

## CR-288 Concentration Monitor Implementations



The CR-288 concentration sensor features materials and design compatible with ultrahigh purity and caustic chemicals.

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#### *CR-288 Realized Performance Data:*

*TMAH resolution:*

*$\pm 0.003\%$  by weight*

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Jetalon Solutions Inc.  
3343 Vincent Road,  
Suite B  
Pleasant Hill CA 94523  
Phone: 925.274.1288  
Fax: 800.878.2311  
www.jetalon.com

## TMAH

**Summary:** CR-288 enables real-time in-line, highly precise monitoring of Tetra Methyl Ammonium Hydroxide (TMAH) concentration and temperature.

**Business Need:** TMAH is an important and expensive chemical used to strip photoresist in SEMI and flat panel display manufacturing in the photolithography processing area.

Typically TMAH is diluted in the manufacturing plant. Process efficiency depends on precise dilution, temperature, and purity. Recycling is desirable, but only if purity is guaranteed through continuous monitoring.

Precise monitoring of TMAH concentration and temperature:

- Reduces chemical consumption and waste creation, leading to cost savings
- Increased throughput by continuous monitoring
- Validates results of TMAH purification for re-use, enabling cost reduction in raw materials

## CR-288 Benefits

Typical industrial testing for TMAH concentration levels involves laboratory analyses or auto-titration.

Because it is an in-line automated test, CR-288 offers multiple benefits over other test methods. Specifically:

- Implementing CR-288 eliminates the need to grab samples for laboratory analysis, thus saving labor and opportunity cost in waiting for results. Data is available continuously.
- The high degree of accuracy, combined with simple user calibration and advanced temperature compensation algorithms, provide manufacturers with outstanding process control while requiring nearly zero maintenance.
- By using materials of construction compatible with ultrahigh-purity processes, the CR-288 sensor is completely process transparent.
- The flowcell footprint is only 3" x 2" x 4" (l x w x h) and is available in a variety of end connections providing flexible installation options.
- CR-288 has no moving parts. Maintenance is minimal.

## Case Study: TMAH Dilution and Recycling with CR-288

This data demonstrates how accurately CR-288 performs when diluting TMAH with de-ionized water in our laboratory. For TMAH, CR-288 has an accuracy of  $\pm 0.003\%$  by weight or better.

The charts show a plot of concentration (blue line) and temperature (gray line) plotted as a function of time for two concentrations of TMAH and also for de-ionized water.

The data below demonstrate fast data acquisition (1.2 secs per data point), user adjustable box car averaging for improved signal to noise, real-time temperature compensation and  $3e-06$  RIU (refractive index unit) degree of accuracy.

