

Barke produces various products in good faith



Comprehensive Manual of Full-controlled Power Quality Product

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PT. BARKE GRUP INDONESIA

Common phenomenon caused by power quality problems

- Abnormal working of computer
- Power capacitor fever fault
- Equipment error alarm
- PLC jump or reset without reason
- Rising of product rejection rate
- Abnormal action of circuit breaker and variable speed drive
- Rising of equipment failure rate
- Neutral cable heating
- Precision instruments cannot work properly or are damaged
- Overheat damage of equipment such as motor and transformer
- The life of motor is shortened
- The operating power of the equipment can not reach the rated power, and the efficiency is low
- Too high switch temperature rise
- Device controller is burnt
- Sudden shutdown of the running inverter.
- Computer crash or loss of data.

Most of these failures are caused by poor power quality.

Benefits from enhancing power quality

1. Harmonics correction

- Improve the quality of power supply, improve the efficiency and reliability of equipment operation, and reduce the economic losses caused by equipment misoperation;
- Reduce heating of electric equipment, prolong insulation aging time, increase service life of equipment, and reduce maintenance cost of equipment;
- Reduce the resonance probability of compensation capacitors in the power grid, and further improve the safety of power consumption. At the same time, reduce the effect of harmonic on A/D signal conversion of each system, and enhance the reliable and accurate control of the system.
- Reduce the error rate of the computer system;
- Reduce the electromagnetic interference caused by harmonic, and ensure the normal work of weak current system.
- Meet the requirements of power supply department on power consumption.

2. Var correction

- Ensure the power factor of the system up to the national standard;
- Reduce the line loss of the power grid and the occupation of the capacity of the upper transformer;
- Reduce the loss of active power and voltage drop, release the capacity of transformer and generator, and improve the utilization ratio of user's equipment and power supply quality of power grid;
- Improve the utilization rate of equipment and improve the stability of power grid.

3. Three-phase imbalance correction

- Avoid local heating and aging of neutral cable, and prevent fire risk;
- Avoid damage and alarm of three-phase motor and other equipment due to local voltage imbalance;
- Avoid burning down of weak current equipment in the control system due to rising mid-point voltage.

THDi
5%

1. Technological progress makes more energy-saving and efficiency-enhancing products and technologies applied to the user system, which improves the efficiency of power application, but produces a series of power quality problems simultaneously.

PF
0.99

2. Power energy is the most widely used energy source through the conversion of many kinds of energy sources. The user's dependence on power energy is increasing day by day. High-quality power energy is the mainstay of maintaining the stability of the user's complex and function-rich system.

Three-phase
balance

3. Considering the whole life cycle of a building, the construction of a high-quality power quality system can improve the power application efficiency and stability of the system, and finally obtain the maximum investment value.

China has issued relevant standards for the protection of the power quality of electric power systems

GB/T 12325-2008 Power quality ---- Deviation OF supply voltage

GB/T 15945-2008 Power quality ---- Frequency deviation for power system

GB/T 15543-2008 Power quality ---- Three-phase voltage unbalance

GB/T 12326-2008 Power quality ---- Voltage fluctuation and flicker

GB/T 14549-1993 Power quality ---- Harmonics in Public supply network

GB/T 24337-2009 Power Quality ---- Interharmonics in Public supply network

GB/T 19862-2016 General requirements for monitoring equipment of power quality

GB/T 15576-2008 Low-Voltage reactive power compensation assemblies

JG/T 417-2013 Shunt active power filtering equipment for electrical installation of buildings



■ The Power Quality Product System of Flexible AC Transmission System

- Applying "flexibility" to power quality control of power system, THDi 5%, PF 0.99 perfect power quality for three-phase balancing is achieved:
- BRK-AHF
Active Harmonic Filter (AHF)
- BRK-SVG
Static VAR Generator (SVG)

The above products are the representative of the latest technology in the field of power quality, parallel to the low-voltage side of the power grid, for the treatment of current quality problems, with intelligent control, high efficiency, fast dynamic response, stable and reliable running state. They solve the complex power quality problems successfully and is able to realize the perfect power quality.

■ With the development of flexible AC transmission technology, perfect power quality is possible.

Flexible AC transmission technology (FACTS) is a technology used to control AC transmission, which is composed of power electronic technology, micro-processing technology, micro-electronics technology and communication technology. Reliable and high-speed high-power power electronic components (thyristor, IGBT) are used to replace mechanical switches attached to traditional equipment of AC system to realize flexible and fast control of AC transmission system, thus improving reliability, controllability, operating performance and power quality of the transmission and distribution system and obtaining a new comprehensive technology to obtain a large amount of power saving benefits.

The so-called "flexible control" is mainly different from the conventional "rigid control" in the original AC power grid. This is not only because the former mainly relies on electronic technology, the latter is often mechanical or electromechanical technology. The more important difference lies in its control speediness, accuracy, continuity, flexibility and effectiveness .

■ Compared with traditional electrical equipment, flexible AC transmission equipment has obvious advantages

- The response time is short (Level ms), the control is fast, which are beneficial to the improvement of transient stability;
- The controlled parameters can be adjusted intermittently or continuously, which is beneficial to the improvement of dynamic stability of the system.
- It is convenient to change the power flow distribution of the system by fast and smooth adjustment, which is very advantageous to improve the transmission capacity of existing power grid and prevent the trip caused by chain reaction after the accident.



■ Product Overview

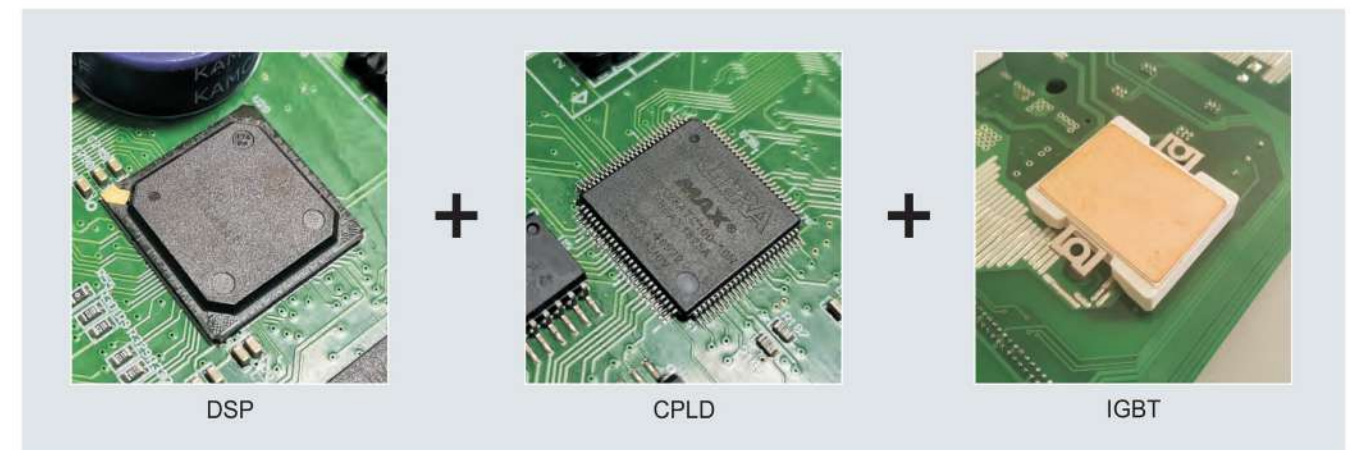
Whole Barke series products provide a perfect solution to the power quality problems, which is based on high performance digital signal processor (DSP) and complex programming logic device (CPLD)

And is a new special power quality control device made of modern power electronic equipment. The use of the power quality products can effectively improve the reliability of distribution system, greatly improve the power quality index of the system, improve power factors, eliminate harmonics, suppress resonance, improve the three-phase imbalance, and ensure the long-term stable and efficient operation of the power system.

■ Full-control technology requires full-control components -- core components of whole Barke series power quality products

Integrated power electronics technology -- IGBT power device (heart of power quality products).

IGBT is a full-control power electronic device, which has the advantages of high input impedance, fast speed, good thermal stability, high voltage and large current, and is the core power component of Barke power quality products.



Micro-processing and microelectronics technology -- DSP + CPLD

Barke series power quality products are digital signal processing technology based on high-speed 32 bit DSP + CPLD full digital control mode. DSP and CPLD are the core computing and control components of Barke power quality products. It is mainly used to realize complex algorithm, sampling, reading, transmitting and calculating of parameters, generating of IGBT trigger signal, processing of fault signal, function of communication and man-machine interface, etc.

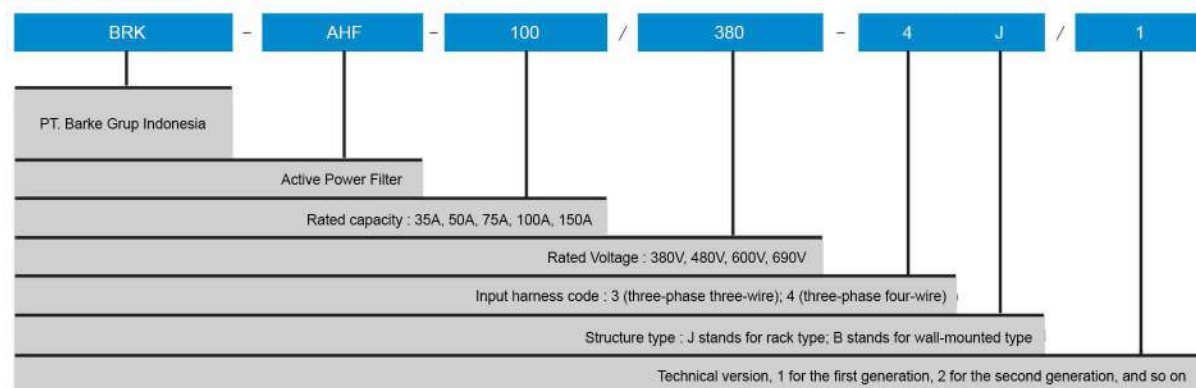
The powerful computing of DSP, the logical control of CPLD and up to 20KHz fast on-off speed of IGBT make Barke full control power quality products achieve THDi 5%, PF 0.99, three-phase fully balanced perfect power quality control effect.

