

MFP-3000 Series

Programmable DC Power Supply

Manual User

MATRIX TECHNOLOGY INC.

Version number: V 1.0



Introduction

Dear users:

Thank you for choosing a brand new MATRIX electronic instrument. In order to use the instrument correctly, please read the full text of the instruction manual carefully before using the instrument, especially about the "safety precautions" part.

If you have read the full text of this manual, it is recommended that you keep it properly together with the instrument or where you can read it for future use.

Copyright information:

-  MATRIX TECHNOLOGY INC.
-  Products are protected by patents in China or other countries, including patents obtained or under application.
- MATRIX TECHNOLOGY INC. reserves the right to change the product specifications and prices.
- "" It is a registered trademark of MATRIX TECHNOLOGY INC.

Check and correction statement

In particular, the company declares that the equipment listed in this manual fully complies with the nominal specifications and characteristics of the company's technical specifications. The instrument has passed the factory calibration of the company before leaving the factory, and the verification procedures and steps are in line with the specifications and standards of the electronic inspection center.

Safety precautions

During each stage of operation of this instrument, the following general safety precautions must be followed. If these are not followed specific warnings stated in preventive measures or other parts of this manual may violate the design, manufacturing, and safety standards for usage. Our company does not assume any responsibility for users' failure to comply with these preventive measures.

Caution

- Do not use damaged equipment. Before using the equipment, please check if it is in good condition. Do not operate this equipment in environments containing explosive gases, vapors, or dust.
- The power supply comes with a three core power cord at the factory, and your power supply should be connected to the three core junction box. Before operating the power supply, you should first ensure that the power supply is well grounded to avoid accidental injury!
- Before connecting the device, please observe all markings on the device.
- Please always use the cable connection equipment provided at the factory to avoid accidental injury.
- Use wires with appropriate rated loads, and the capacity of all load wires must be able to withstand the maximum short-circuit output current of the power supply without overheating. If there are multiple loads, each pair of load wires must be able to safely carry the full load rated short-circuit output current of the power supply.
- To reduce the risk of fire and electric shock, please ensure that the voltage fluctuation of the mains power supply does not exceed 10% of the operating voltage range.
- If charging the battery with a power source, it is necessary to confirm the positive and negative polarity of the battery when wiring, otherwise it will burn out the power source!
- Do not use this device with the cover removed or the cover loose.
- Do not install substitute parts on the instrument by yourself, or perform any unauthorized modifications.
- We are not responsible for any direct or indirect financial losses that may occur while using this product.
- It is strictly prohibited to use this device on life support systems or any other equipment with safety requirements.
- If the device is not used in the manner specified by the manufacturer, it may damage the protection provided by the device.
- Please always use a dry cloth to clean the device casing. Do not clean the inside of the instrument.

safe

Do not install substitute parts on the instrument or perform any unauthorized modifications. Please send the instrument to the company's maintenance department for repair to ensure its safe use.

Please refer to the specific warnings or precautions information in this manual to avoid causing personal injury or instrument damage.

Safety sign

Warning

It reminds users of certain operating procedures, practices, conditions, and other matters that may lead to personal injury.

Caution

It warns the user of procedures, practices, conditions, etc. that may cause damage to the instrument or permanent loss of data.



Grounding point today



High voltage hazard. (Do not open the machine for non-expert personnel)



Refer to the warnings in the related documents and pay attention to the tips. (High voltage, please wear gloves when operating, and do not use the machine for safety purposes).

(The Company follows the sustainable development strategy and reserves the right not to improve the contents of this specification.)

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Chapter 1 Safety and Regulatory Information

Product documentation helps you use products safely and efficiently. Follow the instructions provided here and in the following sections.

Expected use

The MFP3000 family of products provides an adjustable DC voltage, current and power for electrical loads. They are designed for industrial purposes, for example in production testing, maintenance, and engineering laboratories.

Compliance with the operating conditions and performance limitations specified in the data sheet.

operating instruction:

Connect, set up, and use power supplies only when you are an electrical technician.

These personnel have the education and experience needed to identify the risks of electricity operations and avoid hazards.

This document provides information on the entire product life cycle for installers, operators, technicians, maintenance, and service personnel.

Follow the safety instructions provided in the Safety Instructions and additional information provided during setup or operation.

1.1 Safety instructions

The company's products are produced to the highest technical standards. For the safe use of the product, follow the instructions provided here and in the product documentation. Place the product documentation nearby and provide it to other users.

Only use the product for its intended use and within its performance limits. The intended use and limitations, such as data sheets, manuals, and printed "safety instructions", are described in the product documentation. If you are not sure of the appropriate use, please contact service.

Only those proficient in electrical work can connect, set up and use the product. These personnel have the education and experience needed to identify the risks of electricity operations and avoid hazards.

Only configure or adjust the product as described in the product document or data sheet. Any other modification may affect safety and is not allowed.

Do not open the product enclosure. Only the service personnel authorized by the company can repair the product. If any part of the product is damaged or broken, please stop using the product. Contact the company's customer service to deal with it!

service environment

The product can only be used indoors. The product shell is not waterproof. Entering water will electrically connect the housing to live parts, which can cause electric shock, serious injury or death.

Unless otherwise specified, you can operate the product at 2000 m altitude. The product is suitable for grade 2 polluted environment where non-conductive pollution may occur. For more information about environmental conditions (such as ambient temperature and humidity), see the data sheet.

Place the product

Always place the product on a stable, flat, horizontal surface with the bottom facing down.

If the product has a folding foot, always fold the foot completely in or out to ensure stability.

If the foot is not fully folded, or moves the product without lifting the product, the foot may fold. Foldable feet are designed to carry the weight of the product, but not as an additional load.

If it can be stacked, remember that a pile of products can fall and cause damage.

Connect the power supply

This product belongs to the overvoltage class II product. Connect the product to fixtures for supplying energy-consuming equipment such as household appliances and similar loads. Remember to replace safety parts such as power cables or fuses.

