



SBW-F-Z Series

AUTOMATIC COMPENSATION AC VOLTAGE STABILIZER

Instruction Manual

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I 、 Summary

SBW series AC compensating electric power voltage stabilizer(Hereinafter referred to as voltage stabilizer), it is introduced and absorbed from Western Europe and Japan advanced Technology, meanwhile, combining the reality of China's power grid, designed to stabilize the ac voltage.When the mains voltage fluctuation it can maintain the stability of output voltage automatically.

This series product compared with other type voltage regulator has a large capacity, high efficiency, no waveform distortion, stable voltage regulation and control function is strong, variety complete, the applied load, can withstand the instantaneous overload, long-term continuous work, manual/automatic switch at random, with automatic protection device, such as over-voltage, under-voltage, and small volume, light weight, use convenient installation, reliable operation and so on characteristics, phase sequence, open phase protection function to be customized).

This series product can be widely used in industry, agriculture, transportation, post and telecommunications, military, railway, scientific, cultural and other fields of large mechanical and electrical equipment, metal processing equipment, production lines, engineering equipment, elevators, medical machinery, computer room, computer control equipment, embroidery the spinning equipment, air conditioning, radio and television, bowling equipment, hotel and household appliance lighting and so on any sit needs to be regulated.

II 、 Structure

It consists of three phase compensation transformer, three-phase regulating transformer, transmission mechanism, brush contact system, cabinet and control system, etc.Three-phase regulating transformer bobbin winding outside surface after polishing processing, remove the insulation, the conductor surface smooth, so that the brush is good contact;Transmission mechanism consists of motor and worm gear, worm, sprocket, chain;Brush system structure is reasonable and reliable to ensure that brush pressure;Using the close cabinet, small volume, good heat dissipation and instrument measuring position distinct and accurate indicating.

III、 Working principle

SBW series voltage stabilizer insisted by the three-phase compensation transformer TB, three-phase voltage regulating transformer TUV inspection unit, motor control and drive mechanism, touch operation circuit, protect circuit, etc.Its electrical schematic diagram 1.

The primary winding of regulating transformer TUV is Y type, connected to the output of the voltage stabilizer.The secondary winding connects the primary winding of the compensation transformer TB, and compensation transformer working principle, as shown in the electrical schematic diagram 2.

Excluding compensation transformer impedance voltage drop, seen from the graph 2: $U_{ao} = U_{ai} + U_{ac}$

Formula:

U_{ai} - voltage stabilizer A phase input voltage;

U_{ao} - voltage stabilizer A phase output voltage;

U_{ac} - voltage stabilizer A phase compensation voltage;

Its principle is: when A phase input voltage U_{ai} increase ΔU_{ai} , compensating voltage U_{ac} also change accordingly ΔU_{ac} and $\Delta U_{ac} = - \Delta U_{ai}$, make A phase output voltage U_{ao} remains unchanged. So is the same phase B, C phase.

The regulated process is: according to the change of output voltage, the voltage detection unit, sampling, testing and SM output signal control motor rotation, the chain drive the regulating transformer TUV brush set on the slide (or roll) to adjust the second voltage of the voltage regulator, by changing the polarity and the size of the compensating voltage, realize the stable output voltage automatically within the scope of the voltage regulation precision allowed, so as to achieve the goal of automatic voltage regulator.

IV、 The basic components and circuits

1、 Compensation transformer

When the primary winding voltage and polarity changes, it can make a amplitude and polarity is variable compensation voltage transformer from the secondary winding which is installed in series with the load loop.

2、 Regulating transformer

The regulating transformer TUV is a three-phase auto-transformer which can adjust the secondary voltage automatically. It has three pairs of symmetry sliding the brush automatically. The chain drive motor brush along the auto-transformer bobbin winding exposed part slide, secondary voltage regulation, smoothly change the compensating voltage, in order to achieve the purpose of stable output voltage.

3、 Three-phase main circuit switch gear and circuit operation

1) Voltage regulation circuit with a start switch QA, a knife switch. When input voltage is working, as long as the knife switch handle on "REGULATE" position and press the "start" button, when power grid directly through is needed, as long as the knife switch handle "BYPASS" location.

2) In the running of the voltage stabilizer, as long as the output over-voltage, under-voltage, or lack of phase, fault phase occurs, it can be automatic tripping protection and alarming. Need to press the "stop" button to clear the alarm.