Product function

- Reduce current distortion THDi <5%
- Harmonic compensation frequency: 2 ~ 50 times optional
- It can compensate 15 different harmonics at the same time.



Technical parameters

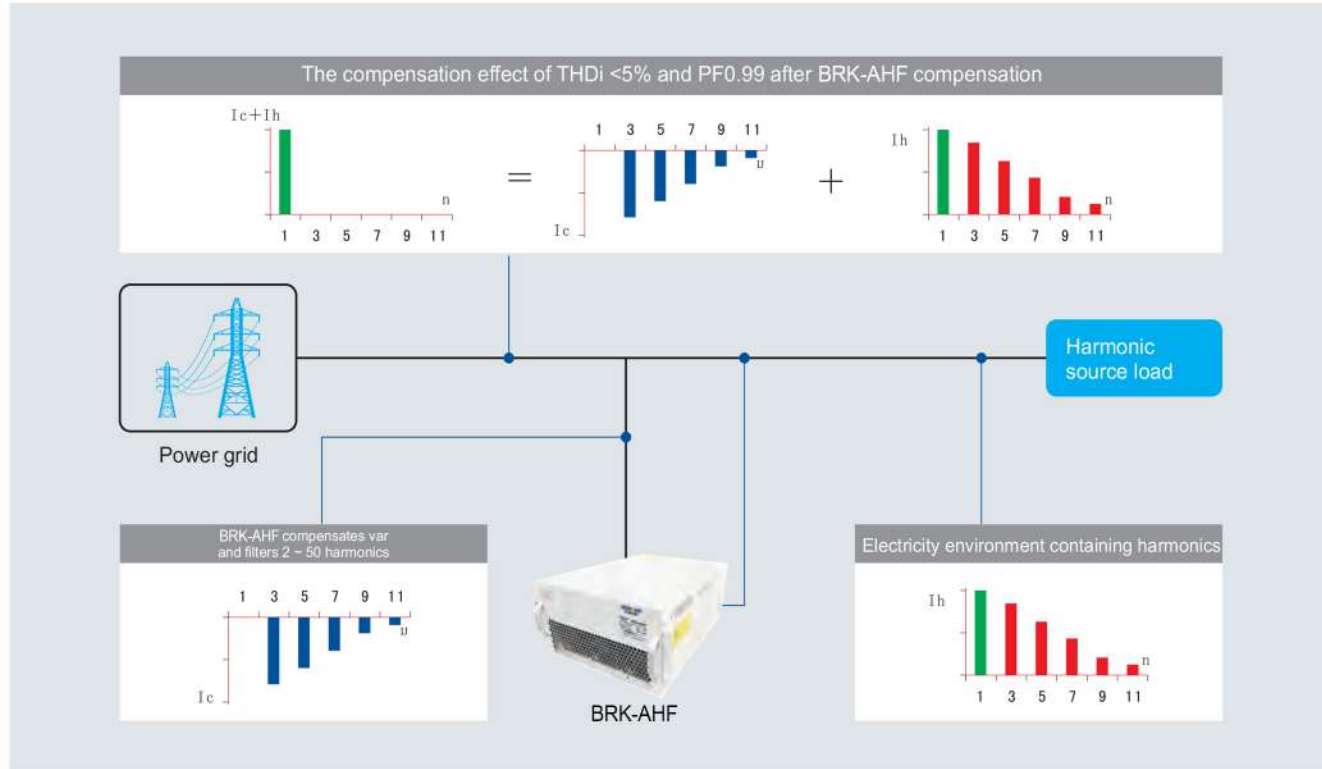


Technical parameters

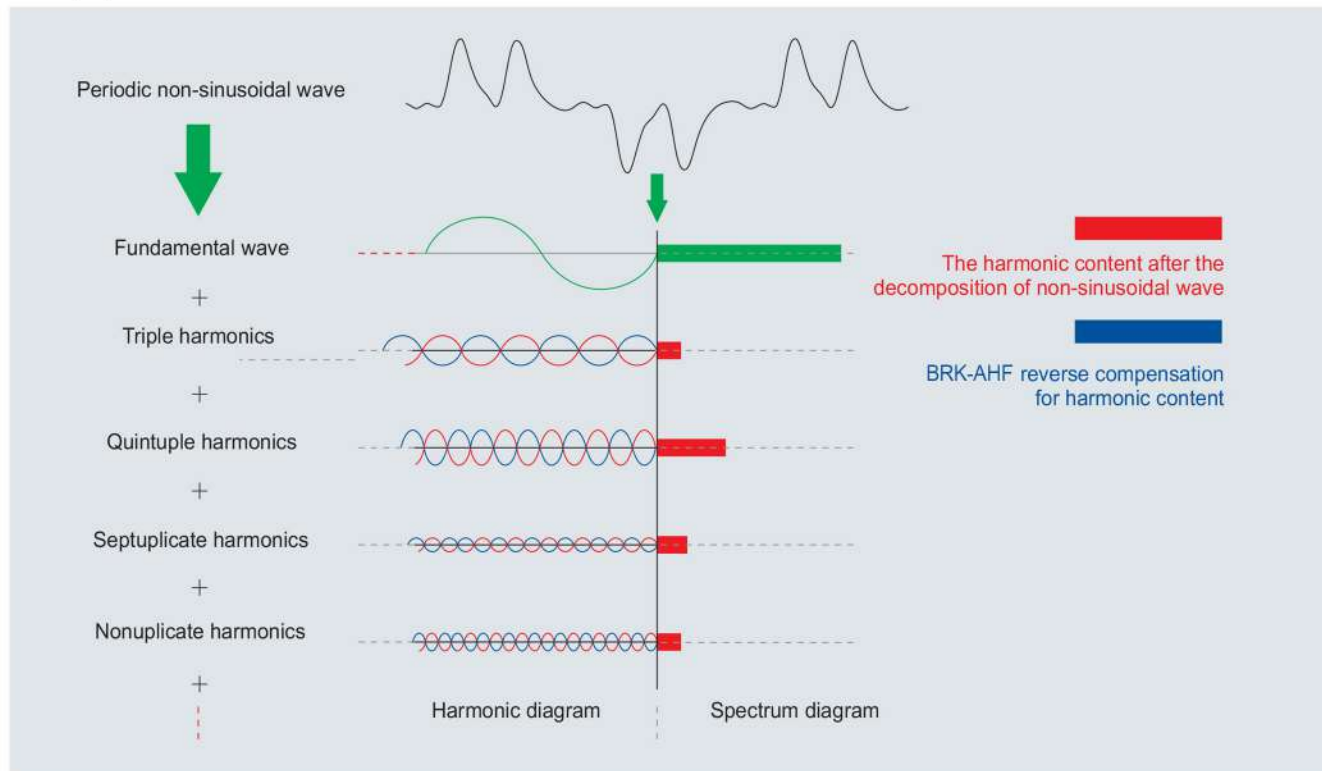
| Standard type | 400V | | | | | 480V | 600V | 690V |
|------------------------------------|--|-------------------|-------------------|-------------------|-------------------|------------------------|------------------|------------------|
| | 35A | 50A | 75A | 100A | 150A | 100A | 100A | 100A |
| System parameters | | | | | | | | |
| Rated input wire voltage | 380V (-15%~+20%) | | | | | 480V (-20%~+20%) | 600V (-20%~+20%) | 690V (-30%~+15%) |
| Grid frequency | 50/ 60Hz (range: 45Hz~62Hz) | | | | | | | |
| Number of parallel machines | 1 ~ 10 sets | | | | | | | |
| Overall efficiency | ≥97% | | | | | ≥98% | | |
| Grid structure | Three-phase three-wire/ three-phase four-wire | | | | | Three-phase three-wire | | |
| Current transformer | 150/5~10000/5 | | | | | | | |
| Circuit topology | Tri-level | | | | | | | |
| Performance index | | | | | | | | |
| Rated capacity | 35A | 50A | 75A | 100A | 150A | 100A | 100A | 100A |
| Filter range | 2 ~ 50 times optional and adjustable | | | | | | | |
| Filtering ability | THDi <5% | | | | | | | |
| Response time | <15ms | | | | | <20ms | | |
| Control algorithm | FFT algorithm, intelligent FFT algorithm, instantaneous reactive algorithm | | | | | | | |
| Switching frequency | 20kHz | | | | | | | |
| Cooling mode | Intelligent air cooling | | | | | | | |
| Noise index | <56dB | | | | | <65dB | | |
| Communication monitoring ability | | | | | | | | |
| Communication interface | Rs485, internet access | | | | | | | |
| Communication protocol | Modbus Protocol, General Electric Protocol, TCP/ IP | | | | | | | |
| Display interface | 4.3-cun LCD or 7-cun LCD touch color screen; LED indicator light | | | | | | | |
| PC-end software | Yes, all parameters can be set directly through PC | | | | | | | |
| Protection function | Overvoltage/ undervoltage protection, short circuit protection, inverter bridge reverse protection and overcompensation protection | | | | | | | |
| Fault alarm | Yes, up to 256 alarm records | | | | | | | |
| Monitoring mode | Support centralized monitoring and independent monitoring | | | | | | | |
| Mechanical characteristic | | | | | | | | |
| Fixed mode | Rack type, wall-mounted type | | | | | Rack type | | |
| Incoming line mode | Rack-type back-incoming line, wall-mounted up-incoming line | | | | | Back-incoming line | | |
| Size (width × height × depth, mm3) | 484 × 156 × 655.5 | 484 × 180 × 655.5 | 484 × 180 × 655.5 | 484 × 234 × 655.5 | 544 × 234 × 655.5 | Under development | | |
| Net weight per module | 30kg | 33kg | 33kg | 40kg | 47.5kg | — | — | — |
| Color | National Standard 7035-Light Grey (Customizable) | | | | | | | |
| Environmental requirements | | | | | | | | |
| Altitude | <1500m, according to the rated capacity; between 1500m and 5000m, according to national standard GB/T 3859.2, for every 100m increase, the rated capacity is reduced by 1% | | | | | | | |
| Operating temperature | -25~40°C | | | | | | | |
| Relative humidity | 5%~95%, no condensation | | | | | | | |
| Grade of protection | IP20 | | | | | | | |

Working principle of BRK-AHF

The active power filter monitors the load current real-time through the external current transformer CT, and extracts the harmonic component of the load current through the internal DSP computing, then sends it through the PWM signal to the internal IGBT, the inverter produces a current equal to the load harmonic and opposite to the harmonic direction and injects the current into the grid to compensate the harmonic current realizing the function of harmonic control.