For your safety, please take the following steps:

- Before opening the product, make sure that the voltage and frequency displayed on the product match the available power supply. If the power adapter cannot adjust automatically, set the correct value and check the fuse rating.
- If the product has a replaceable fuse, its type and characteristics will be displayed next to the fuse seat. Turn off the product and disconnect the power supply before replacing the fuse. The product document describes how to replace the fuse.
- Only the power cord supplied with the product can be used. It meets the security requirements of a particular country. Only the plug can be inserted into a socket with protective conductor terminals.
- Only use intact cables and wire carefully to avoid damage to the cables. Check the power cables regularly to ensure that they are left intact.
- Products can only be connected to the power supply using the safety fuse specified in the data sheet.
- Ensure that you can disconnect the product from the power supply at any time. Pull off the power plug to disconnect the product. The power plug must be easily accessible.

Work at a dangerous voltage

Voltages above 30 V RMS, 42 V peak, or 60 V DC are considered as a hazardous contact voltage. Direct contact with them can cause serious harm.

When working at a dangerous contact voltage, protective measures shall be taken to prevent direct contact with the measuring device:

- Before all measurement, all all before each measurement and replace if necessary.
- Do not touch the exposed connections and components when energon.
- The housing, chassis and all measuring terminals are connected to the ground connection. Do not disconnect the ground connection from the product.
- Turn off the power before connecting or connecting to the rear panel connector. Tighten all the wires connected to the junction board.
- Only use the wires and wiring boards supplied with the product.
- The terminal connection can only use insulated wires, but not peeling wires.
- Turn off the power switch when the product is not in use.
- When operating measuring accessories, only the cables attached with the accessories can be used. If cables from other manufacturers, make sure they belong to the required overvoltage category.

Chapter 2 Product Profile

The MFP-3000 series power supply is based on the classic transformer concept, with an efficient electronic preregulator and a secondary linear regulator. This concept enables the instrument to achieve high output power, high efficiency and lowest residual ripple in minimal space.

The MFP-3000 includes four identical channels with a continuous voltage range of 0 V to 32 V, at 16 V, and at 32 V to 5A through intelligent power management. The MFP-3000 provides an output power of 384 watts (160 watts per channel).

Setting up to 1 mV / 0.1 mA and read back resolution are suitable for highly demanding applications. An arbitrary function allows you to define freely programmable voltage and current waveforms with a minimum time range of 10 milliseconds. You can use the control panel to set up any waveform, or transfer an externally created waveform to a terminal.

MFP3000 Series has current isolation, floating overload and short circuit output. The output can be connected in series or in parallel, thereby providing a high current and a high voltage.

A single electronic fuse can be logically connected according to the user specification. The fuse connection function closes all interconnected channels in case of an error.

2.1 Main characteristics

The MFP-3000 series power supply sets the standard in terms of performance and availability. Key features highlighted include:

- Has high output power, high efficiency and low residual ripple in the smallest space.
- High programming and read-back resolution, suitable for the most demanding applications.
- Real-time voltage, current, and power values.
- EasyArb function programs the voltage and current processes directly on the instrument.
- Separate electronic fuses can be freely combined for all channels, with fuse delays ranging from 10ms to 250ms.
- Independent adjustable overvoltage protection (OVP) for each channel.
- Advanced parallel and series operations through V / I tracking
- Remote control through dual Ethernet / USB interface and USB / RS-232.

For detailed specifications, see the data sheet.

Chapter 3: A Quick Start

3.1 Front panel



Figure 3-1: Front panel

3.2 Rear panel



Figure 3-2: Rear panel

3.3 Displays the information

The main initial home screen displays the parameters for the output of the corresponding channel.

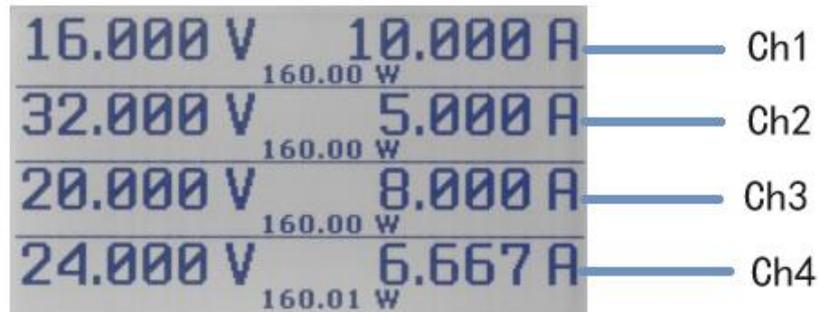


Figure 3-3: Example of the home screen

Set the display properties for control

All system and function keys are backkey to indicate the operation mode or activation function of the channel.

Channel button

Enables you to configure the channel. The key lights up in different colors, indicating its current activity or status.

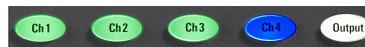


Figure 3-4: Example of the illuminated channel and the output keys

Table 3-1: Color of the channel keys

pigment	state
green	Channel is in constant pressure mode (CV)
red	Channel is in constant current mode (CC)
blue	The channel is in setting mode, where the function is activated
twinkle	<p>If the [Output] and [Voltage] keys are active and you change the settings of the channel for, the color changes depending on the operation mode:</p> <ul style="list-style-type: none"> ● Blue / green: CV= constant voltage. ● Blue / red: CC= constant current

Table 3-2: The color of the function key

pigment	state
white	Function or operation mode is activated.
Not bright	Function or operation mode is not active.

3.4 Description of the key function

selective channel

Press the channel key, such as [Ch 1].

The activated channel key lights up in green

Set the output voltage

1. Press the [Voltage] key. The [Voltage] keys and the arrow keys light up, indicating that they are active.
2. Press the channel key, such as [Ch 1]. Activate the voltage setting. The [Ch 1] key lights up in blue.
3. Set the output voltage value by turning the [knob] or the number keyboard input. Press [Enter] to confirm the power supply.
4. To terminate the setting, press [Voltage]. The [Ch 1] key lights up in green again.

