

# Lotix

Automated Combustion TOC Analyzer



The Lotix TOC Combustion analyzer is designed to accurately measure carbon content in aqueous matrices. It uses proven catalytic combustion, oxidation of carbon material into carbon dioxide, and detection using a new Non-Dispersive Infrared (NDIR) detector.

Lotix is the ultimate solution for wastewater, surface water, ground water, sea water, and other hard to oxidize matrices with an economical price to fit any budget.



# Benefits of the Lotix

- No costly syringe drives or 7-port valves!
- Ability to run 0-20,000 ppm without dilution with a single 0.5 mL injection volume virtually eliminating the need for multiple calibration curves
- Easy to use software requiring < 1 minute to set up a calibration curve
- Simple design ensures virtually any component can be accessed in minutes, and with the furnace located in the front, combustion tube maintenance is a snap
- Real-time viewing of analytical data and printing of completed sample reports while instrument is running
- Easy scheduling of priority samples
- Ability to export to CSV or PDF and import sample IDs from CSV files
- Average run time for triplicate TOC is 13-15 minutes (depending on concentration)
- Uses a pressurized 10 L water reservoir to clean the sample pathway, loop and needle before and after each sample without using any positions on the autosampler







# Accuracy You Can Count On

The Lotix TOC Combustion analyzer is designed to accurately measure carbon content in aqueous matrices down to the ppb level. It uses proven catalytic combustion, oxidation of carbon material into carbon dioxide, and detection using a flow-through Non-Dispersive Infrared (NDIR) detector.

The Lotix features a vertical quartz combustion tube packed with supported platinum catalyst that receives a continuous flow of air or oxygen at 200 mL/minute. The furnace is normally maintained at 680 °C, but can be varied to any temperature up to 1000 °C. Samples containing organic carbon are automatically introduced into the combustion tube via a cost-effective sample loop injection system.

Through catalytic oxidation, the sample is completely oxidized to CO<sub>2</sub>. The gas flow sweeps the CO<sub>2</sub> containing steam out of the combustion tube, through a condenser loop, and then through a mist trap. Final H<sub>2</sub>O removal is accomplished by a permeation dryer. The CO<sub>2</sub> containing gas is then passed through a halogen scrubber and sample filter to a CO<sub>2</sub> specific NDIR for quantification.

Inorganic Carbon (IC) samples are transferred into the IC sparger along with a predetermined amount of acid solution. In this acidic environment, all forms of IC are purged out of the solution as CO<sub>2</sub> by the continuous flow of gas through a sparging tube. After the removal of IC, the gas then continues through the permeation dryer, halogen scrubber, and sample filter to the NDIR detector for analysis.

The oxidation products are swept into the NDIR detector, which is CO<sub>2</sub> selective. As the CO<sub>2</sub> passes through the detector it is analyzed. The output signal is proportional to the concentration of CO<sub>2</sub>, created from the oxidation of the sample, in the carrier gas.

## Applications and Industries

TOC sampling and analysis are used in a wide range of applications in several industries.

