ISO-TECH

Instruction Manual
IPS X303 Series
DC Power Supply

EN FR

Table of Contents

SAFETY INSTRUCTIONS

This chapter contains important safety instructions that you must follow when operating the IPS X303 series and when keeping it in storage. Read the following before any operation to insure your safety and to keep the best condition for the IPS X303 series.

Safety Symbols

These safety symbols may appear in this manual or on the IPS X303 series.

 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 IPS X303 series or to other properties.
	DANGER High Voltage
	Attention Refer to the Manual
	Protective Conductor Terminal
	Earth (ground) Terminal

Safety Guidelines

General Guidelines

CAUTION

- Do not place any heavy object on the IPS X303 series.
- Avoid severe impacts or rough handling that leads to damaging the IPS X303 series.
- Do not discharge static electricity to the IPS X303 series.
- 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 IPS X303 series unless you are qualified as service personnel.

(Measurement categories) EN 61010-1:2001 specifies the measurement categories and their requirements as follows. The IPS X303 series falls under category I.

- 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.
- Measurement category I is for measurements performed on circuits not directly connected to Mains.

Power Supply

WARNING

- AC Input voltage: 100V/120V/220V/230V ±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: T6.3A/250V, 220V/230V: T3.15A/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 IPS X303 series

- 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: < 2,000m • Temperature: 0 to 40°C
	(Pollution Degree) EN 61010-1:2001 specifies the pollution degrees and their requirements as follows. The IPS X303 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 to 70°C

Power cord for the United Kingdom

When using the IPS X303 series 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 colours 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 the letter E or by the earth symbol ⏚ or coloured Green or 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, 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 moulded mains connector that requires removal /replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if a engaged in live socket. Any re-wiring must be carried out in accordance with the information detailed on this label.

OVERVIEW

This chapter describes the IPS X303 series in a nutshell, including its main features and front / rear panel introduction. After going through the overview, follow the Setup chapter (page 20) to properly power up and set operation environment.

Introduction

Overview	The IPS X303 regulated DC power supply series, are light weight, adjustable, multifunctional work stations. The IPS 2303S has two adjustable voltage outputs. The IPS 3303S has three independent outputs: two with adjustable voltage level and one with fixed level selectable from 2.5V, 3.3V and 5V. The IPS 4303S has four independent voltage outputs that are all fully adjustable. The IPS X303 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 / Tracking Series / Tracking Parallel	The three output modes of IPS X303 series, independent, tracking series, and tracking parallel, 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. 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	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 page 14.
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.
Dynamic load	When used in audio production lines, the power supply will provide a continuous or dynamic load using a jumper connector (JP101/JP401).. When the connectors are connected to the position “ON”, a stable DC current power will be provided for audio power amplifiers.

Series Lineup / Main Features

Series Lineup

Model	V Meter	A Meter	USB	Tracking Error
IPS 3303D	3 digit	3 digit	Yes	≤ 0.5% + 50mV of Master
IPS 2303S	5 digit	4 digit	Yes	≤ 0.5% + 10mV of Master
IPS 3303S	5 digit	4 digit	Yes	≤ 0.5% + 10mV of Master
IPS 4303S	5 digit	4 digit	Yes	≤ 0.5% + 10mV of Master

Main Features

Performance	• Low noise: Cooling fan controlled by Heat sink temperature • Compact size, light weight
Operation	• Constant Voltage / Constant Current operation • Tracking Series / Tracking parallel operation • Output On/Off control • Multi-output: IPS 2303S: 30V/3A x2; IPS 3303S: 30V/3A x2, 2.5V/3.3V/5V/3A x 1 IPS 4303S: 30V/3A x2, 5V/1A x1, 5V/3A (10V/1A) x1 • Digital panel control • 4 sets of panel setup save/recall • Coarse and fine Voltage/Current control • Software calibration • Buzzer output • Key lock function
Protection	• Overload protection • Reverse polarity protection
Interface	• USB for remote control

Principle of Operation

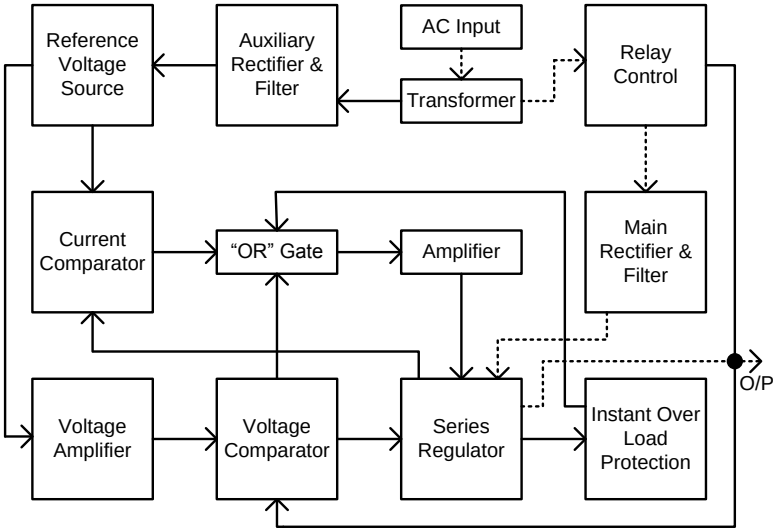
Overview

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 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



Rectifier

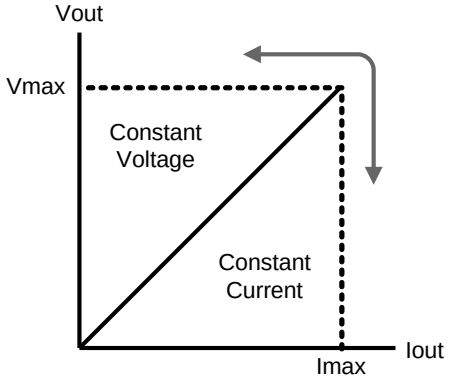
The auxiliary rectifiers D1011 to D1014 provide bias voltage filtered by the capacitors C102 and C103, for the pre-regulators U101 and U102. They provide a regulated voltage for other modules.

Main Rectifier

The main rectifier is a full wave bridge rectifier. It provides the power after the rectifier is filtered by the capacitor C101, and then regulated via a series-wound regulator, which is finally delivered to the output terminal.

