Multi-output DC Power Supply

GPE-3060/GPE-6030

USER MANUAL

GW INSTEK PART NO. 82GP36030030I

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve products and reserves the rights to change specification, equipment, and maintenance procedures at any time without notice.

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SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow when operating the GPE series and when keeping it in storage. Read the following before any operation to insure your safety and to keep the best condition.

Safety Symbols

These safety symbols may appear in this manual.

 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 GPE series 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 Guidelines ⚠ CAUTION	• Do not place any heavy object on the device. • Avoid severe impacts or rough handling that leads to damaging the device. • Do not discharge static electricity to the device. • Do not block or obstruct the cooling fan vent opening. • Do not perform measurement at circuits directly connected to Mains (see note below). • Do not disassemble the device unless you are qualified as service personnel.
Power Supply ⚠ WARNING	• AC Input voltage: 100V/120V/220V/230VAC ±10%, 50/60Hz • Connect the protective grounding conductor of the AC power cord to an earth ground, to avoid electrical shock.
Fuse ⚠ WARNING	• Fuse type: 100V/120V: T12A/250V 220V/230V: T6.3A/250V • Make sure the correct type of fuse is installed before power up. • To ensure fire protection, replace the fuse only with the specified type and rating. • Disconnect the power cord before fuse replacement. • Make sure the cause of fuse blowout is fixed before fuse replacement.
Cleaning the device	• 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 or cleaners containing harsh products such as benzene, toluene, xylene, and acetone.

Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (note below) • Relative Humidity: < 80% • Altitude: < 2000m • Temperature: 0°C to 40°C
	(Pollution Degree) EN 61010-1:2010 specifies the pollution degrees and their requirements as follows. The GPE series 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 • Relative Humidity: < 70% • Temperature: −10°C to 70°C
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.

OVERVIEW

This chapter describes the GPE series in a nutshell, including its main features and front/rear panel introduction. After going through the overview, follow the Setup chapter (page 19) to properly power up and set operation environment.

Introduction

Overview	The GPE series regulated DC power supply series are adjustable, multifunctional work stations. It has three independent outputs: two with adjustable voltage/current levels and one with fixed level 5V. The series can be used for logic circuits where various output voltage or current are needed, and for tracking mode definition systems where plus and minus voltages with insignificant error are required.
Independent / Series Tracking / Parallel Tracking	The three output modes, independent, series tracking and parallel tracking can be selected through pressing the TRACKING key on the front panel. In the independent mode, the output voltage and current of each channel are controlled separately. In the tracking modes, both the CH1 and CH2 outputs are automatically connected in series or parallel. CH1 is master and CH2 is slave; no need to connect output leads. In the series mode, the output voltage is doubled; in the parallel mode, the output current is doubled. The isolation degree, from output terminal to chassis or from output terminal to output terminal, is 500V.

Constant Voltage/ Constant Current	Each output channel works in constant voltage (CV) or constant current (CC) mode. Even at the maximum output current, a fully rated, continuously adjustable output voltage is provided. For a big load, the power supply can be used as a CV source; while for a small load, a CC source. When in the CV mode (independent or tracking mode), output current (overload or short circuit) can be controlled via the front panel. When in the CC mode (independent mode only), the maximum (ceiling) output voltage can be controlled via the front panel. The power supply will automatically cross over from CV to CC operation when the output current reaches the target value. The power supply will automatically cross over from CC to CV when the output voltage reaches the target value. For more details about CV/CC mode operation, see page 18.
Automatic tracking mode	The front panel display (CH1, CH2) shows the output voltage or current. When operating in the tracking mode, the power supply will automatically connect to the auto- tracking mode. For more details about CH1/CH2 Series Tracking Mode, see page 30.

Series Lineup / Main Features

Main Features

Performance	• Low noise: Temperature controlled cooling fan
Operation	• Constant Voltage / Constant Current operation • Series Tracking / Parallel Tracking operation • Output On/Off control • Multi-output: Two channels V/I are adjustable, and one is fixed; • Function for locking the setting • Output voltage/ current setting view • Set the displayed digit resolution for the voltage & current output.
Protection	• Overload protection • Key misoperation protection (Lock) • Reverse polarity protection
Interface	• Remote control (Output ON/OFF)

