

## Manuel Rojas

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**From:** peter@copecoproducts.com  
**Sent:** Wednesday, February 13, 2019 11:23 AM  
**To:** Manuel Rojas  
**Subject:** Recommendation of PQ mitigating equipment

Good morning, Manuel:

Please allow me to explain my recommendation of the ELSPEC Capacitor bank in my report to you.

As the report shows, there are many very deep dropping voltage excursions. These excursions are caused by turning on larger motors in the system, such as pumps and compressors. When a large motor is turned on, the motor requires kVAr, that is reactive energy, to build up the magnetic field in a motor. When the infrastructure, such as transformers, long supply lines and far away generating stations exist, such as in your case, the utility supply cannot supply the needed kVAr. That causes the voltage to drop and that voltage drop will affect your motors, your control systems and other sensitive loads in your systems. VFD's (variable frequency drives) are very sensitive to low voltage conditions and protect themselves by turning power off. That causes an "Undervoltage" or in many cases, an "Overcurrent" condition. You have seen many of those faults in your system.

To mitigate such a condition, you must install a very fast capacitor bank, such as the recommended ELSPEC bank. I know of three or more manufacturers who claim to have such fast capacitor bank, but to my knowledge and experience, none are fast enough to accommodate your needs. A standard capacitor bank will not be able to supply the proper amount of kVAr when needed. The ELSPEC bank will react in less than ½ cycle, calculate the right amount of kVAr and discharge that energy when needed. When that happens, the injected amount of energy will greatly reduce the voltage drop and cause a "ride-thru" of the system. Previously affected systems will no longer drop out and VFD's will continuously operate. At the same time, the ELSPEC bank will reduce any harmonic content in the system by continually adjusting its built-in filters. You will not need a separate harmonic filter to comply with the IEEE 519-2014 Recommendations. The capacitor bank should be installed in an air conditioned environment. The ELSPEC quote includes such an enclosure. I hope this explanation in a nut shell is what you need. Of course I am glad to support you in the City council meeting with more information.

I look forward to hear from you.

Best Regards,

Peter

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