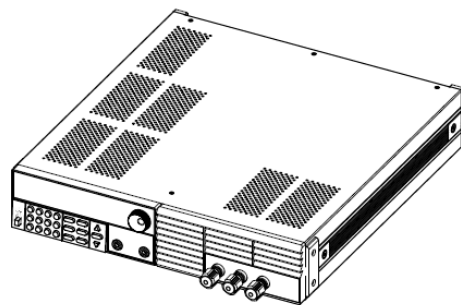


High Resolution and High Speed Programmable Power Supply Series IT6100 User's Manual



Model: IT6151/IT6152/IT6153/IT6154/
IT6162/IT6163/IT6164
Version: V3.0

Notices

© Itech Electronic, Co., Ltd. 2019
No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior permission and written consent from Itech Electronic, Co., Ltd. as governed by international copyright laws.

Manual Part Number

IT6100-402196

Revision

3rd Edition: Mar. 8, 2019
Itech Electronic, Co., Ltd.

Trademarks

Pentium is U.S. registered trademarks of Intel Corporation.

Microsoft, Visual Studio, Windows and MS Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries and regions.

Warranty

The materials contained in this document are provided “as is”, and is subject to change, without prior notice, in future editions. Further, to the maximum extent permitted by applicable laws, ITECH disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. ITECH shall not be held liable for errors or for incidental or indirect damages in connection with the furnishing, use or application of this document or of any information contained herein. Should ITECH and the user enter into a separate written agreement with warranty terms covering the materials in this document that conflict with these terms, the warranty terms in the separate agreement shall prevail.

Technology Licenses

The hardware and/or software described herein are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

Restricted permissions of the U.S. government. Permissions for software and technical data which are authorized to the U.S. Government only include those for custom provision to end users ITECH provides this customary commercial license in software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data – Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

Safety Notices

CAUTION

A CAUTION sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

A WARNING sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.



NOTE

A NOTE sign denotes important hint. It calls attention to tips or supplementary information that is essential for users to refer to.

Quality Certification and Assurance

We certify that IT6100 series power supply meets all the published specifications.

Warranty

ITECH warrants that the product will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of delivery (except those described in the Limitation of Warranty below).

For warranty service or repair, the product must be returned to a service center designated by ITECH.
















- The product returned to ITECH for warranty service must be shipped PREPAID. And ITECH will pay for return of the product to customer.
- If the product is returned to ITECH for warranty service from overseas, all the freights, duties and other taxes shall be on the account of customer.

Limitation of Warranty

This Warranty will be rendered invalid if the product is:

- Damage caused by circuit installed by customer or using customer own products or accessories;
- Modified or repaired by customer without authorization;
- Damage caused by circuit installed by customer or not operating our products under designated environment;
- The product model or serial number is modified, deleted, removed or illegible;
- Damaged as a result of accidents, including but not limited to lightning, moisture, fire, improper use or negligence.

Safety Symbols

	Direct current		ON (power on)
	Alternating current		OFF (power off)
	Both direct and alternating current		Power-on state
	Protective conductor terminal		Power-off state
	Earth (ground) terminal		Reference terminal
	Caution, risk of electric shock		Positive terminal
	Warning, risk of danger (refer to this manual for specific Warning or Caution information)		Negative terminal
	Frame or chassis terminal	-	-

Safety Precautions

The following safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or specific warnings elsewhere in this manual will constitute a default under safety standards of design, manufacture and intended use of the instrument. ITECH assumes no liability for the customer's failure to comply with these precautions.

WARNING

- Do not use the instrument if it is damaged. Before operation, check the casing to see whether it cracks. Do not operate the instrument in the presence of inflammable gasses, vapors or dusts.
- The power supply is provided with a three-core power line during delivery and should be connected to a three-core junction box. Before operation, be sure that the power supply is well grounded. Make sure to use the power cord supplied by ITECH.
- Check all marks on the instrument before connecting the instrument to power supply.
- Use electric wires of appropriate load. All loading wires should be capable of bearing maximum short-circuit of electronic load without overheating. If there are multiple loads, each pair of the load power cord must be carry out the full rated short-circuit output current of the power securely.
- Ensure the voltage fluctuation of mains supply is less than 10% of the working voltage range in order to reduce risks of fire and electric shock.
- Do not install alternative parts on the instrument or perform any unauthorized modification.
- Do not use the instrument if the detachable cover is removed or loosen.
- To prevent the possibility of accidental injuries, be sure to use the power adapter supplied by the manufacturer only.
- We do not accept responsibility for any direct or indirect financial damage or loss of profit that might occur when using the instrument.
- This instrument is used for industrial purposes, do not apply this product to IT power supply system.
- Never use the instrument with a life-support system or any other equipment subject to safety requirements.

CAUTION

- Failure to use the instrument as directed by the manufacturer may render its protective features void.
- Always clean the casing with a dry cloth. Do not clean the internals.
- Make sure the vent hole is always unblocked.

Environmental Conditions




The instrument is designed for indoor use and an area with low condensation. The table below shows the general environmental requirements for the instrument. The speed of fan will change intelligently by the temperature of radiator. When the temperature is up to 40°C, the fan will be on and adjust intelligently when temperature changes.

Environmental Conditions	Requirements
Operating temperature	0°C to 40°C
Operating humidity	20%-80% (non-condensation)
Storage temperature	-20°C to 70 °C
Altitude	≤2,000m
Pollution degree	Pollution degree 2
Installation category	II


NOTE

To make accurate measurements, allow the instrument to warm up for 30 min before operation.

Regulatory Markings

	<p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.</p>
	<p>The instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard the electrical/electronic product in domestic household waste.</p>
	<p>This symbol indicates the time period during which no hazardous or toxic substances are expected to leak or deteriorate during normal use. The expected service life of the product is 10 years. The product can be used safely during the 10-year Environment Friendly Use Period (EFUP). Upon expiration of the EFUP, the product must be immediately recycled.</p>

Waste Electrical and Electronic Equipment (WEEE) Directive



2002/96/EC Waste Electrical and Electronic Equipment (WEEE) Directive

This product complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment classifications described in the Annex I of the WEEE Directive, this instrument is classified as a "Monitoring and Control Instrument" product.

To return this unwanted instrument, contact your nearest ITECH office.

Compliance Information

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low-Voltage Directive (Safety) 2014/35/EU

Conforms with the following product standards:

EMC Standard

IEC 61326-1:2012/ EN 61326-1:2013 ¹²³

Reference Standards

CISPR 11:2009+A1:2010/ EN 55011:2009+A1:2010 (Group 1, Class A)

IEC 61000-4-2:2008/ EN 61000-4-2:2009

IEC 61000-4-3:2006+A1:2007+A2:2010/ EN 61000-4-3:2006+A1:2008+A2:2010

IEC 61000-4-4:2004+A1:2010/ EN 61000-4-4:2004+A1:2010

IEC 61000-4-5:2005/ EN 61000-4-5:2006

IEC 61000-4-6:2008/ EN 61000-4-6:2009

IEC 61000-4-11:2004/ EN 61000-4-11:2004

1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

Safety Standard

IEC 61010-1:2010/ EN 61010-1:2010

Contents

Quality Certification and Assurance.....	i
Warranty	i
Limitation of Warranty	i
Safety Symbols.....	i
Safety Precautions	ii
Environmental Conditions.....	ii
Regulatory Markings.....	iii
Waste Electrical and Electronic Equipment (WEEE) Directive	iii
Compliance Information	iv
Chapter1 Installing the Instrument.....	1
1.1 Verifying the Shipment.....	1
1.2 Instrument Size Introduction	1
1.3 Racking Mount the Instrument.....	3
1.4 Connecting the Power Cord	3
1.5 Connecting Test Lines (Optional).....	4
Chapter2 Quick Start	6
2.1 Brief Introduction.....	6
2.2 Front Panel Introduction.....	6
2.3 Keyboard Introduction	8
2.4 Rear Panel Introduction.....	9
2.5 Power-on Selftest	9
2.6 Output Checkout	11
Chapter3 Functions and Characteristics	13
3.1 Front-panel Operation Overview.....	13
3.2 Setting Voltage	13
3.3 Setting Current	14
3.4 Saving and Recalling Operation.....	14
3.5 Menu Operation.....	15
3.6 Over Voltage Protection Function	22
3.6 Output Operation.....	23
3.7 Remote Sense.....	23
3.8 Milliohm Meter	23
3.9 Voltage Meter	24
Chapter4 Technical Specification.....	25
4.1 Specifications	25
4.2 Supplemental Characteristics	26
Chapter5 Remote Operation Mode	28
5.1 Communication Cable.....	28
5.2 Communication between Power Supply and Computer.....	29
Appendix.....	30
Specifications of Red and Black Test Lines	30

Chapter1 Installing the Instrument

1.1 Verifying the Shipment

Unpack the box and check the contents before operating the instrument. If wrong items have been delivered, if items are missing, or if there is a defect with the appearance of the items, contact the dealer from which you purchased the instrument immediately. The package contents include:

Checklist of Package Contents

Item	Qty.	Model	Remarks
IT6100 power supply	x1	IT6100 series	The IT6100 series include: IT6151/IT6152/IT6153/IT6154/IT6162/IT6163/IT6164
Power cord	x1	IT-E171/IT-E172 /IT-E173/IT-E174	User may select an appropriate power cord that matches the specifications of power socket used in the area. See the Section Connecting the Power Cord for details.
USB cable	x1	-	-
CD	x1	-	It contains IT6100 power supply User's Manual, Programming Guide and other user documentations.
Ex-factory Test Report	x1	-	It is the test report of the instrument before delivery.



