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# Digital-Control and Programmable DC Power Supply

Models: 72-2535, 72-2540, 72-2545, 72-2550 & 72-10480

## User Manual



## Safety Symbols

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

## Safety Symbols

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



WARNING



DANGER High Voltage.



Earth (ground) Terminal

## Safety Instruction

### Safety Guidelines

Do not block or obstruct the cooling fan vent opening.

Avoid severe impacts or rough handling that leads to damage.

Do not discharge static electricity.

Do not disassemble unless you are qualified as service personnel.

## AC Input



AC Input Voltage : 110V / 120V / 220V / 230V , 50 / 60Hz

Connect the protective grounding conduct or of the AC power cord to an earth ground, to avoid electrical shock.

## Operation Environment

Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (note below)

Relative Humidity: < 80%

Altitude: < 2000m

Temperature: 0-40°C

## Storage environment

Location: Indoor

Relative Humidity: < 70%

Temperature: -10-70°C

## Fuse



Model	110/ 120V	220 /230V
72-10480	T4A/ 250V	T2A/ 250V
72-2535	T5A/ 250V	T3A/ 250V
72-2540	T5A/ 250V	T3A/ 250V
72-2545	T5A/ 250V	T3A/ 250V
72-2550	T5A/250	T3A/250V

To ensure fire protection, replace the fuse only with the specified type and rating.

Disconnect the power cord before fuse replacement.

Make sure the cause of fuse blowout is fixed before fuse replacement.

## Series Lineup/Main Features

Model	V Meter	A Meter	USB	Resolution
72-10480	4 digit	4 digit	No	10mV/1mA
72-2535	4 digit	4 digit	Yes	10mV/1mA
72-2540	4 digit	4 digit	Yes	10mV/1mA
72-2545	4 digit	4 digit	Yes	10mV/1mA
72-2550	4 digit	4 digit	Yes	10mV/1mA

### Performance

Low noise: cooling fan controlled by heat sink temperature

Compact size, light weight

### Operation

Constant voltage / constant current operation

Digital panel control

4 pairs of panel setup save / recall

Coarse and fine Voltage / Current control

Software calibration

Beep output

Key lock function

### Protection

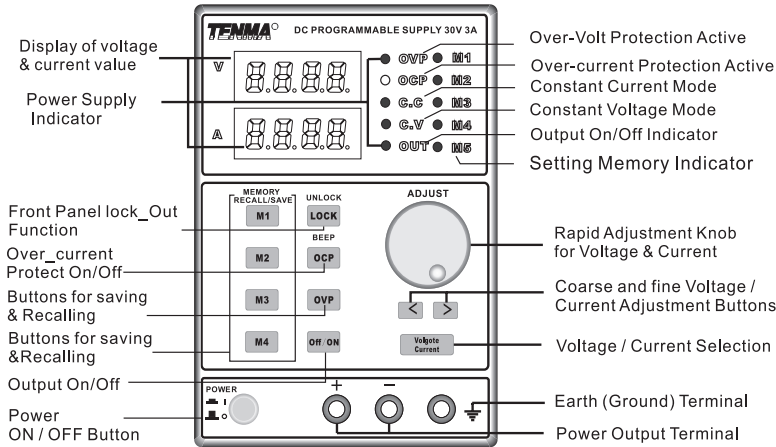
Overload protection

Reverse polarity protection

Interfaces

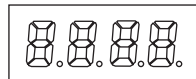
USB/RS 232 for remote control (only for 72-2535, 72-2540, 72-2545, 72-2550)

## Front Panel Overview



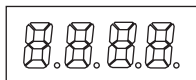
## Display

Voltage level V



Voltmeter displays the setup value of output voltage.

Current level A



Displays the setup value of output current.

## Condition Indication

### OVP

OVP is the indicator of over voltage protection. When over voltage function is turned on, OVP indicator lights on; when output voltage is higher than protection setup value due to unexpected conditions, output cuts off and OVP indicator flickers; Press the key OVP again, and the power supply recovers.

### OCP

OCP is OCP indicator. When over current function is turned on, OCP indicator lights on.

### C.C

C.C is constant current indicator. When power supply is in the mode of constant current, this light is on.

### C.V

C.V is constant voltage indicator. When power supply is in the mode of constant voltage, this light is on.

### OUT

OUT is output indicator. If light on, there is voltage output in the output terminal.

## Storage Indication

- M1
- M2
- M3
- M4
- M5

Indication of saving and recalling 5 setups stored internally.

## Brief Introduction of Panel Operation



Saves or recalls panel settings. For settings, 1 ~ 4 are available. For save / recall details, see Page 08.

