

Comparison of Capacitors for Power Electronics

Power electronics are nowadays hugely applied in the industry, and developments during the last twenty years, has resulted in requirements for more precise and reliable components with reduced dimensions. Capacitors are of primary importance in power electronics applications, together with semiconductor components in their work of conversion and control of the energy. The main functions of capacitors in power electronics applications are the following:

Commutation (AC)

Commutation capacitors are AC capacitors suitable for the forced commutation of controlled rectifiers from the on state to the off state. The applied voltage is generally trapezoidal with an operating frequency that may reach some hundred Hertz. The times of commutation are within 10 and 200 microseconds consequently the currents flowing through these capacitors may reach peak values very high peak values.

R-C Protection (AC)

Used as protection against over voltages in power semiconductors by means of parallel RC circuits. These capacitors are subject to high peak currents but of short duration, therefore the RMS current reaches small values.

Damping (AC)

Also in this application the capacitors are connected in parallel to the semiconductors in order to suppress or attenuate undesired voltage peaks. The capacitors are periodically charged and/or discharged, whereby the peak value of the occurring current substantially exceeds the RMS value at mains frequency.

Supporting (DC)

Supporting capacitors operate in DC voltage condition; they supply high repetitive peaks of current for line supporting purposes.

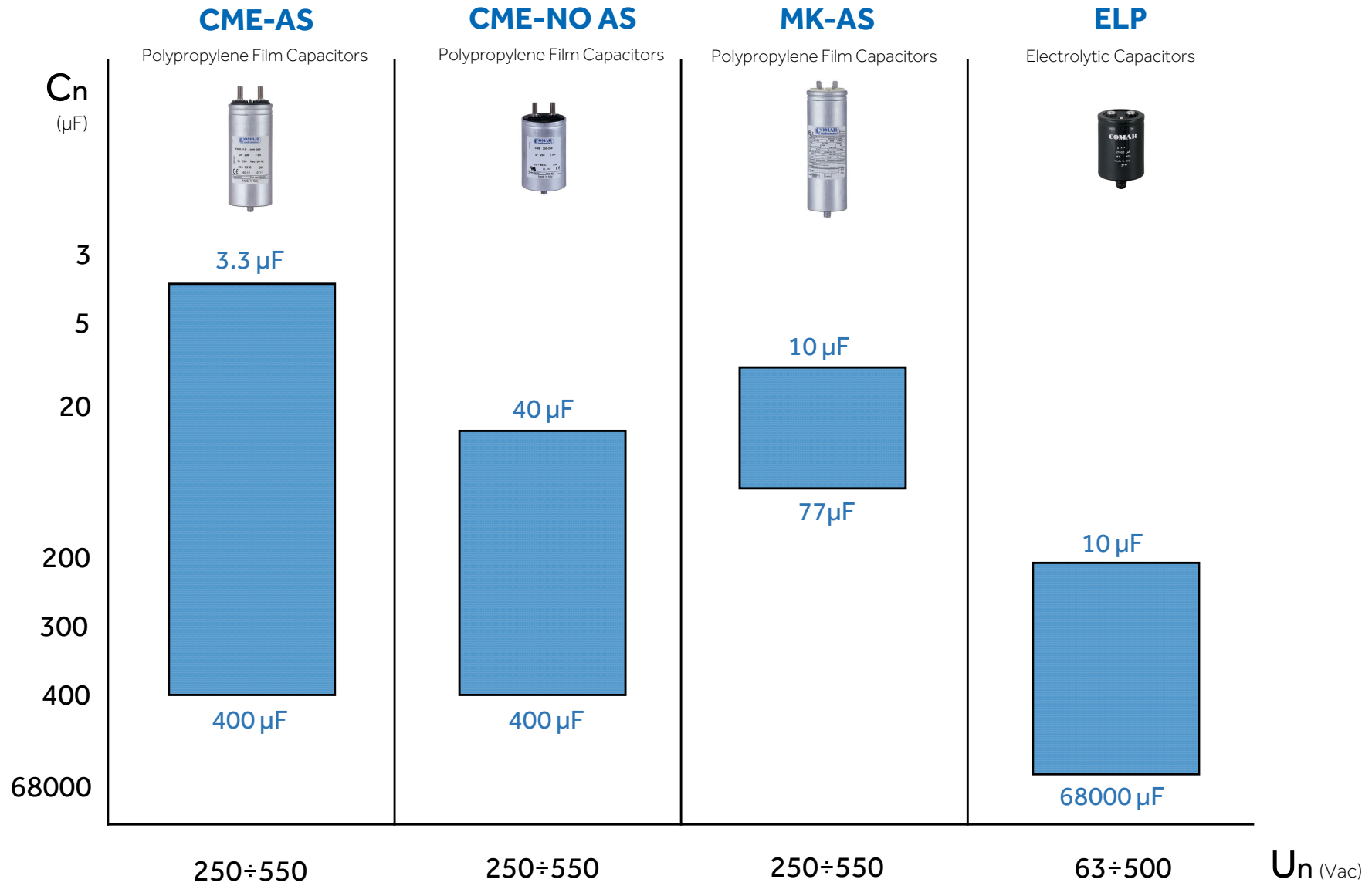
Pulse Capacitors(DC)

Pulse capacitors are periodically charged and briefly discharged during operation thus occurs high peak currents.

Filter Capacitors (AC-DC)

In the AC filter application, capacitors operate at a fundamental frequency with superimposed overload of harmonics. The overload on the capacitors must be known in order to avoid to exceed the maximum values admitted by the manufacturer's specifications. A typical application is the output filters of uninterruptible power supply with the task of reducing the harmonic distortion. In DC filter applications, the capacitors operate at a DC voltage with superimposed ripple voltage. Considering the important values of capacitance normally found in these applications, the ripple current can produce additional losses that must be carefully considered. As can be seen, each application requires capacitors with dedicated characteristics. An application (eg. R-C protection), having two similar circuits to achieve the same results, may require components having different characteristics. Capacitors designed for DC voltage circuits, must not be used on AC circuits, while the contrary may be possible, once verified the characteristics supplied by the manufacturer are not overcome

Here is a comparative table for COMAR Power Electronics capacitors:



Typical applications

Below are some examples of applications for Power Electronics capacitors:

Uninterruptible Power Supply (UPS)



High Frequency Welders



Motor Drives