3) 500KV More than 500 kva voltage stabilizer disconnected by using DW series universal type automatic air circuit breaker.

4、 Three-phase voltage stabilizer voltage testing and adjusting unit.

Sampling control transformer TC takes out the sampling voltage and the control voltage from the voltage stabilizer output side, the control voltage gets the maximum voltage reference after a transformation, rectifier, filter and stabilizer. The sampling voltage gets the signal voltage with change of output voltage after a transformation, rectifier, filter, output to the comparator is used in the comparison, when the signal voltage between upper and lower voltage reference, the control relay KCl, KC2 contacts are in the off position. When the signal voltage beyond the upper and lower reference voltage (accuracy), KCl (KC2) and the contact electrical KAl (KA2) takes action. Motor rotation to adjust compensating voltage, to let voltage stabilizer output voltage stability. In a word, when the output voltage change beyond the rated precision allowed range, voltage detection will send out instruction to adjust the output voltage, until the output voltage return to the rated precision allowed range.

V、The model, main technical indications and specifications

Model	Rated capacity (KVA)	Output current (A)	Input voltage (V)	Output voltage (V)	Phase	Insulation resistance (MΩ)	Efficient	Waveform distortion	Frequency (Hz)	Stabilized voltage precision
SBW-Z-10	10	14	353~ 477	415± 5% Can be set	Three phase	≥3	≥ 98%	≤0.1%	50~60	≤±5% Can be set(three-phase input balance)
SBW-Z-20	20	28								
SBW-Z-30	30	42								
SBW-Z-50	50	70								
SBW-Z-60	60	84								
SBW-Z-80	80	112								
SBW-Z-100	100	140								
SBW-Z-120	120	168								
SBW-Z-180	180	252								
SBW-Z-225	225	313								
SBW-Z-320	320	445								
SBW-Z-400	400	556								
SBW-Z-500	500	695								
SBW-Z-600	600	834								
SBW-Z-800	800	1113								
SBW-Z-1000	1000	1391								
SBW-Z-1200	1200	1670								
SBW-Z-1600	1600	2226								
DBW-Z-20	20	91	176~ 264	220± 5% Can be set	Single phase					
DBW-Z-30	30	137								
DBW-Z-50	50	228								
DBW-Z-100	100	455								
DBW-Z-180	180	818								
DBW-Z-225	225	1013								
DBW-Z-300	300	1364								

VI、 Using conditions

SBW series voltage stabilizer should be used in indoor, normal conditions of use for:

1. The ambient temperature: - 5 °C ~ + 45 °C;
2. Altitude: not more than 1000 meters;
3. Relative humidity: ≤90%
4. The installation place should be not impact stabilizer of the insulation gas, steam, chemical deposition, dust and dirt and other bombings and corrosive substance;
5. Installation site should be no serious shock or turbulence;

VII、 Ordering instructions

1. When placing order, shall specify the product type, capacity, rated output voltage, input voltage range, voltage regulation precision and the corresponding protection function.
2. Have special requirements, please contact with our technology department, you will get a perfect professional.

VIII、 Precautions for use

1. The postal inspection

- 1) Whether the body is damaged in transit.
- 2) Whether the cabinets with the technical documentation, certification, warranty card and accessories are complete.
- 3) Whether the compensation transformer and the regulating transformer, and other components are in good condition.
- 4) Whether there's any loose for fasteners, shift, and the poor contact terminals.
- 5) Whether the voltage regulating system, the transmission mechanism of the device is safe and reliable, the carbon brushes are dislocation, missing, fault phenomenon. If found, it should be replaced in a timely manner.

Note: be sure to pay attention to the machine should not be shelved moisture for a long time after the goods arrived, so as not to affect the quality of performance.

2、 Place guidelines

- 1) The installation site must be dry ventilation, no brute force vibration noise, no dust and rain infiltration.
- 2) Relocation should be handled with great care, it is strictly prohibited to excessive tilt, the machine chassis should be suffer the press on average after the voltage stabilizer located, box located should be smoothly.
- 3) It should have enough space around the stabilizer, to ensure the machine ventilation and maintenance.

