

## Features

- Simultaneous TOC/TN Analysis
- With or without catalyst
- Rapid Response
- Microsoft Windows Touch Screen Computer
- 2 Alarm Levels  
1 Master Fault Alarm
- 4-20 mA Outputs
- RS-232C/485 Outputs
- Powder Coated Steel Enclosure
- Separate Electronics & Liquid Compartments

## Options

- Benchmark / Auto-Validation
- Auto-Cal / Auto-Clean
- Automatic Multi-Range
- Multi-Stream Analysis
- Network Ready
- Stainless Steel Enclosure
- NEMA 4X / IP66



High Temperature  
Oxidation

Total Nitrogen /  
Chemiluminescence  
Detection

Total Organic Carbon /  
NDIR Detection

## Description

Star Instruments, Inc. uniquely offers all methods of TOC analysis\* and recommends **High Temperature Oxidation** as the method of choice for simultaneous TOC & Total Nitrogen (TN) analysis. The basic analyzer is configured with an advanced Microsoft <sup>(1)</sup> Windows-based operating system.

Only Star offers the features and reliability of operation associated with its team's pioneering experience in TOC analysis since 1969.

For difficult or questionable streams, we invite you to send a sample for our complimentary analysis to verify the adequacy of this method. In return, we will provide a confidential report and recommendation for the best method for your application.

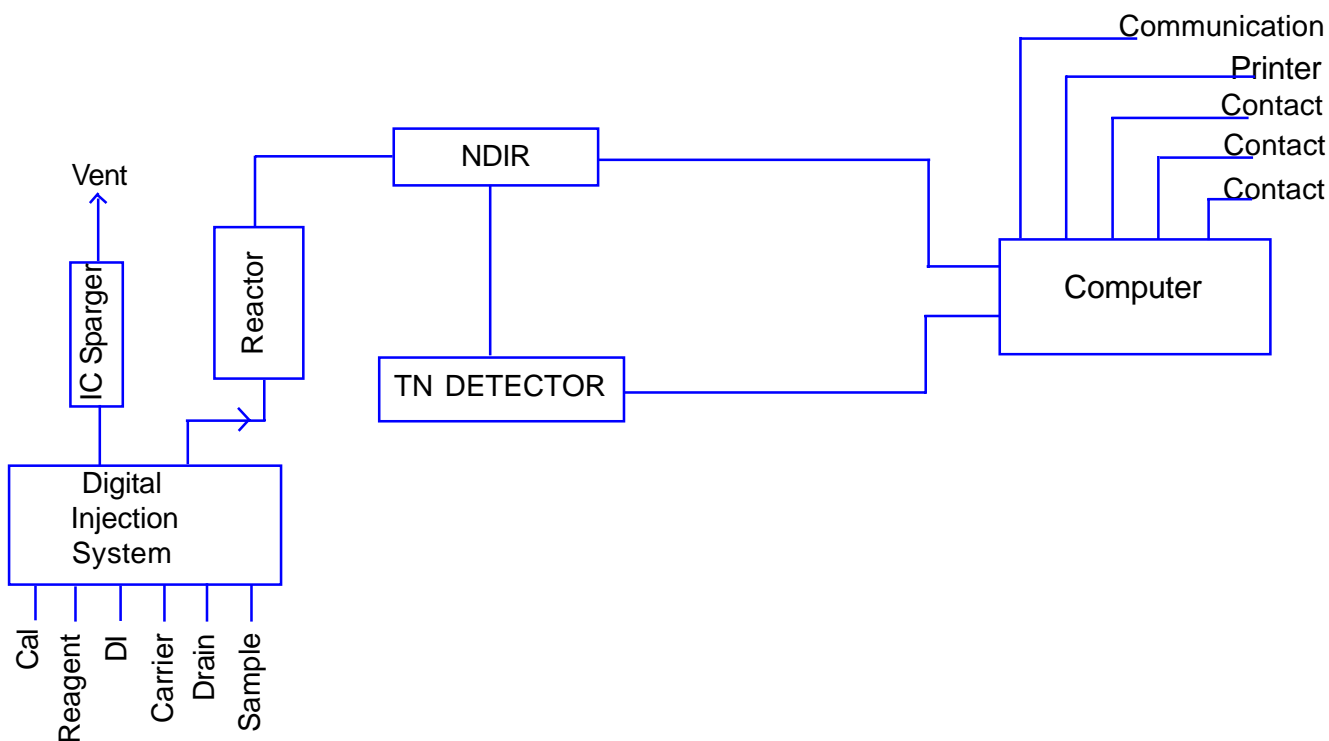
Because we offer a full line of High Temperature Combustion, UV/Heated Persulfate, Ozone Promoted and Ultra-Pure TOC Analyzers, we feel we are able to provide you objective, unbiased advice. We can therefore fully commit our total resources to providing our customers the best possible installation available.