Principle of Operation

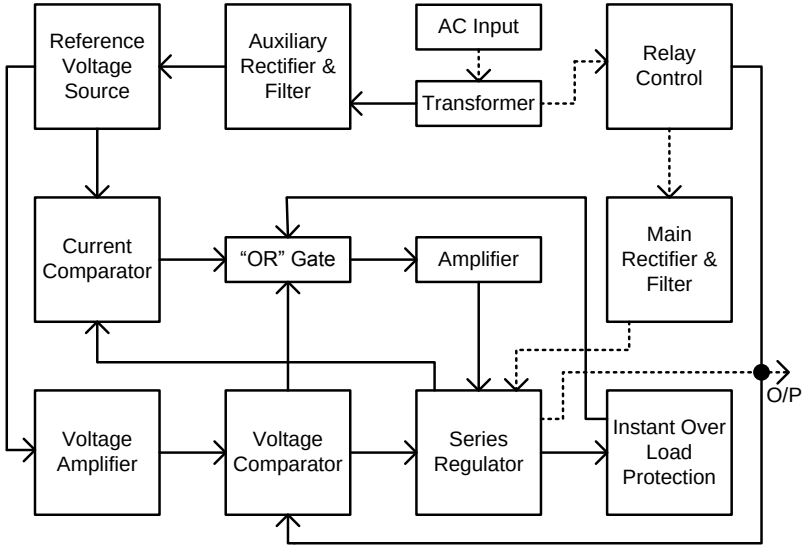
Overview

The power supply consists of the following.

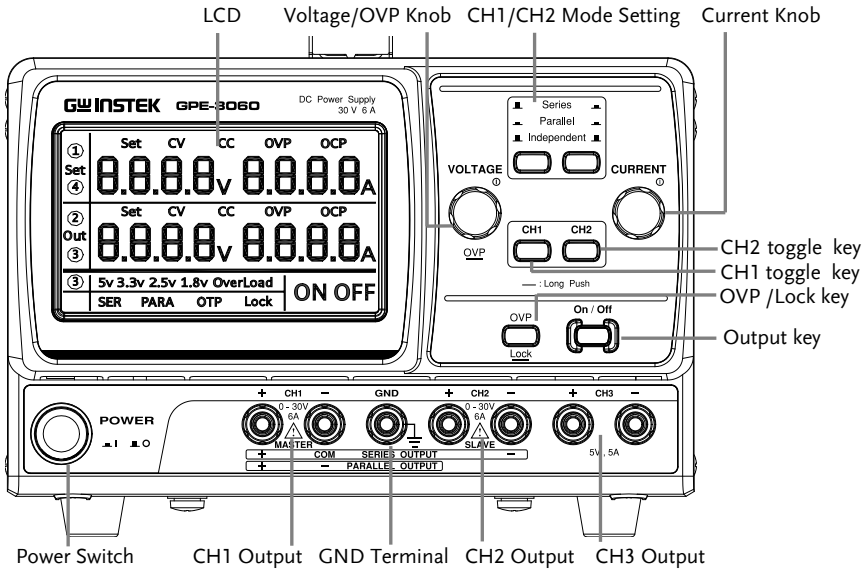
- AC input circuit
- Transformer
- Bias power supply including rectifier, filter, pre-regulator and reference voltage source.
- Main regulator circuit including the main rectifier and filter, series regulator, current comparator, voltage comparator, reference voltage amplifier, remote device and relay control circuit.

The block diagram below shows the CH1 circuit arrangement. The single phase input power is connected to the transformer through the input circuit. Details of each part are described in the next page.

Block diagram



Front Panel Overview



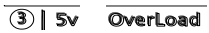
The figure above is the front view of the GPE-3060.

Display

CH1 parameter display area

CH2 parameter display area

CH3 parameter display area



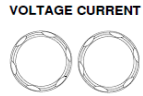
Status display area

Output status display	ON OFF	
Voltmeter	Displays output voltage of CH1/CH2 channel. 3 digits: 8.8.8V 4 digits: 8.8.8.8V CH3 display: 5V	
Ammeter	Displays output current of CH1/CH2 channel. 3 digits: 8.8.8A 4 digits: 8.8.8.8A	
CV/CC/OVP indicators for CH1/CH2	CV CC	You can view the constant current, constant voltage or OVP status for Channel (① ② icon appears on the leaf-hand side of the LCD display). You can view the CV/CC status of the corresponding channel, which is only valid when outputting ON and not displayed when outputting OFF. When OVP is enabled, it is displayed in white, and when it is not enabled, there is no display. After startup, the OVP font flashes.
View setting value	Set	When the channel output is OFF, it is displayed as the set value; When ON, it is displayed as the output value, when there is a set operation, it is displayed as the set value, and the status bar has a Set display..

Channel indicator	① ② ③	Indicates the currently selected channel.
Output status of CH3	OverLoad	When the output current is over range, the overloaded indicator OverLoad will be lit on the LCD display.

