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**RENLE**



**HV/LV REACTIVE COMPENSATION  
HARMONIC SUPPRESSION DEVICES**

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# PRODUCT SUMMARY

INNOVATIVE TECHNOLOGY, SMART WORLD

**Shanghai RENLE  
Science & Technology Co., Ltd.**

**RENLE**

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Professional Manufacturer of  
Intelligent Grid and New Energy

# ENTERPRISE PROFILE

Shanghai RENLE Science & Technology Co., Ltd. is the system integrator in solutions to industrial control, and the professional manufacturer in electric application. After 22 years of development, our company business covers areas of industrial automation products, intelligent power distribution, automatic control systems, lighting and so on. Our products include HV/LV motor soft starter, HV/LV frequency inverter, explosion-proof electrical apparatus, HV/LV reactive compensation and harmonic suppression devices, EPS (emergency power supply), drive control system, MCS, DCS, innovation system for energy conservation, HV/LV complete sets of equipment for electric power transmission distribution and so on. The company products are widely used in electric power, metallurgy, petroleum and petrochemical industries, military industry, mining, chemical industry, construction, building materials, pharmacy, municipal works, textile printing and dyeing, paper making, rubber industry, rail transit, hydropower industry, aerospace technology, new energy battery industry, semiconductor industry and etc.

Shanghai RENLE locates in China, and sets up a research and development centre in Germany. The Shanghai RENLE research and development center is recognized as the Shanghai Enterprise Technology Centre. RENLE participates in drawing-up and revising 14 national technical standards. The company has passed the certification of ISO9001 Quality Management System, ISO 14001 Environment System, ISO45001 Occupational Health and Safety Management System, CE, national CCC, TUV, CU-TR, GOST and products inspection.

Shanghai RENLE's enterprise vision: to build a century-old high-tech electric company of prestige; our mission: we are dedicated to manufacturing, developing and supporting industrial automation products and systems, committed to improving product and energy efficiencies for clients, and help creating a better world.



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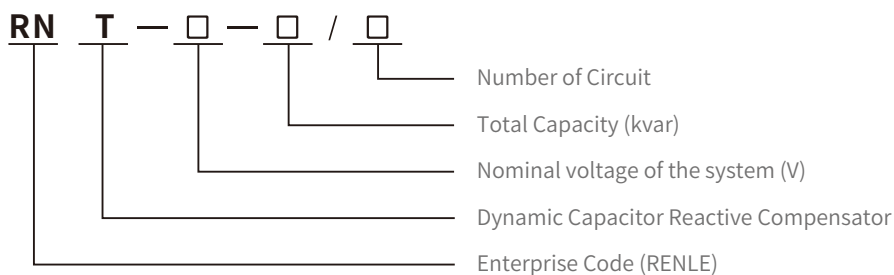
# RNT SERIES

## DYNAMIC CAPACITOR REACTIVE COMPENSATOR

### PRODUCT OVERVIEW

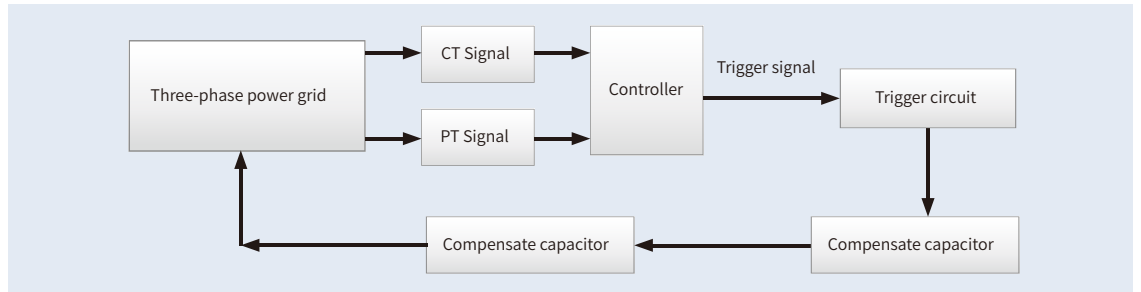
RNT Series Dynamic Capacitor Reactive Compensator, a dynamic reactive power compensator independently developed by Renle, adopts thyristor as hurl-slices switch to automatically switch capacitor bank according to loads status, improving the quality of power grid and keeping power factors stay in their best. RNT, being quick in response, can complete the process of putting-into and reducing all capacitor banks within 10ms or 20ms. It overcomes defects of outdated reactive compensator in way of hurl-slice, control signal, response time, and etc. It is fully equipped with protection measures and self-recovery function due to blackout. Since plunged into the market, this product generates sound economic and social benefits to the user and country and is widely recognized by our costumers. This product has passed the certification of national CCC.

### MODEL EXPLANATION



# PRINCIPLE OF OPERATION

First conducts the sampling process of sending system voltage and current analog to the controller, controller shall extract a reactive component Q for A/D conversion, comparing and computing. Then the controller gives out a control instruction to make thyristor hurl and slice, putting into or reducing the power capacitor bank. Adopting the thyristor as a hurl-slice switch enables the product be quick in response, free from noises, surges, over-voltage and etc. Meanwhile, the capacitor bank of this product can be plunged into repeatedly with no need of a discharged capacitor under the circumstance of equivalent voltage of system and capacitor, realizing the frequent uses of our capacitor bank.



## TECHNICAL FEATURES

- Zero-off: it adopts the technique of thyristor zero-crossing hurl-slice to achieve zero voltage input and zero current elimination, causing no surge or overvoltage;
- Quick in response: it keeps speedy tracks of system load in its reactive varieties, and real-time tracks of dynamics; the response time: <20ms
- Intelligent compensation: it is equipped with an intelligent terminal of monitoring to realize real-time and online display of all parameters within the grid. And functions of remote sensing, communication and control can be realized through the communication port of RS485/232.
- Fully-covered with protections: it is equipped with various digital protection functions of over-voltage, under-voltage, over-current, over-heat, phase loss and etc.
- It can conduct the three-phase or split-phase compensation.

## CONDITIONS OF USE

- Relative humidity: <95%
- Environment Temperature: -25°C~+45°C
- Altitude: <2000m
- Environmental conditions: free from corrosive gas, conductive dust, flammables and explosives.
- Installed at: places free from violent vibration, snow or rain erosion, and with an inclination of no more than 5 degrees;

**Note:** in case of any special terms in use and environment, please negotiate with our company at ordering.

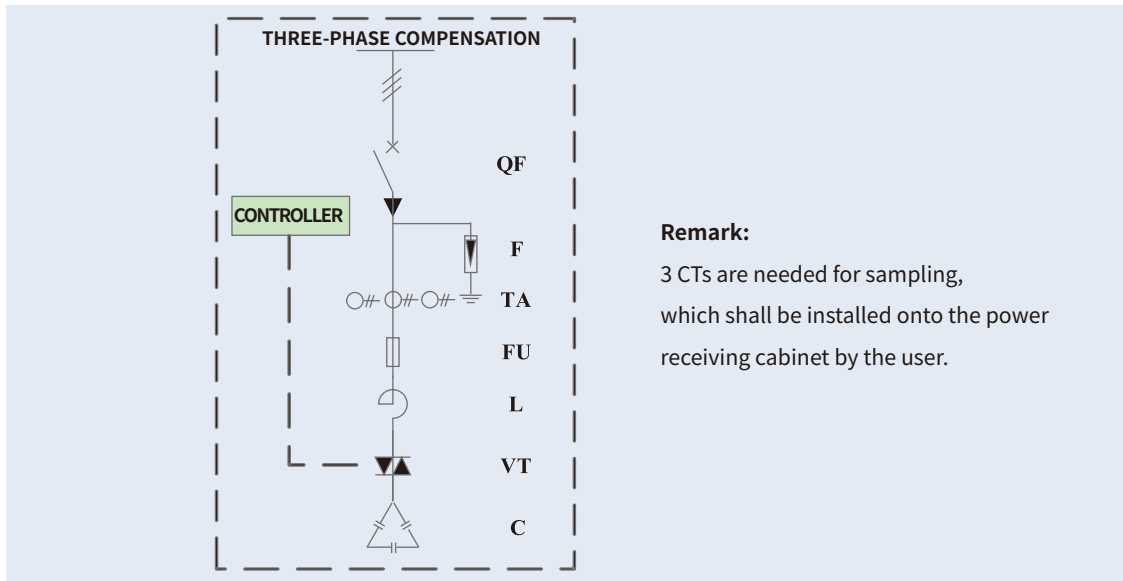
## TECHNICAL PARAMETERS

- In compliance with the Standard: GB/T15576-2008 Low-voltage reactive power compensation assemblies
- Nominal voltage of system: 380V~660V
- Dynamic response time: <20ms
- Frequency: 50-60Hz
- Control signal: Reactive power
- Protection level: IP30

# APPLICATION OCCASIONS

- An occasion of slightly low power factors in load, large line pressure drop and needs in reactive power compensation;
- An occasion of wide-ranged load power factor and speedy response;
- A power consuming occasion of highly demanded voltage fluctuation and dynamic compensation;
- It is widely used in industries of power, mechanical manufacture, automobile, metallurgy, coal mine, chemical engineering, oil field, electric railway, and etc.

# SCHEMATIC DIAGRAM OF THE DEVICE & SHEET OF MODEL SELECTION



# SHEET OF CABINET SIZE FOR REFERENCE

Product Type	Compensation Capacity	Maximum Circuit Number(kvar)	Size of Cabinet Body H×W×D(mm)
RNT-380V-100/3	100	3	2200×800×600
RNT-380V-150/3	150	4	2200×1000×600
RNT-380V-200/4	200	4	2200×1000×600
RNT-380V-250/5	250	4	2200×1000×800
RNT-380V-300/6	300	6	2200×1000×800
RNT-380V-350/6	350	6	2200×1000×1000
RNT-380V-400/6	400	6	2200×1000×1000
RNT-380V-450/7	450	7	2200×1000×1000
RNT-380V-540/10	540	10	2×(2200×1000×800)
RNT-380V-600/11	600	11	2×(2200×1000×1000)
RNT-380V-750/11	750	11	2×(2200×1000×1000)
RNT-380V-900/12	900	12	2×(2200×1000×1000)

**Remark:** the cabinet can be supported with GGD, GCK, GCS, MNS and others.





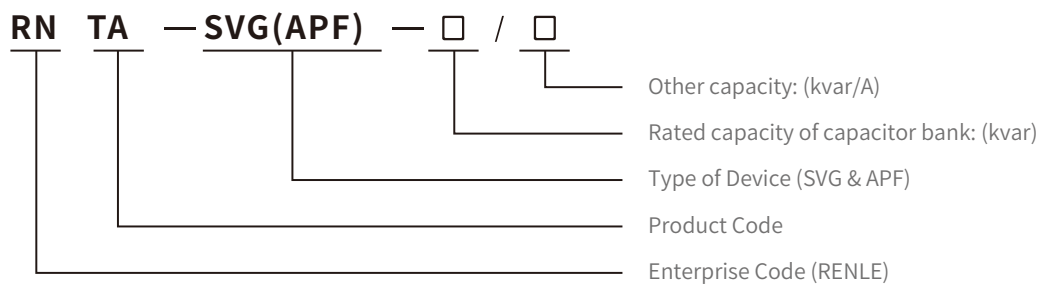
# RNTA SERIES HYBRID

## DYNAMIC ACTIVE POWER FILTER COMPENSATOR

### PRODUCT OVERVIEW

RNTA Series Hybrid Dynamic Active Power Filter Compensator, new to the reactive power compensation field, breaks through restraints of a traditional concept of reactive power factor, regulates stepless outputs of both capacitive and inductive reactive power (QL~QC), increases the grid power factor at the fastest speed, filters and eliminates wave spectrum, improves quality of power grid, and is the ideal solution to high-capacity reactive compensation and harmonic suppression.

