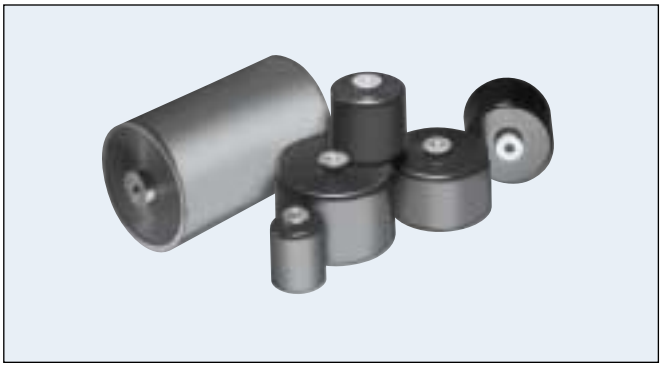
Medium Power Film Capacitors

FPX

PROTECTION



APPLICATIONS

Protection of thyristors.

Protection of gate turn-off thyristor (G.T.O.).

Clamping (Secondary snubber).

TECHNOLOGY

Metallized polypropylene dielectric capacitor with controlled self-healing.

Reinforced metallization developed for high impulse currents.

Axial connections specially developed to reduce series inductance and to provide rigid mechanical mounting.

PACKAGING

Cylindrical in plastic case filled with thermosetting resin.

Outputs: threaded inserts either M6 or M8.

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ELECTRICAL CHARACTERISTICS

Capacitance range C_n	0.5µF to 6µF
Tolerance on C_n	±5%
Rated DC voltage $V_n$dc Peak voltage V_{peak} Allowable overvoltage V_s (for 10 s/day)	1000 to 3000 V 1600 to 4000 V 2000 to 4600 V
Stray inductance	5 to 20 nH
RMS current	I_{rms} max. = up to 160 A The currents shown in the tables are maximum. It is necessary to respect the thermal limits of the dielectric 85°C see “Hot spot temperature calculation”
Insulation resistance	R_i x C ≥ 30,000 s
Impulse current	I^2.t maxi. = up to 729 A^2.s Spikes or peak currents in the capacitors may cause a deterioration of the bonding between the metallization and the connections. These bonds are capable of withstanding only a limited amount of energy for each spike. The table shows the maximum energy permitted in the form (I^2.t), where I is in Ampere, and t is in seconds.

Note: The formula (I^2.t) replaces dV/dt which is less easy to use as it is not an expression of energy (I = C.dV/dt). This type of capacitor has been designed to withstand high (I^2.t) values.

Variation of capacitance with temperature	$\frac{\Delta C}{C}$ ≤ ±2% between -40 and 85°C
Climatic category	40/085/56 (IEC 68)
Test voltage between terminals @ 25°C	V_s for 10s
Test voltage between terminals and case @ 25°C	@ 4 kVrms @ 50 Hz for 1 min.

PROTECTION

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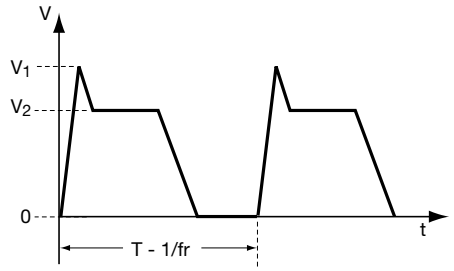
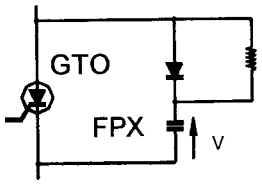
PROTECTION

G.T.O.



Choice of voltage: $V_1 \leq V_{peak}$
$V_2 \leq V_n dc$



Nominal DC voltage ($V_n dc$) and peak voltage (V_{peak}) are given in the tables.

