Programmable DC Power Supply

User's Manual

(FTP Series)

Preface

Dear Sirs,

Thank you for purchasing Faithtech FTP Series programmable DC power supplies. This manual contains detailed information about FTP Series' installation, operation, and specifications, etc..

Please read this manual carefully for using this product safely and correctly, especially safety precautions.

Please keep this manual properly for future use.

Notice

All rights are reserved by Faithtech. This manual is only for reference. Information may be revised without prior notice. Faithtech shall not be liable for possible errors or damages caused by using this manual.

Please visit our website http://www.faithtech.cn for latest information.

Product Warranty

Faithtech promises that specifications and features of FTP Series power supplies have completely met all technical indexes claimed in this manual. We strictly check raw materials and manufacturing technology to ensure the stability and credulity of products.

Warranty Service

From the date of purchase warranty, within the one-year warranty period, Faithtech will provide free repair for all faults in the normal usage and maintenance of the product. The user need prepay one-way freight for sending the product to the service department. The return freight will be paid by Faithtech. If products are returned from other countries for maintenance service, then you should pay all freight, duties and other taxes.

Warranty Limitation

The warranty is only limited to the power supply host. Faithtech will not provide free repair if the product is damaged by misuse, negligence, unauthorized modifications, abnormal application environment or force majeure, instead Faithtech shall provide estimated maintenance cost before the repair.

This warranty is in lieu of all other warranties. Faithtech does not make any other warranties, expressed or implied, including guarantees of merchantability, reasonableness and applicability of certain specific applications, which might arise in the contract, civil negligence or others.

Faithtech assumes no responsibility for its product being used in a hazardous or dangerous manner either alone or in conjunction with other equipment. High voltage used in some instruments may be dangerous if misused. Special disclaimers apply to these instruments. Faithtech assumes no liability for any special, incidental or indirect damages.

Safety Abstract

Please observe important safety instructions strictly in the process of operating and using the power supply. Not observing safety precautions or warnings in this manual will probably weaken protective functions provided by the power supply. Faithtech will not assume any liability for damages if the user does not observe those safety precautions.

Important Safety Instructions

■ **Ensure proper grounding**. Before turning on the power supply, please make sure that the power supply is reliably grounded to prevent electric shock.

■ **Single phase 220VAC input**. Make sure the input wire meets the specified standards, and a protective cover must be installed to prevent electric shock.

■ **Output cable connection**. Make sure the output wire meets the specified standards, and a protective cover must be installed to prevent electric shock.

■ **Do not open the instrument case**. Operators are not allowed to open the shell of the power supply. Non-professionals are not allowed to repair or adjust.

■ **Do not use in a hazardous or dangerous manner** either alone or in conjunction with other equipment. Operating in inflammable or explosive environment is strictly forbidden.

Safety Symbols

Please see the following table for meanings of international symbols applied in the mainframe or the user's manual.

WARNING: To avoid injury, death of personnel, or damage to the instrument, the operator must refer to the explanation in the instruction manual.

High temperature: This symbol indicates the temperature is hazardous to human beings. Do not touch it to avoid any personal injury.

DANGER: High voltage.

Protective grounding terminal: This symbol indicates that the terminal must be connected to ground before operation of the equipment to protect against electrical shock in case of a fault.

⚠WARNING The **WARNING** sign highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury to, or death of personnel or long term heath hazards.

⚡CAUTION The **CAUTION** sign highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to, or destruction of equipment.

📌Notice The **Notice** sign highlights an essential operating or maintenance procedure, condition, or statement.

More safety symbols table

Symbol	Meaning	Symbol	Meaning
⎓	Direct Current (DC)	N	Neutral Line
∼	Alternating Current (AC)	L	Live Line
≈	Alternating and Direct Current	PE	Protective Earth Line
3∼	3 Phase AC Current	I ◯	On / Off (Power)
⏚	Earth	�	Back up (Power)
⏛	Signal Earth	⎍	Press (Button switch)
⏢	Mainframe or Chassis	�憑	Pop (Button switch)

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1. General Description

1.1 Overview

FTP series programmable DC power supply is a high-performance DC power supply, with rated output power 2/3.2/6.5kW, output voltage up to 1500V, current up to 240A. It has the advantages of wide range output, low ripple noise, fast transient response, high resolution, high precision, voltage and current slew rate settable. Moreover, the 40V and 80V model FTP can be configured with automotive waveform test feature, compatible with ISO16750-2, VW80000 standards.

FTP series is the best choice for ATE system integration, laboratory test, vehicle equipment test, superconducting test, motor test, battery charging simulation, voltage and current sensor calibration, laser test and power supply, electronic product life cycle test and other applications.
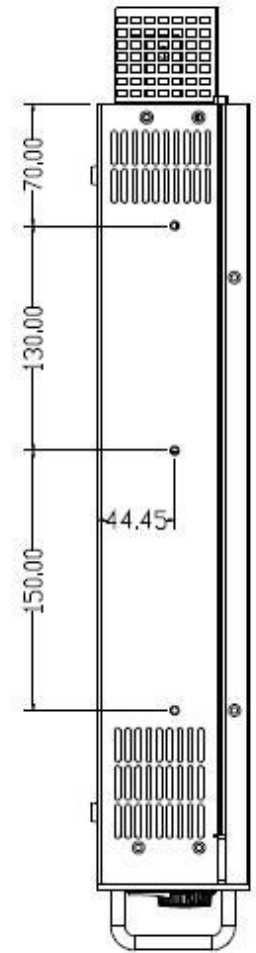
1.2 Main features

■ Output voltages: 40 V up to 1500 V;

■ Output current: 3.5 A up to 240 A;

■ Output power: 2 / 3.2 / 6.5 kW;

■ Constant power output;

■ Easy Master-Slave parallel or serial;

■ Precision V & I measurement;

■ High speed programming;

■ 1ms typical transient response;

■ Programmable sequence;

■ Voltage & current slew rate control;

■ CV / CC priority;

■ Foldback protection;

■ Wide operating region for output;

■ Remote sense compensation;

■ Optional analog programming & monitoring interface;

■ ±OVP, ±OCP, ±OPP, OTP, ±LVP;

■ Voltage limit, current limit;

■ Standard LAN, RS232, optional GPIB interface;

■ SCPI and ModBus RTU protocol;

■ TFT color LCD display.

1.3 Dimension diagram

1.3.1 Model of 2kW, 3.2kW
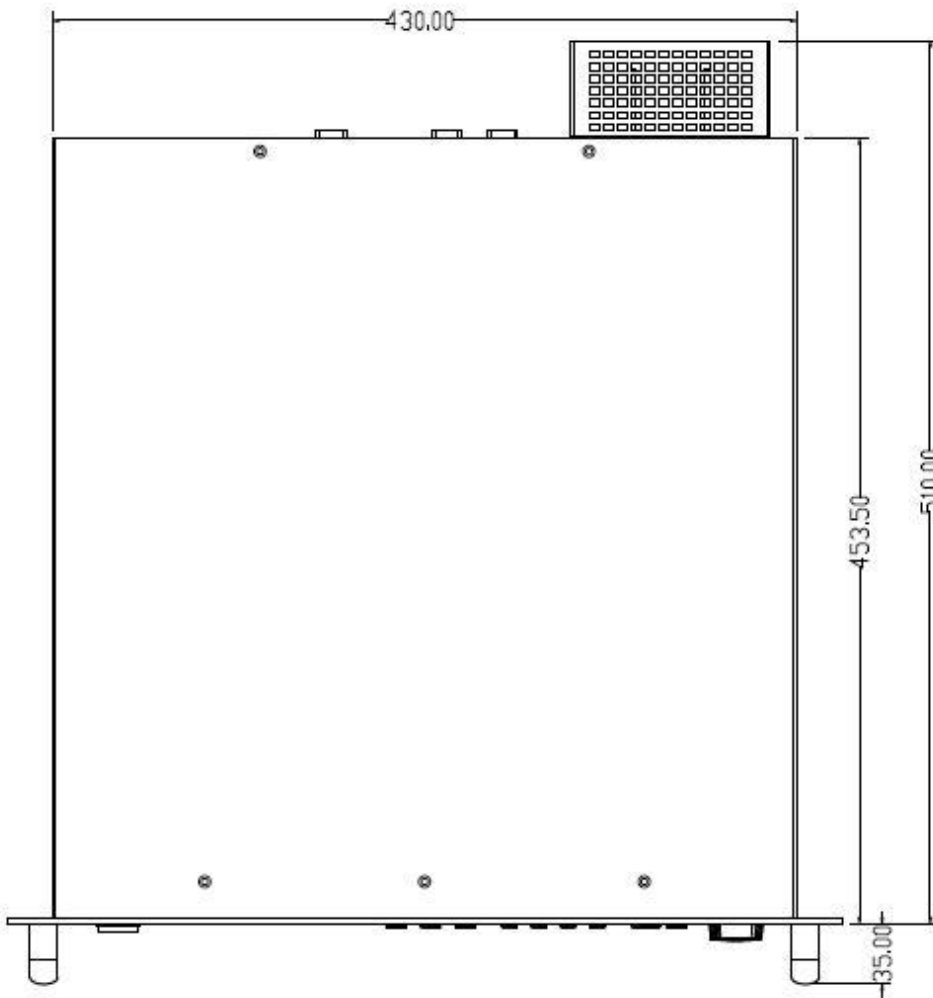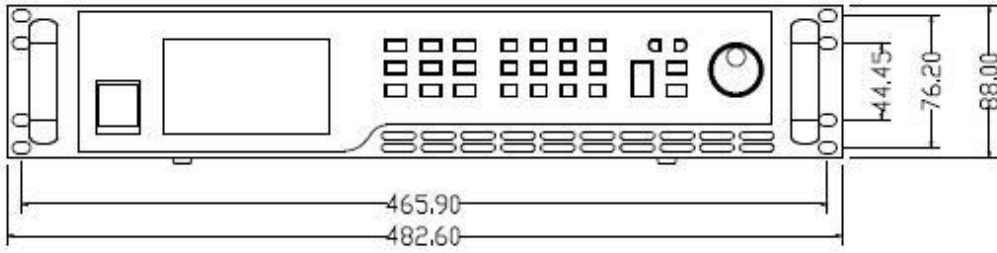
1.3.2 Model of 6.5kW