3、 The insulation requirements

- 1) Short sub the "input" and "output" terminal and lead to measure point.
- 2) The test point to ground (the outer case) with 1000v megohmmeter testing insulation resistance value should be greater than $1 M \Omega$, if it is less than $1 M \Omega$ should check the reason, or use the electric heater to dry the moisture inside of the case, until the insulation resistance up to standard value.

4、 Install the wiring

- 1) Voltage stabilizer less than 350KVA connection inlet wire: input power A, B, C and N three phase four wire are introduced from the side or bottom of the outercase to the input terminals (marked with the input terminal of A and B, C, N)
- 2) Voltage stabilizer more than 400KVA connection inlet wire: input power A, B, C and N three phase four wire connect to the copper or aluminum bus on the end of the air switch (or air circuit breaker), the input voltage corresponding the bus marked input letter A, B, C, N)
- 3). The connecting method between multiple cabinets: two and four cabinets, the connecting method between the cabinets: according to the corresponding mark before manufacturer deliver the goods to connect them one to one correspondence.
- 4). Connect the output wires, stabilizer terminals marked with "the output voltag e of A and B, C, N" for the load, cable specifications are decided the user's loads, g eneral should be the same as the input wires.
- 5). The outer case grounding protection: the specifications of the ground wire sh all be carried out according to the relevant provisions of the local power supply de partment, ground wire connected to machine cabinets marked on a "ground wire" end, grounding resistance should be less than $0.4 M \Omega$.。
- 6). The power supply input wires specification should be according to the capacit y of the voltage stabilizer, hereby the below sheet for reference only.

Capacity (KVA)	20	30	50	100	180	225	320	400	500	600	800	1000
Guide wire (mm ²)	6	10	16	50	90	150	240	Suggest to use the copper bus-bar or aluminum bus-bar to arrange the wires				

5 、 Connection test

The first step of debuggers work is also one of the most important job is to carefully check the wiring, the work is the key to ensure the operation of the voltage stabilizer reliable, must be earnestly. Specific work content is as follows:

1). Whether the primary loop connection is solid and reliable, especially for QA air switch, QN knife switch wiring whether there is loose phenomenon, if there are any loose, must tighten.

2). Check the panel on the back of every electrical devices, such as voltmeter, ammeter, indicating lamp button, switch contact attachment is solid and reliable. If there are any loose, must tighten.

3). Check control circuit boards, whether each point connection is loose. If there are any loose, must tighten.

6 、 Electricity debugging operations

1) please put the switch on the circuit board "manual" "automatic" placed in "automatic" position.

2) QN knife switch are placed in "REGULATE" position. Voltage stabilizer is in no-load condition, connected to the power supply..

3) Put the QA closing the main power switch, at this moment the meter with readings, electricity debugging is done.

Note, when you close the QA switch, the voltage stabilizer without output, the UP light of the phase sequence protector on the left is put out, shows that three-phase phase sequence mis-connect. Elimination method is to cut off power supply first, as long as exchange any two of the three wires position is OK.

4) please place the "manual"/" automatic "switch to the " manual "position, then press the " ↑ " button, the input voltage up to about 400V, then put the switch to " automatic "position, voltage stabilizer output drop to about 380V, this is the voltage step-up test; Place the "manual"/" automatic "switch to the " manual "position, then press the " ↓ " button, the input voltage drop to about 360V, then put the switch to " automatic "position, the output voltage rises to about 380V. This is the voltage step-down test. The success of the two test, automatic test is completed.

Debugging finished, place the "manual"/" automatic "switch to " automatic "position. Voltage stabilizer is in normal operation.

5) "ON" knife switch is placed in the "BY PASS" position, the main power supply QA air switch is in off state can obtain "BY PASS" output.

Pay attention to the debugging of the split-phase voltage stabilizer:

The debugging operation method of this series voltage stabilizer same as above, but different is split-phase adjust the voltage respectively, the adjustment system of each phase is not associated with each other, each phase has a "manual""automatic" switch, debugging must be grouping.

7、 Load operation

During the debugging, the load must be added gradually, take strict precautions against the overload phenomenon. The load does not exceed 80% of the voltage stabilizer, it is the highest efficiency of the voltage stabilizer, reliability is the best, if the load capacity is much bigger, under this situation, must strengthen the cooling measures. During operating the voltage stabilizer with heavy load the power supply cut off suddenly, when the power supply is renewed, adding the load gradually, do not let a number of powerful motors start at the same time, the excessive impact of the current will damage the voltage stabilizer.

