

**MADE IN KOREA**



**Instruction Manual**

*AC. AUTOMATIC VOLTAGE REGULATOR*

**OMEGA**

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**S Y S T E M S**

Before operating this product, please read this manual first and preserve it well.

### Attentions

1. Please place the voltage regulator in a draughty environment where there is no corrosive gas, explosive gas, conductive dust or steam, and the children can't touch it, besides, it mustn't be subject to the sunshine or rain.
2. The product should not be used in a location where is beyond the service environment conditions, otherwise, the LCD meter would be damaged or it would indicate abnormally for environment temperature.
3. The earth terminal must be firm and reliable to ensure safety.
4. The voltage regulator will produce little heat when it works normally, it is not allowed to cover with anything, otherwise, it would be damaged for insufficient heat emission.
5. The fluctuation of external voltage that leads the equipment regulates the voltage automatically, it is normal that there is the friction sound from gear in regulating voltage.
6. Choose input and output leads of suitable sectional area according to the power of voltage regulator, try to reduce power consumption in the circuit, in general, 5A/mm<sup>2</sup> for copper wire, and reduce half for aluminum wire.
7. The earth wire and neutral wire shall not be connected inversely, and the earth wire can't take the place of neutral wire, otherwise, it would cause the equipment body produces electricity or it can't work normally.
8. The input circuit of three-phase voltage regulator must be wired strictly according to three-phase four-wire system, the neutral wire can't be missed absolutely, or, it would result in out of control of control circuit, then would cause the damage of this equipment.
9. When the voltage regulator is energized, it is forbidden to open the case for adjusting randomly, in order to prevent the electric shock.
10. In case that the frequency of generation power grid is unstable, but the electricity is needed urgently, user can use the function of directly providing commercial power, to protect the equipment against damage for unstable frequency.
11. When the equipment has been used for a long time, a professional electric worker shall be invited to clear away the dust in the machine regularly to keep the clean between carbon brush and coil grinding surface, and adjust the contact pressure between them to get a fine contact against flashover; if the carbon brush is worn seriously, please change it in time, to prevent the equipment being damaged.
12. If the equipment works abnormally, user shall cut off the power immediately and send it to the designated place for maintenance.
13. If the safety parts for maintenance or change are not provided by us, we won't be responsible for any possible safety quality problems.

## AC. AUTOMATIC VOLTAGE REGULATOR

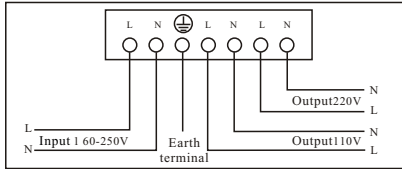


Diagram 8: Wiring diagram of single-phase auto products of 2kVA~3kVA

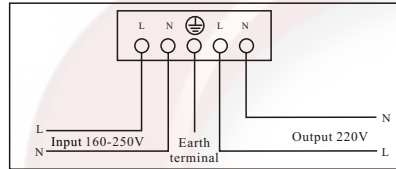


Diagram 9: Wiring diagram of single-phase compensating products of 5kVA and above

