



SPW-TPW6B series SCR Electronic Voltage Stabilizer/Power Conditioner for Industries Use

Applications:

Printing Specific /Medical Specific /Control Numerical Machine/Elevator Specific /Testing Specific/UPS
Bypass Specific /Computer Room Specific /CNC Machine Specific /Broadcast & Communication Specific
/Computer Room Specific /Assembly Line Specific /Textile Specific

1. Electronic Stabilizer and Technical Development

There is lot of areas where power supply quality is not good worldwide. There are a lot of problems, such as over-voltage and under-voltage frequently, transient drop, surge and peak distortion and so on. Following the development of technology and economy and the massive application of information technology and microelectronic technology, the demand to the power source quality for power device is getting higher and higher. So the power stabilizer has been the indispensable power supply device for lots of electronic equipment (for example, computer, communication device, broadcasting device, medical device and so on) and machinery device (CNC machine tools, injection molding machine and so on).

Now, there are stabilizers of servomotor carbon brush type, parameter type, magnetism compensation type and oil immersed type. They have not satisfied the need of technical development. The servomotor carbon brush type has slow response, and the carbon brush is easy to be worn out and sparkle. The parameter stabilizer has bad applicability of load. The magnetism compensation stabilizer will result in harmonic wave while it is working. The oil immersed stabilizer is easy to leak oil.

2. Electronic Stabilizer General

SPW6B/TPW6B type electronic (SCR) single-phase (three-phase) automatic compensated power stabilizer (Electronic (SCR) Stabilizer for short as follows) is our patent product that we absorbed foreign advanced technology and combine our special condition in China to produce. It adopts large-scale integrated circuit to control the zero voltage switching of several thyristors (high-power relay) and change the voltage and its polarity. Compensator transformer and joystick transformer adopt dry self-cooling and insulation B in order to realize the target of continuous operation without maintenance.

Electronic compensated power stabilizer reserves all advantages of single-phase (three-phase) compensated type, parameter type and magnetism compensated type, avoids the servomotor compensated type's flows of slow dynamic response, wearing carbon brush out easily, sparkling and so on, overcomes the flaws of the bad applicability of parameter stabilizer and the low efficiency and large harmonic wave of magnetism stabilizer. Electronic Stabilizer adopts power electronic technology to update, replace and alter the traditional single-phase (or three-phase) compensated stabilizer. Compared with the same kind of product, the stabilizer we designed has advanced technology and complete function, and its capacity and compensated range can reach 2000KVA and $\pm 50\%$ with our company's patent technology. No servomotor, no carbon brush and no noise realize the electronic voltage regulation and the fast response. Our stabilizer has high-efficiency, no contamination to the grid and strong applicability, and can

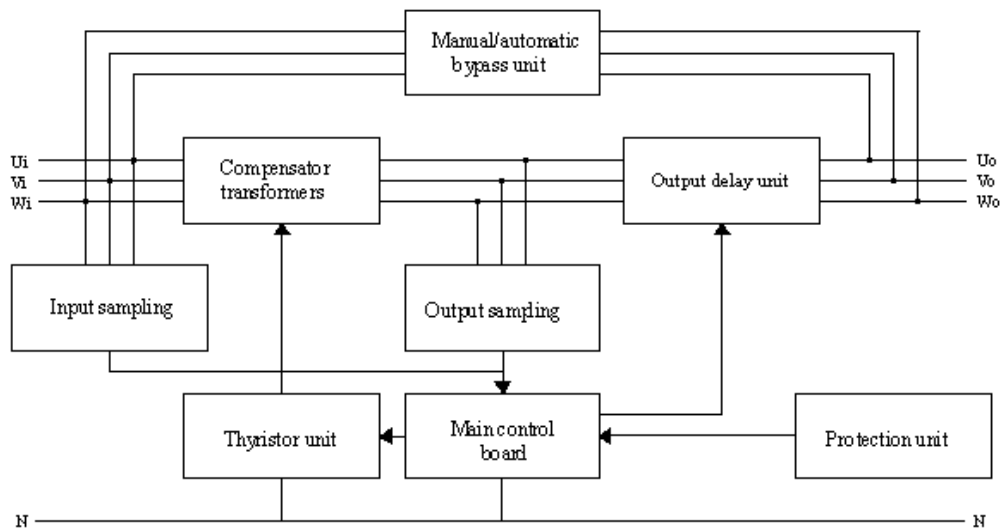


operate continuously, stably and reliably under the conditions of every kind of bad grid and complicated load. At present it is the electronic AC power stabilizer of the most development, the highest capacity and maintenance-free for long term in our nation.