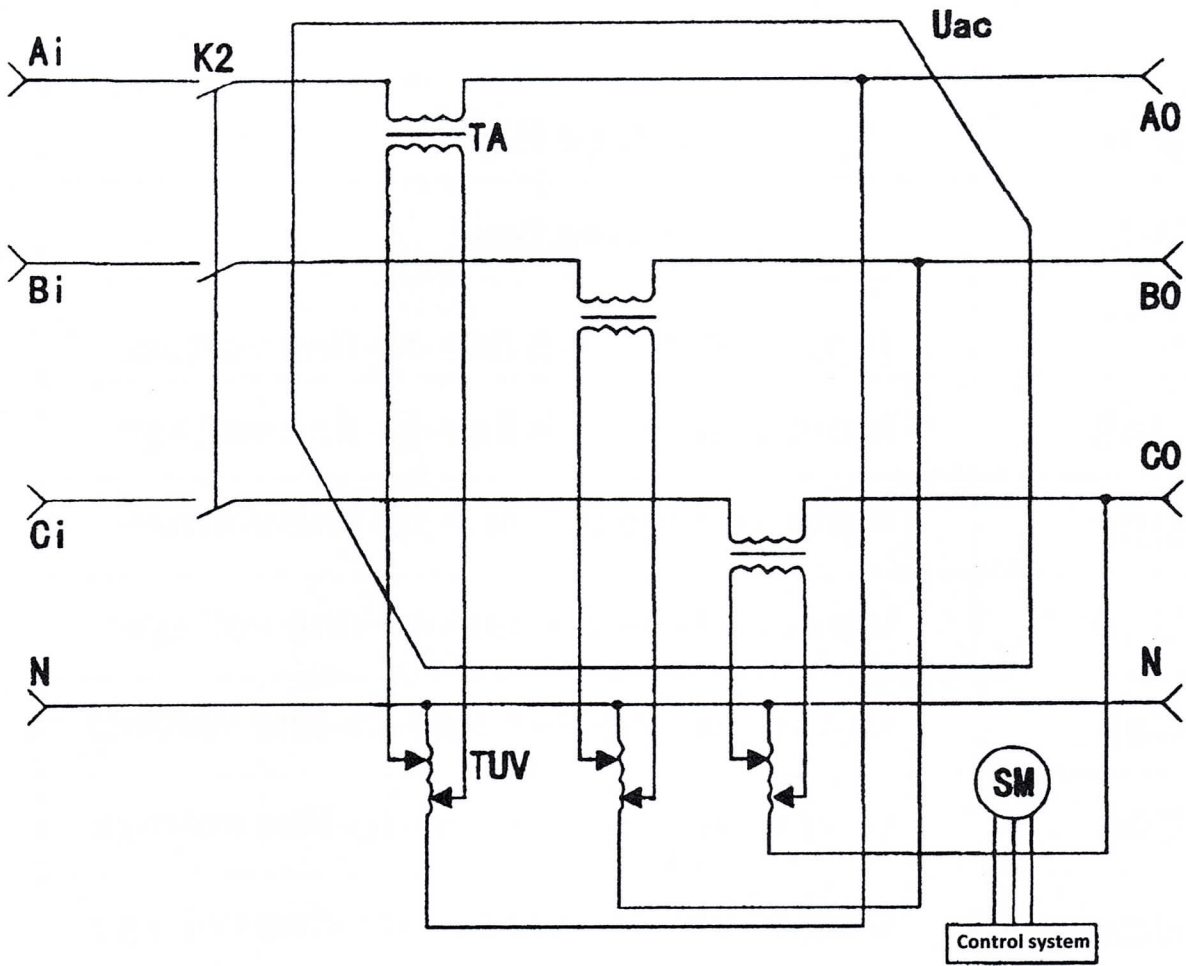
IX、 Daily maintenance work

In the process of using the voltage stabilizer, check the voltage stabilizer working status, whether the regulating transformer compensation transformer temperature rise is normal, the load exceed the rated value, the input voltage is exceed the scope of the regulated value, the regulating system and the transmission device (including transmission chain, reducer) work is normal, six groups of carbon brush are loose, the carbon brush in the same level and straight line, contactors are in good condition. Listed in the above problems are not allowed to exist, therefore, it must be solved as soon as find the problem, encounter problems should contact the manufacturer to obtain the solution in time, in order to avoid damage to the equipment.

