

HTND₂ Series

AC Voltage Stabilizer

User Manual

□ Please carefully read the user manual before the installation and use of the products, and then keep it properly as backup.

Himel
The Right Choice!

High Precise Full-Automatic AC Voltage Stabilizer

Overview

1. HTND2 series is a new developed LED display AC voltage stabilizer based on HTND. It is controlled by CPU, while it has elegant appearance, wide range for stabilizing voltage and no additional distortion. Overvoltage protection and short circuit protection are included in HTND2 (undervoltage protection and time-delay selection can be customized). It is LED display to be easy to read input / output voltage, which is an ideal AC voltage-stabilized power supply.

Our product has high accuracy and low power loss. It is suitable for household appliances, school, research units, laboratory, radio and television equipment, textile machinery, factories and mines and processing equipment, where need to be voltage stabilized.

HTND2 series AC voltage stabilizer consists of voltage regulator, linear integrated control circuit, voltage and current sampling circuit, CPU, servo motor and transmission mechanism. When the electric supply fluctuates or the user load changes, sampling circuit will process the signal of voltage change via control circuit, and then servo motor drives the relative movement of brush arm on the regulator which means adjust the turn ratio of primary and secondary windings in order to stabilize the output voltage automatically.

2. Standard: EN 61000-6-2, EN 61000-6-4, EN 61558-1

Main Technical Parameters

1. Main Technical Parameters

Item \ Pole	Single-Phase
Input Voltage Range	150V~250V
Output Voltage	220V
Output Overvoltage	246±4V
Output Voltage Precision	< ±4%
Frequency	50/60Hz
Temperature Rise	<80K
Efficiency	>92%
Regulation Time	<1s(when variation of input voltage is 10 %)

Note 1: Standard product is without undervoltage protection. If customer requires, it can be customized and the undervoltage value is 184±4V;

Note 2: 110V output is not available for the product with more than 5kVA capacity. If customer wants 110V output, it requires to be customized and output value is 110V±4V. When it is loaded with 110V output, please strictly follow the rule of 2;

Note3: No protection for standard product with 110V output;

Note 4: Customization is allowed if input voltage range is out of that above.

2. Output Capacity Curve

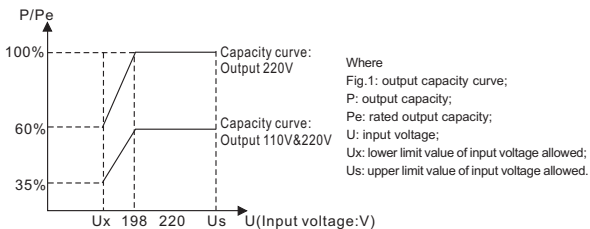


Fig.1 Output Capacity Curve

Product Appearance and Structure

1. HTND2-2~10kVA High precise Full Automatic AC Voltage Stabilizer Appearance

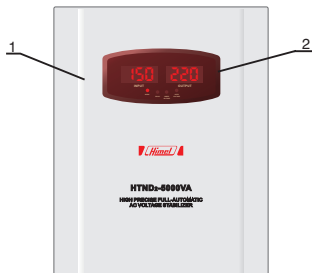


Fig.2: Front panel of HTND2-10kVA

Panel Part

1. Panel; 2. LED display

2 HTND2 series LED Working Mode Display

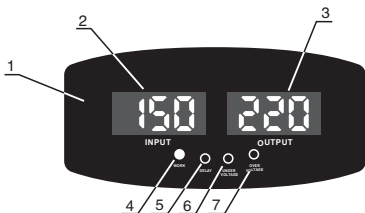


Fig.3 Fig.3 HTND2-LED Display

LCD Display Working Mode:

1. LED panel (lens);
2. Input Voltage;
3. Output Voltage;
4. Working Indicator;
5. Time-delay Indicator;
6. Undervoltage Indicator;
7. Overvoltage Indicator

3 HTND2 -1kVA~1.5kVA End Panel Appearance

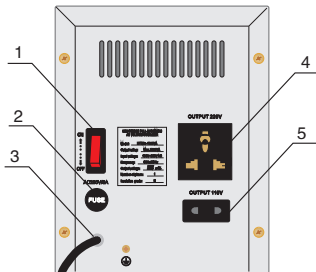


Fig.4 End Panel Part

Where

1. Rocker Switch;
2. Fuse Socket (overcurrent protection);
3. Input Power Cable (plug);
4. Output Three-pin-plug (220VAC);
5. Output Two-pin-plug (110VAC)

