Type 8BK20 Switchgear up to 24 kV with Withdrawable Circuit-Breakers
Type 8BK20 Switchgear up to 24 kV with Withdrawable Circuit-Breakers

Air-Insulated, Metal-Enclosed, Metal-Clad Single/Duplicate Busbar

Medium-Voltage Switchgear
Catalog HA 25.21 · 1999

Supersedes: Catalog HA 25.21 - 1995

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Type 8BK20
Switchgear up to 24 kV
with Withdrawable
Circuit-Breakers

Application

8BK20 switchgear with withdrawable circuit-breakers for indoor installation is suitable for:

- Rated voltages
  from 7.2 kV to 24 kV
- Rated short-circuit breaking currents
  from 31.5 kA to 50 kA
- Rated busbar normal currents
  up to 4000 A
- Rated feeder normal currents
  up to 4000 A

Typical uses

- Power stations, transformer stations and switching substations of public utilities
- Cement industry
- Automotive industry
- Iron and steelworks
- Rolling mills
- Mines
- Food and fiber industry
- Chemical industry
- Mineral oil industry
- Pipelines
- Offshore installations
- Petrochemicals
- Railway power supplies
- Shipbuilding
- Diesel power stations
- Emergency power supplies

Features

Personnel safety

Switching operations with door closed
Personnel safety is increased by:

- Opening and closing of the switching device
  - In the disconnected or connected position
  - Mechanically or electrically
  - With the door closed
- Isolation by moving the withdrawable part, manually or motorized, with the door closed
- Verification of safe isolation from supply. According to VDE 0105, Part 1, there are three alternative methods:
  - Closing of a make-proof earthing switch with the door closed
  - Pole-by-pole testing with a capacitive voltage detector with the door closed
  - Testing with conventional voltage testers to VDE 0681, Part 4, but with the door open
- Opening and closing of the make-proof earthing switch with the door closed
- On the feeder and on the busbar: manually

Interlocking of door/withdrawable part
The door is incorporated in the interlocking concept as follows:

- Opening is possible only when the withdrawable part is locked in the disconnected position.
- The withdrawable part can be moved from the disconnected to the service position only when the door is closed.
Personnel safety

Protection against electric shock and ingress of solid foreign bodies

8BK20 switchgear provides both external and internal protection.
- External protection is provided by
  - Complete enclosure of the panels in all operating states
- Internal protection is provided by
  - Internal metal compartmentalization with enforced-operation shutters; optional arc-resistant version of the busbar compartment
  - The inter-cubicle partitions; optional arc-resistant version
- Degree of protection
  Standard version IP4X/IP3XD. Higher degrees of protection, such as IP31D, IP50 and IP51, can be obtained by additional measures.

Arc-tested sheet-steel enclosure or compartmentalization

8BK20 switchgear has been tested in accordance with the relevant standards for resistance to accidental arcing to ensure:
- External protection (personnel safety)
- Optional resistance to internal arcing (exceeding the scope of the standards), i.e. the effects of an arc are limited as follows:
  - Pressure-proof in relation to neighboring panels
  - Pressure-proof from the withdrawable part or the connection compartment to the busbar compartment (applicable to rated currents up to 2500 A only)
  - Pressure-proof from the busbar compartment to the withdrawable part or connection compartment (applicable to rated currents up to 2500 A only)
- Pressure switch
  - Limits arc duration to a maximum of 100 ms
  - Minimizes the damage and effects of an arc
  - Recommended use with grading times >0.5 s
  - A function check of the pressure switch is possible without interrupting operation
  - Triggers the feeder circuit-breaker if the pressure switch responds

Equipment reliability

Switchgear interlocking

All interlocks are mechanical with preventive, key-operated access shutters, i.e.:
- Operating levers can only be inserted when the interlocking conditions are fulfilled
- This prevents impermissible overstraining of the interlocking mechanisms

Electric strength

Adequate electric strength of 8BK20 switchgear is assured by:
- Sufficiently large air gaps between phases and to earth
- Suitable electrode form
These design features allow all conductor insulation to be dispensed with entirely.

Highest level of independence of climate and environment

This is provided by:
- Ribbed insulators in cast resin, with high resistance to pollution
- Total enclosure under all operating conditions

Maintenance

Minimum maintenance effort is assured by:
- Total enclosure under all operating conditions
- Use of proven, maintenance-free vacuum switching devices

Availability

Easy procurement of parts for extensions and repairs through the use of:
- Standard insulators
- Standard instrument transformers
- Standard vacuum switching devices
- Standard copper sections
- Detachable low-voltage compartment up to 15 kV with plug-in connection technology
Moving a withdrawable part inside a panel
Little effort is required by hand or motor to move a withdrawable part inside a panel with the aid of:
- A spindle mechanism
- Ball-bearing rollers

Moving a withdrawable part outside a panel
A withdrawable part is light and easy to move outside a panel:
- With a central service truck (see also adjacent figures)
- By one man
- Without tools
- Regardless of floor surface

Sequence for moving the withdrawable part
- Move the withdrawable part into the disconnected position
- Open the door
- Unplug the low-voltage connector
- Unlock the withdrawable part (intentional removal of the withdrawable part is prevented by an additional interlock)
- Bring up the central service truck and lock it onto the panel (additional interlock is then overridden)
- Pull out the withdrawable part onto the truck as far as it will go (it cannot fall)
- Detach the central service truck and the withdrawable part from the panel

Remote control
Electric remote control, e.g. from a central control room, can be provided for the following functions:
- Moving a motorized withdrawable part into the disconnected or connected position
- Opening and closing of the switching device
Local manual operation is always ensured.

