



Clean up the power grid Green and energy-saving

Shanghai iKonMac Technology Co., Ltd.

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POWER QUALITY



Reliability is the **soul** of industrial products

Shanghai iKonMac Technology Co., Ltd. adheres to putting product reliability first and has been striving for excellence for 30 years, wholeheartedly ensuring the quality of products across the world.

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6.1 R 6.2 P 6.3 C 6.4 S

Create value for the society

Shanghai iKonMac provides high quality products, strive to create excellent enterprises, and strives to create value for customers and society!

CATALOGUE

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Shanghai iKonMac Technology Co., Ltd was established in 1994 and is located in TianDi Innovation Park in Shanghai. It is a recognized high-tech enterprise. iKonMac focuses on the research of power quality management products and has over 30 years of experience in product development in the power electronics industry. It is a high-tech enterprise that integrates product research and development, production, sales, and service. iKonMac's main products include Active Harmonic Filter (AHFs), Static Var Generator (SVGs) Silicon Carbide(SiC), High Voltage Power Quality Products etc. At the sametime, we provide users with comprehensive and high quality power quality services, including on-site testing, project design, technical consultation, installation and debugging training throughout the service.

iKonMac pursues continuous innovation, which requires a strong and capable R&D team. The core technical team has over 30 years of experience in the power electronics industry, with over 50 post doctoral, doctoral and master's research and development personnel. The efficient product development and management team ensures the progressiveness and competitive advantages of iKonMac Technology's products, and can continuously launch new products to meet the user's demand for high reliability and high intelligence products.

30 years of development **3.5 Million** Amps/kVar Supplied Each Year **125+** Patents & Software Technologies

Global Business Footprint







More than **3000+** Partners Trust **iKonMac** in Power Quality Solution

Corporate Honors Qualifications

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Manufacturing the Most Reliable Power Quality Products in China



UDEM MA ISO





- ISO 9001/ ISO 14001 / ISO 45001
- CE Certificate
- Certified as Top Power Quality Company in China

Charles Co

- National High-tech Enterprise Certificate
- National Innovative Enterprise Award
- National Specialized and New Award
- National Growth Potential Award
- Science & Technology Innovation Award
- High-Tech Achievement Project Award
- Little Giant Enterprise Recognition Award
- Top Ten Innovative Brands in Power Quality

Patents & Inventions



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1.1 The power grid can also get sick

People will suffer from various diseases, such as colds, pneu-monia, heart disease, etc. The power grid, like humans, will also get sick. So what diseases will the power grid suffer from?





Stable Voltage Stable Frequency 🛰 GOOD



Reactive power is the energy required to establish an AC electromagnetic field. If the required reactive power in the load cannot be compensated nearby, it needs to be obtained from the power grid through a transmission line. The transmission of reactive power between the power grid and the load will result in the loss of electrical energy;

Nonlinear loads in the power grid can generate harmonic currents during operation, leading to distortion and distortion of voltage and current waveforms. Harmonic problems can cause increased losses, heat generation, and affect service life, while serious problems can interfere with communication, cause protection malfunctions, and even cause equipment burning or damage;

400V low-voltage distribution contains a large number of single-phase loads, and the electricity consumption is different, which is prone to three-phase load imbalance, leading to increased additional losses and capacity waste of distribution transformers;

The instantaneous reactive power impact generated by the start and stop of high-power loads can cause voltage fluctuations, causing voltage dips and surges. High or low voltage can affect the normal operation of equipment.





High Power Factor Three-Phase Balance

No Harmonics

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People who catch a cold may have a fever, cough, runny nose, and lack of energy. So what are the effects of a power grid illness?



Harmonics can affect user devices, leading to display inaccuracies, touch failures, and malfunctions in precision equipment like medical or CNC devices.



1.4 Private Doctors of the Power Grid

iKonMac Technology Co., Ltd. specializes in R&D, production, and sales of power quality management products, aiming to provide top-quality products and services. It strives to act as a private doctor for large users' power grid quality, ensuring electricity safety and protection.







1.5 Targeted Medication



- Correct the power factor to 0.99 to avoid fines and reduce electricity costs
- Enhance the dynamic and static stability of the power system
- Minimize losses and voltage fluctuations
- Optimize the utilization of power generation equipment, reduce investment
- Reactive power compensation is key to energy conservation and cost reduction



Motors and other loads generate inductive currents, creating reactive power with current lagging behind voltage.



Capacitive loads generate capacitive current, creating capacitive reactive power with current leading voltage.



The IKM-SVG generates capacitive reactive power, which cancels out inductive reactive power, aligning voltage and current phases.



The IKM-SVG generates inductive reactive power, which cancels out capacitive reactive power, aligning voltage and current phases

AHF

SPC

- Filter harmonics to reduce heating in lines and equipment, improving safety and reliability.
- Minimize resonance and fault risk in capacitors, ensuring proper reactive power compensation.
- Prevent equipment malfunctions and inaccurate measurements caused by harmonics.
- Reduce line heating, delay cable insulation aging, and extend lifespan.
- Eliminate electromagnetic interference from harmonics, ensuring proper communication system operation.
- Meet national standards to avoid forced power shutdowns by the supply company



• Lower transformer and line losses, improving transformer efficiency

SVG

OVERVIEW OF POWER QUALITY



Nonlinear loads generate high-order harmonic currents, causing current waveform distortion.



IKM-AHF generates harmonic currents with equal magnitude and opposite phase to cancel out the harmonics.



Three-phase unbalanced load current



IKM-SPC shifts the unbalanced load current to ensure three-phase balance on the grid side.

IKM AHF/SVG Product Introduction







SIMILARITIES

- The external dimensions of AHF and SVG are the same. Standardized modules make production more efficient and convenient to use.
- The monitoring touch screen interface of AHF and SVG is the same.
- AHF and SVG have the ability to simultaneously compensate for harmonics, reactive power, and regulate three-phase unbalanced current.
- The internal structure is the same.





DIFFERENCES

- Different application scenarios. AHF is mainly used for filtering while SVG is mainly used for compensating reactive power, and they are applied in different situations with different requirements.
- The selection and control procedures of internal components are different. Because the main functions of the two are different, they target different current frequencies.
- There are differences in filtering range and capability. AHF can filter out 2-50 harmonics, while SVG can only filter out 2-25 harmonics. AHF has better filtering performance
- There are differences in parameter settings. SVG is generally set to compensate for reactive power priority by default; AHF is generally set to compensate for harmonics first by default.

HARMONIC GOVERNANCE

REACTIVE POWER COMPENSATION

ADJUSTING THREE-PHASE CURRENT IMBALANCE

2.2 IKM AHF/SVG Compensation Principle

WORKING PRINCIPLE



Compensation schematic diagram

AHF/SVG collects current signals in real time through external current transformers, separates the harmonic components through internal detection circuits, and generates compensation currents that are equal in size and opposite in phase to the harmonics in the system through IGBT power converters, achieving the function of filtering out harmonics.

AHF/SVG generates capacitive or inductive fundamental currents through IGBT power converters based on the reactive power of the system, achieving the purpose of dynamic reactive power compensation. The compensation target value can be set through the operation panel, without overcompensation, and the compensation is smooth, without causing inrush current impact on the load and power grid.

AHF/SVG extracts the unbalanced component based on the system current, and the three-phase sends out a current that is equal in size and opposite in phase to the unbalanced component. By compensating the unbalanced part to zero, the three-phase unbalanced current on the grid side can be corrected to three-phase balanced current.



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CONTROL PRINCIPLE



Internal control schematic diagram

After the circuit breaker is closed, in order to prevent the instantaneous impact of the power grid on the DC bus capacitor during power on, AHF/SVG first charges the DC bus through a soft start circuit. When the bus voltage Udc reaches the predetermined value, the main contactor closes. As an energy storage device, DC capacitors provide energy by outputting compensating current through IGBT inverters and internal reactors. AHF/SVG collects current signals in real-time through external CT and sends them to the signal conditioning circuit, which then sends them to the controller. The controller decomposes the sampled current, extracts each harmonic current, reactive current, and three-phase unbalanced current, compares the collected current component to be compensated with the compensation signal to the driving circuit. The IGBT converter is triggered to inject the compensation function.