### UNLOCK

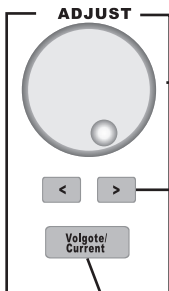
**LOCK** ——— Front panel lock\_out function. For details, see Page 07

### BEEP

**ocp** ——— Over-Current protect on/off, Pressing this key for more than 2 seconds will make beep On/OFF.

**OVP** ——— Over-voltage Protect On/Off

**Off / ON** ——— Output On/Off.



————— Voltage-Current Setting Adjustment

————— Digit Selector Buttons

Selection Voltage / Current for Adjustment

Pressing the key, the volt indicator starts to flicker; pressing it again, the ampere indicator starts to flicker.

Then turn the key ADJUST and the settings of the setted voltage or current can be adjusted.

### POWER



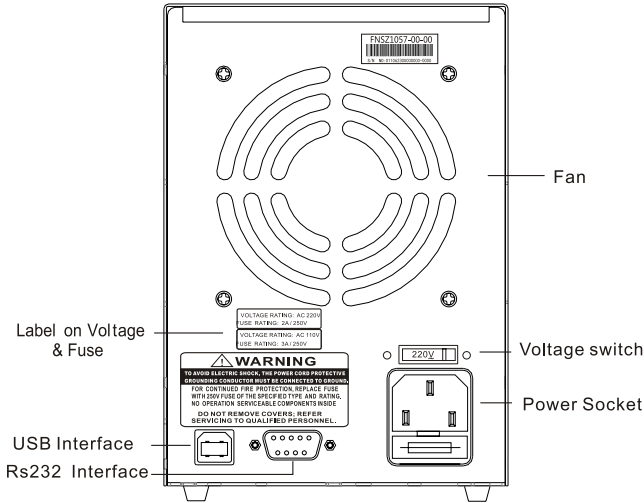
On / Off main power. For power up sequence, see Page 06



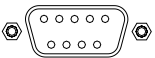
Outputs voltage and current.



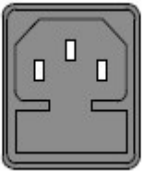
Connects the ground (earth) terminal.



RS232 dependent interface based on remote control order (see Page 08) ; only for KAXXXXP series, such as KA3003P and soon.



RS232 dependent interface based on remote control order (see Page 08); only for KAXXXXP series, such as KA3003P and so on.



The power cord socket mainly accepts AC values: 115V / 230V, 50 / 60 Hz. Please refer to the fuse parameters on the back fuse label to replace the specified fuse.



Make sure the correct type of fuse is installed before power up

## Operation

Connect AC power cord



Connecting AC power cord and selecting the corresponding AC voltage according to the back label on voltage; then connecting the AC power cord to the socket on the back panel

Power on

POWER



Press the power switch to turn power on. The display initializes, showing the model of the machine and then showing the setting last.

Power off

POWER



Press the power switch again to turn power off.

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## Output On / Off

### Panel Operation

Press the Output button to turn on output; and the button LED also turns on. Pressing the Output button again to turn off the output and the LED.

Note: If there are any of the following conditions, the output will automatically turn off.

1. OVP turns on and there are unusual OVP on the output terminal.
2. The setting voltage is more than that of the OVP.
3. Recalling other setups from the memory.

## Beep On / Off

### Panel Operation

By default, the beep sound is enabled. To turn off the beep, press the OCP (BEEP) button for 2 seconds. A beep comes out and the beep setting will be turned off. To enable the beep, press the OCP (BEEP) button again for 2 seconds.

## Front Panel Lock

### Panel operation

Press the LOCK button to lock the front panel button operation. The LED turns on. To unlock, press the LOCK button for 2 seconds.

## Output Set

### Panel operation

1. Connecting the load to the front port, red (+), black (-).
2. Setting output voltage and current.

Press the button Voltage/Current selection to switch voltage adjustment and current adjustment. Adjusting voltage and current with Voltage / Current Adjustment knob. By default, the Voltage and Current knob work in the coarse mode. To activate the fine mode, press the buttons to select the coarse mode or the fine mode.

3. Turning on the output and pressing the output button. The button LED turns on and displays CV or CC mode.

## Save / Recall Setup

### Save Setup

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

Contents The following list shows the setup contents:

Fine / coarse knob editing mode

Beep on / off

Output voltage / current level

The following settings are always saved as "off".

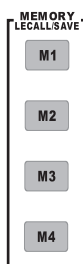
Output on / off

Front panel lock on / off

Panel operation Press one of the 4 buttons (M1, M2, M3, M4) and the LED light turns on accordingly. After you adjust the value, it is saved automatically once it stops blinking.

### Recall Set up

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



Press any button of M1 to M4, and take M1 for example; the memory of panel settings is recalled in M1. After you recall M4, rotate the shuttle knob and then M5 is recalled.