Tip: If the [Voltage] key is not terminated, the instrument will exit the setting mode after the key fallback time, refer to Key Backback Time.

Set the output current

1. Press the [Current] key. The [Current] keys and the arrow keys light up, indicating that they are active.
2. Press the channel key, such as [Ch 1]. Activate the current setting. The [Ch 1] key lights up in blue.
3. Set the output current value by turning the [knob] or the numeric keyboard input. Press [Enter] to confirm the power supply immediately.
4. To terminate the setting, press [Current]. The [Ch 1] key lights up in green again.

Tip: If the [Current] key is not terminated, the instrument will exit the setting mode after the key fallback time, refer to Key Backback Time.

Activate the fuse

The MFP3000 series includes electronic fuse functions that enable you to better protect the connected sensitive test circuits from damage. For optimal protection of the sensitive DUT, the instruments of the MFP-3000 series are equipped with electronic fuses. In addition, you can connect the electronic fuse logic of multiple channels. And response time can response time, see "Menu Introduction".

1. Press the [Fuse] key. Power supply activates the fuse function.
2. Press the channel key, such as [Ch 1]. Activate the fuse settings. The [Ch 1] key turns blue, the power supply immediately applies the settings and indicates the active fuse on the display.
3. To terminate the setting, press the [Fuse] key. The [Ch 1] key lights up in green again.

Tip: If the [Fuse] key is not terminated, the instrument will exit the setting mode after the key backback time ends, see the Key Backback Time.

Activate the output

The output voltage can be turned on and off regardless of the instrument's operating mode.

1. Press [Ch 1] - [Ch 4] to select the required output channel.
2. Press the [Output] key. The [Output] key opens the output of all active channels and powers the connected load.



Save the instrument parameter settings

You can save up to 10 measurement configurations in the 0-9 storage location provided by the instrument.

1. Press the [Store] key. The Storage Settings dialog box opens.
2. Use the [knob] to select the memory position.
3. Check with the [knob].
4. Press [Store] to return. Power supply save settings. Previous settings were overlaid.

Call to the instrument parameter settings

To call the saved parameter configuration:

1. Press the [Recall] key.
2. Use the [knob] to select the memory position.
3. Press the [knob] again to load the configuration.
4. Press [Recall] to exit.

Navigation control

Navigation controls include the [knob] and [arrow] keys. They allow you to navigate through the settings, menu, or dialog boxes.

● Knob function:

Turn the knob left and right to move the selection, such as moving to the parameters in the Settings dialog box.

Tap the knob to activate the edit mode for the parameter.

Increase (clockwise) or decrease (counterclockwise) instrument parameters with digital input with defined step size.

● Direction key function:

[Up] / [bottom] arrow keys, moving selection up and down, such as moving to parameters in the setting dialog box.

[Left] Arrow key returns to the previous menu level.

[Right] arrow key moved to parameters in the Settings dialog.

Numeric keyboard

A keyboard is provided on the MFP3000 series power panel for input values.



Figure 3-5: Numeric keypad

Trace function

The tracking function allows you to link multiple channels (Ch 1-Ch 4). You can simultaneously adjust the voltage and current limits of the linked channel at the same amount (see position 100 mV for the 3 channels in Figure 3-6).



Change the voltage or current value to the same amount

1. Press the [Track] key.
2. Press the [Voltage] key.
3. Also press the channel key of the channel to be adjusted.



Figure 3-6: Changing the 100 mV position of the three channels by tracking

4. On the front panel, use the [left] / [right] arrow key or tap the knob to select the position to change the value.
5. Use the [knob] or [up] / [down] arrows and the number keys.
6. Press the [Current] key.
7. Press [Track] and press [Current] and repeat steps 3 to 5 to adjust the current limit.

Remote and local features

You can operate the MFP-3000 in two ways:

- Manually configure the test settings using the front panel controls.
- Remote control for repeated setting, testing and measurement (in remote mode [Remote] key is on, press [Remote] key to switch to local mode, [Remote] key light is off).

3.5 Menu function

You can use the [Menu] function keys on the front panel to access the main functions and parameters, measurement and display modes, and configure the general instrument settings. When selected, the function is active, and the corresponding function key will be lit up.

To open the dialog box

1. Press the [Menu] key. Power supply displays the main menu.
2. Select functions by turning the [knob]. Or use the [arrow] key.(See: Knob Function and Direction Key Function.)
3. Press the [knob] to confirm the selection. The selected dialog box opens. Press the [Menu] key to close or exit the menu dialog box, and press the [left] key to return to the previous level menu.

The parameter steps in the [Menu] dialog box are as follows:

- 1.Fuse Linking (electronic fuse contact setting).
- 2.Fuse Delay (electronic fuse protection delay setting).
- 3.Over Voltage Protect ion (overpressure protection setting).
- 4.Arbitrary (arbitrary waveform).
- 5.Interface (Communication interface Settings).
- 6.Display & Key (display and key settings).

7. Beeper (buzzer setup).
8. Power On Status (start-on state setting).
9. Voltage Limit (Voltage range setting).
10. Current Limit (Current range setting).
11. Voltage Warning Range (Voltage alarm range setting).
12. Current Warning Range (Current alarm range setting).
13. Information (Instrument information).
14. Reset Device (reset equipment).

Fuse Linking

The fuse contact function allows you to logically connect the channel with its electronic fuse.

When the set channel current exceeds the set value and the electronic fuse trips, all channels connected with the channel will also be closed. The [Output] (output) key remains active.

