

Features

- TOC-True } or {
- NPOC
- Microsoft Windows Touch Screen Computer
- Digital Injection
- 2 Alarm Levels
1 Master Fault Alarm
- 4-20 mA Outputs
- RS-232C Output
- Separate Electronics & Liquid Compartments
- Powder Coated Steel

Options

- Stainless Steel Enclosure
- Dual NDIR Analyzers
- Correlated BOD/COD
- Benchmark/Auto Validation
- Auto-Cal/Auto-Clean
- Automatic Multi-Range
- Multi-Stream Analysis
- RS-485 output
- Network Ready

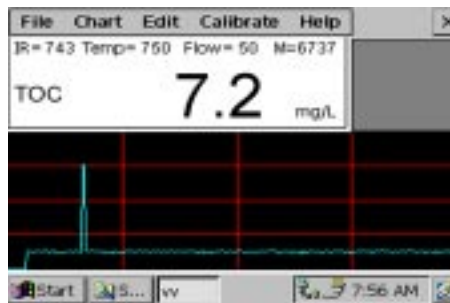
ON - LINE HIGH TEMPERATURE COMBUSTION



-CHOICE OF PLATFORMS-



Microprocessor



**Windows CE Computer
with Touch Screen Control**



- Interactive Menus

- Touch Screen
- VGA Color
- Network Ready
- Paperless Chart Recorder
- PCMCIA Slot
- Solid State Data Storage

Description

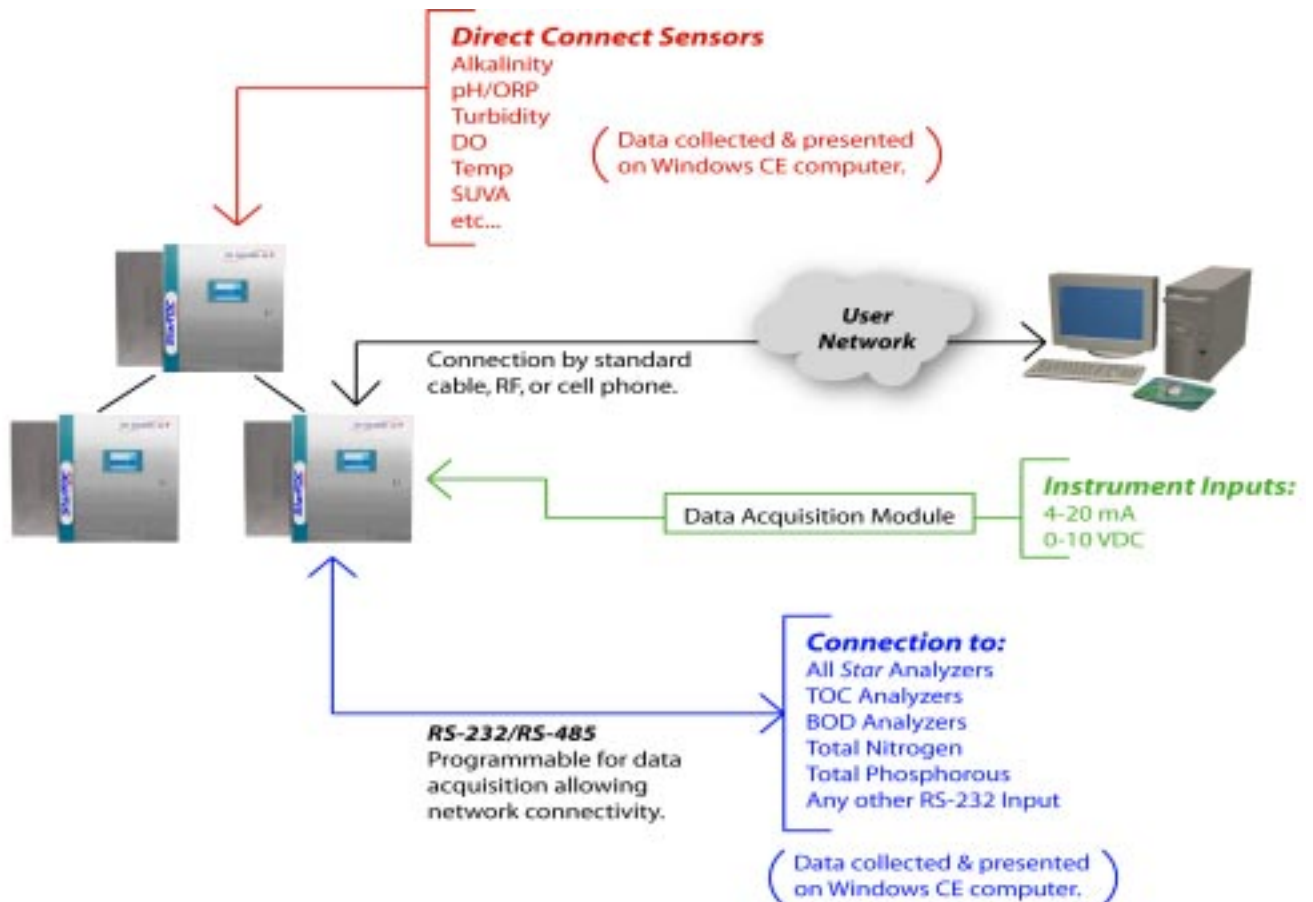
TOC Systems, Inc. uniquely offers all methods of TOC analysis* and recommends [High Temperature Combustion](#) as the method of choice for certain applications.

