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GEYA®

GEYA®

# 电能质量

Power Quality Management

Product Manual

浙江格亚电气有限公司  
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GEYA®



Using Our Technology to Assist Green Earth and Create a Better Future Together

## ABOUT US

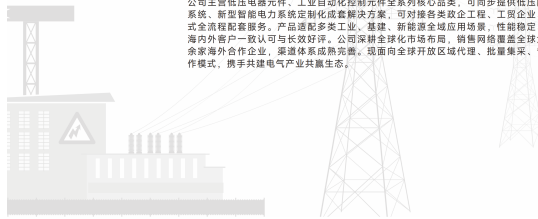
浙江格亚电气有限公司成立于2007年2月，地处浙江温州，是一家专业从事新能源电气与自动化控制产品自主研发、生产、销售及配套服务的高新技术企业。公司具备完整产业链运营能力，依托规范经营管理与持续技术创新，综合实力稳步提升；年营业额已突破2亿元人民币，综合产能及行业综合实力位居区域行业前列。

公司主营低压电器元件、工业自动化控制元件全系列核心品类，可同步提供低压配电系统、自动化控制系统、新型智能电力系统集成解决方案，可对接各类央企工程、工贸企业、跨境项目，交付一站式全流程配套服务。产品适配多类工业、基建、新能源全域应用场景，性能稳定、合规达标率高，收获海内外客户一致认可与长效好评。公司深耕全球化市场布局，销售网络覆盖全球六大洲，累计服务一万余家海外合作企业，渠道体系成熟完善。现面向全球开放区域代理、批量集采、专项项目共建等多元合作模式，携手共建电气产业共赢生态。

自成立以来，公司秉持“格物知致，亚行天下”企业理念，坚守品质为先，创新赋能核心发展原则，严控产品高标准、高性价比、高品质三道核心关口。目前已斩获多项国家实用发明专利，完成GEYA品牌多国全域合规布局，全系产品严格对标国际行业准入标准，顺利取得CCC、CE、SAA、SEMKO、TUV、EN等国内外权威全套资质认证，全面符合欧洲、中东等多国属地质量核证标准，跨境供货合规无壁垒。公司可承接全球客户OEM、ODM定制化代工研发服务，已与多家国际知名电气品牌达成长期稳定战略合作。专业实战型售前服务团队全域联动，稳步拓宽海内外品牌市场版图，持续强化品牌核心竞争力。

格亚电气诚邀海内外优质代理商、渠道商及工程合作伙伴携手拓市，共享行业发展红利。我们将以过硬原装全系列产品、高效全天候专属配套服务、极具市场竞争力的合作扶持政策，全方位护航合作伙伴稳定创收、长效经营。

格亚电气匠心做品质、专心做科研、诚心做合作，期待与全球客商同心同行，共创电气行业高质量发展新未来！



# 增强型静止无功发生装置

Enhanced Static Var Generator

GY-ASVG-SiC

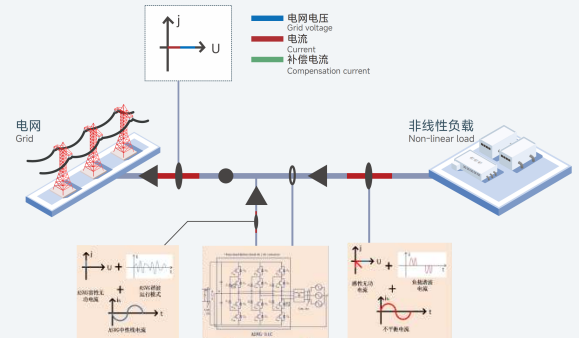
碳化硅增强型静止无功发生装置 (GY-ASVG-SiC) 以碳化硅功率器件为核心, 将电压源逆变器通过滤波器并联在电网上。其工作原理是通

过实时检测负载的电流, 基于先进的无功、谐波及三相有功功率的检测与控制算法, 生成对应的 IGBT 驱动信号, 实现对无功电流、谐波电流以及三相不平衡有功功率的综合补偿。同时, 装置峰值效率达 98.5% 以上, 单柜可容纳 8 台模块, 最大容量可达 800kvar, 安装维护方便。

Silicon Carbide Enhanced Static Var Generator (GY-ASVG-SiC)

Using silicon carbide (SiC) power devices as the core, the GY-ASVG-SiC connects a voltage source converter (VSC) to the power grid via a filter in parallel.

