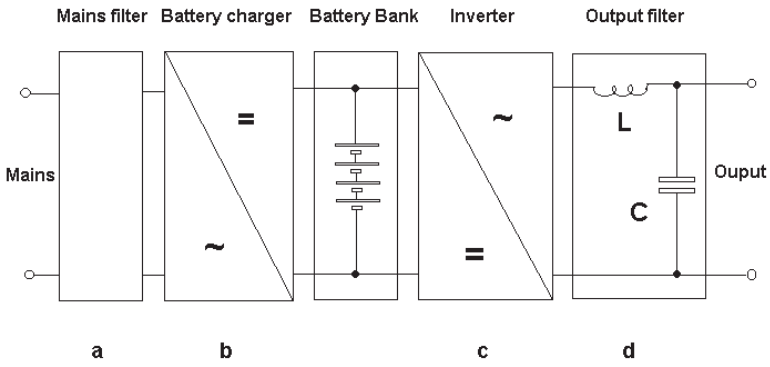
Dry Technology	Series
Snubber capacitors, Alu-can	C44.1
Snubber capacitors, Alu-can, Hi-Voltage	C44.1
Axials capacitors, Snubber	C4C-C4H
Axials capacitors, Switching	C4G-C4M C4T
Filter capacitors, Single and Three-Phase	C44.3 C44.H C933 C9T
General Purpose Power capacitors	C44.
Commutation Capacitors	C44.
Low Voltage Commutation capacitors	C44.
Box capacitors, Wire Terminals, Snubber	C4AS
Box capacitors, Wire Terminals,Switching	C4AT
Box capacitors, LugTerminals, Snubber	C4BS
Box capacitors, LugTerminals, Switching	C4BT
GTO Snubber capacitors	C4DC
GTO Clamper capacitors	C4DR
Oil Impregnated Technology	
Commutation capacitors	C20A
Snubber capacitors	C20B
General Purpose Power AC capacitors	C20F
Power Factor Correction capacitors	C20
General Purpose Power AC capacitors	C20F

Applications																		
Snubber								●		●					●		●	
Snubber High Voltage				●												●		
Snubber for GTO							●											
Clamper for IGBT and MOSFET								●	●	●					●	●		
Clamper for GTO						●			●									
Commutation					●						●	●	●					
Commutation High Current					●													
DC Ripple Filter													●	●				
High frequency Ripple Filter						●		●	●	●	●							
Resonance - Low Power	●	●	●	●					●	●	●	●				●	●	
Resonance - Medium Power					●		●		●									
Energy Storage					●									●				
Pulse				●			●		●		●		●			●	●	●
Battery Operated Devices												●						
Harmonic Filters	●	●	●		●									●	●			
Power Factor Correction	●	●	●												●			
Blocking								●	●	●	●					●	●	
Bypassing								●	●							●	●	
Coupling / Decoupling								●	●							●	●	

UPS – Uninterruptable Power Supply

This is one of the most important field for capacitors for power electronics.
Arcotronics currently supplies the following series suitable to this application:

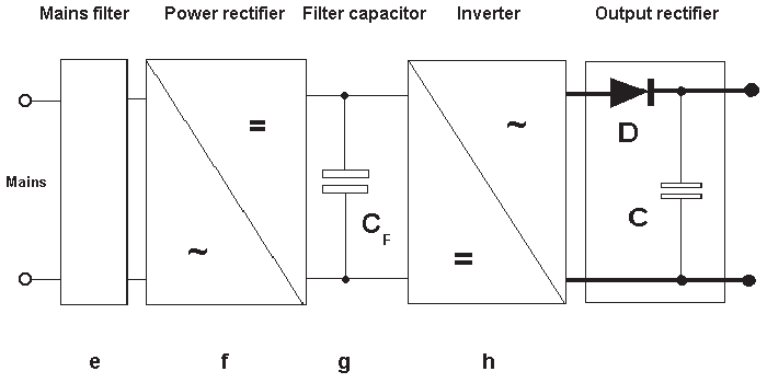
a) C93: In Mains Filters
b) C4A – C4C – C4G:
In Battery Chargers
c) C4A – C4B – C4C – C4G:
In the Inverter
d) C44.A – C44.3 – C93
in Output Filter



High Frequency Welders

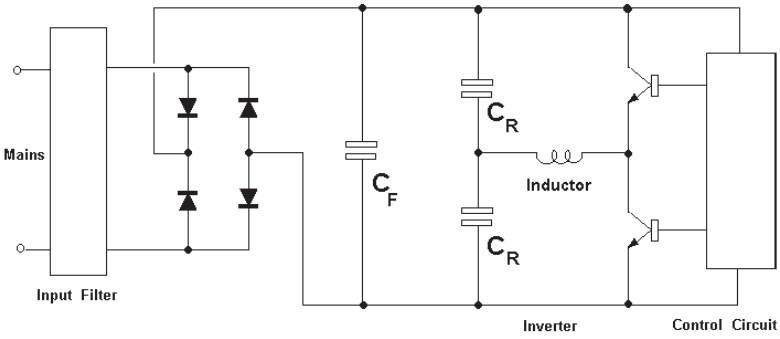
This field is experiencing an important development.
The series that are suitable for this field are:

e) C93: In Mains Filters and PFC
f) C4A – C4C – C4G:
In Power Rectifier
g) C44.A – C44.3:
As C_F Filter Capacitor
h) C44.A: In the Inverter
C4A: In the inverter
of “Plasma Welders”

