

IscoTOC Analyzer

Continuous On-line TOC Measurement— with Low Temperature Oxidation

Total Organic Carbon (TOC) measurement is increasingly accepted as an excellent overall indicator of water quality. TOC measurement is becoming the method of choice for continuous screening for organic compounds, without having to test for each substance individually.

Used to increase the efficiency of water/wastewater treatment, TOC analysis can reduce process costs in both industrial and municipal applications. Used as a warning of organic spills, TOC analysis can protect expensive processes and equipment.

The IscoTOC Analyzer is your solution for on-line, continuous TOC monitoring. It is easy to use, accurate, reliable, and suitable for a variety of applications. Features include:

- Easy programming
- High efficiency UV reactor
- Enhanced NDIR detector
- Flexible four-motor pump system
- Advanced dual calibration

Analysis methodology complies with EPA and ASTM standard methods for TOC determination, as well as ISO and CEN international standards.

The IscoTOC Analyzer can be configured for any maximum ranges between 10 and



10,000 mg/L. And if you're interested in total carbon (TC), IscoTOC can be easily configured for TC analysis. In addition to being a continuous on-line process analyzer, IscoTOC allows you to conveniently measure grab samples.

Exceptional Value and Versatility

More than 18 system parameters, including loss of flow and leak detection, are monitored on every IscoTOC Analyzer.

Other standard features include; automatic calibration and cleaning, and a built-in reagent timer that signals upcoming chemical requirements.

Components are easily accessible, making routine maintenance a snap. Up to eight programmable relays can provide a remote indication of system operation and report trouble conditions. A fail-safe feature prevents damage, should a malfunction occur.

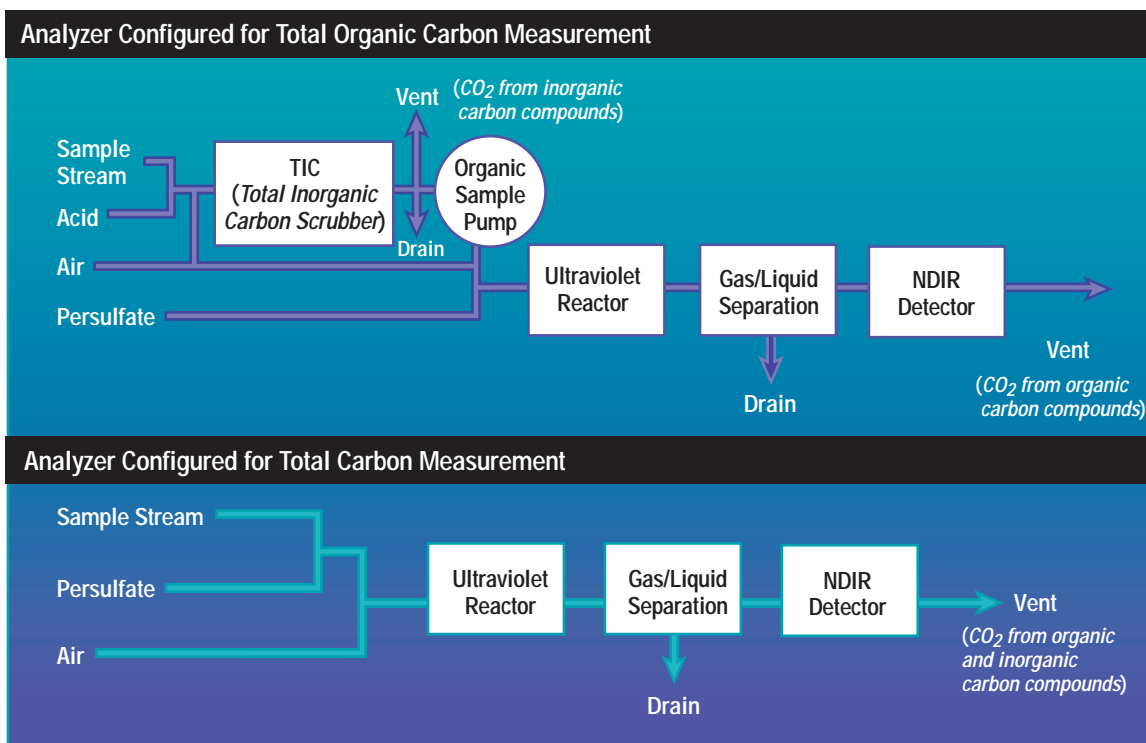
Principles of Operation

The IsoTOC uses UV-promoted, persulfate oxidation to convert organic carbon compounds to CO₂, which is then measured using a non-dispersive infrared detector to determine total organic carbon in the sample.

A sample stream is drawn into the IsoTOC by the source pump. A portion of the source pump flow is continuously transferred to a scrubbing column where it is combined with diluted phosphoric acid. In the scrubbing column, inorganic carbon compounds are converted to CO₂ and removed by sparging.