1.4 Model Naming

FTPXXX - XXXX - XXX - X

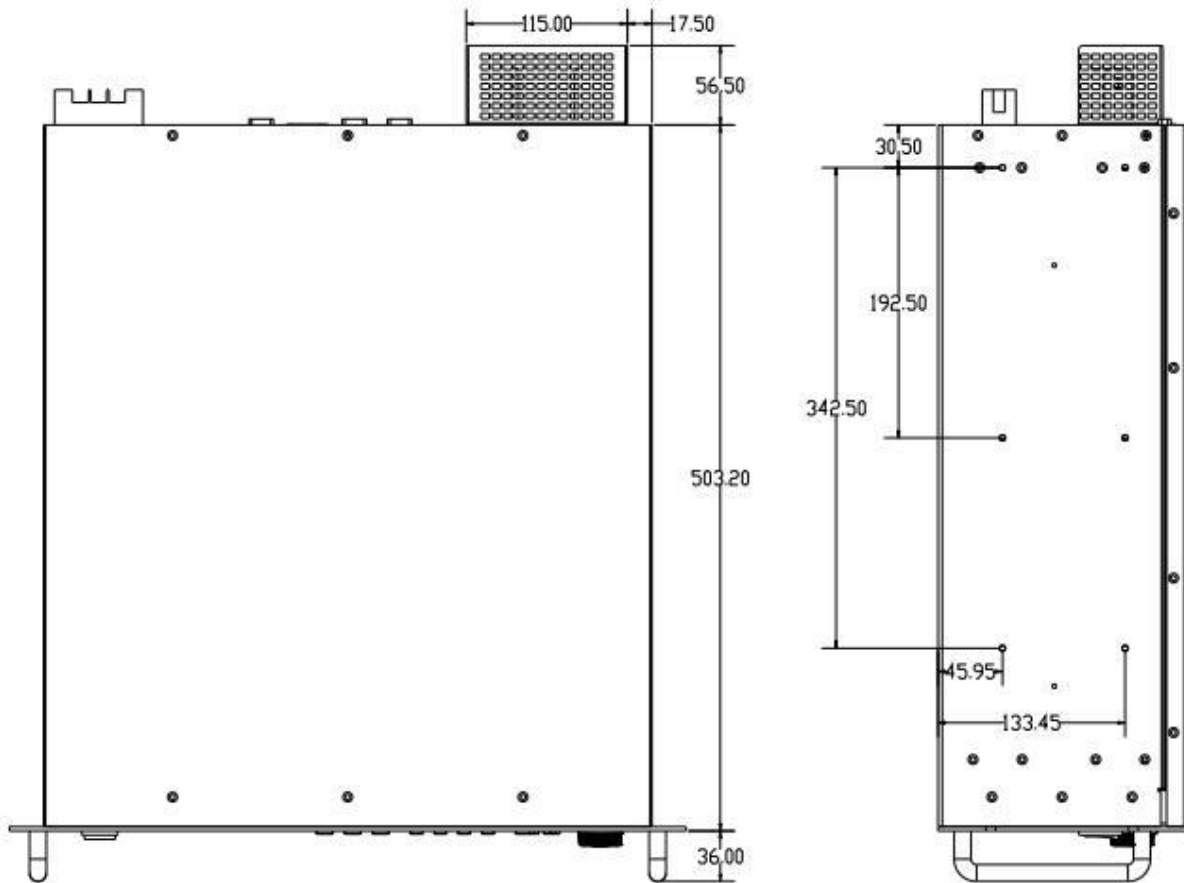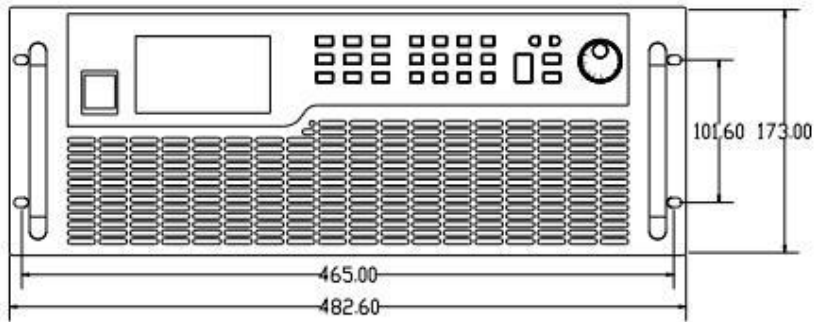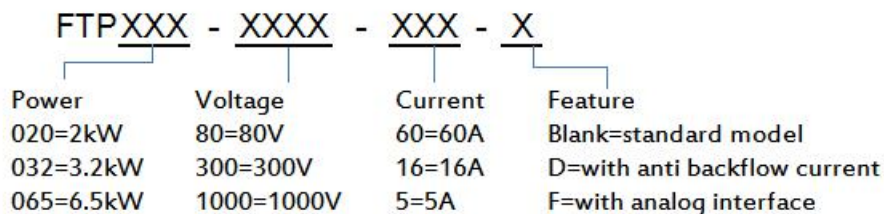| Power	Voltage	Current	Feature
020=2kW	80=80V	60=60A	Blank=standard model
032=3.2kW	300=300V	16=16A	D=with anti backflow current
065=6.5kW	1000=1000V	5=5A	F=with analog interface

1.5 Specification sheet

Specification table 1						
Model	FTP020-40-120	FTP020-50-110	FTP020-80-60	FTP020-120-40	FTP020-160-30	FTP020-300-16
Voltage	0～40V	0～50V	0～80V	0～120V	0～160V	0～300V
Current	0～120A	0～110A	0～60A	0～40A	0～30A	0～16A
Power	2000W					
Model	FTP032-40-120	FTP032-50-110	FTP032-80-60	FTP032-120-40	FTP032-160-30	FTP032-300-16
Voltage	0～40V	0～50V	0～80V	0～120V	0～160V	0～300V
Current	0～120A	0～110A	0～60A	0～40A	0～30A	0～16A
Power	3200W					
Model	FTP065-40-240	FTP065-50-220	FTP065-80-120	FTP065-120-80	FTP065-160-60	FTP065-300-32
Voltage	0～40V	0～50V	0～80V	0～120V	0～160V	0～300V
Current	0～240A	0～220A	0～120A	0～80A	0～60A	0～32A
Power	6500W					
Voltage programming						
Resolution	16Bits					
Accuracy	0.1%+0.1%F.S.					
Current programming						
Resolution	16Bits					
Accuracy	0.1%+0.3%F.S.			0.1%+0.2% F.S.		
External analog programming						
Control voltage	0～5V or 0～10V corresponds to 0～100%F.S.					
Voltage accuracy	0.2%F.S.					
Current accuracy	0.5%F.S.					
Analog output						
Output voltage	0～100%F.S. corresponds to 0～10V.					
Voltage accuracy	0.5%F.S.					
Current accuracy	0.5%F.S.					
Line regulation						
Voltage	0.01%+0.01%F.S.					
Current	0.02%+0.01%F.S.					

Load regulation					
Voltage	0.01%+0.05%F.S.		0.01%+0.01%F.S.		
Current	0.02%+0.1%F.S.				
Voltage measurement					
Resolution	16Bits				
Accuracy	0.1%+0.1%F.S.				
Current measurement					
Resolution	16Bits				
Accuracy	0.1%+0.3%F.S.		0.1%+0.2%F.S.		
Ripple noise					
Ripple Vpp	60mV	70mV	80mV	80mV	100mV	100mV
Ripple Vrms	20mV	20mV	20mV	20mV	40mV	40mV
Rise slew rate					
Voltage	5V/ms(max)				
Current	2A/ms(max)				
OVP Setting					
Range	0～110%F.S.				
Accuracy	1%F.S.				
Transient	Typical 1ms				
Efficiency	0.9(Typical)				
Parallel/Serial	Support master-slave parallel and serial operation				
Communication	RS232 and LAN				
AC input	190VAC～265VAC, 47Hz～63Hz, PF: 0.98(Typical)				
Operation temp	0℃～40℃				
Storage temp	-20℃～70℃				
Altitude	＜2000m				
Dimension	430(W)×88(H)×453(D)mm (2kW&3.2kW model); 430(W)×177(H)×503(D)mm (6.5kW model)				
Weight	15kg(2kW&3.2kW model); 29kg(6.5kW model)				

Specification table 2					
Model	FTP020-400-12	FTP020-600-8	FTP020-800-8	FTP020-1000-5	FTP020-1200-5	FTP020-1500-3.5
Voltage	0～400V	0～600V	0～800V	0～1000V	0～1200V	0～1500V
Current	0～12A	0～8A	0～8A	0～5A	0～5A	0～3.5A
Power	2000W					
Model	FTP032-400-12	FTP032-600-8	FTP032-800-8	FTP032-1000-5	FTP032-1200-5	FTP032-1500-3.5
Voltage	0～400V	0～600V	0～800V	0～1000V	0～1200V	0～1500V
Current	0～12A	0～8A	0～8A	0～5A	0～5A	0～3.5A
Power	3200W					
Model	FTP065-400-24	FTP065-600-16	FTP065-800-16	FTP065-1000-10	FTP065-1200-10	FTP065-1500-7
Voltage	0～400V	0～600V	0～800V	0～1000V	0～1200V	0～1500V
Current	0～24A	0～16A	0～16A	0～10A	0～10A	0～7A
Power	6500W					
Voltage programming					
Resolution	16Bits					

Accuracy	0.1%+0.1%F.S.					
Current programming						
Resolution	16Bits					
Accuracy	0.1%+0.2% F.S.					
External analog programming						
Control voltage	0～5V or 0～10V corresponds to 0～100%F.S.					
Voltage accuracy	0.2%F.S.					
Current accuracy	0.5%F.S.					
Analog output						
Output voltage	0～100%F.S. corresponds to 0～10V.					
Voltage accuracy	0.5%F.S.					
Current accuracy	0.5%F.S.					
Line regulation						
Voltage	0.01%+0.01%F.S.					
Current	0.02%+0.01%F.S.					
Load regulation						
Voltage	0.01%+0.01%F.S.					
Current	0.02%+0.1%F.S.					
Voltage measurement						
Resolution	16Bits					
Accuracy	0.1%+0.1%F.S.					
Current measurement						
Resolution	16Bits					
Accuracy	0.1%+0.2%F.S.					
Ripple noise						
Ripple Vpp	300mV	300mV	500mV	450mV	500mV	700mV
Ripple Vrms	60mV	60mV	80mV	80mV	120mV	150mV
Rise slew rate						
Voltage	5V/ms(max)					
Current	2A/ms(max)					
OVP Setting						
Range	0～110%F.S.					
Accuracy	1%F.S.					
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Efficiency	0.9(Typical)					
Parallel/Serial	Support master-slave parallel and serial operation					
Communication	RS232 and LAN					
AC input	190VAC～265VAC, 47Hz～63Hz, PF: 0.98(Typical)					
Operation temp	0℃～40℃					
Storage temp	-20℃～70℃					
Altitude	＜2000m					
Dimension	430(W)×88(H)×453(D)mm(2kW&3.2kW model); 430(W)×177(H)×503(D)mm(6.5kW model)					
Weight	15kg(2kW&3.2kW model); 29kg(6.5kW model)					

2. Quick Guide

2.1 Checking Goods

Upon reception of the power supply, please examine the equipment according to procedures stipulated as below.

(1) Check if there is damage during transportation.

Contact authorized dealer or Faithtech after-sale service immediately if the packing or protective cushion is severely damaged.

Notice   **Do not return the instrument without obtaining prior approval from Faithtech.**

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(2) Check for the accessories.

Make sure you have received the following accessories along with the power supply:

Table 2-1 Accessories Explanation

Accessory	QTY	Explanation
AC input power cable	1 PCS	* 10A(2kW) / 16A(3.2kW) 3-core power cable
RS232 communication cable	1 PCS	For connecting PC and RS232 port
LAN communication cable	1 PCS	For connecting PC and LAN port
Protective cover	1 PCS	For output protection
User Manual	1 PCS	Installing and operation info
CD Disk	1 PCS	Tech info
Warranty and after-sale info	1 PCS	Warranty and after-sale info

* 6.5kW model does not come with AC input cable.

Contact authorized dealer or Faithtech after-sale service immediately if there is damage or miss.

(3) Check for the power supply unit.

Contact authorized dealer or Faithtech after-sale service immediately if the power supply case is damaged or working abnormally.

(4) Cleaning.

If you need to clean the casing of the machine, please wipe it gently with a dry cloth or a slightly damp cloth. Do not wipe the inside of the machine.

