

10 After-sale Service

Sincerely thank you for choosing our company's product. It will help you save electricity, save you money, and bring you abundant benefits. To ensure your use, please read this "User Manual" carefully before installation. If you do not use the capacitor according to the instructions, it will be considered abnormal use and the capacitor will be severely damaged in the early stage.

Our company's commitment to product quality is to use it under normal usage conditions and without exceeding the harmonic limit. The warranty period is one year, calculated from the date of sale. If there are quality problems with the product within one year (excluding abnormal use), our company will provide free repair or replacement. If the product damage is caused by non-standard design of the complete set, abnormal use of capacitors, or system harmonics, it is not covered by the warranty and the responsibility shall be borne by oneself.

If you have any questions, please call our company's technical consultation hotline: +86-0577-62871678. Our engineering and technical personnel will be available to answer your questions at any time and serve you wholeheartedly!

BAOYU HOLDING CO.,LTD.

Add: Shuang Huang Lou Industrial Park, Yueqing City,
Zhejiang Province, 325603 P.R.China.

Tel: +86-577-6287 1678

Fax: +86-577-6287 2043

<http://www.cnbyg.com>

E-mail: sales01@cnbyg.com

CNBYG[®]

BSMJ Series

Self-healing Low-voltage Parallel Capacitor

Operation Instructions

Compliant with standards: GB/T12747.1-2017 IEC60831

Before installing and using the product, please read
the written instructions and keep them as backup

BAOYU HOLDING CO.,LTD.

Self-healing Low-voltage Parallel Capacitor

1 Main Purpose and Scope of Application

Self healing low-voltage parallel capacitors are suitable for low voltage power systems with frequencies of 50Hz or 60Hz. They are mainly used to improve power factor, reduce reactive power loss, improve voltage quality, and tap into transformer capacity. It is the best energy-saving product strongly recommended by the country.

This product complies with the national standard GB/T12747.1-2017

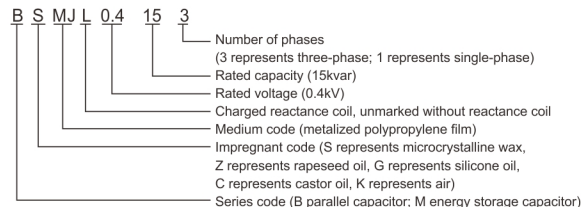
2 Working Conditions

2.1 After cutting off the capacitor from the power supply, it is necessary to ensure that the remaining voltage of the capacitor drops to 10% of the rated voltage before it can be put back into operation. Usually, this time takes about 200 seconds, so the controller should choose a controller with forced delay function after cutting off. If a general controller is used, a fast discharge facility must be installed separately. For those using equipotential switching controllers, this limitation is not applicable.

2.2 The altitude shall not exceed 2000m.

2.3 Environmental temperature category -25/C. The minimum temperature is -25°C, the maximum temperature is Class C (maximum not exceeding 50°C, average temperature within 24 hours not exceeding 40°C, average temperature within one year not exceeding 30°C). Capacitors should operate under good ventilation conditions and are not allowed to work in a closed and unventilated environment.

3 Model and meaning



Note: The subscript "L" indicates that capacitors with larger built-in reactance coils should not have live reactance coils inside, which can cause losses and high temperature rise, affect the service life and energy consumption of capacitors, and are not conducive to energy conservation. Other measures should be taken to limit the surge.

4 Structure Characteristics

4.1 Capacitors consist of six parts: components, impregnating agents, overpressure isolators, discharge resistors, casings, and wiring terminals. The capacitor component is the main body of the capacitor, which is made up of two layers of metallized films wound on an insulating core rod, and then the two ends are sprayed with gold as electrode leads to form the capacitor unit. Our company uses zinc aluminum composite metallized films, which have the characteristic of small capacitance loss under the action of an electric field. Metallized capacitors have self-healing properties, which means they have the ability to self recover from insulation during breakdown, thus achieving the functions of small size and light weight.