### MODEL EXPLANATION



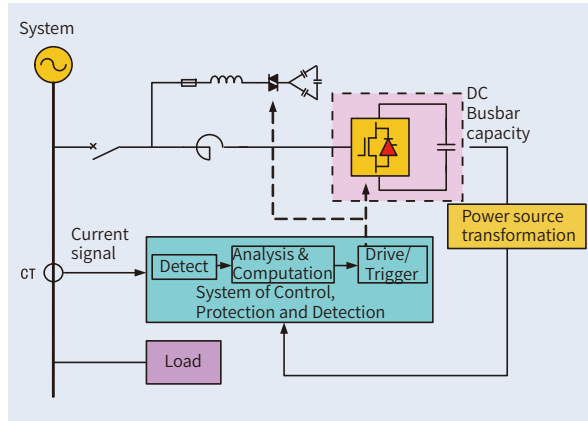
#### An example of product model:

- RNTA-SVG-450/50 stands for a reactive compensation device, of which capacitor compensation capacity is 450kvar, SVG compensation capacity is 50 kvar, and the total rated capacity is 500kvar.
- RNTA-APF-450/50 stands for a dynamic active filter compensator, of which capacitor compensation capacity is 450kvar, with an APF compensation capacity of 50A, in the aim of both reactive compensation and harmonic suppression.



# PRINCIPLE OF OPERATION

RNTA is developed on the theory of instantaneous reactive power, equipped with technology of Pulse Width Modulation (PWM) and multi-core parallel processing. Its main circuit is comprised of IGBT power component (aka SVG/APF) and thyristor controlled capacitor bank. The two parts are parallel connected, detect signal through a gauge system, compute real-time capacity of reactive by intelligent control, realize coarse-tuned reactive power through thyristor controlled capacitor bank and fine-tuned reactive power through IGBT power components, and adopt optimization of certain harmonic elimination technology of PWM to reduce the harmonic wave.



# TECHNICAL FEATURES

- Quick response: it adopts instantaneous reactive power algorithm to conduct speedy reactive compensation; normally the response time shall be less than 5ms.
- No over-compensation: it realizes both dynamic and stepless tracking, which outputs both inductive and capacitive reactive power, avoiding over-compensation.
- Complete function: choices of reactive power compensation or both reactive and harmonic compensation can be made by the user.
- High efficiency: it adopts the new low cost IGBT and SCR, making the device efficiency reach 99% above.
- Improved protection: it is equipped with many protection functions of load short circuit, over-voltage, over-current, over-temperature, phase loss and etc.
- Flexible control: it adopts various control strategies of the constant reactive power or constant voltage control, three-phase balanced control or split-phase control and etc.

# TECHNICAL PARAMETERS

Voltage of power grid	AC380±15%
Compensation response time	<5ms
Active power loss	<1% under rated power
Way of cooling	Heat pipe + Air cooling
Control system	Fully digital control system
Reactive power regulation range	0-100%
Way of regulation	Three-phase balance & Split-phase regulation
Average power factor	≥0.98
Control connection	Optical fiber or electrical connection

# CONDITIONS OF USE

- An occasion of slightly low power factor of system and needs of high-capacity reactive power compensation;
- An occasion of frequently varied load and needs of speedy tracking compensation;
- A power consuming occasion with highly demanded harmonics;



# RNAPF SERIES

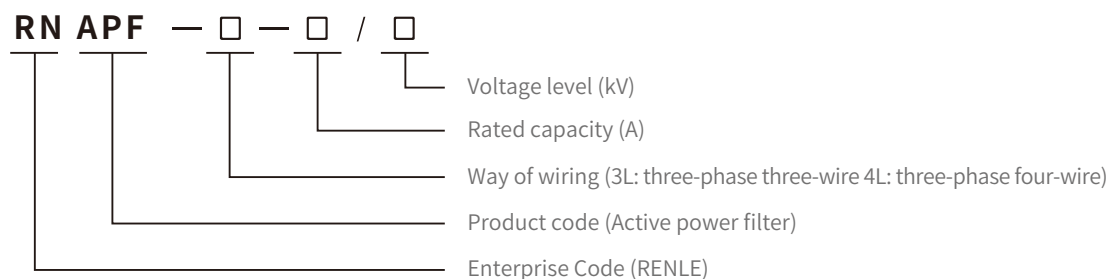
## ACTIVE POWER FILTER

### PRODUCT OVERVIEW

Under the condition of a disturbed LC passive filter, widely used by the terminal load user at present, by the parameter, certain harmonics shall be amplified in consequence, causing much more losses, a larger size and etc. Thus the need for a replacement is urgent.

RNAPF is equipped with a new power electric device by adopting the technology of high-frequency power electronic switch conversion and hybrid circuit of analog and digit to detect and inject current. It is a new power electric device for dynamic harmonic suppression and reactive power compensation. It can compensate both harmonics with varied size and frequency and reactive powers. With its plunge into market, defects of harmonic suppression and reactive power compensation by a LC filter can be overcome. It is an ideal device for harmonic compensation, featured as a better performance in compensation than a passive filter.

### MODEL EXPLANATION



#### An example of product model:

- RNAPF-3L-100/0.4 stands for an active power filter with three-phase three-wire system, a rated voltage of 400V, and a rated current of 100A.
- RNAPF-4L-300/0.4 stands for an active power filter with three-phase four-wire system, a rated voltage of 400V, and a rated current of 300A.

# MODULARIZED APF

## PRODUCT PROPERTIES

- High precision in harmonic compensation;
- Strong compensation capability in neutral line and unbalance;
- Flexible in design, can be used as a standard component for power distribution system;
- Capable of online capacity expansion and maintenance;
- It applies to the voltage level of 380V and 660V.



## APPLICATION OCCASION

- A place in need of harmonic suppression at power distribution side, like school, hospital, stadium and buildings;
- A large load with limited installation room or in needs of power distribution management;

# MACHINE-CABINET APF

## PRODUCT PROPERTIES

- Pure and premium industrial product with imported core parts;
- High reliability, heat-resistant, resistance to salt corrosion, dust and etc;
- Capable of online capacity expansion and maintenance;
- It applies to the voltage level of 380V and 660V.

## APPLICATION OCCASION

- Centralized harmonic suppression in needs of high-capacity .



# OPERATION MODE

RNAPF is capable of five compensation modes, namely modes of reactive power first, harmonic first, unbalance first, voltage as target and fixed reactive power. The above five compensation modes can be chosen at will according to needs.

### ● Priority mode of harmonic

The harmonic component in load current shall be compensated according to priority, if there is an extra capacity, it shall be compensated for reactive power and asymmetric components.

### ● Priority mode of reactive power

The reactive component in load current shall be compensated according to priority, if there is an extra capacity, it shall be compensated for harmonic and asymmetric components.

### ● Priority mode of unbalance

The unbalance component in load current shall be compensated according to priority, if there is an extra capacity, it shall be compensated for harmonic and reactive components.

# TECHNICAL STANDARD

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- GB/T1454993** Quality of electric energy supply: Harmonics in public supply network
- GB/T155761995** The specifications of low-voltage Reactive power steady compensation equipments
- GB7625.11998** The limits for the harmonic current emissions caused by low-voltage electrical and electronic equipments
- Q/VCRR21-2012** General technical specification for RNAPF series active power filter

# TECHNICAL FEATURES

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- **Advanced - It adopts several patented technologies**

It adopts the dual control system of DSP + FPGA and closed loop control to raise detection speed and precision of harmonics;

- **Speedy - Timely dynamic response**

Speedy response to load fluctuation, the controller response time shall be less than 5 $\mu$ s, and the system response time shall be less than 10ms;

- **Strong - Powerful filter capacity**

Wide-ranged filter; it can remove harmonics of 2 to 50 times; or choose to filter a certain time of harmonic; both characteristic and uncharacteristic harmonics can be filtered;

- **Stable - No over-current for the device**

Over-compensation can be fully avoided at filtering; it can give out proper compensation current through auto tracking of load changes, and is with excellent compensation properties;

Premium - Supported with premium spare parts

All the key parts shall be made by world-class brands to ensure product quality;

- **Safe - Complete protection function**

It is equipped with complete protection functions of over-voltage, over-current, over-load, phase loss, over-temperature and etc. Also it can conduct self-diagnosis to intelligently decide whether to auto slice the device, ensuring safeties of equipment and power system;

- **Friendly - Easy to operate**

It adopts the LCD visualized human-machine interface displayed in Chinese, is capable of fault alarm and recalls, shows the running status in the panel, and is set with running parameters.

- **Capacity expansion - strong in parallel capacity expansion**

Several capacities in parallel can be used simultaneously, and each device shall be free from each other;

- **Ecological - Low running losses**

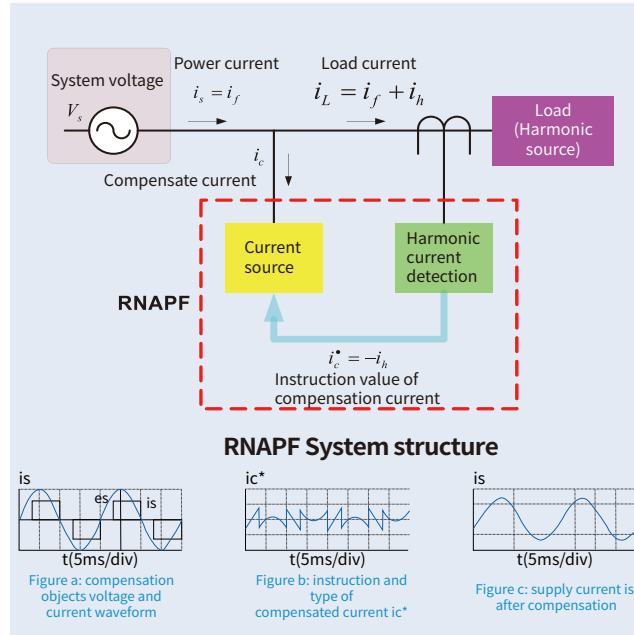
The running losses in average shall be no more than 3% of the whole capacity.



# PRINCIPLE OF OPERATION

RNAPF Series Active Power Filter is, with a strong and active harmonic filtering capability, a perfect solution to harmonic suppression. It can provide continuous dynamic reactive power, improves load unbalance degree. It is free from the affects of changes to power running structure as well as system impedances from different power supplies.

RNAPF conducts real-time detection of line current, and transforms current detected into digital signal of the digital signal processor (DSP). Then the digital signal processor (DSP) generates a series of pulse wide modulation (PWM) signals, driving IGBT power components to output current whose phase position is in exact contrary with system harmonic current but has the same amplitude toward system through a converter reactor. Thus above two harmonic currents shall offset each other, to achieve harmonic elimination and power purification.



