

CONVERTERS AND INVERTERS – WHAT IS THE DIFFERENCE?



There is a lot of confusion about the difference between converters and inverters. This guide will attempt to put your mind at rest and help you choose the most appropriate solution for your requirement.

There are two distinct technologies available for operating three-phase motors from a single phase supply. The traditional phase converter (static and rotary) is based on the "Steinmetz" capacitor principles first applied by the American, Charles Steinmetz, in the late 19th century. The old adage "you can't get something for nothing" holds true for phase conversion like anything else. There is, always has been, and always will be an element of artificiality about the supply a phase converter produces. Despite the idiosyncrasies associated with the nature of the supply, phase converters continue to offer a proven and reliable compromise for people wishing to operate three-phase machinery in single phase environments. Simply put, "Why fix it if it ain't broke"!

Inverters (also known as frequency converters/motor controllers/variable speed drives) offer a 21st century approach to the dilemma. Most people who are aware that a device exists to operate 3-phase equipment from single phase tend to know about inverters and assume that the concept has superseded the traditional phase converter. However the two products will always co-exist as the two products service different requirements.

Generally speaking a converter varies the voltage in the conversion (240v to 415v) but fixes the frequency (50Hz) so there is no motor control available. The transformer/capacitor/motor or rotary transformer make-up of a converter means that the supply remains "AC" throughout the conversion. A phase converter is a so-called "Linear Load". No EMC issues, No supply disturbances, No Harmonic distortion. No filters required.

In contrast, an inverter fixes the voltage in the conversion (240v) but varies the frequency (e.g. 0-400Hz) thereby offering motor control. The 3-phase supply at 240-volt is created by rectifying the AC supply to DC and inverting it back to AC. The involvement of DC means that inverter supplies are defined as "Non-Linear". The input and output supply is subject to EMC regulation as DC distorts the AC single phase supply. Harmonic distortion is a direct consequence. Filters are generally required to ensure your contractual obligations to the electricity supply company are not compromised. Inverter manufacturers do not offer product in excess of 3kW because they run the risk of contravening European Standards such as BSEN 61000-3-2:2006 and BS EN 61000-3-12:2005.

The output from a converter retrofits directly to a machine that is wired for 3-phase operation so no machine modification is necessary. An inverter output cannot be accommodated without machine modification.

The output from a converter is flexible and (within reason) can be applied to a variety of different machines whether operated one at a time or simultaneously. An inverter output can only be applied to one motor.

Converters are available to support any motor requirement, provided there is enough single phase supply available to support the three-phase demand. Inverters are typically only available to a maximum of 4hp or 5hp for reasons outlined above.