



## ENERGY SAVING POWER QUALITY SOLUTION

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## Energy Saving Power Quality Solution

Anhui Zhongdian Electric Co., Ltd.



Anhui Zhongdian(ZDDQ) Electric Co., Ltd. established in 2001. ZDDQ Technology Park locates in Bengbu City of Anhui Province. We're a professional and leading manufacture, focus on advanced power quality improvement and power factor correction. APF,SVG,APFC are our main products. ZDDQ has a leading independent R&D team and quality supervision system, and maintain long-term cooperative relations with China University of Science and Technology, Zhejiang University and a number of well-known institutions.

We insists on customers' demand as the guide, with the technology innovation as the drive, through 20 years technology accumulation, has already owned a series of power quality products including APF, Medium voltage and low voltage SVG, Medium voltage and Low voltage Automatic Power Factor Correction, which are widely used in many countries and industries such as power grid, hospital, sewage plant, railway, subway, airport, seaport, oil and chemical industry, metallurgy, coal mine, tele-communication and high buildings and so on.

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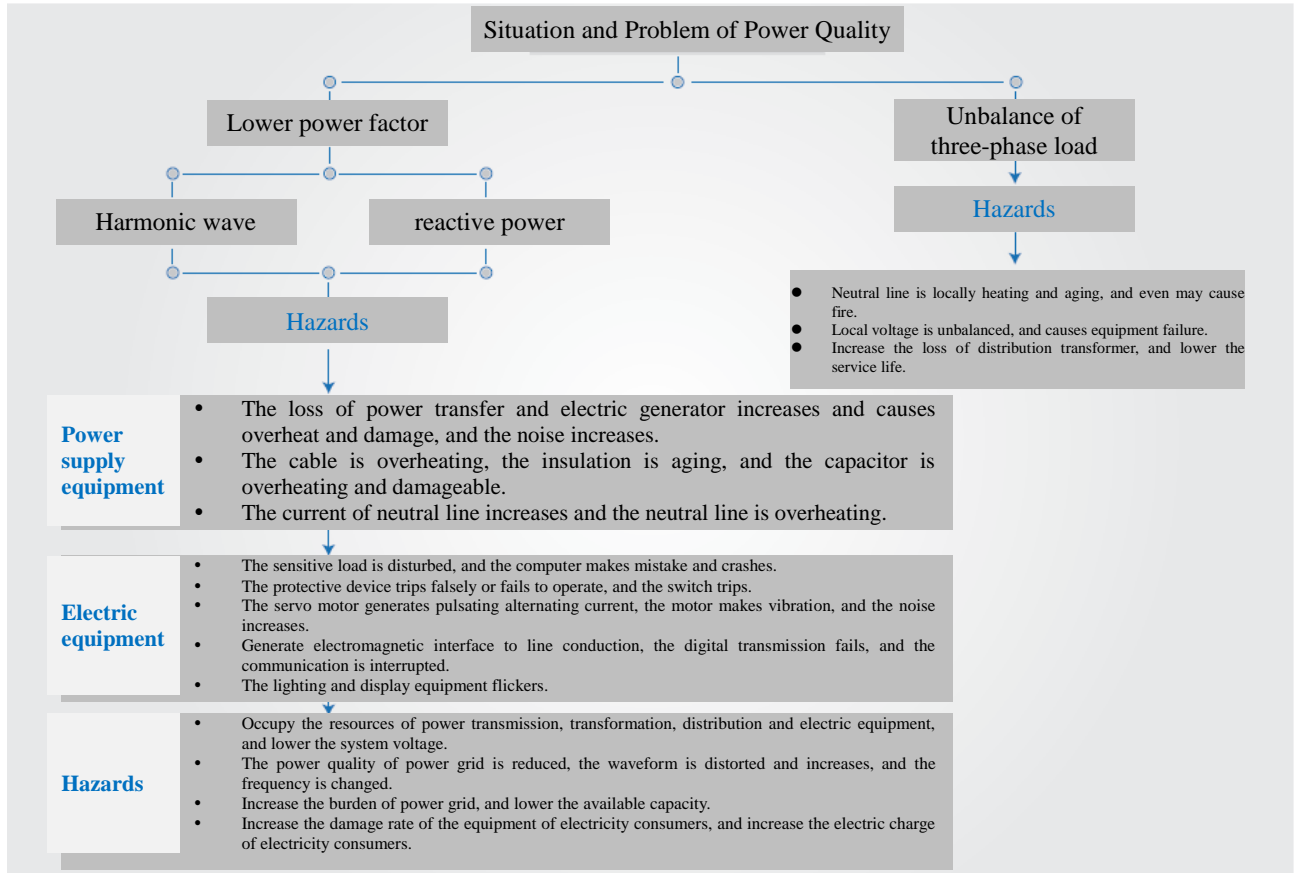
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Focus on Power Quality Improvement and Power Factor Correction.

