background	The ALM CLR (Alarm Clear) function will clear any Over Power, Over Irms, Over Ipeak and Over Temperature alarms.
Applicable Alarms	OVER POWER, OVER IRMS, OVER IPEAK, OVER TEMPERATURE

Steps   1. Press *Shift* + *6* to clear any alarms.

Shift

ALM CLR

+   6

Example

ALM indicator
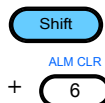
Alarm message
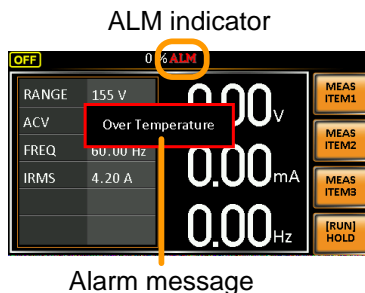
Display Modes

The APS-7000 power supply has two display modes. The standard display mode shows the power supply setup on the left and the 3 configurable measurements on the right. The simple display mode shows all measurement items available on the APS-7000.

Steps

1. Press the *Display* key.

Display ⬤

2. The display mode will toggle each time the key is pressed.

Standard Mode

Settings   Measurements

Configurable measurements
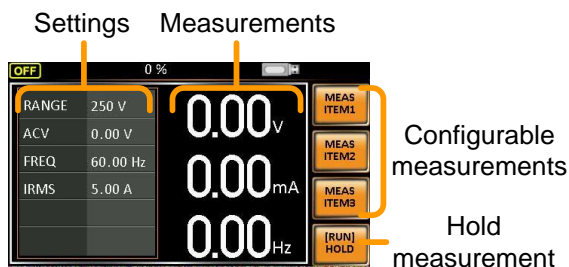
Hold measurement

Simple Mode   Measurement Items
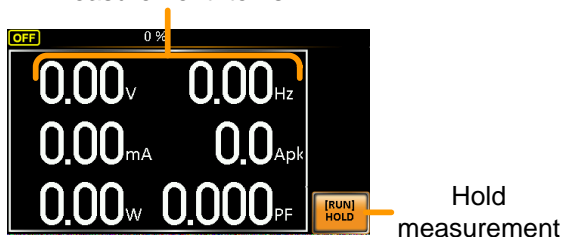
Hold
measurement

Configuring the   1. Press the *Meas Item1, Item2 or Item3*
Standard Mode   soft-key.
Measurements

MEAS
ITEM1

2. Use the scroll wheel to select a measurement
    item and press Enter to confirm.

Sets third measurement item to frequency
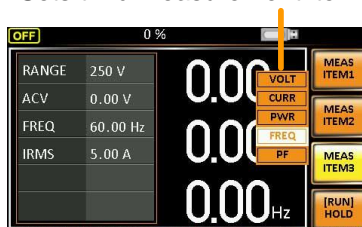
Hold   The Hold function will "hold" the current
Measurement   measurements on the display. Measurements
                    won't be updated on the display until the
                    function is released.

                    Press *HOLD[F4]* to toggle hold on or off.

Panel Lock

The panel lock feature prevents settings from being changed accidentally. When activated, all keys and knobs except the Lock/Unlock key and the Output key (if active) will be disabled.

Activate the panel lock	Press the *Lock* key to active the panel lock. "Keys locked" appears on the display.	Unlock Lock
	A lock icon will appear in the top corner when the panel keys are locked.	
Disable the panel lock	Hold the *Lock* key for ~3 seconds to disable the panel lock. "Keys unlocked" will appear on the display and the padlock icon will disappear.	Unlock Lock (hold)

Example

Message   Lock icon
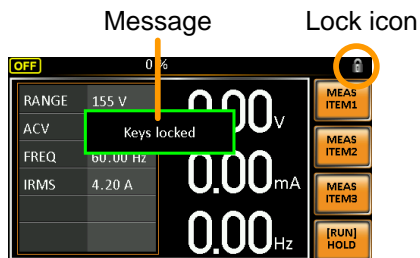
Turning the Output On

When the output is turned on, the DUT can be connected to either the rear panel output or the front panel output.

⚠ Warning	Both of these outputs are electrically linked. Only one DUT should be connected to any one of the outputs at a time. Using both outputs at the same time is not supported. Using the front and rear outputs are the same time could cause dangerous operating conditions. See page 24 for details about using the output terminals or sockets.

Turn Output On	Press the *Output* key. The Output key will light up and ON will be displayed in the status bar to indicate that the output is on.	Output **ON**
Turn Output Off	Press the *Output* key. The Output key light will go out and OFF will be displayed in the status bar to indicate that the output is off.	Output **OFF**
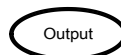
Preset Settings

- Save Presets to Local Memory → from page 56
- Recall Presets to Local Memory → from page 57
- Manage Preset Settings → from page 58
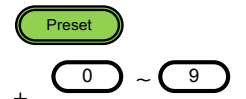
Save Preset Settings to Local Memory

Up to 10 preset settings can be saved to internal memory.

Steps	1. Press *Preset* and then hold a *number key (0~9)* to save the present settings to the corresponding memory number.	

Presets	M0 ~ M9

2. Press the *Preset* key again to exit from the preset mode.

Example	For example, pressing *Preset* & holding *1* will save the present settings to memory slot 1 (saved to M1).

⚠ Note	The preset key will become green when active. A beep will be heard (Buzzer set to ON) and a message will displayed when the settings are saved.

Load Preset Settings to Local Memory

Any of the 10 preset settings can be recalled from internal memory.