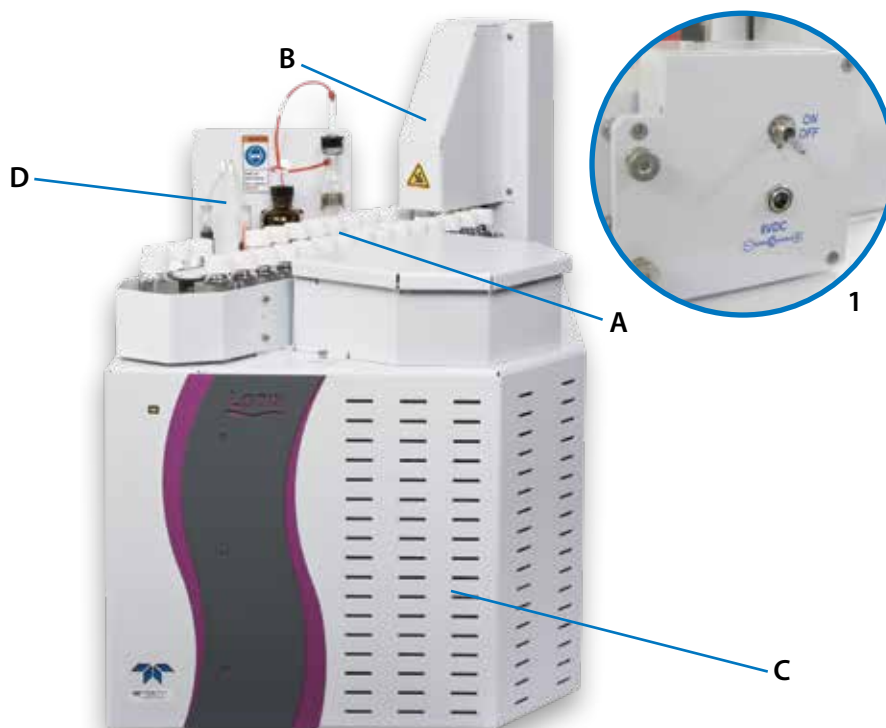
- Environmental
- Petrochemical



## NEW Highly Sensitive NDIR Detector

The Lotix's NDIR detector is an absolute, non-dispersive infrared gas analyzer based upon a single path, dual wavelength, infrared detection system. This low-maintenance analyzer is designed for continuous monitoring of CO<sub>2</sub>. The Lotix's NDIR has the following characteristics:

- High accuracy over the entire measurement range due to automatic temperature and pressure compensation
- High stability with low zero and span drift
- 1 ppm signal noise at 370 ppm CO<sub>2</sub>
- CO<sub>2</sub> measurement range of 0-20,000 ppm without dilution using a single 0.5 mL sample injection. Higher concentrations are achievable with dilution prior to analysis.
- An optical path that can be serviced and cleaned by Teledyne LABS Service Technicians



**A. Sample Conveyor** – The Lotix conveyor systematically moves sample vials to the sample position for sample introduction via the needle assembly. The conveyor is designed to hold thirty 40 mL VOA vials.

**B. Needle Elevator Tower** - The needle elevator raises and lowers the needle assembly using a pneumatic air cylinder. When lowered, the sample and pressurize needles puncture the septa of the vial. When raised, the needles are safely above the sample vial, allowing the sample conveyor to move the vial in the sample position out for rinse, and the next vial into the sample position.

**C. Combustion Furnace** - Provides high temperature necessary to oxidize the carbon in the sample into  $\text{CO}_2$ . The combustion tube contains a bed of proprietary catalyst that promotes oxidation of organics. By removing the side panel, one can gain complete access to the combustion furnace and tube. The design of the furnace permits easy installation, monitoring and maintenance of the combustion tube.

**D. Wet Chemistry Panel** – An easily accessible and visible panel holds the Inorganic Carbon (IC) Sparger, Acid Bottle and Halogen Scrubber for the removal of chlorine and other halogens.

## Options

**1. Mixing Module** - The optional Lotix Mixing Module is designed to stir samples in the vial prior to analysis. The mixing module contains a magnet attached to an electric motor. The rotating magnet in the module causes a magnetized stir bar in the vial to rotate and mix the sample.

**2.  $\text{SO}_3$  Scrubber** (not pictured) - Certain sample matrices (such as samples preserved with sulfuric acid) have the potential to create gases that alter analytical results in the Lotix NDIR detector during analysis. The optional Lotix Sulfate Scrubber ( $\text{SO}_3$  mistcatcher) removes these gases before they reach the detector.

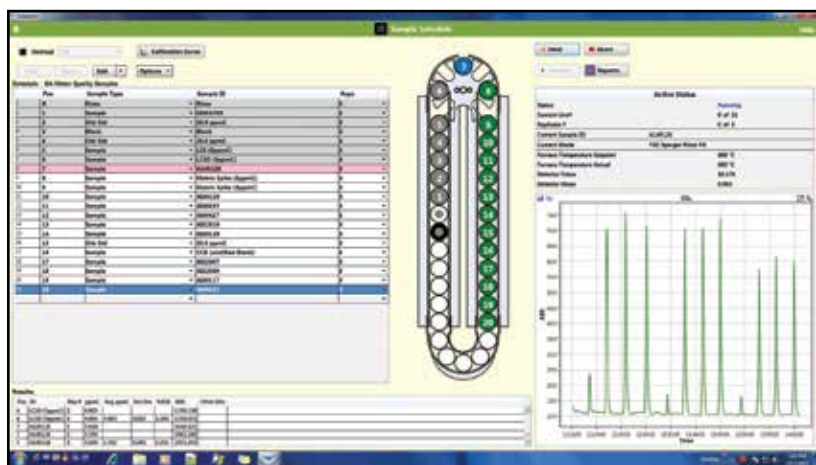
**3. Salt Analysis Kit** (not pictured) - The Salt Analysis Kit contains required components for the analysis of sea water and brines on the Lotix TOC analyzer. The kit includes a 0.3 mL sample loop, catalyst and combustion tube, and replacement parts for Lotix components whose life-span is reduced when analyzing this sample type.