Analysis of Power Quality

Problems, Hazards and Analysis of Causes



Common Harmonic Sources are as Follows

- Rectifier, charging device
  - Frequency converter, DC speed regulator
  - DC power supply, charger
  - Electric arc furnace, induction heating equipment
- Welding equipment
  - Electrified railway and ship electric drive
  - Air conditioner and other household appliances
- Lighting equipment
  - Uninterrupted power supply UPS, EPS
  - Computer and other office equipment



National Standards for Harmonic Limits

For user equipment and public power distribution network, the power quality index directly affects the efficacy, service life and efficiency of equipment, and even may directly damage the electric equipment. In accordance with *Quality of Electric Energy Supply – Harmonics in Public Supply Network* (GB/T 14549-1993), the public supply network standard is as follows:

Nominal voltage of power grid (kV)	Total harmonic distortion of voltage (%)	Voltage content rate of each order of harmonic wave	
		Odd order	Even order
0.38	5.0	4.0	2.0

Standard voltage KV	Reference short-circuit capacity MVA	Harmonic order and allowable value of harmonic current, A																							
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0.38	10	78	62	39	62	26	44	19	21	16	28	13	24	11	12	9.7	18	8.6	16	7.8	8.9	7.1	14	6.5	1

Benefit of Power Quality Control

- Improve the power factor, and save electric energy by 10%~25%;
  - Reduce the inputs in capacity expansion of transformer, and extend the service life of equipment;
  - Increase the operational reliability of equipment, and reduce the inputs in equipment maintenance and replacement;
- Maintain continuity and stability of production and power supply, and improve production efficiency;
  - Meet national standard, and avoid the power supply management department to urge rectification and give punishment.

Application Industry of Power Quality Control

Power Grid, Semi-conductor, rail traffic, telecommunication, hospital, municipal administration, petrochemical, electronics, mining,, automobile manufacturing, machinery & heavy industry, marine petroleum, sewage treatment, cement, tobacco, plastics.

