

PRODUCT DATASHEET

QuickTOCpurity™

Total Organic Carbon (TOC) Pure Water Analyzer



Precise

Fast

Reliable

- Continuous TC, TOC, TIC monitoring
- Easy calibration and validation
- Highest combustion temperature (1,200 °C) available on the market
- Catalyst-free technique
- Closed system to prevent contaminations

The Measuring System For Ultra Pure Water

Organic loads in pure water such as boiler feed water are very low. However, they may cause enormous damage to the systems. Thus, their monitoring requires the highest precision and promptness.

A CO-generator consists of a desalination plant and a boiler. Smallest organic impurities result in production of carbonic acid, which increases the risk of corrosion considerably. It is important to detect impurities quickly and reliably.

The quality requirements for ultra pure water are very high. At high boiler pressure the total organic carbon (TOC) content of boiler feed water shall not exceed the limit of 0.1 to 0.5 mg/l C (100-500 ppb). Otherwise corrosion, scaling, and biological fouling may damage the pipes or even result in a system failure.

Pure Water. Water Quality With High Demands

Pure water is required as process water in industrial plants or for the manufacture of products. The pretreatment of water to process water is very expensive. However, it is necessary in order to guarantee the high requirements of boiler feed water for example. Therefore, the monitoring of the smallest contamination is of great importance.

Organic contaminants in process water caused by leaks or product spills may result in devastating consequences in the plant, especially at boilers or heat exchangers. Corrosion, deposits and coatings are the consequences. In the case of contamination, expensive pure water is drained off, and the water circuit has to be back-fed with costly treated make-up water. If the contamination is too serious, the plant will be shut down.

The fast and reliable detection of smallest impurities by TOC analyzers provides an efficient solution within process monitoring.

What TOC Means And How It Is Measured

A whole variety of organic matter can be present in water, which cannot be determined individually. At least not without considerable analytical effort and within a short time. This is why the so-called sum parameter TOC (total organic carbon) is used. It measures a samples organic loads and is thus an important indicator for water quality.

At 1,200 °C, water samples are completely and precisely analysed.

The TOC Measurement. You Have The Choice

The TOC content may be detected by using the difference method, whereby all organic and inorganic carbon bonds are oxidized resulting in the total carbon (TC, (Fig. 1). From this TC value the separately analysed inorganic carbon (TIC) is subtracted. The result is the TRUE TOC.

Alternatively, the TOC may be detected, directly' by stripping out the TIC using acidification prior to the thermal oxidation. Since during this process the VOC and POC is stripped out too, in general the result is the NPOC.

TC Measurement. Quickly And Beneficial

Within the boiler the inorganic carbon (carbonate) reacts forming carbonic acid that causes corrosion in boilers, pipes, and heat exchangers. Monitoring the TC content includes the TIC and minimizes the risk of damages.

Exact Analysis. At 1,200 °C, The TRUE TOC Is Determined

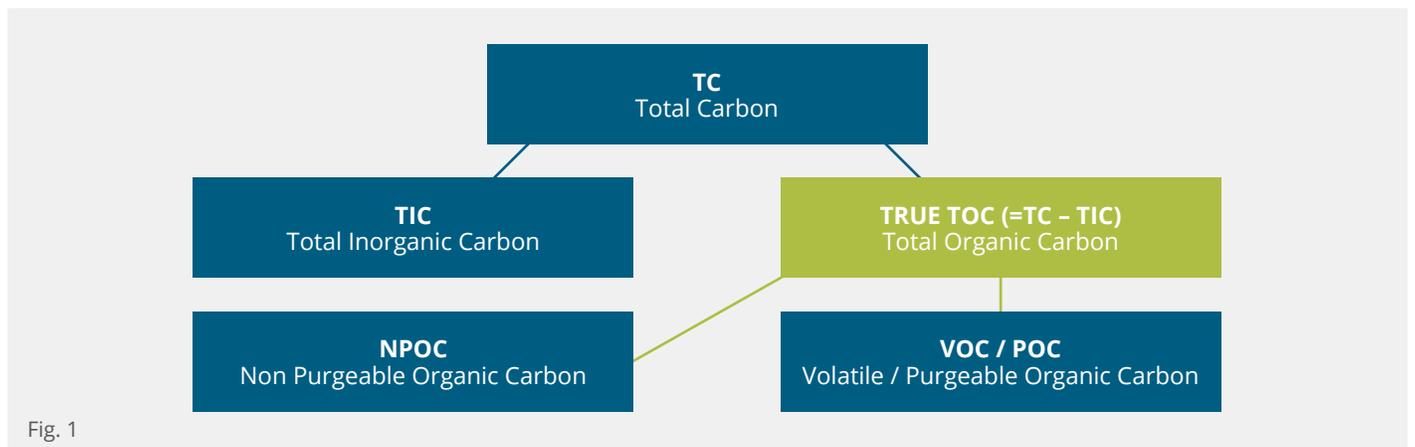
Vital to this method: For an exact TOC measurement all carbon bonds must be reliably combusted. Using a temperature of 1,200 °C, AG have developed a high temperature method which makes this possible! This temperature was chosen due to the proven fact that a complete oxidation of a sample cannot occur at temperatures below it: For example, carbon bonds of carbonates only break fully when reaching a combustion temperature of 1,200 °C. Basically, the lower temperatures deliver less exact measurement results.

