

Earthing Switches Type TEC 72,5 – 300 kV for Outdoor Installation

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HAPAM

Application

Earthing switches are used for earthing and short-circuiting disconnected sections of substation or plant. They are designed for no-load switching and are able to disconnect low charging currents. Earthing switches type TEC are suitable for outdoor installations and can be supplied as the single-column free-standing earthing switch or as earthing switch built-on the same base frame together with disconnector type SGF and TFB. Thanks to the universal design, the built-on earthing switch type TEC can be attached to the disconnector type SGF at site and it can also be retrofitted later without any difficulty.

Regulations

The TEC earthing switches comply with the publications IEC 62271-1021; IEC 60694 and most other national regulations. They are available for rated voltages in the range 72.5 kV to 300 kV.

Design

The carrying constructional element of the single column free-standing earthing switch is the sectional base frame. The post insulator is assembled on the mounting plate and supports the contact with high-voltage terminal according to DIN or NEMA standard.

The tubular arm is permanently connected with the earthed frame by means of a flexible connection. In open position the tubular contact arm is located along the base frame.

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

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 end positions are 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 closed position the contact fingers come to rest against the stop with initial tension.

Operating Mechanisms

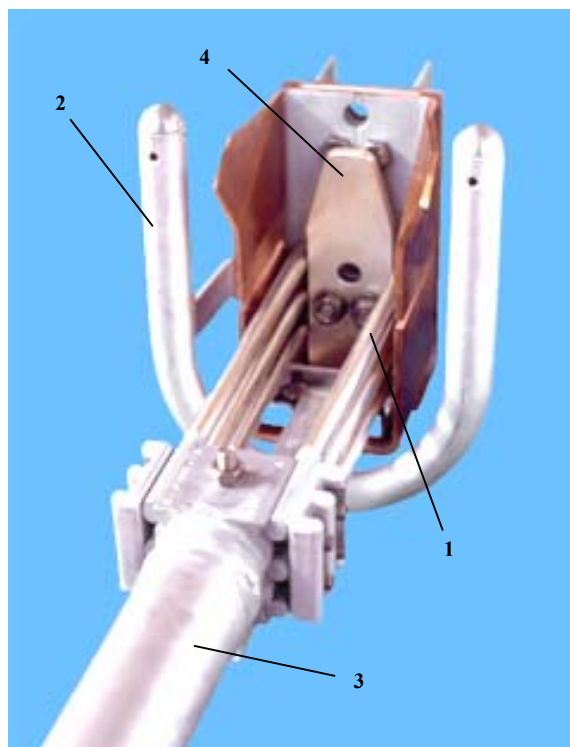
Each three-pole earthing switch group requires only one manual or motor operating mechanism. The operating mechanisms are fastened laterally to the base frame. For units installed on a higher level it is possible to mount the operating mechanism within reach from the ground level by using the additional pivot bearing and the operating shaft.

Interlocks

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.



Earthing switch contact type TEC (for rated short time current 50kA and voltages 245 and 300kV)
1 – contact finger
2 – corona protection fitting
3 – tubular contact arm
4 – contact piece