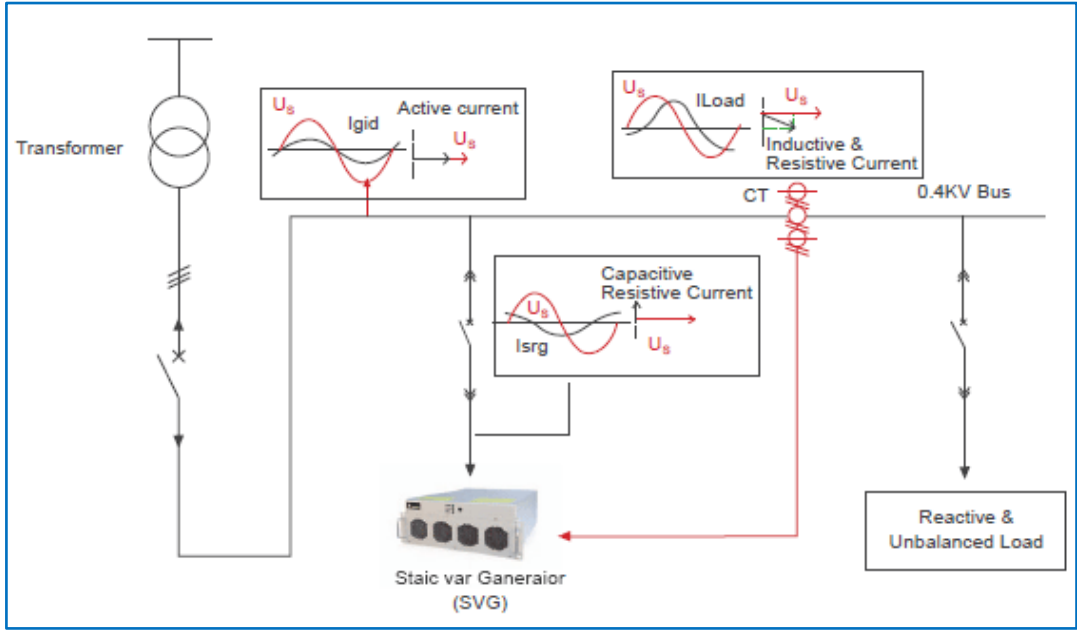
208V Static Var Generator ZD-SVG-02



ZD-SVGM Static Var generator (SVG) is the new standard in reactive energy compensation for 208V networks. This power electronic current source is the accurate and highly reliable solution for today’s networks characterised by significant increase in harmonics, voltage variations caused by intermittent renewable sources connected to the network and voltage level due to the smart grid development. The DSP controlled IGBT topology enables a perfect compensation on each phase for both inductive and capacitive loads. It also correct phase unbalance where necessary. Immune to harmonics, resonance and voltage level, it offers a maintenance free solution reusable in any network configuration.

Principle

Following are principle of Static var generator.



Main Functions

- Precise and step-less power factor correction;
- Fast and dynamic compensation, with a response time less than 5ms;
- Both inductive and capacitive reactive power compensation;
- Improve power transmission stability.

Technical Data

Model	ZD-02-140DF-G	ZD-02-280DF-G	ZD-02-420DF-G	ZD-02-560DF-G	ZD-02-840DF-G	ZD-02-1400DF-G	ZD-02-2100DF-G
Rated voltage（VAC）	208						
Input voltage range（VAC）	208±20%						
Working frequency(Hz)	50/60±5%						
Rated capacity（kvar）	±140	±280	±420	±560	±840	±1400	±2100
Rated current（A）	367	735	1102	1470	2204	3670	5512
Over current	1.2						
Size/mm(WxDxH)	800*800*2200		900*800*2200	1200*800*2200	1800*800*2200	3500*800*2200	5000*800*2200
Wiring system	3 Phase 4 Wires						
Cable entry	Bottom						
Working Temperature(℃)	-25℃～+40℃（≥40℃ Using with reducing the rated capacity）						
Running humidity（%）	<95%，without condensation						
Type of cooling	Air cooling						
Level of Protection	IP3X						
Mounting height above sea level	0≤ 2,000m at rated capacity; appropriately reduce the capacity if it is greater than 2,000m						
Reactive adjustment range	Continuous Adjustment from capacitive power to inductive power						
Harmonic	Meeting 《Power quality public grid harmonic》GB/T14549-93						
Response time	≤5ms						
Screen	TFT LCD touched screen，real time voltage and current data display						
Smart communication	TCP/IP, GPRS, Modbus						
Storage and transportation temperature	-40～70℃						
Reliability & Life	20 years						
EMC	Meeting GB7251-2005(GB/T7261-2000)						

- Remarks: 1, Single cable entry can be divided into forward entry, backward entry and optional
- 2, The parameter and specification for above SVG model products, Maybe changed cause of the client’s site real needful for different situations
- 3, The matching relationship is not unique , User can choose according the application
- 4, The size of cabinet will be difference with different options
- 5,The width less than 1200mm (including) for single cabinet installation

