

Data Sheet no. 1.31/1

Alternating Voltage Capacitors 50 to 1200 kV, Types WC

Application

High-voltage (HV) capacitors are necessary components in all alternating voltage (AC) test systems. They are available in wide ranges of voltage and capacitance and used for

- the HV arm of capacitive voltage dividers (see Data Sheet 5.20/1),
- coupling capacitors and HV filters in partial discharge (PD) measuring circuits (see Catalogue Sheet 6.11),
- basic load capacitors in resonant circuits to enable the HVAC generation in the no-load case of the system.

Sometimes all three functions can be realized by one HVAC capacitor if a low-voltage (LV) impedance is applied which acts as the LV arm of a divider and also as the PD measuring impedance. The HV capacitors, type WC ... are designed for the application in atmospheric air. For the application in SF₆ or insulating oil types with lower dimensions are available on request.



Design

General Design: HV capacitor, type WC ..., consists of the capacitor itself, a HV top electrode and a base frame for carrying by hand (up to 160 kV, Fig. 2), stationary erection (Fig. 4) or mobile transportation (Fig. 3 and 5, the figures are on the last page).

The capacitor has a PD-free, liquid-impregnated paper or foil-paper insulation inside a GFR tube. The applied liquid is PCB-free. The thermal expansion of the liquid is compensated by means of special bellows. For outdoor application GFR tubes with silicon rubber sheds or porcelain tubes are available on request. For voltages of 500 kV and above two capacitor tubes (Fig. 3, 4) are switched in series.

The top electrode is of PD-free design using multisegment (polycon) electrodes (Fig. 2, 3). On request or for special applications (e.g. for HV filters with a blocking impedance between two capacitors, see Fig. 4) the multisegment electrode can be replaced by a single or a double toroid. Toroids are also applied for outdoor application.

The base frame is of aluminium or steel profile. There are different dimensions for stationary and mobile frames (see Table 2). Stationary frames for voltages above 160 kV should be fixed to the floor by screws or bolts. Mobile frames are equipped with rollers, large capacitors can also be mobile by air cushions (on request).

Fig. 1: HV capacitors used for voltage divider (right), HV filter and coupling capacitor

Technical Parameters

Rated voltages:	see Table 1
Rated capacitances:	see Table 1
Frequency:	20 to 120 Hz on request up to 300 Hz
PD level at rated voltage:	< 5 pC (according to IEC 60270) lower values on request
Duty cycle:	continuous operation (limited duty cycle for f > 200 Hz)
Environmental conditions:	temperature 0 to 40° C relative humidity ≤ 90% altitude ≤ 1000 m indoor operation (outdoor application and different parameters on request)
Reference conditions:	20° C; 11 g/m ³ 101.3 kPa
Dimensions and weights:	see Table 2

Type Designation

Indoor design:	WC	a/b	(stationary)
	WCF	a/b	(mobile)

Outdoor design:	FWC	a/b
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Technical parameter:	a	capacitance in nF
	b	rated voltage in kV (r.m.s.)

Examples: FWC 2/500 is a PD free capacitor of 2 nF and 500 kV rated voltage for stationary outdoor erection.

WCF 4/250 is a mobile, PD free capacitor of 4 nF and 250 kV rated voltage for indoor application.

Table 1 Rated voltages and capacitances (Types in bolt letters are preferred)

Rated voltage in kV	50	100	160	200	250	300	350	400	500	600	700	800	1000	1200
Line	one capacitor (capacitance in nF)							series connection of two or more capacitors (capacitance in nF)						
A	0.2	0.1												
B	0.6	0.3	0.2	0.15	0.12	0.1								
C		0.6	0.4	0.3	0.24	0.2	0.17	0.15	0.1					
D	2	1	0.67	0.5	0.4	0.33	0.29	0.25	0.2	0.17	0.14	0.12	0.1	
E	4	2	1.33	1	0.8	0.67	0.57	0.5	0.4	0.33	0.28	0.25	0.2	0.17
F	10	5	3.33	2.5	2	1.67	1.42	1.25	1	0.8	0.71	0.63	0.5	0.4
G	20	10	6.67	5	4	3.33	2.86	2.50	2	1.67	1.43	1.25	1	0.83
H		25	16.7	12.5	10	8.33	7.14	6.25	5	4.18	3.57	3.12	2.5	2.08