3. Electronic Stabilizer Design Features

No contact, no carbon brush	The main circuit adopts several combinations of compensator transformers, it switches zero voltage of relay and thyristor to realize the voltage stabilization. It totally has avoided the flows such as hi-frequency distortion caused by the sparkle abrasion and touch of the carbon brush produce. It has long work life. Its MTBF can reach above 100,000 hours.
The voltage-regulating system	Simple construction. The whole machine has no drive system such as motors, chains and gears.
The remote monitor (optional)	We design monitor interface and realize remote communication, remote measurement and remote control, according to the communication protocol of Directorate General of Telecommunications, The Information Industrial Department.
The lightning and surge protector (optional)	The stabilizer is equipped with surge protector. The lightning and surge protector and lightning module of the first brand in world, American JOSLYN, is optional.
The power factor compensation system (optional)	The users who has big inductive load should be equipped with automatic power factor compensation system. After compensation, the power factor can reach above 90%.
The main circuit filtering system (optional)	The main circuit can be equipped with the PD series type filter according to the need of customers.

4. Electronic Stabilizer Working Principle



5. Electronic Stabilizer Technical Specification

Input phase voltage	176~264V(220V±20%) 154~286V(220V±30%) 132~308V(220V±40%)
Output phase voltage	220V
Capacity	6B type single-phase 10~300KVA three-phase 10~2000KVA
Precision	6B type ±2~3%
Response time	Input voltage fluctuates during -50%~+50%, response time: 6B type ≤40ms
Efficiency	6B type ≥99%
Frequency	50/60HZ
Temperature rise	< 80K
Noise	6B type ≤45db
Insulation resistance	The stabilizer-to-ground insulation resistance ≥2MΩ
Insulation intensity	No arc-over and no puncture with 2000V/1min sine AC voltage
Harmonic wave	No distortion of output voltage and no harmonic wave increment

6. Electronic Stabilizer Main Function

Power-on style	Automatic and manual power-on styles have been set for customer's option. Automatic power-on style has been set
Output delay	The stabilizer will delay in 3-5 seconds(short delay) 3-5 minutes (long delay)to output power in order to protect electronic device from the shocking damage
Over-voltage and under-voltage	When the phase input voltage surpasses $\pm 10\%$ of the compensation range, the stabilizer will send acoustic and optic alarm and cut off output power.
Malfunction protection	When the stabilizer has been damaged and can't work normally, the stabilizer will cut off the output power automatically.
Short-circuit protection	When the short circuit happens to the output terminal, air switch will cut off input power automatically.
Phase-lack protection	When the lack-phase and open-phase happen to the three-phase input, the stabilizer will cut off the output power.
Manual and automatic bypass	When the breakdown happens to the stabilizer, the bypass will work automatically or manually.
Lightning and surge protection	The stabilizer has 20KA surge protector. According to the request, its capacity can be increased or adopt American JOSLYN surge protector.
Alarm and silence function	The stabilizer has the switch of alarm and silence
Phase-sequence protection (optional)	When the input phase-sequence is wrong, the stabilizer will cut off the output power.
Main circuit filtering protection (optional)	The main circuit can be equipped with the PD series type filter according to the need of customers.

7. Electronic Stabilizer's Advantages

- (1) The extremely fast regulation, it just needs 40 milliseconds to output stable voltage (the servomotor carbon brush type needs 7 second to complete the regulation).
- (2) The regulation without carbon brush touch and servomotor operation (80% faults of the carbon brush stabilizer are resulted in by the servomotor drive and carbon brush)
- (3) The three phase separate regulation and the adaptation to the three phase unbalance load (Other stabilizers adopt the collaborative



regulation. they have to raise the fee to adopt separate regulation).

