RONGXIN POWER ELECTRONIC
Industrial
Static Var Compensator (SVC)
RXPE is a leading runner which dedicates itself in green energy revolution that enables utility and industry customers to improve their performance while lowering environmental impact. RXPE is especially proud of its 12 year design, engineering and manufacturing experience in the field of reactive power compensation product.

With more than 600 sets of SVC running onsite, over 300 sets of them in iron industry, RXPE has doubtlessly become one of the largest SVC manufacturers in the world. Since the first day the company was founded, we have successfully provided hundreds of solutions to the industry customers from metallurgy, electric railway and power system, etc. Till today, our products have covered not only domestic market but also Italy, Germany, Vietnam, Thailand, India, Turkey, Bengal, Pakistan and Burma.

Specialization is always our motto. Being the first public treated company in power electronic industry in China, RXPE is also the leading drafter of the first national SVC standards of China. With a totally self-developed unique design, our SVC can bring you faster, more reliable and more convenient services. Being the owner of 27 national patents and 10 software copyrights, RXPE has occupied over 80% domestic SVC market in China. We are confident and ready to offer you highest quality value-added service.

In RXPE every single piece of part has to go through the strictest procedures under ISO9001 quality system to make sure its quality. With a modern and comprehensive medium voltage test facility, each product will be tested under site circumstances to ensure the operation reliability and onsite commissioning span shortened.
Being the domestic NO.1 SVC manufacturer, RXPE has also become one of the leading runners in the world. More than 600 sets of SVC have been provided to customers of Iron & Steel, Coal mine, Electric Power and Electric Railway, most of them are turn-key projects.

**Milestones**

**1997**
- SVC - 6KV Type H steel production line in Anshan First Rolling Mill
- SVC - 10KV wide massive plate production line in Anshan Massive Plate Plant

**1998**
- **FIRST** digital control SVC - Wuhan Iron & Steel Complex Rolling Mill

**1999**
- **FIRST** air-cooled SVC - 35KV, 40Mvar, Xingcheng Steel Making Plant, DC-EAF

**2000**
- **FIRST** domestic air-cooled SVC for power system - Haikou Electric power Bureau

**2001**
- **LARGEST** capacity SVC (100MVar) of that time - Suzhou Iron & Steel Company
- **FIRST** TSC type SVC for coal mine substation - Urumuqi Mining Bureau
- **FIRST** domestic air-cooled SVC for power system - Haikou Electric power Bureau

**2002**
- **FIRST** domestic SVC in electric railway traction - Baolan Line;

**2003**
- Largest Made-in-China SVC for 110kV local grid - 100Mvar;

**2004**
- 27.5KV SVC - Electric Railway substation; award from National Railway Ministry;
- National Technical Innovation Project of high power SVC used in FACTS system;
- **FIRST** SVC global remote monitoring centre in China;

**2005**
- Upgraded digital control system; Better flicker mitigation performance SVC;
- **NEW** National SVC Standard - GB/T 20297—2006, GB/T 20298 – RXPE is one of the leading drifter;

**2006**
- First LTT (Light Triggered Thyristor) SVC commissioned;
Our Advantages:

- More than 600 successful cases of SVC engineering, manufacturing and installation experience.
- National SVC manufacturing standards drafter.
- The only manufacturer in China which is allowed to use international standard marks on the SVC products and other relevant products legally.
- Pioneer on employing SVC to regulate negative sequence currents in regional power system.
- Largest SVC production base in China in terms of its design, manufacturing and installation capability.
- Biggest SVC know-how owner and founder of heat pipe air-cooled technology in China.
- Strictest quality control ISO9001 (certificated by Switzerland SGS)

- Medium-voltage full-load test promise for each individual outcoming product.
- Government support and recognition (National level high-tech industrial demonstration project).
- In line with international trends. A group of foreign experts work permanently in China.
- Satisfying lead & commissioning time.
- Customed & tailored service;
- Excellent public treated company with abundant capital.