Table 2 Dimensions and weights of HV AC capacitors

Rated voltage	kV	50	100	160	200	250	300	350	400	500	600	700	800	1000	1200			
Line		one capacitor								two capacitors				three capacitors				
Example		Fig. 2 & Fig. 3								Fig. 4 & Fig. 5								
A x A (stationary)	mm	200 x 200		350 x 350			650 x 650			1000 x 1000				1500 x 1500				
A x A (mobile)	mm	350 x 350		850 x 850			1250 x 1250			1500 x 1500				2500 x 2500	3500 x 3500			
A	nF	0.2	0.1															
H	mm	570	750															
Ø D	mm	188	188															
Weight	kg	9,5	11															
B	nF	0.6	0.3	0.2	0.15	0.12	0.1											
H	mm	570	750	1430	1700	1700	2200											
Ø D	mm	188	188	358	358	358	358											
Weight	kg	12,5	11	23	26	26	32											
C	nF		0.6	0.4	0.3	0.24	0.2	0.17	0.15	0.12								
H	mm		750	1430	1700	1700	2200	2460	2760	3758								
Ø D	mm		188	358	358	358	358	750	750	1200								
Weight	kg		11	23	26	26	32	40	61	104								
D	nF	2	1	0.67	0.5	0.4	0.33	0.29	0.25	0.2	0.17	0.14	0.12	0.1				
H	mm	750	750	1430	1700	1700	2200	2460	2760	3780	4400	4700	5900	7100				
Ø D	mm	188	188	358	358	358	358	750	750	1200	1200	1200	1880	1880				
Weight	kg	11	11	24	26	26	32	40	61	106	132	158	272	304				
E	nF	4	2	1.33	1	0.8	0.67	0.57	0.5	0.4	0.33	0.28	0.25	0.2	0.17			
H	mm	750	750	1430	1700	1700	2200	2460	2760	3780	4400	4700	5900	7100	8300			
Ø D	mm	188	188	358	358	358	358	750	750	1200	1200	1200	1880	1880	1880			
Weight	kg	11	17	26	26	36	42	50	71	110	152	178	312	344	368			
F	nF	10	5	3.33	2.5	2	1.67	1.42	1.25	1	0.8	0.71	0.63	0.5	0.4			
H	mm	850	850	1430	1700	1800	2200	2560	2760	3780	4400	4900	5900	7100	8300			
Ø D	mm	188	188	358	358	358	358	750	750	1200	1200	1200	1880	1880	1880			
Weight	kg	20	20	34	40	44	52	70	91	126	172	218	352	376	408			
G	nF	20	10	6.67	5	4	3.33	2.86	2.5	2	1.67	1.43	1.25	1	0.83			
H	mm	850	850	1430	1700	1800	2200	2560	2760	3780	4400	4900	5900	7100	8300			
Ø D	mm	188	188	358	358	358	358	750	750	1200	1200	1200	1880	1880	1880			
Weight	kg	20	20	34	40	47	52	80	111	126	172	238	392	388	500			
H	nF		25	16.7	12.5	10	8.33	7.14	6.25	5	4.18	3.57	3.12	2.5	2.08			
H	mm		1190	1430	1700	1825	2200	2580	2760	4080	4447	4940	6074	7700	8394			
Ø D	mm		188	358	358	358	358	750	750	1200	1200	1200	1880	1880	1880			
Weight	kg		50	82	92	102	112	140	155	222	292	358	480	608	648			