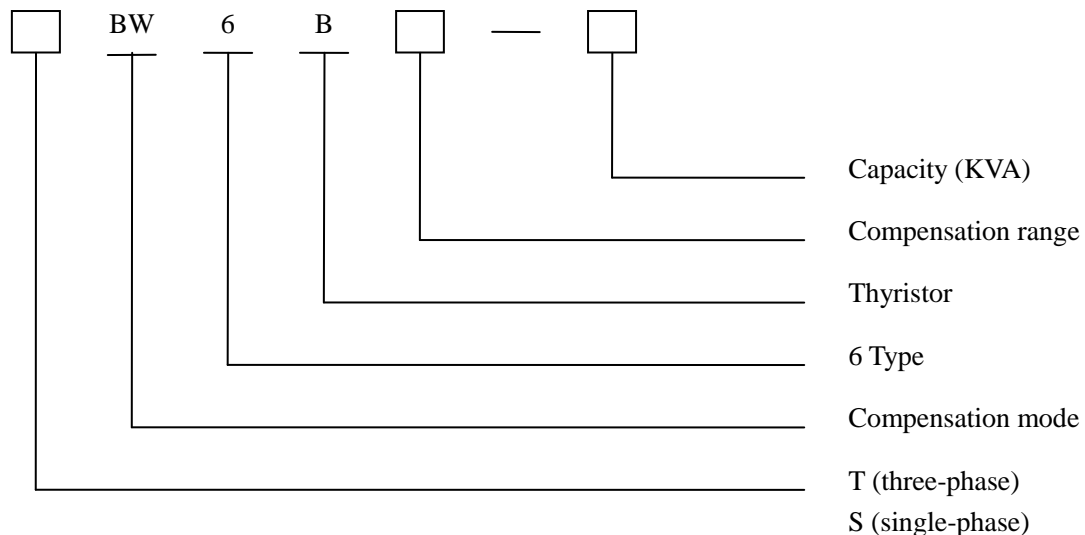
- (4) According to the grid condition, the highest compensation can reach $\pm 50\%$ (the highest compensation of other stabilizers just reach $\pm 30\%$).
- (5) The effect of energy-saving is obvious and the efficiency can reach 99% (the efficiency of other stabilizers is below 95%).
- (6) When our product works under the low voltage, it can guarantee the load capacity 100% (the load adaptation of parameter stabilizer is bad, it can't adapt to nonlinear device).
- (7) Our product can adapts to the any work environment of bad and high safety request (Oil-immersed stabilizer leaks oil easily, so it can't adapt to the occasion above)
- (8) Our product can depress the surge and absorb harmonic waves with the lightning and filtering function (Magnetic-compensation stabilizer results in the harmonic waves when it works).

8. Electronic Stabilizer Model

SPW6B

Specification of single or three phase electronic compensation stabilizer

TPW6B





9. Electronic Stabilizer Circuit Introduction

Single-phase power stabilizer

(1) Automatic voltage stabilization circuit

Turn on the air switch DZ of stabilizer, after delay (long delay 3-5 minutes or short delay 3-5 seconds, decided by users), output contactor KM works, stabilization indicator lightens, the stabilizer stabilizes voltage automatically.

(2) Protection circuit

When the input voltage of the grid surpasses or is lower than the compensation range of the stabilizer greatly, or because of variation of load, the output voltage surpasses $\pm 10\%$ of 220V for 3 seconds delay, the output contactor KM doesn't work to cut off the output power. The stabilizer is in the protection mode, and protection indicator lightens.

Three-phase power stabilizer

(1) Automatic voltage stabilization circuit

Please short connect the terminal S2, turn on the air switch DZ, after 3-5 seconds delay, the output contactor KM1 works, the stabilizer supply power to the load.

(2) Manual voltage stabilization circuit

Please open the terminal S2, turn on the air switch DZ, press down 'voltage stabilization' button (or turn the changeover switch to 'voltage stabilization'), stabilization indication will lightens. Press down 'start' button, the input contactor works. The stabilizer supply power to the load.

(3) Bypass circuit

The stabilizer is not needed to work, or needs maintaining when it works abnormally. Please turn off the air switch DZ at first, then press down 'bypass' button (turn the changeover switch to 'bypass'), the stabilizer is in bypass mode, and bypass indicator lightens. At that time, the stabilizer has no electricity inner and doesn't consume energy.