From the scrubbing column, inorganic carbon-free sample is pumped to a UV reactor where it is combined with concentrated persulfate and carrier gas. Inside the reactor, organic carbon compounds are oxidized to CO₂ by interaction of the sample with the UV light, carrier gas, and concentrated persulfate at an elevated temperature.

Upon leaving the reactor, the CO₂ gas stream passes through gas/liquid separation devices before entering an enhanced non-dispersive infrared detector (NDIR), which measures the CO₂ for determining TOC in mg/L.



Easy Programming

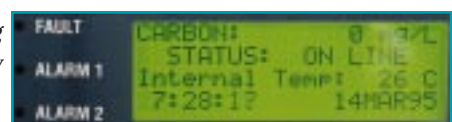
The IsoTOC sets a new standard for ease of use. On an easy to read, backlit display, simple programming menus guide you through quick analyzer setup and operation. The backlit display allows you to monitor the operating status in low light conditions.

Three separate menus guide you through all necessary functions with clear, self-prompting instructions.

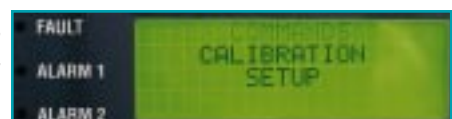
Manual inhibit buttons let you disable alarms, hold an analog output at the current reading, or bypass scheduled cleaning and calibrations.

- The **SETUP** menu is used for the initial installation of your process analyzer
- The **CALIBRATION** menu includes functions used for periodic verification of the analyzer's operations and performance.
- The **COMMANDS** menu provides routine operational command selections.