Note

Upon verification of the shipment, keep the package and relevant contents thereof in a safe place. When returning the instrument for warranty service or repair, the specified packing requirements shall be met. Refer to IT6100 User's Manual for detailed requirements on returns.

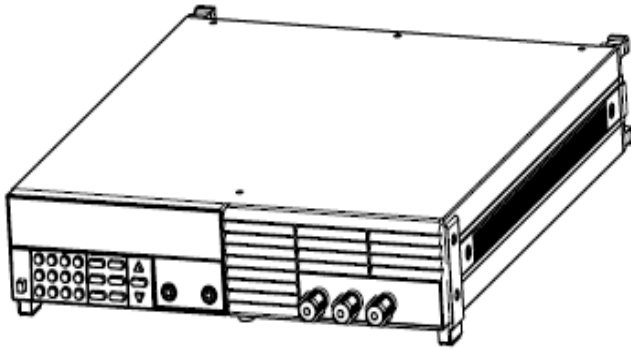
IT6100 series power supply has the following optional accessory:

- IT-E151: 19-inch rack mount
- IT-E121:RS232 communication cable
- IT-E122: USB communication cable
- IT-E123:RS485 communication cable

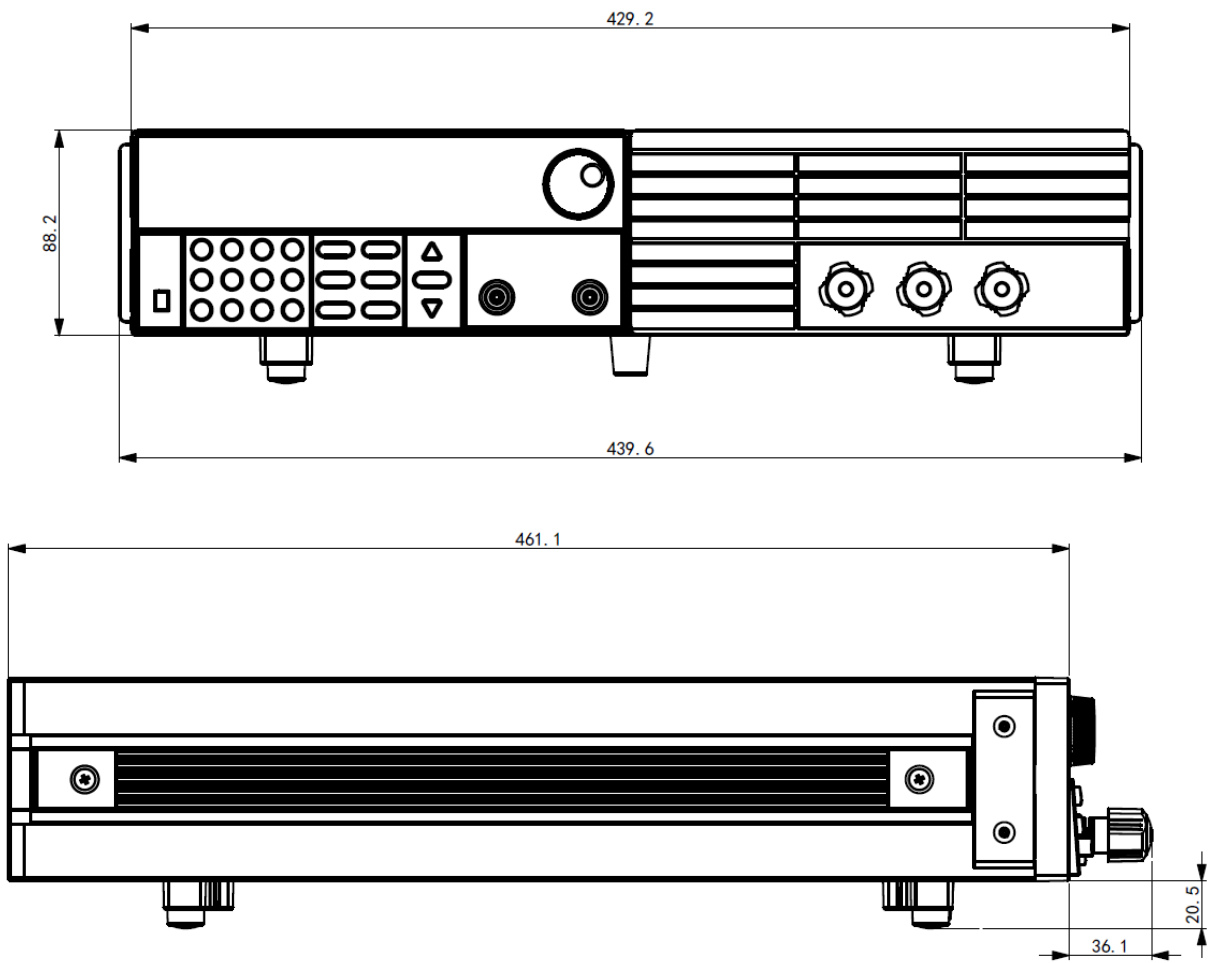
1.2 Instrument Size Introduction

The instrument should be installed at well-ventilated and rational-sized space. Please select appropriate space for installation based on the power supply size.

