BENCHTOP INSTRUMENT

CREATIVE

S.M.CREATIVE
ELECTRONICS LIMITED

Triple Output Digital Power Supply
Model No.: SMC-3303X

Operation Manual

SAFEFY INSTRUCTION

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

Safety Symbols

The following safety symbols may appear in this manual or on the instrument:

⚠	**WARNING**	Identifies conditions or practices that could result in injury or loss of life.
⚠	**CAUTION**	Identifies conditions or practices that could result in damage to the instrument or to other properties.
⚡	**DANGER**	High voltage
⚠	**ATTENTION**	Refer to the manual
⏚		Protective conductor terminal
⏚		Earth (ground) terminal

Safety Guidelines

⚠ **CAUTION**	- Before plugging into local AC mains, check and make sure that the output voltage is compatible to the load. (It is suggested to disconnect a load before plugging into local AC mains. - Do not use this instrument near water. - Do not operate or touch this instrument with wet hands. - Do not open the casing of the instrument when it is connected to AC mains. - The max.output voltage of the instrument may be over 60VDC, avoid touch the metal contact part of the output terminals. - Do not use the instrument in an atmosphere which contains sulfuric acid mist or other substances which cause corrosion to metal. - Do not use the instrument in a dusty place or a highly humid place as such will cause instrument reliability degradation and instrument failures. - Install the instrument in a place where is free from vibration. - Install the instrument in a place where the ambient temperature is in range of -10~70℃. Note that the instrument operation may become unstable if it is operated in an ambient temperature exceeding the range of 0~40℃
Power supply ⚠ **WARNING**	AC Input voltage: 110V/220V ±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: 110V: T6.3A /250V, 220V: T3.15A/250V. - Make sure the correct type of fuse is installed before power up. - Replace the AC fuse with the same type and rating as the original fuse. - Disconnect the power cord before fuse replacement. - Make sure the cause of fuse blowout is fixed before fuse replacement.

1. OVERVIEW

This chapter describes the instrument in a nutshell, including its main features and front /rear panel introduction. After going through the overview, follow the SETUP chapter to properly power up and set operation environment.

1.1 Operation and Storage Environment

Operation Environment

Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (note below)

Relative Humidity: < 80%

Altitude: < 2000m

Temperature: 0° to 40°

Storage Environment

Location: Indoor

Relative Humidity: < 70%

Temperature: -10° to 70°

1.2 Introduction

This series of regulated programmable DC power supply are light weight, adjustable, multifunctional work stations. They have three independent outputs: two with adjustable voltage level and one with fixed level selectable from 2.5V, 3.3V and 5V. The power supply can be used for logic circuits where various output voltage or current are needed, and for tracking mode definition systems where positive and negative voltages with good accuracy are required.

Independent /Tracking Series /Tracking Parallel

The three output modes of the power supply - independent, tracking series, and tracking parallel - can be selected by pressing the TRACKING key on the front panel. In the independent mode, the output voltage and current of each channel are controlled separately. The isolation degree, from output terminal to chassis or from output terminal to output terminal, is 300V. In the tracking modes, both the CH1 and CH2 outputs are automatically connected in series or parallel; no need to connect output leads. In the series mode, the output voltage is doubled; in the parallel mode, the output current is doubled.

Constant Voltage/Constant Current

Except for CH3, each output channel is completely transistorized and well-regulated, and 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 page8.

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.

Main Features

Performance	➢ Low ripple & noise, intelligent cooling fan
	➢ Compact design, light weight

Operation	➢ Constant voltage/constant current operation
	➢ Tracking series/tracking parallel operation
	➢ Output ON/OFF control
	➢ 3 outputs:30V/3A×2, 2.5V/3.3V/5V/3A×1
	➢ Digital panel control
	➢ Panel lock function
	➢ 4 programming presets for voltage and current save/recall
	➢ Coarse and fine control for voltage and current
	➢ Software calibration
	➢ Beeper output
	➢ Voltage and current limit preset

Protection	➢ Over load, over temperature protections
	➢ Reverse polarity protection