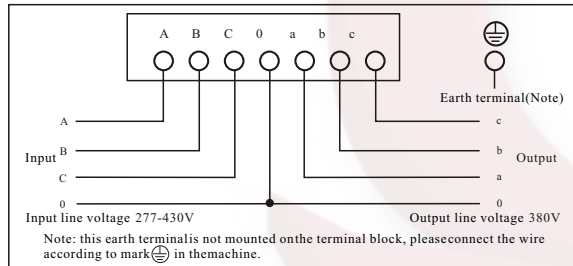


Diagram 10: Wiring diagram of three-phase products of 1.5kVA and above

## Operation methods

1. Before operating, please make sure the mains voltage is within the range of input voltage permitted by this equipment, then connect the wires according to the symbol on front and back panel carefully and do not make mistake, make sure firm grounding. (Input wire of single-phase voltage regulator of 1.5 kVA and below is power line, and socket is for output; please refer to diagram 8 diagram 10 for wiring of other voltage regulators).
2. Turn on the power switch of the voltage regulator, the output voltmeter of single-phase voltage regulator shall indicate to 220V; voltmeter for each phase of three-phase voltage regulator shall indicate to 220V; and check if there is phase failure; only when it is normal voltage regulating that you can turn on the power switch of power device.
3. When single-phase voltage regulator outputs 220V and 110V and both of them can be used at the same time, the sum of load current can't exceed output capacity. When three-phase voltage regulator outputs 380V and single-phase 220V and both of them can be used at the same time, the sum of each phase load cannot exceed the output capacity of each phase, and three-phase load shall be balance.
4. If the mains voltage is lower than 198V (three-phase voltage regulator takes phase voltage as the reference), please see diagram 1, that is, curve of output capacity for service through reducing the power.
5. When it is inductive load (such as air-conditioner and refrigerator), as the starting current of inductive load is very heavy, please choose voltage regulator whose output capacity is 3-5 times of load power. For other capacitive and inductive loads, please leave enough allowance for output capacity of voltage regulator.
6. When the mains voltage is rather normal, please use the function of commercial power, at this time, the voltage regulator does not have itself power loss. Open the voltage regulation circuit breaker, and close commercial power circuit breaker (products of 2kVA below without this function).
7. When mains failure happens (include loss of phase) or the input voltage is too high, please turn off the voltage regulator and the power switch of power device in time.

## AC. AUTOMATIC VOLTAGE REGULATOR

### General

AC automatic voltage regulator is the second generation product which is designed and manufactured by us, adopts 8-digit CPU manufactured by Samsung Corporation, has visible functions like protections against time delay, over voltage inverse time, under voltage, overload, excess temperature as well as mechanical fault, in addition, the accuracy of voltage regulation and time of delay can be settable, it is displayed with LCD, gives blue screen and backlight and is able to dynamically indicate the machine current working state with the interface. When the voltage regulator works abnormally, its interface can supply corresponding prompt, while, alarm sound of different amplitudes makes.

The equipment complies with trade standard SB/T 10266-1996 (single-phase products of 10kVA and below and JB/T 10089-2001 (three-phase products, single-phase products of 15kVA and above).

### Technical characteristics

#### 1. Output capability

When mains voltage is lower than 198V, the output capacity of this equipment reduces correspondingly; when the output voltage is 110V, its output capacity can't exceed 50% of rated capacity; the relationship between output capability and input voltage is shown as diagram 1.

#### 2. Overload capability

When input voltage of this equipment changes from 198V to 250V, its overload capability is shown as table 1 under emergency service (P---Output capability; P<sub>c</sub>---Rated output capability; U---Input voltage)

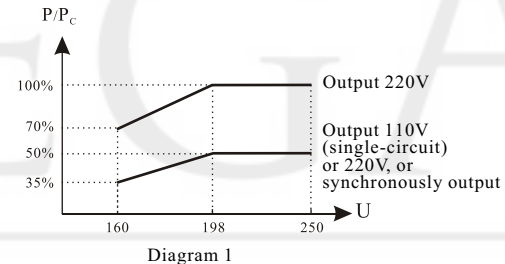


Diagram 1

Overload ratio	Overload time not permitted (min)
20%	60
40%	30
60%	5

Table 1

3. Synchronously output 220V and 110V: 3000VA (single-phase) and below products can output 220V and 110V at the same time.
4. Directly provide commercial power: 2000VA (single-phase) and above as well as 1.5kVA (three-phase) and above products include commercial power function;

5. Overload or short-circuit protection:

- ① Electronic circuit;
- ② Single - phase products of 1500 VA and below offer fuse to protect against overload or short circuit; and other specifications products use circuit breaker.

6. Technical parameters

Specification	Single-phase	Three-phase
		0.5kVA, 1kVA, 1.5kVA, 2kVA, 3kVA, 5kVA, 10kVA, 15kVA, 20kVA, 30kVA, 45kVA, 60kVA
Input voltage range	① AC 160V-250V ② AC 70V-130V	Three-phase four -wire system Phase voltage: 160~250V Line voltage: 277~430V
Output voltage	AC ① 220V ② 110V	Three-phase four-wire system Phase voltage: 220V Line voltage: 380V
Accuracy of voltage stabilization	Phase voltage: 220V, 110V ① ± 1% ② ± 3% ③ ± 5% Wire voltage: 380V ① ± 1% ② ± 3% ③ ± 5%	
Frequency	50Hz/60Hz	
Time of delay	Long: 180s; Short: 5s	
Over-voltage protection value	① 250V/delay 5S; ② 275V/delay 2S; ③ 295V/delay 1S; ④ 305V/0S	
Under-voltage protection value	180V/delay 5S	
Overload protection value	Rated power of 2.8 times	
Excess-temp. protection value	90°C	
Load power factor	COS0.9	
Adjustable time	<1s (when input voltage has a change of 10%)	
Waveform distortion	No additional waveform distortion	
Dielectric strength	1500V/1min	
Insulation resistance	>5MΩ	
Insulation class	E	
Service environment	Temperature: -10°C~+40°C Humidity: <90%	
Altitude	1,000m below	

7. Applicable working conditions

- ① Environment temperature: -5°C~+40°C
- ② Relative humidity: less than 95% (25°C)
- ③ Air pressure: 86-106kPa;
- ④ Working environment: indoors, no chemical deposition, scale, harmful corrosive medium as well as flammable or explosive gas.