# TOC TekLink

## Fully Optimized User Interface

The Lotix was developed to simplify TOC analysis. The Lotix's TOC TekLink software, was designed from the user's perspective. The result is an instrument so fluidly connected to a user's analytical needs that it becomes nearly transparent. TOC TekLink was designed around the following concepts:

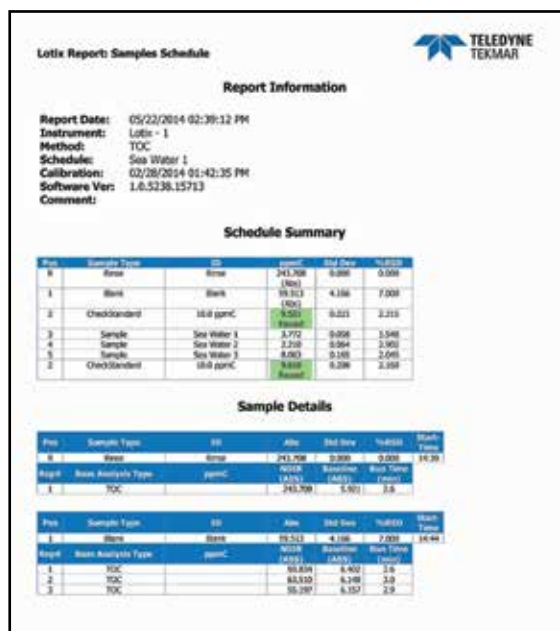
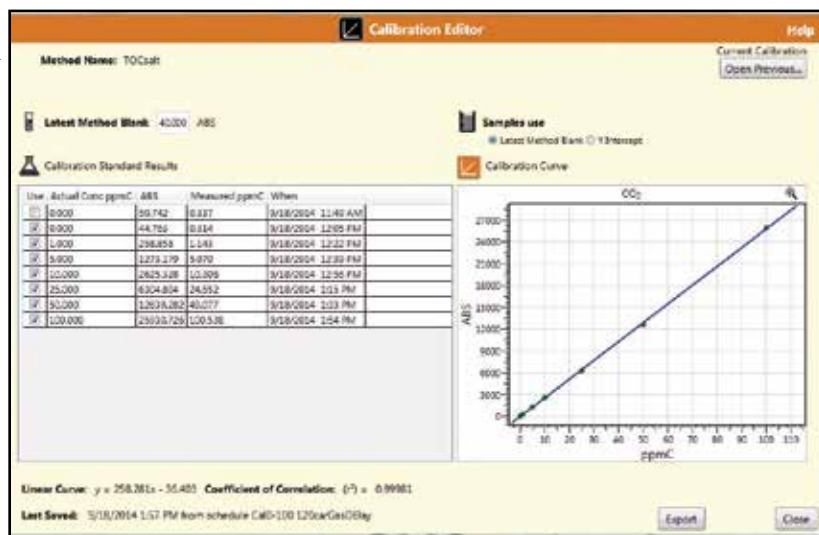


### Schedule Creation Should be Quick and Painless

- Calibration and Sample Schedule Screens are logically organized around essential scheduling functions.
- Prioritize samples by editing a schedule while running.
- Real-time results are shown on both the Calibration and Sample Schedule Screens and the Report Screen.
- Requires <1 minute to set up calibration curve.

### Editing Calibration Curves Should Be a Easy

- Flexibility to select between the latest method blank or y-intercept when running the sample schedule.
- Manually input the blank ABS value.
- Open saved calibrations for review and reuse.