2.3 IKM AHF/SVG Features



GENERAL FEATURES

- AHF and SVG adopt modular standard design. Different capacity modules can be freely matched, making installation and maintenance convenient, Each module operates independently, automatically exiting after any module fails, while the other modules continue to operate, resulting in higher reliability.
- The compensation model is flexible and convenient, with strong comprehensive governance capabilities. Reactive power, harmonic, and imbalance compensation can be freely selected, and priority levels can be set.
- AHF can compensate for 2-50 harmonics, SVG can compensate for 2-25 harmonics, and specific harmonic compensation can be selected.
- Bidirectional dynamic reactive power regulation, with a power factor that can be compensated to 0.99.
- Fast response speed, response time ≤10ms.
- It can be equipped with an external 7-inch centralized monitoring touch screen, and has a friendly human computer interface to view real-time power quality information.
- A single monitoring screen can monitor 12 modules. If there are more than 12 modules in a single system, increasing the number of touch screens is sufficient, and the number of parallel machines is not limited.
- During the compensation process, the module's operating status can be automatically detected in real-time, and self diagnosis can be restarted in case of a fault. If the fault is eliminated, it will be automatically put into use.
- The module has comprehensive and comprehensive protection functions such as overvoltage, undervoltage, and overcurrent temperature.
- Equipped with IGBT temperature monitoring function, when the temperature exceeds the design limit of the software the module will automatically derate for use, effectively protecting the normal operation of the module.

CORE ADVANTAGES

• Industry First Layered Closure Technology Electronic components and power devices are designed in layers, and the electronic layer is fully enclosed. The protection level standard is IP42, and customization can reach IP54, without fear of harsh environments such as dust, high temperature, humidity, salt and alkali. • The Seventh generation IGBT Significantly increase the switching frequency and reduce losses by one-third. FPGA control Adopting full FPGA chip control, completely replacing DSP; FPGA uses hardware logic gates for programming, with no risk of stack overflow and high reliability. • Extremely high switching frequency Using quasi natural sampling and continuous control, the equivalent switching frequency reaches 80kHz, the current loop width reaches 4kHz, and the interference suppression speed reaches more than four times that of other products in the same industry. The mainstream indicators in the industry are 20kHz/1kHz, respectively. Extremely low loss When working at full load, the active power loss is <2.5% which is lower than the mainstream industry indicator of 3%-4%. Save electricity costs for users. • Extremely low noise When the entire machine is operating at full load, the noise is \leq 60dB, which is lower than the mainstream industry indicator of 70dB. Provide users with a better user experience • Extremely high power density 800*800mm standard low-voltage distribution cabinet, with AHF power up to 800A and SVG up to 600kvar. Reduce installation space, save floor space, and reduce costs for users.

2.4 IKM AHF/SVG Technical Parameters Table

Category	Pro	Power Quality Product (Silicon Carbide Customizable)															
Name	Produc	t Name			S٧	'G (kv	ar)			AHF (A)							
	Voltag	e level		40	0V		480V	690V	800V	400V						480/690V	800V
	Module Sp	30	50	100	150	40/80	50/100	100/135	35	50	75	100	150	200	50/100	75/100	
		480*130*440	\checkmark							\checkmark							
	Module size	480*200*530		\checkmark							\checkmark	\checkmark					
Specification	(W*H*D) (Note 1)	680*200*530		\checkmark	\checkmark	\checkmark					\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
0,000,000,000,000		680*200*550					\checkmark	\checkmark	\checkmark							\checkmark	\checkmark
	T 1 ·	600*600		20	00					300							
	capacity of a	600*800		30	00						600						
	single cabinet	800*800		60	00		400	500	675			8	300			500	500
	Number o	f parallels									12						
	Operating	g voltage					400	V (304V-4	456V)	690V	(552V-82	28V)	800V (6	80V-920\	/)		
Input	Operating	frequency							50)Hz/60H	z (-10% -	~ +10%)					
	Current tra	ansformers								100 :	5 ~ 1000	0:5					
	Cont	roller						10	0% Full FF	PGA, 16	CPUs pa	arallel co	mputation	ı			
Function	Compensate	for harmonics				2-	25th						2	2-50th			
	Effici	ency	>97.5%														
	Compensates for	r reactive power	-1~+1adjustable (Within the capacity of the device)														
	Compen Three-phase	sates for e imbalance	100% The imbalance is fully compensated (690V No compensation for three-phase unbalance function)														
	Switching	Frequency	80khz														
	Methods of Co	ommunication	RS485, Modbus RTU, Wifi (Remote control debugging)														
Communi-	Host compu	Yes, all parameters can be set by the host computer															
Protocols	Fault alarm			Yes, up to 500 alarm messages can be recorded													
	Mor	nitor	Support independent monitoring of each module/centralized monitoring of the whole machine														
	Full respo	onse time	≤5ms , instant response <50us														
	Active	e loss	≤2.5%														
Technical	Heat dis	sipation	Intelligent air cooling														
Indicators	No	ise	≤60dB														
	Protection	n features		There are more than 20kinds of protection such as overvoltage, undervoltage,							oltage,						
	CT Installat	ion location		Load side/grid side Optional													
	Wall mo	ount size		The wall mount is the same size as the module													
Mechanical Properties	Module	weight		17.5kg (30k/35A) ; 26kg (480W50k/50A/75A/100A) ; 32kg (680W50k/50A/75A) ; 38.5kg (680W100k/100A/150A) : 45.5kg (150k/200A):													
	Co	lor							7035 Fin	e orang	e texture	spray pa	inted				
	Operating to	emperature								-20	°C~+55°(С					
	Elev	ation					For eve	ery 100 m	<5000m eters of a	eters (N dditiona	lore than I elevatio	1000 me n, the po	eters, wer is red	luced by	1%.)		
Environmental Requirements	Relative	humidity							<	<95%, N	lo conder	nsation		,			
	Ingress p	protection		Module IP20 + Electronic Layer IP42 (Customizable IP54 or IP65)													
	Pollution resi	stance rating	Level 2 (Customizable level 3)														

Note1: The opening ratio and fan specifications of the front and rear doors of the cabinet should meet the specifications specified by our company and keep the ventilation good.

2.5	IKM A	HF/SV	/G Mo	del D
AHF	Model D	escriptio	n	
IKM	AHF	400V	100A	3L/R
				TT



IKM AHF/SVG PRODUCT INTRODUCTION

Description

*i*KonMac

2.6 IKM AHF/SVG Capacity Configuration Scheme

Capacity Determination of AHF Active Filter

Based on the experience of the power quality industry, two formulas are commonly used to estimate the capacity of harmonic suppression.

(1) Centralized governance: Estimate the configuration capacity of harmonic governance based on industry classification and transformer capacity.

$$I_{h} = \frac{S \times K}{\sqrt{3} \times U \times \sqrt{1 + THD^{2}}} \times THD^{i}$$

h ---- Harmonic current

S — Transformer rated capacity U — Rated voltage on the secondary side of the U-transformer

THD — Total current distortion rate, with a range of values determined based on different industries or loads

K ---- Transformer load rate

Industry type	Typical harmonic distortion rate %
Subways, Tunnels, High-speed trains, Airports	15%
Communication, Commercial buildings, Banks	20%
Medical Industry	25%
Automobile manufacturing, Ship manufacturing	30%
Chemical / Petroleum	35%
Metallurgical Industry	40%

(2) On site governance: Estimate the configuration capacity of harmonic governance based on different load devices.

$$I_{h} = K \times I_{N} \times \frac{THD_{i}}{\sqrt{1 + THD_{i}^{2}}}$$

Ih — Harmonic current THD; — Total current distortion rate, with a range of values determined based on different industries or loads

Load type	Typical harmonic content %	Load type	Typical harmonic content %		
Inverter	30~50	Medium freqency induction heating power supply	30~35		
Elevator	15~30	Six pulse rectifier	28~38		
LED Lights	15~20	Twelve pulse rectifier	10~12		
Energy saving lamp	15~30	Electric welding machine	25~58		
Electronic ballast	15~18	Variable frequency air conditioning	6~34		
Switching Mode Power Supply	20~30	UPS	10~25		

Note: The above calculations are only estimation formulas and have a certain error

Determination of SVG reactive power compensation capacity

(1) Estimate based on transformer capacity:

20% to 40% of the transformer capacity is used to configure reactive power compensation capacity, with a general selection of 30%

$$Q_{\text{compensate}} = 30\% \times S$$

O — Reactive power compensation capacity

For example, a 1000kVA transformer is equipped with 300kvar reactive power compensation

(2) Calculate based on the power factor and active power of the equipment:

If there are detailed load parameters, such as maximum active power P, power factor COS0 before compensation, and target power factor COS₀ after compensation, the actual compensation capacity required for the system can be directly calculated:

$Q = K \times P \times (\tan \theta_1 - \tan \theta_2)$

Q — Reactive power compensation capacity P — Maximum active power

Q — Average load coefficient (generally taken as 0.7-0.8)

Note: The above calculations are for reference only.