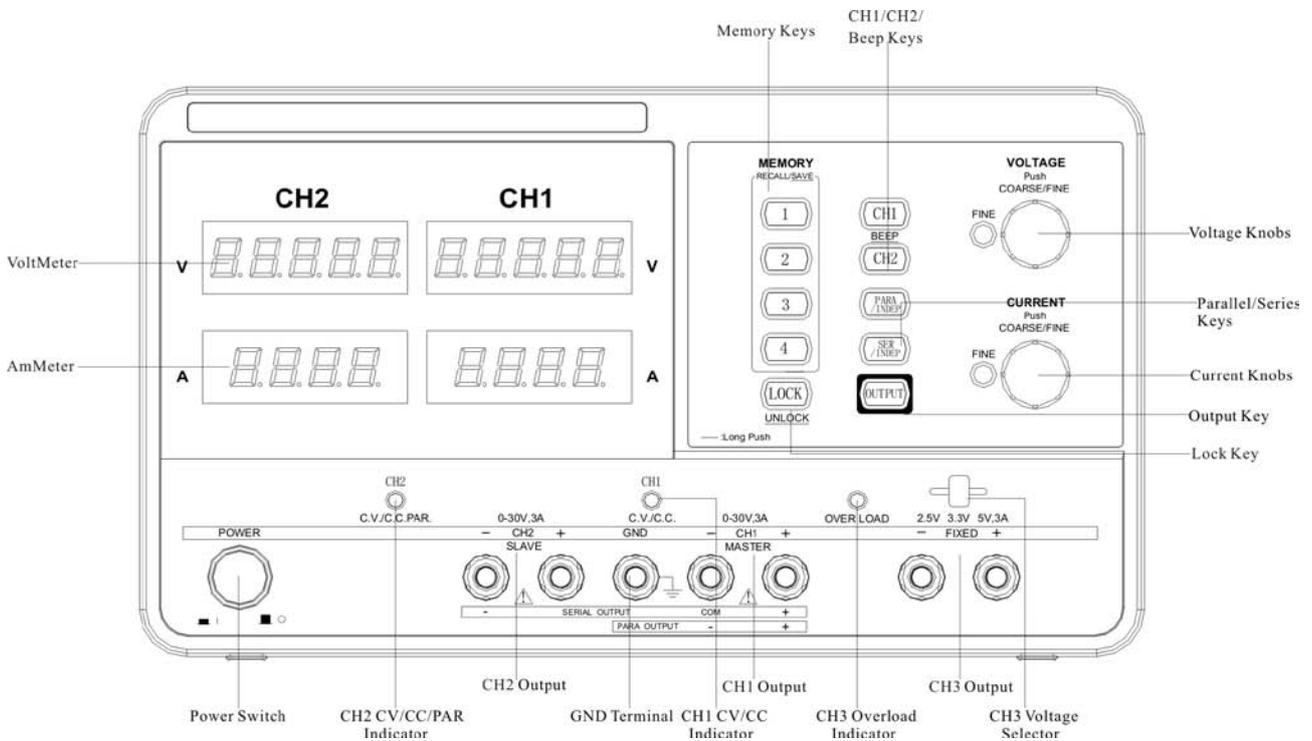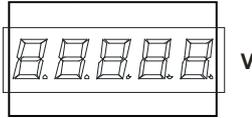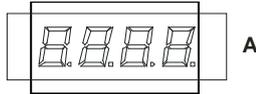|	
Interface	➢ USB interface for remote PC control

1.5 Front Panel Overview

Fig.1.5-1 Front panel

Display

Voltmeter	Displays CH1 or CH2 output voltage

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| | V |

Ammeter	Display CH1 or CH2 output current

| | A |

Control Panel

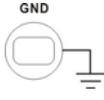| Memory keys	MEMORY SAVE 1 2 3 4	Saves or recalls panel settings. Max.4 sets for programming preset. Refer to page 17 for details.
CH1/CH2 beep keys	CH1 BEEP CH2	Selects the output channel for level adjustment. Refer to page 11 for level setting details Pressing and holding CH2 key enables beep sound. Refer to page 10 for details.
Parallel/Series keys	PARA /INDEP SER /INDEP	Activates Tracking Parallel operation or Tracking Series operation. Refer to page 12 for details.
Lock key	LOCK UNLOCK	Locks or unlocks the front panel settings. Refer to page 10 for details.
Output key	OUTPUT	Turns the output on or off.
Voltage knobs	VOLTAGE FINE	Adjusts the output voltage level for CH1 or CH2. Pressing the knob switches for coarse and fine level setting. When in fine adjustment, the FINE indicator lights on.
Current knobs	CURRENT FINE	Adjusts the output current level for CH1 or CH2. Pressing the knob switches coarse and fine level setting. When in fine adjustment, the FINE indicator lights on.

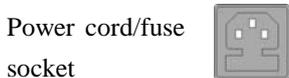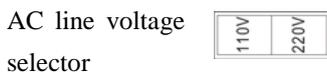| Terminals		
Power switch	POWER	Turns on ▬ or off ▬ the main power. Refer to page 9 for power up sequence.
GND terminal	GND	Accepts a grounding wire.
CH1 output	CH1 MASTER − +	Outputs CH1 voltage and current.
CH1 CV/CC indicator	CH1 C.V./C.C	Indicates CH1 constant voltage or constant current operation mode.
CH2 output	CH2 SLAVE − +	Outputs CH2 voltage and current.
CH2 CV/CC/ PAR indicator	CH2 C.V./C.C.PAR	Indicates CH2 constant voltage, constant current or tracking parallel operation mode.
CH3 output	FIXED − +	Outputs CH3 voltage and current.
CH3 overload Indicator	OVER LOAD	Indicates when CH3 output current is overloaded.
CH3 voltage Selector	2.5V 3.3V 5V, 3A	Selects CH3 output voltage from 2.5V, 3.3V, 5V.

