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## Sitras CSG

### Compact DC switchgear with integrated rectifier

The Sitras® CSG DC switchgear is used in the power supply for DC vehicles in mass transit systems, especially in tram and trolleybus systems.

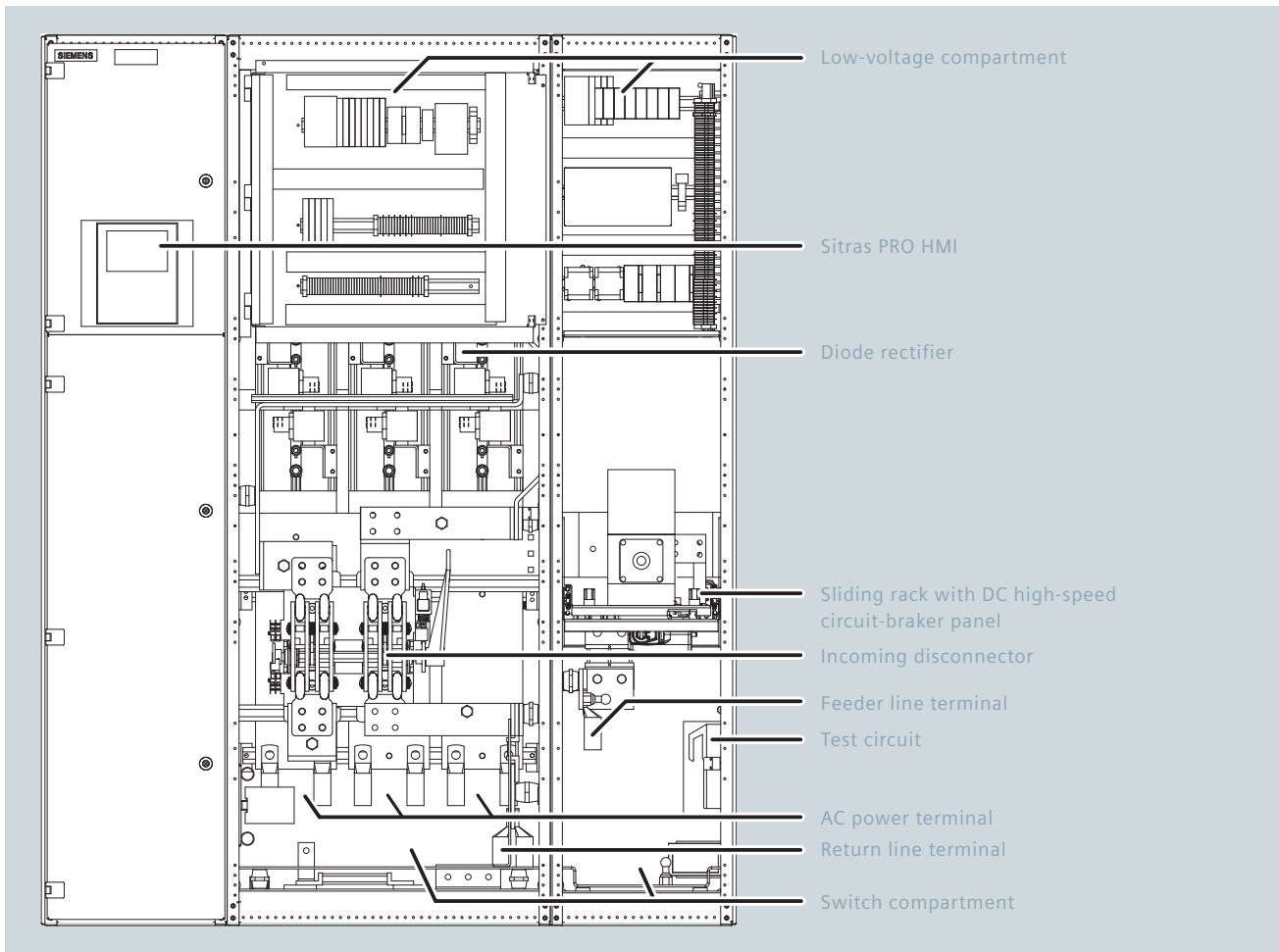
Sitras CSG is a type-tested, metal-enclosed indoor switchgear unit with integrated diode rectifier. It is designed for use in DC traction power supply systems with lower to medium power ratings.