1. Press the [Menu] key.
2. Press the [knob] or [right] arrow key to select the Fuse Linking.
3. Select the channel to be set up by turning the [knob].
4. Press the [knob] or [right] arrow key to select the channel on the right to link to the selected channel.
5. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

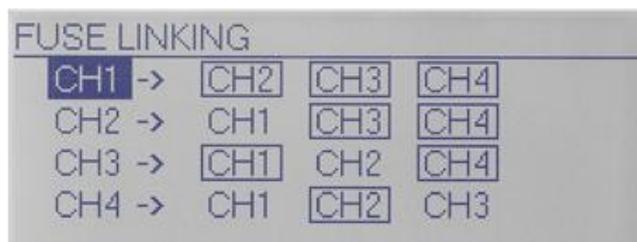


Figure 3-7: Fuse contact setting

Fuse Delay

This time delay prevents the fuse from tripping immediately, for example when a peak current above the set current limit occurs due to a connected capacitive load. The fuse delays range from 0 ms to 250 ms.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select Fuse Delay.
3. Press the [knob] or [right] [arrow] key and select Fuse Delay.
4. Select the channel to be set with the [up] [bottom] arrow key.
5. Turn the [knob] left and right to set the delay time.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.



Figure 3-8: Fuse delay setting



Over Voltage Protection

Overvoltage protection enables you to protect the DUT from damage that exceeds the output voltage. It closes the output when the voltage exceeds the settings in the corresponding channel. The preset is 32.50 V (factory preset) and you can set the OVP to meet the requirements.

The MFP-3000 offers two OVP modes:

- "Measurement" The mode power supply takes the measured voltage value as the reference threshold (measured) for the OVP.
- "Protection" mode power supply takes the voltage value set on the instrument as the reference threshold (Protected) for OVP.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Over Voltage Protection".
3. Press the [knob] or [right] [arrow] key and select Over Voltage Protection.
4. Turn the [knob] left and right or set the OVP value through the keyboard.
5. Press the [knob] or [up] [down] arrow keys to select the OVP mode and switch channels.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

When the OVP is activated and the output voltage exceeds the set OVP value, MFP3000 indicates the flashing "OVP" in the corresponding channel and closes the output of the channel.

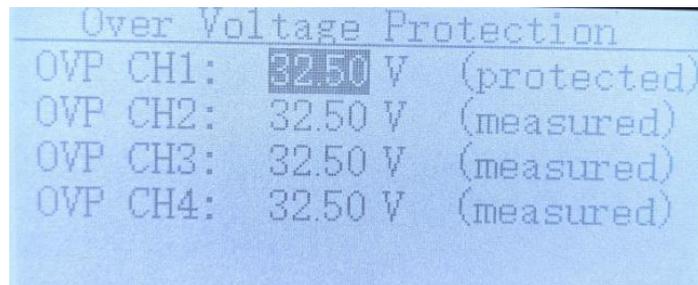


Figure 3-9: Overvoltage protection settings

Arbitrary

The arbitrary waveform function allows you to define freely programmable waveforms for voltage and current within the limits of the instrument setting. The waveform includes up to 255 sets of voltage and current values, and each set has a defined dwell time. These basic parameters enable you to create any common waveforms (step functions, sawtooth waves, sine, etc.).

"Cycles" allows the number of times an arbitrary wave function performs. If Cycles is set to 000, the power supply will repeat any wave function indefinitely.

Each channel is equipped with a memory for preserving the waveforms. To configure a waveform, you can use a control panel or an externally created waveform!

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Arbitrary".
3. Press the [knob] or [right] [arrow] key and select Arbitrary.
4. Turn the [knob] left and right or press the [up] [down] arrow key to move the cursor to the setting item.

5. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

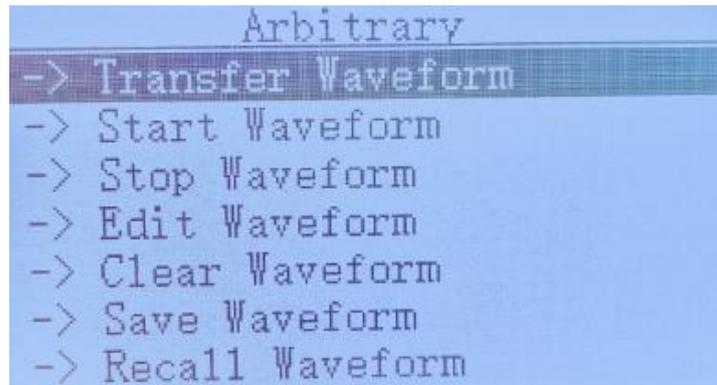


Figure 3-10: Any waveform function setting

● **Transfer Waveform**

Transfer the waveform to the specified channel (transfer the document in "Edit Waveform" to Ch 1-Ch 4).

● **Start Waveform**

Start any waveform of the selected channel (" Open any waveform function of Ch 1-Ch 4, and display the corresponding channel voltage window ).

● **Stop Waveform**

Stop any waveform of the selected channel (turn " off any waveform function of Ch 1-Ch 4, and then the voltage window icon of the corresponding channel will disappear after closing .

● **Edit Waveform**

Open the Any Waveform Editor to insert the parameters used to define the waveform! Press the [knob] or [up] [down] arrow keys to move the cursor to the parameters to be set, turn the [knob] left and right, or change the parameter settings through the keyboard.

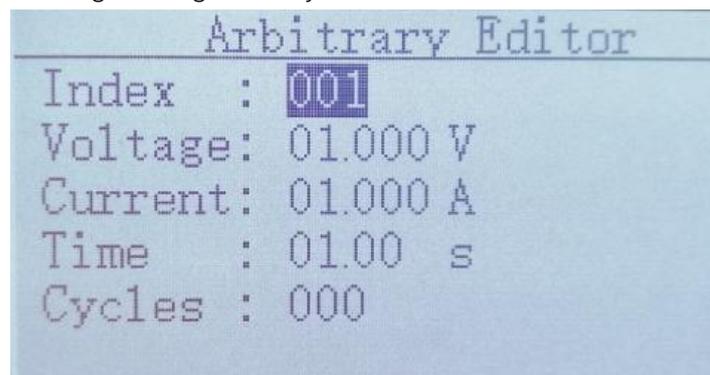


Figure 3-11: Arbitrary Waveform Editor

- ◇ Index Set up steps (0... 128).
- ◇ Voltage Set the voltage value for the current step.
- ◇ Current Set the current value for the current step.
- ◇ Time sets the residence time of the value (the residence time defines the duration of the signal at the output).
- ◇ Cycles Set the number of cycles of the waveform (0-255,0 is infinite cycle, this value all channels are common, change one other steps).



