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10. How is the LINEATOR™ different from other forms of passive harmonic filters?

Although a truly passive filter, the LINEATOR™ exhibits none of the problems that plague conventional filters. The unique winding configuration of the LINEATOR™ reactor provides much better attenuation of harmonics than standard reactors thereby allowing the LINEATOR™ to get exceptional performance even with a much smaller capacitor bank than found in all other passive filters.

The large capacitor banks in both trap filters and broadband filters present a capacitive reactance to the system, especially under light loads. This can be a beneficial feature where inductive loads require a compensating reactance to improve a low displacement power factor. However, in many VFD applications, displacement power factor is quite high even though overall power factor is low due to the harmonic content. Compensation for inductive loads is not necessary and, in fact, can cause problems especially when the supply is an emergency standby generator. To address this, more sophisticated filters will be equipped with a mechanism for switching out the capacitors under light loads, increasing cost and complexity. Even under no load conditions, the capacitive reactance of the LINEATOR™ is so low that switching out the capacitors is unnecessary.

The conventional trap filter has no directional properties. It therefore, can easily be overloaded by attracting harmonics from upstream non-linear loads. The LINEATOR™, on the other hand, will present a high impedance to line side harmonics eliminating the possibility of inadvertent importation and overloading.

At frequencies below its tuned frequency, a conventional filter will appear capacitive. This capacitance has the potential of resonating with the power systems natural inductance. When a filter is tuned to a higher order harmonic, such as the 11^{th}, it can easily resonate at a lower harmonic frequency, such as the 5^{th} or 7^{th}. The natural resonance frequency of the LINEATOR™ is below that of any predominant harmonic, therefore inadvertent resonance is avoided.

The filtering effectiveness of a trap filter is dependent upon the amount of harmonics present at untuned frequencies as well as the residual at the tuned frequency. To obtain performance better than 15% THID, multiple tuned branches are often required. Some broadband filters claim < 12% THID but require relatively large capacitor banks to achieve this. Even larger capacitors are required if further reduction in THID is desired. The LINEATOR™ will reduce current distortion to < 8% over the entire operating range and typically achieves near 5% THID at normal operating levels.