K — Transformer load rate

IKM AHF/SVG PRODUCT INTRODUCTION

S — Transformer capacity

IKM AHF/SVG Quick Selection Table 2.7

• AHF Quick Selection Table

Transformer capacity	AHF Capacity configuration	AHF Capacity configuration
Scope of application	Commercial plazas, Office buildings, Financial Towers, Hotels, Theaters, Data Centers, Hospitals, Banks, Schools and other light-load occasions	Petrochemical, Mining and Metallurgy, Automobile Manufacturing, Shipbuilding and heavy industry, Sewage treatment, Port terminals, Rail transit, Food processing, Papermaking, Textile printing and dyeing, Material processing!
200kVA	35A	50A
250kVA/315kVA	50A	75A
400kVA/500kVA	75A	100A
630kVA/800kVA	100A	150A
1000kVA	150A	200A (100A*2)
1250 kVA	200A (100A*2)	250A (150A +100A)
1600 kVA	250A (150A+100A)	300A (150A*2)
2000 kVA	300A (150A*2)	400A (150A*2+100A)
2500 kVA	400A (150A*2+100A)	500A (150A*2+100A*2)

• SVG Quick Selection Table

Transformer	SVG Capacity configuration							
capacity	Cosθ≤0.5	0.5≤Cosθ≤0.6	0.6≤Cosθ≤0.7	0.7≤Cosθ≤0.8	0.8≤Cosθ≤0.9			
200kVA	100kvar	100kvar	100kvar	100kvar	100kvar			
250kVA	150kvar	100kvar	100kvar	100kvar	100kvar			
315kVA	200kvar	100kvar	100kvar	100kvar	100kvar			
400kVA	200kvar	200kvar	200kvar	150kvar	100kvar			
500kVA	300kvar	300kvar	300kvar	150kvar	100kvar			
630kVA	300kvar	300kvar	300kvar	200kvar	150kvar			
800kVA	500kvar	500kvar	300kvar	300kvar	150kvar			
1000kVA	300kvar	500kvar	500kvar	300kvar	200kvar			
1250kVA	700kvar (300kvar+400kvar)	600kvar	600kvar	500kvar	300kvar			
1600kVA	800kvar (400kvar*2)	800kvar (400kvar*2)	800kvar (400kvar*2)	500kvar	300kvar			
2000kVA	1000kvar (500kvar*2)	1000kvar (500kvar*2)	1000kvar (400kvar*2)	600kvar	300kvar			
2500kVA	1500kvar (500kvar*3)	1300kvar (500kvar*2+300kvar)	1000kvar (500kvar*2)	800kvar (400kvar*2)	500kvar			

2.8 IKM AHF/SVG Product Dimensions

680 Width Rack Type Module Dimension Diagram (100/150kvar 150/200A)



680 Width Rack Type Module Dimension Diagram (50kvar 50/75A)



Top view







Rear view



Side view



Rear view



680 Width Rack Type Module Dimension Diagram (100A)

Front view



Top view



Side view

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Rear view



680 Width Wall Type Module Dimension Diagram (150kvar 200A)

Bottom view







680 Width Wall Type Module Dimension Diagram (100kvar 150A)

Bottom view





680 Width Wall Type Module Dimension Diagram (100A)

Bottom view





IKM AHF/SVG PRODUCT INTRODUCTION



Top view



Side view





Side view



480 Width Rack Type Module Dimension Diagram (50kvar 50/75A)







Side view



Rear view



480 Width Rack Type Module Dimension Diagram (100A)



Top view



Shanghai iKonMac Technology Co., Ltd.



Rear view



480 Width Wall Type Module Dimension Diagram (50kvar 50/75A)





480 Width Wall Type Module Dimension Diagram (100A)

Bottom view



Front view



Top view M6 23 27 4*M8 454

Side view



Top view



Side view



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130 Height Rack Type Module Dimension Diagram (30kvar 35A)

Front view





Side view



Rear view



130 Height Wall Type Module Dimension Diagram (30kvar 35A)

Bottom view



Front view Fuguer 10 12 480 505 530



Side view



480/690V Rack Type Module Dimension Diagram (50/100 kvar 50/100A)

Front view



Top view



480/690V Wall Type Module Dimension Diagram (50/100 kvar 50/100A)

Front view



Front view





Side view



Rear view



Side view





2.9 IKM AHF/SVG Design Scheme



Note: The AHF active filter is located between the reactive power compensation cabinet and the feeder cabinet, and the current sampling CT is located on the front side of the load(i.e., the back side of the AHF active filter access point)

Example of SVG Design Scheme



Note: The SVG reactive power compensation device is located in front of the feeder cabinet, and the current sampling CT is located on the front side of the load(i.e., behind the access point of the SVG reactive power compensation device)

2.10 IKM AHF/SVG Application Cases

Example 1: Metallurgical Industry

A certain metallurgical casting plant, mainly loaded with rectifier equipment such as intermediate frequency furnaces, generates a large amount of harmonics during operation. Due to the small capacity of the transformer, the power supply system exhibits weak grid characteristics when the load is large. The current harmonic distortion rate THD reaches 31%, resulting in a voltage distortion rate THDv of 21%, and a low power factor of 0.55. The on-site dust is severe and the ventilation conditions are poor, which is a typical complex and harsh working condition with "current harmonics + voltage harmonics + severe reactive power + dust pollution + high temperature". Ordinary equipment cannot function properly in this harsh power supply and working environment. The addition of IKM series products to control power quality. Due to IKM's strong anti-interference and pollution resistance capabilities, after the installation and operation of the device, IKM has a significant control effect and stable and reliable operation. The comparison effect before and after

governance is shown in the following figure.

After IKM-AHF was put into operation, the governance effect was very obvious, with voltage and current harmonics basically disappearing. THDi decreased to 4.3%, THDv decreased to 4.5%, and the power factor increased to 0.98.

Example 2: Welding Industry

A certain automobile manufacturing factory mainly carries suspended spot welding, robotic arms, assembly lines, motors, etc. The spot welding machine uses two-phase 380V power supply, and the current fluctuates greatly and the imbalance phenomenon is severe during operation. The A-phase current (yellow) is basically 0, while the B-phase and C-phase currents are 278A and 317A, respectively. The power factor is 0.52, and the current distortion rate is 40%. Because most of the unbalanced current flows through the neutral line, it causes severe heating in the neutral line. It is a typical complex and harsh working environment that combines "current harmonics+severe imbalance+severe reactive power".

After installing IKM-AHF, the current harmonics and reactive power were treated. The results were compared as follows: the three-phase current imbalance was basically eliminated, the neutral current was basically zero, the voltage and current harmonics were basically eliminated, THDi was reduced to 2.7%, and the power factor was increased to 0.98.

IKM AHF/SVG PRODUCT INTRODUCTION



Voltage and current in the metallurgica industry before governance



Voltage and current in the metallurgical industry after governance





Voltage and current of spot welding machine before treatment



Voltage and current of spot welding achine after treatment

IKM Silicon Carbide(SiC) AHF/SVG Product Introduction



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2.11 IKM AHF/SVG Silicon Carbide (SiC) Series

Introduction

In traditional low-voltage 415V power quality systems, switching devices commonly use siliconbased IGBT. The new generation of silicon carbide (SiC) materials has numerous advantages over silicon (Si)-based materials, including lower losses and smaller size. At the same time, with technological advancements, the power capacity of SiC MOS has gradually expanded and has begun to be widely applied in high-power fields such as new energy vehicles, energy storage, and power quality management.