Characteristics

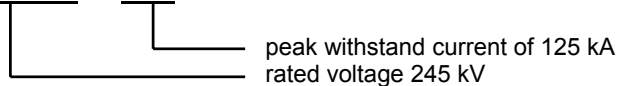
Earthing switch		TEC 72,5 /***	TEC 90 /***	TEC 123 /***	TEC 145 /***	TEC 170 /***	TEC 245 /***	TEC 300 /***
Rated voltage	kV	72,5	90	123	145	170	245	300
Rated peak withstand current	kA	100	100	100 /125	100 /125	100 /125	100 /125	100 /125
Rated short-time withstand current (rms.)	kA	40	40	40 / 50	40 / 50	40 / 50	40 / 50	40 / 50
Rated power-frequency withstand voltage to earth 50 Hz, 1min	kV	140	150	230	275	325	460	380
Rated lighting impulse withstand voltage to earth 1,2 / 50µs	kV	325	380	550	650	750	1050	1050
Rated switching impulse withstand voltage to earth 250/2500 µs	kV	-	-	-	-	-	-	850
Discharge inception voltage	kV	>46	>57	>80	>95	>110	>160	>230
Radio interference voltage	µV	-	-	<500	<500	<1000	<500	<1000
3- phase breaking capacity inductive / capacitive	A	2	2	2	2	2	1,5	1
Inducted current switching ability according to IEC1129 * for electromagnetic coupling	A/kV	-	-	50/0,5	50/1	50/1	80/1,4	80/1,4
	A/kV	-	-	0,4/3	0,4/5	0,4/3	1,25/5	1,25/5
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
	mm	770	870	1220	1500	1700	2300	2650
	mm	1450	1800	2460	2900	3400	4900	4900
Admissible mechanical terminal load: **	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
	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

* as an option

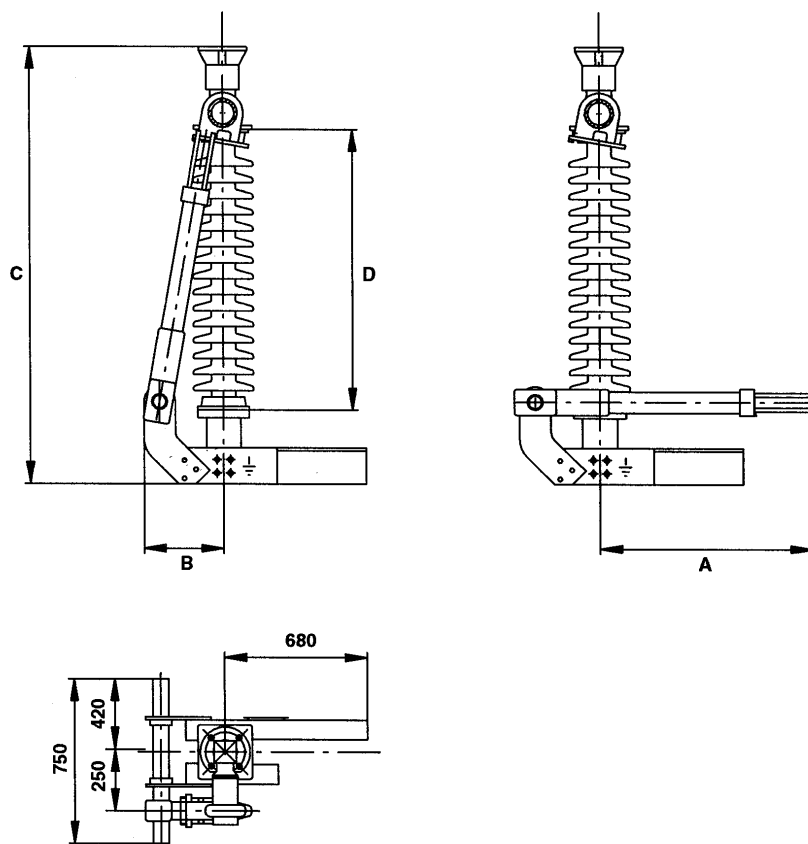
** Values apply to support insulators of standard design given in the table

*** Values type designation is complemented by the data for rated peak withstand current.

Example: TEC 245 / 125



Main dimensions and weights



Main dimensions		kV	72.5	90	123	145	170	245	300
A	Tubular contact arm (OPEN)	mm	490	590	930	1215	1415	1995	2350
B	Earthing switch support frame	mm	310	310	310	310	310	310	310
C	Height of earthing switch	mm	1325	1425	1775	2055	2255	2855	3205
D	Height of support insulator	mm	770	870	1220	1500	1700	2300	2650
Weights									
3-pole group –including insulators of standard design and operating mechanisms		kg	220	220	325	355	430	625	625

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