## REFERENCE LIST OF CABINET SIZE AT CUSTOMER'S DEMANDS

### LIST OF RNAPF SPECIFICATION & MODEL

System type	Structure form	Product model	Rated capacity(A)	W×D×H Size(mm)
Module unit	Drawer type or wall-mountable type	RNAPF-30/380-M	30	440×522×243
		RNAPF-50/380-M	50	440×522×243
		RNAPF-75/380-M	75	587×630×243
		RNAPF-100/380-M	100	587×630×243
		RNAPF-200/380-M	200	587×650×353 *
		RNAPF-100/660-M	100	587×630×243
		RNAPF-200/660-M	200	587×650×353 *
Cabinet system	Drawer cabinet type	RNAPF-100/380	100	800×1000×2200
		RNAPF-200/380	200	800×1000×2200
		RNAPF-300/380	300	800×1000×2200
		RNAPF-400/380	400	800×1000×2200
		RNAPF-500/380	500	1000×1000×2200
		RNAPF-600/380	600	1000×1000×2200
		RNAPF-100/380	100	800×1000×2200
		RNAPF-200/660	200	800×1000×2200
		RNAPF-300/660	300	800×1000×2200
		RNAPF-400/660	400	800×1000×2200
	All-in-one cabinet type	RNAPF-3 (4) -100/380	100	800×1000×2200
		RNAPF-3 (4) -150/380	150	800×1000×2200
		RNAPF-3 (4) -200/380	200	800×1000×2200
		RNAPF-3 (4) -300/380	300	800×1000×2200
		RNAPF-3 (4) -100/660	100	800×1000×2200
		RNAPF-3 (4) -200/380	200	800×1000×2200
		RNAPF-3 (4) -200/380	200	800×1000×2200

**Remark:** 1. The above are the regular specifications, other unlisted models can be consulted;  
 2. If there are any changes to equipment size, please confirm and subject to the latest design!  
 \*: no consideration of reactor

# TECHNICAL PARAMETERS

Product features	Rated voltage	AC380±15%、AC660±15%。
	Operating frequency	50±5%
	Electrical wiring	Three-phase three-wire/ Three-phase four-wire
	CT requirement	3 CTs are needed; 5VA; Secondary current at CT side is 5A
	Range of filtering	2~50 times of harmonics (the filter can be selected; each time of harmonic compensation can be set separately)
	Degree of filtering	Amplitude compensation setting can made by choosing each time of harmonic
	Filter capacity	≥97%
	Reactive compensation	Optional mode, auto control of capacity
Product properties	Power-factor correction	Yes and can be set.
	Response time	Controller response time: <5us; System response time: <10ms.
	Active power loss	<3% under rated module power
	Overload capacity	120%,1min.
	Operation way of multi-machine	Parallel running
	Mean time between failure	≥ 100,000 hours
Control features	Switch frequency	20kHz in average
	Control algorithm	Field screening vector compensation algorithm with self-adaptive capability
	Way of Control	Closed loop control
	Controller	Dual DSP+FPGA
	Communication function	Remote communication protocol of Modbus, RS485/232 LAN communication interface
	Control connection	Optical fiber or electrical connection
Structure features	Outline	H: 2200(mm)×W: 800(mm)×D: 600(mm)or customized
	Weight	<600kg
	Protection level	IP30
	Color	RAL7035 (Light grey), other colors can be provided at request
	Way of cooling	Forced air cooling
	Overall structure	Floor stand
	Way of Installation	Indoor installation, optional methods of fastening and incoming cable wires
	Way of primary incoming line	Incoming lines from top or bottom
Environmental conditions	Environment temperature	-2°C~+40°C
	Storage temperature	-25°C~+55°C
	Relative humidity	95% at maximum, free from condensation
	Altitude	Installed at an altitude of less than 2000 meters (Other special requirements needs to be customized)
Electromagnetic compatibility	In conformity with GB/T7251-2005 (GB/T7261-2000), including pulse train disturbance to damping oscillation waves, electrostatic discharge disturbance, radiated electromagnetic field disturbance, fast transient disturbance, surge (impact) disturbance degree, voltage interruption disturbance resistance, electromagnetic emission test, etc.	



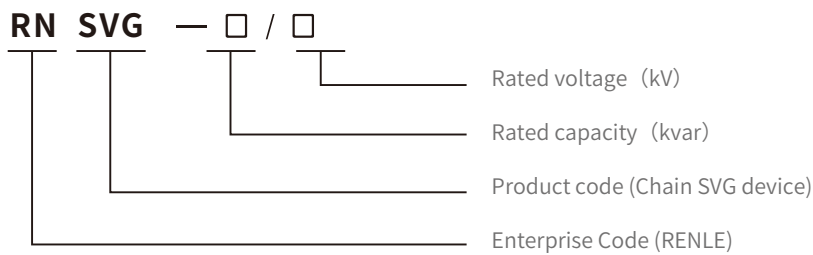
# RNSVG SERIES

## LV DYNAMIC POWER QUALITY CONTROL DEVICE

### PRODUCT OVERVIEW

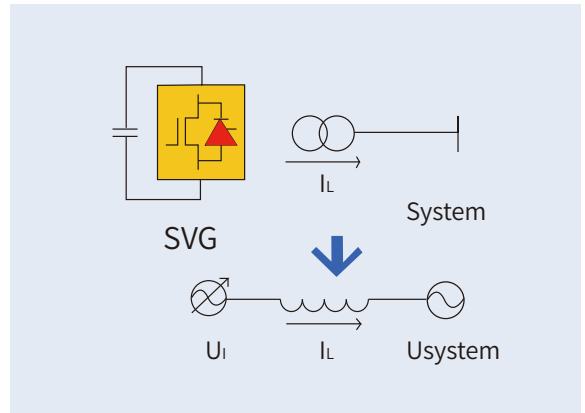
Low-voltage RNSVG is the latest product of dynamic static var generator (short as SVG), representing the latest technology applied in the field of reactive power compensation. It uses the high-power IGBT device to replace ordinary thyristor. As an advanced reactive power compensation device of more reliability and flexibility, it plays a greater role in the field of power quality research. Its outstanding advantages are as follows: quick in response, absorption of continuous reactive power, generation of small higher harmonics, wide-ranged adjustment, low losses and noises.

### MODEL EXPLANATION



# PRINCIPLE OF OPERATION

Low-voltage RNSVG applies technologies of power electronics, computer and modern control into the electric power system. It connects the voltage source inverter (VSC) in parallel at the AC side to power grid, adopts advanced direct current control technology to flexibly and speedily control the current at the AC side directly, conducts the continuous reactive power adjustment from inductive to capacitive, meeting a demand of speed compensation on reactive power in order to suppress voltage fluctuations and enhance system stabilities. RNSVG dynamic compensates the reactive power current and harmonic current to lessen line losses, enhance the capability of active power transmission,



suppress harmonics and improve power quality. Low-voltage RNSVG applies technologies of power electronics, computer and modern control into the electric power system. It connects the voltage source inverter (VSC) in parallel at the AC side to power grid, adopts advanced direct current control technology to flexibly and speedily control the current at the AC side directly, conducts the continuous reactive power adjustment from inductive to capacitive, meeting a demand of speed compensation on reactive power in order to suppress voltage fluctuations and enhance system stabilities. RNSVG dynamic compensates the reactive power current and harmonic current to lessen line losses, enhance the capability of active power transmission, suppress harmonics and improve power quality.

## LIST OF PRODUCT SPECIFICATION & MODEL

### LIST OF RNSVG SPECIFICATION & MODEL

System type	Structure form	Product model	Rated capacity(kvar)	W×D×H Size(mm)	
Module unit	Drawer type or wall-mountable type	RNSVG-50/380-M	50	587x630x243	
		RNSVG-100/380-M	100	587x650x353	
		RNSVG-50/660-M	50	587x630x243	
Cabinet system	Drawer cabinet type	RNSVG-100/380	100	800x1000x2200	
		RNSVG-150/380	150	800x1000x2200	
		RNSVG-200/380	200	800x1000x2200	
		RNSVG-250/380	250	800x1000x2200	
		RNSVG-300/380	300	1000x1000x2200	
		RNSVG-400/380	400	1000x1000x2200	
		RNSVG-500/380	500	1000x1000x2200	
		RNSVG-100/660	100	800x1000x2200	
		RNSVG-150/660	150	800x1000x2200	
		RNSVG-200/660	200	800x1000x2200	
		RNSVG-250/660	250	1000x1000x2200	
		RNSVG-300/660	300	1000x1000x2200	
		RNSVG-100/380	100	800x1000x2200	
		RNSVG-150/380	150	800x1000x2200	
		RNSVG-200/380	200	1000x1000x2200	
		RNSVG-300/380	300	1000x1000x2200	
		All-in-one cabinet type	RNSVG-100/660	100	800x1000x2200
			RNSVG-200/660	200	1000x1000x2200
RNSVG-300/660	300		1000x1000x2200		
RNSVG-400/660	400		1000x1000x2200		
RNSVG-500/660	500		1000x1000x2200		

**Remark:** 1. The above are the regular specifications, other unlisted models can be consulted;  
2. If there are any changes to equipment size, please confirm and subject to the latest design.



# PRODUCT PROPERTIES

- **It is equipped with the running ability of anti-harmonic, and increases the reliability of reactive power devices.**

As the most advanced active power generator, RNSVG's harmonic current in system will not cause over-load damages to itself, but to considerably increase the device reliability. However, the traditional capacitor compensator shall amplify the harmonic in system, which in reverse caused a faulted capacitor by the magnified harmonics, lowering the reliability of reactive power compensator to a great amount.

- **It completely avoids the resonance and greatly enhances the safety of system running.**

RNSVG's property of power source avoids the possibility of a resonance in theory, which greatly enhances the running safety of the power distribution system. But the traditional passive compensator is haunted by the possibility of a series or parallel resonance, a hazard in safety operation.

- **Quick in response proves a better compensation.**

RNSVG, an active power generator cored with a 1GBT fully controlled high power electronic device, has the fastest response in control, being less than 1ms, and in closed loop, less than 5ms. The perfection in power quality is closely related to the speed of response. A higher speed of response has better effect on voltage flicker and fluctuation.

- **A dynamic and continuous adjustment provides a refined compensation of reactive power.**

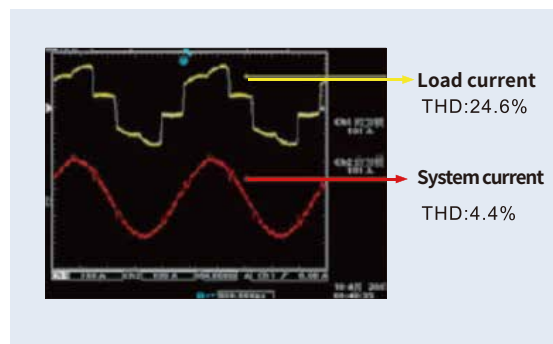
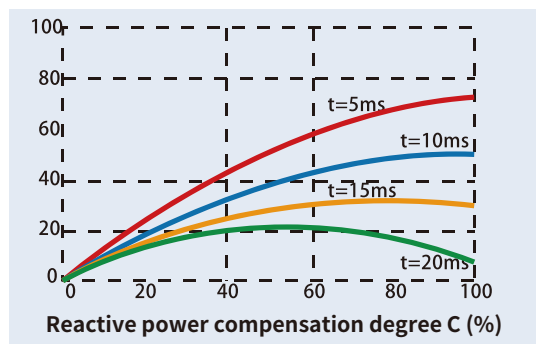
Equivalent to a dynamic reactive power generator, RNSVG gives out the reactive power current accurately in real-time according to loads changes, enabling a stepless and continuous adjustment in reactive power output, with no occurrence of under-compensation and over-compensation, realizing a refined compensation of reactive power. Meanwhile, it lowers the loss and saves energy.

