Product Brochure

Generator Circuit-Breakers
HVR-63XS
HVR-63S
Technical Data

Generator circuit-breaker type

<table>
<thead>
<tr>
<th></th>
<th>HVR-63XS</th>
<th>HVR-63S</th>
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<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated maximum voltage kV</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Rated frequency Hz</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Rated continuous current A rms</td>
<td>up to 6300</td>
<td>up to 8000</td>
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Rated insulation level

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<tbody>
<tr>
<td>Rated power frequency withstand voltage to earth and across circuit-breaker/switch contacts kV rms</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage to earth and across circuit-breaker/switch contacts kV peak</td>
<td>125</td>
<td>125</td>
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Circuit-breaker

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<tbody>
<tr>
<td>Rated peak withstand current kA peak</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>Rated short-time withstand current kA, 3s</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Rated short-circuit making current kA peak</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>Rated short-circuit breaking current kA rms</td>
<td>63 1)</td>
<td>63 1)</td>
</tr>
<tr>
<td>Rated operating sequence</td>
<td>CO - 30min - CO</td>
<td></td>
</tr>
<tr>
<td>Rated interrupting time ms</td>
<td>47</td>
<td>47</td>
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</table>

1) Provided that surge capacitors of 130 nF on the transformer side are installed.

The above data are not limiting values. Additional data on request. We reserve the right to alter data and technical details without notice.

Single-line diagram

1 Generator circuit-breaker
2 Capacitor 130 nF

Terminal configurations

The terminal configurations as shown in adjacent Figure, can be selected:
With horizontal and vertical operating mechanism Var. U, S, Z and C.
The new circuit-breaker HVR-63
Open design and small footprint offers maximum flexibility

The HVR-63 generator circuit-breaker (GCB) is the latest generation of ABB’s well-proven HGI generator circuit-breaker series and it is best suited for retrofit in power plants with a unit power of up to 180 MW. The open design and small footprint make it perfect for systems with open busbar and short-circuit ratings up to 63 kA. Our innovative built-in direct contact ablation display offers the highest degree of safety and reliability for power plants with frequent switching operations such as pumped storage power plants. The HVR generator circuit-breaker is available as HVR-63XS with rated continuous currents up to 6300 A or as HVR-63S with rated continuous currents up to 8000 A. Both variants offer flexible busbar connection. With this new HVR-63 GCB, ABB continues to lead the way in designing the most advanced GCBs.

Hydraulic spring operating mechanism
Advanced operating system delivers stability and dependability

The hydraulic spring operating mechanism combines the advantages of a hydraulic operating mechanism with those of spring energy storage system.

Energy storage is accomplished with the aid of a disk spring assembly, with the advantages of stability, reliability and resistance to temperature variability.

Tripping of the operating mechanism and energy output are based on proven design elements of the hydraulic operating technique, such as control valves and hydraulic cylinders.

The operating mechanism is based on the differential piston principle. For the closing operation the piston head side is isolated from the low pressure and simultaneously connected to the high pressure oil volume. As long as the pressure is maintained, the piston remains in the “closed” position. A pressure controlled mechanical interlock prevents movement of the piston to the “open” position in case of a pressure drop.

For the opening operation, the piston head side is isolated from the high pressure and simultaneously connected to the low pressure oil volume.

The charging state of the spring disk assembly is controlled by switching elements, actuating the pump motor to immediately maintain the oil pressure.

A non-return valve between pump and high-pressure oil volume prevents pressure loss in the event of a pump outage. The hydraulic system is hermetically sealed against atmosphere. The mechanically operated position indicator provides reliable indication of the circuit-breaker position. The drive operates all three circuit-breaker poles simultaneously by mechanical linkages, thus keeping the switching time difference between the poles to a minimum.