The superposition of each harmonic current and the base wave current shows non-sinusoidal waveform.



To achieve the perfect power quality system

| | |
|-------------------------|--|
| Harmonic compensation | |
| Harmonic compensation | BRK-AHF can filter out 2 ~ 50 harmonics and set the frequency of harmonic current compensation and the compensation rate of each harmonic according to the need. |
| Var compensation | |
| Var compensation | Capacitive and inductive (-1 ~ 1) stepless compensation, PF 0.99 perfect reactive compensation effect. |
| Three-phase imbalance | |
| Unbalanced compensation | Three-phase active power unbalanced compensation, three-phase reactive unbalanced compensation, phase-division compensation. |

Comprehensive protection function improves the use stability by users

| | |
|-----------------------------|---|
| Learning function | |
| Learning function | In addition to the Fourier algorithm, Barke created an intelligent Fourier algorithm, which can automatically learn the power grid environment and system impedance, effectively avoid system vibration, so that the system reaches the most stable compensation state. |
| Resonance suppression | |
| Resonance suppression | If resonance occurs during load change, BRK-AHF can automatically suppress resonance and avoid failure. |
| Temperature monitoring | |
| Temperature monitoring | It can monitor the internal temperature of module and IGBT device temperature in real time, when the temperature is too high, it will issue an over-temperature alarm and automatically shut down the stop compensation. |
| Various kinds of protection | |
| Various kinds of protection | BRK-AHF has various protection functions: Overvoltage, undervoltage, overcurrent, short-circuit protection, etc. |

■ Design for easy integration into the system

Independent air duct



Unique Barke multi-layer space heat dissipation design can effectively isolate the layer adhesion in the environment and improve the product heat dissipation efficiency.

Modular design



Modularization

Barke BRK-AHF adopts modular design. It is small and light. No large equipment such as crane and forklift is needed for its installation. It's time-saving and labor-saving. It is wall-mounted, with flexible installation, and is especially suitable for small space.

Flexible and stable



Module has 35 ~ 150A five capacities, any capacity can be combined into a cabinet; the capacity of single cabinet is up to 600A to meet different capacity requirements. Any module can achieve all the functions; if any module has problems, the rest of the modules can run normally to ensure the continuity of safe operation of the system.

■ Good man-machine interaction experience

Means of monitoring



Barke BRK-AHF is equipped with various monitoring methods for different models, including 4.3-cun touch color screen, 7-cun full-color LCD touch screen and background monitoring software, to meet the different needs of users.

Resonance monitoring



Through the monitoring system of BRK-AHF, users can have a clear understanding of system oscillograph, spectrum diagram, current effective value, THDi, THDu, power factor, active power, reactive power, apparent power, and other power quality improvement before and after compensation.

■ Product graphic characteristics

1. BRK-AHF series rack products

- Module capacity: 35 A/ 50 A/ 75 A/ 100 A/ 150 A



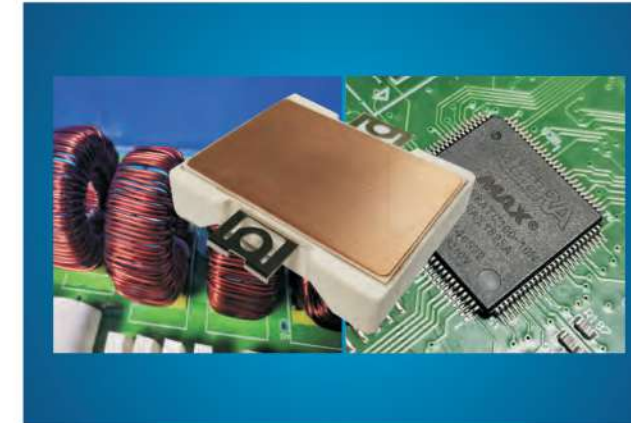
2. BRK-AHF series wall-mounted products

- Voltage coverage: 380 V
- Module capacity: 35 A/ 50 A/ 75 A/ 100 A/ 150 A



■ Display of details

- High frequency inductance
- IGBT (Insulated Gate Bipolar Transistor)
- DSP (Digital Signal Processor)



- Approximate wire-free design-copper bar
- Independent air duct

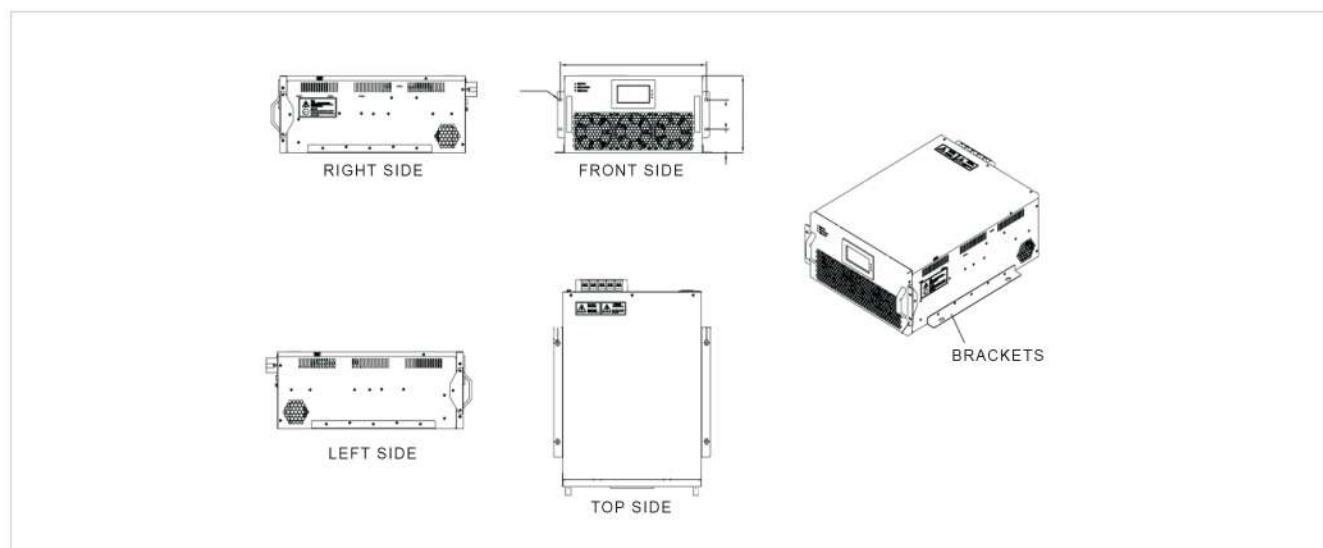


- Single module is equipped with 4.3-cun LCD touch color screen
- The whole cabinet adopts 7-cun full color touch screen



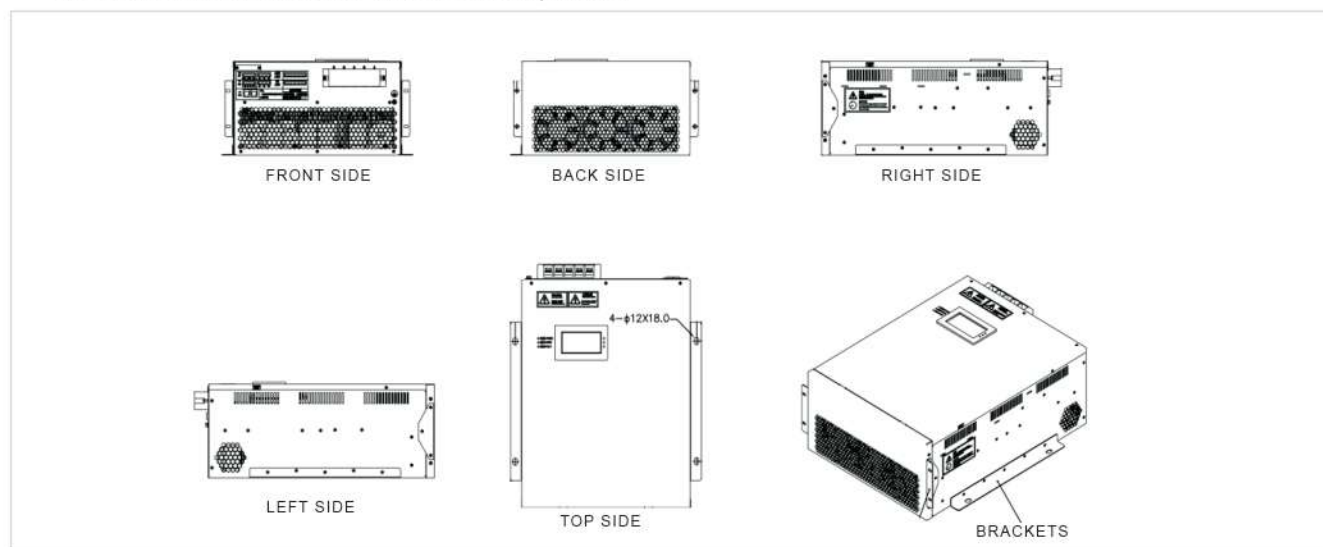
■ Structure and dimension

1. Dimension of BRK-AHF rack product



| Model | Dimensions (W. H. D) / mm | Weight/ kg |
|----------------------|---------------------------|------------|
| BRK-AHF-35/380-4J/1 | 484 × 156 × 655.5 | 30 |
| BRK-AHF-50/380-4J/1 | 484 × 180 × 655.5 | 33 |
| BRK-AHF-75/380-4J/1 | 484 × 180 × 655.5 | 33 |
| BRK-AHF-100/380-4J/1 | 484 × 234 × 655.5 | 40 |
| BRK-AHF-150/380-4J/1 | 544 × 234 × 655.5 | 47.5 |