- **A two-way adjustment from inductive to capacitive makes the device automatically adapt to more working conditions.**

RNSVG gives out both capacitive and inductive reactive power, which automatically adjusts according to different working conditions. In removing a heavy load and a sudden increase of capacitive reactance (at the capacitive power side), the problem of a surge in voltage shall be caused. Under that condition, RNSVG can automatically absorb the redundant reactive power in system to lower voltage to a normal level, ensuring the safety operation of electric equipment.

- **A capability of harmonic filter enables the clean electric power.**

RNSVG is capable of certain harmonic filtering. At the time of providing a dynamic reactive power, the remaining capacities can filter the harmonic waves of 2 to 13 times, to the effect of electric power cleaning and pollution control.



# APPLICATION OCCASION

- It is used in the reactive power compensation for AC motor, rectification, frequency conversion, medium-and-high frequency induction heating, welding and mixed loads, etc. It applies to low-voltage high-power electrolysis, electroplating, electric arc furnace, pumping unit of oilfield, steel rolling factory, chemical engineering, intermediate frequency furnace, subway, machinery factory, wind power station, pump station, port, automobile factory, exhibition venues, office buildings, and etc.

# PRODUCT SPECIFICATION

Product	RNSVG-100/0.4	RNSVG-200/0.4	RNSVG-300/0.4
Compensation capacity	±100	±200	±300
Rated voltage	380V		
Rated frequency	50/60		
Protection level	IP20 or customized at customer's demands		
Size (W×D×H)	800mm×800mm×2000mm		
Weight	100	180	200

**Remark:** above are the specifications of standard product, in case of any other needs, please contact our company.

## TECHNICAL PARAMETERS

Product features	Rated voltage	AC380±15%, AC660±15%
	Operating frequency	50±5%
	Reactive compensation	Optional mode, auto control of capacity
	Reactive power adjustment range	A continuous and stepless adjustment between the rated inductive reactive power to the rated capacitive reactive power.
	Response time	1ms
	Active power loss	<3% under rated module power
	Overload capacity	120%
	Operation way of multi-machine	Parallel running
Meantime between failure	≥ 100,000 hours	
Control features	Switch frequency	10kHz in average
	Control algorithm	Field screening vector compensation algorithm with self-adaptive capability
	Way of Control	Closed loop control
	Controller	Digital DSP
	Communication function	Remote communication protocol of Modbus, RS485/232 /LAN communication interface
Control connection	Optical fiber or electrical connection	
Structure features	Protection level	IP20 or customized at customer's demands
	Color	RAL7035 (Light grey), other colors can be provided at request.
	Way of cooling	Forced air cooling
	Overall structure	Floor stand
	Way of Installation	Indoor installation, optional methods of fastening and incoming cable wires
Environmental conditions	Environment temperature	-25°C-+40°C
	Storage temperature	-25°C-+55°C
	Relative humidity	95% at maximum, free from condensation
	Altitude	Installed at an altitude of less than 2000 meters
Electromagnetic compatibility	In conformity with GB/T7251-2005 (GB/T7261-2000), including pulse train disturbance to damping oscillation waves, electrostatic discharge disturbance, radiated electromagnetic field disturbance, fast transient disturbance, surge (impact) disturbance degree, voltage interruption disturbance resistance, electromagnetic emission test, etc.	



# RNSVG SERIES

## 660V/1140V SPECIALIZED CHAIN DYNAMIC POWER QUALITY CONTROL DEVICE

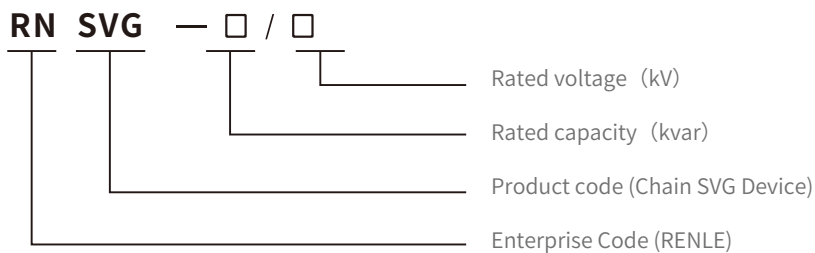
### PRODUCT OVERVIEW

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660V/1140V specialized chain-typed RNSVG (Static Var Generator) is the latest generation of SVG dynamic reactive power compensation device developed independently by our company through the technology of active power filtering based on the traditional SVG (aka STATCOM in the world). As the advanced equipment with cutting-edge dynamic compensation technology, it realizes speedy reactive power tracking and dynamic compensation under the environment of high harmonic current, and actively suppresses the harmonic waves of the system.

### MODEL EXPLANATION

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#### An example of product model:

- RNSVG-1200/0.66 stands for the RNSVG series chain dynamic power quality control device with a rated capacity of 1200kvar and a rated voltage of 660V.
- RNSVG-2000/1.14 stands for the RNSVG series chain dynamic power quality control device with a rated capacity of 2000kvar and a rated voltage of 1140V.

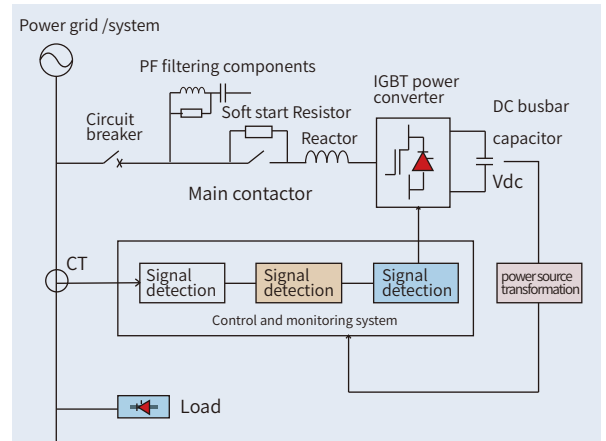
# TECHNICAL PARAMETERS

## Principle of Reactive Compensation

In accordance with the reactive power current given by the real-time testing system, RNSVG realizes the dynamic reactive power compensation through the capacitive or inductive compensating current generated by the IGBT power converter. The target value of the reactive power compensation can be set through the RNSVG operation panel. The reactive compensating current of RNSVG changes dynamically according to the requirements of the system reactive power, thus no over-compensation shall occur for flexible reactive power compensation causing no surge impacts.

## Principle of filtering

RNSVG collects the real-time current signals through external CT inductor, separates the harmonic part through internal testing currents, and realizes lowering harmonics through the compensating current, with an equal amount to system harmonic but with opposite phase, generated by the IGBT power converter and PF filtering components. RNSVG adopts the self-mixing filtering algorithm independently developed by our company and a patent technique of PF filtering to ensure its stable operation under a high harmonic environment of 660V, and an actively suppression of system harmonics.



# TECHNICAL FEATURES POWER ADVANTAGE

- **Advanced control strategy and algorithm**

Featured as high accuracy in control and fast in response, RNSVG adopts the closed loop control strategy and the algorithm of direct current control, to have a better compensation effect on a rapidly changing load of impact. Its total response time of the closed loop shall be less than 10ms.

- **An unique self-mixing filtering technique**

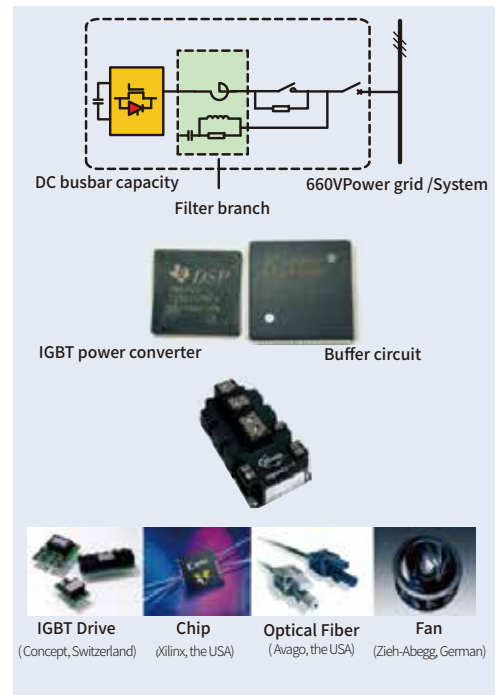
The unique self-mixing filtering technique based on the topological structure of L+LC filtering current it adopted causes large amount of low-order harmonics for filtering by a specialized PF filtering components. And the high-order harmonics shall be actively filtered and eliminated by the IGB power converter and an internal reactor. Thus, due to a better effect on filtering, it applies to any sites with electric network impedance for no resonances and its own safety.

- **Control chip with military standards**

It adopts the control technique of DSP+FPGA+CPLD, and parallel operation of dual DSP. Thus its computing speed is way higher than the one adopts single DSP control way, and it has a smaller delay in communication, and is faster in response speed, beneficial to adopting a more advanced control algorithm, which makes RNSVG have a better compensating effect. Once after FPGA and CPLD are recorded in program, its operation reliability gets higher for a hardware circuit has no running programs.