With the large-scale release of domestic SiC production capacity in 2025 and the reduction in SiC device costs, iKonMac has adopted the industry's most advanced active clamping technology, softswitching technology, and proprietary innovative technology, combined with SiC devices, to launch the 415V(304V-456V) SiC power quality device. Compared to the current silicon-based IGBT products in the industry, it has twice the reliability and response speed, and the power module size has been reduced by 46%.



Size Reduced by 46%



Silicon Carbide MOS

Dimensions

Front view





Rear view



Top view



2.12 IKM AHF/SVG SiC Series Specifications

Category	Indicators	Specification		
	Product Series	AHF/SVG 415V SiC Series		
	Module Specifications	100kvar / 150A		
Dimonolono	Module Dimensions(W*H*D)	480*200*530		
·	Number of Parallels	12		
	600*800*2200 Max Capacity Per Cabinet	750A or 500kvar		
	Operating Voltage	(304V-456V)		
Input	Operating Frequency	50Hz/60Hz(±10%)		
	Current Transformer	100 : 5 ~ 10000 : 5		
	Controller	100% Full FPGA, 16 CPUs parallel computation		
Functions	Harmonic Compensation	AHF: 2-50th harmonics, SVG: 2-25th harmonics		
	Harmonic Elimination Rate	Better than the requirements of the "JB/T11067-2011 Low Voltage Active Harmonic Filter Device		
	Switching Frequency	80kHz		
Communi-	Communication Method	RS485, Modbus RTU, Wifi (Remote control debugging)		
	Upper-Level Software	All parameters can be set via the upper-level software		
Protocol	Fault Alarm	Up to 500 alarm messages can be recorded		
	Monitoring	Supports independent monitoring of each module / centralized monitoring of the entire system		
	Response Time	≤5ms , instant response ≤ 50us		
	Efficiency	>98.5%		
Technical	Cooling Method	Intelligent air cooling		
Indicators	Noise	≤60dB		
	Protection Functions	There are more than 20 kinds of protection such as overvoltage, undervoltage, overheating, overcurrent, short circuit, etc		
	CT Installation Location	Load Side		
Mechanical	Module Weight	30kg		
Properties	Color	7035 Fine orange texture		
	Operating Temperature	-40°C~+60°C		
Environ-	Altitude	<5000meters (More than 1000 meters, For every 100 meters of additional elevation, the power is reduced by 1%.)		
mental Require-	Relative Humidity	<95%, No condensation		
ments	Protection Level	Module IP20 + Electronic Layer IP42 (Customizable IP54 or IP65)		
	Pollution Resistance Level	Level 2 (Customizable level 3)		

IKM Silicon Carbide PRODUCT INTRODUCTION

Ultra AHF Product Introduction



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iKonMac

3.1 **Ultra AHF Completes the Last Puzzle Piece of AHF**



iKonMac breaks through the barrier of the lack of a complete solution to power quality issues in weak grid environments. The independently developed Ultra AHF series stable active harmonic filters perfectly achieve the goal of jointly controlling current harmonics and voltage harmonics.

The Ultra AHF series stable active harmonic filters feature faster response times and can more accurately avoid resonance. The most prominent advantage is the ability to simultaneously control various unstable harmonics and stabilize the power grid.

Applicable Load Types



Heating Furnace Equipment



Medium Frequency **Furnace Equipment**



High Frequency Power Supply Equipment



Ultra AHF Advantag-

Advantages of Stable AHF

- Simultaneously compensates for current distortion rate (THDi) and voltage distortion rate (THDv)
- Capable of mitigating interharmonics, even-order harmonics, transient harmonics, and other unstable harmonics
- Switching frequency can reach up to 80kHz
- Response time ≤ 1 ms





- harmonics

ULTRA AHF PRODUCT INTRODUCTION





Challenges with Traditional AHF

• Can only mitigate current harmonics, not voltage harmonics. In weak grid conditions, where the voltage distortion rate is generally high, traditional AHF may fail to operate

Cannot address complex harmonics such as interharmonics, even-order harmonics, or transient

Susceptible to resonance issues

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3.3

Ultra AHF Technical Specifications

Category	Indicators	Specifications		
Name	Product Series	Ultra Active Harmonic Filter		
	Module Specifications	100A/150A		
Dimensions	Module Dimensions(W*H*D)	680*200*545		
	Number of Parallels	12		
	800*800*2200 Max Capacity Per Cabinet	750A		
	Operating Voltage	(304V-456V)		
Input	Operating Frequency	50Hz(±10%)		
	Current Transformer	100 : 5 ~ 10000 : 5		
	Controller	100% Full FPGA, 16 CPUs parallel computation		
Functions	Harmonic Compensation	Harmonic Current: 2nd to 50th Order, Harmonic Voltage		
Tunctions	Efficiency	>98% & THDi < 5%		
	Switching Frequency	80kHz		
	Communication Method	RS485, Modbus RTU, Wifi (Remote control debugging)		
Communi-	Upper-Level Software	All parameters can be set via the upper-level software		
Protocol	Fault Alarm	Up to 500 alarm messages can be recorded		
	Monitoring	Supports independent monitoring of each module / centralized monitoring of the entire system		
	Response Time	≤1ms , instant response < 50us		
	Active Power Loss	≤2%		
Technical	Cooling Method	Intelligent air cooling		
Indicators	Noise	≤60dB		
	Protection Functions	There are more than 20 kinds of protection such as overvoltage, undervoltage, overheating, overcurrent, short circuit, etc		
	CT Installation Location	Load Side		
Mechanical	Module Weight	38.5kg		
Properties	Color	7035 Fine orange texture spray painted		
	Operating Temperature	-20°C~+55°C		
Environ-	Altitude	<5000meters (More than 1000 meters, For every 100 meters of additional elevation, the power is reduced by 1%.)		
mental Require-	Relative Humidity	<95%, No condensation		
ments	Protection Level	Module IP20 + Electronic Layer IP42 (Customizable IP54 or IP65)		
	Pollution Resistance Level	Level 2 (Customizable level 3)		



3.5 **Ultra AHF Product Dimensions**



Top view



ULTRA AHF PRODUCT INTRODUCTION



Rear view



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3.6 **Application in the Semiconductor Industry**



Project Challenge

Dongni Electronics belongs to the semiconductor materials manufacturing industry, with its main load being crystal growth furnaces. During operation, a large amount of harmonics is generated. Multiple crystal growth furnaces cannot be used in parallel, resulting in serious voltage distortion. The load current increases, causing damage to components. Traditional AHF cannot effectively solve the resonance issues and voltage harmonic problems in this project.

Solution



The crystal growth furnace is a high-frequency rectifier power source, which is unstable during operation and easily generates a large amount of voltage and current harmonics. iKonMac Technology solved the persistent voltage harmonic problem and also compensated for current harmonics by using the Ultra AHF stable active harmonic filter. The voltage distortion rate remained stable at less than 4%, and the current distortion rate stabilized at around 8%, effectively solving the complex harmonic issues on Dongni's site.

Before and After Treatment Comparison

Decreased From 10.7% to 2.3%





Voltage waveform after treatment

ULTRA AHF PRODUCT INTRODUCTION



Voltage Harmonic Distortion Rate

Voltage waveform before treatment

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3.7 Application in Supressing Odd Harmonics

Project Challenge

In a rectifier power supply project in Qinghai, the power system had significant even-order harmonic current issues, particularly 2nd and 4th harmonic currents as high as 40A. Notably, the system's front-end power supply was an UPS (uninterruptible power supply). In this environment, using traditional Active Harmonic Filters (AHF) not only failed to effectively address the even-order harmonic issues, but also caused resonance between the AHF and the UPS, further destabilizing the system. Therefore, a more suitable harmonic mitigation solution was needed to ensure the stable operation of the power system.

Project Solution

Unlike odd-order harmonics, even-order harmonics primarily arise from specific devices in the power system. These devices are typically non-linear loads, such as rectifiers, thyristors, and electric arc furnaces. When such non-linear loads are widely used in the power system, the even-order harmonic content significantly increases, posing a serious threat to the stability of the power system and the safe operation of equipment.

After installing the Ultra AHF stable active harmonic filter on the load side, the even-order harmonics were eliminated. The voltage distortion rate remained stable at around 1%, and the harmonic current distortion rate was significantly reduced from 34% to approximately 6%.