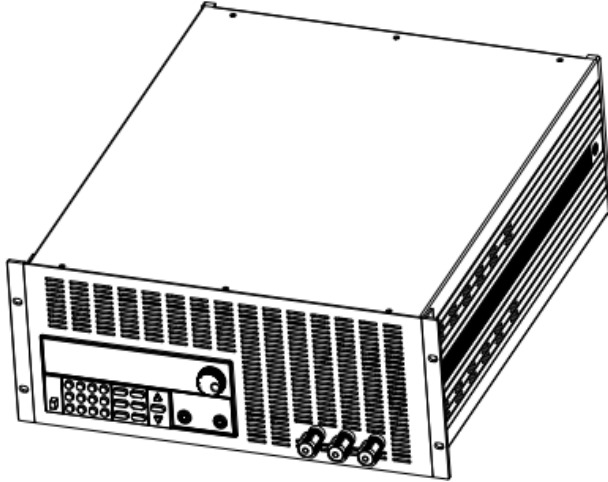
Model IT6150 Series



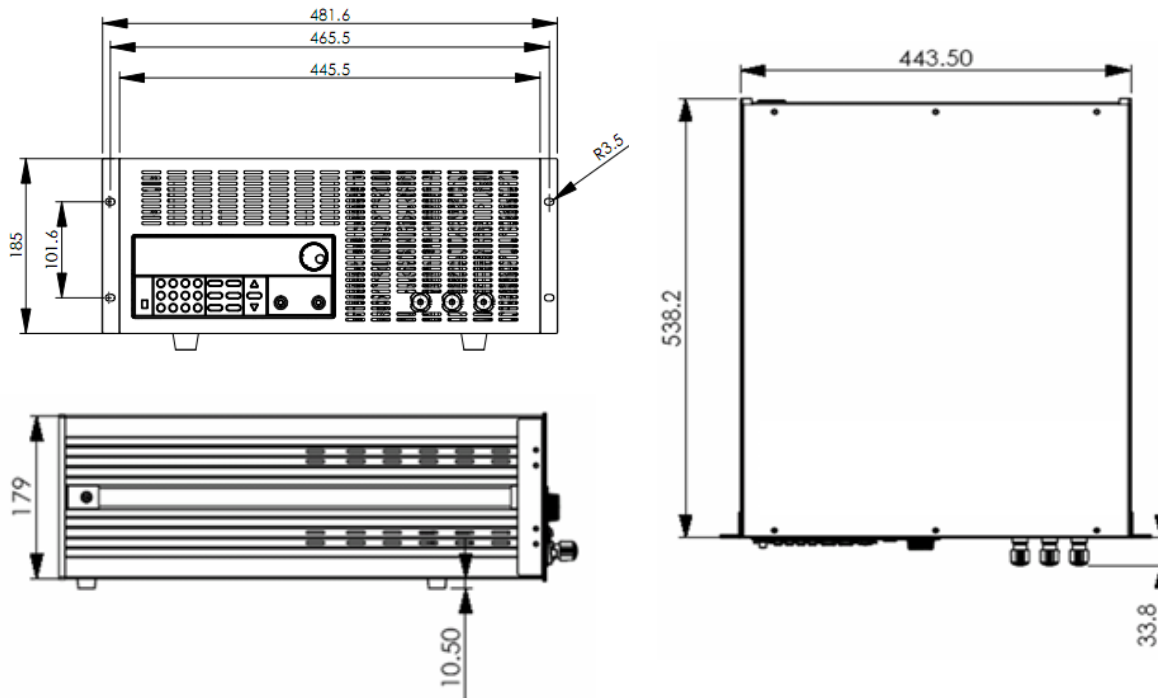
Detailed dimensional drawings



Model IT6160 Series



Detailed dimensional drawings



1.3 Racking Mount the Instrument

You can mount the IT6150 series power supply in a standard 19-inch rack cabinet. For details, please see the corresponding rack mounting installation instruction.

1.4 Connecting the Power Cord

Before connecting the power cord, please ensure the power switch of the instrument is turned OFF. Only use the power cord supplied as a standard accessory. A summary of connection procedures is given below.

AC power input level

IT6150 series power supply working voltage is 110V and 220V. Please pay attention to the AC power input level as below.

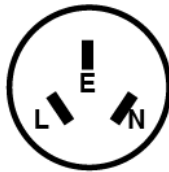
AC power input level:

- Option Opt.01: 220VAC \pm 10%, 47 to 63 Hz
- Option Opt.02: 110 VAC \pm 10%, 47 to 63 Hz

Categories of power cords

IT6100 series power supply provides the standard power cords as below.

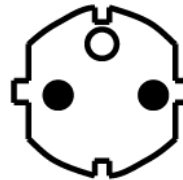
Please select appropriate power cords appropriate to local voltage based on the specifications of power cords below. If purchased model fails to meet local voltage requirements, please contact distributor or factory for change.



China
IT-E171



America, Canada,
Japan
IT-E172



Europe
IT-E173



Britain
IT-E174

1.5 Connecting Test Lines (Optional)

Test lines are not standard accessories of the instrument. Please select optional red and black test lines for individual sales based on the maximum current value. For specifications of test lines and maximum current values, refer to “Specifications of Red and Black Test Lines” in “Appendix”.

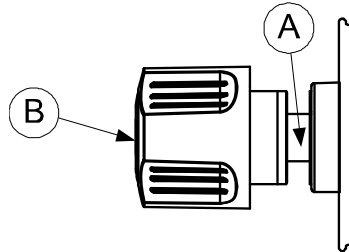
WARNING

- Before connecting test lines, be sure to switch off the instrument. Power switch is in Off position. Otherwise, contact with output terminals in rear panel may cause electrical shock.
- To avoid electrical shock, before testing, please make sure the rating values of the testing lines, and do not measure the current that higher than the rating value. All test lines shall be capable of withstanding the maximum short circuit output current of the power supply without causing overheat.
- If several loads are provided, each pair of load wires shall safely withstand the rated short circuit output current of the power supply under full load.
- Always use test lines provided by ITECH to connect the equipment. If test lines from other factories are used, please check that the test line can withstand maximum current.
- During wiring, check that the anode and cathode of the test lines are properly and tightly connected; anode ON and cathode OFF are prohibited.

Introduction of Binding Posts

The maximum rated current of the terminal at position (A) is the maximum rated output current of the instrument. Securely fasten all wires by hand-tightening the binding posts. You can also insert standard banana plugs into the front of the connectors as shown in (B), and the maximum rated current at (B) is 10 A.

IT6150 series:



Connecting the DUT

Test line connection is given below taking local measurement as example. For details of local and remote measurements, refer to “**Terminals at rear panel**”.

1. Before connecting the test lines, be sure that the instrument Power is in Off position.
2. Check whether the shorting clip of Sense terminal is correctly mounted.
3. Unscrew the screws of the output terminals and connect the red and black test lines to the output terminals. Re-tighten the screws.

When maximum current that one test line can withstand fails to meet the current rated current, use several pieces of red and black test lines. For example, the maximum current is 1,200A, then 4 pieces of 360A red and black lines are required.

4. Directly connect the other end of the red and black lines to the DUT terminal.

Chapter2 Quick Start

2.1 Brief Introduction

IT6100 Series power supplies are high resolution and high speed programmable DC power supplies. This series have very small size of 2U, and they are equipped with $5\frac{1}{2}$ digital voltage meter and $m\Omega$ meter. That means you don't need to invest extra money to purchase digital meter. This series offer flexible solution to general laboratory and workshop requirement.

- VFD display
- Linear programmable power supply with low ripple and noise
- Very high accuracy and resolution of 0.1mV/0.1mA
- High rise speed<30mS
- Equipped with $5\frac{1}{2}$ digital voltage meter and $m\Omega$ meter
- Small size can be installed in standard 19" rack or bench top
- Remote control via USB/RS232/GPIB
- Limit voltage protection
- Over current/temperature protection
- Free software for control the machine on computer

Model	Voltage	Current	Power
IT6151	5.2V	60A	312W
IT6152	20V	27A	540W
IT6153	30V	18A	540W
IT6154	60V	9A	540W
IT6162	20V	48A	960W
IT6163	30V	32A	960W
IT6164	60V	16A	960W

2.2 Front Panel Introduction

IT6150 Series' Front Panel as shown below.

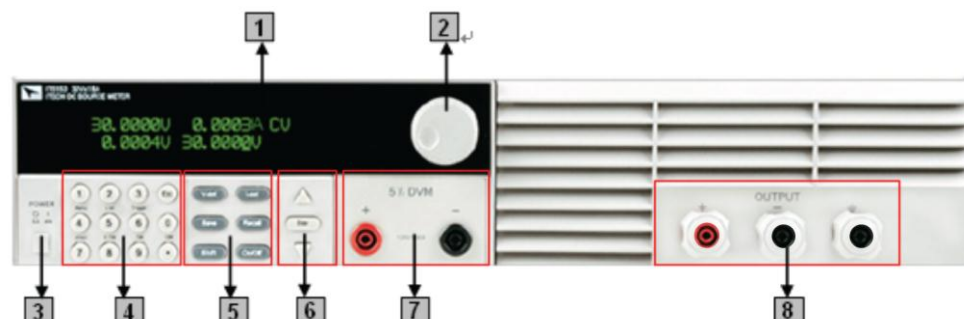
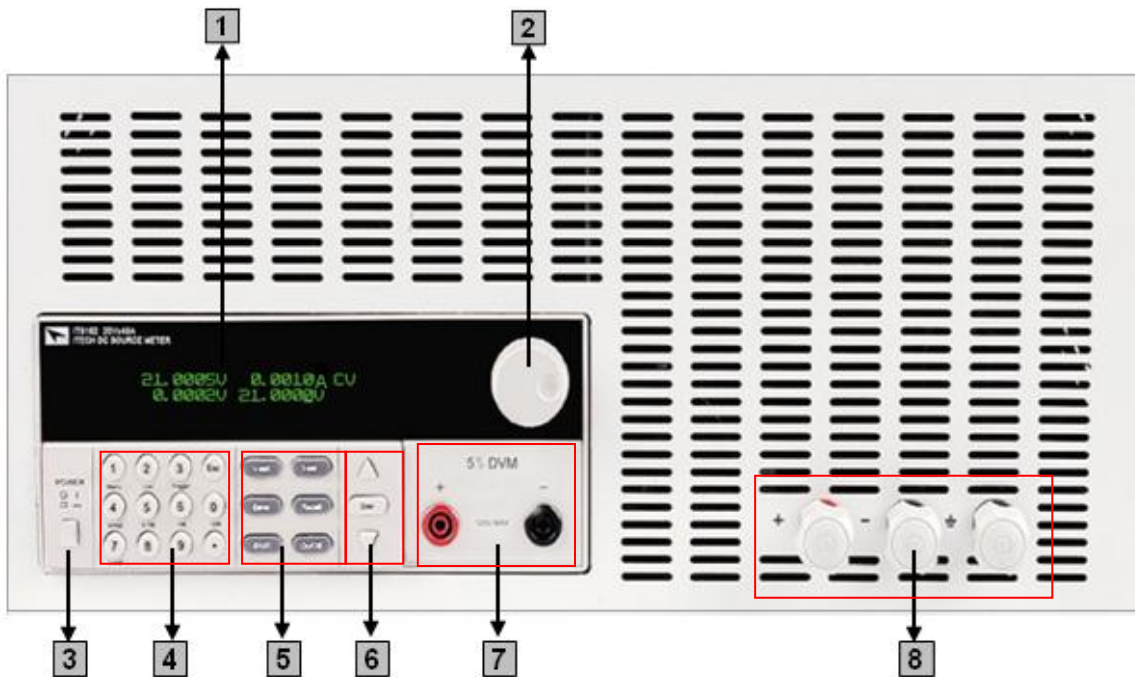