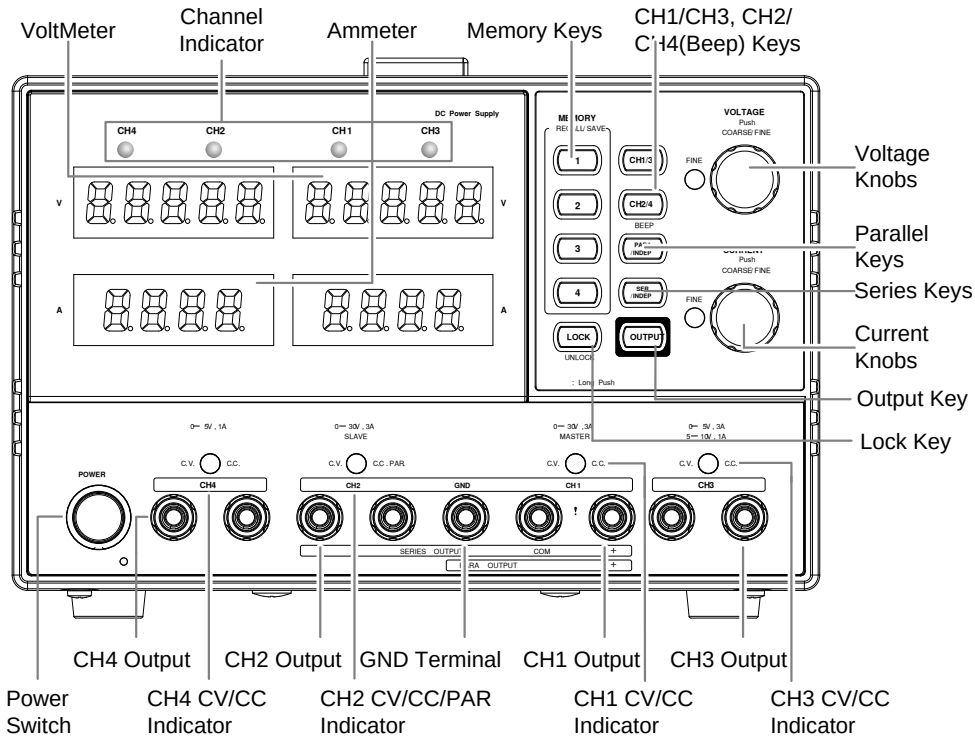
Current Limiter	U104 acts as a current limiter. When the current is over predetermined rating, U104 is activated and decreases the current. U208 provides a reference voltage. U206 is the inverter amplifier. U103 is a comparator amplifier which compares reference voltage and feedback voltage, and then delivers to Q102, which then calibrates the output voltage.
Overload	When the unit is overloaded, Q107 activates to control the current magnitude of Q102, to limit the output current. The relay control circuit controls the power dissipation in the series-wound regulated circuit.

CV/CC Crossover Characteristics

Background	The IPS X303 series 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 IPS X303 series 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 IPS X303 series 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 IPS X303 series goes back to the Constant Voltage mode.
Diagram	

FRONT AND REAR PANELS

Front Panel Overview



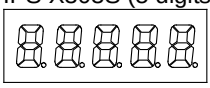
Display

Volt Meter Displays output current of each channel.

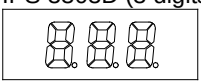
IPS 4303S: CH1/CH3 and CH2/CH4

IPS 2303S/3303S: CH1 and CH2

IPS X303S (5 digits)

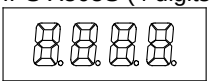


IPS 3303D (3 digits)

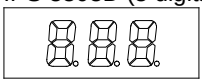


Amp Meter Displays output current of each channel.
IPS 4303S: CH1/CH3 and CH2/CH4
IPS 2303S/3303S: CH1 and CH2

IPS X303S (4 digits)

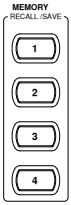


IPS 3303D (3 digits)



Control Panel

Memory Keys

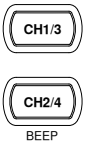


Saves or recalls panel settings. Four settings, 1 to 4, are available. For save/recall details, see page 36.

CH1/CH2

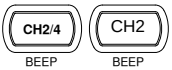
IPS 2303S/3303S: Selects the output channel (CH1/CH2) for level adjustment. For level setting details, see 22.

CH1/3 and CH2/4



IPS 4303S: Selects the output channel (CH1/3 and CH2/4) for level adjustment.

Beep Keys



Pressing and holding the CH2 (IPS 2303S/3303S) or the CH2/4 key (IPS 4303S) enables the beeper sound. For details, see page 22.

Parallel/Series Keys

Activates Tracking Parallel operation or Tracking Series operation, For details, see page 28.

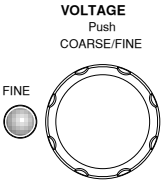
Lock Key

Locks or unlocks the front panel keys (excluding the OUTPUT key). Pressing the LOCK key will also exit remote mode if the machine is in remote mode. For details, see page 23.

Output Key

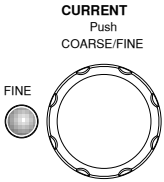
Turns the output on or off.

Voltage Knobs



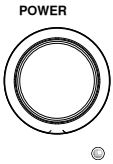
Adjusts the output voltage level for the selected channel. Pressing the knob switches coarse and fine level setting.

Current Knobs



Adjusts the output current level for the selected channel. Pressing the knob switches coarse and fine level setting.

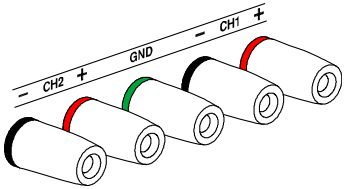
Power Switch



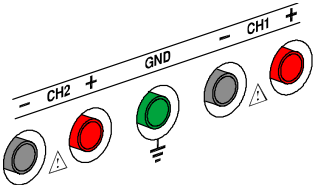
Turns On▬ or Off■ the main power. For power up sequence, see page 20.

Terminals

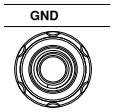
Default Terminals



European Terminals

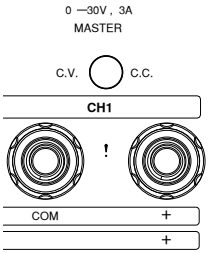


GND Terminal



Accepts a grounding wire.

CH1 Output
CH1 CV/CC Indicator

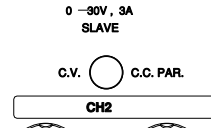


Indicates CH1 Constant Voltage or Constant Current state.

CH1 Output

Outputs CH1 voltage and current.

CH2 CV/CC/PAR Indicator

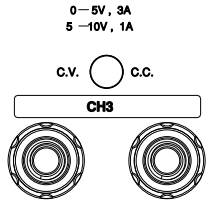


Indicates CH2 Constant Voltage, Constant Current, or Tracking Parallel operation mode.

CH2 Output

Outputs CH2 voltage and current.

CH3 Overload Indicator



Indicates CH3 Constant Voltage or Constant Current state for the IPS 4303S.

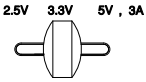
CH3 Output

Outputs CH3 voltage and current.

CH3 Overload Indicator

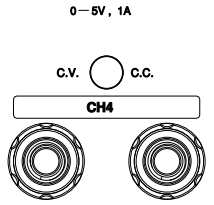
Indicates when CH3 (IPS 3303S) output current is overloaded.

CH3 Voltage Selector



Selects CH3 output voltage for the IPS 3303S: 2.5V, 3.3V, or 5V.