\* Visit our website at [www.starinstruments.com](http://www.starinstruments.com) to view our entire family of analyzers.

\*\*Former Owners of Astro International Corporation

<sup>(1)</sup>Microsoft is a Registered Trade Mark of Microsoft Corporation

## Flow Diagram



## Analysis

For TOC analysis, the sample stream is automatically directed to the Inorganic Carbon Sparger, where it is mixed with an acid reagent. The pH of the solution is lowered to approximately 2, converting the inorganic carbon to  $\text{CO}_2$ , which is sparged out by the carrier gas.

The carbonate-free sample is then directed to the High Temperature Combustion Reactor, where remaining organic carbon is oxidized to  $\text{CO}_2$  and measured by the NDIR (Non-Dispersive Infrared Analyzer) as TOC. The nitrogen compounds are oxidized to NO and measured as Total Nitrogen by the Chemiluminescence Detector.

## Benchmark/Auto-Validation

Benchmark<sup>(2)</sup> is the European NAMUR specified 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.

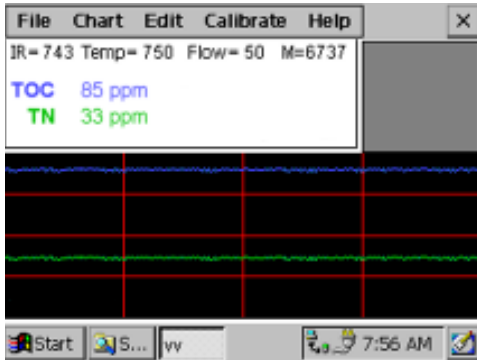
Auto-Cal and Auto-Clean utilities are also available.

<sup>(2)</sup>*The Pitfalls of Process TOC Analysis and How to Avoid Them* by John W. Small  
1999 Instrument Society of America Tutorial

# Advanced Technology, Today and Tomorrow

Star analyzers use Microsoft Windows CE <sup>(1)</sup> computer to ensure that you are always up-to-date with the latest technologies. By incorporating a modular software design, Star is capable of offering advanced options unavailable elsewhere.