21. Dimension of BRK-AHF wall-mounted product



| Model | Dimensions (W. H. D) / mm | Weight/ kg |
|----------------------|---------------------------|------------|
| BRK-AHF-35/380-4B/1 | 500 × 156 × 655.5 | 30 |
| BRK-AHF-50/380-4B/1 | 500 × 180 × 655.5 | 33 |
| BRK-AHF-75/380-4B/1 | 500 × 180 × 655.5 | 33 |
| BRK-AHF-100/380-4B/1 | 500 × 234 × 655.5 | 40 |
| BRK-AHF-150/380-4B/1 | 560 × 234 × 655.5 | 47.5 |

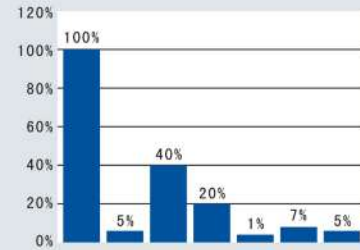
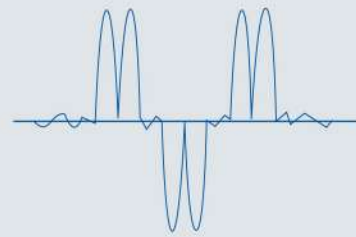
■ Typical application fields

| | | | |
|--|--|--|---|
| | <p>Automobile manufacturing Harmonic source: Rectifier and converter Harmonic equipment: spot welder, carbon dioxide shielded welding, conveying system, punching machine, electric welder</p> | | <p>IDC industry Harmonic source: UPS, converter Harmonic equipment: UPS, switching power supply, inverter air conditioner, elevator, lighting</p> |
| | <p>Hospital Harmonic source: UPS, rectifier Harmonic equipment: The main load is hospital precise electronic equipment, lighting and variable frequency ventilation equipment, computers and UPS, fluorescent lamps and so on</p> | | <p>Modern architecture Harmonic source: Rectifier and converter Harmonic equipment: Switching power supply, inverter air conditioner, elevator, lighting, water pump, energy-saving lamp, SCR dimming system, large-scale LED equipment</p> |
| | <p>Theatre, radio and television Harmonic source: Rectifier, frequency converter, SCR dimming power supply Harmonic equipment: Lighting, elevator, audio, air conditioning, screen, SCR dimming</p> | | <p>Photovoltaic Harmonic source: rectifier, SCR Harmonic equipment: monocrystal furnace, slicer.</p> |
| | <p>Oil production Harmonic source: Rectifier and converter Harmonic equipment: AC generator set (direct current supplied by controlled silicon rectifier), derrick (winch, pulley), drill disc, mud pump</p> | | <p>Semi-conductor Harmonic source: Monocrystal furnace, SCR Harmonic equipment: monocrystal furnace, quartz crucible</p> |
| | <p>Theme parks and hotels Harmonic source: Converter, UPS, switching power supply Harmonic equipment: pendulum, roller coaster (about 150A), ropeway (rotary motor), vertical lift, central air conditioning, heating, ventilation, lighting, elevator</p> | | <p>Iron and steel smelting Harmonic source: rectifier, converter, SCR Harmonic equipment: Transmission system of blast furnace, converter, medium furnace and electric arc furnace</p> |
| | <p>Papermaking Harmonic source: Converter, halogen lamp Harmonic equipment: Pulper, overpressure machine, paper cutting, CNC machine, electric arc lamp, halogen lamp, air conditioning</p> | | <p>Subway Harmonic source: UPS, converter, switching power supply Harmonic equipment: Elevator, lighting, UPS</p> |
| | <p>Sewage treatment Harmonic source: Converter and rectifier Harmonic equipment: Fan, pump (condensate pump, circulating pump, feed pump, ejector pump)</p> | | <p>Waste power generation Harmonic source: Converter and rectifier Harmonic equipment: Pump (condensate pump, circulating pump, feed pump, ejector pump)</p> |
| | <p>Electric vehicle charging station Harmonic source: Rectifier Harmonic equipment: Charging machine</p> | | <p>Rubber Harmonic source: Converter, SCR Harmonic equipment: Mixer, extruder, molding machine, vulcanizer</p> |

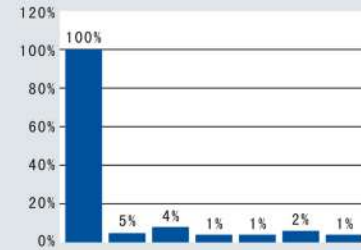
■ Typical application of BRK-AHF/3L series active harmonic filter in six-pulse rectifier

Six-pulse rectifier is the most widely used non-linear load in industrial system, and its harmonic generation is mainly septuplicate harmonics, nonuplicate harmonics, 11th and 13th harmonics. The comparison of the harmonic content on the power supply side before and after the input of the BRK-AHF/3L active power filter shows that it has strong filtering ability.

Current waveform before the input



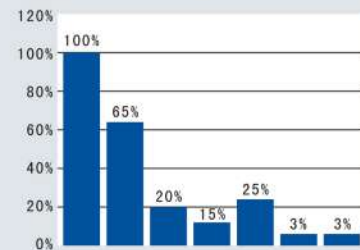
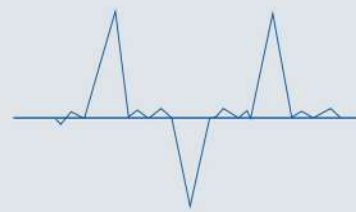
Current waveform after the input



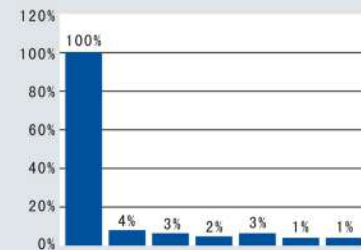
■ Typical application of BRK-AHF/4L series active harmonic filter in commercial architecture

Non-linear devices such as fluorescent lamps, computers, UPS, elevators and inverter air conditioner, which are widely used in commercial buildings, not only pollute the power grid seriously, but also superpose the triple harmonics to the neutral line, which makes the neutral line heat up and threatens the safety of distribution transformer system seriously. For commercial mixed load, our company introduces BRK-AHF/4L series active power filter. BRK-AHF ensures the safe, stable and reliable operation of commercial building system with its excellent neutral-line harmonic control.

Current waveform before the input



Current waveform after the input

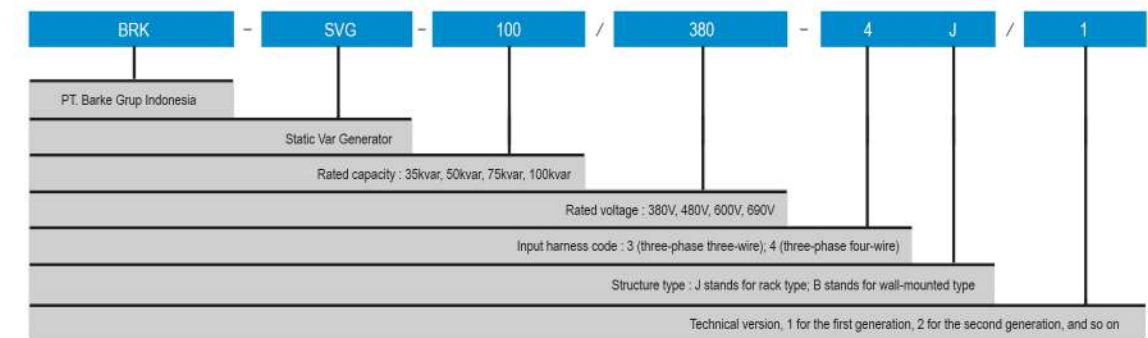


■ Product function

- Improved power factor $PF \geq 0.99$
- Compensated inductive or capacitive reactive
- Unaffected by harmonics



