

# Medium Power Film Capacitors



## FFHV/FTHV 1500Vdc to 3000Vdc



The FFHV and FTHV series are specifically designed for DC filtering applications such as DC link or resonant filters for voltages up to 3000V.

These capacitors are proposed in 2 different versions: resin top for the FFHV series and hermetic case for the FTHV.

Large case sizes up to 36 liters and high specific energy up to 380J/l together with safe and reliable Controlled Self Healing Technology make this series particularly suitable for power converters in traction, drives, renewable energy and power transmission areas.

FFHV and FTHV use a wet solution with polypropylene metallized film and oil (without free oil). Standard designs proposed in this catalogue are covering a wide range of voltage and capacitance values.

In case of specific requirements about shape and performances, feel free to contact your local AVX representative.

DC FILTERING

### PACKAGING MATERIAL

<p><b>FFHV</b> Non-painted rectangular resin filled aluminium case Mounting brackets M8/17 female connections or M12/30 male connections 2 or 4 connections</p>	<p><b>FTHV</b> Non-painted rectangular aluminium hermetic case Mounting brackets M8/17 female terminals or M12/30 male terminals 2 or 4 terminals</p>
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### STANDARDS

<p><b>FFHV</b> IEC 61071: Power electronic capacitors IEC 61881: Railway applications, rolling stock equipment, capacitors for power electronics IEC 60068-2: Environmental testing UL 94: Fire requirements NF F 16-101: Rolling stock – Fire behaviour – Materials choosing NF F 16-102: Rolling stock – Fire behaviour – Materials choosing, application for electric equipments EN 45545-2: Railways applications – Fire protection on railway vehicles. Part 2: Requirements for fire behaviour of materials and components</p>	<p><b>FTHV</b> IEC 61071: Power electronic capacitors IEC 61881: Railway applications, rolling stock equipment, capacitors for power electronics IEC 60068-2: Environmental testing EN 45545-2: Railways applications – Fire protection on railway vehicles. Part 2 : Requirements for fire behaviour of materials and components</p>
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### HOW TO ORDER

<b>D</b> 	<b>FFHV</b> 	<b>1</b> 	<b>1</b> 	<b>M</b> 	<b>R</b> 	<b>2637</b> 
<b>Series</b>	<b>Section and Option</b>	<b>Height</b>	<b>Terminal Code</b>	<b>Voltage</b>	<b>Capacitance EIA code</b>	
FFHV: resin top	1 = 340x125 2 connexions 2 = 340x125 4 connexions 3 = 340x175 2 connexions 4 = 340x175 4 connexions	1 = 230mm 2 = 295mm 3 = 370mm 4 = 450mm 5 = 530mm 6 = 610mm	F = female M = male	R = 1500V S = 1750V N = 2000V T = 2250V P = 2500V W = 2750V X = 3000V		
<b>D</b> 	<b>FTHV</b> 	<b>1</b> 	<b>1</b> 	<b>M</b> 	<b>R</b> 	<b>2637</b> 
<b>Series</b>	<b>Section and Option</b>	<b>Height</b>	<b>Terminal Code</b>	<b>Voltage</b>	<b>Capacitance EIA code</b>	
FTHV: hermetic case	1 = 340x125 2 connexions 2 = 340x125 4 connexions 3 = 340x175 2 connexions 4 = 340x175 4 connexions	1 = 240mm 2 = 305mm 3 = 380mm 4 = 460mm 5 = 540mm 6 = 620mm	F = female M = male	R = 1500V S = 1750V N = 2000V T = 2250V P = 2500V W = 2750V X = 3000V		



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FFHV/FTHV 1500Vdc to 3000Vdc