Its working principle is to detect the load current in real time and, based on advanced detection and control algorithms for reactive power, harmonics, and three-phase active power, generate corresponding IGBT drive signals to achieve comprehensive compensation of reactive current, harmonic current, and three-phase unbalanced active power. In addition, the device achieves a peak efficiency of over 98.5%. A single cabinet can accommodate up to 8 modules, with a maximum capacity of 800 kvar, offering easy installation and maintenance.



浙江格亚电气有限公司



**性能特点:**

1) DSP+CPULD 全数字控制核心, 三电平拓扑技术, 2) 降低模块损耗, 提升模块效率, 峰值效率达 98.5% 以上, 3) 高功率密度模块化设计, 单柜可容纳 8 台模块, 最大容量可达 800kvar, 安装维护方便, 4) 具有两路外部电流采样通道, 可支持低电压侧采样低电压侧补偿、高压侧采样低电压侧补偿、无功分量补偿等多种补偿方式, 5) 通过更高开关频率控制算法, 减小输出谐波电流, 提升动态响应速度, 6) 利用 SiC 功率器件的更高耐压能力, 同时简化热设计和电磁兼容设计, 提升产品的可靠性, 7) 无功补偿能力: 补偿率 >99%, 8) 不平衡补偿能力: 补偿后不平衡度 <5%, 9) 电流谐波补偿能力: 补偿率 >95%, 2~50 次, 谐波补偿率可调, 10) 中性线零序电流谐波能力为相线三倍, 11) 可设定 100% 限流输出, 保证设备长期稳定运行, 12) 支持无功补偿、谐波补偿、三相不平衡补偿任意一种、两种或三种搭配可选。

1DSiP-CPULD full-digital control core, three-level topology technology, 2) Reduced module losses, improved module efficiency, peak efficiency up to 98.5% or higher, 3) High power density modular design, a single cabinet can accommodate 8 modules with a maximum capacity of 800 kvar, easy installation and maintenance, 4) Equipped with two external current sampling channels, supporting various compensation modes such as low-voltage side sampling with low-voltage side compensation, high-voltage side sampling with low-voltage side compensation, and reactive component compensation. Single-pulse switching frequency control algorithm reduces output ripple current and improves dynamic response speed. 6) Utilizes the higher voltage withstand capability of SiC power devices while simplifying thermal design and electromagnetic compatibility (EMC) design, enhancing product reliability. 7) Reactive power compensation capability: compensation rate >99%. 8) Unbalance compensation capability: unbalance degree after compensation <5%. 9) Current harmonic compensation capability: compensation rate >95%, 2nd to 50th harmonics, individual compensation rate adjustable. 10) Neutral line zero-current filtering capacity is three times that of the phase line. 11) Supports 100% current limiting output to ensure long-term stable operation of the equipment. 12) Supports any one, any two, or all three of reactive power compensation, harmonic compensation, and three-phase unbalance compensation as selectable options.

