

Capacitors store an electrical charge for use later when required by the system that they are installed into. Capacitors used in our hoists generally have a cylindrical shape and are white, silver and black. Depending on the hoist you may find a "Start Capacitor", "Run Capacitor" or a "Brake Capacitor" inside of the electrical box.

Capacitors in our equipment are typically constructed of two metallic plates separated by a non-conductive material in between. They are then rolled up and put into the cylinder case that you are used to seeing. Many of these capacitors are also filled with oil inside.

Capacitors have a rating measured in "farads" on the outside label. Farads are a measurement of capacitance and were named after an English scientist named Michael Faraday. We do not use a complete "farad" in any of our hoists. The actual energy size of a farad is extremely large. We use capacitors that are measured in microfarads ( $\mu\text{F}$  or  $\mu\text{F}$ ). A microfarad is a millionth of a farad. Capacitors within the electronics industry may be found in even smaller sizes than what we use.

- Nano-farad (nF) is a billionth of a farad
- Pico-farad (pF) is a trillionth of a farad

Capacitors come in many sizes and those used in the single-phase motor application are usually either run or start capacitors. Run capacitors are rated within the range of 3-70 microfarads. Capacitors rated over 70 microfarads are start capacitors. Run capacitors are rated for continuous duty and are used while the hoist is running. Start capacitors are only used for a short duration, just long enough for the motor to exceed  $\frac{3}{4}$  of its normal operating speed.

## Start Capacitors

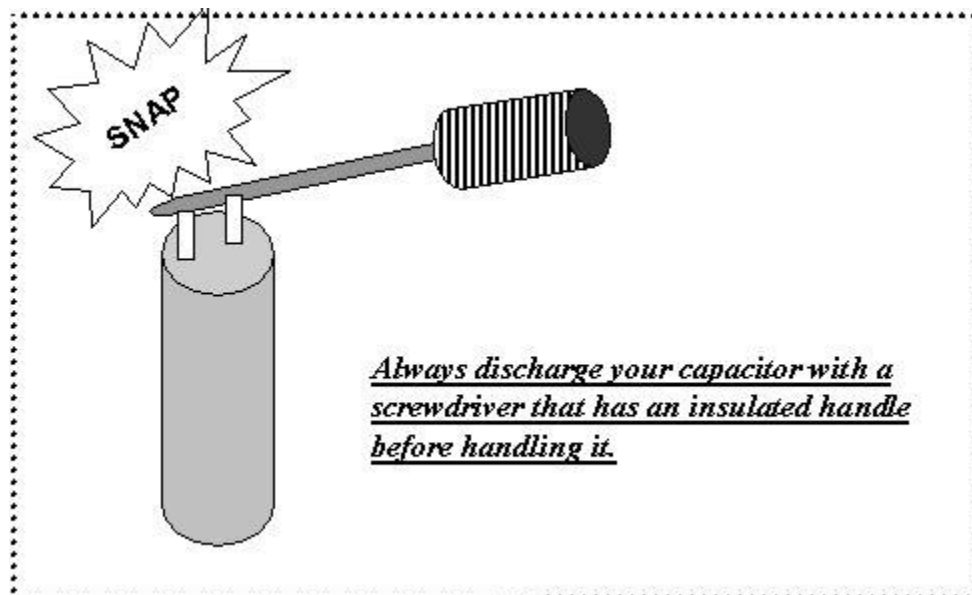
The start capacitor is an electrical component that is used to give a single-phase induction motor its initial torque. Once the motor has reached approximately 1,200 rpm's the centrifugal switch opens and takes the start capacitor out of the run circuit.

### Symptoms of a bad start capacitor are:

- Hoist can't lift a suspended load.
- Hoist only operates in the DOWN direction under load, even when depressing the UP control button.
- Hoist will only operate in the UP direction without a load. This symptom will only occur on hoists that have the run capacitor in the UP circuit only.
- Hoist hums in the down direction while being operated without a load. This symptom will only occur on hoists that have the run capacitor in the UP circuit only.

Some causes of a bad start capacitor are:

- Anything that will prevent the motor from reaching an rpm level above 1,200.
- Platforms that are overloaded by too much added weight.
- Platforms that are overloaded due to binding against immovable objects.
- Low and/or inconsistent voltage.
- Improperly adjusted or a non-functioning brake.
- Voltage extremes whether they are high or low can cause capacitors to be short lived. The most common condition seen in the field are failures caused by low voltage.



Inspection procedure

- A visual inspection can be made to help determine if a capacitor may have blown. Look to see if the enclosure has an oily film or if the capacitor is ruptured or deformed.
- Use a meter that has the capability to check the MFD's of a capacitor. When measuring the capacitor always read the side of the capacitor for the rating and tolerance. For example a start capacitor could be 100 MFD +/-10% (i.e. A Fluke # 12 multi meter) *Before using a meter to check the MFD's of any capacitor, make sure that it has been safely discharged.*
- Use a clamp-on amp meter to inspect if a start capacitor is functioning. Attaching the clamp-on amp meter to a wire that is connected to the start capacitor does this. When the hoist is operated in either direction there is a sudden amp draw that can be detected on the amp probe. This amp draw will only be seen for a brief second, because the centrifugal switch, if working properly, will open the circuit.
- Inspect all wire connections and contacts that are in the circuit before the start capacitor. Any open circuit will allow for improper function of the capacitor.

## Did You Know?

- Capacitors usually have a date code on their label.
- Capacitors can remain on the shelf up to five years and still be considered good. Depending on the type of capacitor some are considered stale at one year old and others not until they reach an age of 5-10 years old.
- The capacitors used in hoists prefer to be stored in an environment where the temperature is more constant. They also prefer a cooler temperature to a warm temperature, so do not store them near an external heat source.

## Tips and Tricks

- If a capacitor is beginning to swell, or the top vent on the capacitor begins to swell, change it out. Though it may still check out on your meter, it may have a short continued life. It is better to change this out before it creates a service call in the field.

For questions or comments, contact Customer Service at 1-800-560-CLIMB (2546) or [customerservice@safeworks.com](mailto:customerservice@safeworks.com).