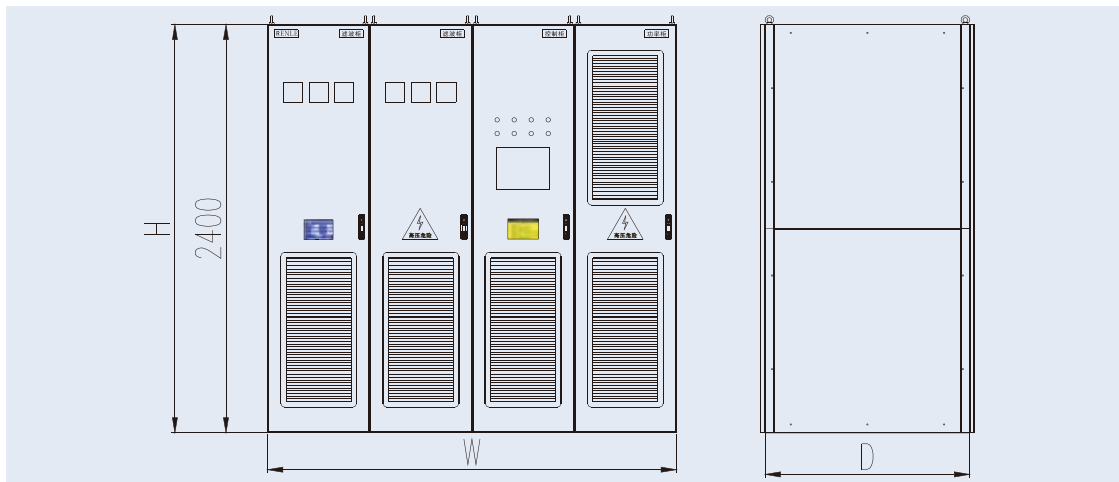
- **All key components and parts are imported with original packaging**

- 1.IGBT module- imported with original packaging from Infineon, German
  - (1)Fourth generation of the latest IGBT technology
  - (2)A significantly decrease in switch and conduction losses
  - (3)A considerable increase in temperature and power cycles, prolonging the service life
- 2.Other key parts





# OUTLINE DIAGRAM OF RNSVG SERIES CHAIN DYNAMIC POWER QUALITY CONTROL DEVICE



Voltage level	Rated capacity	Compensation capacity	Standard size of cabinet body HxWxD(mm)	Way of Incoming Lines
660V (-20%~+15%)	600	600	1200x1200x2400	Incoming lines from top or bottom
	800	800	1800x1200x2400	
	1000	1000	1800x1200x2400	
	1200	1200	1800x1200x2400	
	1600	1600	2400x1200x2400	
	2000	2000	2400x1200x2400	
1140V (-20%~+15%)	1000	1000	3000x1200x2400	Incoming lines from top or bottom
	1200	1200	3600x1200x2400	
	1600	1600	3600x1200x2400	

## APPLICATION OCCASION

RNSVG series 660V/1140V specialized chain-typed dynamic power quality control device realizes dynamic reactive power compensation and harmonic treatment for power distribution system on non-linear loads in the industries of rubber, coal, petrochemical engineering, metallurgy and port, etc. In above industries, where large amount of high-power frequency inverter, intermediate frequency furnace, rolling mill, DC speed regulation and others are used, severely pollutes the power grid for harmonics generated due to frequent load changes and low power factors.





# RNSVG SERIES

## HV CHAIN DYNAMIC POWER QUALITY CONTROL DEVICE

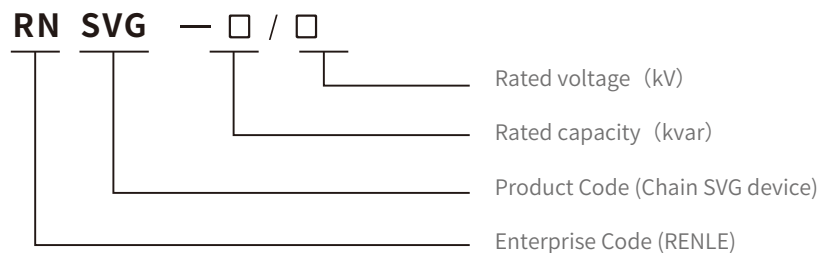
### PRODUCT OVERVIEW

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Chain typed RNSVG (Static Var Generator) is the latest generation of dynamic reactive power compensation device based the IGBT, also known as the STATCOM (Static Compensator) in the world. As the advanced equipment with cutting-edge dynamic compensation technology, it is the third generation of dynamic reactive power compensator after the static reactive power compensator controlled by mechanical switching capacitor and thyristor.

### MODEL EXPLANATION

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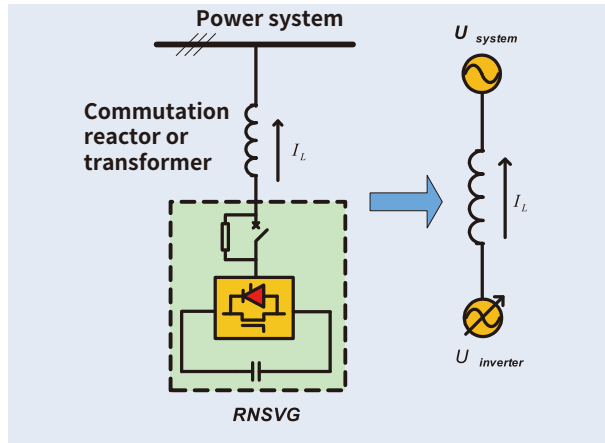
#### An example of product model:

- RNSVG-6000/10 represents the RNSVG series chain-typed dynamic power quality control device with a rated capacity of 6000kvar and a rate voltage of 10kV.

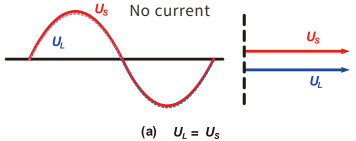
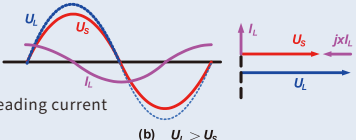
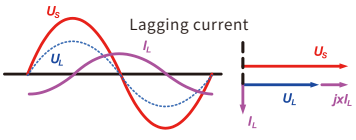
# PRINCIPLE OF OPERATION

A self-commutated bridge circuit with a high power core of IGBT shall be connected in parallel to the power grid by commutation reactor (or transformer), then adjust the amplitude and phase position of output voltage from above bridge circuit in the AC side, or directly control the current in the AC side to absorb or give out the reactive power current in needs to realize the dynamic reactive power compensation.

Basic principle of chain RNSVG device 



# THREE MODE OF OPERATION

Operation mode	Waveform and Vector Diagram	Statement
No load operation mode	 <p>(a) <math>U_L = U_s</math></p>	$U_L = U_s, I_L = 0$ RNSVG no reactive power output.
Capacitive operation mode	 <p>(b) <math>U_L &gt; U_s</math></p>	$U_L = U_s, I_L$ is the leading current RNSVG generates continuous and adjustable capacitive reactive power.
Inductive operation mode	 <p>(c) <math>U_L &lt; U_s</math></p>	$U_L < U_s, I_L$ is the lagging current RNSVG generates continuous and adjustable inductive reactive power.

# PRODUCT CONFIGURATION

Configuration form of 6kV chain-typed dynamic power quality control device (includes no reactor size)

Product model	Capacity	Voltage	Overall size (includes the fan size on top of power cabinet)		
			W(mm)	D(mm)	H(mm)
RNSVG-1200 / 6	1200	6	4200	1200	2772
RNSVG-1800 / 6	1800	6	4200	1200	2772
RNSVG-2400 / 6	2400	6	4200	1200	2772
RNSVG-3000 / 6	3000	6	5400	1200	2772
RNSVG-3600 / 6	3600	6	5400	1200	2772
RNSVG-4800 / 6	4800	6	6600	1200	2772
RNSVG-6000 / 6	6000	6	6600	1200	2772
RNSVG-7200 / 6	7200	6	6600	1200	2772

Note: the above list of sizes is for reference, and you can consult the manufacturer for unlisted model.

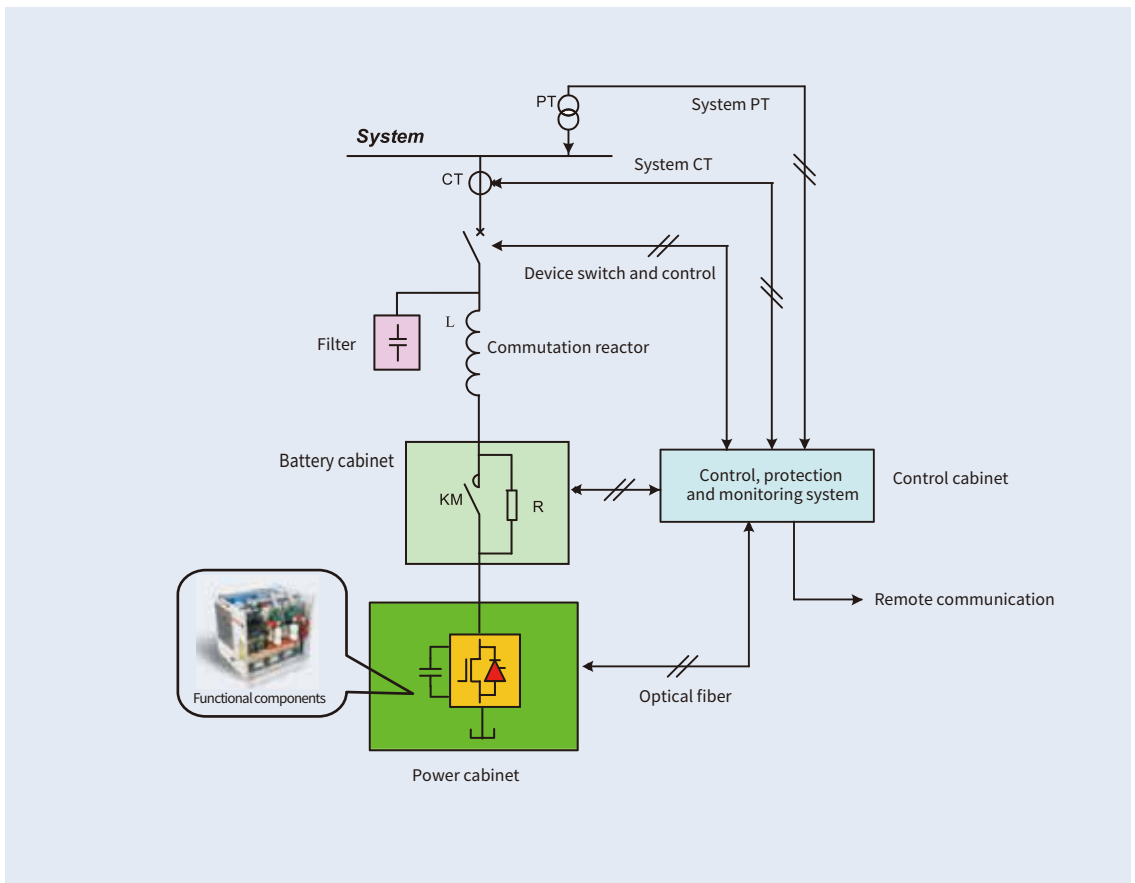
**Configuration form of 10kV chain-typed dynamic power quality control device (includes no reactor size)**

Product model	Capacity	Voltage	Overall size (includes the fan size on top of power cabinet)		
			W(mm)	D(mm)	H(mm)
RNSVG-1000/10	1000	10	3000	1200	2772
RNSVG-2000/10	2000	10	4600	1200	2772
RNSVG-3000/10	3000	10	4600	1200	2772
RNSVG-4000/10	4000	10	5400	1200	2772
RNSVG-5000/10	5000	10	6600	1200	2772
RNSVG-6000/10	6000	10	7600	1200	2772
RNSVG-8000/10	8000	10	8600	1200	2772
RNSVG-10000/10	10000	10	10200	1200	2772
RNSVG-12000/10	12000	10	11800	1200	2772

**Note:** the above list of sizes is for reference, and you can consult the manufacturer for unlisted model.

## SYSTEM CONFIGURATION

RNSVG device is composed of commutation reactor, battery cabinet, power cabinet, control cabinet, filter cabinet and etc. Its main configuration and schematic diagram are as follows:







# RNZB SERIES

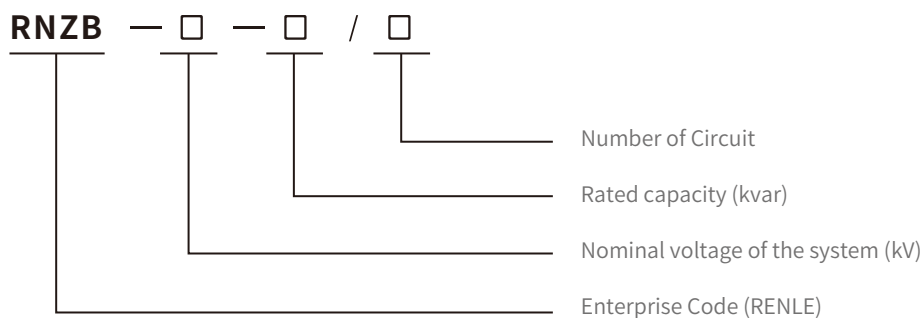
## HV AUTO REACTIVE COMPENSATOR

### PRODUCT OVERVIEW

RNZB series HV auto reactive power compensator applies to the power distribution in three-phase AC line system of 6kV, 10kV and 35kV. It improves power factor, lowers line losses, improves power quality and increases the use inefficiency of power supply and distribution equipment.

