

NEW!

**REPLACE
CAP +
DETUNE**

SVG: Static Var Generator
AHF: Active Harmonic Filter
SPC: Static Power Compensation

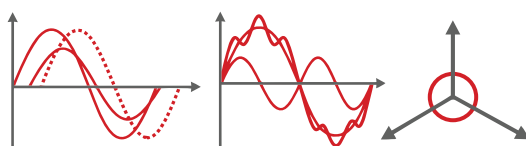


**3 in 1 APF
SVG + AHF + SPC**



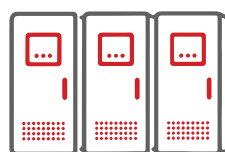
**Fast Response
<10 ms**

Instant detection
and compensation



3-in-1

Reactive Power +
Harmonics +
Phase Balancing



**Compact
Modular Design**

Saves space and easy
system expansion

OVERVIEW

OF POWER QUALITY PRODUCT

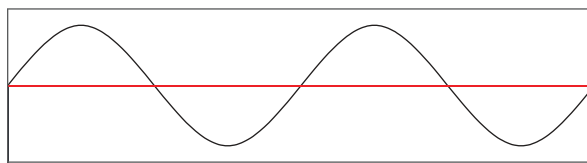
Electricity is the most commonly used energy source in the world today. In the process of using electricity, many power supply links and electrical equipment will waste electricity, and the proportion of this energy waste has reached a level that cannot be ignored. One of the main reasons for the waste of electricity is poor voltage quality, that is, voltage waveform distortion, poor current quality, that is, current distortion caused by nonlinear loads such as power electronic equipment to the power grid, including harmonic currents flowing into the power grid, as well as reactive power, unbalanced load current, flicker caused by low-frequency load changes, etc. It is mainly reflected in:

- 01** Increase line loss, cause cable overheating, insulation aging, and reduce power efficiency;
- 02** Overload and heat the capacitor, accelerate capacitor aging or even breakdown;
- 03** Misoperation or failure of protection devices to operate, leading to regional power outages;
- 04** Causes grid resonance and leads to safety accidents;
- 05** Affects motor efficiency and normal operation, generates vibration and noise, and shortens motor life;
- 06** Damage to sensitive equipment in the power grid;
- 07** Cause errors in various measuring instruments in the power system;
- 08** It will interfere with communication and electronic equipment, causing brake system failure or malfunction.

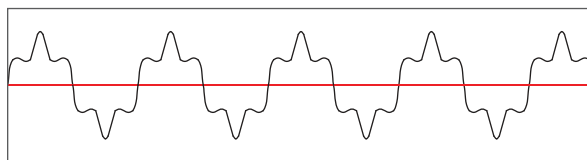
Aiming at reactive power compensation and harmonic control, voltage fluctuation and flicker in modern power distribution system, Shanghai Qidian provides you with a full range of solutions, so that each of our customers can achieve the best state of energy saving and improvement of power quality.

Raynen Technology hopes to work with you to create a green and safe electricity environment.

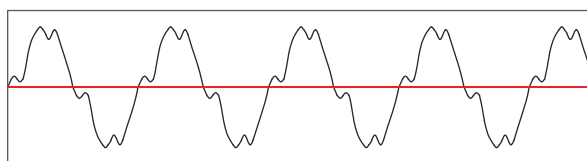
Our eternal mission is to improve the quality of electricity, purify the electricity environment, reduce energy loss, and save electricity costs!



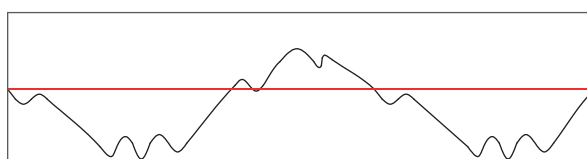
→ The waveform of a pure power grid is a perfect sine curve



→ The polluted power grid contains 5th and 7th harmonic waveforms



→ The polluted power grid contains the waveform of x harmonics



→ The heavily polluted power grid contains many kinds and large amounts of high-order harmonics