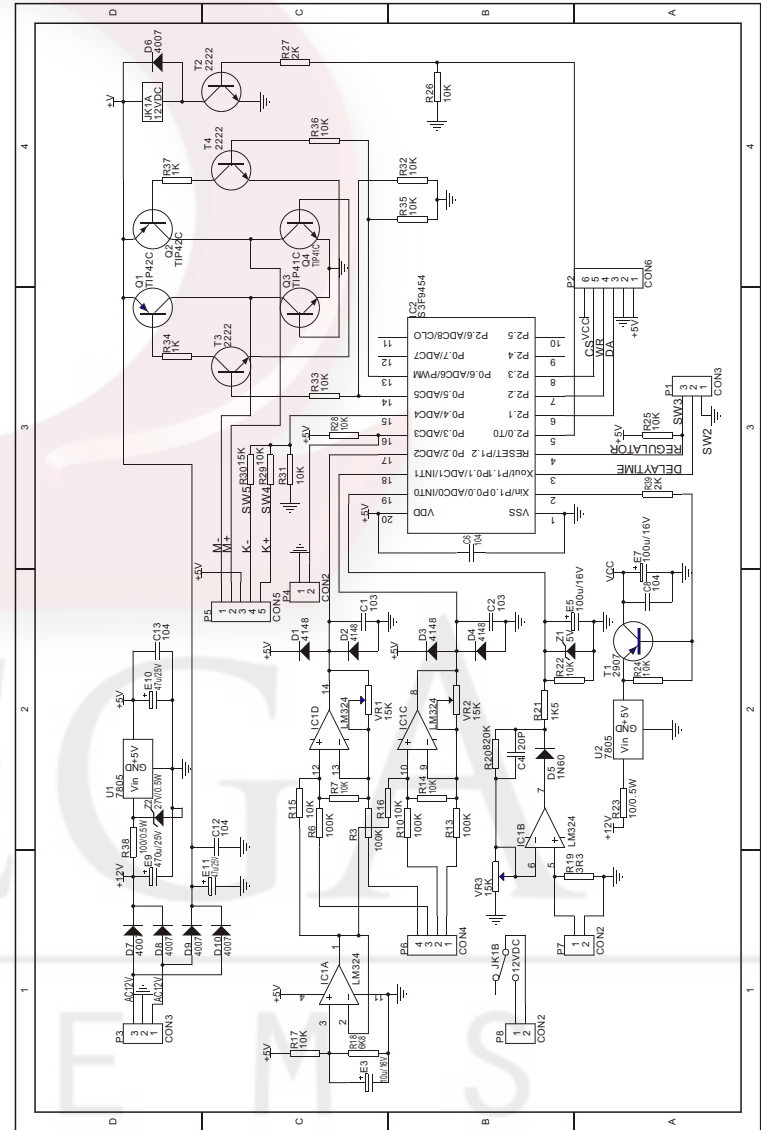


Diagram 7 Sampling control principle diagram

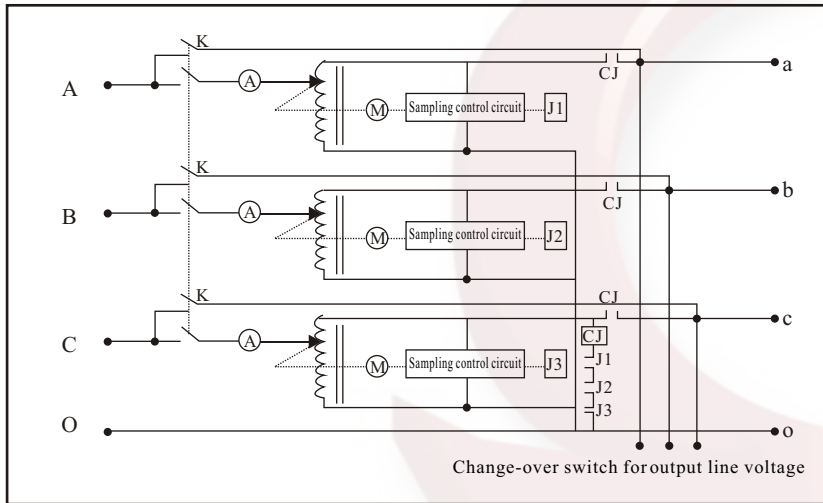


Diagram 5: Circuit diagram of three-phase auto products of 1.5kVA~9kVA

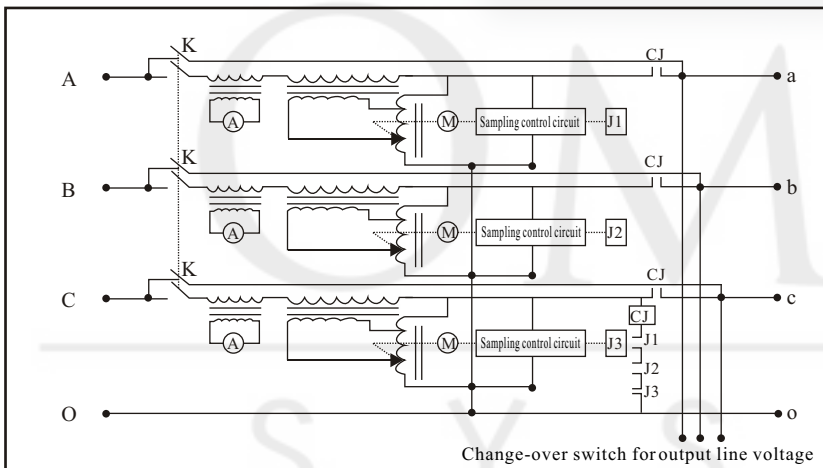


Diagram 6: Circuit diagram of three-phase compensating products of 15kVA and above

## Direction for use

### 1. Operating function

Front panel:

- ① "DELAYTIME" key is used for selecting the time of delay, there are two kinds of delay time, i.e. 5s and 3s, this key is effective only at the time lag, default of power-on for the system is 5s, press this key during time lag period to switch into 3s, it can be operated circularly, when the time lag period passed, it is ineffective to press this key, and the interface will display "NOP". Power switch of products of 2kV and above adopts T series circuit breaker.
- ② "PRECISION" key is used for selecting precision: under normal working state, it can be operated circularly,  $\pm 1\%$ ,  $\pm 3\%$  and  $\pm 5\%$ , default of power-on for the system is  $\pm 3\%$ . It is ineffective to press this key when it is under protection state, and the interface will display "NOP".

Back panel:

"POWER" on products of 2K below means mains switch. 220V socket outputs stabilized voltage 220V, 110V socket outputs stabilized voltage 110V, fuse holder guarantees safety for input, power line works as input line. 110V  $\rightleftharpoons$  220V changeover switch used to change over the input voltage range can be set under requirements. Output of products of 2kVA and above adopt terminal block mode.

### 2. Interface display function

- ① Starting: LCD displays the trademark for 5s, and then displays input voltage, input current, and output voltage.
- ② Interface displays
 

<ul style="list-style-type: none"> <li>a. Normal: NORMAL</li> <li>b. Unusual: UNUSUAL</li> <li>c. Load instruction: LOAD</li> <li>d. Input voltage: INPUT VOLTAGE</li> <li>e. Input current: INPUT CURRENT</li> <li>f. Output voltage: OUTPUT VOLTAGE</li> </ul>	<ul style="list-style-type: none"> <li>③ Displays under different states</li> <li>a. Ineffective: NOP</li> <li>b. Overload: OL PROT</li> <li>c. Over-voltage: OV PROT</li> <li>d. Under-voltage: UV PROT</li> <li>e. Excess temperature: OT PROT</li> <li>f. Motor block: ERROR</li> </ul>
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### 3. Working principle

