PowerIT Uniswitch Medium Voltage Switchgear

12, 17.5 and 24 kV
630 and 1250 A
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1. Uniswitch

Design Philosophy

Uniswitch, need to say more?

Uniswitch, the light flexible switchgear developed as a modular, simple to apply design, with fewer components, providing a high reliable, quality and safe product for you, our Customer.

By reducing the number of components, utilising modern materials correctly, we have developed an environmentally and user friendly product. The simple design and construction of Uniswitch will stand the test of time for generations to come.

Uniswitch is an air insulated (AIS), metal enclosed, switchgear cubicle design of the next generation developed through continuous innovation and vision to meet the changing market needs. The standard cubicle is powder pointed light gray (RAL 7035) on visible parts.

Uniswitch provides long-term technical solutions for various applications. Safety, user friendliness and environmental concerns have been the driving force in the development of the switchgear.

Uniswitch switchgear is a compact solution for a fully automated power distribution network. Supported by sensor technology and the latest in protection relays, it meets even the most demanding requirements in hospitals and airports.

Uniswitch is a worldwide switchgear development utilising the global experience of ABB to incorporate the needs of Customers from all over the world. Uniswitch switchgear is available from the ABB worldwide network of Companies.
Uniswitch market segment

Uniswitch product provides our Medium Voltage Customer with the best solution for heavy duty switchgear in a size only a little than a single tank Ring Main Unit while including:

- the flexibility in meeting our Customers specification and accommodating on future change and upgrading
- the options include complete control, measuring and protection systems
2. Uniswitch

Applications

1. Airport
2. Utility
3. Hospital
4. Power Plants, Diesel/gas engine (built by Wärtsilä)
5. Industry
6. Windmills
7. Sports center (Botnia Hall, Vaasa)
8. Metro
9. Shopping center
3. Uniswitch
Switchgear Construction

Metal enclosed switchgear

1. Busbar compartment
The busbar compartment is located on the top of the cubicle. This compartment contains the main busbars that interconnect between switchgear cubicles.

2. Switching compartment
A 3-position SF6 switch disconnector with epoxy cast resin housing is provided with inspection windows and available also with gas density indicator.

3. Cable compartment
75% of the space in the switch disconnector cubicle is reserved for power cable connection making it possible to use both 1- and 3-phase cables with most simple unscreened terminations. Space is also adequate for cubicle accessories such as surge arresters, current transformers, second earthing switch etc. The door has an inspection window and safety interlocking as standard. For cable entry there are 3 individual cable gland plates in the bottom with support for a suitable dimensioned cable clamp. The bottom and the threshold of the cubicle can be removed for ease of cable installation.

4. Mechanism, interlocking and low voltage compartment
Behind a hinged door (which serves as control panel) are located the spring operating mechanism with position indicator and the mechanical interlocking unit. There are also facilities for cubicle accessories such as: auxiliary contacts, tripping coil, emergency tripping mechanism, capacitive voltage presence indicating system, key interlocks and motor operating device. Space is also provided for control circuits and measuring instruments as well as a protection relay. In the 750 wide cubicles there is also a second identical compartment for further accessories.

The upper part of the cubicle, including the busbar compartment, the switch disconnector and the mechanism and low voltage compartment is separated from the lower part and the cable compartment. Because of this it is possible to carry out maintenance, repair and upgrading of the unit in the lower module while the switchgear is in service.
Primary part

1. **Top unit**
   - 3-position switch disconnector SFG
   - Operating mechanism with mechanical position indication
   - Enclosure of busbar compartment
   - Integrated low voltage compartment for secondary components
   - Interlocking unit
   - Busbars
   - Control cable ducts

2. **Bottom unit**
   - Enclosure
   - Circuit breaker (fixed version)
   - Current transformers
   - Earthing switches
   - Voltage transformers
   - Cable entry with cable support
4. Uniswitch

Cubicle Types / Cubicle Program

Switch Disconnector Cubicle, type SDC

Width: 375 or 500 mm
Height: 1635 or 1885 mm

Example: equipped with motor, current transformer, voltage indication

Switch Disconnector with Fuse, type SDF

Width: 375 or 500 mm
Height: 1635 or 1885 mm

Example: equipped with motor, voltage metering and indication

Circuit Breaker Cubicle, type CBC

Width: 750 mm
Height: 1635 or 1885 mm

Example: equipped with motor, current and voltage transformers, voltage indication
Uniswitch

Cubicle Types / Cubicle Program

Withdrawable Circuit Breaker cubicle, type CBW

Width: 800 mm
Height: 1885 mm

Direct Busbar connection Cubicle, type DBC

Width: 375 or 500 mm
Height: 1635 or 1885 mm
Example: equipped with earthing switch, current transformers and voltage indication

Bus Riser Cubicle, type BRC

Width: 375 or 500 mm
Height: 1635 or 1885 mm
Example: equipped with earthing switch, current and voltage transformers, voltage indication
Uniswitch

Cubicle Types / Cubicle Program

Sectionalising Cubicle, type SEC

Width: 375, 500 or 750 mm
Height: 1635 or 1885 mm

Example: equipped with motor operation, current and voltage transformers, voltage indication

Sectionalising cubicle with Fuse, type SEF

Width: 375 or 500 mm
Height: 1635 or 1885 mm

Sectionalising Breaker Cubicle, type SBC

Width: 750 mm
Height: 1635 or 1885 mm

Example: equipped with motor operated CB, current and voltage transformers, second earthing switch, voltage metering
Sectionalising Withdrawable Breaker cubicle, type SBW

Width: 800 mm
Height: 1885 mm

Sectionalising Metering cubicle with Disconnector, type SMD

Width: 750 mm
Height: 1635 or 1885 mm

Sectionalising Metering Cubicle, type SMC

Width: 750 mm
Height: 1635 or 1885 mm
Uniswitch

Cubicle Types / Cubicle Program

**Bus Metering Cubicle, type BMC**

Width: 750 mm  
Height: 1635 or 1885 mm

**Universal Metering Cubicle, type UMC**

Width: 750 mm
Height: 1635 or 1885 mm

Prepared for mounting of universal instrument transformers, busbars on request
4.1 Uniswitch

Cubicle Types

Switch Disconnector Cubicle, type SDC

Switch disconnector cubicle type SDC, is mainly used as an incoming, ring or branch cubicle. The basic unit is equipped with an SF6-insulated, 3-position switch disconnector type SFG with its operation mechanism. The 3-position switch disconnector may be in one of three positions, “closed”, “open” or “earthed”, therefore preventing incorrect operation. Access to the cable compartment is possible in earthed position. “Open” and “earthed” positions are “visible” through the inspection windows placed behind the low voltage compartment door. Inspection of cable connections and fault indicators, when used, is easily carried out through the front-door window.

For safe cable testing a unique interlocking mechanism is included as standard feature.

**Basic equipment**

Top unit, including
- 3-position switch disconnector
- operating mechanism with mechanical position indication
- enclosure of busbar compartment
- integrated low voltage compartment
- interlocking unit
- busbars
- earthing bar

Bottom unit, including
- enclosure of cable compartment
- cable entry with cable support

**Cubicle Accessories**

- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact
- motor operation device
- current transformers
- arc-gas channel
- channel for control cables
- surge arresters
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar
- short-circuit indicator

**Data SDC**

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<td>630/800</td>
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<td>Rated current [A]</td>
<td></td>
<td>630/800</td>
<td>630/800</td>
<td>630/800</td>
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<td>Rated short-time withstand current [kA]</td>
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<td>20</td>
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<tr>
<td>Max. rated duration of short circuit [s]</td>
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<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Cubicle dimensions

- width [mm] | 375/500 | 375/500 | 375/500 |
- depth [mm] | 1000 | 1000 | 1000 |
- height [mm] | 1635/1885 | 1635/1885 | 1635/1885 |
4.2 Uniswitch

Cubicle Types

Switch Disconnector cubicle with Fuse, type SDF

Fused switch disconnector cubicle type SDF, is primarily used for transformer protection voltage metering. The cubicle is equipped with a SF6-insulated, 3-position switch disconnector and with earthing switch. For fuse earthing, the integrated earthing switch operates on the upstream side and separate earthing switch operates on the downstream side of the fuses. The mechanism used is a double spring mechanism with automatic fuse-tripping. Access to cable compartment is possible in earthed-position. “Open” and “earthed” positions are “visible” through inspection windows placed behind the low voltage compartment door. Inspection of cable connections and fault indicators when used, is easily carried out through the front-door window.

