

2018 Product Brochure

The Station

From ZAPS Technologies



AUTOMATED ONLINE WATER QUALITY MONITORING

The LiquID™ Station

The LiquID Station is an intelligent optical, online instrument for multi-parameter water quality monitoring in high value processes, such as water and wastewater treatment and other industrial applications. LiquID is a highly extensible, fully automated and low maintenance monitoring platform. The system is configurable to measure parameters related to organics, nitrate, ammonia, solids, common water pollutants, algae and more. Through a series of engineering innovations, the instrument provides a unique combination of broad detection capability, robustness, accuracy, and reliability, representing the new generation of online monitoring instrumentation.



The Optical Advantage

Automated Water Quality Monitoring

Across industries, the prevailing trend in monitoring is increasing use of automated, continuous online solutions. There are two major types of online monitoring instruments: wet chemistry devices and solid state devices. Wet chemistry analyzers take the processes conducted by skilled lab technicians and automate them on a miniature scale, typically utilizing pumps, reagents and complex machinery. These devices tend to provide good data when properly operated and calibrated, but at a cost of high requirements in terms of operation and maintenance time.

Solid-state monitoring devices, such as optical instrumentation, are mechanically simple by contrast. They have few moving parts to break or wear, so tend to provide a high level of hardware robustness. The LiquID Station is one such device, which uses light rather than wet chemistry to collect measurements, and uses no reagents in the process. The system has true self-cleaning and self-calibration cycles that function automatically and independently of operator attention for up to months on end.

Hybrid, Multispectral Detection

Multi-Parameter Monitoring

The key to the multi-parameter monitoring capability of the LiquiD platform is its hybrid multispectral analysis (HMA) methodology. LiquiD uses a rotating optical filter set to cycle rapidly through a range of illumination and detection frequencies—

Hybrid Multispectral Analysis

Using frequencies from across the light spectrum.



These light frequencies range from the deep ultraviolet through the visible band and into the infrared. They are selected to represent the major constituent groups within the complex water matrix and are configured in each instrument to the parameter requirements

hitting the sample with a variety of different light waves—to collect measurements of multiple water constituents.

These light frequencies range from the deep ultraviolet through the visible band and into the infrared. They are selected to represent the major constituent groups within the complex water matrix and are configured in each instrument to the parameter requirements

Hybrid Spectrometry

Unmatched Detection

This multispectral capability is accomplished through an innovative “hybrid spectrometer” design, which allows the system to monitor absorbance, fluorescence and reflectance all from the same optical platform. LiquiD uses all three of these independent detection methods in effectively real time. This is made possible through Zero Angle Photo-Spectrometry (“ZAPS”) and LiquiD’s unique proprietary design.

More compounds can be seen using a combination of detection methods than by using a single method. Thus, the multiple optical methods in hybrid spectrometry afforded by ZAPS provide increased breadth of detection capability.

Parameters

Carbon Organics

- Total Organic Carbon
- UV Absorbance
- Specific UV Absorbance
- Natural Organic Matter
- Refined Hydrocarbons
- Airplane Deicing Fluid

Events/Environmental

- Algae/Chlorophyll *a*
- Chlorophyll *b*
- Fecal Contaminants

Nitrogen

- Nitrate + Nitrite
- Ammonia

Oxygen Demand

- Biochemical Oxygen Demand
- Carbonaceous BOD
- Chemical Oxygen Demand

Disinfection

- Free Chlorine
(OCl^- & $HOCl$)
- Chloramine
- Disinfection Byproducts

General

- Turbidity
- Total Suspended Solids
- Temperature
- Flow Rate

And More...

Algorithmic Detection

Reliability in Complex Matrices

The LiquID Station collects reams of water quality data—cycling through multiple different frequencies and using different detection methods with hundreds of repetitions in each measurement—and stores it in an onboard computer database.

Besides allowing LiquID to measure a broad range of constituents, this massive data enables added reliability of readings through the use of matrix correction. Software algorithms in the onboard computer process the data on the fly and correct the readings for background interference (e.g. from particulate solids). In this way, LiquID produces measurements you can trust even in a complex water system.

