

# SSP Pantograph System Disconnecter

*The specialists*



In service since 1954 (3000 3-pole installed since then), the Pantograph System

Disconnect (SSP) is a device for vertical disconnection that separates 2 stacked horizontal layers.

### Advantages of the conventional pantograph system

- Small floor dimensions.
- Maintenance is possible on the entire disconnector while the upper busbar is live.

### ... plus specific advantages

Above 170 kV, there are specific advantages, which are the result of a unique design:

- electrical and mechanical functions are dissociated when coming into contact with the upper bar,
- reduced device dimensions (the arm's movement only works sideways) which decreases the phase to phase clearance in most cases,
- high connection latitude to upper contact which allows for a large sensing range on conductors (flexible and tubular),
- electrical joints divided by two,
- balancing system is lodged in the lower half arm (13), which simplifies and lightens the upper frame (18).

It has same technology as the OH disconnector (horizontal break) with which it shares most of its parts.

The result of our know-how and our experience, this line of switchgear distinguishes itself through its **simplicity and sturdiness**, and allows for better management of replacement spare parts and operating staff training.



## Construction details



### Main contact dependability

#### Dissociated kinematics

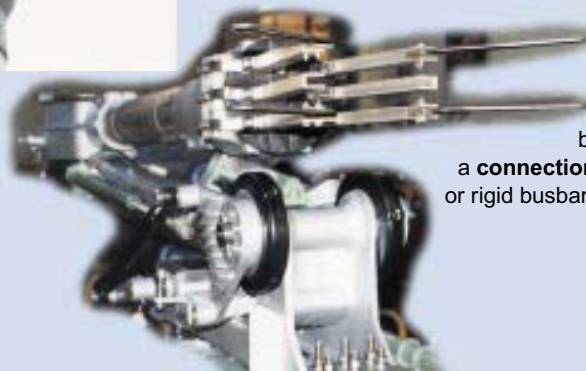
This dependability is ensured by a **physical separation of the mechanical and electrical functions**. Balancing systems and systems that pressurise clamps are located inside the upper half arm; once completed the main contact pressure remains perfect whatever the service conditions may be, and it is independent from the disconnector's general movement transmission mechanism.

#### Improved short-circuit performances

When a short-circuit flows through it, electrodynamic forces are used to raise the pressure of the contact fingers on the current connection bar. The tubular design of the live part also prevents the appearance of internal electrodynamic forces.

#### Increased connection latitude

During disconnector closing, contact clamps remain wide open; pressurisation takes place at the end of stroke, upon arrival on the upper bar; this gives the disconnector a **connection latitude that is adapted** to all flexible or rigid busbar installation types.



## Operating principle

### The insulating rod transmits the movement to the lower arm

- Supported by a single insulator (17), the knee-type unit moves along a vertical plane.
- A 90° rotation of the insulating rod (16) transmits the movement to the lower arm (13) through a taper coupling (15) and the crank-rod system (14).

### Locked in the closed position

- The device is locked in the closed position when the system moves past the dead centre (14).

### Transmission of the movement to the upper tube

- The upper arm's movement is controlled by a rack and pinion unit (11).

### Balancing the entire unit

- A spring (12) ensures constant balance so as to reduce the operating torque, when the device opens or closes.

### Contact pressure ensured by a spring (5)

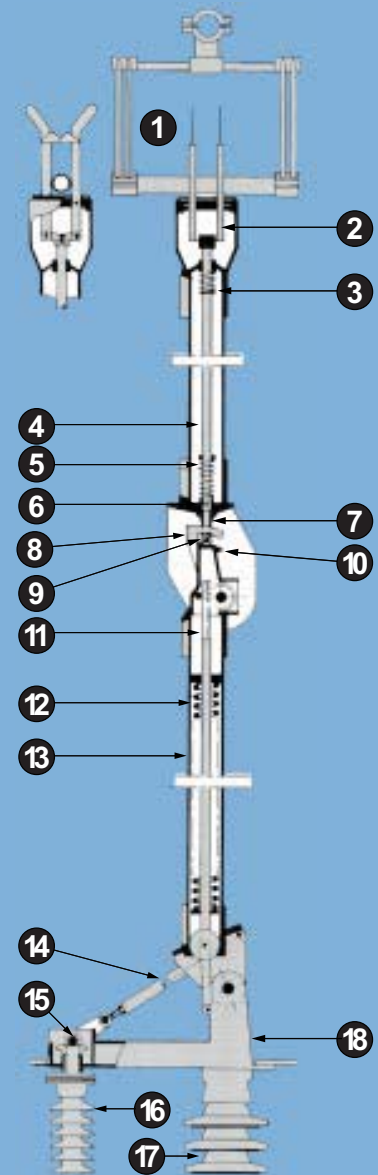
- At the end of closing, the roller (9) moves up the ramp (10) and lodges in a recess, which puts pressure on the spring (5) by means of the clevis (7). By pressing on the control rod (4), this spring enables the clamps to be tightened (2) and ensures high contact pressure on the fixed contact (1).