Steps	1. Press *Preset* and press a *number key(0~9)* to load the corresponding memory number.	

Presets	M0 ~ M9

2. Press the *Preset* key again to exit from the preset mode.

Example	For example, pressing *Preset + 1* will recall the saved settings from memory slot 1 (recalled from M1).
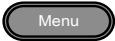
⚠ Note	The preset key will become green when active. A beep will be heard (Buzzer set to ON) and a message will be displayed when the settings are recalled.

Manage Preset Settings

Preset settings can be easily saved to or from a USB flash drive using the Save/Recall Files utility in the Menu system. Files can also be deleted from local memory using the utility.

File Format	When files are saved to USB they are saved in the following format: presetX.set, where X is the memory number M0 ~ M9. The files are saved to USB:/gw.
	When files are recalled from USB, files must be recalled from the same memory number. For example, the file preset0.set can only be recalled to memory number M0. The files can only be recalled from the USB:/gw directory.

Steps	1. Press the *Menu* key. The Menu settings will appear on the display. (Menu)
	2. Use the scroll wheel to go to item 10, *Save/Recall Files* and press *Enter*.
	3. Go to the *Type* setting using the scroll wheel and press *Enter*. Select *Preset* and press *Enter* to confirm.
	4. Go to the *Action* setting and choose the file operation and then press *Enter*.

MEM→USB	Saves the selected preset memory from the local memory to a USB flash drive.
MEM←USB	Loads a preset memory from a USB flash drive to the selected local memory.

DELETE(MEM)	Deletes the selected preset memory from local memory.

5. Go to the *Memory No.* setting and select the preset memory number to perform the operation on. Press *Enter* to confirm.

Memory No.	0 ~ 9 (M0 ~ M9)

Execute File Operation

6. Press *Exe[F1]* to perform the file operation.

EXE

Exit

7. Press *Exit[F4]* to exit from the *Save/Recall Files* settings.

EXIT

Example

MENU

Save/Recall Files

Type	:	PRESET
Action	:	MEM←USB
Memory No.	:	1

EXE

EXIT

Settings

Test Mode Function

The Test Mode function is a quick and easy way to simulate fluctuations in voltage and frequency in mains supply power.

Test Mode Overview

Background   The Test function is used to test power supply
                    fluctuation. This function is able to simulate
                    common abnormalities in mains power such as
                    fluctuations in voltage and frequency. These
                    tests can be run as one-off anomalies or cyclic
                    anomalies.

Setting Screen   Number of repetitions   V RANGE
Overview

                    Step time   Step voltage
                    Step   Step frequency
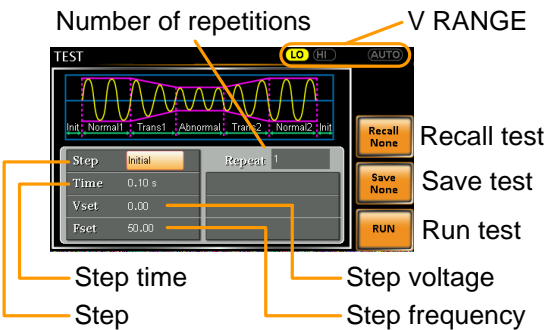
Step Overview   The Test function is comprised of 6 steps. Each
                    step is run sequentially in the following order:
                    Initial, Normal1, Trans1, Abnormal, Trans2,
                    Normal2, Initial.

Initial	The Initial step is used as the initial and final settings of the waveform test. This is the standby step before the test starts and the standby step after the test ends.
Normal1	This step configures the normal output conditions that precede the abnormal conditions.

Trans1	This step configures the transition from normal to abnormal conditions. This step will linearly interpolate the normal settings to the abnormal settings. This step can be skipped for abrupt state changes.
Abnormal	This step contains the abnormal conditions for the test.
Trans2	This step configures the transition from abnormal to normal conditions.
Normal2	This step configures the normal conditions that supersede the abnormal conditions.
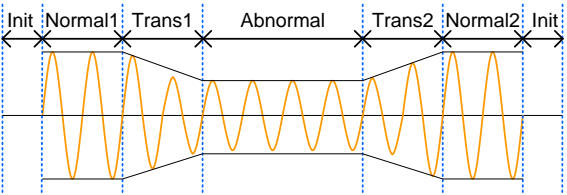
Parameter Overview

The following table shows which parameters are available for each step.

Step\Parameter	Initial	Normal1	Trans1	Abnormal	Trans2	Normal2
Repeat	✓	✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓	✓
Vset	✓	✓	X	✓	X	✓
Fset	✓	✓	X	✓	X	✓

Repeat	Indicates the number of times the test will be run, from Normal1 to Normal2.
	A value of 0 indicates infinite repeats. The repeat setting is the same for each step.
Time	Sets the duration time of the step.

Fset	Sets the frequency of the step. Not applicable for the Trans 1/2 steps.
Vset	Sets the voltage of the step. Not applicable for the Trans 1/2 steps.

Test Settings

Entering the Test Menu

1. Press *Test*.
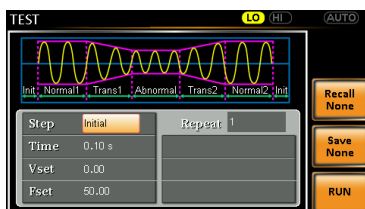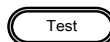
Test

Steps

2. Use the scroll wheel to go to the *Step* setting and press *Enter*.

3. Use the scroll wheel to select one of the test steps and press *Enter*.

Steps	Initial, Normal1, Trans1, Abnormal, Trans2, Normal2

4. Go to the *Time* setting and set the duration of the step.

Time	0.01 ~ 99.99s, 0(Trans 1 and Trans2) Note: For Trans1 and Trans2, it supports a value of 0, which will skip the step.