For this reason, to distinguish ourselves from these other methods, we talk of the TRUE TOC.

Catalysts. For Our Analyzers Simply Not Necessary

Because of their high temperatures our analyzers do not need any catalysts. Catalysts are only necessary for the low temperature catalytic "high temperature" oxidation (680 – 1,100 °C) to support the oxidation of the carbon bonds. However, the performance of the catalysts is lowered over time. This affects the measurement results making continually new calibrations necessary and eventually requires the replacement of the catalysts. We want to save you the trouble: With the QuickTOCpurity.

What Is The TRUE TOC Derived From? And What Is It Composed Of?



At A Glance

- The TOC value is the measure for the organic load in a water sample.
- The TRUE TOC value can only be determined using the difference method at 1,200 °C.
- A reliable measurement system must be able to analyse the coarse material in water.
- The TC value is detected fast and reliably.
- At 1,200 °C, a complete oxidation is guaranteed which is why catalysts are unnecessary.

The Analyzer

A hot oven: Where temperature makes the difference.

Warm, Warmer, Hot. Tracking Organic Load At 1,200 °C

The catalyst-free ceramic oven is the centre piece of the QuickTOCpurity. At 1,200 °C, it reliably dissolves all carbon bonds and thus enables a complete analysis of samples. Despite the high temperatures used, absolute safety is guaranteed in all settings. For this end, the QuickTOCpurity can be delivered with a number of different housings, depending on the intended location. That way the analyzer itself can be safely at high corrosive places as well as in potentially explosive areas.

The determination is in accordance with DIN EN 1484:1997-08, ISO 8245:1999-03 and EPA 415.1.

The Building Blocks Principle For A Tailor Made Measurement Instrument

The modular system offers high flexibility. When your application demands it, you can measure up to six different sample streams with one machine for example. Each sample stream is individually lead into the analyzer in order to avoid cross contamination and carry-over effects. Furthermore, you may build in additional detectors to determine further parameters such as the TNb.

The QuickTOCpurity. Ultra Quick Measurements And Maintenance

The TRUE TOC measurement takes place in less than 3 minutes. The TC is measured even in one minute. The TC is particularly advantageous if a high proportion of TIC is present. This speed guarantees that very short peaks can be determined very well during a daily cycle. The maintenance service is also fast: Less than half an hour per month. The analyzer's availability is over 98%.

Calibration And Validation. Ready At Any Time

With the patented calibration and validation technique QuickCalibration offers the opportunity to check the analyzer automatically and remotely at any time.

Another benefit: No need of liquid standards, that must be produced or purchased expensively. In combination with the 1,200 °C oxidation uses a defined gas. Such a test gas is stable for a long time and cost efficient. Thus, you can find out easily whether your analyser works correctly.

Who Is Allowed To Do What? It's Up To You To Decide

Through separately programmable user-access levels, you can assign access rights to individual operators. With a 10.4 inch touchscreen, the QuickTOCpurity is easy to operate. Another option would be to control the analyzer via remote control using a PC, which is connected to your network.