Only the StarTOC analyzers offer the features and reliability of operation associated with its team's pioneering experience in TOC analysis since 1969**.

Because we offer a full line of High Temperature Combustion, UV/Heated Persulfate, Ozone Promoted and Ultra-Pure TOC Analyzers, we are able to offer you objective, unbiased advice and can therefore fully commit our total resources to providing you the best possible installation.

Network Enabled

Utilization of an onboard Windows CE computer allows direct networking. Central control of analyzer operation and data management are easily facilitated.



Preferred Applications

Excellent TOC accuracy from parts-per-billion to moderate concentration levels of salt-free samples, with minimum maintenance.

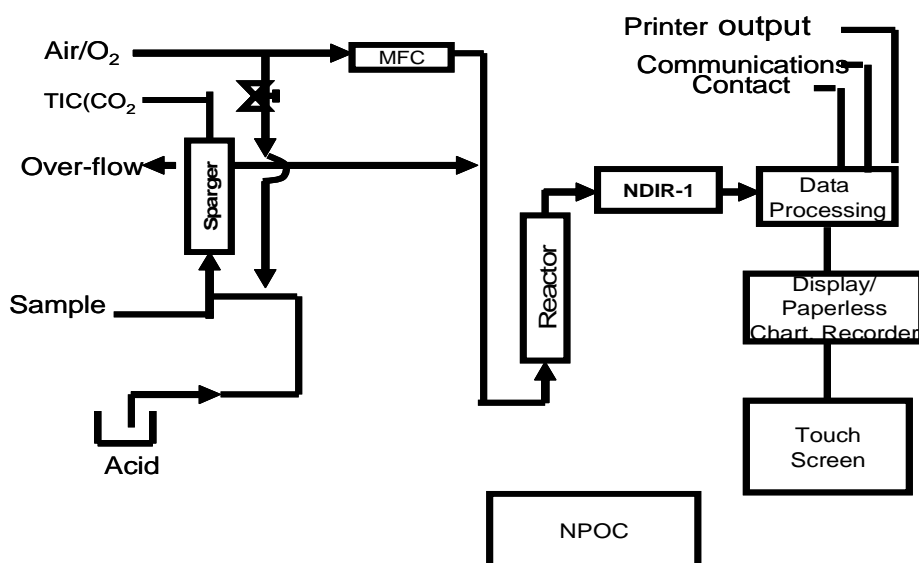
Standard Method 5310 C/D
EPA 415.1
EPA 9060
ASTM D 4839-88
ASTM D 4779-88

Wastewater
Heavy Particulated Liquids
Difficult to Oxidize Samples
Process Streams
Oil in Water

Regulatory Compliance Guaranteed

* Visit our website to view our entire family of TOC analyzers.