- 4.2 Our company's impregnating agent uses microcrystalline paraffin wax, which has solid properties at room temperature, does not leak oil, and serves as electrical insulation and isolation from the atmosphere.
- 4.3 Overpressure isolator: When the capacitor fails to self heal due to some reason and the box shell bulges, the overpressure isolator will act to cut off the power supply. Prevent further expansion of capacitor faults and avoid explosions.
- 4.4 Built in discharge resistor, allowing the capacitor to discharge below 50V within 3 minutes after disconnecting from the power supply, protecting personal safety.
- 4.5 Shell: Made of tin plated iron plate (tinplate), with a special anti-corrosion protective layer on the outside, which has a double-layer anti-corrosion effect.
- 4.6 Wiring Terminals: Our company's wiring terminals use 0-type sealing rings to prevent leakage. The patented structural design ensures a ground withstand voltage level of 4.5kV without breakdown. The selection of the diameter of the conductive rod ensures sufficient current carrying capacity and greater safety margin during breakdown, thus achieving the functions of small size and light weight.

5 Main Technical Parameters

- 5.1 Rated voltage: 230VAC, 400VAC, 525VAC, 690VAC, 750VAC, 1050VAC, 1200VAC. Other voltages can be ordered specifically.
- 5.2 Rated capacity: 0-60kvar at 0.4-0.69kV, other capacities are determined according to the voltage level.
- 5.3 Rated frequency: 50Hz or 60Hz.
- 5.4 Capacity tolerance: -5%~+10%.
- 5.5 Tangent value of loss angle: $\tan \delta \leq 0.1\%$ at 20 °C.
- 5.6 Voltage endurance: 2.15 times the rated voltage between poles for 5 seconds, 2Un+2kV or 3kV between pole shells, whichever is higher, for 10 seconds.
- 5.7 Maximum allowable overvoltage: at 1.1 times the rated voltage, not exceeding 8 hours per 24 hours; At 1.15 times the rated voltage, not exceeding 30 minutes every 24 hours; At 1.2 times the rated voltage, not exceeding 5 minutes; At 1.3 times the rated voltage, not exceeding 1 minute; When adding harmonics to the power frequency, the current should not exceed the maximum allowable current value.
- 5.8 Maximum allowable current: The allowable current shall not exceed 1.3 times the rated current for operation. The transient overcurrent considers the effects of overvoltage, capacitor positive deviation, and harmonics, and the maximum transient overcurrent should not exceed 1.43 times the rated current.
- 5.9 Connection methods: Δ angle connection, Y star connection, Y star connection with neutral point lead out, III three segment type, single-phase type, etc. Other connection methods can be agreed upon according to user needs.
- 5.10 Self discharge performance: After the capacitor is powered off, the residual voltage drops from $\sqrt{2}Un$ to below 50V within 3 minutes.
- 5.11 Compliance with standards: GB/T12747.1-2017.IEC60831:2002.

6 Installation, Use, and Maintenance

- 6.1 The installation site should be free of flammable materials, corrosive gases, conductive or explosive dust.
- 6.2 The installation of capacitors should be at least 20cm above the ground (not allowed to be placed close to the ground) to ensure that the bottom surface can receive air and dissipate heat. When multiple capacitors are installed together, the distance between the two capacitors should be kept at least 50mm, and it is not allowed to install them tightly.
- 6.3 The connection between the capacitor terminal and the busbar should be made with a soft connection and transitioned with a wiring nose to prevent the electric force of the faulty capacitor from damaging the intact capacitor.
- 6.4 Wiring nuts must be tightened and secured with spring washers or double nuts.
- 6.5 The current carrying capacity of connecting wires and other matching electrical appliances should be selected at 1.5 times the rated current of the capacitor.