Central service truck for moving the withdrawable part
- Withdrawable part can be lowered to the floor
- Collapsible for space-saving storage
- Withdrawable part locks automatically onto the trunk
- Lifting arms can be cranked up to maximum heights
  - 1200 mm for 7.2/12/15 kV installations
  - 1430 mm for 17.5/24 kV installations
- Large, swiveling wheels
- Suitable for all withdrawable parts

Verification of safe isolation from supply
With a voltage detector conforming to the LRM system (Low Resistance Modified) to E VDE 0682 Part 415:
- Pole-by-pole verification of safe isolation from supply
- Detector suitable for continuous operation
- Safe to touch
- Routine-tested
- Measuring system and voltage detector can be tested
- Voltage detector flashes when high voltage is applied

Interlocking conditions
The following operations can be carried out as soon as the following standard interlocking conditions have been met:
- Moving the withdrawable part from the disconnected to the connected position:
  - Low-voltage connector plugged in
- High-voltage door closed ¹)
- Circuit-breaker in the OPEN position
- Make-proof earthing switch in the OPEN position
- Moving the withdrawable part from the connected to the disconnected position:
  - Circuit-breaker in the OPEN position
- Operating the circuit-breaker: withdrawable part in the interlocked end position
- Operating the make-proof earthing switch:
  - Withdrawable part in the interlocked disconnected position ¹)
- Opening the high-voltage door:
  - Withdrawable part in the interlocked disconnected position ¹)

¹) Additional interlocks that exceed the scope of VDE 0670 Part 6 or IEC 60 298.
## Technical Data

### Withdrawable vacuum circuit-breaker panel

<table>
<thead>
<tr>
<th>Rated voltage kV</th>
<th>7.2</th>
<th>12</th>
<th>15</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Rated short-time power-frequency withstand voltage kV</td>
<td>20</td>
<td>28</td>
<td>36</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage kV</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated short-time withstand current max. kA 1 s</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>3 s</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### Disconnector-link panel

<table>
<thead>
<tr>
<th>Rated voltage kV</th>
<th>7.2</th>
<th>12</th>
<th>15</th>
<th>17.5</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Width mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Rated short-time power-frequency withstand voltage kV</td>
<td>20</td>
<td>28</td>
<td>36</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage kV</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated short-time withstand current max. kA 1 s</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>3 s</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### Sectionalizer panel

<table>
<thead>
<tr>
<th>Rated voltage kV</th>
<th>7.2</th>
<th>12</th>
<th>15</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Rated short-time power-frequency withstand voltage kV</td>
<td>20</td>
<td>28</td>
<td>36</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage kV</td>
<td>60</td>
<td>75</td>
<td>95</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated short-time withstand current max. kA 1 s</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>3 s</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### Earthing transformer panel

<table>
<thead>
<tr>
<th>Rated voltage kV</th>
<th>7.2</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width mm</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>Rated short-time power-frequency withstand voltage kV</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage kV</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>Rated short-time withstand current max. kA 1 s</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>3 s</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Rated short-circuit making current/ rated peak withstand current max. kA</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Rated normal current of busbars max. A</td>
<td>4000</td>
<td>4000</td>
</tr>
</tbody>
</table>

1) Please inquire about 17.5 kV with corresponding insulating capacity. 2) When used without HV HRC fuses.
Room planning

Pay attention to the information in the adjacent figures and tables for details of planning the switchgear room.

Legend

1. 8BK20 switchgear
2. Panel subdivision
3. Switchgear termination
4. Front operating aisle
5. Distance from wall
6. Building wall

**Dimensions**

**Panel dimensions**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>kV</th>
<th>7.2</th>
<th>12</th>
<th>15 1)</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width Standard</td>
<td>mm</td>
<td>2050</td>
<td>2050</td>
<td>2550</td>
<td>2750</td>
<td>2550</td>
</tr>
<tr>
<td>Height Standard</td>
<td>mm</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
</tr>
<tr>
<td>With additionally mounted low-voltage compartment</td>
<td>mm</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
</tr>
<tr>
<td>With de-flecting plates fitted to comply with criteria 1 to 6, for arc fault duration of 1s</td>
<td>mm</td>
<td>2050</td>
<td>2050</td>
<td>2050</td>
<td>2050</td>
<td>2050</td>
</tr>
<tr>
<td>With cable connection to the busbars</td>
<td>mm</td>
<td>2550</td>
<td>2550</td>
<td>2550</td>
<td>2550</td>
<td>2550</td>
</tr>
</tbody>
</table>

**Installation details**

**Legend**

1. 8BK20 switchgear
2. Panel subdivision
3. Switchgear termination
4. Front operating aisle
5. Distance from wall
6. Building wall

**Useable internal dimensions of the low-voltage compartment**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>kV</th>
<th>7.2</th>
<th>12</th>
<th>15 1)</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width Standard</td>
<td>mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Height Standard</td>
<td>mm</td>
<td>680</td>
<td>680</td>
<td>680</td>
<td>680</td>
<td>680</td>
</tr>
<tr>
<td>Depth Standard</td>
<td>mm</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Additional top box</td>
<td>mm</td>
<td>680</td>
<td>680</td>
<td>680</td>
<td>680</td>
<td>680</td>
</tr>
<tr>
<td>Height Additional top box</td>
<td>mm</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td>Depth Additional top box</td>
<td>mm</td>
<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
</tr>
</tbody>
</table>

**Useable internal height for high-voltage cables**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>kV</th>
<th>7.2</th>
<th>12</th>
<th>15 1)</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width Standard</td>
<td>mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Height Standard</td>
<td>mm</td>
<td>425</td>
<td>425</td>
<td>425</td>
<td>425</td>
<td>425</td>
</tr>
<tr>
<td>Connection at front</td>
<td>approx. mm</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>Connection at rear</td>
<td>approx. mm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>850</td>
<td>850</td>
</tr>
</tbody>
</table>

1) Please inquire about 17.5 kV with corresponding insulating capacity.
2) See also section entitled “Panel connection”, page 19.
3) Depth of 3960 mm for rated short-circuit breaking current of 50 kA.
Installation details

Room dimensions (min. room height 2800 mm 1)
(see also adjacent tables)

Single-row arrangement (plan view)
for single busbar installations

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1300</td>
<td>1850</td>
<td>50</td>
</tr>
</tbody>
</table>

Rear

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>1300</td>
<td>1775</td>
<td>500</td>
</tr>
</tbody>
</table>

Rated voltage 7.2/12/15 kV

Front

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1300</td>
<td>1850</td>
<td>50</td>
</tr>
</tbody>
</table>