Control Panel

CH1/CH2 parameter setting



Voltage/Current：When rotate clockwise, the value increases, and rotate counterclockwise, the value decreases. Click on the Encode to enter the setting. Automatically confirm and exit the set state after stopping the operation for a few seconds.

OVP: Press and hold the Encode to enter the OVP setting. When rotating clockwise, the value increases, and rotating counterclockwise, the value decreases. Click the Encode to enter the setting. Automatically confirm and exit the set state after stopping the operation for a few seconds.

CH1/CH2 toggle

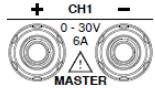
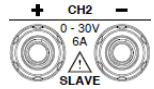
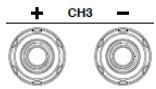
Click on the CH1 or CH2 button (there will be a flashing display of the corresponding channel number on the LCD) to set the voltage/current of this channel or view its readback value.

Parallel/Series Keys

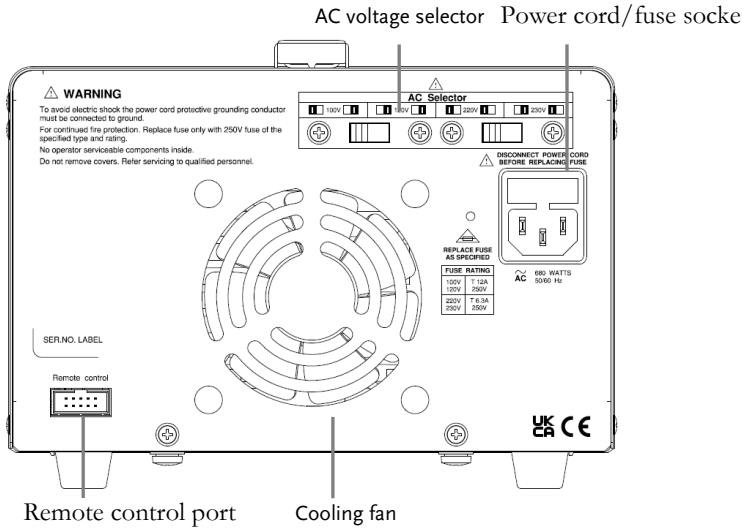
Activates parallel/series tracking operation. For details, see page 30. The corresponding channel will be displayed on the LCD display.

Enable/Disable OVP, Lock key		Click this button to enable and disable the OVP function, which can refer to the OVP icon display in the status bar; Long time is the Lock function, which can lock or unlock the panel buttons (except for serial and parallel operation and output key functions). The status bar displays Lock ,For more information, please refer to page 23.
Output Key		Turns the output on or off. For more details, see page 21.
Power Switch		Turns On or Off the main power. For the power up sequence, see page 19.

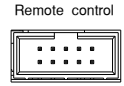
Terminals

GND Terminal		Accepts a grounding wire.
CH1 Output		Outputs CH1 voltage and current.
CH2 Output		Outputs CH2 voltage and current.
CH3 Output		Outputs CH3 voltage and current.

Rear Panel Overview

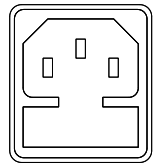


Remote Control Terminal



For more information about the remote control terminal, please see page 25.

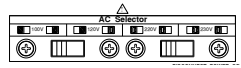
Power Cord / Fuse Socket



The power cord socket accepts the AC mains. For power up details, see page 19.

The fuse holder contains the AC mains fuse. For fuse replacement details, see page 37.

AC Selector

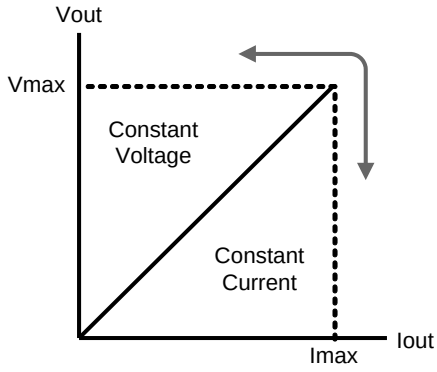


Selects AC input voltage: 100V/ 120V/ 220V/ 230V; 50/60Hz.

CV/CC Crossover Characteristics

Background	According to load condition, The GPE can automatically switch between constant voltage mode (CV) and constant current mode (CC).
CV mode	When the current level is smaller than the output setting, the GPE series operates in Constant Voltage mode. The CV indicator for the corresponding channel appears on the LCD. The Voltage level is kept at the setting and the Current level fluctuates according to the load condition until it reaches the output current setting.
CC mode	When the current level reaches the output setting, the GPE series starts operating in Constant Current mode. The CC indicator for the corresponding channel appears on the LCD. The Current level is kept at the setting but the Voltage level becomes lower than the setting, in order to suppress the output power level from overload. When the current level becomes lower than the setting, the GPE series goes back to the Constant Voltage mode.