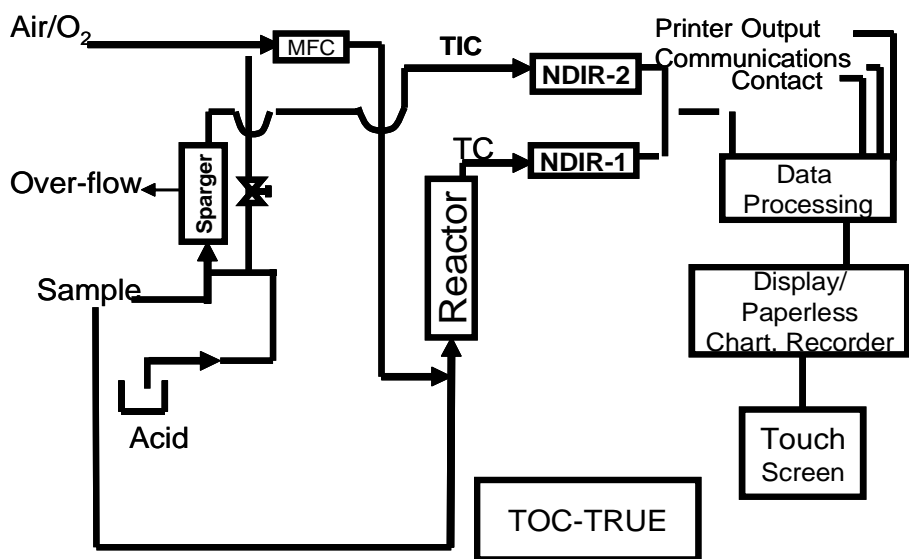
⁽²⁾ "The Pitfalls of Process TOC Analysis and How to Avoid Them"
(1999 Instrument Society of America Tutorial)



NPOC Analysis

“NPOC” (Non-Purgeable Organic Carbon) mode is preferred for accuracy when no volatile organics are in the sample. The Digital Injector delivers the sample to the sparger, where it is mixed with acid to lower its pH to approximately 2.0. At this pH, the inorganic carbon in the sample is converted to dissolved CO₂ and is stripped (sparged) from the sample by air/O₂ and vented to atmosphere, along with any purgeable/volatile organics. The carbonate-

free sample is drawn from the sparger by the Digital Injector and delivered to the Reactor, where the remaining NPOC is oxidized to CO₂, which is measured by the NDIR (Non-Dispersive Infrared Analyzer) as a direct correlation of NPOC in the sample. **NPOC is often erroneously reported as “TOC”.**



TOC-True Analysis

TOC-True mode is the preferred method of use if any volatile hydrocarbons are present in the sample, which would be lost in the Inorganic Carbon removal sparging stage in an “NPOC” analysis. The TOC-True method measures both TC (Total Carbon) and TIC (Total Inorganic Carbon) for a more accurate and complete analysis of the total organics in the sample, including the purgeable/volatile organic carbon. By subtracting the TIC from the Total Carbon in the sample,

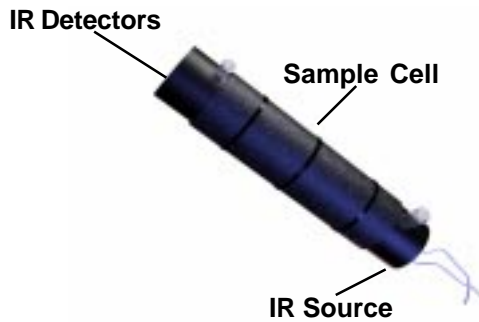
all species of organic carbon are measured, not just the NPOC.

Benchmark/Auto-Validation

Benchmark⁽²⁾ is the validation technique, whereby on command a chemical calibration standard is automatically introduced to the analyzer and the response is compared to the previous analyzer calibration. If the response falls within a certain specified limit, the computer/output indicates “Benchmark Passed”. If the response falls outside specified performance limits, either a “Maintenance Request” or a “Fault” alarm is activated, depending on preset tolerances. Thus, in cases of process spills, when the analyzer performance is questioned, Benchmark can rapidly and automatically validate analyzer performance. It eliminates time consuming and unnecessary recalibration cycles, which take the analyzer out of service just when it is most critically needed. Benchmark may be on-demand, or operator programmed for designated day and time activation on a repetitive basis.

Auto-Cal and Auto-Clean utilities are also available.

NDIR (The key component for reliable TOC analysis.)



