Programmable DC Power Supply

PSU Series

QUICK START GUIDE

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

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SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to insure 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 PSU 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 PSU. • Avoid severe impact or rough handling that leads to damaging the PSU. • Do not discharge static electricity to the PSU. • Use only mating connectors, not bare wires, for the terminals. • Do not block the cooling fan opening. • Do not disassemble the PSU unless you are qualified. (Measurement categories) EN61010-1:2010 and EN61010-2-030 specifies the measurement categories and their requirements as follows. The PSU falls under category II. • 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: 85Vac~265Vac • Frequency: 47Hz to 63Hz • To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.

Cleaning the PSU	• 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%~ 85% (no condensation) • Altitude: < 2000m • Temperature: 0°C to 50°C (Pollution Degree) EN61010-1:2010 and EN61010-2-030 specifies the pollution degrees and their requirements as follows. The PSU 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: -25°C to 70°C • Relative Humidity: ≤90%(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 power supply 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 supply in a nutshell, including its main features and front / rear panel introduction. After going through the overview, please read the theory of operation to become familiar with the operating modes, protection modes and other safety considerations.

PSU Series Overview

Series lineup

The PSU series consists of 5 models, covering a number of different current, voltage and power capacities:

Model name	Voltage Rating[1]	Current Rating[2]	Power
PSU 6-200	6V	200A	1200W
PSU 12.5-120	12.5V	120A	1500W
PSU 20-76	20V	76A	1520W
PSU 40-38	40V	38A	1520W
PSU 60-25	60V	25A	1500W

[1]Minimum voltage guaranteed to 0.2% of rating voltage.

[2]Minimum current guaranteed to 0.4% of rating current.

Main Features

Performance	• High power density: 1500W in 1U • Universal input voltage 85~265Vac, continuous operation. • Output voltage up to 60V, current up to 200A.
Features	• Active power factor correction. • Parallel master/slave operation with active current sharing. • Remote sensing to compensate for voltage drop in load leads. • 19" rack mounted ATE applications. • A built-in Web server that lets you monitor the instrument directly from an internet browser on your computer. • OVP, OCP and OHP protection. • Preset memory function. • Adjustable voltage and current slew rates. • Bleeder circuit ON/OFF setting. (to prevent over-discharging of batteries) • CV, CC priority start function. (prevents overshoot with output ON) • Supports test scripts.
Interface	• Built-in RS-232/485, LAN and USB interface. • Analog output programming and monitoring. • Optional interfaces: GPIB, Isolated Voltage (0-5V/0-10V) and Isolated Current (4-20mA) programming and monitoring interface. (Factory options)

Accessories

Before using the PSU power supply unit, check the package contents to make sure all the standard accessories are included.

Standard Accessories	Part number	Description	Qty.
		Output terminal cover	1
		Analog connector plug kit	1
		Output terminal M8 bolt set	1
		Input terminal cover	1
	62SB-8K0HD101	1U Handle, ROHS	2
	62SB-8K0HP101	1U BRACKET (LEFT), RoHS	1
	62SB-8K0HP201	1U BRACKET (RIGHT), RoHS	1
	CD-ROM	User manual, Programming Manual	1 set
		Quick start guide	1
	82SU-062H0K01	Packing list	
	82GW-00000C01	* CTC GW/INSTEK JAPAN USE ,RoHS	1

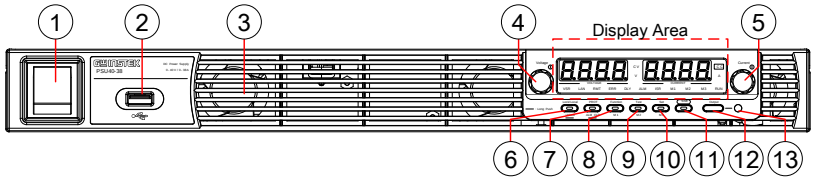
Factory Installed Options	Part number	Description
	PSU-GPIB	GPIB interface
	PSU-ISO-V	Voltage programming isolated analog interface
	PSU-ISO-I	Current programming isolated analog interface

