VArPro™ STATCOM
Dynamic reactive power compensation
Power quality solutions for heavy industry

Power and productivity
for a better world™

VArPro STATCOM gives you proactive solutions for reactive needs

Improve operational performance and lower energy costs – VArPro™ STATCOM

With over a GigaVAr of STATCOM installations worldwide, ABB is a pioneer and a leader in reactive power compensation solutions. ABB's VArPro STATCOM solution allows industrial facilities to mitigate power quality issues and improve operational performance.

Installing a STATCOM (Static Synchronous Compensator), which is a power electronics voltage source converter, can protect facilities prone to power disruptions, voltage sags, light flickering, and abnormal equipment failure.

With the modernization and automation of many industrial processes came enhanced operational performance through increased efficiencies, safety and precision. However, cutting edge manufacturing technologies have spawned other challenges pertaining to the electrical network mainly on the customer's side of the meter.

With the increase in power electronic devices such as programmable logic controllers (PLCs), adjustable-speed drives (ASDs), efficient industrial motor systems, and other advanced equipment, industrial facilities are more vulnerable and less resilient to deviations in voltage and frequency that often occur on the electrical grid.

Power quality concern	Cause	Effect
Voltage Sags	Fault on feeder or connecting large loads such as motors	Tripping of VSDs, PCs, switchgear, high motor current, protection equipment tripping
Transients	Lightening, storms, down power lines, capacitor switching, animals	Equipment failure, overvoltage tripping, voltage breakdown
Harmonics	Use of power electronics (VSDs, SMPS, high efficiency lamps)	Overheating of critical equipment such as motors, transformers, conductors as well as instrumental and PLC malfunctioning
Fluctuations	Non-linear loads, cranes, welding, arc furnaces	Visible lighting flicker and damage to electronic equipment
Neutral –ground voltages	Poor electrical wiring and grounding	Device malfunction

The VArPro™ STATCOM solution

VArPro STATCOM prevents process interruptions by ensuring superior use and flow of power, optimizing plant profitability

Value and performance

With the advances and automation of industrial processes it has never been more important to provide smooth and reliable ac power to the commercial and industrial loads on today's electrical grid. Even the most minor of voltage fluctuations, power disruptions, or transients can interrupt operational performances of industrial facilities.

To protect against the adverse impacts of power quality issues, ABB's VArPro STATCOM can detect and instantly compensate for voltage fluctuations, mitigate impacts of flicker, and correct power factor. As a fully controllable power electronic device, a STATCOM is capable of providing both capacitive and inductive VArs. ABB's VArPro STATCOM solution ranges from 100 kVAr up to 50 MVAr. Our modular design with enhanced reliability features allows facility managers to lower operating cost and increase plant profitability.

+ Utility grade with advanced controls

Our grid expertise supports precise system control to avoid utility penalties

+ High availability

Built-in redundancy and protection system ensures lowest cost of ownership

+ Minimized risk due to proven technology

Global installed base with high reliability and strong track record

+ Modular and scalable systems sizes

Flexible designs can accommodate to system sizes from 100 kVAr and up to 50 MVAr

+ Rugged design for harsh environments

Containerized solution protects sensitive equipment for low maintenance cost and peace of mind regardless of climate conditions

+ Turnkey systems and optimization studies

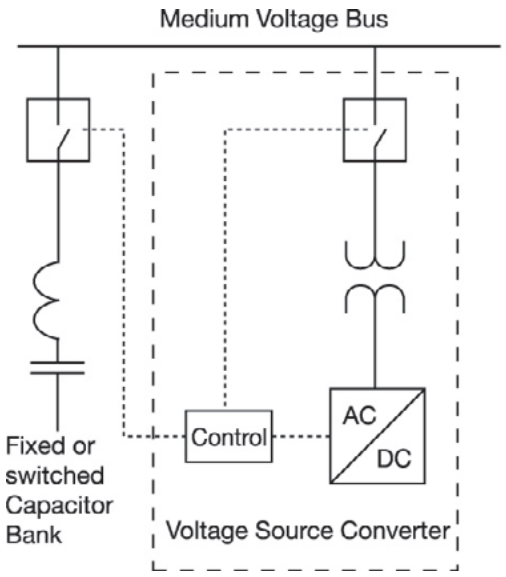
Leverage ABB's vast product offering and expertise in substation designs

VArPro STATCOM installation at a substation in the Canadian Maritimes to support a growing power generation profile

Engineered for user simplicity

What is a STATCOM?