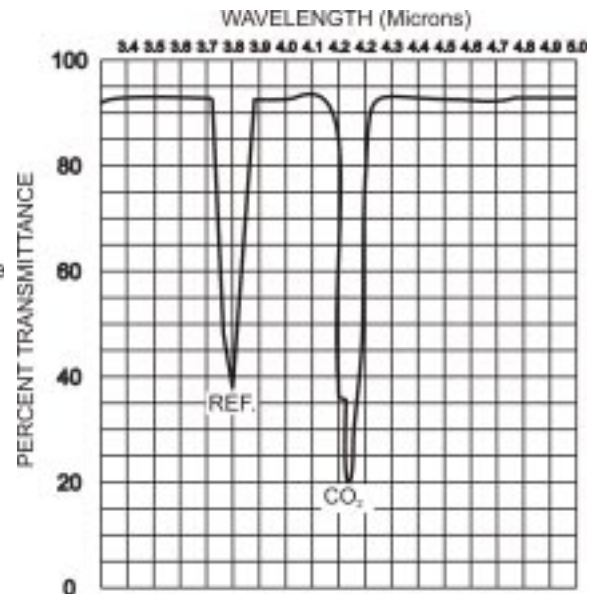
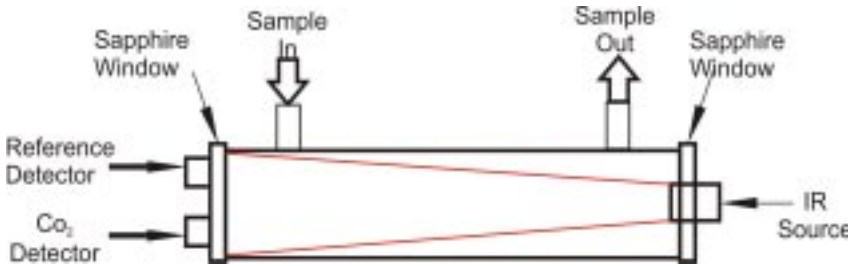
- Specific, Interference-Free CO₂ Detection
- Dual-Wavelength Ratioing Compensates for Drift
- Computer-Controlled for Accuracy
- Sapphire Protected Optics
- Non Corrosive, Non-Reflective Sample Cell (Borosilicate)

- No Moving Parts or tools required for Easy Maintenance and Service
- No Critical Realignment Required



Detection Technique

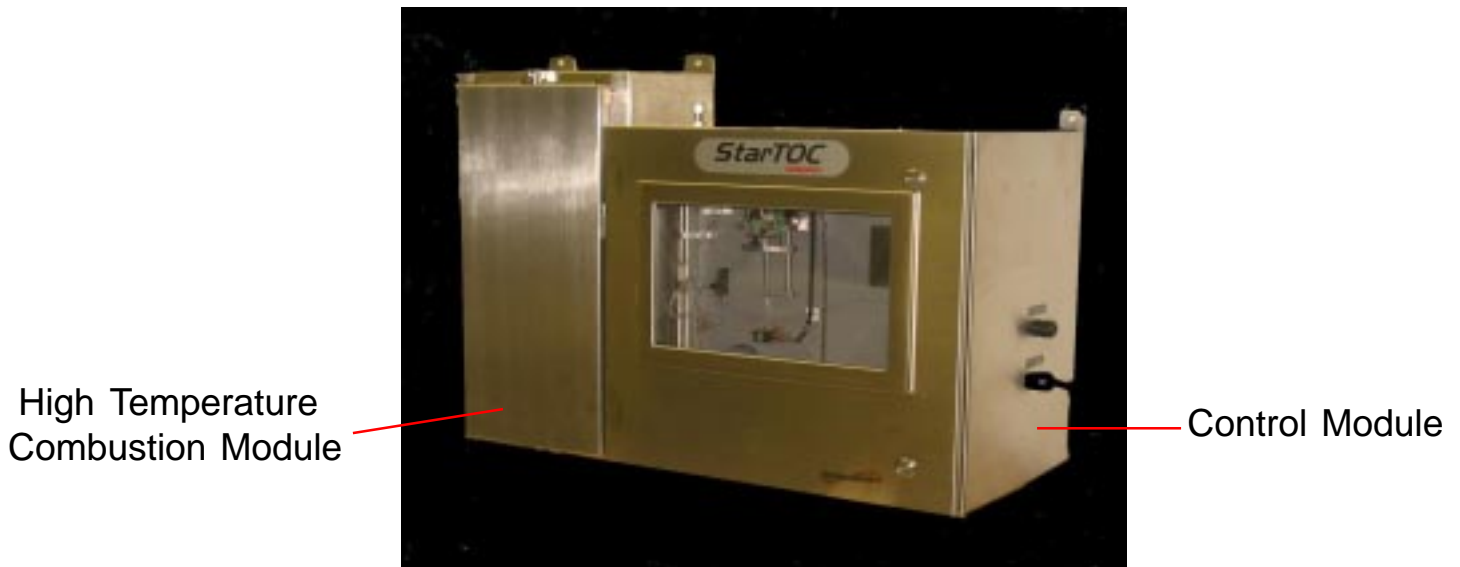
The NDIR CO₂ detector uses a solid-state, dual-wavelength system with a single borosilicate glass sample cell that requires no wall reflectivity. There is a reference and a CO₂ specific detector in the sample path. Use of the true zero filter eliminates water vapor interference and the requirement for chemically removing acid gases prior to detection. An infrared source is cycled on and off to avoid mechanical choppers required in alternate NDIRs. The StarTOC NDIR has **no moving parts**.



