

[Hach₂O] Your formula for water analysis.



**99.7%
Uptime!**

Hach BioTector[®] Online TOC Analyzers

**TOC, COD,
BOD with TN
and TP options**



Be Right[™]

Maximum Uptime and Reliability: Any Application, Any Condition

Hach BioTector B7000 TOC Analyzers

A patented self-cleaning oxidation technology enables BioTector analyzers to easily handle difficult samples and significantly reduce the maintenance schedule and costs associated with traditional on-line measurement. BioTector analyzers eliminate build up issues from salts, particulates, fats, oils and greases that lead to drift and high maintenance.

With reliable, continuous environmental monitoring and real-time process control, BioTector analyzers allow plants to optimize processes by decreasing chemical dosing, minimizing waste, reducing sample processes, and lowering overall plant operating costs. For over 15 years, BioTector products have proven to be the most advanced in their class, achieving precise results from the simplest to the most demanding applications.

- **Superior Reliability—Typically 99.7% uptime**
- **High Dependability—Patented two-stage advanced oxidation (TSAO) technology handles even the most challenging applications**
- **Smart Design—Self-cleaning technology and oversized tubing eliminates filtration and prevents clogging and sample contamination**



Technology Comparison

How does your TOC analyzer measure up? Hach BioTector Analyzers outperform traditional technologies for superior performance.

	Hach BioTector Two-Stage Advanced Oxidation (TSAO)	Thermal	UV Persulfate
Calcium and salt	Causes no impact with chlorides up to 30% and calcium up to 12%.	Leads to analyzer failure due to collection of un-oxidized particulates in the furnace.	Reduces persulfate oxidation potential with concentration as low as 0.05%.
Algae growth	Does not impact the analyzer due to automatic self-cleaning feature.	Collects in the sample system, leading to plugging.	
Microfilters and pre-filter systems	Eliminates the need for filtering due to 3.2 mm sample tubes which handle up to 2 mm particulates. (See photo at right.)	Requires filtering to prevent plugging of very small sample tubes (0.5 mm) and microsyringes.	Requires filtering to prevent plugging of very small sample tubes and micro-slider valves.
Oils, fats and greases	Self cleans in approximately 12-24 minutes.	Must shut down analyzer to clean and maintain regularly.	Loses measurement for approximately 12-24 hours.
Measurement drifts	Allows a 6-month calibration interval due to TSAO method and high quality build.	Requires calibration every 2-3 days due to furnace buildup and IR bench contamination.	Requires calibration every 2-3 days due to UV light source scaling that causes incomplete oxidation and drift.
Automatic self-cleaning capability	Includes automatic self-cleaning of the reactor and sample system with every reaction.	Not available. Requires analyzer to be offline for 1 hour for manual cleaning.	



Principles of Operation

Sampling

A representative unfiltered sample from the stream to be measured is pumped into the analyzer. The sample injection valve automatically selects the appropriate sample volume for the optimum measuring range.

TIC

Acid is added to lower the pH so that inorganic carbon is sparged off as CO₂. This is measured to ensure Total Inorganic Carbon (TIC) is not carried over into the TOC.

Oxidation

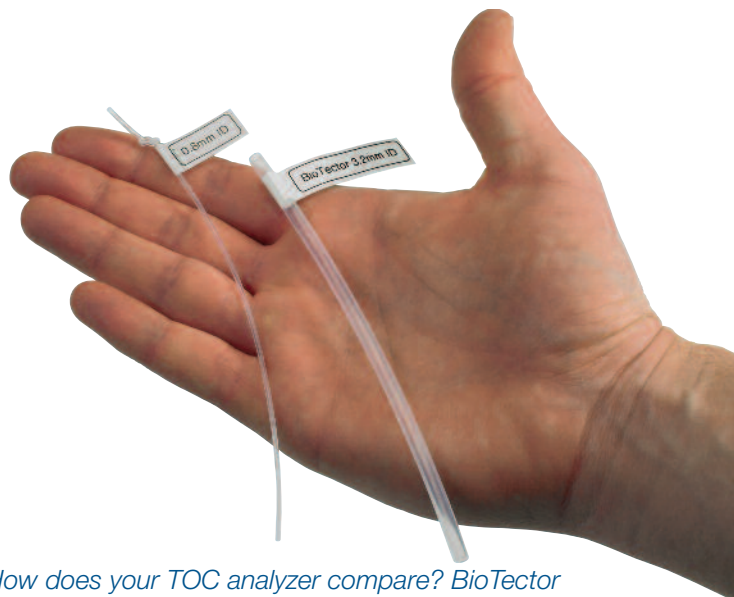
BioTector's patented oxidation method (TSAO) achieves total and complete oxidation of the sample, including organic carbon to CO₂, nitrogen compounds to nitrate and phosphorous compounds to phosphate. TSAO utilizes hydroxyl radicals generated within the analyzer by combining oxygen, which passes through the ozone generator, with sodium hydroxide.