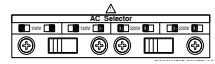
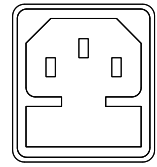
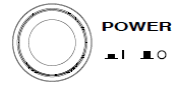
Diagram



SETUP

This chapter describes how to properly power up and configure the GPE series before operation.

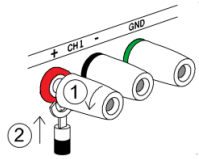
Power Up

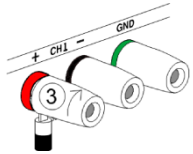
Select AC voltage	Before powering up the power supply, select the AC input voltage from the rear panel.	
Connect AC power cord	Connect the AC power cord to the rear panel socket.	
Power On	Press the power switch to turn on the power. The display will first display all the LCD segments before showing settings for each channel.	
Power Off	Press the power switch again to turn off the power.	

Load Cable Connection

Standard accessories

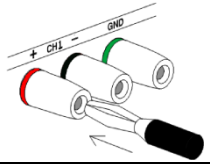
1. Turn the terminal counterclockwise and loosen the screw.
2. Insert the cable terminal.
3. Turn the terminal clockwise and tighten the screw.





Banana plug

Insert the plug into the socket.



Wire type

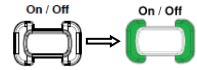
When using load cables other than the attached, make sure they have enough current capacity for minimizing cable loss and load line impedance. Voltage drop across a wire should not excess 0.5V. The following list is the wire current rating at 450A/cm^2.

Wire size (AWG)	Maximum current (A)
20	2.5
18	4
16	6
14	10
12	16

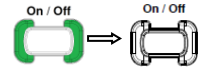
Output On/Off

Panel operation

Press the Output key to turn on all outputs in each channel. The ON icon will become lit on the LCD display.



Push the Output key again to turn off all outputs. The OFF icon will become lit on the LCD display.



Automatic output off

Any of the following actions during output on automatically turns it off.

- Change the operation mode between independent/series tracking/parallel tracking, three channels will be closed together.
- When a single channel OVP is started, the corresponding output will be closed. When CH1/CH2 is simultaneously OVP, three channels will be closed together.

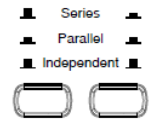
Select CH1/CH2 series or parallel mode

Background / Connection

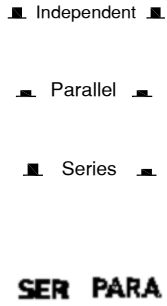
When you need to output a higher voltage or current through the GPE-2323/3323/4323 series can be connected in series or parallel to achieve it. When connecting in series, the output voltage is twice than that of a single channel. When connecting in parallel, the output current is twice than that of a single channel. For details, please see page 30 through to 34.

Panel operation

You can toggle the connection mode of CH1/ CH2 by using different combinations of the mode selection key.



- For the independent mode, the right key is not pressed
- Toggle to parallel mode when both keys are pressed.
- Right key is pressed and the left key is not pressed in series mode.
- When CH1 / CH2 is in the series or parallel mode, the corresponding series or parallel icon appears on the LCD display.



Setting Lock from Front Panel

Background / Connection

The lock function can be used when you need to keep the output constant to avoid the load from being damaged due to inadvertent operation.

Panel operation

Press the LOCK key (for more than 2 seconds) to lock the operation in the front panel. The Lock icon will become lit.

To unlock, press the LOCK key for more than 2 seconds. The Lock icon will then turn off.

Note

- The OUTPUT key is not affected by the lock operation.
- Series and parallel operation is not controlled by the locking key, It will unlock the lock function.

Set the output state at startup

Background / Connection

Through the following steps, you can set the output state at its next startup. There are two choices, ON and OFF available for selection.

Panel operation

1. Press and hold the Output key and turn on the power until the ON or OFF icon flashes on the LCD display.

2. Press the "OVP" key to select.

3. Press the "ON/OFF" key to confirm.

Note

By default the output is set to OFF at startup.

Selection voltage/current display digits

Background / Connection	It can set the displayed digit resolution for the voltage and current settings/readings to 3 or 4 digits at startup.
Panel operation	1. Press and hold the "OVP" key and turn the power until on the decimal point for the CH1 voltage flashes on the LCD display. 
	2. Press the “OVP” key to select the number of displayed digits. 
	3. Press the “ON/OFF” key to confirm the selection. 

