

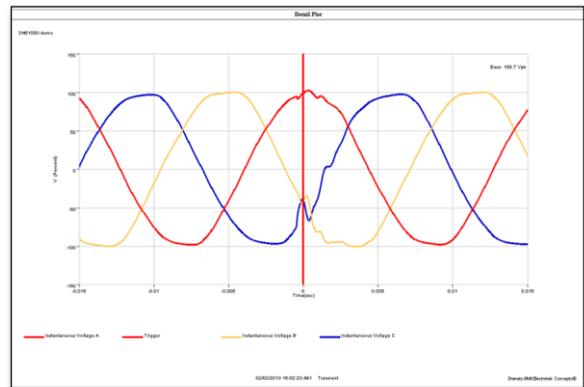
AnswerModule® CapSwitch®

Intelligent Answer Modules

Answer Modules are proprietary algorithms that convert raw power quality event data into precise answers to determine the source and cause of disturbances. Answer Modules characterize data recorded by Dranetz power quality instruments, storing the results of the analysis as part of the data recorded in the Encore Series Software database. These unique software tools are only available from Dranetz, and enable users to save time and improve accuracy when troubleshooting power quality problems.

Diagnose and Locate Capacitor Transients

Capacitors are used to provide voltage support and improve the power factor in power distribution systems. Some capacitors are permanently connected, but many others are switched in and out as needed. Time clocks, voltage levels, and load sensors are all used to trigger capacitor switching. While capacitors can improve the performance of the power system, switching in capacitors can cause disruptive transients, the second most common power quality event (voltage sags are the most common). Cap switch transients can disrupt adjustable speed drives, data communication systems, process controls, or any load that cannot tolerate sub-cycle transients.

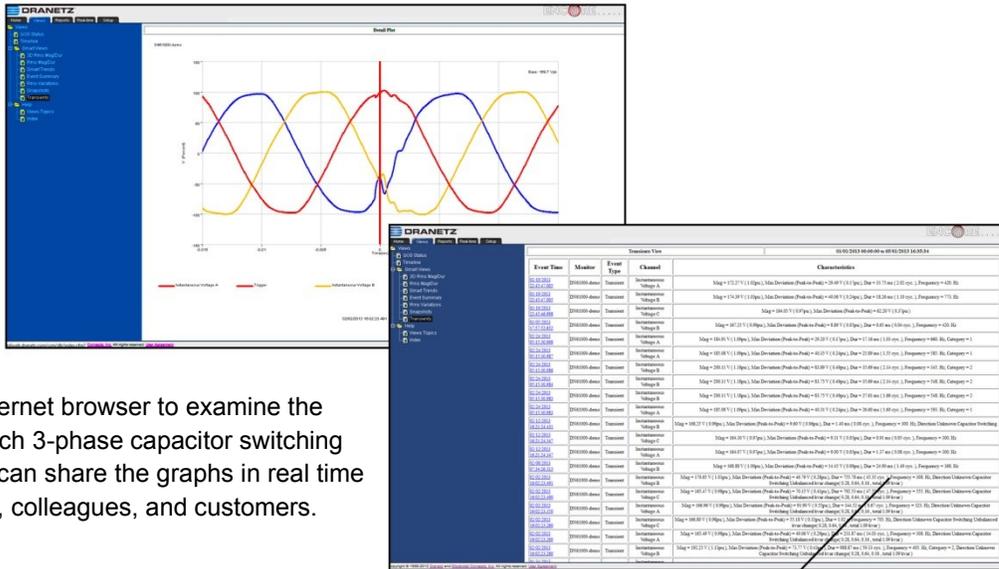


There are many sources of harmful transients, but capacitor switching transients can travel long distances through the power grid, and in some cases, can be magnified on low voltage busses.

‘Poynting’ You in the Right Direction

The Encore Series® CapSwitch Answer Module identifies recorded transients that originated from capacitor switching operations. After you discover a disruptive capacitor switching transient problem, you must locate its source. The CapSwitch Answer Module not only automatically identifies the source of the transient as being from a capacitor, but also determines the direction of the capacitor switching transient as being upstream or downstream from the monitoring point. The GPS or NTP based precision time stamps of the Encore Series Datanode’s let you correlate reports from many locations, so you can instantly track down the offending capacitor bank, and develop a solution to the problem (new switching schedule, controlled switching, mitigation or changing equipment). Also available is a VAR verifier option that helps you determine the health of the capacitor bank, by determining the change in VAR’s per phase and if the capacitor switch was balanced.

The CapSwitch Answer Module uses Poynting Vector analysis coupled with the expert power quality knowledge of Dranetz and Electrotek Concepts, our power system consulting company. Our proprietary algorithms give accurate results for grounded and ungrounded capacitor banks, for individual and back-to-back capacitor switching, and even for magnified transients caused by down line capacitors.



Use your internet browser to examine the details of each 3-phase capacitor switching event. You can share the graphs in real time with experts, colleagues, and customers.

Mag	Max Deviation (Peak-to-Peak)	Dur	Freq	Direction
166.80 V (0.98pu)	55.18 V (0.33pu)	1.02 s	705 Hz	Unknown
165.49 V (0.98pu)	49.06 V (0.29pu)	233.87 ms		Unknown
192.25 V (1.13pu)	73.77 V (0.43pu)	983.87 ms		Unknown

Capacitor Switching Unbalanced

The CapSwitch Answer Module automatically identifies the events, and tells you the direction relative to your monitoring location.

Specifications for the CapSwitch Answer Module Software

Operating Environment:
Optionally available in any InfoNode® or Encore® Series Software.

Input Data:
Accepts low-frequency transient waveform data from any Dranetz DataNode® that provides greater than 64 samples/cycle for 3-phase voltage and current.

Output Information:
Capacitor switching transients identified. Direction (upstream, downstream) to switched capacitor identified relative to monitored point. KVAR change and balanced switching optionally available.

Applications:
Three-Phase capacitor switching. Supports grounded, ungrounded, back-to-back capacitor configurations; identifies magnification and restrike events.

Algorithms:
Proprietary algorithms incorporating Poynting Vector analysis, initiating dV/dt vs dI/dt, and expert knowledge. Confidence of diagnosis is automatically assessed and categorized.



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