400V Static Var Generator ZD-SVG-04

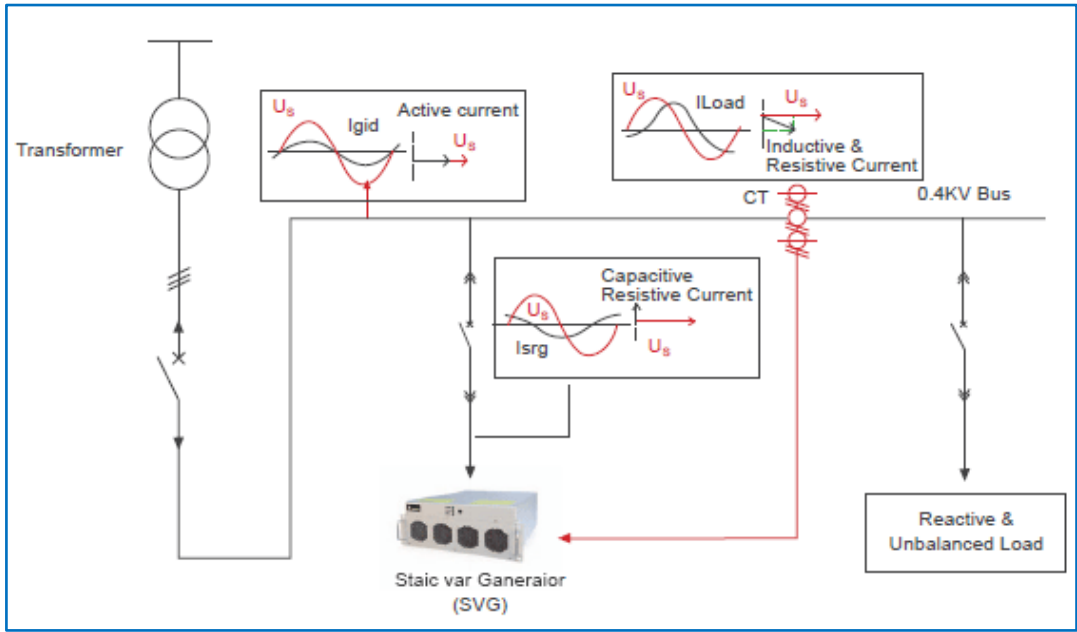


ZD-SVGM Static Var generator (SVG) is the new standard in reactive energy compensation for 400V networks. This power electronic current source is the accurate and highly reliable solution for today’s networks characterised by significant increase in harmonics, voltage variations caused by intermittent renewable sources connected to the network and voltage level due to the smart grid development. The DSP controlled IGBT topology enables a perfect compensation on each phase for both inductive and capacitive loads. It also correct phase unbalance where necessary. Immune to harmonics, resonance and voltage level, it offers a maintenance free solution reusable in any network configuration.

Note: If site voltage need 480V device, please inform in advance.

Principle

Following are principle of Static var generator.



Main Functions

- Precise and step-less power factor correction;
- Fast and dynamic compensation, with a response time less than 5ms;
- Both inductive and capacitive reactive power compensation;
- Improve power transmission stability.

Technical Data

Model	ZD-04-250DF-G	ZD-04-500DF-G	ZD-04-750DF-G	ZD-04-1000DF-G	ZD-04-2000DF-G	ZD-04-3000DF-G	ZD-04-5000DF-G
Rated voltage （VAC）	400						
Input voltage range（VAC）	400±20%						
Working frequency(Hz)	50/60±5%						
Rated capacity （kvar）	±200	±300	±400	±600	±800	±1000	±1200
Rated current （A）	300	450	600	900	1200	1500	1800
Over current	1.2						
Size/mm (WxDxH)	800*800*2200			1600*800*2200		2400*800*2200	
Wiring system	3 Phase 4 Wires						
Cable entry	Bottom						
Working Temperature(℃)	-25℃~+40℃ （≥40℃ Using with reducing the rated capacity）						
Running humidity (%)	<95%， without condensation						
Type of cooling	Air cooling						
Level of Protection	IP3X						
Mounting height above sea level	≤ 2,000m at rated capacity; appropriately reduce the capacity if it is greater than 2,000m						
Reactive adjustment range	Continuous Adjustment from capacitive power to inductive power						
Harmonic	Meeting 《Power quality public grid harmonic》 GB/T14549-93						
Response time	≤5ms						
Screen	TFT LCD touched screen， real time voltage and current data display						
Smart communication	TCP/IP, GPRS, Modbus						
Storage and transportation temperature	-40～70℃						
Reliability & Life	20years						
EMC	Meeting GB7251-2005(GB/T7261-2000)						

Remarks: 1, Single cable entry can be divided into forward entry, backward entry and optional  
2, The parameter and specification for above SVG model products, Maybe changed cause of the client’s site real needful for different situations  
3, The matching relationship is not unique , User can choose according the application  
4, The size of cabinet will be difference with different options  
5,The width less than 1200mm (including) for single cabinet installation