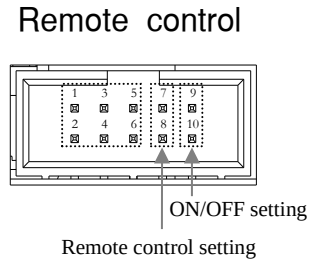
Note

By default the number of displayed digits is set to 3.

Remote Control Setting

Background / Connection

Through the "Remote Control" terminal, the GPE can turn the power on or off.



Panel operation

1. Short pins 7 and 8 (remote control setting). This will put the power state (ON/OFF) under remote control. At this moment, the **ON** or **OFF** icon flashes on the LCD display.

2. Output control :

- Pin 9 & 10 Open: ON state.
- Pin 9 & 10 Short: OFF state.

Warring

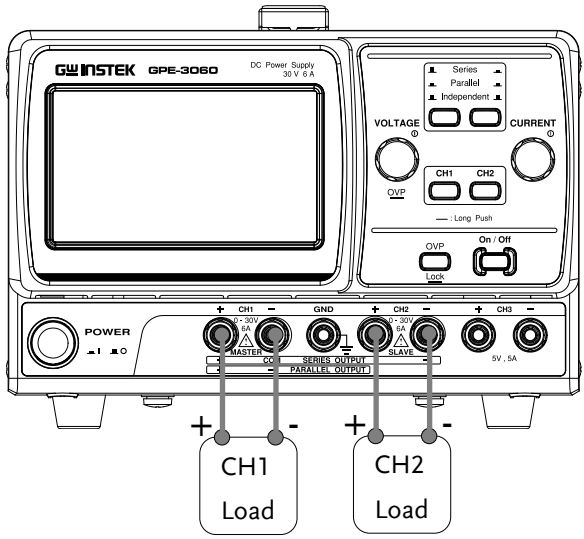
The remote control terminal can only be controlled by shorting (external relay or jumper shunt) /opening the pins. Voltage cannot be applied to the pins. It is strictly prohibited to short pins 5 & 7 or 6 & 8. Pin 1~6 must be set to open.

OPERATION

CH1/CH2 Independent Mode

Background / Connection

CH1 and CH2 outputs work independent of each other.



Output rating

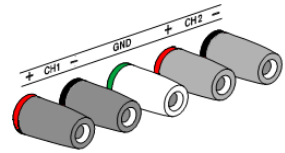
Please refer to the specification sheet.

Panel operation

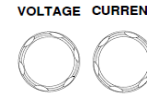
1. Make sure the Series/Parallel key is not activated (both the SER and PARA icons are off).

Independent

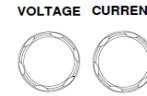
2. Connect the load to the front panel terminals, CH1 +/−, CH2 +/−.



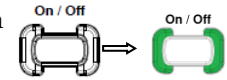
3. Use the voltage and current knob to set the CH1 output voltage and current.



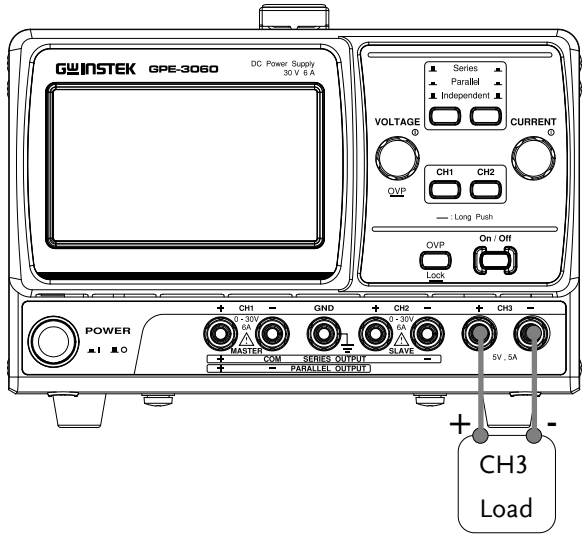
4. Use the voltage and current knob to set the CH2 output voltage and current.



5. Press the Output key to turn on the output. The Output key will be lit and the ON icon will appear on the LCD display. The CV or CC icon appears on the LCD to indicate the output status for each channel.



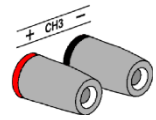
CH3 Independent Mode



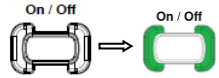
Output rating	Please refer to the specification sheet.
No Series/Parallel Tracking	CH3 doesn't have series/parallel tracking mode. Also, the CH3 output is not affected by the CH1 and CH2 modes.

