



Sievers InnovOx On-Line TOC Analyzers

for organics monitoring
includes BOD and COD reporting



GE Power
Water & Process Technologies
Analytical Instruments

Overview

GE Analytical Instruments' Sievers* InnovOx Total Organic Carbon (TOC) Analyzers are designed to continuously measure organic carbon in a broad range of water streams ranging from steam condensate to wastewater influent and effluent. All InnovOx Analyzers include robust sample handling capability, industry leading supercritical water oxidation (SCWO) technology, and simple maintenance and operation, all designed to enhance performance and uptime in challenging applications. For well over 20 years, customers around the globe have trusted the Sievers name for industrial water organic monitoring.

Industries Served



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Real-time Monitoring Applications

Biological wastewater plant optimization. Monitoring organics before and after treatment can allow operators to optimize the F/M (food to microorganism) ratio, thereby enhancing organics removal and reducing sludge, minimizing chemical usage as well as avoiding system upsets.

Wastewater effluent monitoring and COD/BOD correlation[†].

As a fully automated surrogate for time consuming and difficult COD and BOD tests, the InnovOx TOC instrument can continuously track the performance of a wastewater system. Optimizing the process provides confidence that regulatory testing results will be below permit limits.

Steam condensate leak detection. The InnovOx is uniquely capable of monitoring hot condensate water up to 85 °C (185 °F) and quickly identifying glycol, hydrocarbons, or other product leaks before expensive boiler/steam components or final products are damaged or contaminated.

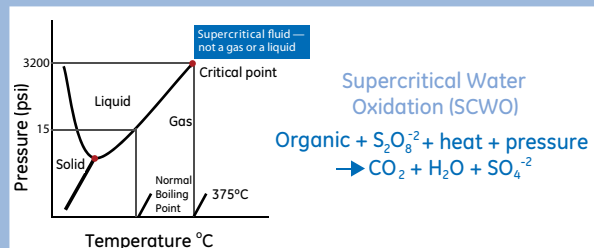
Cooling water contamination. The InnovOx continuously monitors both raw water and discharged cooling water to protect cooling systems from contamination and quickly identify leakage of any organic before discharge to the environment.

High-salt seawater and brine monitoring. GE's patented SCWO oxidation technology was designed to measure organics reliably in high-salt or brine samples commonly encountered in refineries. Unlike combustion TOC technologies that can easily be plugged or damaged by salt, the InnovOx oxidation reactor is self-cleaning and is not affected by salts coming out of solution.

Supercritical Water Oxidation (SCWO)

Supercritical water oxidation (SCWO) was originally developed to treat large volumes of aqueous waste, sludges, and contaminated soils. SCWO destroys organic wastes using an oxidant in water and temperatures and pressures above the critical point of water: 375 °C (770 °F) and 22.1 mPa (3,200 psi). These conditions enable rapid and complete oxidation of organic carbon to CO₂.

Today, SCWO research and development is focused on treating a variety of toxic and hazardous organic wastes. GE Analytical Instruments is the first company to use this technique in a commercial laboratory TOC instrument.



[†] BOD or COD values are calculated based on the TOC measurement.

Compliance

US EPA Method 415.1 – Organic carbon in drinking, surface, seawater, and waste water

US EPA Method 415.3 – Organic carbon in surface and drinking water

US EPA Method 9060A – Organic carbon in ground, surface, saline, and waste water

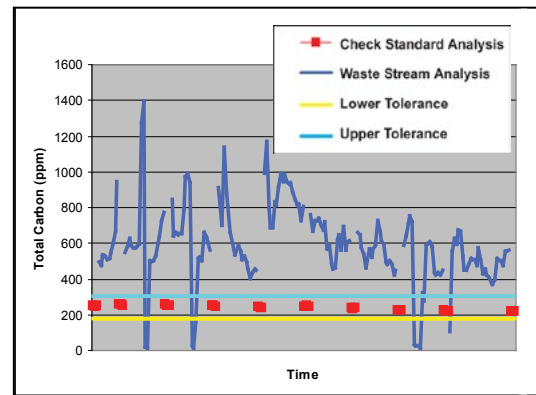
CEN Method DIN EN 1484 – Organic carbon in drinking, ground, surface, sea, and waste water

ISO 8245 – Organic carbon in drinking, ground, surface, sea, and waste water

Pattern Approval Certificate for Measuring Instruments of the People's Republic of China, issued by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China

Product Capabilities

- Wide dynamic range up to 50,000 ppm TOC
- Robust sample handling options for reliable operation even with high suspended solids
- Patented supercritical water oxidation (SCWO) for superior TOC recovery and high reliability
- Reliable NDIR detection technology with no moving parts
- Straightforward operation and maintenance
- High temperature option allows measurement of samples up to 85°C
- Versatile measurement modes include TOC (TC-IC) or NPOC
- Handles tough TOC samples, like cellulose and brine, without increased maintenance or downtime