600+ SVC applications
China LARGEST SVC manufacturer
FULL-LOAD test guarantee
Expertise service for customer

The service of Rongxin Power Electronic range from analysis, design, manufacture, delivery of SVC, erection supervision, commissioning to after-sales services. We also carry out tests and measurements to guarantee the performance of our SVC meet the criteria determined in the beginning of each project. Rongxing Power Electronic promises our customers a customized service for each project.
SVC Functional benefits:

By installing SVC at different suitable points of the network will give customers higher power factor, more constant voltage level, far lower harmonics contamination, significantly decreased power losses, better performance of electrical equipments, shortened production cycle and collateral reactive power penalty can be totally avoided. Static Var Compensator give a boost to the power quality in more than one aspect.

Flicker mitigation:
Rapid changing reactive power causes voltage fluctuations at the point of PCC point of a steel plant. Human’s eyes perceives this frequency of voltage fluctuations as flickering lights.

Voltage stabilization:
A common trend among steel makers is to install more and more Electrical Arc Furnaces (EAF) in this plant. Often the power supply is poor and insufficient. In order to make the investment feasible, Static Var Compensator becomes an indispensable part. The operation characteristics of EAF is intensely unbalanced and impactive especially in the beginning of melting process. Other power consuming equipments suffer due to this unbalanced and huge voltage fluctuation. Consequences such as reduced efficiency, overheat, noise, unexpected torque pulses and protection malfunction will also follow. An SVC is based on phase control, thus above problems can be easily solved.

Reactive power compensation:
Existence of reactive power compensation in power transmission system leads to significant voltage drops and losses in the networks, which restrict the transmission capacity of active power. A reactive power compensation will maximize the transmission capacity and length significantly.

Harmonics elimination:
Non-linear loads, like Electric Arc Furnaces, and power electronic equipments, like big current rectifier, yield harmonic current. The flow of harmonic current in network leads to voltage distortion. Distorted voltage may cause malfunction and even damage to other devices in the same network.

The filter circuit of SVC is designed to absorb the harmonic current in the network, which is either generated by above mentioned equipments or itself. This philosophy of design limits total harmonic distortion and individual harmonic voltages below desirable values.
Economical benefits:

For Steel works customers:
- Shorter melting times
- Increased steel production
- Extended electrode life
- Extended life of ladle lining
- Reduced energy losses and energy costs
- Reduced refractory material consumption
- No power penalties

For Power utilities and other customers
- Minimum flicker disturbances on own and neighboring facilities
- Minimum malfunction of protective devices
- Higher transmission efficiency of active power

The first figure shows the power factor on an EAF customer’s bus. According to the test result, average power factor is above 0.97 after the SVC is being used.

The second figure shows the Total Harmonic Distortion of single phase voltage from the same customer. According to the test result, max THD is 1.79% after SVC is being used.
How do we design a SVC?

The electrical parameters in each customer’s site is different as well as their special requirement for power quality. So is our SVC. Each SVC is an order specific product. It has to be tailor made always. Before the component parameters are decided, a thorough research to each customer’s local system has always been carried out by our experienced engineers. Doule-insuranced modern softwares are also used to make sure a reliable, convincing, cost-effective proposal ready for our customer. A onsite reconnaissance will also be carried out as long as it is needed.

Digital control & protection, key to high performance

The digital control system run as the command center of a SVC system. It measures grid parameter and initiates corrections to either generate or absorb reactive power. The software and hardware of the control system are totally self-developed. More than 10 years of experience accumulation has made it perfect in terms of every way.

The performance of the control system is essential for flicker reduction. The main parameters is the response time of SVC control system, which varies between 1 to 3 millionseconds depending on load current. RXPE employs fast-running, prompt-response and most reliable DSP chips as the core of its control system. Thus the maximum response time of the complete SVC installation is 10ms in a 50Hz network.

The control system complies with all EMC (Electro Magnetic Compatability) requirements. RXPE runs a simulation in RTDS (Real Time Digital Simulation) enviroment when developing the digital control system for each customer.
For each critical component of an SVC, RXPE selected world-known suppliers to ensure a quality product. From the very beginning of the strict incoming inspection for each part till the last full load test, each process is under the control of ISO9001.