CH4 CV/CC Indicator

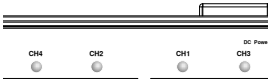


Indicates CH4 constant voltage or constant current for the IPS-4303S.

CH4 Output

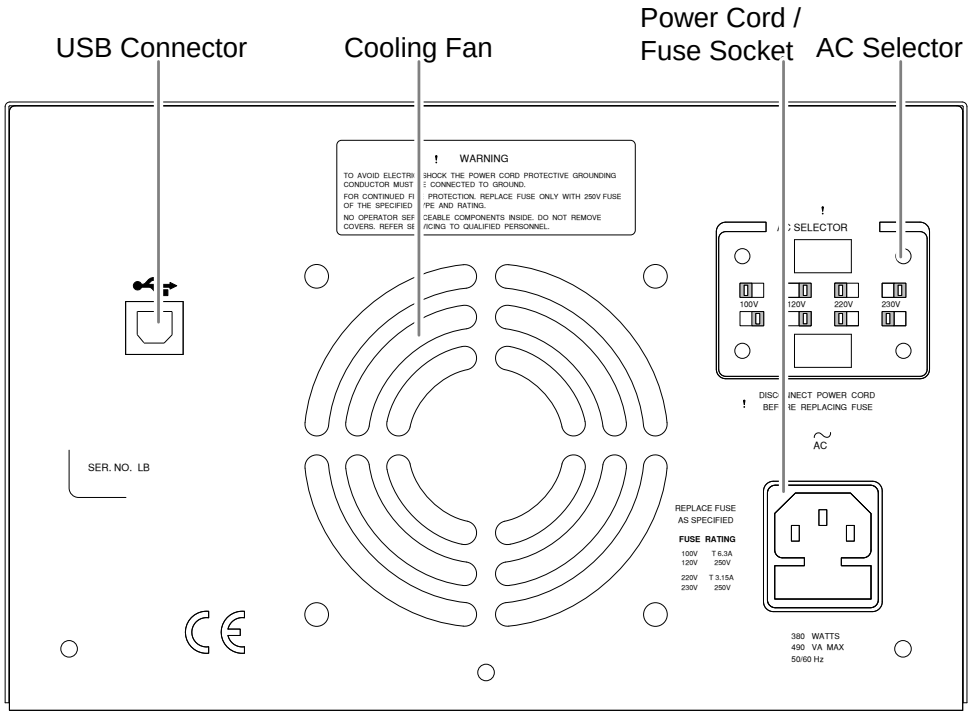
Outputs CH4 voltage and current.

Channel Indicator

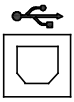


Indicates which channel the 2 LED voltmeters/ammeters represent.

Rear Panel Overview

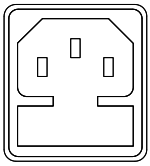


USB Connector



Accepts a USB slave connector for command-based remote control (page 38).

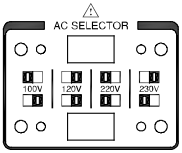
Power Cord / Fuse Socket



The power cord socket accepts the AC mains: 115V/230V, 50/60Hz. For power up details, see page 20.

The fuse holder contains the AC main fuse. For fuse replacement details, see page 48.

AC Selector



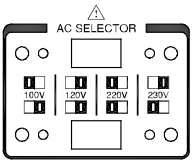
Selects AC voltage: 100V/ 120V/ 220V/ 230V.

SETUP

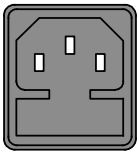
This chapter describes how to properly power up and configure the IPS X303 series before operation.

Power Up

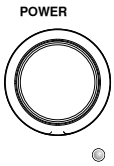
Select AC voltage Before powering up the power supply, select the AC input voltage from the rear panel.

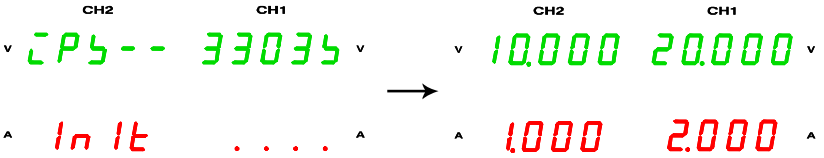


Connect AC power cord Connect the AC power cord to the rear panel socket.

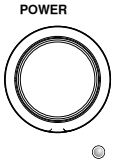


Power On Press the Power switch to turn on the power. The display shows the initialization screen with the model name (IPS 3303S shown), followed by the last recalled settings.





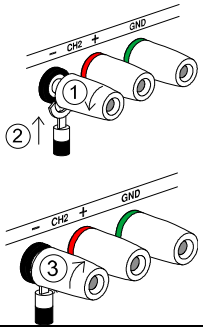
Power Off Press the Power switch again to turn off the power.



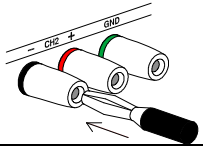
Load Cable Connection

GTL-104A

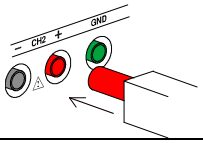
1. Turn the terminal counter-clockwise and loosen the screw.
2. Insert the cable terminal.
3. Turn the terminal clockwise and tighten the screw.



GTL-105A Insert the plug into the socket.



GTL-203A, 204A Insert the plug into the terminal.



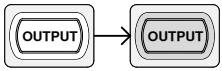
Wire type When using load cables other than the attached, make sure they have enough current capacity for minimizing cable loss and load line impedance. Voltage drop across a wire should not excess 0.5V. The following list is the wire current rating at 450A/cm^2.

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

Output On/Off

Panel operation

Pressing the Output key turns on all channel outputs.



The key LED also turns on. Pressing the Output key again turns the output and the key LED off.

Automatic output off

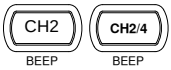
Any of the following actions during output on automatically turns it off. They might involve sudden and harmful change in the output level.

- Change the operation mode between independent / tracking series / tracking parallel
- Recalling other setups from the memory
- Storing the setup into the memory

Beep On/Off

Panel operation

By default, the beep sound is enabled. To turn off the beep, press the CH2 or CH2/CH4 key for 2 seconds.



A beep will be heard and the beep setting will be turned off. To enable the beep, press the CH2 or CH2/CH4 key again for 2 seconds.

List of beep

The following operations beep when the beep setting is on.

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

Switch between channels

Panel operation

Switching between channels only applies to IPS 4303S.

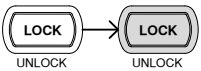
Press the CH1/3 key to toggle between CH1 and CH3. The active channel will be shown on the channel indicator.

Press the CH2/4 key to toggle between CH2 and CH4. The active channel will be shown on the channel indicator.

Front Panel Lock

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.