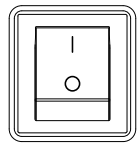
Optional Accessories	Part number	Description
	PSU-01C	Cable for 2 units of PSU-Series in parallel mode connection
	PSU-01B	Bus Bar for 2 units of PSU-Series in parallel mode connection
	PSU-01A	Joins a vertical stack of 2 PSU units together. 2U-sized handles x2, joining plates x2.
	PSU-02C	Cable for 3 units of PSU-Series in parallel mode connection
	PSU-02B	Bus Bar for 3 units of PSU-Series in parallel mode connection
	PSU-02A	Joins a vertical stack of 3 PSU units together. 3U-sized handles x2, joining plates x2.
	PSU-03C	Cable for 4 units of PSU-Series in parallel mode connection
	PSU-03B	Bus Bar for 4 units of PSU-Series in parallel mode connection
	PSU-03A	Joins a vertical stack of 4 PSU units together. 4U-sized handles x2, joining plates x2.
	PSU-232	RS232 cable with DB9 connector kit
	PSU-485	RS485 cable with DB9 connector kit
	GRM-001	Rack-mount slides (General Devices P/N: C-300-S-116-RH-LH)
	GTL-246	USB Cable 2.0-A-B Type, Approx. 1.2M
	GPW-001	Power Cord SJT 12AWG/3C, 3m MAX Length, 105 °C, RNB5-5*3P UL/CSA type
	GPW-002	Power Cord H05W-F 1.5mm^2/3C, 3m MAX Length, 105 °C, RNB5-5*3P VDE type

	GPW-003	Power Cord VCTF 3.5mm^2/3C, 3m MAX Length, 105 °C, RNB5-5*3P PSE type
Download	Name	Description
	psu_cdc.inf	PSU USB driver
Other	Name	Description
	Certificate of traceable calibration	

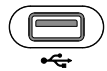
Appearance

PSU Series Front Panel



1. Power Switch 

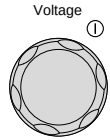
   Used to turn the power on/off.

2. USB A Port 

   USB A port for data transfer, loading test scripts etc.

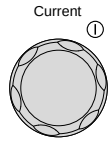
3. Air Inlet

   Air inlet for cooling the inside of the PSU series.

4. Voltage Knob 

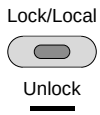
   Used to set the voltage value or select a parameter number in the Function settings.

   Display Area — The display area shows setting values, output values and parameter settings. The function LEDs below show the current status and mode of the power supply. See page 14 for details.

5. Current Knob 

   Used to set the current value or change the value of a Function parameter.

6. Lock/Local Button

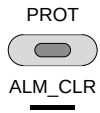


Used to lock all front panel buttons other than the Output Button or it switches to local mode.

Unlock Button

(Long push) Used to unlock the front panel buttons.

7. PROT Button

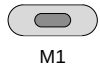


Used to set and display OVP, OCP and UVL.

ALM_CLR Button

(Long push) Used to release protection functions that have been activated.

8. Function Button

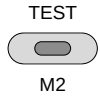


Used to configure the various function.

M1 Button

(+Shift) Used to recall the M1 setup.
(+Shift and hold) Used to save the current setup to M1.

9. Test Button

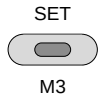


Used to run customized scripts for testing.

M2 Button

(+Shift) Used to recall the M2 setup.
(+Shift and hold) Used to save the current setup to M2.

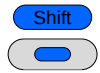
10. Set Button



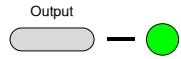
Used to set and confirm the output voltage and output current.

M3 Button

(+Shift) Used to recall the M3 setup.
(+Shift and hold) Used to save the current setup to M3.

11. Shift Button 

Used to enable the functions that are written in blue characters below the button.

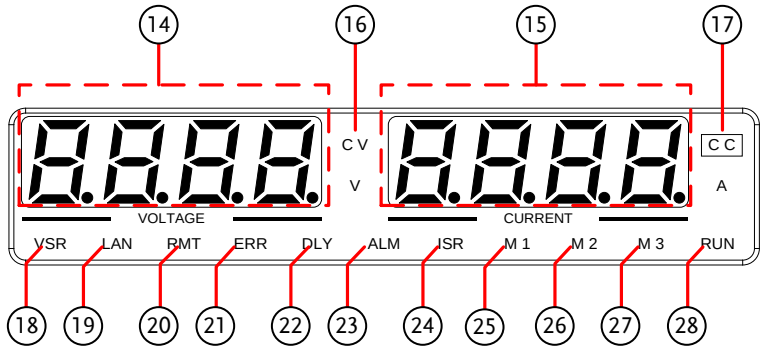
12. Output Button 

Used to turn output on and off.

