AC SWITCHGEAR
AIR-INSULATED
27.5 kV 1S-27.5 SERIES
2x25 kV 1S-2x25 SERIES
The AC switchgears, air-insulated, indoor installation 1S-27.5 series (SWG-27.5 kV) and 1S-2x25 series (SWG-2x25 kV) are designed to distribute the electric energy alternating current 27.5 kV and 2x25 kV at AC railway traction substations.

**SWITCHGEAR PANEL TYPES**

**SWG- 27.5 kV**
- 1S-27.5-2-WW-UHL4 two-pole circuit-breaker incoming panel
- 1S-27.5-1-FKS-UHL4 single-pole feeder circuit-breaker panel
- 1S-27.5-1-ZW-UHL4 single-pole bypass circuit-breaker panel
- 1S-27.5-2-DPR-UHL4 two-pole circuit-breaker “two lines – rail” feeder panel
- 1S-27.5-2-TN-UHL4 two single-phase voltage transformers panel
- 1S-27.5-2-SR-UHL4 two-pole section disconnector panel
- 1S-27.5-1-PG-UHL4 glaze ice melting feeder circuit-breaker panel
- 1S-27.5-2-UFK-UHL4 two-pole filter and compensating unit circuit-breaker panel
- 1S-27.5-2-ZWR-UHL4 two-pole bypass circuit-breaker and section disconnector panel
- 1S-27.5-3-WW-UHL4 three-pole circuit-breaker incoming panel
- 1S-27.5-3-TN-UHL4 three single-phase voltage transformers panel
- 1S-27.5-2-TSN-UHL4 two-pole circuit-breaker auxiliary transformer panel
- 1S-27.5-3-SR-UHL4 three-pole section disconnector panel

**SWG-2x25 kV**
- 1S-2x25-2-WW-UHL4 two-pole circuit-breaker incoming panel
- 1S-2x25-2-FTS-UHL4 two-pole feeder circuit-breaker panel
- 1S-2x25-1-FTS-UHL4 single-pole feeder circuit-breaker panel
- 1S-2x25-2-ZW-UHL4 two-pole bypass circuit-breaker panel
- 1S-2x25-2-TN-UHL4 voltage transformers panel
- 1S-2x25-2-SR-UHL4 section disconnector panel
- 1S-2x25-2-UFK-UHL4 two-pole filter and compensating unit circuit-breaker panel
The basic design and functional unit of SWG is the panel containing all the necessary components of the primary and auxiliary circuits.

The panel types, quantity and mutual arrangement of the SWG’s are determined in the substation design.

The ready-to-operate SWG panels are mechanically coupled to each other and supplied together with a kit of fabricated buses and cables for quick electrical connection.

SWG panels with circuit-breakers are equipped with smart protection and control terminals of InTer type.
ADVANTAGES

OPERATIONAL SAFETY
- The integrated mechanical and electromagnetic interlocks exclude the operational personnel’s errors.
- All switching of the high-voltage panel devices is performed with the door closed.

OPERATIONAL RELIABILITY
- The contact connections in the panels need no maintenance over the entire operation life due to the using the disc springs with normalised pressure in connection points of buses and devises.

OPERATIONAL ECONOMY
- The one-sided maintenance of the panels supposes reduced room area and minimal dimensions of the substation design.
- The panels require minimum maintenance: periodical inspection, dust and dirt removal, regreasing of the friction surfaces.
- The design of the panels of galvanized steel excludes corrosion over the entire operational life.
- The operational life of the panels is at least 25 years.

CONVENIENT INSTALLATION, ADJUSTMENT AND OPERATION
- The panels may be installed on an straight floor with hard surface in permanent buildings or in special containers (modules).
- The panels design allows front access to all the necessary units and elements during assembling, adjusting and further operation.
Two-pole circuit-breaker incoming panel
1S-27.5-2-WW-UHL4

Two-pole feeder circuit-breaker panel
1S-2x25-2-FTS-UHL4

27.5 kV switchgear containers (modules) "Beregovaya" AC traction substation, North-Caucasian Railway