### Opening of clamps ensured by a spring (3)

- When the device opens, and the roller leaves its recess and the ramp, the spring (3) releases the control rod and allows the clamps to open.

### Opening of the device under ice

- In the case of frost or ice, the hook (8) acts as an ice breaking device pulling forcibly the clevis (7) which pulls the control rod (4) by means of the mechanical pin (6).



## Advanced technology for rubbing contacts

### Dependability of the electrical link

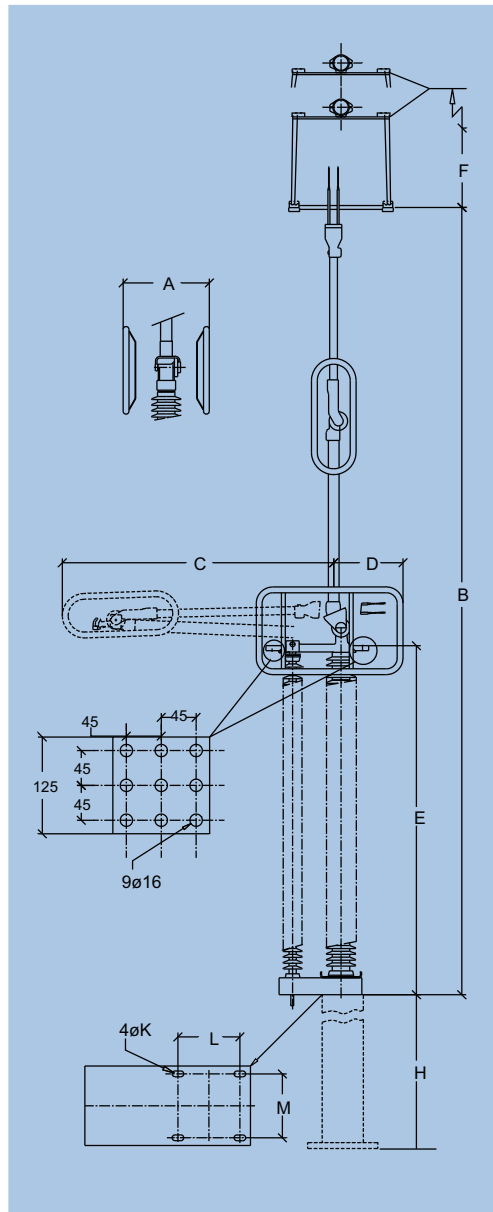
The contact system using conic pions via a point contact ensures a permanent electrical link between rotating conductive parts. Each pion is kept under pressure using an independent spring. Their number has been studied to diminish the repulsion effect when a short-circuit occurs (performance is 187 kA).

The insulated enclosure prevents the current from being transmitted by the springs, and the ventilation system enables the entire unit to withstand high temperatures.

### Maintenance-free contact

The contacts are self-cleaning (maintenance-free) and do not show any wear after 10 000 operating cycles; return experience on all fitted out devices (SSP and OH), is entirely satisfactory throughout the world. 30 successful years with EDF (Electricity of France).





SSP						
<b>U<sub>R</sub> (Un) (kV)</b>	170	245	360	420	550	800
<b>U<sub>p</sub> (BIL) across isolating distance (kV)</b>	860	1200	1175 (+205)	1425 (+240)	1550 (+315)	2100 (+455)
<b>U<sub>p</sub> (BIL) to earth (kV)</b>	750	1050	1175	1425	1550	2100
<b>U<sub>S</sub> (SIL) across isolating distance (kV)</b>			900 (+345)	900 (+345)	900 (+450)	1100 (+650)
<b>U<sub>S</sub> (SIL) to earth (kV)</b>			950	1050	1175	1425
<b>I<sub>r</sub> (In) (A)</b>	up to 4000 A					
<b>I<sub>k</sub> (Isc) (kA)</b>	from 31,5 kA/3 s to 63 kA/3 s/160peak					
Dimensions (mm)						
<b>A</b>		670	890	890	890	890
<b>B</b>	4235	5660	6890	7800	8950	10725
<b>C</b>	1100	1735	2330	2580	2880	3270
<b>D</b>	670	655	640	640	640	705
<b>E</b>	1700	2500	3120	3580	4080	4644
<b>F (adjustable)</b>	600 to 800	600 to 800	600 to 1000	600 to 1000	600 to 1000	600 to 1000
<b>H</b>	from 2500 to 4000					
<b>L</b>	180	180	320	320	320	320
<b>M</b>	230	230	330	330	330	330
<b>K</b>	18 L 40	20 L 40	20 L 40	20 L 40	20 L 40	20 L 40
<b>earthing switch position</b>	parallel	parallel	parallel	parallel	parallel	parallel or perpendicular

### Earthing switch

Disconnecter coupling is possible with 1 earthing switch:

- same short-circuit current as the disconnecter,
- manual or electrical operation,
- mechanical and electrical interlocking with the disconnecter,
- conform to IEC1129 "alternating current earthing switches: induced current switching" on request.

### Breaking device

For busbar disconnectors:

- conform to IEC1128 "alternating current disconnectors: bus-transfer current switching by disconnectors" on request.