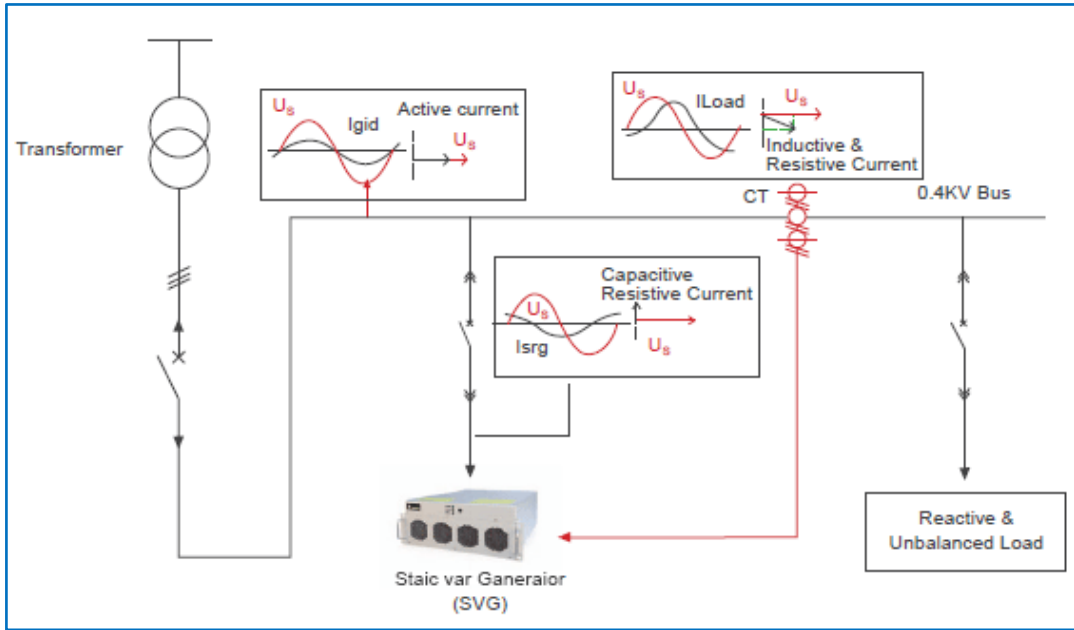
600V Static Var Generator ZD-SVG-06



ZD-SVGM Static Var generator (SVG) is the new standard in reactive energy compensation for 600V networks. This power electronic current source is the accurate and highly reliable solution for today’s networks characterised by significant increase in harmonics, voltage variations caused by intermittent renewable sources connected to the network and voltage level due to the smart grid development. The DSP controlled IGBT topology enables a perfect compensation on each phase for both inductive and capacitive loads. It also correct phase unbalance where necessary. Immune to harmonics, resonance and voltage level, it offers a maintenance free solution reusable in any network configuration.

Principle

Following are principle of Static var generator.



Main Functions

- Precise and step-less power factor correction;
- Fast and dynamic compensation, with a response time less than 5ms;
- Both inductive and capacitive reactive power compensation;
- Improve power transmission stability.

Technical Data

Model	ZD-06-200DF-G	ZD-06-300DF-G	ZD-06-600DF-G	ZD-06-900DF-G	ZD-06-1200DF-G	ZD-06-3000DF-G	ZD-06-6000DF-G
Rated voltage (VAC)	600						
Input voltage range (VAC)	600±20%						
Working frequency(Hz)	50/60±5%						
Rated capacity (kvar)	±200	±300	±600	±900	±1200	±3000	±6000
Rated current (A)	192	289	577	866	1155	2887	5774
Over current	1.2						
Size/mm (WxDxH)	800*800*2200		1600*800*2200	2400*800*2200	2400*800*2200	6000*800*2200	6500*800*2200
Wiring system	3 Phase 4 Wires						
Cable entry	Bottom						
Working Temperature(℃)	-25℃~+40℃ (≥40℃ Using with reducing the rated capacity)						
Running humidity (%)	<95%, without condensation						
Type of cooling	Air cooling						
Level of Protection	IP3X						
Mounting height above sea level	≤ 2,000m at rated capacity; appropriately reduce the capacity if it is greater than 2,000m						
Reactive adjustment range	Continuous from capacitive power to inductive power						
Harmonic	Meeting 《Power quality public grid harmonic》 GB/T14549-93						
Response time	≤5ms						
Screen	TFT LCD touched screen, real time voltage and current data display						
Smart communication	TCP/IP ,GPRS, Modbus						
Storage and transportation temperature	-40~70℃						
Reliability & Life	20 years						
EMC	Meeting GB7251-2005(GB/T7261-2000)						

