
AVR Series

Single Phase microcomputer
AC voltage stabilizer

User Manual

First of all, thank you for choosing our company's voltage stabilized power supply series products(Voltage Stabilizer/Regulator)!

This manual provides users with relevant precautions for installation, use and maintenance of this product. To ensure that this product can be installed and operated correctly, please read this manual carefully before installation and use. If you have any questions, please contact our company or agent for consultation. Our professionals will sincerely serve you.

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1. Product Introduction

1-1. Overview

This series of microcomputer AC voltage stabilizers, hereinafter referred to as voltage stabilizers, is a new generation of intelligent voltage stabilizer equipment successfully developed by our company after years of hard work.

It adopts the latest single-chip computer calculation and metering chip control technology, fast AC sampling technology, effective value correction technology and fast compensation voltage stabilization technology, combining intelligent instruments, fast voltage stabilization and fault diagnosis together to make the product safe, efficient and precise.

It is mainly composed of an isolation transformer, an auto-coupling voltage regulator, a CPU control core, intelligent voltage stabilization technology and a safety protection device, realizing a fully automatic control, safe, efficient, energy-saving and environmentally friendly intelligent voltage stabilizer.

The products are widely used in large-scale electromechanical equipment, metal processing equipment, production lines, elevators, medical equipment, embroidery and textile equipment, air conditioners, radio and television, household appliances, building lighting and other electrical equipment that require stable voltage in the fields of industry, transportation, post and telecommunications, national defense, railways, scientific research, etc.

1-2. Product Features

- (1) High efficiency: effective power is more than 99 % .
- (2) High precision: voltage regulation accuracy is $\pm 1\%$ ($\pm 1\% \sim \pm 5\%$) .
- (3) Intelligent instrument display: The intelligent instrument displays the effective values of voltage, current, power, etc. in real time, which is clear, accurate, and high-resolution. It is operated by membrane buttons and is safe and reliable.
- (4) Wide application scope: The voltage stabilization range is wide, which can meet the use of places and equipment with poor power supply quality and large voltage fluctuation range.
- (5) High-speed response: The voltage stabilization response speed is $> 0.5\text{ S}$, and there is no voltage change impact on any computer automation, equipment and instruments.
- (6) Complete protection functions: It is equipped with overload, overvoltage, undervoltage, short circuit and other fault display and protection functions to ensure the safe operation of

the voltage stabilizer and load.

- (7) Strong preset function: protection limit can be set arbitrarily.
- (8) Strong overload capacity: The whole machine adopts high-quality components with good performance. It can be used continuously under 100% rated load conditions and can withstand instantaneous overload without damaging the machine.
- (9) Strong adaptability: It has strong adaptability to power grids and loads, and can work reliably, continuously and stably under various harsh power grids and complex load conditions.
- (10) No distortion: There is no interruption of current and no surge current during the switching process, so the waveform is not distorted.
- (11) Low loss: Minimum power loss, no-load loss is less than 0.5%, saving customers a lot of electricity bills.
- (12) Bypass function (option) , easy maintenance: can switch between "voltage stabilization" and "bypass direct power supply", which is convenient for use when repairing faults.

2 . Technical Parameters

2-1. Technical Parameters:

(1) Product model:	EPL(1FVR)
(2) Rated capacity:	1 ~ 10K VA
(3) Phase:	1L + N + G
(4) Input voltage :	☒ 1 2 0V ☐ Others:
(5)Input voltage regulation range:	☐ ± 15% ☒ ± 20% ☐ ± 25% ☐ ± 30% ☐ Others:
(6) Output voltage:	120 V
(7) Voltage stabilization accuracy:	☒ ± 1 % ☒ ± 2 % ☐ ± 3 % ☐ ± 5 % (adjustable)
(8) Efficiency:	≥95 %
(9) Frequency:	50Hz/60Hz
(10) Response time :	0.5s
(11) Insulation grade:	E-Class