Basic equipment
Top unit, including
- 3-position switch disconnector
- operating mechanism with mechanical position indication
- enclosure of busbar compartment
- integrated low voltage compartment
- interlocking unit
- fuse tripping with indication
- busbars
- earthing bar

Bottom unit, including
- earthing switch type EF
- fuse base
- enclosure of cable compartment
- cable entry with cable support

Cubicle Accessories
- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- auxiliary contacts for fuse tripped, 1NO+1NC
- gas density indication with alarm contact
- emergency tripping
- tripping coil
- motor operation device
- voltage transformers
- arc-gas channel
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

Data SDF

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<tr>
<td>Max. rated duration of short circuit</td>
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<td>Cable shoe, max. width</td>
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4.3 Uniswitch
Cubicle Types

Circuit Breaker Cubicle, type CBC

The circuit breaker cubicle, type CBC is designed for control and protection of distribution lines, networks, motors, transformers, capacitor banks, etc. The cubicle can be equipped with a vacuum or a SF6-gas circuit breaker. The breaker is rail mounted and fixed to the busbars. To achieve the disconnecting function a 3-position switch disconnector with an earthing switch is mounted between the breaker and busbars.

The door is mechanically interlocked with the switch disconnector’s earthing position to provide personal safety. The cubicle is designed to be equipped with CTs and VTs (Standard DIN size, see item 5.9).

Basic equipment

Top unit on right hand side, including
- 3-position switch disconnector
- operating mechanism with mechanical position indication
- enclosure of busbar compartment
- interlocking unit
- busbars
- earthing bar

Top unit on left hand side, including
- integrated low voltage compartment for secondary components
- enclosure of busbar compartment

Bottom unit, including
- earthing switch type EM
- enclosure of cable compartment
- cable entry with cable support

Cubicle Accessories
- circuit breaker, vacuum- or SF6-type
- integrated voltage indicators or socket interface for portable indicators
- current transformers
- voltage transformers
- cable core transformer
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact for switch disconnector
- motor operation device
- arc-gas channel
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

Data CBC

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<td>- height</td>
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</table>
Withdrawable Circuit Breaker cubicle, type CBW

The CBW panel is a circuit breaker panel with a withdrawable circuit breaker. The circuit breaker cubicle is designed for control and protection of distribution lines, networks, motors, transformers, capacitor banks, etc. The cubicle is available with either vacuum or SF6-gas circuit breaker. The CB truck handles the disconnecting function of the circuit breaker. A separate earthing switch enables earthing of the cables.

The door is mechanically interlocked with the circuit breaker and the earthing switch to provide personnel safety.

A wide range of secondary control & protection equipment is available for the cubicle, from the simplest self-powered protection relays to complicated protection, monitoring and controlling devices.

Basic equipment
Basic cubicle, including
- metal enclosed Alu-zinc steel cubicle enclosure with integrated rear-mounted arc gas channel
- busbars
- non-metallic partitioning and shutter
- low voltage compartment for secondary components
- withdrawable circuit breaker, vacuum- or SF6-type, including interlocked LV cable plug
- earthing switch, including interlocked operation device
- cable entry with cable support

Cubicle Accessories
- integrated voltage indicators or socket interface for portable indicators
- current transformers
- voltage transformers or surge arresters
- cable core transformer
- additional auxiliary contacts
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar
- electrical position indication
- electrical interlocking of earthing switch
- electrical interlocking of truck

Data CBW

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<td>Rated current, circuit breaker</td>
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<td>1335</td>
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<tr>
<td>Cubicle dimensions - height</td>
<td>1885</td>
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Uniswitch
Cubicle Types

Direct Busbar connection Cubicle, type DBC

To connect cables to the busbars, a busbar connection cubicle is available. This cubicle is equipped with connection lugs for fixing the cables. CT’s can be installed in the 500 mm cubicle.

The lower front door is fixed and can only be opened with a tool when earthing switch is not included. The door has a window for inspection.

Basic equipment
Top unit, including
– bushings
– enclosure of busbar compartment
– interlocking unit, but only when using earthing switch (EM)
– integrated low voltage compartment
– busbars
– earthing bar

Bottom unit, including
– enclosure of cable compartment
– parallel cable connection possibility
– cable entry with cable support or VT mounting bracket

Cubicle Accessories
– integrated voltage indicators or socket interface for portable indicators
– current transformers
– earthing switch for CT’s (EM)
– arc-gas channel
– channel for control cables
– surge arresters
– anti condensation heater
– through-going earthing bar

Data  DBC

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<td>17.5</td>
<td>24</td>
</tr>
<tr>
<td>Rated current</td>
<td>[A]</td>
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<td>630/1250</td>
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<td>[s]</td>
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<td>3</td>
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Cubicle dimensions
- width [mm]: 375/500, 375/500, 375/500
- depth [mm]: 1000, 1000, 1000
- height [mm]: 1635/1885, 1635/1885, 1635/1885
Bus Riser Cubicle, type BRC

Bus riser cubicle, type BRC, connects the busbar to the bottom of a sectionalising cubicle with circuit breaker or switch disconnector. This 500 mm width cubicle can be used as a metering cubicle with space for 3 CTs and 3 VTs.

The lower front door is fixed to the cubicle and has to be released with a tool. The door has a window for inspection.

Basic equipment
Top unit, including
– bushings
– enclosure of busbar compartment
– integrated low voltage compartment
– busbars
– earthing bar

Bottom unit, including
– enclosure with bus riser bars
– bottom cover

Cubicle Accessories
– integrated voltage indicators or socket interface for portable indicators
– current transformers
– voltage transformers
– earthing switch with position indication
– auxiliary contacts for earthing switch, 2NO+2NC
– arc-gas channel
– channel for control cables
– anti condensation heater
– through-going earthing bar

Data BRC

<table>
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Sectionalising Cubicle, type SEC

The sectionalising cubicle is always used together with the bus riser cubicle. The standard version with 375 mm width is equipped with a SF6-insulated, 3-position switch disconnector for sectionalising the busbars. Earthing facility is provided always as a standard.

**Basic equipment**
- Top unit, including
  - 3-position switch disconnector
  - operating mechanism with mechanical position indication
  - enclosure of busbar compartment
  - integrated low voltage compartment
  - interlocking unit
  - busbars
  - earthing bar
- Bottom unit, including
  - enclosure with sectionalising busbars
  - bottom cover

**Cubicle Accessories**
- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact
- motor operation device
- current transformers
- arc-gas channel
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar
- voltage transformers

**Data SEC**

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<td>Cubicle dimensions</td>
<td>[mm]</td>
<td>375/500/750</td>
<td>375/500/750</td>
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<td>width</td>
<td>[mm]</td>
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<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>depth</td>
<td>[mm]</td>
<td>1635/1885</td>
<td>1635/1885</td>
<td>1635/1885</td>
</tr>
</tbody>
</table>
Sectionalising cubicle with Fuse, type SEF

The cubicle type SEF is used when a sectionalising cubicle with fuse protection is needed, or if there is a requirement for measuring on the transformer feeder. For fuse earthing, the integrated earthing switch operates on the upstream side and separate earthing switch operates on the downstream side of the fuses.

The mechanism used is a double spring mechanism with automatic fuse tripping. Access to cable compartment is only possible in earthed-position. A visible check of the “open” and “earthed” positions is available through inspection windows placed in the low voltage compartment. Busbar connections to both left and right are possible.

Basic equipment
Top unit, including
- 3-position switch disconnector
- operating mechanism with mechanical position indication
- enclosure of busbar compartment
- integrated low voltage compartment
- interlocking unit
- fuse tripping with indication
- busbars
- earthing bar

Bottom unit, including
- earthing switch type EF
- fuse base

Cubicle Accessories
- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- auxiliary contacts for fuse tripped, 1NO+1NC
- gas density indication with alarm contact
- emergency tripping
- tripping coil
- motor operation device
- arc-gas channel
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

Data  SEF

<table>
<thead>
<tr>
<th></th>
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<td>20</td>
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<tr>
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<tr>
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<td>[mm]</td>
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<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>[mm]</td>
<td>1635/1885</td>
<td>1635/1885</td>
<td>1635/1885</td>
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</tbody>
</table>
4.9 Uniswitch
Cubicle Types

Sectionalising Breaker Cubicle, type SBC

Sectionalising breaker cubicle is used together with the bus riser cubicle. The standard cubicles are equipped with a SF6 insulated 3-position switch disconnector in series with a circuit breaker for sectionalising the busbar. The cubicle is equipped with a vacuum or a SF6-gas circuit breaker. The breaker is rail mounted and fixed to the busbars. Earthing facility on the switch disconnector is always included.