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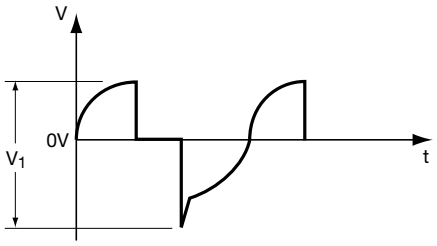
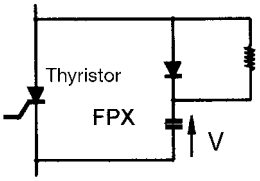
THYRISTOR



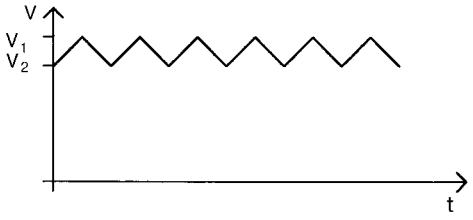
Choice of voltage: $V_1 \leq V_{peak}$

Note that V_1 is the voltage peak to peak and cannot be symmetrical vs 0 V

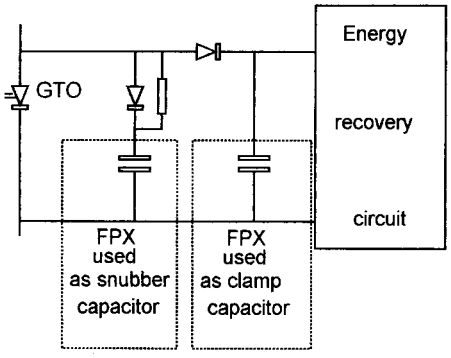


Peak voltage is given in the tables.

CLAMPING



Choice of voltage: $V_1 \leq V_{peak}$
$V_2 \leq V_n dc$



Nominal DC voltage ($V_n dc$) and peak voltage (V_{peak}) are given in the tables.

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FPX Table of Values

PROTECTION

Dimensions: millimeters (inches)

