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<b>PAV250Bi POWER AMPLIFIER USER MANUAL</b>
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# Content

1. Safety Precaution.....	3
2. General Description .....	9
3. Main Technical Specifications .....	10
3.1 Power Supply .....	10
3.2 Environment Conditions .....	10
3.3 Dimension and Weight .....	10
3.4 Technical Specifications.....	11
4. Functions and Features .....	12
4.1 Basic Principle.....	12
4.2 Functions and Features .....	12
5. Panels .....	15
6. How to Use Amplifier .....	17
6.1 Wiring .....	17
6.2 Running .....	17
6.3 Voltage Output .....	17
6.4 Amplifier Off.....	18
6.5 Amplifier Test Items .....	18
7. Cables .....	19
8. Parameter definition.....	20

# 1. Safety Precaution


Read User Manual before operation.

1. Check carefully all buttons are positioned correctly before startup.
  - 1) Pause button in correct position in pressed state.
  - 2) ON/OFF in OFF state.
  - 3) Not press high power button (High power indicator in OFF state)
2. Main supply capacity should meet the requirement; otherwise it will affect output power of amplifier during high current output.
3. Handle the amplifier with great care and follow the symbols on the package: fragile, handle with care, top (an arrow pointing up), keep dry and protect from shaking.
4. Generally it's not necessary to depress high power button (high power button light should be off also).
5. Never operate live signal and load wires with voltage or current output to protect the safety of equipment and personnel.
6. In case the power outlet for powering up the amplifier does not have protective ground customer must connect the ground socket to the protective ground at the test site
7. The voltage output of over 36V is considered as dangerous and care must be taken
8. It's not allowed to feed external voltage into the voltage/current output sockets
9. It's not allowed to feed external current into the current/voltage output sockets
10. Disconnect the external circuit from the relay to avoid any influence to the test
11. Do not block the ventilation outlets

## **PAV250Bi Power Amplifier User Manual**

12. Avoid the equipment to be wet by rain
13. Do not switch-on and operate the equipment in the place having explosive gas or water vapor.
14. The 500V dangerous voltage can be in the equipment and please don't remove the cover by yourself
15. Please contact the manufacture for any maintenance
16. The guarantee will become invalid if kit is opened by the customer

## **For Your Safety Please Note**

 This symbol indicates potential hazards by electrical voltages/currents caused by, for example, wrong connections, short-circuits, technically inadequate or faulty equipment or by disregarding the safety notes of the following sections.

## **Use Proper Power Cord**

Only the power cord designed for the instrument and authorized by local country could be used.

## **Ground The Instrument**

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

## **Observe All Terminal Ratings**

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

## **Do not Assemble/Disassemble the Instrument without Authorization**

The instrument should be assembled and or disassembled by professional engineers; users are not allowed to perform related operations except for some possible replacements in this

manual.

## **Do not Move or Maintain the Instrument When it is Powered On**

To avoid personnel injuries, any position adjustment, maintenance or parts replacement are forbidden when instrument is on.

## **Use Proper Fuse**

Please use the specified fuses.

## **Do Not Operate With Suspected Failures**

If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by authorized personnel.

## **Keep Well Ventilation**

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

## **Do Not Operate in Wet Conditions**

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

## **Do Not Operate in an Explosive Atmosphere**

In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

## **Keep Product Surfaces Clean and Dry**

To avoid the influence of dust and/or moisture in air, please keep the surface of device clean and dry.

## **Operate the Instrument in a Suitable Environment**

The best condition for optimal measurement is: 5 °C to 40°C; less than 2 °C/hour changing, 20% to 80% RH and the instrument should not be placed towards the air outlet.

## **Electrostatic Prevention**

Operate in an electrostatic discharge protective area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to release static before connecting.

## **Proper Use of Solvent**

Please use the solvent in compliance with instructions specified in its supplier. If necessary, wear protective clothing, gloves and glasses to avoid any injuries.

## Handling Safety

Please handle with care during transporting to avoid damages to surface, panel and parts resulting from the falling from your hand.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



## 2. General Description

The power amplifier for digital simulator in power system is required to have high linearity, quick response, be available to all kinds of capacitive, inductive and resistive loads. Generally power amplifier consists of two types of amplifiers: linear power amplifier and switching power amplifier. The linear power amplifier has the strengths of high linearity, quick response, high accuracy, good electromagnetic compatibility and the weakness of bad performance in high current and high power cases. The switching power amplifier is quite fit in high current, high power devices with its strength of high efficiency, but it's weak in linearity, small signal noise, DC offset, drift, transient response, load driving capability aspects, which are very difficult to fix.

PAV250Bi is specially designed for R&D of power system simulation. It is adapt to various capacitive and inductive load. There are 6-phase voltage outputs with max. 250V rms per phase and max. output power 75VA..

