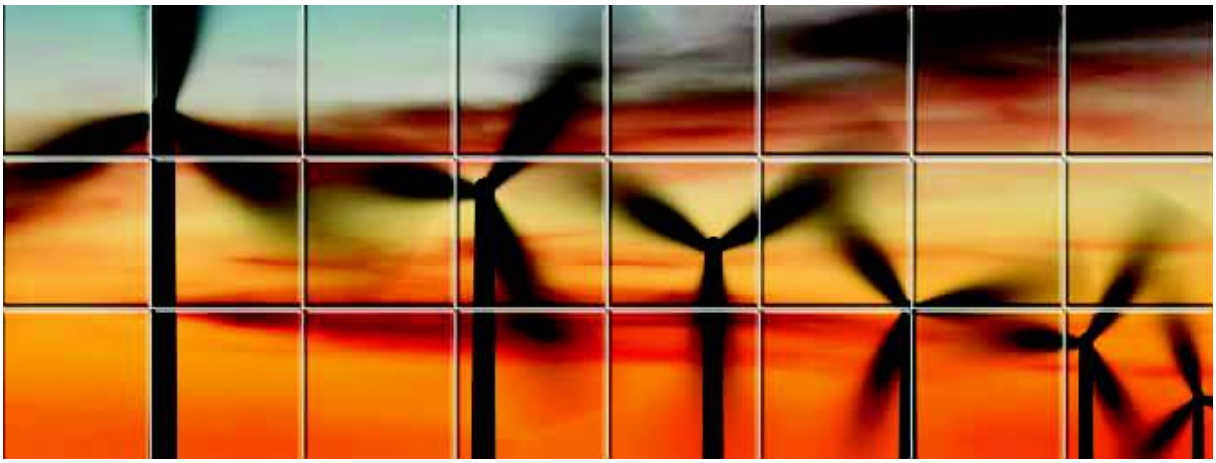
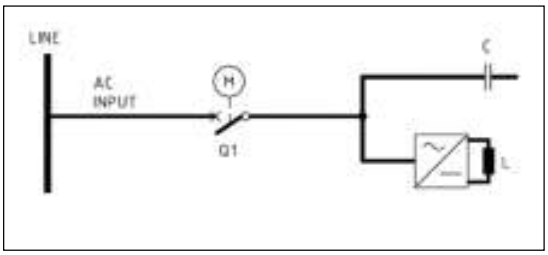
THYCON



APR Summary Sheet



Product Description

- Suitable for 415V or 690V application.
- Fixed Capacitor Bank at rated kVAR.
- Series Inductor with Capacitor Bank provides harmonic filtering.
- Parallel Variable Inductor with Capacitor Bank provides continuous Power Factor control to provide overall leading / lagging compensation.

Advantages over Competitor's Equipment.

Soft-start control and static transfer on and off line

- Self testing during startup.
- Transfer to and from the load is fully automatic requiring no user checks or adjustments before it is initiated, thus removing the possibility of human error.
- Smooth transfer on-line and accurate regulation through the operating range ensures seamless operation of the APR.

Active regulation using Thycon Static Flywheel Technology

- Provides individual phase correction of power factor to achieve unity power factor on all phases even under unbalanced load conditions.
- Provides Lead and Lag compensation capability.
- Provides fast continuous regulation of power factor – achieves sub-cycle control at 12 points/cycle.
- Enables initiated response to transient step load changes within one power cycle period.
- Allows the APR to store substantial reserve power for transient conditions and high crest factor loads.

Harmonic filtering capability.

- Depending on size and site application can reduce THVD from 8% to 1%.
- Real time filtering during changing loads means constant effective filtering.

Efficiency

- System operates up to 99% efficiency resulting in low running costs and heat dissipation.
- System maximises energy saving due to accuracy and speed of regulation.

Parallel operation

- Easy paralleling with similar systems during any stage of the APR lifetime means increased flexibility and permits future growth as required.

Power distribution

Switched Power Factor Correction Comparison

- APR is not prone to capacitor damage from harmonics. Swiched capacitors are 'protected' by isolating the system when THDV exceeds 5%
- Switched capacitors can cause premature failure of capacitors and contactor welding due to hard switching requirements.
- Switched capacitors can only be as accurate as the discrete steps allow causing wasted energy saving opportunity.
- No harmonic filtering is achieved, only power factor correction.
- Slow response and control. Therefore, not suitable for changing/dynamic load applications such as printing presses, lifts, conveyors, etc.

Active Filter Comparison

- Active Filters must be oversized to provide Power Factor and Harmonic filtering.
- Active Filter is an expensive solution.
- Active Filter requires in-line chokes for filtering
  - A 3% reactor is required in series with the load to limit load harmonics. This will generate heat and increase energy consumption
  - Some filters use DC caps across a flux cancelling choke (both polarity wound on the same core) to reduce ripple caused by harmonics on the fundamental. This also provides a form of energy storage.
- Active Filter concept is to:
  - Measure the harmonic load.
  - Produce an “opposing” harmonic waveform.
  - Inject the “opposing” harmonic waveform in subsequent cycles with the aim of “cancelling” the existing harmonics.
- PROBLEM: Active filters measure waveform distortion, calculate and generate a corresponding opposite which is then injected into the measured waveform. This process takes at least 20msec. In this time the load may change causing the active filter to inject insufficient or even in phase harmonic current into the supply. Under dynamic load conditions, the active filter may become a net contributor to the harmonic problem rather than a solution thereby increasing energy use.
- APRs provide real time filtering ensuring filtering occurs at all times during all load variations.
- APRs provide a simple, uncomplicated and effective solution.