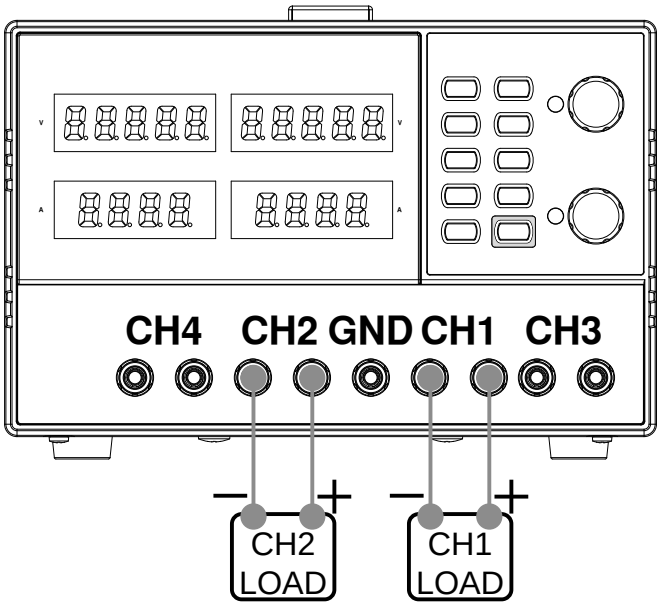
Note

The OUTPUT key is not affected by the lock operation.

OPERATION

CH1/CH2 Independent Mode

Background / Connection CH1 and CH2 outputs work independent of each other.

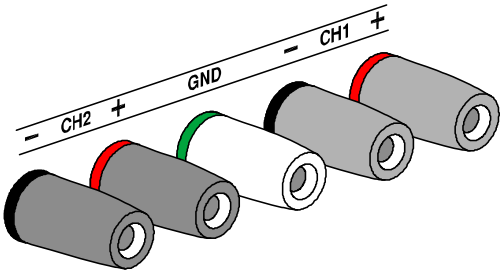


Output rating 0 to 30V / 0 to 3A for each channel

Panel operation

1. Make sure the PARA/ INDEP and SER/INDEP keys are turned off (the key LEDs are off).

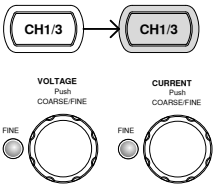
2. Connect the load to the front panel terminals, CH1 +/−, CH2 +/−.



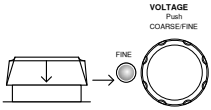
Note: this diagram shows non-European terminals.

3. Set the CH1 output voltage and current. Press the CH1 key (LED turns on) and then 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 to turn the FINE LED on.

(For CH1)



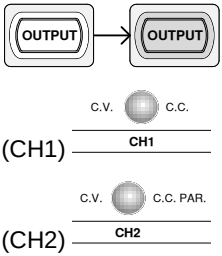
(Fine control)



- Coarse: 0.1V or 0.1A for each step
- Fine: 1mV or 1mA for each step

4. Repeat the above settings for the CH2.

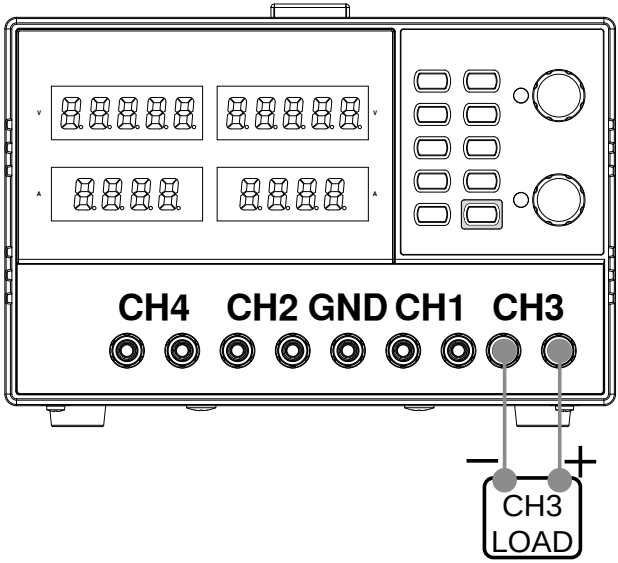
5. To turn on the output, press the output key. The key LED turns on and the CH1 / CH2 indicator shows the output mode, CV or CC.



CH3 Independent Mode

Background / Connection

For the IPS 3303S the CH3 rating is fixed at 2.5V/3.3V/5V, 3A. CH3 for the IPS 4303S is variable: 0~5V,0~3A / 5.001~10V,0~1A .



Output rating

IPS 3303S：2.5V/3.3V/5V，3A (fixed)

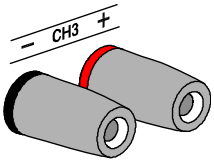
IPS 4303S：0~5V,0~3A / 5.001~10V,0~1A

No Tracking Series/Parallel

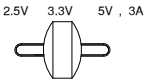
CH3 does not have tracking series/parallel mode. Also, CH3 output is not affected by CH1 and CH2 modes.

Panel operation

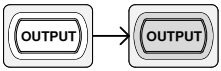
1. Connect the load to the front panel CH3 +/− terminal. (the diagram shows non-European terminals)



2. IPS 3303S: Select the output voltage, 2.5V/3.3V/5V using the CH3 voltage selector key.
   IPS 4303S: Press the CH1/3 key to switch to CH3 (The CH3 indicator will light). Use the voltage and current knobs to set the voltage and current.

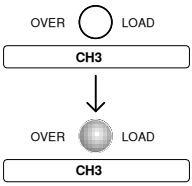


3. To turn on the output, press the output key. The key LED turns on.

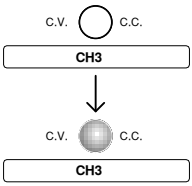


CV → CC

3303S: When the output Current level exceeds 3.2A, the overload indicator turns red and CH3 operation mode switches from Constant Voltage to Constant Current.



4303S: When the output value exceeds the set value, the C.V./C.C. indicator turns red. This indicates that CH3 has switched from the constant voltage to constant current.

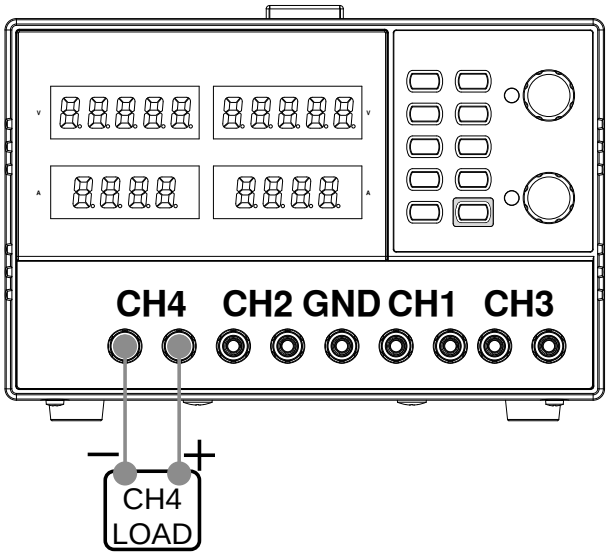


Note: “overload” in this case does not mean an abnormal operation.