	A	В	С	N	
Voltage U:	219.5V	221.4V	221.1V		
Distortion Rate THDu:	2.1%	2.3%	2.1%		
Current I:	286.4A	242.7A	287.4A	24.9A	
Distortion Rate THDi:	34.7%	31.7%	27.6%		
Fundamental PF DPF:	0.75	0.85	0.90		
PF:	0.71	0.80	0.86		
Active Power:	44.3kW	43.2kW	54.6kW		
Reactive Power:	39.1kVar	26.8kVar	26.8kVar		
Apparent Power:	62.8kVA	53.6kVA	63.5kVA		

Before mitigation, the grid-side current harmonic distortion rate reached 34%.



Before mitigation, there were even-order harmonics such as the 2nd and 4th harmonics.

	А	В	С	N
Voltage U:	219.4V	221.1V	221.0V	
Distortion Rate THDu:	1.0%	1.2%	1.4%	
Current I:	311.8A	283.4A	280.5A	19.0A
Distortion Rate THDi:	6.0%	6.8%	6.5%	
Fundamental PF DPF:	0.74	0.71	0.82	
PF:	0.74	0.71	0.82	
Active Power:	50.8kW	44.3kW	50.6kW	
Reactive Power:	45.5kVar	44.1kVar	35.5kVar	
Apparent Power:	68.4kVA	62.6kVA	61.9kVA	

After mitigation, the grid-side current harmonic distortion rate was reduced to 6%.



After mitigation, even-order harmonics were successfully eliminated.



Application in Rectifier Power Supply Loads

Project Challenge

At the Tianma Power Supply project site, the load used is a rectifier power supply. When traditional AHF is used for compensation, the harmonics compensated for create resonance with high order harmonics, resulting in poor compensation and a discrepancy with the customer's target requirements.

Project Solution

Rectifier power supply loads generate a series of harmonic components during the rectification process due to their non-linear nature. These harmonic components not only affect the efficiency of the rectifier power supply itself but also pollute the power grid, interfering with the normal operation of other electrical equipment.

By installing the Ultra AHF stable-type active harmonic filter on the load side and simultaneously compensating for both current and voltage harmonics, the harmonic current distortion rate was reduced from 46.5% to 1.9% after compensation.

	A	В	С	N
Current I	273.6A	273.6A	268.6A	41.6A
Distortion Rate THDi:	46.5%	49.4%	48.3%	
Fundamental Power D	PF: 0.94	0,94	0.94	
Power Factor PF:	0.88	0.87	0.87	
Active Power P:	51.5kW	51.8kW	51.3kW	
Reactive Power Q:	18.0kVar	18.4kVar	18.2kVar	
Apparent Power:	58.6kVA	59.4kVA	58.8kVA	
	-	-		_
	S 67		() ()	

Before mitigation, the current harmonic distortion rate was 46%.



Project Application Site



After mitigation, the current harmonic distortion rate was 1.9%.

SVGC Hybrid Compensation Controller







The hybrid compensation controller can achieve SVG/AHF switching control of capacitor reactance.



Figure: Basic schematic diagram of hybrid compensation controller

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SVGC Model Description

4.2

STATIC SVGC-CON-J

The static hybrid compensation controller SVGC-CON-J outputs a dry contact signal used to control the switching of capacitor banks by contactors

> Dry Contact Output Port (3A/250V) Output Common Terminal Output Channels: 16 Channels Output signal: Dry Contact, 3A/250V ower input: AC220V COM0 (3A4B): SVG Access.6P4C Crystal Head Insertion ster Slave: Short-circuit for master, open for slave

> > (AC220V)Power Input L N

╎╎	→ → → → → → → → → → → → → → → → → → →
put Port	(25mA/12V) Output Common Terminal
Output Cha	nnels: 16 Channels
Output Sigr	al: DC12V, 25mA/12V
Power Inpu	t: AC220V
COM0: SVG	Access,6P4C Crystal Head Insertion
Master Slav	e: Short-circuit for master, open for slave
nput	(AC220V)Power Input
10 4014	
NZ 12V7	LN

Input

IN1 IN2 12V+

V2.0

SVG Access COM0



SVGC Advantages 4.3

- The hybrid compensation controller can achieve SVG combined with capacitor compensation, reducing compensation costs.
- Rail mounted, more convenient and flexible, without occupying space.
- Paired with AHF/ SVG, it can compensate for the difference in capacitance compensation, resulting in higher compensation accuracy and faster response speed.
- Prevent switching oscillation.



SVGC Product Dimensions 4.4

Front View

Left View





Isometric View

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4.5

SVGC Wiring Diagram

IKM HV-SVG Product Introduction

/iKonMac

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Static Var Generator



iKonMac

HV-SVG Function and Technology Features 5.1

HV-SVG Functions

Compensate System Reactive Power

SVG can compensate for the reactive power loss caused by capacitive equipment such as electric motors, cold and hot rolling mills and electric arc furnaces, which can also improve power factor and reduce line loss.

Stabilize Transmission Lines

Installing SVG on long-distance transmission lines can not only compensate for reactive power losses, increase line voltage and enhance effective transmission capacity under normal operating conditions, but also provide reactive power regulation and damping system oscillations in case of system failures, improving transmission line stability.

Supress Voltage Fluctuation and Flicker

The fluctuation and flicker of voltage are mainly caused by the sharp changes in load, resulting in drastic fluctuations in voltage and current. SVG can provide rapidly changing reactive current to suppress voltage fluctuation and flicker.

Adjust Three-Phase Imbalance

The imbalance of three-phase impedance of transmission and distribution equipment such as lines and transformers in the distribution network can lead to voltage imbalance. Installing SVG can quickly compensate for the negative sequence current caused by load imbalance, ensure the balance of three-phase current in the power grid and improve the power quality of the power grid.



High voltage busbar High voltage busbar User Side SVG Side $\left(\right)$

Typical Topology



Boosting Star Connected SVG

Topology Structure of Converter Chain

- Fully controlled IGBT power devices with fast device response speed, good control effect and flexible configuration;
- The unit adopts modular design to reduce maintenance costs;
- Automatic redundancy design with ability of fault modules being able to automatically exit and SVG being able to continue to run without stoping;
- H-bridge chain cascade structure with low module switching frequency, reducing equipment operating losses;
- PWN carrier phase shiftring control technology, with t he output waveform being close to a sinewave;
- Integrated chain link desgin, occupying aa smaller area.

IKM HV-SVG Product Introduction







HV-SVG Technology Features

- Adopt instantaneous reactive power theory with controller response time ≤5ms and full power response time ≤30ms:
- Equipped with oscilloscope function, which can display real time waveforms of input current, voltage, output current, voltage, etc. of the device;
- Equipped with black box function, which can view current, voltage and other data before and after protection action;
- Comprehensive protection algorithms and online system status self-checking, ensuring system reliability;
- Industrial class storage media, complete data recording, waveform recording and "fault query expert system";
- Advanced hardware platform + real-time multitasking operating system ensures fast processing capability for "avalanche events";
- Adopt high-speed fiber optic multi machine ring parallel communication technology to improve the redundancy of equipment operation and enhance the stability of parallel operation;
- Excellent anti electromagnetic interference capability, capable of withstanding severity levels up to level IV;

- The control system can be fully configured with dual redundancy, with one main and one backup;
- SVG has functions such as harmonic control, three phase imbalance control, high and low voltage ride through, synchronous oscillation control, etc,
- SVG can collaboratively complete high and low voltage ride through, transient modeling, multi-level parallel connection, primary frequency regulation transformation and sub synchronous oscillation suppression of new energy stations;
- Multiple operating modes, including constant reactive powermode, constant power factor mode, constant voltage mode and negative sequence compensation mode, with the ability to switch operating modes online.



HV-SVG Application Scenarios 5.2

The IKM HV-SVG is widely used in power grids, large industries (such as petrochemicals, steel metallurgy and other high energy consuming and high emision industrial users), new energy industries (such as wind power and photovoltaics) and others (such as airports, ports, rail transit). It plays an important role in energy conservation, improving the safety and stability of power grid, enhancing power factor and improving power quality.

