Shunt reactors
Proven history for future success
Shunt reactors
– an investment for today and for the future

Improving power quality and reducing transmission costs

Shunt reactors increase the energy efficiency of power transmission systems by improving power quality and reducing transmission costs. By combining low life cycle cost and high efficiency, ABB shunt reactors will boost your bottom line.

Why shunt reactors?
Shunt reactors are the most compact and cost-efficient way to compensate for reactive power generation in long high-voltage power transmission lines and in cable systems. They can be permanently used in service to stabilize power transmission, or switched in under light-load conditions for voltage control only.

Increasing energy efficiency in overhead lines
Over long transmission lines, reactive power is generated as an effect of the capacitance between the lines and earth. The reactive power cannot be used for any application and should be balanced to reduce energy losses. Shunt reactors absorb the reactive power, thus increasing the energy efficiency of the system.

Improving voltage stability at low load
At low loads, the voltage increases along the transmission line. A shunt reactor reduces the voltage increase, keeps the voltage within the desired limits, and contributes to the voltage stability of the system.

Time-varying load conditions
Transmission systems are subject to daily or seasonal load variations. Variable shunt reactors allow customers to continuously adjust the compensation, as loads vary over time. They make switching in and out of fixed-rating reactors unnecessary, which eliminates harmful voltage steps. The variable reactor can always be adopted to the need, both in today’s operation and in the future grid. In addition, variable shunt reactors can interact with other systems such as SVC and HVDC links in order to optimize the system operation. Variable shunt reactors are therefore economical means to improve voltage stability and power quality under time-varying load conditions.
A vital part of modern energy systems

Cables and renewable energy sources are becoming increasingly common in energy systems. However, in both cases, reactive power or unpredictable active power generation are negative side effects. Shunt reactors are playing an increasingly important role to compensate for these variations.

Long transmission lines
Shunt reactors are the most compact and cost-efficient means of compensating for reactive power generation in long transmission lines. Placed permanently in service to stabilize power transmission, or switched in under light-load conditions for voltage control only, shunt reactors combine high efficiency and low life cycle costs to cut transmission costs. Shunt reactors increase energy efficiency and power quality in both new and existing transmission lines.

Cable systems
The increased use of cables is driven by environmental concerns such as the development of offshore wind parks and the difficulty in obtaining the right of way for new overhead lines. Energy trading and the need for efficient use of generation and reserves between countries drive the demand for interconnections, sometimes using AC sea cables. However, cables generate more reactive power than overhead lines, which makes shunt reactors even more important for transmitting active power in the grid.

Renewable energy sources
Wind power and solar energy are a growing part of the energy mix in many countries. Compared to conventional large power generation, renewable energy sources generate unpredictable and fluctuating active power. Variable shunt reactors provide an attractive solution to compensate for these variations.

Auxiliary power in remote areas
By adding a secondary winding, shunt reactors can be used to supply several MVA of power in remotely located substations. These specially designed shunt reactors can also be used to supply power to remote villages located close to the substation, without the need for a high voltage step-down transformer.

Flexible spare in larger networks
A variable shunt reactor (VSR) can be used as a flexible spare, positioned on different locations along larger transmission networks.

Exceptional and proven field reliability

ABB’s large installed base, our exceptionally low failure rate and our leadership in technology, combined with our global presence makes us stand out from our competitors. We are determined to continue to drive innovation. Our reliability in support and operation means lower total cost of ownership.

Extensive experience
ABB offers a complete range of traditional and variable shunt reactors. The product range is up to 1,000 kV and up to 330 Mvar. Variable shunt reactors are available up to over 300 Mvar with a large regulating range.

Since 1960, we have delivered more than 2,500 shunt reactors to around 60 countries worldwide. With reactor production in all continents, ABB has in-depth reactor competence close to you. In addition, we have a unique service organization providing expert support all over the world.