InnovOx On-Line Analyzer Data

InnovOx Measurements for Brine, Cellulose, and Humic Acid Samples			
Replicate	28% Brine Solution (Process Sample)	90 m Cellulose Solution (100 ppm C)	Humic Acid Solution (10 ppm C)
1	5.80	95.1	10.2
2	5.69	98.0	10.1
3	5.59	90.9	10.4
4	5.68	104	10.4
5	5.69	93.2	10.2
6	5.53	98.0	10.2
7	5.49	93.3	10.4
8	5.70	101	9.91
9	5.57	103	9.86
Mean	5.66	97.3	10.19
Stand. Dev.	0.12	4.50	0.20
RSD	2.13%	4.63%	2.0%

InnovOx robust SCWO oxidation

Options & Accessories

Multi-stream capability

Either 2-stream (standard) or 5-stream (optional) configurations. Allows monitoring of multiple sample streams where processes are not so dynamic that they require continuous monitoring.

High-temperature sampler

Stainless steel components allow for monitoring of samples up to 85°C. Ideal for use in steam condensate and cooling tower applications (available in 2-stream version only).

Wastewater sampler

For wastewater applications, a sampler is available in either 2-stream or 5-stream configurations. Configurable for either low to moderate or high levels of particle content without the maintenance of filtering systems. Ideal for wastewater applications in a wide range of industrial applications.

IP56/NEMA 4X /Class 1 Division 2/ATEX enclosures

Enclosure options for varying levels of harsh environments or hazardous locations. For use in elevated ambient temperatures, environments with corrosive gasses, refinery, or high dust applications.

Fail safe

Monitors for the presence of sample flow and adequate supply of reagents/check standards to increase reliability. Recommended for most applications.

Exterior sample pumps

Auxiliary sample pumps for applications where a pressurized sample is not available. Pulls sample from a reservoir or tank.



Wastewater 2-Stream and 5-Stream Option

Systems Specifications

InnovOx On-Line TOC Analyzer	
Operating Specifications¹	
Analysis Modes	NPOC, TOC (TC-IC), TC, IC
Range	0.250 to 50,000 ppm TOC
Precision	RSD ≤3% of reading at >5 ppm NPOC or TOC
Accuracy	Greater of ± 3% of reading or ± 0.25 ppm, 1 to 100 ppm, NPOC or TOC
Linearity	$R^2 \geq 0.995$, measured as NPOC
LOD	≤0.10 ppm NPOC mode ²
TOC Calibration Stability	Up to 6 months
Analysis Time	2.6 to 8.3 minutes in Online mode
Particle size	≤200 µm without filtration or >200 µm with optional wastewater sampler
Sample Temperature	10-60° C (41-140 °F), or 10-85 °C (41-185 °F) with high-temperature options
Ambient Temperature	10-40 °C (50-104 °F)
Source Sample Pressure	125 psig maximum with provided control valve 0.5 psig minimum without optional sample pump
Minimum Sample Flow Rate	50 mL/min without optional sample pump
Drain	Gravity Drain
Analyzer Specifications	
Outputs	External USB Port (1); Internal USB Ports (2); Ethernet (1); Binary End-of-Analysis Output (1); Isolated 4-20 mA Analog Outputs (5 analytical; 1 for stream ID)
Inputs	Binary Input (1) for Remote Analysis Start/Stop
Display	Color LCD w/touch-screen
Power	100 – 240 ± 10% VAC, 50 – 60 Hz, 400 VA
Alarm Relays	System Fault Alarm (1); User-Configurable Alarms, High and Low Limit (4)
Communications Protocols	Modbus®; TCP/IP over Ethernet
Installation/Overvoltage Category	II
Sample Streams	2 Streams (standard), 5 Streams (optional)
Dimensions	H: 92.7 cm (36.5 in.); W: 64.6 cm (25.4 in.); D:38.7 cm (15.3 in)
Weight	36.3 kg (80 lb)
Safety Certifications	CE, ETL listed. Conforms to UL Std. 61010-1. Certified to CSA C22.2 NO. 61010-1
Environment	
Enclosure Options	IP56/NEMA 4X/Class 1 Division 2/ATEX
Maximum Relative Humidity	Up to 95%, non-condensing
Maximum Altitude	3,000 m (9,800 ft)
Pollution Degree	2

¹ Stated analytical performance is achievable under controlled laboratory conditions that minimize operator and standards errors.

² NPOC mode, bottled N₂ as carrier gas. This performance is achieved under controlled conditions where variables that influence low-level performance have been minimized or eliminated. This performance may not be achievable on instruments delivered before August 2016.

www.geinstruments.com/innovox

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