

## Inside This Issue:

- ▶▶ Cogeneration
- ▶▶ PH Sensors
- ▶▶ OMNI & Molly Bear
- ▶▶ Power Supply (UPS)
- ▶▶ OMNI Safety Corner



## COGENERATION: Combined Heat & Power

By: Craig Drabyk

**Cogeneration, also known as combined heat and power (CHP), is the process in which a single fuel source is used to produce both electrical and thermal energy.** Most cogeneration plants in the U.S. are operated by non-utility companies and institutions. These on-site plants capture waste heat to be used to produce thermal energy for reuse such as process steam, hot water, space heating, and cooling, or as fuel to generate even more electrical power. They are highly efficient, providing substantial energy savings and reducing environmental impact.

Cogeneration plants can range in size from small units to large plants serving industrial sites, college campuses, or entire towns. Omni has successfully worked on several cogeneration power plant projects, most recently at a natural gas turbine CHP plant. Other common plant types include gas engine, biofuel engine, combined cycle, steam turbine, molten-carbonate and solid oxide fuel cell, nuclear power, biomass, and industrial or municipal waste.

Smaller CHP projects typically utilize pre-assembled package equipment such as gas compressors, turbines, and HRSGs (heat recovery steam generators). Larger projects typically require more field assembly due to larger equipment size. The project I&C contractor is responsible for controlling the utilities (natural gas, water, etc.) feeding the major equipment and installing communications between the vendor control systems to ensure safe operation of the processes. It is important to work closely with vendors on equipment assembly, startup and functionality, and thorough loop check and precise calibration are of utmost importance. And, as with any complex project, proper commissioning is key to an efficient and safe operating plant.

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## OMNI TECH TALK: Maintaining and Calibrating Your pH Sensors

**Because proper pH adjustment is critical for many processes, maintaining the accuracy of your pH measurement devices is vital. Proper maintenance and calibration on a regular basis are required ensure accurate measurements and increase the lifetime of your pH electrode.**

### Maintaining your pH electrode

A pH meter measures the potential differences between a reference electrode and a pH electrode that is exposed to the measured media. The lifetime of the exposed pH electrode is not very long, but if well-maintained it can be expected to function effectively for 6 to 12 months in a typical application. A pH electrode that is not maintained and cleaned regularly will become coated and reference junctions may become contaminated, causing it to become sluggish or non-responsive. A simple rinse with clean water after use goes a long way to keeping your pH electrode functioning properly, but a cleaning agent may be required. Check with your manufacturer or supplier for a cleaning solution that is appropriate for your particular pH electrode and the type of contamination.

### Calibration is key

Because a pH electrode will gradually change or degrade over time due to aging and coating of the membrane (even with proper maintenance), regular calibration of your pH meter is required to ensure accuracy. Frequency of calibration depends on a number of factors. In a laboratory setting, your pH equipment should be calibrated each time it is used. For online pH measurement in a process environment, frequency can vary considerably depending on the application, its unique conditions, and the level of accuracy required.

The pH calibration procedure requires the use of at least two pH buffer solutions (pH 4 and pH 10 are most common) that span the range of pH values to be measured, but a multi-point calibration method should be used for greater accuracy. In a three-point calibration, the meter is first calibrated at pH 7 (neutral), then to the pH closest to the pH desired level. The third calibration point allows you to calibrate to both sides of the zero point (pH 7) by expanding your measurement range and providing greater linear accuracy.

### Storage

The glass membrane at the probe tip of your pH electrode must be kept moist. If it is allowed to dry out, it will not function properly. To maximize performance, store your pH electrode in a solution recommended by the manufacturer. Never store your electrode in water. If your pH electrode dries out or is damaged after a rough cleaning procedure, there are regeneration procedures that can be attempted to restore the membrane.



## OMNI & MOLLY BEAR



**Congratulations to Omni VP Craig Drabyk for competing in the 2011 NJ State Triathlon on July 23 as a member of Team Molly Bear.** Despite wilting heat and a flat tire during the bike course, Craig was able to surpass his 2010 race time by over four minutes. More importantly, though, Craig raised \$2,775.00 for the Molly Bear Foundation, a charity founded by the parents of Molly Elizabeth Brown to raise awareness and help families of children born with Trisomy 18, a severe chromosomal disorder. To learn more or make a contribution, please visit [www.mollybear.org](http://www.mollybear.org)

## FROM THE PANEL SHOP:

### Uninterruptible Power Supply (UPS)

By Chris Czubowicz

**A UPS (uninterruptible power supply) is an important device used to provide instantaneous emergency power to a load in case of input power interruption or failure. Common power problems that can affect systems include sag, spike, surge, noise, frequency instability, harmonic distortion, and power failure. Without the protection of a UPS unit, such problems can cause data loss, down time, equipment damage, and even injuries and fatalities.**

There are three main types of UPS: standby (off-line), line-interactive, and on-line (double conversion):

**Standby:** The most basic UPS type, standby, provides surge protection and battery backup. The load is powered directly by the input power and the backup power circuitry is only invoked when the utility power fails. The standby is usually used in smaller applications such as personal computer protection.

**Line-interactive:** This type of UPS, similar in operation to a standby UPS, offers a higher level of performance by adding better voltage regulation and filtering features. It maintains the inverter in line and redirects the battery's DC path from the normal charging mode to supplying current when power is lost.

**On-line:** The on-line UPS, which provides the highest level of protection, combines a double conversion power circuit and an inverter, which continuously powers the load providing both conditioned power and outage protection. The on-line UPS is commonly used for mission critical applications.

**Choosing your UPS:** There are a number of factors to be considered when choosing a UPS, such as load importance (non-essential vs. critical), power requirements, capability and battery run time, installation, maintenance needs, and cost. For expert advice and assistance in choosing a UPS, please contact Omni Instrumentation at (908) 523-0800.

## The OMNI Safety Corner

Omni Instrumentation boasts one of the best safety records in our industry, with 9 years of no recordable incidents.

Omni has participated in numerous OSHA VPP projects, and we are ISNetwork approved.