● **Clear Waveform**

Remove the previously edited parameter settings in the Edit Waveform.

● **Save Waveform**

Save the previously edited parameter settings in the Edit Waveform. Save up to 3 settings.

● **Recall Waveform**

Load the previously edited parameter settings in the Edit Waveform.

Transfer the waveform to the channel and start the signal generation

To start signal generation based on any waveform:

1. Press the [Menu] key.
2. Select "Arbitrary" and confirm with the [knob].
3. If you do not define any waveform:
 - a) Create the waveform as described in the Edit Waveform
 - b) Load previously saved waveforms from the internal memory with "Recall Waveform".
4. To transmit the waveform to the corresponding channel:
 - a) Select "Transfer Waveform"
 - b) Press [knob].
 - c) In the Transfer Arbitrary dialog box, select the channel, for example, Channel 1-Channel4
 - d) Press the [knob].
 - e) Transmit the waveforms to other channels in the same manner, if necessary.

The MFP-3000 confirms the transfer and returns to the "Arbitrary" menu.

5. To start any waveform signal generation, select "Start Waveform" to start any wave function of the channel required for "Channel1-Channe4".
6. Press [Menu] to return to the original screen of the home screen.
7. Open the output of the corresponding channel, and MFP-3000 outputs any waveform, (after the arbitrary waveform function is opened, the corresponding channel voltage window below is activated .

Interface

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Interface".
3. Press the [knob] or [right] [arrow] key and select Interface.
4. Turn the [knob] left and right or press the [up] [down] arrow key to move the cursor to the setting item.
5. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

In the menu list, you can select the interface, access the corresponding settings, and retrieve the information on the interface.

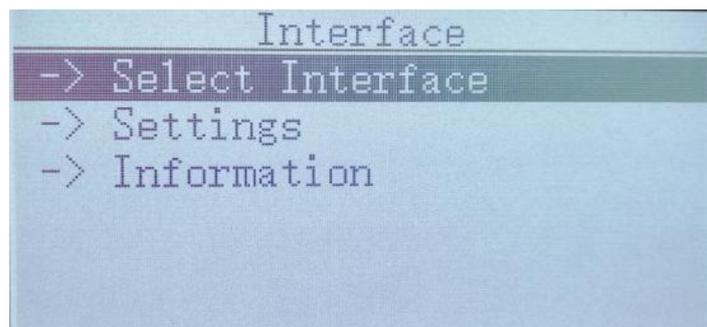


Figure 3-12: Figure communication interface setting

◇ **Select interface**

Select the interface used to establish a remote connection. The selection list varies with the remote control interface installed.

Option: USB / LAN / RS-232

◇ **Settings**

Access the setting parameters of the selected communication interface.

a) For the USB / RS-232 interface, the parameters are set as follows:

Baud Rate: 9600 (communication baud rate set, porter rate: 4800, 9600, 19200, 38400, 57600, 115200 respectively).

Device ID: 1 (device address setting).

Command: SCPI (communication instruction type, with SCPI and MODBUS options).

End Char: LF (communication command end character, respectively: CR, LF, CR + LF, LF + CR).

b) is for LAN interface, the parameters are set as follows:

1. Press the [knob] or the [up] [down] arrow key to move the cursor to the setting item.

2. Turn the [knob at the left and right] to modify the parameters selected by the cursor.

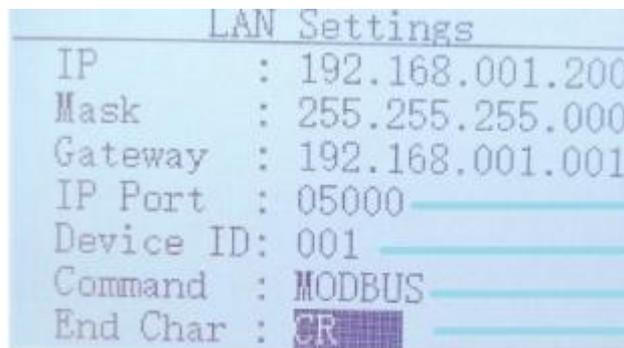


Figure 3-13: Settings of the communication interface

◇ **Information**

Displays the information on the selected communication-interface interface.

Display & Key

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select Display & Key.
3. Press the [knob] or [right]] key and select Display & Key.
4. Turn the [knob] left and right or press the [up] [down] arrow key to move the cursor to the setting item.
5. Press the [knob] or [right]] key to enter the setting.
5. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

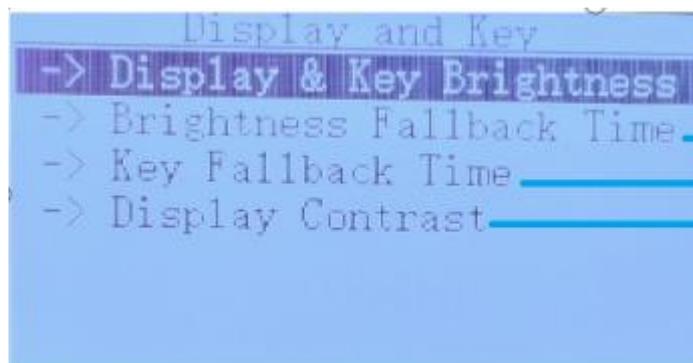


Figure 3-14: Display and key Settings

Note: If no setting is changed to the instrument during the set time, the instrument automatically reduces the light intensity of the display and the keys.