5. Press the *Range* key repeatedly to set the voltage range for the Vset parameter. The range will be shown in the top corner, which indicates that the test will be executed within this voltage range.
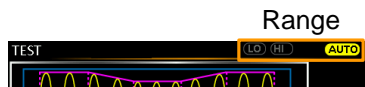
Range

Range	LO(250V), MD(500V), HI(1000V) , Auto

6. Go to the *Vset* setting and set the Vrms level of the step. If you input a Vset value that is not within the voltage range, the input value will be ignored.
Not applicable for Trans1 and Trans2.

Vset	0.00 ~ 1000Vrms (range dependent), Auto

7. Go to the *Fset* setting set the frequency of the step. Not applicable for Trans1 and Trans2.

Fset	45.00 ~ 500.0Hz

8. Lastly, go to the *Repeat* parameter to select the number of times the test will repeat the Normal1-Trans1-Abnormal-Trans2-Normal2 sequence of steps. A value of 0 will set the number of repetitions to infinite.

Repeat	1 ~ 9999, 0(infinite)

Save a Test to Local Memory

Saving a Test   Test settings can be saved to one of 10 memory
                       slots (TEST0 ~ TEST9).

Steps   1. Press *Save[F3]* and then long press a *number key*
                          when prompted.

                       2. A message will appear when the save is
                          successful.

Save	TEST0 ~ TEST9

Recall a Test from Local Memory

Recall a Test   Test settings can be recalled from one of 10
                       memory slots (TEST0 ~ TEST9).

Steps   1. Press *Recall[F2]* and then press a *number key*
                          when prompted.

                       2. A message will appear when the settings are
                          recalled successfully.

Recall	TEST0 ~ TEST9

Manage Test Settings

Test settings can be easily saved to or from a USB flash drive using the Save/Recall Files utility in the Menu system. Files can also be deleted from local memory using the utility.

File Format	When files are saved to USB they are saved in the following format: testX.sim, where X is the memory number 0 ~ 9 (TEST0 ~ TEST9). The files are saved to USB:/gw. When files are recalled from USB, files must be recalled from the same memory number. For example, the file test0.sim can only be recalled to memory number TEST0. The files can only be recalled from the USB:/gw directory.

Steps	1. Press the *Menu* key. The Menu settings will appear on the display. [Menu]
	2. Use the scroll wheel to go to item 10, *Save/Recall Files* and press *Enter*.
	3. Go to the *Type* setting using the scroll wheel and press *Enter*. Select *TEST* and press *Enter* to confirm.
	4. Go to the *Action* setting and choose the file operation and then press *Enter*.

MEM→USB	Saves the selected test memory from the local memory to a USB flash drive.
MEM←USB	Loads the test memory from a USB flash drive to the selected local memory.

DELETE(MEM)	Deletes the selected test memory from local memory.

5. Go to the *Memory No.* setting and select the test memory number to perform the operation on. Press *Enter* to confirm.

Memory No.	0 ~ 9 (TEST0 ~ TEST9)

Execute File Operation

6. Press *Exe[F1]* to perform the file operation.

EXE

Exit

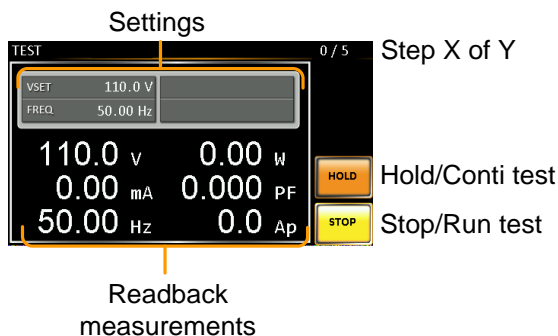7. Press *Exit[F4]* to exit from the *Save/Recall Files* settings.

EXIT

Example

MENU

Save/Recall Files
Type   :   TEST
Action   :   MEM→USB
Memory No. :   0

EXE

EXIT

Settings

Running a Test

Background	When running a test, the display changes to the run test view.

Run Screen
Overview

Settings

Step X of Y

Hold/Conti test

Stop/Run test

Readback
measurements

Steps

1. Press *Output*.

   Output

2. Press *Run[F4]*. The test will start to run.

   The settings of the current step will be shown at the top of the screen and the measurement readout will be shown on the bottom of the screen.

   The top-right of the screen will display the current step number of the test.

1/5 = Normal1	2/5 = Trans1
3/5 = Abnormal	4/5 = Trans2
5/5 = Normal2	

3. The test will continue to run until the last repeat step has run, *Stop[F4]* is pressed or the output is turned off*. When the test has finished/stopped, the screen will return to the original settings screen.

Hold Test   To pause the test mid-way, press *Hold[F3]*.

Continue Test   To continue a paused test, press *Conti[F3]*.

COMMUNICATION INTERFACE

This chapter describes basic configuration of IEEE488.2 based remote control. For a command list, refer to the programming manual, downloadable from GW Instek website, www.gwinstek.com

⚠ Note
If the instrument is remotely controlled via the USB/LAN/RS-232/GPIB interface, the panel lock is automatically enabled.

Interface Configuration

USB Remote Interface – Optional

USB configuration	PC side connector	Type A, host
	APS-7000 side connector	Rear panel Type B, slave
	Speed	1.1/2.0 (full speed/auto speed)
	USB Class	CDC (communications device class)

⚠ Note

The RS-232/USB interface card (APS-002) must first be installed before the USB interface can be used for remote control. Please see page 28 for installation details.