Global presence
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Leadership in technology
Drawing on ABB’s extensive R&D resources, we are at the very front line of reactor development, pushing the limits for higher power and voltage levels. For example, ABB developed and produced the first very large three-phase shunt reactors and variable shunt reactors with an extended regulation range. We developed these reactors under the most challenging customer requirements.

Low failure rate
ABB’s design concept with high mechanical stability and low vibration ensures a long and problem-free service life for your reactor and its external components. Many ABB reactors have been in service for 30–40 years without the need for refurbishment.

Unique expertise
ABB’s expertise is available globally to support all forms of advanced solutions for transformers and reactors worldwide. Along with other ABB companies, we have developed and manufactured accessories to optimize our solutions in a way that few others can.

Now and in the future
ABB reactors are designed and manufactured according to the same production methods and quality systems throughout the world, ensuring a life cycle of consistently high production quality.

Global support of installed reactors, along with the introduction of new technology, materials and innovative solutions, are the two pillars that ABB is built upon. This has been our strategy for 120 years, and it still is.
Excellence in technology

ABB’s shunt reactor technology offers the state of art solutions with a high and consistent quality.

Customized to operating environments
Differing environmental and operating conditions require special design and manufacturing considerations. ABB reactors are customized in cooperation with our customers according to specifications and international standards.

Long and trouble-free lifetime
ABB reactors offer trouble-free operation and easy maintenance. ABB’s unique design concept with high mechanical stability and low vibration ensures a long service life of the reactor and its external components. Many ABB reactors have been in service for 30–40 years without the need for service or repairs.

Low sound and vibration levels
Reactors are subjected to extreme mechanical forces. 100 times per second, the gapped limb in a large shunt reactor experiences forces of up to 40 tons. Low sound and vibration levels throughout their lifetime are proof of the solid mechanical design of ABB shunt reactors. The mechanically stable concept of ABB shunt reactors is the result of optimum design and manufacturing quality and leading engineering know-how in every detail.

Drawing on extensive research and development resources
ABB reactors are designed and manufactured according to the same production methods and quality systems throughout the world – ensuring consistently high product quality. Drawing on ABB’s extensive research and development resources, we use advanced design tools to ensure optimum design parameters.

All shunt reactors are laboratory tested
Reactors are laboratory tested according to standards using the most modern test equipment for correct and reliable measurement. Reactor integrity and performance under full-load and over-voltage conditions are verified as well as noise, vibrations and magnetic characteristics.

Long-term noise stability

![Long-term noise stability graph](image)

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<th>MANUFACTURING YEAR</th>
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Single-phase shunt reactors
- Reactive power: up to 320 Mvar
- Voltage: up to 1000 kV
- Regulation rate: N/A

Three-phase shunt reactors
- Reactive power: up to 330 Mvar
- Voltage: up to 765 kV
- Regulation rate: N/A

Three-phase variable shunt reactors
- Reactive power: up to 300 Mvar
- Voltage: up to 550 kV
- Regulation rate: Up to ±100%

Full support from transport to training

Our shunt reactor services range from basic maintenance to advanced diagnostic assessments. Contact your local ABB representative for further information.

Transport
Reliable transportation is key to successful shunt reactor installation. Moving an object the size and weight of a shunt reactor requires planning, know-how, and a global network of contacts. ABB has long experience in delivering reactors by rail, road, sea, and even air – world-wide. Our skilled staff will ensure a fast and efficient transport process.

Installation
ABB engineers will be on site to supervise installation and startup. They will prepare the reactor by reassembling all parts dismantled for transit, refill it with oil and run the necessary tests to ensure trouble-free operation. Customers can choose between a supervisory or full-installation agreement. As far as possible, the engineers assigned will have local language skills.

Service
Each shunt reactor comes with a technical guarantee and full backup. This includes field support and global after-sales services delivered by local branch offices, agencies, and representatives throughout the world. Diagnostic assessment, onsite repairs, upgrades, and spare parts deliveries are available to customers worldwide.

Training
The customer’s local operation and service personnel will be trained during installation and commissioning on site. Comprehensive training programs are available – contact your local ABB representative for more information.