DC FILTERING

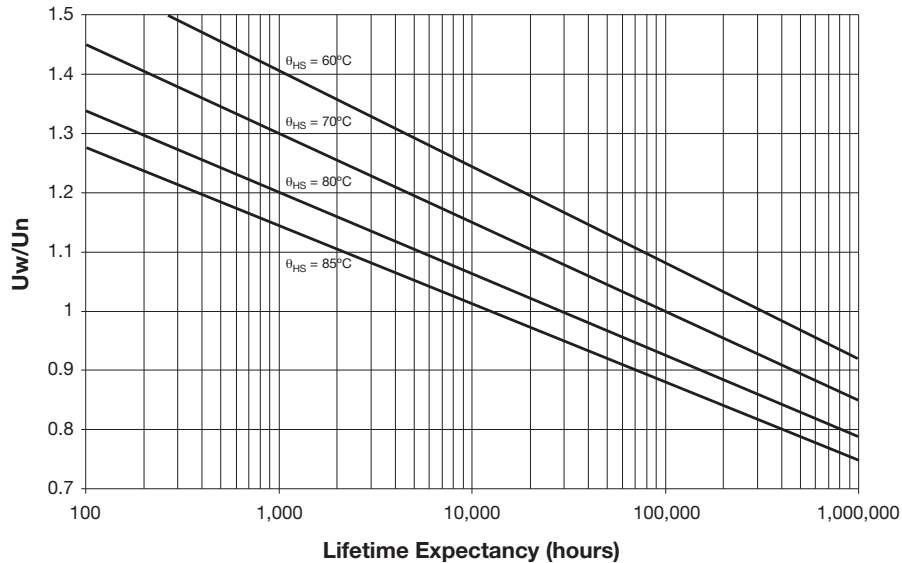
## DEFINITIONS

<b>C<sub>n</sub></b> (μF)	capacitance	nominal value of the capacitance measured at $\theta_{amb} = 25 \pm 10^\circ\text{C}$
<b>U<sub>n</sub></b> (V)	rated DC voltage	maximum operating peak voltage of either polarity (non-reversing type waveform), for which the capacitor has been designed for continuous operation
<b>U<sub>w</sub></b> (V)	working voltage	value of the maximum operating recurrent voltage for a given hot spot temperature and an expected lifetime
<b>U<sub>r</sub></b> (V)	ripple voltage	peak-to-peak alternating component of the unidirectional voltage
<b>L<sub>s</sub></b> (nH)	parasitic inductance	capacitor series self-inductance
<b>R<sub>s</sub></b> (mΩ)	series resistance	capacitor series resistance due to galvanic circuit
<b>I<sub>rms</sub></b> (A) Thermal 1	RMS current	rms current value @ 100Hz for continuous operation under natural convection generating 20°C overheating (255A <sub>rms</sub> maximum for 2 connexions or terminals and 400Arms maximum for 4 connexions or terminals)
<b>I<sub>rms</sub></b> (A) Thermal 2	RMS current	rms current value @ 100Hz for continuous operation under forced air generating 20°C overheating (255A <sub>rms</sub> maximum for 2 connexions or terminals and 400Arms maximum for 4 connexions or terminals)
<b>θ<sub>amb</sub></b> (°C)	cooling air temperature	temperature of the cooling air measured at the hottest position of the capacitor, under steady-state conditions, midway between two units NOTE If only one unit is involved, it is the temperature measured at a point approximately 0.1 m away from the capacitor container and at two-thirds of the height from its base
<b>θ<sub>HS</sub></b> (°C)	hot spot temperature	highest temperature obtained inside the case of the capacitor in thermal equilibrium

## CHARACTERISTICS

Capacitance range C <sub>n</sub>	590μF to 12600μF
Tolerance on C <sub>n</sub>	±10%
Rated DC voltage U <sub>n</sub>	1500 to 3000V
Lifetime at U <sub>n</sub> and 70°C hot-spot temperature and ΔC / C < 2%	100,000h
Parasitic inductance L <sub>s</sub>	27nH to 88nH
Maximum rms current I <sub>rms</sub>	up to 400A <sub>rms</sub>
Test voltage between terminals @ 25°C	1.5 x U <sub>n</sub> for 10s
Test voltage between terminals and Case @ 25°C	7kV <sub>rms</sub> @ 50Hz for 10s
Dielectric	polypropylene
Climatic Category	40 / 85 / 56 (IEC 60068)
Working temperature	-40°C / +85°C (according to the power dissipated)
Storage temperature	-40°C / +85°C
Calorific value	34 MJ/kg

## LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



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FFHV/FTHV 1500Vdc to 3000Vdc

## HOW TO CHOSE THE RIGHT CAPACITOR

The capacitor lifetime depends on the working voltage and the hot spot temperature.

Our caps are designed to meet 100000 hours lifetime at rated voltage and 70°C hot spot temperature. In accordance with operating conditions, please calculate the hot spot temperature and deduce from this calculation if the obtained lifetime can suit the application.

### 1. From the tables, select a capacitor with required capacitance $C_n$ and voltage $U_n$ .

Calculate the maximum ripple voltage allowed for the selected cap:

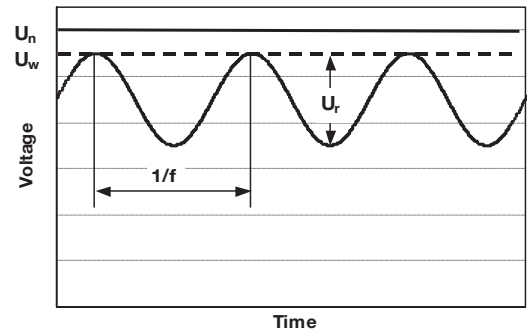
$$U_{rmax} = 0.2U_n$$

If  $U_r > U_{rmax}$ , select a capacitor with higher rated voltage

Make sure  $I_{rms}$  application  $<$   $I_{rms}$  table

Copy out:

- serial resistance ( $R_s$ ): see table of values
- thermal resistances  $R_{th1}$  and  $R_{th2}$  (depending on cooling conditions)



### 2. Hot spot temperature calculation

Total losses are calculated as follow:  $P_t = P_j + P_d$

Joule losses:  $P_j = R_s \times I_{rms}^2$

Dielectric losses:  $P_d = Q \times \text{tg}\delta 0$  with

- $Q(\text{reactive power}) = \frac{I_{rms}^2}{C\omega}$  for a sinusoidal waveform

- $\text{tg}\delta 0 = 2 \times 10^{-4}$  (dielectric losses of polypropylene)

Hot spot temperature will be:

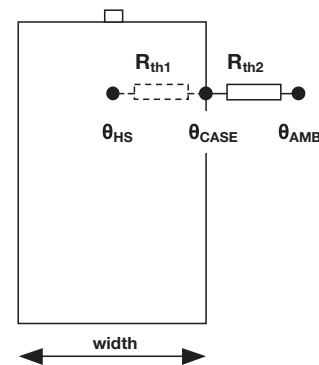
$$\theta_{HS} = \theta_{amb} + (P_j + P_d) \times (R_{th1} + R_{th2})$$

$\theta_{HS}$  **absolute maximum is 85°C**

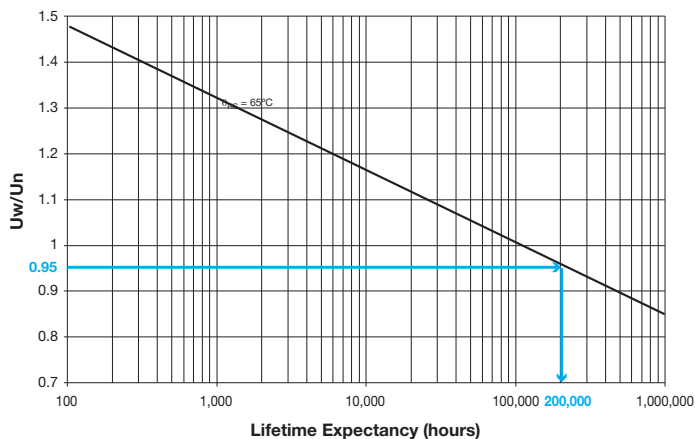
If temperature is higher than 85°C, come back to #1 and start again with another selection.