Automatic gain control (AGC) is employed during the reference/sample cycle to compensate for such factors as NDIR source deterioration, dirty optical windows, and detector gain changes. When the AGC level reaches a predetermined threshold, the output alerts the Operator to check the NDIR. Malfunctions of major NDIR components are detected as an alarm, providing fail-safe operation. Signal detection is completely synchronous and, because of the differential technique of ratioing the Zero and CO₂ outputs, zero drift is virtually eliminated. All critical optics are protected by sapphire windows. The sample cell can be easily removed and the windows cleaned within 15 minutes, without realignment or the use of any tools.

This absolute measuring, dual-line spectra comparison NDIR provides simple, direct measurement of all CO₂ contributing factors (including background) for a true and accurate calibration and precisely offsets these effects for very accurate TOC determinations. The consequences of water vapor interferences in low-level precision TOC analysis are avoided.

POWDER COATED STEEL ENCLOSURE



Stainless Steel (option)

Specifications

Nominal at 25°C. Subject to custom application requirements.

Measuring Range (Std.)	0-100 ppm through 0-20,000 ppm without dilution
Repeatability	+/- 2% of Full Scale
Drift	Compensated, self-calibrated NDIR (+/- 2% non-accumulative)
Response Time T₉₀	From 6 minutes, depending on range
Analog Outputs	4-20 mA (1 each per Stream)
Relay Outputs	2 TOC adjustable level alarms 1 master fault alarm
Computer/Display	Microsoft Windows CE Touch Screen Computer: Color VGA Display, Solid-State Data Storage, Paperless Chart Recorder, PCMCIA Slot, Network-Ready & Optional RS-485 Or Modbus
Power Supply	110/220 VAC 10 Amp service recommended
Enclosure	Powder Coated Steel or Stainless Steel
Dimensions (HxWxD)	61x81x41 (cm) 24x32x16 (in)
Weight	34 Kg. 75 Lbs.
<small>The analysis range and precision are affected by sample introduction, sample homogeneity, sample container cleanliness, reagent purity, chemical standards preparations, gas purity and operator skill.</small>	

Installation Requirements

The StarTOC™ On-Line High Temperature Combustion model can handle suspended solids up to 1,000 microns without filtration, thus providing a truly representative sample.

TOC Systems, Inc. furnishes recommended installation drawings. The user must provide the following:

1. Electrical Source (110/220 VAC 10 Amp service with cutoff switch)
2. Sample flow of a minimum of 10 ml /minute. A fast bypass loop is recommended.
3. Gravity fed drain with air break.
4. A source of CO₂-free air, or oxygen with a maximum flow rate of 300 cc/minute at 15 psig.

(Optional Star Oxygen Generator requires electricity only.)

Purchase Specifications

The Analyzer shall use the EPA, ASTM and Standard Approved Methods for TOC analysis. It shall utilize the High Temperature Combustion method capable of either catalytic or non-catalytic oxidation. An onboard Windows CE Computer shall be used to control all analyzer functions automatically and be configured with a touch screen, paperless chart recorder and be network-ready. It shall store time/date stamped historical data records up to one (1) year. CO₂ detection shall be by a solid-state, single path length non-dispersive infrared analyzer (NDIR), having no moving parts. It shall be self-calibrated and interference-free. A computer controlled Mass Flow Controller shall be used to provide maximum analytic stability and reliability of results. The Analyzer shall be housed in a (specify: epoxy powder coated painted steel, or FRP, or stainless) enclosure to avoid corrosion and have separate compartments for liquid handling and electrical systems. The Analyzer shall be a TOC Systems, Inc. Star TOC High Temperature Combustion Analyzer, suitable for the on-line designated application.