■ Product model and meaning



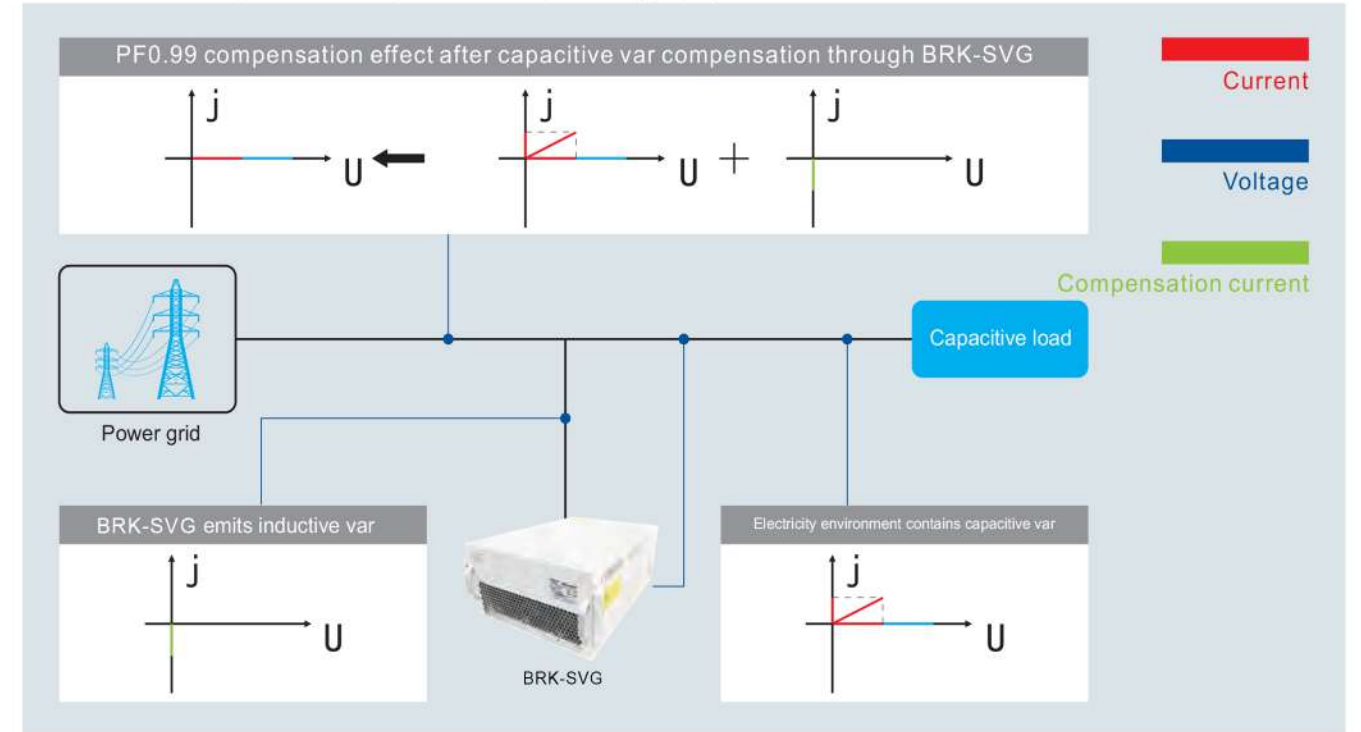
■ Technical parameters

| Standard type | 400V | | | | 480V | 600V | 690V |
|-------------------------------------|---|-------------------|-------------------|-------------------|------------------------|------------------|------------------|
| | 35kvar | 50kvar | 75kvar | 100kvar | 90kvar | 100kvar | 120kvar |
| System parameters | | | | | | | |
| Rated input wire voltage | 380V (-15%~+20%) | | | | 480V (20%~+20%) | 600V (-20%~+20%) | 690V (-30%~+15%) |
| Grid frequency | 50/ 60Hz (range: 45Hz~63Hz) | | | | | | |
| Number of parallel machines | 1~10台 | | | | | | |
| Overall efficiency | ≥97% | | | | ≥98% | | |
| Grid structure | Three-phase three-wire/ three-phase four-wire | | | | Three-phase three-wire | | |
| Current transformer | 150/5~10000/5 | | | | | | |
| Circuit topology | Tri-level | | | | | | |
| Performance index | | | | | | | |
| Single module compensation capacity | 35kvar | 50kvar | 75kvar | 100kvar | 90kvar | 100kvar | 120kvar |
| Response time | <15ms | | | | <20ms | | |
| Scope of compensation | From -1 to 1, capacitive and inductive continuity is adjustable | | | | | | |
| Cooling mode | Intelligent air cooling | | | | | | |
| Noise index | <56dB | | | | <65dB | | |
| Communication monitoring ability | | | | | | | |
| Communication interface | Rs485, internet access | | | | | | |
| Communication protocol | Modbus Protocol, General Electric Protocol, TCP/ IP | | | | | | |
| Fault alarm | Yes, up to 256 alarm records | | | | | | |
| Monitoring mode | Support centralized monitoring and independent monitoring | | | | | | |
| Mechanical characteristic | | | | | | | |
| Fixed mode | Rack type, wall-mounted type | | | | Rack type | | |
| Incoming line mode | Rack-type back-incoming line, wall-mounted up-incoming line | | | | Back-incoming line | | |
| Size (width × height × depth, mm3) | 484 × 180 × 655.5 | 484 × 180 × 655.5 | 484 × 234 × 655.5 | 544 × 234 × 655.5 | Under development | | |
| Net weight per modul | 33kg | 33kg | 40kg | 47.5kg | — | — | — |
| Appearance color | National Standard 7035-Light Grey (Customizable) | | | | | | |
| Altitude | National Standard 7035-Light Grey (Customizable) | | | | | | |
| Operating temperature | <1500m, used in accordance with rated capacity; 1500-5000m, used according to GB/T 3859.2, reducing rated capacity by 1% for each increase of 100m. | | | | | | |
| Relative humidity | -25~40°C | | | | | | |
| Grade of protection | 5% ~ 95%, no condensation | | | | | | |
| | IP20 | | | | | | |

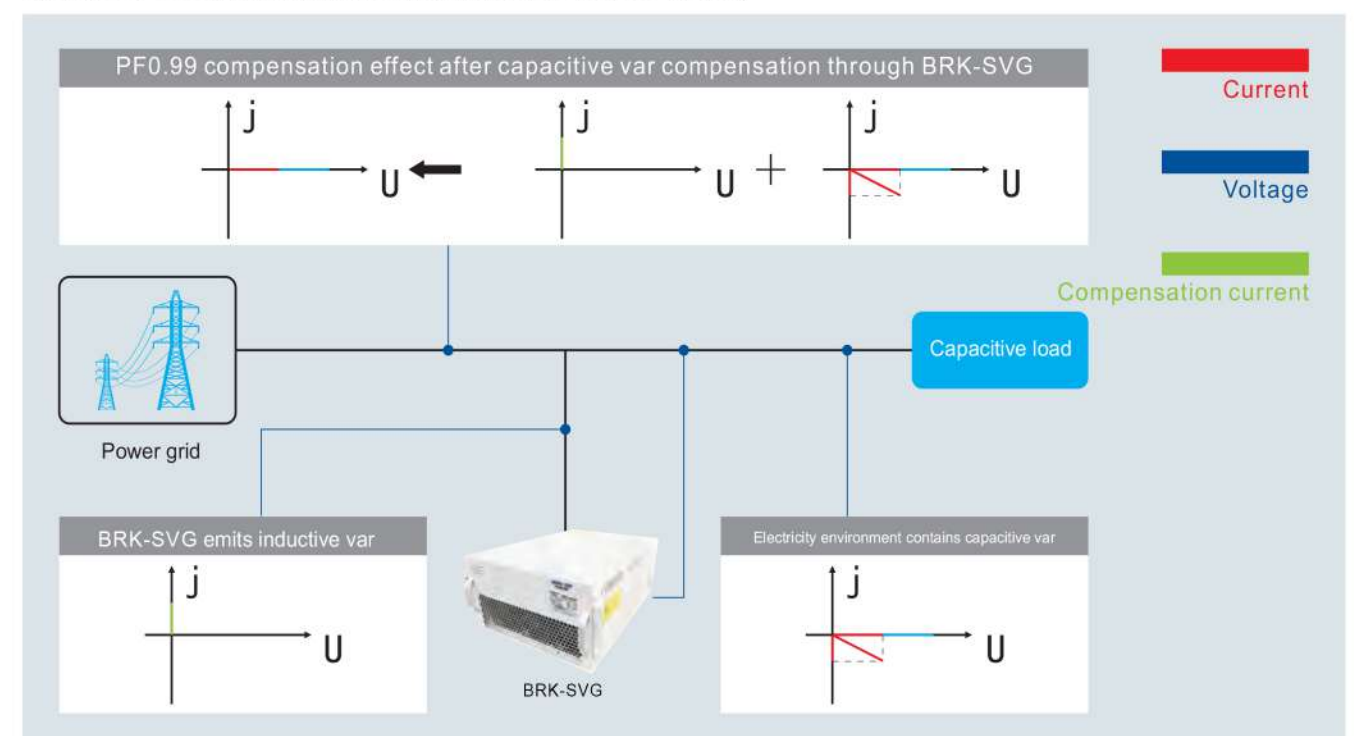
■ Working principle

BRK-SVG static var generator is a bridge converter composed of fully controlled power electronic devices for dynamic reactive compensation. The basic principle is that the load current is detected in real time by the external current transformer (CT), and the reactive content of load current is extracted by the internal DSP computing. Finally, the instruction value is calculated to control the PWM signal generator to send the control signal to the internal IGBT, so that the inverter can produce the reactive compensation current to meet the requirement, and finally realize the dynamic reactive compensation.