Quality Control
Certificates and awards:

**Product highlights:**

**Heat pipe air-cooled technology**

A heat pipe is a heat transfer mechanism that can transport large quantities of heat with a very small difference in temperature between the hotter and colder interfaces. Inside a heat pipe, at the hot interface a fluid turns to vapour and the gas naturally flows and condenses on the cold interface. The liquid falls or is moved by capillary action back to the hot interface to evaporate again and repeat the cycle. The heat pipe technology first originates from space technology for efficient temperature control. RXPE is the first one who introduces heat pipe technology into the power electronic equipment. Compared to conventional water cooling technology, heat pipe has following advantages:

- Higher efficiency;
- No pump needed;
- No future water leakage risk;
- Much lower noise;
- No corrosion; no dew;
- 20 years plus service cycle;
- Totally maintenance free;

**Heat pipe thermal cycle**

1) Working fluid evaporates to vapour absorbing thermal energy.
2) Vapour migrates along cavity to lower temperature end.
3) Vapour condenses back to fluid and is absorbed by the wick, releasing thermal energy.
4) Working fluid flows back to higher temperature end.
Global Remote Monitoring System – Your online expert to count on

The philosophy of GRMS is we see what our customers see and give our customer on time expertise advice upon presence of failure. Via Internet, the SVC running parameters can be uploaded to our monitoring center, including video footage from customer site. Where there is Internet access, there is our online expertise service.

24-7 uninterrupted online monitoring service for customers.
Data required for the design of a Static Var Compensator

Each SVC is designed individually, taking into consideration special characteristics of customer plant. The contents in following table are necessary for the design of SVC; In case some of the parameters are not available, an estimation value from our prior experience will be used for preliminary design.

| 1. Single-line drawing of the system to which the SVC will be connected; |
| 2. Data for the Point of Common Coupling (PCC) |
| 2.1 Rated voltage |
| 2.2 Frequency |
| 2.3 Max & Min short circuit power |
| 3. Step-down transformer |
| 3.1 Voltage (primary/secondary) |
| 3.2 Rated power |
| 3.3 Short circuit reactance |
| 4. Load data (Arc furnace) |
| 4.1 Type Electric Arc Furnace (EAF), Ladle Furnace (LF), AC or DC Furnace |
| 4.2 Series reactor rated inductance |
| 4.3 Power of furnace transformer |
| 4.4 Primary and secondary current of furnace |
| 5. Transformer |
| 5.1 Short circuit reactance |
| 5.2 Secondary circuit reactance |
| 5.3 Flicker factor $P_{st}$ |
| 5.4 Harmonics generated by the furnace (if available) |
| 5.5 Load cycle of the furnace |
| 5.6 Information about the used scrap metal |
| 6. Data for Rolling Mill |
| 6.1 Power (active, reactive) |
| 6.2 Load cycle |
| 6.3 Generated harmonics (if available) |
| 7. Power utility’s requirements for the PCC |
| 7.1 Requested power factor |
| 7.2 Total Harmonic Distortion (THD) |
| 7.3 Odd voltage harmonic distortion |
| 7.4 Even voltage harmonic distortion |
| 7.5 Flicker $P_{st}$ |
| 7.6 Voltage fluctuation |
| 7.7 Voltage unbalance |
Product competence portfolio

- Mature, reliable, advanced and practical TCR type design;
- DSP based full-digital control system;
- All crucial parts imported from world wide prestigious suppliers;
- Heat-pipe air-cooled system totally rids you of the trouble of maintenance & noise caused by a conventional water cooling system;
- Global remote control and monitoring system optional. With this value-added service, RXPE can provide our customers with on-line diagnosis and expert advices;
- All devices and electric circuit boards 100% tested; All circuit boards 48-hour high-low temperature aging tested (−10℃～+55℃); All PCB lead-free machine soldered;
- International advanced system simulation design. (PSCAD, RTDS)
- Reliable, anti-interference LTT (light triggered thyristor) technology optional;
- Prompt system response time. Using "STEINMETZ" theory to realize the real split phase control solves the problems of voltage unbalance and negative sequence currents.
- Strong anti-interference control cabinet;
- All-in-one workstation for monitoring system, friendly Human Machine Interface;
- Full load test guarantee for each product;
Other products:

In addition to SVC, RXPE is also a manufacturer of

- Static Var Generator (Statcom)
- Medium Voltage Drives
- Variable Frequency Starter
- MABZ