Power Grid







Large Industries





Transportation Indsutry





IKM HV-SVG Product Introduction

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Product Classifications 5.3











5.4

Category	Indicators	Parameters	
Rated	Rated output voltage	3kV, 6kV, 10kV, 20kV, 22kV, 24kV, 33kV, 35kV	
Output	Rated capacity	-150Mvar~+150Mvar	
Input	Main circuit	Three-phase 3kV, 6kV, 10kV, 20kV, 35kV	
	Control circuit	DC220, AC380V	
	Allowable power fluctuations	≤120%	
	Functions	Meet the standards of IEEE Std 519-1992, GB/T 14549-93	
Control mode		Fixed reactive powe, fixed voltage, fixed power factor, comprehensive control of voltage/power factor	
	Control chip	DSP+FPGA	
	Operating frequency	50Hz/60Hz	
Control Functions	Response time	≤5ms	
	Unit DC voltage control	Stable unit DC busbar control ensures normal operation of the device	
	Carrier phase shifting	Eliminate or reduce output harmonics	
	Subsidiary functions	Fault recording, harmonic current compensation, negative sequence current compen- sation, etc	
	Run/Stop setting	Touch screen, DCS control, upper communication	
ι	Jpper communication	RS485, Ethernet, Optical Fibre, RS232, 4G	
	Protection function	Overcurrent, quick break, overvoltage, instantaneous drop, cooling fan failure, power unit failure, PT disconnection, unit overvoltage, system voltage abnormality, input voltage imbalance	
	Display/Operation	Local: Touch screen, cabinet door buttons, etc Remote: SCADA, AVC, etc	
Cooling mode		Forced air-cooled, liquid-cooled, air conditioning internal circulation, air liquid cooled	
Protection level		≥IP56	
	Ambient temperature	-10°C ~ +50°C	
Mechanical	Storage/transportation temperature	-40°C ~ +85°C	
Properties	Ambient humidity	≤95%, no condensation	
	Application environment	Below altitude of 2000 meters, there are no corrosive gases,flammable gases or salt spray; Customization is required for environments above 2000 meters or for special use	

Main Technical Parameters and Dimensions

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HV-SVG Outline Dimensions





Volt	age	Outline Dimensions: Width * Depth * Height (mm)					
3kV	6kV	Indoor air-cooling		Indoor liquid-cooling		Outdoor	
Rated C Q (N	Capacity Ivar)	Direct hanging type	Boosting voltage type	Direct hanging type	Boosting voltage type	Air-cooling	Liquid-cooling
0 <q≤0.4< td=""><td>0<q≤0.9< td=""><td>1400x1300x2400</td><td>1400x1300x2400</td><td></td><td></td><td>2200x2100x2700</td><td></td></q≤0.9<></td></q≤0.4<>	0 <q≤0.9< td=""><td>1400x1300x2400</td><td>1400x1300x2400</td><td></td><td></td><td>2200x2100x2700</td><td></td></q≤0.9<>	1400x1300x2400	1400x1300x2400			2200x2100x2700	
0.4 <q≤0.6< td=""><td>0.9<q≤1.2< td=""><td>1520x1350x2400</td><td>1520x1350x2400</td><td>3200x1300x2400</td><td>3200x1300x2400</td><td>2300x2300x2700</td><td>3250x2350x2800</td></q≤1.2<></td></q≤0.6<>	0.9 <q≤1.2< td=""><td>1520x1350x2400</td><td>1520x1350x2400</td><td>3200x1300x2400</td><td>3200x1300x2400</td><td>2300x2300x2700</td><td>3250x2350x2800</td></q≤1.2<>	1520x1350x2400	1520x1350x2400	3200x1300x2400	3200x1300x2400	2300x2300x2700	3250x2350x2800
0.6 <q≤0.9< td=""><td>1.2<q≤1.8< td=""><td>2520x1300x2400</td><td>2520x1300x2400</td><td></td><td></td><td></td><td></td></q≤1.8<></td></q≤0.9<>	1.2 <q≤1.8< td=""><td>2520x1300x2400</td><td>2520x1300x2400</td><td></td><td></td><td></td><td></td></q≤1.8<>	2520x1300x2400	2520x1300x2400				
0.9 <q≤1.4< td=""><td>1.8<q≤2.8< td=""><td>4160x1300x2400</td><td>2560x1300x2400</td><td>5020x1300x2400</td><td>3420x1300x2400</td><td></td><td>3250x2350x2800</td></q≤2.8<></td></q≤1.4<>	1.8 <q≤2.8< td=""><td>4160x1300x2400</td><td>2560x1300x2400</td><td>5020x1300x2400</td><td>3420x1300x2400</td><td></td><td>3250x2350x2800</td></q≤2.8<>	4160x1300x2400	2560x1300x2400	5020x1300x2400	3420x1300x2400		3250x2350x2800
1.4 <q≤2.1< td=""><td>2.8<q≤4.2< td=""><td>4400x1300x2400</td><td>0000 4000 0400</td><td>5500x1300x2400</td><td></td><td>3000x2900x3200</td><td></td></q≤4.2<></td></q≤2.1<>	2.8 <q≤4.2< td=""><td>4400x1300x2400</td><td>0000 4000 0400</td><td>5500x1300x2400</td><td></td><td>3000x2900x3200</td><td></td></q≤4.2<>	4400x1300x2400	0000 4000 0400	5500x1300x2400		3000x2900x3200	
2.1 <q≤2.5< td=""><td>4.2<q≤5.0< td=""><td>4600x1300x2400</td><td>2800x1300x2400</td><td></td><td></td><td></td><td>4500x2350x3100</td></q≤5.0<></td></q≤2.5<>	4.2 <q≤5.0< td=""><td>4600x1300x2400</td><td>2800x1300x2400</td><td></td><td></td><td></td><td>4500x2350x3100</td></q≤5.0<>	4600x1300x2400	2800x1300x2400				4500x2350x3100
2.5 <q≤3.6< td=""><td>5.0<q≤7.2< td=""><td>6400x1300x2400</td><td>4000 4000 0400</td><td>5700x1300x2400</td><td>3900x1300x2400</td><td></td><td></td></q≤7.2<></td></q≤3.6<>	5.0 <q≤7.2< td=""><td>6400x1300x2400</td><td>4000 4000 0400</td><td>5700x1300x2400</td><td>3900x1300x2400</td><td></td><td></td></q≤7.2<>	6400x1300x2400	4000 4000 0400	5700x1300x2400	3900x1300x2400		
3.6 <q≤4.5< td=""><td>7.2<q≤9.0< td=""><td>6600x1300x2400</td><td>4600x1300x2400</td><td>5900x1300x2400</td><td></td><td>3500x3000x3200</td><td>5000x2350x3100</td></q≤9.0<></td></q≤4.5<>	7.2 <q≤9.0< td=""><td>6600x1300x2400</td><td>4600x1300x2400</td><td>5900x1300x2400</td><td></td><td>3500x3000x3200</td><td>5000x2350x3100</td></q≤9.0<>	6600x1300x2400	4600x1300x2400	5900x1300x2400		3500x3000x3200	5000x2350x3100