- Remarks: 1, Single cable entry can be divided into forward entry, backward entry and optional
- 2, The parameter and specification for above SVG model products, Maybe changed cause of the client’s site real needful for different situations
- 3, The matching relationship is not unique , User can choose according the application
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- 5,The width less than 1200mm (including) for single cabinet installation

6kv~35kv STATCOM ZD-FGSVG

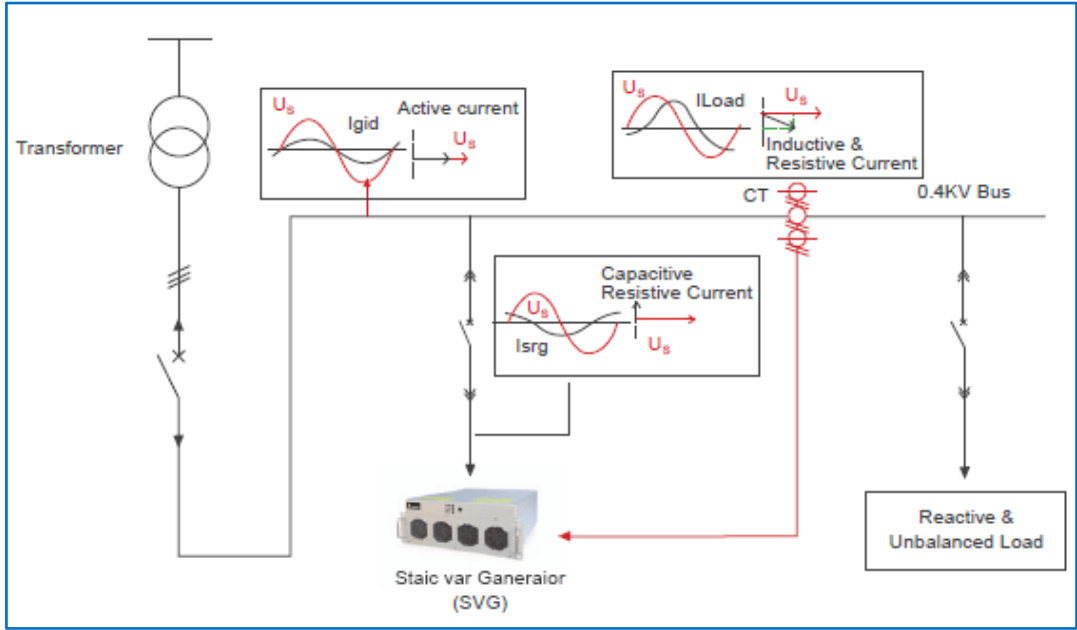


Like SVC but faster, STATCOM continuously provides variable reactive power in response to voltage variations, supporting the stability of the grid. STATCOM operates according to voltage source converter (VSC) principles, combining unique PWM (pulse width modulation) with millisecond switching. STATCOM functions with a very limited need for harmonic filters, contributing to a small physical footprint. If required, switched or fixed air core reactors and capacitors can be used with the VSC as additional reactive power elements to achieve any desired range.

ZD-FGSVG STATCOM has outdoor type and indoor type, with air cooling system or water cooling system.

Principle

Following are principle of Static var generator.



STATCOM Advantages

STATCOM ,Best Power Quality  
Solutions for Medium Voltage Grids

- The fastest dynamic voltage stabilizer
- Better control for power grids, better load compensation
- Optimal stability and quality
- In harmony with harmonics-Best flicker reduction
- Fastest response time-efficient solution