CH4 Independent Mode

Background / Connection

The IPS 4303S has a rating of 5V/1A max.



Output rating

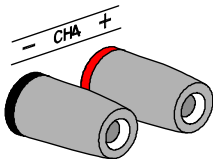
5V/1A max

No Tracking Series/Parallel

CH4 does not have tracking series/parallel mode. The CH4 output is not affected by CH1 and CH2 modes.

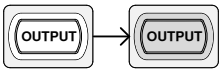
Panel operation

1. Connect the load to the front panel CH4 +/− terminal. (the diagram shows non-European terminals)



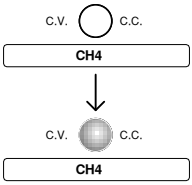
2. Press the CH2/4 key to switch to CH4 (The CH4 indicator will light). Use the voltage and current knobs to set the voltage and current.

3. To turn on the output, press the output key. The key LED turns on.



CV → CC

When the output value exceeds the set value, the C.V./C.C. indicator turns red. This indicates that CH3 has switched from constant voltage to constant current.



CH1/CH2 Tracking Series Mode

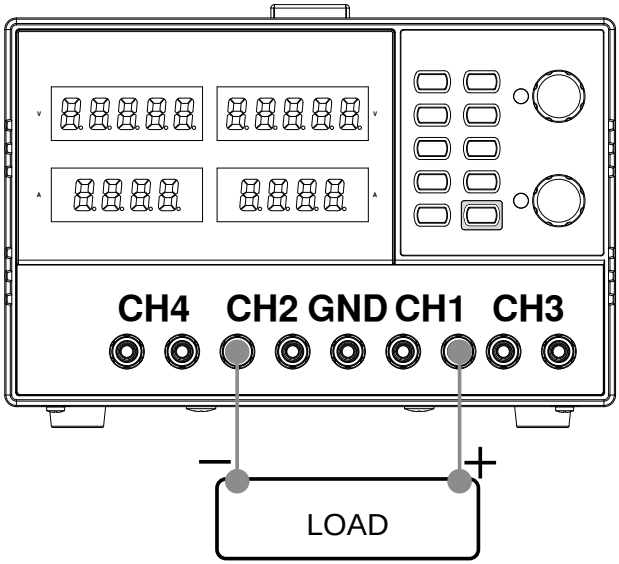
Background

Tracking series operation doubles the Voltage capacity of the IPS X303 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.

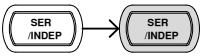
Tracking series without common terminal

Connection

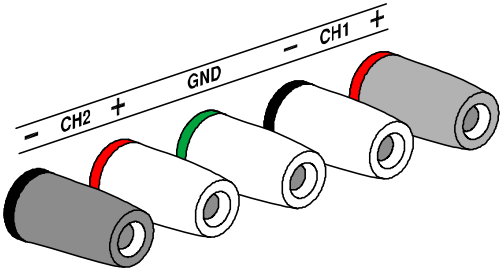


Output rating 0 to 60V / 0 to 3A

1. Press the SER/INDEP key to activate the tracking series mode. The key LED turns on.

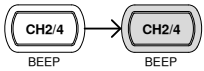


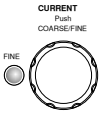
2. Connect the load to the front panel terminals, CH1+ & CH2− (Single supply).



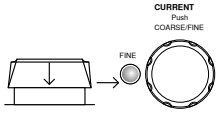
Note: this diagram shows non-European terminals.

3. Press the CH2 key (LED turns on) and then use the Current knob to set the CH2 output current to the maximum level (3.0A).
By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the knob to turn the FINE LED on.



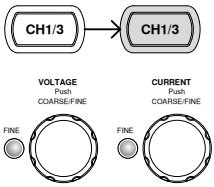


(Fine control)

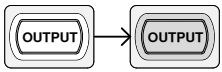


- Coarse: 0.1V or 0.1A for each step
- Fine: 1mV or 1mA for each step

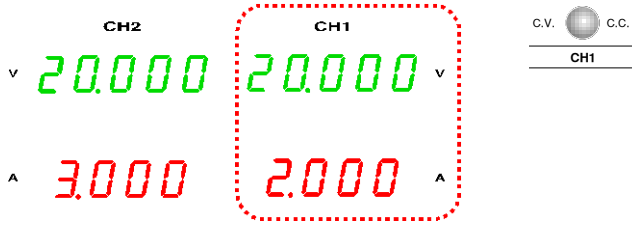
4. Press the CH1 key (LED turns on) and then use the Voltage and Current knob to set the output voltage and current level.



5. To turn on the output, press the output key. The key LED turns on.



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

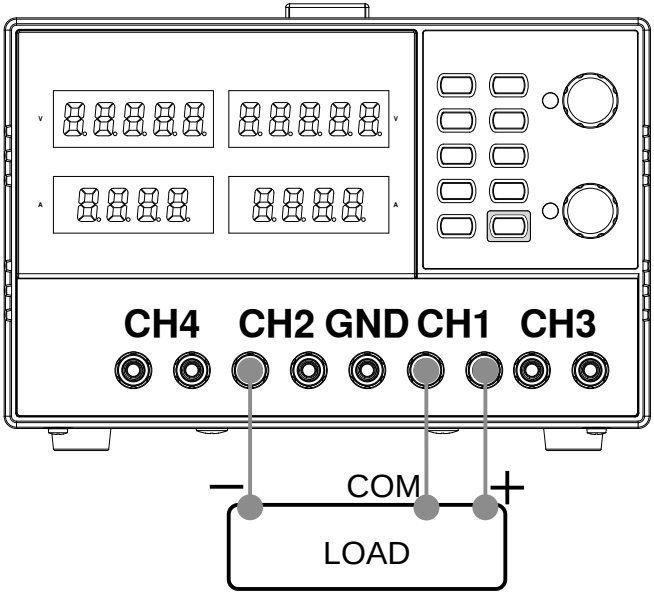


Voltage level — Double the reading on the CH1 Voltage meter. In the above case, the actual output is 20.0 x 2 = 40.0V.

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).

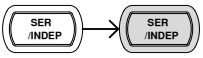
Tracking series with common terminal

Connection

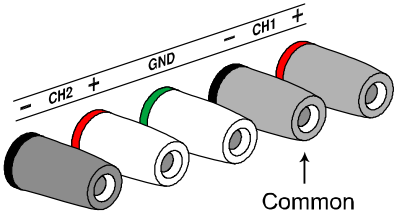


Output rating 0 to 30V / 0 to 3A for CH1 to COM
0 to –30V / 0 to 3A for CH2 to COM

1. Press the SER/INDEP key to activate the tracking series mode. The key LED turns on.

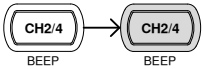


2. Connect the load to the front panel terminals, CH1+ & CH2−. Use the CH1 (−) terminal as the common line connection.

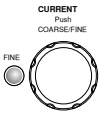


Note: this diagram shows non-European terminals.