Beeper (Buzzer setup)

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Beeper".
3. Press the [knob] or [right]] key to select the "Beeper" setting.
4. Turn the [knob] left and right or press the [up] [down] arrow key to move the cursor to the setting item.
5. Press the [knob] or [right]] key to set it up.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

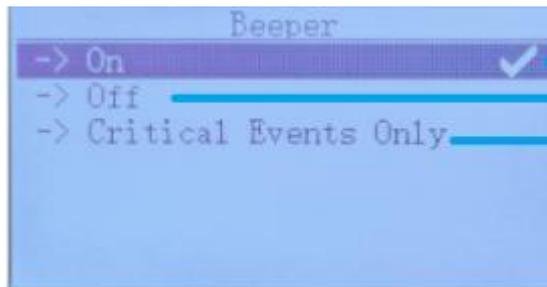


Figure 3-15: Buzzer setup

Power On Status

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Power On Status".
3. Press the [knob] or [right]] key to select the "Power On Status" setting.
4. Turn the [knob] left and right or press the [up] [down] arrow key to move the cursor to the setting item.
5. Press the [knob] or [right]] key to set it up.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

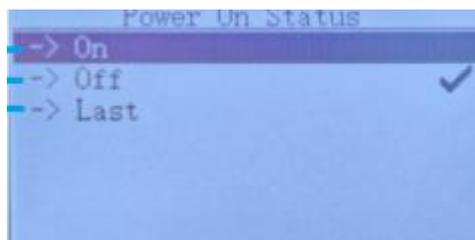


Figure 3-16: Power-on state setting

Voltage Limit (Voltage range setting)

The voltage range setting function allows you to set the regulating voltage of Ch 1-Ch 4 channel in a certain range, and when a channel is set, the regulating range of its voltage will be limited between this parameter.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Voltage Limit".
3. Press the [knob] or [right]] key to select the "Voltage Limit" setting.
4. Press the [knob] or [up] [down] arrow keys to move the cursor to the set parameter item.
5. Turn the [knob] left and right or set the parameters through the keyboard.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.



Current Limit (Current range setting).

The current range setting function allows you to set the regulating current of Ch 1-Ch 4 channel in a certain range. When the channel is set, the adjustment range of its current will be limited between this parameter.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Current Limit".
3. Press the [knob] or [right]] key to select the "Current Limit" setting.
4. Press the [knob] or [up] [down] arrow keys to move the cursor to the set parameter item.
5. Turn the [knob] left and right or set the parameters through the keyboard.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

Voltage Warning Range.

The voltage warning range setting function allows you to set an upper and lower limit of the output voltage of Ch 1-Ch 4 channel. When the voltage of a channel exceeds the upper and lower limit, "VL" or "VL" or "VH" will be prompted below the corresponding voltage display window.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Voltage Warning Range".
3. Press the [knob] or [right]] key to select the "Voltage Warning Range" setting.
4. Press the [knob] or [up] [down] arrow keys to move the cursor to the set parameter item.
5. Turn the [knob] left and right or set the parameters through the keyboard.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

Current Warning Range

The current warning range setting function allows you to set an upper and lower limit of the output current of Ch 1-Ch 4 channel. When the current exceeds the upper and lower limit, the message "AL" or "AH" will be prompted below the corresponding current display window.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Current Warning Range".
3. Press the [knob] or [right]] key to select the "Current Warning Range" setting.
4. Press the [knob] or [up] [down] arrow keys to move the cursor to the set parameter item.
5. Turn the [knob] left and right or set the parameters through the keyboard.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

Information

The instrument information will display the equipment model, version number, and the current internal temperature of the instrument.

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Information".
3. Press the [knob] or [right]] to select the "Information" interface.
4. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.



Reset Device

This feature will help you restore the device to the factory state (No, Yes).

1. Press the [Menu] key.
2. Turn the [knob] right or press the [down] arrow key to move the cursor and select "Reset Device".
3. Press the [knob] or [right] key to select the "Reset Device" setting.
4. Turn the [knob] or [up] [down] arrow key to move the cursor to select parameters.
5. Press the [knob] to confirm the selected parameters.
6. Press [Menu] key to return to the original home screen, and press [left] key to return to the previous menu.

The equipment factory setting parameters are as follows:

1. Fuse Linking (the electronic fuse function is off and each channel is not connected).
2. Fuse Delay (the electronic fuse protection delay is 0ms).
3. Over Voltage Protection (each voltage protection set channel for voltage protection).
4. Arbitrary (all settings for any waveform will not be recovered).
5. Interface (Communication interface default: USB, port rate default: 9600, device address default: 1, command default: SCPI, end default: LF).
6. Display & Key (Display and key brightness are set by default: 5, display brightness screen guarantee time by default is 30min, key brightness screen guarantee time by default: 5s, and display contrast is set by default: 0).
7. Beeper (default buzzer is 0).
8. Power On Status (The boot state is set by default: on).
9. Voltage Limit (voltage range is set by default: minimum 0, maximum maximum).
10. Current Limit (The current range is set by default: lower limit 0, upper limit maximum).
11. Voltage Warning Range (Voltage alarm range is set by default: minimum 0, maximum maximum).
12. Current Warning Range (Current alarm range is set by default: minimum 0, maximum maximum value).

3.4.4 Remote control

In addition to directly operating the power supply on the instrument, it can also be operated and controlled remotely through a PC.

Remote control interface

MFP3000 supports various remote control interfaces:

- Ethernet/USB interface, optional HO732
- USB/RS232 interface, optional HO720

Chapter 4 Application

4.1 About the output mode of the MFP-3000

Depending on the connected DUT (load), the MFP3000 is automatically operating in the constant pressure (CV) or constant current (CC) operating mode. The color of the channel key displays the current output mode!

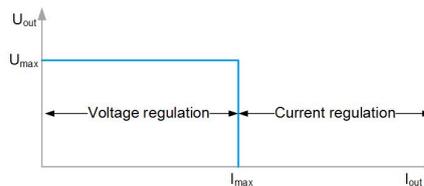


Figure 4-1: MFP-3000 output mode

CV Mode

The CV mode is the standard output mode when powered on.

