Digital-control IT6720 Series DC Power Supply User's Manual

Model: IT6720/IT6721
Version: V3.0

Notices

Manual Part Number

IT6720-402168

Revision

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Itech Electronic, Co., Ltd.

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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 IT6721/IT6720 series power supply meets all the published specifications at time of shipment from the factory.

Warranty service

ITECH Company will provide one-year warranty services for the product materials and manufacturing (excluding the following limitations).

- When warranty service or repair is needed, please send the product to the service unit specified by ITECH Company.
- When the product is sent to ITECH Company for warranty service, the customer must pay the one-way freight to the maintenance department of ITECH, and ITECH will be responsible for return freight.
- If the product is sent to ITECH for warranty service from other countries, the customer will be responsible for all the freight, duties and other taxes.

Limitation of Warranty

- Warranty service does not apply to the damage caused in the following circumstances:
- Damage resulting from customer-wired circuits or customer-supplied parts or accessories;
- Product which has been modified or repaired by the customer;
- Damage caused by the circuit installed by the customer or damage caused by operation of the product in non-specified environment;
- The product model or serial number is altered, deleted, removed or made illegible by customer;
- Damage caused by accidents, including but not limited to lightning, water, fire, abuse or negligence.

Safety signs

	Direct current		ON (power)
	Alternating current		OFF (power)
	Both direct and alternating current		Power-on state
	Protective earth (ground) terminal		Power-off state
	Earth (ground) terminal		Reference terminal
	Caution		Positive terminal

	Warning (refer to this manual for specific Warning or Caution information)	—	Negative terminal
	A chassis terminal	-	-

Safety Precautions

General safety precautions below must be followed in each phase of instrument operation. In case of failure to follow these precautions or specific warnings in other parts of the manual, violation against the safety standards related to the design, manufacture and purpose of the instrument will occur. If the user does not follow these precautions, ITECH will bear no responsibility arising there from.

WARNING

- The power supply is provided with a three-core power cord during delivery and should be connected to a three-core junction box. Before operation, be sure that the power supply is well grounded.
- Use electric wires of appropriate load. All loading wires should be capable of bearing maximum short-circuit of electronic load without overheating.
- 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.
- To prevent burnout, please pay special attention to positive and negative polarities of power supply during connection!
- Do not use damaged equipment. Please check the housing before using the equipment. Check whether the instrument is subject to cracking or is lack of plastic. Do not operate the instrument in the environment with explosive gas, steam or dust.
- Observe all tags on the equipment before connection.
- Do not install alternative parts on the instrument or perform any unauthorized modification.
- Do not use the equipment when the removable cover is dismantled or loose.
- Please use the power adapter supplied by the manufacturer to avoid accidental injury.
- Do not use the equipment on the life support system or other equipment with 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 IT6720/IT6721 series power supplies are only permitted to be used indoors and in low condensation areas, the following table shows the general environmental requirements for this instrument.

Environmental conditions	Requirement
Operating temperature	0°C - 40°C
Operating humidity	20% - 80% (non condensing)
Storage temperature	-20°C - 70 °C
Altitude	Operating up to 2,000 meters
Installation category	II
Pollution degree	Pollution degree 2

NOTE

In order to ensure the accuracy of measurement, it is recommended to operate the instrument half an hour after start-up.

Regulation tag

CE	The CE tag shows that the product complies with the provisions of all relevant European laws (if the year is shown, it indicates that the year when the design is approved).
UKCA	The UKCA tag shows that the product complies with the provisions of all relevant United Kingdom laws (if the year is shown, it indicates that the year when the design is approved).
	This instrument complies with the WEEE directive (2002/96/EC) tag requirements. This attached product tag shows that the electrical/electronic product cannot be discarded in household waste.
	This symbol indicates that no danger will happen or toxic substances will not leak or cause damage in normal use within the specified period. The service life of the product is 10 years. The product can be used safely within the environmental protection period; otherwise, the product should be put into the recycling system.

Waste electrical and electronic equipment (WEEE) directive

Waste electrical and electronic equipment (WEEE) directive, 2002/96/EC

The product complies with tag requirements of the WEEE directive (2002/96/EC). This tag indicates that the electronic equipment

cannot be disposed of as ordinary household waste.

Product Category
According to the equipment classification in Annex I of the WEEE directive, this instrument belongs to the “Monitoring” product.
If you want to return the unnecessary instrument, please contact the nearest sales office of ITECH.

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 [1][2][3]
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

Chapter I Acceptance and Installation

The power supply is a safety rated device with a protective earth terminal. Before installation or operation, please check and read the safety signs and instructions in this manual.

1.1 Confirm package contents

Open the package and check the contents of the box before operating the instrument, if there is any discrepancy, missing or appearance of wear and tear, please contact the seller quickly.

Box contents include:

Device name	Quantity	Model	Remarks
IT6720/IT6721 Digital-control DC Power Supply	x1	IT6720 series	IT6720 series include: IT6720/IT6721
Power Cord	x1	IT-E171/ IT-E172/ IT-E173/ IT-E174	The User may select different power cords based on local outlet specification. For detailed specifications, refer to 1.5 Connecting the Power Cord.
Calibration Certificate	x1	-	It is the calibration certificate of the instrument before delivery.