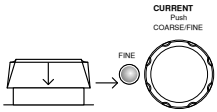
3. Press the CH1 key (LED turns on) and use the Voltage knob to set the master & slave output voltage (the same level for both channels).
By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the knob to turn the FINE LED on.



(master & slave)

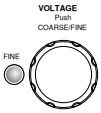


(Fine control)

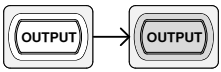


- Coarse: 0.1V or 0.1A for each step
- Fine: 1mV or 1mA for each step

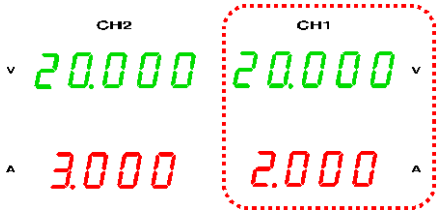
4. Use the Current knob to set the master output current.

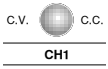


5. To turn on the output (and LED), press the output key.



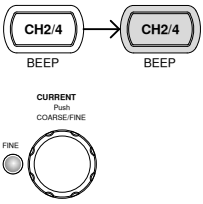
6. For the master (CH1) output level and CV/CC status, refer to the CH1 meter and indicator.



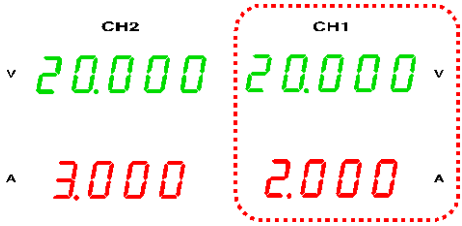


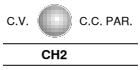
Master (CH1) voltage level	CH1 meter reading shows the output voltage. In the above case, 20.0V.
Master (CH1) current level	CH1 meter reading shows the output current. In the above case, 2.000A.

7. Press the CH2 key (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/CH2 meter and CH2 indicator.



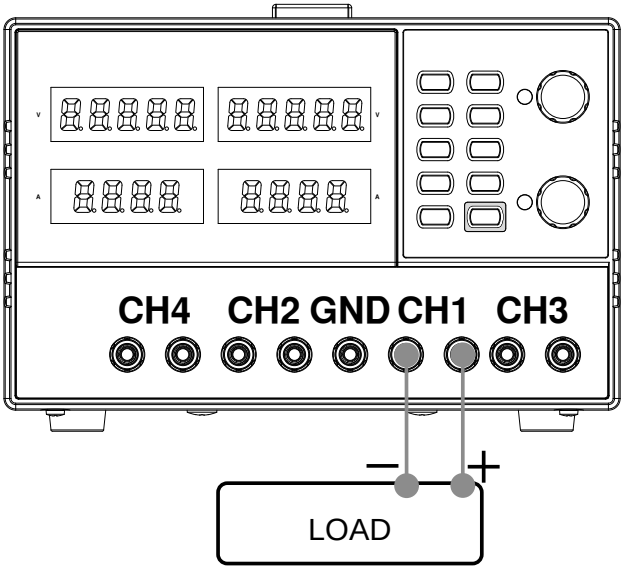


Slave (CH2) voltage level	The CH1 meter reading shows the output voltage. In the above case, 20.0V.
Slave (CH2) current level	The CH2 meter reading shows the output current. In the above case, 3.000A.

CH1/CH2 Tracking Parallel Mode

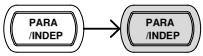
Background / Connection

Tracking parallel operation doubles the current capacity of the IPS X303 series by internally connecting CH1 and CH2 in parallel and combining the output to a single channel. CH1 controls the combined output.

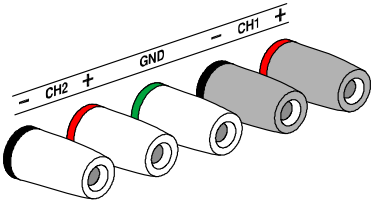


Output rating 0 to 30V / 0 to 6A

1. Press the PARA/INDEP key to activate the tracking parallel mode. The key LED turns on.

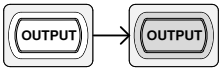


2. Connect the load to the CH1 +/− terminals.

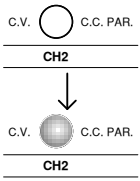


Note: this diagram shows non-European terminals.

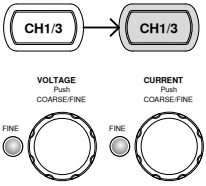
3. To turn on the output, press the output key. The key LED turns on.



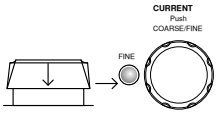
4. The CH2 C.V./C.C. PAR. indicator turns red, indicating tracking parallel (PARA) mode.



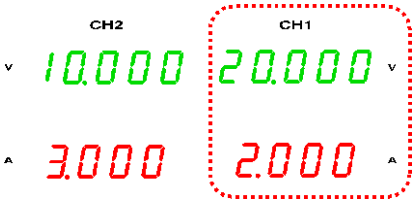
5. Press the CH1 key (LED turns on) and then use the Voltage and Current knob to set the output voltage and current. The CH2 output control is disabled.
   By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the knob to turn the FINE LED on.

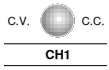


(Fine control)



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.

SAVE/RECALL SETUP

Save Setup

Background

The front panel settings can be stored into one of the four internal memories.

Contents

The following list shows the setup contents.

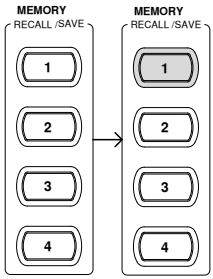
- Independent / tracking series / tracking parallel mode
- CH1/CH2 knob selection
- Fine/coarse editing mode
- Output voltage/current level

The following settings are always saved as “off”.

- Output on/off
- Front panel lock/unlock
- Buzzer on/off

Panel operation

Press one of the 1 to 4 Memory keys for 2 seconds, for example memory 1. The panel settings are saved in memory 1 and the key LED turns on. When the panel settings are modified, the LED turns off.



Note

When a setting is stored, the output automatically turns off.

Recall Setup

Background

The front panel settings can be recalled from one of the four internal memories.

Contents

The following list shows the setup contents.

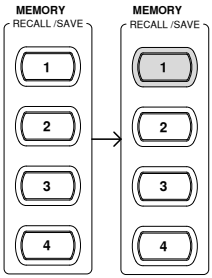
- Independent / tracking series / tracking parallel mode
- CH1/CH2 knob selection
- Fine/coarse editing mode
- Output voltage/current level

The following settings are always recalled as “off”.

- Output on/off
- Front panel lock/unlock
- Buzzer on/off

Panel operation

Press one of the 1 to 4 Memory keys, for example memory 1. The panel settings saved in memory 1 are recalled. The key LED turns on. When the panel settings are modified, the LED turns off.

