ESTRA-MBS-ANSI

High-speed circuit breaker panels
Heavy Duty (IEEE/ANSI standards)
GENERAL INFORMATION

With a complete range of equipment and a leading expertise in DC traction power substations, Sécheron SA is a world leader and major partner for electrification of DC traction networks.

Covering all activities from calculation, network design and engineering, up to the production of the DC Systems, Sécheron SA can offer customers and partners tailor made solutions based on a modular concept and standard products.

Our equipment is developed on world leading technology and proven worldwide design and acceptance. In-house technology covers all key devices applied in the DC Systems (Rectifiers, DC HSCB, Disconnect Switches, Protection Relays, Measuring Amplifiers, etc.).

MAIN BENEFITS

- Heavy Duty performances.
- Limited maintenance with easy access to all parts.
- Very compact with minimum depth.
- Possibility to install cubicles directly against a wall.
- Front access to all equipment.
- Extended modular line-up.
HSCB DC SWITCHGEAR: DESCRIPTION

DC traction networks require safe power distribution and reliable control systems.

The MBS breaker panel is based on Sécheron traction DC protection experience and proven technology components are applied for all major functions in this cubicle.

The DC switchgear serves as the control and protection equipment for the DC power distribution.

The DC breaker panel type MBS is a modular concept cubicle which integrates different functions and equipment in three compartments:
– Rear high-voltage busbar compartment
– Protection and control system
– High-speed circuit breaker trolley

/// REAR HIGH-VOLTAGE BUSBAR COMPARTMENT

The high-voltage compartment is at the rear of the cubicle. It contains the main busbar, cable connections, voltage and current measuring and, where applicable, disconnector switches.

/// PROTECTION AND CONTROL SYSTEM

The protection and control system is located at the front of the cubicle. This low-voltage compartment contains low-voltage components and ensures the protection through the SEPCOS, protection and control relay.

/// HIGH-SPEED CIRCUIT BREAKER TROLLEY

The high-speed circuit breaker (Sécheron UR series) is mounted on a removable four-wheeled trolley which can be easily withdrawn from the cubicle. The trolley also contains the load measurement system. The HSCB is connected to the auxiliary circuits thanks to an unpluggable multiple connector and the breaker is connected to the high-voltage busbars by power finger connectors. All trolleys are exchangeable by one of the same type and are easy to manoeuvre.

The withdrawable high-speed circuit breaker trolley has four positions:
– Service position
– Test position
– Disconnected position
– Removed position

When the trolley is in service position, the front high-voltage door is locked and it is not possible to access the trolley. When high-voltage is applied to the breaker, it must be open before the trolley can be moved from service to test position.

The trolley is moved from one position to another either manually by an external handle or electrically via the SEPCOS touch screen display. In this way, user's security is ensured. Trolleys can be encoded to ensure that they cannot be exchanged for a trolley of another type.

Active equipment is located on the trolley.

The motorized trolley is an available option that allows the trolley to be disconnected remotely, thus replacing the line isolating disconnecting switch. Motor is embedded on the trolley.
HSCB DC SWITCHGEAR: CHARACTERISTICS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Unit</th>
<th>MBS 24&quot;</th>
<th>MBS 20&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated service current</td>
<td>$I_{Ne}$ [A]</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>$U_{Ne}$ [VDC]</td>
<td></td>
<td>800/1600</td>
</tr>
<tr>
<td>Circuit breaker type</td>
<td>-</td>
<td>-</td>
<td>UR26</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>- [kV]</td>
<td>5.5/9.2</td>
<td></td>
</tr>
<tr>
<td>Main busbar</td>
<td>$I_b$ [kA]</td>
<td>Up to 11</td>
<td></td>
</tr>
<tr>
<td>Busbar rating - Connection</td>
<td>- [A]</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>Rated short-circuit current</td>
<td>$I_{Nss}$/$I_{Nss}$ [kA]</td>
<td>120/200</td>
<td>60/100</td>
</tr>
<tr>
<td>Protection degree</td>
<td>-</td>
<td>IP20 or IP42</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>$T$ [°C]</td>
<td>-5 to +40</td>
<td></td>
</tr>
<tr>
<td>Typical weight</td>
<td>- [kg]</td>
<td>500</td>
<td>550</td>
</tr>
<tr>
<td>Dimensions (W x D x H)</td>
<td>- [mm]</td>
<td>500 or 600* x 1600 x 2400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- [in]</td>
<td>19.75 or 23.5* x 63 x 94.5</td>
<td></td>
</tr>
</tbody>
</table>

* UR80 fits only in 600 mm / 23.5" MBS.


HSCB DC SWITCHGEAR: COMPOSITION

Key components of the switchgear are designed and manufactured by Sécheron and are fully compatible.

SEPCOS Control and protection relay
VM10 / VM12 Voltage measuring amplifier
MIU10 Current measuring amplifier
Optional: SWS Disconnector

SEPCOS Display Touch screen interface
UR26 to UR80 High-Speed Circuit Breaker
Installation of lightning arrester for outgoing feeder is available upon request.