4 HTND2-2kVA End Panel Appearance

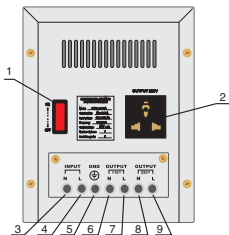


Fig.5 End Panel Part

Where

1. Overload Protection Switch (If overload trip happens, re-operation should be acted after 20-minute waiting); 2. Output Three-pin-plug (220VAC); 3. Input Neutral Line (N); 4. Input Phase Line (L); 5. Protective Grounding; 6. Output Neutral Line (110VAC); 7. Output Phase Line (110VAC); 8. Output Neutral Line (220VAC); 9. Output Phase Line (220VAC)

5 HTND2-3kVA~5kVA End Panel Appearance

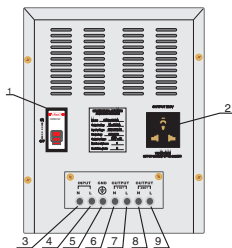


Fig.6 End Panel Part

Where

1. Miniature Molded Case Circuit Breaker; 2. Output Three-pin-plug (220VAC/10A);
3. Input Neutral Line (N); 4. Input Phase Line (L); 5. Protective Grounding;
6. Output Neutral Line (110VAC); 7. Output Phase Line (110VAC);
8. Output Neutral Line (220VAC); 9. Output Phase Line (220VAC)

6 HTND2-7kVA ~10kVA End Panel Appearance

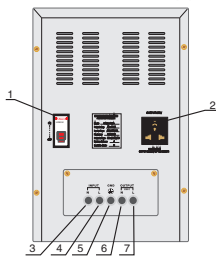


Fig.7 End Panel Part

Where

1. Miniature Molded Case Circuit Breaker;
2. Output Three-pin-plug (220VAC/10A);
3. Input Neutral Line (N);
4. Input Phase Line (L);
5. Protective Grounding;
6. Output Neural Line (110VAC);
7. Output Phase Line (110VAC);
8. Output Neural Line (220VAC);
9. Output Phase Line (220VAC)

Electric Diagram

1 Single-phase 1kVA~30kVA Diagram of Sampling and Control Part

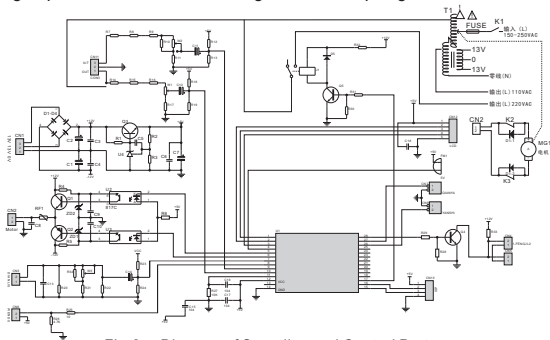


Fig.8 Diagram of Sampling and Control Part

2 Single-phase 1kVA~10kVA Electric Block Diagram.

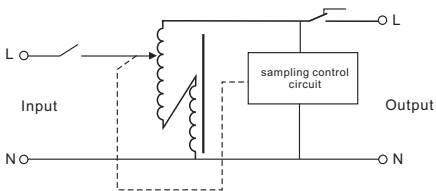


Fig.9: 1kVA~10kVA Electric Block Diagram

3 Single-phase 15kVA~30kVA Electric Block Diagram Using Compensation Circuit.

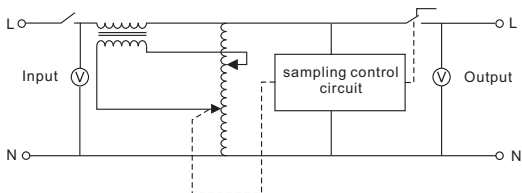


Fig.10: Single-phase 15kVA~30kVA Electric Block Diagram

Electric Diagram

1 The nominal power of the voltage stabilizer is maximum apparent power, however, the nominal power of the household appliances is active power, e.g. fridge, air conditioner, motor. Such a kind of inductive load has a very high instantaneous current on the moment of starting, thus 3 to 5 times of nominal power is recommended to select voltage stabilizer when using fridge and air conditioner. If

input voltage is too low, load shall be decreased, and details for selection can follow the capacity curve (Fig.1).

2 If stabilizer uses 110V as the output voltage, the output capacity shall not exceed 35% of rated capacity in order to avoid being damaged from overload.

3 Check whether the input voltage is in the application scope of stabilizer, and then switch on the power on the back after confirmation. The display shall enter into self-check status at this moment, and all functions will display on the screen. Meanwhile, output-time-delay indicator shall flash, and the time-delay indicator will go off after 3-minute flashing. After then, the voltage stabilizer will get into normal working status and the output voltage will display a normal value.