TOC

To remove CO₂ from the oxidized sample, the pH of the sample is lowered again. The CO₂ is sparged and measured by the specially developed NDIR CO₂ analyzer. The result is displayed as Total Organic Carbon (TOC).

COD, BOD

BioTector can also be configured to display Chemical Oxygen Demand (COD) or Biochemical Oxygen Demand (BOD) measurements after correlation against standard laboratory methods. Algorithms are applied to Total Organic Carbon, nitrogen and phosphorus results to calculate COD/BOD.



How does your TOC analyzer compare? BioTector (shown at right) uses larger tubing to prevent plugging or fouling.

OPTIONAL MEASUREMENTS

Consider these additional parameters to enhance your process control.

TN

When TOC analysis is complete, the oxidized sample fluid is brought from the reactor into the measuring cell. Here the photometer analyzes the wavelengths applicable to nitrates. The result is displayed as Total Nitrogen (TN).

TP_R

When TOC analysis is complete the oxidized sample is mixed with the TP (Total Phosphorus) reagent. The reaction produces a vanadomolybdophosphoric acid complex which is then brought to the TP measuring cell. Here the photometer analyzes the wavelengths applicable to phosphates. The result is displayed as Total Reactive and Organic Phosphorus (TP_R).

TP

For applications with significant condensed phosphate concentrations, an acid hydrolysis process is required to arrive at the TP (Total Phosphorus) result. The oxidized sample fluid is placed into the TP boiler where it undergoes an acid boiling at 100°C for 15 minutes. This process breaks down the condensed phosphate compounds into reactive phosphates. The hydrolyzed sample is mixed with the TP reagent. The reaction produces a vanadomolybdophosphoric acid complex which is then brought to the TP measuring cell. Here the photometer analyzes the wavelengths applicable to phosphates. The result is displayed as TP.

VOC

In BioTector systems configured to measure Volatile Organic Carbon (VOC), the analysis involves a combination of TC analysis followed by a TIC & TOC analysis in a single reactor configuration. The VOC result obtained represents the Purgeable Organic Carbon (POC) content of the sample. Available results from a VOC configured BioTector are: TIC, TOC (NPOC + POC), TC and VOC.

TC

In BioTector systems configured to measure TC, Two-Stage Advanced Oxidation is carried out without the TIC stage, thus preventing the loss of volatile material. The TC result obtained represents the sum of TIC, Non-Purgeable Organic Carbon (NPOC) and Purgeable Organic Carbon (POC) content. The result is displayed as Total Carbon (TC).

TC-TIC

In BioTector systems configured to measure TOC as TC-TIC, TC and TIC analyses are carried out simultaneously in a dual reactor configuration. The TOC result, which represents the sum of NPOC and POC content of the sample, is calculated from the difference between the measured TC and the measured TIC.



