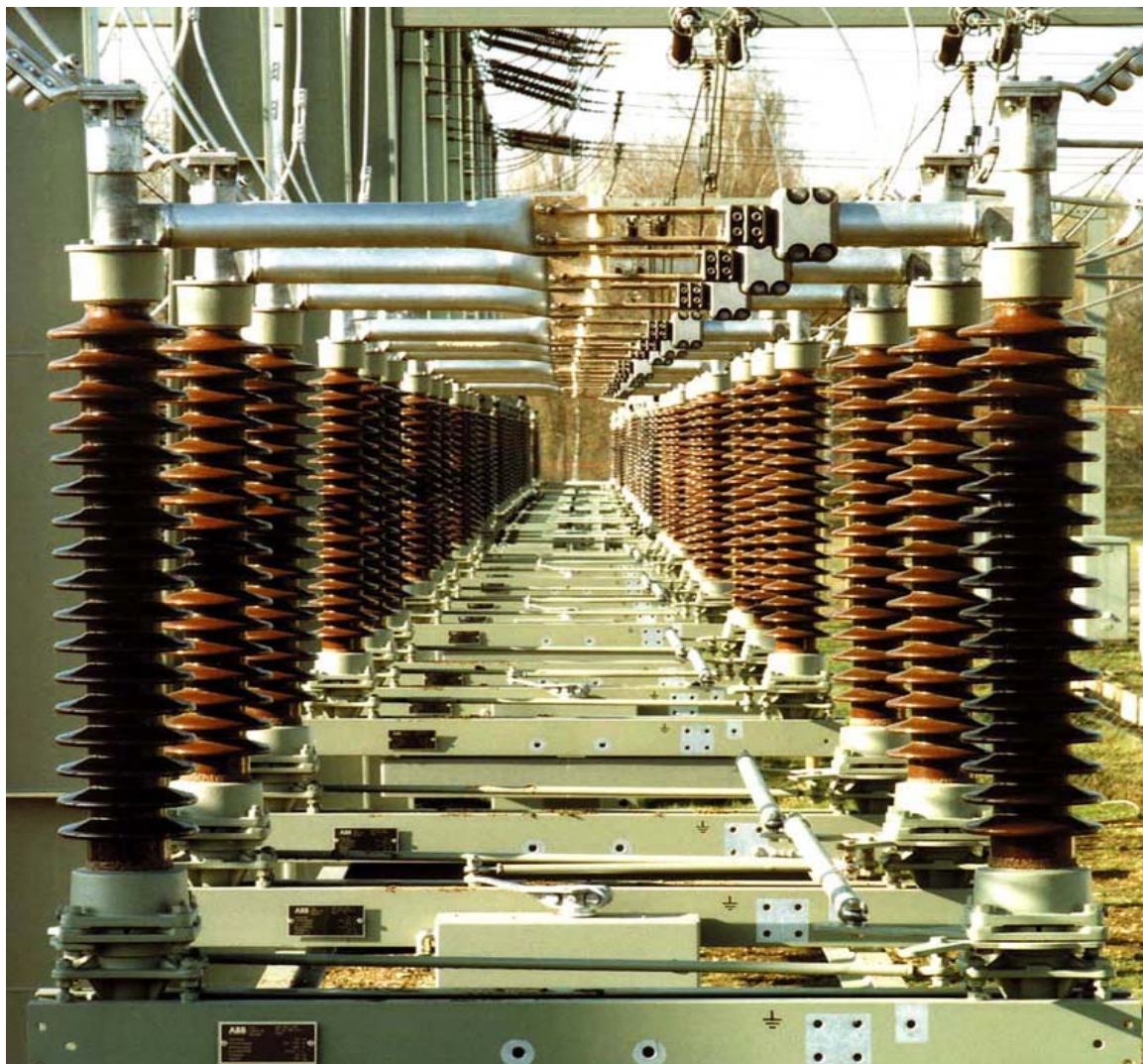


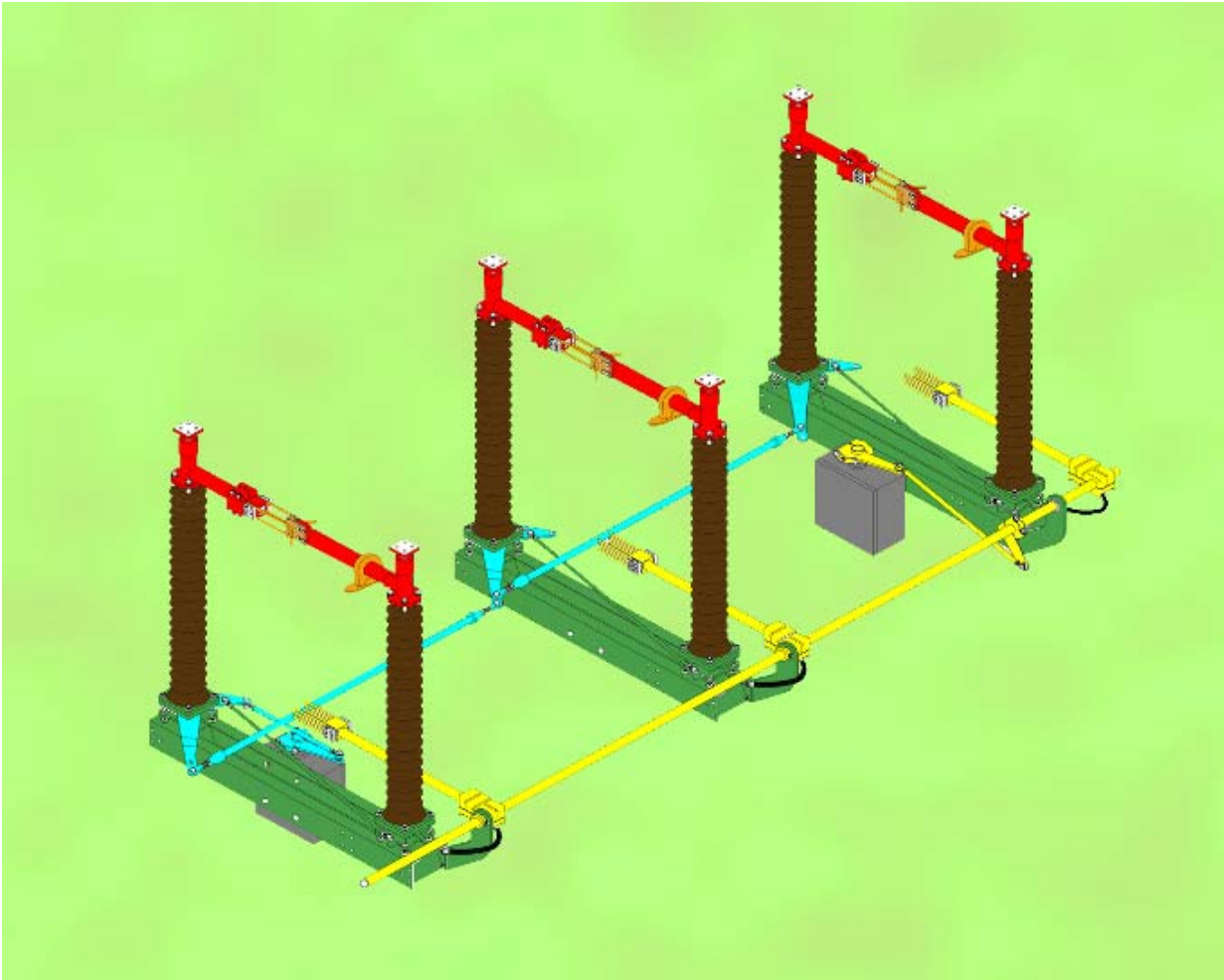
Centre-Break Disconnectors Type SGF 72.5 ÷ 550 kV

for Outdoor Installation

Publication No. 1HPL 700 001a En



HAPAM



Two-Column Rotary Disconnecter
(3 pole coupling for rated voltage range up to 300kV)

Application

Disconnectors are used for metallic isolation of systems by creating in open position a visible isolating distance.