The door is mechanically interlocked with the switch disconnector’s earthing position to give personal safety. The cubicle is designed to be equipped with CTs and VTs (Standard DIN size, see item 5.9).

Basic equipment
Top unit on right hand side, including
- 3-position switch disconnector
- operation mechanism with mechanical position indication
- enclosure of busbar compartment
- interlocking unit
- busbars
- earthing bar

Top unit on left hand side, including
- integrated low voltage compartment for secondary components
- enclosure of busbar compartment

Cubicle Accessories
- circuit breaker, vacuum- or SF6-type
- integrated voltage indicators or socket interface for portable indicators
- current transformers
- voltage transformers
- auxiliary contacts for close (2NO+2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact for switch disconnector
- motor operation device
- arc-gas channel
- channel for control cables
- earthing switch type EM
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

Data SBC

<table>
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</tr>
<tr>
<td>Rated short-time withstand current</td>
<td>[kA]</td>
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<td>20</td>
</tr>
<tr>
<td>Max. rated duration of short circuit</td>
<td>[s]</td>
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<td>Cubicle dimensions</td>
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<tr>
<td>- width</td>
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<td>- depth</td>
<td>[mm]</td>
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<td>1635/1885</td>
</tr>
<tr>
<td>- height</td>
<td>[mm]</td>
<td></td>
<td></td>
</tr>
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Sectionalising Withdrawable Breaker cubicle, type SBW

The SBW panel is a sectionalising circuit breaker panel with a withdrawable circuit breaker. The SBW is used together with the bus riser cubicle (BRC). The cubicle is designed for sectionalising the busbar in the switchgear. It is available with either vacuum or SF6-gas circuit breaker. The CB truck handles the disconnecting function of the circuit breaker. A separate earthing switch enables earthing of the busbar.

The door is mechanically interlocked with the circuit breaker and the earthing switch to provide personnel safety.

A wide range of secondary control & protection equipment is available for the cubicle, from the simplest self-powered protection relays to complicated protection, monitoring and controlling devices.

**Basic equipment**
- Basic cubicle, including
  - metal enclosed Alu-zinc steel cubicle enclosure with integrated rear-mounted arc gas channel
  - busbars
  - non-metallic partitioning and shutter
  - low voltage compartment for secondary components
  - withdrawable circuit breaker, vacuum- or SF6-type, including interlocked LV cable plug
  - earthing switch, including interlocked operation device

**Cubicle Accessories**
- integrated voltage indicators or socket interface for portable indicators
- current transformers
- additional auxiliary contacts
- channel for control cables
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

### Data SBW

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<td></td>
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<tr>
<td>Rated short-time withstand current [kA]</td>
<td>25</td>
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<tr>
<td></td>
<td>20</td>
</tr>
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<td></td>
<td>20</td>
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<tr>
<td>Max. rated duration of short circuit [s]</td>
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</tr>
<tr>
<td></td>
<td>1</td>
</tr>
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<td>- width [mm]</td>
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<td>- depth [mm]</td>
<td>1335</td>
</tr>
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<td>- height [mm]</td>
<td>1885 (1905 with cable channel)</td>
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Sectionalising Metering cubicle with Disconnector, type SMD

Sectionalising metering cubicle, type SMD, is mainly used when medium voltage metering is required and/or when there is a requirement to sectionalise the switchgear. Cubicle is based on operation of two separately operated 3-position, SFG type switch disconnectors. Switch disconnectors are located at both ends of the sectionalised busbar. DIN size VT's and CT's are available on right hand side of the switchgear.

3-position switch disconnectors are interlocked with cubicle front door and access into cable compartment is possible only when both switch disconnectors are in earthed-position.

**Basic equipment**
- Top unit on left hand side, including
  - 3-position switch disconnector or bushing
  - operation mechanism with mechanical position indication
  - integrated low voltage compartment
  - interlocking unit
  - busbars
  - earthing bar
- Top unit on right hand side, including
  - 3-position switch disconnector or bushing
  - operation mechanism with mechanical position indication
  - integrated low voltage compartment
  - interlocking unit
  - busbars
  - earthing bar
- Bottom unit, including
  - enclosure of busbar compartment

**Cubicle Accessories**
- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO-2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact for switch disconnector
- current transformers
- voltage transformers
- channel for control cables
- arc-gas channel
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

**Data SMD**

<table>
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<tr>
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<td>630</td>
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<td>- depth</td>
<td>940+60</td>
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<tr>
<td>- height</td>
<td>1635/1885</td>
<td>1635/1885</td>
<td>1635/1885</td>
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</table>
Sectionalising Metering Cubicle, type SMC

Sectionalising metering cubicle, type SMC, is mainly used when medium voltage metering is required and/or when there is a requirement to sectionalise the switchgear. Cubicle is based on operation of one rail mounted circuit breaker and two separately operated 3-position, SFG type switch disconnectors. Switch disconnectors are located at both ends of the sectionalised busbar with the circuit breaker in between, after left hand side switch disconnector. DIN size VT’s and CT’s are available on right hand side of circuit breaker, in previously mentioned order.

3-position switch disconnectors are interlocked with cubicle front door and access into cable compartment is possible only when both switch disconnectors are in earthed-position.

### Basic equipment
- Top unit on left hand side, including
  - 3-position switch disconnector or bushing
  - operation mechanism with mechanical position indication
  - integrated low voltage compartment
  - interlocking unit
  - busbars
  - earthing bar
- Top unit on right hand side, including
  - 3-position switch disconnector or bushing
  - operation mechanism with mechanical position indication
  - integrated low voltage compartment
  - interlocking unit
  - busbars
  - earthing bar
- Bottom unit, including
  - enclosure of busbar compartment

### Cubicle Accessories
- circuit breaker, vacuum- or SF6-type
- integrated voltage indicators or socket interface for portable indicators
- auxiliary contacts for close (2NO-2NC) and earth (2NO+2NC) position
- gas density indication with alarm contact for switch disconnector
- current transformers
- voltage transformers
- channel for control cables
- arc-gas channel
- anti condensation heater
- through-going earthing bar
- apparatus earthing bar

### Data SMC

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<td>[A]</td>
<td>630/800</td>
<td>630/800</td>
</tr>
<tr>
<td>Rated short-time withstand current</td>
<td>[kA]</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Max. rated duration of short circuit</td>
<td>[s]</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Cubicle dimensions</td>
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</table>
Uniswitch

Cubicle Types

**Bus Metering Cubicle, type BMC**

Metering cubicle, type BMC, is mainly used when medium voltage metering is required. DIN size VT’s and CT’s are available on right hand side of cubicle. Access into cable compartment is possible only when the interlocking unit is in the door open position.

**Basic equipment**

Top unit on left hand side, including
- integrated low voltage compartment
- interlocking unit
- busbars
- earthing bar
- bushings

Top unit on right hand side, including
- integrated low voltage compartment
- interlocking unit
- busbars
- bushings

Bottom unit, including
- enclosure of busbar compartment

**Cubicle Accessories**

- integrated voltage indicators or socket interface for portable indicators
- current transformers
- voltage transformers
- channel for control cables
- arc-gas channel
- anti condensation heater
- through-going earthing bar

**Data BMC**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>12</th>
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<th>24</th>
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<tr>
<td>Rated voltage [kV]</td>
<td>630</td>
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<td>630</td>
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<td>Rated current [A]</td>
<td>630</td>
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<td>630</td>
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<tr>
<td>Rated short-time withstand current [kA]</td>
<td>25</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Max. rated duration of short circuit [s]</td>
<td>2</td>
<td>3</td>
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</table>

* Cubicle dimensions:
  - width [mm]: 750
  - depth [mm]: 750
  - height [mm]: 1635/1885
Universal Metering Cubicle, type UMC

The Universal metering cubicle, type UMC, is used when special arrangements with medium voltage metering are required. The cubicle is very flexible and fulfills most customer requirements of metering and cable arrangements. Please see the available busbar configurations in the sketch below.

Thanks to a universal instrument transformer assembly device, different types of VT’s and CT’s are possible to install in the cubicle. To provide full flexibility, the busbars in the cubicle will be made to order, or by the customer. Access into the cable compartment is only possible when the interlocking unit is in the door open position.