⚠WARNING   **Turn off the power supply before cleaning.**

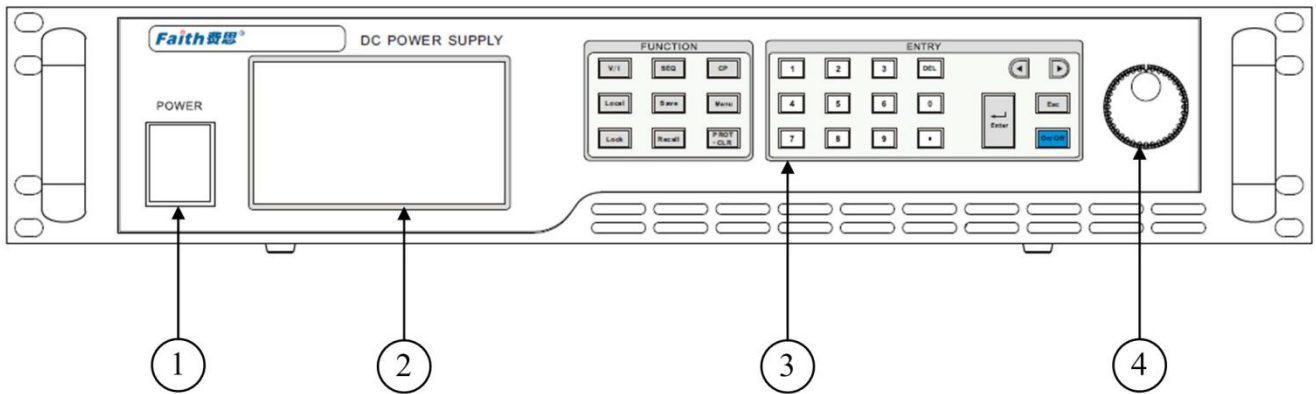
2.2 Front Panel

Figure 2-1 FTP Front Panel

① Power switch
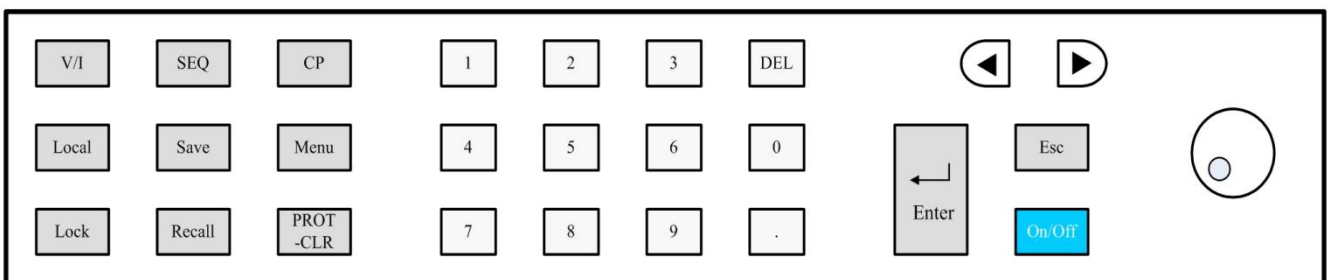② TFT color screen
③ Keyboard
④ Rotary knob

2.3 Keyboard
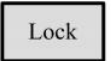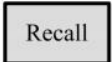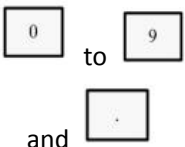
Figure 2-2 FTP keyboard

Table 2-2 Key Function Descriptions

Button	Description
(rotary knob)	Move the cursor position, or increase/decrease numeric number
V/I	Go to voltage/current output interface
SEQ	Go to sequence output interface
CP	Go to constant power output interface

|	
Local	Switch to local operation mode from remote control mode
Save	Save the settings of the static output to internal memory.
Menu	Go to main menu.
Lock	Lock/Unlock the keyboard
Recall	Recall the saved settings from internal memory.
PROT -CLR	Clear the occurred protection and warning messages.
0 to 9 and .	Input numeric numbers and decimal point
DEL	Each press clears one digit of your numeric or decimal input.
◀ ▶	Control the cursor to move between digits when setting parameters. In menu navigation, used for navigating and selecting the menu item.
↵ Enter	Enter into set item, or confirm input and exit set item.
Esc	Exit set item or current menu.
On/Off	Turn on/off power supply output.

2.4 Screen Display
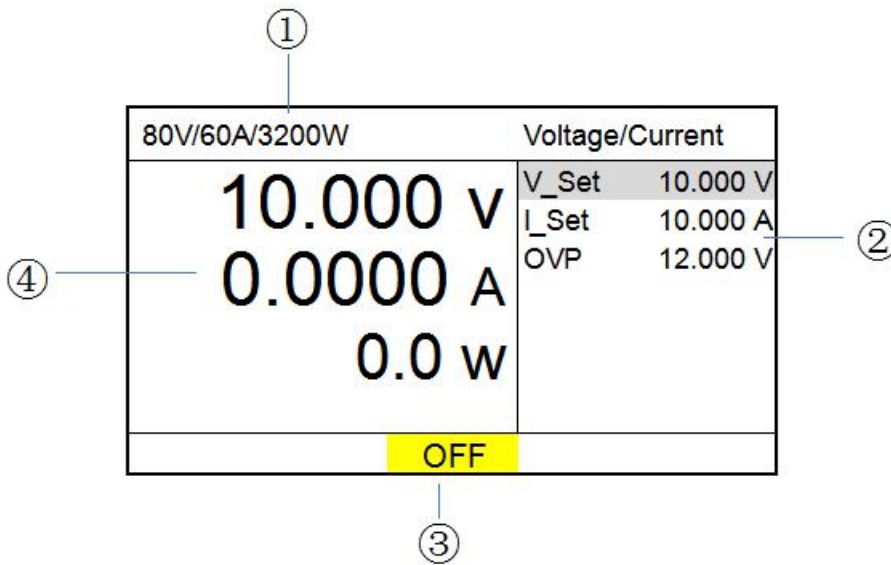
Figure 2-3 MAIN PAGE Display

① Specification info of the power supply;
② Parameters setting area;
③ Status prompt area;
④ Readback voltage, current, etc. parameters display area;

About specification info:
Displays the rated voltage, rated current, rated power of the power supply;

About V, I parameters display area:
Displays readback voltage, current, power, measurement result etc.. However, the actual displayed information varies, for example, in voltage/current static output mode, the area displays output voltage, current and power; in sequence test mode, the area displays output voltage, current, sequence current steps and sequence cycle times.

About Status prompt area:

OCP **Protection occurred**: Blank (no protection occurred), OVP, OCVP, OCP, OPP, OTP, LVP, RVP, etc.. protections occurred;

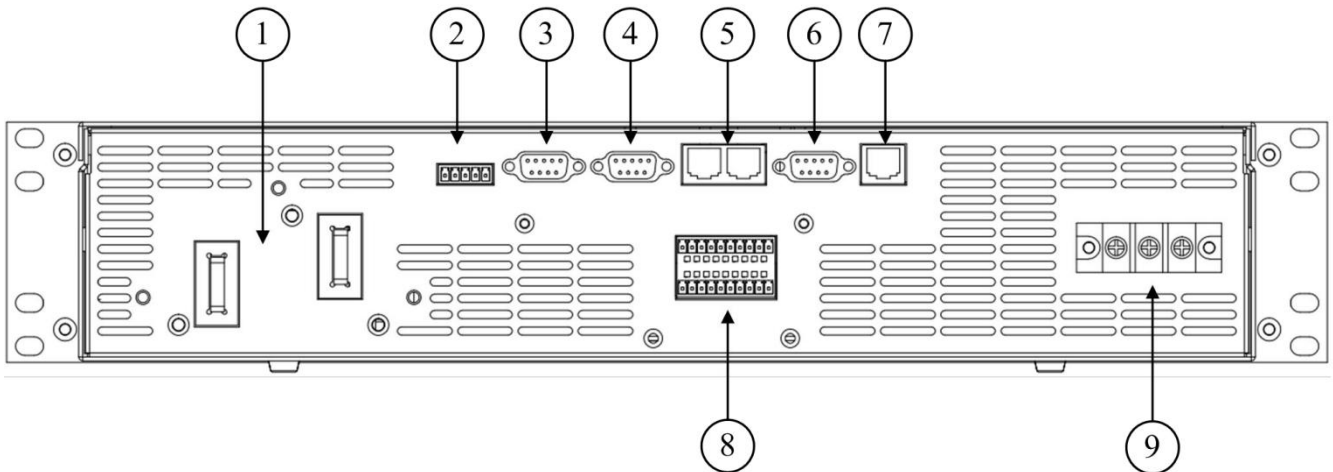Off **Output mode indicator**: CV, CC, CP, Off;

2.5 Rear Panel

Figure 2-4 FTP Rear Panel

Item	Name	Description
1	DC Output	The output terminals of the DC Power Supply.
2	Remote/Local V-SENSE	This connector compensates for any voltage drop generated by the cable resistance. Be sure to connect the remote sense connector "+" to the positive output terminal and the "−" connector to the negative output terminal. **Do not reverse the connections.**
3	Parallel Current Share In	For master-salve parallel operation
4	Parallel Current Share Out	For master-salve parallel operation
5	RS485	For master-salve parallel or serial operation
6	RS232	The remote controller uses the RS232 connector to connect to a PC for remote operation.
7	LAN	The remote controller uses the LAN connector to connect to a PC for remote operation.
8	Analog interface	This interface has the functions of analog programming input, voltage/current monitoring output, external control, power supply status and work mode indication.
9	AC INPUT	Single phase AC INPUT

2.6 Installing

2.6.1 Preparation For Use

(1) Ensure the Power Supply is connected to the AC line input that meets the specification.

(2) The instrument must be installed in an area with good air circulation to avoid the internal temperature getting too high.

(3) For indoor use only, ambient temperature 0°C to 40°C.

2.6.2 Requirements of Input Power

Please pay attention to the following items for FTP series power supply input connection:

① Single phase AC input: 190VAC~265VAC, 47~63Hz;

② Ensure reliable grounding;

③ The AC power cord temperature resistance is greater than 85℃;

④ Please refer to "Table 6-1 Recommended Wire Diameters for Cables" for the selection of input wire diameters to avoid potential safety hazards due to thinner wire diameters.

⚠WARNING 1. To protect the operator, the wire connected to the GND terminal must be connected to the earth. Under no circumstances shall this DC Power Supply be operated without an adequate ground connection.

2. Installation of the power cord must be done by a professional and compliant with local electrical codes.

2.6.3 Power ON Self Check

When powered on, the power supply will conduct self check, the check process and results will be displayed on the screen, such as below:

```
(c)All rights reserved.

Test ov/sense.    OK

Test converter.    OK

Test sample.    OK

Loading calibration data.    OK

Loading parameters.    OK
```
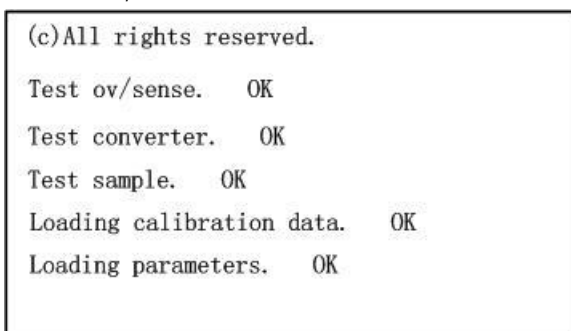
Figure 2-5 FTP Power ON Self Check

The power supply will enter MAIN PAGE if all checking results are OK.

If there is FAULT during power supply power on self check, please contact authorized Faithtech agent or Faithtech after-sale service.

2.7 Connection

2.7.1 Input Connection

The user connects the three-phase wire and the ground wire to the power supply input terminal as shown in Figure 2-6. For the size of the wire diameter, please refer to "Table 6-1 Recommended Wire Diameter for Cables".
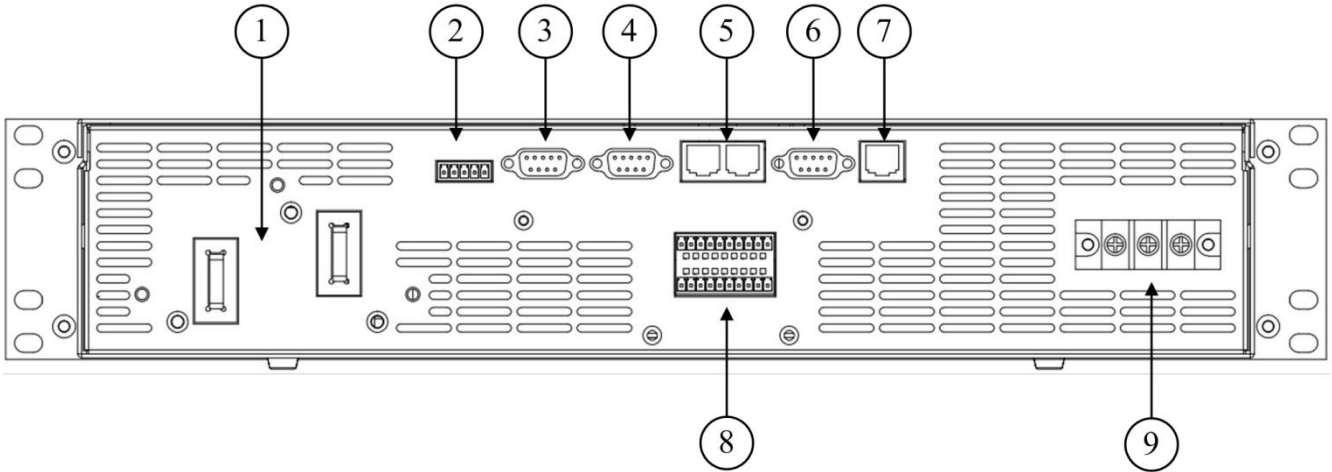
Figure 2-6 FTP Power supply Input Connection

⚠️**WARNING**

1. To protect the operator, the wire connected to the GND terminal must be connected to the earth. Under no circumstances shall this DC Power Supply be operated without an adequate ground connection.
2. Installation of the power cord must be done by a professional and compliant with local electrical codes.