**技术参数:**

	220V	380V
机壳 Module		
海拔高度 Altitude	<2000m, 2000米以上按照 GB/T 3859.2 降额使用 <2000 m, above 2000 m, derate according to GB/T 3859.2	
环境温度 Ambient temperature	-10~+50°C (40°C 以上降额不超过 30%) -10 to +50 °C (above 40 °C, capacity derating <30%)	
相对湿度 Relative humidity	<90%, 月最低温度 25°C 表面无凝露 <90% relative humidity, no condensation on the surface at a monthly minimum temperature of 25 °C	
污染等级 Pollution degree	III 级以下 Pollution degree < Class II	
工作电压 Operating voltage	AC 220V (-20% ~ +20%)	AC 380V (-20% ~ +20%)
工作频率 Operating frequency	50Hz/60Hz (45Hz ~ 63Hz)	
额定补偿容量 Rated compensation capacity	37kvar, 50kvar	75kvar, 100kvar
电网结构 Grid configuration	三相三线, 三相四线 Three-phase three-wire, three-phase four-wire	
并联台数 Number of parallel units	不限 No restrictions	
整柜效率 Overall efficiency	>98%	
开关频率 Switching frequency	30kHz	
功能选择 Function selection	A、B、A+B、B+A、B+C、A+C、B+C+A、A+C+B	
无功补偿率 Reactive compensation rate	无功补偿 >99%	
不平衡补偿能力 Unbalance compensation capability	补偿后不平衡度 <5%	
电流谐波补偿能力 Current harmonic compensation	谐波补偿 >95%	
中性线滤波能力 Neutral line filtering capability	中性线滤波能力为相线滤波能力的 3 倍 Neutral line filtering capacity is 3 times that of phase filtering capacity	
全响应时间 Full response time	无功 <10ms, 谐波 <40ms	
冷却方式 Cooling mode	强制风冷 Forced air cooling	
噪音 Noise level	<65dB	
通讯方式 Communication method	2 路 RS485 通信接口 (支持 Wi-Fi) 2 RS485 communication interfaces (Wi-Fi supported)	
保护功能 Protection functions	过载、软/硬件过流、电网过欠压、电网电压不平衡、电源故障、过温、频率异常、短路保护、谐波保护等 Overload, soft/hardware overcurrent, grid overvoltage/undervoltage, grid voltage unbalance, power supply failure, overtemperature, frequency anomaly, short-circuit protection, resonance protection, etc.	
过载能力 Overload capability	额定 1.2 倍过流 60 秒 Rated overload 1.2 times for 60 seconds	
安装方式 Installation method	机架/壁挂 Rack-mount/Wall-mount	
进线方式 Cable entry	后进线(机架式)、上进线(壁挂式) Rear-mount (Rack-mount), Top-mount (Wall-mount)	
防护等级 Protection rating	IP20/IP54 可定制 IP20/IP54 available on request / customizable	
尺寸 (W*D*H) Size	500*600*100mm	

① A: 无功补偿 Reactive compensation B: 谐波补偿 Harmonic compensation  
C: 三相不平衡补偿 Three-phase unbalance compensation

## 合作案例 COOPERATION STUDIES

### 智能制造业

Intelligent manufacturing industry

提升功率因数、抑制谐波、稳压  
Improve power factor, suppress harmonics, stabilize voltage

**案例背景:** 湖北某商用车制造公司车身涂装车间, 冲击性负荷导致功率因数较低。  
**治理方案:** 投入总容量800kvar的静止无功发生装置 (SVG), 将功率因数由0.63提升至0.97, 避免力调电费罚款。

**Case Background:** In the body welding workshop of a commercial vehicle manufacturing company in Hubei, impact loads resulted in a low power factor.  
**Solution:** An 800kvar Static Var Generator (SVG) was installed, increasing the power factor from 0.63 to 0.97, thereby avoiding penalty charges for low power factor.

项目 Project	补偿前 Before compensation	补偿后 After compensation
平均功率因数 Average power factor	0.63	0.97
增收力调电费 Power factor penalty charge	增收力调电费	免收力调电费
豁免力调电费 Exemption from power factor penalty charge		豁免力调电费



### 半导体行业

Semiconductor industry

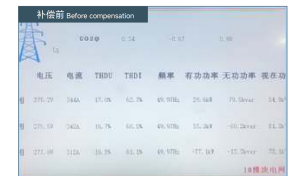
抑制谐波、提升供电质量  
Harmonic suppression and power quality improvement

**案例背景:** 某半导体生产车间机台负载产生的电流谐波, 导致UPS供电电源输出电压谐波畸变率严重增加, 影响机台负载正常运行, 甚至造成机台负载停机。

**治理方案:** 利用高性能APF, 将THDu由17%降至3%, 避免机台负载停机。

**Case Background:** In a semiconductor manufacturing workshop, current harmonics generated by the equipment loads caused a severe increase in the output voltage harmonic distortion (THDu) of the UPS power supply, affecting the normal operation of the equipment and even leading to equipment shutdown.  
**Solution:** A high-performance Active Power Filter (APF) was deployed, reducing THDu from 17% to 3%, thereby preventing equipment shutdown.