APF

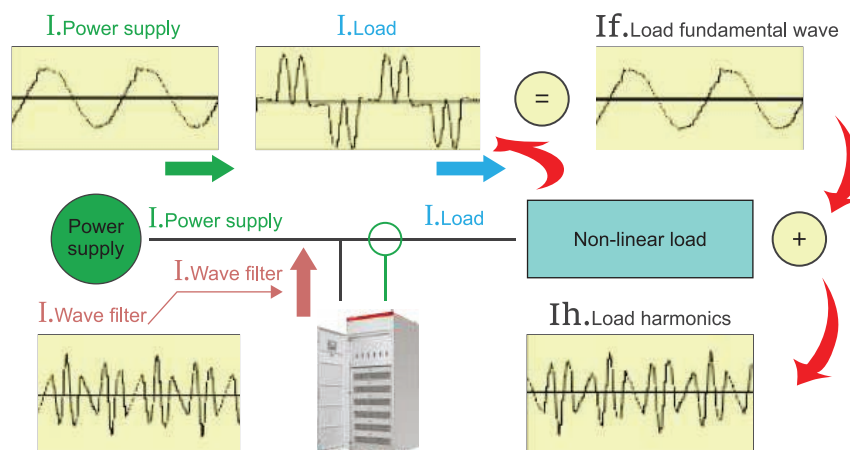
Active Power Filter

Product summary

- The IGBT power converter in the main circuit of the RVPQ-APF active power filter uses detection technology based on instantaneous reactive power theory to automatically track changes in grid harmonics, and is highly controllable and responsive. It overcomes the shortcomings of traditional passive filters, such as poor filtering effect, easy resonance, and only filtering fixed harmonics, and can play a good filtering and compensation effect on various fast transient impact loads.
- The RVPQ-APF active filter is a technical upgrade product of the integrated active filter. It uses military-grade control chips, with strong computing power and anti-interference capabilities, and can realize the centralized control of multiple active filters in parallel by the controller; it uses an adaptive current average value control algorithm combined with an LCL topology structure to overcome the shortcomings of traditional hysteresis current control due to changes in switching frequency, such as a wide output spectrum range, difficult filtering, and high-frequency harmonics interfering with the grid.

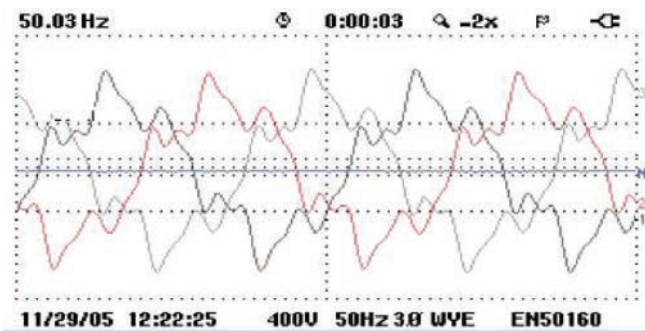
Working principle

APF collects current signals in real time through external current transformers, separates the harmonic part through internal detection circuits, and generates compensation currents with equal magnitude and opposite phase to the harmonics in the system through IGBT power converters, thereby achieving the function of filtering out harmonics.

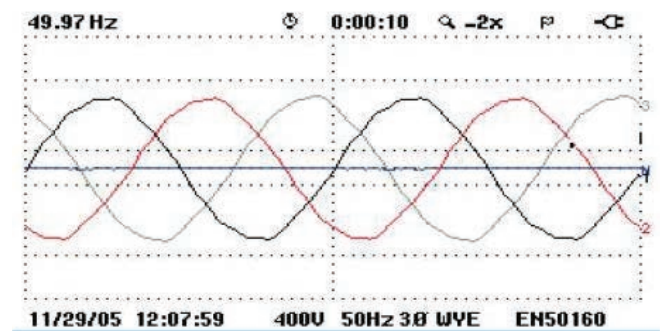


■ Technical features

- Excellent filtering capability: harmonic filtering rate greater than 98%
- The control system uses military-grade FPGA chip: super computing power
- High reliability parallel mode: centralized control by the same controller, no circulation between modules
- Three-level structure: smooth output current, low device loss
- Building block expansion structure is convenient for equipment expansion and maintenance
- All data are communicated by optical fiber: strong anti-interference ability
- Adaptive control algorithm: adapt to any system impedance change
- Each harmonic current output can be limited: can be used with passive filter to filter out the same harmonic



Before filter installation



After filter is put into use



■ Performance parameters

Basic parameters	
Wiring method	Three-phase three-wire or three-phase four-wire
Operating voltage	200V/400V (−20%~+20%), 480V (maximum voltage: 500V), 690V (−20%~+10%)
Operating frequency	50/60HZ (+−10%)
Filtering capability	<5%THDi rated capacity
Filtering range	2~50 times optional, single time optional
Response time	<100μs
Switching frequency	20KHz
Function setting	Compensate only harmonics, only reactive power, both harmonics and reactive power; manual and automatic switching
Protection type	DC overvoltage, IGBT Overcurrent, device temperature protection, phase loss protection
Overload protection	Automatically limit current at the set value, no overload
Cooling method	Intelligent air cooling
Noise	≤65db (inside the cabinet and operating at rated state)
Display interface	7-inch touch screen
Display status	Various load parameters such as harmonic current
Operation	Various operation mode selection and start and stop touch buttons
Communication	RS485, RS232, Modbus protocol
Ambient temperature	−20℃~+45℃
Storage temperature	−40℃~+65℃
Relative humidity	Maximum 95%, no condensation
Sea wave height	Derating for use when >1500m