Basic equipment
Top unit on left hand side, including:
- integrated low voltage compartment
- interlocking unit
- earthing bar
- bushings

Top unit on right hand side, including:
- integrated low voltage compartment
- interlocking unit
- bushings

Bottom unit, including:
- enclosure of busbar compartment
- instrument transformer assembly device

Cubicle Accessories
- integrated voltage indicators or socket interface for portable indicators
- current transformers
- voltage transformers
- channel for control cables
- arc-gas channel
- anti condensation heater
- through-going earthing bar

Data UMC

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>24 kV</th>
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<td>630/1250</td>
<td>630/1250</td>
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<td>Rated current</td>
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<td>[kA]</td>
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<tr>
<td>Max. rated duration of short circuit</td>
<td>[s]</td>
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<tr>
<td>- height</td>
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</table>

6 main configurations
5. Uniswitch
Components & Accessories

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Switch disconnector, type SFG

The switch disconnector, type SFG, has the following 3 positions:
- CLOSE
- OPEN
- EARTHING

The switch disconnector is using SF6 as extinguishing and insulation medium. The switch housing is equipped with two thermo plastic windows to allow visual inspection.

Each switch is sealed for life (i.e. 30 years) and maintenance free. The SFG switch incorporates a capacitive divider for voltage indication.

Switch types
- SFG with UES-K3 single spring operating mechanism
- SFG with UES-A3 double spring operating mechanism

Optional equipment
Auxiliary contacts:
- close position 2NO+2NC
- earth position 2NO+2NC

Shunt trip coil:
For SFG with UES-A3 operating mechanism.

Push-button for mechanical tripping of SFG with UES-A3 operating mechanism.

Motor operation: See item 5.3.
5.2 Uniswitch
Components & Accessories

Operating mechanism

UES-K3/10 single spring operating mechanism
The UES-K3/10 is used together with the switch disconnector type SFG and the cubicles of
- SDC
- CBC
- SEC
- SBC
- SMC

The same mechanism is used to operate the switch positions between OPEN – CLOSE and OPEN – EARTH. There has to be always the central interlocking module 1VFJ220030R2 fully assembled in the front of the UES-K3/10 during the operation.

The UES-K3/10 uses the energy stored in a flat spring to close and open the switch disconnector. The total operation angle is about 180° (90° + 90°). The switch disconnector is closed by a clockwise operation and the earthing switch is closed by an anti-clockwise operation.

The mechanism is maintenance free during whole lifetime (i.e. 30 years) in normal conditions. Mechanical endurance is 1000 C/O and 1000 O/Earth.

The UES-K3/10 can be equipped with motor operating device 1VFU110002R2. The opening time from the impulse is about 40 ms.

UES-A3/10 double spring operating mechanism
The UES-A3/10 is used together with the switch disconnector type SFG and the cubicles of SDF.

The same mechanism is used to operate the switch positions between OPEN – CLOSE and OPEN – EARTH.

The UES-A3/10 uses the energy stored in 2 flat springs. One (K-spring) to close and open the switch disconnector and another (A-spring) to rapidly open the switch disconnector.

The A-spring charges the K-spring. The A-spring is charged during the manual or motor operation from the open to the close position only once. During the operation the A-spring will be locked and not released before the impulse from the fuse, shunt trip-coil or mechanical push button. Before that the UES-A3/10 can be used similarly to UES-K3/10. The operation shaft has to be returned to the open position after the tripping.

The total manual operation angle is approximately 180° (90°+ 90°). The switch disconnector is closed by a clockwise operation and the earthing switch is closed by an anti-clockwise operation.

The mechanism is maintenance free during the whole lifetime (i.e. 30 years) in normal conditions. Mechanical endurance is 1000 C/O and 1000 O/Earth.

Central interlocking module
There is a new central interlocking module type 1VFJ220030R2 used in Uniswitch. The module is used to avoid any incorrect operations and to give more alternatives to interlock. Padlocks can be used to interlock. Can be equipped with a fast lock.

Position indication and operator interface module
Different colors of position indication labels are available. As a standard white color has been used in the module type 1VFJ120005R2.

Manual operation handle
To avoid any incorrect operations use the manual control handle type 1VFJ220002R2 only.
Motor operation of switch disconnector

For electrical or remote operation of the switch disconnector type SFG a motor operation device and a control unit are available for all cubicles.

The motor operating devices and the control unit are mounted in the low voltage compartment. They can be mounted without any additional parts.

The motor operating devices are DC operated and a rectifier is used when AC supply. For control of motor operating device 2NO+2NC aux. contacts on switch disconnector and earthing switch are required.

The motor operation device types when mechanism UES-K3/10 is used

**Standard voltages**
- 12 VDC
- 24 VDC
- 48 VDC
- 60 VDC
- 110 VDC
- 125 VDC
- 220 VDC

**Control**

Includes:
- open/close push buttons
- local/remote switch
Earthing Switches

The earthing switch for earthing parts of main circuits is incorporated in the switch disconnector SFG-three position switch. The earthing switch has double bladed moving knives. The fixed contacts are connected together (short-circuited) to a common earthing bar inside the switch housing. Outside the housing is an earthing terminal for connection to an earthing conductor.

The main earthing switch is incorporated in the switch disconnector SFG. The earthing switch has 3 double bladed moving knives. The fixed contacts are connected together to a common earthing bar inside the switch housing.

Fused switch disconnector cubicles are equipped with two earthing switches. Because the both ends of fuse links are earthed, the fuse links can be replaced by hands without any special tools.

The earthing switch, type EF, has reduced making capacity due to the fact that no full short circuit current can occur (Fuse down stream).

Earthing switch, type EM, is used for earthing of cable terminations in circuit breaker cubicles and when the main busbar earthing is needed.

All earthing switches have true position indicators through the front door and are operated by the main operating shaft in the front of the panel.

For fuse base (down stream)
EF 210

Earthing of cable terminations and busbar
EM 210

Optional equipment
– auxiliary contacts 2NO+2NC

Different configurations

Technical Data IEC 62271-102

<table>
<thead>
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<th>Rated voltage</th>
<th>12 kV</th>
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<td>62.5</td>
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Vacuum Circuit Breaker, VD4/S
Fixed version

The vacuum circuit breaker VD4/S has been specially designed for Uniswitch switchgear. The switching capacity is sufficient for any conditions arising from switching of the equipment as well as from system components under normal operating and fault conditions.

Vacuum circuit breakers have particular advantages for use in power systems where frequently switching with normal operating currents is required. VD4/S vacuum circuit breakers are equipped with a stored-energy spring mechanism suitable for normal operating sequence, and also for autoreclosing sequence (O-0.3s-CO-3min-CO). They have exceptionally high operating reliability and long life.

The breaker poles, designed in column form, include vacuum interrupters installed in tubular epoxy resin insulators.

The current-breaking process in a vacuum circuit breaker differs from all other CBs which use an arc quenching medium like oil or gas. After separation of the current-carrying contacts, the contact material has to generate the charge carriers by itself which are required to pass the current through the vacuum to the natural current zero. For normal currents up to about 10 kA this effect is characterized as “diffuse vacuum arc”. Without special measures contraction of the diffuse vacuum arc occurs at higher levels, which is resulting in overheating and overall erosion of the contacts. These effects will be avoided by magnetically forced motion of the plasma arc due to spiral contacts.

Due to the small contact gap and the conductivity of the vacuum arc the arc-drop voltage, and additionally due to the short arcing time, the associated arc energy is extremely low. This results in a long life of the vacuum interrupters and the vacuum circuit breakers.

Basic equipment
- manually charged mechanism
- shunt release + auxiliary switch
- auxiliary contacts, 1NO + 3NC
- auxiliary switch for fault annunciation

Optional equipment
- blocking magnet
- charging motor + auxiliary switch
- shunt release + auxiliary switch
- 2nd shunt release
- auxiliary switch (5 contacts)
- undervoltage release
- PR521 + 2/3 current sensors built in the circuit breaker.

Technical Data VD4/S

<table>
<thead>
<tr>
<th></th>
<th>12 kV</th>
<th>17.5 kV</th>
<th>24 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>12 kV</td>
<td>17.5 kV</td>
<td>24 kV</td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Rated lighting impulse withstand voltage [kV]</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage [kV]</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated current [A]</td>
<td>630/800</td>
<td>630/800</td>
<td>630</td>
</tr>
<tr>
<td>Rated short-circuit breaking current [kA]</td>
<td>12/16/20/25</td>
<td>12/16/20</td>
<td>12/16/20</td>
</tr>
<tr>
<td>Rated short-circuit making current [kA]</td>
<td>30/40/50/63</td>
<td>30/40/50</td>
<td>30/40/50</td>
</tr>
<tr>
<td>Rated short-circuit duration [s]</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pole centres [mm]</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
</tbody>
</table>
Vacuum Circuit Breaker, VD4/US
Withdrawable version

The new VD4/US are a synthesis of the renowned technology in designing and constructing vacuum interrupters embedded in resin poles, and of excellence in design, engineering and production of circuit breakers. The VD4/US medium voltage circuit breakers use vacuum interrupters embedded in resin poles. Embedding the interrupter in resin makes the circuit breaker poles particularly sturdy and protects the interrupter against shocks, accumulation of dust and humidity. The vacuum interrupter houses the contacts and makes up the interrupting chamber.