相位 Phase	补偿前 Before compensation	补偿后 After compensation	改善幅度 Improvement margin
A相	17.0	2.9	83.5%
B相	16.7	3.3	80.2%
C相	16.8	3.0	82.1%



### 数据中心

Data center

提升功率因数和供电质量、抑制谐波  
Improve power factor and power quality, suppress harmonics

**案例背景:** 某数据中心服务器精密空调变频器产生的谐波, 给配电系统造成非必要损耗, 影响电气设备正常运行, 降低配电系统使用效率以及增加用电成本。

**治理方案:** 利用高性能APF, 将THDi由60%降至5%, 用电效率显著提升。

**Case Background:** Harmonics generated by the variable-frequency compressor of precision air conditioners at the load end of a data center computer room caused unnecessary losses to the power distribution system, affected the normal operation of electrical equipment, reduced the efficiency of the power distribution system, and increased electricity costs.  
**Solution:** A high-performance Active Power Filter (APF) was deployed, reducing THDi from 60% to 5%, significantly improving power efficiency.

项目 Project	补偿前 Before compensation	补偿后 After compensation
平均功率因数 Average power factor	0.84	0.96
电流谐波畸变率 Current harmonic distortion rate	60%	5%



### 新能源并网

New energy grid connection

避免力调电费罚款、抑制谐波  
Avoid power factor penalty charges and suppress harmonics

**案例背景:** 浙江湖州某309.6kWp光伏并网发电项目, 计量点在400V低压侧与光伏接入点间, 功率因数不达标, 面临大额力调电费罚款。

**治理方案:** 在计量点上安装150ATPQC, 通过高低补偿方式, 改善功率因数。

**Case Background:** A 309.6kWp photovoltaic grid-connected power generation project in Huzhou, Zhejiang. The metering point is located between the 400V low-voltage side and the PV grid connection point. The power factor was below the required standard, facing substantial penalty charges for low power factor.  
**Solution:** A 150 A TPQC (Three-phase Power Quality Conditioner) was installed upstream of the metering point, using a high-side sampling / low-side compensation method to improve the power factor.

相位 Phase	治理前 Before compensation	治理后 After compensation	改善幅度 Improvement margin
平均功率因数 Average power factor	0.67	0.95	41.8%
电路电流降低 Circuit current reduction	$1 - 0.67 / 0.95 = 29.47\%$		
电路损耗降低 Circuit loss reduction	$1 - 0.67 / 0.95^2 = 29.47\%$		

**行业痛点:** 新能源发电出力受自然条件影响呈间歇性、波动性, 易引发电网电压与频率波动, 且并网逆变器会产生谐波, 污染电网电能质量; 这类问题既冲击电网调度与稳定运行, 还会损害变电设备寿命, 降低新能源消纳能力。

**Industry Pain Points:** The output of renewable energy generation is intermittent and fluctuating due to natural conditions, which can easily cause grid voltage and frequency fluctuations. Additionally, grid-connected inverters generate harmonics, polluting the power quality of the grid. These issues not only impact grid dispatch and stable operation, but also shorten the lifespan of substation equipment and reduce the grid's capacity to absorb renewable energy.



