Capacitor Bank Reformation Guidelines for AC Drives

The following application note will discuss general guidelines for Reforming Electrolytic Capacitor Banks in AC drives that have been in storage.

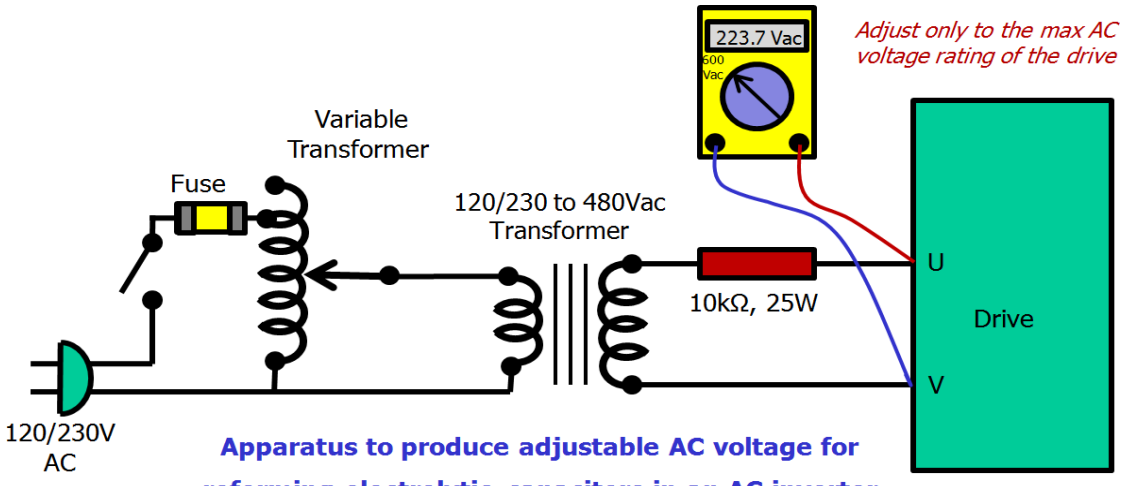
AC drives contain electrolytic capacitors which will lose their ability to withstand rated voltage if not periodically charged to rated voltage. If a capacitor has not been charge to rated voltage for an extended period of time it can be “reformed” by slowly charging it, bringing its voltage up to rated level at a controlled rate.

Drives having been in storage for less than two years:

For drives (capacitors) that have been in storage and discharged for less than two years, rated voltage can be directly applied with no control of the rate of rise of voltage. If such a drive will not be put into service, then rated voltage (480 Vac or 240 Vac, for example) should be left connected for about two hours before the drive is returned to storage. It is recommended that the date of the application of power should be posted on the unit.

Drives in storage for more than two years:

Drives that have been in storage for more than two year, or the duration is unknown, must have their capacitors charged at a controlled rate. The circuitry in the diagram below can be used to accomplish this.



Apparatus to produce adjustable AC voltage for reforming electrolytic capacitors in an AC inverter

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Controlled charging circuit description:

This circuitry uses a variable transformer (such as a Variac® or Powerstat®) to produce 0 to (usually greater than) the available single phase supply (120 or 230 Vac) and then a step-up transformer to create an AC voltage of 480 Vac or higher. These transformers need not to be any larger than 100 VA since the power requirement is very low. For drives rated higher than 480 Vac, a higher ratio step-up transformer would be needed. The step-up transformer can be a typical step-down (control) transformer used in reverse. The diagram shows the connection of the variable AC connected to two drive output terminals. For most drives this could alternatively be any two AC input terminals instead; however some larger drives have thyristor front-end rectifiers which will not conduct with reduced voltage, which would not allow proper charging of the drive's DC bus capacitors at a controlled rate.
Therefore connection to the output terminals will always work - that takes advantage of the inherent "back" diode or anti-parallel diodes in the output power transistor bridge which will rectify the AC to charge the DC bus. A voltmeter is used to monitor the applied voltage.

Charging procedure:

Warning:

Use of the recommended circuitry or any equivalent apparatus to produce the required voltage should only be conducted by persons who are trained and experienced in maintaining and troubleshooting equipment that operates at voltages such as 480 Vac. Although the power levels being used for this procedure are low, the energy storage in capacitors is considerable. A person not greatly familiar with typical electrical safety practices and precautions should not be conducting this procedure.

With the variable transformer set to produce 0V output, the circuit should be energized and the voltage at the drive connections should then be slowly increased at a rate of 5 Vac per minute. The final voltage should be not higher than 275 Vac for 240 Vac products or 575 Vac for 400 Vac products.
Once full voltage is reached remove the drive from the supply.

Caution:

The DC bus and all power terminal connections will remain energized with a high voltage for many minutes after power has been removed.