Steps

1. Connect the Type A-Type B USB cable from the PC to the rear panel USB B port.

2. Press the *Menu* key. The Menu setting will appear on the display.

   `Menu`

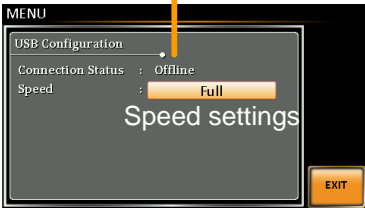3. Use the scroll wheel to go to item 3, *Rear USB* and press *Enter*.

4. Go to the *Speed* setting and set the USB speed.

Speed	Full, Auto

5. If the connection is successful *Connection Status* will change from Offline to Online.

Connection status

Speed settings

Exit   6. Press *Exit[F4]* to exit from the rear
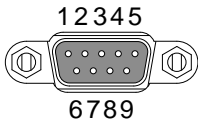   panel USB settings.

RS-232 Remote Interface - Optional

The APS-002 RS-232/USB interface card must be installed to
remotely control the APS-7000 via the serial port.

RS-232 configuration	Connector	BD-9, male
	Parameters	Baud rate, data bits, parity, stop bits.

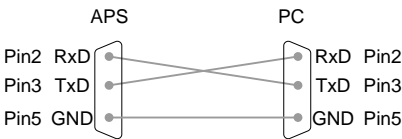| Pin Assignment	1 2 3 4 5 6 7 8 9	2: RxD (Receive data) 3: TxD (Transmit data) 5: GND 4, 6 ~ 9: No connection

Pin Connection   Use a Null Modem connection (RS-232C cable)
                    as shown in the diagram below.

APS   PC

Pin2 RxD   RxD Pin2
Pin3 TxD   TxD Pin3
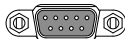Pin5 GND   GND Pin5

⚠ Note

The RS-232/USB (APS-002) or RS-232 (APS-007) must first be installed before the RS-232 interface can be used for remote control. Please see page 28 for installation details.
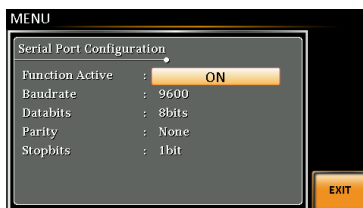
Steps

1. Connect the RS-232C cable from the PC to the rear panel RS-232 port.

2. Press the *Menu* key. The Menu setting will appear on the display.

   Menu

3. Use the scroll wheel to go to item 5, *Serial Port* and press *Enter*.

4. Go to the *Function Active* setting and turn the serial port connection on.

Function Active	ON, OFF

5. Set the remaining serial port settings.

Baud rate	1200, 2400, 4800, 9600(default), 19200, 38400, 57600, 115200,
Data bits	7, 8(default)
Parity	None(default), odd, even
Stop bits	1(default),2

   Serial port configuration

   MENU
   Serial Port Configuration
   Function Active   :   ON
   Baudrate   :   9600
   Databits   :   8bits
   Parity   :   None
   Stopbits   :   1bit
                                        EXIT

Exit

6. Press *Exit[F4]* to exit from the serial port settings.

> EXIT

RS-232/USB Remote Control Function Check

Functionality check

Invoke a terminal application such as Realterm.

For both USB and RS-232, set the COM port, baud rate, stop bit, data bit and parity accordingly. The RS-232 settings are configured on the APS-7000. The UART settings for the USB connection can be seen in the Windows Device Manager.

To check the COM settings in Windows, see the Device Manager. For example, in WinXP go to the Control panel → System → Hardware tab.

⚠ Note

If you are not familiar with using a terminal application to send/receive remote commands from the serial port or via a USB connection, please see page 75 for more information.

Run this query command via the terminal after the instrument has been configured for RS-232/USB remote control (page 72, 71).

*IDN?

This should return the Manufacturer, Model number, Serial number, and Software version in the following format.

GWINSTEK,APS-7051, GEXXXXXXX, XX.XX.XXXXXXXX

Manufacturer: GWINSTEK
Model number : APS-7051

Serial number : GEXXXXXXX
Software version : XX.XX.XXXXXXXX

⚠ Note

For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.

Using Realterm to Establish a Remote Connection

Background

Realterm is a terminal program that can be used to communicate with a device attached to the serial port of a PC or via an emulated serial port via USB.

The following instructions apply to version 2.0.0.70. Even though Realterm is used as an example to establish a remote connection, any terminal program can be used that has similar functionality.

⚠ Note

Realterm can be downloaded on Sourceforge.net free of charge.

For more information please see http://realterm.sourceforge.net/

Operation

1. Download Realterm and install according to the instructions on the Realterm website.

2. Connect the APS-7000 via USB (page 71) or via RS-232 (page 72).

3. If using RS-232, make note of the configured baud rate, stop bits and parity.

4. Go to the Windows device manager and find the COM port number for the connection. For example, go to the Start menu > Control

Panel > Device Manager.

Double click the *Ports* icon to reveal the connected serial port devices and the COM port for the each connected device.