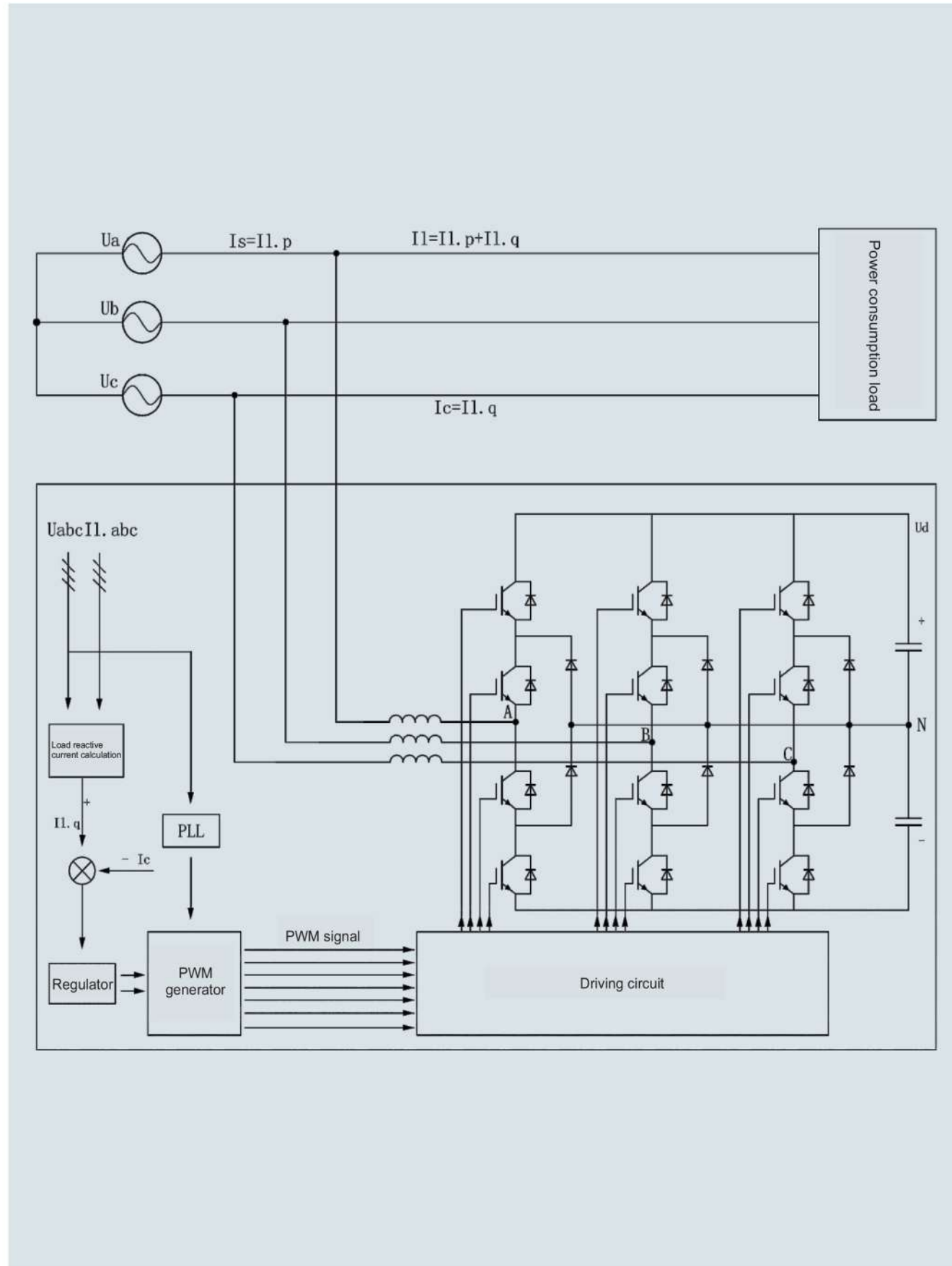
1. BRK-SVG compensates capacitive var (vector graph)



2. BRK-SVG compensation for inductive var (vector graph)

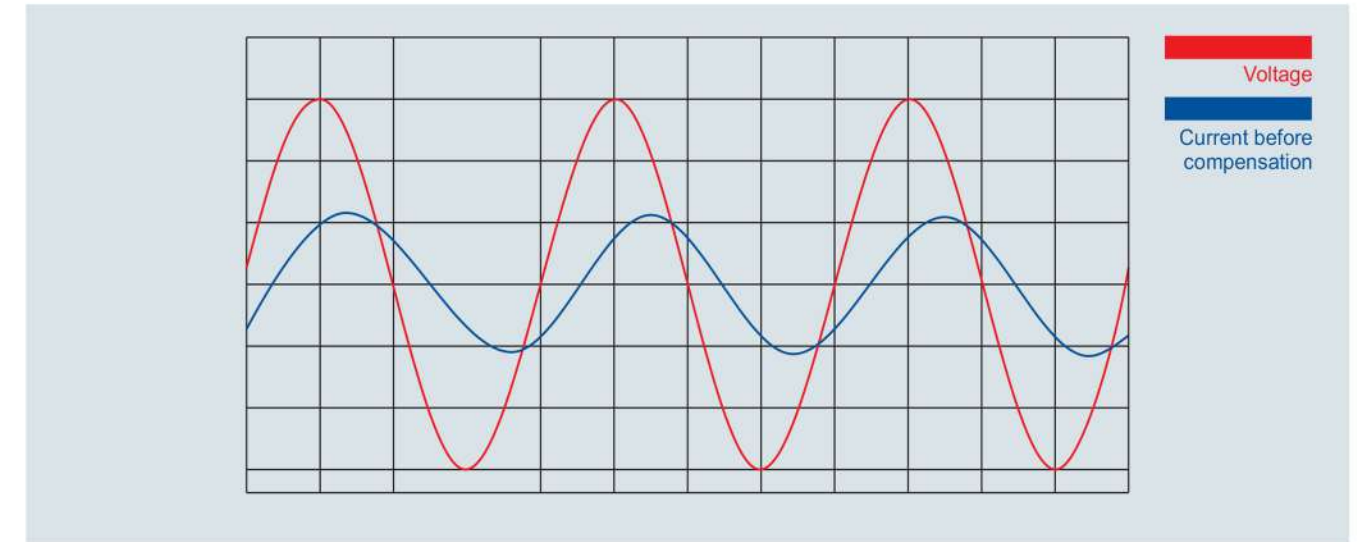


3. BRK-SVG schematic diagram

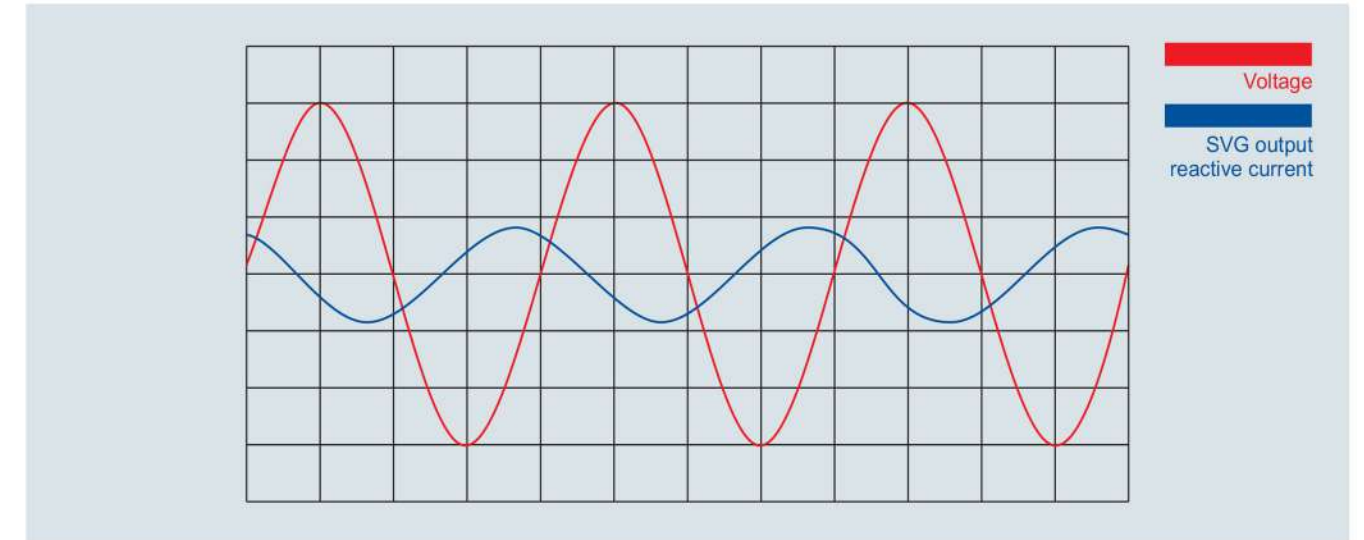


4. The compensation effect before and after the use of BRK-SVG is shown in the picture

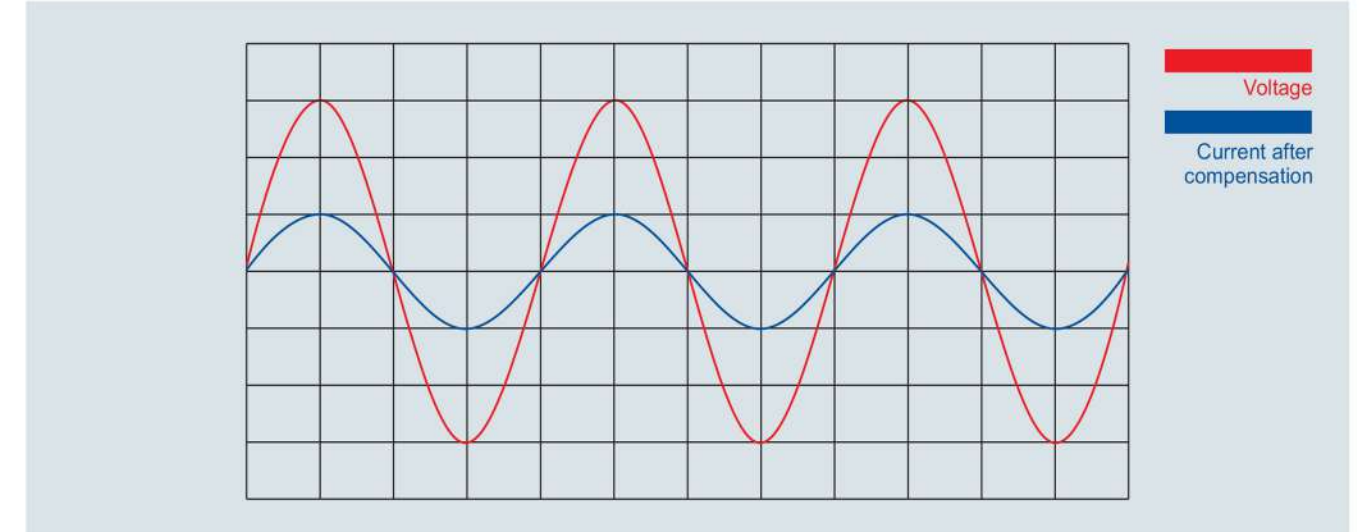
a. Voltage and current before the analog device is put into operation



b. Reactive current emitted by the analog device



c. The compensation effect after the analog device is put into operation



■ The essential improvement of the var compensation effect of BRK-SVG

Traditional compensation device

| |
|---|
| BRK-SVG is a component device and can be assembled freely, but TSC compensation device switching capacitor group is grouped switching, the reactive power output capacity is stepped compensation capacity which can not be adjusted continuously, it is difficult to achieve balance completely with the reactive power of the system, which is easy to cause over complement or under-compensation, the compensated power factor is generally around 0.8-0.9. |
| It takes up to 20 milliseconds for a traditional compensation device to complete the compensation |
| The traditional compensation device uses SCR-regulated reactance plus multi-group LC as the main means of var compensation, which is easy to produce resonance amplification and leads to safety accident. |
| The traditional compensation device uses capacitor to provide var power, which can only compensate the inductive load, and loses the compensation effect when the system is capacitive or in the state of capacitive and inductive repeated changes. |
| Traditional compensation devices usually require high-capacity capacitors and reactors as energy storage components, so they occupy a large area of space. |
| Traditional compensation devices rely on capacitors to provide capacitive var. Because the output reactive current is proportional to the grid voltage, if the grid voltage is low, the output reactive current is also low, resulting in a decrease in the compensation capacity, it is difficult for them to provide adequate compensation. |
| The traditional compensation device has frequent compensation switching, short service life, usually in three years or so, and needs to be maintained frequently. |
| To achieve better compensation effect, the traditional compensation device usually requires the installation capacity to be greater than the compensation capacity |

