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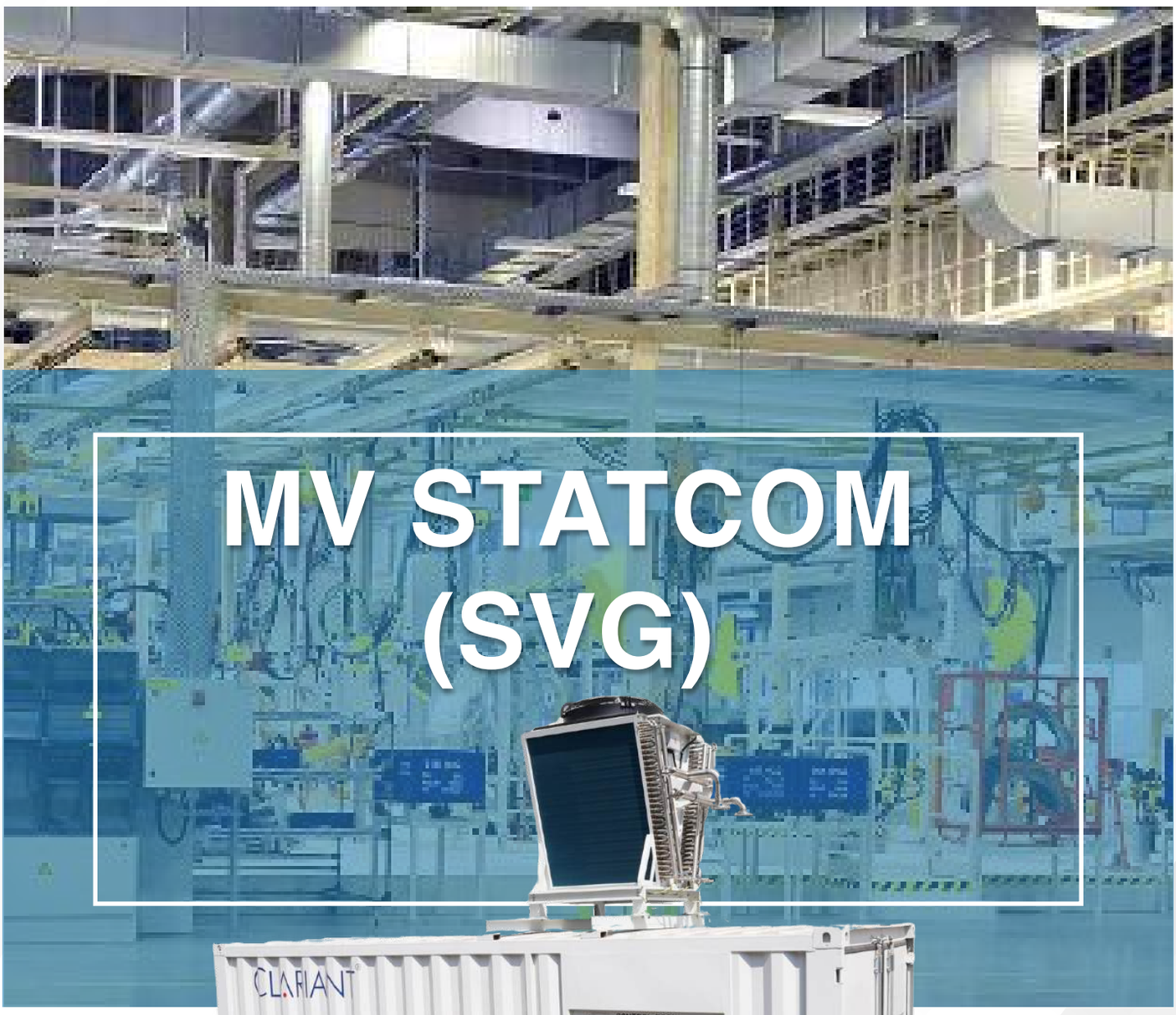
In collaboration with Frako-Germany

Trusted Name in Power Quality Management Since 1998

## Clariant Power System Ltd.



# MV STATCOM (SVG)


More Power by Saving Energy

It's all about saving your money!