13. Output ON LED
Lights in green during output ON.

PSU Series Display and Operation Panel

Display Area



14. Voltage Meter — Displays the voltage or the parameter number of a Function parameter.

15. Current Meter — Displays the current or the value of a Function parameter.

16. CV LED — Lights in green during constant voltage mode.

17. CC LED — Lights in green during constant current mode.

18. VSR LED — The voltage slew rate enable.

19. LAN LED — Lights up when the LAN interface is connected.

20. RMT LED — Lights in green during remote control.

21. ERR LED — Lights in red when an error has occurred.

22. DLY LED — The output on/off delay enable.

23. ALM LED — Lights in red when a protection function has been activated.

24. ISR LED — The current slew rate enable.

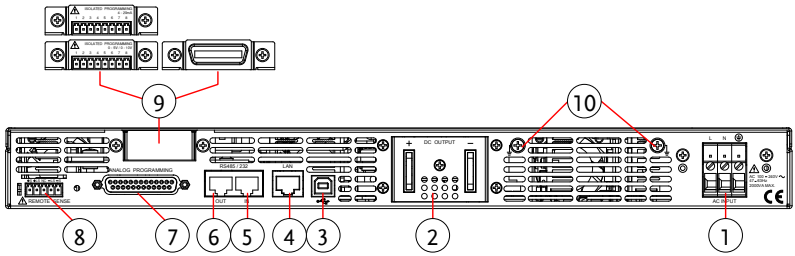
25. M1 LED — Lights in green when the memory value are being recalled or saved.

26. M2 LED — Lights in green when the memory value are being recalled or saved.

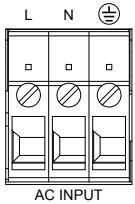
27. M3 LED — Lights in green when the memory value are being recalled or saved.

28. RUN LED — Auto sequence has been activated.

Rear Panel

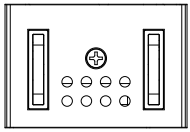


1. AC Input



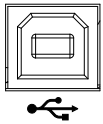
Wire clamp connector.

2. DC Output



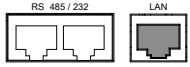
Output terminals for 6V to 60V models.

3. USB



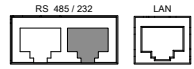
USB port for controlling the PSU remotely.

4. LAN



Ethernet port for controlling the PSU remotely.

5. Remote-IN

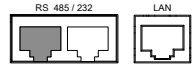


Two different types of cables can be used for RS232 or RS485-based remote control.

PSU-232: RS232 cable with DB9 connector kit.

PSU-485: RS485 with DB9 connector kit.

6. Remote-OUT



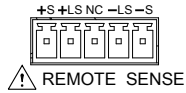
RJ-45 connector that is used to daisy chain power supplies with the Remote-IN port to form a communication bus.

PSU-485S: Serial link cable with RJ-45 shielded connector.

7. Analog Control

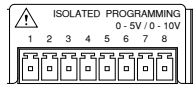
External analog control connector.

8. Remote Sense



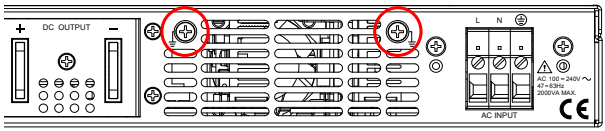
Compensation of load wire drop.

9. Option Slot



Blank sub-plate for standard units.
Isolated Analog connector for units equipped with Isolated Current and Voltage Programming and Monitoring option.
GPIB connector for units equipped with IEEE programming option.

10. Ground Screw — Connector for grounding the output (two positions, shown in red).



OPERATION

Set Up

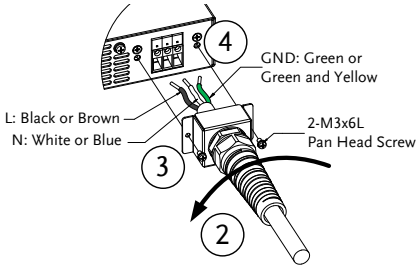
Line Voltage Connection

Background	The PSU power supplies use a universal power input that can be used with 100 and 240 Vac systems. To connect or replace the power cord (user supplied, specification below), 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. Always allow the power supply to fully discharge before disconnecting the AC power cord.
Recommended Power Cord Specifications	25A 250V, 3x12 AWG, outer diameter: 9-11mm, rated 60 °C min., 3m maximum length and approved by the national safety standards for the country of use. The PSU has a number of power cord options available. Please see the optional accessories on page 8 for details.
Removal	1. Turn off the power switch and unplug the power from the socket.