(12) Insulation resistance:	The insulation resistance of the whole machine to ground >5MΩ
(13) Insulation strength:	2500V AC /1min, no arc discharge, no breakdown
(14) Output waveform:	The output waveform has no distortion and no harmonic increment
(15) Instantaneous overload capacity:	5 times rated current
(16) Display mode:	LED Display
(17) Working method:	Long-term continuous operation
(18) Protection function:	Overload, overvoltage, undervoltage, short circuit
(19) Heat dissipation method:	Self-cooling

Note: ① The rated capacity of the voltage stabilizer is calculated as follows:

$$P = \sqrt{m} I_2 U_2 10^{-3} (\text{KVA})$$

Where: P — rated (output) capacity of the voltage regulator (KVA) m — Number of phases

Single phase: m=1

I_2 — Rated output current (A)

U_2 — Rated output voltage (V)

② The above are the technical parameters of our company's conventional products, which are not the basis for customers to accept the products. Product acceptance should be based on the technical parameters agreed in the contract.

③ If customers have special requirements, they can negotiate with the relevant departments of our company.

3 . Environmental Requirements

3-1. Environmental requirements are as follows:

- (1) The voltage stabilizer should be used indoors.
- (2) No conductive or explosive dust, no gas, steam or oil mist that corrodes metal or destroys insulation.
- (3) Good ventilation.
- (4) A flat and solid foundation.
- (5) The altitude should not exceed 1000m. If the altitude is higher than 1000m, the load capacity of the voltage stabilizer will decrease with the increase of altitude .
- (6) Ambient air temperature: minimum temperature -5°C , maximum temperature $+40^{\circ}\text{C}$. The daily average temperature of cooling air shall not exceed $+30^{\circ}\text{C}$, the annual average temperature shall not exceed $+25^{\circ}\text{C}$, and the temperature change rate of the working environment shall not exceed 5K/h . (Note: When the operating ambient temperature is higher than the specified limit value, the load capacity of the voltage stabilizer will be reduced.)
- (7) Relative humidity: $\leq 90\%\text{RH}$ ($40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ without condensation).
- (8) The waveform of the power supply voltage is approximately a sine wave ($\text{THD} \leq 4\%$).
- (9) The transient peak voltage V_{p-p} in the power grid is $\leq 2000\text{V}$ and there is no lightning strike.
- (10) Do not be exposed to radioactive radiation.
- (11) Avoid abnormal mechanical stress such as shock and vibration.
- (12) Multiple voltage stabilizers cannot be operated in parallel.
- (13) Sufficient heat dissipation space and maintenance space should be left around and on the top of the voltage stabilizer.

3-2 . Storage environmental requirements

The product should not be exposed to the sun or rain. It should be stored in a clean place without strong mechanical vibration, impact and strong magnetic field, and without various harmful gases, flammable and explosive items and corrosive chemicals.

3-3. Transportation environmental requirements

The product should be transported with necessary packaging and should be protected from direct rain and snow, severe vibration, impact and inversion.

■ Notice:

If there are special conditions of use that cannot be met as specified above, please consult with the seller when placing an order, or consult us at any time during use.

4 . Installation Wiring

Please read the following before installing the wiring:



- Before installing and wiring, be sure to cut off the input power to prevent accidents caused by electric shock.
- The product must be installed and tested by trained personnel with electrician qualifications.

4 -1. Pre-installation inspection

- (1) Check whether the product model and specifications are consistent with your order information, especially the capacity, input/output voltage value, etc.
- (2) Check whether the factory documents (instructions, certificates of conformity, etc.) and other items to be delivered as agreed in the ordering information are complete.
- (3) Check whether the electrical components in the voltage stabilizer cabinet are damaged during transportation.
- (4) The fasteners of the voltage stabilizer must be firm and reliable, and the wiring is not allowed to fall off. If it falls off, it must be tightened, especially the control plug-in must not be loose or have poor contact.
- (5) After the voltage stabilizer arrives, please unpack, inspect and install it within one month to avoid long-term storage and quality impact.

4 - 2 . Installation wiring

(1) In place:

① After the voltage stabilizer has passed the inspection, it can be put into place. During the placement process, ensure that the voltage stabilizer box and components inside the cabinet are not damaged.

② After positioning, ensure that the chassis of the voltage stabilizer is evenly stressed and the box is placed stably.