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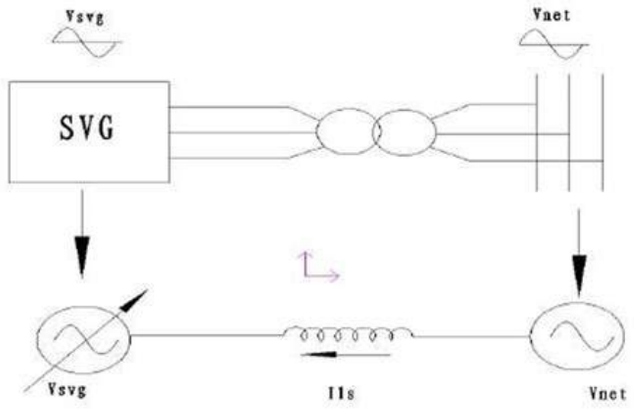
Clariant STATCOM is a reactive power compensation system with IGBT as the core, which can provide capacitive or inductive reactive power continuously, realize the control of constant reactive power, voltage and power factor at the assessment point, and guarantee the stable, efficient and high-quality operation of the power system.

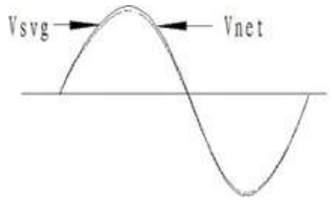
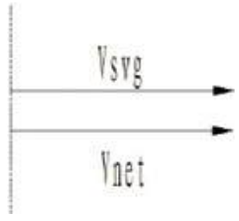
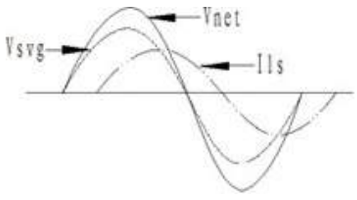
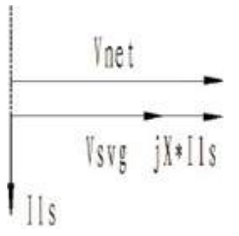
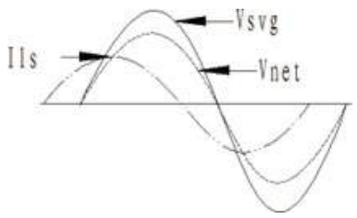
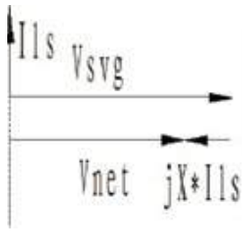
Our STATCOM adopt modern power electronics, automation, microelectronics, network communication technologies and advanced instantaneous reactive power theory and decoupling algorithm based on synchronous coordinate transformation to operate with the set reactive power, power factor and grid voltage as the control target, dynamically track the changes in grid power quality to regulate reactive power output and can realize curve setting operation to improve grid quality.

## Working Principles of STATCOM

The schematic diagram of STATCOM (SVG) is shown below. In the AC circuit, there are three cases of voltage and current phases: when the load is purely resistive, the voltage and current phases are the same; when the load is inductive, the voltage phase exceeds the current phase; when the load is capacitive, the voltage phase lags the current phase.