NOTE

After confirming that the contents of the package are the same and there is no problem, please keep the box and related contents properly, and the instrument needs to comply with the packing requirements when returning to the factory for service.

1.2 Connecting the Power Cord

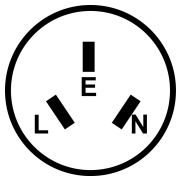
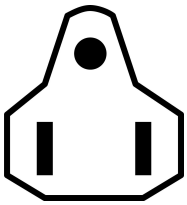
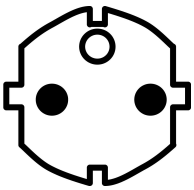
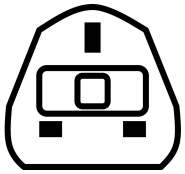
Connect the standard accessory power cord to ensure that the power supply has been properly energized.

Power Supply Input Requirements

The IT6720/IT6721 power supply can also be operated at 110V±10%, but the output power of the power supply is halved. If full power output is required, please use 220V±10% voltage according to the specification.

Types of power cords

The power supply IT6720/IT6721 is supplied as standard with the power cord model number shown below. Please select the power cord model number suitable for your regional voltage from the power cord specification table below. If you have purchased the wrong model number, please contact your dealer or the manufacturer directly for an exchange.

			
China IT-E171	United States & Canada & Japan IT-E172	Europe IT-E173	Britain IT-E174

CAUTION

The power cord supplied with this product is certified for safety. If the supplied power cord is to be replaced, or if an extension cable must be added, make sure that it is capable of complying with the power rating required for this product. Misuse will void the warranty on this product.

1.3 Communication Module Introduction

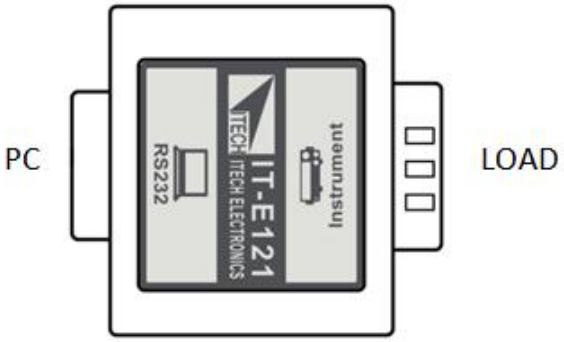
The output of DB9 interface on the rear panel of IT6720/IT6721 DC power supply is TTL level, which needs to be converted by the accessory level conversion before it can be connected to the serial port of PC, and the communication module can be optionally equipped according to the requirements.

The optional communication modules are: IT-E121/IT-E122/IT-E123.

IT-E121 Communication Module

The DB9 connector output on the rear panel of the IT6720/IT6721 power supply is TTL level; you can use the IT-E121 communication module and a standard RS232 extension cable to connect the DB9 connector of the power supply to the RS-232 connector of the computer for communication.

IT-E121 communication cable

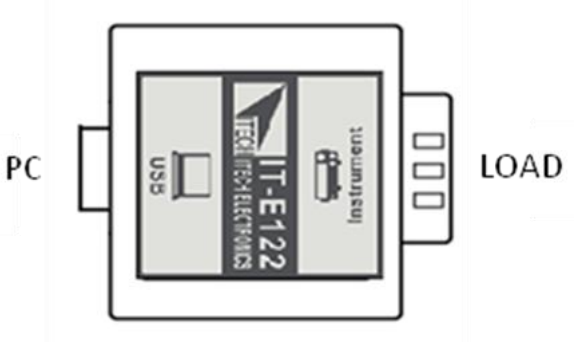


IT-E122 Communication Module

IT6720/IT6721 power supply DB9 interface output on the rear panel of the TTL level; IT-E122 end of the USB interface (B-type male interface), you can use the IT-E122 communication module and a standard USB extension cable (one end of the B-type female connector, one end of the A-type) to connect the power supply DB9 interface and the computer's USB interface for communication.

Note: After connecting the power supply and PC through IT-E122, only Win7 computer system needs to install IT-E122driver (you can search and install it in ITECH official website-Resource Center-Software Driver), and after installing it, USB-to-Serial COM Port will appear in PC's Device Manager.

IT-E122 communication cable

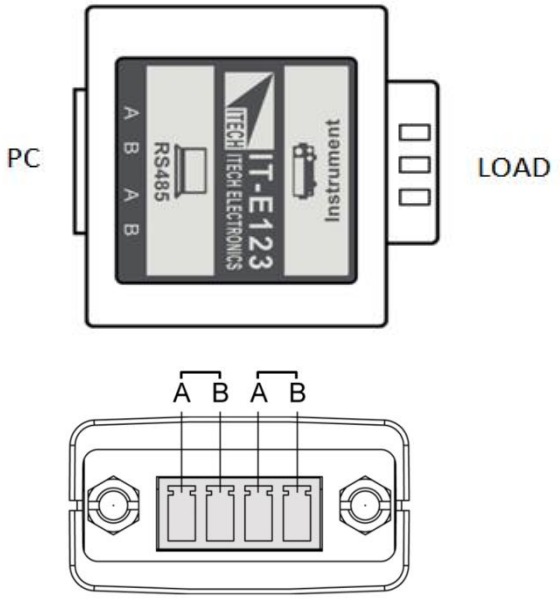


IT-E123 Communication Module

The DB9 interface on the rear panel of the IT6720/IT6721 power supply outputs TTL levels; the interfaces on both ends of the IT-E123 are the DB9 interface and the RS485 interface, which can be used to communicate with the DB9 interface of

the power supply and the RS232 interface of the computer by using the IT-E123 communication module and a standard RS485- RS232 conversion cable.