- ① After energizing and closing the mains switch, there will have a long whistle, LCD backlight goes on, moves and displays at the same time, meanwhile, it proceeds system initiation setting, and the system enters into time lag state of 5s, interface displays, during this moment, you can press DELAY TIME key to switch time lag duration into 5s or 3s, and LCD will display the corresponding state.
- ② There is no over-current or excess-temperature protection during time lag period, and only when the voltage stays within voltage stabilizing range, then it will enter into normal state, if the time lag is finished, and it detects over-voltage, under-voltage, over-current or excess-temperature out, then LCD will display relative fault indication and the equipment will enter into protection state, at this moment, there is no output voltage, after time delay, it will enter into the next stage, the output relay attracts and outputs voltage. LCD displays the actual input voltage, input current, output voltage and so on. If wanting to adjust the precision, you just press the PRECISION key to adjust it among  $\pm 1\%$ ,  $\pm 3\%$  and  $\pm 5\%$  circularly.
- ③ If the system finds that there is over-voltage, over-current, excess-temperature or under-voltage, it will enter into protection state after corresponding time lag, and meanwhile break the output. After over-voltage protection, when the output voltage gets back to 185V-245V, the system returns to normal, and relay attracts and makes output.
- ④ Buzzer will make a sound like "di-, di-, ····," but without protection, when the system finds that the temperature of voltage regulating wire wrapping reaches over  $80^{\circ}\text{C}$ , when it reaches  $90^{\circ}\text{C}$ , it will enter into protection state and meanwhile break the output. When the temperature resumes to  $70^{\circ}\text{C}$ , it will return to normal working.
- ⑤ When the system finds that the load reaches 90%, the buzzer will make a sound like "di-, di-, ····," but without protection, when the load reaches as high as 105%, buzzer will make a sound like "di-, di-, ····," the equipment will enter into protection time delay state of 30min, there still has output at this moment, if it can not resume normal after 30min, then it will enter into protection state and meanwhile break the output. When the system detects 280% load in instant, it will make protection immediately, and meanwhile break the output. After overload protection, the system will not resume automatically, you need to start the machine again. If LCD displays "ERROR" for 2s and other states for 5s, displays circularly, it means there is something wrong on the regulating system in the machine.
- ⑥ Every time, after pressing the key "DELAY TIME" or "PRECISION", the backlight will go off 30s later automatically.
- ⑦ Refer to diagram 2-6 for circuit schematic diagram of voltage stabilizer.
- ⑧ Refer to diagram 7 for sampling control principle of voltage stabilizer.

(Remark: the following circuit diagrams are only for reference, if the products subjects to upgrade, we will not make additional notice for it.)

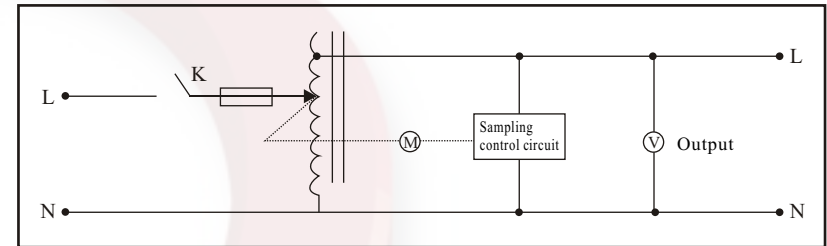


Diagram 2: Circuit diagram of single-phase auto products of 500VA~1500VA

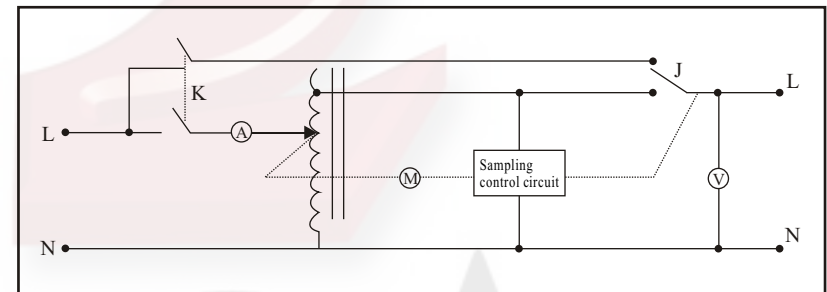


Diagram 3: Circuit diagram of single-phase auto products of 2000VA~10000VA

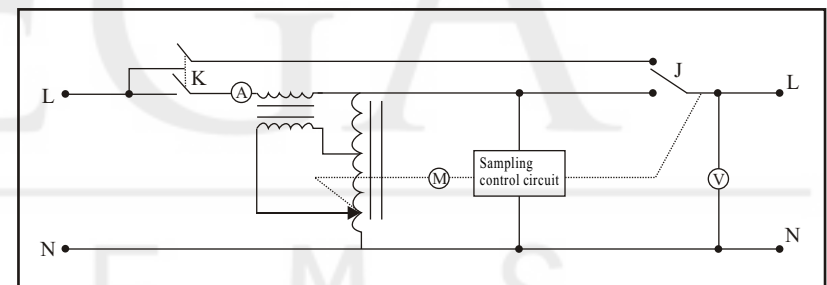


Diagram 4: Circuit diagram of single-phase compensating products of 5kVA and above