Technical Data

Electrical properties	Rated voltage	6kv~35kv
	Operating frequency	50/60Hz
	Electrical connection	Three-phase three-wire
	Rated Capacity	1Mvar~100Mvar
	Reactive Power Compensation	Compensate inductive and capacitive power continuously and smoothly.
	Control Power	380VAC, 220VAC, or 220VDC
	Over-load Capacity	>120%
	Response time	≤5ms
	Active power loss	≤0.8%
	THDi (Current)	≤3%
	Start regulated reactive power	10kvar
	Resolution of compensate current	1%
Control characteristics	Main Circuit	H-Bridge IGBT
	Redundant Design	Yes
	Power Cells Design	Yes
	Protection	The protection strategy includes three levels, such as component protection, device protection, system protection.
	Running Mode	Constant reactive power, constant assessment point of reactive power, constant assessment point of power factor, constant assessment point of voltage, load compensation and 96 points time sharing control.
	Communication Interface	Ethernet, RS485, CAN, high-speed optical communication interface
	Communication Protocol	Communication protocol: MODBUS_RTU, ProfiBUS, CDT91, IEC61850-103/104, CANOPEN, User-defined.
Structural characteristics	Weight and Dimensions	Refer to the model table.
	Level of protection	Indoor IP40,Outdoor IP44
	Cooling system	Air cooling system or water cooling system
	Installation method	Indoor or outdoor(Container)
Environmental requirements	Ambient temperature	-10~40℃
	Relative humidity	Maximum 90%(25℃), without condensation.
	Mounting height above sea level	≤2,000m at rated capacity; If above, should inform in advance.
	Seismic intensity	8 degree

Projects List

SN	Product	Capacity	User	Field	City	Country
1	10kv APFC	2000Kvar	Runfeng Power	Mining	Liupanshui	CN
2	10kv APFC	3000Kvar	CN Electric Construction	Power Distribution	Mianyang	CN
3	6kv APFC	3600kvar	Weifang Chemical Factory	VFDs	Weifang	CN
4	400V SVG	1100kvar	Hebei Yanzhong Power	Mining	Shijiazhuang	CN
5	10KV SVG	2000Kvar	Ningbo Power Design Institute	Solar	CiXi	CN
6	35kv SVG	4Mvar	GD Changsheng	Solar	Dawu	CN
7	6kv APFC	2Mvar	Tongxin Power design Institute	Rolling furnace	Zhengzhou	CN
8	35kv SVG	10Mvar	CN Huadian Corporation	Wind	Yantai	CN
9	10kv APFC	6Mvar	JinRen Design Institute	Electrolytic AL Manu.	Jijing	CN
10	400V APF	1200A	National Grid(jiangsu)	Hospital	Heze	CN
11	400V APF	600A	Hebei TX power Design Institute	Hospital	Baoding	CN
12	400V SVG	900kvar	Jinan Metro	Railway/metro	Jinan	CN
13	10KV SVG	1400kvar	Xian hh power design institute	Power Distribution	Xining	CN
14	11kv APFC	1200kvar	Motors	Sugar factory	Jhang	PK
15	SVG	1MVAR	Solar	Solar station	Icheon	KR
19	400V SVG	800Kvar	Harmonics from device	Medical		IN
20	380V SVG	600Kvar	Lights	high building		BR
21	6.6kv SVG	1000Kvar	Solar	Solar Sation		MY
23	7.2KV APFC	1500kvar	Poor Power Factor	Steel		RO
24	380V APF	800A	VFDs and Motors	Chemical		EG
25	380V APF	400A	Melting funace	Steel factory		BR
26	380V APF	300A	Harmonics from device	Hospital		BR
27	440V APF	300A	Harmonics from device	Hospital		CO
28	208V SVG	6*75Kvar	Motors	Factory		CO
29	440V APFC	350Kvar	Motors	foundry factory		CO
30	400V APF	300A	Motors	Steel factory		IN
31	400V SVG	400kvar	Motors and ovens	Bakery factory		ZA
32	400V APF	300A	VFDs	Oil factory		LB
33	400V SVG	200Kvar	Motors	Steel factory		IN
34	400V APF	300A	VFDS	Seaport		SG
35	400V APF	600A	VFDs	Seaport		SG
36	3.3kv APFC	675kvar	Waste water treatment	Motors		ZW
37	33kv Statcom	2.5Mvar	Symbior 8MW solar plant	Solar plant		BD
38	6.6kv Statcom	2Mvar	Auto Manufactory	Automotive machine		TH
39	10kv Statcom	3Mvar	Wind Plant	Wind Plant		KR
40	35kv s tatcom	30Mvar	Power Plant	Oil and Gas		GO

Company Certificate and Honor