- 6.6 When the transformer is under no-load or light load, it is not allowed to put capacitors into operation without taking any measures. In severe cases, third or other harmonic amplification may occur, which is more dangerous. It can cause damage to transformers, capacitors, or other connected electrical appliances.
- 6.7 The power factor control type compensation controller will experience switching oscillation during light load, which will cause repeated and unnecessary work of capacitors, switching capacitor switches, etc., resulting in damage, and oscillation switching will also endanger the stability of power grid consumption. Especially when using a single unit with a larger capacity and equal capacity combination, this switching oscillation is bound to occur. If a reactive power control plow compensation controller is used and different capacitor combinations are selected, the occurrence of oscillation switching can be completely avoided.
- 6.8 Harmonics are the main culprit for premature damage of metalized capacitors. In today's electronic age, frequency converters, thyristor devices, electric arc furnaces, intermediate frequency furnaces, rectification equipment, as well as fluorescent lamp rectifiers, color TVs, computers, copiers, etc., are all sources of harmonic waves. In the presence of harmonics, injecting harmonics into capacitors can cause overload and even more serious situations: capacitors amplify harmonics, resulting in overvoltage, overcurrent, and reduced partial discharge performance. Capacitors will quickly be damaged and endanger the safety of power grid usage. In the presence of harmonics, it is necessary to connect a series of harmonic suppression reactors or install filtering devices before using capacitors. Otherwise, in this abnormal situation, the capacitor will suffer greatly and be prematurely damaged.
- 6.9 Switching capacitors should be carried out using switches that limit inrush current to <20 times the rated current. Due to the structural characteristics of metalized capacitors, they are afraid of inrush current and cannot be switched using general contactors or switches. Instead, capacitor specific contactors with series resistors, general contactors with series limiting inrush current reactors, or thyristor switches for inrush current should be used.
- 6.10 Capacitors are capacitive. When connected to inductive loads in the power grid, the two parameters of capacitance and inductance may experience harmonic oscillations at a certain coincidence, which must be estimated when using capacitors. When designing the capacity of each group in the capacitor device, it is necessary to conduct power frequency and harmonic oscillation calculations in advance to avoid resonance points.
- 6.11 Parallel connection of capacitors to the power grid may cause a voltage increase at the installation location, so the selection of the rated voltage of capacitors must be at least 5% higher than the nominal voltage of the power grid.
- 6.12 When there is a reactor in the series of capacitors, it will cause the voltage on the capacitor terminals to rise. At this time, the rated voltage of the capacitor should be correspondingly increased according to the percentage of reactance in the series.
- 6.13 When capacitors are fixedly connected to motors (commonly known as on-site compensation), metalized capacitors must be connected in series with anti surge reactors, otherwise the capacitors are easily damaged by surge currents. The selection of capacitor capacity should be 0.9 times lower than the no-load current of the motor. When installing on-site compensation capacitors for Y/starting devices, it is important to note that capacitors should be connected according to specific methods before use. Simply connecting them in parallel to the motor is incorrect.
- 6.14 It is not possible to judge the quality of capacitors based on the voltage and current of the connected power grid, and a micro meter should be used for measurement verification. The capacitance between any two terminals of a three-phase capacitor should be half of the rated capacitance. The capacitance between the two ends of a single-phase capacitor is the rated capacitance. A capacitance deviation within -5% to +10% is considered qualified.
- 6.15 When capacitors with higher voltage levels are connected to lower power grids for use, the capacitor current will be lower than the rated current indicated on the nameplate, which is a normal phenomenon. For example, if a 0.45-20-3 capacitor has a rated current of 25.7A and is connected to a grid voltage of 0.38kV, the capacitor current will only be 21.6A.