If using USB, the baud rate, stop bit and parity settings can be viewed by right-clicking the connected device and selecting the *Properties* option.
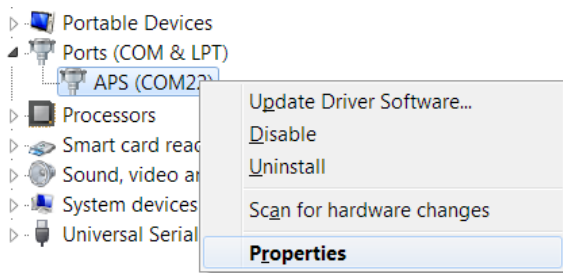
5. Start Realterm on the PC as an administrator. Click:
    Start menu>All Programs>RealTerm>realterm

    Tip: to run as an administrator, you can right click the Realterm icon in the Windows Start menu and select the *Run as Administrator* option.

6. After Realterm has started, click on the *Port* tab.

    Enter the *Baud*, *Parity*, *Data bits*, *Stop bits* and *Port* number configuration for the connection.

    The *Hardware Flow Control*, *Software Flow Control* options can be left at the default settings.

    Press *Open* to connect to the APS-7000.

⚠ Note
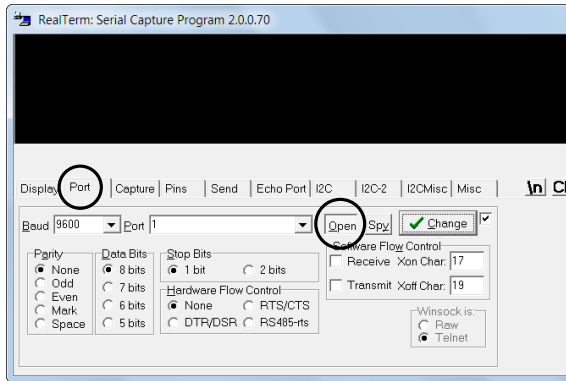
For USB, the baud rate should be fixed to 115,200.
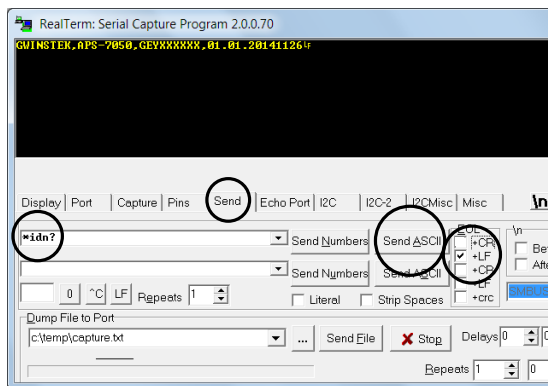
---

7. Click on the *Send* tab.

    In the *EOL* configuration, check on the *+LF* check boxes.

    Enter the query:
    *idn?

    Click on *Send ASCII*.

8. The terminal display will return the following:

GWINSTEK,APS-7051, GEXXXXXXX, XX.XX.XXXXXXXX

(manufacturer, model, serial number, software version)

9. If Realterm fails to connect to the APS-7000, please check all the cables and settings and try again.

Configure GPIB Interface - Optional

To use GPIB, the optional APS-001 GPIB interface card must first be installed.
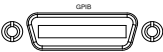

⚠️ Note | The GPIB interface card (APS-001) must first be installed before the GPIB interface can be used for remote control. Please see page 28 for installation details.

GPIB Configuration

1. Connect a GPIB cable from the PC to the GPIB on the interface card.

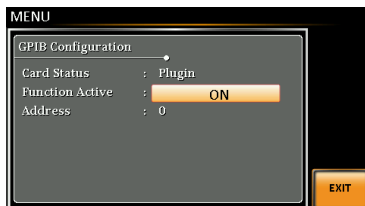2. Press the *Menu* key. The Menu setting will appear on the display.

   `Menu`

3. Use the scroll wheel to go to item 6, *GPIB* and press *Enter*.

4. If the GPIB card is installed successfully, the *Card Status* will show *Plugged in*.

5. Go to the *Function Active* setting and turn the GPIB port on.

Function Active	ON, OFF

6. Set the GPIB address.

GPIB Address	0 ~ 30

GPIB port configuration

Exit	7. Press *Exit[F4]* to exit from the serial port settings.	EXIT

GPIB constraints	• Maximum 15 devices altogether, 20m cable length, 2m between each device
	• Unique address assigned to each device
	• At least 2/3 of the devices turned On
	• No loop or parallel connection

GPIB Function Check

| Functionality check	Please use the National Instruments Measurement & Automation Controller software to confirm GPIB/LAN functionality.
	See the National Instrument website, http://www.ni.com for details.

⚠ Note	For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.

Operation   1. Start the NI Measurement and
                Automation Explorer (MAX)
                program. Using Windows, press:

   *Start>All Programs>NI MAX*
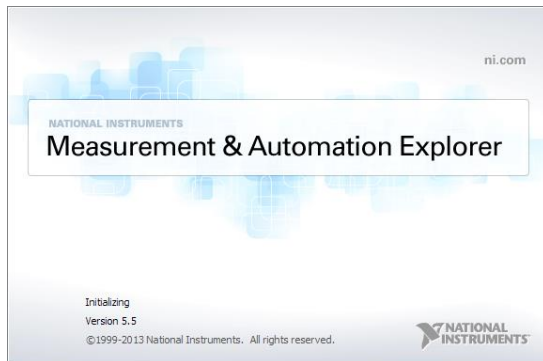
             2. From the Configuration panel access;

                My System>Devices and Interfaces>GPIB0

             3. Press the *Scan for Instruments* button.

             4. In the *Connected Instruments* panel the APS-7000
                should be detected as *Instrument 0* with the
                address the same as that configured on the
                APS-7000.