To rear

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>1300</td>
<td>1775</td>
<td>500</td>
</tr>
</tbody>
</table>

Upwards

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2025</td>
<td>50</td>
</tr>
</tbody>
</table>

F Rated voltage 17.5/24 kV

Front

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100</td>
<td>1650</td>
<td>2025</td>
<td>150</td>
</tr>
</tbody>
</table>

To rear

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2025</td>
<td>150</td>
</tr>
</tbody>
</table>

Upwards

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2150</td>
<td>500</td>
</tr>
</tbody>
</table>

Back-to-back arrangement

<table>
<thead>
<tr>
<th>a</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>2150</td>
</tr>
</tbody>
</table>

Rated voltage 7.2/12/15 kV

Front

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2150</td>
<td>500</td>
</tr>
</tbody>
</table>

To rear

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2150</td>
<td>500</td>
</tr>
</tbody>
</table>

Upwards

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>1600</td>
<td>2150</td>
<td>500</td>
</tr>
</tbody>
</table>

Rated voltage 17.5/24 kV

Front

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>2025</td>
<td>2025</td>
<td>150</td>
</tr>
</tbody>
</table>

Rear

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400</td>
<td>2025</td>
<td>2025</td>
<td>150</td>
</tr>
</tbody>
</table>

Floor loading

Single busbar or duplicate busbar panels in face-to-face arrangement

<table>
<thead>
<tr>
<th>Weight of each single panel</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>700 to 1200 kg</td>
<td>1400 to 2000 kg</td>
</tr>
</tbody>
</table>

Rated voltage 7.2/12/15 kV

700 to 1200 kg

800 to 1000 kg

1600 to 2000 kg

Fixing

The switchgear can be fixed by:

- Bolting to the foundation rails
- Welding to the foundation rails

Foundation rail position

The position of the foundation rails is fixed by fixing points in the base frame of the panels. Please inquire for further details.

4) For switchgear with a rated short-circuit breaking current of 50 kA at 7.2/12/15 kV only connection at front and with rear pressure relief duct is feasible.

The rear distance from wall must be at least 500 mm.

Termination walls at the sides for this distance from wall must be provided on site.

1) Please inquire if rooms are low.
2) Please inquire about 8BK20 systems up to 15 kV with a rated short-circuit breaking current of 50 kA.
3) A 1200 mm wide operating aisle is needed to move the withdrawable part.

Back-to-back arrangement (plan view)
for duplicate busbar installations

Face-to-face arrangement (plan view)
for single and duplicate busbar installations
## Technical Data

### Shipping details

#### Transport units

The following factors should be taken into account when deciding on the size of transport units to be employed:

- Transport facilities on site
- Transport dimensions and weights
- Size of building doorways

#### Packing

<table>
<thead>
<tr>
<th>Destination</th>
<th>Transport by</th>
<th>Type of packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany/Europe</td>
<td>Road and rail</td>
<td>Panels on pallets and open packing with polyethylene sheets covering the panels</td>
</tr>
<tr>
<td>Overseas</td>
<td>Ship</td>
<td>Panels on pallets in sealed crates with upper and lower polyethylene sheets, welded together, with desiccant bags and sealed wooded floor; max. storage: 6 months</td>
</tr>
</tbody>
</table>

#### Transport dimensions and weights

<table>
<thead>
<tr>
<th>Destination</th>
<th>Rated voltage</th>
<th>Number of panels per transport unit</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany and Europe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Connection at front, without rear-mounted pressure relief duct**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 panel</td>
<td>Width m: 1.06, Depth m: 1.90, Height m: 2.25</td>
<td>4.53</td>
</tr>
<tr>
<td></td>
<td>2 panels</td>
<td></td>
<td>8.12</td>
</tr>
<tr>
<td></td>
<td>3 panels</td>
<td></td>
<td>11.37</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 panel</td>
<td>Width m: 1.26, Depth m: 2.27, Height m: 2.45</td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>2 panels</td>
<td></td>
<td>12.63</td>
</tr>
<tr>
<td></td>
<td>3 panels</td>
<td></td>
<td>18.13</td>
</tr>
</tbody>
</table>

**Connection at front or rear, with rear-mounted pressure relief duct**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 panel</td>
<td>Width m: 1.06, Depth m: 2.08, Height m: 2.25</td>
<td>4.96</td>
</tr>
<tr>
<td></td>
<td>2 panels</td>
<td></td>
<td>8.90</td>
</tr>
<tr>
<td></td>
<td>3 panels</td>
<td></td>
<td>12.48</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 panel</td>
<td>Width m: 1.26, Depth m: 2.44, Height m: 2.45</td>
<td>7.53</td>
</tr>
<tr>
<td></td>
<td>2 panels</td>
<td></td>
<td>13.57</td>
</tr>
<tr>
<td></td>
<td>3 panels</td>
<td></td>
<td>19.50</td>
</tr>
</tbody>
</table>

**Back-to-back arrangement 1)**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 double panel</td>
<td>Width m: 1.06, Depth m: 4.00, Height m: 2.30</td>
<td>9.75</td>
</tr>
<tr>
<td>2 double panels</td>
<td></td>
<td></td>
<td>17.48</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 double panel</td>
<td>Width m: 1.26, Depth m: 4.70, Height m: 2.55</td>
<td>15.10</td>
</tr>
<tr>
<td>2 double panels</td>
<td></td>
<td></td>
<td>27.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Destination</th>
<th>Rated voltage</th>
<th>Number of panels per transport unit</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overseas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Connection at front, without rear-mounted pressure relief duct**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 panel</td>
<td>Width m: 1.06, Depth m: 1.90, Height m: 2.41</td>
<td>4.85</td>
</tr>
<tr>
<td>2 panels</td>
<td></td>
<td></td>
<td>8.65</td>
</tr>
<tr>
<td>3 panels</td>
<td></td>
<td></td>
<td>12.15</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 panel</td>
<td>Width m: 1.26, Depth m: 2.27, Height m: 2.61</td>
<td>7.65</td>
</tr>
<tr>
<td>2 panels</td>
<td></td>
<td></td>
<td>13.44</td>
</tr>
<tr>
<td>3 panels</td>
<td></td>
<td></td>
<td>19.31</td>
</tr>
</tbody>
</table>

