



Capacitors for Motor Applications

Motors are at the heart of modern industrial automation, robotics, and complex machinery. Capacitors play a critical role in motor drives and control systems, ensuring smooth operation, energy efficiency, and protection against voltage spikes.

KEY APPLICATIONS IN MOTORS:

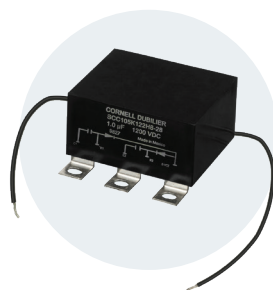
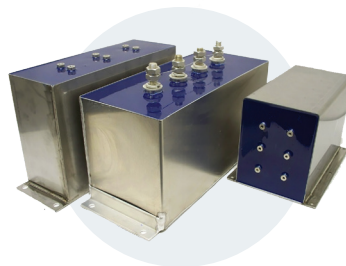
- DC Filter and DC Link
- AC Filter
- Snubber
- Motor Start & Run



CAPACITORS ROLE IN MOTOR APPLICATIONS

In motor applications, capacitors are used for several key functions. They provide power factor correction, smooth voltage fluctuations, and protect sensitive components from electrical noise and transients.

In motor drives and controllers, capacitors help manage the high switching frequencies and rapid load changes typical in modern automation. Specialized capacitors, such as snubber and motor run capacitors, are designed to handle the demanding environments and electrical stresses found in industrial motor systems.





Recommended Capacitor Types for Motor Applications

APPLICATION	CAP TYPE	DESCRIPTION
AC Filter:	Harmonic Filter: Film	250–600 VAC, 10 μF to 100 μF, high ripple current capability, low loss, and long service life - These capacitors are designed for reliability in harsh industrial environments
	X and Y Capacitors: Film	X1 or X2 class, 250–440 VAC, 0.01 μF to several μF, low dissipation factor, high insulation resistance, and compliance with international safety standards
	X and Y Capacitors: MLCC	Safety-certified, surface-mount device (Y2 class), 250 VAC, with capacitance values from 470 pF to 4.7 nF, certified to international safety standards
DC Link and DC Filter:	DC Link: Film	450–1,200 VDC, 1 μF to 400 μF, low ESR, high ripple current capability, and long service life
	DC Filter: MLCC	DC Filter stack of X7R type, 0.1–1 μF per capacitor, rated for 500–2,000 V DC, in a 1206–2225 case size, with multiple units paralleled to achieve the desired total capacitance and performance
Snubber:	For IGBT: Film	630–3,000 VDC, 0.033 μF to 20 μF, low ESR and inductance, high peak current and dV/dt capability, and long service life
	For SiC and GaN: MLCC	C0G MLCC rated for 630–3,000 VDC, with capacitance from 100 pF to 10 nF (up to 82 nF for larger sizes), low dissipation factor, high insulation resistance, and stable performance across temperature and voltage
Motor Start and Motor Run:	Motor Start: Aluminum Electrolytic	Non-polarized aluminum electrolytic capacitor rated for 50–1,200 μF and 110–330 VAC, designed for intermittent duty with a round plastic case and push-on terminals
	Motor Run: Film	- Rated for 250–450 VAC, with capacitance values from 1 μF to 100 μF - These capacitors are engineered for continuous duty, long service life