Model Description

RN-E - APF 100M/4L - 0.4

① ② ③ ④ ⑤ ⑥

① RN-E : Enterprise code	② APF: Product code	③ 100: Filter capacity A
④ M: Modular type H: Wall-mounted type F: Cabinet type	⑤ 4L (3L): Three-phase four-wire system (three-phase three-wire system)	
	⑥ 0.2 (0.4/0.48/0.69): Voltage level: 200V/400V/480V/690V	

APF module (Wall-mounted H or Rack-mounted M)						
Module specifications	50A	75A	100A	150A	200A	100A
Wall-mounted size(W*D*H mm)	378*525*200	418*556*200	503*611*232	573*621*250	694*680*250	—
Rack-mounted size(W*D*H mm)	359*538*200	399*626*200	484*646*232	554*656*250	674*715*250	569*697*250
Voltage level	220V/400V/480V					690V
Wiring method	Three-phase three-wire; three-phase four-wire					
Number of parallel connections	≥20 modules in parallel					
Weight	22kg	27kg	38kg	47kg	56kg	50kg
Installation method	Wall-mounted H; Rack-mounted M					

APF complete machine (Cabinet type F)								
Product model	100A	150A	200A	250A	300A	350A	400A	500A
Voltage level	200V/400V/480V/690V							
Wiring method	Three-phase three-wire; Three-phase four-wire							
Protection level	IP30 or customized according to user requirements							
Dimensions (W*D*H mm)	800*800*2200 or customized according to user requirements							
Current transformer	500/5 to 5000/5							
Cooling method	Forced air cooling							
Inlet method	Through busbar, cable upper, lower or side entry							
Installation method	Vertical cabinet type (F)							

*Products are continuously iterating, module information is for reference only, if you need accurate data, please consult our technicians.

SVG

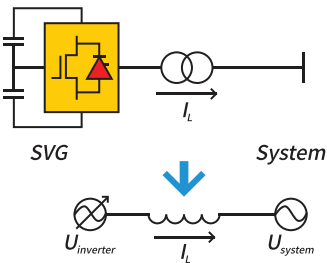
Static VAR Generator

Product summary

Low-voltage static VAR generator is a new generation of reactive power compensation device. Compared with the traditional reactive power compensation device composed of capacitors and reactors, SVG has incomparable advantages. This product can choose a variety of working modes to operate, which can compensate both inductive reactive power and capacitive reactive power. It can absorb and emit reactive current instantaneously to meet the reactive power demand of the system, realize the local balance of reactive current, and maintain the real-time high power factor operation of the system. SVG is the best solution in the field of reactive power control. It has the advantages of more stable operation, longer life, faster response, larger operating range, smoother adjustment, and more stable system voltage.

Working principle and characteristics

The RVPQ-SVG static VAR generator detects the load current in real time through an external current transformer (CT), and analyzes the reactive power and harmonic content of the load current through internal DSP calculations. Then, the PWM signal generator is controlled according to the set value to send a control signal to the internal IGBT, so that the inverter can invert the reactive current and harmonic current that can meet the system requirements, so as to achieve the purpose of reactive power compensation and harmonic elimination.



Three operating modes of static VAR generator

Operation Mode	Waveform and vector diagrams	illustrate
No-load operation		SVG does not absorb or emit reactive power
Capacitive operation		SVG generates continuous controllable reactive power
Inductive operation		SVG absorbs continuously controllable reactive power

■ Technical features

1. The control algorithm and software have been accumulated and improved for more than ten years, and the technology is mature, stable and reliable. The computing speed and control technology of the full FPGA control system have reached the international leading level.
2. Multiple compensation functions, one machine for multiple uses, two-way continuous adjustment of reactive power, can compensate for inductive loads, and can also compensate for capacitive loads. Track the rapid changes in loads and adjust continuously and seamlessly. At the same time, current harmonics can also be filtered out.
3. The on-site setting is simple and convenient. The distribution ratio of reactive compensation and harmonic compensation can be set according to the on-site reactive content and harmonic characteristics, giving full play to the role of one machine with multiple functions.
4. Modular product design has the following advantages:
 - Each module has independent operation capability and complete functions.
 - Functional modules of the same specifications have good consistency, standardization and strong interchangeability.
 - Convenient maintenance and fault handling. When one of them fails, it does not affect the operation of multiple other devices.
 - Convenient for on-site capacity expansion. If the system load increases, flexible capacity expansion can be achieved by adding functional modules.