- M1
- M2
- M3
- M4
- M5

It means the current memory is recalled that the memory indicator on the panel lights on accordingly.

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

## Remote Control

### Remote Control Setup

All the models 72-2535, 72-2540, 72-2545, 72-2550 etc. can be connected to the PC through interfaces USB/RS232 on the back of the machine and controlled by the remote control.

### COM setting

Set up the COM port inside the PC according to the following list.

Baud rate: 9600

Parity bit: None

Data bit: 8

Stop bit: 1

Data flow control: None

## Functionality check

Run this query command via the terminal application such as MTTY (Multi-threaded TTY).

\*IDN?

This should return the identification information: Manufacturer, model name, serial number. 72-10480 SN:xxxxxxx Vx.xx

## Remote Control Procedures

### Entering the Remote Control Mode

1. Connecting USB
2. The power supply will automatically connect. After normal connection, there will be a tweet from the power supply itself.
3. The panel keys are locked, so the power supply can only rely on the remote control.

### Exiting from the Remote Control Mode

1. Closing the remote control software.
2. Disconnecting USB from the back.
3. The power supply disconnects; a tweet from the beep with the hint that the remote control is over.
4. The power supply automatically comes into the panel control mode.



## FAQ

Q1: The panel buttons don't work when power on.

A1: The panel is locked. Press the key **UNLOCK** for over 2 seconds, and then the panel will unlock.

Q2: Pressing ON/OFF, there is no out put when power on.

A2: Current set up is 0.

Q3: Output voltage rises slowly when out put button is on.

A3: Current set up is too small.

Q4: Making OCP on and pressing out put switch; and then the out put is automatically shut off.

A4: Current protection value set up is too small. You could press output switch and then make OCP on.

## Specifications

Note: The specifications below are tested under the conditions of temperature 25°C ±5°C and the warm-up for 20 minutes.

Models	72-10480	72-2535	72-2540	72-2545	72-2550
Voltage Range	0-30V	0-30V	0-30V	0-60V	0-60V
Current Range	0-3A	0-3A	0-5A	0-2A	0-3A
<b>Load Regulation</b>					
Voltage Current	≤0.01% +2mV ≤0.1% +5mV	≤0.01% +2mV ≤0.1% +10mV	≤0.01% +2mV ≤0.1% +5mV	≤0.01% +2mV ≤0.1% +5mV	≤0.01% +2mV ≤0.1% +5mV
<b>Line Regulation</b>					
Voltage Current	≤0.01% +3mV ≤0.1% +3mV	≤0.01% +3mV ≤0.1% +3mV	≤0.01% +3mV ≤0.1% +3mV	≤0.01% +3mV ≤0.1% +3mV	≤0.01% +3mV ≤0.1% +3mV
<b>Setup Resolution</b>					
Voltage Current	10mV 1mA	10mV 1mA	10mV 1mA	10mV 1mA	10mV 1mA
<b>Setup Accuracy (25°C ±5°C)</b>					
Voltage Current	≤0.5% +20mV ≤0.5% +5mV	≤0.5% +20mV ≤0.5% +5mV	≤0.5% +20mV ≤0.5% +10mV	≤0.5% +30mV ≤0.5% +5mV	≤0.5% +30mV ≤0.5% +5mV
<b>Ripple (20-20M)</b>					
Voltage Current	≤1mVrms ≤3mA <sub>rms</sub>	≤1mVrms ≤3mA <sub>rms</sub>	≤2mVrms ≤3mA <sub>rms</sub>	≤1mVrms ≤3mA <sub>rms</sub>	≤1mVrms ≤3mA <sub>rms</sub>
<b>Temp. Coefficient</b>					
Voltage Current	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm
<b>Read Back Accuracy</b>					
Voltage Current	10mV 1mA	10mV 1mA	10mV 1mA	10mV 1mA	10mV 1mA
<b>Read Back Temp. Coefficient</b>					
Voltage Current	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm	≤150ppm ≤150ppm
<b>Reaction Time</b>					
Voltage Rise Voltage Drop	≤100mS ≤100mS (10% Rated Load)	≤100mS ≤100mS (10% Rated Load)	≤100mS ≤100mS (10% Rated Load)	≤100mS ≤100mS (10% Rated Load)	≤100mS ≤100mS (10% Rated Load)

<b>Interface</b>
Optional Interface (for programmable models only): RS232, USB
<b>Accessories</b>
User manual 1PC; Power Cord: 1×UK power cord and 1×Euro power Cord
<b>Weight and Dimensions(mm)</b>
110(W) × 156(H) × 260(D), 72-10480/722535 × 3.6kg, 72-2540, 72-2545 × 4.3kg, 72-2550 × 4.8kg

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