Panel operation

1. Connect the load to the front panel CH3 +/− terminal.



2. Press the Output key to turn on the output. The Output key will be lit.



OVERLOAD	When the output current value is too high, the OverLoad icon appears on the LCD display and CH3 operation mode switches from constant voltage to constant current.	OverLoad

CH1/CH2 Series Tracking Mode

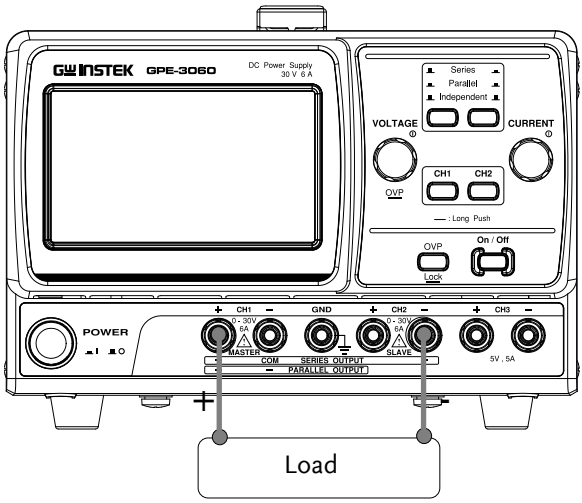
Background

Series tracking operation allows the GPE to combine the output by internally connecting CH1 (Master) and CH2 (Slave) in series. CH1 (Master) controls the combined output voltage/current level which is set independently.

The following describes two types of configurations, depending on how common ground is used.

Series Tracking without Common Terminal

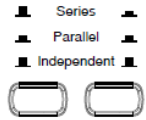
Connection



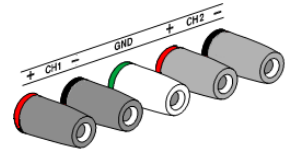
Output rating

Please refer to the specification sheet

1. Press the Series/Parallel key to activate the series tracking mode. The SER icon will be lit on the LCD display.

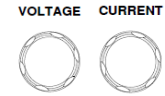


2. Connect the load to the front panel terminals, CH1+ & CH2− (Single supply).

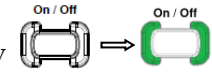


3. Use the current knob to set the CH2 output current to the maximum level.

4. Use the voltage and current knob to set the CH1 output voltage and current level.



5. Press the Output key to turn on the output. The Output key will be lit.

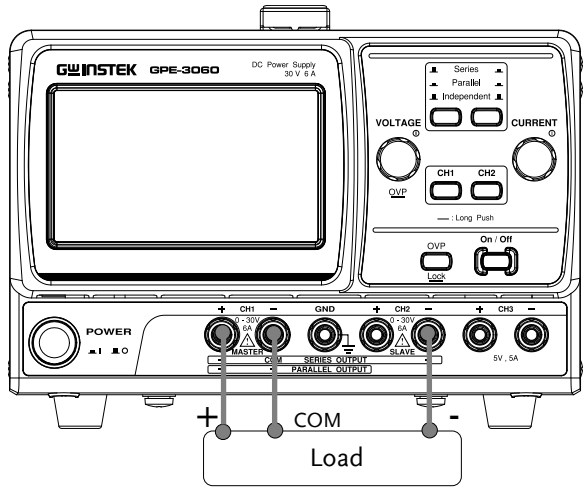


6. Refer to the CH1 (Master) meter and indicators for the output level and CV/CC status.

Output voltage level	Double the reading on the CH1 voltage meter.
Output current level	CH1 meter reading shows the output current.

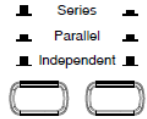
Series Tracking with Common Terminal

Connection

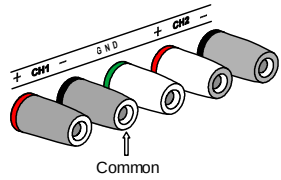


Output rating	CH1+ ~ COM ~ CH2- , Please refer to the specification sheet.

1. Press the Series/Parallel key to activate the series tracking mode. The SER icon will be lit on the LCD display.



2. Connect the load to the front panel terminals, CH1+ & CH2−. Use the CH1 (−) terminal as the common line connection.

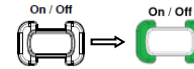


3. Use the CH1 voltage knob to set the master & slave output voltage (the same level for both channels).

4. Use the CH1 current knob to set the master output current.

5. Use the CH2 current knob to set the slave output current.

6. Press the Output key to turn on the output. The Output key will be lit.



7. Refer to the CH1 (Master) meter and indicators for the output level and CV/CC status.

CH1 (Master) voltage level	CH1 meter reading shows the output voltage.
CH1 (Master) current level	CH1 meter reading shows the output current.