1.6 Rear Panel Overview
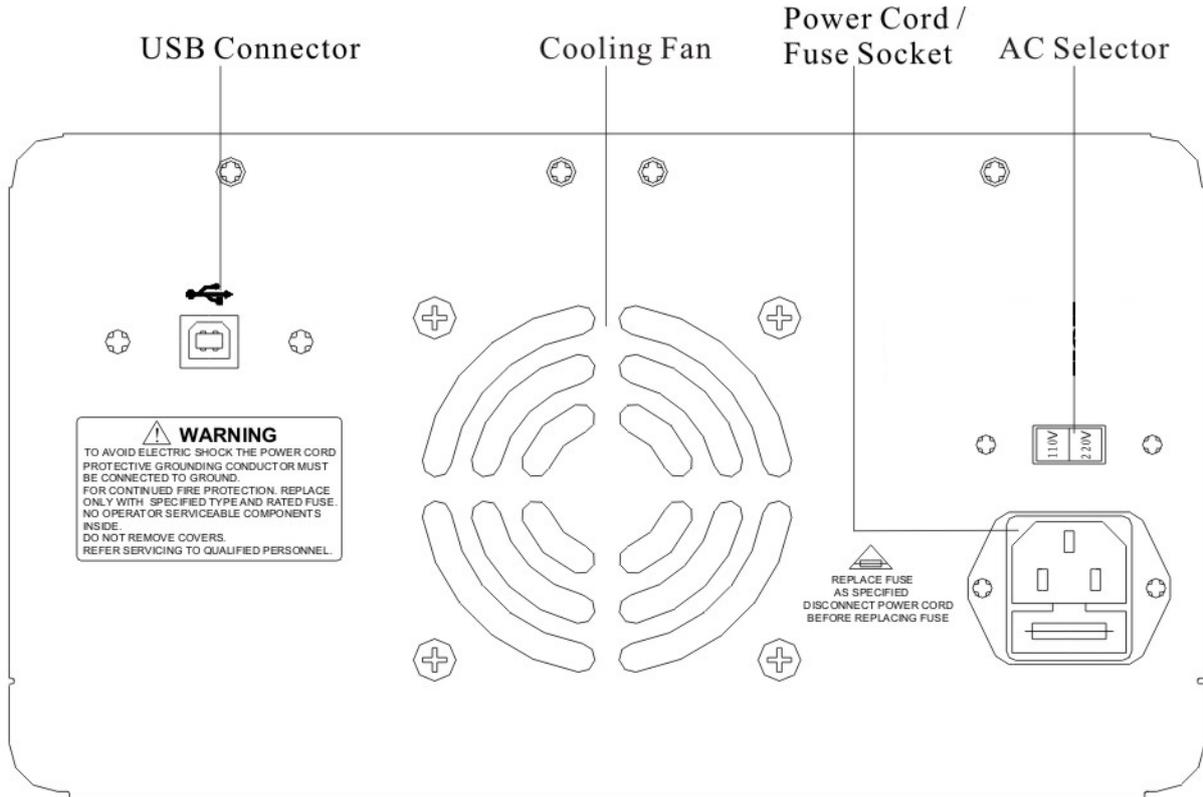
Fig.1.6-1 Rear panel of models with USB interface
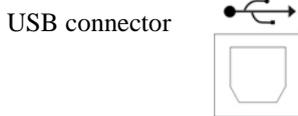
|		
USB connector		Accepts a USB slave connector for command-based remote control (page 18). For models with USB interface.
Power cord/fuse socket		The power cord socket accepts the AC mains. Refer to page 9 for power up details. The fuse holder contains the AC main fuse. Refer to page 23 for details of fuse replacement.
AC line voltage selector		Selects AC line voltage from 110V/220V.

1.7 CV/CC Crossover Characteristics

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Background	The instrument automatically switches between constant voltage mode (CV) and constant current mode (CC), according to load condition.
CV mode	When the current level is smaller than the output setting, the instrument operates in Constant Voltage mode. The indicator on the front panel turns green (C.V.) 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 instrument starts operating in Constant Current mode. The indicator on the front panel turns red (C.C.) 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 instrument goes back to the Constant Voltage mode.
Diagram	
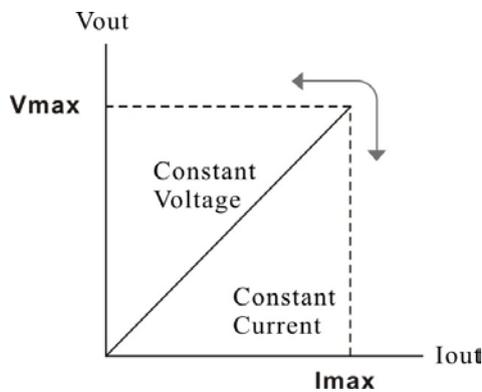
2. SETUP

This chapter describes how to properly power up and configure the power supply series before operation.
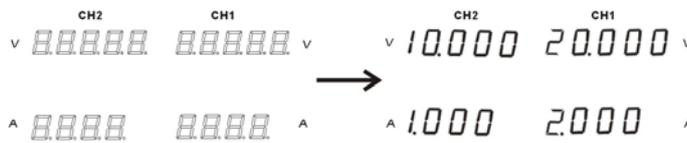
2.1 Power Up

Select AC line voltage	Before powering up the power supply, select the AC input voltage from the rear panel.
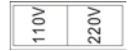
Connect AC power cord	Connect the AC power cord to the rear panel socket.

Power on	Press the power switch to turn on the power. The display shows the initialization screen, followed by the last recalled settings.

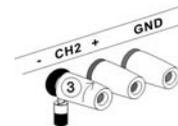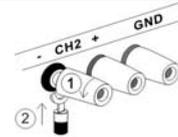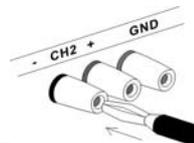|	
Power off	Press the power switch again to turn off the power.