4 Before using voltage stabilizer, power supply shall be checked and it must be in the range of nominal voltage. The output voltage of voltage stabilizer is also required to be checked whether it is in the range of accuracy before connecting to the electric appliances, and after confirming that the stabilizer is under normal voltage stabilization, the electric appliances are allowed to be connected with stabilizer.

5 For the voltage stabilizer that has undervoltage protection, when the input voltage is lower than the range of the stabilized voltage, or the output voltage is less than $184V \pm 4V$ due to its own problem (standard product is without undervoltage protection), the undervoltage indicator will flash and alarm, and then power supply will be cut off after 10 to 15 seconds time-delay.

6 When input voltage is higher than the range of the stabilized voltage, or the output voltage is higher than

246V±4V due to its own problem, the overvoltage indicator will flash and alarm, and then power supply will be cut off after 10 to 15 seconds time-delay.

7 When the output load exceeds the integrated rated load or output is short circuit, the power switch will trip for protection and cut off the power supply. The output load shall be decreased at this moment, and re-operating the power switch once after 20-minute waiting is able to work normally (except the products with fuse tube). If the fuse tube is fused, a new fuse tube should replace.

8 If the motor-rotated equipment or high-current starting equipment is connected to the output of the voltage stabilizer, more than 3 times of its capacity shall be selected for stabilizer in order to avoid abnormal operation being caused from voltage drop in the power circuit due to high starting current.

9 HTND2-1kVA~1.5kVA voltage stabilizer uses fuse tube, while 2kVA uses overload protection switch for overcurrent protection, and more than 3kVA (including 3kVA) uses HDB3w miniature circuit breaker for overcurrent protection. Fuse tube shall be checked whether it is fine and the circuit breaker shall be checked whether it is flexible and reliable before being used.

10 Ensure the safety of equipment and people, all voltage stabilizers have grounding screws or grounding terminals. Well grounding is mandatory during installation.

11 After installation, input power switch should be open first. If the input voltage and output voltage are in the range of normal output voltage, switch of electric appliances can be open to make the load for normal operation.

12 Our product has input/output connecting terminals and output socket. According to product power, suitable conductive wires can be selected for input/output wires following No.10 “installation trip” in the user manual.

13 Phase line, neutral line and grounding line are wiring following the product marking in order to avoid being electrified on the output after power-off. Neutral line cannot replace grounding line, while grounding line cannot replace neutral line either.

14 For the product that is with lightning protection, the neutral line is absolutely not ignored, otherwise the voltage stabilizer or the electric appliance is easily to be damaged. Operation without grounding will cause the lightning protection become invalid, even lead to electric shock accidents.

Normal Application Conditions and Maintenance

1 Normal application conditions of voltage stabilizer should meet the following requirements:

1.1 Altitude

The altitude of the installation site does not exceed 2000m.

1.2 Ambient Temperature

Maximum temperature is 40°C , and the minimum temperature is -5°C (applicable for indoor voltage stabilizer).

1.3 Working Environment

- a) An indoor space without chemical deposition and dirt;
- b) An indoor space without harmful erosive medium and flammable and explosive gas or dust;
- c) An indoor space without severe vibration and turbulence;
- d) Voltage stabilizer should be placed in an indoor space

where is ventilate, dry, no direct sunlight and no erosive gas;
e) Output side cannot be used in parallel.

1.4 Relative Humidity

Relative humidity shall not exceed 90% (When temperature is 25°C).

2 Power supply shall be disconnected regularly (generally 6 months or 1 year) according to application environment. Clean the dust inside the product in order to keep the clean of the contact surface of toroidal transformer, gear and carbon brush. If carbon brush becomes too worn, the same mode of carbon brush should be used instead and adjust the pressure;

3 when the carbon brush is replaced, the carbon brush pressure should be adjusted appropriately, and the adjustment method is as follows: loosen the carbon brush assembly screws installed in the shaft of the motor, and press the carbon brush assembly in order to make the carbon brush be elastic with 3-5mm, and then fasten screws. If carbon brush is unable to well touch the contact surface of the coil, cloth cushion should be placed between carbon brush and the plane of coil, and then rotate the carbon brush once while it's smooth;

4 Uncharged operation such as installation, wiring and adjustment must be operated by electricians in order to avoid electric shock or voltage stabilizer damage during the wiring and adjustment.

Common Faults and Troubleshooting

Installation, wiring, maintenance and troubleshooting are not allowed to be operated with electricity, which must be done by professional electricians or professional technical

engineers to avoid electric shock accidents or voltage stabilizer damage.