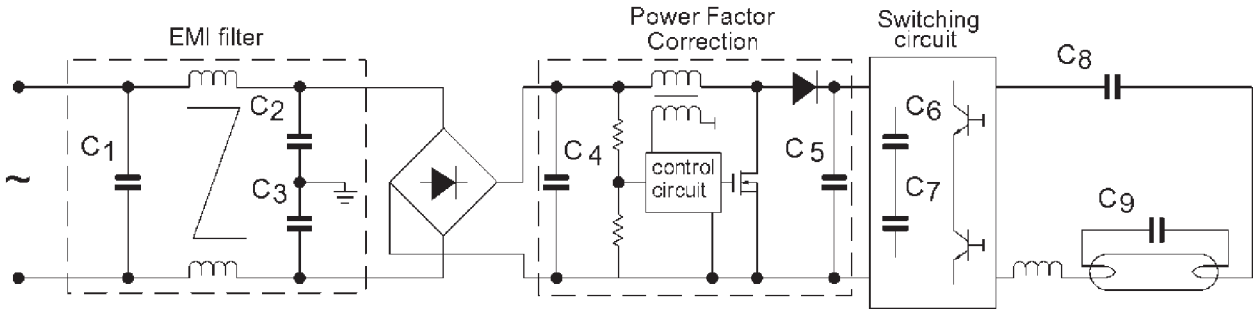


Induction Plates

The induction plates are expanding year after year due to the great reduction in cooking time
Arcotronics suggests the following series
C4C (As $\mathbf{C_R}$) – C4G (As $\mathbf{C_F}$):In low profile equipments
C4AS – C4BS (As $\mathbf{C_R}$) - C4AT – C4BT (As $\mathbf{C_F}$):
In medium power devices
C44.A (As $\mathbf{C_R}$ and $\mathbf{C_F}$): In high power equipments



Electronic Ballast



The increasing switching frequency of electronic ballasts in the range of 60 to 150 KHz takes advantage in performances applaying Polypropylene film capacitors **C 5** in replacement of electrolytics capacitors.
For this application Arcotronics suggests the series **C4G**, **C4M** and **C4T**. The advantages are:

- ❑ The Self-healing property avoids short circuits
- ❑ Non polarized product
- ❑ Leakage current 50 times lower
- ❑ 50 % Lower capacitance value
- ❑ No derating in performances down to –40 °C

Increased surge voltage capability
Ripple current 5 to 10 times higher
Stray inductance 30% lower
Life expectancy of 60 to 100 Khours
Same value of ESR from –40 to + 85 °C.

Motor Drives

The static motor drives use several types of capacitors depending on the circuit and power associated.

- ❑ Power 0.5 to 5 KW : Series C4A - C4C - C4G - C4H - C4M
- ❑ Power 5 to 500 KW : Series C4A - C4B - C4C - C44.A - C93
- ❑ Power 500 to 1000 KW : Series C4D - C4B - C44.A - C20 - C93

Automotive

The new design of electric, hybrid and diesel vehicles use several capacitors in the associated circuits.
The series suggested by Arcotronics for these fields are the following:

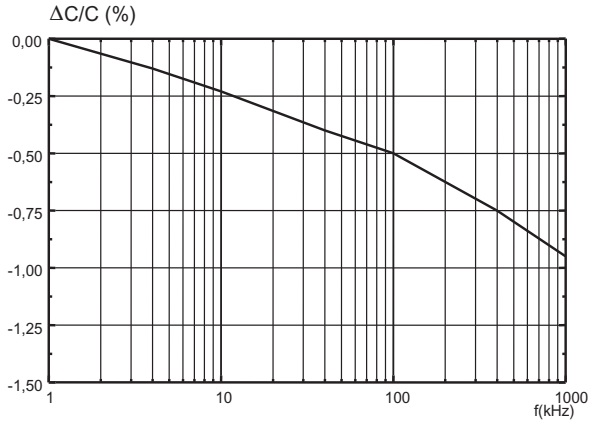
- ❑ Motor drive and energy management : C4B - C4D - C4G - C4T
- ❑ Air conditioner and fan management : C4A - C4B - C4T
- ❑ HID (High intensity discharge lamps) : C4A - C4C - C4T
- ❑ Battery charger : C4A - C4B - C4D
- ❑ Hybrid vehicles : C4T - C4G
- ❑ Diesel injection system : C4T

Polypropylene Typical Dielectric Features

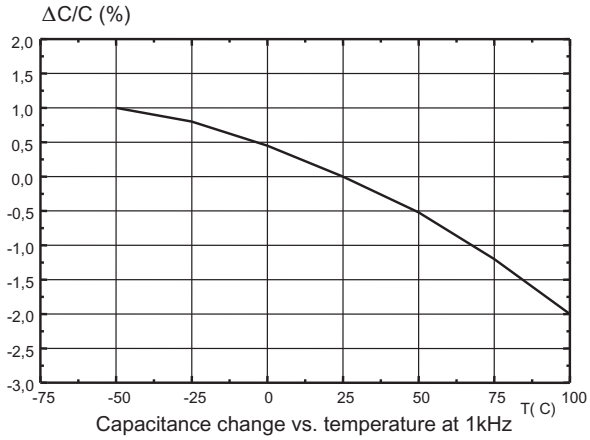
ARCOTRONICS

The selection of Polypropylene as a dielectric is due to the following inherent properties:

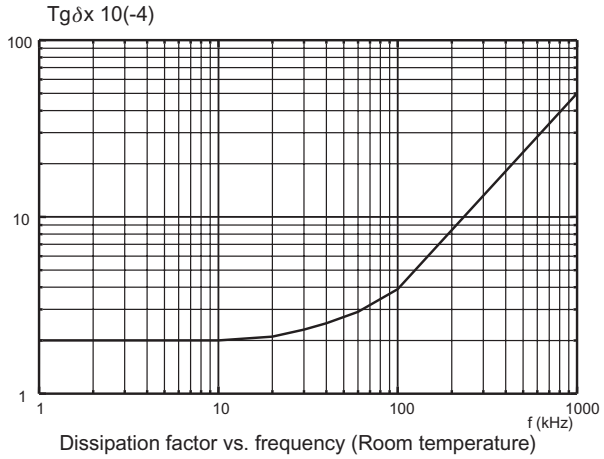
- ❑ Very low dissipation factor
- ❑ High insulation resistanc
- ❑ High thermal stability
- ❑ Good self-healing features



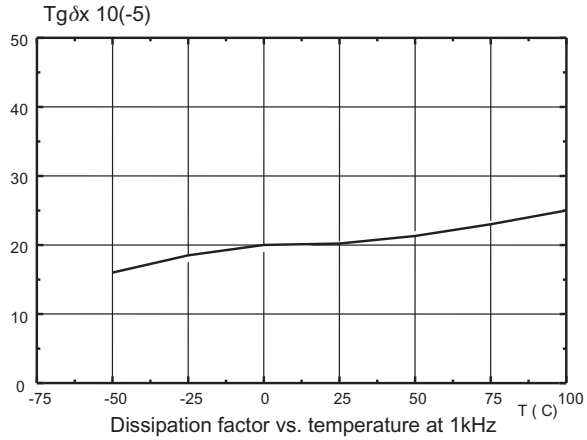
Capacitance change vs. frequency (room temperature)



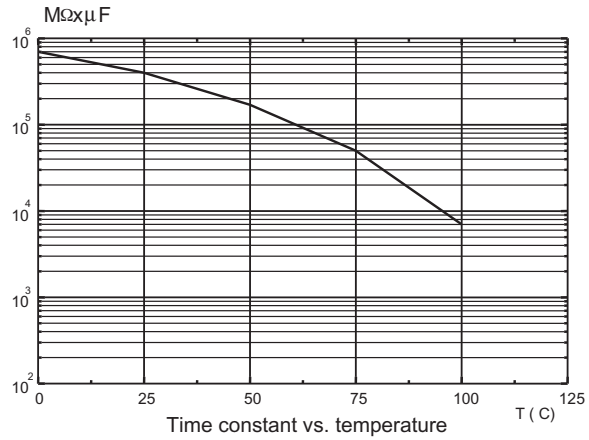
Capacitance change vs. temperature at 1kHz



Dissipation factor vs. frequency (Room temperature)



Dissipation factor vs. temperature at 1kHz



Time constant vs. temperature

The technological development of Power semiconductors led to an ever increasing widespread use of power electronics. Many of these applications are based on the usage of capacitors specially designed to withstand th electric and thermal stresses required. Arcotronics developed a wide range of capacitors for power electronics that are shown in this catalogue and suitable to be used in applications like forced commutation, damping, clamping, snubbering, A.C. and D.C. filtering. These capacitors are wound in such a way to provide low values of stray inductance (ESL), series resistance (ESR) in order to minimize the power dissipation (Tgδ). With these characteristics the capacitors for power electronics made by Arcotronics allow to operate with high values of RMS and Peak currents producing a negligible temperature rise of the case.

QUALITY

Arcotronics capacitors are manufactured with maximum attention to product quality and customer service is our first task.
In order to assure high quality and reliability to its products, Arcotronics adopts the most modern and world wide standards and procedures of continuous improvement.
Arcotronics quality system is certified **ISO9001 EN 29001** – **BS5750** part 2 and **CECC 00114** part 1.
The target of Arcotronics quality control is the achievement of zero defect.

TERMINATIONS

The standard terminations of capacitors with aluminium case are made by two M6 tinned brass screws allowing a maximum driving torque of 6 Nm.
Upon request it is possible to supply single or double tinned brass 6.35x0.8 mm faston or 2.8x0.5 mm mini faston. The solderability of fastons is guaranteed for period of 4 months starting from the manufacturing date marked on the case. Axial and Box executions are provided with tinned copper wire terminations.

MARKING

The marking is made in black colour. Every product is marked with most of the informations that can be fitted on the case depending on its dimensions. The standard marking is the following: Arcotronics trade Mark, Series number, Capacitance in microfarad, tolerance in %, Rated DC and AC voltages, operating temperature range in degree Centigrade, coded climatic class and reliability data according to DIN 40040, Self-healing property SH, Batch number, year and month of production coded in accordance with DIN 42314 standard shown in the following table:

Year	Letter
199	F
199	H
199	J
199	K
199	L
200	M
200	N
200	P
200	R
200	S
200	T
200	U

Month	Letter
Januar	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	O
November	N
December	D

These performances are obtained using low loss dielectrics wich assure high stability of capacitance versus temperature and time. The metallized electrodes under vacuum assure the self-healing characteristic, this means that voltage transients exceeding the rated voltage can be applied without causing short circuits. The tight production of the case guarantees a complete protection against humidity and external pollutants. The capacitors for power electronics shown in this catalogue are the most common models, but many others are normally in production or in development stage. For particular requirements or custom designed products please contact directly the Arcotronics local office.

