



## **Unisin 3100 Broad Band Harmonic Filter Avoidance of Generator Derating**

**Application Note      May 2003      AN403.1**

### **Background**

It is well known that harmonics have significant adverse effects on generator performance. In addition to numerous publications on this subject, IEEE-519 has a section entitled "Effects of Harmonics", which describes the impact of harmonics on generator systems.

The major effects of concern may be summarized as follows:

1. Derating due to overheating
2. Mechanical oscillation
3. Additional pulsating or reduced torques
4. Malfunction of generator-regulating control.

Harmonics will reduce the life and performance of generators. Normally a small amount of harmonics, less than about 4%, has negligible impact on the generator system but can still reduce electric performance by 5% or more. Higher levels of harmonics can result in far more severe reductions in power output. Elimination, or at least minimization of harmonics is therefore desirable.



### **Application**

Our unique Broad Band Harmonic Filter, the Unisin 3100, consists of 2 major parts: a series component and a shunt component. The series component is a reactor that functions to prevent the flow of harmonics towards the generator and a shunt component, which is an all-around filter that filters out all harmonics. If the filter is designed to filter out 3<sup>rd</sup> or 5<sup>th</sup> harmonics, then the filtering efficiency at the design harmonic is typically over 95%; efficiencies for other higher order harmonics are typically about 65%.

Our design of the Unisin 3100 is based on user requirements so that one filter will handle all of the harmonics for a major savings in cost and space. Moreover, the Unisin 3100 contains no electronic parts and so is very reliable.

It is commonly recognized that a solidly grounded neutral of a generator in low voltage systems, say 3 phase 4-wire 480 volts, can have severe effects on the generator's derating due to circulation of the 3<sup>rd</sup> harmonic through the ground loop. A derating also occurs when a generator is impedance grounded in medium voltage systems. The Unisin 3100 can filter out the 3<sup>rd</sup> harmonic without impacting the service of 3 phase 4-wire systems for single-phase loads.

### **Conclusion**

The Unisin 3100 Broad Band Harmonic Filter can meet your need to avoid derating.

### **Power Quality Consultation**

Please feel free to contact us for free consultation.