



## TOC TN TP

COMBINED MEASUREMENT  
PROVIDES EXCELLENT  
BOD COD  
RELATIONSHIP

## TOC, TN TP, COD, BOD

THE OXIDATION PROCESS  
THAT TOTALLY  
SELF-CLEANS

### PRODUCT FEATURES AND BENEFITS

- Low Maintenance - No Calibration required between 6 month service intervals
- High Reliability - Typically 99.7% 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% by volume
- No filtering requirements
- 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, OOP, 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 & phosphorous
- Optimizing and controlling waste treatment plant performance
- Real On-Line COD measurement calculated from organic carbon, nitrogen & phosphorous loads
- Monitoring final effluent
- Increasing compliance with regulatory requirements
- Monitoring municipal waste treatment plants – influent and effluent
- Monitoring river water
- Monitoring surface water
- Monitoring Process Breakthrough and Spills
- 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. Over the past 15 years BioTector products have proven their ability on the simplest to the most demanding 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<sub>2</sub> and measured to ensure TIC is not carried over into the TOC measurements. The BioTector's patented oxidation method (TSAO) is used to achieve total and complete oxidation of sample, including organic carbon to CO<sub>2</sub>, 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. To remove the CO<sub>2</sub> from the oxidized sample, the pH of the sample is lowered again. The CO<sub>2</sub> is sparged and measured by the specially developed NDIR-detector. The result is displayed as Total Organic Carbon (TOC).

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

**OOP MEASUREMENT:** When both TOC and TN analysis are complete, the sample fluid is reacted with a Vanadate-Molybdate reagent at 70°C to produce an acidic compound. The spectrophotometer then analyzes this sample at the wavelengths applicable to ortho-phosphates. The result is displayed as Oxidized and Ortho-Phosphorus (OOP). For applications without any polyphosphates, the OOP is equal to TP.

**TP MEASUREMENT:** For applications with significant polyphosphate concentrations, a further step is required to arrive at the TP result. The sample fluid undergoes an acid boiling at 100°C for 20 minutes, breaking down the polyphosphate bonds into ortho-phosphates. The result is displayed as Total Phosphorus (TP), which is measured using the procedure described above for OOP analysis.

**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 TOCTNTP 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 Flash Card allows easy software & configuration updates and may be used to download the 5,000 event archive.

## BIOTECTOR PLUS

---

BioTector is also available in a Plus model with a Hastelloy Reactor. With this Plus model, BioTector Analytical Systems offers a 6 month satisfaction guarantee regardless of application or stream content.

## ALSO AVAILABLE FROM BIOTECTOR ANALYTICAL SYSTEMS LIMITED

---

*BioTector Ultra Low TOC On-Line Analyzer \**

*BioTector TOC On-Line Analyzer \**

*BioTector TOC & TN On-Line Analyzer \**

*BioTector Vacuum Sampler*

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

---







## GENERAL TECHNICAL DATA

<b>Enclosure:</b>	Fibreglass Reinforced Polyester
<b>Dimensions (HxWxD):</b>	1500 x 750 x 320mm
<b>Weight:</b>	110 kg
<b>Power Consumption:</b>	300 W
<b>Mains Connection:</b>	230V or 115V AC

## FEATURES IN DETAIL

<b>Display:</b>	High Contrast 40 Character x 16 Line Backlit LCD with CFL Backlight
<b>Data Storage:</b>	Previous 5000 Reaction Data Previous 50 Fault Events
<b>SD Flash Card:</b>	Allowing Easy Software & Configuration Updates
<b>Operation:</b>	Microcontroller with Membrane Keyboard
<b>Language Options:</b>	Multiple Languages Available

## INPUT & OUTPUT SIGNALS

<b>Standard Output:</b>	4 - 20mA for TOC, TN & TP
<b>Digital Output:</b>	1 Potential Free Contact, Programmable 1 Potential Free Fault Contact, Programmable
<b>Serial Port:</b>	RS232 Output for Printer or Data Logger

## OPTIONAL FEATURES

<b>Output:</b>	OOP, TIC, TC, VOC, BOD, COD (As individual signals or full multiplex)
<b>Remote Pause Signal:</b>	Input for Remote Pause
<b>Industrial Interface:</b>	Modbus, Profibus, Ethernet
<b>Valves:</b>	Automatic Calibration and Manual Sample
<b>Multi-Stream:</b>	Up to 3 Streams
<b>Manual Sample:</b>	Up to 3 Manual Sample Input Points
<b>EExp:</b>	Certified Option Available
<b>Outdoor Model:</b>	Integrated Outdoor Version to IP54