(4) Protection circuit

When the input voltage lacks phase, the output contactor KM1 doesn't work, the stabilizer cuts off the



output voltage. The stabilizer is in the protection mode. When the input voltage of the grid surpasses or is lower than the compensation range of the stabilizer greatly, or because of variation of load, the output voltage surpasses $\pm 10\%$ of 220V for 3 seconds delay, the output contactor KM1 doesn't work to cut off the output power.

(5) Alarm/silence circuit

When the stabilizer is in the protection mode, if alarm button had been pressed down before (or had turned changeover switch to 'alarm'), so the protection indicator lightens, and the buzzer alarms. If press down 'silence' button (or turn the changeover switch to 'silence'), the buzzer stops alarming. If users don't need sound alarm, after the stabilizer is power-on, don't press down 'alarm' button (or turn the changeover switch to 'silence')

(6) Emergency circuit

When emergency happens, press down 'stop' button, the output contactor KM1 doesn't work, the stabilizer automatically cut off the output power at once, at that time, 'stop' indicator lightens.

Note: the stabilizer whose capacity is above 100KVA takes the operation of 'bypass' and 'stabilization' or 'alarm' and 'silence' with the changeover switch.

10. Electronic Stabilizer Installation and Wiring

1. Open the packing and inspect

- (1) Before open the packing, please inspect whether the packing is damaged.
- (2) After open the packing, please inspect whether the cabinet and components are damaged.
- (3) Inspect whether the electrical equipment connections in cabinet have loosed or dropped, if they have, please fasten them.
- (4) Please inspect whether the technical document, the certificate and the accessories are complete and integrate.

2. Installation

The stabilizer shall be installed on the firm mesa (or foundation), and avoid vibrating and shaking. The stabilizer above 10KVA shall be fastened with bolts.



3. Wiring

- (1) Before wiring, please inspect insulation resistance first, test each electronic point-to-ground insulation resistance (air switch, contactor, the breaker and so on) with 1000V megameter, the value shall be more than $1M\Omega$. If it is not, we can adopt heating, evaporation and ventilation to let insulation resistance match the request.
- (2) According to the rated current and users' relative standard, the section of in and out wire shall match the capacity of stabilizer.
- (3) The wiring style of three-phase and single-phase stabilizer above 100KVA: the power input is connected to the terminal of air switch in cabinet, and the power output is connected to the terminal of output contactor in the cabinet.
- (4) The wiring style of three-phase stabilizer below 100KVA: the input and output wires are connected to relevant terminal in the cabinet.
- (5) The stabilizer must be connected with neutral line to operate.
- (6) The outer covering of cabinet must be connected to ground stably.

Working condition

Ambient temperature: $-15^{\circ}\text{C} \sim +40^{\circ}\text{C}$

The altitude over sea level shall not surpass 2000m

Relevant humidity shall not surpass 90%

Avoid vibrating and shaking

11. Electronic Stabilizer Debugging

Single-phase stabilizer

(1) No-load debugging

After installation, let it be with no load, and connected power source to it, turn on the power switch on the panel. The power indicator lightens. If the delay button (short delay) has been pressed down before the power switch on, the stabilizer shall automatically output voltage in 3—5 seconds. Otherwise, the stabilizer automatically output voltage in 3—5 minutes. Please observe the output voltmeter, it shall read 220V, the precision is $\pm 3\% \sim \pm 5\%$. If there is no abnormality, the no-load debug is complete.

(2) Debugging with load

After no-load debugging, cut off input power source, and connect the output of the stabilizer to the load of user. Accord to step (1), restart the stabilizer, at that time the ammeter shall have indication. When everything is normal, and increase load gradually to the rated load. Observe the input and output voltage



and current indication of the stabilizer. When the stabilizer operates with rated load, the current indication shall not exceed the rated current of the stabilizer. The stabilizer's current shall not exceed 70% of rated current with the inductive load (elevator, electric welding machine and so on) and 50% of the rated current with non-linear load (the equipment with power electronic device).

After 20-minutes observation, inspect the temperature rise of the stabilizer. That shall be less than 80°C. When everything is normal, then the debugging is finished

Three-phase stabilizer

(1) Bypass debugging with no-load

After the installation of stabilizer, let it be in no-load condition, connect input power source to it, press down bypass button (or turn the changeover switch to 'bypass'), observe the stabilizer panel, at that time, three power and stabilization indicators lighten. Turn the voltage changeover switch, observe the input and output voltage of A, B and C phase separately, and that time, the input voltage shall amount to the output voltage. If everything is normal, the bypass debugging is finished.