IT-E123 communication cable



RS485 pins

CAUTION

You cannot connect the DB9 communication interface of the power supply directly to the RS232 level of the PC using the standard RS232 cable, you must purchase the communication cable of ITECH to connect it.

DB9（TTL）serial interface

The electronic load can be connected to the RS232 interface via the DB9 plug on the rear panel via a level shifter circuit. The following content can help to understand how to control the electronic load via a PC.

The communication settings are as follows:

Before performing the communication operation, you should first match the electronic load with the following parameters of the PC.

- Baud rate: 4800
- Data Bits: 8
- Stop Bit: 1
- Parity: None
- Address: 0 to 30, factory setting 0

Start Bit	8 Data Bits	Parity=None	Stop Bit

Chapter II Quick Start

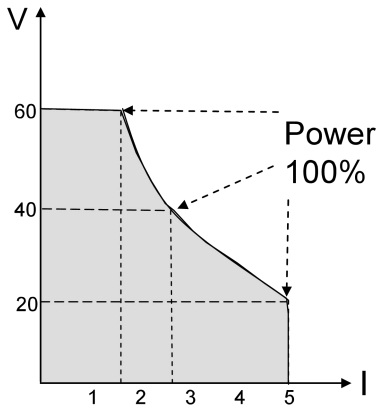
This chapter briefly introduces the front panel, rear panel, keyboard key functions, and panel display functions of the IT6720 series power supply to ensure a quick understanding of the power supply's appearance, structure, and key usage functions before operating the power supply, and to help you better utilize this series power supply.

2.1 Instrument Introduction

The IT6720/IT6721 CNC DC power supplies have the widest voltage and current utilization in their class, greatly increasing the range of applications.

Take IT6720 as an example, 100W power, the output value is adjustable within 60V/5A, the rate of change of voltage and current is automatically controlled, and the power ratio reaches as much as three times. One machine can replace the previous 60V × 1.6A/32V × 3A/20V × 5A three models, reducing your repeated investment .

Examples:
When you select the output voltage as 60V, since the output power of the IT6720 is 100W, the maximum output current at this time is 100(W) / 60(V) = 1.66A; when you change the output voltage to 20V, the maximum output current value at this time is 100(W) / 20(V) = 5A; next, when you change the output voltage to 10V, based on the above method of calculation, the maximum output current value is 5A. When you change the output voltage to 10V, based on the above method, the output current should be 10A, but since the maximum output current of IT6720 is 5A, the maximum output current value is 5A at this time.