Ordering Information

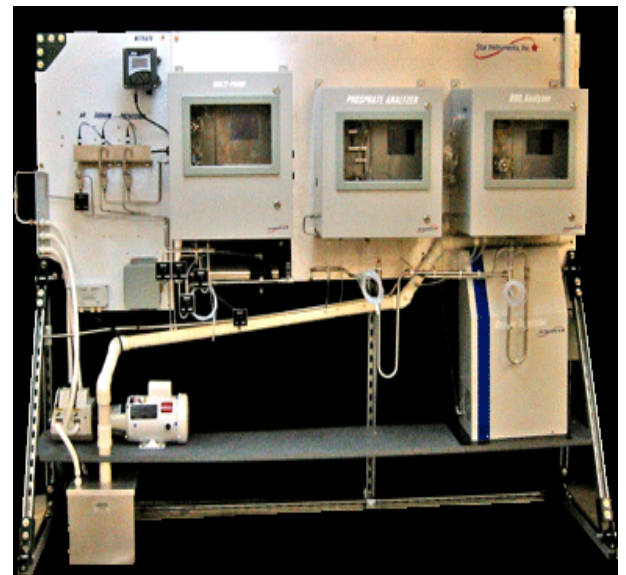
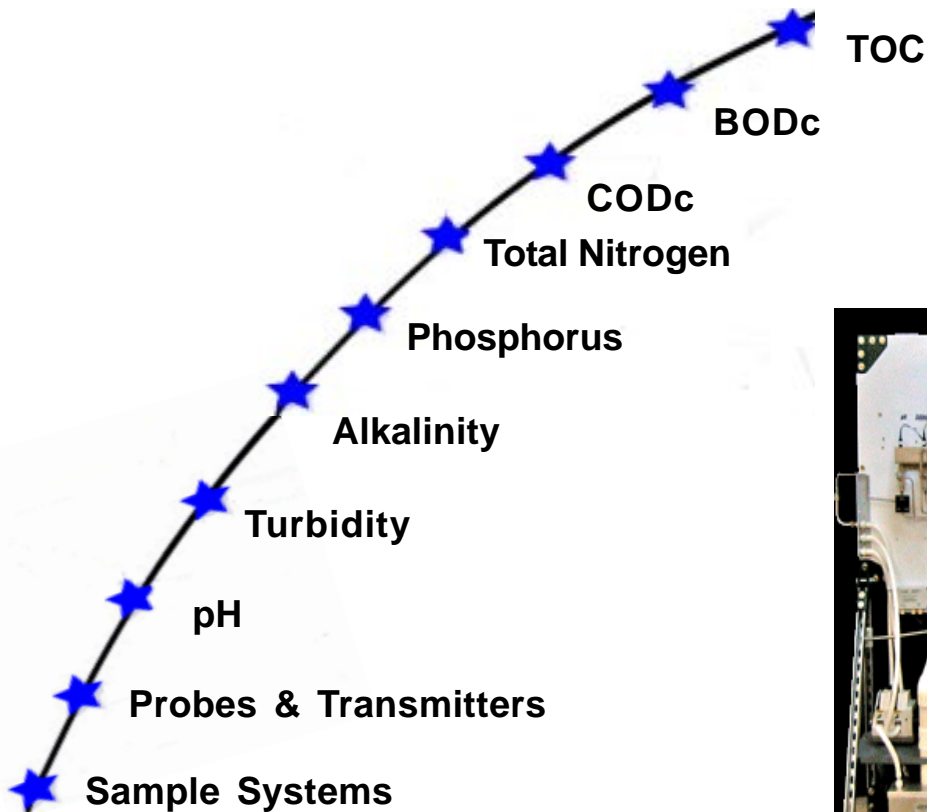
Description	Specify Configuration
Microsoft Windows-CE Computer based, Single Stream Analyzer, Benchmark, Auto-Calibrate, Auto-Clean, Paperless Chart Display, Historical Records Digitally Stored Up to One Year	
TOC Configuration	NPOC
TOC Configuration	TOC-TRUE
TC Configuration	TC
Multi-Stream Sequencer to Multiplex Up to 4 Streams, Std. (Requires Microsoft Windows Computer)	
2-Stream Sequencer with independent 4-20 mA	
3-Stream Sequencer with independent 4-20 mA	
4-Stream Sequencer with independent 4-20 mA	
<small>(¹) Microsoft is a Registered Trade Mark of Microsoft Corporation</small>	