**Connection at front or rear, with rear-mounted pressure relief duct**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 panel</td>
<td>Width m: 1.06, Depth m: 2.08, Height m: 2.41</td>
<td>5.31</td>
</tr>
<tr>
<td>2 panels</td>
<td></td>
<td></td>
<td>9.47</td>
</tr>
<tr>
<td>3 panels</td>
<td></td>
<td></td>
<td>13.30</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 panel</td>
<td>Width m: 1.26, Depth m: 2.44, Height m: 2.61</td>
<td>8.03</td>
</tr>
<tr>
<td>2 panels</td>
<td></td>
<td></td>
<td>14.44</td>
</tr>
<tr>
<td>3 panels</td>
<td></td>
<td></td>
<td>20.74</td>
</tr>
</tbody>
</table>

**Back-to-back arrangement 1)**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Number of panels</th>
<th>Dimensions, volumes and weights</th>
<th>Gross weight approx. kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2/12/15 kV</td>
<td>1 double panel</td>
<td>Width m: 1.06, Depth m: 4.00, Height m: 2.46</td>
<td>10.43</td>
</tr>
<tr>
<td>2 double panels</td>
<td></td>
<td></td>
<td>18.70</td>
</tr>
<tr>
<td>17.5/24 kV</td>
<td>1 double panel</td>
<td>Width m: 1.26, Depth m: 4.70, Height m: 2.70</td>
<td>16.00</td>
</tr>
<tr>
<td>2 double panels</td>
<td></td>
<td></td>
<td>28.81</td>
</tr>
</tbody>
</table>

---

1) The gross weight increases by about 180 kg when there are 2 withdrawable circuit-breakers in a panel. The depth will be increased by 0.4 m for switchgear with rated short-circuit breaking current of 50 kA at 7.2/12/15 kV. The volume will change accordingly.
Single busbar panels

Withdrawable panel

1) See also page 19 for details of voltage measurement of the panel connection.
2) Details refer to conventional Siemens single-core sealing ends for XLPE cables or other makes with similar dimensions.
Type 8BK20
Switchgear up to 24 kV
with Withdrawable
Circuit-Breakers

Product Range

Single busbar panels

Sectionalizer
(Mirror-image arrangement
also possible)

Withdrawable panel
Bus riser panel,
type I

Withdrawable panel
Bus riser panel,
type II

1) See also page 19 for
details of voltage
measurement of the
panel connection.
Single busbar panels

**Metering panel, withdrawable type**

- Busbar fittings
- Withdrawable part
- Voltage transformer on busbars
- Make-proof earthing switch on busbars
- Bus riser
- Cable connection at top
- Metering section

**Busbar connection panels**

**Type I**

- Busbar fittings
- Withdrawable part
- Connection fittings
- Voltage transformer
- Make-proof earthing switch on busbars
- Current transformer
- Cable sealing ends, max. 4 x 500 mm² per phase
- Bars

**Type II**

- Busbar fittings
- Connection fittings
- Current transformer
- Voltage transformer
- Make-proof earthing switch on busbars
- Cable sealing ends, max. 12 x 500 mm² per phase
- Bars

---

**Earthing transformer panel**

- Voltage transformer on busbars
- Make-proof earthing switch on busbars
- Busbar fittings
- Connection fittings
- Current transformer
- Voltage transformer
- Cable sealing ends, max. 4 x 500 mm² per phase
- Bars
Duplicate busbar panels

8BK20 duplicate busbar switchgear is assembled from the range of single busbar panels. They can be arranged either:
- Face-to-face or
- Back-to-back

**Face-to-face arrangement**
- Panels from the single busbar product range
- The two rows are linked by cables or bars underneath the panels
- Bus coupling, comprising:
  - Withdrawable panel
  - Busbar connection panel

**Back-to-back arrangement**
- Panels from the single busbar product range
- The two rows are linked by bars inside the panels
- Bus coupling, comprising:
  - Withdrawable panel, but only with current transformer and a special bus coupling and riser panel
  - Fittings on the busbars as for sectionalizing a single busbar installation

SS1 = Busbar system 1
SS2 = Busbar system 2
Basic panel design

Single busbar panel

- Single-row arrangement
- 1 Low-voltage compartment
- 2 Withdrawable vacuum circuit-breaker
- 3 Cable connection
- 4 Voltage transformer
- 5 Make-proof earthing switch
- 6 Current transformer
- 7 Busbars
- 8 Rear-mounted pressure relief duct (option)

Duplicate busbar panels

- Face-to-face arrangement
  - 2 to 8: See above
  - 9 Cable or busbar connection between both panels underneath the installation (in the cable basement)
  - 10 Special connection bracket

- Back-to-back arrangement
  - 1 to 8: See above
  - 11 Busbars between both panels within the enclosures
**Mechanical Design**

### High-voltage section

#### Frame

**Design**
- Bolted steel profiles and sheets
- Rails for accommodating the withdrawable part
- Base cover optionally available
- Surface treatment
  - Steel profiles and sheets galvanized
  - Doors and front frame powder-coated, color grey (RAL 7032)
  - Switchgear side walls powder-coated, color grey (RAL 7032)

#### Partitions

Partitions isolate neighboring panels from one another

**Design**
- Galvanized sheet steel
- With cutout for continuous busbars
- Bushing plate with cast resin bushings for transverse isolation of busbars optionally available
- Degree of protection with respect to neighboring panels: IP4X/IP3XD
- Optionally in an arc-resistant design

#### Pressure relief

When the pressure relief flaps are opened, the excess pressure in the panel in the event of an arc occurring is dissipated.