**HSCB DC SWITCHGEAR: APPLICATIONS**

- Line feeder
- Line feeder with isolating switch
- Line feeder with earthing switch
- Rectifier breaker
- Line feeder with by-pass
- Line feeder with by-pass and isolating switch

**HSCB DC SWITCHGEAR: MAIN DIMENSIONS**

- Low-voltage compartment (control and protection circuits)
- DC circuit breaker
- HSCB connector (harting)
- Withdrawable breaker trolley
- HSCB control
- Optional: Load measurement system
- Optional: Motor
- Optional: By-pass busbar
- Optional: Disconnecting switch
- VM10 / VM12 Voltage measuring isolator
- MIU10 Current measuring isolator
- Output cables
- Shunt (current)
- Main plugs (power circuit)
- Main busbar
- High-voltage compartment

<table>
<thead>
<tr>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.75 or 23.5</td>
</tr>
<tr>
<td>86.5</td>
</tr>
<tr>
<td>64.25</td>
</tr>
</tbody>
</table>
DISCONNECTING DC SWITCHGEAR

Disconnector cubicles are applied for incoming DS, negative DS or coupling DS.

The system contains two compartments:
- High-voltage compartment
- Low-voltage compartment

Each compartment has a separate front door and can be mounted against the wall. Cable connection is possible from the bottom or top. Disconnectors are rated 2000 A, 4000 A, 6300 A and 8000 A.

/// INCOMING DS CUBICLE

Incoming DS cubicles isolate the positive high-voltage output transformer/rectifier group from the feeder DC distribution bus. Disconnectors may have single or double poles. Double poles are used to disconnect the positive and the negative pole simultaneously. Operation may be motorized or manual. There are four different sizes: 19.75 in, 31.5 in, 47.25 in or 63 in. Incoming DS cubicles may contain up to 4 disconnectors.

/// NEGATIVE DS CUBICLE

Negative DS cubicles isolate the negative pole of the rectifier groups from the return current of the network (rail). Operation may be motorized or manual. There are four different sizes: 19.75 in, 31.5 in, 47.25 in or 63 in. Negative DS cubicles may contain up to 4 disconnectors.

/// COUPLING DS CUBICLE

Coupling DS cubicles subdivide the DC switchboard into separate busbar sections. Operation may be motorized or manual, size is 19.75 in.

Below are the different configurations according to the cubicle dimensions and types:

<table>
<thead>
<tr>
<th>Incoming DS cubicle</th>
<th>Negative DS cubicle</th>
<th>Coupling DS cubicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>800 A - 1 pole</td>
<td>800 A - 1 pole</td>
<td>800 A - 1 pole</td>
</tr>
<tr>
<td>4000 A - 1 pole</td>
<td>4000 A - 1 pole</td>
<td>4000 A - 1 pole</td>
</tr>
<tr>
<td>6000 A - 1 pole</td>
<td>6000 A - 1 pole</td>
<td>6000 A - 1 pole</td>
</tr>
<tr>
<td>4000 A - 2 poles</td>
<td>4000 A - 2 poles</td>
<td>4000 A - 2 poles</td>
</tr>
<tr>
<td>6000 A - 2 poles</td>
<td>6000 A - 2 poles</td>
<td>6000 A - 2 poles</td>
</tr>
</tbody>
</table>

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2 2 2 1 1 2 2 2 1 1 1 2 2 2 1 1
4 4 4 2 2 4 4 4 2 2 2 4 4 4 2 2
SEPCOS is a protection and control unit that is applied to the outgoing feeder or the incoming HSCB cubicles in the DC traction substation.

### MAIN FEATURES
- Modular PLC concept, PLC programming, IEC 61131 normalized programming.
- Fully approved in railway substation environment IEC 60255-22.
- High noise immunity thanks to sampling rate at 40 microseconds and 16 bits A-D converter.

### PROTECTION FUNCTIONS
- All typical protection functions (e.g. DDL +/-, Imax +/-, etc.).

### CONTROL FUNCTIONS
- HSCB ON/OFF control with electric or magnetic holding.
- Intertripping, automatic reclosing, anti-pumping, load measurement.
- External synchronization of the PLC, measurement supervisor control.

### OPEN TO ALL CUSTOMER NETWORKS AND PROTOCOLS
- TCP/IP: Modbus-TCP.
- Specific TCP/IP based power distribution protocols: IEC 60870-5-104, IEC 61850, DNP 3.0.
- Fieldbus: Modbus-RTU, Profibus-DP.

1. SEPCOS may be controlled and parametrized through a user-friendly 7” color touch screen Display located on the front door of the cubicle.
2. All functions are available through a web-server (S-Web), including visualization of trends.

### STANDARDS
According to IEEE Std. C37.20.1-2015 and IEC 60980 (Seismic tests). Approved type test reports available.

### MAIN FEATURES

<table>
<thead>
<tr>
<th>Main features</th>
<th>MBS 20&quot;</th>
<th>MBS 24&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>800 VDC</td>
<td>1600 VDC</td>
</tr>
<tr>
<td>Rated service current</td>
<td>6000 A</td>
<td>6000 A</td>
</tr>
<tr>
<td>Rated making &amp; breaking capacity</td>
<td>120/200 kA</td>
<td>60/100 kA</td>
</tr>
<tr>
<td>Duty classes</td>
<td>a, b, c, d</td>
<td>a, b, c, d</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP42</td>
<td>IP42</td>
</tr>
</tbody>
</table>

### INTERNAL ARC TEST

<table>
<thead>
<tr>
<th>Main features</th>
<th>MBS 20&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>900 VDC</td>
</tr>
<tr>
<td>Rated insulation voltage</td>
<td>1800 V</td>
</tr>
<tr>
<td>Prospective current under arcing conditions</td>
<td>50/71 kA</td>
</tr>
<tr>
<td>Permissible arc duration</td>
<td>250 ms</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP42</td>
</tr>
</tbody>
</table>

SEPCOS is a protection and control unit that is applied to the outgoing feeder or the incoming HSCB cubicles in the DC traction substation.
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