We also Offer Complete, Turn-Key, Analyzer & Sample Systems

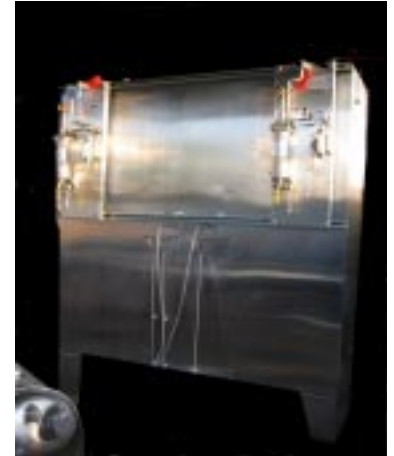
Pre-engineered and custom packages , including small shelters with all utilities installed and ready to be delivered to your site.



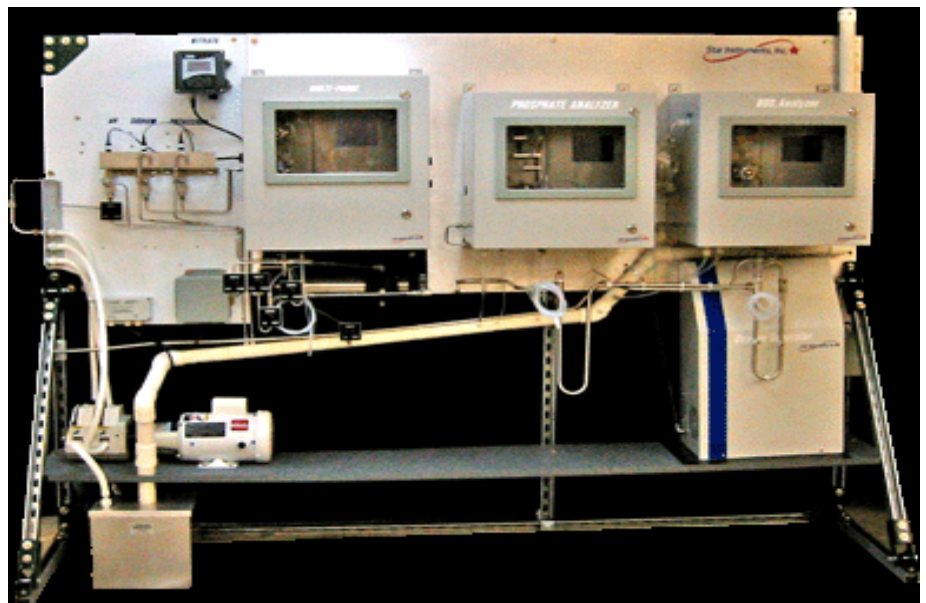
- **Effluent Monitoring**
- **Waste Treatment**
- **Drinking Water**
- **Process Monitoring**
- **Panels & Small Shelters**
- **Custom Packages**



