SVC Light®
For electrical transmission grids
SVC Light® was introduced in 1997 and improves the efficiency of transmission systems, increasing the power transmission capacity as well as reducing the risk of voltage collapses and blackouts. Its innovative design makes SVC Light particularly suitable for power grids facing a variety of challenges.
A new era in grid optimization

ABB is a pioneer and the recognized market leader in the FACTS field. Since decades, ABB’s FACTS installations enable more efficient power transmission. SVC Light is the latest contribution to the FACTS family of grid-optimization solutions. SVC Light is ABB’s brandname for STATCOM.

Meeting demands today and tomorrow
There is an ever-growing need for new and efficient solutions for power transmission. Continued urbanization, energy trading between regions, growing utilization of electrified railway transport and the increasing use of renewable energy sources place more stringent demands on new and existing infrastructure.

In recent years, we have seen massive blackouts paralyze entire cities, regions or even whole nations, at enormous cost to the societies affected.

Thousands of Mvar in operation worldwide
ABB’s range of FACTS products offers a flexible solution for grid optimization. Since the 1950s, these solutions have contributed to substantial reductions in carbon dioxide emissions and optimal use of energy resources. Likewise, they will ensure sustainability and security of the power supply for tomorrow.

SVC Light is the latest member of ABB’s FACTS family of products, taking proven Voltage Source Converter (VSC) principles to the transmission and distribution grids one step further. The concept of VSC-based reactive power compensation is known as STATCOM in the industry, and branded SVC Light by ABB.

The first SVC Light was commissioned in the 1990s, which makes ABB a pioneer and leader in the field. Today, SVC Light installations of thousands of dynamic Mvar are in operation or under construction in transmission and distribution grids – and serving with pride.
Unrivalled design, performance and dependability

SVC Light is a static compensator of reactive power. Static refers to the absence of moving parts. Its power semiconductors make it a high-quality dynamic device, which improves grid availability, stability and power quality.

**Multi-level topology**
As a crucial grid component, SVC Light must perform reliably at all times, particularly “under pressure”. Its design is uniquely tailored for these extremes, combining simplicity and versatility. Chain-link multi-level topology allows for simple configuration of power circuits, while Pulse Width Modulated (PWM) power converters enhance their robustness. The result is an unrivalled combination of performance, user-friendly design and dependability.

**Suitable for support of weak grids**
SVC Light is capable of yielding a high reactive input to the grid more or less unimpeded by possible low grid voltages and with a high dynamic response. This is useful, for instance, for support of weak grids and to improve the availability of large wind farms under varying grid conditions, as well as of grids loaded by a large percentage of air conditioners in hot and humid climates.

**Prefabriocated modules**
Thanks to simplicity in topology, requiring a minimum of components, the footprint of an SVC Light installation is small. Furthermore it enables a high degree of prefabrication and in-factory testing, leading to an overall reduction of project lead times and enhanced product quality. If dictated by application requirements, SVC Light is excellent for hybrid solutions.

**Hybrid solutions**
SVC Light provides a symmetrical operating range. For asymmetrical operations and in order to optimize performance, thyristor-switched reactors and capacitors are operated in parallel to form a hybrid solution.
IGBTs (Insulated Gate Bipolar Transistors) are key components in SVC Light. Uniquely experienced as a manufacturer of IGBTs, ABB has been able to perfectly customize the SVC Light.

Benefits of SVC Light:
- high performance, low losses
- suitable for hybrid solutions
- large rated power range
- sub-cycle response
- ability to operate in grids with low fault levels
- compact, with a small footprint
- low audible noise
- high degree of prefabrication
- high degree of encapsulation, low harmonic generation
- robust algorithms and behavior for voltage support, even under unsymmetrical conditions
- full reactive converter output even at depressed system voltages
- less sensitive and less dependent on network conditions
- advanced functions such as active filtering and phase balancing

Modular design
Each IGBT is built up in a modular housing comprising a number of sub-modules, each containing a number of semiconductor chips. The IGBTs have passed rigorous failure mode and safety tests. Depending on current requirements, up to six sub-modules are used in each IGBT, enabling a high current rating.

Multilevel converter:
- Chain-link multi-level topology
- Low switching frequency per cell, enabling low switching losses, and high overall effective switching frequency enabling a smooth output voltage
- High power rating

Redundancy ensures reliability
There is built-in redundancy with additional cells in series, meaning that IGBTs can fail without stopping the operation of the SVC Light. Replacement can be performed during planned outages of the installation.