Basic equipment
- EL type manual operating mechanism
- Mechanical signalling device for closing springs charged/discharged
- Mechanical signalling device for circuit breaker open/closed
- Closing/Opening pushbutton
- Operation counter
- Set of ten circuit breaker open/closed auxiliary contacts
- Lever for manually charging the closing springs
- Isolating contacts
- Cord with connector (plug only) for auxiliary circuits
- Racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered).

Optional equipment
- Shunt opening release
- Additional shunt opening release
- Opening solenoid
- Shunt closing release
- Undervoltage release with power supply branched on the supply side
- Undervoltage release with electronic time delay device (0.5 - 1 - 1.5 - 2 - 3 s) (power supply branched on the supply side)
- Undervoltage release mechanical override
- Contact for signalling undervoltage energised/de-energised
- Set of 15 circuit breaker open/closed auxiliary contacts (alternative to the set of 10 contacts)
- Transient contact
- Position contact
- Spring-charging geared motor
- Contact for signalling closing springs charged/discharged
- Opening and closing pushbutton protection
- Opening and closing pushbutton padlocks
- Key lock in open position
- Locking magnet on the operating mechanism
- Locking magnet on truck.

Technical Data VD4/US

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value 12/24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage / Rated insulation voltage [kV]</td>
<td>12</td>
</tr>
<tr>
<td>Withstand voltage at 50 Hz [kV]</td>
<td>50</td>
</tr>
<tr>
<td>Impulse withstand voltage [kV]</td>
<td>125</td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td>50-60</td>
</tr>
<tr>
<td>Rated normal current [A]</td>
<td>630/1250</td>
</tr>
<tr>
<td>Rated breaking capacity [kA]</td>
<td>25</td>
</tr>
<tr>
<td>Rated short time withstand current (3s) [kA]</td>
<td>25</td>
</tr>
<tr>
<td>Making capacity [kA]</td>
<td>62.5</td>
</tr>
<tr>
<td>Pole centres [mm]</td>
<td>210</td>
</tr>
</tbody>
</table>
5.7 Uniswitch
Components & Accessories

SF6-Circuit Breaker, HD4/S, Fixed version

Description
HD4/S SF6 Medium voltage circuit breakers, specially designed for installation in Uniswitch cubicles, are equipped with right-hand operating mechanism. They use SF6 gas to extinguish the electric arc and as the insulating means. They are constructed using the separate pole technique. The operating mechanism is the ESH type with stored energy, free release, and with closing and opening independent of operator action. By adding electrical accessories, remote control is possible. Construction is compact, sturdy and of limited weight. The HD4/S are systems with lifelong sealed pressure (IEC 60056 Standards).

Main characteristics
No maintenance, high number of operations, long electrical and mechanical life, remote control, complete range of accessories and many possibilities of personalization, gas control device (on request), self-supplied overcurrent releases (on request), autoreclosing sequence O-0,3min-CO-3min-CO.

Optional equipment
– Shunt closing release
– Spring charging geared motor
– Undervoltage release
– Locks on operating push-buttons
– PR521 + 2/3 current sensors built in the circuit breaker.

Breaking technique
SF6 is an inert gas with excellent insulating properties. Thanks to its special thermal and chemical stability, SF6 maintains its characteristics over the long term, ensuring a high level of reliability of the circuit breakers.

The blasting and cooling effect of SF6 and the special shape of the contacts, gradually quenches the electric arc and rapidly restores the dielectric properties, without re-ignition. This process results in very low over-voltage values and short arc duration. These characteristics make HD4/S the ideal circuit breaker in M.V. distribution substations.

Basic equipment
– Connection terminals
– Manual operating mechanism
– Mechanical indicator for closing and opening springs (charged/discharged)
– Mechanical indicator for circuit breaker open/closed
– Closing and opening push-buttons
– Operation counter
– Connector (plug) for auxiliary circuits
– Key lock
– Spring charging lever
– Shunt opening release
– Group of auxiliary open/closed contacts.

Technical Data HD4/S

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>12 kV</th>
<th>17.5 kV</th>
<th>24 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated frequency</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Rated lighting impulse withstand voltage</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>630/800</td>
<td>630/800</td>
<td>630</td>
</tr>
<tr>
<td>Rated short-circuit breaking current</td>
<td>12/16/20/25</td>
<td>12/16/20</td>
<td>12/16/20</td>
</tr>
<tr>
<td>Rated short-circuit making current</td>
<td>30/40/50/63</td>
<td>30/40/50</td>
<td>30/40/50</td>
</tr>
<tr>
<td>Rated short-circuit duration</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pole centres</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
</tbody>
</table>

Two Level pressure switch
First level - intervention for low pressure
The indication is given when the gas pressure drops from 380 kPa absolute to a value under 310 kPa absolute.

Second level - intervention for insufficient pressure
The indication is given when the gas pressure drops to below 280 kPa absolute.

Circuit-breaker locking device (with/without lamps) for insufficient SF6 gas pressure
This device can only be supplied for circuitbreakers provided with a pressure switch. The locking circuit is an optional application and can only be installed by ABB.

The following configurations are available:
A - Circuit for automatic circuit-breaker opening and lock in the open position; version without signalling lamps.
B - Circuit for locking the circuit-breaker in the position it is found in; version without signalling lamps.
C - Circuit for automatic circuit-breaker opening; version with three signalling lamps.
D - Circuit for locking the circuit-breaker in the position it is found in; version with three signalling lamps.

Breaking technique
SF6 is an inert gas with excellent insulating properties. Thanks to its special thermal and chemical stability, SF6 maintains its characteristics over the long term, ensuring a high level of reliability of the circuit breakers.

The blasting and cooling effect of SF6 and the special shape of the contacts, gradually quenches the electric arc and rapidly restores the dielectric properties, without re-ignition. This process results in very low over-voltage values and short arc duration. These characteristics make HD4/S the ideal circuit breaker in M.V. distribution substations.

Basic equipment
– Connection terminals
– Manual operating mechanism
– Mechanical indicator for closing and opening springs (charged/discharged)
– Mechanical indicator for circuit breaker open/closed
– Closing and opening push-buttons
– Operation counter
– Connector (plug) for auxiliary circuits
– Key lock
– Spring charging lever
– Shunt opening release
– Group of auxiliary open/closed contacts.

Optional equipment
– Shunt closing release
– Spring charging geared motor
– Undervoltage release
– Locks on operating push-buttons
– PR521 + 2/3 current sensors built in the circuit breaker.

Technical Data HD4/S

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>12 kV</th>
<th>17.5 kV</th>
<th>24 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated frequency</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Rated lighting impulse withstand voltage</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Rated current</td>
<td>630/800</td>
<td>630/800</td>
<td>630</td>
</tr>
<tr>
<td>Rated short-circuit breaking current</td>
<td>12/16/20/25</td>
<td>12/16/20</td>
<td>12/16/20</td>
</tr>
<tr>
<td>Rated short-circuit making current</td>
<td>30/40/50/63</td>
<td>30/40/50</td>
<td>30/40/50</td>
</tr>
<tr>
<td>Rated short-circuit duration</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pole centres</td>
<td>210</td>
<td>210</td>
<td>210</td>
</tr>
</tbody>
</table>
SF6 Circuit Breaker, HD4/US
Withdrawable version

HD4/US medium voltage circuit breakers use sulphur hexafluoride gas (SF6) to extinguish the electric arc and as the insulating medium. Breaking in SF6 gas takes place without any arc chopping and without generation of overvoltages. These characteristics ensure long electrical life of the circuit breaker and limited dynamic, dielectric and thermal stresses on the installation.

The circuit breaker poles are systems with lifelong sealed pressure (IEC 62271-100 Standards) and are maintenance-free.