2.2 Load Cable Connection

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

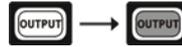|	
Banana plug	Insert the plug into the socket.

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)	Max. current (A)
20	2.5
18	4
16	6
14	10
12	16

2.3 Output ON/OFF

Panel operation	Pressing the Output key turns on all CH 1/2/3 outputs. [OUTPUT] → [OUTPUT] The key LED also turns on. Pressing the Output key again turns off the output and the key LED.
Automatic output off	Any of the following actions during output on automatically turns it off. They might involve sudden and harmful change in the output level. ➢ Change the operation mode between independent / tracking series / tracking parallel ➢ Recalling other setups from the memory ➢ Storing the setup into the memory

2.4 Beep ON/OFF

Panel operation	By default, the beeper sound is enabled. To turn off the beep, press the beep key [BEEP CH2] for 2 seconds. A beep sound comes out and the beeper setting will be turned off. To enable the beeper, press the beep key again for 2 seconds.
List of beeper	The following operations go with a beep sound when the beeper setting is on.

Power on	Output on/off
INDEP – SER – PAR mode switching	Panel lock/unlock
Setup save/recall	CH1/CH2 output level knob
Voltage/current knob, fine/coarse knob	Voltage/current level reaching minimum (zero) level

2.5 Front Panel Lock

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Panel operation	Press the LOCK key to lock the front panel key operation. The key LED turns on. To unlock, press the LOCK key for 2 seconds. The key LED also turns off. [LOCK UNLOCK] → [LOCK UNLOCK]
Note	The OUTPUT key is not affected by the lock operation. [OUTPUT]

3. OPERATION

3.1 CH1/CH2 Independent Mode

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Background/ Connection	CH1 and CH2 outputs work independent of each other and are separately controlled.
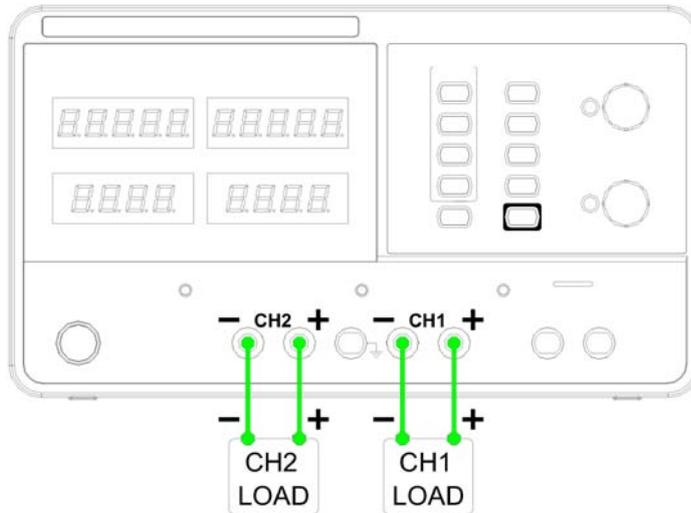
Output rating	0~30V/0~3A for each channel (I≤3A)
	0~30V/0~5A for each channel (I>3A)

Panel operation	1. Make sure the PARA INDEP and SERIES INDEP keys are turned off (the key LEDs are off)
	2. Connect the load to the front panel terminals, CH1 +/-, CH2 +/-.
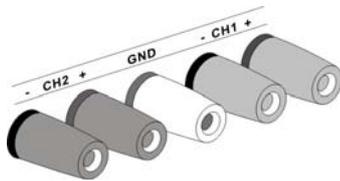
3. Set the CH1 output voltage and current. Press the CH1 switch (LED turns on) and use the Voltage and Current knob. By default, the Voltage and Current knob work in   the coarse mode. To activate the fine mode, press the knob and turn on the FINE LED.
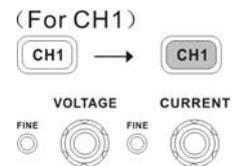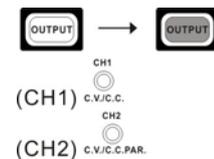
Coarse: 0.1V or 0.1A @ rotation click.
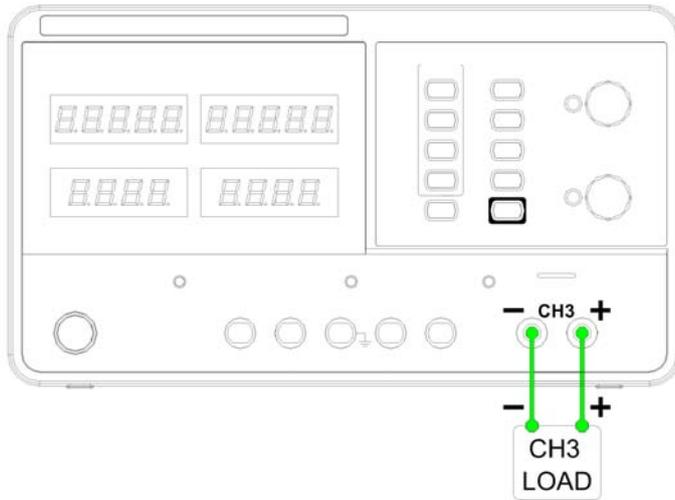Fine: the smallest digit @ rotation click.