$R_{th1}$ : thermal resistance between hot spot and case

$R_{th2}$ : thermal resistance between case and ambient air



### 3. Refer to the curve and deduce the lifetime vs $U_w/U_n$ ratio



eg: rated voltage 2000V  
 working voltage 1900V  
 $\rho = 0.95 \Rightarrow$  lifetime 200,000 hours  
 @ 70°C hot spot temperature

Please, find a calculation form at the end of the catalog

# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

DC FILTERING

## THERMAL RESISTANCES

$R_{th1}$  (°C/W): Thermal resistance between hot spot and case

Height (mm)	$R_{th1}$ (°C/W)	
	Width (mm)	
	125	175
230/240	0.40	0.41
295/305	0.33	0.36
370/380	0.27	0.30
450/460	0.22	0.26
530/540	0.19	0.22
610/620	0.17	0.19

$R_{th2}$  (°C/W): Thermal resistance between case and ambient air under natural convection and forced air

Height (mm)	$R_{th2}$ (°C)			
	Natural air cooling		Forced air cooling >2m/s	
	Width (mm)		Width (mm)	
	125	175	125	175
230/240	0.3	0.26	0.15	0.13
295/305	0.25	0.21	0.13	0.11
370/380	0.2	0.18	0.1	0.09
450/460	0.17	0.15	0.09	0.08
530/540	0.15	0.13	0.08	0.07
610/620	0.13	0.11	0.07	0.06



For confined area, capacitor working in a closed cabinet, a thermal test under real conditions is necessary to evaluate the thermal resistance.

## PARASITIC INDUCTANCE VS SIZE

Measurement @ 1MHz

Height (mm)	$L_s$ (nH) FFHV resin top			
	Width (mm)			
	2 Connections		4 Connections	
	125	175	125	175
230	70	73	27	30
295	72	77	29	34
370	75	82	32	39
450	79	86	36	43
530	82	91	39	48
610	85	96	42	53

Height (mm)	$L_s$ (nH) FTHV hermetic case			
	Width (mm)			
	2 Connections		4 Connections	
	125	175	125	175
240	73	76	28	31
305	75	80	30	35
380	78	85	33	40
460	82	89	37	44
540	85	94	40	49
620	88	99	43	54

# Medium Power Film Capacitors

FFHV/FTHV 1500Vdc to 3000Vdc

## MTBF CALCULATION

Based on Return Of Experience from the field of more than 30 years, we have established the following relation.

The failure rate  $\lambda_B$  depends on hot spot temperature  $\theta_{HS}$  and charge ratio  $\rho$ .

$$\rho = U_w/U_n$$

$$\lambda_o = 3 \times 10^{2,75(\rho-1)} \times e^{\left(3,2 \left(\frac{\theta_{HS}+273}{358}\right)^{30}\right)} \times 10^{-9} \text{ in failures/hour}$$

## GENERAL FAILURE RATE

$\lambda = \lambda_B \times \pi_Q \times \pi_B \times \pi_E$  failures/hour •  $\pi_Q$ ,  $\pi_B$  and  $\pi_E$  see following tables

Qualification	Qualification factor $\pi_Q$
Product qualified on IEC61071 and internal qualification	1
Product qualified on IEC61071	2
Product answering on another norm	5
Product without qualification	15

Environment	Environment factor $\pi_E$
On ground (good conditions)	1
On ground (fixed materials)	2
On ground (on board)	4
On ship	9
On plane	15

Environment	Environment factor $\pi_B$
Favorable	1
Unfavourable	5

## MEAN TIME BETWEEN FAILURE (MTBF)

$$MTBF = 1/\lambda \text{ hours}$$

## SURVIVAL FUNCTION

$$N = N_0 \times \exp(-\lambda t)$$

N is the number of pieces still working after t hours.

$N_0$  is the number of pieces at the origin (t = 0)

## FAILURE MODE

Main failure mode due to AVX's **Controlled Self-Healing Technology** is only losses of capacitance. Thanks to **Controlled Self-Healing** solution to interrupt self-healing process in order to prevent avalanche effect due to polypropylene molecular cracking producing gas and potential explosion in confined box for none **Controlled Self-Healing capacitors**.