StakPak IGBTs 4,5 kV voltage rating

Multilevel converter

Chain-link cell
Specific features

Control and protection
ABB’s MACH, for control and protection, is specially designed to meet the strictest demands of advanced power system applications. Fiber optics ensure safe feedback and control of the high-voltage bridges. The MACH platform has been proven in field for decades and is built around a fully redundant real-time controller, equipped with high performance add-in boards. It also includes a whole family of I/O circuit boards for sampling and signal processing. The MACH platform supports most cyber security standards available in the market.

The converter valve
The VSC of SVC Light is a Multi-Level Chain Link converter, with single-phase units consisting of a number of series connected chain link cells, forming the converter phase legs. Each chain link cell module consists of four IGBT positions, each featuring an IGBT module with a corresponding Gate Unit, and a DC capacitor.

Smooth output voltage
Pulse Width Modulation (PWM) is utilized with an effective switching frequency in the tens of kHz range, providing a smooth output voltage shape.
Superior flexibility

Thanks to a simple topology and few components, the footprint of an SVC Light installation is small. The high degree of prefabrication and in-factory testing reduces project lead times and enhances product quality.

**Customization based on prefabricated engineering**
SVC Light is very flexible and can be customized to individual reactive power demands. For a balanced output one converter is needed. By adding thyristor switched capacitors and/or reactors, the required range is achieved. For applications with lower dynamic requirements mechanically switched capacitors and/or reactors can be combined with the converter. ABB can provide solutions with all combinations.

**Direct connection**
The SVC Light converter is available for system voltages up to 69 kV and converter ratings of up to ± 360 Mvar. For higher voltages, a step-down transformer is used to connect SVC Light to the power grid.

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A flexible design to cover every requirement.
An oil and gas fired power plant in Texas was retired due to reduced use, environmental concerns and the availability of more cost-effective generation elsewhere. SVC Light compensates for the loss of reactive power.

**Located in a densely populated area**
The old plant was located close to a densely populated residential area in Texas. In order to ensure the transmission system's voltage stability, it was necessary to install a reliable dynamic reactive power source as replacement.

To make up for the loss of reactive power support in the 138 kV grid, an SVC Light, rated at 80 Mvar inductive to 110 Mvar capacitive, was put into service 2004. Due to the many high tech sensitive loads in the region, the fast response offered by SVC Light to help recover from voltage sags was particularly important to the grid owner.

**Small footprint and zero emissions**
Also, space was scarce and ambient noise was a concern. SVC Light was chosen because of its minimal footprint, minimal environmental impact and capability to support the grid even more effectively than the old generators. Reactive power support is provided dynamically, quietly and with zero emissions into the air.
SVC Light increases the power transmission capability of a major power transmission network in Chile by improving the system’s dynamic stability.

SVC Light in Chile
After completion of feasibility studies, the grid owner decided to install FACTS with the aim of increasing the dynamic stability of the system, thereby allowing more power to be transmitted through the grid.

Verified performance
The SVC Light rated at 220 kV, 65 Mvar inductive to 140 Mvar capacitive was put into service 2011, bringing additional power transmission capability to the existing grid.

The SVC Light and an ABB SVC are located close to each other. Tests were performed to verify stable control without any harmful interaction between the devices. The performance of the devices and control functions were successfully verified during different operational scenarios.
FACTS customer support enables you to rest assured throughout all phases of the installation’s lifecycle. We offer you service 24/7 all around the world. With our FACTS Online remote service we can help to improve risk management and increase grid stability. FACTS customer support is offered worldwide.

Thanks to a truly global service organization, ABB can offer local FACTS customer support worldwide.
FACTS customer support empowers our customers throughout all phases of the installation’s lifecycle. Our Customer Support Agreements are the foundation for a long-term partnership.

24/7 Support
24/7 Support is available regardless of time or place. 24/7 secures business continuity for utilities and industries, and their customers around the world.

Corrective maintenance
Corrective maintenance is our emergency service. It aids finding, isolating and rectifying the fault and restoring the system. It assures that there are skilled ABB personnel on standby, to assist you in the case of any problems.

Preventive maintenance
Preventive Maintenance helps our customers to check the condition of their system and its components. It will determine the best solution to ensure system performance, safety, availability and reliability.

Remote Service
Remote Service satisfies the need for fast, efficient fault analysis, in combination with data analysis and respect for our customers security concerns.

Training
Knowledge is something intangible, obtained in theory and hands-on. ABB offers various kind of trainings for all types of FACTS Systems.

Spare parts
The right part, in the right place, and at the right time. The goal is to protect our customer from unknown and unexpected trouble related to spare parts support.

Updates
Updates ensure that the system is up-to-date and optimized and can be done in a few simple steps.

Upgrades
An upgrade will increase the lifetime of your facility, boost capacity and production, and also save valuable time and money.
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