The basic principle is to connect a self-commutating bridge circuit to the grid in parallel with a transformer or reactor, properly adjust the amplitude and phase of the output voltage on the AC side of the bridge circuit, or directly control the AC side current to make the circuit absorb or emit reactive current to meet the requirements to achieve the purpose of dynamic reactive power compensation, as shown in below table.

| Operating mode | Waveform | Phase | Description |
|---|---|---|---|
| No-load operation mode |   |   | If VSVG = Vnet, then Ils=0, which is equivalent to a resistance adjustable resistor. |
| Inductive operation mode |   |   | If VSVG = Vnet, then Ils=0, which is equivalent to a resistance adjustable resistor. |
| Capacitive operation mode |   |   | If VSVG > Vnet, then Ils is the overrun current. Equivalent to the continuous adjustable capacitance |

## Key Features

| Industry | SVG Application Features |
|---|---|
| Wind power, photovoltaic and other new energy industries | Control the reactive power at the source access point of wind power and photovoltaic power generation equipment to prevent the backward transmission of reactive power |
| | Stabilize grid voltage and reduce voltage fluctuations caused by fluctuations in power generation |
| | Compensate harmonics to improve power quality |
| | Maintain input voltage and improve LVRT ability |
| Urban distribution network and agricultural network power supply | Improve power factor to reduce reactive power loss |
| | Resolve voltage fluctuations and flicker generated by fluctuating loads |
| | Stabilization of voltage at the receiving end |
| | Suitable for centralized compensation of reactive power and harmonics for multiple users, especially where there are many shock- type loads |
| Electrified railway and urban rail transit industry | Comprehensive management of reactive power and harmonics in traction power supply system, improving power quality and traction capacity, saving energy and reducing consumption |
| | Compensation of negative sequence currents generated by locomotive loads |
| Steel and metallurgy industry | Improve power factor and reduce reactive power loss |
| | Reduces voltage fluctuations, suppresses flicker, and improves production efficiency |
| | Filtering harmonics to ensure equipment safety |
| | Load Balance |
| Oil, chemical, mining, dock and heavy industry | Stabilized supply voltage |
| | Centralized compensation for substations supplying a large number of low and medium voltage motors |
| | Local reactive power compensation for large motors |
| | Centralized reactive power compensation for various types of crushers and ball mills |
| | Reduction of reactive fluctuations and harmonics of traction drives |
| | Reactive power compensation for large crane equipment, ship lock control systems, forging equipment, etc. |
| | Stabilized supply voltage |

## Technical Parameters

| | |
|---|---|
| Rated Voltage | 6kV±10%～35kV±10% |
| Assessment point Voltage | 6kV±10%～500kV±10% |
| Input Voltage | 0.9～1.1pu |
| Low Voltage ride through | 0pu（150ms）0.2pu(625ms) |
| High Voltage ride through | 1.2~1.3pu(can set 1s) |
| System Frequency | 50Hz/60Hz |
| Output Capacity | ±0.1Mvar～±200Mvar |
| Response Time | Total response time ≤5ms |
| Overload Capacity | ≥120%（1min） |
| Total Harmonic Current Distortion (THDi) | ≤ 3% |
| Reactive power regulation mode | Capacitive and inductive automatic continuous smooth adjustment |
| Communication Interface | Ethernet, RS485, CAN, high-speed fiber optic communication interface |
| Communication Protocol | MODBUS_RTU, ProfiBUS, power CDT91 statute, IEC60870-5-104 |
| Operation Mode | Constant device reactive power mode, constant assessment reactive power mode, constant assessment power factor mode, constant assessment voltage mode, etc., the target value can be changed in real time |
| Parallel Mode | Multi-unit parallel network operation, multi-busbar comprehensive compensation, multi-group FC comprehensive compensation control |
| Protection Function | Bus over-voltage, bus under-voltage, FGSVG over-current, drive fault, power unit over-voltage, over-current, unit over- temperature; protection input nterface, protection output interface, system power abnormalities and other protection functions. |
| Fault Handling | Take redundant design to meet N-1 operation |
| Cooling Method | Air-cooled/water-cooled |
| Protection Level | Indoor type IP30, outdoor type IP44 |
| Storage Temperature | -30°C～+70°C |
| Operating Temperature | Indoor type -10°C～+40°C, outdoor type -25°C～+40°C |
| Relative Humidity | Monthly average value not more than 90% (25°C), no condensation |
| Seismic Humidity | VIII degree |
| Dirt Grade | Grade IV |