GENERAL TECHNICAL DATA

The capacitive cartridge is wound on high speed automated machines, in cylindrical shape, non inductive, self-healing, surge proof and low loss metallized plastic dielectric films. The terminations are connected to the electrodes through metal sprayed front ends (Shoopage), assuring an high contact reliability and low values of ESR.

VIBRATION STRENGTH

The vibration strength of Aluminium can capacitors having a diameter ≤ 60mm and heigth ≤ 160mm, corresponds to the test loading according to the standard **DIN 40046** page 8, test FC – B1 or IEC Pubblication 68-2-6 at the following conditions:

Case diameter	≤ 60mm	≤ 65mm
Test duration	6 hours	6 hours
Frequency range	10 to 55 Hz	10 to 55 Hz
Amplitude	0.75mm	0.75 mm
Acceleration ma	10 g	2 g

Fixing method is very important in order to minimize the Detrimental effects of vibrations.

– **Capacitance: C (µF)**
The rated capacitance measured at 20 °C ±5 °C at 1 KHz.

– **Tolerance**
The maximum admitted deviation from the rated value of Capacitance measured at 20 °C, ±5 % code J, ±10 % Code K.

– **Capacitance change versus temperature**
The capacitance change from nominal value at 20 °C ± 5 °C Over specified temperature range. Typical capacitance change versus temperature is shown in the diagrams on Page 5.

– **Rated D.C. Voltage: Un**
The maximum operating peak recurrent voltage of either Polarity but of a non reversing type waveform, marked on the capacitor.

– **Rated A.C. Voltage: U_{RMS}**
The maximum RMS value of the sinusoidal alternating voltage marked on the capacitor.

– **Non recurrent surge voltage: U_{PK}**
The maximum non recurrent peak D.C. voltage that can be applied in either polarity for a limited number of times. The application of higher than rated peak voltage Upk may result in premature failure of the dielectric.

– **U_{RMS} trapezoidal** - The RMS value of trapezoidal A.C. voltage at which the capacitor will provide full rated life.

– **$\hat{U}_{MAX}$** - The maximum repetitive peak DC voltage that can be applied in either polarity.

– **Voltage test between terminals: Utt**
All capacitors are tested at 20 °C ± 5 °C for 10 s to one or both the following voltages:
D.C. Test Voltage: $2.5\ U_N / \sqrt{2}$
A.C. Test Voltage: 1.5 U_{RMS}

– **Voltage test between terminals and case Utc**
The standard test conditions are 3 KV_{RMS} sinus at 50 Hz, 20 °C ± 5 °C for 1 minute, no breakdown discharges are admitted. The maximum operating voltage applied continuosly between each terminal and case is:
- 1.25 U_{RMS} for A.C. Applications
- 1.25 UPK for D.C. Applications

– **Self-healing: SH**
The capacitors for Power Electronics are wound with vacuum metalized films with the self-healing characteristics.
Electrical discharges between electrodes may thus occur during operation without damaging dielectric, producing only a negligible capacitance reduction.

– **Dissipation Factor DF (tgδ)**
Two values may be specified:
1) tgδ max, that represents the maximum guaranteed value.
2) tgδ typ, that is the typical value of the capacitors.
The tgδ value is measured at 20 °C ± 5 °C at 1 KHz.
The max error of tgd measurement is less than $\pm 1 \times 10^{-4}$ ± 10% of the measured value.
Note: the measurements of capacitance and tgd of capacitors MKP C.44/3 series are carried out at 50 Hz.

– **Equivalent Series-Inductance: ESL**
The capacitors has a certain inductance due to the length of connections and capacitive element, the sum of these stray inductances represents the Equivalent Series Inductance (ESL).
The value indicated is typical and is measured at 20 °C ± 5 °C at the self-resonance frequency, it is expressed in nano-Henry (nH).

– **Equivalent Series Resistance: ESR**
The ESR is the equivalent series resistance due to resistivity of electrodes, internal connections and dielectric losses.
The ESR is measured in milliohm (mΩ) at 20 °C ± 5 °C and a frequency of 10 KHz.

– **Insulation Resistance - I.R.**
The insulation resistance between terminals is expressed by means of the discharge time constant R.C. according to DIN 41180. The standard guaranteed value is of RC ≥ 3000 s Measured for 1 minute at 100 Vdc and at 20 °C ± 5 °C.
Climatic category: 40/85/21 according to IEC 68-1.

– **I.R. - between terminals and case.**
Applaying a D.C. voltage of 500 V, the capacitor displays a Resistance value higher than 3×10^{-4} MΩ.

– **Rated insulation Voltage: Ui**
The rated insulation voltage is the RMS value of the A.C. Voltage for which the capacitor insulation between terminals and case is designed.

– **Operating temperature-Climatic category-Reliability Data**
All capacitors for Power Electronics are made in accordance with standard DIN 40040.
Metal case execution: DIN 40040 GPD/LS.
G = -40 °C, P = + 85 °C,
D = average humidity ≤ 80 %,
L = Failure quota $300/10^9$ components hours,
S = load duration 30,000 hours.
Polyester film coated execution: DIN 40040 GPE/LS.
E = average humidity ≤ 75%.