Fig 1.2 IT6150 series' front panel

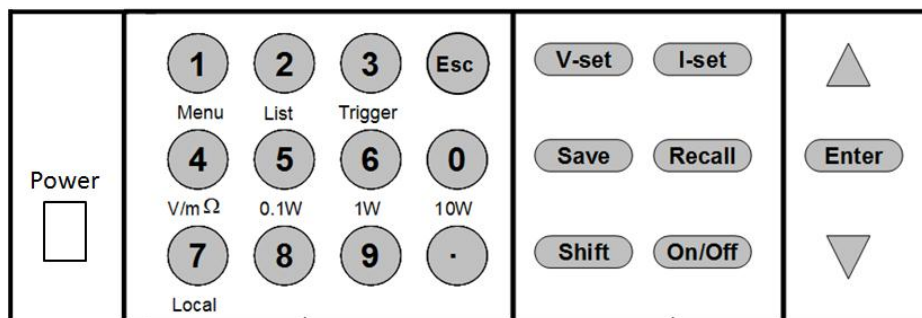
- 1 VFD display
- 2 Rotary knob
- 3 Power switch
- 4 Numeric keys and ESC key
- 5 Function keys
- 6 Up, down key and ENTER key
- 7 DVM input terminals
- 8 Output terminals and ground terminal

IT6160 Series' Front Panel as shown below.




- 1 VFD display
- 2 Rotary knob
- 3 Power switch
- 4 Numeric keys and ESC key
- 5 Function keys
- 6 Up, down key and ENTER key
- 7 DVM input terminals
- 8 Output and ground terminals


















2.3 Keyboard Introduction



Detailed description of keys:

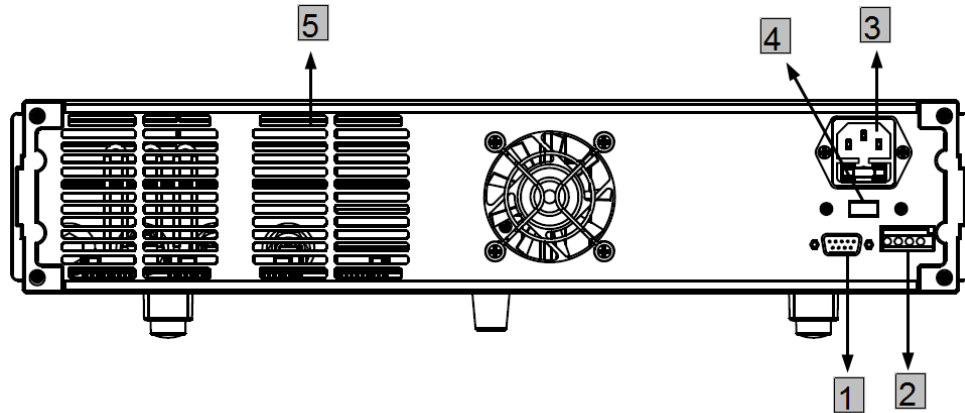
keys	Name and functions
Power	Power on the instrument.
0~9	Numeric button
•	Dot mark.
Esc	Esc key. Exit under any conditions.
V-set	Set the voltage value
I-set	Set the current value
Save	Save the currently data of the power supply to internal register
Recall	Recall the data from the internal register
On/Off	Set the output state of power supply
Shift	Use it with multiple key
▲	Up key. Select menu items or increase output voltage in menu operation.
▼	Down key. Select menu items or decrease output voltage in menu operation.
Enter	Enter key.

Combination keys. Press  (Shift) button first and then other keys to achieve all kinds functions in the following table.

 +  (Menu)	Combine with  key to realize menu operation and set the corresponding parameters of power supply.
 +  (List)	Set LIST operation parameters.
 +  (Trigger)	Cause an immediate trigger.
 +  (V/mΩ)	Voltmeter/Milliohm meter
 +  (0.1W)	Milliohm meter 0.1W range.
 +  (1W)	Milliohm meter 1W range.
 +  (10W)	Milliohm meter 10W range.
 +  (Local)	Local key. Remote mode switch to local mode.

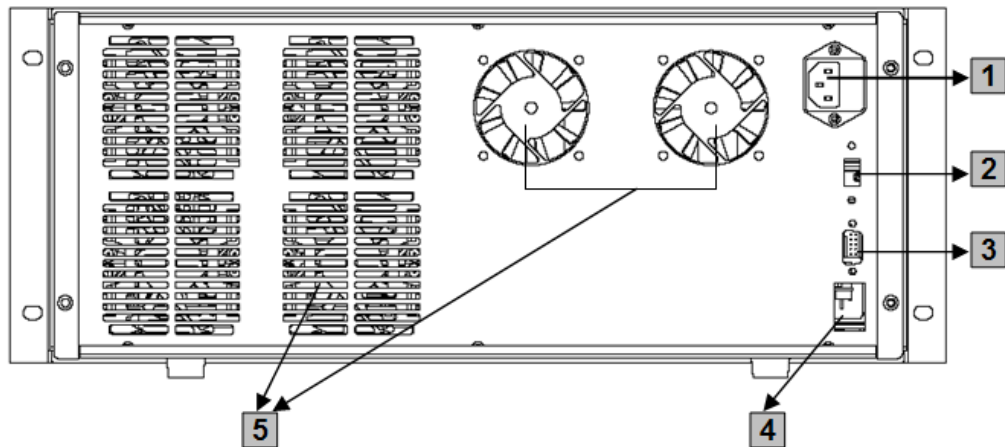
2.4 Rear Panel Introduction

IT6150 Series' Rear Panel as shown below.



- 1 9-Pin COM port interface connector
- 2 4-Pin Trigger and Remote sensing connectors
- 3 Power socket
- 4 Power switch (110V / 220V)
- 5 Cooling window

IT6160 Series' Rear Panel as shown below.



- 1 Power socket
- 2 Power switch (110V / 220V)
- 3 9-Pin COM port interface connector
- 4 4-Pin Trigger and Remote sensing connectors
- 5 Cooling window

2.5 Power-on Selftest

A successful selftest indicates that the purchased power product meets delivery

standards and is available for normal usage.

Before operation, please confirm that you have fully understood the safety instructions.

WARNING

- To avoid burning out, be sure to confirm that power voltage matches with supply voltage.
- Be sure to connect the main power socket to the power outlet of protective grounding. Do not use terminal board without protective grounding. Before operation, be sure that the power supply is well grounded.
- To avoid burning out, pay attention to marks of positive and negative polarities before wiring.

Selftest steps

Normal selftest procedures:

1. Correctly connect the power cord. Press **Power** key to start up.
2. After selftest, VFD display the output voltage and current status as below:

0.000V	0.00000A	OFF
0.000V	3.00<u>0</u>V	

Error Information References

The following error information may occur when an error occurs during Power On self-test:

- If the EEPROM was damaged, the VFD will display “EEPROM Error”.
- If the latest operation data in EEPROM is lost, then VFD will display “Error Config Data”.
- If the calibration data in EEPROM is lost, then VFD will display “Error Calibration Data”.
- If the factory calibration data in EEPROM is lost, and then the VFD will display “Error Factory Cal.Data”.

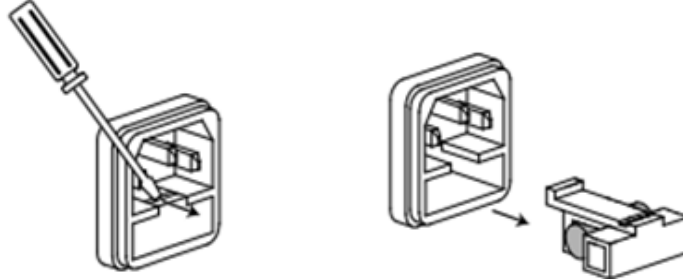
Exception handling

If the power supply cannot start normally, please check and take measures by reference to steps below.