IT6720 Output Curve Example Diagram

Key Features：

- Fully digital control
- 10mV/1mA high accuracy and resolution

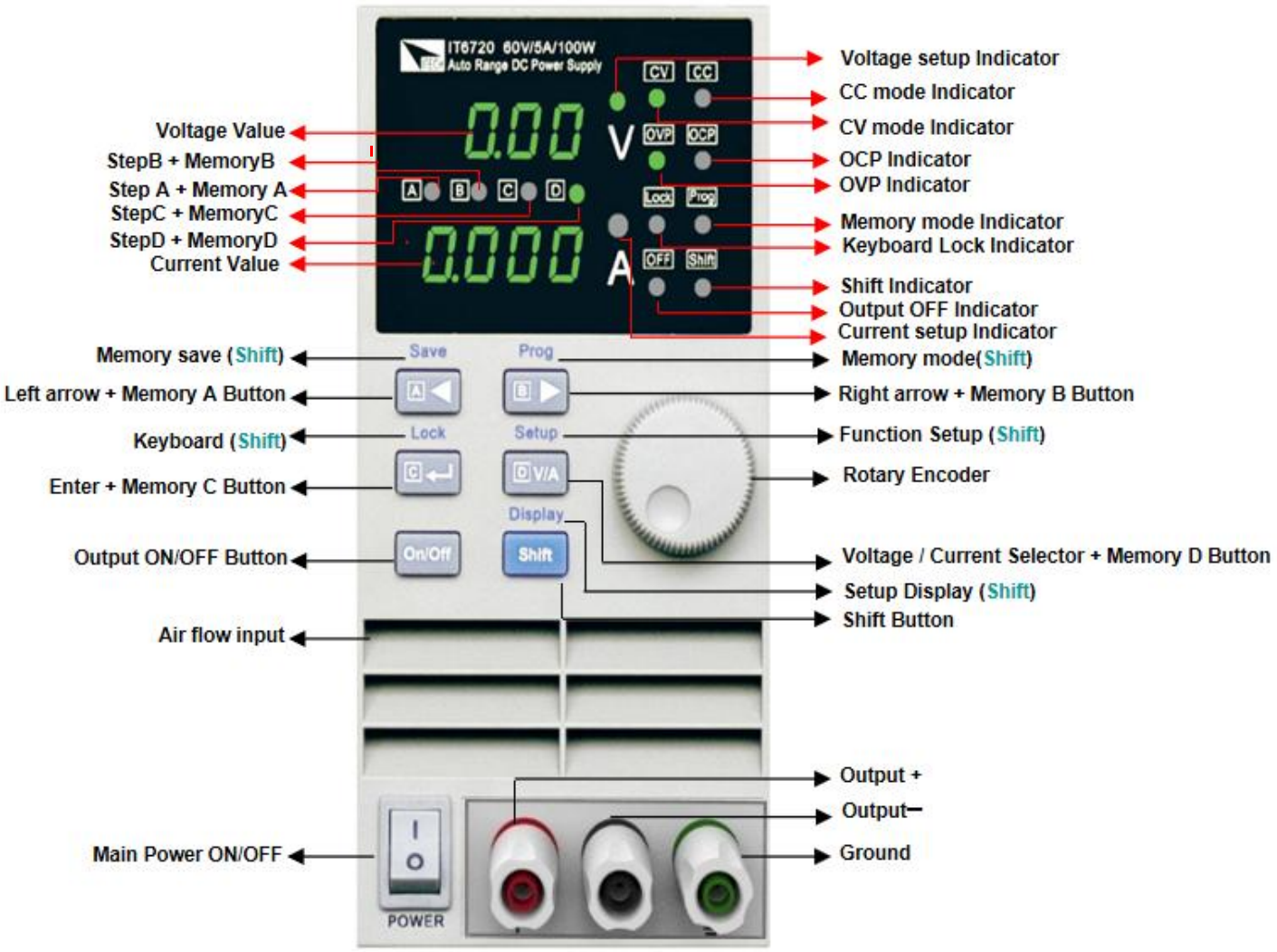
- Lower noise and ripple
- Software calibration function
- Minimum external dimensions
- Ultra-high brightness LED display
- Constant voltage and constant current output
- Optional remote control keypad function
- OCP/OVP/OTP protection
- Output On/Off Control
- High quality and cost-effective
- Preset multiple output voltages and currents: 4×100 groups

IT6720 Series Selection Chart:

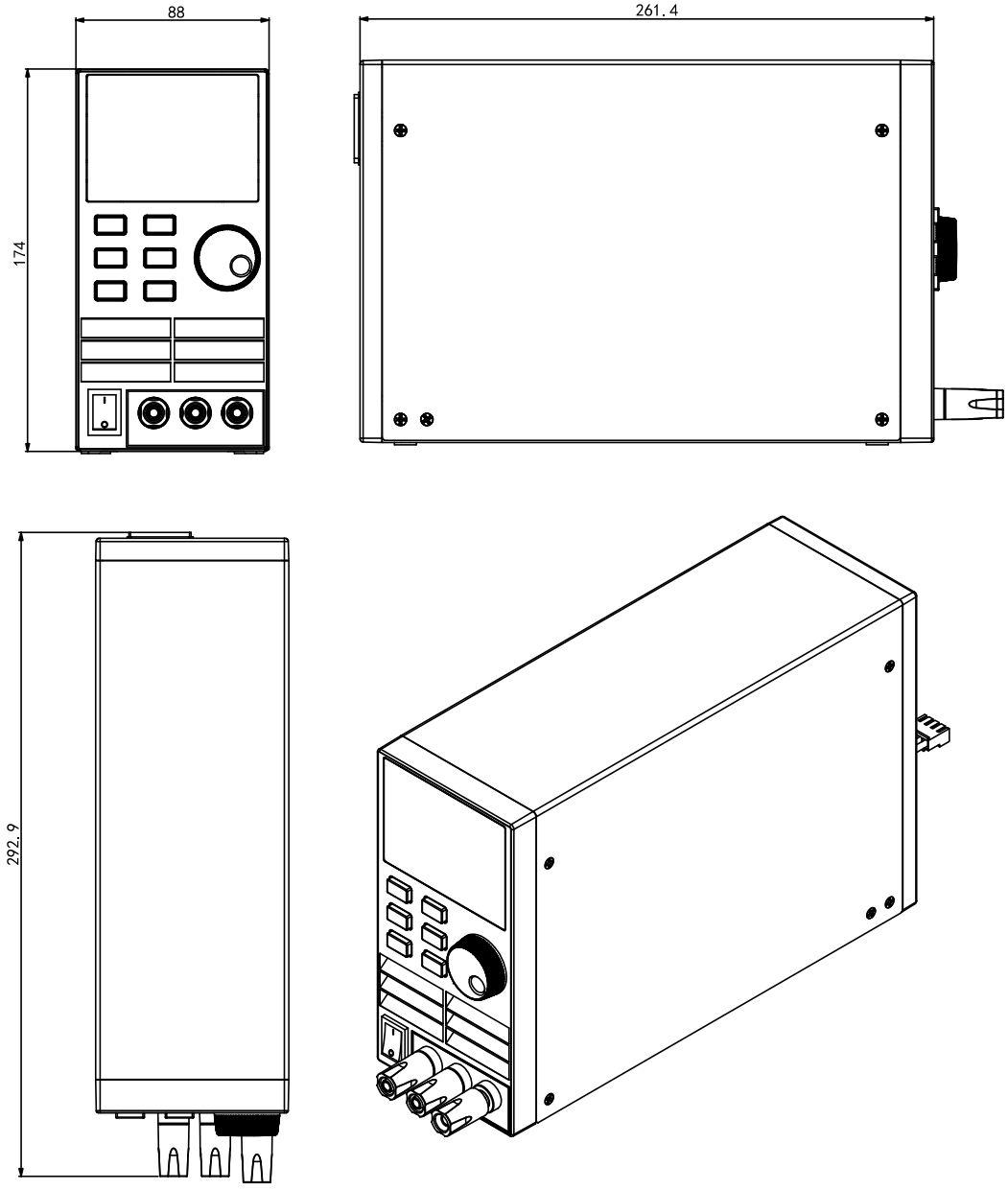
Model	Voltage	Current	Power
IT6720	60V	5A	100W
IT6721	60V	8A	180W