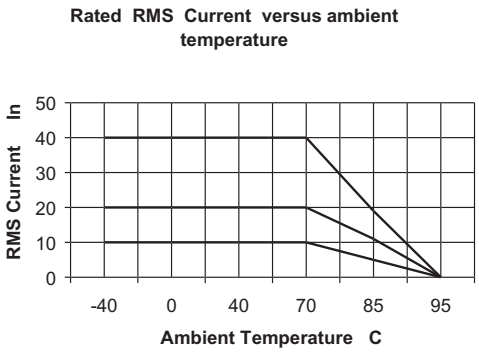
– **Storage temperature**
The range over which the capacitor may be stored unenergized, with no degradation is –55… + 105 °C.

– **Altitude**
The maximum allowable altitude is 2200 meters.
As the barometric pressure decreases, the terminal arcover susceptibility increases. Heat generated cannot be properly dissipated operating at high altitude and can result in high RI^2 losses and eventual failure.

– **Thermal Dissipation Coefficient: K**
The thermal dissipation coefficient K is the typical value that allows to calculate the temperature rise of capacitor case over the ambient temperature in operating conditions.
$\Delta T = K\ ESR\ I^2_{RMS}$ (°C)

– **Rated RMS current: I_{RMS}**
The rated RMS current is the highest permissible RMS value of the continuous current flowing through the capacitor at the max case temperature of 70 °C.
Operating at the rated RMS current, the capacitor produces a case temperature rise of about 15 °C over the ambient

due to the resistive losses of dielectrics, plates and conductors.
The rated RMS current IRMS must be derated taking into account the ambient temperature and the skin effect due to the duration of peak current time according to the following diagram:



– **Materials and environment**
The selection of materials, used by Arcotronics for the production of capacitors, is the result of a long experience and constant attention to the environment protection.
Arcotronics selects its suppliers according to ISO9001 standards and carries out statistical analysis on the materials purchased before acceptance. All materials are, to its present knowledge, non toxic and free from: Cadmium, Mercury, Crome and compounds, PCB (Polychlorine Triphenyl), Bromide and Chlorine Dioxins Bromurate Clorurate, CFC and HCFC, Asbestons.

– **Disposal**
The capacitors should be disposed of in compliance with the local laws and regulations active according to the following European classifications:
91 / 156 / CEE
91/ 689 / CEE

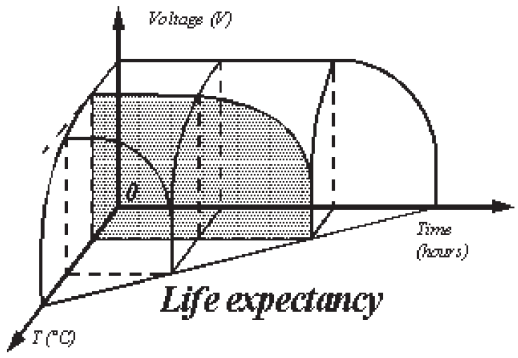
– **Voltage rise time: du/dt**
This value shows the maximum voltage rise/fall time, it is expressed in volts per microsecond, and cannot be overcome.

– **Peak Repetitive Current: IPKR**
The peak repetitive current is the maximum value that the peak current can assume.

– **Peak Non Repetitive Current:** Ipkn
The peak non repetitive current is the maximum admissible non periodic current peaks.

– **Expected life**
Any material or element has a longer or shorter life according to the working conditions to which it is submitted

Due to its intrinsic properties, the capacitor is subjected to several types of stresses: overvoltage, overheating, pollution, humidity, radiation, vibrations. The ageing causes an irreversible change of its properties as a result of the application of an external stress. The expected life is the time required by the capacitor to reach the specified limit of reduced value. The main stresses are both electric and thermal in origin. It is possible to demonstrate a model of life for each series of capacitors and type of stress in order to estimate the life of the component according to the temperature and voltage applied.
L (hours) = F (V, T).



– **Life expectancy versus voltage**
The life expectancy of a capacitor subjected to a voltage different from the nominal one, can be approximately calculated with the following semplified formula:

$$L_E = L_{vr} \times (V_r / V)^8$$

L_E = Life expectancy at operating voltage (hours)
L_{vr} = Life expectancy at nominal voltage (hours)
V_r = Nominal voltage Un (V)
V = Operating voltage (V)
The above formula is valid within ± 20% of the nominal Voltage.

– Life expectancy versus temperature
The life expectancy of a capacitor subjected to a temperature different from the rated one of 70 °C can be calculated with:

$$L_E = L_{T0} \times 2^{(T0 - Ths)/7}$$

L_E = Life expectancy at operating temperature (hours)
L_{T0} = Life expectancy at 70 °C (hours)
T_0 = Reference temperature (70 °C)
T_{hs} = Hot spot case temperature (≤ 70 °C)
7 = Arrhenius coefficient

Plastic dielectric film capacitors can undergo two classic failure modes: opens or shorts. Included in these categories are intermittent opens, shorts or high resistance shorts.
In addition to these failures, capacitors may fail due to capacitance drift, instability with temperature, high dissipation factor or low insulation resistance. Failures can be the result of electrical, mechanical or environmental overstress, due to dielectric degradation during operation.