BOD in Real Time

LiquID utilizes a revolutionary new method for real-time measurement of key oxygen demand metrics including Biological Oxygen Demand (BOD), carbonaceous BOD (cBOD) and Chemical Oxygen Demand (COD).

The instrument characterizes the complex wastewater matrix at the sub-molecular level, looking at bonds of the organic and other compounds in wastewater that make up BOD. Onboard software algorithms process the data to create the remarkable ability to reliably measure oxygen demand in a continuous real-time basis for applications such as optimized process control and quality assurance in wastewater treatment.

Flow Cell Design

Maximum Optical Sensitivity

At the heart of LiquID is its optical flow cell, where light from the instrument interacts with the online sample fluid stream. The proprietary flow cell design of the LiquID Station minimizes the number of interfaces in the light path, which increases the signal-to-noise ratio. Combined with a high-quality photon detector for collecting light readings, the result is maximum sensitivity in an online optical instrument. Even small changes or small quantities are clearly detectible.

Reliable Optical TOC

Standard methods for total organic carbon (TOC) analysis using a lab bench-top or automated analyzer are generally labor intensive. Lab analysis requires a skilled technician, and automated wet chemistry systems are typically high-maintenance.

ZAPS has developed a new method for real-time measurement of TOC. LiquID uses a proprietary high-energy UV frequency combined with intelligent analytics to cut through matrix effects like no other optical instrument can. With this method, LiquID provides a robust TOC measurement with a detection limit of less than 10 parts per billion and boasts the reliability and ease of a reagent-free, automated optical instrument.

Ruggedized Hardware & Online Software

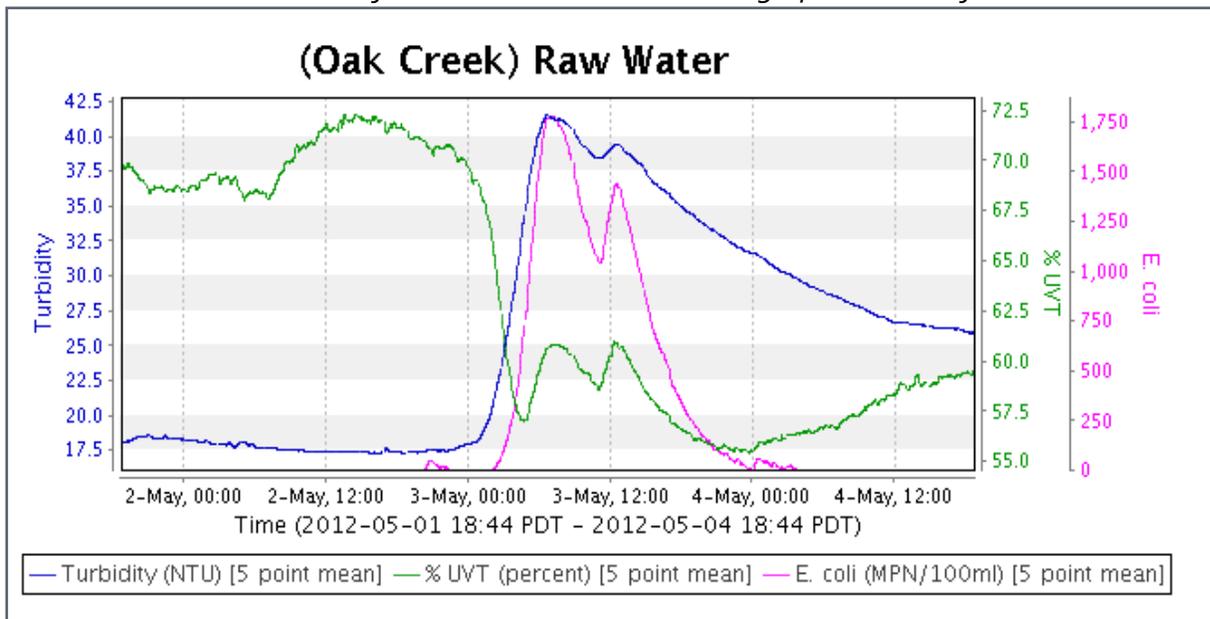
Remote Monitoring

The LiquID standard design features a ruggedized, water resistant NEMA 4X enclosure, for installation indoors or outdoors. The power of LiquID to reliably monitor multiple water-quality parameters in real time can be installed anywhere there is access to power, a cellular signal, and a water stream to sample.