**Design**
- Galvanized sheet steel
- Locked to prevent unintentional opening from the outside
- Separate pressure relief flaps for busbar, withdrawable part and connection compartments
### High-voltage section

#### Compartmentalization Design
- Bolted galvanized steel sheets subdivide the panel into:
  - Busbar compartment
  - Withdrawable part compartment
  - Connection compartment
- Degree of protection between the individual compartments: IP4X/IP3XD
- Thanks to integrated cup-type bushings, complete compartmentalization even when the withdrawable part is in the connected position
- Upper and lower mating contacts fixed in cup-type bushings
- Enforced operated metal shutters for opening or closing the cup-type bushings when moving the withdrawable part
- Metal shutters can be locked when the withdrawable part is racked out
- Upper barrier (access to the busbar) or lower barrier (access to the cable) can be unscrewed independently of one another
- Optional resistance to internal arcing of the busbar compartment

#### Mechanical Design

### High-voltage door
- Inspection window (1)
  - Pressure-proof
  - For checking the withdrawable part position
  - For reading off the CLOSED/OPEN position indicator of the switching device, of the operating cycle counter and of the “closing spring charged” indication
- Lock (2)
  - For locking or unlocking the high-voltage door (taking the interlocking conditions into account) with an interlocking key
- Hand crank opening
  - Hand crank for charging the operating mechanism springs of the switching device
  - Opening closes automatically
- Door handle
  - After the lock has been unlocked, the door is opened by lifting or is closed by lowering (taking the interlocking conditions into account)
- CLOSED/OPEN pushbutton of the switching device
  - CLOSED/OPEN switching when the withdrawable part is in the connected position: When the door is closed, mechanically with pushbutton and tiltable extension mechanism for pushbutton actuation
  - CLOSED/OPEN switching when the withdrawable part is in the disconnected position: When the door is closed mechanically by means of pushbuttons (direct actuation)
- Lever for tilting over the extension mechanism (see adjacent figure for operating principle)
- Openings for withdrawable part actuation
  - For the hand crank for moving the withdrawable part (taking the interlocking conditions into account)
  - For the interlocking key of the withdrawable part (same key as for the high-voltage door).

### Diagrams
- Metal shutters opened (no operation)
- Metal shutters closed
- Withdrawable part compartment
- Inspection window (1) for checking the withdrawable part position
- Lock (2)
- CLOSED/OPEN pushbuttons
- Door handle
- Lever for tilting over the extension mechanism
- Inspection window (1) for reading off the indicators
- Openings for withdrawable part actuation
- Opening for hand crank
- High-voltage door (e.g. for panel with 3AH vacuum circuit-breaker)
- Operating mechanism box of the switching device
- Pushbutton actuation in the high-voltage door
- Extension mechanism
- Actuation of the pushbuttons on the switching device
- Tiltable extension mechanism for pushbutton actuation
Busbars
(commercially available flat copper)

Busbar mounting
• On commercially available cast-resin insulators
• Busbars bolted, length according to panel width

Compartmentalization
• Metal compartmentalization to the withdrawable part and connection compartments with degree of protection IP4X/IP3XD
• Busbar compartment continuous throughout the entire installation, transverse compartmentalization with respect to neighboring panels possible
• Resistance to internal arcing of the busbar compartment optionally possible

Insulation
• Busbar insulation not necessary because dielectric strength is also guaranteed without insulation
• Busbar insulation up to the upper mating contacts optionally possible

Busbar fittings (options)
The following fittings on the busbars – shown in the adjacent figure with reference to the example of withdrawable vacuum circuit-breaker panels – are optionally available without detrimentally influencing pressure relief:

4MR voltage transformer
• Cast-resin insulated
• Up to 3 x one-pole or 2 x two-pole

Make-proof earthing switch
• Manually operated
• Optionally lockable or electromagnetically locked

Bus riser
• Rated normal current in accordance with the max. rated normal current of the busbar
• Connecting bars mounted on 3 post insulators
• Necessary bar duct can be modified

Cable connection at top
• Max. 2 x 500 mm² single-core XLPE cables per phase
• With cable connection compartment and cable brackets

Spur panel connection at top
• Max. 2 x 500 mm² single-core XLPE cables per phase
• Cable connection within the panel, with cable brackets

1) Details refer to conventional Siemens sealing ends or other makes with similar dimensions.
High-voltage section

Panel connection
- Connection of cables or bars to current transformers or post insulators
- Connection variants or types of installation are as shown in the illustrations
- Earthing and short-circuiting via earthing switch directly at the point of connection
- Fixed-mounted voltage transformers within the current transformer protection zone

Panel connection fittings (options)
The following optional fittings are available for panel connection according to the relevant project planning documentation:

Connection
- Connection of max. 4 x 500 mm² single-core XLPE cables per phase with Siemens sealing ends or other makes of similar size
- Or connections for plug-in, shock-proof sealing ends, including floor plate
- Or connection for bars: Flat copper bar with bushings, optionally with floor plate or fully insulated bars including floor plate

4MA post-insulator current transformers
- Cast-resin insulated
- Narrow design to DIN 42600
- Max. 3 units

4MR voltage transformers
- Cast-resin insulated
- Max. 3 x one-pole or 2 x two-pole
- Fixed-mounted, without primary fuses
- Withdrawable, optionally with primary fuses, voltage pickoff on the circuit-breaker, automatic earthing of primary terminals or isolation of secondary circuits during access to voltage transformers

Make-proof earthing switch
- Manually operated
- Additional to standard locking of earthing switch/withdrawable part, optionally lockable or electromagnetically locked

Surge arresters or limiters
- Surge arresters for protecting the switchgear against external overvoltages
- Limiters for protecting the loads against switching overvoltages
- Max. 3 units
Type 8BK20
Switchgear up to 24 kV
with Withdrawable
Circuit-Breakers

Mechanical Design

High-voltage section

Withdrawable vacuum circuit-breaker section
(See page 5 for technical data)
- Fitted with a vacuum circuit-breaker featuring a spring stored-energy operating mechanism

Withdrawable vacuum switch section
(See page 5 for technical data)
- Fitted with a vacuum switch featuring a spring stored-energy operating mechanism
- Also optionally with HV HRC fuses

Withdrawable disconnector-link section
(See page 5 for technical data)
- Performs a disconnector function
- Fitted with copper links
- Locking preferably with a padlock

Withdrawable metering section
(See page 5 for technical data)
- Fitted with 4MR voltage transformers, cast-resin insulated, Max. 3 x one-pole or 2 x two-pole
- Also optionally with 6.3 A primary fuses
Mechanical Design