③ There should be enough space around the installation location to ensure ventilation, repair and maintenance of the stabilizer.

(2) Cable selection:

- ① When wiring, please select appropriate cables and wire ears to ensure reliable

connection between the input and output ends.

② When choosing cables, factors such as load rate, interception capacity, heat dissipation conditions, environmental conditions, laying method, and transmission length must be considered.

③ The wire gauge of the input and output lines should be determined by the user according to the capacity of the voltage stabilizer, and a certain margin should be allowed. It is recommended to use copper wire for the cable connected to the voltage stabilizer, and select it according to $2.5A/mm^2$.

(3) Cable connection:

① Connect the input power line to the input wiring terminal in the voltage stabilizer cabinet (marked with "input" and "L" and "N");

② Connect the load wires to the output terminals in the voltage stabilizer cabinet (marked with the word "output" and phase line identification: marked with "L" and "N").

③ Casing protection grounding: The grounding wire should be connected to the position of the stabilizer grounding wire (marked with the grounding mark " $\equiv$ ").



• **The above wiring diagram is for reference only. Please refer to the marking on the voltage stabilizer.**

• **When wiring, be sure to connect according to the markings on the wiring terminals. Do not reverse the input and output, and do not reverse the phase line and the neutral line! The neutral line and the ground line cannot be confused, and the ground line cannot be**

omitted. If the line is connected incorrectly, the voltage stabilizer will not work properly or even be damaged!

• **The wires and wire terminal connectors from the power supply to the voltage regulator and from the voltage regulator to the load should have good contact, be firm and reliable, and be able to pass the rated current of the voltage stabilizer.**

5 . Operation

5-1 . Power on and run

(1) Before powering on, make sure that the input and output cables are properly connected and the unit is safely grounded.

(2) Put the load (device) connected to the voltage stabilizer into the OFF state.

(3) Turn the power switch on the voltage stabilizer to the ON state. The display panel will show "AVR" and the output voltage area will show the phase voltage value of the

corresponding phase.

- (4) Check whether each phase of the input voltage of the display panel is within the input voltage range of the voltage stabilizer. If the voltage exceeds the customized input range, the voltage stabilizer will not be able to automatically or manually start voltage stabilization operation and will always be in the AC power mode state.
- (5) If the output voltage of the voltage stabilizer is within the normal range under AC power supply, and the voltage stabilizer does not automatically switch to voltage stabilization after 5 seconds, please check whether the input phase sequence is correct. You can arbitrarily change the two-phase live wires and then power on for testing.
- (6) Under normal situation, the voltage stabilizer will automatically start voltage stabilization after powering on 5 seconds. Please make sure that the output voltage meets the load requirements.
- (7) After everything is normal, gradually add load and proceed a trial run.
- (8) Check whether the voltage and current values on the display panel are within the specified range. If the functions are displayed within the normal values, they can be used normally.

5-2 . Instructions for use

1. The load capacity of the voltage stabilizer must have a certain degree of larger power rating to extend the service life of the voltage stabilizer. Do not fully load it for a long time and do not overload it.
2. The voltage stabilizer is equipped with perfect protection functions to ensure the safe operation of the voltage stabilizer and load equipment. The details are as follows:
 - (1) Overload protection: If the load current exceeds the set overcurrent value, the corresponding "overload" indicator light will light up . If the overload is not eliminated within 1 minute, the system will cut off the output ;
 - (2) Undervoltage protection: when the output voltage is 10% lower than the rated voltage , the undervoltage indicator light will light up and the output is cut off after a delay of 5 seconds ;
 - (3) Overvoltage protection: When the output voltage is 10% higher than the rated

voltage , the overvoltage indicator light will light up and the output is cut off.

(4) Short-circuit protection: When a short-circuit fault occurs in the voltage stabilizer, the system automatically trips.

(5) Input undervoltage protection: When the input voltage is lower than the input range of the voltage stabilizer, the voltage stabilizer is in the mains state and cannot be automatically or manually started.

(Input tripping can be selected to cut off input protection)

3. If the input voltage is within the regulation range and the output voltage is unstable, check it immediately.

5-3 . Display panel operation

(The following photos are for illustration only. Please refer to the actual display.)