Technical Parameters				
Input	Working voltage	400V/200V -20%~+20%	480V Maximum voltage: 500V	690V -20%~+10%
	Working frequency	50Hz (-10% ~ +10%)		
	Current transformer	100/5~6000/5		
	Compensation for reactive power	-1~+1 adjustable		
	Compensation for three-phase imbalance	100% unbalanced full compensation		
Communication Protocol	Communication method	485, Modbus protocol		
	Upper computer software	Yes, all parameters can be set through the host computer		
	Fault alarm	Yes, up to 500 alarm messages can be recorded		
	Monitoring	Support independent monitoring of each module/centralized monitoring of the whole machine		
Technical indicators	Full response time	<10ms		
	Active power loss	<2.5%		
	Cooling method	Intelligent air cooling		
	Noise	<60dB		
	Protection function	Over 20 types of protection such as overvoltage, undervoltage, overheating, overcurrent, short circuit, etc.		
	CT installation position	Load side/grid side optional		
Environmental requirements	Working temperature	-10℃~+45℃		
	Altitude	> 2000m, use at reduced rating		
	Relative humidity	<95%, no condensation		
	Protection level	IP20 (higher protection level can be customized)		

■ Model Description

$$\frac{\text{RN-E}}{\textcircled{1}} - \frac{\text{SVG}}{\textcircled{2}} \frac{100\text{M}/4\text{L}}{\textcircled{3} \textcircled{4} \textcircled{5}} - \frac{0.4}{\textcircled{6}}$$

① RN-E: Enterprise code	② SVG: Product code	③ 100: Filter compensation capacity Kvar
④ M: Modular type H: Wall-mounted type F: Cabinet type	⑤ 4L (3L): Three-phase four-wire system(three-phase three-wire system)	
	⑥ 0.2 (0.4/0.48/0.69): Voltage level: 200V/400V/480V/690V	



• SVG Selection

The capacity Q of SVG is determined by the reactive capacity Q_1 and harmonic capacity Q_h required by the system.

$$Q = \sqrt{Q_1^2 + Q_h^2} \quad (\text{And } Q \geq 2Q_h)$$

When the harmonic content is small, the capacity of the SVG can be approximated by taking an appropriate margin from the reactive capacity. If the harmonic content is large, it must be calculated using a formula.

Transformer capacity (KVA)		315	630	800	1000	1250	1600	2000	2500
SVG	Compensation capacity	100Kvar	200Kvar	250Kvar	300Kvar	400Kvar	500Kvar	600Kvar	750Kvar
	Fixed method	Cabinet type	Cabinet type	Cabinet type	Cabinet type	Cabinet type	Cabinet type	Cabinet type	Cabinet type
	Number of cabinets	1	1	1	1	1	1	2	2

SVG module (Wall-mounted H or Rack-mounted M)										
Module specifications		35Kvar	50Kvar	75Kvar	100Kvar	150Kvar	25Kvar	50Kvar	75Kvar	120Kvar
Wall-mounted size	W (mm)	378	418	503	573	694	399	554	674	569
	D (mm)	525	556	611	621	680	626	656	715	697
	H (mm)	200	200	232	250	250	200	250	250	250
Rack-mounted size	W (mm)	359	399	484	554	674	—			—
	D (mm)	538	626	646	656	715				
	H (mm)	200	200	232	250	250				
Voltage level		400V/480V					200V			690V
Wiring method		Three-phase three-wire; Three-phase four-wire								
Number of parallel connections		≥20 modules in parallel								
Installation method		Wall-mounted H; Rack-mounted M								

SVG complete machine (Cabinet type F)							
Module specifications	100Kvar	150Kvar	200Kvar	250Kvar	300Kvar	350Kvar	400Kvar
Voltage level	200V/400V/480V/690V						
Wiring method	Three-phase three-wire; Three-phase four-wire						
Dimensions mm (W*D*H mm)	600*800*2200, 800*800*2200 or customized according to user requirements						
Current transformer	500/5 to 5000/5						
Cooling method	Forced air cooling						
Inlet method	Through busbar, cable top, bottom or side entry						
Installation method	Cabinet type F						

*Products are continuously iterating, module information is for reference only, if you need accurate data, please consult our technicians.

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