They are appropriate for switching small currents or currents when no significant change in voltage occurs across the terminals. Two-column rotary disconnectors can be operated in many types of high voltage switchgear that are in use.

For earthing and short-circuiting disconnected plant sections, each disconnector pole can be equipped with one or two earthing switches. They are available for rated voltages from 72.5 to 550 kV and for rated currents up to 4000 A.

Regulations

The disconnectors are designed according to the publication IEC 62271-102; IEC 60694 and most other national regulations.

ANSI specifications can be met on request.

Tests

The type tests on the disconnectors were performed successfully in our own and also in independent test laboratories in accordance with the latest regulations. During manufacture all components are continuously subjected to quality tests in order to ensure consistent high quality of the products.

After completion of the disconnector poles a comprehensive electrical and mechanical routine test is carried out on the poles and associated operating mechanisms, so that their perfect functioning is guaranteed.

Features

- **WELDED ALUMINIUM STRUCTURE**
The current path halves are welded aluminium structures with a minimum number of terminal points that are subject to corrosion; thanks to that no appreciable change of the contact resistance over many years
- **NO EXTERNAL SPRINGS**
Contact fingers without external springs.
- **STRONG ROTARY PEDESTALS**
They guarantee that the deflection remains unchanged at high static mechanical terminal loads.
- **ICE BREAKING CAPABILITY**
Disconnectors for operations under severe ice conditions up to 20 mm ice thickness are available.
- **DEAD CENTRE INTERLOCKING**
For all operating mechanisms. It ensures no change of the switching position in case of extreme external influences such as storm, vibration and earthquake.
- **LITTLE MAINTENANCE**
Owing to the selection of the material used and the encapsulation of the pedestals and rotary heads in connection with a permanent lubrication, the units are practically maintenance-free.



**Two-Column Rotary
Disconnector SGF**

Design

The load-carrying constructional element of the disconnecter is a sectional-steel base frame. On it are assembled enclosed rotary pedestals protected against atmospheric influences and running on maintenance-free assembled ball bearings.

The support insulators are mounted on the mounting plate or the stud bolts of the rotary pedestal and support both current path halves (finger and contact side) with the rotary heads and high-tension terminals acc to DIN or NEMA standard.

This version offers freedom of arrangement, since the high-tension terminal can be turned within 360 degrees.

Thus, the installation of a pipe connection or the straining of a connection cable is possible from any direction.

The current path consists of a welded aluminium structure with a minimum of terminal points and therefore no appreciable change of the contact resistance over many years occurs.

Disconnectors for a rated voltage of 170 kV and above are equipped with an interlocking device, consisting of a catch hook and an interlocking bolt which prevents the two halves from separating in longitudinal direction in case of high short-circuit currents.

The optionally available earthing unit consists of a hinged-type-earthing switch fixed at the base frame. When in the open position, the tubular arm is located along the base frame.

In closed position the earthing switch contact attached to the current path comes to rest between the contact fingers of the earthing switch, which can be mounted either on the contact side or the finger side or on both sides of the disconnecter (with the exception of SGF 72.5 & 90 kV which can be furnished with one earthing switch only).

The universal design permits the earthing switch to be attached at site and it can be retrofitted without any difficulty.

All components are protected against atmospheric influences; the steel parts liable to rusting being hot galvanised.

Mode of Operation

Disconnecter and earthing switch are operated separately.

The design of the operating mechanism of the disconnecter and earthing switch is such that a dead centre position is passed through shortly before the end positions are reached. Due to that incidental opening or closing of the units due to external influences (e.g. short-circuits, storm, earthquake) is impossible.

The energy is transmitted from the operating mechanism of the disconnecter to a rotary pedestal.

The diagonal rods connect both rotary pedestals of each pole which ensures simultaneous operation.

