### 5. Operation instructions

5.1 Connect the input of the voltage stabilizer to the power supply, turn on the power switch, the power indicator light goes on, the delay indicator flickers (self-test). After 2-4s of self-test,

the stabilizer will enter the normal operation state 5.2 When the output voltmeter displays in normal range, connect the input plug (terminal) of electrical appliance to the output end of voltage stabilizer, switch on the electrical appliance and it can be used normally.

5.3 When the overvoltage indicator flickers, it indicates that the output voltage is too high (above the overvoltage value) and the output voltmeter shows "H".

5.4 When the undervoltage indicator flickers, it indicates that the output voltage is too low (below the undervoltage value) and the voltmeter shows "L".

5.5 When the output voltage box shows "T", it indicates that the overtemperature inside the machine exceeds the setting value and the output is in overtemperature protection state. At this moment, it needs to reduce the load and wait for 20 minutes to resume normal operation.

5.6 When the output voltage box shows "O", it indicates that the output end has exceeded the load capacity of the machine, the output is in overload protection state. At this moment, it needs to reduce the load and reboot to resume normal operation.

5.7 When the input voltage exceeds the stabilization range or when the output voltage is higher than 246V ± 4V caused by faults, the voltage stabilizer will automatically cut off the output voltage, at this moment, the output indicator flickers and voltmeter shows "H".

### 6. Matters need attention

6.1 The voltage stabilizer should be installed in draughty and dry room without direct sunlight or corrosive gas.

6.2 The power of the voltage stabilizer should be greater than the total power of the electrical appliances. When the input voltage is as low as 100V or to the lower limit, the stabilizer capacity will drop to 35% of the rated capacity, see the output capacity curve chart in this manual.

6.3 The power switch of voltage stabilizer should not be used as main switch of electrical appliances, switch on the stabilizer first, wait until the output voltage is normal, and then put through the electrical appliances one by one from large to small.
6.4 Turn off the electrical appliances first from large to small, and

then switch off the voltage stabilizer.
6.5 When using the voltage stabilizer, pay attention to the indoor wiring as well as the sectional area of incoming line of electric meter that should meet the requirements, otherwise, it may

cause large line drop and result in difficult startup of electrical appliances and undervoltage of stabilizer. 6.6 Output voltage of voltage stabilizer is 220V ±8%, which allows fluctuations in the range of 202V ~ 237V, accompanying

with the relay action "click" sound inside, and it is normal phenomenon if the filament lamp brightness changes at the 6.7 The switch of voltage stabilizer should not be frequently operated, activating interval should be greater than 5 seconds, or easy to cause the stabilizer malfunction, or even damage. 6.8 When installing the stabilizer's peripheral circuit, please use

the copper wire with sufficient current according to the rated capacity of the product to reduce the line loss. 6.9 Ground wire must be installed reliably, check all connection vires are correct, focus on checking the wire connector is firm and reliable.

### 7. Selection guide

Consider the following two factors when choosing the power of

7.1 Power of home appliances refers to the active power, the actual input power will be greater, and some electrical appliances (such as refrigerator, freezer and air conditioning) vill have higher instantaneous power and current (usually is 3~5 times larger than the normal power and current) at the moment of startup, which cause voltage drop of power network and result in significantly darkened of lights;

7.2 The lower the stabilizer input voltage (grid voltage), the smaller the output power (see output capacity curve chart). 7.3 Calculate the sum of the power of voltage stabilizer, calculate by

3-5 times for air conditioners and refrigerators, by 1.5 times for inductive loads (such as fans), and by 1 times for resistive electrical appliances (such as electric heater, lighting).

### 8. Common problems and troubleshooting

Note! When the product is maintained, overhauled, or compone nts replaced, the input power must be disconnected first.

		Symptom	Cause	Remedy
1. Overvoltage protection; No output voltage Protection; 2. The CPU board is damaged; 3. Overheatprotection.  The output voltage is lower than the stabilized value (202V)  1. Insufficient supply voltage (less than 140V); 2. Digital display meter is damaged; 3. CPU control panel is input voltage exceeds 260V, should immediately turn off the power switch, not use the machine until the grid is normal; 2. Replace the CPU control board.  1. The power supply line is too long, too thin or socket aging, contact resistance is too large, should be improved or replaced; 2. Replace the digital display meter; 3. CPU control panel is 3. Replace the CPU	111111111111111111111111111111111111111	power switch, lightless indicator, the voltmeter	2. The power line and plug are damaged, or has broken line 3. The power switch is	circuit and the user electrical appliances whether there is short-circuit phenomenon, remove the fault; 2. Replace the power line and plug wire;
The output voltage is lower than the stabilized value (202V)  1. Institucient supply voltage (less than140V); 2. Digital display meter is damaged; 3. CPU control panel is 3. Replace the CPU		No output voltage	protection; 2. The CPU board is damaged;	input voltage exceeds 260V, should immediately turn off the power switch, not use the machine until the grid is normal; 2. Replace the CPU
		voltage is lower than the stabilized value	voltage (less than140V); 2. Digital display meter is damaged; 3.CPU control panel is	is too large, should be improved or replaced; 2. Replace the digital display meter; 3. Replace the CPU

9.1 Installation and User Manual (including Certificate of Conformity) 9.2 Enclosed spare parts fuse tube (500VA ~ 1500VA products)

### 10. Order guide

10.1 Please specify the product model, rated power, phase number, input voltage range, and the output voltage in the order; 10.2 Required quantity:

10.3 If there are special requirements, please contact us.

### 11. Installation tips!!

Before installing, select the appropriate external copper wires according to the load power or rated power of voltage stabilizer; the external input and output wires should not be too thin or too long, so as not to lead to malfunction of product. External adapter wire can refer to the following example: calculate according to the current carrying capacity of general copper wire: the safe current carrying capacity of the wire is determined by the maximum allowable core temperature, cooling conditions, and laying conditions. The safe current carrying capacity of general copper wire is

E.g.: recommended value for 2.5mm<sup>2</sup> BVV copper wire current

arrying capacity: 2.5 × 8A/mm² = 20A						
S/N	Rated capacity	Cross section of wire	S/N	Rated capacity	Cross section of wire	
1	500VA	≥0.5mm²	5	3000VA	≥2.5mm²	
2	1000VA	≥0.75mm²	6	5000VA	≥4.0mm²	
3	1500VA	≥1.0mm²	7	7000VA	≥6.0mm²	
Δ	2000\/A	≥1.5mm²	Ω	101///	$\geq 10 \text{mm}^2$	

Usually the loads (such as filament lamps, refrigerators, etc.) can be divided into two kinds, i.e. resistive loads and inductive loads. Calculation formula for the commonly used resistive

P = the rated power (W); U = the rated voltage (V); I = the rated current (A).

The relationship between the apparent power and active power is power factor, take the power factor of cosφ0.8; the relationship between them: apparent power 1000VA × 0.8 = active power 800W.

# HAVRL **Ultra-low voltage automatic** AC voltage stabilizer

# **User Manual**

Postal code

Invoice No.

Inspector

Date of production

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# 1. Overview

HAVRL series is a new generation of electronic voltage stabilizer newly developed by our company, which combines advantages of reasonable structure, easy to use, stable quality, reliable performance, energy efficient, etc., especially suitable for areas with low voltage and large voltage fluctuation. It is an ideal voltage stabilizer and protector for such household appliances as air conditioners, refrigerators, televisions, stereo equipment, etc.

### 2. Main features

2.1 Wide input voltage range. When the utility power fluctuates within 85V~250V, the stabilizer still can output stable AC voltage in permissible range to ensure the normal operation of various

2.2 High efficiency. Machine efficiency reaches 90% above, it is energy saving, and reduces family cost on electricity.

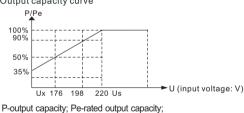
2.3 The product uses 8-bit high-performance, high-efficiency RISC single-chip microcomputer control, with miniature relay to switchover the autotransformer taps to stabilize the voltage automatically, which completely overcome the shortcomings of mechanical wear, noise, slow response etc. of traditional voltage

2.4 It has LED digital display for input/output voltage, working status display and fault code indication.

2.5 It has protection functions against overvoltage, overcurrent or short circuit, which ensures normal operation of electrical

2.6 The high reliability, well-designed circuit, high-quality electronic components and strict production process guarantee high product quality.

## 3. Main technical parameters 3.1 Output capacity curve P/Pe



U-input voltage; Ux-lower limit of the permissible input voltage range; Us – upper limit of the permissible input voltage range.

3.2 technical parameter

object shall prevail

Spec.	HAVRL – 500VA~10kVA		
Input voltage range	85~250VAC		
Output voltage	220VAC±8%		
Output voltage	110VAC±10%		
Output overvoltage protection	246V±4V		
Frequency	50Hz / 60Hz		
Temperature rise	Less than 80K (full load)		
Efficiency	Greater than 90%		
Delay time	5±2min		
Adjustment time	<10ms		
Note: for technical indicators of each specification, the data on			

### 4. Product diagram

4.1 Outline of HAVRL ultra-low voltage automatic AC voltage stabilizer, see Fig.4

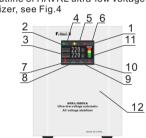


Fig.4: Front panel part

1. Status display screen; 2. Input voltage display/countdown of delay time;3. Output voltage display/status display ("L"-output undervoltage, "H"-output overvoltage, "T"-overtemperature, "O"output overload:

4. Work indicator; 5. Delay state; 6. Protection state;7. Temperature protection state: 8. Undervoltage indicator: 9. Overvoltage protection state; 10. Overload protection state; 11. Load display bar; 12. Front panel

4.2 Outline of the rear panel of HAVRL 500VA~1500VA ultra-low voltage automatic AC voltagestabilizer, see Fig.5;

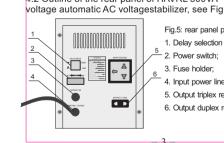


Fig.5: rear panel part: 1. Delay selection button;

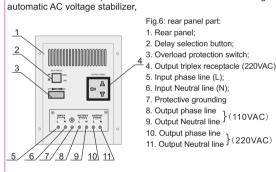
3. Fuse holder; 4. Input power line;

5. Output triplex receptacle (220VAC);

6. Output duplex receptacle (110VAC).

4.3 Outline of the rear panel of HAVRL 2000VA ultra-low voltage

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4.4 Outline of the rear panel of HAVRL 3000VA~10000VA ultra-low voltage automatic AC voltage stabilizer, see Fig.7

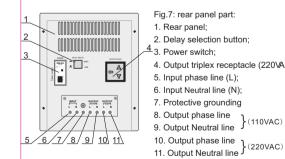


Fig.7: rear panel part: 1. Rear panel; 2. Delay selection button;

3. Power switch; 4. Output triplex receptacle (220VAC) 5. Input phase line (L); 6. Input Neutral line (N); 7. Protective grounding 8. Output phase line 9. Output Neutral line } (110VAC)

Warranty unit Warranty address

**Warranty Card** 

Sales unit

Sales date

# Maintenance Record

Repair date	Maintenance content	Inspector
		·
	Repair date	Repair date Maintenance content