Cn (µF)	Dimensions: Case Type	H* ±0.5 (±0.020)	h ±2 (±0.079)	D max.	d ±0.1	I^2t max. ($A^2.s$)	I_{rms} max. (A)	Rs (mΩ)	Rth (°C/W)	Part Number
FPX 2000 V	**$V_n$dc = 1000 V**		**V_{peak} = 1600 V**		**V_{rms} = 560 V**			**V_s = 2000 V**		
1	Plastic case M6/6	52 (2.072)	5 (0.197)	40 (1.575)	18 (0.709)	2	15	2.4	14	FPX66N0105J--
2	Plastic case M8/8	52 (2.072)	5 (0.197)	60 (2.362)	22 (0.866)	8	30	1.2	6.1	FPX86N0205J--
3	Plastic case M8/8	52 (2.072)	5 (0.197)	72 (2.835)	22 (0.866)	18	45	0.9	4.5	FPX86N0305J--
3.5	Plastic case M8/8	52 (2.072)	5 (0.197)	72 (2.835)	22 (0.866)	25	50	0.85	4.5	FPX86N0355J--
4	Plastic case M8/8	52 (2.072)	5 (0.197)	82 (3.228)	22 (0.866)	32	60	0.75	3.5	FPX86N0405J--
5	Plastic case M8/8	52 (2.072)	5 (0.197)	82 (3.228)	22 (0.866)	50	70	0.65	2.5	FPX86N0505J--
FPX 2500 V	**$V_n$dc = 1300 V**		**V_{peak} = 2000 V**		**V_{rms} = 700 V**			**V_s = 2500 V**		
0.5	Plastic case M6/6	52 (2.072)	5 (0.197)	40 (1.575)	18 (0.709)	1	15	3	14	FPX66P0504J--
1	Plastic case M8/8	52 (2.072)	5 (0.197)	60 (2.362)	22 (0.866)	3	20	2.3	10.5	FPX86P0105J--
1.5	Plastic case M8/8	52 (2.072)	5 (0.197)	60(2.362)	22 (0.866)	7	30	1.5	6.1	FPX86P0155J--
2	Plastic case M8/8	52 (2.072)	5 (0.197)	72 (2.835)	22 (0.866)	12.7	40	1.1	4.5	FPX86P0205J--
2.5	Plastic case M8/8	52 (2.072)	5 (0.197)	72(2.835)	22 (0.866)	20	60	0.89	3.7	FPX86P0255J--
3	Plastic case M8/8	52 (2.072)	5 (0.197)	82 (3.228)	22 (0.866)	28	60	0.85	3.2	FPX86P0305J--
3.5	Plastic case M8/8	52 (2.072)	5 (0.197)	82(3.228)	22 (0.866)	39	65	0.78	2.9	FPX86P0355J--
FPX 3500 V	**$V_n$dc = 2000 V**		**V_{peak} = 2400 V**		**V_{rms} = 850 V**			**V_s = 3500 V**		
2	Plastic case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	23	41	1.24	6.1	FPX86X0205J-
3	Plastic case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	50	62	0.92	3.9	FPX86X0305J--
3.5	Plastic case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	70	72	0.83	3.4	FPX86X0355J--
4	Plastic case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	85	80	0.78	3.1	FPX86X0405J--
FPX 4500 V	**$V_n$dc = 2500 V**		**V_{peak} = 3200 V**		**V_{rms} = 1130 V**			**V_s = 4500 V**		
1	Plastic case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	15	38	1.4	6.2	FPX86Z0105J--
2	Plastic case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	70	75	0.85	3.1	FPX86Z0205J--
FPX 4600 V	**$V_n$dc = 3000 V**		**V_{peak} = 4000 V**		**V_{rms} = 1400 V**			**V_s = 4600 V**		
0.68	Plastic case M8/8	62 (2.441)	5 (0.197)	72 (2.835)	22 (0.866)	14	35	1.59	6.2	FPX86Y0684J--
1.25	Plastic case M8/8	62 (2.441)	5 (0.197)	92 (3.622)	22 (0.866)	50	65	1	3.3	FPX86Y1254J--
1.5	Plastic case M8/10	79 (3.110)	6 (0.236)	97 (3.819)	–	32	60	1.4	8.3	FPX86Y0155J--
1.7	Plastic case M8/10	79 (3.110)	6 (0.236)	97 (3.819)	–	40	70	1.3	7.4	FPX86Y0175J--
2	Plastic case M8/10	79 (3.110)	6 (0.236)	97 (3.819)	–	56	80	1.1	6.3	FPX86Y0205J--
2.5	Plastic case M8/10	118 (4.646)	6 (0.236)	97 (3.819)	–	200	130	0.8	3.3	FPX86Y0255J--
2.7	Plastic case M8/10	118 (4.646)	6 (0.236)	97 (3.819)	–	232	140	0.7	3.2	FPX86Y0275J--
3	Plastic case M8/10	143 (5.630)	6 (0.236)	97 (3.819)	–	128	100	0.9	4.4	FPX86Y0305J--
3.5	Plastic case M8/10	143 (5.630)	6 (0.236)	97 (3.819)	–	170	110	0.8	4.2	FPX86Y0355J--
4	Plastic case M8/10	143 (5.630)	6 (0.236)	97 (3.819)	–	224	115	0.8	4.0	FPX86Y0405J--
4.5	Plastic case M8/10	163 (6.417)	6 (0.236)	97 (3.819)	–	522	120	0.6	5.0	FPX86Y0455J--
5	Plastic case M8/10	163 (6.417)	6 (0.236)	97 (3.819)	–	600	130	0.6	5.0	FPX86Y0505J--
6	Plastic case M8/10	163 (6.417)	6 (0.236)	97 (3.819)	–	729	160	0.5	5.0	FPX86Y0605J--