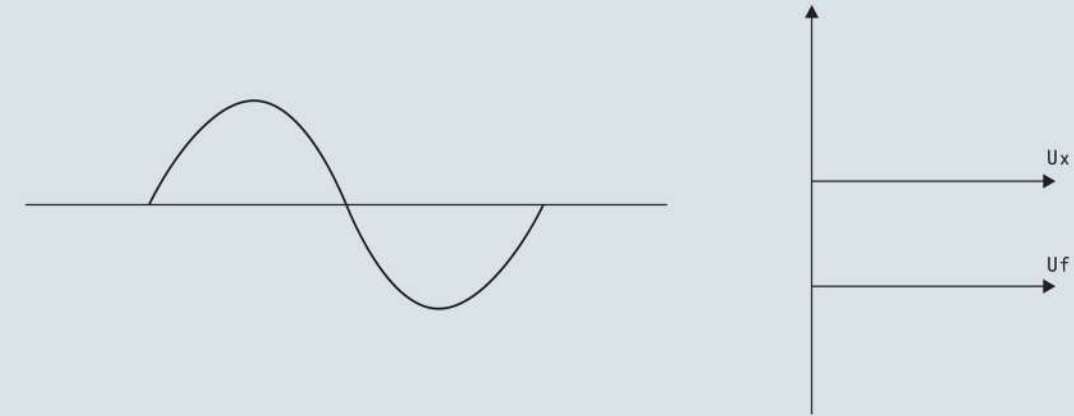
BRK-SVG static var generator

| |
|--|
| BRK-SVG adopts the design concept of component-based products, which can compensate the capacitive and inductive loads, achieving the level 0.99 compensation effect, and avoiding the situation of overcompensating and under-compensating. |
| The complete response time of BRK-SVG is less than 15 milliseconds, and the dynamic response time is less than 50 microseconds, especially suitable for fast changing situations. |
| BRK-SVG capacitors do not need to set up filter banks, there is no resonance amplification; and BRK-SVG is an active compensation device, is a current active device composed of a detachable device IGBT, the resonance phenomenon is avoided in mechanism and the safety is greatly improved. |
| BRK-SVG can adjust var power dynamically, bidirectionally (-1 ~ 1) continuously, that is, it can output var continuously from rated inductive condition to rated capacitive condition, and it, combined with fixed capacitor, can form any range of continuous compensation. |
| BRK-SVG does not need large capacity capacitors and reactors to do energy storage components, the area is usually only 50% of the same capacity of other types of dynamic compensation, or even smaller, while BRK-SVG uses modular design and cabinet installation, workload of engineering design and installation is small. |
| BRK-SVG adopts active compensation circuit, the compensation capacity is little affected by the system voltage, and can output reactive current similar to the rated condition when the system voltage is low. |
| BRK-SVG has minimal loss and doesn't need maintenance basically, and there is no resonance overvoltage problem. the design life is more than ten years with normal use and trouble-free. |
| The compensation capacity is installation capacity, when reaching the same compensation effect, the capacity can be 20% - 30% smaller than the capacity of the traditional compensation device. |

■ Operation mode

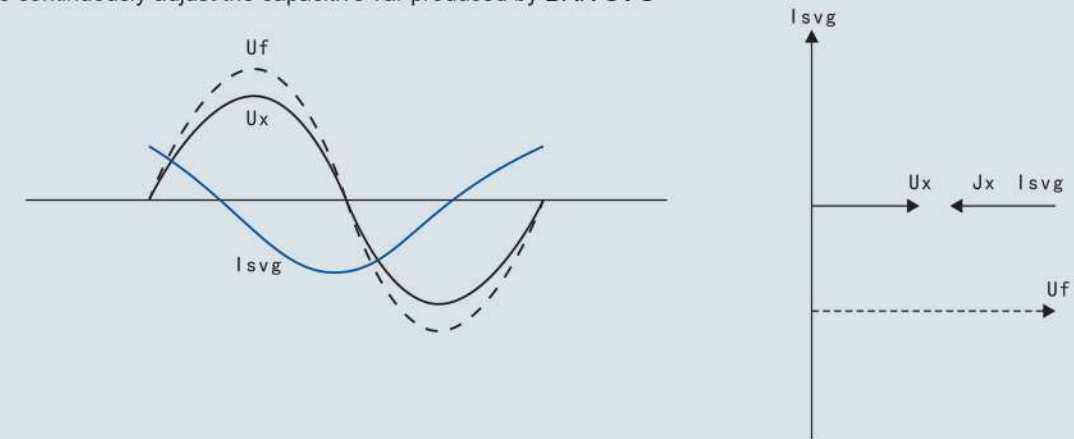
1. No-load operation mode

$U_x = U_r$, $T_{svg} = 0$, BRK-SVG does not output reactive power.



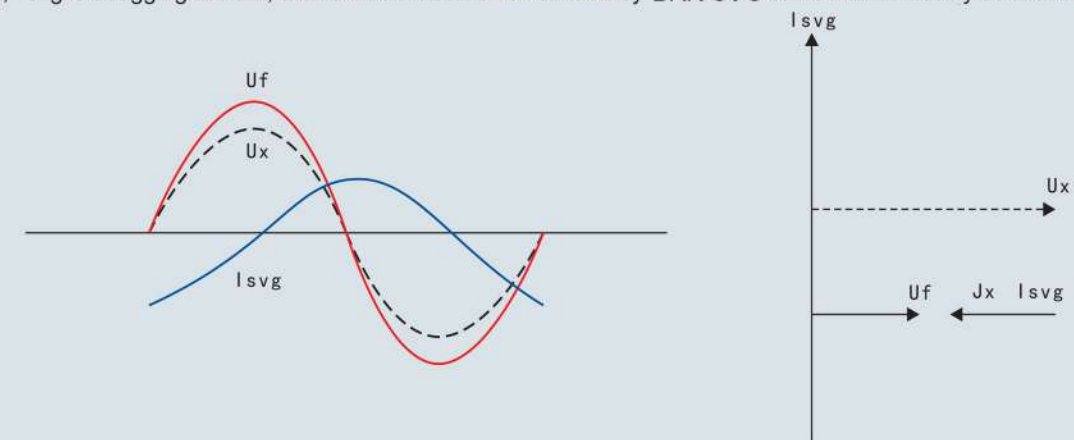
2. Capacitive operation mode

$U_r > U_x$, T_{svg} is a leading current. Its amplitude can be continuously controlled by adjusting U_i , so as to continuously adjust the capacitive var produced by BRK-SVG



3. Inductive operation mode

$U_r < U_x$, T_{svg} is a lagging current, at this time inductive var emitted by BRK-SVG can be continuously controlled.



BRK-SVG characteristics

Outstanding effect

1. Excellent reactive compensation effect

- Power factor 0.99-level reactive compensation function
- Dynamic reactive compensation, continuously adjustable
- Capacitive load -1 ~ 1 compensation effect

Stable and fast

2. Stable and fast reactive compensation effect

- Real-time compensation, full response time less than 15ms
- Dynamic response time less than 50μs
- No overcompensation, no undercompensation, no resonance
- The compensation capacity is equal to the installation capacity and is not affected by the system voltage drop

Component type

3. Modular design to achieve component-based product applications

- Component-based product design concept is consistent with universal reactive compensation application mode
- Single module capacity contains 50kvar and 100kvar, with single cabinet up to 400kvar.
- Users can also design cabinet by himself.
Easy to use, easy to transport, easy to maintain

Multiple combinations

4. Combined application for arbitrary working conditions

- BRK-SVG reactive compensation
- BRK-SVG + BRK-SVG reactive compensation
- BRK-SVG + BRK-AHF compensation

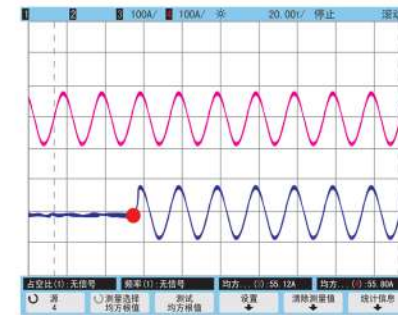
Durable

5. Long service life

- SVG has very small loss, and it doesn't need maintenance basically.
- It can be normally used without trouble, and can be used for more than 10 years.