2.2 Front Panel Introduction

IT6720 series power supply, front panel layout introduction.



2.3 Size introduction



2.4 Basic operations

Exterior Inspection

Confirm that the machine has not been damaged during shipment, if so, please contact your supplier. Verify that the input AC voltage specification of the IT6720/IT6721 is in accordance with the power supply voltage in your country or region.

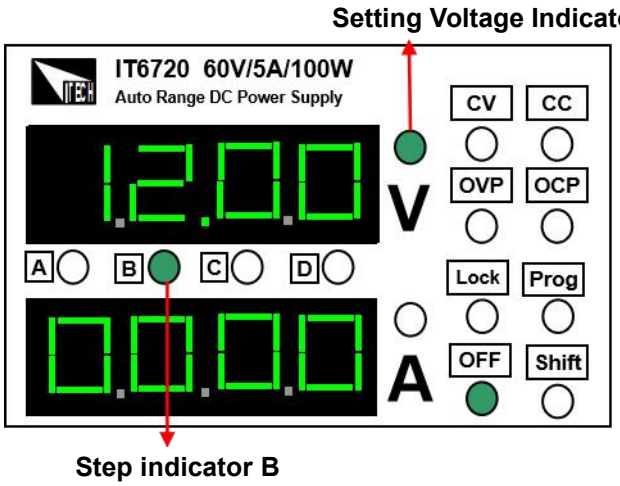
Note: If you need to switch the input voltage, you can do it through the 110V/220V switch on the back of the machine. After confirming that the above matters are correct, please turn on the product.

Turn on the power switch: I/O

Setting Voltage

Use key D/V/A to move the setting indicator to the V position, when the power supply is in the voltage setting mode, as shown in Figure 1.

Using the A◀ B▶ key, adjust the step indicator to position B. At this point, the voltage will rise or fall by 1V with each toggle of the rotary encoder , at which point the voltage will be adjusted to 12.00V.

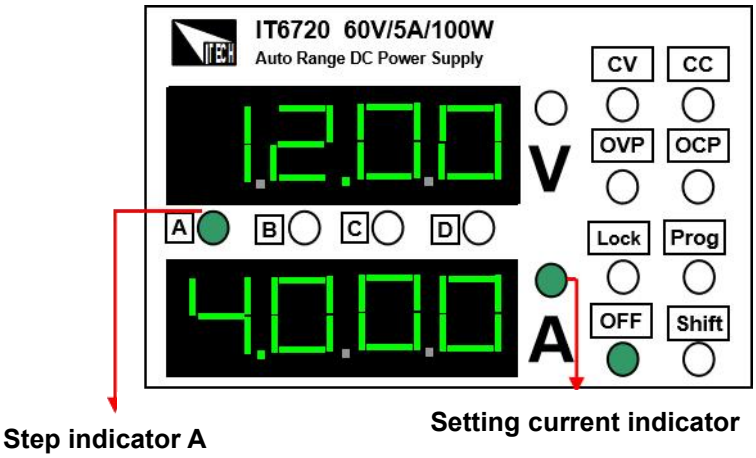


(Figure 1)

Setting current

Use the D/V/A key to move the setup indicator to position A. The power supply is now in current setup mode, as shown in Figure 2.

Using the A◀ B▶ key, adjust the step indicator to position A. At this point, the current will rise or fall by 1A with each toggle of the rotary encoder , at which point the current will be adjusted to 4.000A.

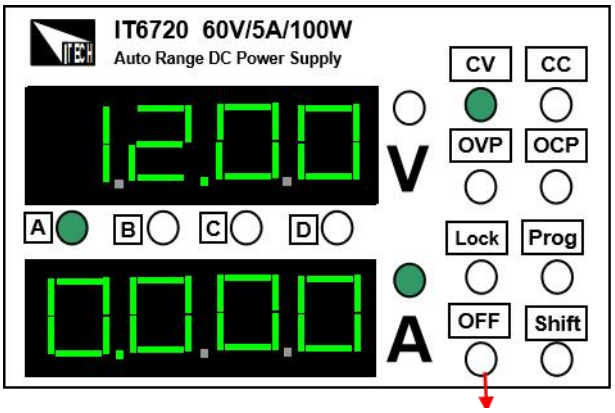


(Figure 2)

Turn on the power output

Use the On/Off key to turn the power output on, at this time the voltage/current set value will blink for three seconds, after which the display on the numerical indicator will change from the set value to the actual measured voltage and current values of the power output. At this time, the power output shutdown indicator will turn off, indicating that the power supply is in the output working state.