This product is defined by the user according to line needs, realizes automatic switching of capacitors in parallel connection. Meanwhile, it is equipped with protections against short circuit, over-current, over-voltage, under-voltage and etc. The vacuum contactor it adopted causes no bouncing on switch-on, no reigniting on switch-off, prolonging service life and etc. The high voltage capacitors in parallel connection are installed with fuses both inside and outside and a discharge resistance. The reactive power compensation automatic controller has strong anti-interference capability and reliable performance.

### MODEL EXPLANATION



# TECHNICAL FEATURES

- It is installed with a RNZ-1 controller, automatically tracks switch capacitors and controls on-load voltage regulation of the main transformer, keeping the power system and system voltage within regulated range to realize the status display of voltage, current, power factor, reactive power, capacitor switch-on-and-off and alarm protection at the low-voltage side of the main transformer.
- It is equipped with high-voltage, low-voltage, PT disconnection, unit malfunction, over-current of main transformer and other alarm protection functions.
- It is installed with RS-485 or RS-232 high-speed data communication interface, supports with the comprehensive automation system of a transformer substation to realize remote signaling, remote metering, and remote control.
- It shall automatically and flexibly switch in cycles and order to ensure an average usage of each capacitor bank in accordance with the total compensation capacity, and a repeat switch of the same capacitor bank in less than the discharge time.
- The micro-computer protection device for power distribution capacitor bank enables protections for two stage over-current and zero-sequence voltage. In case of one certain group of capacitors breaks down, it can automatically switches off and locks down, causing no impacts on the normal switching of other capacitors.
- It can be installed with reactors of different ratios to restrain on-off inrush and suppress higher harmonics.

# TECHNICAL PARAMETERS

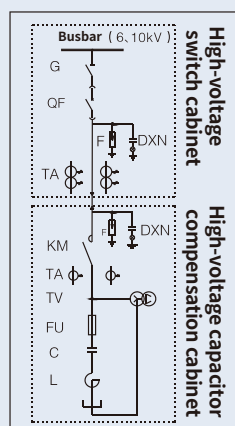
- **Nominal voltage of the system:** 6kV,10kV,35kV;
- **Rated frequency:** 50~60Hz;
- **Reactance rate:** 0.1~1%;4.5~6%;12~13%;
- **Way of internal wiring:** Y (Start connection)

# TERMS OF APPLICATION

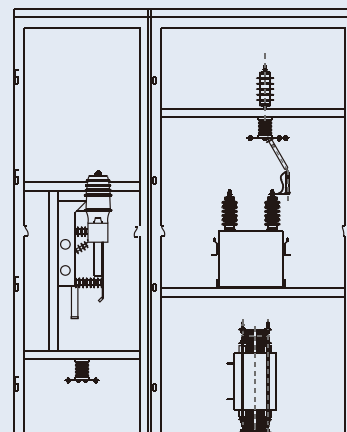
- **Relative humidity:** <95%;
- **Environment temperature:** -25°C~+45°C;
- **Altitude:** <2000m;
- **Environment and condition:** no corrosive gas, conductive dusts, inflammables and explosives in the surrounding environment.
- **Installation site:** no violent vibration at indoor or outdoor, no erosion from rain or dust, and installed at a place with an inclination of no more than 5 degrees.

**Note:** in case of any special terms in use and environment, please negotiate with our company at ordering.

# SCHEMATIC DIAGRAM & SHEET OF MODEL SELECTION



Schematic diagram of the device



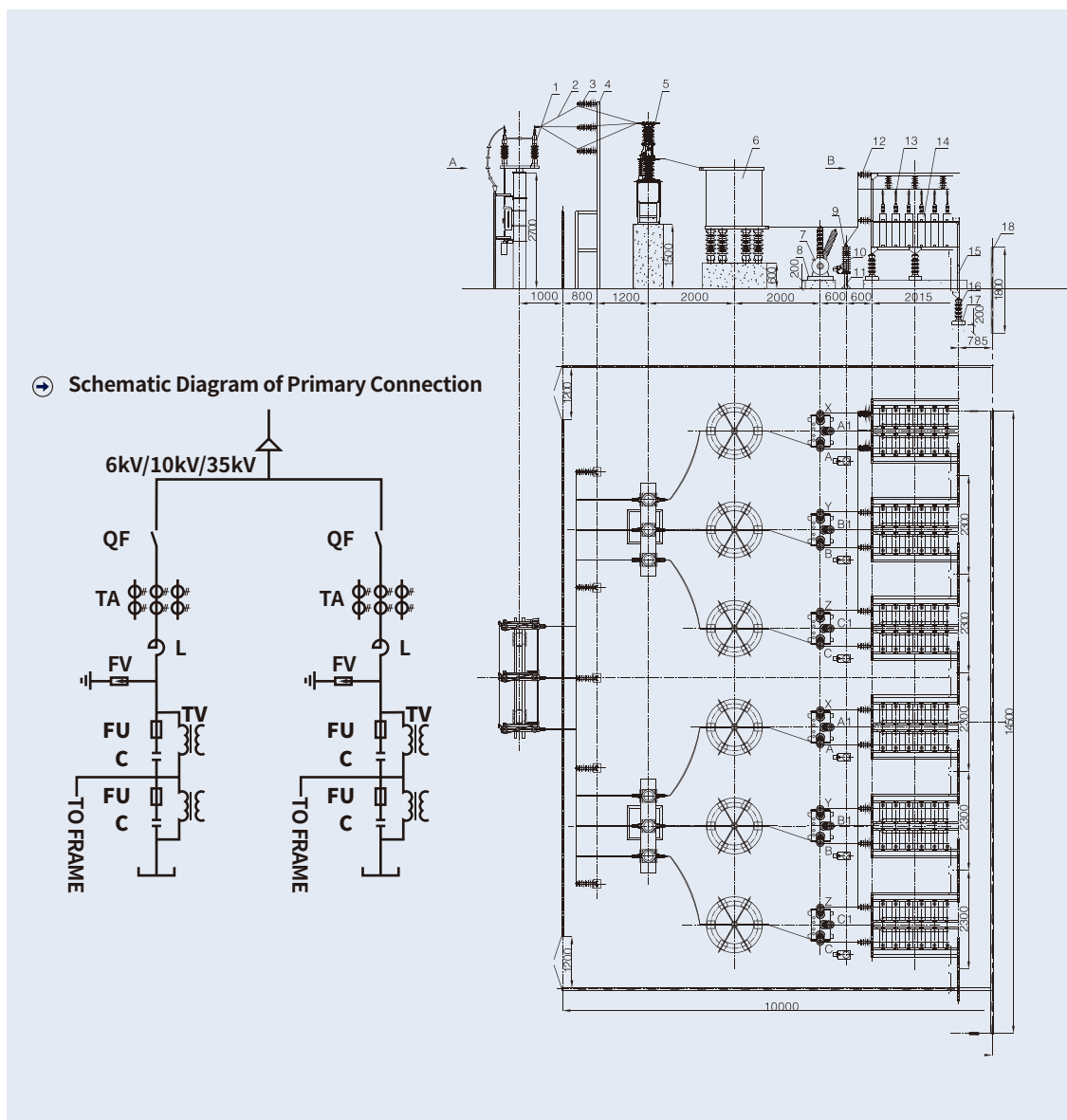
Structure Graph inside cabinet body

# SHEET OF EQUIPMENT MODEL SELECTION

Configuration form of 10kV chain-typed dynamic power quality control device (includes no reactor size)

Product Model	Compensation Capacity (kvar)	Cabinet Size H×W×D (mm)
RNZB-6(10)-1200/2	1200	2600×2800×1600 (Three cabinets)
RNZB-6(10)-1500/3	1500	2600×3800×1600 (Four cabinets)
RNZB-6(10)-1800/3	1800	2600×3800×1600 (Four cabinets)
RNZB-6(10)-2400/3	2400	2600×3800×1600 (Four cabinets)
RNZB-6(10)-3000/4	3000	2600×4800×1600 (Five cabinets)
RNZB-6(10)-4200/4	4200	2600×4800×1600 (Five cabinets)

## INSTALLATION DIAGRAM OF FRAMED DEVICE



# MSVC-RNZC

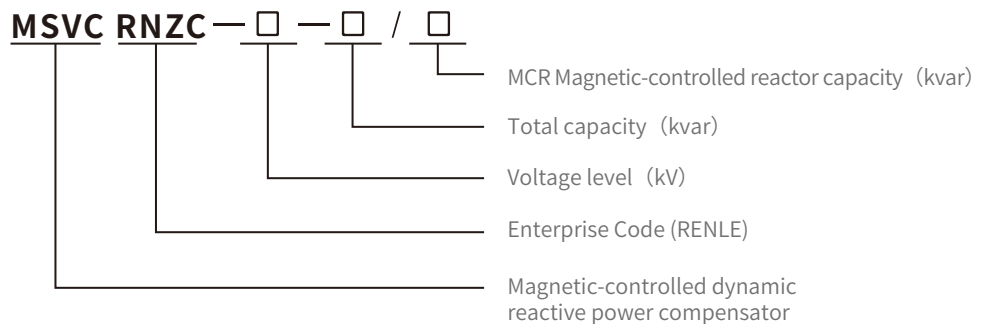
## MAGNETICALLY-CONTROLLED DYNAMIC REACTIVE COMPENSATOR

### PRODUCT OVERVIEW

MSVC-RNZC dynamic reactive power compensator is mainly used in the power system of 6~35kV, for realizing dynamic compensation of reactor power, an increase of power factors, voltage stability, elimination of harmonics and improving power quality of the grid. This device applies to the system of a frequently changing reactive load. Currently, it is widely used in the industries of coal, electric railway, steel and iron, wind power, electric-arc furnace, rolling mill and etc. Featured as high reliability, fast response, continuous and stepless adjustment, small occupied area, maintenance free and others, it is the ideal dynamic reactive power compensator used in electrical power system, electric railway, metallurgy, mining, new energy and etc. As a completely new HV/ LV dynamic reactive power compensation device, it offers a new choice for the user in increasing power factors, improving power quality and automatic running level.