In this mode, the MFP-3000 keeps the voltage U_{out} constant, and if the connected load increases, to increase the current to its maximum I_{max} (See Setting I_{max} , Current Limit).

CC Mode

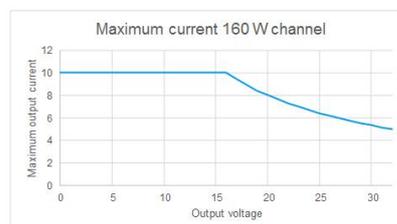
When the output current exceeds the maximum I_{max} , the MFP-3000 automatically switches to the CC mode. The output mode is switched from voltage regulation to current regulation. It keeps the current constant at the finite I_{max} and reduces the output voltage U_{out} , namely $U_{out} < U_{set}$.

Set the current limit I_{max}

Current limit determines the maximum I_{max} of the output current. If a short circuit exists, limiting the output current prevents damage to the connected DUT.

Maximum voltage, power, and current values

The output voltage for each channel ranges from 0V to 32V. The maximum output of each channel was 10A and the maximum output power was 160W.



If U_{out} is > 16 V, the maximum current decreases according to the following formula:

Example of $I=P / U$: $U_{out} = 24$ V

● MFP-3000, 160W: $I_{max}=6,67$ A

4.2 Compensation the voltage drop on the power supply line

With these two induction lines, you can compensate for the voltage drop of up to 1 V on the load power line. Therefore, the voltage you set in the MFP-3000 is applied to the DUT without loss. See the Data Table for the specified maximum sensing compensation.

Note for sensing line connection ensures that no current flows through the sensing line.

- Use two independent insulated cables of the same cross section and length.
- Use the same cable wiring settings, for example, when you connect the output serial or parallel.

Set up the connection of the sensing line

1. Connect each cable to the black and blue terminals of the corresponding channel.
2. Connect the two cables to the DUT connector of the power cable, as shown in Figure 4-1

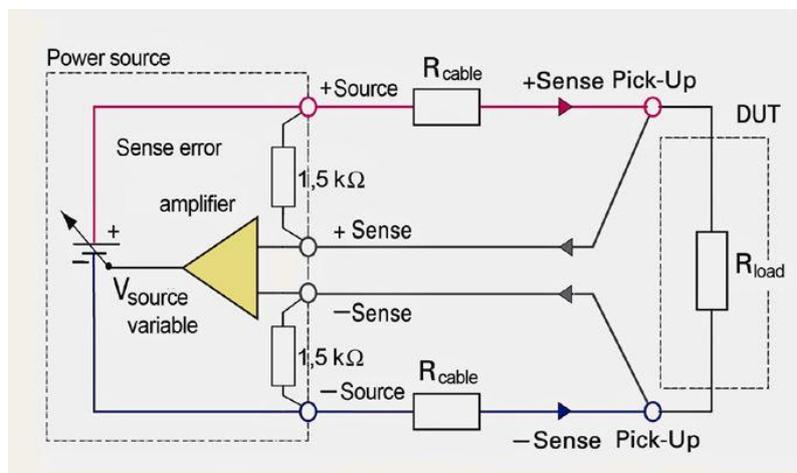


Figure 4-1: Voltage drop compensation circuit

4.3 Operate in parallel and serial modes

The MFP-3000 series instruments enable you to connect output channels such as increasing output voltage. Therefore, in order to increase the output current, the channels can be connected in parallel.

Notes for the serial and parallel operation modes

- Since the output channel of the MFP-3000 power series is electrically equivalent, only the same type of instrument can be used. Use of different series of power supplies may damage the instrument, for example, caused by different overload protection, uneven current distribution, or compensating current within the instrument.

- Output voltage The output voltage of a serially connected channel shall not exceed the maximum voltage to the ground. Therefore, the number of channels you can connect depends on the maximum output voltage and the MFP-3000 instrument model number used.

For information on the output voltage and maximum output voltage of each channel, please refer to the data sheet.

- Output power If the maximum total power of the instrument exceeds, the MFP-3000 automatically turns off the output and displays a warning notification.

Please refer to the data sheet for the specified maximum output power.

- If possible, use the rear panel connector. The channel output in the back panel provides a lower connection resistance, resulting in better results.

- Cable uses cables with maximum cross section to minimize conductor resistance. Ensure that the cable type is the same and is as short as possible.

For the parallel mode, use with the same cross reference, especially the same length of the cable connected to the DUT.

For the serial mode, keep the cable connections between the channels as short as possible to minimize the voltage drop.

- Sensing line The sensing line is connected to compensate for the voltage drop on the power line, thus improving the accuracy of the voltage provided for the DUT.

Always connect the induction cord in the same manner as the power cord.

- The output channel connecting the output interconnection must be connected simultaneously, especially when the DUT draws the full current immediately.

If more than one instrument is connected, activate the output of the DUT using a suitable external switch after activating all the channels of the power supply used.

- Tracking Mode

If the output voltage is changed in tracking mode and the current difference between channels is too high, switch to manual mode.

4.3.1 Serial mode

To achieve a higher voltage, you can connect the channels of the MFP-3000 power supply.

The following interconnection example adds up the output voltage of the connected channel. The same current flows through all outputs.

1. If active, press [Output] to close the output of all channels.
2. Set the current limit of all output channels to the same value to evenly distribute the output voltage.
3. Set the output voltage of all channels to the same value.
4. Pay attention! Risk of damage to the DUT. Exceeding the output voltage may damage the connected load (DUT).