Basic equipment
- Manual operating mechanism
- Mechanical signalling device for closing springs charged/discharged
- Mechanical signalling device for circuit breaker open/closed
- Closing / Opening pushbutton
- Operation counter
- Set of ten open/closed circuit breaker auxiliary contacts (four opening (NC) and three closing (NO) available)
- Lever for manually charging the closing springs (quantity to be define)
- Isolating contacts
- Cord with connector (plug only) for auxiliary circuits
- Racking-in/out lever

Optional equipment
- Shunt opening release
- Additional shunt opening release
- Opening solenoid with demagnetisation
- Shunt closing release
- Undervoltage release
- Undervoltage release with electronic delay device (0.5 – 1 – 1.5 – 2 – 3 s)
- Mechanical override of undervoltage release trip with electrical signalling.
- Undervoltage release electric signalling
- Alternative set of 15 circuit-breaker open/closed auxiliary contacts (alternative to the set of 10 contacts)
- Transient contact
- Position contact
- Spring-charging geared motor
- Thermomagnetic protection of the motor
- Electrical signalling of operating mechanism springs charged/discharged.
- Opening pushbutton lock
- Closing pushbutton lock
- Key lock for circuit breaker open
- Operating mechanism locking magnet
- Truck locking magnet
- Two-level pressure switch gas control device
- Two-level pressure switch gas control device with three LEDs and additional shunt opening release: circuit breaker opening and lock on closing
- Two-level pressure switch gas control device with three LEDs: circuit breaker locking in the position it is found in.

Technical Data HD4/US

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HD4/US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage / Rated insulation voltage [kV]</td>
<td>12 24</td>
</tr>
<tr>
<td>Withstand voltage at 50 Hz [kV]</td>
<td>50 50</td>
</tr>
<tr>
<td>Impulse withstand voltage [kV]</td>
<td>125 125</td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td>50-60 50-60</td>
</tr>
<tr>
<td>Rated normal current [A]</td>
<td>630/1250 630/1250</td>
</tr>
<tr>
<td>Rated breaking capacity [kA]</td>
<td>25 20</td>
</tr>
<tr>
<td>Rated short time withstand current (3s) [kA]</td>
<td>25 20</td>
</tr>
<tr>
<td>Making capacity [kA]</td>
<td>62.5 50</td>
</tr>
<tr>
<td>Pole centres [mm]</td>
<td>210 210</td>
</tr>
</tbody>
</table>
The Uniswitch system is designed for HRC-fuses according to IEC Publication 282-1. The dimensions are in accordance to DIN 43625 with length «e» 292 mm for 12 kV and 442 mm for 24 kV. To select and order fuse for the transformer protection see table below.

The lower fuse contacts are mounted on the insulators. These insulators can be selected with or without capacitive voltage transmitters. The upper fuse contact with fuse tripping release is fixed directly on the switch disconnector.

Medium voltage - HRC fuse links

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage kV</th>
<th>Rated current A</th>
<th>e/d mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEF</td>
<td>12</td>
<td>6, 10, 16, 25, 40, 50, 63</td>
<td>292/65, 292/65, 292/65, 292/65, 292/65, 292/65, 292/65</td>
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<tr>
<td></td>
<td>80, 100, 125</td>
<td></td>
<td>292/87, 292/87, 442/87</td>
</tr>
<tr>
<td>CEF</td>
<td>17.5</td>
<td>6, 10, 16, 25, 40, 50, 63</td>
<td>292/65, 292/65, 292/65, 292/65, 292/65, 292/65, 292/65</td>
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<tr>
<td></td>
<td>80, 100</td>
<td></td>
<td>442/87, 442/87</td>
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<tr>
<td>CEF</td>
<td>24</td>
<td>6, 10, 16, 25, 40, 50, 63</td>
<td>442/65, 442/65, 442/65, 442/65, 442/65, 442/65, 442/65</td>
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<tr>
<td></td>
<td>80, 100</td>
<td></td>
<td>442/87, 442/87</td>
</tr>
</tbody>
</table>

Selection of fuses: According to IEC 60420

<table>
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<tr>
<th>Transformer rating [kVA]</th>
<th>57</th>
<th>75</th>
<th>100</th>
<th>125</th>
<th>160</th>
<th>200</th>
<th>250</th>
<th>315</th>
<th>400</th>
<th>500</th>
<th>630</th>
<th>800</th>
<th>1000</th>
<th>1250</th>
<th>1600</th>
<th>2000</th>
<th>2500</th>
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</thead>
<tbody>
<tr>
<td>Fuse selection (ratings in Amps)</td>
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<td>16</td>
<td>16</td>
<td>10</td>
<td>12</td>
<td>15</td>
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</tbody>
</table>

1) Unique ratings on request
### Current transformers

<table>
<thead>
<tr>
<th>Un kV</th>
<th>BIL kV</th>
<th>Basic dimensions</th>
<th>Transformer type</th>
<th>Drawing number</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>75</td>
<td>DIN 42600 T8</td>
<td>TPU 4x.xx</td>
<td>1VL 44614040</td>
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<tr>
<td></td>
<td></td>
<td>(DIN 42600 - SSB 12)</td>
<td></td>
<td>1VL 44614050</td>
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<td>17.5</td>
<td>95</td>
<td>DIN 42600 T8</td>
<td>TPU 5x.xx</td>
<td>1VL 44614590</td>
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<tr>
<td></td>
<td></td>
<td>(DIN 42600 - SSB 12)</td>
<td></td>
<td>1VL 44614600</td>
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<tr>
<td>24</td>
<td>125</td>
<td>DIN 42600 T8</td>
<td>TPU 6x.xx</td>
<td>1VL 44615040</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(DIN 42600 - SSB 24)</td>
<td></td>
<td>1VL 44615050</td>
</tr>
</tbody>
</table>

1) Primary terminal P1 near the secondary terminal box (normal polarity)

2) Primary terminal P2 near the secondary terminal box (inverted polarity)

### 1-core current transformers, 12-24 kV, 50 Hz (60 Hz)

- Single ratio with secondary current 1 A or 5 A
- Extended primary current value: 120 %
- Alternative classes: 0.5, 10 VA, 5P10, 10 VA, 5P20, 10 VA

<table>
<thead>
<tr>
<th>Ip (A)</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>500</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ith (kA 1s)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Ith (kA 3s)</td>
<td>6.3</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### 2-core current transformers, 12-24 kV, 50 Hz (60 Hz)

- Single ratio with secondary current 1 A or 5 A
- Extended primary current value: 120 %
- Core 1: class 0.5, 10 VA
- Core 2: class 5P10, 10 VA
- Alternatively: 5P20, 5 VA

<table>
<thead>
<tr>
<th>Ip (A)</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>300</th>
<th>500</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ith (kA 1s)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Ith (kA 3s)</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### KOLMA

Transformer KOLMA is suitable for the measurement of the sum of three-phase current in a 3-phase cable. Under normal operating conditions this sum is zero. In the event of an earth-fault the sum of the currents are equal to the earth-fault current and a corresponding current flows in the secondary.

This transformer is used together with static earth-fault relays. The cable current transformer can generally be used when measuring the residual current e.g. to prewarn of, or locate an earth-fault.

- Window diameter: 180 mm
- Construction: Ring core, multi-cap secondary
- Secondaries: 100/1A 2.0 VA 10P10, 150/1A 4.0 VA 10P10
Voltage transformers

Guaranteed max. data for voltage transformers 50 Hz (60 Hz)

Single pole insulated (phase-to-earth) voltage transformers are available in three sizes:

- 12 kV, 17.5 kV and 24 kV. They can be built for most primary voltages between 1:√3 kV and 22:√3 kV and for all normal secondary voltages; e.g., 100:√3 V, 110:√3 V, 115:√3 V and 120:√3 V.

The voltage transformers type TJC must be connected to the primary using the HV connecting cable KREZ 15, when using single pole insulated voltage transformers.