2x25 kV switchgear containers (modules) "Buryatskaya" AC traction substation, Trans-Baikal Railway
### Basic Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SWG-27.5 kV</th>
<th>SWG-2x25 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (linear), kV</td>
<td>27.5</td>
<td>-</td>
</tr>
<tr>
<td>Maximum operational voltage (linear), kV</td>
<td>29</td>
<td>-</td>
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<tr>
<td>Nominal voltage</td>
<td>-</td>
<td>27.5</td>
</tr>
<tr>
<td>HV part - earthed part, kV</td>
<td>-</td>
<td>29</td>
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<tr>
<td>Maximum operational voltage HV part - earthed part, kV</td>
<td>-</td>
<td>55</td>
</tr>
<tr>
<td>Nominal voltage between busbars, kV</td>
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<td>58</td>
</tr>
<tr>
<td>Maximum operational voltage between busbars, kV</td>
<td>-</td>
<td>58</td>
</tr>
<tr>
<td>Nominal current of SWG panel’s main circuits, A</td>
<td>630; 1250; 1600; 2000</td>
<td>1250</td>
</tr>
<tr>
<td>Nominal current of busbars, A</td>
<td>1600; 2000; 2500</td>
<td>1250</td>
</tr>
<tr>
<td>Nominal short-circuit breaking current, kA</td>
<td>20</td>
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<tr>
<td>Thermal withstand current (short time), kA *</td>
<td>20</td>
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<tr>
<td>Nominal electrodynamic withstand current of the main circuit, kA**</td>
<td>41</td>
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<tr>
<td>Nominal voltage of the auxiliary circuits, V</td>
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<tr>
<td>DC</td>
<td>110, 220</td>
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<tr>
<td>AC, 50 Hz</td>
<td>220</td>
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<tr>
<td>Insulation type</td>
<td>Air</td>
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<td>Maintenance conditions</td>
<td>One-side</td>
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<tr>
<td>Type of linear high-voltage connections</td>
<td>Cable, bus</td>
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<td>IP code</td>
<td>IP20</td>
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<tr>
<td>Climatic version and location category</td>
<td>UHL4 (boreal climate, from +5 to +45 degrees Celsius)</td>
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</tbody>
</table>

* Time of the thermal resistance current flow is 3 s max for main circuits, 1 s max for earthing blade.

** If there are no current transformer’s limits.

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### SWG-27.5 kV and SWG-2x25 kV Panels

<table>
<thead>
<tr>
<th>Panels</th>
<th>Dimensions (WxDxH), mm, maximum</th>
<th>Weight, kg, maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-pole panels</td>
<td>1350x1960x2450</td>
<td>1100</td>
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<tr>
<td>Two-pole panels (excluding the two-pole section disconnector panel and the two-pole bypass circuit-breaker and section disconnector panel)</td>
<td>1600x1960x2450</td>
<td>1300</td>
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<tr>
<td>Two-pole section disconnector panel</td>
<td>2400x1960x2450</td>
<td>1400</td>
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<tr>
<td>Two-pole bypass circuit-breaker and section disconnector panel</td>
<td>4000x1960x2450</td>
<td>2600</td>
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<tr>
<td>Three-pole panels (excluding the three-pole section disconnector panel)</td>
<td>1600x1960x2450</td>
<td>1400</td>
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<tr>
<td>Three-pole section disconnector panel</td>
<td>2400x1960x2450</td>
<td>1450</td>
</tr>
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TYPICAL DIAGRAMS SWG-27.5 kV

Two-pole circuit-breaker auxiliary transformer panel 15-27.5-2-TWN-UHL4
Two-pole circuit-breaker "two lines -aul" feeder panel 15-27.5-2-BPR-UHL4
Two-pole circuit-breaker incoming panel 15-27.5-2-WWN-UHL4

Single-pole feeder circuit-breaker panel 15-27.5-1-FES-UHL4
The single-bond backup switch cell 15-27.5-1-ZWB-UHL4
Glaze ice melting feeder circuit-breaker panel 15-27.5-1-FPG-UHL4

Two single-phase voltage transformers panel The cell of two single-phase voltage transformers 15-27.5-2-TTN-UHL4

Two-pole section disconnector panel 15-27.5-2-SR-UHL4
Two-pole filter and compensating unit circuit-breaker panel 1C-27.5-2-URK-UHL4

To the filter unit

TYPICAL DIAGRAMS SWG-2x25 kV

Three-pole circuit-breaker incoming panel 15-27.5-3-WWN-UHL4

Three single-phase voltage transformers panel 15-27.5-3-TTN-UHL4

Two-pole bypass circuit-breaker and section disconnector panel 15-27.5-2-ZWB-UHL4

Three-pole section disconnector panel 15-27.5-3-SR-UHL4

To the filter unit

Two-pole circuit-breaker incoming panel 15-2x25-2-TWN-UHL4
Two-pole feeder circuit-breaker panel 15-2x25-2-FTS-UHL4
Two-pole bypass circuit-breaker panel 15-2x25-2-ZWB-UHL4

Two-pole filter and compensating unit circuit-breaker panel 15-2x25-2-FTS-UHL4

Voltage transformers panel 15-2x25-2-TTN-UHL4

Section disconnector panel 15-2x25-2-SR-UHL4

Single-pole feeder circuit-breaker panel 15-2x25-1-TTS-UHL4