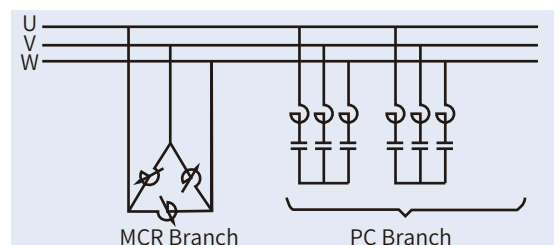
MSVC device is composed of FC filter (or fixed) capacitor branch, MCR magnetic-controlled reactor (including an MCR unit and an excitation system), automatic control and protection system and etc. FC branch is used in proving the capacitive reactive power for the system, and in designing the multipath passive filter to reach the aim of harmonic suppression. MCR magnetic-controlled reactor is used for balancing the excessive capacitive reactive power caused by loads fluctuations, and stabilizing the voltage fluctuation caused by loads impacts. The control and protection systems are responsible for instructing the whole system in control of reactive power compensation, and protecting relevant devices.

### MODEL EXPLANATION



### PRINCIPLE OF OPERATION

First, it shall start sampling on reactive power of the system through a MCR controller, and change the saturation of core magnetic through the conduction angle of an automatically controlled thyristor to realize the continuous adjustment of output capacity. It is a static structure inside with no moving parts, and high in working reliability.



# TECHNICAL FEATURES

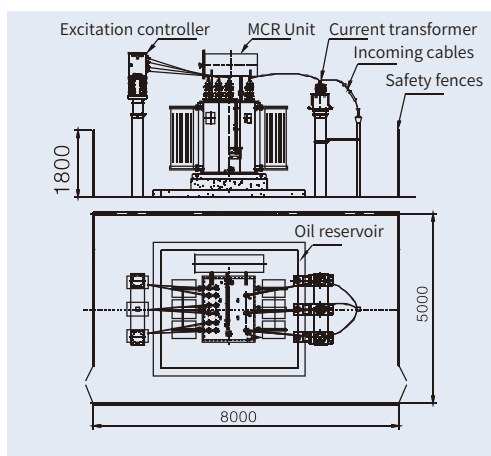
- A speedy tracking of reactive power regulation, equipped with magnetically controlled saturated reactor, a self-decoupled DC excitation and way of limiting magnetic saturation in operation, which greatly reduced the harmonics. It has low losses in active power and is fast in response.
- It adopts the optical isolation phase-shifting trigger technology to use optical fiber in transmission and phase-shifting in trigger, which increases the system insulation level, enhances system anti-interference capacity and reduces the equipment volumes.
- Its control part is made of low-voltage thyristor, which needs no withstanding voltage in operation, tolerates large current, is reliable in safety, causes a small heat and can be cooled by air with no help of a freezer. It is flexible in installation, both indoor and outdoor.
- It occupies small in floor space, and is high in reliability, free from maintenance and long in service life.
- It is highly automated by adopting CPUs in parallel connection for processing, which enables a perfect control, protection, online monitoring of the switch, harmonic measurement and control, data transmission and the function of Four Remote for items in MCR and FC branches. It is easy to operate and user friendly.

# TERMS OF APPLICATION

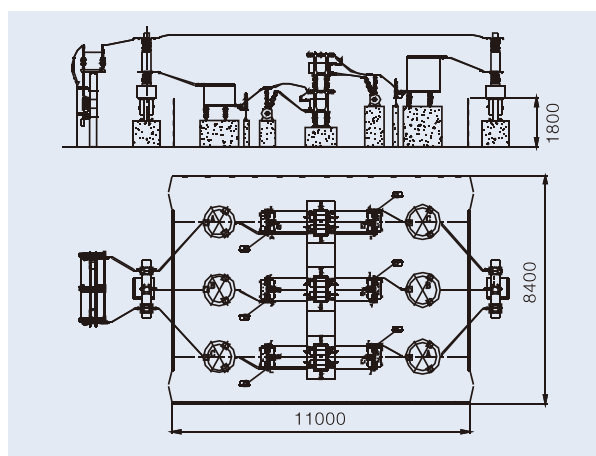
- **Installation site:** indoor and outdoor
- **Altitude:**  $-40^{\circ}\text{C}\sim+55^{\circ}\text{C}$ ;
- **Environment temperature:**  $<2000\text{m}$ ;
- **Relative humidit:** no more than 95% in daily average value, and no more than 90% in monthly average value;
- **Environment and condition:** no violent mechanical vibration, no harmful gases or steam, no conductive or explosive dusts;
- **Anti-pollution capacity:** creepage distance of outer insulation shall be no less than 25 mm/kV (comparing to the highest running voltage of the system);
- **Earthquake intensity:** no more than 8 degree
- **Wind speed:**  $<35\text{m/s}$

**Note:** in case of any special terms in use and environment, please negotiate with our company at ordering.

# INSTALLATION DIAGRAM



Configuration form of 10kV chain-typed dynamic power quality control device (includes no reactor size)



Installation diagram of FC branch (Exemplified by a MSVC35-3600/2700 outdoor two-path filter branch)

# TECHNICAL PARAMETERS

- **Rated voltage of system:** 6kV~35kV
- **Maximum capacity of MCR branch:** 20000kvar
- **MCR regulation range:** 1%~100%
- **Maximum capacity of FC branch:** 60000kvar
- **Response time:** 80~300ms

## A GUIDE TO MODEL SELECTION OF SERIES PRODUCTS

- **Case where a voltage level of 380V is used:**

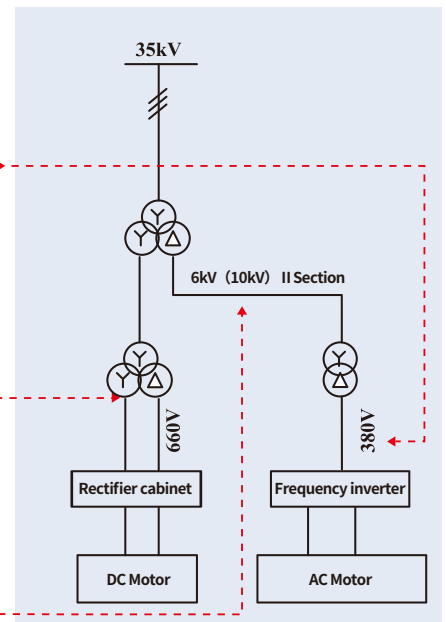
1. For the power factor being smaller than 0.8 and load changes being flat, it is recommended to use the RNT series dynamic capacitor compensator;
2. For the power factor being smaller than 0.8, load changes being dramatic and requires certain filters, it is recommended to use the RNTA series dynamic active power filter compensator;
3. For being filter targeted, it is recommended to use the RNAPF series active power filter;
4. For those with dramatic changes in loads and with a high demand in response time, it is recommended to use RNSVG series low-voltage dynamic power quality control device;

- **Case where a voltage level of 660V is used:**

For those with dramatic changes in loads and with a high demand in response time, it is recommended to use RNSVG 690V specialized chain dynamic power quality control device;

- **Case where a high voltage level of 6kV/10kV/35kV is used:**

1. For those with dramatic changes in loads and with a high demand in response time, it is recommended to use the RNSVG HV chain dynamic power quality control device;
2. For the power factor being smaller than 0.8 and load changes being flat, it is recommended to use the RNZB series HV auto reactive power compensator;
3. For the power factor being smaller than 0.8, load changes being flat and with a need of dual adjustment, it is recommended to use RNZC series magnetically controlled dynamic reactive power compensator.



## CORE COMPETITIVE TECHNOLOGY

**Core switching device IGBT:** it adopts the fifth generation of IGBT. Compared to the fourth generation of IGBT, the new one has a higher switching frequency and smaller losses. Meanwhile, it adopts the parallel computing technique in algorithm. Multi-core CPU in parallel computing takes less time to complete the control algorithm.

**Equivalent switching frequency:** 80 kHz at maximum. The core technology of an extremely high current loop bandwidth enables speedier response time and higher reliability.

**Power loss:** less than 2.5%. The greater losses in active power, the equipment's heating problem becomes more severe. To power electronic equipment, 50% of them malfunction due to broken electrical parts from internal heating. So it is very important to lower the active power losses. And using the fifth generation of IGBT shall achieve the goal of lowering switching losses.

**Extremely low noise:** 60dB. The equipment noise, being of great importance to user's experience, is mainly caused from two aspects. One is from heat dissipation. When the air flows inside modules, it shall cause sounds. Also the use of a fan shall cause noises. Thus, a smaller heat loss shall bring a lowered fan noise. The other is from the noise of a reactor. The noise of a reactor is caused by its IGBT high-frequency switching current, the higher switching frequency gets, the lower noise of a reactor can give out. Thus, a noise of less than 60dB can be reached by adopting a high-frequency switching.



# CASE IN APPLICATION

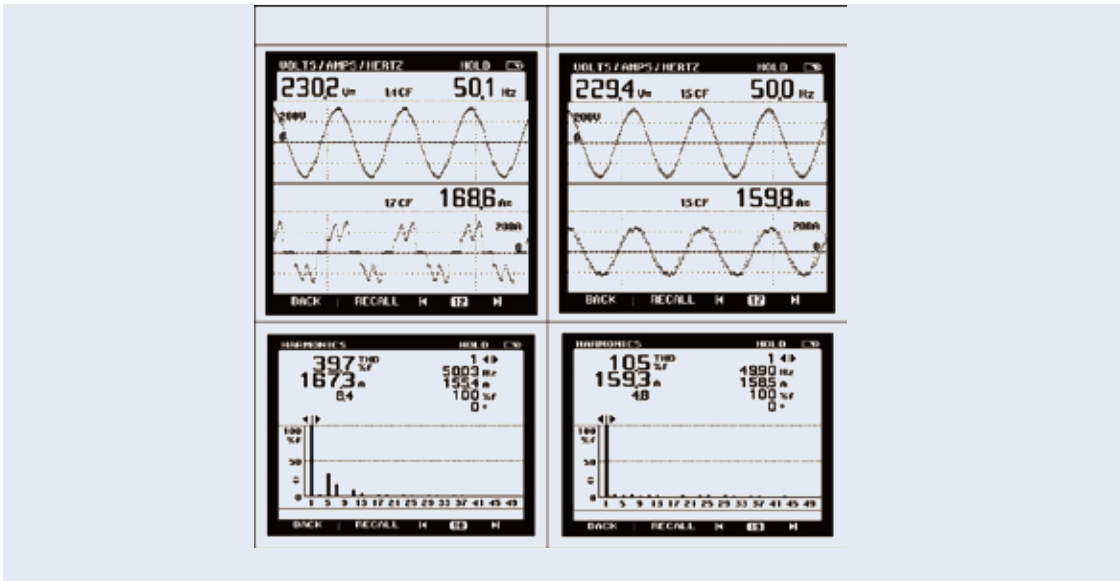
## Case 1:

**DC speed regulation device used in industry of rubber tire for reactive power compensation and harmonics suppression**

**Name of equipment:** RNAPF series active power filter  
**Capacity of compensation:** the one calculated from onsite measured data  
**Voltage level:** 380V

**Load property:** manufacturing machine driven by DC motor is a part of a thyristor DC drive system. Due to the needs of manufacturing technique, normally a thyristor transformer used in rubber company has a bigger the control angle (Angle  $\alpha$ ), causing larger reactive power in needs and lower power factor (normally between 0.4 and 0.6). Meanwhile, the thyristor transformer generates so many characteristic harmonics during work, mainly as odd harmonics of order 5, 7, 11, 13, that leads to a voltage distortion of the power grid.

