BioTector

BioTector
TOC, TN & TP ON-LINE ANALYZER

PRODUCT FEATURES AND BENEFITS

- NEW BioTector Network Control Unit. Giving remote access to multiple analyzers (Optional Module).
- Low Maintenance - No Calibration required between 6 month service intervals
- High Reliability - Typically 99.86% Uptime
- Self Cleaning Technology - Prevents clogging & sample contamination
- Clean & Dirty water analysis (including fats, oils & greases)
- Can handle chlorides up to 30% and calcium sludge up to 12% w/w
- No filtration
- Complete Oxidation of Representative Sample using Patented Two-Stage Advanced Oxidation (TSAO) Technology
- Multi Range with automatic selection
- Single or Multi-Stream Option
- Measured Components: TOC, TN, TP, COD, BOD, TC, TIC, VOC
- Very Low Cost of Ownership
- Guaranteed to handle the most demanding applications

APPLICATIONS

- Determining the total biodegradable load of influent to industrial and municipal waste treatment plants from organic carbon, nitrogen & phosphorus
- Optimizing and controlling waste treatment plant performance
- Real On-Line COD measurement calculated from organic carbon, nitrogen & phosphorus loads
- Monitoring final effluent
- Increasing compliance with regulatory requirements
- Monitoring municipal waste treatment plants – influent and effluent
- Monitoring Process Breakthrough and Spills
- Monitoring river water
- Monitoring surface water
- Special Applications

BioTector liquid analyzers are specifically developed for continuous analysis in the harsh on-line environment. Biotector's patented self-cleaning oxidation technology (TSAO) has overcome the traditional problems associated with on-line measurement and can reliably measure samples containing salts, particulates, fats, oils and greases.
BioTector products are regarded by major international users as the most reliable on-line liquid analyzers on the market. Since 1995, BioTector products have proven their ability on a wide variety of clean and dirty applications throughout the world.

MEASUREMENT PROCESS

TOC MEASUREMENT: A representative sample from the stream to be measured is pumped into the analyzer. Acid is added to lower the pH so that inorganic carbon is sparged off as CO_2 and measured to ensure Total Inorganic Carbon (TIC) is not carried over into the Total Organic Carbon (TOC) measurements. The BioTector's patented oxidation method (TSAO) is used to achieve total and complete oxidation of sample, including organic carbon to CO_2, nitrogen compounds to nitrate and phosphorus compounds to phosphate. TSAO utilizes hydroxyl radicals generated within the analyzer by combining oxygen, which passes through the ozone generator, with sodium hydroxide. To remove the CO_2 from the oxidized sample, the pH of the sample is lowered again. The CO_2 is sparged and measured by the specially developed NDIR-detector. The result is displayed as TOC.

TN MEASUREMENT: When TOC analysis is complete, the oxidized sample liquid 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 MEASUREMENT: When TOC analysis is complete, while the TN measurement is taking place, the oxidised sample liquid undergoes an acid boiling at 100°C (hydrolysis). The hydrolysis process breaks down the long chain condensed phosphates, such as polyphosphates and metaphosphates, into ortho-phosphates. The hydrolised sample liquid is mixed with the Vanadate-Molybdate Reagent to react and produce a yellow-colored acidic compound. The photometer then analyses this sample at the wavelengths applicable to ortho-phosphates. The result is displayed as Total Phosphorus (TP).

CLEANING: The entire system is automatically self-cleaned by the reaction process during every cycle.

MAINTENANCE

Normal service frequency is 6 months. Ready made service kits are available for the 6-month and 12-month service.

GENERAL INFORMATION

Designed to withstand corrosive environments, the BioTector TOC TN TP Analyzer is housed in a FRP enclosure with dual compartments to keep all electronic components separate from the "wet" or analysis section. The BioTector TOC TN TP Analyzer has an in-built microcontroller and is operated through a membrane keypad. An SD/MMC Card allows easy software and configuration updates, downloading of the data from the microcontroller and storage of reaction data for the lifetime of the analyzer.