4. Repeat the above settings for CH2 channel.

5. To turn on the output, press the output key. The key LED turns on and the CH1 /CH2 indicator shows the output mode, CV or CC.
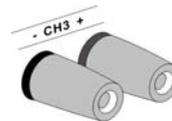
3.2 CH3 Independent Mode

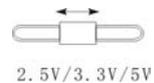|	
Background/ Connection	The CH3 rating is 2.5V/3.3V/5V, maximum 3A. It works independently from CH1 and CH2, regardless of their modes.

Output rating	Fixed 2.5V/3.3V/5V, 3A

No tracking Series/Parallel mode	CH3 does not have tracking series/parallel mode. Also, CH3 output is not affected by CH1 and 2 modes.

Panel operation	1. Connect the load to the front panel CH3 +/- terminal.
	2. Select the output voltage from 2.5V, 3.3V and 5V, using the CH3 voltage selector switch.
	3. To turn on the output, press the output key. The key LED turns on.

|	
CC to CV	When the output Current level exceeds 3A, the overload indicator turns red and CH3 operation mode switches from Constant Voltage to Constant Current.
	Note: "overload" in this case does not mean an abnormal operation.

3.3 CH1/CH2 Tracking Series Mode

|	
Background	Tracking series operation doubles the Voltage capacity of the power supply series by internally connecting CH1 (Master) and CH2 (Slave) in series and combining the output to a single channel. CH1 (Master) controls the combined Voltage output level.
	The following describes two types of configurations depending on the common ground usage.

Tracking series without common terminal

Connection
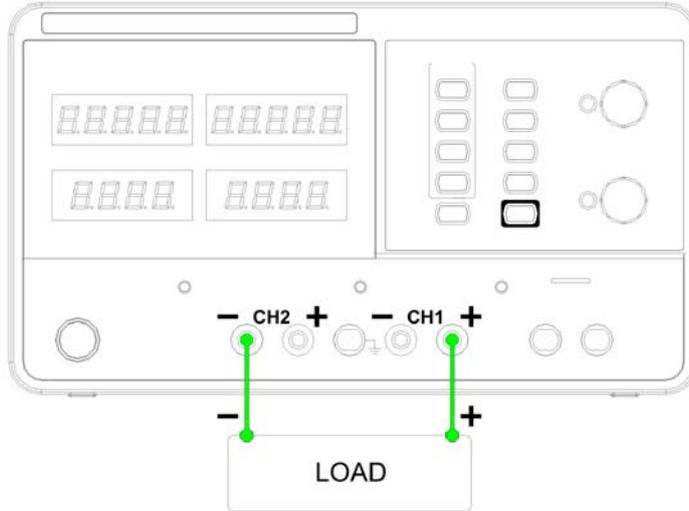
Output rating   0~60V/0~3A (I≤3A)

0~60V/0~5A (I>3A)

Panel operation   1.   Press the SER/INDEP key to activate the tracking series mode.   [SER/INDEP] → [SER/INDEP]
The key LED turns on.

2.   Connect the load to the front panel terminals, CH1+ & CH2-. (Single supply).
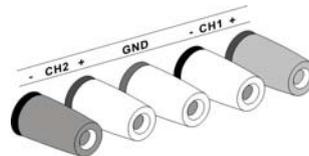
3.   Press the CH2 switch (LED turns on) and use the Current knob to set   [CH2] → [CH2]
the CH2 output current to the maximum level. By default, the
Voltage and Current knob work in the coarse mode. To activate the
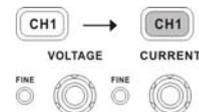fine mode, press the knob and turn on the FINE LED.
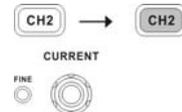
(Fine control)

Coarse: 0.1V or 0.1A @ rotation click.
Fine: the smallest digit @ rotation click.

4.   Press the CH1 switch (LED turns on) and use the Voltage and   [CH1] → [CH1]
Current knob to set the output voltage and current level.

5.   To turn on the output, press the output key. The key LED turns on.   [OUTPUT] → [OUTPUT]

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

Voltage level	Double the reading on the CH1 Voltage meter. In the above case, the actual output is 20.0 x 2= 40.0V.

Current level	CH1 meter reading shows the output Current. In the above case, 2.000A. (CH2 Current control must be in the Maximum position=3.0A(I≤3A) or 5.0A(I>3A)).