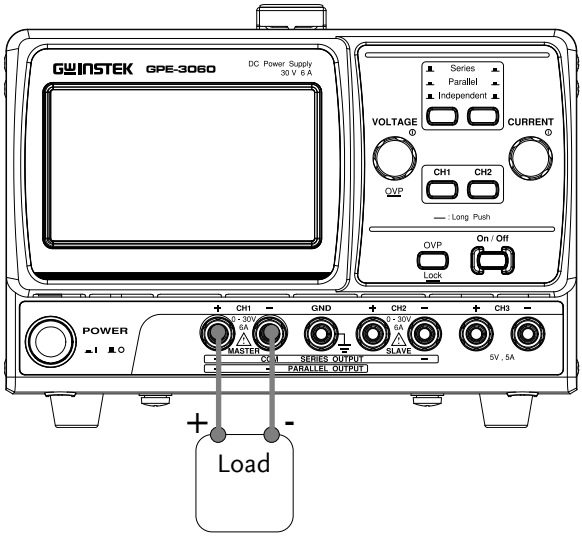
8. Refer to the CH1/CH2 meter and CH2 indicators for the output level and CV/CC status.

CH2 (Slave) voltage level	The CH2 meter reading shows the output voltage.
CH2 (Slave) current level	The CH2 meter reading shows the output current.

CH1/CH2 Parallel Tracking Mode

Background / Connection

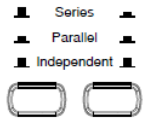
Parallel tracking operation allows the GPE to combine the output by internally connecting CH1 (Master) and CH2 (Slave) in parallel. CH1 (Master) controls the combined output voltage/current level.



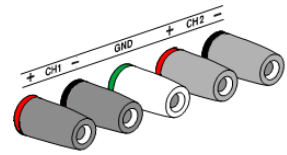
Output rating

Please refer to the specification sheet

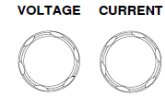
1. Press the Series/Parallel key to activate the parallel tracking mode. The **PARA** icon will be lit on the LCD display.



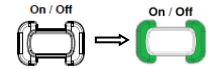
2. Connect the load to the CH1 +/− terminals.



3. Use the CH1 voltage and current knobs to set the output voltage and current. CH2 control function is disabled.



4. Press the Output key to turn on the output. The Output key will be lit.



5. The operating mode of CH2 will appear as the CC icon on the LCD display.

6. Refer to the CH1 meter and indicator for the output level and CV/CC status.

Output voltage level	The CH1 meter reading shows the output voltage.
Output current level	Double the amount of CH1 current meter reading.

FAQ

Q1. I pressed the panel lock key but the output still turns on/off.

A1. For safety reasons the output key is not affected by the panel key lock feature.

Q2. The CH3 overload indicator turned on – is this an error?

A2. No, it simply means that the CH3 output current reached the maximum 5.2A and the operation mode turned from CV (constant voltage) to CC (constant current). You can continue using the power supply, although reducing the output load is recommended.

Q3. The specifications do not match the real accuracies.

A3. Make sure that the power supply is powered on for at least 30 minutes, within +20°C ~ +30°C.

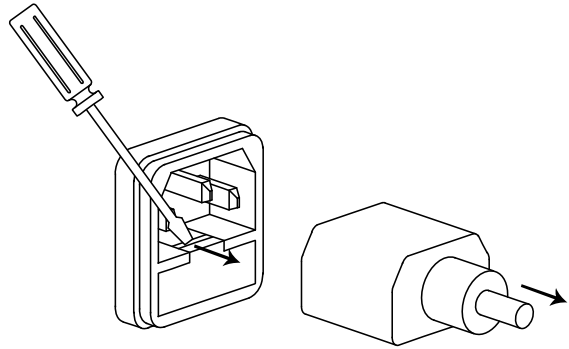
For more information, contact your local dealer or GWInstek at www.gwinstek.com.tw / marketing@goodwill.com.tw

APPENDIX

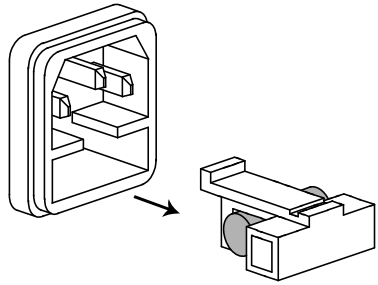
Fuse Replacement

Steps

1. Take off the power cord and remove the fuse socket using a minus driver.



2. Replace the fuse in the holder.



Rating

- 100V/120V:T12A/250V
- 220V/230V:T6.3A/250V

Specifications

The specifications apply when the GPE are powered on for at least 30 minutes under +20°C – +30°C.