Voltage	Outline Dimensions: Width * Depth * Height (mm)							
10kV	Indoor air-cooling		Indoor liqu	Indoor liquid-cooling		Outdoor		
Rated Capacity Q (Mvar)	Direct hanging type	Boosting voltage type	Direct hanging type	Boosting voltage type	Air-cooling	Liquid-cooling		
0 <q≤1.5< td=""><td>1400x1300x2400</td><td>1400x1300x2400</td><td></td><td></td><td>2200x2100x2700</td><td></td></q≤1.5<>	1400x1300x2400	1400x1300x2400			2200x2100x2700			
1.5 <q≤2.0< td=""><td>1520x1350x2400</td><td>1520x1350x2400</td><td>3200x1300x2400</td><td rowspan="2">3200x1300x2400</td><td>2300x2300x2700</td><td>3250x2350x2800</td></q≤2.0<>	1520x1350x2400	1520x1350x2400	3200x1300x2400	3200x1300x2400	2300x2300x2700	3250x2350x2800		
2.0 <q≤3.0< td=""><td>2520x1300x2400</td><td>2520x1300x2400</td><td></td><td></td><td></td></q≤3.0<>	2520x1300x2400	2520x1300x2400						
3.0 <q≤4.5< td=""><td>4160x1300x2400</td><td>2560x1300x2400</td><td>5020x1300x2400</td><td>3420x1300x2400</td><td>2000-2000-2200</td><td>3250x2500x2800</td></q≤4.5<>	4160x1300x2400	2560x1300x2400	5020x1300x2400	3420x1300x2400	2000-2000-2200	3250x2500x2800		
4.5 <q≤7.0< td=""><td>5000x1300x2400</td><td>2400</td><td>5500x1300x2400</td><td></td><td>3000x2900x3200</td><td></td></q≤7.0<>	5000x1300x2400	2400	5500x1300x2400		3000x2900x3200			
7.0 <q≤8.0< td=""><td>5200x1300x2400</td><td>3400x1300x2400</td><td>5700-400-0400</td><td>2000</td><td></td><td>4500x2350x3100</td></q≤8.0<>	5200x1300x2400	3400x1300x2400	5700-400-0400	2000		4500x2350x3100		
8.0 <q≤12.0< td=""><td>7600x1300x2400</td><td>5800v1200v2400</td><td>5700x1300x2400</td><td>39002130022400</td><td>5600v2000v2200</td><td></td></q≤12.0<>	7600x1300x2400	5800v1200v2400	5700x1300x2400	39002130022400	5600v2000v2200			
12 <q≤15.4< td=""><td>7800x1300x2400</td><td>30002130022400</td><td>5900x1300x2400</td><td></td><td>5600x3000x3200</td><td>5000x2350x3100</td></q≤15.4<>	7800x1300x2400	30002130022400	5900x1300x2400		5600x3000x3200	5000x2350x3100		

Voltage				Outline Dimensi	ons: Width x Depth	n x Height (mm)	
20kV, 22kV	24kV	33kV	35kV	Air-cooling Liquid-cooling		cooling	
Rated Capacity Q (Mvar)		Outdoor, direct hanging type	Outdoor, direct hanging type	Indoor, direct hanging type			
0 <q≤4.2< td=""><td>0.00010.5</td><td>0.00015.0</td><td>0.00016.0</td><td>4000x2500x2700</td><td>5000-2500-2400</td><td>500045000050</td></q≤4.2<>	0.00010.5	0.00015.0	0.00016.0	4000x2500x2700	5000-2500-2400	500045000050	
4.2 <q≤9.0< td=""><td>0<q510.5< td=""><td>U<q≤15.0< td=""><td>5000x2000x2000</td><td>5000x2500x3100</td><td>5000x4500x2850</td></q≤15.0<></td></q510.5<></td></q≤9.0<>	0 <q510.5< td=""><td>U<q≤15.0< td=""><td>5000x2000x2000</td><td>5000x2500x3100</td><td>5000x4500x2850</td></q≤15.0<></td></q510.5<>	U <q≤15.0< td=""><td>5000x2000x2000</td><td>5000x2500x3100</td><td>5000x4500x2850</td></q≤15.0<>	5000x2000x2000	5000x2500x3100	5000x4500x2850		
9.0 <q≤16.0< td=""><td></td><td></td><td>10.0.0.000.0</td><td>5600x3000x3200</td><td>0000 0000 0400</td><td>5000 5000 0050</td></q≤16.0<>			10.0.0.000.0	5600x3000x3200	0000 0000 0400	5000 5000 0050	
16.0 <q≤18.0< td=""><td>10.5<qs21.5< td=""><td>15.0<qs30.0 16.0<qs3<="" td=""><td>10.0~Q=30.0</td><td>16.0<q≤32.0< td=""><td>/</td><td>6200x3000x3100</td><td>5000x5000x2850</td></q≤32.0<></td></qs30.0></td></qs21.5<></td></q≤18.0<>	10.5 <qs21.5< td=""><td>15.0<qs30.0 16.0<qs3<="" td=""><td>10.0~Q=30.0</td><td>16.0<q≤32.0< td=""><td>/</td><td>6200x3000x3100</td><td>5000x5000x2850</td></q≤32.0<></td></qs30.0></td></qs21.5<>	15.0 <qs30.0 16.0<qs3<="" td=""><td>10.0~Q=30.0</td><td>16.0<q≤32.0< td=""><td>/</td><td>6200x3000x3100</td><td>5000x5000x2850</td></q≤32.0<></td></qs30.0>	10.0~Q=30.0	16.0 <q≤32.0< td=""><td>/</td><td>6200x3000x3100</td><td>5000x5000x2850</td></q≤32.0<>	/	6200x3000x3100	5000x5000x2850
18.0 <q≤27.0< td=""><td>21.5<q≤32.5< td=""><td>30.0<q≤45.0< td=""><td>32.0<q≤50.0< td=""><td>/</td><td>7000x3000x3100</td><td>6000x6000x2850</td></q≤50.0<></td></q≤45.0<></td></q≤32.5<></td></q≤27.0<>	21.5 <q≤32.5< td=""><td>30.0<q≤45.0< td=""><td>32.0<q≤50.0< td=""><td>/</td><td>7000x3000x3100</td><td>6000x6000x2850</td></q≤50.0<></td></q≤45.0<></td></q≤32.5<>	30.0 <q≤45.0< td=""><td>32.0<q≤50.0< td=""><td>/</td><td>7000x3000x3100</td><td>6000x6000x2850</td></q≤50.0<></td></q≤45.0<>	32.0 <q≤50.0< td=""><td>/</td><td>7000x3000x3100</td><td>6000x6000x2850</td></q≤50.0<>	/	7000x3000x3100	6000x6000x2850	
27.0 <q≤34.0< td=""><td>32.5<q≤41.0< td=""><td>45.0<q≤56.5< td=""><td>50.0<q≤60.0< td=""><td>/</td><td>8500x3000x3100</td><td>7000x7000x2850</td></q≤60.0<></td></q≤56.5<></td></q≤41.0<></td></q≤34.0<>	32.5 <q≤41.0< td=""><td>45.0<q≤56.5< td=""><td>50.0<q≤60.0< td=""><td>/</td><td>8500x3000x3100</td><td>7000x7000x2850</td></q≤60.0<></td></q≤56.5<></td></q≤41.0<>	45.0 <q≤56.5< td=""><td>50.0<q≤60.0< td=""><td>/</td><td>8500x3000x3100</td><td>7000x7000x2850</td></q≤60.0<></td></q≤56.5<>	50.0 <q≤60.0< td=""><td>/</td><td>8500x3000x3100</td><td>7000x7000x2850</td></q≤60.0<>	/	8500x3000x3100	7000x7000x2850	

Note:

The above voltage levels are common grid connection point voltage levels for SVG equipment. If there are other voltage levels, SVG equipment can be customized according to the voltage level.
 The above SVG equipment dimensions are for reference only. Customization can be made for special scenarios, please refer to the actual supply.

IKM HV-SVG Product Introduction



Successful Projects 5.5









IKM HV-SVG **Product Introduction**

10kV direct hanging indoor air-cooled SVG project of a stone factory in Fujian

> Nonlinear harmonic control High energy consuming industries

6kV direct hanging indoor air-cooled SVG project for Yangjiang LNG storage facility in Guangdong Province

> High temperature High humidity High salt spray

Vietnam 35kV direct hanging outdoor air-cooled SVG project

High temperature

Uzbekistan 35kV direct hanging outdoor air-cooled SVG project

> Three phase unbalance control Nonlinear harmonic control Power factor control of substations

Poland 6kV direct hanging indoor air-cooled SVG project

High energy-consumption industries

IF iKonMac Tech Core Advantages



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6.1

Research and Development Strength

1 Master the Core Technology of AHF/SVG

- iKonMac specializes in R&D, with all products independently developed using core AHF and SVG technologies, including 7th-generation IGBT and full FPGA control chips.
- The Product Features a unique layered design, with industry-leading technical parameters and over 30 patents, including 5 inventions and 8 software copyrights.
- iKonMac continuously innovates to advance power quality products and drive industry progress.







2 R&D Team Composition

- The R&D team of iKonMac is composed of high-tech professionals such as postdoctoral, doctoral, and master's degrees, with a R&D workforce accounting for 35%.
- The R&D team consists of positions such as Chief Engineer, Software, Control, Electronics, Electrical, Layout, Structure, Heat Flow, Testing, Process, etc. The R&D team is fully equipped.
- The R&D personnel mainly come from well-known universities such as Shanghai Jiaotong University, Zhejiang University, Xi'an Jiaotong University, Huazhong University of Science and Technology, and China University of Mining and Technology.

