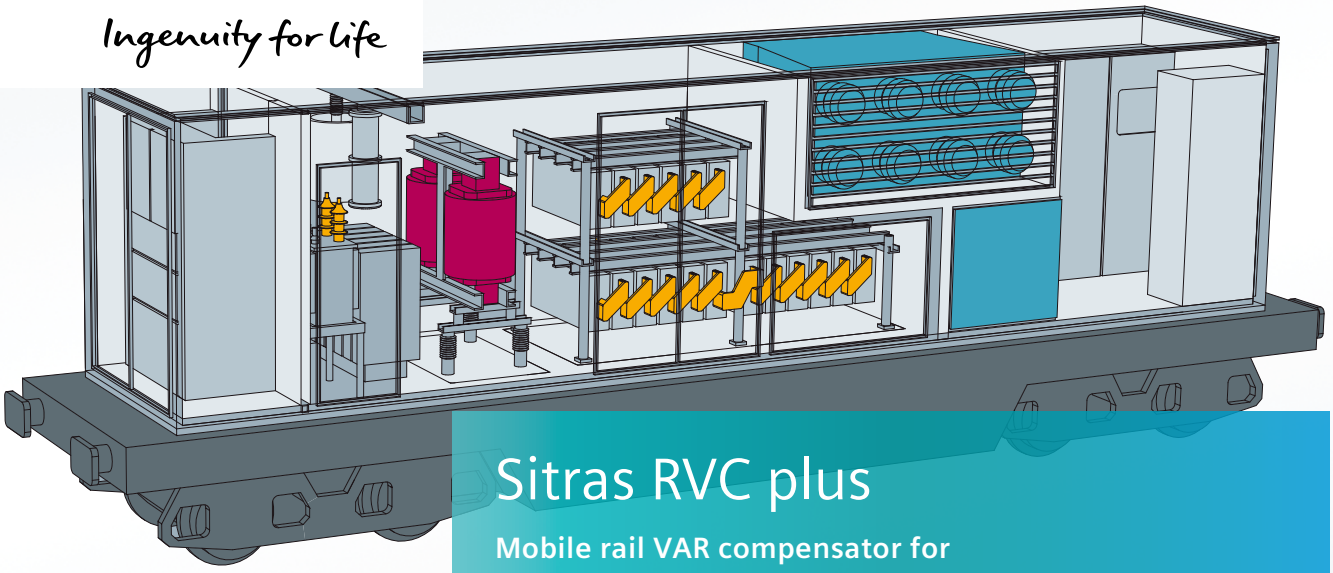
SIEMENS
Ingenuity for life



Sitras RVC plus

Mobile rail VAR compensator for AC traction power supply

siemens.com/rail-electrification

Sitras® RVC plus mobile rail VAR compensators are used to stabilize the voltage in single-phase railway networks.

Features

- The innovative multilevel converter concept ensures
  - Compact design in 40-foot high cube standard container
  - Connection of the converter to the contact line without a heavy transformer
  - High availability due to redundancy in the converter power section
  - Low losses over the entire operating range
- An alternative auxiliary power supply via the contact line or an external 400 V 3-phase AC network
- Automatic operation or remote control operation possible
- Control of contact line voltage by means of capacitive and inductive reactive power within the performance limits

Function and features

Power

- One container has an output of 15 MVAr (inductive or capacitive)
- Paralleling of several units is possible

