CAPACITALK™

Capacitor At Load

MYRON ZUCKER INC.
36825 Metro Court • Sterling Heights, MI 48312-1013 • www.myronzucker.com
Phone: (586) 979-9955 / (800) 245-0583 • Fax: (586) 979-9484

No. 106

# CAL in the World of Motor Starters
## (Part III)

Yes, you can use power factor capacitors with soft-start starters, you just have to apply them in a different fashion. First, let's look at how soft-start starters operate to see why we must apply the capacitor a little differently.

## Soft-Start Modes

### Basic Soft-Start Mode

The motor voltage is gradually increased during the acceleration ramp time.

*Figure 1.*

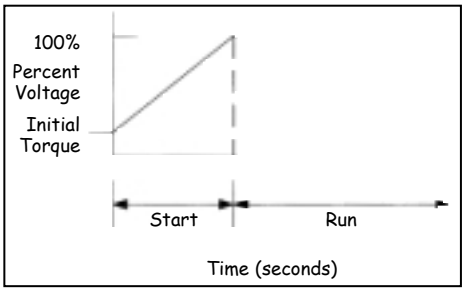



**Figure 1 — Basic Soft-Start Mode**

### Current Limit Start Mode

Used when it is necessary to limit the maximum starting current.

*Figure 3.*

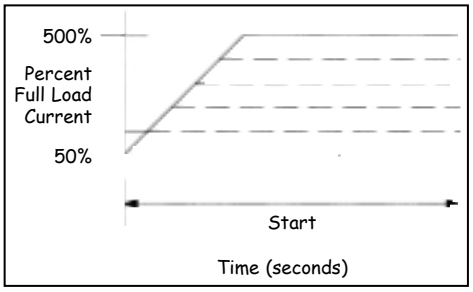



**Figure 3 — Current Limit Start Mode**

### Soft-Start with Kickstart Mode

A kickstart, or boost, at the beginning of the voltage ramp. This allows the motor to develop additional torque at the start. For loads which may need a boost to get started.

*Figure 2.*

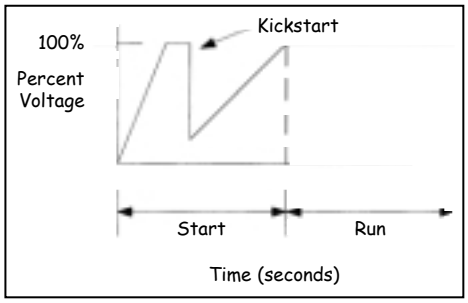
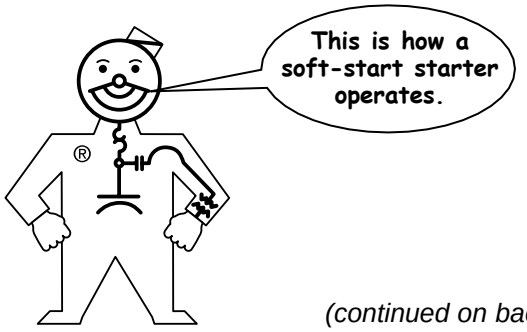



**Figure 2 — Soft-Start with Kickstart Mode**




*(continued on back)*

*(continued from front)*

### Dual Ramp Start Mode

Used on applications that have varying loads or varying torque requirements.

*Figure 4.*

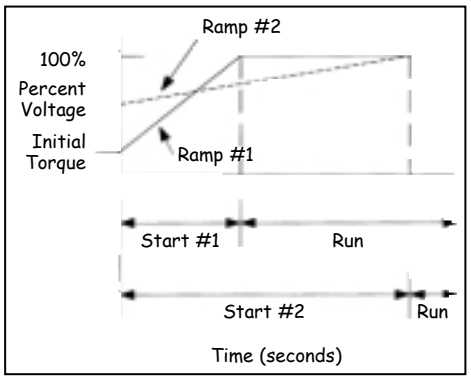



**Figure 4 — Dual Ramp Start Mode**

As you can see, each type of starting controls the voltage to the motor. In order to do this, the soft-start chops up the sine wave, changing AC voltage to DC voltage and then back to AC voltage. As the sine wave is being chopped up, it is giving off harmonic currents.

If we apply a capacitor to this motor circuit, the capacitor becomes the lowest impedance in the motor circuit. When this happens, most of the harmonic currents will flow to the capacitor, causing the capacitor to draw more current than it normally would. Consequently, the capacitor fuses will blow or the capacitor cell itself will fail. So how do we keep the capacitor from doing this?

When we look at soft-start starters, the time it takes to reach full speed can be anywhere from 0 to 30 seconds. So what we need to use is a contactor with the capacitor (*Figure 5*). When the startup is complete and the bypass contactor has been energized, then we can energize the capacitor contactor. This will keep the soft-start harmonic currents from your capacitor.

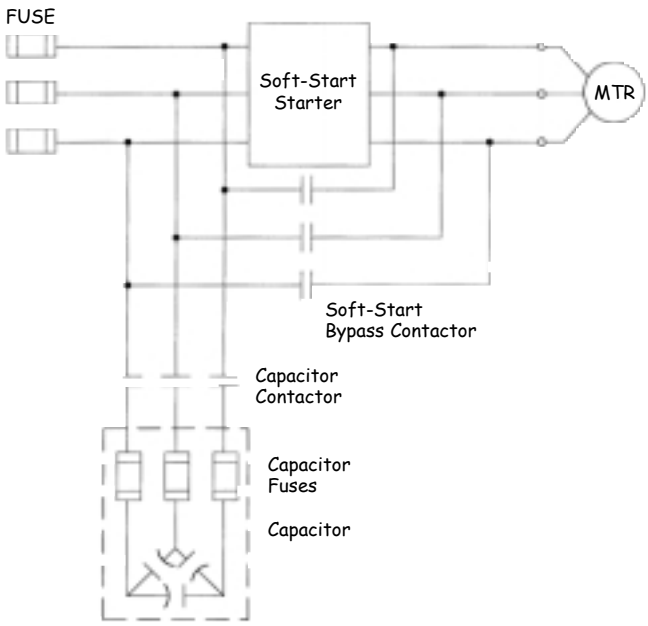
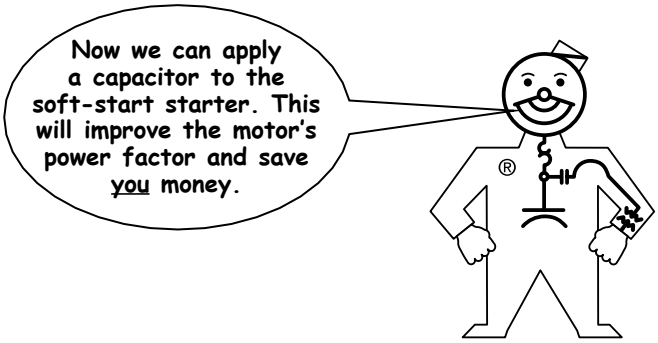



**Figure 5 — General Diagram — Soft-Start with Power Factor Capacitor**




If you have any questions for CAL, simply write to Myron Zucker, Inc. or e-mail us at **info@myronzucker.com**

MYRON **ZUCKER** INC.

36825 Metro Court • Sterling Heights, MI 48312-1013 • www.myronzucker.com
Phone: (586) 979-9955 / (800) 245-0583 • Fax: (586) 979-9484