Normal Operating Display



Main Program Menu



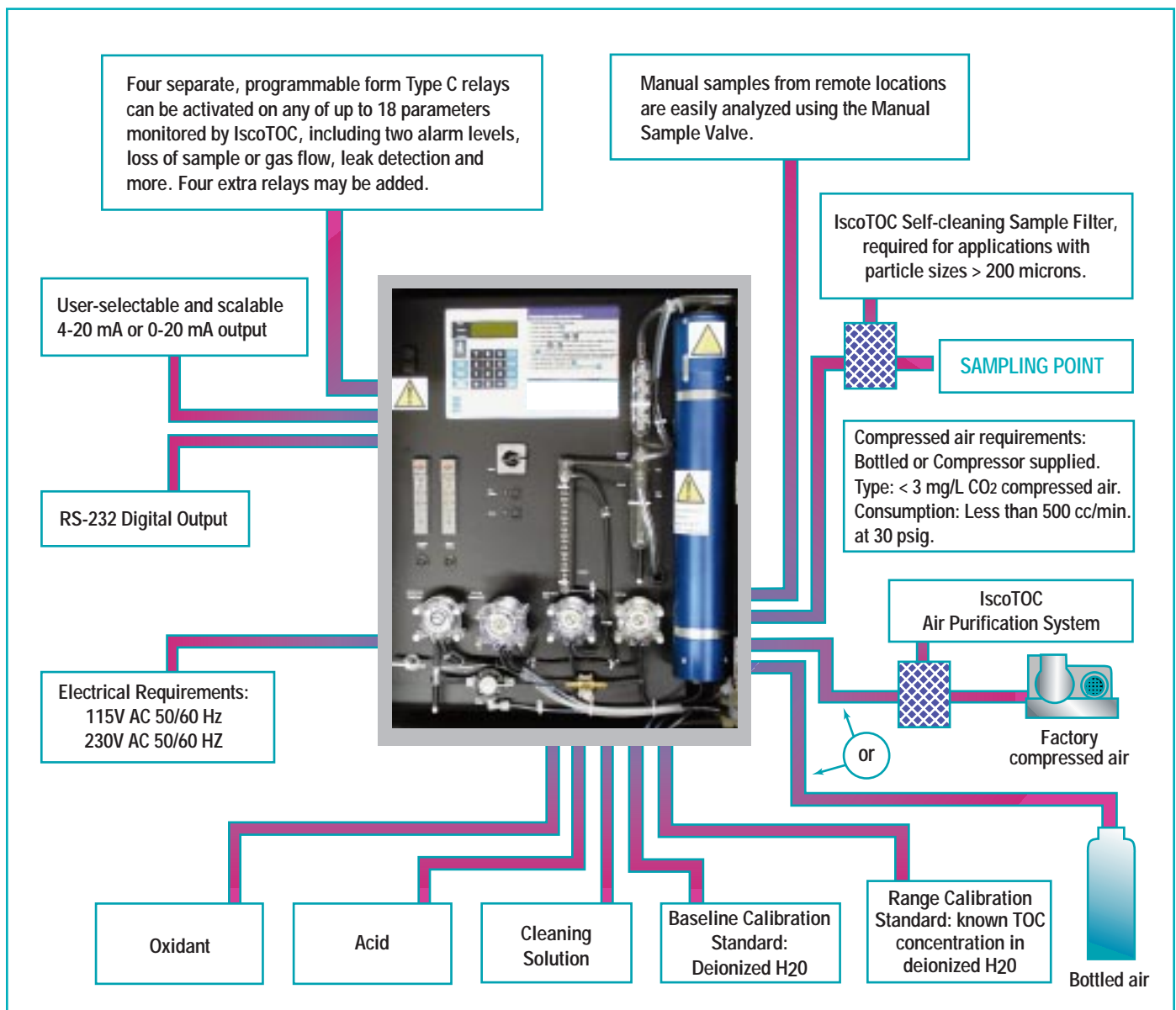
Improved UV Reactor

IscoTOC's new UV reactor system includes several advanced design features. An exclusive sample flow path design assures your sample is oxidized efficiently. A special sensor continuously monitors the temperature of the reaction chamber to maintain an elevated temperature (approximately 75°C), which increases the efficiency of the UV-persulfate oxidation. The single UV-lamp design greatly reduces maintenance costs. It also enhances reliability by providing positive indication of lamp failure, instead of producing inaccurate data as can occur when a single lamp fails in a multi-lamp system.

Enhanced NDIR Detector

Using NDIR detection of CO₂ for TOC analysis is the preferred method for complying with U.S. and International Standard protocols.

IscoTOC's enhanced NDIR detector eliminates the need for separate infrared sources and detectors for the sample and reference cells. This design provides a sensitive, stable, noise-free environment for accurate and reliable CO₂ measurement.



IscoTOC Analyzer Specifications

Contact the factory or your Isco representative for additional specifications.

Operating Characteristics		Sample Requirements	
Function	Total Organic Carbon (TOC) or Total Carbon (TC)	Inlet Pressure	Atmospheric to 3 PSIG (1.00 - 1.21 Bar)
Operating Principle	Ultraviolet-promoted, persulfate oxidation. Non-dispersive infrared detection.	Drain Pressure	Gravity drain, vented to atmosphere
Organic Measurement Ranges	Unlimited full-scale selectable ranges between 10 and 10,000 mg/L carbon	Suspended Solids	200 µm maximum particle size. 3% maximum concentration of suspended solids by volume. Oxidation rate is dependent on constituency.
Data Handling	EIA/TIA-232E and CCITT V.28 Serial (unidirectional)	Flow Rate of Sample Through Unit	35 ml/min. maximum at 60 Hz
Electrical Output	Programmable, user-selectable 4-20mA or 0-20mA current loop into 1000 ohms maximum	Carrier Gas	Type: Compressed air containing < 3mg/L CO ₂ Consumption: Less than 750cc/min. at 30 PSIG
Alarms	Two programmable alarm levels driving up to 8 programmable Type C* relays	Reagents	1.5 M Na ₂ S ₂ O ₈ (sodium persulfate) & 10% v/v H ₃ PO ₄ (phosphoric acid) both in deionized water. Consumption: 5.2 gallons/month each.
Programmable Outputs	Up to 8 customer-programmable outputs on Type C* relays (4 relays are standard). Can be programmed to output any combination of 18 system parameters (includes the two alarms).	Physical Characteristics	
Display	4-line, 20 character/line backlit display	Enclosure	NEMA 4, IP 65
Power Requirements	115 ± 10% VAC, 50/60 Hz, 2 Amps maximum, 230W; 230 ± 10% VAC, 50/60 Hz, 1 Amp maximum, 230W	External Dimensions (excludes mounting feet)	Height: 30" (76 cm) nominal Width: 24" (61 cm) nominal Depth: 22" (56 cm) nominal
Operating Ambient Temperature	> 0°C to 50°C	Weight	160 lbs. (72.6 kg) nominal
Performance Characteristics**		Shipping Weight	220 lbs. (99.8 kg) nominal
Calibration	2 point liquid, 2 point gas, manual and automatic	*Each Type C relay consists of 1 single-pole, double-throw (SPDT) isolated contact closure.	
Response Time	Less than 8 minutes to T ₉₀ at 100 mg/L configuration TOC	Each relay output board rated at 0.5A @ 24VDC/240VAC due to circuit board current carrying limitations	
Repeatability	± 1% full scale	**All performance specifications have been verified in a laboratory environment.	
Drift	± 1% of full scale over 72 hours without calibration at 20°C	Specifications involving TOC were tested using potassium biphthalate.	
Temperature Stability	Less than 2% of full scale drift over ambient range of 10°C to 30°C without liquid calibration	Specifications involving TIC were tested using sodium carbonate.	
Inorganic Carbon Removal	> 95% removal when TIC equals full scale TOC with standard TIC scrubber	Actual field performance may vary.	
Accuracy (% of full scale)	± 1.5% for TOC concentrations ranging from 0% to 75% of full Scale ± 2.5% for TOC concentrations ranging from 75% to 100% of full scale		

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