ALSO AVAILABLE FROM BIOTECTOR ANALYTICAL SYSTEMS LIMITED

*NEW BioTector System-C Online TOC Analyzer for Clean Water Applications **

*BioTector Ultra Low TOC On-Line Analyzer **

*BioTector TOC On-Line Analyzer **

*BioTector TOC & TN On-Line Analyzer **

BioTector Sampler

* Also utilizing BioTector's Patented Two-Stage Advanced Oxidation (TSAO). See separate brochures or website for further details.

GENERAL TECHNICAL DATA

Enclosure:	Fibreglass Reinforced Polyester
Standard Dimensions:	1500 x 750 x 320mm (HxWxD)
Weight:	90kg - 120kg
Power Consumption:	300 W (VA)
Mains Connection:	115V AC, 60Hz or 230V AC, 50Hz (± 10%) Other power options available upon request

FEATURES IN DETAIL

Display:	High Contrast 40 Character x 16 Line Backlit LCD with CFL Backlight
Data Storage:	Storage of reaction data for the lifetime of the analyzer in the SD/MMC Card. 9,999 reaction events stored in the microcontroller memory.
SD/MMC Card:	Flash Memory Card, Allowing Easy Data Transfer, Software and Configuration Updates
Operation:	Microcontroller with Membrane Keyboard
Language Options:	Multiple Languages Available

INPUT & OUTPUT SIGNALS

Standard Output:	4-20mA, 1 included (typically for TOC) Option for a maximum of 6 output signals Output Multiplex option is available for up to 35 output signals
Digital Output:	2 Freely Programmable System Relays 1 System Fault Relay
Data Transfer Port:	SD/MMC Card and Serial RS232 Output for Printer, PC or Data Logger

OPTIONAL FEATURES

Result Output:	TIC, TC, VOC, TN, TP, after correlation COD, BOD
Remote Control:	Hardwire Control for: Remote Start/Standby Remote Stream & Range Selection Remote Manual Sample Analysis
Industrial Interface:	Modbus, Profibus, Ethernet
Network:	For remote access over Internet or Intranet connection using HTTP over TCP/IP protocol
Valves:	For Automatic Calibration and Sample Line Cleaning
Multi-Stream:	Up to 3 Streams
Manual Sample:	Up to 3 Manual Grab Sample Input Points
EExp/Z Purge:	Certification options are available to EU Standards (ATEX, Zone 2) and to North American Standards (Class 1, Div 2) . Other options available on request.

CONSUMABLES

Acid & Base:	Replacement Frequency - Application Dependent Typically 3-10 weeks/25 Liters (application dependent)
Deionised Water:	5-10 weeks/10 Liters (application dependent)
TN Cleaning Solution:	15-30 weeks/10 Liters (application dependent)
TP Reagent:	6-12 weeks/10 Liters (application dependent)
HCl Acid:	6-12 weeks/10 Liters (application dependent)
Oxygen:	Average consumption is 22L/hour (367 ml/min) Integrated and External Oxygen Concentrator Options Available
Service:	6 Monthly Intervals

ANALYSIS PARAMETERS

Oxidation Method:	Patented Two-Stage Advanced Oxidation Process using Hydroxyl Radicals
TOC Measurement:	NDIR measurement of CO_2 after oxidation
TN Measurement:	Direct Photometric Analysis of Nitrate after oxidation
TP Measurement:	Colorimetric analysis of Phosphate with Standard Vanadomolybdophosphoricacid Method after oxidation
Measured Components:	TOC (NPOC) TOC (NPOC + POC) TIC TC VOC (POC) TOC as TC-TIC TN TP COD* BOD*

*COD & BOD by correlation algorithm incorporating TOC, TN and/or TP results

Cycle Time:	TOC, TN, TP - Typically 10 minutes
Filtration Requirements:	Not required
Signal Drift:	<5% per year (Automatic Calibration not required)
Chloride Tolerance:	TOC - Up to 30% all ranges TN - Up to 30% (range dependent) TP - Up to 30% (range dependent)