合作案例  
COOPERATION STUDIES

农网台区1  
Rural Grid Distribution Area 1

高低电压治理、节能降耗  
High/low voltage regulation, energy saving and consumption reduction

**案例背景:** 浙江温州某台区, 大规模光伏接入台区, 高电压、三相电压不平衡问题接连产生, 导致光伏跳闸, 甚至严重影响用户及企业用电情况。

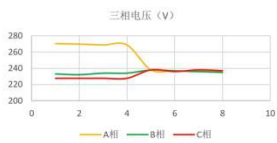
**治理方案:** 利用TPQR治理高电压/三相电压不平衡, 将电压调整至230V, 满足考核要求。  
**Case Background:** In a distribution area in Wenzhou, Zhejiang, large-scale photovoltaic integration led to successive issues of high voltage and three-phase voltage imbalance, causing PV disconnection and even seriously affecting power consumption for both residential and industrial users.  
**Solution:** A TPQR was used to regulate the high voltage and three-phase voltage imbalance, adjusting the voltage to 230V and meeting the required compliance standards.

**行业痛点:** 因单相负荷分布不均、线路径细且供电半径长、季节性负荷波动, 普遍存在三相不平衡、电压偏低或偏高的问题; 譬如非线性设备普及带来的谐波污染, 加剧线路损耗与设备故障, 影响乡村生产生活用电安全。

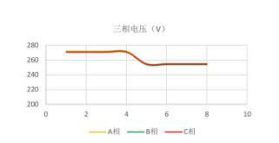
**Industry Pain Points:** Due to uneven distribution of single-phase loads, thin line diameters with long power supply radii, and seasonal load fluctuations, issues such as severe three-phase unbalance and voltage deviation (either too low or too high) are common. Coupled with harmonic pollution caused by the widespread use of nonlinear equipment, these problems aggravate line losses and equipment failures, affecting the safety of electricity consumption for rural production and daily life.



补偿前 Before compensation



补偿后 After compensation

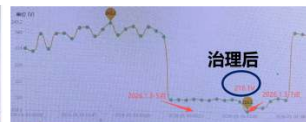
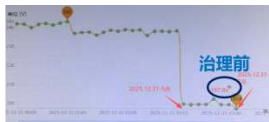


农网台区2  
Rural Grid Distribution Area 2

末端稳压  
Endpoint voltage regulation

**案例背景:** 安徽某台区, 供电台区至线路末端线路长度约1km, 供电线路过长, 线路末端每4台单相7kW的充电桩, 当充电桩运行时, 导致末端电压低, 有时电压会低至190V左右, 严重影响末端用户的用电质量。

**治理方案:** 利用TPQR治理高电压/三相电压不平衡, 将电压调整至230V, 满足考核要求。  
**Case Background:** In a distribution area in Anhui, Zhejiang, large-scale photovoltaic integration led to successive issues of high voltage and three-phase voltage imbalance, causing PV disconnection and even seriously affecting power consumption for both residential and industrial users.  
**Solution:** A TPQR was used to regulate the high voltage and three-phase voltage imbalance, adjusting the voltage to 230V and meeting the required compliance standards.



石油开采  
Oil extraction

提升功率因数和供电质量、抑制谐波  
Improve power factor and power quality, suppress harmonics

**案例背景:** 石化某石油开采项目, 设备作业期间产生大量谐波电流, 给系统带来严重的谐波污染, 导致抽油机误动作甚至停机。

**治理方案:** 在低压配电室安装490V APF进行谐波治理, 安装完毕后此系统的电流畸变率降低至GB/T 14549标准要求, 治理效果显著, 抽油机运行状态良好, 无误动作及停机事件发生。

**Case Background:** In a petrochemical oil extraction project, large amounts of harmonic current were generated during equipment operation, causing serious harmonic pollution to the power system, which led to malfunction or even shutdown of the pumping units.  
**Solution:** A 490V Active Power Filter (APF) was installed in the low-voltage distribution room for harmonic mitigation. After installation, the current distortion rate of the system was reduced to meet the requirements of the GB/T 14549 standards, achieving significant improvement. The pumping units have been operating in good condition, with no malfunctions or shutdowns.



电流畸变率对比 Current Distortion Rate Comparison	
治理前 Before treatment	33.69%
治理后 After treatment	11.92%