Electrical properties

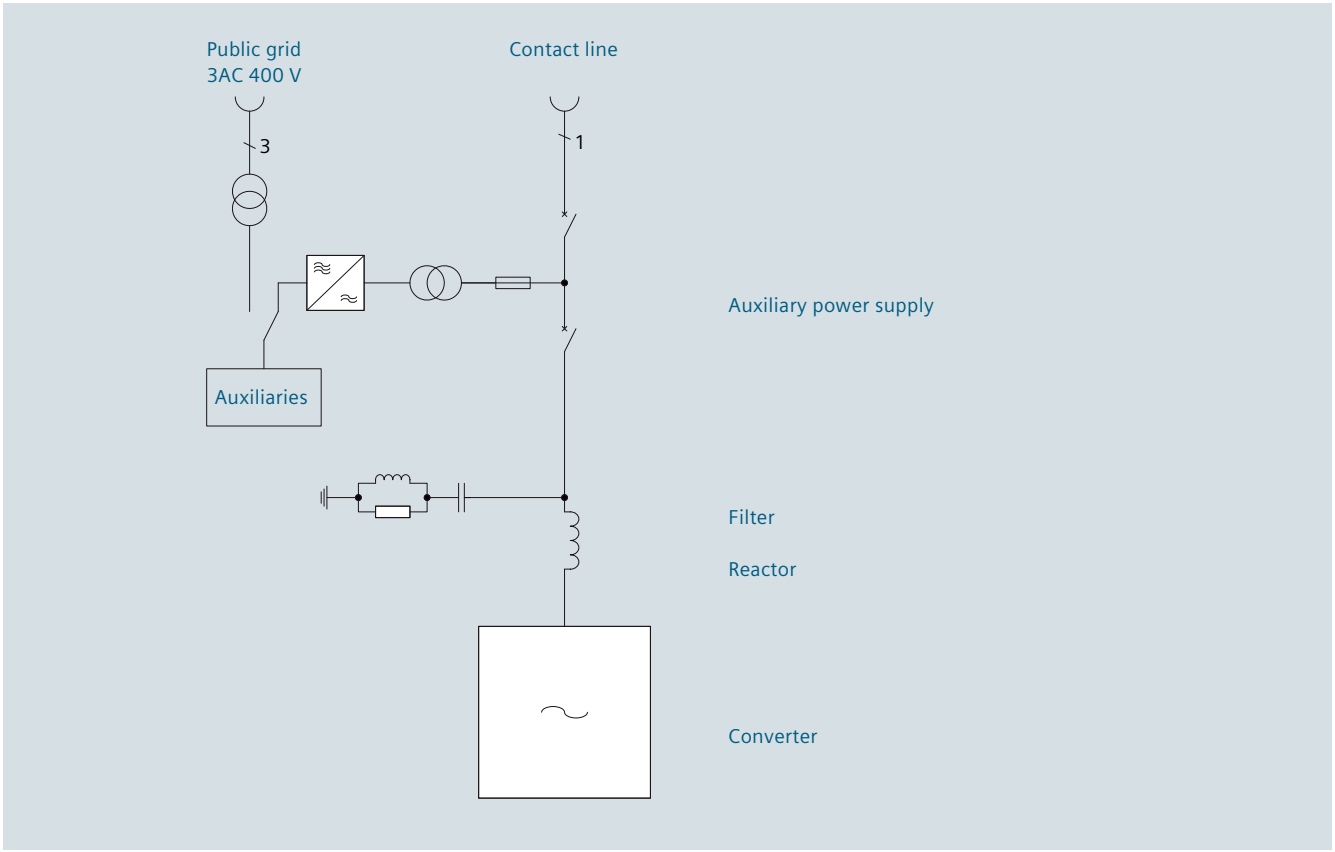
- Power supply friendliness:
  - Implementation of the output voltage in small voltage steps enables the generation of an output voltage that is comparable to that of a generator
  - In order to meet high demands and be capable of use at any location in the traction power supply, a compact filter has been provided
- No complementary energy storage units and therefore no uncontrolled oscillation of series resonant circuits in the event of line disruptions
- Stored energy is distributed among numerous power modules (any fault will remain limited to the easily replaceable power module)
- Redundancy in the power section (operation is not interrupted by failure of power modules)

Design

- Compact 40-foot high cube standard container solution (L x W x H: 12.2 m x 2.4 m x 2.9 m), weight approx. 28 t
- Suitable for use in ambient conditions with high levels of pollution (external air only passes through the heat exchanger area).
- Simple single-circuit cooling system for cooling reactor and converter
- Use of proven components and materials offers a high level of reliability and robustness
- Use under the following climatic conditions:
  - Snow-load on roof surface of up to 150 kg/m²
  - Crosswind speeds up to 160 km/h
  - Temperature range -20 °C to +40 °C
  - Site altitude up to 1,000 m above sea level
  - Earthquake-proof for earthquake zone Z3b, earth class E and structure class III (in accordance with SIA 261)

Operating modes

- Can be operated on power supplies with elastic or rigid frequencies
- 24 hours in standby mode without contact line voltage or auxiliary power supply



Design of mobile rail VAR compensator Sitras RVC plus

Main components

Multilevel converter

The converter consists of 18 series-connected power modules with a connected module capacitor. Service-proven power modules are also used in the Sitras SFC plus static frequency converter and for SVC and HVDC systems.

Output reactor

A compact water-cooled, iron-cored reactor is used for decoupling the converter and traction power supply.

Filter

A compact RLC high-pass filter ensures the reduction of system perturbation, especially in the frequency range of the track circuits, even in case of different power supply configurations.

Switchgear

The compact and maintenance-free gas-insulated traction supply switchgear 8DA11 is equipped with Connex plug-connectors for connection of the compensator to the overhead contact line.

Protection

The components such as reactor, cables, filters and auxiliary power transformer are protected against overcurrent by means of a standard protection device.
The converter's own controller protects against over- and undervoltage, as well as highly dynamic overcurrents. Moreover, the thermal overload protection is also implemented here.

In the event of short-circuits on the traction power supply side the converter does not contribute to the short-circuit current, but instead reduces the current to zero. After a programmable break for the short-circuit test (e.g. 500 ms), operation is automatically resumed when the voltage returns.

Open and closed-loop control

The proven Siemens Simatic® TDC multiprocessor system with a subordinate PLUSCONTROL system is used as an open and closed-loop control system. These systems control all components that are assigned to the compensator. The closed-loop control converts the setpoints for the compensator into the switching commands of the semiconductor valves. The compensator is operated using the proven Simatic WinCC system.

Technical data

Sitras RVC plus		
Nominal power	[MVar]	15
Nominal voltage	[kV]	15
Nominal frequency	[Hz]	16,7
Voltage range	[kV]	11...17,25
Auxiliary power	[kW]	< 25

References

Sites that are using the new Sitras RVC plus mobile rail VAR compensators in modular multilevel technology are:

- Domodosola / Italy
- Neuhausen / Switzerland.

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

For more information about industrial security, please visit: http://www.siemens.com/industrialsecurity.

Product information / Version 1.0.2
Nr. A6Z00036124075

Siemens AG
Mobility Division
Otto-Hahn-Ring 6
81739 Munich
Germany

For further information please contact:
Siemens AG
Mobility Division
Turnkey Projects & Electrification
Rail Electrification
Mozartstraße 33b
91052 Erlangen
Germany

electrification.mobility@siemens.com
www.siemens.com/rail-electrification