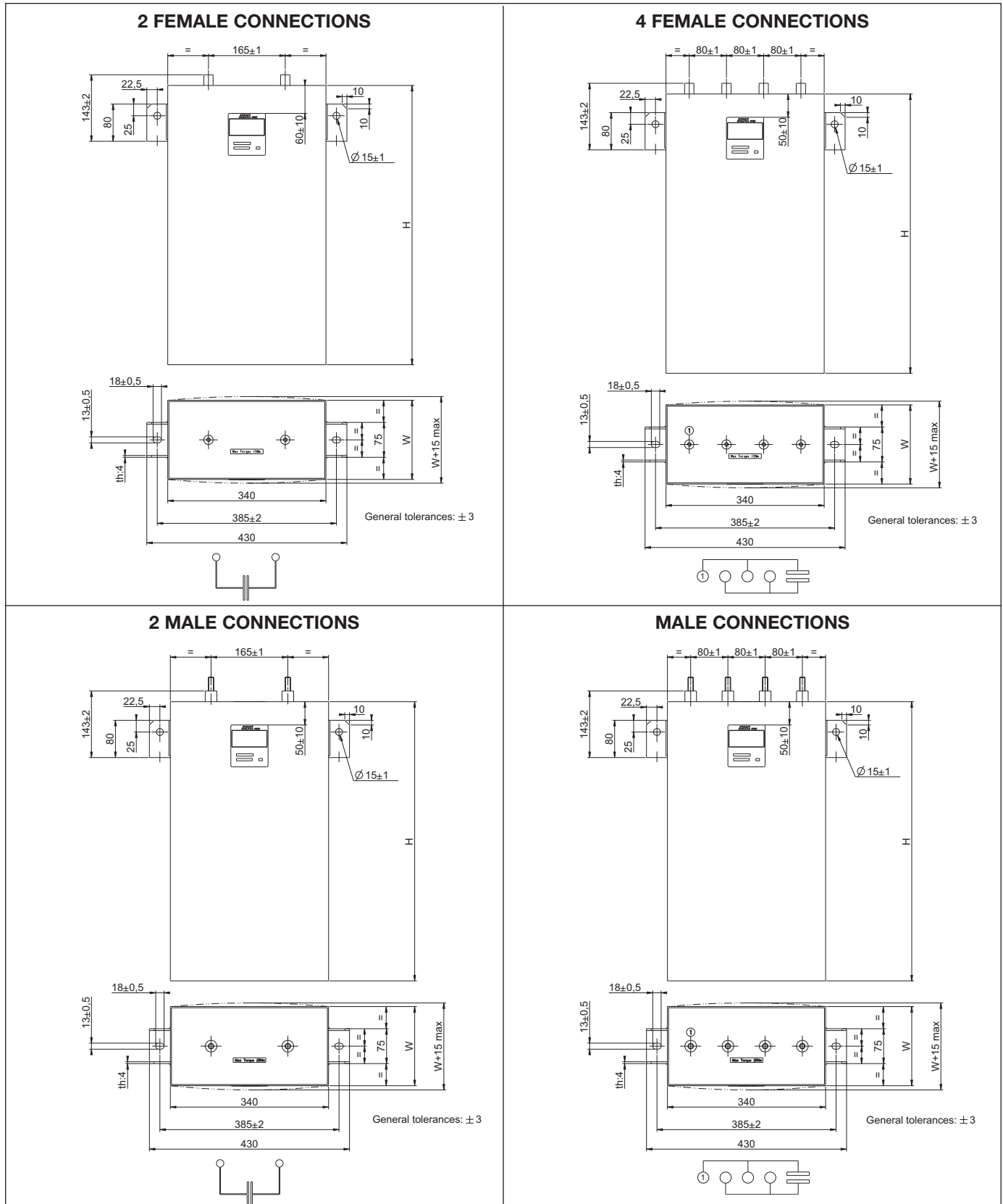
# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## DIMENSIONS

DC FILTERING



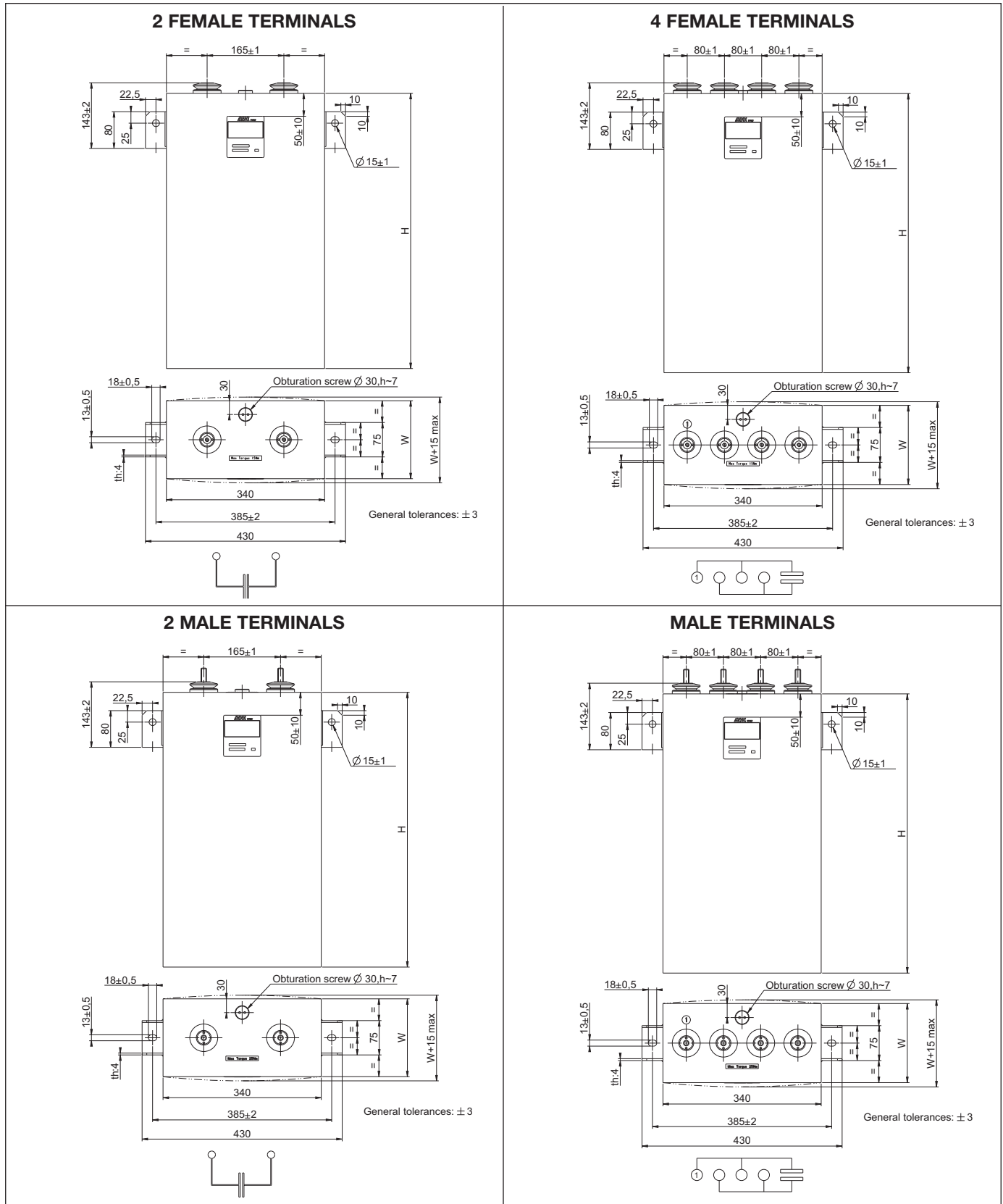
# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## DIMENSIONS