SAMPLE SYSTEMS



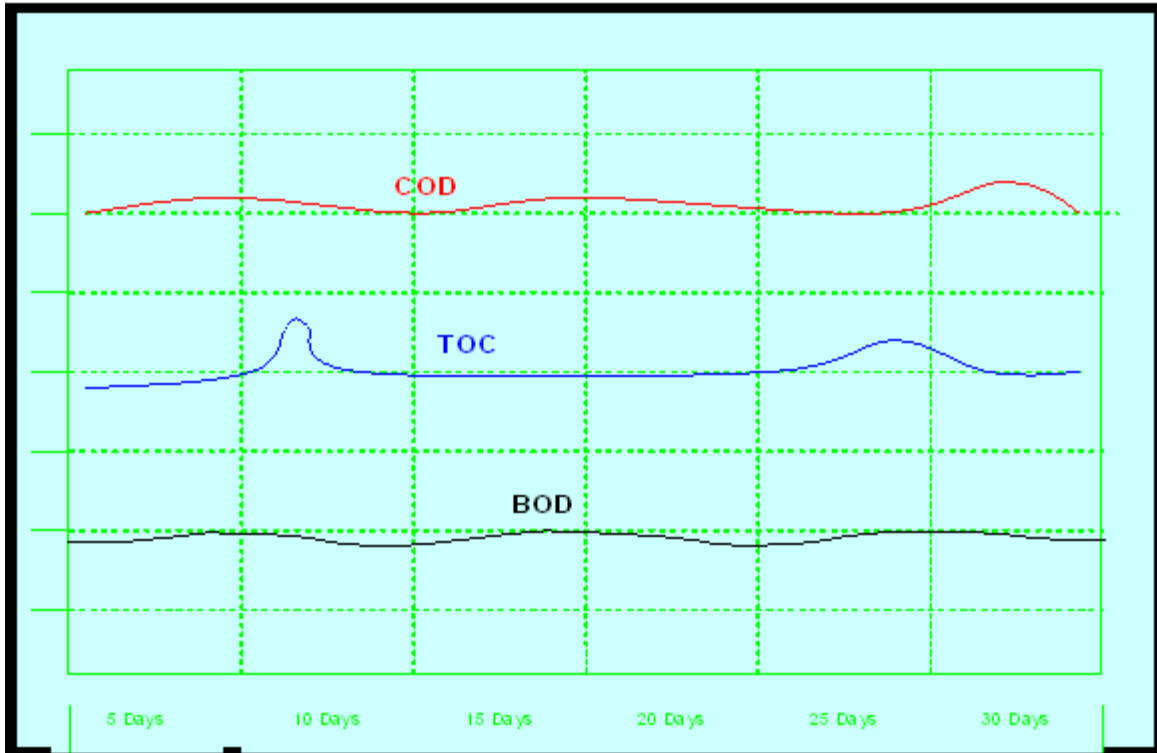
BASF PROJECT



CENTER FOR DISEASE CONTROL PROJECT

CORRELATED PROCESS COD/BOD

(option available for all StarTOC on-line models)

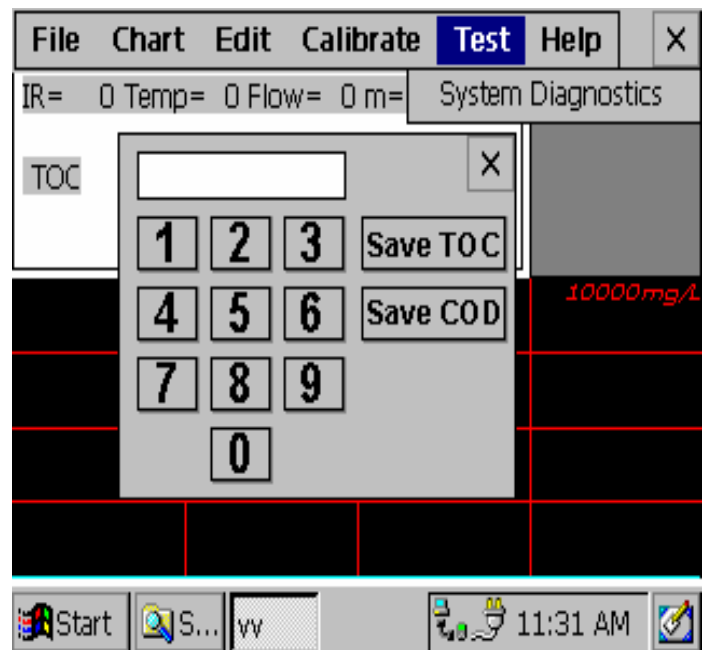


Benefits

- Excellent Correlation (Requires initial correlation of Lab analysis with “grab samples”).

Procedure

- Collect representative grab samples from analyzer & press “Save TOC” button.
- Send grab samples to lab for BOD or COD analysis.
- After receipt of lab analysis, enter BOD or COD analysis values as prompted by the Microsoft Windows CE Computer. This automatically correlates in time with the TOC measurement previously taken.



- Thereafter organic values are displayed in units of choice (BODc, CODc or TOC).

StarTOC™ Family of TOC Analyzers (Partial).

FOR THE LAB / BENCHTOP



Automatic



Semi-Automatic



Solids, Slurries, Liquids

FOR THE ON - LINE / PROCESS



- UV/ Persulfate
- Ultra-Pure



- Ozone / Hydroxyl Radical



- Total HC
- Oil-in-Water



- Combustion
- TOC/TN



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