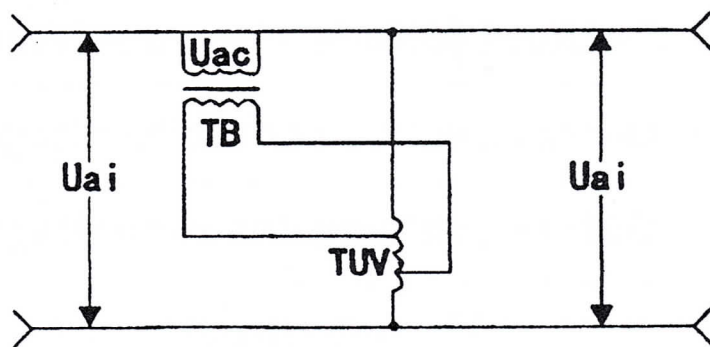
To maintain the voltage stabilizer once every three months, maintenance include:

- (1) Eliminate the dust and dirt on the each component of the voltage stabilizer;
- (2) Check that whether the components are damaged, if there are any damage, must be changed in time;
- (3) The regulating speed reducer system, chain transmission mechanism work is normal or not, should keep the lubrication, correct the tightness of the chain. Replace the damaged or wear carbon brush, with four carbon oxide with clean cotton to wipe the column type voltage regulator coil.
- (4) maintenance records.

AC voltage stabilizer electrical schematic diagram 1



Three phase AC voltage stabilizer electrical schematic diagram 1



Single phase AC voltage stabilizer electrical schematic diagram 1





Explicit declaration

V-H	Voltage High
V-L	Voltage Low
C-H	Input voltage A/B line-to-line voltage
UAB	Input voltage A/B line-to-line voltage
UBC	Input voltage B/C line-to-line voltage
UCA	Input voltage C/A line-to-line voltage
Uab	Output voltage a/b line-to-line voltage
Ubc	Output voltage b/c line-to-line voltage
Uca	Output voltage c/a line-to-line voltage
UA	Input voltage phase A voltage
UB	Input voltage phase B voltage
UC	Input voltage phase C voltage
Ua	Output voltage phase a voltage
Ub	Output voltage phase b voltage
Uc	Output voltage phase c voltage
Ia	Phase a current
Ib	Phase b current
Ic	Phase c current