Specifications

Standard Features

	TOC	TN	TP
Measurement Terms	Total Organic Carbon including: <ul style="list-style-type: none"> • Non Purgeable Organic Carbon (NPOC) and Purgeable Organic Carbon (POC) BioTector's TOC mode measures NPOC BioTector's TOC/VOC mode measures NPOC and POC	Total bound nitrogen measuring the sum of: <ul style="list-style-type: none"> • Bound (organic and inorganic) Nitrogen • Ammonium Nitrogen (NH₄-N) • Nitrate Nitrogen (NO₃-N) • Nitrite Nitrogen (NO₂-N) 	Total Phosphorous measuring the sum of: <ul style="list-style-type: none"> • Ortho-Phosphate (PO₄-P) • Bound (organic and inorganic) phosphorus compounds • Polyphosphates • Other reactive phosphate molecules (PO₂-P, PO₃-P, etc.) • Other phosphorus compounds, e.g. phosphonates, phosphinates, etc.
Oxidation Method	Patented Two-Stage Advanced Oxidation Process (TSAO) using hydroxyl radicals		
Measurement	Infrared Measurement of CO ₂ after Oxidation	Direct spectrophotometric measurement of nitrate after oxidation	Colorimetric measurement of phosphate after oxidation using Standard vanadomolybdophosphoric acid Method
Range Selection	Automatic or manual		
Automatic Range Selection	3 ranges configurable within each range band detailed below:		
Low	0-5 mgC/L up to 0-1,250 mgC/L	0-5 mgN/L up to 0-1,250 mgN/L	0-5 mgP/L up to 0-1,250 mgP/L
Standard	0-10 mgC/L up to 0-10,000 mgC/L	0-10 mgN/L up to 0-10,000 mgN/L	0-10 mgP/L up to 0-10,000 mgP/L
High	0-15 mgC/L up to 0-15,000 mgC/L	0-15 mgN/L up to 0-15,000 mgN/L	0-15 mgP/L up to 0-15,000 mgP/L
Ultra-high	0-20 mgC/L up to 0-100,000 mgC/L	0-20 mgN/L up to 0-100,000 mgN/L	0-20 mgN/L up to 0-100,000 mgN/L
Range Combination	Wide TOC, TN and TP range combinations are available.		
Standard Output	4 - 20mA		
Digital Output	2 potential free contacts, programmable 1 potential free fault contact, programmable	1 potential free fault contact, programmable 1 potential free contacts, programmable	
Serial Port	RS232 output for printer or data logger		
Display	High-contrast 40-character x 16-line backlit LCD with CFL backlight		
Repeatability	±3% of reading or 0.3mg whichever is greater, with automatic range selection (multi-range) feature		
Cycle Time (Typical)	TOC: < 6.5 minutes	TOC TN: 7 minutes TOC, TN, TP _R : 8 minutes	TP: 25 minutes
Sample Volume	Up to 8.0 mL		
Particle Size	Up to 2 mm Ø, soft particulates		
Filtration Requirements	Not required		
Signal Drift	< 5% per year		
Sample Flow Rate:	Minimum 100 mL per sample		
Sample Inlet Temperature:	2 to 60°C (36 to 140°F)		
Ambient Temperature	5 to 40 °C (41 to 104°F) Air conditioning option available		
Humidity	5-85%, non-condensing		



Specifications *(continued)*

	TOC	TN	TP
Chloride Tolerance	Up to 30% all ranges	Up to 30% (range dependent)	Up to 30% (range dependent)
Exceedance Tracking	Full exceedance tracking to maximum range		
Data Storage	Previous 5000 Reaction Data Previous 50 Fault Events		
SD Flash Card	Allows easy software and configuration updates		
Operation	Microcontroller with membrane keyboard		
Language Options	English, French, German, Dutch, Spanish, Swedish		
Enclosure	Fiberglass-reinforced polyester		
Dimensions (HxWxD)	1250 x 750 x 320 mm 49.21 x 29.53 x 12.60 in.	1500 x 750 x 320 mm 59.06 x 29.53 x 12.60 in.	1250 x 750 x 320 mm 49.21 x 29.53 x 12.60 in.
Weight	90 kg 198.42 lbs.	110 kg 242.51 lbs.	110 kg 242.51 lbs.
Power	230 Vac, 50 Hz or 115 Vac, 60 Hz Consumption: 300 W		
Service	6-month intervals		

Optional Features

Output	TIC, TC, VOC, BOD, COD	TIC, TC, VOC, BOD, COD	TP _R , TIC, TC, VOC, BOD, COD
Remote Pause Signal	Input for remote pause		
Industrial Interface	Modbus®, PROFIBUS, Ethernet Modbus is a registered trademark of Gould Inc.		
Valves	Automatic calibration and manual sample		
Multi-Stream	Up to 6 streams		Up to 3 streams (TN + TP models only)
Manual Sample	Up to 6 manual sample input points		Up to 3 manual sample input points (TN + TP models only)
EExp / Hazardous Location	ATEX and ETL certification available		
Outdoor Model	Integrated outdoor version to IP54		





Ordering Information

Please contact your local Hach representative to configure a TOC analyzer for your application.