             5. Double click the *Instrument 0* icon.
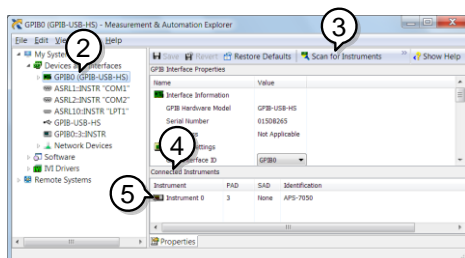
6. Click on *Visa Properties*.

7. Click on *Open Visa Test Panel*.
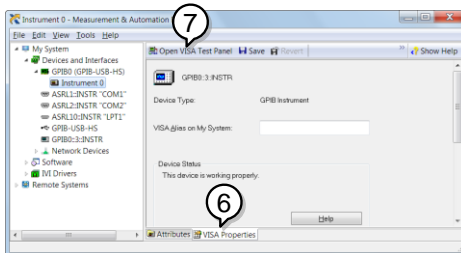
8. Click on the *Input/Output* icon.

9. Under the Basic I/O tab, ensure **IDN?* is written in the *Select or Enter Command* text box.

10. Click on the *Query* button to send the **IDN?* query to the instrument.

11. The instrument identification string will be returned to the buffer area:

    GWINSTEK,APS-7051, GEXXXXXXX, XX.XX.XXXXXXXX

   (manufacturer, model, serial number, software version)

12. The function check is complete.

Configure Ethernet Connection

The Ethernet interface can be configured for a number of different applications. Ethernet can be configured for basic remote control or monitoring using a web server or it can be configured as a socket server.

The APS-7000 supports both DHCP connections so the instrument can be automatically connected to an existing network or alternatively, network settings can be manually configured.

Ethernet Parameters	MAC Address (display only)	DHCP
	IP Address	Subnet Mask
	Gateway	DNS Address
	DNS Server	Socket port fixed at 2268

Ethernet Configuration	1. Connect a LAN cable from the PC to the Ethernet port on the rear panel.	LAN

2. Press the *Menu* key. The Menu setting will appear on the display.

Menu

3. Use the scroll wheel to go to item 3, *LAN* and press *Enter*.

4. If the LAN cable is installed correctly a connection is active, the *Connection Status* will show *Online*.

5. To automatically have the network assign an IP address, set DHCP to ON. Otherwise set DHCP to OFF to manually set the Ethernet settings.

DHCP	ON, OFF

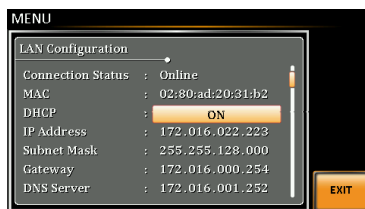6. If DHCP was set to OFF, configure the remaining LAN parameters.

IP Address

Subnet Mask

Gateway

DNS Server

LAN configuration

Exit

7. Press *Exit[F4]* to exit from the LAN settings.

Web Server Remote Control Function Check

Functionality check

Enter the IP address of the power supply (for example: http:// XXX.XXX.XXX.XXX) in a web browser after the instrument has been configured for LAN(page 82).

The web interface allows you to:

- View the system and information and the network configuration.

- View the analog control pinout.

- View the dimensions of the unit.

- View the operating area

Example:

Socket Server Function Check

Background	To test the socket server functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for the VISA Run-time Engine page, or "downloads" at the following URL, http://www.ni.com/visa/

Requirements	Operating System: Windows XP, 7, 8, 8.1

Functionality check	1. Start the NI Measurement and Automation Explorer (MAX) program. Using Windows, press:
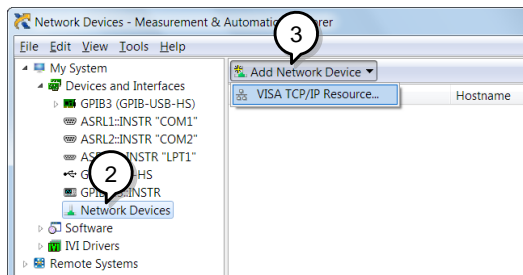
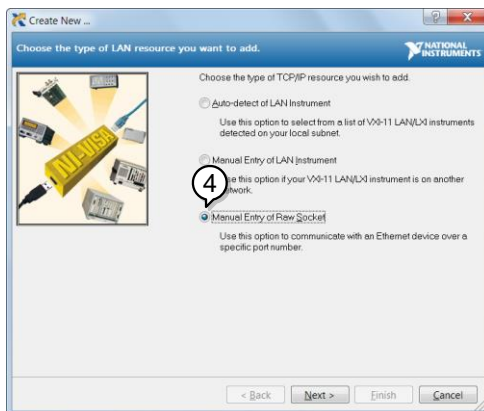*Start>All Programs>NI MAX*

2. From the Configuration panel access;
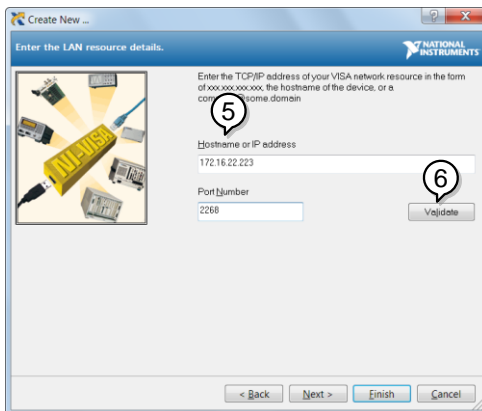
My System>Devices and Interfaces>Network Devices