### Little Extras Make A Big Difference

- Automatic shutdown/standby of temperature and gas results in cost savings!
- Automatic corrective actions (outlier deletion) in response to exceeded %RSD, standard deviation, and failed check standards.
- Auto-export of reports to a default printer, CSV or the ability to print on demand to PDF format.

# Lotix Specifications

<b>Chemistry:</b>	Oxidation by Catalytic Combustion: From 680 °C - 1000 °C
<b>TOC Detector:</b>	Non-Dispersive Infrared (NDIR) Detector
<b>TOC Analytical Modes:</b>	TOC (NPOC), TC-IC, TC, IC
<b>TOC Analytical:</b>	<p>Concentration range 0-20,000 ppm without dilution using a single 0.5 mL sample injection. Higher concentrations achievable with dilution prior to analysis.</p> <p>Limit of Detection: 50 ppb</p> <p>Carryover: ≤ 1.0% Cross Contamination</p> <p>Sample Size: 0.5 mL (0.3 mL for high concentration, difficult or salt samples)</p> <p>Precision*: ≤ 2% RSD, typical of a mid-range standard.</p> <p>* Analytical performance is affected by laboratory water, reagent and gas purity, sample container cleanliness, sample matrix, gas regulator cleanliness, precision and operator skill.</p> <p>** %RSD Area, as opposed to %CV, calculates precision after blank subtraction. This yields a lower precision measurement, but improves sensitivity and accuracy.</p>
<b>TOC Analysis Time:</b>	13-15 minutes typical for triplicate TOC analysis
<b>Carrier Gas Handling:</b>	Integrated pressure regulator with in-line flow restrictors to maintain carrier gas at 200 mL/min
<b>Liquid Handling:</b>	<p>Pressurized sample delivery and liquid handling</p> <p>Solenoid actuated micro-pump precisely delivers acid for IC removal/analysis in 50 µL increments +/-5%</p> <p>Self-cleaning sample handling process that cleans sample pathway before and after every sample</p>
<b>Sample Introduction:</b>	Integrated 30-position autosampler
<b>Controller:</b>	PC, Interface through Windows® 7 or greater
<b>Data Handling:</b>	<p>Reports exportable to CSV and PDF format</p> <p>Importing from CSV file</p> <p>Real time viewing and printing of analytical results while instrument is running</p> <p>Ability to store customized individual test methods</p> <p>Priority samples via schedule interrupt</p> <p>Outlier deletions and precision performance criteria controls</p>
<b>Other Features:</b>	<p>Pre-programmed point and click method set-up</p> <p>Instrument condition light</p> <p>Automatic and configurable standby mode</p> <p>Simple design ensures access to internal components in minutes</p> <p>Combustion tube can be accessed from the front of the instrument in minutes</p> <p>Autorinsing from sample and/or rinse water via built-in rinse station</p>
<b>Principal Applications:</b>	Wastewater, Industrial Waste Effluent, Surface Water, Ground Water, Sea Water
<b>Methods:</b>	Standard Method 5310B, EPA 415.1, EPA 9060A, ASTM D2579, ISO 8245, AOAC 973.47
<b>Certification:</b>	CE (CSA site certified if required)
<b>TOC Utility Requirements:</b>	Universal Voltage: 100/115/230 VAC (±10%), Frequency: 50/60 Hz, Power: 1150 VA
<b>TOC Dimensions:</b>	<p>18.2" W (46.2 cm) x 23.7" D (60.2 cm) x 26.3" (66.8 cm) H (Lotix only)</p> <p>Weight 53 lbs (24 kg) (Lotix only)</p>
<b>TOC Gas Supply:</b>	<p>Hydrocarbon and Carbon Dioxide (CO<sub>2</sub>) free air with (greater than 18% oxygen) TOC content &lt;1 ppm or UHP O<sub>2</sub>. Gas can be supplied from a cylinder or TOC gas generator. If a TOC gas generator is used, resulting gas must be hydrocarbon and water free.</p> <p>To assure clean carrier gas is used, we suggest employing a complete CO<sub>2</sub> removal system and hydrocarbon trap between the gas source and analytical instrument. Ultra-zero air or Oxygen may be used.</p>
<b>TOC Gas Inlet Pressure:</b>	50 to 100 psi

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