Hach BioTector B7000 Base Models

See your representative for assistance with additional configuration options.

BTAA0CAXXH	TOC Analyzer, Plus Model
BTAE0HAXXH	TOC/TN Analyzer, Plus Model
BTBF0HAXXH	TOC/TP Analyzer, Plus Model- Polyphosphorus
BTBG0HAXXH	TOC/TN/TP Analyzer, Plus Model- Polyphosphorus
BTBJ0HAXXH	TOC/TP Analyzer, Plus Model- Phosphorus
BTBK0HAXXH	TOC/TN/TP Analyzer, Plus Model- Phosphorus

Consumables

2985462	Acid Reagent w/Catalyst, 4-8 weeks typical replacement frequency
2985562	Base Reagent, 4-8 weeks typical replacement frequency
27362	Deionized (DI) Water, 4-8 weeks typical replacement frequency, 5 gallons
2985662	TN Cleaning Solution, 10-12 weeks typical replacement frequency
2986162	Total Phosphorus Reagent, 18-20 weeks typical replacement frequency

Vacuum Samplers

Bring water samples to the analyzer over a horizontal distance of 131 feet (40 meters) and a vertical distance of 20 feet (6 meters) at ambient pressure. Can also be used as a gravity filtration system whereby sand and other hard particles settle in the sampling chamber before the BioTector takes its sample.



Vacuum Sampler

19-PCS-009	Single Output
19-PCS-010	Hot Water Wash

Venturi Driven Vacuum Sampler

19-PCS-016	With air and wash water. Requires a minimum air pressure of 3.5 bar (6.6m lift)
19-PCS-019	With composite sample output, with air and wash water. Requires a minimum air pressure of 3.5 bar (6.6m lift)



Oxygen Concentrator

Produces highly concentrated oxygen on demand. Connects to an instrument air supply and uses Pressure Swing Adsorption (PSA) to separate oxygen from its air supply and release nitrogen through a waste gas silencer.

19-OGS-101	115V 60Hz. Requires instrument air-20°C dew point and oil free
19-OGS-102	230V 50Hz. Requires instrument air- 20°C dew point and oil free



Oxygen Concentrator with Compressor

A self-contained system designed to produce highly concentrated oxygen. Capable of delivering enough oxygen flow to drive two BioTector TOC analyzers. All with integrated compressor.

12-AIR-001	115V 60Hz
12-AIR-002	230V 50Hz
12-AIR-003	230V 60Hz



Enclosure and Other Options

Protects the analyzer and accessories from environmental challenges. A variety of options available, including air conditioning, heating, interior and exterior lighting and alarm functionality. Contact Hach for additional details.

Warranty

Up to 12 months warranty against manufacturing defects. All parts becoming unserviceable within 12 months from commissioning but not later than 18 months from shipment, due to poor materials and/or faulty fabrication or shop assembly, will be replaced free of charge by sending the necessary parts freight paid on carriage-paid receipt of the parts. The guarantee does not cover wear parts.



Be Right™

Hach BioTector Online TOC Analyzers

- **Superior Reliability**
Typically 99.7% uptime
- **High Dependability**
Patented two-stage advanced oxidation (TSAO) technology handles even the most challenging applications involving fats, oils, greases, salts, sludge, and particulates
- **Smart Design**
Self-cleaning technology and oversized tubing eliminates filtration and prevents clogging and sample contamination
- **Minimal Maintenance**
No calibration or maintenance required between 6-month service intervals
- **Low Cost of Ownership**
Provides a quick pay back with cost savings in chemical dosing, waste reduction, and optimized processes

For more information, visit www.hach.com/BioTector or call toll-free 866-450-4248.

HACH COMPANY World Headquarters
P.O. Box 389
Loveland, Colorado 80539-0389 U.S.A.
Telephone: 970-669-3050
Fax: 970-669-2932
E-mail: orders@hach.com

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