

Single-Column Earthing Switches Type TEB 170 – 550 kV

for Outdoor Installation

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HAPAM

Application

Earthing switches are used for earthing and short-circuiting disconnected sections of substations and plants. They are designed for no-load switching and able to disconnect low charging currents. Earthing switches type TEB are suitable for outdoor installations and can be supplied as earthing switch built-on the same base frame together with disconnecter TFB or SGF or as the single-column free-standing earthing switch.

Regulations

The TEB earthing switches comply with the publications IEC 62271-102 and IEC 60 694 and most other national regulations.

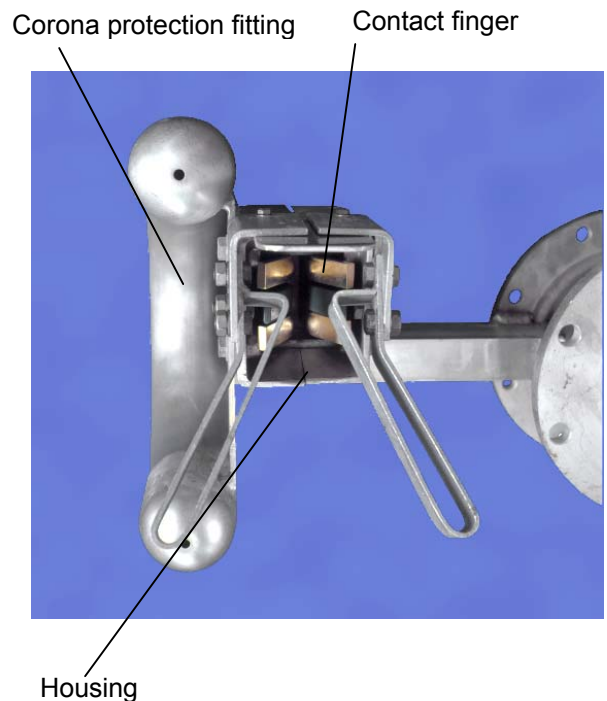
They are available for rated voltage in range 170 kV to 550 kV.

Design

The carrying constructional element of the earthing switch is the stable base frame and it is mounted to the foundation by means of four stud bolts. On that base frame is assembled the insulator column which is equipped with corona protection fitting and contact carrier. The tubular arm is permanently connected with the earthed frame by means of a flexible connection (silver-faced copper strips). Earthing contact is attached to the contact carrier.

When in closed position, the earthing blade at the top of tubular contact arm lies between the contact fingers of the earthing contact.

Re-adjustment of the stud bolts nuts enables easy and precise adjustment of the earthing switch and/or compensation of inaccuracies from foundation or caused by tensile forces. All components are protected against atmospheric influences; the steel parts liable to rusting are hot dip galvanised



Counter contact of TEB earthing switch
(view from the bottom)

Mode of operation

The earthing switch is operated separately. The design of the operating linkage is such that a dead centre position is passed through shortly before the respective end position is reached. Due to that is avoided automatic opening or closing of the units caused by some external influences (e.g. due to vibrations caused by an earthquake, short circuits etc.). The energy is transmitted to the earthing switch shaft via the operating shaft and the tubular contact arm swings upwards when the unit is closed. In the end position, the earthing blade is inserted upwards into earthing contact where it is held in place.

Operating mechanisms

The operating mechanisms are fastened laterally below the base frame at the foundation within easy reach. The earthing switches can be operated by way of manual or motor-operated mechanisms.

Interlocks

Motor-operated mechanism can be interlocked electrically. If required, 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 earthing switches in the whole substations.

Little Maintenance

Due to the selection of the materials used and the permanent lubrication the units are practically maintenance-free.

Inspections are mainly limited to components exposed to atmospheric influences.

Under normal climatic conditions the inspection intervals are every 5 years.