During switching operation both current path halves rotate by 90 degrees and when the disconnecter is open they are located parallel to each other and at right angles to the base frame.



Two-Column Rotary Disconnecter SGF Current Path Half "Finger Side"



Two-Column Rotary Disconnecter SGF Current Path Half "Contact Side"

Operating Mechanisms

All disconnectors can be supplied with manual operating mechanism or motor-operated mechanism, as requested by the client. Each three-pole disconnector or earthing switch group requires only one operating mechanism with the exception of 420 and 550 kV disconnector, which is single-pole operated.

The operating mechanisms are fastened laterally to the base frame.

With units installed on a higher level it is possible to mount the operating mechanism within reach from the ground level by using the additional pivot bearing and the operating shaft.

Interlocks

At the client's request disconnector and earthing switch can be mechanically interlocked with each other so that during manual operation it is only possible to operate the earthing switch with the disconnector in the open position and the disconnector with the earthing switch in the open position. For disconnectors with motor-operated mechanism and earthing switches with manual operating mechanism, mechanical interlock can be provided for the earthing switch, whereas the motor operating mechanism of the disconnector is interlocked electrically.

Electrical interlocking of both operating mechanisms can be provided if motor-operated mechanisms are used both for disconnector and earthing switch.

As the additional interlocking facility operating mechanisms can be equipped with the blocking magnet, which prevents any operation of the manual operating mechanism or emergency manual operation of motor operated mechanism if there is no actuating signal from the control room. This enables the centralised supervision over all manual operations of disconnectors and earthing switches in the whole substations.

Little Maintenance

Owing to the selection of the material used and the encapsulation of the pedestals and rotary heads in connection with a permanent lubrication the units are practically maintenance-free.

Inspections and maintenance are mainly limited to components exposed to atmospheric influences and cover for example cleaning the insulators. Under normal climatic conditions the inspection intervals are 5 years.