## 3. Main Technical Specifications

### 3.1 Power Supply

Model	PAV250Bi
Item	
Power supply	3 phase 380VAC±10% , 50/60Hz
Power capacity	750VA

### 3.2 Environment Conditions

Temperature: 25°C±10°C

Related humidity: 20%RH—85%RH

Pressure: 86 kPa—106kPa

Surrounding conditions: No dust, vibration or serious electromagnetic field interferes

### 3.3 Dimension and Weight

4U standard chassis H×W×D(mm): 177×445×455mm

Weight:20kg

### 3.4 Technical Specifications

Voltage output	6x0 ~ 250V RMS
Max. output power	> 75VA (250V output)
Input signal	0 - 7V RMS
Voltage accuracy	<0.2% (5V-250V)
Typical voltage accuracy	<0.1%
Differential input impedance	20kΩ
Gain	35V/1V
THD	≤0.1%
Linearity	≤0.2%
Phase accuracy	0.2°
Frequency range	>3kHz±1dB
Step response	< 80μs
Input/output time delay	< 80μs
Power supply	3 phase 380VAC±10% 50/60Hz

## 4. Functions and Features

### 4.1 Basic Principle

PAV250Bi consists of the below parts mainly:

- a) High-speed differential input circuit for amplifier;
- b) Voltage power amplifier module;
- c) Detection and alarm circuit: each amplifier has an output distortion detection circuit.
- d) Temperature protection circuit: Turn off the amplifier when the temperature is too high; It will resume working when it is cooled down to a reasonable degree.
- e) Cooling fan: when the temperature is quite low, the fan will work at a low speed for prolonging the fan's life-span and reducing working noise.

### 4.2 Functions and Features

#### 4.2.1 Differential input circuit

The differential input circuit can reduce the influence of the common mode noise to make it possible that use long wires to connect across the amplifier and signal source, which will reduce mutual effects between all amplifiers during output to guarantee the operation safety of the simulator.

## 4.2.2 Over-load alarm function

The output voltage distortion and overload auto-detection circuit will protect the voltage amplifier output overload or short-circuit automatically. It automatically closes amplifier input/output, and the overload alarm in rear panel lights. After overload and short-circuit disappear, it restores to working status.

## 4.2.3 Pause control function

The pause button on the front panel can cut off the amplifier's signal output. The Pause indicator will be on and the Run indicator will be off after pressing the Pause button. The output of amplifier is turned off.

## 4.2.4 Overheat protection function

When the overheat protection is activated, the amplifier will stop working automatically and the "Overtemp" indicator will be on and it sends off alarm.

## 4.2.5 Voltage high power output function

In normal situation, the high power control button is located in OFF status and the indicator is off. The voltage range of amplifier is 0 ~ 120V. When pressing ON button, the high power control indicator lights and the voltage range is 0 ~ 250V.

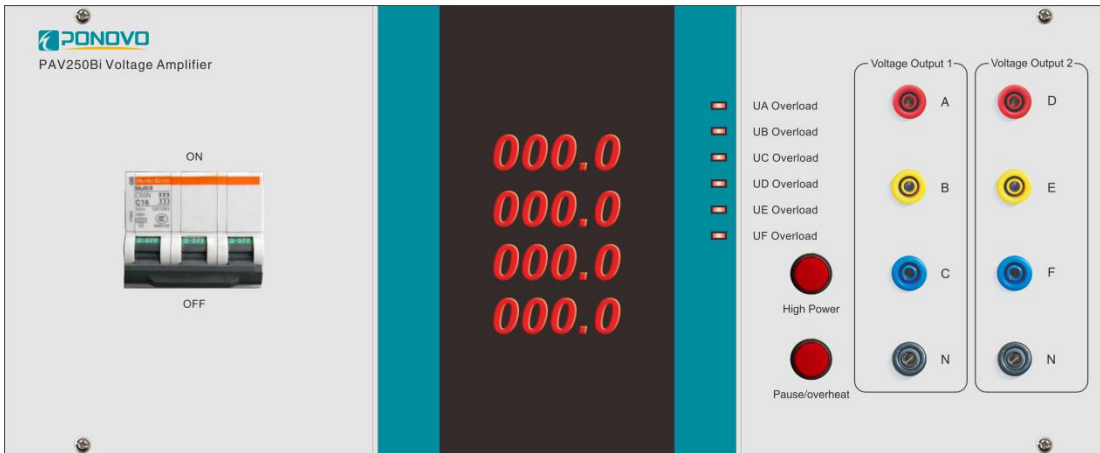
**Notes:** 1. when the voltage is low, it is unnecessary to use high power output.

2. Exit the high power function after finishing the function. Working in high power output status in long time is not permitted.