- 6.16 After the capacitor is disconnected from the power supply, there is still residual voltage present. It is necessary to wait for the capacitor to be discharged through the built-in discharge resistor before touching it. This time is about 5 minutes. When touching the capacitor at the same time, it is necessary to short-circuit discharge the capacitor before touching it. Before measuring the deactivated capacitor, it is also necessary to short-circuit discharge the capacitor before measurement can be carried out (some faulty components with poor contact may show electricity at any time), in order to avoid burning the micro meter or causing personal electric shock accidents. When a capacitor is fixedly connected to an electric motor, it is necessary to wait for the motor to stop rotating before allowing contact with the live parts of the motor and capacitor.
- 6.17 Each capacitor should be reliably grounded, and its wire cross-sectional area should comply with the standard requirements of "Low Voltage Parallel Capacitor Device".
- 6.18 Carry out daily maintenance and regular inspections of capacitors. Promptly remove dust and dirt from the adhesive wood connectors, pay attention to whether the capacitor is heating up. If the temperature rises too high or the capacitor leaks or bulges severely, the capacitor should be shut down in a timely manner. If it is found that the power factor compensation is insufficient due to a serious decrease in capacitor capacitance (such as a decrease of more than 50%), the damaged capacitor should be replaced in a timely manner. Otherwise, it will result in insufficient reactive power compensation and be fined.
- 6.19 The complete set of capacitors must not be placed horizontally during transportation or installation, and must be placed vertically.

7 Common Faults and Their Troubleshooting Methods

No.	Fault	Cause of malfunction	Troubleshooting
1	The new capacitor connected to the power grid measures a much smaller current than the rated current indicated on the nameplate, and the same applies to other capacitors.	Capacitors with higher voltage levels connected to a 380V power grid have much smaller capacitor currents, which is a normal phenomenon and not a problem with the capacitors.	The quality of a capacitor should be judged by measuring its capacitance value.
2	When the capacitor is put into use, the current approaches the rated value, and after a period of use, the current decreases.	The capacitance value of the capacitor decreases and the current decreases. The decrease in daily capacitance value can be caused by improper use or internal quality defects of capacitors.	After identifying the cause of the malfunction, take appropriate action. If the self capacitance value drops by more than half, the capacitor should be replaced.
3	The capacitor is leaking oil at the joint of the rolling edge.	Rolling edge not properly secured	Can be repaired by soldering edge.
4	The root of the unused wiring terminal of the capacitor has oil marks.	There is residual oil in the gap between the terminal root and the cover, which was not cleaned thoroughly before leaving the factory.	Wipe off any remaining oil in the gap with a dry cloth.

No.	Fault	Cause of malfunction	Troubleshooting
5	The terminal nut and guide rod of the capacitor in use are heating up or even turning black.	The wiring nut is loose or the nut head is not tightened during installation.	Tighten the wiring nut if necessary, replace the nut, flat washer, side spring washer, and thread the conductive rod with a die, and then tighten the nut.
6	Fuses often melt (when using small circuit breakers, they often trip), thermal relays trip, # contactor contacts fuse, and the contactor resistance of the series limiting resistor burns out.	The system has large harmonics, or harmonic amplification or resonance occurs.	Install a filter to eliminate harmonics or a series reactor in the capacitor circuit to suppress harmonics from entering the capacitor.
7	There is continuous electromagnetic vibration sound inside the capacitor in use. Sometimes there is a sound, sometimes there is no sound.	Harmonic current flows through the capacitor	Harmonic current should only be allowed within the allowable range of capacitors. When the harmonic current is too large, measures must be taken to suppress it (as in 6).
8	The current of a capacitor in a certain circuit increases significantly.	It can be power frequency resonance, harmonic amplification, or harmonic resonance.	(As in 6)
9	The voltage of the power grid is not high or does not exceed the rated voltage of the capacitor, but the current of the capacitor exceeds the rated current by a lot.	The system has harmonics flowing through the capacitor	(As in 6)
10	The temperature of the lower cover of the left and right terminals of the three -phase capacitor in operation is higher than that of other parts.	Capacitors with built-in reactance coils have high power consumption, and the places where the reactance coils are installed are located under the left and right terminals when the temperature rises.	Capacitors with large capacity should not be equipped with current suppression coils. Other measures should be taken outside the capacitor to limit surge current.