A STATCOM (static synchronous compensator) is a voltage regulating device. It is based on a power electronics voltage-source converter and can act as either a source or sink of reactive power. It is a member of the flexible AC transmission systems (FACTS) family which detects and instantly compensates for voltage fluctuations or flicker, as well as controls power factor. As a fully controllable power electronic device, the STATCOM is capable of providing both capacitive and inductive VArs.



Features
Power factor control
Voltage regulation
Independent phase control
Flicker reduction
Active harmonic filtering (application specific)
Multiple system parallel control
High and low voltage ride through
Modular inverter blocks for simple long term maintenance
Flexible transformer integration for optimal footprint and low installation costs
Optional overload capacity up to 300 percent

A line up of ABB's containerized STATCOMs in operation during Ontario's winter months.

VArPro™ STATCOM ratings

Modular building blocks for optimized system sizes and easily tailored solutions

System ratings	
VArPro 1000	50 kVAr – 1,000 kVAr
VArPro 2000	1,000 kVAr – 2,000 kVAr
VArPro 3000	2,000 kVAr – 3,000 kVAr
VArPro 5000	3,000 kVAr – 5,000 kVAr
Connection	
AC grid voltage [1]	480 V to 46kV
Grid frequency [2]	50 Hz or 60 Hz
Harmonic distortion	IEEE / IEC compliant
Performance	
Response time	Sub-cycle
Output control	Independent phase control
Overload [3]	application specific

Standards	
Safety, EMC	Designed to ANSI, IEEE standards
Quality	ISO 9000 /ISO 9001
Environmental	
Protection class indoor	NEMA 1 / IP21 / IP23
Protection class outdoor	NEMA 3R, NEMA 4, NEMA 4x / IP54
Ambient temperature range [4]	-30°C to 50°C
Cooling	Forced air

[1, 2] Other values available upon request
[3] Optional overload capability up to 300%
[4] Temperature rating depends on housing selection, systems derated over 40°C

Containerized, or outdoor and indoor cabinet enclosure configurations

VArPro™ STATCOM engineering studies

Increase productivity, stability, efficiency and safety with a power system study

VArPro STATCOM studies	
Feasibility studies	– Determine the impact of network modifications to assist with planning and design requirements
Harmonic analysis	– Identification of harmonic generating equipment – Provide filter sizing and solutions – Recommend efficient sizing of new components
Load flow	– Analyze the power system to determine optimal operating conditions – Evaluate under operations and outline fault conditions
Short circuit	– Calculate available fault current at specific points in the system – Determine if over current component sizing is correctly applied on site – Verify settings to withstand possible fault currents
Coordination studies	– Review over current and overvoltage set points for protective devices – Evaluate size and proper insulation
Transient impact analysis	– Record and evaluate system response during load application or rejection – Assess the impact of the system response at various component levels
Failure analysis	– Study component failure to determine financial impacts and lost time effects – Provide effective and preventative component solutions
Analysis Tools	– PSS®E – DlgSILENT PowerFactory – PSCAD® – MATLAB Simulink

ABB’s remote asset enterprise

Improving your bottom line through ABB’s remote services and virtual technical support team.

In today’s operating climate, many businesses are required to increase operational efficiency with fewer available resources. Remote monitoring presents an effective solution for around the clock monitoring and network uptime, with little investment. The remote asset enterprise allows ABB’s experienced professionals to remotely monitor valuable assets, freeing users to allocate their valuable resources more productively.

Remote asset enterprise service packages

	Monitoring on-demand	Real-time performance analysis	Continuous monitoring and diagnostics
Remote trouble shooting	●	●	●
Automatic notifications and alerts	●	●	●
Fault and early warning detection system	●	●	●
Event logging and visualization		●	●
Voltage and current measurements		●	●
System performance reports		●	●
Trending analysis			●
Predictive maintenance			●

VArPro™ STATCOM service and support

Rapid Response

We guarantee fast and flexible service response to maximize your equipment availability.

Rapid Response

- **Repairs:** During emergencies or planned production breaks, when equipment or processes fail and need instant repairs.
- **Spare parts:** Delivery of spares and consumables.
- **Replacement:** Troubleshooting, identifying and analyzing the root causes of equipment failures and suggesting the most effective courses of action.
- **Training:** Equipment and system training services for personnel.

Lifecycle Management

We provide you powerful tools and our knowledge base to optimize and extend the lifecycle of your equipment.

Operational Efficiency

Remote monitoring: Outsource asset monitoring to experienced professionals with an easy access to our virtual engineer support team. Allow for real-time visibility into equipment performance with fast and secure information retrieval.

Operational Efficiency

We optimize the usability and efficiency of your equipment and systems to increase productivity.