Pressing On/Off again will turn off the output of the power supply.



Step value for Cursor Position

Cursor position	Step voltage	Step current
A	------	1A
B	1V	0.1A
C	0.1V	0.01A
D	0.01V	0.001A

Check the set voltage and current value

The power supply usually displays the actual voltage and current values. When you want to check the preset voltage and current values, the unit will display automatically settings, press Shift twice, the settings will be displayed for three seconds.

Key Lock function(Lock)

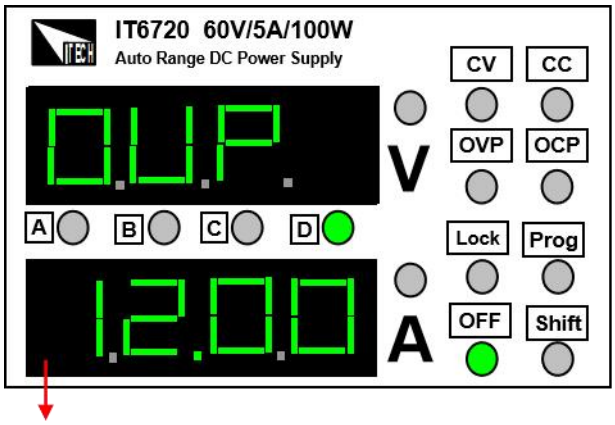
The keypad lock function prevents misuse by unauthorized personnel or operators, which may result in damage to the object to be measured.

After pressing the Shift key, wait for the **Shift** indicator to light up, then press the C↵ (Lock) key, the Lock indicator will light up, and all keys and knobs on the keypad will be locked except for the Shift and On/Off keys. Repeat the above steps to unlock the keypad.

Overvoltage protection (OVP) setting

Press the Shift key and then the D V/A (Setup) key for about three seconds, at

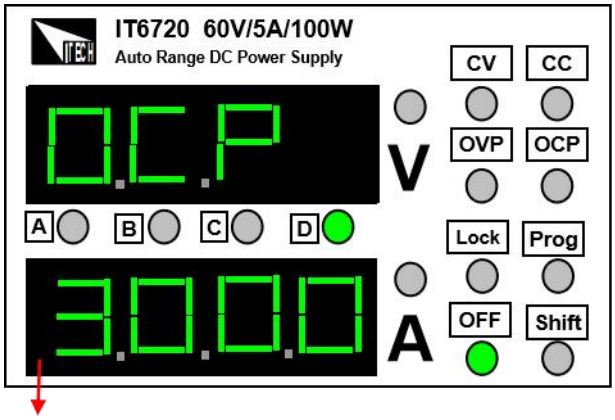
which time the panel will display OVP as shown below.
In this case, the [A◀] [B▶] key and the knob can be used to make OVP voltage adjustments.



OVP voltage value

Overcurrent protection (OCP) setting

Press [C↵] to enter the OCP setting interface after setting OVP, at this time, you can use the [A◀] [B▶] key as well as the knob to make OCP current adjustment.



OCP current value

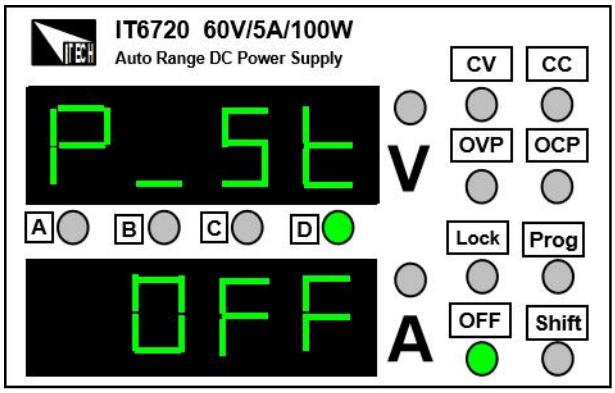
NOTE

If OVP and OCP values are set lower than the actual voltage/current values, it will cause power protection and output shutdown. The factory preset values of IT6720 are OVP=61V, OCP =5.1A; IT6721 OVP=61V, OCP=8.1A.