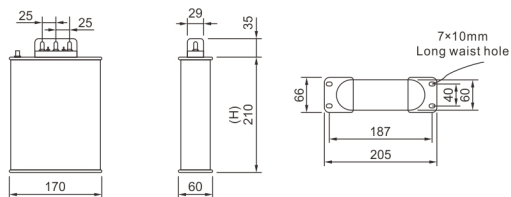
8 Ordering Instructions

- 8.1 The selection of rated voltage for capacitors must be based on the network voltage and consider that the input of capacitors will increase the voltage. Often, the actual voltage of the network is much higher than the nominal voltage of the network. The selection of capacitor voltage level should be at least 5% higher than the nominal voltage of the network. For example, for a 380V power grid, at least 400V capacitors should be used, and for a 660V power grid, at least 690V capacitors should be used. Especially when there are reactors in series in the capacitor circuit, the voltage on the capacitor terminals will increase correspondingly with the reactance rate of the series reactor. At this time, the rated voltage of the capacitor should be determined based on the calculation of the series reactance rate. The selection of rated voltage for capacitors should not blindly pursue the higher the better. Choosing a higher voltage but actually using a lower voltage will cause a significant decrease in the actual output capacity of the capacitor.
- 8.2 Capacitors cannot be judged as qualified based on the measured current size. The capacitance value of the capacitor should be measured using a micro meter to determine. Three phase capacitors: The measured capacitance between any two terminals should be half of the total capacitance value indicated on the capacitor nameplate, with an error within -5% to +10%. Single phase capacitor: The measured capacitance between the two terminals should be the total capacitance value indicated on the capacitor nameplate. Its error is within -5% to +10%.
- 8.3 Our company is a Class C capacitor with a maximum ambient temperature not exceeding 50°C. The average temperature within 24 hours should not exceed 40°C, and the average temperature within one year should not exceed 30°C.
- 8.4 Capacitors are low impedance channels for harmonics. Under harmonics, a large amount of harmonics are injected into capacitors, causing overcurrent, overcurrent, and overvoltage. Capacitors can also amplify or even resonate with harmonics, endangering the safety of the power grid and greatly reducing the lifespan of capacitors. Especially for metallized capacitors, due to their structural characteristics, they are most afraid of harmonics, so capacitors must be used in series with harmonic suppression reactors in situations with high harmonics. It is almost rare to see the use of non series harmonic suppression reactors in developed countries abroad. Rectification equipment, intermediate frequency furnaces, electric arc furnaces, power electronic devices (frequency converters, thyristor voltage regulators, control equipment, inverter power switch power supplies, fluorescent lamp rectifiers, copiers, computers, fax machines and other electronic office equipment), magnetic iron core equipment (transformers, power frequency induction furnaces, welding machines, inferior motors) are all sources of harmonic generation.
- 8.5 When ordering capacitors, be sure to order them correctly according to the capacitor model labeling method. For example, for a 380V system with a capacity of 15kvar three-phase BSMJ capacitor, the model should be selected when ordering: BSMJ0.4-15-3.