#### Features

- Very small space requirement due to extremely compact design and unrestricted suitability for wall mounting
- Optimized cost/benefit ratio due to demand-oriented design and high degree of standardization
- Low lifecycle costs due to low maintenance requirements and insensitivity to environmental influences
- Safe and reliable, as verified by type tests acc. to EN 50123-6 and EN 50328
- Arc-fault tested and earthquake tested panels available

Electrical data			
Nominal voltage $U_n$	[V]	600 / 750	1,500
Rated voltage $U_{Ne}$	[V]	900	1,800
Rated insulation voltage $U_{Nm}$	[kV]	1.2	2
Impulse voltage withstand level $U_{Ni}$ (1,2/50 $\mu$ s)	[kV]	8	12
Power frequency withstand voltage $U_a$ (50 Hz, 1 min)	[kV]	3.6	5.5
Peak inverse voltage of diodes $U_{RRM}$ (option)	[kV]	2,200	4,000 (4,600)
Rated current			
– Busbar $I_{Ne}$	[kA]	3.3	3.3
– Incomer $I_{Ne}$	[kA]	up to 3.3	up to 2.4
– Feeder $I_{Ne}$	[kA]	1.0...3.0	1.0...1.5
Rated short-circuit current $I_{Nss}$ (peak value $\hat{I}_{Nss}$ )	[kA]	up to 50 (71)	up to 25 (36)
Rated track time constant $T_{Nc}$	[ms]	80	80
Rated earth fault current $I_{Ncwe}$	[kA]	50	50

# Design



Example layout: front view of Sitras CSG for 1.5 MW substation (750 V), footprint 1.4 m<sup>2</sup>

The panels are designed for indoor installation in a steel cabinet system. The following basic types are available:

- rectifier-incoming-return line panel
- section feeder panel

The switchgear panels are covered on top by a perforated metal grating and can be fitted with a dripwater protection steel plate as an option. The panel-to-panel compartment partition is also made of metal.

Behind the upper doors the low-voltage compartments are located. Through the lower doors, it is possible to gain access to the switch compartments.

The switchgear has a single busbar system. All power terminals are arranged as cable connections facing downwards as standard.

All the main components are easily accessible from the front, thus making the panels suitable for wall mounting.

The Sitras CSG is operated and monitored via Sitras PRO HMI or Simatic® Touch Panel, which are installed in the door to the low-voltage compartment.

The control, protection and signaling devices are installed in the low-voltage compartment. These built-in devices are shielded by metal compartmentalization against electromagnetic interference.

## Rectifier-incoming-return line panel

The low-voltage compartment for the rectifier-incoming-return line panel is pivot-mounted. The low-voltage compartment is pulled out sideways to gain access to the upper zone inside the panel.

This zone contains the rectifier with high-power disc-type diodes, which are clamped in a thermally optimized aluminum heat sink section and cooled by natural convection.

The disconnector, which connects the rectifier to the main busbar, is located behind the lower door underneath the rectifier.

The busbar for the return line terminals and the terminal connection point for frame earthing is located in the lower panel zone.

## Section feeder panel

The low-voltage compartment is fixed-mounted in the upper zone in the cabinet.

The sliding rack with the DC high-speed circuit-breaker panel is within the medium zone. The sliding rack may be moved in the service or disconnected position, when the door is closed. When the door is open, the sliding rack

can be pulled out from the panel and, if necessary, the DC high-speed circuit-breaker with the isolating contacts can be taken off.

The cable terminal plate for the feeder line and the test circuit are located underneath the sliding rack at the side partitioning walls.

# Variants

## Rectifier-incoming-return line panel

Depending on the desired performance, each rectifier-incoming-return line panel can be assembled with six or twelve diodes as well as with or without a fuse in series with each diode.

Panels with twelve diodes can be realized as 6-pulse or 12-pulse connection.

To realize a remote control isolating distance, a motor, which can move the sliding rack with the DC high-speed circuit-breaker between the service and disconnected positions, can be fitted to each section feeder panel.