Table 1: Common Faults and Troubleshooting

Failure Phenomenon	Failure Reason	Troubleshooting
Voltage stabilizer is out of work and no output voltage	<ol style="list-style-type: none"> 1. Input of the stabilizer is open circuit; 2. Circuit breaker is tripped or fuse tube is burn out due to overload. 	<ol style="list-style-type: none"> 1. Power on the input power and check whether the wiring is solid and reliable; 2. Change a new fuse tube or restart the switch to decrease the load power.
Unable to stabilize voltage	<ol style="list-style-type: none"> 1. Servo motor fault; 2. Circuit board is damaged; 3. Input voltage is out of range for stabilizing voltage; 4. Limit switch is open circuit. 	<ol style="list-style-type: none"> 1. The both ends of motor has the voltage but without motor rotation, the motor shall be replaced with a new one; if no voltage on both ends of motor, then check whether the limit switch is open circuit: if it is fine, and then check the circuit board; 2. If sampling voltage is fine, adjust the output potentiometer on the circuit board. If the fault cannot be removed, the circuit board shall be replaced with a new one in same type; 3. Check whether the input voltage is out of stabilizing range; if it exceeds, adjust the voltage of power grid or circuit, or customize a stabilizer with a wide range; 4. When the power is cut off, measure the pins on both ends of limit switch. If the resistance is 0, it's fine, while if the resistance is over heavy or infinite, the limit switch shall be replaced with a new one in same type.
Indicator flashes and no output voltage	<ol style="list-style-type: none"> 1. Input or output voltage is too low; 2. Input or output voltage is too high; 3. Temperature is too high inside the stabilizer or poor contact for thermocouple; 4. Load is too heavy. 	<ol style="list-style-type: none"> 1. Adjust the voltage of the power grid, and change a new control circuit board or servo motor; 2. Adjust the voltage of the power grid, and change a new control circuit board or servo motor; 3. Decrease the load, and check the heat-sensitive sensor; 4. Decrease the load and re-start.
Voltage stabilizer is able to stabilize the voltage but has the voltage deviation problem	<ol style="list-style-type: none"> 1. Voltage regulating to make the potentiometer displacement; 2. Voltmeter has no accurate indicating. 	<ol style="list-style-type: none"> 1. Re-adjust the potentiometer; 2. Change a new voltmeter or repair it.
Toroidal transformer inside the stabilizer is burn out	The load is too heavy that exceeds the load capacity of voltage stabilizer	Change a new toroidal transformer and then re-adjust the output voltage, meanwhile decrease the load to avoid being burn out again.
Sound of Mechanical drive and friction will happen inside stabilizer sometimes	<ol style="list-style-type: none"> 1. Frequent fluctuations for input voltage; 2. Too much load fluctuations. 	<ol style="list-style-type: none"> 1. A normal case caused from input voltage fluctuation; 2. A normal case caused from load fluctuation.
Circuit breaker trips after powering on voltage stabilizer	<ol style="list-style-type: none"> 1. Wrong wiring for input connection of stabilizer; 2. The rated current of circuit breaker does not match the circuit; 3. The front of the input is residual current operated circuit breaker. 	<ol style="list-style-type: none"> 1. Re-wiring the input and output connections of stabilizer; 2. Select a proper circuit breaker; 3. Residual current operated circuit breaker can be moved to the output of stabilizer.

Installation Tips

Proper external wiring conductive lines are selected according to load power or rated power of voltage stabilizer before installation. Input and output conductive lines for external wiring is not recommended to be too thin or too long to cause abnormal work. External wiring conductive lines can be selected as follows:

As calculation of a standard current-carrying capacity for a copper conductor: the safe current-carrying capacity depends on the allowed maximum temperature on the wire core, cooling conditions and laying conditions. The safe current-carrying capacity for a standard copper conductor is 5 to 8A/ mm² , e.g. the recommended safe value of the 2.5mm² BVV copper conductor is: $2.5 \times 8A/mm^2 = 20A$.

No.	Single-phase Product Capacity	Cross Section of the External Connecting Copper Conductor
1	1000VA	$\geq 0.75mm^2$
2	1500VA	$\geq 1.0mm^2$
3	2000VA	$\geq 1.5mm^2$
4	3000VA	$\geq 2.5mm^2$
5	5000VA	$\geq 4.0mm^2$
6	7500VA	$\geq 6.0mm^2$
7	10kVA	$\geq 10mm^2$
8	15kVA	$\geq 16mm^2$
9	20kVA	$\geq 16mm^2$
10	30kVA	$\geq 25mm^2$

Generally, standard loads (e.g. filament lamp, fridge) are divided into two types: resistive load and inductive load. The formula for a resistive load is: $P=U \times I$, and P presents rated power (W), U presents rated voltage (V), and I represents rated current (A). Apparent power is related with power factor, for example, if power factor $\cos\phi$ is 0.8, the relation between apparent power and power factor is:

Apparent Power $1000VA \times 0.8 =$ Active Power 800W

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