Through the display panel, we can clearly understand the operating status of the voltage stabilizer and set parameters. Let's take a look at the functions of the display panel and the specific operation methods.

(1) Display panel diagram:



(2) Main functions:

- 1) Real-time display of input voltage , output voltage and current;
- 2) Undervoltage, overvoltage and overload settings;

- 3) Voltage and accuracy value setting;
- 4) Voltage regulation speed setting ;
- 5) Overload, overvoltage and undervoltage fault indication .

(3) Operation panel description :

Input voltage display.

Output voltage display.

Output current display.

Use this key to set the parameter value of the voltage stabilizer (see parameter setting for specific methods).

"+" : Parameter setting key (increase).

"—" : Parameter setting key (decrease).

Parameter setting confirmation key.

Voltage stabilization: When the AVR indicator light is on, the voltage stabilizer works in the voltage stabilization state.

Overvoltage: When the OVER.V indicator light is on, it means the output voltage is too high.

Undervoltage: When the UNDER.V indicator light is on, it means the output voltage is too low.

The "over-current" means overload, and the load needs to be reduced appropriately .

5 - 4 . Use parameter settings:

(1) How to use "MENU":

2.1 Press the "MENU" key for the first time, the display window shows "000", press the "+" or "-" key to set the item to "007", and then continue to press "MENU" to enter the parameter setting mode.

2.2 At this time, "1" (output voltage setting) is displayed in the upper right corner of the display. You can adjust this parameter value by pressing the "+" or "-" key, press the "MENU" key to continue to enter the next function setting, and press the "BACK" key to confirm the parameter and return.

(2) Meaning and factory setting of each parameter :

1. Output voltage setting: 120V (center voltage value LN)
2. Voltage accuracy setting: 1.0 ($\pm 1\% \sim \pm 5\%$)
3. Output undervoltage setting: 110 V (when the output voltage is lower than this value for 5S, the output will be automatically cut off, and the output will be restored after the voltage is back to the normal rated value for 5S)
4. Output overvoltage setting: 130 V (when the output voltage is higher than this value for 5S, the output will be automatically cut off, and the output will be restored after the voltage is back to the normal rated value for 5S)
5. Overload current setting : When the current exceeds the rated value for 1 minute continuously, the voltage stabilizer automatically cuts off the output.
6. Motor speed setting: The default setting is 10 .
7. Output delay time adjustment: factory default is 5S
8. Voltage stabilization mode: 0 (center tap) 1 (compensation type)
9. Mains frequency: 50Hz or 60Hz adaptive
10. MODBUS slave address
11. Baud rate: (0:1200, 1:2400, 2:4800, 3:9600)
12. Parity check: (0: no parity, 1: odd parity, 2: even parity)
13. Motor speed reduction: (1-10)
14. Firmware version

6 . Precautions

The following are matters that users need to pay special attention to. In order to ensure your life safety and protect the safety of the product and connected devices, please read them carefully before use and strictly abide by them during use.

6-1. Precautions for use

- (1) The voltage stabilizer must be installed, operated and maintained by trained personnel with electrician qualifications to prevent unauthorized personnel from operating the machine.
- (2) Before installing or repairing the voltage stabilizer, be sure to cut off the input power to avoid electric shock or product damage.
- (3) The wiring must be connected firmly and tightly to prevent it from falling off and sparking, and from oxidation of the contacts due to heat caused by excessive contact resistance.
- (4) The input and output connections of the voltage stabilizer must be arranged reasonably to prevent them from being stepped on and worn out, which may cause leakage accidents.
- (5) The voltage stabilizer must be properly grounded. The user is responsible for any electric shock or personal injury caused by operating without a ground wire.
- (6) The ground wire of the voltage stabilizer must never be connected to public facilities such as heating pipes, water supply pipes, gas pipes, etc., so as not to infringe on the rights of third parties or cause harm.
- (7) When the voltage stabilizer is running, do not disassemble the chassis to touch the internal components or pull the input and output wires of the voltage stabilizer to avoid electric shock or other electrical safety accidents.
- (8) Do not operate the stabilizer when your hands are wet;
- (9) Please do not disassemble or modify the voltage stabilizer without authorization to avoid malfunction, leakage or fire.
- (10) Do not stand or place heavy objects on the voltage stabilizer box. Do not allow debris, especially conductive objects, to enter the box through the heat dissipation holes or other parts to avoid malfunctions, leakage or other safety accidents.
- (11) It is strictly forbidden to use corrosive cleaning agents or solvents that have a corrosive effect on plastics and paint films to clean the voltage stabilizer;
- (12) Avoid stacking objects around the stabilizer to block air circulation;
- (13) When the voltage stabilizer is not in use, turn off the power switch and remove the