Low-voltage section

Low-voltage compartment
- For accommodating the devices for protection, control, measuring and metering, e.g. bay controller SIPROTEC 4 type 7SJ62
- Shock-proof partitioning from the high-voltage section
- Pressure-resistant partitioning from the high-voltage section
- Low-voltage compartment can be removed (only possible for installations up to 15 kV) thanks to plug-in ring and control cables
- Door optionally with inspection window
- Additional built-on low-voltage compartment possible
- See page 6 for details of useful internal dimensions

Low-voltage cables
- Withdrawable section control cables via 64-pole plug connector, flexible cables in a metal conduit
- Control cables of the panel are flexible and have metallic covers
- Connection from withdrawable part and panel wiring to the low-voltage compartment by means of 10-pole module connectors
- Ring cables with plug-in connections between panels for installations up to 15 kV

Solid-state HMI (human-machine interface)
Bay controller SIPROTEC 4 type 7SJ62 for control and protection

Features
1 LCD for process and equipment data, e.g. for:
   - Measuring and metering values
   - Binary data for status of switchpanel and device
   - Protection data
   - General signals
   - Alarm
2 Keys for navigation in menus and for entering values
3 Seven programmable LEDs with possible application-related inscriptions, for indicating any desired process and equipment data
4 Four programmable function keys for frequently performed actions

Door of the low-voltage compartment
Bay controller SIPROTEC 4 type 7SJ62

Low-voltage compartment with fittings (example)
Standards

Type 8BK20 switchgear for indoor installation complies with the following valid standards:

<table>
<thead>
<tr>
<th>IEC</th>
<th>VDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60 694</td>
<td>VDE 0670 Part 1000</td>
</tr>
<tr>
<td>IEC 60 298</td>
<td>VDE 0670 Part 6</td>
</tr>
<tr>
<td>IEC 60 129</td>
<td>VDE 0670 Part 2</td>
</tr>
<tr>
<td>IEC 60 256-1</td>
<td>VDE 0670 Part 201</td>
</tr>
<tr>
<td>IEC 60 420</td>
<td>VDE 0670 Part 303</td>
</tr>
<tr>
<td>IEC 60 056</td>
<td>VDE 0670 Part 1</td>
</tr>
<tr>
<td>IEC 61 243-5</td>
<td>E VDE 0882 Part 415 and EN 61 243-5 (E)</td>
</tr>
<tr>
<td>IEC 60 529</td>
<td>VDE 0470 Part 1</td>
</tr>
<tr>
<td>IEC 60 071</td>
<td>VDE 0111</td>
</tr>
</tbody>
</table>

In accordance with the harmonization agreement reached by the countries of the European Community, their national standards conform to IEC 60 298.

Service locations

Type 8BK20 switchgear can be used as indoor installation in accordance with VDE 0101:
- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools.
- Inside lockable electrical service locations. A lockable electrical service location is a place outdoors or indoors that is reserved exclusively for housing electrical equipment and which is kept under lock and key. Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

Definition

“Make-proof earthing switches” are earthing switches that have a short-circuit making capacity (VDE 0670 Part 2).

Insulating capacity

- The insulating capacity is verified by testing the switchgear with rated values of short-time power-frequency withstand voltage and impulse withstand voltage according to VDE 0670 Part 1000 or IEC 60 694 (see adjacent table):
- Rated values are referred to sea level and to normal atmospheric conditions (1013 h Pa, 20 °C, 11 g/m³ humidity in accordance with VDE 0111 and IEC 60 071).
- The insulating capacity decreases with increasing altitude, but is not taken into account by the standards and specifications up to a site altitude of 1000 m.

<table>
<thead>
<tr>
<th>Rated voltage (rms)</th>
<th>Rated short-time power-frequency withstand voltage (rms)</th>
<th>Rated lightning impulse withstand voltage (peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2</td>
<td>23 20 70</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>32 28 85</td>
<td>75</td>
</tr>
<tr>
<td>15</td>
<td>39 36 105</td>
<td>96</td>
</tr>
<tr>
<td>17.5</td>
<td>45 38 110</td>
<td>95</td>
</tr>
<tr>
<td>24</td>
<td>60 50 145</td>
<td>125</td>
</tr>
</tbody>
</table>

For site altitudes above 1000 m, the adjacent correction factor a is recommended, depending on the actual site altitude above sea level.

Resistance to internal arc faults

- Tests for verifying resistance to internal arc faults should establish proper protection for operating personnel.
- The tests must be performed in accordance with VDE 0670 Part 6, Appendix AA or IEC 60 298, Appendix AA.
- Type 8BK20 switchgear conforms to the criteria of the above standards and specifications
  - Criteria 1 to 3 and 6 in the standard version
  - Criteria 1 to 6 with additional measures
- Definitions of criteria:
  - Criterion 1: Correctly secured doors, covers etc. do not open.
  - Criterion 2: Parts which may cause a hazard do not fly off.
  - Criterion 3: No holes in the freely accessible external parts of the enclosure as the result of burning in or tearing open.
  - Criterion 4: Vertically arranged indicators do not ignite.
  - Criterion 5: Horizontally arranged indicators do not ignite.
  - Criterion 6: The effectiveness of the earth connection must not be detrimentally influenced.

Resistance to internal arc faults can be provided over and above the requirements of the standards and specifications mentioned before.

Example

<table>
<thead>
<tr>
<th>Rated short-time power-frequency withstand voltage to be selected (VDE 0670 Part 1000/IEC 60 694)</th>
<th>Rated lightning impulse withstand voltage to be selected (VDE 0670 Part 1000/IEC 60 694)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 · a</td>
<td>1.1 · a</td>
</tr>
</tbody>
</table>

Site altitude above sea level = 3000 m

Rated voltage of switchgear = 12 kV

Rated lightning impulse withstand voltage (VDE 0670 Part 1000/IEC 60 694) = 75 kV

Rated lightning impulse withstand voltage to select = 1.1 · 0.75 = 83 kV

Result:

According to the above table, 17.5 kV switchgear should be selected.
Current-carrying capacity
- According to VDE 0670 Part 6 or Part 1000, IEC 60 298 or IEC 60 694, current-carrying capacities are referred to the following ambient temperatures:
  - Maximum of 24-hour mean + 35 °C
  - Maximum + 40 °C
- The current-carrying capacity of the panels and busbars depends on the ambient temperature outside the enclosure.