2. Unscrew the power cord protective sheath.

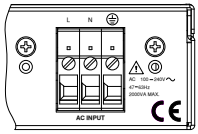
3. Remove the 2 screws holding the power cord cover and remove.

4. Remove the AC power cord wires with a flat head screwdriver.

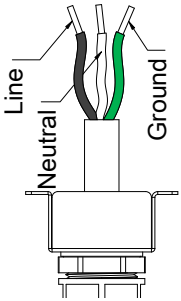


Installation

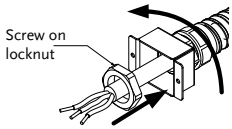
1. Connect the AC power cord wires to the AC input terminals.



   - Black/Brown → Line (L)
   - White/Blue → Neutral (N)
   - Green /Green & Yellow → Ground (⏚)



2. Make sure the sheath is tightened to the lock nut.



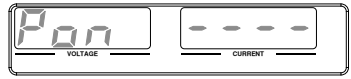
3. Re-install the power cord cover.

Power Up

Steps

1. Connect the power cord to the universal power input. Page 19
2. Press the POWER switch on.

3. The power supply will show the Power On settings (Pon) at start up. If no Power On settings are configured, the PSU will recover the state right before the power was last turned OFF. If used for the first time, the default settings will appear on the display.



Note

You may also configure how the PSU will behave on startup by altering the Power On Configuration settings, see the user manual for details.

Power Down

To turn the PSU power supply off, press the power switch again (0 position). It may take a few seconds for the power supply to fully turn off.

CAUTION

The power supply takes around 8 seconds to fully turn on and shutdown.

Do not turn the power on and off quickly. Please wait for the display to fully turn off.

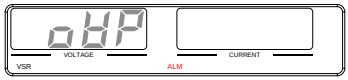
Basic Operation

Setting OVP/OCP/UVL Levels

The OVP level and OCP level has a selectable range that is based on the output voltage and output current, respectively. The OVP and OCP level is set to the highest level by default. The actual selectable OVP and OCP range depends on the PSU model.

When one of the protection measures are on, ALM indicator is lit red on the front panel and the type of alarm is also shown on the display. The ALM_CLR button can be used to clear any protection functions that have been tripped. By default, the output will turn off when the OVP or OCP protection levels are tripped.

The UVL will prevent you from setting a voltage that is less than the UVL setting. The UVL setting range is from 0% to 105% of the rated output voltage.



Example: OVP alarm

Before setting the protection settings:

- Ensure the load is not connected.
- Ensure the output is turned off.

⚠ Note

You can use the Function settings (F-13 and F-14) to apply limits to the voltage and current settings, respectively. You can set limitations so that the values do not exceed the set OVP and the set OCP

level, and so that the values are not lower than the set UVL trip point.

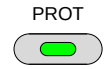
By using this feature, you can avoid turning the output off by mistakenly setting the voltage or current to a value that exceeds the set OVP or OCP level or to a value that is lower than the set UVL trip point.

If you have selected to limit the voltage setting (F-14), you will no longer be able to set the output voltage to a value that is above about 95% of the OVP trip point or to a value that is lower than the UVL trip point.

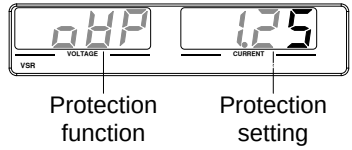
If you have selected to limit the current setting (F-13), you will no longer be able to set the output current to a value that is above about 95% of the OCP trip point.

Steps

1. Press the PROT key. The PROT key lights up.

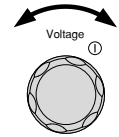


2. The OVP protection function will be displayed on the voltage display and the setting will be displayed on the current display.



Choose a Protection Function

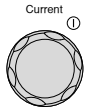
3. Turn the voltage knob to select a protection function.



Range OVP, OCP, UVL

Setting the Protection Level

4. Use the current knob to set the protection level for the selected function.

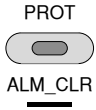


	Setting Range		
PSU Model	OCP	OVP	UVL
6-200	5~220	0.6~6.6	0~6.3
12.5-120	5~132	1.25~13.75	0~13.12
20-76	5~83.6	2~22	0~21
40-38	3.8~41.8	4~44	0~42
60-25	2.5~27.5	5~66	0~63

5. Press PROT again to exit. The PROT key light will turn off.

Clear OVP/OCP/UVL protection

The OVP, OCP or UVL protection can be cleared after it has been tripped by holding the ALM_CLR button for 3 seconds.