1. Check whether the power cord is correctly connected and confirm whether the power supply is powered.
 Correct wiring of power cord => 2
 Incorrect wiring of power cord => Re-connect the power cord and check whether the exception is removed.
2. Check whether the power in On. Power key is under “**I**” On status.
 Yes => 3
 No => Please check the Power key to start power and check whether the

exception is removed.

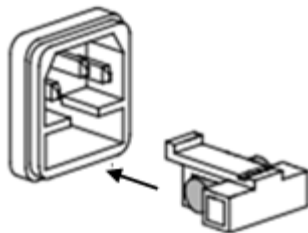
3. Check whether the fuse of power supply is burned out.
If yes, change fuse. Detailed steps:
 1. Use a screwdriver to push and turn the fuse box on the rear panel of the power supply, refer to the below picture.



Fuse specification list

Model	Fuse Specification (110VAC)	Fuse Specification (220VAC)
IT6151	T10A 250V	T5A 250V
IT6152	T10A 250V	T5A 250V
IT6153	T10A 250V	T5A 250V
IT6154	T10A 250V	T5A 250V
IT6162	Does not support 110V AC input	T10A 250V
IT6163		
IT6164		

2. After the fuse box is opened, you can see the fuse in it. Please replace with a fuse of the same specification.



2.6 Output Checkout

The following procedures check to ensure that the power supply develops its rated outputs and properly responds to operation from the front panel.

2.6.1 Voltage Output Checkout

The following steps verify basic voltage functions without load.

1. Turn on the power supply.
2. Enable the outputs
Press **Out on/off** key to let the CV annunciator turn on to light.
3. Set the voltage value
Set some different voltage values, then wait till the Meter mode to check if the

VFD displayed voltage value is the same as the set voltage value, and to check if the VFD displayed current value is nearly zero.

4. Ensure that the voltage can be adjusted from zero to the full rated value.

2.6.2 Current Output Checkout

The following steps check basic current functions with a short across the power supply's output.

1. Turn on the power supply.

2. Disable the output

Press **On/Off** key to ensure that the output is disabled.

3. Connect a short across (+) and (-) output terminals with an insulated test lead.

Use a wire size sufficient to handle the maximum current.

4. Enable the output

5. Adjust the voltage value to 1.0 volt

Adjust the voltage to 1.0 volt to ensure the power supply is in CC operation mode. The CC annunciator will turn on.

6. Adjust the current value

Set some different voltage values, then wait till the Meter mode to check if the VFD displayed current value is the same as the set voltage value, and to check if the VFD displayed voltage value is nearly zero

7. Ensure that the current can be adjusted from zero to the full rated value

8. Turn off the power supply and remove the short wire from the output terminals

Chapter3 Functions and Characteristics

This chapter elaborates on the functions and characteristics of IT6100 series power supply. Contents following sections:

- Front-Panel Operation Overview
- Setting Voltage
- Setting Current
- Saving and Recalling Operation
- Menu Operation
- Output Operation
- Remote Sense
- Milliohm Meter
- Voltage Meter

3.1 Front-panel Operation Overview

The following section describes an overview of the front-panel keys before operating your power supply.

1. The power supply is shipped from the factory configured in the front-panel operation mode. At power-on, the power supply is automatically set to operate in the front-panel operation mode. When in this mode, the front panel keys can be used.
2. When the power supply is in remote operation mode, you cannot use the front-panel. A change between front-panel and remote operation modes will not result in any change in the output parameters. You can change the front-panel and remote operation modes by computer.
3. The output of the power supply can be enabled or disabled from the front panel by pressing **On/Off** key.
4. The VFD display shows the present operating status of the power supply with annunciators. Turn on the power supply, VFD displays two lines data. The first line shows the actual output voltage value, current value and the state of the power supply. The second line shows the voltage value tested by the voltage meter and the output value of the power supply.

3.2 Setting Voltage

The constant voltage range is from 0V to the maximum voltage value of each model. It is very easy for you to set the constant voltage output. You have 2 solutions to set the constant voltage value.

Solution1:

Step1: Power on the IT6100 series instrument.

Step2: Press the ▲ and ▼ keys to change the value.

Solution2:

Step1: Power on the IT6100 series instrument.

Step2: Press **V-set** .

Step3: Use the numeric keys **0** to **9** or **▲** and **▼** keys to change the voltage value.

Step4: Press **Enter** to confirm.

Solution3:

Step1: Power on the IT6100 series instrument.

Step2: Press **V-set** .

Step3: Use rotary knob  to adjust the voltage value.

Setp4: Press **Enter** to confirm.

3.3 Setting Current

The constant current output range is from 0A to the maximum current value of each type. It is very easy for you to set the constant current output.

Solution1:

Step1: Power on the IT6100 series instrument.

Step2: Press **I-Set** key.

Step3: Use the numeric keys **0** to **9** or use **▲** and **▼** keys to change the current value.

Step4: Press **Enter** key to confirm the value.

Solution2:

Step1: Power on the IT6100 series instrument.

Step2: Press **I-Set** key.

Step3: Use rotary knob  to adjust the voltage value.

Step4: Press **Enter** key to confirm the value.

3.4 Saving and Recalling Operation

You can use **Save** or **Recall** or use the SCPI order *SAV、*RCL to store up to 50 different output states in storage register locations(1 to 50). If the fast recall function is turned on, you can recall the saved settings by pressing numerical key (0~9) . You can store the followings: the maximum output voltage value, the voltage setting value, the current setting value and the step value of voltage.

Saving Operation: You can use **Save** and 0~50 numeric key, press **Enter** , and store the parameter of IT6100 series into the register.

Recalling Operation: You can use **Recall** and 0~50 numeric key, press **Enter** , and recall the parameter stored before from the register.

3.5 Menu Operation

Menu Description

Press **MENU** to indicate operation mode. View the menu in VFD, and use ▲ and ▼ to scroll through the complete menu list as following. If press **ENTER**, you could get the selected menu function. Press **ESC** back to the previous menu selection page.

MENU		
Config		
	Config Init.	Return to the factory default setup value.
	Out Recall	Setting Power-on state of power supply.
	On	When users turn on the power supply; its setup value will keep the state of last time as users turned off the power supply.
	Off<Default>	Disable this function.
	PWR-ON Recall	Setting power-on parameter of power supply
	On	When users turn on the power supply; its setup value will keep the state of last time as users turned off the power supply.
	Off<Default>	Disable this function.
	Key Sound Set	Keypad sound setting.
	On<Default>	Enable key sound.
	Off	Disable key sound
	Knob Lock Set	Setup Rotary knob lock state.
	On	Lock Rotary knob.
	Off< Default >	Unlock Rotary knob.
	Remote Sense	Setup voltage measurement Mode.
	On	The electronic load will measure input voltage from the remote sense connector.
	Off< Default >	The power supply will measure input value from the front panel connector.
	ShortCut Recall	Quickly recall the data stored before
	On	Enable this function
	Off<Default>	Disable this function
	OVP Set	Setting over voltage protection
	On	Enable this function
	Off< Default >	Disable this function
	Meter Rate Set	Setting the speed of power supply
	High	High speed
	Low< Default >	Low speed
	Baudrate set	Setting baud rate
	Baudrate 4800 < Default >	
	Baudrate 9600	
	Baudrate 19200	
	Baudrate 38400	
	Comm. Parity	Communication parity bit set.
	None< Default >	

	Even	
	Odd	
	Address Set	Setting communication address(range from 0to 254)
	Address= * *	
	Port Mode	Select function of port
	Trigger< Def >	
	R/DIF	
	DIGITAL I/O	
	Trig Source	Setting trigger mode
	Immediat<Def>	Trigger signals from Shift + Trigger key
	External	Trigger signals from the TRIG connector in the rear panel.
	Bus	Communication command trigger mode.
	RI Mode	Control the output mode
	Off< Default >	Disable this function
	Latching	
	Live	
	DFI Source	Discrete Fault Indicator
	Off< Default >	
	QUES	Question Bit
	OPER	Operation Bit
	ESB	Event State Bit
	RQS	Require Bit
	Key Lock Set	Setting keypad password. Press ENTER directly to disable the key lock function.
	Password= * * * *	
	Exit	
	System Set	
	Max Volt. set	Setup the Maximum Voltage.
	Max= * * * *	
	Step Volt Set	Set voltage step
	Step= * * * *	
	Exit	
	List Set	
	Call ListFile	Recall list operation file.
	Edit ListFile	Edit list operation file.
	Continuous	
	Once	
	Repeat	
	Step	
	Once	
	Repeat	
	Save Mode Set	Users can choose 4 kinds of memory space to save the list file.
	8 X 25 Steps	
	4 X 50 Steps	
	2 X 100 Steps	

	1 X200 Steps	
	Exit	
Out Timer	On	Output timer,if you start this function, the power supply will turn off after the time you set.
	Timer State	Setting POWER ON timer state
	On	When users choose the timer state ON, and then turn on the power supply's output, the POWER ON TIMER will start working, and when the POWER ON TIMER is reach the setup time, the power supply's output will turn off automatically.
	Off< Default >	
	Timer Set	Setting time of POWER ON timer.
	Timer= * * S	
	Exit	
Exit		



Note:

Press **Shift** + **1** (Menu) to enter menu operation, then press **Esc** to exit. During any function operations, press **Esc** key to exit the current operation state.