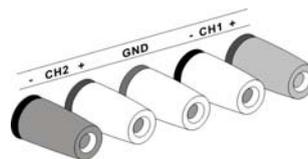## Tracking series with common terminal

Connection	
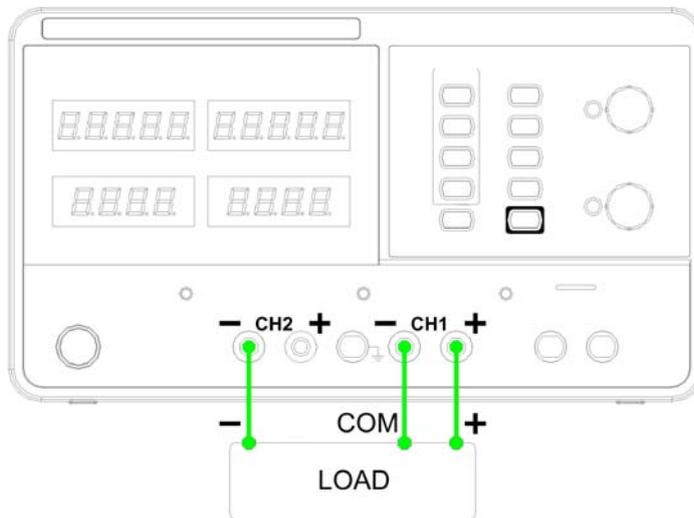
Output rating	0~30V/0~3A for CH1~COM (I≤3A) 0~30V/0~5A for CH1~COM (I>3A)
	0~-30V/0~3A for CH2~COM (I≤3A) 0~-30V/0~5A for CH2~COM (I>3A)

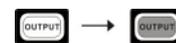| Panel operation	1. Press the SER/INDEP key to activate the tracking series mode. The key LED turns on.
	2. Connect the load to the front panel terminals, CH1+/- & CH2-. Use the CH1 (-) terminal as the common line connection.
	3. Press the CH1 switch (LED turns on) and use the Voltage knob to set the master & slave output voltage (the same level for both channels). By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the knob and turn on the FINE LED.
	Coarse: 0.1V or 0.1A @ rotation click.
	Fine: the smallest digit @ rotation click.
	4. Use the current knob to set the master output current.
	5. To turn on the output, press the output key. The key LED turns on.
	6. For the master (CH1) output level and CV/CC status, refer to the CH1 meter and indicator.

Master (CH1) voltage level: CH1 meter reading shows the output voltage. In the above case, 20.0V.

Master (CH1) current level: CH1 meter reading shows the output current. In the above case, 2.000A.

7. Press the CH2 switch (LED turns on) and use the Current knob to set the slave output current.
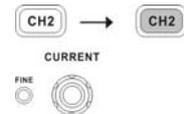
8. For the slave (CH2) output level and CV/CC status, refer to the CH1/2 meter and CH2 indicator.


Slave (CH1) voltage level: CH1 meter reading shows the output voltage. In the above case, 20.0V.

Slave (CH1) current level: CH1 meter reading shows the output current. In the above case, 2.000A.

3.4 CH1/CH2 Tracking Parallel Mode

| Background/ connection	Tracking parallel operation doubles the current capacity of the power supply series by internally connecting CH1 and CH2 in parallel and combining the output to a single channel. CH1 controls the combined output.
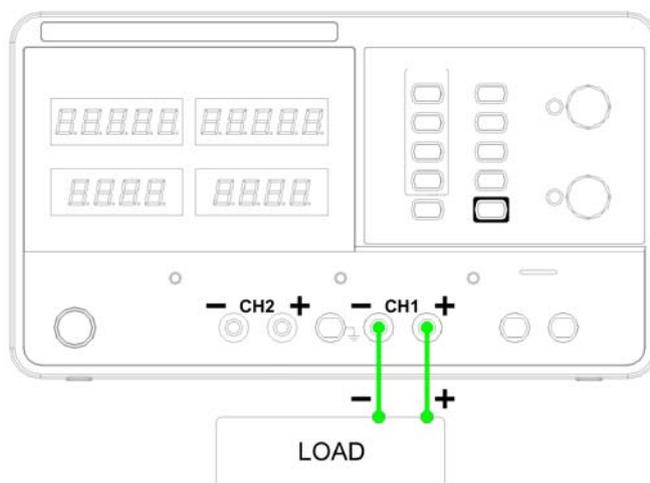
Output rating	0~30V/0~6A (I≤3A)
	0~30V/0~10A (I>3A)
Panel operation	1. Press the PAR/INDEP key to activate the tracking parallel mode.

The key LED turns on.

2. Connect the load to the CH1 +/- terminals.
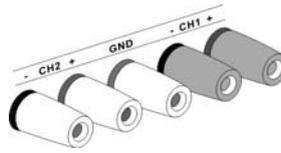
3. To turn on the output, press the output key. The key LED turns on.

4. The CH2 indicator turns red, indicating tracking parallel (PAR) mode.

5. Press the CH1 switch (LED turns on) and use the Voltage and Current knob to set the output voltage and current. The CH2 output control is disabled. By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the knob and turn on the FINE LED.
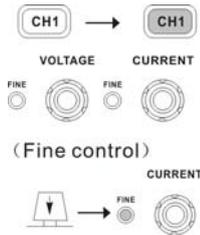
6. For the output level and CV/CC status, refer to the CH1 meter and indicator.

Voltage level: The CH1 meter reading shows the output voltage. In the above case, 20.0V.

Current level: Double the amount of CH1 current meter reading. In the above case,

2.0A x 2 = 4.0A.