Set to C.V. Priority Mode

When setting the power supply to constant voltage mode, a current limit must also be set to determine the crossover point. When the current exceeds the crossover point, the mode switches to C.C. mode. C.C. and C.V. mode have two selectable slew rates: High Speed Priority and Slew Rate Priority. High Speed Priority will use the fastest slew rate for the instrument while Slew Rate Priority will use a user-configured slew rate.

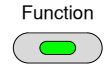
Background

Before setting the power supply to C.V. mode, ensure:

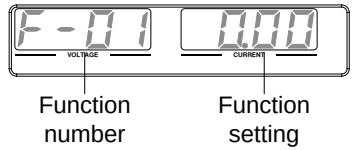
- The output is off.
- The load is connected.

Steps

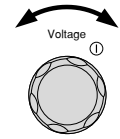
1. Press the Function key. The Function key will light up.



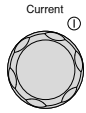
2. The display will show the function (F-01) on the voltage display and the setting for the function in the current display.



3. Rotate the voltage knob to change the F setting to F-03 (V-I Mode Slew Rate Select).



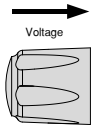
4. Use the current knob to set the F-03 setting.



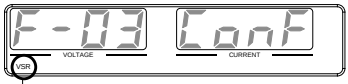
Set F-03 to 0 (CV High Speed Priority) or 2 (CV Slew Rate Priority).

F-03	0 = CV High Speed Priority 2 = CV Slew Rate Priority

5. Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.



Example



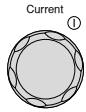
VSR indicator for CV Slew Rate Priority (F-03=2)

6. If CV Slew Rate Priority was chosen as the operating mode, set F-04 (Voltage Slew Rate Up) and the F-05 (Voltage Slew Rate Down) and save.

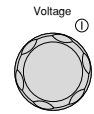
F-04 / F-05	0.001V~0.06V/msec (PSU 6-200) 0.001V~0.125V/msec (PSU 12.5-120) 0.001V~0.2V/msec (PSU 20-76) 0.001V~0.4V/msec (PSU 40-38) 0.001V~0.6V/msec (PSU 60-25)

7. Press the Function key again to exit the configuration settings. The function key light will turn off.

8. Use the Current knob to set the current limit (crossover point).



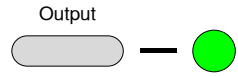
9. Use the Voltage knob to set the voltage.



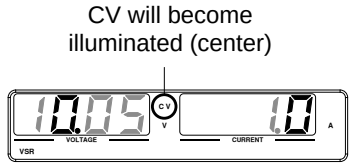
Note

Notice the Set key becomes illuminated when setting the current or voltage. If the voltage or current knobs are unresponsive, press the Set key first.

10. Press the Output key. The Output ON LED becomes lit.



Example



Note

Only the voltage level can be altered when the output is on. The current level can only be changed by pressing the Set key.

For more information on the Normal Function Settings, see the user manual.

Set to C.C. Priority Mode

When setting the power supply to constant current mode, a voltage limit must also be set to determine the crossover point. When the voltage exceeds the crossover point, the mode switches to C.V. mode. C.C. and C.V. mode have two selectable slew rates: High Speed Priority and Slew Rate Priority. High Speed Priority will use the fastest slew rate for the instrument while Slew Rate Priority will use a user-configured slew rate.

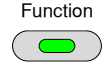
Background

Before setting the power supply to C.C. mode, ensure:

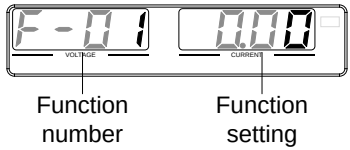
- The output is off.
- The load is connected.

Steps

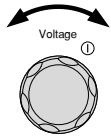
1. Press the Function key. The Function key will light up.



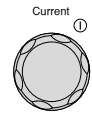
2. The display will show the function (F-01) on the voltage display and the setting for the function in the current display.



3. Rotate the voltage knob to change the F setting to F-03 (V-I Mode Slew Rate Select).



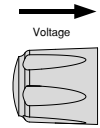
4. Use the current knob to set the F-03 setting.



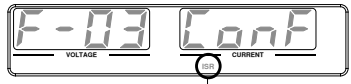
   Set F-03 to 1 (CC High Speed Priority) or 3 (CC Slew Rate Priority) and save.