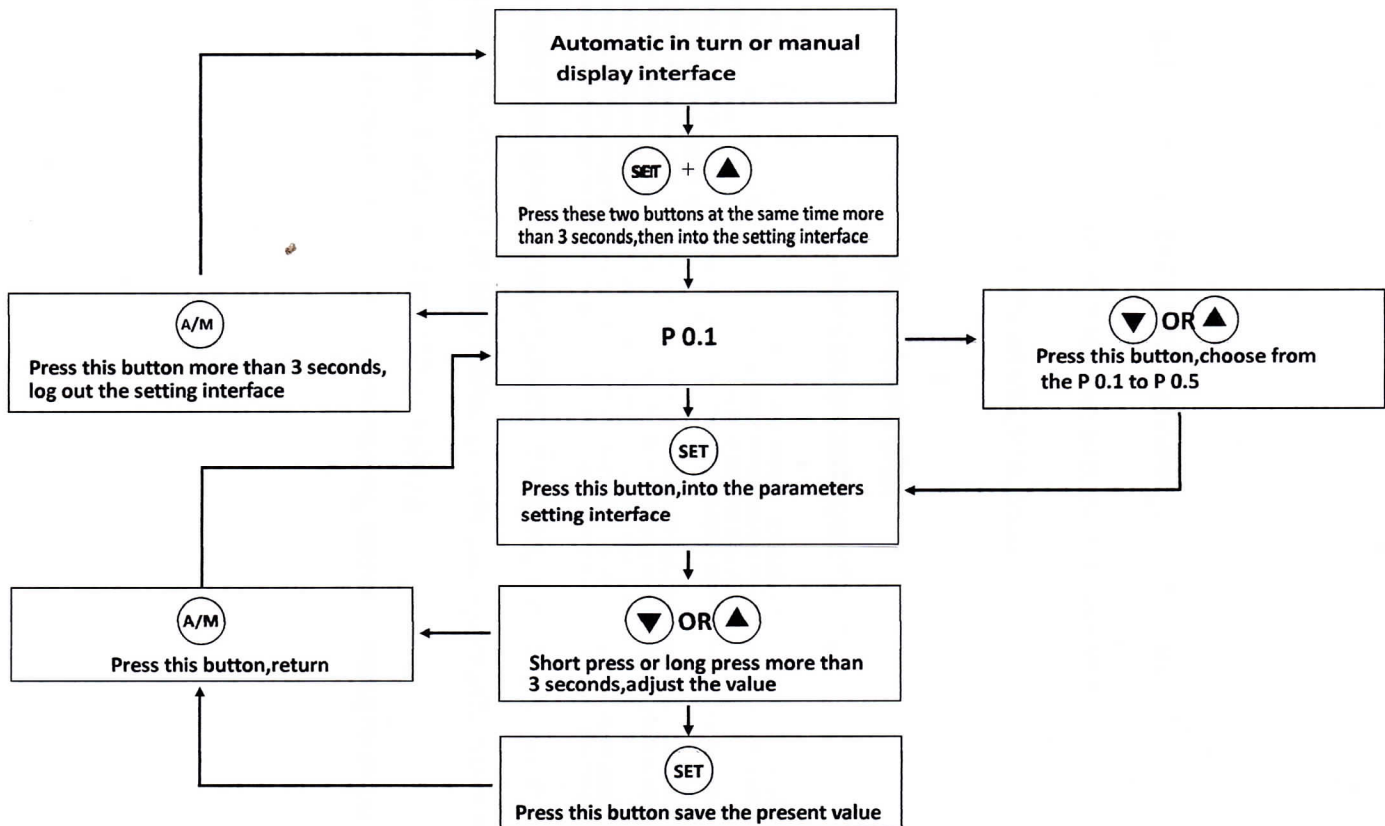
Parameters setting

P 01	Over-current protection value	The actual value is more than 20 seconds consecutive will start over current protection function
P 02	Current mutual inductance ratio	The external current sensor range from 25:5 to 2500:5
P 03	Over-voltage upper limit	The actual value is more than 5 seconds consecutive will start over-voltage protection function
P 04	Under-voltage lower limit	The actual value is less than 5 seconds consecutive will start under-voltage protection function
P 05	Protection selection	<ol style="list-style-type: none"> 1. Over current protection works only, over voltage and under voltage protection don't work. 2. Over current, over voltage and under voltage protection work, after the protection, the maint output control the connection, manual operation for revert. 3. Over current, over voltage and under voltage protection work, after the protection, the maint output control the connection, revert automatically if the protection is over voltage or under voltage protection. 4. Over current, over voltage and under voltage protection work, after the protection, the maint output control the disconnect, manual operation for revert. 5. Over current, over voltage and under voltage protection work, after the protection, the maint output control the disconnect, revert automatically if the protection is over voltage or under voltage protection.
P 06	Precision adjustment	Setting for the output voltage limit
P 07	Output adjustment	Factory default 415V
P 09	Communication unnumber	1
P 10	Screen version	The software version of the screen
P 11	Control board version	The software version of the control board
P 12	Frequency of System	1. 50Hz/60Hz detection automatic 2. 50Hz 3. 60Hz

Key function

	Switch/Return	Press it 3 seconds,log out
	SET/OK	Press this key for 2 seconds, it display the frequency on the left, temperature inside on the right; log out press A/M.
	Down (-)	Automatically or manually in turn display,long press this button more than 3 seconds,you can switch shown between the line voltage(380V)and phase(220V).
	Up (+)	After the protection function,long press this button,the protection function recovery and clear the warning mark.

Parameter setting process



Surge protector alarm function:

When struck by lightning, alarm sound to the machine, check the surge protector module window.

1. If it's green, press the reset button to turn off the alarm sound on the alarm board.

2. If it's red, replace the corresponding surge protector module, press the reset button to turn off the alarm sound on the alarm board.

Manual/automatic selection:

1. Select AUTO, the stabilizer output is automatically after the power resume, don't press the START button again. The button at AUTO, the stabilizer can start to work automatically when power resume, after the input over of under voltage protection.

2. Select MANU, the stabilizer can't start to work automatically when power resume, people should press the START button to make the stabilizer start to work. The button at MAN, the stabilizer has no return to work automatically after the input over of under voltage protection.