– **Dielectric breakdown (Shorts)**
The classic capacitor failure mechanism is dielectric breakdown. The dielectric in the capacitor is subjected to the full potential to which the device is charged and, high electrical stresses are common. Dielectric breakdowns may develop after many hours of satisfactory operation.
There are several causes which could be associated with operational failures. If the device is operating at or below its maximum rated conditions, most dielectric materials gradually deteriorate with time and temperature to the point of eventual failure. Most of the common dielectric materials undergo a **slow ageing process** by which they become brittle and are more susceptible to cracking. The higher the temperature is, the more the process is accelerated.
Chemical or aqueous cleaning may also have an adverse effect on capacitors. Dielectric breakdown may occur as a result of misapplication of high transients (surges). The capacitor may survive many repeated applications of high voltage transients, howewer, this may cause a premature failure.

– **Open capacitors**
Open capacitors usually occur as a result of overstress in application. For instance operation of DC rated capacitors at high AC current levels can cause a localized heating at the end terminations. The localized heating is caused by high RI^2 losses. Continued operation of the capacitor can result in increased end termination resistance, additional heating, and possible failure. The open condition is caused by a separation of the end-connection of the capacitor. Both RMS and Peak currents may cause the open condition when overcome.
Mounting capacitors by the leads in high vibration environment may also cause an open condition. The lead wire may fatigue and break at the egress area if a severe resonance is reached. The capacitor body must be fastened into place by use of a clamp or a structural adhesive.

– **Environmental considerations**
The following list is a summary of most common environmentally critical factors affecting the life of capacitors. The design engineer must take into consideration his own applications and the effects caused by combinations of various environmental factors.

– **Service life**
Service life of a capacitor must be taken into consideration. The service life decreases when the temperature increases (see page 8).

– **Capacitance**
Capacitance will change up and down with temperature due to the dielectric constant and an expansion or shrinking of the dielectric material (see diagram ΔC/T on page 5).
Capacitance changes can be the result of excessive clamping pressure on non-rigid cases.

– **Insulation resistance**
When the capacitor temperature increases the insulation resistance decreases. This is due to increased electron activity. Low insulation resistance can also be the the result of moisture tapped in the windings, caused by a prolonged exposure to excessive humidity.

– **Dissipation factor tgδ**
The dissipation factor is a complex function involved with the inefficiency of the capacitor. The tgδ may change up and down with increased temperature (see diagram tgδ/T on page 5).

– **Dielectric strength**
The dielectric strength (dielectric withstanding voltage or “stress” voltage) level decreases as the temperature increases. This is due to chemical activity of the dielectric material which causes a change in the phisical or electrical properties of the capacitor.

– **Sealing**
Hermetically Sealed Capacitors
When the temperature increases, the pressure inside the capacitor increases. If the internal pressure is high enough, it can cause a breach in the capacitor, which can then cause leakage of impregnation or filling fluid or moisture susceptibility.

– **Epoxy encased / Wrap and fill capacitors**
The epoxy seals on both epoxy encased and wrap and fill capacitors will withstand short-term exposure to high humidity environments without degradation. Epoxies and plastic tapes will form a pseudo-impervious barrier to humidity and chemicals. These case materials are somewhat porous and through osmosis can cause contaminants to enter the capacitor. The second area of contaminate absortion is the lead-wire / epoxy interface. Since epoxies cannot 100% bond to tinned wires, there can be a path formed, up to the lead wire, into the capacitor section. This can be aggravated by aqueous cleaning of circuit boards.

– **Vibration, Acceleration and shock**
A capacitor can be mechanically destroyed or may malfunction if it is not designed,manufactured, or installed to meet the vibrations, shock or acceleration requirement within a particular application. Movement of the capacitor within the case can cause low insulation resistance,shorts or opens. Fatigue in the leads or mounting brackets can also cause a catastrofic failure.

– **Barometric Pressure**
The altitude at which hermetically sealed capacitors have to be operated controls the voltage rating of the capacitor. As the barometric pressure decreases so does the terminal arcover susceptibility increases. Non-hermetic capacitors can be affected by internal stresses due to pressure changes. This can be in the form of capacitance changes or dielectric arc-overs as well as low insulation resistance. Heat transfer can be also affected by altitude operation. Heat generated in operation cannot be dissipated properly and can result in high RI^2 losses and eventual failure.

– **Radiation**
Radiation capabilities of capacitors must be taken into consideration. Electrical degradation in the form of dielectric embrittlement can take place causing shorts or opens.

ORDERING CODES - Series C4A, C4B, C4D, C44/B, C44/3, C44/A

C44 A F F P 6100 Z A 0 J

Tolerances: J = ±5%, K=±10

ARCOTRONICS INTERNAL CODE

Box Capacitors

A1 = Copper wire terminals d = 0.8 mm

A3 = Copper wire terminals d = 1.2 mm

Capacitance code in picofarads (pF)

6 = Number of zeros to be added to the capacitance value

100 = First 3 figures indicating the capacitance value

Terminals code

1 = Single faston 2.8mm	2 = Single faston 6.35 mm
3 = Double faston 6.35 mm	M = M3 screw terminals
N = M4 screw terminals	O = M5 screw terminals
P = M6 screw terminals	Q = M8 screw terminals
R = M10 secrew terminals	S = M12 screw terminals
U = Copper wire terminals	W = Double copper wire terminals
X = Flat rigid connection	Z = Special terminal
0 = No terminations	Y = Flat flexible connection