Memory set value (P_ST) setting

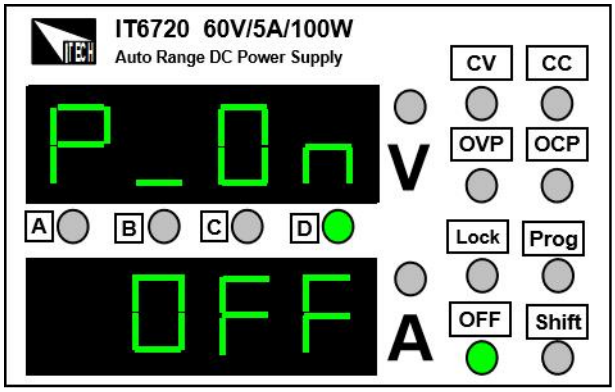
After setting OCP, press [C↵] to enter P_ST setting interface, at this time, you can use knob to select ON/OFF. ON refers to memorize the maximum current and voltage, as well as the user's current setting of the output current and voltage, and the next power-on to restore the user's setting value, OFF refers to restore the default maximum current and voltage, as well as the output setting value is

restored to 0. Press [C↵] key to confirm.



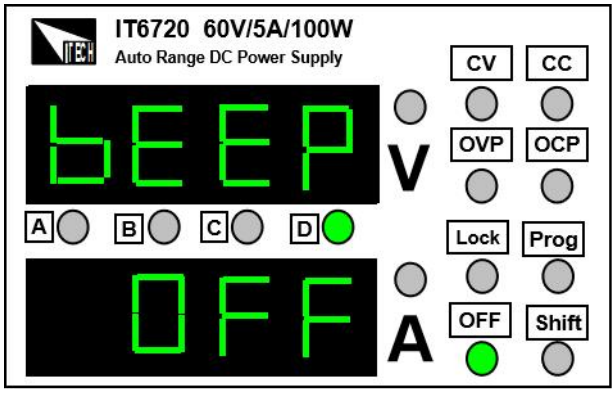
Power-on output state (P_ON) setting

After setting OCP, press [C↵] to enter P_ON setting interface, at this time, you can use knob to select ON/OFF. ON means to memorize the state of power-on before the last power-off, and restore this state after the next power-on, and OFF means to not memorize it, and it will be OFF every time you turn on the power. Press [C↵] key to confirm.



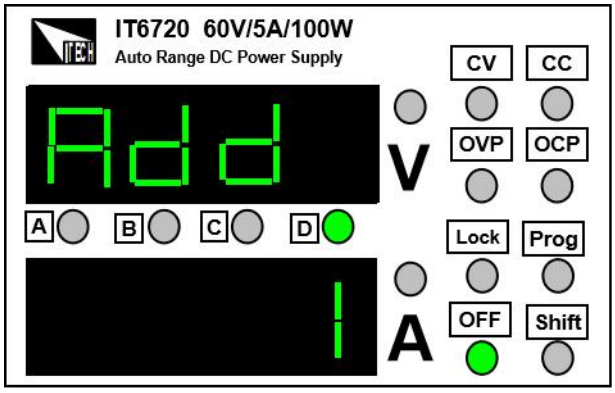
Keyboard Sound (BEEP) Settings

After setting OCP, press [C↵] to enter BEEP setting interface, then you can use knob to select ON/OFF. ON means there is sound when you press the keypad, OFF means there is no sound when you press the keypad. Press [C↵] to confirm.



Power address (ADD) setting

After setting BEEP, press [C↵] key to enter ADD address setting interface, at this time, you can use [A◀] [B▶] key and knob to make quick address setting. Address range: 0~30, press [C↵] key to confirm.



Group of Shortcut Keys (GRP) Settings

After setting ADD, press [C↵] key to enter GRP Setup interface。At this time, [A◀] [B▶] key and knob can be used for shortcut group selection. Press [C↵] to confirm the selected group and end the Setup mode.

The IT6720 and IT6721 allow customers to set up shortcut keys in groups of 100, each with four setting values, A/B/C/D.

Setting Shortcuts

In normal mode, after setting the voltage and current value to be stored in the shortcut key, press [Shift] key, then press [A◀] (Save) key, at this time, the shortcut key indicator [A] [B] [C] [D] blinks at the same time, at this time, you can press any shortcut key [A◀] [B▶] [C↵] [D V/A] to save the setting value in this shortcut key for direct recall in the future.

Using the shortcut function

After pressing the [Shift] key, then press the [B▶] (Prog) key, at this time, the [Prog] indicator lights up, indicating that the IT6720 is currently working in the shortcut key mode, and you can press any of the [A◀] [B▶] [C↵] [D V/A] keys to recall the pre-stored set voltage and current values stored in that key.

When working in shortcut mode, the [A◀] [B▶] [C↵] [D V/A] keys will be disabled from their normal function and can only be used as shortcut keys. To abort the shortcut mode, press the [Shift] key followed by the [B▶] (Prog) key to leave the shortcut mode.

CV and CC operating modes of the power supply

The power supply has a constant voltage/constant current automatic conversion function. With this function, the power supply maintains uninterrupted operation during the transition from constant voltage mode to constant current mode that occurs in response to load changes.

For the current load, the power supply operates in constant voltage mode, where the power supply will provide a controlled output voltage, and the output voltage drop will remain constant as the load resistance becomes smaller, until the current increases and is limited to a preset current value, and then a switchover occurs. At this point the power supply becomes a constant current output and the output voltage is reduced proportionally to further load resistance decreases. When the current value falls below the set value, the power supply returns to constant voltage mode.