external wiring on the terminal board.

6-2 . Power Supply Considerations

- (1) Select this series of products according to the actual power of the electrical equipment used and leave appropriate margin;
- (2) The allowable fluctuation range of input voltage is the order standard range;
- (3) The frequency fluctuation of the input voltage should not exceed $\pm 2\%$, and the positive (negative) fluctuation of the frequency and the negative (positive) fluctuation of the voltage cannot occur at the same time;
- (4) The relative harmonic content of the voltage waveform should not exceed 10%.

※ **If there are special usage conditions that cannot meet the above regulations, please negotiate with the seller when ordering, or consult us at any time during use.**

7 . Daily Maintenance



Notice

Before performing maintenance, be sure to cut off the input power to avoid electric shock or other safety accidents.

7-1 . Regularly inspect the working status of the voltage stabilizer

- (1) Check whether the voltage stabilizer is operating normally;
- (2) Check whether the load exceeds the rated value;
- (3) Check whether the input voltage exceeds the allowable fluctuation range, etc.
- (4) Check whether the LED display is normal.

If any abnormal phenomenon occurs during the inspection, it should be handled in a timely manner. If it cannot be handled in time, the supplier or manufacturer should be notified in time and contacted for a solution to avoid damage to the equipment.

7 -2. It is recommended to maintain the voltage stabilizer every three months. The maintenance contents include:

- (1) Carefully clean all parts of the regulator to remove dust and dirt.
- (2) Check whether the fasteners and connecting wires in the chassis are loose. If there are loose connections or poor contact, they should be dealt with in time.
- (3) Faulty or damaged components should be repaired or replaced promptly .

8 . Abnormal Situation Handling



Before carrying out maintenance, be sure to cut off the input power to avoid electric shock or other safety accidents.

If the user finds that there is a problem with the voltage stabilizer during use, please refer to the following content for processing:

Phenomenon		reason	Treatment
No output	Panel displays overvoltage	The output voltage exceeds the overvoltage setting value;	a.Check whether the output voltage exceeds the panel overvoltage setting. b.If the voltage is within the rated value, restart the voltage regulator and check whether the motor can rotate. c.If it is a compensated voltage stabilizer, check whether the relay is energized.
	Panel displays undervoltage	The output voltage is lower than the undervoltage setting value;	a.Check whether the output voltage exceeds the panel undervoltage setting b.If the voltage is within the rated value, restart the voltage regulator and check whether the motor can rotate. c.If it is a compensated voltage stabilizer, check whether the relay is energized.

	Panel display overload	The load current exceeds the overcurrent setting value Overcurrent setting value is incorrect	a. Reclose the switch and check whether the load is overloaded. If overloaded, reduce the load. b. Reclose the circuit breaker and reset the overcurrent setting value
The output voltage is abnormal or unstable	Panel output voltage jumps unsteadily	Input terminal is not secure The output terminal is not firm.	Re-tighten the terminal blocks
		Fuse damage	Check whether the fuse is damaged. If damaged, replace it with the same model and specification.
High machine temperature	Fan does not rotate	Fan burnt out	Replace the fan
		Serious damage to internal components	Stop operation immediately and notify the agent or manufacturer
		Fan plug is loose	Plug in the plug
The machine is not working	Burning smell or smoke	Internal objects burned	Check if there is any obvious burn damage inside and replace the burnt parts.

※ After checking the above items and taking measures, if the problem still cannot be solved, please contact the supplier or manufacturer to report the problem.