MEASUREMENT TERMS

TOC: Total Organic Carbon including Non-Purgeable Organic Carbon (NPOC) and Purgeable Organic Carbon (POC)
BioTector's TIC & TOC mode measures NPOC
BioTector's VOC mode measures TOC as NPOC + POC

TN: Total Nitrogen (Total Bound Nitrogen) measuring the sum of:
- Organic Nitrogen
- Inorganic Nitrogen
- Ammonium Nitrogen (NH_4-N)
- Nitrate Nitrogen (NO_3-N)
- Nitrite Nitrogen (NO_2-N)

TP: Total Phosphorus measuring the sum of:
- Organic Phosphorus
- Inorganic Phosphorus
- Ortho-Phosphate (PO_4-P)
- Polyphosphates, Metaphosphates, Pyrophosphates
- Other reactive Phosphate molecules (PO_2-P, PO_3-P etc.)
- Other Phosphorus compounds, e.g. Phosphonates, Phosphinates, etc.

SAMPLE & ENVIRONMENTAL CONDITIONS

Sample Volume:	Up to 8.0 ml
Sample Inlet Pressure:	Typically ambient (for applications with high sample pressure, sampling systems are available)
Drain Pressure:	Typically ambient (for applications with high drain pressure, optional systems are available)
Sample Inlet Temperature:	2°C – 60°C (36°F – 140°F)
Sample Flow Rate:	Minimum 100ml per sample
Sample Particle Size:	Up to 2mm, soft particulates
Ambient Temperature:	5°C – 40°C (41°F – 104°F) Air conditioning and heating options available
Humidity:	5% - 85%, non-condensing
Ingress Protection:	IP44. Optional IP54 with air purge
System Sound:	<60 dBA

TOC TN TP MONITORING RANGES

Automatic Range Selection – 3 Ranges Configurable for each component within each range band detailed below

Standard Range	0-10mg/l up to 0-20,000mg/l
Ultra High Range	0-10mg/l up to 0-40,000mg/l
Repeatability:	TOC: ± 3% of reading or ± 0.3mg/l whichever is greater, with Automatic Range Selection (Multi Range) feature TN & TP: ± 3% of reading or ± 0.2mg/l whichever is greater, with Automatic Range Selection (Multi Range) feature
Range Combination:	Wide combination of TOC, TN & TP monitoring ranges, including higher ranges, are available on request
Exceedence Tracking:	Full Exceedence Tracking to Maximum Range
Range Selection:	Automatic or Manual
Detection Limit:	0.6mg/l TOC with Automatic Range Selection 0.4mg/l TN with Automatic Range Selection 0.4mg/l TP with Automatic Range Selection

ACCREDITATION

BioTector TOC analysis complies with the following standards:
- DIN-EN1484
- US EPA 415.1
- ASTM D5173: 97(2007) Standard Test Method for On-line Monitoring of Carbon Compounds in Water by Chemical Oxidation, by UV Light Oxidation, by both, or by High Temperature Combustion followed by Gas Phase NDIR or by Electrolytic Conductivity
- DIN 38409-H3
- ISO 8245

BioTector TN analysis complies with the following standard:
- Standard Method 4500-NO3 B (after oxidation)

BioTector TP analysis complies with the following standards:
- Standard Method 4500-P C (after oxidation)
- DIN 38405-D11-1 (after oxidation)

FROST & SULLIVAN 2012 BEST PRACTICES AWARD
UNITED STATES WATER AND WASTEWATER ANALYTICAL INSTRUMENTATION PRODUCT LEADERSHIP AWARD

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12 month warranty with all BioTector Online Analyzers. BioTector Analytical Systems Limited have a continuous research and development programme. Specifications may therefore be changed without notice. For specification updates, please contact BioTector Analytical Systems Limited.

www.biotector.com