DC FILTERING



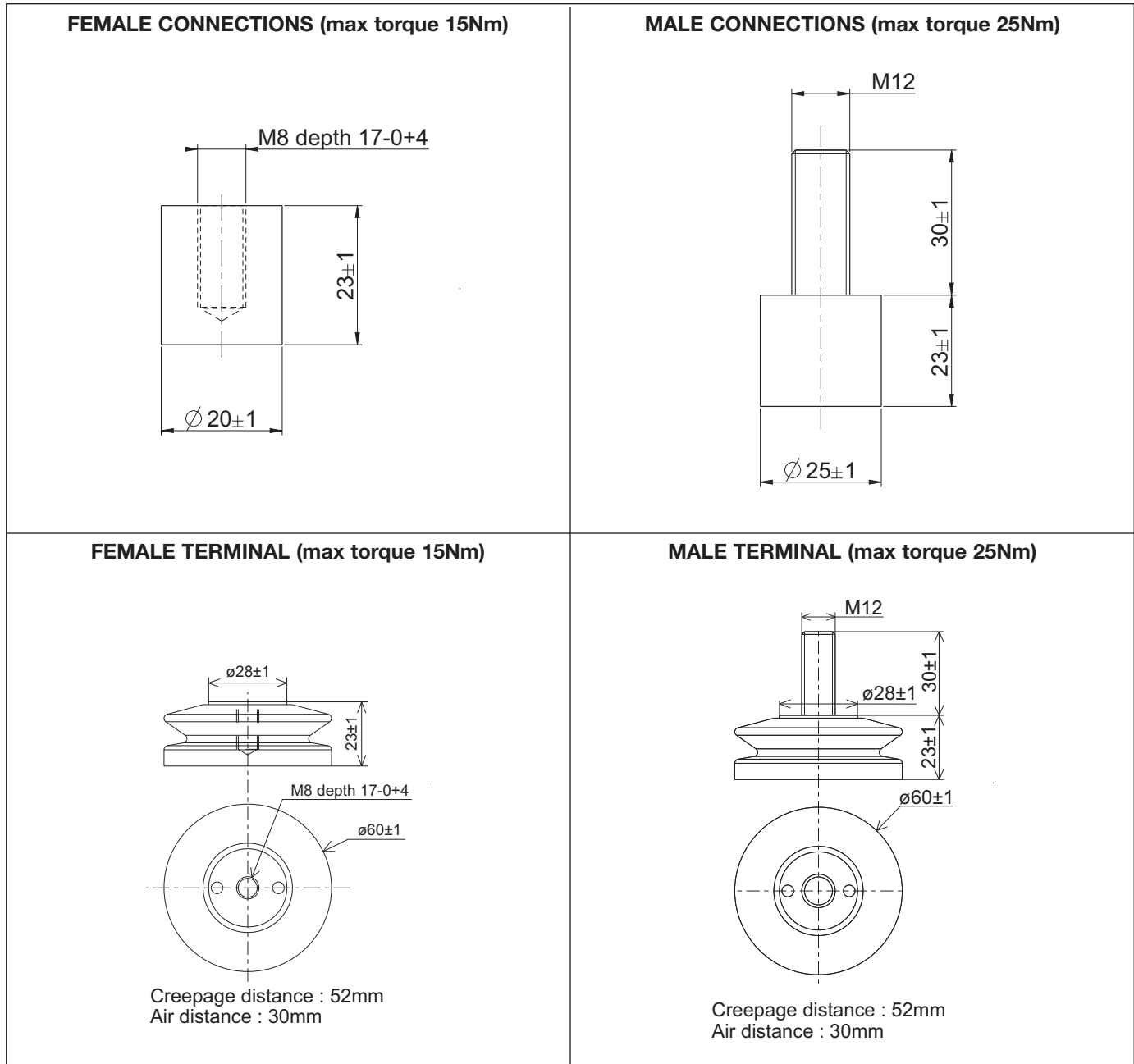
# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## DIMENSIONS

DC FILTERING



## WEIGHT VS SIZE

Height (mm)	Weight (kg) FFHV resin top			
	Width (mm)			
	2 Connections		4 Connections	
	125	175	125	175
230	13	17.5	13.5	18
295	17	22.5	17.5	23
370	21	27.5	21.5	28
450	25	33.5	25.5	34
530	29	39	29.5	39.5
610	33.5	44.5	34	45

Height (mm)	Weight (kg) FTHV hermetic case			
	Width (mm)			
	2 Connections		4 Connections	
	125	175	125	175
240	14.5	19	15	19.5
305	18	24	18.5	24.5
380	22	29.5	22.5	30
460	26.5	35	27	35.5
540	30.5	40.5	31	41
620	34.5	46	35	46.5



# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## TABLE OF VALUES

Part Number	Capacitance (µF)	Width (mm)	Height (mm)		R <sub>s</sub> (mΩ)	I <sub>rms</sub> Thermal 1 (A)	I <sub>rms</sub> Thermal 2 (A)
			FFHV	FTHV			
<b>Un = 1500Vdc</b>							
DF*HV11°R2637	2630	125	230	240	0,42	215	240
DF*HV21°R2637	2630	125	230	240	0,35	230	255
DF*HV12°R3447	3440	125	295	305	0,36	255	255
DF*HV22°R3447	3440	125	295	305	0,29	285	320
DF*HV31°R4127	4120	175	230	240	0,57	205	230
DF*HV41°R4127	4120	175	230	240	0,48	220	245
DF*HV13°R4597	4590	125	370	380	0,32	255	255
DF*HV23°R4597	4590	125	370	380	0,25	345	390
DF*HV32°R5407	5400	175	295	305	0,48	245	255
DF*HV42°R5407	5400	175	295	305	0,39	270	300
DF*HV14°R5747	5740	125	450	460	0,30	255	255
DF*HV24°R5747	5740	125	450	460	0,23	400	400
DF*HV15°R6897	6890	125	530	540	0,29	255	255
DF*HV25°R6897	6890	125	530	540	0,22	400	400
DF*HV33°R7207	7200	175	370	380	0,42	255	255
DF*HV43°R7207	7200	175	370	380	0,33	325	360
DF*HV16°R8047	8040	125	610	620	0,28	255	255
DF*HV26°R8047	8040	125	610	620	0,21	400	400
DF*HV34°R9007	9000	175	450	460	0,39	255	255
DF*HV44°R9007	9000	175	450	460	0,30	375	400
DF*HV35°R1088	10800	175	530	540	0,37	255	255
DF*HV45°R1088	10800	175	530	540	0,28	400	400
DF*HV36°R1268	12600	175	610	620	0,36	255	255
DF*HV46°R1268	12600	175	610	620	0,27	400	400
<b>Un = 1750Vdc</b>							
DF*HV11°S1917	1910	125	230	240	0,46	200	225
DF*HV21°S1917	1910	125	230	240	0,39	210	235
DF*HV12°S2507	2500	125	295	305	0,39	245	255
DF*HV22°S2507	2500	125	295	305	0,32	260	295
DF*HV31°S3007	3000	175	230	240	0,63	195	215
DF*HV41°S3007	3000	175	230	240	0,54	205	225
DF*HV13°S3347	3340	125	370	380	0,34	255	255
DF*HV23°S3347	3340	125	370	380	0,27	320	360
DF*HV32°S3927	3920	175	295	305	0,53	230	255
DF*HV42°S3927	3920	175	295	305	0,44	250	275
DF*HV14°S4177	4170	125	450	460	0,32	255	255
DF*HV24°S4177	4170	125	450	460	0,25	375	400
DF*HV15°S5017	5010	125	530	540	0,31	255	255
DF*HV25°S5017	5010	125	530	540	0,24	400	400
DF*HV33°S5227	5220	175	370	380	0,46	255	255
DF*HV43°S5227	5220	175	370	380	0,37	300	335
DF*HV16°S5847	5840	125	610	620	0,30	255	255
DF*HV26°S5847	5840	125	610	620	0,23	400	400
DF*HV34°S6537	6530	175	450	460	0,42	255	255
DF*HV44°S6537	6530	175	450	460	0,33	350	390
DF*HV35°S7837	7830	175	530	540	0,39	255	255
DF*HV45°S7837	7830	175	530	540	0,30	395	400
DF*HV36°S9147	9140	175	610	620	0,38	255	255
DF*HV46°S9147	9140	175	610	620	0,29	400	400

\* Insert F for resin top or T for hermetic case

° Insert F for female terminals or M for male terminals

DC FILTERING

# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## TABLE OF VALUES

DC FILTERING

Part Number	Capacitance (µF)	Width (mm)	Height (mm)		R <sub>s</sub> (mΩ)	I <sub>rms</sub> Thermal 1 (A)	I <sub>rms</sub> Thermal 2 (A)
			FFHV	FTHV			
<b>Un = 2000Vdc</b>							
DF*HV11°N1447	1440	125	230	240	0,50	180	200
DF*HV21°N1447	1440	125	230	240	0,43	185	210
DF*HV12°N1887	1880	125	295	305	0,42	225	255
DF*HV22°N1887	1880	125	295	305	0,35	240	270
DF*HV31°N2257	2250	175	230	240	0,69	175	195
DF*HV41°N2257	2250	175	230	240	0,60	185	205
DF*HV13°N2517	2510	125	370	380	0,37	255	255
DF*HV23°N2517	2510	125	370	380	0,30	295	335
DF*HV32°N2957	2950	175	295	305	0,57	215	240
DF*HV42°N2957	2950	175	295	305	0,48	230	260
DF*HV14°N3147	3140	125	450	460	0,34	255	255
DF*HV24°N3147	3140	125	450	460	0,27	345	390
DF*HV15°N3777	3770	125	530	540	0,32	255	255
DF*HV25°N3777	3770	125	530	540	0,25	395	400
DF*HV33°N3937	3930	175	370	380	0,49	255	255
DF*HV43°N3937	3930	175	370	380	0,40	280	310
DF*HV16°N4407	4400	125	610	620	0,31	255	255
DF*HV26°N4407	4400	125	610	620	0,24	400	400
DF*HV34°N4917	4910	175	450	460	0,44	255	255
DF*HV44°N4917	4910	175	450	460	0,35	330	365
DF*HV35°N5907	5900	175	530	540	0,42	255	255
DF*HV45°N5907	5900	175	530	540	0,33	375	400
DF*HV36°N6887	6880	175	610	620	0,40	255	255
DF*HV46°N6887	6880	175	610	620	0,31	400	400
<b>Un = 2250Vdc</b>							
DF*HV11°T1157	1150	125	230	240	0,53	165	190
DF*HV21°T1157	1150	125	230	240	0,46	175	195
DF*HV12°T1507	1500	125	295	305	0,45	210	240
DF*HV22°T1507	1500	125	295	305	0,38	225	250
DF*HV31°T1807	1800	175	230	240	0,74	165	185
DF*HV41°T1807	1800	175	230	240	0,65	175	195
DF*HV13°T2017	2010	125	370	380	0,39	255	255
DF*HV23°T2017	2010	125	370	380	0,32	275	310
DF*HV32°T2357	2350	175	295	305	0,61	205	230
DF*HV42°T2357	2350	175	295	305	0,52	220	245
DF*HV14°T2517	2510	125	450	460	0,35	255	255
DF*HV24°T2517	2510	125	450	460	0,28	325	370
DF*HV15°T3017	3010	125	530	540	0,33	255	255
DF*HV25°T3017	3010	125	530	540	0,26	375	400
DF*HV33°T3147	3140	175	370	380	0,52	250	255
DF*HV43°T3147	3140	175	370	380	0,43	265	295
DF*HV16°T3517	3510	125	610	620	0,32	255	255
DF*HV26°T3517	3510	125	610	620	0,25	400	400
DF*HV34°T3937	3930	175	450	460	0,47	255	255
DF*HV44°T3937	3930	175	450	460	0,38	315	345
DF*HV35°T4727	4720	175	530	540	0,44	255	255
DF*HV45°T4727	4720	175	530	540	0,35	355	395
DF*HV36°T5507	5500	175	610	620	0,41	255	255
DF*HV46°T5507	5500	175	610	620	0,32	395	400