Notes:
Frequency: 50 Hz
Ambient temperature: 40 °C
Standard IEC 60044-2

<table>
<thead>
<tr>
<th>Type</th>
<th>TJC 4</th>
<th>TJC 5</th>
<th>TJC 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary voltage</td>
<td>3000:√3 to 12000:√3</td>
<td>3000:√3 to 15000:√3</td>
<td>3000:√3 to 24000:√3</td>
</tr>
<tr>
<td>Terminal marking</td>
<td>A-N</td>
<td>A-N</td>
<td>A-N</td>
</tr>
<tr>
<td>Max. number of sec. windings</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Winding</td>
<td>Measuring winding</td>
<td>Residual winding</td>
<td>Measuring winding</td>
</tr>
<tr>
<td>Secondary voltage</td>
<td>100:√3 or 110:√3</td>
<td>100:3 or 110:3</td>
<td>100:√3 or 110:√3</td>
</tr>
<tr>
<td>Terminal marking</td>
<td>a-n</td>
<td>da-dn</td>
<td>a-n</td>
</tr>
<tr>
<td>Accuracy class</td>
<td>0.2, 0.5, 1, 3</td>
<td>3P, 6P</td>
<td>0.2, 0.5, 1, 3</td>
</tr>
<tr>
<td>Rated burden max. VA 1) when earth fault winding fitted</td>
<td>25, 50, 100, 150</td>
<td>50, 100</td>
<td>25, 50, 100, 150</td>
</tr>
<tr>
<td>Secondary thermal limiting current</td>
<td>U = 1.2 x Un</td>
<td>-</td>
<td>U = 1.2 x Un</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

1) Valid for single measuring winding only.

Available outputs for double measuring windings are calculated on request.
Uniswitch
Components & Accessories

Sensor Technology

The protection and monitoring in switchgear today, is many times based on equipment with digital technologies with a very low power consumption on the input.

This enables the use of sensor technology in Uniswitch instead of conventional current transformers and voltage transformers.

The current sensors are based on the Rogowski coil – a magnetic current transducer – in which the iron core has been replaced by non-magnetic material.

The measuring principle for voltage measurement is based on a resistive or capacitive voltage divider, which results in a wide dynamic range and high linearity.

The signal produced by the sensors can easily be verified by an off-the-shelf multimeter. As a result, the sensors ensure high protection performance throughout the whole range without saturation.

The sensor technology also makes it possible to integrate both the current and the voltage sensors in the same compact cast resin part, as a combi sensor.

With their remarkably low measuring signals (between 0 to 10 VAC), the sensors reduce the risk of component break-downs and grid shutdowns. They are also resistant to secondary short circuits and open windings, and are not prone to ferroresonance.

Another positive feature of the sensor is the limited number of types, basically only a few types for all applications. This feature will reduce delivery times, as the sensors do not need to be produced especially for each switchgear.

Combi / current sensor KEVCD

Highest voltage for equipment 12 - 17.5 - 24 kV
Max. continuous thermal current 1250 A

Current measurement
Rated primary current 80 - 240 - 640 A
Rated output voltage 0.150 V

Voltage measurement
Rated division ratio 10 000 / 1 (can be excluded)

Coupling electrode for voltage indication is always included.
Protection relays and feeder terminals

A wide range of secondary control & protection equipment is available for the Uniswitch switchgear range, from the simplest self-powered protection relays to advanced protection, monitoring and controlling devices.

Protection relays

ABB offers a wide range of protection schemes from simple protection relays to more versatile feeder protection. The ABB relays have worldwide references and have been used for a long time. The reputation for reliability and secure operation is excellent. The use of sensors is possible in this range (REX type). The relays in this range require auxiliary power.

Selfpowered protection relays

The most economical protection solution is achieved through the use of selfpowered relays. As the current transformers power the protection relay there is no need for external power supply. The selfpowered relays are excellent for use in rough conditions and places without auxiliary supply. The adjustment of protection parameters is simple and quick. Both the ABB range as well as other manufacturer’s relays can be supplied.

Feeder terminals

The most comprehensive protection, monitoring and control functions are offered with the ABB feeder terminals. The feeder terminals offer configurable protection and control schemes and a possibility to use sensors, if so requested. The relays in this range require auxiliary power.

Sensor technology

For protection, control, measurement and supervision with sensor technology we can offer the Feeder Terminal serie REX 521, REF 541, REF 542+, REF 543 and REF 545 of ABB.
## Relays

<table>
<thead>
<tr>
<th>Type of faults</th>
<th>IEEE device No.</th>
<th>IEC Symbols</th>
<th>Protection function</th>
<th>SPAA C 121</th>
<th>SPAA C 341</th>
<th>SPAJ (C 140)</th>
<th>SPAU 130</th>
<th>SPAM C150</th>
<th>PR 512 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short circuits</strong></td>
<td>51</td>
<td>3 l &gt;</td>
<td>Three-phase non-directional overcurrent, low-set stage</td>
<td>X</td>
<td>X (X)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 / 51 / 51B</td>
<td>3 l &gt;&gt;</td>
<td>Three-phase non-directional overcurrent, high-set stage</td>
<td>X</td>
<td>X (X)</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>50 / 51B</td>
<td>3 l &gt;&gt;&gt;</td>
<td>Three-phase non-directional overcurrent, high-set stage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>2 l &gt;</td>
<td>Two-phase non-directional overcurrent, low-set stage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 / 51</td>
<td>2 l &gt;&gt;</td>
<td>Two-phase non-directional overcurrent, high-set stage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Earth fault</strong></td>
<td>51N</td>
<td>l o &gt;</td>
<td>Non-directional earth-fault, low-set stage, coarse, ( I_n = 1 ) A and 5 A</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>51N</td>
<td>l o &gt;/ SEF</td>
<td>Non-directional earth-fault, low-set stage, sensitive, ( I_n = 0.2 ) A and 1 A</td>
<td></td>
<td></td>
<td>(X)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50N / 51N</td>
<td>l o &gt;&gt;/ l o-o &gt;</td>
<td>Non-directional earth-fault, high-set stage</td>
<td>X</td>
<td>X (X)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>67N</td>
<td>l o &gt;&gt;-/ SEF</td>
<td>Directional earth-fault, low-set stage, sensitive, ( I_n = 0.2 ) A and 5 A</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>67N</td>
<td>l o &gt;&gt;</td>
<td>Directional earth-fault, high-set stage</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59N</td>
<td>u o &gt;</td>
<td>Residual overvoltage, low-set stage</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59N</td>
<td>u o &gt;&gt;</td>
<td>Residual overvoltage, high-set stage</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59N</td>
<td>u o &gt;&gt;&gt;</td>
<td>Residual overvoltage, instantaneous stage</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overload</strong></td>
<td>49M</td>
<td>3</td>
<td>Three-phase thermal overload (motors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 3)</td>
</tr>
<tr>
<td><strong>Over-/under-voltage</strong></td>
<td>59</td>
<td>3 u &gt;</td>
<td>Three-phase overvoltage, low-set stage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 2)</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>3 u &lt;</td>
<td>Three-phase undervoltage, low-set stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 2)</td>
</tr>
<tr>
<td><strong>Additional functions</strong></td>
<td>79</td>
<td>o → i</td>
<td>Auto-recloser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>Δ i &gt;</td>
<td>Phase discontinuity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>62BF</td>
<td>CBFP</td>
<td>Circuit breaker failure</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>(X)</td>
</tr>
<tr>
<td></td>
<td>48 / 51</td>
<td>l s, i &gt; l s / i s</td>
<td>Start-up supervision (locked rotor, multiple starts)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X 4)</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>n &lt;</td>
<td>Start-up supervision using speed device</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>3 l &lt;</td>
<td>Loss of load / under current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### Type of measurement

<table>
<thead>
<tr>
<th>Current</th>
<th>Protected current function</th>
<th>SPAA C 121</th>
<th>SPAA C 341</th>
<th>SPAJ (C 140)</th>
<th>SPAU 130</th>
<th>SPAM C150</th>
<th>PR 512 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 l / 2 l</td>
<td>Three-phase / two-phase current</td>
<td>X</td>
<td>X</td>
<td>X (X)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>l o</td>
<td>Neutral current</td>
<td></td>
<td>X</td>
<td>X (X)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Δ i</td>
<td>Degree of unbalance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Protective voltage function</th>
<th>SPAA C 121</th>
<th>SPAA C 341</th>
<th>SPAJ (C 140)</th>
<th>SPAU 130</th>
<th>SPAM C150</th>
<th>PR 512 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 u</td>
<td>Three-phase voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>u o</td>
<td>Residual voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

1) Can be used instead of directional earth-fault current stage
2) Single-phase operation selectable
3) Also applicable for small distribution transformers and small and medium sized generators and feeders
4) Can be used as additional overcurrent stage, if start-up supervision not needed
5) Only available with SF6 circuit breaker, equipped with additional opening solenoid and two or three current sensors
The Uniswitch system contains an integrated low voltage compartment which is segregated from the high voltage side by a metal partition.

For 750 mm wide cubicles the LV compartment consists of two 375 mm compartments. The left side is reserved for relays, meters, switches and push buttons. The right side compartment’s lower side is reserved for the SFG switch disconnector’s operating device.