2.7.2 Input Connection for Multiple Power Supplies

If multiple models are connected to the grid, it is recommended to distribute the access points in a balanced manner as shown in the figure below.
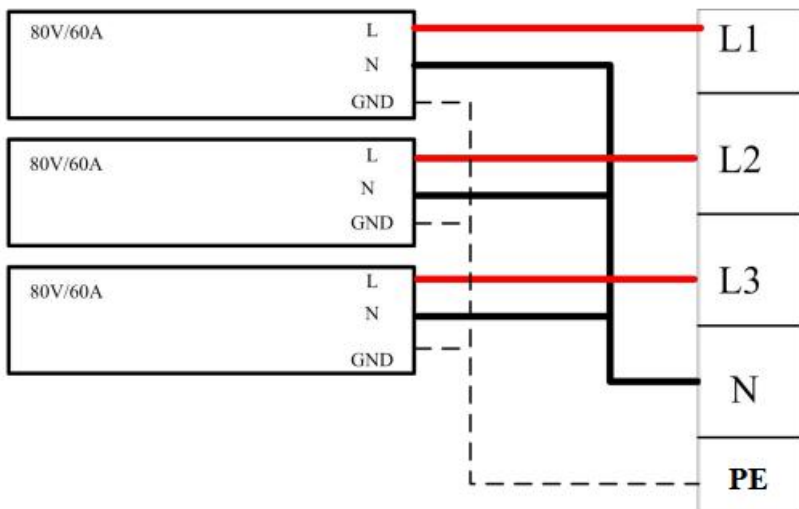
Figure 2-7 Input Connection of multiple FTP Models

2.7.3 Output Connection

The device under test is connected to the "+" and "-" output terminals on the rear panel of the power supply. When connecting, pay attention to the wire diameter, length and polarity of the output cable. To prevent the wire diameter from being too small to affect the test accuracy and generate large heat to cause safety accidents, please refer to "Table 6-1 Recommended Wire Diameters for Cables" for wire diameter selection.
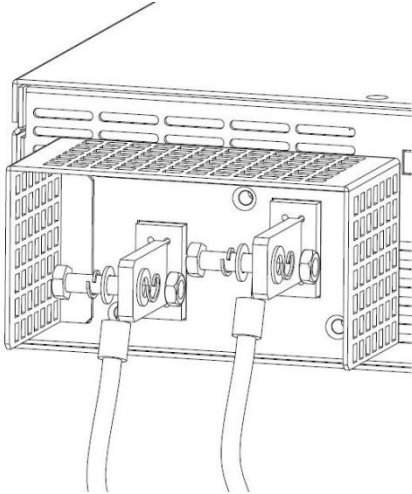

Figure 2-9 Power Supply Output Connection

⚡ **CAUTION**   The diameter of the wire connected to the load must be adequate so as to carry the maximum applied current.

2.7.4 V-Sensing Connection

FTP series power supplies are able to compensate for the voltage drop caused by output connecting cables. In order to use the remote V-sense function, firstly, remove the connecting wire between V-SENSE terminal: +LS and +S, -LS and -S. Then connect the +S and -S terminal to the positive/negative of the load respectively.
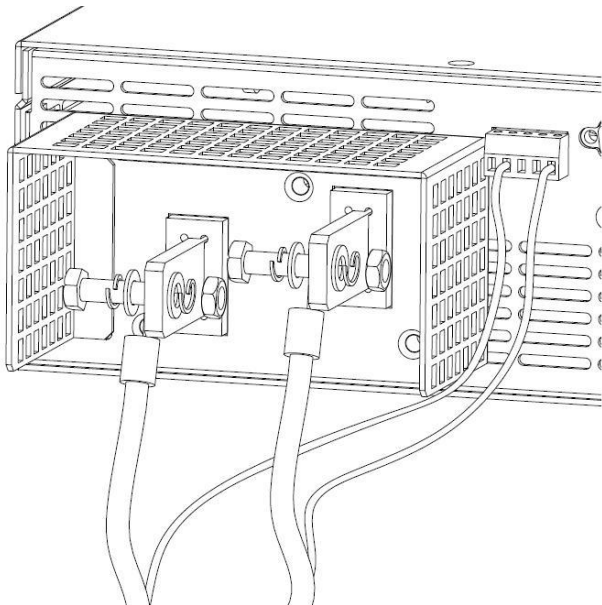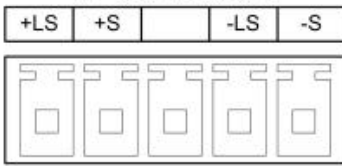

Figure 2-10 Power Supply Remote V-Sense Connection

V-SENSE terminal explanation:

① +LS: local V-sense positive terminal;

② -LS: local V-sense negative terminal;

③ +S: remote V-sense positive terminal;

④ -S: remote V-sense negative terminal

⚡ **CAUTION**   The allowed compensation voltage is relating to model voltage ratings, for specifics please refer to "3.8.2 Over Compensate Voltage Protection (OCVP)"

2.7.5 Analog Interface

FTP series power supply provides optional analog Interface at its rear panel. This interface has the functions of analog programming input, voltage/current monitoring output, external control, power supply status and work mode indication.
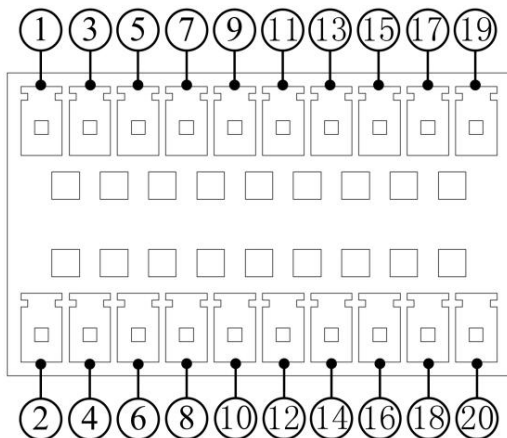

Figure 2-11 Analog Interface

Table 2-4 Analog Interface Function Description

PIN	Name	I/O	Description
1	IMON+	Output	Power supply output current monitoring port, monitor output range 0~10V
2	VMON+	Output	Power supply output voltage monitoring port, monitor output range 0~10V
3	IMON-	Output	Power supply output current monitoring port, monitor output range 0~10V
4	VMON-	Output	Power supply output voltage monitoring port, monitor output range 0~10V
5	VSET+	Input	Power supply voltage programming port, input signal range 0~5V or 0~10V
6	ISET+	Input	Power supply current programming port, input signal range 0~5V or 0~10V
7	VSET-	Input	Power supply voltage programming port, input signal range 0~5V or 0~10V
8	ISET-	Input	Power supply current programming port, input signal range 0~5V or 0~10V
9	GNDA	---	Reference ground
10	Reserved	---	Reserved
11	MODE	Output	Output mode indicating port. The port outputs High level signal under CV mode, low level signal under CC mode
12	READY	Output	The port outputs High level signal normally, low level signal if fault or protection
13	OV	Output	Overvoltage indicating, The port outputs High level signal when overvoltage protection. Otherwise output low level signal.
14	Reserved	---	Reserved
15	FAULT	Output	This port outputs high level signal if there is power supply FAULT, otherwise output low level signal
16	Reserved	---	Reserved
17	ON/OFF	Input	Control the power supply output ON/OFF state
18	DC_ON	Output	Monitor the power supply output voltage
19	Reserved	---	Reserved
20	GND	---	Digital ground

⚡ CAUTION
1. The level of the analog signal is related to the reference voltage setting;
2. The digital signal level is 0~5V.
3. The driving capacity of the output digital signal is up to 10mA.
4. The analog interface terminal is electrically isolated from the power supply output terminal.

----

3. Function Introduction

This chapter describes the main functions and characteristics of the power supply. Reading this chapter, you will have a deeper understanding of FTP series power supplies.

3.1 Local & remote operation mode

The power supply provides two operation modes: local operation and remote operation. In the local operation mode, the user mainly operates through the keyboard and knob on the front panel, and checks the power status through the LCD display; in the remote operation mode, the user mainly performs settings and operations via the communication interface and programming commands.

Local operation mode

When the power supply is turned on, it operates in local operation mode by default. In this mode, the user operates the power supply through the front panel keyboard and rotary knob. The LCD screen provides users with display functions such as parameter viewing, measurement display and status indication.

Some parameters can only be set in local mode, including:

● Serial port baud rate and parity method

● IP address and subnet mask

Remote operation mode

To enter the remote operation mode, please use the proper communication cable to connect the PC with the power supply. The communication configuration parameters must be consistent with the control device settings. Upon receiving the programming command, the power supply automatically switches to the remote operation mode from local control mode.

In remote control mode, all other keys are disabled except [Local] key, and the power supply can only be controlled by programming commands. Press [Local] on the front panel to return to local operation mode.

3.2 Menu Layout

3.2.1 Set Menu

Press [Menu] to enter main menu, then select "Set" and press [Enter] to pop up sub menu as below:

Table 3-1 Set Menu Layout

System	IP	Default 192.168.1.123
	S-Mask	Default 255.255.255.0
	Baud	Serial port baud rate, 4800/9600/19200/38400/115200, default: 9600.
	Parity	None/odd parity/even parity, default: None
	Sound	Keyboard sound ON/OFF. Default: ON
	Language	Simplified Chinese/Traditional Chinese/English. Default: English.
	Shortcut	Fast recall function ON/OFF. Default: Off
	Power Save	Power down save function ON/OFF. Default: ON
	Power Output	Define power supply output On/Off state at its power on moment. Default: Off
Output	V_MAX	Upper limit of static output voltage set , default 0 means no limit
	V_MIN	Lower limit of static output voltage set, default 0 means no limit
	I_MAX	Upper limit of static output current set, default 0 means no limit
	I_MIN	Lower limit of static output current set, default 0 means no limit
	VDC_R	Set rise voltage threshold in DC_ON function, refer to "3.7.2 DC_ON Set"
	VDC_F	Set fall voltage threshold in DC_ON function, refer to "3.7.2 DC_ON Set"
	TTL	Set DC_ON function output TTL level signal, refer to "3.7.2 DC_ON Set"
	Vslew	Set Voltage slew rate, range: 0.001V/s~5000V/s
	Islew	Set current slew rate, range: 0.001A/s~2000A/s
	Prior	Choice for CV or CC priority. Default value: Voltage (CV Priority)
Protect	OVP	Set overvoltage protection point, default value 110% rated output voltage
	OCP	Set overcurrent protection point, set 0 to turn off this protection, default 0
	OPP	Set overpower protection point, set 0 to turn off this protection, , default 0
	Foldback	Select foldback protection mode, OFF / CC-to-CV / CV-to-CC, default set OFF
	F_Time	Set foldback delay time, default 0.1s
	RVP	Turn on/off reverse voltage protection, default value: OFF
	LVP	Set low voltage protection point, default set 0 to turn off this protection.
	Over time	Set communication time out, range: 0.0~60.0s, set 0 to turn off this protection;
External	Inhibit	Choose external control mode, Off/Toggle/Hold, default: OFF
	APG	Choose external programming mode, Off/U/I/U+I/P, default: Off.
	Vref	Select reference voltage, 5V/10V, default: 5V
	DEVI-ADDR	Set device address
	Protocol	Set protocol
	Filter	Set voltage/current data acquisition speed in remote communication
	GPIB	Set GPIB address

Connect	M_or_S	Set the power supply as master or slave, default value: master
	P_or_S	Choose operation mode, parallel or serial, default: Parallel
	S.NUM	Set number of slaves in master, range: 1~9
	MS_CTRL	Turn on/off parallel function, default value: OFF
Factory		Reset to factory setting. Reboot the machine to take effect.

3.2.2 Edit Menu

Press "Menu" to enter into main menu, then select "Edit" and press "Enter" to pop up sub menu as below:

Table 3-2 Edit Menu Layout

Edit	Sequence	Select sequence file number, range 1~10
	Back	Exit

3.2.3 About Menu

Press "Menu" to enter main menu, then select "About" and press "Enter" to pop up sub menu such as HMI, MAIN, COMM program version information etc..