## - Computer Platform -

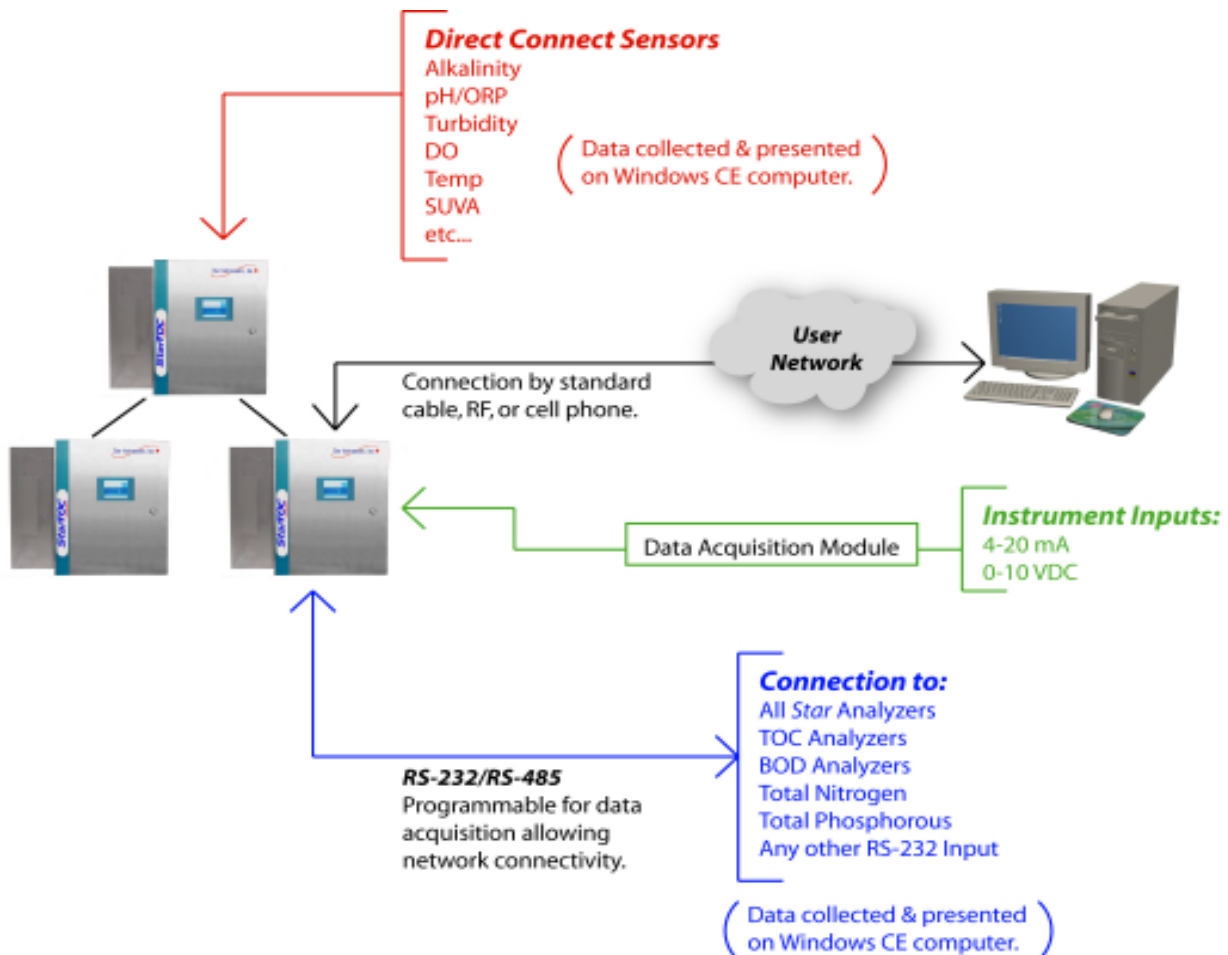


- Touch Screen
- VGA Color Display
- Network Ready
- Paperless Chart Recorder
- PCMCIA Slot
- Solid State Data Storage

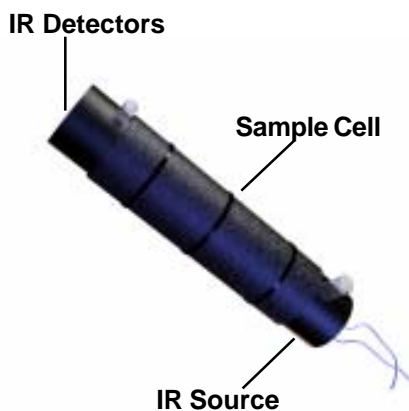
Windows CE Computer with Touch Screen Control

## Network Enabled

Star's utilization of an onboard Microsoft Windows CE computer allows direct networking. Central control of analyzer operation and data management are easily facilitated.



## ***NDIR (The key component for reliable TOC analysis.)***



- Specific Interference-Free CO<sub>2</sub> Detection
- Dual-Wavelength Ratioing Compensates for Drift
- Computer-Controlled for Accuracy
- Sapphire Protected Optics
- Non Corrosive, Non-Reflective Sample Cell (Borosilicate)



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

**“Unique with all Star TOC”  
5 Year Warranty on NDIR Sample Cell  
2 Year Warranty on Complete NDIR Bench**

## ***Chemiluminescence Detector***



- Robust chemiluminescence detector
- Very reliable
- Simple Maintenance
- No calibration

## ***Installation Requirements***

The StarTOC/TN™ Combustion model can oxidize suspended solids up to 1,000 microns without filtration, thus providing a truly representative sample.

Star furnishes recommended installation drawings. The user must provide the following:

1. *Electrical Source (110/220 VAC 1000 watt 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 CO<sub>2</sub>-free air or oxygen with a maximum flow rate of 300 cc/minute at 15 psig. (Optional Star Oxygen Generator requires electricity only.)*

## ***Start-Up Assistance***

Star's distribution network offers complete installation assistance and stocks ancillary items, such as valves, regulators, fittings, tubing, filters, etc...

# Specifications

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

<b>Measuring Range (Std)</b>	0-5 through 0-10,000 ppm TOC 0-1 ppm through 0-5,000 ppm TN
<b>Repeatability</b>	TOC: +/- 2% of Full Scale TN: +/- 4% of Full Scale (4 ppm or less)+/-2% full scale greater than 4ppm full scale.
<b>Drift</b>	Compensated, self-calibrated NDIR (+/- 2% non-accumulative)
<b>Response Time</b>	From 3 minutes, depending on application
<b>Analog Output</b>	2 each 4-20 mA
<b>Relay Outputs</b>	2 TOC adjustable level alarms 1 master fault alarm
<b>Display/Computer</b>	Microsoft Windows CE Touch Screen Computer; Color VGA Display, Solid-State Data Storage, Paperless Chart Recorder, PCMCIA Slot, Network-Ready, RS-485 Modbus
<b>Ambient Temperature</b>	0-40°C
<b>Power Supply</b>	110/220 VAC 10 Amp service recommended
<b>Enclosure/Construction</b>	Powder Coated Steel (Dual Cabinet), Indoor Mounting
<b>Input Signal</b>	Sample Measurement Start, Sample Measurement Stop, Calibration Start, Alarm Reset
<b>Benchmark/Auto Calibration/AutoClean</b>	1-2 Point Possible Option
<b>Multi-Stream Option</b>	Dual Stream optional sample switching
<b>Carrier Gas</b>	Air or Oxygen CO <sub>2</sub> Free
<b>Dimensions (HxWxD)</b>	114.3 x 50.8 x 38.1 (cm) 45 x 20 x 15 (in.)
<b>Weight</b>	68 Kg 150 Lbs.