CH1/ CH2	Independent	0 ~ 30V , 0 ~ 6A (GPE-3060) 0 ~ 60V , 0 ~ 3A (GPE-6030)
Output Ratings	Series	0 ~ 60V , 0 ~ 6A (GPE-3060) 0 ~ 120V , 0 ~ 3A (GPE-6030)
	Parallel	0 ~ 30V , 0 ~ 12A (GPE-3060) 0 ~ 60V , 0 ~ 6A (GPE-6030)
Voltage Regulation	Line Regulation	≤ 0.01% + 3mV
	Load Regulation	≤ 0.01% + 5mV ≤ 0.02% + 5mV (≥ 10A)
	Ripple & Noise	≤ 1mVrms (5Hz ~ 1MHz)
	Recovery Time	≤ 100μs (50% load change, minimum load 0.5A)
	Temperature Coefficient	≤ 300ppm/°C
Current Regulation	Line Regulation	≤ 0.1% + 3mA
	Load Regulation	≤ 0.1% + 3mA
	Ripple & Noise	≤ 2mArms
OVP	Range	OFF,ON(1V～35V) (GPE-3060) OFF,ON(1V～65V) (GPE-6030)
	Resolution	1V
	Accuracy	≤±1V
Tracking Operation	Output tracking Error	≤0.1%+10mV of Master(GPE-3060) ≤0.2%+20mV of Master(GPE-6030) (No Load, with load add load regulation ≤200mV)
	Parallel Regulation	Line: ≤ 0.01% + 3mV Load: ≤ 0.01% + 5mV ≤ 0.02% + 5mV (≥ 10A) Ripple & Noise: ≤2mVrms (5Hz~1MHz)
	Series Regulation	Line: ≤ 0.01% + 5mV Load: ≤ 200mV Ripple & Noise: ≤2mVrms (5Hz~1MHz)

Meter Display	LCD	4.3" single color LCD
	Setting/Read back Resolution	Voltage(4digits): 10mV (GPE-3060) / 20mV (GPE-6030) Current(4digits): 2mA (GPE-3060) / 1mA (GPE-6030)
	Setting/ Read back Accuracy	Voltage: ±(0.1% of reading+30mV) (4digits) ±(0.1% of reading+200mV) (3digits) Current: ±(0.3% of reading+10mA) (4digits) ±(0.3% of reading+20mA) (3digits)
CH3 Output	Voltage	5V ±5%
	Current	5A
	Line Regulation	≤ 3mV
	Load Regulation	≤ 5mV
	Ripple & Noise	≤ 1mVrms (5Hz ~ 1MHz)
	Recovery Time	≤ 100μs
	OVP	5.5V
Insulation	Chassis and Terminal	20MΩ or above (DC 500V)
	Chassis and AC cord	30MΩ or above (DC 500V)
Operation Environment	Indoor use, Altitude: ≤ 2000m Ambient temperature: 0 ~ 40°C Relative humidity: ≤ 80% Installation category: II Pollution degree: 2	
Storage Environment	Ambient temperature: -10 ~ 70°C Relative humidity: ≤ 70%	
Power Source	AC 100V/120V/220V/230V±10%, 50/60Hz	
consumption	900VA, 680W	
Accessories	Quick Start manual x1 Test lead: Non-European: GTL-104A x3 Test lead: European: GTL-204A x 3 , GTL-201A x1	
Dimensions	210 (W) x 155 (H) x 360 (D) mm	
Weight	Approx. 10kg	

Declaration of Conformity

We
GOOD WILL INSTRUMENT CO., LTD.
declare that the CE marking mentioned product
satisfies all the technical relations application to the product within the scope of council:
Directive: EMC; LVD; WEEE; RoHS
The product is in conformity with the following standards or other normative documents:

◎ **EMC**

EN 61326-1 :	Electrical equipment for measurement, control and laboratory use — EMC requirements
Conducted & Radiated Emission EN 55011 / EN 55032	Electrical Fast Transients EN 61000-4-4
Current Harmonics EN 61000-3-2 / EN 61000-3-12	Surge Immunity EN 61000-4-5
Voltage Fluctuations EN 61000-3-3 / EN 61000-3-11	Conducted Susceptibility EN 61000-4-6
Electrostatic Discharge EN 61000-4-2	Power Frequency Magnetic Field EN 61000-4-8
Radiated Immunity EN 61000-4-3	Voltage Dip/ Interruption EN 61000-4-11 / EN 61000-4-34

◎**Safety**

EN 61010-1 :	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

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