AC Power Supply

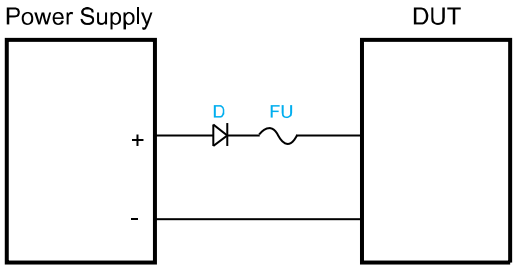
The AC power input of the IT6720 and IT6721 is 110V or 220V, 50/60 HZ. Before connecting the AC power supply and turning on the instrument, please check that the 110/220V changeover switch on the back of the instrument is in the correct position, otherwise the power supply may be burned out!

Battery charging protection function

NOTE

When connecting the batteries, please be sure to pay attention to the positive and negative terminals, if reversed will burn out the power supply!

When the user uses the power supply to charge the battery, it is necessary to refer to the series access diode and fuse shown below for circuit protection. The detailed scheme is shown in the figure below.



As shown above, the diode and the fuse serve the purpose of each:

- The purpose of the diode is to prevent the flow of current from the battery side to the power supply to protect the power supply or internal components from being damaged. The series diode also prevents the battery from being discharged in the off state and in the off state

due to resistive loads inside the power supply.

When selecting this diode, the current capacity of the diode must be at least 110% of the rated battery current. When setting the battery input voltage, users also need to consider the diode's on-state voltage, typical silicon diode on-state voltage is 0.6 V to 0.7 V. The diode's reverse withstand voltage value must be greater than 2 times the rated voltage of the battery. The power of the diode also needs to be taken into account, and a power heatsink should be added if necessary.

- The role of the fuse is: in the current abnormally high to a certain height and heat, its own fuse cut off the current, to protect the safe operation of the circuit.

  When the user selects this fuse, the current rating of the fuse must be 150% to 200% of the maximum battery current and less than 150% of the maximum output current of the power supply.

Fault Resolution

- **No output from power supply:**

1: Check if the voltage and current settings are zero, if they are zero, reset the voltage and current values.

2: Check that the instrument output status is **OFF**. Indicator for output shutdown: **OFF** The lower indicator is lit. Press the On/Off key on the front panel to turn on the power output, i.e., the OFF indicator is off.

After setting the voltage and current, the DC power supply can output voltage with no load and no current output; if you need to output current, you need to connect it to the object to be measured, and the output of the power supply current is related to the actual pulling load of the object to be measured.

3: Check whether the instrument has entered the protection state. When the **OVP** **OCP** indicator is lit, it means that the power supply has entered the protection state: over-voltage protection/over-current protection, please check the **OVP/OCP** setting method in **chapter 2.4** to reset the over-voltage/current protection point.

- **Keyboard inoperative**

Check to see if the **Lock** indicator is lit. If it is lit, the keyboard and knobs are locked.

To unlock: Press the Shift key on the keyboard, when the Shift indicator is lit, press C↵ the (Lock) key again to unlock the keyboard and knobs.

Chapter III Technical specifications

Main technical parameters

Parameters		IT6720
Output Rating (0 °C~40 °C)	Voltage	0~60V
	Current	0~5A
	Power	100W
Load Regulation ±(%of output+offset)	Voltage	≤0.01%+3mV
	Current	≤0.01%+3mA
Line Regulation ±(%of output+offset)	Voltage	≤0.01%+3mV
	Current	≤0.01%+3mA
Setup Resolution	Voltage	10mV
	Current	1mA
Read Back Resolution	Voltage	10mV
	Current	1mA
Setup Accuracy (Within 12 months) (25 °C ± 5 °C) (%of output+offset)	Voltage	≤0.05%+10mV
	Current	≤0.2%+2mA
Read Back Accuracy (Within 12 months) (25 °C ± 5 °C) (%of output+offset)	Voltage	≤0.05%+10mV
	Current	≤0.1%+2mA
Ripple (20Hz ~20MHz)	Voltage	≤2mVrms
	Current	≤5mArms
Dimension (mm)	88mm×175mm×282mm	
Weight(Net)	2.5kg	

Parameters		IT6721
Output Rating	Voltage	0~60V

(0 °C~40 °C)	**Current**	0~8A
	Power	180W
Load Regulation ±(%of output+offset)	**Voltage**	≤0.01%+5mV
	Current	≤0.01%+5mA
Line Regulation ±(%of output+offset)	**Voltage**	≤0.01%+5mV
	Current	≤0.01%+5mA
Setup Resolution	**Voltage**	10mV
	Current	1mA
Read Back Resolution	**Voltage**	10mV
	Current	1mA
Setup Accuracy (Within 12 months) (25 °C ± 5 °C) (%of output+offset)	**Voltage**	≤0.05%+10mV
	Current	≤0.3%+5mA
Read Back Accuracy (Within 12 months) (25 °C ± 5 °C) (%of output+offset)	**Voltage**	≤0.05%+10mV
	Current	≤0.3%+5mA
Ripple (20Hz ~20MHz)	**Voltage**	≤5mVrms
	Current	≤8mArms
Dimension (mm)	88mm×175mm×282mm	
Weight (Net)	3.5kg	

These specifications are subject to change without prior notice.

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