Output Recall

This function can help you set the output state when the power supply is powered on. If you select **On**, the power supply will keep the state of last time as it is turned off. If you select **Off**, this function is disabled. **Default is On.**

Key Sound

This instruction can switch on/off the buzzing sound when you press any key, if you select **On**, the buzzer will sound when any key was pressed. If you select **Off**, the buzzer will not sound when the keys were pressed. **Default is On.**

ShortCut Recall

This function can help you recall the data stored before.

Option:

1. Press **Shift** + **MENU** into menu operation, VFD displays **Config**, press **ENTER** to confirm.
2. Press **▲** and **▼** to select **ShortCut Recall**, press **ENTER** to confirm.
3. Press **▲** and **▼** to select **On**, press **ENTER** to confirm.
4. Press **ESC** two times to escape menu operation.
5. Press **V-set** or **I-set**, select **0** to **9** to set voltage value or current value, press **ENTER** to confirm.
6. Press **Save**, VFD displays **Store 1**, select **0** to **9** to set the register

number (range from 1 to 50) , press **ENTER** to confirm.

- You can recall the data stored before by pressing the register number.

Setting Communication Baud Rate (>BAUDRATE)

This function can help you set communication baud rate. There are 4 kinds of baud rate, 4800HZ, 9600HZ, 19200HZ and 38400HZ. Make sure that power's baud rate is as the same as your computer before communication. **Default baud rate is 4800HZ.**

Setting Communication Parity Bit (>Comm.Parity)

This function can set communication parity bit. There are three kinds of communication parity bit, None, Even and Odd. Make sure that the communication parity bit set to None during remote communication operation. **Default communication parity bit is None.**

Setting Address (>ADDRESS)

This instruction can set the communication address for each power supply. The address range is from 0 to 30. Before the communication, you must make sure that there is same address between the power supply and the computer. **Default address is 0.**

Option:

- Press **Shift** + **MENU** into menu operation, VFD displays **Config**, press **ENTER** to confirm.
- VFD displays **Address= * *** , select **0** to **9** and set address, press **ENTER** to confirm.
- Press **ESC** two times to escape menu operation.

Setting Port Mode

The level of the port on the rear panel is TTL, and the port has 3 kinds of function as follows:

TRIGGER: pin1 and pin 2 can be used as the external trigger source for power supply, and can control the list operation.

RI/DFI: Inhibit Input can control the output state of power supply, Fault Output can find fault of power supply.

DIGITAL I/O: It can read and control output and input state.

Pin \ mode	Trigger	RI/DFI	DIGITAL I/O
1	Trigger in	Inhibit Input	Digital Input
2	GND	GND	GND
3	No Use	Fault Output	Digital Output
4	No Use	GND	GND

Setting Trigger Operation (Shift+Trigger)

The power supply has 3 kinds of trigger mode. You must choose trigger source before trigger operating.

Trigger Key: If this function is enabled, press **Shift** + **Trigger**, the power supply will start trigger operation once.

External trigger signal (TTL): There is a trigger input port on the rear panel. When this function is enabled, please give this trigger input port a pulse about 5 mS, and the power supply will start trigger operation once.

Bus: When this function is enabled, and the power supply receives order***TRG** or **TRigger**, the power supply will start trigger operation once.

Setting Remote Inhibit

RI input has 3 modes: **LATCHING**, **LIVE**, **OFF**

LATCHING: When the level of **RI** port changes from high to low, the output of power supply is off.

LIVE: The output state of power supply changes along with the level of **RI** port. If the level of **RI** is high, the output is on; and the level of **RI** is low, the output of power supply is off.

OFF: The level state of **RI** do not affect the output state of power supply.

Setting Discrete Fault Indicator

DFI source contains **QUES**、**OPER**、**ESB**、**RQS**、**OFF**.

QUES: The output level of DFI changes along with the state of **QUES** bit. When **QUES** bit is 1, DFI outputs low level. When **QUES** bit is 0, DFI outputs high level.

OPER: The output level of DFI changes along with the state of **OPER** bit.

ESB: The output level of DFI changes along with the state of **ESB** bit.

RQS: The output level of DFI changes along with the state of **RQS** bit.

OFF: The output level of DFI remains high.

Setting KEY LOCK

This instruction can set a password (1 through 4 digits) to lock the function keys operation. After setting the password, all the function keys on the front panel will be locked except the **OUT on/off** key. You must enter the correct password to unlock them, then you can continue to do the function key operation. If you don't want to lock the function keys, please don't press any number key when you enter the **>KEY LOCK** instruction, just press **ENTER** key to unlock it.



Note: When shipped from factory, there is no password and function keys are unlocked. The start bit of your desired password shouldn't be 0.

Setting Maximum Output Voltage (>Max Volt. Set)

The range of maximum voltage value is from 0V to full rated output voltage, the steps are as follows:

1. Press **Shift** + **1** (Menu) to enter menu function. VFD displays **>Config**,

- Press Δ and ∇ to select **>System Set**, then press **ENTER** to confirm.
2. Press Δ and ∇ to select **>Max Volt. Set**, then press **ENTER** to confirm.
3. VFD displays **Max=73.000V**, select **0-9** to set maximum voltage value, press **ENTER** to confirm.
4. Press **Esc** twice time to exit menu operation. **Default value of Max Volt. Set is full rated output voltage.**

List Set

Before you edit the list file, please set trigger source as “immediate” in the menu.

Action:

1. Press **Shift** + **Menu** into the menu.
2. Press up or down key to select **“Config”**, press **Enter** to confirm.
3. Press up or down key to select **“Trig Source”**, press **Enter** to confirm.
4. Press up or down key to select **“Immediat”**, press **Enter** to confirm.

You can make the input change order by editing every step value of list operation. The parameter of list operation includes the name of list file, input step (no more than 400 steps), step time (the minimum is 1mS) and every step value. The list file can be stored in ROM whose capacity is 4K, and it can be fast recalled. This store area is divided into A, B, C and D four areas. In area A, there is only 1 group whose capacity is 4Kb. In area B, there are 2 groups and each group’s capacity is 2Kb. In area C, there 4 groups and each group’s capacity is 1Kb. In area D, there are 8 groups and each group’s capacity is 512b.

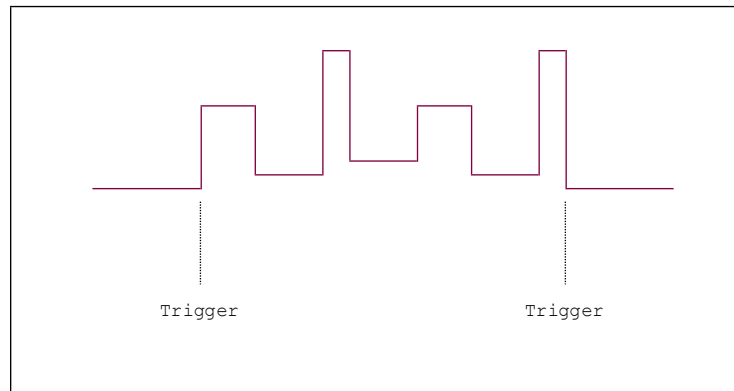
If the list operation mode is CONTINIOUS, when you receiving a trigger signal, the power supply will start list operation until the list operation is over or a trigger is received again.