LiquID also comes with ZAPS own web-based online monitoring software. LiquID measurement data is collected and stored in a database on the instrument. From there it is either sent to the user's own data system (such as a SCADA or PLC) or transmitted via cellular modem to a remote online server, where it is accessible through a secured web-user interface to any authorized device (e.g. a computer or smartphone).



Views of historical multi-parameter data from the ZAPS LiquID web user interface. Above: the Quick Glance view of current conditions. Below: a graphical view of historical data.



Extensible Platform

For Multiple Applications

With multi-parameter capability from a single platform, LiquID is extensible to a wide range of applications:

Drinking Water Treatment and Water Security

For water treatment facilities, the primary value of LiquID is typically in event detection—in source water, within treatment processes, or in distribution networks. The broad detection capability of the LiquID hybrid monitoring methodology provides a powerful way to detect changes, both in terms of “normal” changes due to natural events and cycles as well as contamination events. The LiquID Station for Drinking Water & Environmental Monitoring is a potent event detection tool, providing water treatment managers and operators a means to detect change, characterize change and respond quickly and intelligently.

Wastewater Treatment

The LiquID Station for Wastewater is configurable to monitor BOD (as well as CBOD and COD), TSS, ammonia and combined nitrate+nitrite in a variety of matrixes from cleaned final effluent to raw influent. These parameters are measured every couple of minutes on a continuous basis, provided an unprecedented view of “the secret life of a wastewater treatment plant” that grab sampling and lab analysis can not reveal, because it is cost and time prohibitive to sample at the necessary frequency. These data provide a host of process optimization, event detection and quality assurance opportunities in the plant, adding up to greater efficiency in terms of power and chemicals along with fewer excursions.

Water Reuse

The LiquID Station is configurable with parameters for both water and wastewater treatment monitoring, making it an ideal tool for water reuse applications, which combine the processes of both. LiquID provides continuous automated monitoring of TOC down to 10 parts per billion, as well as highly sensitive UV-nitrate detection, a proprietary real-time BOD measurement, and a host of other readings to provide water reuse operators with assurance their processes meet specifications and the means to detect and diagnose problems as they arise.

Industrial Process Control and Verification

The extensibility of the LiquID Station’s multi-parameter detection and matrix correction capabilities are a boon to industrial process managers and engineers. Algorithmic correction allows the instrument to reliably function in challenging process streams such as waters that are turbid, high in organics, brackish or saline. With those features, LiquID is adaptable for new applications where attempts with other instruments have failed. The science and engineering teams at ZAPS Technologies have extensive experience with parameter development and analysis, and are available to assist in creating monitoring capability for high value applications on a custom basis.



About ZAPS Technologies

ZAPS Technologies provides high-precision optical instrumentation and services for water quality monitoring and analysis. The company's flagship product, the LiquID™ Station, provides multi-parameter detection and measurement capability for varied fluid systems, and is rugged enough for exposed field installations. LiquID is a versatile platform and can be installed in a wide range of applications. It excels where real-time information is valuable and broad contaminant detection capability is critical.

The technology and design of LiquID originated from the invention of ZAPS Chief Science Officer Dr. Gary Klinkhammer, who has over 25 years experience in the fields of environmental monitoring and spectrometry. Dr. Klinkhammer wanted to study oceanographic conditions using a sampling device mounted on a trailer towed behind a US Navy nuclear submarine. He required automated, robust instrumentation with multi-parameter capability for this application. Unable to find satisfactory equipment, he set out to create his own and developed an innovative, novel optical platform. The current LiquID Station is the third generation of evolution from his original invention.

Next Generation Monitoring *In Your Hands*

The LiquID Station provides hassle-free automated monitoring of a wide range of water quality parameters for a variety of applications. To learn more about how LiquID can fulfill your water monitoring needs, contact ZAPS today at:

info@zapstechnologies.com

www.zapstechnologies.com

(866) 390-9387

**213 Water Ave NW
Albany, OR 97321**