3. Press *Add New Network Device>Visa TCP/IP Resource…*

4. Select *Manual Entry of Raw Socket* from the popup window.

5. Enter the IP address and the port number of the APS-7000. The port number is fixed at 2268.

6. Double click the Validate button and press *Next*.

7. Next configure the Alias (name) of the APS-7000 connection. In this example the Alias is: APS

8. Click finish.
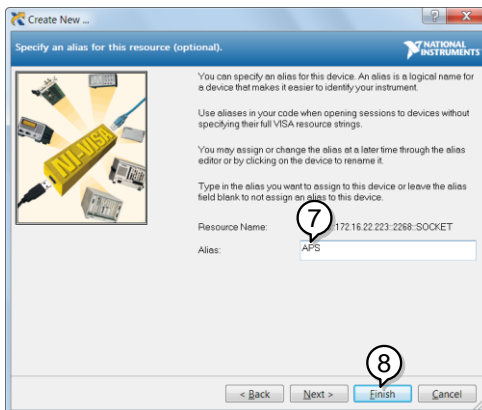
9. The IP address of the power supply will now appear under Network Devices in the configuration panel. Select this icon now.

10. Press *Open VISA Test Panel.*

11. Click the *Configuration* Icon. Under the *IO Settings* tab check *Enable Termination Character*. The termination character should be set as *Line Feed - \n*.
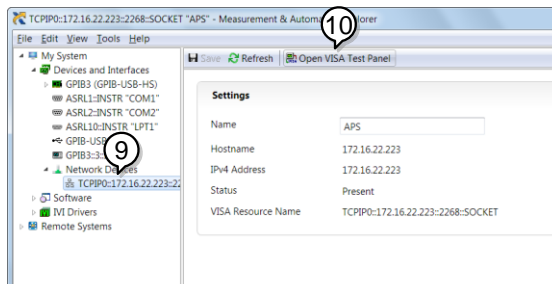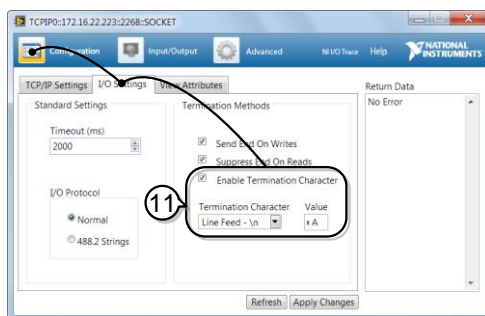

12. Click the *Input/Output* icon. Under the *Basic I/O* tab, make sure **IDN? \n* is entered in the *Select or Enter Command* drop box.

13. Click Query.

The APS-7000 will return the machine identification string into the buffer area: *GWINSTEK,APS-7051, GEXXXXXXX, XX.XX.XXXXXXXX*
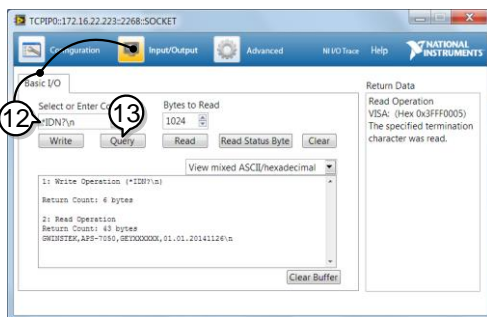
⚠ Note	For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.

F_{AQ}

- The accuracy does not match the specification.
- The display shows "fuse broken" message.
- The display shows "output shorted" message.
- The display shows "waiting for 10secs" message.
- The display shows "OCP" message.

The accuracy does not match the specification.

Make sure the device is powered On for at least 30 minutes, within +18°C~+28°C. This is necessary to stabilize the unit to match the specification.

The display shows "fuse broken" message.

The internal protection fuse is open. Contact your local dealer or GW Instek.

The display shows "output shorted" message.

Make sure the DUT is correctly connected to the APS-7000 output terminals and that no shortcut exist. A DUT malfunction may also be the cause.

The display shows "waiting for 10secs" message.

A protection function is likely in force, check the DUT settings.

The display shows "OCP" message.

OCP message be occurred that is mean over the specification of APS-7000 series.

Even set Irms is equal to 0.

Purchasing more higher power AC Source, please.

For more information, contact your local dealer or GWInstek at www.gwinstek.com / marketing@goodwill.com.tw.

APPENDIX

Firmware Update

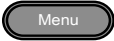Background   The APS-7000 firmware can be upgraded using
                   the USB A port on the front panel. See your
                   local distributor or the GW Instek website for
                   the latest firmware information.

⚠ Note   • Ensure the DUT is not connected.
                   • Ensure the output is off.

Steps   1. Insert a USB Flash Drive into the USB port on
                      front panel of the APS-7000.
                   • The USB drive should include the "**gw.sbt"
                      firmware** file in a directory named
                      "gw"(USB:\gw:).

                   2. Press the *Menu* key. The Menu
                      setting will appear on the display.   Menu

                   3. Use the scroll wheel to go to item 9, *Special
                      Function* and press *Enter*.

                   4. Key in the password when prompted and then
                      press *Enter*.

                   • The password is "5004".

                   5. Go to Item 1, *Update Main Program* and press
                      Enter.

Exit   6. Wait for the unit to update. Upon completion
                           the unit will automatically reset.

Example

Password setting screen

APS-7000 Default Settings

The following default settings are the factory configuration settings for the power supply.

For details on how to return to the factory default settings, see page 33.