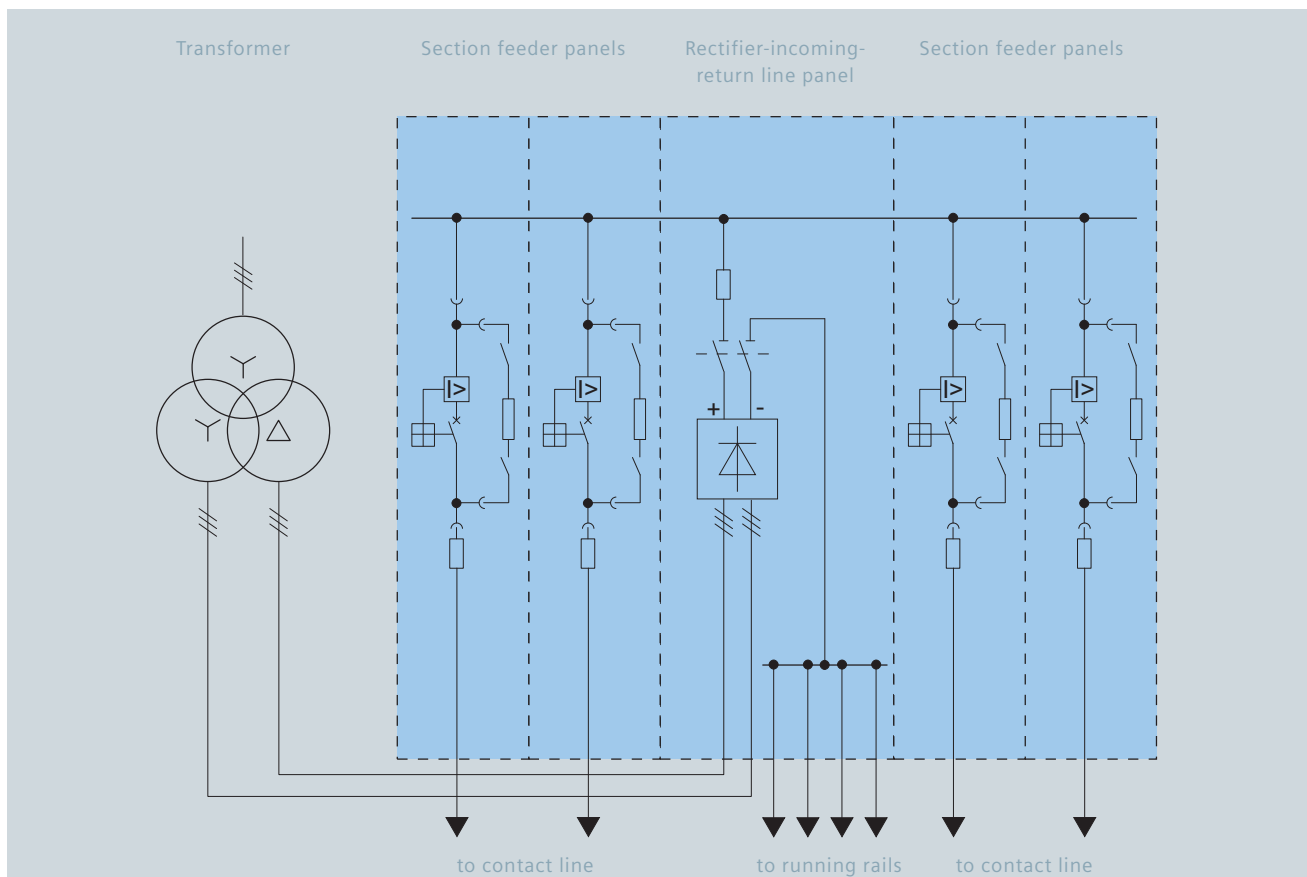
## Section feeder panel with bypass disconnecter and bypass panel

To increase availability, the section feeder panels can be combined with a bypass panel.

## Section feeder panel

Section feeder panels can be equipped with two or three front doors.

In this case, the section feeder panels are fitted with bypass disconnectors and connected with the bypass panel via a bypass busbar.



Example of arrangement of panels: Sitras CSG for 2.5 MW substation (750 V) with 12-pulse rectifier

# Mechanical data

Mechanical data		
Height	[mm]	2,200
with optional IPX1 roof (dripwater protection)	[mm]	2,500
Width		
– Rectifier-incoming-return line panel	[mm]	800
– Section feeder panel	[mm]	450
Depth	[mm]	800/1,000*
Maximum weight		
– Rectifier-incoming-return line panel	[kg]	550
– Section feeder panel incl. DC high-speed circuit-breaker	[kg]	400
– DC high-speed circuit-breaker incl. isolating contacts	[kg]	60/130*
Minimum height of room	[mm]	2,600
Minimum width of corridor in front of plant	[mm]	1,000/1,200*
Degree of protection acc. to IEC 60529		IP20
with optional IPX1 roof		IP21
Maximum ambient temperature	[°C]	40
Maximum installation height above sea level	[m]	2,000

\* type with rated short-circuit current 50 kA



Section feeder panel, footprint 0.45 m<sup>2</sup>

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The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. If not stated otherwise, we reserve the right to include modifications, especially regarding the stated values and dimensions.