



Digital vs. Rotary Phase Converters

Digital Three-Phase Converters

In terms of generated power, these are the top of the heap. It is quite simple how they work. Single-phase motors have two wires which make it turn. Three-phase motors will turn with two legs, but also generate voltage on the third leg that is 60 degrees out of phase with the other two coming from the power company.



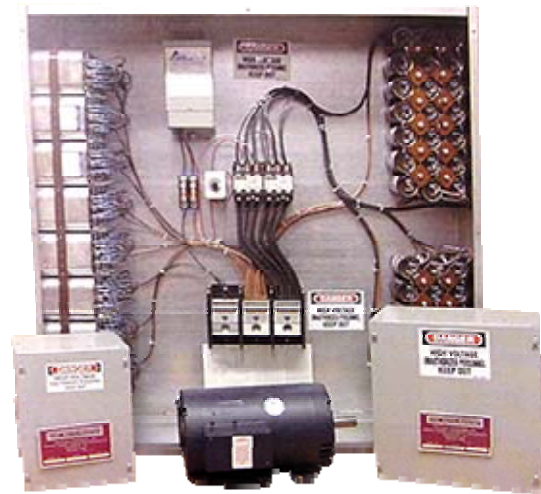
If you only have single-phase power, you can upgrade to a digital three-phase converter; two-phases from the power panel and one generated electronically to be exactly 120 degrees from the other two legs thus giving you the full three-phase like you would see from your power company.

Phase perfect converters provide balanced and regulated three-phase power. No loss from a motor turning and little to no power consumption while not used. Much like a TV set. Turn it on when you need it; otherwise, it sits idle waiting for you to give it a load to turn.

It is the ultimate in efficiency and clean generated power.

Rotary Phase Converters

Much has been written about rotary phase converters, but here is the Cliffs Notes version of how they work and to understand what you are buying when you do make that purchase.



Rotary converters use a three-phase motor, preferably wound in a delta configuration, supplied with single-phase power from the wall to get it turning, then the third leg is generated, but 60 degrees out of phase from the other legs. This is not good, so manufacturers use capacitors to shift the phase of the voltage, so it is much closer to 120 degrees away from the other legs. Ours are made to hold the voltage to ± 5 to 7% of the wall power and are made specifically with CNC products in mind.

A good analogy of this would be an engine with only 3 spark plugs. You want each plug to fire right before dead center, so the explosion in the cylinder occurs right after dead center and you get the maximum power from the engine.



However, if you have one cylinder firing 60 degrees from center (or much at all from dead center), you generate heat in the device you are trying to control as it fights itself from not firing at the right time and losing power. The engine moves slower and consumes more fuel (electricity in this case).

There is no way to get around the phase shift of the generated leg on rotary phase converters and thus they are derated to fit your application. Such as using a 20HP unit to run a 15HP load. This is efficiency lost in the motor by having to fight itself and is no different than any rotary phase converter on the market. The capacitors help get it closer to 10 to 20 degrees away from the other legs, but it is never perfect like you will see with a digital phase converter.

Rotary phase converters, unless made specifically for CNC applications, will not be suitable for a CNC without eventually ruining the control boards in the machine. Rotary phase converters also pass dirty power to the machine, because they have no regulation without our external surge protector, which is highly recommended to all CNC shop owners as a cheap insurance policy.

Keep in mind that rotary phase converters consume 1/3 of the power of the motor spinning to create your three-phase power. Example: If you have a 30HP rotary phase converter, you will be consuming 10HP with no load on it. This is one major drawback to rotary phase converters.

Troubleshooting

If you become stuck or confused, don't panic. Simply contact us at 208.855.9426 and one of our friendly service technicians will be happy to assist you.

Instructions written by FadalCNC.com. We put in hundreds of hours of hands-on experience in the field each year.