For 375 mm and 500 mm wide cubicles the LV compartments upper side is reserved for terminals. The lower side for the SFG switch disconnector’s operating device.

The withdrawable CB cubicles, CBW & SBW have an 800 mm wide low voltage compartment, with more space for secondary apparatus.

An additional low voltage compartment placed on top of the cubicle is also available for all cubicle types.

The pictures on the left show examples of how the components can be arranged in the low voltage compartment.

**Measurements**

CBW, SBW \((W \times H \times D)\)
800 x 580 x 180 mm

Other \((W \times H \times D)\)
375/500 x 580 x 120 mm

Additional LV-box
375/500/750/800 x 390 x 390 mm
5.16 Uniswitch

Components & Accessories

Voltage Presence Indicating System (VPIS)

Capacitive voltage presence indicating system for Uniswitch ≥ 6 kV in accordance with IEC 61958.

A complete system consists of:

– 1 integrated voltage indicator (CL-497) or 1 interface with sockets (CL-498) and portable indicator
– 3 connecting cables including measuring circuit components and voltage limiting devices
Control cable entries

In the basic cubicle the control cable entry is in the bottom (1). An internal cable duct 30 x 60 mm is supporting the cable from the bottom up to the upper part (TopUnit). Internal wiring between cubicles (5) is easily done through openings in side walls.

Several options are available (2, 3, 4, 6) for control cable inlet.

(2) At both ends of the switchgear, it is possible to have side ducts mounted.

(3) A duct can also be placed on top of the switchgear supporting cables coming from e.g. overhead cable ladder (4).
Arc gas channel

To ventilate the arc-gas out in a certain direction, arc-gas channels are available for the Uniswitch system. Vertical channel (1) on the rear of each cubicle has been connected to a common horizontal channel (2) on the top of the switchgear. The horizontal channel has been connected to an opening (3) in the wall of the switchgear room. The connecting point from channel (2) to the opening will be located in the rear or in the end of the top channel (2). The opening (3) has been equipped with a pressure relief flap.
6. Uniswitch

Technical data / Cubicle Dimensions

Cubicle dimensions

Main dimensions and the need of space of cubicles.

Main dimensions and the need of space of circuit breaker cubicle.

Main dimensions and the need of space of withdrawable circuit breaker cubicle.

Cubicle types:

- SDC
- SDF
- DBC
- BRC
- SEC
- BMC
- SMD
- SEF
- UMC

Cubicle types:

- CBC
- SMC
- SBC

Cubicle types:

- CBW
- SBW
Cable arrangement

Information regarding cable arrangement is available in installation manual.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>By H 1635 = 980 mm</td>
<td>By H 1885 = 1230 mm</td>
</tr>
<tr>
<td></td>
<td>By H 2635 = 400 mm</td>
<td>By H 1885 = 650 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>12/17.5 kV = 605 mm</td>
<td>12 kV = 400 mm</td>
</tr>
<tr>
<td></td>
<td>24 kV = 455 mm</td>
<td>24 kV = 650 mm</td>
</tr>
<tr>
<td></td>
<td>By H 1885 = 855 mm</td>
<td>By H 1850 = 705 mm</td>
</tr>
</tbody>
</table>

Information regarding cable arrangement is available in installation manual.
Information regarding cable arrangement is available in installation manual.
## Technical data

<table>
<thead>
<tr>
<th>Rated voltage Ur</th>
<th>kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- common value kV</td>
<td>75</td>
<td>95</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>- across the isolating distance</td>
<td>85</td>
<td>110</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td><strong>AC withstand voltage</strong></td>
<td>kV</td>
<td>28</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>- common value</td>
<td>28</td>
<td>38</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>- across the isolating distance</td>
<td>32</td>
<td>45</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td><strong>Rated frequency</strong></td>
<td>Hz</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td><strong>Rated current</strong></td>
<td>A</td>
<td>630/1250</td>
<td>630/1250</td>
<td>630/1250</td>
</tr>
<tr>
<td>- busbar</td>
<td>A</td>
<td>630/800/1250</td>
<td>630/800/1250</td>
<td>630/800/1250</td>
</tr>
<tr>
<td>- feeder</td>
<td>A</td>
<td>630/1250</td>
<td>630/1250</td>
<td>630/1250</td>
</tr>
<tr>
<td><strong>Rated short-time withstand current</strong></td>
<td>kA</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>- main circuit</td>
<td>kA</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>- earthing circuit</td>
<td>kA</td>
<td>25</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Rated peak withstand current</strong></td>
<td>kA</td>
<td>65</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Rated duration of short circuit</strong></td>
<td>s</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Arc-fault current, 1s</strong></td>
<td>kA</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Degree of protection, enclosure</strong></td>
<td>IP2XC</td>
<td>IP2XC</td>
<td>IP2XC</td>
<td></td>
</tr>
<tr>
<td><strong>Degree of protection, partitions</strong></td>
<td>IP2X</td>
<td>IP2X</td>
<td>IP2X</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>°C</td>
<td>+40</td>
<td>+40</td>
<td>+40</td>
</tr>
<tr>
<td>- maximum value</td>
<td>°C</td>
<td>+35</td>
<td>+35</td>
<td>+35</td>
</tr>
<tr>
<td>- minimum value</td>
<td>°C</td>
<td>-5</td>
<td>-5</td>
<td>-5</td>
</tr>
<tr>
<td><strong>Altitude above sea level</strong></td>
<td>m</td>
<td>≤1000</td>
<td>≤1000</td>
<td>≤1000</td>
</tr>
</tbody>
</table>

1) Higher values in accordance with national standards on request
2) Adjustment is necessary for greater altitudes
3) Lower ambient temperature on request.
4) 1250 A = CBW, SBW, BRC, DBC
Tests and Certificates

Type test according to IEC 60298 and certificated by SATS
Routine test IEC 60298
Quality certificate ISO 9001
Environmental certificate ISO 14001.

Weights (without packing)

<table>
<thead>
<tr>
<th>Dimensions: (W x H mm)</th>
<th>SDC 1)</th>
<th>SDF 2)</th>
<th>CBC 1) 3)</th>
<th>CBW 4)</th>
<th>DBC 1)</th>
<th>BRC1)</th>
<th>SEC1)</th>
<th>SEF 2)</th>
<th>SBC 1) 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>375 x 1635 [kg]</td>
<td>130</td>
<td>140</td>
<td>–</td>
<td>–</td>
<td>110</td>
<td>140</td>
<td>140</td>
<td>150</td>
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<tr>
<td>375 x 1885 [kg]</td>
<td>140</td>
<td>150</td>
<td>–</td>
<td>–</td>
<td>120</td>
<td>150</td>
<td>150</td>
<td>160</td>
<td>–</td>
</tr>
<tr>
<td>500 x 1635 [kg]</td>
<td>140</td>
<td>150</td>
<td>–</td>
<td>–</td>
<td>120</td>
<td>150</td>
<td>150</td>
<td>160</td>
<td>–</td>
</tr>
<tr>
<td>500 x 1885 [kg]</td>
<td>150</td>
<td>160</td>
<td>–</td>
<td>–</td>
<td>130</td>
<td>160</td>
<td>160</td>
<td>170</td>
<td>–</td>
</tr>
<tr>
<td>750 x 1635 [kg]</td>
<td>–</td>
<td>–</td>
<td>420</td>
<td>–</td>
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<tr>
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<td>650</td>
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<th>Dimensions: (W x H mm)</th>
<th>SBW 4)</th>
<th>SMD 1)</th>
<th>SMC 1) 3)</th>
<th>BMC1)</th>
<th>UMC 1)</th>
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<td>375 x 1635 [kg]</td>
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<td>375 x 1885 [kg]</td>
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<tr>
<td>500 x 1635 [kg]</td>
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<td>500 x 1885 [kg]</td>
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<td>750 x 1635 [kg]</td>
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<td>290</td>
<td>220</td>
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<tr>
<td>750 x 1885 [kg]</td>
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<tr>
<td>800 x 1885 [kg]</td>
<td>680</td>
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</tbody>
</table>

1) without CT’s and VT’s
2) without fuses
3) without circuit breaker
4) with circuit breaker and CT’s

Circuit breakers:
- VD4/S 103 kg
- VD4/US 115 kg
- HD4/S 103 kg
- HD4/US 125 kg

Transformers:
- 12/17.5 kV 25 kg
- 24 kV 30 kg
Information given in this publication is generally applicable to equipment described. Changes may be made in future without notice.