The weight refers to HVAC capacitors with stationary frame

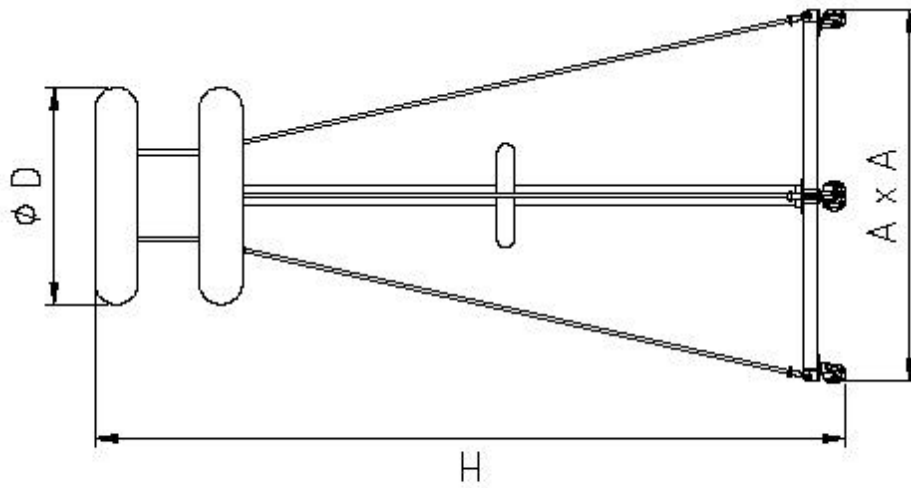


Fig. 5

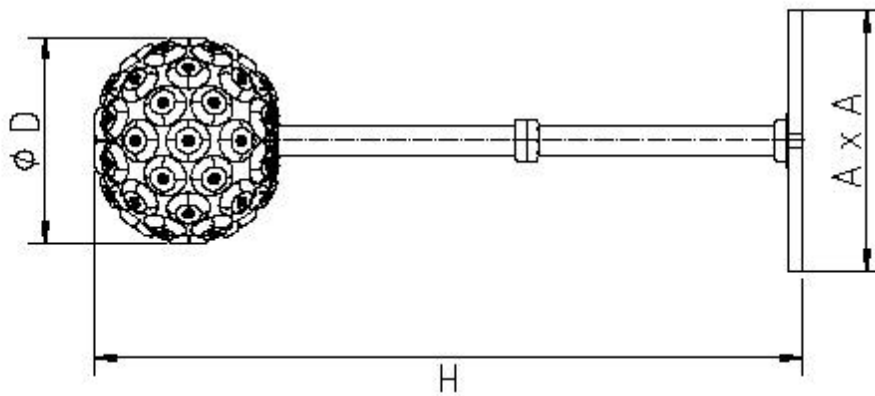


Fig. 4

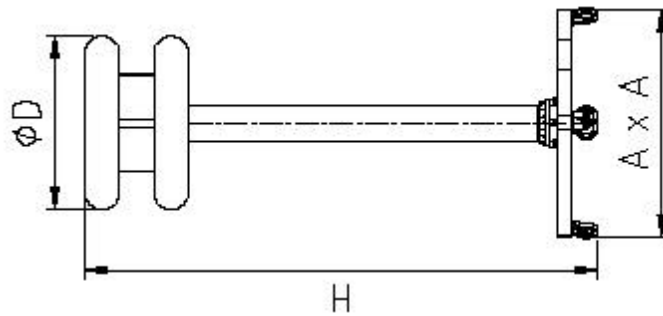


Fig. 3

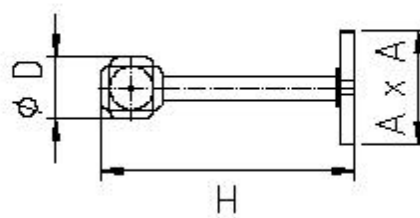


Fig. 2

For further information please contact:

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