3.3 Switch Power Supply Output Mode

FTP series power supply provides three different output modes: CV/CC output, sequence output and constant power (CP) output. Press the specific key so as to switch to corresponding output mode.

Table 3-3 Three test output modes

Key	Testing output mode	Explanation
V/I	CV/CC output	
SEQ	Sequence output	
CP	Constant power output	

Notice   When power supply output is on, it is not allowed to switch the output mode. It is required to turn off output before switching output mode.

3.4 Turn ON/OFF Power Supply Output

In any of three output modes, press the [On/Off] key to turn ON/OFF power supply output. For example, in CV/CC output interface, when press the [On/Off] key, the screen status prompt area no longer displays "OFF", instead it indicates the power supply output mode "CV".

80V/60A/3200W	Voltage/Current	
10.000 V	V_Set	10.000 V
0.0000 A	I_Set	10.000 A
	OVP	12.000 V
0.0 W		
CV		

Figure 3-1 Turn ON Power Supply Output

3.5 Setting Voltage, Current

Press [V/I] key to enter into CV/CC output interface, as shown in below:

80V/60A/3200W	Voltage/Current	
10.000 V	V_Set	10.000 V
0.0000 A	I_Set	10.000 A
	OVP	12.000 V
0.0 W		
OFF		

Figure 3-2 CV/CC Output Interface

1. Rotate the rotary knob in order to select the item to be edited, press "Enter" to enter into edit status;
2. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase/decrease the value;
3. Press "Enter" to validate the input parameters.

There is furthermore an adjustable overvoltage protection parameter, users are able to modify the overvoltage protection threshold according to their needs.

When finished setting of voltage, current, press [On/Off] to start power supply output.

3.6 Save and Recall

FTP series provides users with up to 20 memory locations for saving V/I parameters. To recall saved parameters, you can perform in recall function interface, or just press a number key to shortcut recall saved parameters.

3.6.1 Save Operation

1. Press [Save] to enter into save interface;

2. Press number key or rotate the rotary knob to input a save location, press "Enter" to confirm.
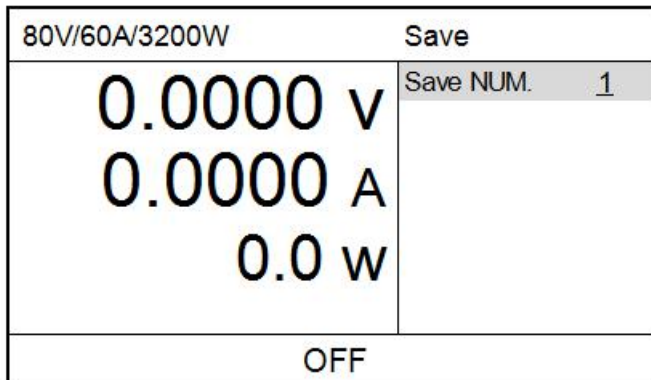
```
80V/60A/3200W          Save
                       ┌──────────────────┐
     0.0000 v          │ Save NUM.      1  │
                       │                    │
     0.0000 A          │                    │
                       │                    │
        0.0 w          │                    │
                       └──────────────────┘
              OFF
```

Figure 3-3 Save Interface

3.6.2 Recall Operation

1. Press [Recall] to enter into recall interface;

2. Press number key or rotate the rotary knob to input a recall location, press "Enter" to confirm.

```
80V/60A/3200W          Recall
                       ┌──────────────────┐
     0.0000 v          │ Recall         1  │
                       │                    │
     0.0000 A          │                    │
                       │                    │
        0.0 w          │                    │
                       └──────────────────┘
              OFF
```
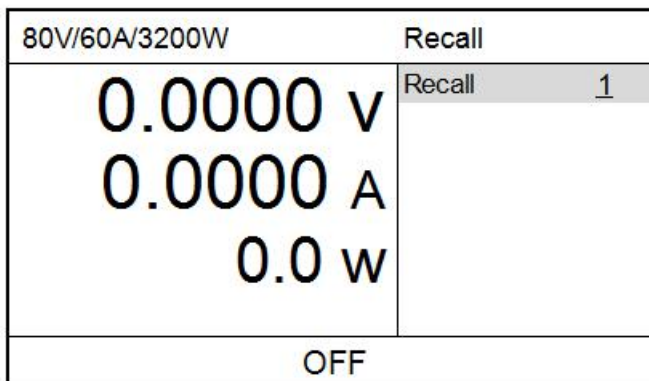
Figure 3-4 Recall Interface

3.6.3 Shortcut Recall

To recall the saved V/I parameters, there is furthermore a shortcut recall function (On the condition that "Shortcut" menu item is enabled). In CV/CC output interface "OFF" status, when parameters are not in editing state, simply press number key [0] ~ [9] to recall the corresponding saved parameter (0 corresponds to location 10).

3.7 Output Setting

3.7.1 Voltage/Current Limit Set

FTP series power supply allows for setting upper and lower limits on output voltage, current. When the upper and lower limit is set to non-zero, the allowed setting range of static output voltage, current is limited between the upper and lower limit. This function is useful for preventing misoperation from damaging the user's DUT.
The limit function will be canceled if upper and lower limit both are set to 0.

1. Press Menu ;
2. Select "Output" sub menu under "Set", press "Enter" to enter into the limit setting page shown as below:

Set	Edit	About	
V_MAX	48.000 V	TTL	0
V_MIN	44.000 V	V_Slew	5000.0 V/S
I_MAX	0.0000 A	I_Slew	2000.0 A/S
I_MIN	0.0000 A	Prio	Voltage
VDC_R	0.0000 V		
VDC_F	0.0000 V		

Figure 3-5 Voltage, Current Limit Set

3. Rotate the rotary knob in order to select the item to be edited, press "Enter" to enter into edit status;
4. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase or decrease the value;
5. Press "Enter" to validate the input parameters.

3.7.2 DC_ON Set

FTP series power supply analog interface provides an level signal output port (PIN18) to monitor its voltage output. When power supply turns on output, the analog interface PIN 18 outputs high level signal if power supply output voltage exceeds the set VDC_R voltage; when power supply turns off output, the PIN 18 outputs low level signal if power supply output voltage below the set VDC_F voltage, as illustrated as follows:
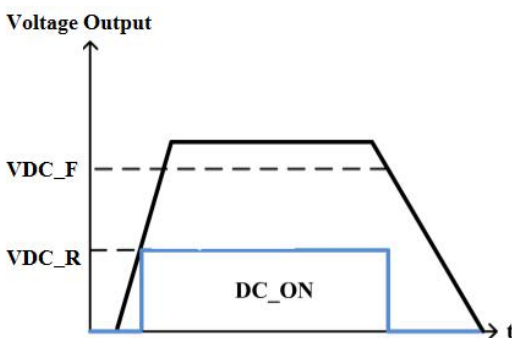

Figure 3-6 DC_ON outputs level signal

1. Press Menu , select sub menu "Output" under "Set", press "Enter" to enter into output set interface:

Figure 3-7 DC_ON Set

2. Rotate the rotary knob to select "VDC_R" or "VDC_F", press "Enter" to enter into edit status;

3. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase or decrease the value;

4. Press "Enter" to validate the input parameters.

3.7.3 Voltage Slew Rate

Voltage slew rate is defined as the voltage speed in output voltage rising period (In output voltage falling period, the voltage speed is determined by load). Take FTP-80-60 as an example, the maximum voltage slew rate is 5000 V/S, minimum 0.001 V/S.

1. Press [Menu], select sub menu "Output" under "Set", press "Enter" to enter into output set interface:

Figure 3-8 Voltage Slew Rate Set

2. Rotate the rotary knob to select "V_Slew", press "Enter" to enter into edit status;

3. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase or decrease the value;

4. Press "Enter" to validate the input parameters.

3.7.4 Current Slew Rate

FTP power supply outputs current at a designated set slew rate till reaches the preset current value. Take FTP-80-60 as an example, the maximum current slew rate is 2000 A/S, minimum 0.001 A/S.

1. Press [Menu] , select sub menu "Output" under "Set", press "Enter" to enter into output set interface:

Set	Edit		About	
V_MAX	48.000 V		TTL	0
V_MIN	44.000 V		V_Slew	5000.0 V/S
I_MAX	0.0000 A		I_Slew	2000.0 A/S
I_MIN	0.0000 A		Prio	Voltage
VDC_R	0.0000 V			
VDC_F	0.0000 V			

Figure 3-9 Voltage Slew Rate Set

2. Rotate the rotary knob to select "I_Slew", press "Enter" to enter into edit status;
3. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase or decrease the value;
4. Press "Enter" to validate the input parameters.

3.7.5 CV/CC Priority Start function

FTP series power supply provides CC priority and CV priority start function, which forces the power supply to operate in CC or CV mode at the moment the output is turned on, effectively avoids the current or voltage overshoot resulted from capacitive or inductive load.

1. Press [Menu] ;
2. Select "Output" sub menu under "Set", press "Enter" to enter into output set interface as below:

| Set	Edit		About	
V_MAX	48.000 V		TTL	0
V_MIN	44.000 V		V_Slew	5000.0 V/S
I_MAX	0.0000 A		I_Slew	2000.0 A/S
I_MIN	0.0000 A		Prio	Voltage
VDC_R	0.0000 V			
VDC_F	0.0000 V			

Figure 3-10 CV, CC Priority Start Set

3. Select "Prio SLT" to set the value. "Voltage" stands for CV priority start. "Current" stands for CC priority start.
4. Press "Enter" to validate the configuration.

3.8 Protection

FTP series power supply provides comprehensive protection functions, some of them are user adjustable protection functions and it is possible to set an protection threshold, while others are not. The adjustable protection functions includes protections against overvoltage (OVP), overcurrent (OCP), overpower (OPP), foldback, reverse voltage (RVP), low voltage (LVP), communication time out (Over time). Non-adjustable protections are triggered by hardware protection circuit, including overtemperature protection (OTP), over compensate voltage protection (OCVP), module fault protection (FAULT)

When a protection occurs, the power supply will turn off output, sounds an alarm, and prompt corresponding protection information on display.

1. Press ⎡Menu⎤ to enter into the main menu, select "Protection" sub menu under "Set", press "Enter", you will see following interface for protection setting:

Set	Edit	About	
OVP	88.000 V	LVP	0.0000 V
OCP	0.0000 A	Over Time	0.0 S
OPP	0.000 W		
Foldback	Off		
F_Time	0.1 S		
RVP	Off		

Figure 3-11 Protection Setting

2. Rotate the rotary knob to select the protection to be adjusted, press "Enter" to enter into edit status;

3. Use the numeric keys and decimal point key to input data, also you can rotate the rotary knob to increase or decrease the value;

4. Press "Enter" to validate the input parameters.

Clear Protection: when protection occurred, to clear the protection state, press and hold ⎡PROT -CLR⎤ for 3 seconds.

Overvoltage protection (OVP)

Users are able to set the OVP threshold, setting range 0...110% rated output voltage, set to 0 means to turn off OVP (Default 110% rated output voltage). OVP is triggered once the output voltage exceeds OVP set, the DC output is shut off and "OVP" is prompted on display.

Over Compensate Voltage Protection (OCVP)

When using remote V-Sense, the power supply automatically compensate the voltage drop resulted from line loss, and it is possible to trigger OCVP if the compensate voltage is too high. When OVP occurred, the DC output is shut off and "OCVP" is prompted on screen.

Table 3-4 Over Compensate Voltage

Model Voltage	40V	50V	80V	120V	160V	300V
Over compensate voltage thresh	2.5V	2.72V	5V	7.5V	10V	18.75V
Model Voltage	400V	600V	800V	1000V	1200V	1500V
Over compensate voltage	25V	37.5V	37.5V	60V	60V	85.7V

Overcurrent Protection (OCP)

Users are able to set the OCP threshold, set to 0 means to turn off OCP (Default set is 0). OCP is triggered once the output current exceeds OCP set, the DC output is shut off and "OCP" is prompted on display.

Overpower Protection (OPP)

Users are able to set the OPP threshold, set to 0 means to turn off OPP (Default set is 0). OPP is triggered once the output power exceeds OPP set, the DC output is shut off and "OPP" is prompted on display.

Foldback Protection (Foldback)

This function turns off power supply output if its output mode is changed (CV to CC or CC to CV).