Withdrawable section positions
There are three different positions for the withdrawable sections of type BBK20 switchgear as defined in VDE 0670 Part 6 or IEC 60 298:
- Service position
  - In this position, the switching device establishes a connection between the busbars and the panel connection.
  - The low-voltage connector is plugged in.
- Disconnected position
  - In this position, segregation is ensured, i.e. arcing possible only against earth.
  - The low-voltage connector can be either plugged in or disconnected.
- Test position
  - The low-voltage connector is plugged in.

Climate and ambient conditions
Type BBK20 switchgear, if necessary with additional measures, can be used in the following climate classes and under the following ambient conditions:
- Ambient conditions
  - Natural pollutants
  - Chemically active pollutants
  - Small animals
- Climate classes I1, I2, I3
  - Climate class I1: Rooms in buildings with good thermal insulation or high thermal capacity, heated or cooled: normally only the temperature is monitored, e.g. in normal living rooms, offices, shops, telecommunications exchanges, storage rooms for sensitive products.
  - Climate class I2: Rooms in buildings with poor thermal insulation or low thermal capacity, heated or cooled, without temperature monitoring; heating or cooling subject to failure over several days, e.g. unattended relays, booster or transformer stations, stables, motor vehicle repair shops, manufacturing rooms for unfinished products, hangars.
  - Climate class I3: Rooms in buildings without significant thermal insulation and with low thermal capacity, neither heated nor cooled, e.g. telephone booths, entrances of buildings, barns, lofts, unheated store rooms, sheds, garages.

Conditions in switchgear rooms

<table>
<thead>
<tr>
<th>Room climate affecting the switchgear</th>
<th>Ambient temperature</th>
<th>Relative humidity</th>
<th>Condensation</th>
<th>Special ambient conditions</th>
<th>Additional measures needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate class I1</td>
<td>+ 5 to + 40 °C</td>
<td>5 to 85 %</td>
<td>None</td>
<td>None</td>
<td>–</td>
</tr>
<tr>
<td>Climate class I2</td>
<td>– 25 to + 55 °C</td>
<td>10 to 100 %</td>
<td>Occasionally once a month for 2 hours</td>
<td>Blown sand, dust, small animals</td>
<td>Yes</td>
</tr>
<tr>
<td>Climate class I3</td>
<td>– 25 to + 70 °C</td>
<td>10 to 100 %</td>
<td>Frequently once a day for 2 hours</td>
<td>None</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Areas subject to chemical pollution
- Sulfur dioxide (SO₂) ≥ 2 ppm
- Hydrogen sulfide (H₂S) ≥ 1 ppm
- Hydrochloric acid (HCl) ≥ 3 ppm
- Ammonia (NH₃) ≥ 15 ppm
- Nitric oxides (NOₓ) ≥ 2 ppm
- Chloride deposit (Cl⁻) (saline fog) ≥ 2 mg/l dm²

1) Based on IEC 60 721-3-3 and IEC 60 721-3-4.
Interlocks
- The following interlocks are specified by VDE 0670 Part 6 and IEC 60298:
  - The withdrawal or engagement of a circuit-breaker, switch or contactor shall be impossible unless it is in the open position.
  - The operation of a circuit-breaker, switch or contactor shall be impossible unless it is in the service, disconnected, removed, test or earthing condition.
  - It shall be impossible to close the circuit-breaker, switch or contactor in the service position unless it is connected to the auxiliary circuit, unless it is designed to open automatically without the use of an auxiliary circuit.
  - The provision of additional or alternative interlocks shall be subject to agreement between the manufacturer and user.
  - The manufacturer shall give all necessary information on the character and function of interlocks.
  - It is recommended that earthing switches having a short-circuit making capacity less than the rated peak withstand current of the circuit should be interlocked with the associated disconnectors.
  - Apparatus installed in main circuits, the incorrect position of which can cause damage or which are used for assuring isolating distances during maintenance work, shall be provided with locking facilities (for example, provision for padlocks).
  - Wherever possible, preference should be given to mechanical interlocks.
- Type 8BK20 switchgear fulfils other interlocking conditions over and above those mentioned here; see page 4.

Protection against water, electric shock and ingress of solid foreign bodies
As detailed in
- VDE 0470 Part 1
- IEC 60298 and 60529
- VDE 0670 Part 6
type 8BK20 switchgear conforms to the following degrees of protection:
- For panels without ventilation slits:

<table>
<thead>
<tr>
<th>Degree of protection</th>
<th>Standard</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>IP4X</td>
<td>IP31D</td>
</tr>
<tr>
<td></td>
<td>IP3XD</td>
<td>IP60, IP61</td>
</tr>
<tr>
<td>Compart-mentation</td>
<td>IP4X</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>IP3XD</td>
<td>–</td>
</tr>
</tbody>
</table>

- For panels with prod-proof ventilation slits:

<table>
<thead>
<tr>
<th>Degree of protection</th>
<th>Standard</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>IP4X</td>
<td>IP31D</td>
</tr>
<tr>
<td></td>
<td>IP3XD</td>
<td>–</td>
</tr>
</tbody>
</table>

Refer to the adjacent table for explanations
## Catalog Index of the Power Transmission and Distribution Group (Medium-Voltage Division)

### High-Voltage Equipment (Above 52 kV)

<table>
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<tr>
<th>Title</th>
<th>Designation</th>
<th>Order No.</th>
</tr>
</thead>
</table>

