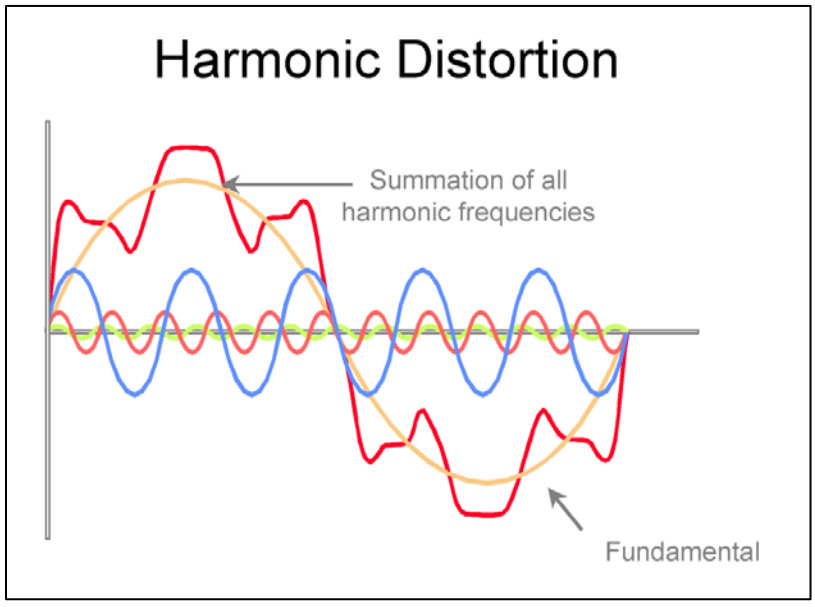
LIMA® MAC Non-Linear Loading

The LIMA® MAC generator is a brushless, synchronous, self-excited, self-voltage regulated 60 Hertz AC generator with superior motor starting and non-linear loading capabilities.

The heart of this unique generator is its patented excitation system. The exciter stator is comprised of two separate windings: a shunt winding, and a series winding. Each of the coil groups of the generator main stator winding) have a shunt tap which is interconnected with the shunt portion of the exciter stator to provide no load excitation. The series portion of the exciter stator winding is connected across the complete stator winding, and carries all of the load current to provide excitation compounding component, proportional to the generator load.

By nature of this design – no automatic voltage regulator sensing or excitation – the LIMA MAC is essentially immune to the waveform distortion that may be created VFDs and other non-linear loads and is able to accept load inrush currents in excess of 500% of rated full load current which enable LIMA MAC generators to sustain 500% short circuit current for ten seconds.

Non-linear loads, such as – Variable Frequency Drives (VFDs), LED Lighting Systems, Welders and UPS Systems –can have a severe impact on generators due to the harmonics created by the load.



Harmonics are created anytime diodes and/or thyristers (SCRs) are used to convert AC to DC as they switch on and off, creating the non-linear load. These harmonics distort the generator output waveform. AUX Windings are magnetically coupled to the generator main stator windings.

As a result, the non-linear load harmonics (shown at left) also impact the Aux Winding waveform and this can result in voltage instability.

These harmonics will also affect any Automatic Voltage Regulators ability to correctly sense the generator terminal voltage which may also result in voltage instability.

In contrast, the LIMA® MAC generator excitation support system fully supports non-linear loading by reason of its design. No automatic voltage regulator sensing or excitation, low sub-transient reactances (X''d) and voltage regulation based on line current means the LIMA MAC is immune to the waveform distortion that may be created by VFDs and other severe non-linear loads with load induced voltage spikes and notches on the waveform that result in false zero crossings.