You can configure the "Foldback" setting in "Protection" sub menu under "Set" menu. It has three choices:
● OFF, this turns off foldback protection;
● CV to CC, power supply is allowed to output under CV only, it automatically turns off output if switch to CC;
● CC to CV, power supply is allowed to output under CC only, it automatically turns off output if switch to CV.

Furthermore, there is a "F_Time" item for users to set the foldback protection delay time, range is 0.1 seconds up to 600 seconds. When foldback protection occurred, the DC output is shut off and "FOLD" is prompted on screen.
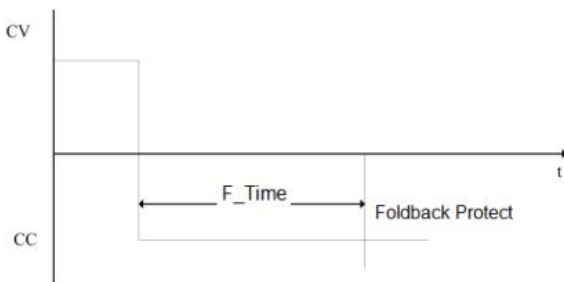

Figure 3-12 F_Time (Foldback Protect Delay Time)

![Notice] Note: If DELAY TIME (F_Time) is set to t seconds, the FOLDBACK will not be activated until t seconds after a mode change is detected. If the actual mode change time is less than t seconds and then it return to its original state, in this situation FOLDBACK protection will not occur.

Low Voltage Protection (LVP)

Users are able to set the low voltage protection threshold, set to 0 means to turn off this protection. Low voltage protection is triggered once the output voltage is below the set value, the DC output is shut off and "LVP" is prompted on display.

TOUT Protection

When TOUT protection occurred, the DC output is shut off and "TOUT" is prompted on display.

OTP Protection

OTP protection is triggered when instrument internal temperature is getting too high. When OTP protection occurred, DC output is shut off and fan will operate at full speed to cool down the instrument, and the screen prompt "OTP".

SHUT Protection

SHUT protection is triggered when AC input over normal range (lower than 190VAC or higher than 265VAC), or there is PFC circuit abnormal, or there is abnormal in auxiliary power supply output, or there is OVP in one of the

power supplies during parallel or serial operation. When SHUT protection occurred, the DC output is shut off and "SHUT" is prompted on display.

FAULT Protection

FAULT protection is triggered when internal power module abnormal, or V-SENSE line fall off. If FAULT protection occurred, the DC output is shut off and "FAULT" is prompted on display.

3.9 External Analog Programming

Users are able to control the power supply's output voltage, output current and output power through external 0 ~ 5V or 0 ~ 10V DC voltage.

1. Press | Menu | , select "External" sub menu under "Set" menu, press "Enter" to enter into external programming setting interface as follows;

Set	Edit	About	
Inhibit	Off	GPIB	5
APG	Off		
Vref	10V		
DEVI_ADDR	0		
Protocol	Modbus		
Filter	100Hz		

Figure 3-13 Analog Programming Setting Interface

2. Rotate the rotary knob to select the "APG", press "Enter" to switch to edit state;
3. Rotate the rotary knob to select the analog programming parameter (refer to "Table 3-4 Analog Programming Parameter");

Table 3-5 Analog Programming Parameter

Selection	Port	Explanation
Off	None	Turn off analog programming function
U	VSET+, VSET-	Turn on voltage programming
I	ISET+, ISET-	Turn on current programming
U+I	VSET+,VSET-,ISET+,ISET-	Turn on voltage and current programming
P	VSET+, VSET-	Under CP output mode, turn on power programming

4. Press "Enter" to validate the selected parameter.
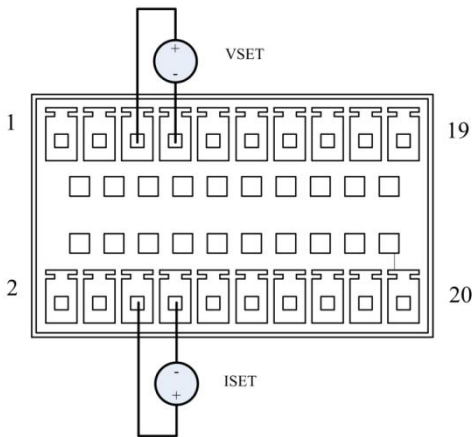
3.9.1 External Analog Programming Connection

Figure 3-14 Analog Programming Connection

3.9.2 External Analog Programming Reference Voltage

External analog programming supports two different reference voltage: 5V or 10V.

1. Press Menu , select "External" sub menu under "Set" menu, press "Enter" to enter into external programming setting interface;

2. Rotate the rotary knob to select the "Vref", press "Enter" to switch to edit state;

3. Rotate the rotary knob to select the reference voltage;

4. Press "Enter" to validate the selected parameter.

5. Parameter notes: reference voltage 0~5V/10V corresponds to 0~100% output set voltage or 0~100% output set current.
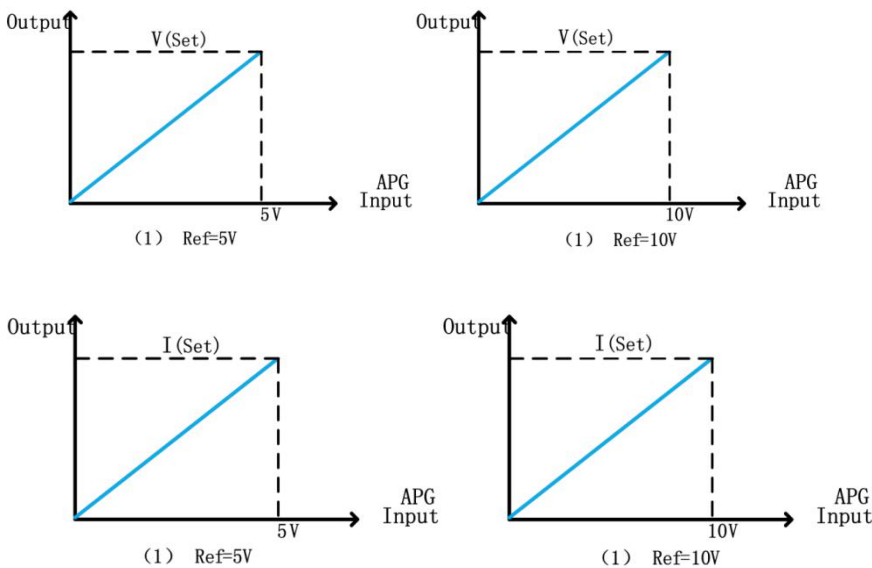
Figure 3-15 Analog Programming Reference Voltage and Power Supply Output Relation

3.10 External Control

FTP series power supply analog interface PIN 18 can control the power supply ON/OFF status. This function has three selections:

● Off, turn off external control;

● Toggle, similar to front panel [On/Off] key, to switch the power supply ON/OFF state;

● Hold, turn on output when input signal is valid, turn off when invalid.

How to configure the external control:

1. Press [Menu] , select "External" sub menu under "Set" menu, press "Enter" to enter into external setting interface;

2. Rotate the rotary knob to select the "Inhibit", press "Enter" to switch to edit state;

3. Rotate the rotary knob to select the external control behavior;

4. Press "Enter" to validate the selected parameter.

There are two different ways for external control connection,
option 1: connect the analog interface PIN 18 and PIN 20:
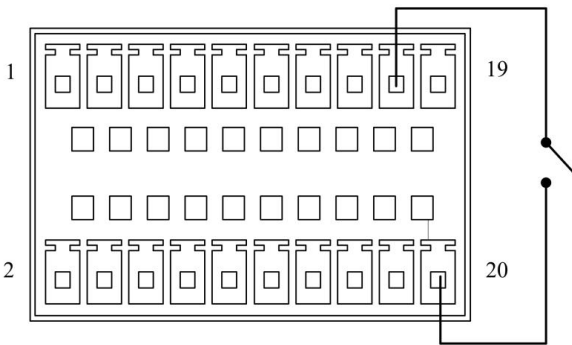
Figure 3-16 External Control Connection 1

This is quite simple, close the switch, control signal valid; open the switch, control signal become invalid.
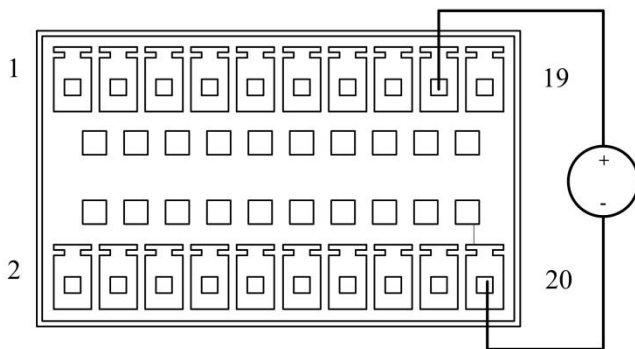Option 2: Use 0~5V level signal.

Figure 3-17 External Control Connection 2

This way requires external voltage source, the control signal is valid when input voltage 0V; invalid if 5V.

3.11 Master-slave Parallel and Serial Operation

FTP series power supply supports master-slave parallel and serial operation.

⚡ CAUTION

1. Must be same model power supplies;
2. Max 5 units, needs to customize from Faithtech if connect over 5 units;
3. Parallel and Serial can not be mixed;
4. Total voltage **can not exceed 600V if serial connect** multiple power supplies;
5. When parallel or serial operation for multiple power supplies, it is recommended to distribute the access points in a balanced manner as shown in the figure below.
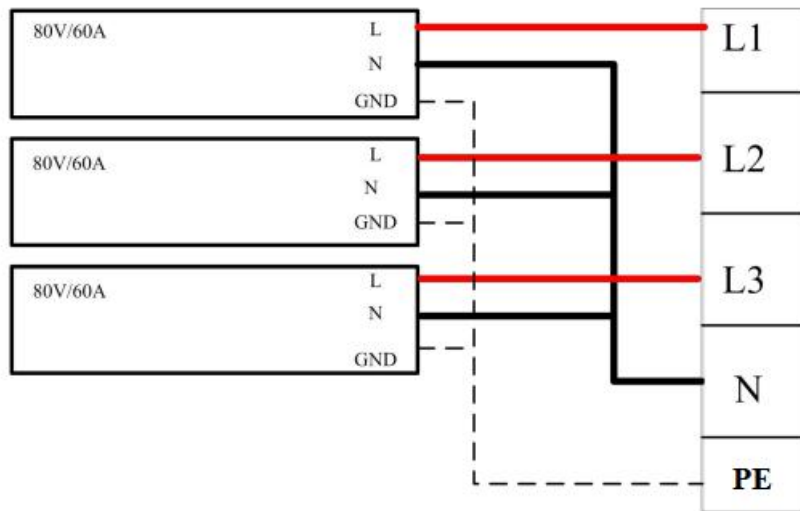
Figure 3-18 Input Connection for Parallel or Serial Operation