### Medium-Voltage Equipment (High-Voltage Equipment up to 52 kV)

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<thead>
<tr>
<th>Title</th>
<th>Designation</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3AH Vacuum Circuit-Breakers</td>
<td>HG 11.11</td>
<td>E50001-K1511-A111-A3-7600</td>
</tr>
<tr>
<td>Components up to 24 kV for 3AH Vacuum Circuit-Breakers</td>
<td>HG 11.15</td>
<td>E50001-K1511-A151-A1-7600</td>
</tr>
<tr>
<td>3TL Vacuum Contactors</td>
<td>HG 11.21</td>
<td>E50001-K1511-A211-A1-7600</td>
</tr>
<tr>
<td>Vacuum Switches, Switch-Disconnectors, HV HRC Fuse</td>
<td>HG 12</td>
<td>E50001-K1512-A101-A4-7600</td>
</tr>
<tr>
<td>Switchgear Interlock Units, Control Valves, Compressed Air Systems</td>
<td>HG 13</td>
<td>E86010-K1513-A101-A1-7600</td>
</tr>
<tr>
<td>3EH2 Surge Arresters</td>
<td>HG 21.2.5</td>
<td>E50001-K1521-A251-A3-7600</td>
</tr>
<tr>
<td>3EE2 Special-Purpose Surge Arresters for the Protection of Motors, Generators and Furnace Transformers</td>
<td>HG 21.2.7</td>
<td>E50001-K1521-A271-A3-7600</td>
</tr>
<tr>
<td>Insulators of Cast Resin (Excerpt)</td>
<td>HG 22</td>
<td>E50001-K1522-A111-A1-7600</td>
</tr>
<tr>
<td>Current and Voltage Transformers</td>
<td>HG 24</td>
<td>E50001-K1524-A101-A2-7600</td>
</tr>
<tr>
<td>Air-Cored Reactors, High-Voltage Capacitors</td>
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<td>E86010-K1525-A101-A4-7600</td>
</tr>
</tbody>
</table>

### Medium-Voltage Switchgear (High-Voltage Indoor Distribution Switchgear)

<table>
<thead>
<tr>
<th>Title</th>
<th>Designation</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal-Enclosed Truck-Type Switchboards for Indoor Installation (BBC1, BDS1)</td>
<td>HA 21</td>
<td>E86010-K1421-A101-A3-7600</td>
</tr>
<tr>
<td>Type 8BK20 Switchgear up to 24 kV with Withdrawable Circuit-Breakers (Metal-Clad)</td>
<td>HA 25.21</td>
<td>E50001-K1425-A311-A6-7600</td>
</tr>
<tr>
<td>Type 8BKA0 Switchgear up to 17.5 kV/83 kA with Withdrawable Circuit-Breakers</td>
<td>HA 25.31</td>
<td>E50001-K1425-A411-A2-7600</td>
</tr>
<tr>
<td>Generator Circuit-Breaker Units up to 17.5 kV/80 kA, Type 8BK41</td>
<td>HA 25.41</td>
<td>E50001-K1425-A511-A1-7600</td>
</tr>
<tr>
<td>Type 8BJ50 Switchgear up to 24 kV with Withdrawable Circuit-Breakers*</td>
<td>HA 25.61</td>
<td>E50001-K1425-A711-A2-7600</td>
</tr>
<tr>
<td>36/38 kV Switchgear with Withdrawable Vacuum Circuit-Breakers, Type 8BK20</td>
<td>HA 26.1</td>
<td>Siemens Den Haag, Dept.CMS DMS</td>
</tr>
<tr>
<td>Type 8BK30 Switchgear up to 12 kV with Draw-Out Vacuum Contactors</td>
<td>HA 27.11</td>
<td>E50001-K1427-A111-A2-7600</td>
</tr>
<tr>
<td>Panels up to 36 kV with Fixed-Mounted Circuit-Breakers, SF6-Insulated, Types BDA10 and BDB10 Single-Pole, Metal-Enclosed, Metal-Clad</td>
<td>HA 35.11</td>
<td>E50001-K1535-A101-A6-7600</td>
</tr>
<tr>
<td>Single-Busbar Switchgear</td>
<td>HA 35.41</td>
<td>E50001-K1435-A401-A3-7600</td>
</tr>
<tr>
<td>Type 8DC11 Panels up to 24 kV, Fixed-Mounted Vacuum Circuit-Breaker Switchgear, SF6-Insulated</td>
<td>HA 35.61</td>
<td>E50001-K1435-A511-A1-7600</td>
</tr>
<tr>
<td>NXPLUS Fixed-Mounted Circuit-Breaker Switchgear up to 36 kV, SF6-Insulated</td>
<td>HA 35.61</td>
<td>E50001-K1435-A511-A1-7600</td>
</tr>
<tr>
<td>Spline-Shaft Drive 8UG for Torque Transmission up to 200 Nm</td>
<td>HA 39.1</td>
<td>E86010-K1439-A111-A2-7600</td>
</tr>
<tr>
<td>Motor Drive 8UH for Torque Requirements up to 250 Nm</td>
<td>HA 39.3</td>
<td>E86010-K1439-A131-A1-7600</td>
</tr>
<tr>
<td>Fixed-Mounted Ring-Main Units up to 24 kV, SF6-Insulated, Type BDB10</td>
<td>HA 41.11</td>
<td>E50001-K1441-A101-A2-7600</td>
</tr>
<tr>
<td>Fixed-Mounted Ring-Main Units up to 24 kV, SF6-Insulated, Type 8DJ10</td>
<td>HA 45.11</td>
<td>E50001-K1445-A111-A6-7600</td>
</tr>
<tr>
<td>Secondary Distribution Switchgear up to 24 kV, SF6-Insulated, Type 8D20</td>
<td>HA 45.31</td>
<td>E50001-K1445-A311-A1-7600</td>
</tr>
<tr>
<td>Type 8FB1 Compact Transformer Substations up to 24 kV Factory-Built Container Stations, Type 8FF1</td>
<td>HA 52.1</td>
<td>E50001-K1452-A111-A1-7600</td>
</tr>
</tbody>
</table>
Appendix

Conditions of Sale and Delivery

Subject to the General Conditions of Supply and Delivery for Products and Services of the Electrical and Electronic Industry and to any other conditions agreed upon with the recipients of catalogs.

The technical data, dimensions and weights are subject to change unless otherwise stated on the individual pages of this catalog. The illustrations are for reference only.

We reserve the right to adjust the prices and shall charge the prices applying on the date of delivery.

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All dimensions in this catalog are given in mm.

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