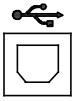


Note

When a setting is recalled, the output automatically turns off.

REMOTE CONTROL

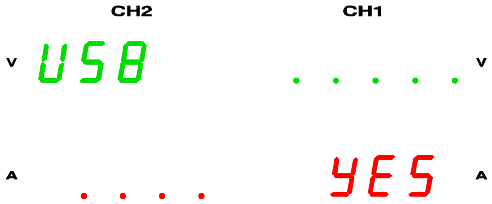
Remote Control Setup

Background	The IPS 3303D and IPS X303S are 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: 57600 or 115200 • 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: Manufacturer, model name, serial number, firmware version. Iso-tech, IPS X303x, SN: xxxxxxxx, Vx.xx

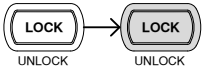
Remote Connection Step

Entering 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.

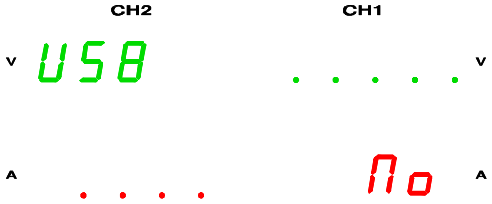


3. The power supply also automatically enters the lock state (the Lock key will become activated).

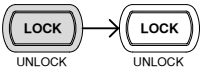


Leaving the remote control mode

1. To exit remote mode either, 1) use the LOCAL command from the terminal connection, or 2) Press the LOCK key on the front panel to return to local mode, or 3) disconnect the USB cable from the rear panel.
2. The display shows “USB…NO” message.

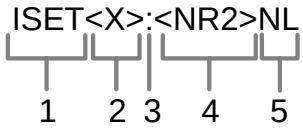


3. The LOCK will no longer be lit when remote mode is off.



4. The power supply goes back to the local operation mode.

Command Syntax

Command format			1: command header 2: output channel 3: separator 4: parameter 5: terminator(line feed)
Output channel	1 (CH1) or 2 (CH2)		
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
Terminator	Each command must end with a terminal character (new line code, ASCII: 0x0A) and each query must end with a carriage return, ASCII: 0x0D.		
Note	Commands are not case-sensitive.		

Error Messages

The following error messages might appear when the IPS 3303D or X303S cannot accept the command.

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

Command List

- Detailed descriptions of each command start from the next page.
- The “HELP” command shows all the below commands and their meanings, except for the HELP command itself.

ISET<X>:<NR2>	Sets the output current.
ISET<X>?	Returns the output current setting.
VSET<X>:<NR2>	Sets the output voltage.
VSET<X>?	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 IPS 3303D or IPS X303S status.
*IDN?	Returns the IPS 3303D or IPS X303S identification.
RCL<NR1>	Recalls a panel setting.
SAV<NR1>	Saves the panel setting.
HELP?	Shows the command list.
ERR?	Returns the instrument error messages.
BAUD<NR1>	Sets the baud rate.
LOCAL	Returns the instrument to local mode.

Command Details

ISET<X>:<NR2>

Description	Sets the output current.	
X	1= CH1, 2= CH2, (IPS 4303S: 3 = CH3, 4= CH4)	
<NR2>	Decimal number, range 0～3.200A	
Response time	Minimum 10ms	
Example	ISET1:2.234	Sets the CH1 output current to 2.234A (for IPS X303S)
	ISET1:2.23	Sets the CH1 output current to 2.23A (for IPS 3303D)

ISET<X>?

Description	Returns the output current setting.	
X	1= CH1, 2= CH2, (4303S: 3 = CH3, 4= CH4)	
Response time	Minimum 10ms	
Example	ISET1?	Returns the CH1 output current setting

VSET<X>:<NR2>

Description	Sets the output voltage.	
X	1: CH1, 2: CH2, (IPS 4303S: 3: CH3, 4: CH4)	
<NR2>	Decimal number, range 0～32.000V	
Response time	Minimum 10ms	
Example	VSET1:20.345	Sets the CH1 voltage to 20.345V (for IPS X303S)
	VSET1:20.3	Sets the CH1 voltage to 20.3V (for IPS 3303D)

VSET<X>?

Description	Returns the output voltage setting.	
X	1: CH1, 2: CH2, (IPS 4303S: 3: CH3, 4: CH4)	
Response time	Minimum 10ms	
Example	VSET1?	Returns the CH1 voltage setting

IOUT<X>?

Description	Returns the actual output current.	
X	1: CH1, 2: CH2, (IPS 4303S: 3: CH3, 4: CH4)	
Response time	Minimum 10ms	
Example	IOUT1?	Returns the CH1 output current

VOUT<X>?

Description	Returns the actual output voltage.	
X	1: CH1, 2: CH2, (IPS 4303S: 3: CH3, 4: CH4)	
Response time	Minimum 10ms	
Example	VOUT1?	Returns the CH1 output voltage

TRACK<NR1>

Description	Selects the operation mode: independent, tracking series, or tracking parallel.	
NR1	0: Independent, 1: Series, 2: Parallel	
Response time	Minimum 10ms	
Example	TRACK0	Selects the independent mode

BEEP<Boolean>

Description	Turns the beep on or off.	
<Boolean>	0: off, 1: on	
Response time	Minimum 10ms	
Example	BEEP1	Turns on the beep

OUT<Boolean>

Description	Turns on or off the output.	
<Boolean>	0: off, 1: on	
Response time	Minimum 10ms	
Example	OUT1	Turns on the output

STATUS?

Description	Returns the IPS 3303D or IPS X303S status.
Response time	Minimum 10ms
Contents	8 bits in the following format

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	0=115200bps，1=57600bps

*IDN?

Description	Returns the IPS 3303D or IPS X303S identification.
Response time	Minimum 10ms
Contents	Iso-tech, IPS X303x,SN: xxxxxxxx, Vx.xx (Manufacturer, model name, serial number, firmware version)

RCL<NR1>

Description	Recalls a panel setting.	
<NR1>	1 – 4: Memory 1 to 4	
Response time	Minimum 10ms	
Example	RCL1	Recalls the panel setting stored in memory 1

SAV<NR1>

Description	Stores the panel setting.	
<NR1>	1 – 4: Memory 1 to 4	
Response time	Minimum 10ms	
Example	SAV1	Stores the panel setting in memory 1

BAUD<NR1>

Description	Sets the baud rate to 57600bps or 115200bps.	
<NR1>	0: 115200bps, 1: 57600bps	
Response time	Minimum 10ms	
Example	BAUD0	Sets the baud rate to 115200bps.

LOCAL

Description	Exits remote mode and sets the instrument to local mode.
Response time	Minimum 10ms

ERR?

Description	Checks the error status of the instrument and returns the last error message.
Response time	Minimum 10ms
Contents	See page 41 for the list of error messages.

HELP?