9 Outline and Installation Dimension Diagram of New Power Capacitor

Type A

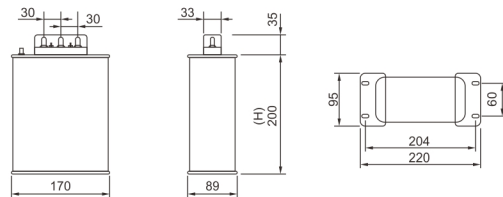
Unit: mm



1~8(kvar)	H-105mm
10(kvar)	H-125mm
12~16(kvar)	H-175mm
18~20(kvar)	H-210mm

Type B

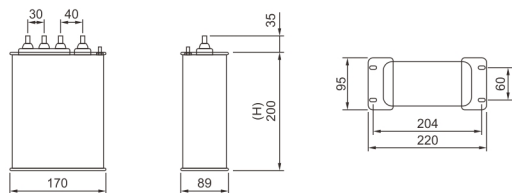
Unit: mm



22~30(kvar)	H-200mm
35~40(kvar)	H-245mm
45~50(kvar)	H-300mm

Type C

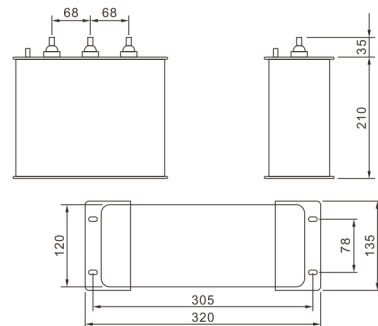
Unit: mm



0.25-X-3YN	
X-15, 18(kvar)	H-200mm
X-20(kvar)	H-245mm
X-25-30(kvar)	H-300mm

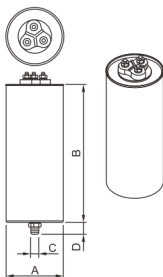
Type D

Unit: mm

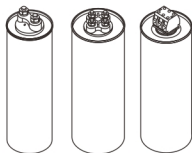


BSMJ0.25/0.3kV Series

Main Specifications and Parameters



Co supplied capacitors



Single-phase capacitor Complementary capacitors European capacitors

Specifications	Capacity (μ F)	Current(A)	Body size(mm)		Install footings C x D(mm)
			A	B	
0.25-3.34*3-1Y	170.2*3	13.4*3	86	245	M12*17
0.25-5*3-1Y	254.8*3	20.0*3	96	245	M16*25
0.25-6.67*3-1Y	339.9*3	20.0*3	106	245	M16*25
0.25-8.34*3-1Y	425.0*3	33.4*3	116	245	M16*25
0.25-10*3-1Y	509.6*3	40.0*3	116	290	M16*25
0.3-3.34*3-1Y	118.2*3	11.1*3	86	245	M12*17
0.3-5*3-1Y	176.9*3	16.7*3	96	245	M16*25
0.3-6.67*3-1Y	236.0*3	22.2*3	106	290	M16*25
0.3-8.34*3-1Y	236.0*3	27.8*3	106	290	M16*25
0.3-10*3-1Y	353.9*3	33.3*3	116	290	M16*25
0.25-3.34-1	353.9*3	13.4	76	120	M12*17
0.25-5-1	254.8	20.0	76	200	M12*17
0.25-6.67-1	339.9	26.7	76	200	M12*17
0.25-10-1	509.6	40.0	76	245	M12*17
0.3-3.34-1	118.2	11.1	76	120	M12*17
0.3-5-1	176.9	16.7	76	200	M12*17
0.3-6.67-1	236.0	22.2	76	245	M12*17
0.3-10-1	353.9	33.3	86	245	M12*17
0.3-12-1	424.6	40.0	86	245	M12*17

*If there are any changes in the external dimensions, the actual dimensions shall prevail.

BSMJ0.45/0.48/0.525kV Series

Main Specifications and Parameters

Specifications	Capacity (μ F)	Current(A)	Body size(mm)		Install footings C x D(mm)
			A	B	
0.45-10-3	157.3	12.8	76	245	M12*17
0.45-15-3	235.9	19.2	96	245	M16*25
0.45-20-3	314.5	25.7	106	245	M16*25
0.45-25-3	393.2	32.1	116	245	M16*25
0.45-30-3	471.8	38.5	116	290	M16*25
0.45-40-3	629.1	51.3	126	290	M16*25
0.48-10-3	138.2	12.0	76	245	M12*17
0.48-15-3	207.3	18.0	96	245	M16*25
0.48-20-3	276.5	24.1	106	245	M16*25
0.48-25-3	345.6	30.1	116	245	M16*25
0.48-30-3	414.7	36.1	116	290	M16*25
0.48-40-3	552.9	48.1	126	290	M16*25
0.525-10-3	115.5	11.0	76	245	M12*17
0.525-15-3	173.3	16.5	96	245	M16*25
0.525-20-3	231.1	22.0	106	245	M16*25
0.525-25-3	289.9	27.5	116	245	M16*25
0.525-30-3	348.6	33.0	116	290	M16*25
0.525-40-3	462.2	44.0	126	290	M16*25
0.525-50-3	577.7	55.0	136	290	M16*25

*If there are any changes in the external dimensions, the actual dimensions shall prevail.