4. SAVE/RECALL SETUP
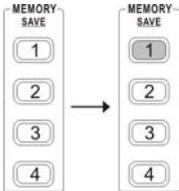
4.1 Save Setup

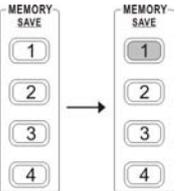|	
Background	The front panel settings can be stored into one of the four internal memories.
Programming contents	The following list shows the programming setting contents: ➢ Independent / tracking series / tracking parallel mode ➢ CH1/CH2 knob selection ➢ Fine/coarse knob editing mode ➢ Beep on/off ➢ Output voltage/current level The following settings are always saved as "off": ➢ Output on/off ➢ Front panel lock on/off
Panel operation	Press one of the 1~4 Memory keys for 2 seconds, for example memory 1. The panel settings will be saved in memory 1 by long push to this key and the key LED turns on. When the panel settings are modified, the LED turns off.
Note	When the setting is stored, the output automatically turns off.

4.2 Recall Setup

Background	The front panel settings can be recalled from one of the four internal memories.
Programming contents	The following list shows the programming setting contents: ➢ Independent / tracking series / tracking parallel mode ➢ CH1/CH2 knob selection ➢ Fine/coarse knob editing mode ➢ Beep on/off ➢ Output voltage/current level The following settings are always recalled as "off": ➢ Output on/off ➢ Front panel lock on/off
Panel operation	Press one of the 1~4 Memory keys, for example memory 1. The panel settings saved in memory 1 will be recalled by pressing this key. The key LED turns on. When the panel settings are modified, the LED turns off.
Note	When a setting is recalled, the output automatically turns off.

5. REMOTE CONTROL

5.1 Remote Control Setup

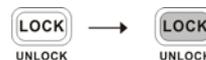|	
Background	The power supply is capable of being remotely controlled via the USB connection.
Interface	USB slave port, rear panel
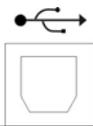
COM setting	Set up the COM port inside the PC according to the following list:
	    Baud rate: 9600
	    Parity bit: None
	    Data bit: 8
	    Stop bit: 1
	    Data flow control: None

Functionality check	Run this query command via the terminal application such as MTTTY (Multi-threaded TTY). *IDN? This should return the identification information: series number, firmware version.

5.2 Remote Connection Step

Enter the remote control mode	1. Connect the USB cable to the slave port. 2. The connection will be automatically established, and the front panel shows "USB…YES" message. 3. The power supply also automatically enters the lock state (the Lock key will be activated).
Exit the remote control mode	1. Disconnect the USB cable from the rear. 2. The display shows "USB…NO" message. 3. Unlock the power supply by pressing the Lock key until it turns off backlight. 4. The power supply goes back to local operation mode.

5.3 Command Syntax

Command format	ISET\<X>:\<NR2>	1: command header
		2: output channel
	1 2 3 4	3: separator
		4: parameter

Parameter	Type	Description	Example
	\<Boolean>	Boolean logic	0 (off), 1 (on)
	\<NR1>	Integers	0, 1, 2, 3
	\<NR2>	Decimal numbers	0.1, 3.14, 8.5

Output channel	1 (CH1) or 2 (CH2)

Note	Commands must be capital letters

5.4 Error Messages

The following error messages might appear when the power supply cannot accept the command.

Message contents		Descriptions
a	Program mnemonic too long	The command length must be 15 characters or less.
b	Invalid character	Invalid characters, such as symbols, are entered. Example: VOUT#
c	Missing parameter	The parameter is missing from the command. Example: VSET: (should have a number)
d	Data out of range	The entered value exceeds the specification. Example: VSET:33 (should be $\leqslant$32V)
e	Command not allowed	The entered command is not allowed in the circumstance. Example: trying to set CH2 output while in the tracking mode.
f	Undefined header	The entered command does not exist, or the syntax is wrong.

5.5 Command List

Detailed descriptions of each command starts from the next page.

The "HELP" command shows all the following commands and their meanings, except for the HELP command itself.

Command	Meanings
ISET\<X>:\<NR2>	Sets the output current
ISET\<X>?	Retunes the output current setting
VSET\<X>:\<NR2>	Sets the output voltage
VSET?	Returns the output voltage setting
IOUT\<X>?	Returns the actual output current
VOUT\<X>?	Returns the actual output voltage
TRACK\<NR1>	Selects the operation mode
BEEP\<BOOLEAN>	Turn on or off the beep
OUT\<BOOLEAN>	Turn on or off the output
STATUS?	Returns the MODEL status

*IDN?	Returns the MODEL identification
RCL<NR1>	Recalls a panel setting
SAVE<NR1>	Saves the panel setting
HELP?	Shows the command list
ERR?	Returns the instrument error messages

5.6 Command Details

Command	ISET<X>:<NR2>
Description	Sets the output current.
Panel operation	Refer to page 11
Response time	Min.70ms
Example	ISET1:2.234 Sets the CH1 output current to 2.234A. (for 1mV 1mA models) ISET1:2.23 Sets the CH1 output current to 2.23A. (for 10mV 10mA /100mV 10mA models)

Command	ISET<X>?
Description	Returns the output current setting
Response time	Min.70ms
Example	ISET1? Returns CH1 output current setting.

Command	VSET<X>:<NR2>
Description	Sets the output voltage.
Panel operation	Refer to page 11
Response time	Min.70ms
Example	VSET1:20.345 Sets the CH1 voltage to 20.345V.(for 1mV 1mA models)

Command	VSET<X>?
Description	Returns the output voltage setting.
Response time	Min.70ms
Example	VSET1? Returns the CH1 voltage setting.