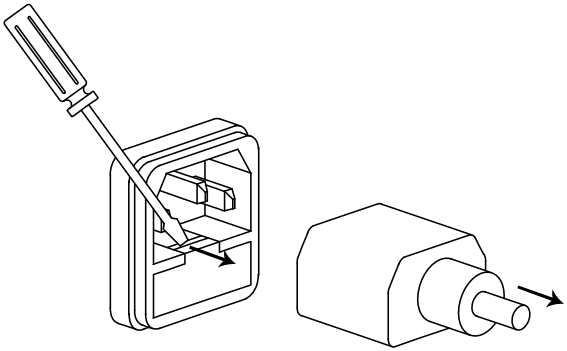
Description	Shows the command list.
Response time	Minimum 50ms
Return parameters	ISET<x>:<NR2> Sets the value of current. VSET<x>:<NR2> Sets the value of voltage. ISET<x>? Return the value of current. VSET<x>? Return the value of voltage. IOUT<x>? Returns actual output current， VOUT<x>? Returns actual output voltage. TRACK<NR1> Sets the output of the power supply working on independent or tracking mode. BAUD<NR1>Set the value of baud rate. RCL<NR1> Recall the setting data from the memory which previous saved. SAV<NR1> Saves the setting data to memory. BEEP<Boolean> Sets the BEEP state on or off. OUT<Boolean> Sets the output state on or off. LOCAL Return to local mode *IDN？ Returns instrument identification. ERR？ Returns instrument error messages. STATUS？ Returns the power supply state.
⚠ Note	All response time estimates are based on a baud rate of 115200bps. Expect longer response times with a baud rate of 57600bps.

APPENDIX

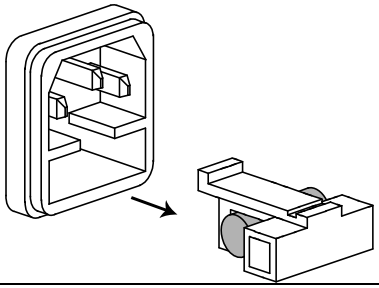
Fuse Replacement

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:T6.3A/250V
- 220V/230V:T3.15A/250V

SPECIFICATIONS

The specifications apply when the IPS X303 series are powered on for at least 30 minutes under +20 to +30°C.

Output Ratings	CH1/CH2 Independent	0 to 30V / 0 to 3A
	CH1/CH2 Series	0 to 60V / 0 to 3A
	CH1/CH2 Parallel	0 to 30V / 0 to 6A
	CH3	2.5V/3.3V/5.0V, 3A
	CH4	0~5V,0~1A
Voltage Regulation	Line	≤ 0.01% + 3mV
	Load	≤ 0.01% + 3mV (rating current ≤ 3A) ≤ 0.02% + 5mV (rating current > 3A)
	Ripple & Noise	≤ 1mVrms (5Hz to 1MHz) ≤ 10mVpp (5Hz~1MHz)
	Recovery Time	≤ 100μs (50% load change, minimum load 0.5A)
	Temperature Coefficient	≤ 300ppm/°C
Current Regulation	Line	≤ 0.2% + 3mA
	Load	≤ 0.2% + 3mA
	Ripple & Noise	≤ 3mArms
Tracking Operation	Tracking Error	≤ 0.1% + 10mV of Master (0~30V) (No Load, with load add load regulation≤100mV)) (IPS X303S) ≤ 0.5%+50mV of Master (IPS 3303D)
	Parallel Regulation	Line: ≤ 0.01% + 3mV Load: ≤ 0.01% + 3mV (rating current ≤ 3A) Load: ≤ 0.02% + 5mV (rating current > 3A)
	Series Regulation	Line: ≤ 0.01% + 5mV Load: ≤ 300mV

Meter Resolution	IPS 3303D	Voltage: 100mV Current: 10mA
	IPS X303S	Voltage: 1mV Current: 1mA
A Meter	IPS 3303D	3.2A full scale, 3 digits 0.5" LED display
	IPS X303S	3.2A full scale, 4 digits 0.4" LED display
V Meter	IPS 3303D	32V full scale, 3 digits 0.5" LED display
	IPS X303S	32V full scale, 5 digits 0.4" LED display
Program Accuracy	IPS 3303D	Voltage: ± (0.5% of reading + 2digits) Current: ± (0.5% of reading + 2digits)
	IPS X303S	Voltage: ± (0.03% of reading + 10mV) Current: ± (0.3% of reading + 10mA)
Readback Accuracy	IPS 3303D	Voltage: ± (0.5% of reading + 2digits) Current: ± (0.5% of reading + 2digits)
	IPS X303S	Voltage: ± (0.03% of reading + 10mV) Current: ± (0.3% of reading + 10mA)
Overvoltage Protection	CH1/CH2	≥35V
	CH3	≥11V
	CH4	≥6V
Insulation	Chassis and Terminal	20MΩ or above (DC 500V)
	Chassis and AC cord	30MΩ or above (DC 500V)
Operation Environment	Indoor use, Altitude: ≤ 2,000m Ambient temperature 0 to 40°C Relative humidity ≤ 80% Installation category: II, Pollution degree: 2	
Storage Environment	Ambient temperature –10 to 70°C Relative humidity ≤ 70%	
Power Source	AC 100V/120V/220V/230V±10%, 50/60Hz	
Accessories	User manual x1 Test lead GTL-104A x 2, GTL-105A x 1 (Europe) Test lead GTL-203A x 1, GTL-204A x 2	
Dimensions	210 (W) x 130 (H) x 265 (D) mm	
Weight	Approx. 7kg	

Options

USB cable	GTL-246	USB 2.0, A-B type

FAQ

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

A1. The output key is not affected by the panel lock key operation, for ensuring safety.

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

A2. No, it simply means that the CH3 output current reached the maximum 3.0A 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 to +30°C.

Q4. The internal memory is not recording the panel setting correctly – the output should be on.

A4. The output is always stored or recalled as “off” to ensure safety.

INDEX

Limited Warranty

This meter is warranted to the original purchaser against defects in material and workmanship for 3 years from the date of purchase. During this warranty period, RS Components will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction. This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling. Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. RS Components shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you. For full terms and conditions, refer to the RS website.

Africa
Iso-Tech
1 & 2 Indianapolis Street
Kyalami Business Park
Kyalami, Midrand, South Africa

Asia
Iso-Tech
460 Alexandra Road, #15-01A
PSA Building
Singapore 119963

Europe
Iso-Tech
PO Box 99
Corby
Northamptonshire
NN17 9RS
United Kingdom

Japan
West Tower (12th Floor)
Yokohama Business Park
134 Godocho, Hodogaya
Yokohama, Kanagawa 240-0005 Japan

USA
7410 Pebble Drive
Fort Worth
Texas 76118-6961

Canada
1701 Woodward Drive
Ste 108 Ottawa
Ontario K2C 0R4, Canada

South America
Av. Pdte. Eduardo Frei M. 6001-71
Centro Empresas El Cortijo
Conchali, Santiago, Chile