## Ordering Information

<b>Description</b>	<b>Order number</b>
<b>Single Stream Analyzer, Manual Calibrate/Clean</b>	
TOC/TN Configuration	HTTNW
<b>Single Stream Analyzer, Benchmark, Auto-Calibrate, Auto-Clean, Paperless Chart Display, Historical Records Digitally Stored Up to One Year</b>	
TOC/TN Configuration (Only Available Maximum 2 Streams)	HTTNW-1
<b>Multi-Stream Sequencer to Multiplex Up to 2 Streams, Std.</b>	
2-Stream Sequencer	MSS-2
<b>NEMA 4X / IP66 Stainless Steel Enclosure (Optional)</b>	MFC-1

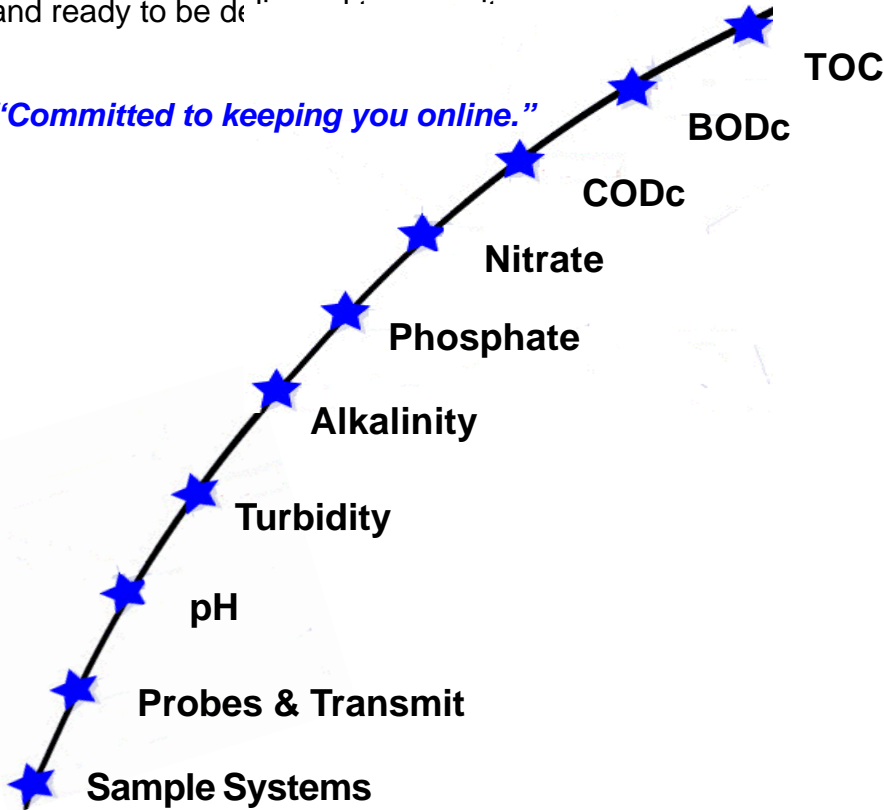
## Purchase Specifications

The Analyzer shall use the EPA, ASTM and Standard approved methods for TOC & TN analyses. It shall utilize a high temperature combustion principle, be temperature adjustable up to 950°C and provide sufficient oxidation by either catalytic or non-catalytic means. It shall utilize a pressure-fed Digital Injection System and have no peristaltic pumps. An onboard Microsoft 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 provide time/date stamped historical data records for up to one (1) year. CO<sub>2</sub> detection shall be by a solid-state non-dispersive infrared analyzer (NDIR), having no moving parts. The NDIR shall be self-calibrated and interference-free. Total Nitrogen analysis shall be by chemiluminescence detection. A computer controlled mass flow controller shall be used to provide maximum analytic stability and reliability of results. The Analyzer shall have separate compartments for liquid handling and electrical systems. The Analyzer shall be a Star Instruments, Inc. Model "StarTOC Online High Temperature Combustion TOC/TN" analyzer.

# Pre-Engineered Online System Packages and Enclosures

Star also provides pre-engineered and custom systems, including small shelters with all utilities installed and ready to be d

*"Committed to keeping you online."*



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## Offering Complete Analyzer & Sample Systems

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