Focus On Creating Excellence





3 Experienced R&D Team

- Core R&D personnel with 30 years of experience in power electronics development and over 15 years of experience in AHF/SVG development.
- The R&D team previously developed the medium voltage SVG in 2007 and put it into use in 2008. In 2009, a full cabinet AHF was developed and put into use the same year. Modular AHF was developed from 2010 to 2011 and put into use in 2011. In 2015, AHF/SVG was developed based on the core technology of the 7th generation IGBT and full FPGA, and was put into use in 2016. Industrial specific models were developed in 2019 and officially put into use in 2020.

iKonMac Core Advantages



5 Proprtion of R&D Investment

 The proportion of R&D investment is greater than 12% of annual sales revenue and continues to increase year by year.

4 R&D Management and Development Equipment

- iKonMac follows the IPD product development process and has partnered with Shanghai JiaoTong University to establish a joint laboratory. This collaboration enhances R&D management, accelerates the transformation of high-tech achievements, and boosts product innovation.
- We have advanced development and testing equipment, including vibration tables, programmable power supplies, IGBT testers, power quality analyzers, temperature change test boxes, and performance testing platforms for active filters and static reactive power generators.
- A dedicated project customization team provides R&D support for product adjustments in special projects.



1 Extremely High Anti Pollution Ability

The design adopts a layered structure, with the electronic layer and power components separated. The electronic layer provides effective insulation, moisture-proofing, and dust-proofing, while the power layer is cooled by fans. The electronic layer has an IP54 protection rating, and the module has a pollution resistance level of Class 3, making it suitable for harsh environments such as saline, humid, dusty, and corrosive gas conditions.



Germany's TÜV Rheinland Pollution Degree 3 certification



Shanghai Bureau of Technical

Shematic diagram of the layered design

2 Adopting the 7th Generation IGBT from German Infineon

iKonMac's AHF/SVG uses the seventh generation IGBT, while most domestic AHF/SVG manufacturers still use the third generation. At the same time reducing switching loss by one-third and increasing the switching frequency by 2x40kHz, with parallel interleaving technology achieving an effective switching frequency of 80kHz. This challenges the control algorithm, as the main control chip needs to complete a PWM calculation within 1/80k=12.5us. iKonMac uses FPGA as the main control chip with parallel processing and multi-core CPU computing, allowing faster completion of control algorithms.





IGBT Driver Board



Seventh Generation IGBT

3 Adopting a Full FPGA Main Control Chip

Using the seventh-generation IGBT, doubling the switching frequency halves the control calculation time. Most manufacturers use DSP combined with CPLD or FPGA, but DSP's single-core serial processing can't meet the high switching frequency of the seventh generation IGBT. iKonMac's AHF/SVG uses an all FPGA control chip, with 8 million logic gates in the calculation program, equivalent to 16 parallel-running hardware CPU units.

4 Extremely Low Noise 60dB

Noise is crucial for user experience and comes from two main sources: first, heat dissipation, including airflow and fan noise. With the seventh generation IGBT, iKonMac reduces losses, adds temperature monitoring, and adjusts fan speed based on temperature, significantly lowering fan noise. Second, noise from the reactor is caused by high-frequency switching currents, with higher switching frequencies resulting in lower noise. iKonMac's seventh-generation IGBT achieves an effective switching frequency of 80kHz, compared to the common 20kHz, reducing module noise to under 60dB, while the industry standard is below 70dB.



FPGA Main Control Chip



Extremely Low Noise 60dB

┥ iKonMac |

5 Extremely Low Power Consumption 2.5%

The higher the active power loss, the more severe the heat generated by the device, and many failures in power electronics are due to internal heat damaging electronic components. Reducing active power loss is crucial, especially for large-scale applications like state grid industries. For AHF/SVG, power loss is a critical technical parameter. For instance, a 100A AHF module has a loss of 2.5%, which affects touch screen power, reactor heating, IGBT heating, etc., and reducing loss by even 0.1% is challenging.

iKonMac uses the seventh-generation IGBT, which reduces loss by 1/3 compared to the previous generation. By increasing the switching frequency to 40kHz, the inductance is halved, and with interleaved parallel technology, it is reduced even further. This results in an inductance value only 1/4 of similar products, leading to proportionally lower losses. As a result, iKonMac's AHF/SVG has a loss of less than 2.5%, while domestic products typically measure 3.5%.

6 Extremely High Temperature Resistance of 55°C

For AHF/SVG, reliability comes from voltage and temperature resistance. iKonMac's AHF/SVG can run at full load in 55°C environments, thanks to the seventh-generation IGBT, which reduces loss and temperature rise, and the layered design that ensures effective heat dissipation and protection for the electronic layer.



Power Consumption $\leq 2.5\%$



Full-load operation at an ambient temperature of 55°C.

Intelligent Compensation Efficient Prevention of Resonance

iKonMac's AHF/SVG adds a smart startup mode in the software to effectively avoid resonance points and protect the device's normal operation, enhancing product reliability. This allows the product to be used in more challenging electrical environments.



reach 800A or 675kvar.

iKonMac's AHF/SVG adopts a standard modular design with an efficient layout and high power density. For a 800x800 standard cabinet, its capacity can



iKonMac Core Advantages



Smart Startup Mode



Specification	Max Power
Single Module/ Wall Mounted	200A/150kvar
600(W) * 600(D) Cabinet	300A/200kvar
800(W) * 600(D) Cabinet	400A/300kvar
600(W) * 800(D) Cabinet	600A/300kvar
800(W) * 800(D) Cabinet (Recommend Dimensions: 800(W) * 1000(D) Cabinet	800A/675kvar

Maximum 800A/675kvar per cabinet

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6.3 Quality Control

Incoming Inspection:

- All components are sourced from well-known international and domestic manufacturers.
- All materials undergo incoming inspection, with random checks for standard materials and full checks for critical ones.
- Key inspection equipment includes:
- Bridge for measuring inductance
- Heat sink jig ----- for measuring hole positions on heat sinks
- Inductor jig for measuring inductor dimensions
- Oven for testing FPC terminal temperature resistance
- Microscope for inspecting PCBA soldering quality
- High-precision multimeter for measuring precision resistors (0.001)
- After all components are inspected, they are sent to the SMT factory for assembly.

ICT Testing

• The SMT factory conducts ICT testing on all completed PCBs to prevent soldering defects such as cold or missed solder joints.

FCT Testing

• Once the PCBs arrive at the company, full inspection is carried out with dedicated testing fixtures for each board

Assembly

 All assembly is done in an ESD-protected environment (ESD clothing, shoes, flooring, constant temperature and humidity chamber, ESD wristbands, ESD transit boxes, and all equipment grounded). Process inspections are conducted according to SOP.

Low-voltage Testing

 After assembly, products undergo 30V low-voltage communication testing on a custom automated test platform.

High-voltage Testing

 Next, products undergo 400V high-voltage on/off testing on a custom automated test platform.

Aging Test

• Full-load aging test of all modules for 24 hours.

- Final Inspection
- Before shipment, the product undergoes a final inspection to check its operational status.

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🖌 iKonMac



Product Customization

- Custom brand silk printing
- Customized design for human-machine interface startup screen
- Customized shipping documentation
- Special projects with dedicated R&D technical support.



Power Quality Testing Services and Professional Solutions

- Provide power quality testing services
- Develop professional power quality management solutions
- Create reasonable corrective action plans
- Full-line technical support for solution implementation
- Provide project effectiveness reports and equipment operation reports.



Power Quality Issues:

Technical Consultation, Installation Guidance, Debugging, and Training Services



- After-Sales Service Commitment
- Supporting Documentation

We ensure product traceability with full documentation, including user manuals, product drawings, and technical info for each project.

• Online-Remote Service

We offer remote technical support with a response time under 2 hours, and resolve issues within 24 hours. For unresolved issues, on-site technicians will be dispatched.

- Post-Warranty Service
- Lifetime maintenance after warranty, charging only for costs. A full maintenance plan is provided beyond warranty.
- Service Records

We keep detailed records of every customer interaction, service, and feedback for quality analysis.

• Preventive Inspections

Regular follow-ups and site inspections to ensure customer satisfaction.