**Motor-Operated Mechanism
MT 50/100**



**Manual-Operated Mechanism
HA 31-80**

Characteristics

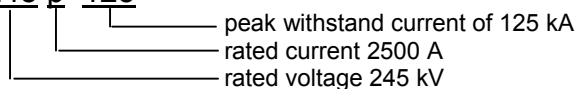
Disconnecter		SGF 72,5	SGF 90	SGF 123	SGF 145	SGF 170	SGF 245	SGF 300	SGF 420	SGF 550
Rated voltage	kV	72,5	90	123	145	170	245	300	420	550
Rated normal current										
- type n	A	1600	1600	1600	1600	1600	1600	1600	-	-
- type p	A	2500	2500	2500	2500	2500	2500	2500	2500	2500
- type pc	A	3150	3150	3150	3150	3150	3150	3150	3150	3150
- type q	A	4000	4000	4000	4000	4000	4000	4000	4000	4000
Rated peak withstand current of disconnecter and earthing switch										
- type n	kA	100	100	100	100	100	100	100	-	-
- type p /pc /q	kA	100	100	100 /125	100 /125	100 /125	100 /125	100 /125	125 /160	125 /160
Rated short-time withstand current (rms.)	kA	40	40	40 / 50	40 / 50	40 / 50	40 / 50	40 / 50	50 / 63	50 / 63
Rated power-frequency withstand voltage 50 Hz, 1min										
- to earth and between phases:	kV	140	150	230	275	325	460	380	520	620
- across open switching device:	kV	160	175	265	315	375	530	435	610	800
Rated lighting impulse withstand voltage 1,2 / 50µs										
- to earth and between phases:	kV	325	380	550	650	750	1050	1050	1425	1550
- across open switching device:	kV	375	440	630	750	860	1200	1050(+170)*	1425(+240)*	1550(+315)*
Rated switching impulse withstand voltage 250/2500 µs										
- to earth and across open switching device:	kV	-	-	-	-	-	-	850	1050	1175
- between phases:	kV	-	-	-	-	-	-	1275	1575	1760
- across open switching device:	kV	-	-	-	-	-	-	700(+245)*	900(+345)*	900(+450)*
Discharge inception voltage	kV	> 46	> 57	> 80	> 95	> 110	> 160	> 230	> 270	> 350
Radio interference voltage	µV	-	-	< 2500	< 2500	< 2500	< 2500	< 2500	< 2500	< 2500
3- phase breaking capacity inductive / capacitive	A	2	2	2	2	2	1,5	1	1	1
Bus-transfer switching ability according to IEC 62271-102 Annex B	A/V	1600/100	1600/100	1600/100	1600/100	1600/100	1600/200	1600/200	-	-
Inducted current switching ability according to IEC 62271-102 Annex C class A **										
- for electromagnetic coupling	A/kV	-	-	50/0,5	50/1	50/1	80/1,4	80/1,4	80/2	80/2
- for electrostatic coupling	A/kV	-	-	0,4/3	0,4/3	0,4/3	1,25/5	1,25/5	1,25/5	1,25/5
Inducted current switching ability according to IEC 62271-102 Annex C class B **										
- for electromagnetic coupling	A/kV	-	-	80/2	80/2	80/2	80/2	160/10	160/10	160/20
- for electrostatic coupling	A/kV	-	-	2/6	2/6	3/9	3/12	10/15	18/20	25/25
Insulator design:										
minimum failing load	kN	4,0-6,0	4,0-6,0	4,0-6,0-8,0	4,0-6,0-8,0	4,0-6,0-8,0	4,0-6,0-8,0	6,0-8,0	8,0-10,0	8,0-10,0
overall height	mm	770	870	1220	1500	1700	2300	2650	3350	4000
minimum creepage distance	mm	1450	1800	2460	2900	3400	4900	6000	8400	10500
Admissible mechanical terminal load:										
- static and dynamic	kN	2,5-2,5	2,5-2,5	3,0-4,5-6,0	3,1-4,7-6,0	3,1-5,1-6,0	3,2-5,1-6,0	5,1-6,0	5,1-6,0	4,0-4,0
- static portion	kN	0,5-0,5	0,5-0,5	1,5-2,5-2,5	1,5-2,5-2,5	1,5-2,5-2,5	1,5-2,5-2,5	2,5-2,5	1,5-1,5	1,0-1,0

* Values in brackets are peak values of power frequency voltage applied to the opposite terminal