Command	IOUT<X>?
Description	Returns the actual output current.
Response time	Min.70ms
Example	IOUT1? Returns the CH1 output current.

Command	VOUT<X>?
Description	Returns the actual output voltage.
Response time	Min.70ms
Example	VOUT1? Returns the CH1 output voltage.

Command	TRACK<NR1>
Description	Selects the operation mode: INDEP, tracking SER, tracking PAR
Panel operation	Refer to page 12
NR1	0: Independent 1: Tracking series 2: Tracking parallel
Response time	Min.70ms

Command	BEEP<Boolean>
Description	Turns on or off the beeper.
Panel operation	Refer to page 10
Response time	Min.70ms
Example	BEEP1 Turns on the beeper.

Command	OUT<Boolean>
Description	Turns on or off the output.

Example	TRACK0
	Selects the independent mode.

Panel operation	Refer to page 10
Response time	Min.70ms
Example	OUT1
	Turns on the output.

Command	STATUS?
Description	Returns the MODEL status.
Response time	Min.400ms
Contents	8 bits in the following format. (Refer to table on the right.)

Bit	Item	Description
0	CH1	0=CC mode, 1=CV mode
1	CH2	0=CC mode, 1=CV mode
2, 3	Tracking	01=Independent, 11=Tracking series，10=Tracking parallel
4	Beep	0=Off, 1=On
5	N/A	N/A
6	Output	0=Off, 1=On
7	N/A	N/A

Command	SAV<NR1>
Description	Saves the panel setting.
Panel operation	Refer to page 17
NR1	1~4: Memory 1 to 4
Reponses time	Min.70ms
Example	SAV1
	Stores the panel setting into memory 1.

Command	RCL<NR1>
Description	Recalls a panel setting.
Panel operation	Refer to page 17
NR1	1~4: Memory 1 to 4
Reponses time	Min.70ms
Example	RCL1
	Recalls the panel setting stored in memory 1.

Command	*IDN?
Description	Returns the MODEL identification
Reponses time	Min.300ms
Contents	Series number, firmware version

Command	HELP?
Description	Shows the command list.
Reponses time	Min.1000ms
Contents	Refer to the following table.

Command	ERR?
Description	Checks the error status of the instrument and returns the last error massage
Reponses time	Min.70ms
Contents	See page 19 for list of error messages.

| Contents for Command HELP	
ISET<x>:<NR2>	Sets the value of current.
VSET<x>:<NR2>	Sets the value of voltage. X: 1=CH1, 2=CH2.
ISET<x>?	Return the value of current.
VSET<x>?	Return the value of voltage.
IOUT<x>?	Returns actual output current.
VOUT<x>?	Returns actual output voltage.
TRACK<NR1>	Sets the output of the power supply working on independent or tracking mode. NR1: 0=INDE, 1=SER, 2=PARA.
BEEP<Boolean>	Sets the BEEP state on or off.
OUT<Boolean>	Sets the output state on or off
STATUS?	Returns the power supply state.
bit0:(CH1)0=CC,1=CV	
bit1:(CH2)0=CC,1=CV	
bit23:(TRACK)01=INDEP, 11=SER,10=PAR	
bit4:(BEEP)0=OFF,1=ON	
bit6:(OUT)0=OFF,1=ON	
*IDN?	Returns instrument identification.
RCL<NR0>	Recall the setting data from the memory which previous saved.
SAV<NR0>	Saves the setting data to memory.

NR0: 1=Memory1, 2=Memory2, 3=Memory3, 4=Memory4;

6. MAINTENANCE

6.1 Inspection
- Inspect the instrument at regular intervals so that it maintains its initial performance for a long time.
- Check the input power cord for damage of the vinyl cover and overheating of the plug and cord stopper. Check the terminal screws and binding posts for loosening.
- Remove dust from the inside of the casing and ventilation holes of the cover by using a compressed air of the exhaust air of a vacuum cleaner.

6.2 Fuse Replacement
Steps   1.   Take off the power cord and remove the fuse socket using a minus driver.
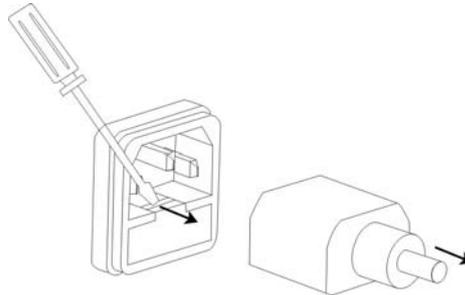
               2.   Replace the fuse in the holder.
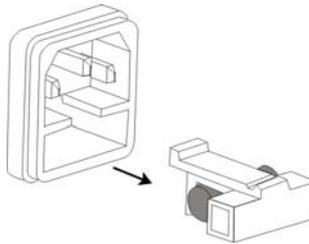
Fuse rating   110V: T6.3A/250V
                  220V: T3.15A/250V

6.3 Cleaning
- Before cleaning, disconnect the AC mains.
- To clean the power supply, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage.
- Do not use chemicals containing benzene, benzene, toluene, xylene, acetone, or similar solvents.
- Do not use abrasive cleaners on any portion of the instrument.