Continuous Mode	APS-7051	APS-7101
Range	250V	
ACV	0.00V	
FREQ	60.00Hz	
IRMS	2.50A	5.00A
V limit	250.0Vrms	
F Limit	500.0Hz	
Ipeak Limit	10.00Arms	20.00Arms

Test Mode	APS-7051	APS-7101
Step	Initial	
Repeat	1	
Time	0.10s	
Vset	0.00	
Fset	50.00	
Range	LO	

Configuration Menu	APS-7051	APS-7101
Buzzer	ON	
LCD Contrast	50%	
LCD Brightness	50%	
LCD Saturation	50%	

APS-7000 Specifications

The specifications apply when the APS-7000 is powered on for at least 30 minutes.

APS-7000

Model	APS-7051	APS-7101
AC Input		
Phase	Single Phase	
Voltage	115/230 Vac ± 15%	
Frequency	50/60Hz	
Max. Current	16A / 8A	32A / 16A
Power Factor	0.7 Typ.	
AC Output		
Power Rating	500 VA	1000 VA
Output Voltage	0 ~ 250 Vrms / 0 ~ 500 Vrms / 0 ~ 1000 Vrms	
Output Frequency	45.00 ~ 500.0 Hz	
Maximum Current (r.m.s) [*1]		
0 ~ 250 Vrms	2.5 A	5.0 A
0 ~ 500 Vrms	1.25 A	2.5 A
0 ~ 1000 Vrms	0.63 A	1.25 A
Maximum Current (peak)		
0 ~ 250 Vrms	10.0 A	20.0 A
0 ~ 500 Vrms	5.0 A	10.0 A
0 ~ 1000 Vrms	2.5 A	5.0 A
Phase	Single Phase, Two Wire (1P2W)	
Total harmonic distortion (THD) [*2]	$\leq$0.5% at 45 ~ 500 Hz (Resistive Load)	
Crest factor	≥ 4	
Line regulation	0.1% (% of full scale)	
Load regulation	0.5% (% of full scale)	
Setting		
Voltage		
Range	0 ~ 250 Vrms, 0 ~ 500 Vrms, 0 ~ 1000 Vrms, Auto	
Resolution	0.01 V at 0.00 ~ 99.99 Vrms 0.1 V at 100.0 ~ 999.9 Vrms	
Accuracy	$\pm$ (0.5% of setting + 2 counts)	
Frequency		
Range	45 ~ 500 Hz	
Resolution	0.01 Hz at 45.00 ~ 99.99 Hz 0.1 Hz at 100.0 ~ 500.0 Hz	

Accuracy	± 0.02% of Setting	
Measurement [*3]		
Voltage (r.m.s)		
Range	0.20 ~ 38.75 Vrms 38.76 ~ 77.50 Vrms 77.51 ~ 250.0 Vrms 250.1 ~ 1000 Vrms	
Resolution	0.01 V at 0.00 ~ 99.99 Vrms 0.1 V at 100.0 ~ 999.9 Vrms	
Accuracy [*4]	± (0.5% of reading + 2 counts)	
Frequency		
Range	45 ~ 500 Hz	
Resolution	0.01 Hz at 45.00 ~ 99.99 Hz 0.1 Hz at 100.0 ~ 500.0 Hz	
Accuracy	± 0.1 Hz	
Current (r.m.s)		
Range	2.00 ~ 70.00 mA 60.0 ~ 350.0 mA 0.300 ~ 3.500 A 3.00 ~ 5.00 A	
Resolution	0.01 mA 0.1 mA 0.001 A 0.01 A	
Accuracy	± (0.6% of reading + 5 counts), 2.00 ~ 350.0 mA ± (0.5% of reading + 5 counts), 0.350 ~ 3.500 A ± (0.5% of reading + 3 counts), 3.500 ~ 5.00 A	
Current (peak)		
Resolution	0.1 A	
Accuracy	± (1% of reading + 1 count)	
Power (W)		
Resolution	0.01 W 0.1 W 1 W	
Accuracy	± (0.6% of reading + 20counts), 0.20 ~ 99.99 W ± (0.5% of reading + 20counts), 100.0 ~ 999.9 W ± (0.5% of reading + 2counts), 1000 ~ 9999 W	
Power Factor		
Resolution	0.001	
Accuracy	±2% reading + 2 counts	
General		
Number of Preset	10 (0~9 numeric keys)	
Protection	OCP, OPP, OHP and Alarm	

Environmental Conditions		
Operating temperature range	0 ~ +40 °C	
Storage temperature range	-10 ~ +70 °C	
Operating humidity range	20 ~ 80% RH (no condensation)	
Storage humidity range	80% RH or less (no condensation)	
LCD Display	4.3 inch, 480 (RGB) x 272	
Dimensions (mm)		
W	430	430
H	88	88
D	400	560
Weight	24 Kg	38 Kg
Test Function		
Number of Memories	10 (0~9 numeric keys)	
Step Time Setting Range	0.01 ~ 99.99 S	
Operation within Step	Constant, Keep, Linear Sweep	
Parameters	Output Range, Frequency, Waveform (sine wave only)	
Interface		
Standard	USB Host, LAN	

Product specifications are subject to change without notice.

*1 Maximum output current at working voltage 200Vrms, 400Vrms, 800Vrms
*2 45Hz to 500Hz, 10% or higher of the rated output voltage, the maximum current or lower.
*3 All of measurement accuracy is at 23±5°C.
*4 In the case of 25V to 250V / 50V to 500V / 100V to 1000V sine wave, no load.

APS-7000 Dimensions

APS-7051

545.5

401.3

87.9

110.4

430.0

Scale = mm

![GWINSTEK]

APS-7101

705.4

561.3

87.9

110.4

430.0

Scale = mm

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