----
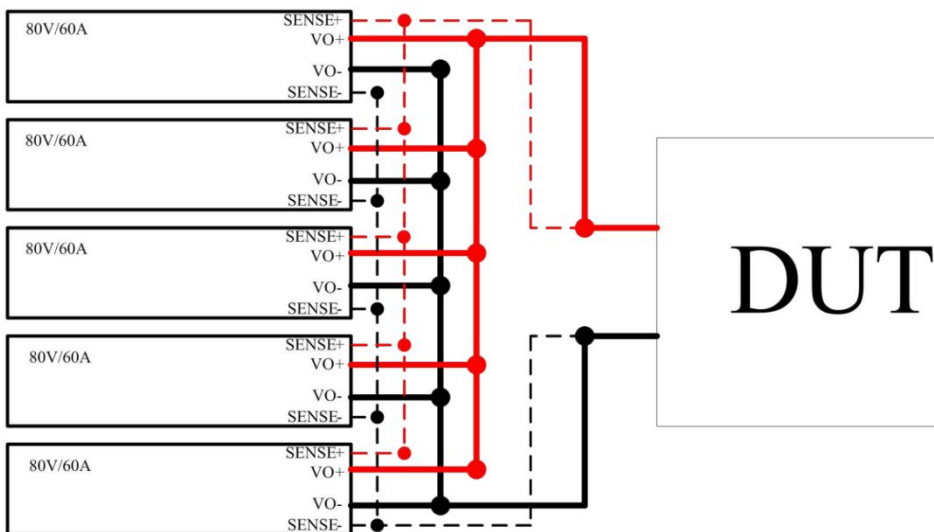
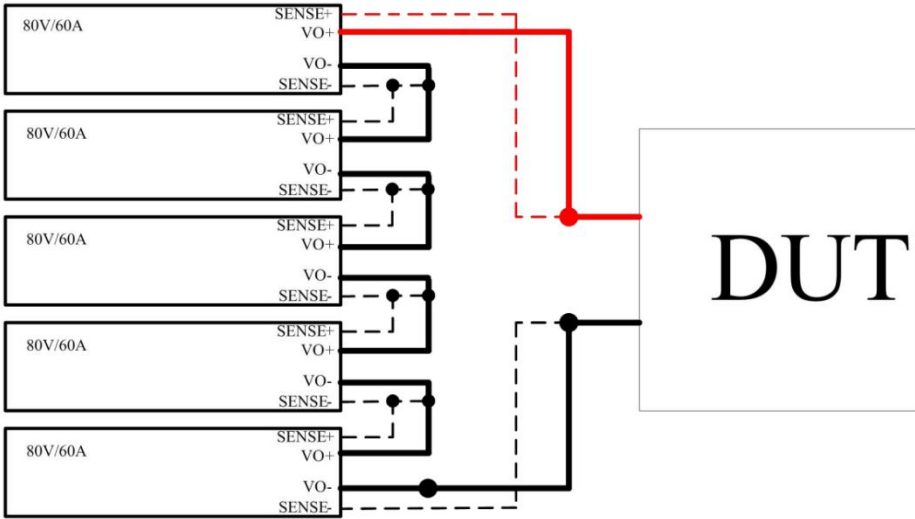### 3.11.1 Output Connection

Figure 3-19 Parallel Connection

Figure 3-20 Serial Connection

3.11.2 Communication Connection

When multiple same model FTP power supplies are used for parallel operation, must connect the current sharing cable and RS485 communication cable.

However, for serial connection, must only connect RS485 communication cable.
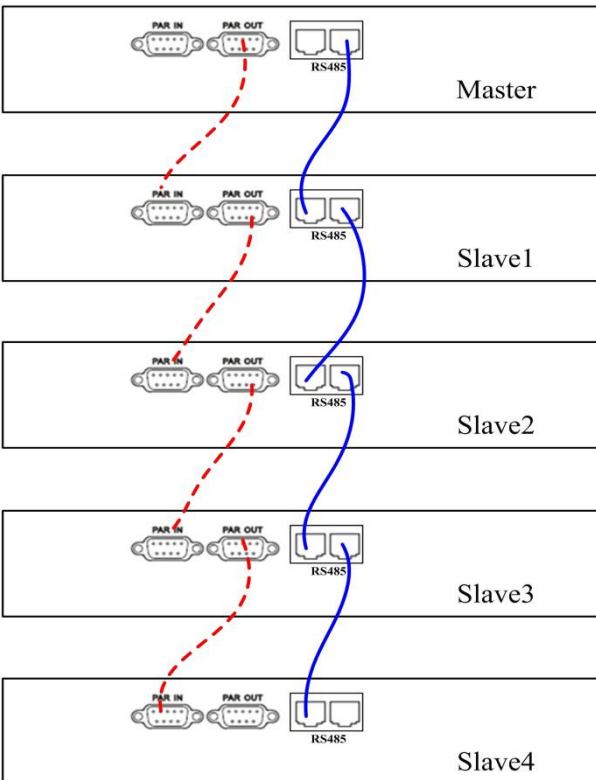
Refer below pictures:

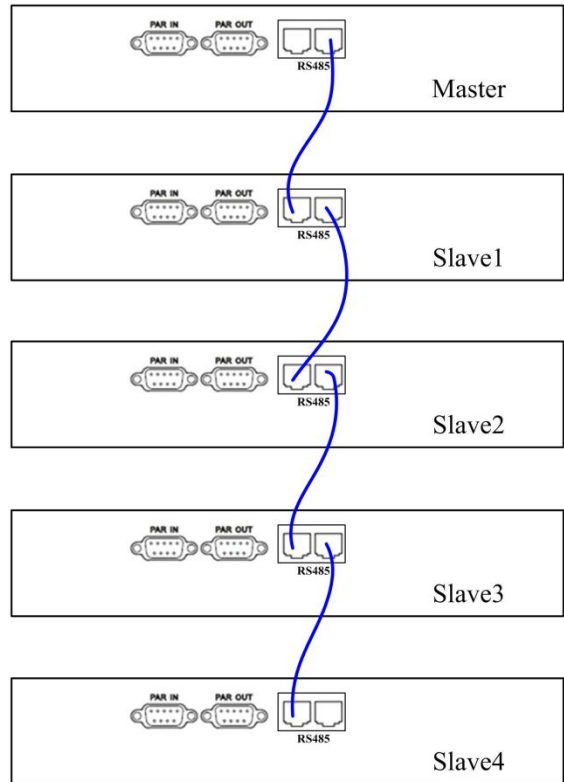Figure 3-21 Parallel Communication Connection

Figure 3-22 Serial Communication Connection

⚡ **CAUTION**

1. For **parallel** operation, **must connect the current sharing cable**, otherwise it will not work normally and correctly;

2. For **serial** operation, **must not** connect the current sharing cable, otherwise it may damage the power supply.

3.11.3 Slave Setting

In master-slave parallel or serial operation, must set slave power supply first, and set master power supply finally. Slave power supplies can be set as Slave1 up to Slave4, starts from Slave1 and needs to be consecutive.

1. Press Menu , select "Parallel" sub menu under "Set" menu, press "Enter" to enter into parallel setting interface;

Figure 3-23 Parallel Setting Interface

2. Rotate the rotary knob to select the "M_or_S", press "Enter" to switch to edit state;
3. Rotate the rotary knob to select Slave1 ~ Slave4;
4. Press "Enter" to validate the selected parameter.

When power supply is set as slave, its screen parameter setting area displays slave power supply code only, however, users can still view the readback voltage, current from the slave screen.

Figure 3-24 Slave Power Supply Display

3.11.4 Master Setting

When finished setting slave power supply, set master power supply according to following procedures:

1. Press [Menu], select "Parallel" sub menu under "Set" menu, press "Enter" to enter into parallel setting interface;
2. Set "M_or_S" value as Master;
3. Set "P_or_S" according to actual situation (parallel or serial operation);
4. Set "S.NUM" according to actual slave power supply units (range 1~4);
5. Set "MS_CTRL" value as ON.

When "MS_CTRL" is turned ON, the master power supply starts searching slave power supplies and building communication. Users only need to operate the master unit to control all power supplies. Pay attention that once "MS_CTRL" is ON, it is not allowed to modify parameters in "P_or_S" and "S.NUM".

After setting parallel/Serial operation parameters, press [Esc] to return to main interface, screen shall display the whole group's specifications, and shows operation mode (Σ-P stands for parallel, Σ-S stands for serial).

> Figure 3-25 Parallel Master Display

3.11.5 Parallel/Serial Operation V/I Setting

After correctly setting the parallel or serial operation, users are able to configure the voltage, current, etc. parameters on master power supply, and view the readback information of the whole group such as readback voltage, readback current, readback power and other status information. The master power supply's output voltage, output current, output power setting range are also automatically updated, operating the whole group is as simple as operating a single power supply (constant power output mode and sequence output mode does not support parallel/serial operation).

For example, parallel 5 units FTP-80-60. In master power supply, the allowed output current setting range expands to 5 times of a single power supply, i.e. max. output current 300A, max. output voltage remains 80V.

If serial connect 5 units FTP-80-60. In master power supply, the allowed output voltage setting range expands to 5 times of a single power supply, that is maximum output voltage 400V, max. output current remains 60A.

3.11.6 Parallel/Serial Operation Protection

When "MS_CTRL" is turned on, all power supply protection functions are still effective. If any of the power supplies turned off output due to protection, master power supply will turn off all power supplies' output and displays information on screen, as shown in following picture:
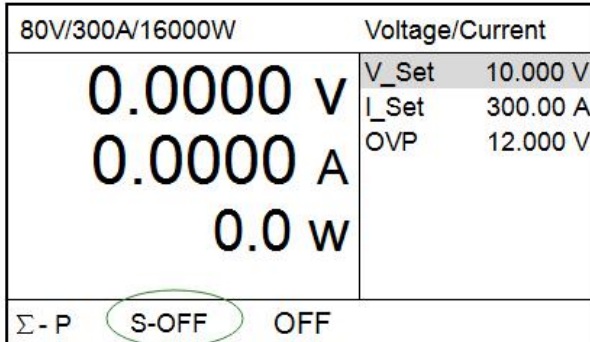

Figure 3-26 Master Display If Protection Triggered

When protection is triggered in slave unit, then detailed protection information is displayed in slave screen:
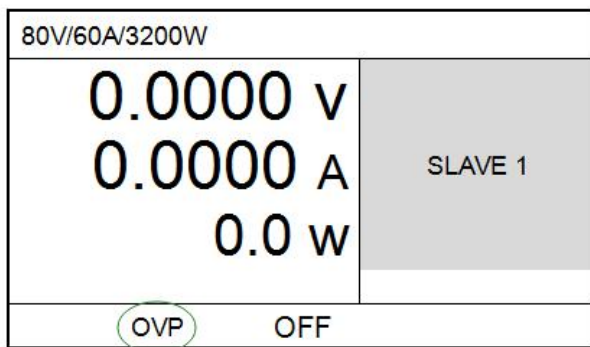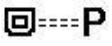

Figure 3-27 Slave Display If Protection Triggered

To clear the protection in slave unit, press [PROT -CLR] and hold for three seconds.

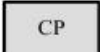Following table listed the possible protections and fault when parallel or serial operation.

Table 3-6 Parallel/Serial Protection/Fault Explanation

Symbol	Explanation
▣—S	Damaging power supply! **Do not connect** current sharing cable in serial operation
▣====P	Can not output correctly! **Do connect** current sharing cable in parallel operation
M-MIS	Master power supply communication abnormal
S-MIS	Slave power supply communication abnormal
S-OFF	Protection is occurred in slave power supply, output is turned off
Σ-P blinks	Communication unstable in parallel operation
Σ-S blinks	Communication unstable in serial operation

3.12 Constant Power Output (CP) Setting

CP setting has 4 parameters:

● Voltage, set power supply allowed max. Output voltage;

● Current, set power supply allowed max. Output current;

● Power, set target output power;

● Response, set constant power output adjust speed.

1. Press [CP] to switch to constant power output function, as shown in following picture:

Figure 3-28 Constant Power (CP) Output

2. Rotate the rotary knob to select the parameter to be edited, press "Enter" to enter into edit state;

3. Input value with number key and decimal point key, or rotate the rotary knob to increase or decrease value;

4. Press "Enter" to validate the input.

Typically, the default 50% response speed is suitable for most loads. You can change the response speed in case of needs.

3.13 SEQ (Sequence) Output Setting

For sequence test function, the corresponding set menu option is "Sequence". The sequence feature allows users to program a list of steps into the power supply's internal memory and execute them. A total of 20 steps can be allocated to each internal memory location, up to a maximum of 20 locations (sequences files). Voltage, current and delay can be set in each step. Sequence file supports "cycle" and "link" attributes. "cycle" controls the sequence file to run cyclically for a specified times, set to 0 means infinite loop. "Link" can add other sequence file into test, set to 0 means no linked sequence file.

When SEQ output is turned on, the highest voltage and current slew rate are used by default.

Table 3-7 Sequence Parameter Explanation

Parameter	Explanation
Length	SEQ file running steps, range 1 ~ 20
Cycle	Set SEQ file running cycles, range 0 ~ 60000, value 0 means infinite cycle. Default value 1
Link	Range 0 ~ 20, call specified SEQ file to run at this step, value 0 means no linked file
SEQ Step	Choose the specified step to edit. Range 1 ~ 20

V_Set	Output voltage for current step, Range 0 ~ max. Output voltage
I_Set	Output current for current step, Range 0 ~ max. Output current
Step-Time	Delay for current step, range 0.001 ~ 86400s. The delay time is counting from the moment that the current step V/I reaches the setting value.