## CONSUMABLES

<b>Acid &amp; Base:</b>	Replacement Frequency – Application Dependent (Typically 4 – 8 weeks)
<b>DI Water:</b>	4-8 weeks
<b>TN Cleaning Solution:</b>	10-12 weeks
<b>TP Reagent:</b>	18 -20 weeks
<b>Oxygen:</b>	Integrated or Stand Alone Oxygen Concentrator Available
<b>Service:</b>	6 Monthly Intervals



## ANALYSIS PARAMETERS

<b>Oxidation Method:</b>	Patented Two-Stage Advanced Oxidation Process using Hydroxyl Radicals	
<b>TOC Measurement:</b>	Infrared measurement of CO <sub>2</sub> after oxidation	
<b>TN Measurement:</b>	Direct Spectrophotometric Measurement of Nitrate after oxidation	
<b>TP Measurement:</b>	Colorimetric Measurement of Phosphate after oxidation using Standard Vanadomolybdophosphoricacid Method	
<b>Measured Components:</b>	TOC TIC TC VOC / POC TOC as TC-TIC	TN TP OOP COD* BOD*

\* Algorithms applied to the Total Organic, Nitrogen & Phosphorous results to calculate COD/BOD

<b>Cycle Time:</b>	TOC, TN, OOP - Typically 8 minutes TP - Typically 25 minutes
--------------------	---

<b>Sample Volume:</b>	Up to 8.0 ml
<b>Particle Size:</b>	Up to 2mm Ø, soft particulates
<b>Filtration Requirements:</b>	Not required
<b>Signal Drift:</b>	< 5% per year
<b>Ambient Temperature:</b>	5 - 40°C Air Conditioning Option Available
<b>Humidity:</b>	5 - 85%, non-condensing
<b>Chloride Tolerance:</b>	TOC - Up to 30% all ranges TN - Up to 30% (range dependent) TP & OOP - Up to 30% (range dependent)

## RANGES

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

	<i>TOC Range Band</i>	<i>TN Range Band</i>	<i>TP Range Band</i>
<b>Low</b>	0-5mgC/l up to 0-1,250mgC/l	0-5mgN/l up to 0-1,250mgN/l	0-5mgP/l up to 0-1,250mgP/l
<b>Standard</b>	0-10mgC/l up to 0-10,000mgC/l	0-10mgN/l up to 0-10,000mgN/l	0-10mgP/l up to 0-10,000mgP/l
<b>High</b>	0-15mgC/l up to 0-15,000mgC/l	0-15mgN/l up to 0-15,000mgN/l	0-15mgP/l up to 0-15,000mgP/l
<b>Ultra High</b>	0-20mgC/l up to 0-100,000mgC/l	0-20mgN/l up to 0-100,000mgN/l	0-20mgP/l up to 0-100,000mgP/l
<b>Repeatability:</b>	+/- 3% of reading or 0.3mg whichever is greater, with automatic range selection (Multi Range) feature		
<b>Range Combination:</b>	Wide TOC, TN & TP range combinations are available. Please contact manufacturer for details		
<b>Exceedence Tracking:</b>	Full Exceedence Tracking to Maximum Range		
<b>Range Selection:</b>	Automatic or Manual		

## MEASUREMENT TERMS

**TN:** Total Bound Nitrogen measuring the sum of:

- Bound (organic and inorganic) Nitrogen
- Ammonium Nitrogen (NH<sub>4</sub>-N)
- Nitrate Nitrogen (NO<sub>3</sub>-N)
- Nitrite Nitrogen (NO<sub>2</sub>-N)

**TP:** Total Phosphorous measuring the sum of:

- Ortho-Phosphate (PO<sub>4</sub>-P)
- Bound (organic and inorganic) phosphorus compounds
- Polyphosphates
- Other reactive phosphate molecules (PO<sub>2</sub>-P, PO<sub>3</sub>-P etc.)
- Other phosphorus compounds, e.g. phosphonates, phosphinates, etc.

*BioTector On-Line Analyzers come with up to 12 months warranty against manufacturing errors.*

*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.*

**BioTector**  
ANALYTICAL SYSTEMS LIMITED



*For more information on any of our products please visit our website or contact us at:*

BioTector Analytical Systems Limited,  
Raffeen House, Ringaskiddy, County Cork, Ireland.  
Telephone: (Intl) +353 21 437 4237  
Facsimile: (Intl) +353 21 437 4236  
Email: info@biotector.com