Case and fixing bolt code

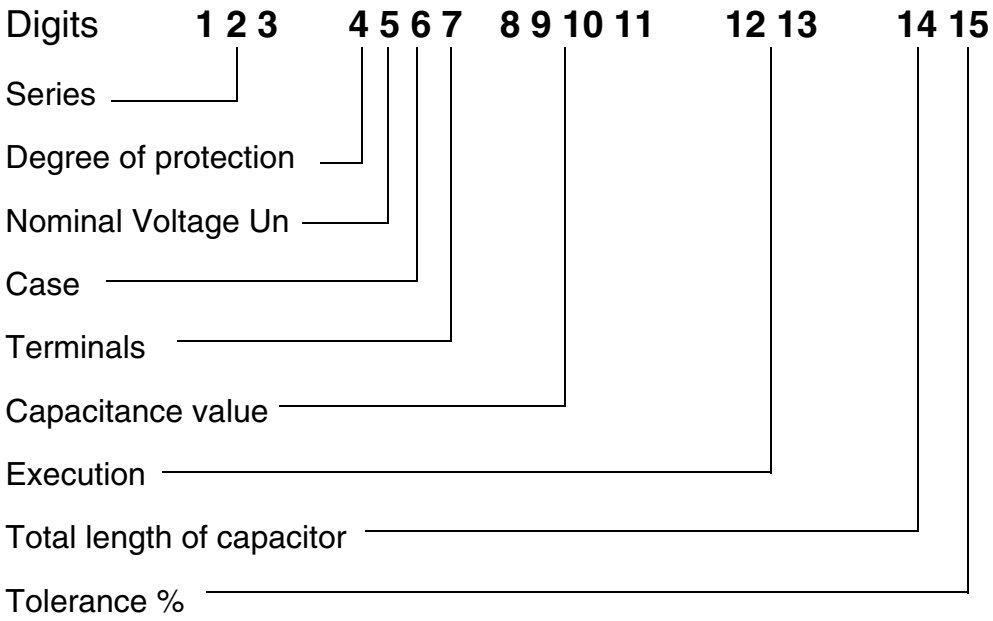
A = Plastic case without bolt	B = Box plastic case
O = Uncased capacitor	E = Cylindrical alu-case without bolt
F = Cylindrical alu-case with M8 bolt	G = Cylindrical alu-case with M12 bolt
H = Oval alu-case without bolt	I = Oval alu-case with M8 bolt
L = Oval alu-case with M12 bolt	M = Parallepipedal plastic case
N = Parallepipedal steel case	U = Polyester film coatin
Z = Special case	

Rated D.C. voltage Un code

B = 160 V	C = 200 V	D = 250 V
F = 400 V	G = 450 V	E = 300
I = 630 V	L = 500	H = 600 V
M = 850	J = 700 V	K = 750
R = 1400	N = 1000 V	P = 1200
U = 1700	S = 1500 V	T = 1600 V
X = 2400 V	V = 1800 V	W = 2000 V
Y = 3000 V	Z = Special Voltage	

Standard models	Safety device models
Application code:	Application code:
A = Commutation MKP	H = Commutation MKP
B = Snubber alu-case MK	L = Snubber alu-case MKP
D = Commutation MKT	M = Commutation MKT
E = Filter MKP	P = Filter MKP
R = Clamper	
S = Snubber box case	
T = Switching box case	

ORDERING CODES - Axials Series C4C, C4G, C4H, C4M, C4T



Digits 1 – 2 – 3: Series

Defines the series of axials capacitors:

- **C** Axials capacitors made by **A.C. and Power division of Arcotronics**
  - **4 C** Axials cylindrical MKP capacitors for **snubber** applications
  - **4 G** Axials cylindrical MKP capacitors for **switching** applications
  - **4 H** Axials ovoidal MKP capacitors for **snubber** applications
  - **4 M** Axials ovoidal MKP capacitors for **switching** applications
  - **4 T** Axials cylindrical MKT polyester dielectric **high temperature** capacitors

Digits 4: Degree of protection

Defines the type of case protection:

- **A** Standard execution **not flame retardant**
- **B** Standard execution **flame retardant**

Digits 5: Nominal D.C. Voltage Un

Defines the nominal voltage of a capacitor according to the following table:

1 = 250 Vac	2 = 275 Vac	3 = 400 Vac	
A = 550 Vdc	B = 160 Vdc	C = 200 Vdc	D = 250 Vdc
E = 300 Vdc	F = 400 Vdc	G = 450 Vdc	H = 600 Vdc
I = 630 Vdc	J = 700 Vdc	K = 750 Vdc	L = 500 Vdc
M = 850 Vdc	N = 1000 Vdc	P = 1200 Vdc	R = 1400 Vdc
S = 1500 Vdc	T = 1600 Vdc	U = 1700 Vdc	V = 1800 Vdc
W = 2000 Vdc	X = 2400 Vdc	Y= 3000 Vdc	Z = Special voltage

Digits 6: Case

Defines the type of case:

- 0 Capacitor unprotected.
- U Capacitor protected with tape and resin.
- Z Capacitor protected with a special execution.