Operation:

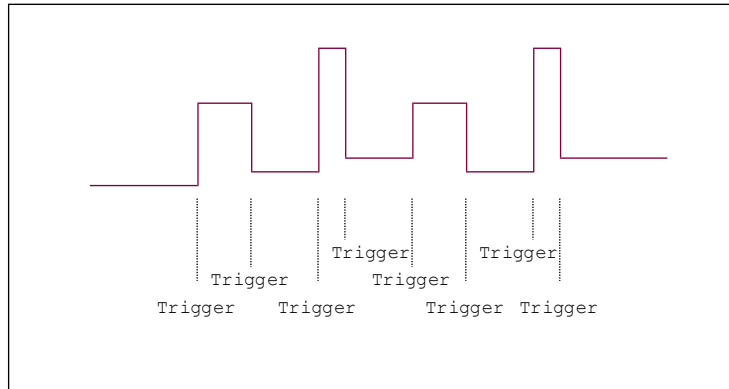
1. Press **Shift** + **Menu** into menu operation.
2. VFD displays **Config**, press ∇ to select **List Set**, press **Enter** to confirm.
3. VFD displays **Call ListFile**, press ∇ to select **Edit ListFile**, press **Enter** to confirm.
4. VFD displays **Continuous**, press **Enter** to confirm.
5. VFD displays **Once**, press ∇ to select **Repeat**, press **Enter** to confirm, select circle operation.
6. VFD displays **Second**, press ∇ to select **MilliSecond**, press **Enter** to confirm, select time unit.
7. VFD displays **List Count= _**, press numeric key or move the rotary knob, set circle times (in this example, count is 2),press **Enter** to confirm.
8. VFD displays **1th=*.***V**, press numeric key or move the rotary knob, set the maximum voltage, press **Enter** to confirm.
9. VFD displays **1th=*.***A**, press numeric key or move the rotary knob,

- set the maximum current, press **Enter** to confirm.
10. VFD displays **1th= * mS**, press numeric key or move the rotary knob, set delay time, press **Enter** to confirm.
 11. VFD displays **2th= * . * * * V**, press numeric key or move the rotary knob, set the maximum voltage, press **Enter** to confirm.
 12. VFD displays **2th= * . * * * A**, press numeric key or move the rotary knob, set the maximum current, press **Enter** to confirm.
 13. VFD displays **2th= * mS**, press numeric key or move the rotary knob, set delay time, press **Enter** to confirm.
 14. VFD display **Store File_**, press numeric key or move the rotary knob, set the register number (1 to 8) , press **Enter** to confirm.
 15. Press **Esc** two times to escape menu operation.
 16. Press **Shift** + **List** to set the list file, then press **Shift** + **Trigger** to run the list file. Press **Shift** + **List** to stop.

If you have edited several list files, you can call the list file that you need by “Call ListFile” function in the menu. Press **Esc** two times to exit menu operation. And then press **Shift** + **List** to set it, press **Shift** + **Trigger** to run the file that you call. Press **Shift** + **List** to stop running.



When the list operation mode is **STEP**, the power supply will go to the next step when receive a trigger signal.



Setting Output Timer Function (>Out On Timer)

The loading time of IT6100 power supply can be set. When the timer state is ON, the power supply output opens and starts with load. When the loading time reaches the set time, the output will be turned off automatically. When the timer state is OFF, the timer function will be disabled. Default value is OFF.

The detailed operations are as follows:

Set timer state:

1. Press **Shift** + **1** (Menu) to enter menu function, VFD displays **>Config**, press **▲** and **▼** to select **>Out On Timer**, then press **Enter** to confirm.
2. Press **▲** and **▼** to select **>Timer State**, then press **Enter** to confirm.
3. VFD displays **Off<Default>** (or On), press **▲** and **▼** to select On or Off, then press **Enter** to confirm.
4. Press **Esc** twice time to exit the operation.

Set the time of output timer:

1. Press **Shift** + **1** (Menu) to enter menu function, VFD displays **>Config**, press **▲** and **▼** to select **>Out On Timer**, then press **Enter** to confirm.
2. Press **▲** and **▼** to select **>Timer Set**, then press **Enter** to confirm.
3. VFD displays **Timer=20S**, press **0**-**9** to set time, then press **Enter** to confirm.
4. Press **Esc** twice time to exit the operation.

Digital I/O

When the digital port of the power supply mode is DIGITAL I/O and power supply is under remote sense, you could send SCPI order (DIGital:INPut[:STATe?]) and DIGital:OUTPut[:STATe?]) to read and set the state of output and input port.

3.6 Over Voltage Protection Function

When the output voltage exceeds the constant voltage by 5%, or the connection is unsuccessful under remote sense mode, the power supply will protect itself automatically. The power supply must be turned on again. When the power is in overvoltage protection, the output is off, and buzzer is mooring. VFD displays Over Voltage.

Over Voltage

When the power supply with other power supply is in parallel connection, please disable this function.

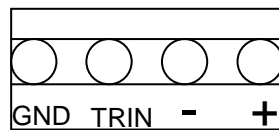
3.6 Output Operation

If you control the power supply by front panel, you can press **On/Off** and switch the state of output. If power supply is under remote sense, you can send SCPI order (OUTPut ON|OFF) to change the state of output.

3.7 Remote Sense

The wire connected the power supply and electronic load will produce voltage difference when the current of the power supply is so big. In order to make the measurement accuracy much accurate, there are 4 pin trigger and remote sensing connectors on the rear panel and you can use it to measure the output voltage of the tested instrument. You must set remote sense mode before you start remote test function.

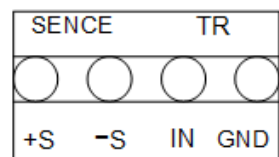
IT6150 4 pin connector in rear panel



GND, TRIN: Trigger port

-, +: Remote sense port

IT6160 4 pin connector in rear panel

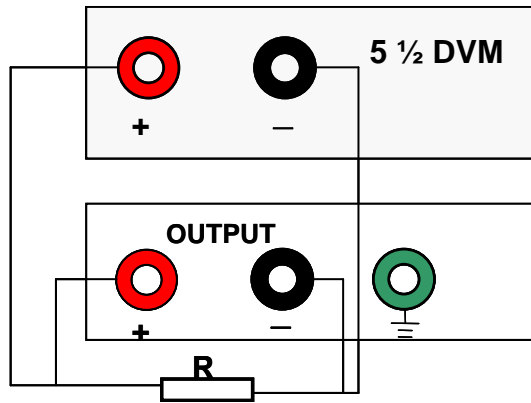


+S, -S: Remote sense port

IN, GND: Trigger port

3.8 Milliohm Meter

SOURCE METER can measure resistant value accurately and the biggest resistance it can measure is 1kΩ. In order to protect the resistor, please select the power range of the resistor before you measure it. Wiring diagram as follows:



There are 3 ranges to be chosen: 0.1W、1W、10W.

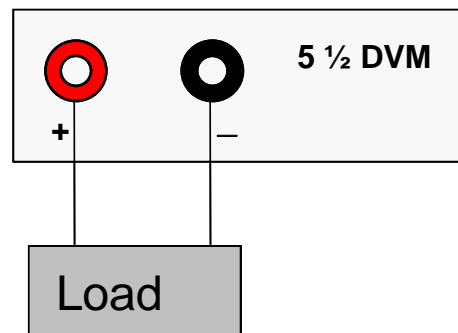
The accuracy of the measurement is <1%, the higher range you select, the more accurate result you can get.

Option:

1. Press **Shift** +V/m Ω (if VFD displays * * . * * V, press **Shift** +V/m Ω), set m: * *, you can measure resistance value.
2. Press **Shift** +0.1W /1W /10W, you can set different range of milliohm meter.

3.9 Voltage Meter

Wiring diagram as follows:



Press **Shift** +V/m Ω (if VFD displays **Range:** * * ,please press **Shift** +V/m Ω) , VFD displays * * . * * V, you can begin to test the voltage value.

The accuracy is <0.1%.

Chapter4 Technical Specification

4.1 Specifications

IT6150 Series High Resolution Power Supply

Parameter		IT6151	IT6152	IT6153	IT6154
Output Ratings (0 °C~40 °C)	Voltage	0~5.2V	0~20V	0~30V	0~60V
	Current	0~60A	0~27A	0~18A	0~9A
	LVP	0~5.5V	0~21V	0~31V	0~61V
The model of remote sense±(%ofoutput+offset)	Voltage	<0.05%+30mV	<0.05%+20mV	<0.05%+15mV	<0.05%+10mV
	Current	<0.1%+10mA	<0.1%+5mA		<0.1%+2mA
Line Regulation ±(%of output+offset)	Voltage	<0.02%+1mV	<0.02%+1mV		<0.02%+2mV
	Current	<0.1%+1mA	<0.01%+1mA		<0.01%+0.1mA
Setup resolution	Voltage	0.1mV	0.5mV		0.5mV
	Current	1mA	1mA		1mA
Readback resolution	Voltage	0.1mV	0.1mV		0.5mV
	Current	1mA	0.1mA		0.1mA
Setup accuracy, 12 months±(%of output+offset)	Voltage	0.02%+2mV	<0.02%+6mV		≤0.02%+12mV
	Current	<0.1%+30mA	<0.1%+15mA		<0.05%+10mA
Readback accuracy ±(%of output+offset)	Voltage	0.02%+1.5mV	0.02%+3mV		0.02%+6mV
	Current	<0.05%+15mA	<0.05%+10mA		<0.05%+5mA
Ripple (20Hz~20MHz)	Voltage	≤4mVp-p	≤4mVp-p		≤5mVp-p
	Current	<15mA _{rms}	<5mA _{rms}		<3mA _{rms}
Temperature Coefficient (0 °C~40 °C) ±(%of output+offset)	Voltage	<0.02%+2mV	<0.02%+5mV		<0.02%+10mV
	Current	<0.1%+30mA	<0.1%+15mA		<0.05%+5mA
Readback temperature coefficient±(%of output+offset)	Voltage	<0.02%+2mV	<0.02%+5mV		<0.02%+10mV
	Current	<0.1%+30mA	≤0.05%+10mA		≤0.05%+5mA
Dimension(mm)		429mmW×88.2mmH×458.9mmD			
Weight		29 kg			