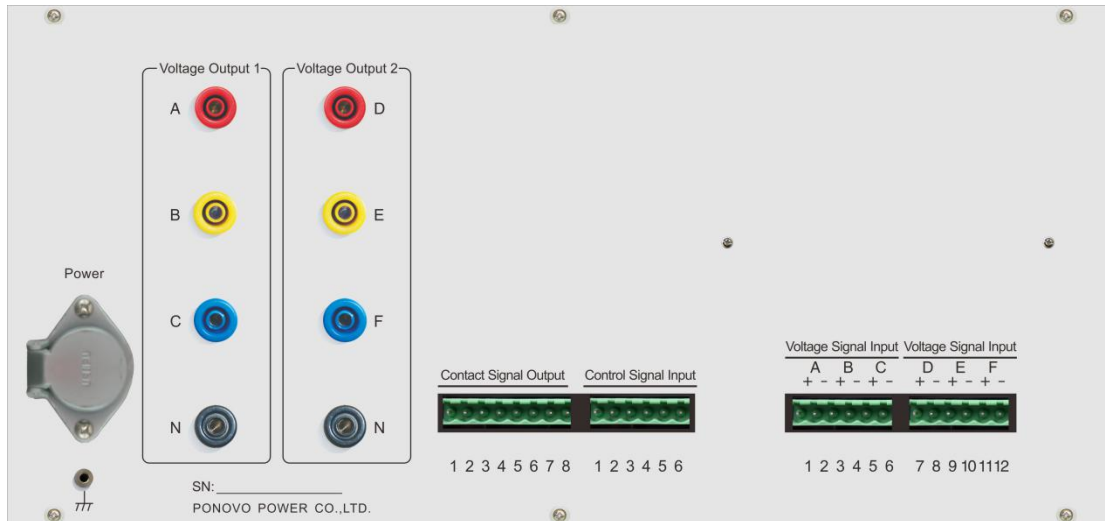
3. Don't switch high power control button while there is output.

# 5. Panels




## Front Panel



## Rear Panel



**Terminal Definition**

Contact Signal Output								
Terminal No.	1	2	3	4	5	6	7	8
Output Mode								
Function Definition	Overtemp. alarm signal output		Voltage output overload/short-circuit alarm signal		Pause signal output		Standby	

Control Signal Input						
Terminal No.	1	2	3	4	5	6
Output Mode	+	+	+	COM-	+	-
Function Definition	Pause control +12V input		Calibration control +12V input	Common terminal	Calibration signal input	

**Note:** Pause control and calibration control both are valid for high level input (5-15V).



## 6. How to Use Amplifier

### 6.1 Wiring

Connect digital simulator system's D/A output signals to corresponding signal channels of voltage input (Refer to the Definition of terminal leads). Pay attention that the shielded layer of the signal wire at simulator side should be grounded.

### 6.2 Running

Check the power supply is normal before energizing the amplifier and the polarity of input signal is correct. After all points are confirmed correctly, turn on the amplifier, the power supply indicator will light and run indicator will flicker. It indicates the amplifier works normal.

### 6.3 Voltage Output

First, press "Pause" button and connect the voltage output terminals to corresponding terminals of the tester respectively. And then inactivate the pause function and input simulation signal, the amplifier will work under voltage amplifying status.

The formula is : Voltage output = Input simulation signal x gain

- Notes:**
1. Generally don't press high power button (The high power control indicator is off.).
  2. Never operate live signal and load cables with voltage or current output to protect the safety of equipment and personnel.

## 6.4 Amplifier Off

Stop simulation signal input firstly if users stop using amplifier. Press “Pause” buttons, and cut off all connections of amplifier and load, lastly turn off power.

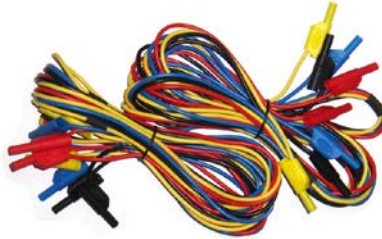
## 6.5 Amplifier Test Items

Before putting into market, the amplifier is required to have strictly inspections. The test items are: function inspection, linearity, load stability, THD, max output power, amplitude-frequency characteristic, input/output delay and step response, etc.

Please refer to Factory Test Report for the detailed information.

## 7. Cables

Colour coded voltage cables



SAW0202 colour coded voltage cable

Amount: 8 pieces

The voltage cables to connect the amplifier output to other safety sockets of, generally the voltage parts.

## 8. Parameter definition

**Notes:** The voltage/current values are valid if not specified.

- 1) Output calculation value: input signal RMS x gain value

For example:  $1.0V \times 50.0V/V = 50.0V$

- 2) Measured output value: the effective value of actual output
- 3) Relative error:

$$\frac{\text{Measured output value} - \text{output calculation value}}{\text{Output calculation value}} \times 100\%$$

- 4) Linearity:

$$\frac{\text{Max. positive error} - \text{max. negative error}}{2}$$

- 5) Voltage amplifier load stability: No-load voltage U1 50% rated load U2

$$\frac{U1 - U2}{\text{Output calculation value}} \times 100\%$$

- 6) Input/output delay: the time delay of 50% rising rate between input square wave signal and the output square wave signal
- 7) Amplifier step response: the bigger value between the time of 10%-90% rising rate and 90%-10% falling rate.