Lifecycle Management

- **Installation and commissioning:** Installation supervision and commissioning of the equipment by qualified engineers reduces start-up time, increases safety and reliability, while decreasing lifecycle costs.
- **Extensions, upgrades and retrofits:** Upgrade current installations with next generation product and software to ensure maximum return on investment
- **Service agreement:** Tailored service agreements that guarantee quick help in all situations, including lifecycle services to keep equipment and assets in full working condition and updated to use the latest technology

Performance Improvement

Engineering and consulting: Engineering and consulting assistance in identifying areas for improvement in the reliability, availability, maintainability and safety of production processes. We offer advanced services that allow for appropriate sizing of systems and determine the optimal solution for each application.

Performance Improvement

Your strategic partner in improving productivity, usability, reliability, safety, cost and energy efficiency and emissions control.

VAr compensation experience

Reference installations across heavy industrial applications

Matachewan, Ontario

Power quality solution for new site reliability

Mines rely on a significant amount of electrical power with large continuous processes, and therefore need to lower energy costs while managing power quality. AuRico Gold's Young-Davidson gold mine in Matachewan, Ontario began production in 2012, with development attention given to ensuring facility-wide power quality. AMEC, a global engineering and project management company, worked with ABB to study and implement a power quality solution.

The Young-Davidson facility boasts high power electrical machines fed over very long cable lengths. ABB installed a total of six 4.5 MVAr STATCOM containerized units with transformers, inverter racks and controls, all inside each 40 foot container. The STATCOM technology is used to regulate voltage by providing reactive power to the grid in either capacitive or inductive VAr sourcing. This ensures fast response times with redundancy to maintain power performance requirements, lower energy costs and longer lives for the motors and process equipment.

Opapamiskan Lake, Ontario

Voltage support for mine expansion

Goldcorp's Musselwhite mining facility planned expansion of operations, which meant modifying an existing load supply point through a transmission line serving the current facility. The total combined load was expected to increase to 20 MVA, with 8 MVA located at the new substation. A system impact study assessed the expansion's impact on the grid. Excessive bus voltage fluctuations were identified at the substation during operation of a large hoist motor, and voltage criteria issues at the mine point of connection.

The hybrid solution was a 5 MVAr ABB STATCOM and a 5 MVAr capacitor bank, which allowed the mine expansion project to operate at full 18 MW load while meeting voltage criteria. The container included an integrated transformer in the design to reduce footprint and installation cost. The STATCOM provides dynamic reactive power support to limit voltage sags caused by operation of the 4,600 HP (3,400 kW) skip hoist motor. Increased network stability, transmission capacity and grid compliance ensures facility and grid power quality.

Kosciusko, Mississippi

Helping a steel facility open a new galvanizing plant

Located in Mississippi, a 30,000-square-foot galvanizing facility will complement an existing structural steel mill and fabrication plant. The new facility, which will utilize the latest advances in environmental technology, provides a one-stop shop for solar panel I-beam supports, tubing, pipes and pedestal posts used in the mounting of solar panels. The facility was experiencing poor power factor, voltage transients, flicker and harmonics, which not only had adverse impacts on the load but the surrounding utility distribution network as well. ABB's VArPro STATCOM provided a robust solution that improved power quality to the plant, improved utilization of the new equipment, increased plant efficiency, whilst being compliant with utility requirements, including voltage and flicker limits.

Gulf Coast, Texas

Reactive power compensation for a petrochemical plant

Petrochemical plants rely on consistent, high quality power to run their motor-heavy operations. Production can be adversely affected by voltage instability where site conditions and poor power factor disrupt operations. Power quality devices with dynamic voltage regulation can mitigate costly utility penalties, production losses and stress on capital equipment. For a major petrochemical plant in Texas has applied an ABB VArPro STATCOM system, consisting of 6 indoor units totaling 16.8 MVArs, to improve their site-wide operational reliability save additional costs in utility penalties.

Chesapeake, Virginia

Helping a car crusher facility regulate voltage

Shredder and crusher motors can often draw intermittent peak high currents that will result in voltage drops in the system. These drops will directly affect the power grid, causing dynamic voltage disturbance problems like unbalance, distortion or flicker. Reactive power control can resolve these issues by improving the power factor and compensating for the voltage instability. In many cases, traditional solutions like switching capacitors are too course and slow to stabilize a weak network.

ABB provided a hybrid system that included dynamic VAr compensation (STATCOM) along with a switched capacitor bank to help achieve the lowest overall system costs. ABB's VArPro STATCOM compensated dynamically to directly mitigate the voltage disturbances that were causing the voltage fluctuations.

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