   F-03 1 = CC High Speed Priority
   3 = CC Slew Rate Priority

5. Press the Voltage knob to save the configuration setting. ConF will be displayed when it is configuring.



Example

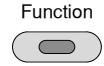


ISR indicator for CC Slew Rate Priority (F-03=3)

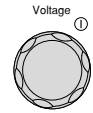
6. If CC Slew Rate Priority was chosen as the operating mode, set F-06 (Current Slew Rate Up) and F-07 (Current Slew Rate Down) and save.

   F-06 / F-07 0.001A~2A / msec (PSU 6-200)
   0.001A~1.2A / msec (PSU 12.5-120)
   0.001A~0.76A / msec (PSU 20-76)
   0.001A~0.38A / msec (PSU 40-38)
   0.001A~0.25A / msec (PSU 60-25)

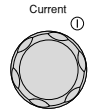
7. Press the Function key again to exit the configuration settings. The function key light will turn off.



8. Use the Voltage knob to set the voltage limit (crossover point).



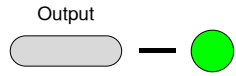
9. Use the Current knob to set the current.



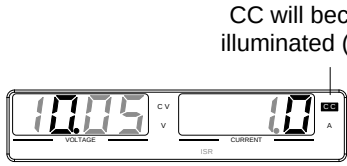
Note

Notice the Set key becomes illuminated when setting the current or voltage. If the voltage or current knobs are unresponsive, press the Set key first.

10. Press the Output key. The Output key becomes illuminated.



Example



Note

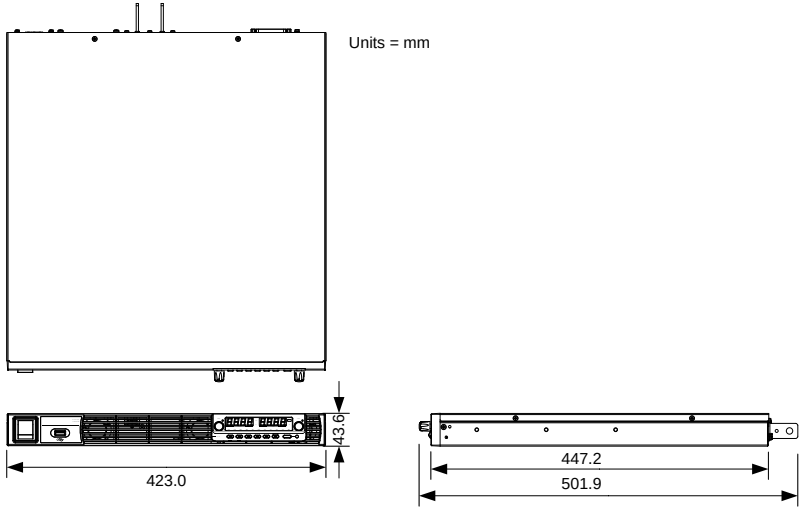
Only the current level can be altered when the output is on. The voltage level can only be changed by pressing the Set key.

For more information on the Normal Function Settings, see the user manual.

APPENDIX

PSU Dimensions

PSU 6-200, PSU 12.5-120, PSU 20-76, PSU 40-38, PSU 60-25



Declaration of Conformity

We

GOOD WILL INSTRUMENT CO., LTD.

declare that the below mentioned product

Type of Product: Programmable DC Power Supply
Model Number: PSU 6-200, PSU 12.5-120, PSU 20-76, PSU 40-38, PSU 60-25 are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (2014/30/EU), Low Voltage Directive (2014/35/EU), WEEE (2012/19/EU) and RoHS (2011/65/EU).
For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Directive, the following standards were applied:

◎ **EMC**	
EN 61326-1: EN 61326-2-1:	Electrical equipment for measurement, control and laboratory use -- EMC requirements (2013)
Conducted & Radiated Emission EN 55011: 2009+A1:2010	Electrical Fast Transients EN 61000-4-4: 2012
Current Harmonics EN 61000-3-2: 2006+A1: 2009+A2: 2009	Surge Immunity EN 61000-4-5: 2006
Voltage Fluctuations EN 61000-3-3: 2008	Conducted Susceptibility EN 61000-4-6: 2009
Electrostatic Discharge EN 61000-4-2: 2009	Power Frequency Magnetic Field EN 61000-4-8: 2010
Radiated Immunity EN 61000-4-3: 2006+A1:2008+A2:2010	Voltage Dip/ Interruption EN 61000-4-11: 2004
Low Voltage Equipment Directive 2014/35/EU	
Safety Requirements	EN 61010-1: 2010

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