\* Insert F for resin top or T for hermetic case

° Insert F for female terminals or M for male terminals

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## FFHV/FTHV 1500Vdc to 3000Vdc

DC FILTERING

Part Number	Capacitance (µF)	Width (mm)	Height (mm)		R <sub>s</sub> (mΩ)	I <sub>rms</sub> Thermal 1 (A)	I <sub>rms</sub> Thermal 2 (A)
			FFHV	FTHV			
<b>Un = 2500Vdc</b>							
DF*HV11°P0877	870	125	230	240	0,57	155	175
DF*HV21°P0877	870	125	230	240	0,50	160	185
DF*HV12°P1137	1130	125	295	305	0,48	200	225
DF*HV22°P1137	1130	125	295	305	0,41	205	235
DF*HV31°P1397	1390	175	230	240	0,80	160	175
DF*HV41°P1397	1390	175	230	240	0,71	165	185
DF*HV13°P1517	1510	125	370	380	0,41	245	255
DF*HV23°P1517	1510	125	370	380	0,34	260	290
DF*HV32°P1827	1820	175	295	305	0,65	195	215
DF*HV42°P1827	1820	175	295	305	0,56	205	230
DF*HV14°P1897	1890	125	450	460	0,37	255	255
DF*HV24°P1897	1890	125	450	460	0,30	305	345
DF*HV15°P2277	2270	125	530	540	0,35	255	255
DF*HV25°P2277	2270	125	530	540	0,28	350	400
DF*HV33°P2427	2420	175	370	380	0,55	235	255
DF*HV43°P2427	2420	175	370	380	0,46	250	280
DF*HV16°P2657	2650	125	610	620	0,33	255	255
DF*HV26°P2657	2650	125	610	620	0,26	400	400
DF*HV34°P3037	3030	175	450	460	0,49	255	255
DF*HV44°P3037	3030	175	450	460	0,40	295	330
DF*HV35°P3647	3640	175	530	540	0,46	255	255
DF*HV45°P3647	3640	175	530	540	0,37	340	375
DF*HV36°P4257	4250	175	610	620	0,43	255	255
DF*HV46°P4257	4250	175	610	620	0,34	380	400
<b>Un = 2750Vdc</b>							
DF*HV11°W0717	710	125	230	240	0,61	145	165
DF*HV21°W0717	710	125	230	240	0,54	150	170
DF*HV12°W0937	930	125	295	305	0,51	185	210
DF*HV22°W0937	930	125	295	305	0,44	195	220
DF*HV31°W1147	1140	175	230	240	0,85	150	165
DF*HV41°W1147	1140	175	230	240	0,76	155	175
DF*HV13°W1247	1240	125	370	380	0,43	230	255
DF*HV23°W1247	1240	125	370	380	0,36	240	275
DF*HV32°W1497	1490	175	295	305	0,70	185	205
DF*HV42°W1497	1490	175	295	305	0,61	195	215
DF*HV14°W1557	1550	125	450	460	0,39	255	255
DF*HV24°W1557	1550	125	450	460	0,32	285	325
DF*HV15°W1867	1860	125	530	540	0,36	255	255
DF*HV25°W1867	1860	125	530	540	0,29	330	375
DF*HV33°W1997	1990	175	370	380	0,58	225	250
DF*HV43°W1997	1990	175	370	380	0,48	240	265
DF*HV16°W2177	2170	125	610	620	0,35	255	255
DF*HV26°W2177	2170	125	610	620	0,28	375	400
DF*HV34°W2497	2490	175	450	460	0,52	255	255
DF*HV44°W2497	2490	175	450	460	0,43	280	310
DF*HV35°W2997	2990	175	530	540	0,48	255	255
DF*HV45°W2997	2990	175	530	540	0,39	320	360
DF*HV36°W3487	3480	175	610	620	0,45	255	255
DF*HV46°W3487	3480	175	610	620	0,36	360	400

\* Insert F for resin top or T for hermetic case  
 ° Insert F for female terminals or M for male terminals

# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

DC FILTERING

Part Number	Capacitance (µF)	Width (mm)	Height (mm)		R <sub>s</sub> (mΩ)	I <sub>rms</sub> Thermal 1 (A)	I <sub>rms</sub> Thermal 2 (A)
			FFHV	FTHV			
<b>Un = 3000Vdc</b>							
DF*HV11°X0597	590	125	230	240	0,65	140	160
DF*HV21°X0597	590	125	230	240	0,58	145	165
DF*HV12°X0787	780	125	295	305	0,54	175	200
DF*HV22°X0787	780	125	295	305	0,47	180	205
DF*HV31°X0957	950	175	230	240	0,91	140	160
DF*HV41°X0957	950	175	230	240	0,82	145	165
DF*HV13°X1047	1040	125	370	380	0,45	215	245
DF*HV23°X1047	1040	125	370	380	0,38	225	255
DF*HV32°X1257	1250	175	295	305	0,75	175	195
DF*HV42°X1257	1250	175	295	305	0,66	185	205
DF*HV14°X1307	1300	125	450	460	0,41	255	255
DF*HV24°X1307	1300	125	450	460	0,34	270	305
DF*HV15°X1567	1560	125	530	540	0,38	255	255
DF*HV25°X1567	1560	125	530	540	0,31	315	355
DF*HV33°X1667	1660	175	370	380	0,62	215	240
DF*HV43°X1667	1660	175	370	380	0,53	225	250
DF*HV16°X1827	1820	125	610	620	0,36	255	255
DF*HV26°X1827	1820	125	610	620	0,29	355	400
DF*HV34°X2087	2080	175	450	460	0,55	250	255
DF*HV44°X2087	2080	175	450	460	0,46	270	295
DF*HV35°X2507	2500	175	530	540	0,50	255	255
DF*HV45°X2507	2500	175	530	540	0,41	310	340
DF*HV36°X2927	2920	175	610	620	0,47	255	255
DF*HV46°X2927	2920	175	610	620	0,38	345	385

\* Insert F for resin top or T for hermetic case

° Insert F for female terminals or M for male terminals

# Medium Power Film Capacitors



FFHV/FTHV 1500Vdc to 3000Vdc

## CALCULATION FORM

### SPECIFICATION

Capacitance	C (μF)	
Working voltage	U <sub>w</sub> (V)	
Rms current	I <sub>rms</sub> (Arms)	
Frequency	f (Hz)	
Ripple voltage	U <sub>r</sub> (V)	
Ambient temperature	θ <sub>amb</sub> (°C)	
Lifetime @ U <sub>w</sub> , I <sub>rms</sub> and θ <sub>amb</sub>	hours	
Parasitic inductance	L (nH)	

### Your choice

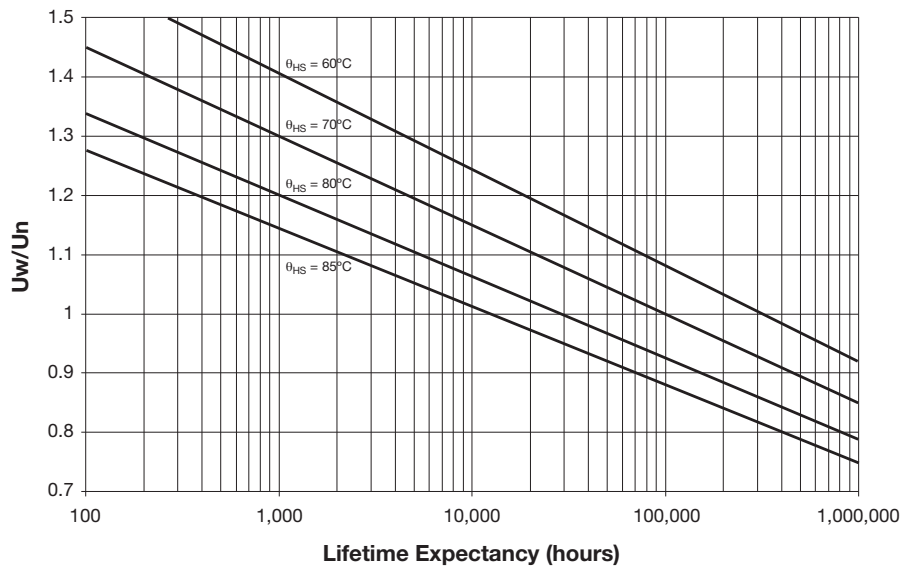
PN		
Capacitance	C (μF)	
Rated voltage	U <sub>n</sub> (V)	
Serial resistance	R <sub>s</sub> (mΩ)	
between hot spot and case	R <sub>th</sub> (°C/W)	

DC FILTERING

## CALCULATIONS

Maximum ripple voltage	U <sub>rmax</sub> = 0.2 U <sub>n</sub>	U <sub>rmax</sub> =	V
<i>The maximum ripple voltage of the selected capacitor must be in any case higher than the ripple voltage of your application</i>			
Ratio U <sub>w</sub> /U <sub>n</sub>	ρ = U <sub>w</sub> /U <sub>n</sub>	ρ =	
Joule losses	P <sub>j</sub> = R <sub>s</sub> I <sub>rms</sub> <sup>2</sup>	P <sub>j</sub> =	W
Dielectric losses	P <sub>d</sub> = Qxtgδ0=Qx 2.10 <sup>-4</sup>	P <sub>d</sub> =	W
Hot spot temperature	θ <sub>HS</sub> = θ <sub>amb</sub> +(P <sub>j</sub> +P <sub>d</sub> )xR <sub>th</sub>	θ <sub>HS</sub> =	°C
<i>The hot spot temperature must be in any case lower than 85°C</i>			

## LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



Expected lifetime at hot spot calculated and U = U <sub>w</sub>	
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