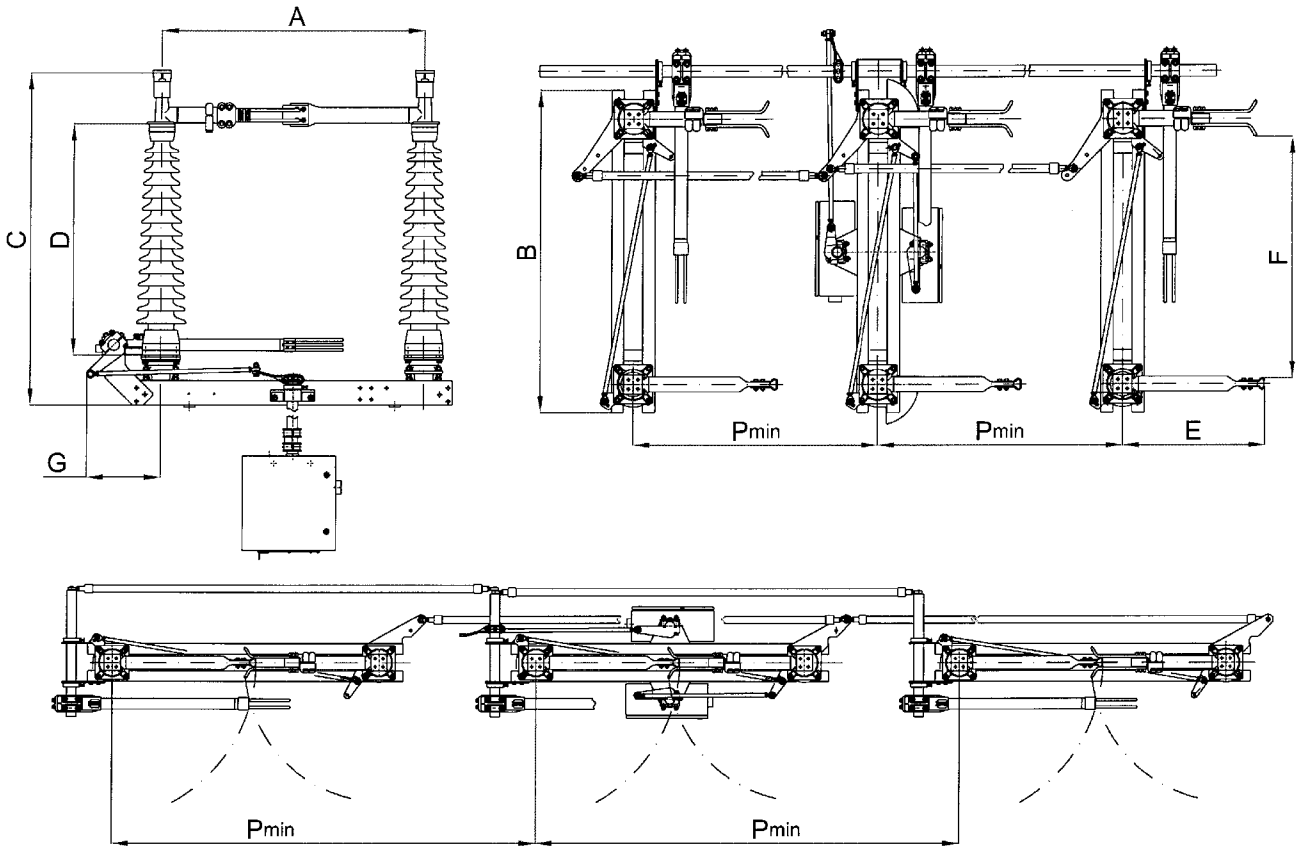
** As an option

Type designation is complemented by the data for rated current (n-1600A; p- 2500A) and peak withstand current.

Example: **SGF 245 p 125**



Main dimensions, Weights



Main dimensions	kV	72.5	90	123	145	170	245	300	420	550
Equipped with earthing switch type		TEC	TEC	TEC	TEC	TEC	TEC	TEC	TEB	TEB
A Support insulator distance	mm	1000	1000	1400	1650	1830	2620	2620	3800	4200
B Base frame length	mm	1200	1200	1700	1950	2130	2920	2920	4100	4500
C Disconnector height										
-rated current ≤ 1600 A (type n)	mm	1288	1388	1775	2055	2255	2855	3245	x	x
-rated current ≤ 2500 A (type p)	mm	1338	1438	1825	2105	2305	2905	3295	4035	4650
-rated current ≤ 3150 A (type pc)	mm	x	x	1900	2180	2380	2980	3330	4070	4725
-rated current ≤ 4000 A (type q)	mm	x	x	1900	2180	2380	2980	3330	4070	4725
D Height of support insulator	mm	770	870	1220	1500	1700	2300	2650	3350	4000
E Isolator width (open)	mm	560	560	760	925	1030	1370	1370	2070	2365
F Isolating distance	mm	800	800	1200	1450	1630	2370	2300	3385	3810
G Length of earthing switch attachment	mm	300	300	450	450	450	450	450	940	1100
P Minimum distance between poles										
- parallel arrangement	mm	1270	1390	1970	2330	2640	3570	4000	5410	6200
- series arrangement	mm	1790	1910	2700	3150	3530	4920	5700	7320	8900
Weights										
Disconnector 3-pole group ¹⁾²⁾	kg	460	460	730	820	1030	1495	1675	3750	3950
Built-on earthing switch , 3-pole group	kg	60	60	60	60	75	75	75	300	450

¹⁾ Including operating mechanisms

²⁾ Including standard insulators

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