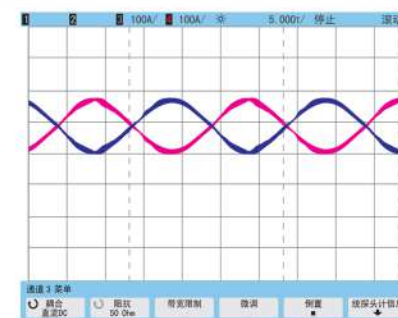
Compensation effect of BRK-SVG

Fast response



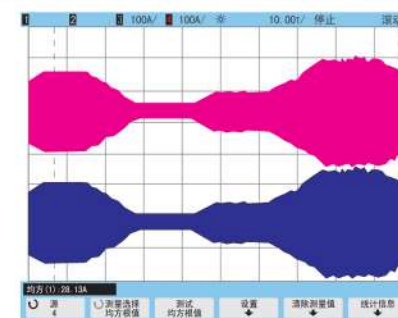
BRK-SVG can achieve all the system var compensation in the start-up moment

Perfect compensation



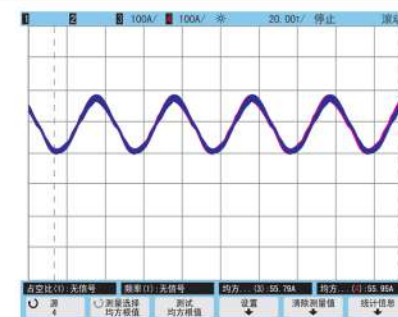
BRK-SVG can achieve all the system var compensation in the start-up moment

Real-time tracking



BRK-SVG can achieve all the system var compensation in the start-up moment

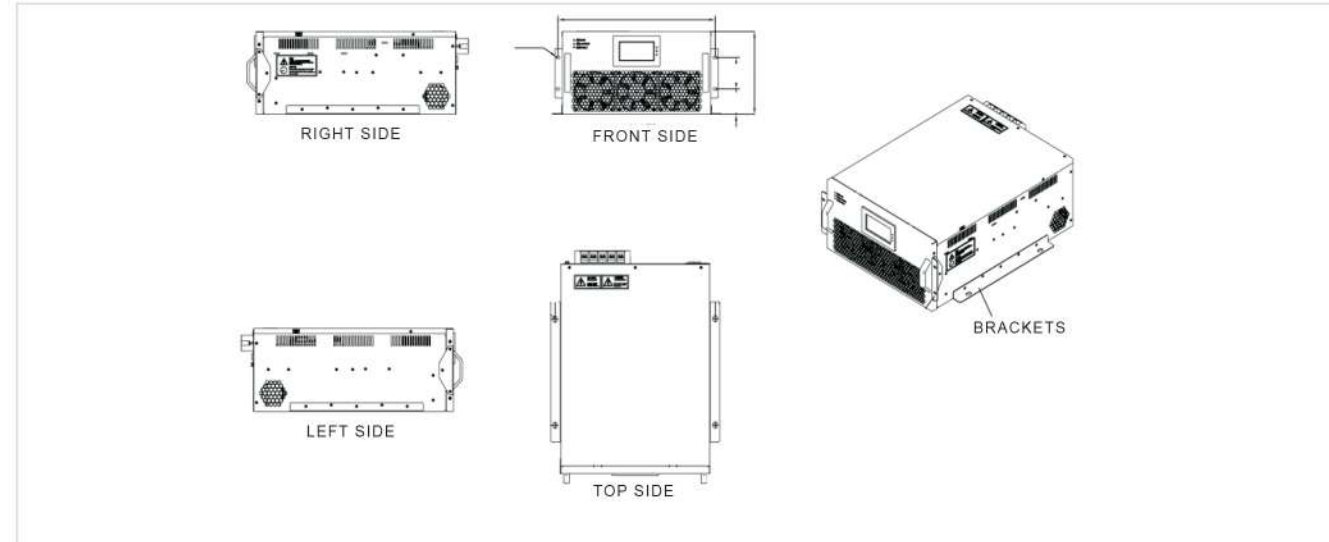
Reverse overlap



BRK-SVG can achieve all the system var compensation in the start-up moment

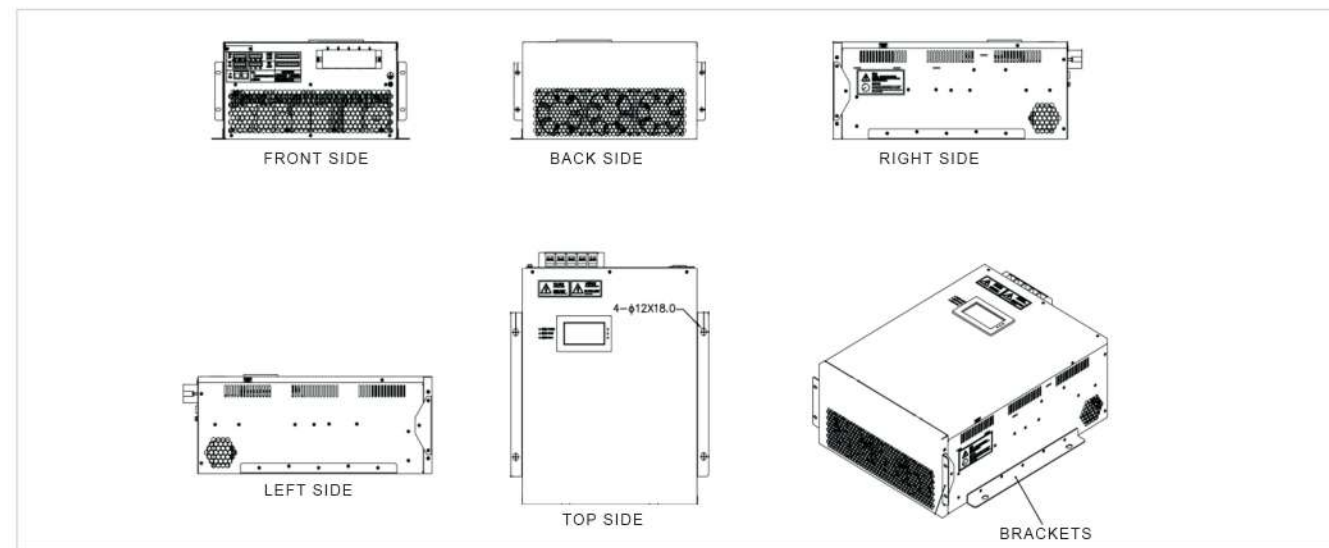
■ Structure and dimension

1. Dimension of BRK-SVG rack product



| Model | Dimensions (W. H. D) / mm | Weight/ kg |
|----------------------|---------------------------|------------|
| BRK-SVG-35/380-4J/1 | 484 × 180 × 655.5 | 33 |
| BRK-SVG-50/380-4J/1 | 484 × 180 × 655.5 | 33 |
| BRK-SVG-75/380-4J/1 | 484 × 234 × 655.5 | 40 |
| BRK-SVG-100/380-4J/1 | 544 × 234 × 655.5 | 47.5 |

21. Dimension of BRK-SVG wall-mounted product



| Model | Dimensions (W. H. D) / mm | Weight/ kg |
|----------------------|---------------------------|------------|
| BRK-SVG-35/380-4B/1 | 500 × 180 × 655.5 | 33 |
| BRK-SVG-50/380-4B/1 | 500 × 180 × 655.5 | 33 |
| BRK-SVG-75/380-4B/1 | 500 × 234 × 655.5 | 40 |
| BRK-SVG-100/380-4B/1 | 560 × 234 × 655.5 | 47.5 |

■ Comparison between capacitor technology and full control power quality product technology

| Type | Item | Capacitor | BRK-SVG static var generator | BRK-ASVG advanced static var generator | BRK-AHF active filter |
|----------------------------------|--------------------------------------|--|--|--|--|
| Harmonic control function | Harmonic control | Usually none. It is necessary to specially design a single-tuned loop | No | Yes | Yes |
| | Range of compensation | Odd times, usually triple or quintuple harmonics. | — | Triple, quintuple, septuplicate nonuplicate and 11th harmonics (times) | 2 ~ 50 times, intelligently and independently compensate and adjust compensation power |
| Reactive compensation function | Reliability | Ordinary, susceptible to system fluctuations. | Dynamic real-time compensation, stable and reliable | Dynamic real-time compensation, stable and reliable | Dynamic real-time compensation, stable and reliable |
| | Range of compensation | Usually 0.6 ~ 1 | -1 ~ 1 | -1 ~ 1 | -1 ~ 1 |
| Unbalanced compensation function | Phase compensation | No, special design is required | Yes | Yes | Yes |
| | Unbalanced compensation | No | Yes | Yes | Yes |
| | Active power unbalanced compensation | No | Yes | Yes | Yes |
| Core function difference | Compensation mode | Hierarchical compensation, which can easily cause over-compensation and under-compensation | Dynamic real-time compensation | Dynamic real-time compensation but compared with BRK-SVG, 11th harmonics and below harmonic compensation function is added | Dynamic real-time compensation, the most outstanding harmonic and reactive compensation effect |
| | Complete response time | No complete response time | <15 ms | <15 ms | <15 ms |
| | Capacity characteristic | The installation capacity should be larger than the compensation capacity; when the grid voltage is low, the reactive current output is also low, resulting in a decrease in the compensation capacity, difficult to provide adequate compensation | The installation capacity is the compensation capacity; it is an active compensation circuit, compensation current is little affected by system voltage. | The installation capacity is the compensation capacity; it is an active compensation circuit, compensation current is little affected by system voltage. | The installation capacity is the compensation capacity; it is an active compensation circuit, compensation current is little affected by system voltage. |
| | Floor area | Large | Small | Small | Small |

PFC Performance

- PFC performance 0.99
- Compensate capacity - Stage less compensation without over compensation and below compensation with specific system requirements.
- The voltage of grid has little effect on SVG compensation capacity as SVG is like a current source.
- System reactive power changes with full PFC process within 15minutes and maintain it at PF0.99.
- Compensation with capacitive reactive power and inductive reactive power.

Maintenance Free, safe and Easy to use.

- Can work under high THDu upto 15%
- Advance technology and easy to use with HMI monitor.
- MTBF (Mean Time Between Failures) upto 100,000 hours, helps consumers lower the cost.
- Maintenance free, minimum loss, and no need to replace capacitor bank every time.

Space and Capacity

- To save at least 70% space compared with capacitor bank.