**Compensation effect:** it meets the demand of power factor compensation and active filter, actively improves the power quality of a 400V system. And it shall save energy and money for the user.



## Case 2:

**Reactive power compensation and harmonic suppression in coal mining**

**Client name:** Gaoping Yuxing Shenjiazhuang Coal Industry Co., Ltd.  
**Installed in:** Shanxi  
**Name of equipment:** RNSVG series chain dynamic power quality control device  
**Compensation capacity:** 1500kvar  
**Voltage level :** 10kV

**Load property:** when a hoister and winch of the coal industry work, the harmonic pollution from their power supply system shall gets worse due to low power factors, large impacts on reactive power, losses on consumptions of tons of coal energy, in addition with the use of frequency control and cascade speed control systems.

**Compensation effect:** the power factor is 0.85 before compensating and 0.99 after compensating. It solves the problem of both reactor power and harmonics in power system of coal mining.



# CASE IN APPLICATION

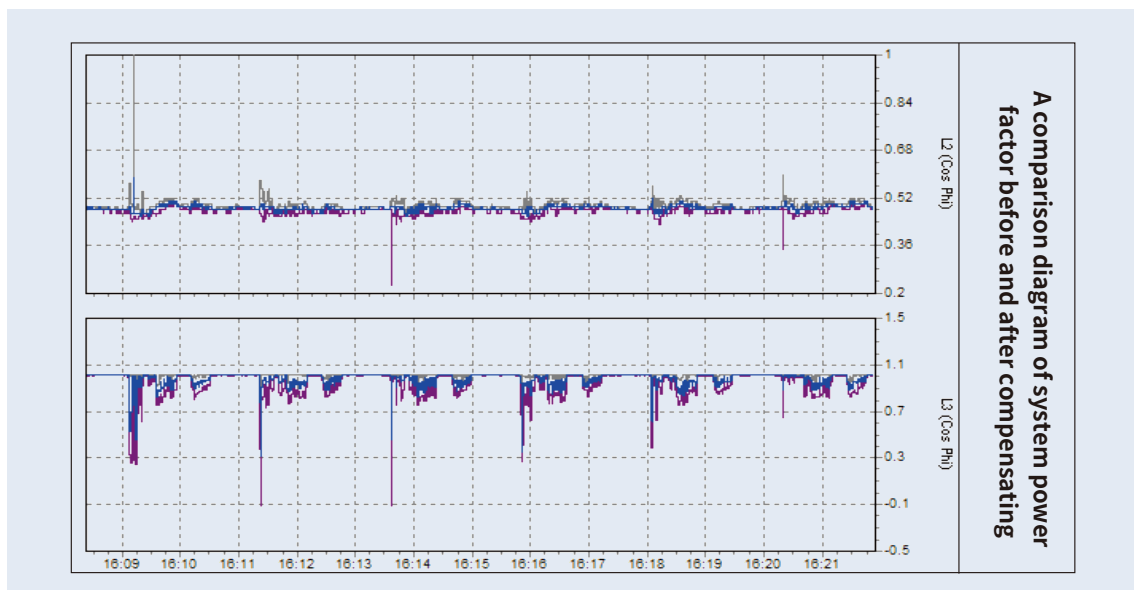
## Case 3:

### Reactive power compensation and harmonic suppression of internal mixer system in rubber industry

<b>Client name:</b>	Shandong Linglong Tire Co., Ltd.
<b>Installed in:</b>	Shandong
<b>Name of equipment:</b>	690V specialized SVG
<b>Compensation capacity:</b>	2000kvar
<b>Voltage level :</b>	690V

**Load property:** for working periodically, the internal mixer changes frequently in loads, has a high amount of harmonics while a low numbered power factor.

**Compensation effect:** the power factor is 0.485 before compensating and 0.984 after compensating. The harmonic voltage meets the requirements of national standards. It reaches the aim of reactive power compensation and harmonic suppression. Meanwhile, the specialized SVG device can operate stably even in a high harmonic environment of over 70%, and lower the harmonics to 40% with no need of an extra active filter.



## Case 4:

### Reactive power compensation harmonic suppression of rolling mill system in iron and steel industry

<b>Client name:</b>	Tangshan Fengnan Huatong Steel Co., Ltd.
<b>Installed in:</b>	Tangshan, Hebei
<b>Name of equipment:</b>	RNSVG series chain dynamic power quality control device
<b>Compensation capacity:</b>	8000kvar SVG
<b>Voltage level :</b>	10kV

**Load property:** it will cause voltage drop of the power grid, even electrical equipment malfunction in certain severe cases, lower production efficiency, and decrease power factors. The drive device in the load side will produce so many harmful higher harmonics, mainly the odd ones of order 5, 7, 11, 13, leading to a voltage distortion of the power grid.

**Compensation effect:** the power factor is 0.734 before compensating and between 0.98 and 0.99 after compensating. And the voltage fluctuation is greatly decreased. The harmonic voltage meets the requirements of national standards. It reaches the aim of reactive power compensation and harmonic suppression.



# TECHNICAL SUPPORTS AFTER SALES SERVICES

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## SALES & SERVICE NETWORK

More than 120 sales and service outlets

More than 200 professional engineers of sales and technical supports

### ITEMS OF TECHNICAL SUPPORTS:

Provide technical consultancy and plan design at the design stage;

Provide technical consultancy before ordering;

Assist the user to conduct factory commissioning;

Onsite on-load test and commissioning;

Free technical services within warranty period;

Follow-ups and technical services beyond warranty period.

### TECHNICAL SUPPORT & SERVICE

Technical hotline ----- a 24-hour hotline service provided by our customer service centre

A regular call on clients for our product feedbacks;

Follow-ups on clients commissioning, and be well informed of related test time and schedule ;

The design engineers shall actively respond to and deal with client' s problems.

### TECHNICAL SERVICE HOTLINE:

Client service center: 021-59966666-8055

Client service hotline: 021-39538022

Fax: 021-39538100

Email: renle@renle.com

## LETTER OF COMMITMENT ON PRODUCT QUALITY AND AFTER-SALES SERVICES

Upholding the business philosophy of customer first, science-orientated, down-to-earth, high-efficiency, product delivery in time and quality, targeting for over 98% of customer satisfaction rate, our company shall satisfy clients with high-qualified products and sincere services. Our company has built a team of powerful technical supports and professional services to provide clients all-round technical services, to help them correctly choose and use our products, and to timely solve any abnormalities and problems in products during operation.

### OUR SERVICES AND PROMISES INCLUDE:

- Once the product arrive at the place designated by the user, our company shall sent related staff to participate in open-box inspection, technical disclosure, staff training, installation commissioning (guidance), test for acceptance and trial running during the process of installation, commissioning, acceptance and trial running.
- The warranty period is 12 months since the day of manufacturer sold the product. Our company shall provide free maintenance services (including no fees of accessories and spare parts) for products with quality problems under the warranty. Within the product warranty, our company shall be responsible for any problems caused by defects and shortcomings in product design, techniques or materials. If our company failed to solve problems in a reasonable speed and way within contract time, the user can adopt necessary remedies, and our company shall undertake the risk and related fees. Also, within the product warranty, our company shall accept returns from customer and undertake related losses when failing to solve problems caused by defects and shortcomings in product design, technique or materials.
- At the request of the user, our company shall send technical staff to conduct operations on equipment, and maintainers to conduct technical training according to the detailed situation.
- In-time onsite service and our staff shall arrive at site with 3 hours for Shanghai and its neighboring areas, within 24 hours for other areas inside country, and 48 hours for remote areas.
- Our company set up a department of after sales service to serve the user, which shall include providing technical consultancy before and in sales, after sales guidance on installation, commissioning, maintenance and onsite technical training and related service, solving user' s problems, collecting user' s opinions on use and etc. When the user has any requirements on equipment reforms and capacity expansion, our company shall timely support their behaviors. And our company shall appoint an engineer to specialize in dealing with user' s calls to make sure timely technical supports and services for users during the use of our products.

# NATIONAL KEY PROJECTS



- Three Gorges Project
- Beijing Olympic Rowing-Canoeing Park
- Supporting Projects for the Beijing Olympic Games
- Wukesong Indoor Stadium
- Bureau of Government Offices Administration of the State Council
- CCTV (China Central Television)
- Beijing Capital International Airport
- China Second Artillery Corps Missile Base
- China Air-to-air Missile Research Centre
- LA Air Force Radar Base
- South-to-North Water Diversion
- Zhejiang Huangqunan Expressway
- Electricity Transmission from West to East China
- West-East Natural Gas Transmission
- Shanghai Maglev Rail Transit Station
- Supporting Projects for Shanghai Expo
- Shanghai Pudong International Airport
- Shanghai Auto Museum
- Extension Project for Shanghai Hongqiao Airport
- Terminal Expanded for Hohhot Baita International Airport
- Shenyang Olympic Sports Center
- Beijing Nanyuan Airport
- Yunnan 2409 Airforce Airport
- Qingdao Olympic Sports Center
- Jinan Olympic Sports Center
- Extension Projects for Chengdu Shuangliu International Airport
- Chongqing Olympic Sports Center
- New Baiyun International Airport
- Wuhan Tianhe Airport
- Shanghai Metro Line 3
- Chongqing International Conference Centre
- Shanxi Wanjiashai Yellow River Diversion Project
- Qinghai Xiaoyou Mountain Ecological Project

# NATIONAL KEY PROJECTS

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- Tianjin Badapian Heating Project
- Shandong Heze Yellow River Diversion & Water Supply Project
- Shanghai International Shipping Center Yangshan Deepwater Port
- Xichang Satellite Launch Center
- Guangxi Longtan Hydropower Project
- Gansu Satellite Launch Center
- Yunnan Honghe Nansha Hydropower Station
- Datang International Power Generation Co., Ltd.
- Guizhou Kailin Group Co., Ltd.
- Inner Mongolia Shenhua Group
- Jinshan Petrochemical Company
- Shanghai Baosteel Group
- Taizhou Petrochemical Company
- Anshan Iron and Steel Group
- Jilin Petrochemical Company
- Wuhan Iron and Steel Group
- Guangxi Liuzhou Chemical Industry
- Capital Iron and Steel Company
- Guangzhou Petrochemical Company
- China Great Wall Aluminum Corporation
- Luoyang Petrochemical Company
- Guangxi Pingguo Aluminum Company
- Yueyang Petrochemical Company
- Guangxi Liuzhou Iron and Steel Group
- Nanjing Petrochemical Company
- Maanshan Iron and Steel
- Beijing Yanshan Petrochemical Company
- Shanxi Zhongyang Steel
- Urumqi Petrochemical Company
- Daqing Oilfield
- Jinxi Petrochemical Company
- Shengli Oilfield
- Dushanzi Petrochemical Company
- Liaohe Oilfield
- Beijing Financial Street
- Talimu Oilfield
- Panda Museum in the Chengdu Ecological Park of Giant Panda
- Karamay Oilfield
- Qingdao Beihai Shipyard
- Shaanxi Changqing Oilfield