(2) Stabilization debugging with no-load

Please open the functional terminal S2, turn on the power switch DZ of stabilizer, press down stabilization (or turn the changeover switch to 'stabilization'). Observe stabilizer panel, at that time, three power source and stabilization indicator lighten. If everything is normal, press down 'start button', output contactor KM1 closes, at that time, the voltmeter shall read normal (input voltage shall be in compensation range, output voltage shall be 220V, the precision is $\pm 3\% \sim \pm 5\%$). Press down 'stop button' again, the stabilizer shall cut off output voltage automatically. Cut off the power source switch of stabilizer DZ, short out the functional terminal S2, then turn on DZ again, after 3—5 seconds delay, the stabilizer shall power on automatically.

(3) Debugging with load

After debugging with no-load, cut off the input power source, and connect the output of stabilizer to the load of user. Accord to step (2), restart the stabilizer, at that time, the ammeter shall have indication. After everything has been normal, increase the load gradually, until to the user preserved rated load. Then observe the input and output voltage and current indication of the stabilizer. When stabilizer operates with rated load, the current indication shall not exceed the rated current. The stabilizer's current shall not exceed 70% of rated current with the inductive load (elevator, electric welding machine and so on) and 50% of the rated current with non-linear load (the equipment with power electronic device).

After 20-minutes observation, inspect the temperature rise of the stabilizer. That shall be less than 80°C. When everything is normal, then the debugging is finished



12. Electronic Stabilizer Attention

- (1) The work environment of stabilizer shall have no chemical precipitate, no dirt, no harmonic corrosive medium and no flammable explosive gas in the room.
- (2) User couldn't operate the stabilizer with over-load.
- (3) Under the normal condition, if the power switching of the stabilizer turns off automatically. It indicates that the load has exceeded the rated capacity of the stabilizer or load circuit is short. So the load must be reduced or the short breakdown excluded, after that, the power switch shall be turned on again, otherwise, the stabilizer will be destroyed.
- (4) Please don't open the cabinet at will, the unusual situations , alike peculiar smell, smoking and so on, happen, the power source shall be cut off and sent for the professionals to repair it.
- (5) When use the stabilizer in bypass condition, each protection function won't work. So users pay attention to input voltage themselves in order to avoid damaging the device.
- (6) Users must install a breaker in the front of the stabilizer in order to maintain easily.
- (7) The stabilizer must be connected with neutral line.

13. Electronic Stabilizer Breakdown Exclusion

Breakdown phenomenon	Breakdown cause	Excluding method
Air switch trips when stabilizer starts	User's air switch capacity is small, the main transformer exciting current causes the air switch trip when it start	Change user's air switch whose capacity is same with stabilizer's air switch.
Start fails	1) there is phase-leak in input power source or the voltage of grid is abnormal. 2) the start button has broken	1) Inspect whether there is phase-leak in input power source or the voltage of grid is abnormal. 2) Change the start button
Voltage stabilization fails	1) The power source transformer AT is damaged, main control board has no power. 2) Input or output sampling	1) Change power source transformer AT 2) Inspect input and output sampling (U1,U2,N) connection 3) Change fuse

	(U1, U2,N) connection is not good 3) Fuse F1or F2 melts	
Protection performance malfunctions frequently	The over-voltage and under-voltage hasn't been adjusted or parameter has changed on the main control board	They shall be fixed or repaired by the professional

14. Electronic Stabilizer Type Selection

- (1) According to the electricity net, choose the input range of stabilizer.
- (2) According to the load admitted input voltage, choose the precision of Electronic Compensated Stabilizer.
- (3) According to the load capacity, load power factor and load performance, choose the capacity of Electronic Compensated Stabilizer.
- (4) The common AC equipment, the power factor is supposed to be computed by 0.7, the inductive load (elevator, electric welding machine and so on) needs pondering over the starting current.
- (5) The non-linear equipment (frequency conversion equipment, UPS and so on), the electric current is supposed to be computed by 2~2.5 times than common.
- (6) According to the local thunderstorm day index, the stabilizer could be installed with the lightning and surge protector and the wave filter in the cabinet;
- (7) If users' requests exceed the range of the instruction above, it will be treated as a special order to design and produce.