Hydro-mechanical spring operating mechanism type HMB-1.1

1. Breaker operating rod
2. Energy storage device

High pressure
Low pressure
The current carrying contacts (main contacts) are separated from the arcing contacts in order to ensure high current carrying capability in conjunction with low contact ablation. The main contact system consists of a moving part sliding inside a fixed concentric one. The arcing contacts are of “head-to-head” type. This solution provides a low contact resistance of the current carrying path and leads to a reduction of the energy required for contact commutation. Another advantage of the “head to head” solution is the very low stress on the contacts during operations which delivers a high level of safety and significant reduction of the energy required for the operating mechanism providing a more compact solution. The “head-to-head” arcing contact system also enables an innovative and highly reliable built-in mechanical solution for a direct measurement of contact ablation. A visual indication of the remaining lifetime of the arcing contact system is provided by the ablation indicator, which is directly connected to the upper arcing contact aiding you for the timely planning of maintenance.

**Schematic description:**
Mode of operation of the interrupting chamber of the type HVR-63 circuit-breaker

**a** Circuit-breaker in the “OPEN” position; the spring is uncharged and the contacts are open

**b** Circuit-breaker in the “CLOSED” position; the spring is charged and the contacts are closed. Ablation indicator shows full contact length.

**c** Circuit-breaker in the “CLOSED” position; the spring is charged and the contacts are closed. Ablation indicator shows reduced contact length.

$$\Delta s = \text{the ablation of the upper and lower arcing contacts}$$

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<tbody>
<tr>
<td>1</td>
<td>Ablation indicator</td>
</tr>
<tr>
<td>2</td>
<td>Spring</td>
</tr>
<tr>
<td>3</td>
<td>Upper arcing contact</td>
</tr>
<tr>
<td>4</td>
<td>Fixed main contacts</td>
</tr>
<tr>
<td>5</td>
<td>Moving main contact</td>
</tr>
<tr>
<td>6</td>
<td>Lower arcing contact</td>
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Flexible Connection Kit

Flexible connections provide a detachable (bolted) connection between the generator circuit-breaker live part and the conductor of the adjacent phase bus.

The flexible connections are designed to:

A) Carry the rated continuous current and the rated short-time withstand current without exceeding the maximum permissible temperatures.

B) Ensure that the dielectric strength requirements are met.

C) Compensate expansion and contraction of the conductor due to temperature changes.

D) Offset vibrations and withstand the stress caused during switching operations.

E) Endure the mechanical stress resulting from electro-dynamic forces in case of short-circuit current.

F) Provide a low resistance, safe and stable electrical connection.

ABB recommended type and arrangement of flexible copper straps responds to these requirements as follows:

A), B) & E) Fully type tested together with the Generator Circuit-Breaker to prove that the stringent requirements imposed by the relevant IEC and IEEE Standards with regard to dielectric strength, hottest spot temperature and mechanical stress are fully met.

The special shape easily adapts to different distances between terminals ensuring that dielectric strength requirements are always met.

C), D) & E) Flexible type employing laminates with pressure-welded contact ends designed and tested for high mechanical stress.

F) Silver plated contact ends with high requirements on contact surface evenness and material properties.

1 Flexible copper straps
2 Fastening and securing bolts & nuts
3 Terminal with silvered contact surfaces for welded connection to the conductor of the IPB or busbar
N = Phase distance: 500 or 800mm - other values for N are not available. Busbars need to be adjusted accordingly.

S1 = min. 360mm for BIL 110kV, min. 385mm for BIL 125kV (clearance to any object)

S2 = min. 190mm for BIL 110kV, min. 215mm for BIL 125kV (clearance to any object)

*) min. space required for operation and maintenance
N = Phase distance: 500 or 800mm - other values for N are not available. Busbars need to be adjusted accordingly.

S1 = min. 360mm for BIL 110kV; min. 385mm for BIL 125kV (clearance to any object)

S2 = min. 190mm for BIL 110kV; min. 215mm for BIL 125kV (clearance to any object)