* Tol: +0 / -3mm for H ≥ 118mm

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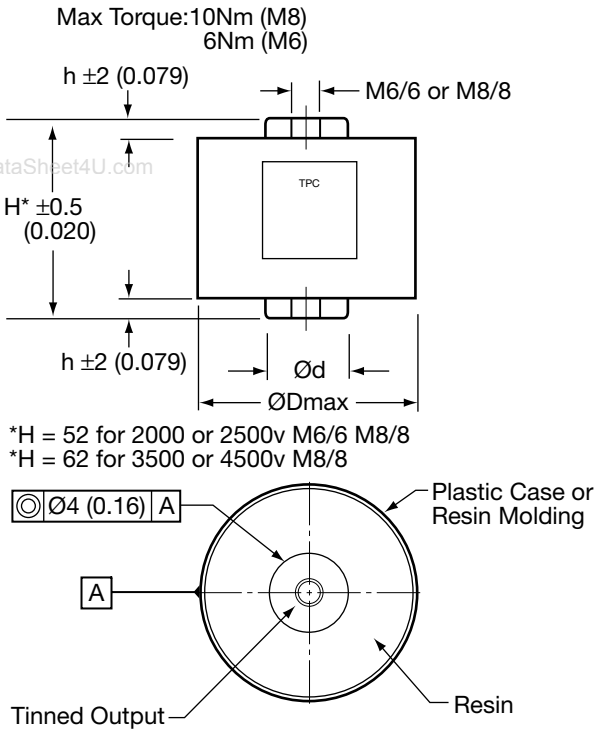
PROTECTION

MARKING

Logo
Withstanding surge voltage
Capacitance and tolerance in clear
Nominal DC voltage in clear
RMS current in clear
Date of manufacture (IEC coding)

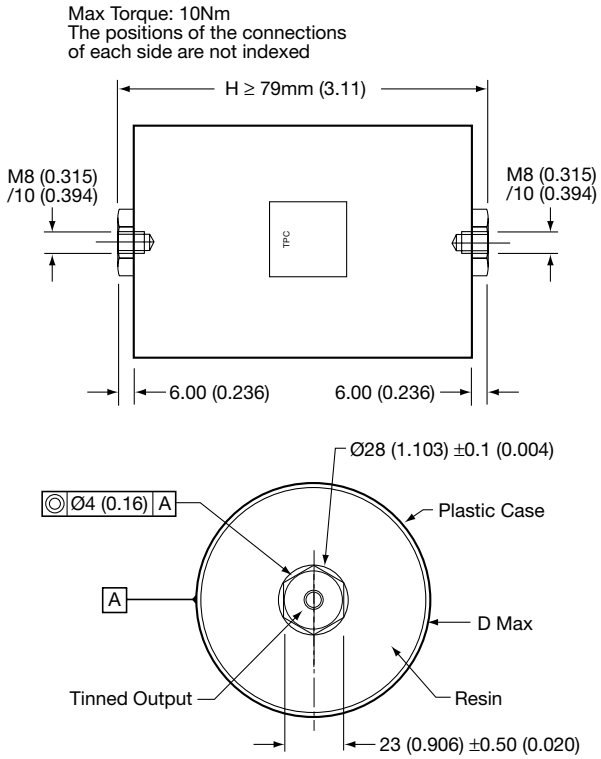
DESIGN

Plastic Case M6 / 6 or M8 / 8



Dimensions: millimeters (inches)
General tolerance: ±2

Plastic Case M8 / 10



Dimensions: millimeters (inches)
General tolerance: ±2

HOT SPOT TEMPERATURE CALCULATION

$$\theta_{hot\ spot} = \theta_{terminals} + (P_d + P_t) \times R_{th}$$

with

P_d (Dielectric losses) = $Q \times tg\delta_0$
$\Rightarrow [\frac{1}{2} \times C_n \times (V_{peak\ to\ peak})^2 \times f] \times (2 \times 10^{-4})$

P_t (Thermal losses) = $R_s \times (I_{rms})^2$

where

C_n in Farads
V in Volts
I_{rms} in Amperes
R_s in Ohms
f in Hertz
θ in °C
R_{th} in °C/W

Due to the design of the capacitor and its technology, the thermal impedance between the terminations and the core of the capacitor is low, it is necessary to take care that the capacitor is never overheated by use of incorrect sized connections.

In the case where the series diodes are screwed to the capacitor, cooling of the diodes must be taken in account.

Do not use the capacitor as a heat sink.

Due to the complexity of the diode/capacitor thermal exchanges, we recommend that thermal measurements shall be made on the different components. We would be pleased to advise you on specific problems.

WORKING TEMPERATURE

(according to the power to be dissipated) -40°C to +85°C

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