IT6160 Series High Resolution Power Supply

Parameter		IT6162	IT6163	IT6164
Output Ratings (0 °C~40 °C)	Voltage	0~20V	0~30V	0~60V
	Current	0~48A	0~32A	0~16A
	LVP	0~21V	0~31V	0~61V

The model of remote sense \pm (%of output+offset)	Voltage	<0.05%+25mV	<0.05%+20mV	<0.05%+15mV
	Current	<0.05%+20mA		<0.05%+10mA
Line Regulation \pm (%of output+offset)	Voltage	<0.02%+1mV		<0.02%+2mV
	Current	<0.01%+1mA		<0.01%+0.5mA
Setup resolution	Voltage	0.5mV		1mV
	Current	1mA		0.5mA
Readback resolution	Voltage	0.1mV		0.5mV
	Current	0.5mA		0.1mA
Setup accuracy, 12 months \pm (%of output+offset)	Voltage	\pm 0.02%+10mV		\pm 0.02%+30mV
	Current	\pm 0.05%+10mA		\pm 0.05%+5mA
Readback accuracy \pm (%of output+offset)	Voltage	\pm 0.02%+15mV		\pm 0.02%+20mV
	Current	\pm 0.05%+10mA		\pm 0.05%+5mA
Ripple (20Hz~20MHz)	Voltage	<5mVp-p		<6mVp-p
	Current	<10mA _{rms}		<5mA _{rms}
Temperature Coefficient (0 °C~40 °C) \pm (%of output+offset)	Voltage	<0.02%+20mV		<0.02%+30mV
	Current	<0.05%+20mA		<0.05%+10mA
Readback temperature coefficient \pm (%of output+offset)	Voltage	<0.02%+20mV		<0.02%+30mV
	Current	<0.05%+10mA		<0.05%+5mA
Dimension(mm)	445mmW×180mmH×539mmD			
Weight	45kg			

* The above specifications may be subject to change without prior notice.

4.2 Supplemental Characteristics

State Storage Memory: Fifty (50) user-configurable stored states

Recommended Calibration Interval: Once a year

AC Input Ratings (selectable via switch on the rear panel):

Option Opt.01: 220VAC \pm 10%, 47 to 63 Hz

Option Opt.02: 110 VAC \pm 10%, 47 to 63 H

Maximum power:

IT6150 Series	IT6160 Series
1000VA	2000VA

Cooling: Fan cooled

Operating Temperature: 0 to 40 °C

Storage Temperature: -20 to 70 °C

Environmental Conditions

Designed for indoor use in an installation category II, pollution degree 2

environment. Designed to operate at maximum relative humidity of 95% and at altitudes of up to 2000 meters.

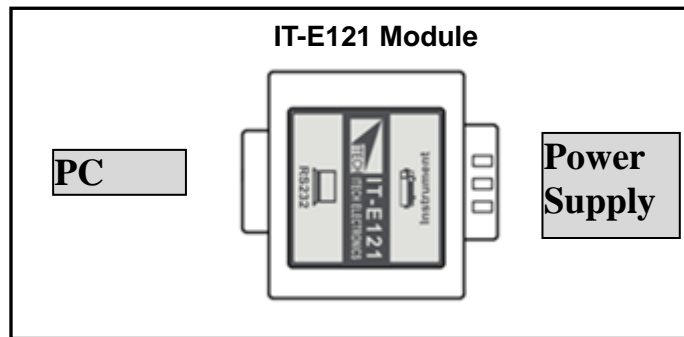
Chapter5 Remote Operation Mode

The DB9 interface connector on the rear panel of the power supply can be transferred to RS-232 interface, the following information will tell you how to use the computer to control the output of the power supply.

5.1 Communication Cable

IT-E121 RS232 Communication Cable

The DB9 interface connector on the rear panel of power supply is TTL voltage level; you can use the communication cable (IT-E121) to connect the DB9 interface connector of the power supply and the RS-232 interface connector of computer for the communication.

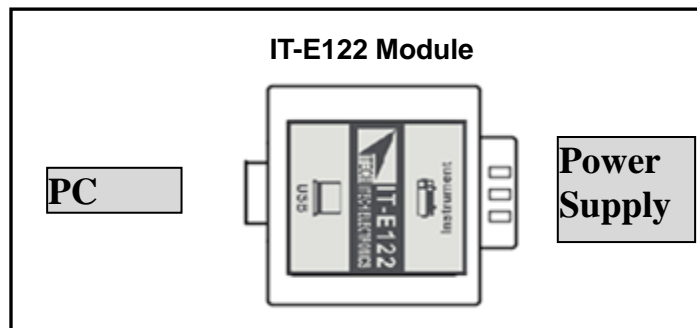


IT-E122 USB Communication Cable

The DB9 interface connector on the rear panel of power supply is TTL voltage level; you can use the communication cable (IT-E122) to connect the DB9 interface connector of the power supply and the USB interface connector of computer for the communication.

IT-E122 has a USB interface (male connector B) on one end, you can use IT-E122 and a standard USB extension cable (type B female connector at one end and type A at one end) to connect the DB9 interface connector of the power supply and the USB interface connector of computer for the communication.

After connecting the power supply and computer by USB, you need to install IT-E122 driver (see in ITECH CD or contact ITECH agent). The device manager of PC will display 'Prolific USB-to-Serial COM Port' after installing.





Forbidden to connect DB9 connector in power supply directly with PC or other RS232 port.

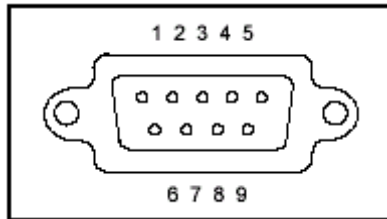
5.2 Communication between Power Supply and Computer

Before using the remote operation mode, please make sure that the baud rate and communication address in power supply are the same as in the computer software, otherwise, the communication will fail, you can change the baud rate and communication address from the front panel or from computer.

1. Address: the range is from 0 to 254, default setting is 0
2. Baud rate: 4800,9600,19200 and 38400 are selectable, default setting is 4800
3. Data bit:8 bit
4. Stop bit:1
5. Parity: None

Parity=None	Start Bit	8 Data Bits	Stop Bit	Stop Bit
-------------	-----------	-------------	----------	----------

1. End of String is '\n'(0x0a)
2. DB9 Interface Details



DB9 in the rear panel of power supply is TTL level signal. It can be connecting with standard PC interface through the isolated communication cable.

Appendix

Specifications of Red and Black Test Lines

ITECH provides you with optional red and black test lines, which individual sales and you can select for test. For specifications of ITECH test lines and maximum current values, refer to the table below.

Model	Specification	Cross section	Length
IT-E301/10A	10A	-	1m
IT-E301/30A	30A	6mm ²	1.2m
IT-E301/30A	30A	6mm ²	2m
IT-E301/60A	60A	20mm ²	1.5m
IT-E301/120A	120A	50mm ²	2m
IT-E301/240A	240A	70mm ²	1m
IT-E301/240A	240A	70mm ²	2m
IT-E301/360A	360A	95mm ²	2m

For maximum current of AWG copper wire, refer to table blow.

AWG	10	12	14	16	18	20	22	24	26	28
The Maximum current value (A)	40	25	20	13	10	7	5	3.5	2.5	1.7

Note: AWG (American Wire Gage), it means X wire (marked on the wire). The table above lists current capacity of single wire at working temperature of 30°C. For reference only.

Contact US

Thank you for purchasing ITECH products. If you have any doubt about this product, please contact us as follow.

1. Please refer to the CD-ROM of related user's manual in package.
2. Visit ITECH website www.itechate.com .
3. Select the most convenient contact for further consultation.