Digits 7: Terminals

Defines the type of terminals:

0	Without terminals
A	Tinned copper wire diameter 0.6 mm
B	Tinned copper wire diameter 0.8 mm
C	Tinned copper wire diameter 1.0 mm
D	Tinned copper wire diameter 1.2 mm
Z	Special terminals

Digits 8 – 9 – 10 – 11: CAPACITANCE

The nominal capacitance is exponential: the digits 9, 10, 11 show the first 3 significative numbers of capacitance, the digit 8 defines the exponent on 10 base to obtain the nominal capacitance in pF. I.E:
Standard capacitance indication

0,033 µF =	33000 pF	330 x 100	330 x 10^2 = 2330
4,7 µF =	4700000 pF	470 x 10000	470 x 10^4 = 4470

Digits 12 – 13: EXECUTIONS

Defines the executions or changes:
The standard execution is coded **AA**.
Executions different from the standard are defined with a special code.I.E.: ZA, ZB, …

Digit 14: TOTAL LENGTH OF CAPACITOR

Defines the total length of the capacitor taped.

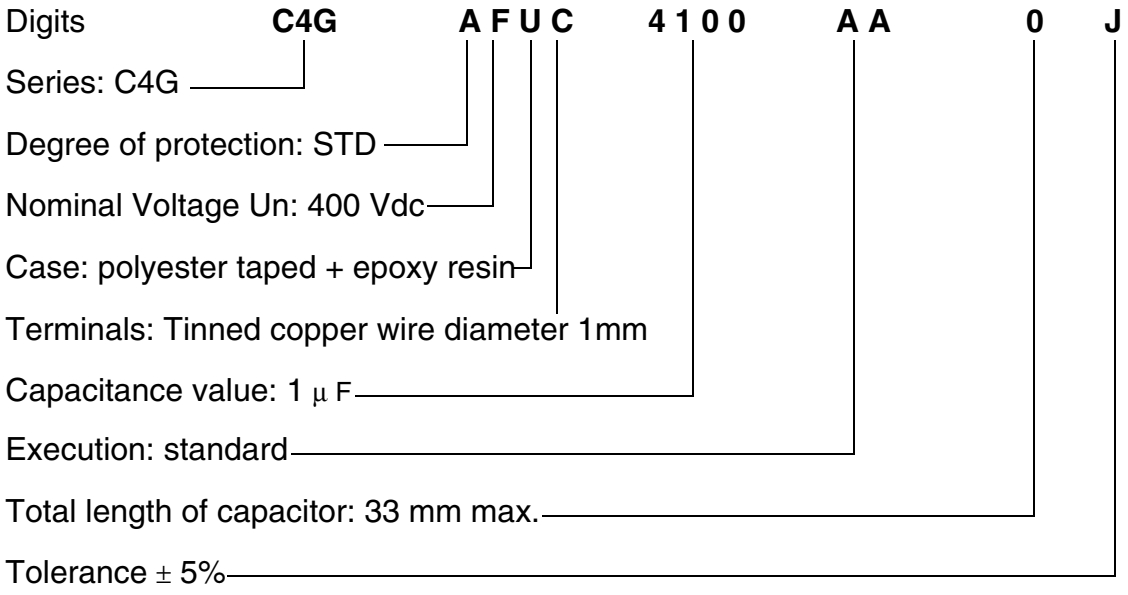
0 = H max 33 mm (tape H=31,5 mm)	1 = H max 44 mm (tape H=42 mm)
2 = H max 46 mm (tape H=44 mm)	3 = H max 58 mm (tape H=56 mm)
4 = H max 20,5 mm (tape H = 19 mm)	5 = H max 28 mm (tape H=26,5 mm)
6 = H max 38 mm (tape H = 36 mm)	

Digit 15: TOLERANCE

According to IEC 1968, this code defines the tolerance on nominal capacitance of the capacitor.

J = ± 5% K = ± 10 M = ± 20 X= Special tolerance

Coding example



W A R N I N G

DO NOT MISAPPLY CAPACITORS FOR POWER ELECTRONICS

Arcotronics Italia S.p.A. is not responsible for any extent of possible damages to persons or things, of any kind, caused by the improper installation and application of capacitors for power electronics

1.0 MISAPPLICATION FORMS

Common misapplications which may cause failures:

1.1 Ripple current or peak current or voltage above specification.
1.2 Application voltages beyond surge voltage specified.
1.3 Temperature exposures beyond specified limits.
1.4 Unusual service conditions:
- unusual mechanical shocks and vibrations,
- corrosive and abrasive particles in cooling air,
- conducting dust in the cooling air,
- oil or water vapour or corrosive substances,
- explosive gas or dust,
- radioactivity,
- unusual storage or transport temperature,
- excessive and rapid changes of ambient temperature or humidity,
- service areas higher than 2000 m above sea level,
- superimposed radiofrequency voltages.

In case of doubt between service conditions and correspondent capacitor performances, the Arcotronics Technical Service **MUST** be consulted for approval by customer.

1.5 APPLICATIONS ACROSS THE MAINS
The products of this catalogue fully comply with **ECC Standard 89/366** but are not suitable for applications “Across the Line ” except the series C93 specifically designed for this purpose.

2.0 PERSONAL SAFETY

2.1 Electrical or mechanical misapplication of capacitor for power electronics may be hazardous. Personal injury or property damage may result from explosion of a capacitor or from the expulsion of oil due to mechanical disruption of a capacitor. In case of injury or skin or eye exposure to oil, contact a physician immediately.

2.2 Don’ t dispose of capacitors in fire, explosion may result.

Before using capacitors in any application, please read this Technical Information Bulletin carefully familiarizing yourself thorougly with the information contained herein. Special care should be take to assure that the capacitors are proper for your application and that warinings and instructions for use are followed

CHECK in the intended application and operating conditions of the capacitor before using in any product to be sure that the capacitor is proper for your application.