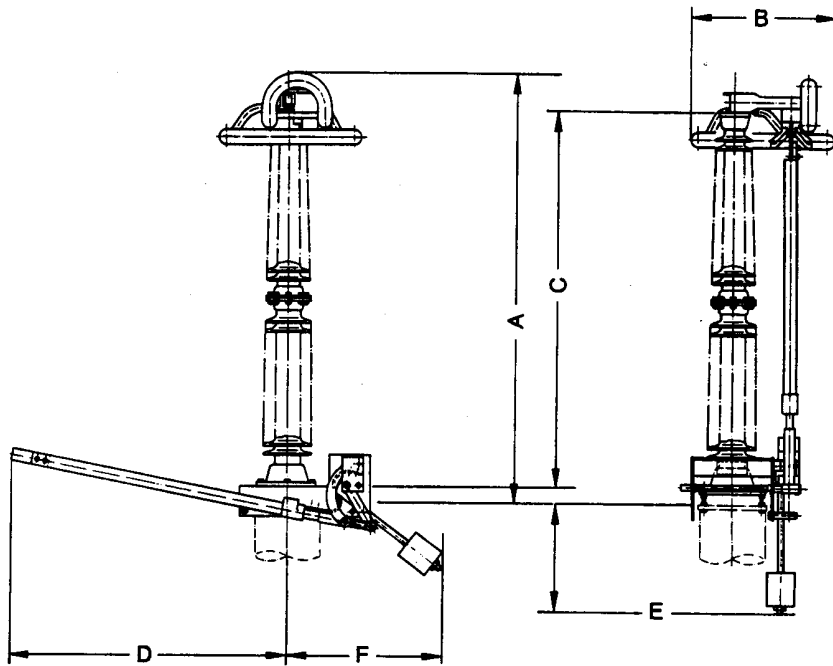
Characteristics

Earthing Switch		TEB 170 / **	TEB 245 / **	TEB 300 / **	TEB 362 / **	TEB 420 / **	TEB 550 / **
Rated voltage	kV	170	245	300	362	420	550
Rated peak withstand current of earthing switch (peak)	kA	100-125-160	100-125-160	100-125-160	100-125-160	100-125-160	100-125-160
Rated short-time withstand current (r.m.s.)	kA	40-50-63	40-50-63	40-50-63	40-50-63	40-50-63	40-50-63
Rated power-frequency withstand voltage 50 Hz, 1min to earth and between poles	kV	325	460	380	450	520	620
Rated lightning impulse withstand voltage 1,2 / 50µs to earth and between poles	kV	750	1050	1050	1175	1425	1550
Rated switching impulse withstand voltage 250/2500 µs to earth and between poles	kV	--	--	850	950	1050	1175
Discharge inception voltage	kV	> 110	> 160	> 190	> 230	>270	> 350
Radio interference voltage	µV	< 500	< 500	< 500	< 500	< 500	< 1000
3- phase breaking capacity inductive / capacitive	A	1	1	1	1	1	1
Insulator design: minimum failing load overall height	kN mm	6,0-8,0-10 1700	6,0-8,0-10 2300	6,0-8,0-10 2650	6,0-8,0-10 2900	6,0-8,0-10 3350	6,0-8,0-10 4200
Admissible mechanical terminal load: *** static and dynamic static portion	kN kN	4,2-5,6-7,0 1,5-2,0-2,5	4,2-5,6-7,0 1,5-2,0-2,5	4,2-5,6-7,0 1,5-2,0-2,5	4,2-5,6-7,0 1,5-2,0-2,5	4,2-5,6-7,0 1,5-2,0-2,5	4,2-5,6-7,0 1,5-2,0-2,5

** Values type designation is complemented by the data for rated peak withstand current.
Example: The complete designation for a 420 kV single-column earthing switch with peak withstand current of 125 kA is: TEB 420 / 125

*** Values apply to support insulators of standard design given in the table

Main dimensions and Weights



Main dimensions		kV	170	245	300	362	420	550
A	Height	mm	2080	2480	3030	3280	3750	4380
B	Width	mm	705	705	705	760	760	760
C	Height of support insulator	mm	1700	2300	2650	2900	3350	4000
D	Tubular contact arm (OPEN)	mm	1200	1800	2150	2400	2950	3700
E	Counterpoise (CLOSED)	mm	--	--	--	320	320	320
F	Counterpoise (OPEN)	mm	500	500	500	1030	1030	1030
Weights								
3-pole group -including insulators of standard design and operating mechanisms		kg	720	1020	1170	1380	1440	1680

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