Program Sequence (SEQ):

1. Press Menu ;

2. Select "Sequence" sub menu under "Edit", press "Enter" to enter into sequence file choosing page;

3. Rotate the rotary knob or input numbers to choose a sequence file for editing, press "Enter" to enter SEQ editing page shown as below:

Set	Edit	About	
SEQ Step	1	Length	20
V_Set	0.0000 V	Cycle	1
I_Set	0.0000 A	Link	0
SEQ-Delay	1000 s		

Figure 3-29 Sequence File Edit

4. Set "Length", press Enter to validate it, the editing cursor will move to "Cycle" automatically;

5. Set "Cycle", press Enter to validate it, the editing cursor will move to "Link" automatically;

6. Set "Link", press Enter to validate it, the editing cursor will move to "SEQ Step" automatically;

7. Set "SEQ Step", press Enter to validate it, the editing cursor will move to "V_Set" automatically;

8. Set "V_Set", press Enter to validate it, the editing cursor will move to "I_Set" automatically;

9. Set "I_Set", press Enter to validate it, the editing cursor will move to "SEQ-Delay" automatically;

10. Set "SEQ-Delay", press Enter to validate it, the editing cursor will move to "SEQ step" and increase its value by 1 automatically;

11. Repeat procedures of 7 ~ 10, till all sequence steps have been programmed.

12. Press Enter to save the programmed sequence file.

13. Press Enter to quit sequence editing.

 Notice   **When power supply output is ON, sequence editing is not allowed.**

Running sequence file

1. Press SEQ to enter into sequence output function, as follows:

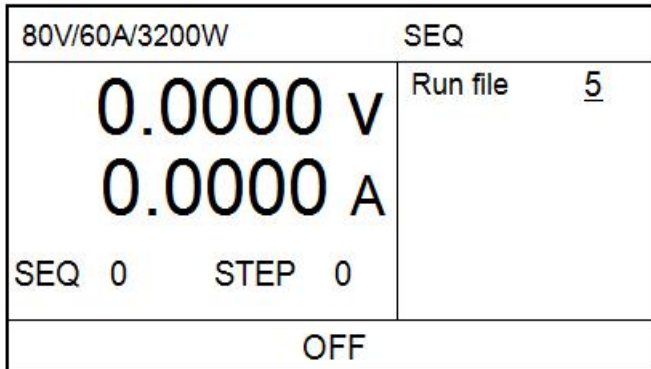| 80V/60A/3200W	SEQ
0.0000 V	Run file 5
0.0000 A	
SEQ 0 STEP 0	
OFF	

Figure 3-30 Sequence Test Display

2. Press Enter to edit "Run file", rotate the rotary knob or press number key to input sequence file number;

3. Press Enter to validate the input;

4. Press On/Off to start running sequence test output. The screen will display the current sequence file and step number. "STEP" stands for sequence current step, "SEQ" stands for current running sequence file number.
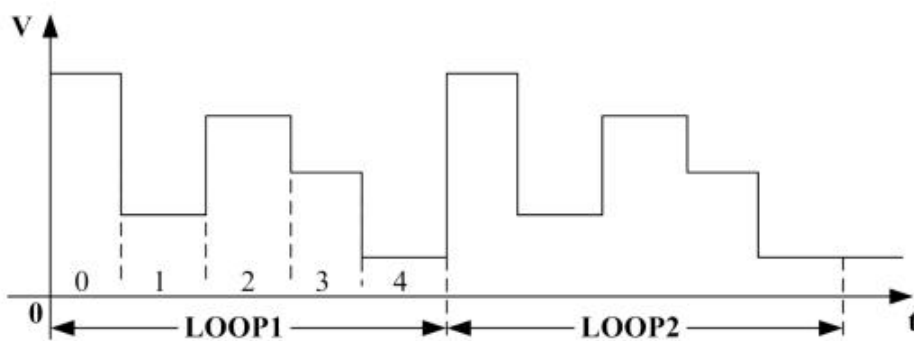
SEQ output function can simulate complex waveforms, such as below waveform:

Figure 3-31 Sequence Output Waveform

3.14 System Configuration

FTP series power supply system parameters configuration ways:

1. Press [Menu], select "System" sub menu under "Set", press [Enter] to enter into system parameter set:

Set	Edit	About	
IP	192.168.1.123		
S-Mask	255.255.255.0		
Baud	9600	Shortcut	Off
Parity	None	Power Save	On
Sound	On	Power Output	Off
Language	English		

Figure 3-32 System Parameter Set

2. Rotate the rotary knob to select the parameter to be set, press [Enter] to enter into edit state;
3. Press number key and decimal point key to input value, or rotate the knob to increase/decrease value;
4. Press [Enter] to validate the input;
5. Power down the instrument, power on again for parameters to take effect.

⚡ CAUTION   After modifying the configuration, you need to restart the power supply for changes to take effect.

3.14.1 Power Save

This parameter determines the initializing parameters when power supply is powered on, there are two choices:
● On, use the parameter setting in last power-off;
● Off, use the system default parameter

3.14.2 Power Output

This parameter determines whether power supply output is automatically turned on at the moment of power on, there are two choices:
● Off, when power supply is powered on, its output is turned off;
● On, when power supply is powered on, its output is turned on.

📌 Notice   To enable this configuration, must enable "Power Save" parameter first.

3.14.3 Shortcut Recall

There are two choices for this parameter setting:
● Off, shortcut recall function is disabled;
● On, users can shortcut recall saved V/I parameters with just one number key pressing (under CV/CC output mode).

3.14.4 Remote Communication Address

"IP" and "S-Mask" are used for setting remote communication network address.
IP default: 192.168.1.123; S-Mask default: 255.255.255.0

⚡ **CAUTION**   After modifying the configuration, you need to restart the power supply for changes to take effect.

3.14.5 Baud Rate and Parity Set

"Baud" and "Parity" are used for setting remote communication serial port parameters.
Baud rate setting range: 4800bps, 9600bps, 19200bps, 38400bps, 115200bps.
Parity: None, Odd, Even.

⚡ **CAUTION**   After modifying the configuration, you need to restart the power supply for changes to take effect.

3.14.6 Sound

This parameter determines the sound of key pressing. There are two choices for this parameter setting:
● Off, no sound if you press the key or rotate the rotary knob;
● On, there is beep sound if you press the key or rotate the rotary knob.

📌 **Notice**   There is always protection alarm sound, even if you turn off the sound in parameter set.

3.14.7 Language

FTP series display screen supports simplified Chinese, traditional Chinese, English.

4. Communication Introduction

FTP series power supply provides users with RS232 and LAN standard communication interfaces. Users can operate the power supply remotely using a PC connected to the power supply. Pay attention that you can only use one interface at a time, RS232 and LAN can not be used concurrently. The default remote communication interface is RS232.

The communication configuration data is stored in power supply internal memory, power off or power down does not affect its configuration. Once there is modification in configurations, must reboot the power supply for changes to take effect.

4.1 Communication Interface

4.1.1 RS232

FTP series uses a default baud rate of 9600bps, parity is none, does not support flow control method. Regarding RS232 interface, only TxD and RxD foot can transmit data, its PIN are explained as following:

Table 4-1 RS232 PIN signal

Pin NO.	Input/Output	Description
1	---	N.C.
2	Input	RxD
3	Output	TxD
4	---	N.C.
5	GND	GND
6	---	N.C.
7	---	N.C.
8	---	N.C.
9	---	N.C.

4.1.2 LAN

The FTP series power supply has an Ethernet communication interface and adopts UDP communication mode. The default IP address is 192.168.1.123, the default subnet mask is 255.255.255.0, and the default port number is 7000.


⚡ CAUTION   Before starting communication, make sure that the address of the PC and the power supply are in the same network segment, and that there is no duplicate IP address with the power supply in this network segment, otherwise it will not be able to connect correctly.


4.1.3 Voltage, Current Acquisition Speed

After the above communication configuration is completed, if the user needs to increase the voltage, current acquisition speed for remote control, the configuration can be as follows:

1. Press [Menu] to enter main menu page;

2. Select "External" sub menu under "Set", press [Enter] to show as below:

Set	Edit	About	
Inhibit	Off	GPIB	5
APG	Off		
Vref	10V		
DEVI_ADDR	0		
Protocol	Modbus		
Filter	100Hz		

Figure 4-1 V/I acquisition speed setting

3. Rotate the rotary knob to select "Samp Rate", Press [Enter] to enter into edit state;

4. Rotate the rotary knob to select rate, default is 100Hz.

5. Reboot the power supply for changes to take effect.

⚡ **CAUTION**   After modifying the configuration, you need to restart the power supply for changes to take effect.


4.2 Communication Protocol

FTP series power supply supports SCPI and Modbus-RTU protocol.

Set	Edit	About	
Inhibit	Off	GPIB	5
APG	Off		
Vref	10V		
DEVI_ADDR	0		
Protocol	Modbus		
Filter	100Hz		

Figure 4-2 Communication Protocol Selection

1. Press [Menu] , select "External" sub menu under "Set", press "Enter" to enter into above set page;

2. Rotate the rotary knob to select "Protocol", press "Enter" to enter into edit state;

3. Rotate the rotary knob to select "SCPI" or "Modbus";

4. When choosing Modbus protocol, ensure that the device address (DEVI_ADDR) is the same with host PC;

5. Press [Enter] to validate the input;

6. Reboot the power supply for changes to take effect.

⚡ **CAUTION**   After modifying the configuration, you need to restart the power supply for changes to take effect.

4.2.1 SCPI Protocol

For specific content of SCPI protocol, please refer to "FTP Programming Manual SCPI Edition".

4.2.2 Modbus Protocol

For specific content of Modbus protocol, please refer to "FTP Programming Manual Modbus Edition"

5. Troubleshooting

Follow the actions described in this chapter to inspect the instrument and troubleshoot the problem if the FTP series DC Power Supply does not operate normally. Contact Faithtech authorized agent or Faithtech after-sales if the information provided in this manual does not resolve the problem.

Table 5-1 Fault Check

Problem	Possible Cause	Solution
Measurement accuracy is not within SPEC.	Measurement swings due to aged components.	Do calibration.
Output accuracy is not within SPEC.	Output swings due to aged components.	Do calibration
Overtemperature Protection (OTP)	1. The ambient temperature is too high. 1. Bad ventilation. 2. Fan damaged.	1. Operate the instrument within an ambient temperature of 0 - 40°C. 2. Ensure the instrument is well ventilated. 3. Contact Faithtech authorized agent or Faithtech after-sales 4. Press [PROT -CLR] to clear protection state.
Overpower Protection (OPP)	The output power exceeds the OPP setting.	1. Decrease load or increase OPP setting. 2. Press [PROT -CLR] to clear protection state.
Overcurrent Protection (OCP)	The output current exceeds the OCP setting.	1. Decrease load or increase OCP setting. 2. Press [PROT -CLR] to clear protection state.
Overvoltage Protection (OVP)	The output voltage exceeds the OVP setting.	1. Decrease output voltage or increase OVP setting. 2. Press [PROT -CLR] to clear protection state.
Overvoltage Protection (OCVP)	Remote V-sense compensate voltage is too high	1. Decrease voltage line loss 2. Press [PROT -CLR] to clear protection state.
Module Fault Protection (FAULT)	Module damaged	Contact Faithtech authorized agent or Faithtech after-sales
Power On Self Check Fault	Damage in internal component	Contact Faithtech authorized agent or Faithtech after-sales

6. Appendix

Table 6-1 Recommended Wire Diameters for Cables

Type	Cross-sectional area	Different temperature conditions			
		60℃	75℃	85℃	90℃
AWG	mm^2	Wire type: RUW, T, UF	Wire type: RHW, RH	Wire type: V, MI	Wire type: TA, TBS, SA, AV
		Rated Current (A)			
14	2.08	20	20	20	20
12	3.31	25	25	30	30
10	5.26	30	35	40	40
8	8.36	40	50	55	55
6	13.3	55	65	70	75
4	21.1	70	85	95	95
3	26.7	85	100	110	110
2	33.6	95	115	125	130
1	42.4	110	130	145	150
0	53.5	125	150	165	170
00	67.4	145	175	190	195
000	85	165	200	215	225
0000	107	195	230	250	260