

What's Cool: Digital Phase Converters

Balanced three-phase power

This month I decided to revisit the old problem of three-phase power for small wineries. As we know, process equipment in our industry is mostly European and therefore all three-phase. It is an old story, but for those yet to do the research, the exorbitant cost for a utility company to install three-phase power is probably beyond the budget of your remote, hillside facility.

Fortunately, even with single-phase power, you can simply purchase a phase converter. When I sold winery equipment, I would give you a converter just to get the rest of the sale. The question now is what kind of converter should you buy?

The reason that question is raised is because today's increasingly sophisticated crush pad and bottling machines use more on-board computers. As a result, there is now a problem with the traditional voltage imbalance between the three legs or phases.

Imbalance in voltage can happen quickly and is typical for rotary converters, a popular design that has been around since the 1950s. Fortunately, digital conversion addresses this issue and even offers added benefits.

Phase Perfect of Rapid City, South Dakota has patented a digital design that uses advanced switching technology. It contains software in a microprocessor to control the solid-state components. Called a DSP (digital signal processor), it will continually and immediately monitor the phase conversion process, adjusting the input and output of the converter to maintain balanced power to all three legs under all variable load conditions.

The Phase Perfect units produce what is called a true "sinusoidal" output voltage, which they claim allows only a 1 percent variation. By balancing the output voltages, any number of three-phase pieces of equipment will be safely powered to within its rated capacity.

This quality of power means it can simultaneously handle anything from the electronic control panel to a 10 H.P. motor. With their ability to run parallel systems, they can handle up to 60 H.P., which is far beyond the needs of most wineries.

In contrast, rotary converters are electro-mechanical devices and generate a third phase by a spinning, internal motor. They cannot respond quickly to changes in loads, easily resulting in imbalance between legs by as much as 20 percent. When the voltages are not equal, heat can be created. Worse yet, such wandering voltages will shut down your computers.

The perfect example is a crush pad or bottling line. Using different sized motors and levels of electronic process control, several components (pumps, drive motors, electronics) may be operating at the same time, creating ripe opportunities for failure and lost time: computer overload, lack of power to motors if running concurrently and the potential for burned motors.

Imbalance also means you do not get full torque from the motors. I was told that equipment running on digital power just "sounds better."

Installation is simple and referred to as "plug and play." There will be two wires (in) from the existing electrical service with three wires (out). The unit is sold complete and ready in minutes. If running multiple motors or machines, the winery will have to install a three-phase sub-panel to accept the three output wires. The required input voltage must be between 187 to 260 V, and 110V voltage does not work.

Location would be next to the existing electrical panel, preferably off the floor and in a dry location. The converter comes as a floor unit or wall mount. They have two housings available, either Type 1 (indoor) or Type 3R (rainproof). Rainproof does not translate into "waterproof." Since they weigh less than half that of a rotary converter, wall mounting is advised.

Another nice feature is that digital is relatively quiet. Rotary converters are quite annoying due to the humming of the internal motor, and this is why they are often installed in remote locations away from workers. Digital converters are circuit boards and have no moving parts except for a thermostatically-controlled cooling fan.

The downside to digital is they will cost more than rotary. A 10-horsepower rated rotary will cost in the neighborhood of \$1,895 while the current price for a comparable model, **DPC-A10** from Phase Perfect, is \$2,770. But because of the safe and balanced power, digital still makes sense--not only for the protection it affords but also for the extended life you can expect with your equipment operating on efficient power.



Maintenance is virtually non-existent while trouble-shooting is basic. Each unit comes with three "status lights," which in combination with either on/off or blinking will advise the winemaker of potential issues like an over-or-under input voltage, resulting in a possible automatic shutdown. The factory claims 95 percent of problems can be diagnosed over the phone with factory technicians, and replacement parts (boards) can be shipped and easily installed.

The units come with a one-year warranty, and an additional two-year is available. Again I was advised that most problems are solved over the phone.

Distribution is limited. Most wineries will specify Phase Perfect to their contractors, and in-house electricians can deal direct with the home office.

What's Cool: While more expensive than rotary converters, digital converters are still relatively cheap and can more easily handle the power needs of today's sophisticated winery equipment. The mechanicals run more smoothly. There is less noise and improved electrical efficiency. With a high level of dependability the winery can expect many years of maintenance-free operation. It might also cut to the bottom line. Check with your local power utility to see about the economics of three-phase conversion.

For more information, contact Phase Perfect toll free at 866-250-7934 or www.phaseperfect.com.
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