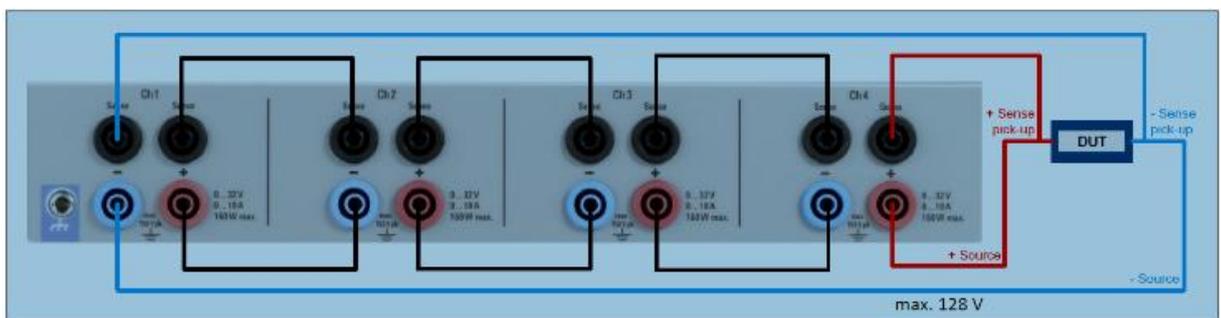


Figure 4-2: Example of a serial connection

4.3.2 Parallel mode

To achieve a higher output current, you can connect the MFP-3000 power supply channel in parallel. The maximum total current is the sum of single currents of all parallel power sources.

1. If active, press [Output] to close the output of all channels.

2. Proportional at the total current to the connected channel. To set the current limit,
3. Set the output voltage of all channels to the same value.
4. Pay attention! Tolerances may result in voltage deviations. The voltage in the channel varies slightly due to the tolerance

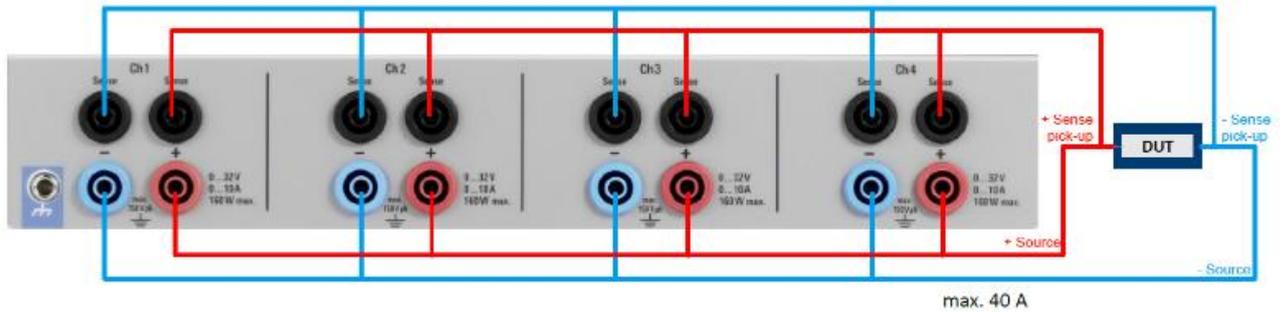


Figure 4-3: Example of a parallel connection.

Chapter 5 Technical Specification Table

Technical specifications:

Model	MFP-3003	MFP-3004
Rated input voltage	AC 110V/220V ±10%	
Output	All channel outputs are currently isolated and ungrounded	
Rated output power	160W*3CH	160W*4CH
Rated output voltage	0-32V*3CH	0-32V*4CH
Rated output current	0-10A*3CH	0-10A*4CH
Variable pressure mode	Linear power supply	Linear power supply
Maximum voltage when connected in series	96V	128V
Maximum current when connected in parallel	30A	40A
Load regulation rate	Voltage	≤0.01% + 2 mV
	Current	≤0.01% + 250 μA
Power supply regulation	Voltage	≤0.01% + 2 mV
	Current	≤0.01% + 250 μA
Set value resolution	Voltage	1mV
	Current	< 1 A: 0.2mA; ≥ 1 A: 1 mA
Setting accuracy (25°C±5°C)	Voltage	≤0.05% + 5 mV
	Current	≤ 0.1% + 5 mA
Readback value resolution	Voltage	1mV
	Current	< 1 A: 0.2mA; ≥ 1 A: 1 mA
Readback accuracy (25°C±5°C)	Voltage	≤0.05% + 5 mV
	Current	≤ 0.1% + 2 mA
Ripple(20Hz-20MHz)	Voltage	≤1.5 mV (RMS)
	Current	≤1 mA (RMS)
Temperature	Operational environment	5 to 40°C ≤ 80% R.H
	Storage environment	-20 to 70°C ≤ 80% R.H
Sense compensate	Maximum voltage compensation	1V
Remote communication time	Update time	< 50 ms
	Response time	< 10 ms
Electronic fuse	Fuse delay	0 ms to 250 ms (10 ms step)
	Standard	RS-232+USB
Interface	Optional	LAN
Size(W*H*D , mm)	mm	285 × 136 × 405
Net weight	kg	14kg

Chapter 6 Communication

6.1 Communication between power supply and PC

The power supply can be connected to the PC host interface through the DB9 plug or the USB plug on the rear panel. The following content can help you understand how to control the output of the power supply through the host panel (refer to the communication manual for details).

1. Communication setting

Before performing communication, you should first match the power supply to the following parameters of the control host:

- (1) Baud rate: 4800,9600,19200,38400,57600,115200 for selection.
- (2) verification:NONE
- (3) Data bit: 8, stop bit: 1 (fixed value)



Warranty Card

What the warranty covered:

If the machine break down due to its defectiveness, MATRIX will provide free maintenance during warranty period. If the machine break down due to wrong operation or carelessness, then Matrix provide paid service within warranty period.

How long does this warranty last:

This warranty lasts for 1 years from the date of original purchase of all MATRIX branded products.

Who is covered:

This warranty covers only the original purchaser of this product. This warranty is not transferable to subsequent owners or purchasers of this product.

What do customers need to do to get repairs/service under the warranty policy?

If the machine get problem, please contact our local distributor. If you cannot find the local distributor, you can contact us directly, our email is service@szmatrix.com, our telephone No. is 0086 755 2836 4276.

What information do customers need to supply?

Model No.	
Serial No.	
Problem description	
Picture	
Video if necessary	