



AC Frequency

Power Purifier

General

In general terms, *frequency* is the rate at which an event is repeated. In electrical applications, three hundred sixty degrees represent one full cycle of alternating current. In determining the frequency of electrical systems, the number of cycles completed in one second needs to be known. The symbol for frequency is f .

$$f = \# \text{ cycles/1 second}$$

Frequency's unit of measurement is expressed in *Hertz* (Hz), named after Heinrich R. Hertz, a German physicist. Heinrich Hertz gave the true definition of frequency as: *an alternating current going through one complete cycle in one second, has a frequency of one hertz.*

AC Frequency

Standard alternating current in the United States is produced and used at 60 Hz. Thus, the current completes 60 cycles in one second. In some European and Asian countries the standard alternating current is produced and used at 50 Hz. Trystar manufactures two distinct *Power Purifiers* based on ferroresonant technology. One to operate at 50 Hz and the other at the United States standard of 60 Hz.

The design of the transformer is dependent upon frequency, 50 and 60 hertz units are different designs. The biggest difference between the two systems is the 50 Hz system uses an input voltage of 220 or 240 volts, whereas, the 60 Hz system typically uses an input voltage of 120 volts. Also, in the 50 Hz system, the harmonic levels change. For example, the 3rd harmonic is 150 Hz, the 5th harmonic is 250 Hz, and the 7th harmonic is 350 Hz. Whereas, in the 60 Hz system the 3rd harmonic is 180 Hz, the 5th harmonic is 300 Hz, and the 7th harmonic is 420 Hz.

Power Purifier

As the frequency changes from 50 Hz to 60 Hz, the input voltage varies and harmonics change as well. In order for the 50 Hz *Power Purifier* to give the best quality performance, Trystar increases the core material to provide proper control of the flux level within the windings. The benefit of having proper control of the flux level within the windings is improved harmonic attenuation and a clean sine wave. Other benefits of having extra core in the transformer is that it reduces the hysteresis loss and provides better efficiency at lighter loads than any other typical transformer in the market.

Summary

The standard frequency in the United States is 60 hertz meaning that current completes 60 cycles every second. *Two unique Power Purifiers* are manufactured by Trystar, one for 60 hertz and the other for 50 hertz applications. Both units provide line voltage regulation, electrical noise attenuation, harmonic attenuation, power factor correction, and protect against voltage spikes.