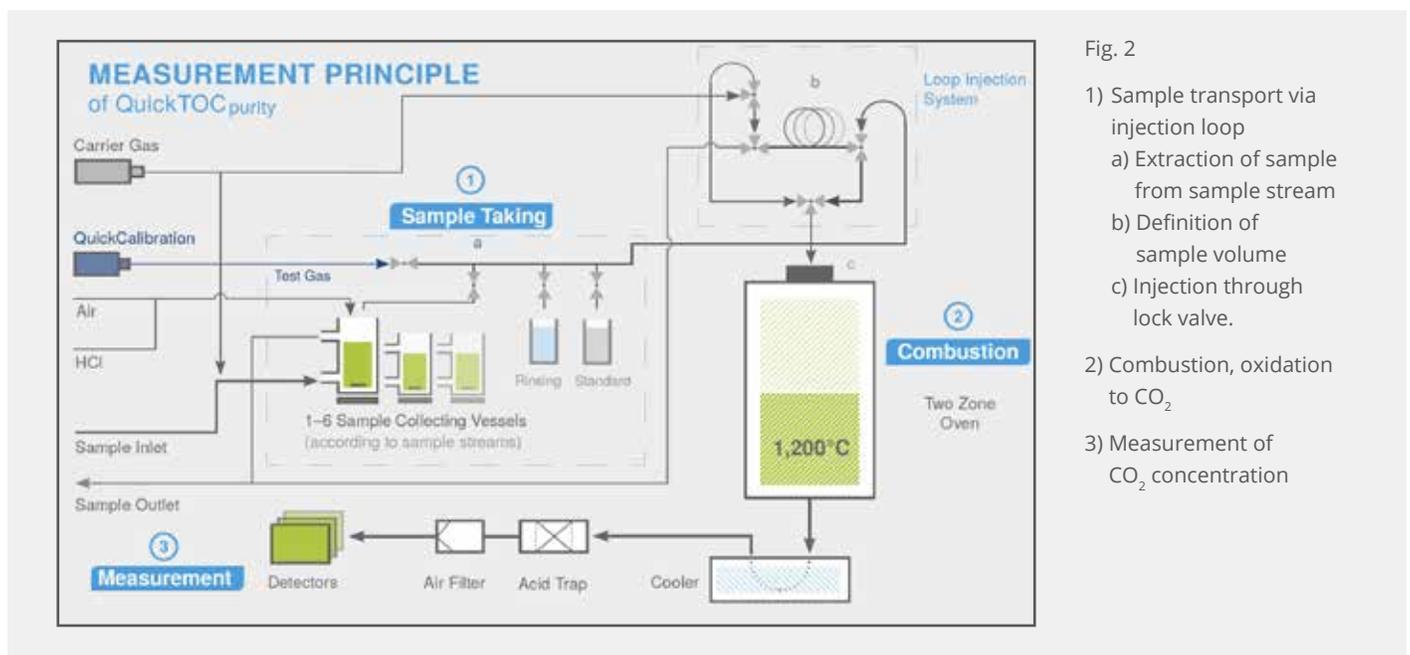


Fig. 2

- 1) Sample transport via injection loop
 - a) Extraction of sample from sample stream
 - b) Definition of sample volume
 - c) Injection through lock valve.
- 2) Combustion, oxidation to CO₂
- 3) Measurement of CO₂ concentration

The Principle

Precise, even in the purest water.

The Loop Injection. For Clean Sample Dosing

The loop injection of the QuickTOCpurity is a closed system and hence, protected against environmental influences and other impurities. Small, defined sample volumes are injected to the carrier gas stream, that continuously flows through the high temperature oven. Depending on the expected TOC or TC load of the respective application, various injection volumes between 100 and 400 µl are available. At a very low concentration the multi loop injection can be used, in which a defined sample volume is injected multiple times into the oven. Thus, the load is determined accurately even in the lowest µg ranges (ppb).

Inside Of The Ceramic Oven: We Like It Hot

And it is that hot, that – without catalysts – the sample's content of organic and inorganic carbon is completely converted into CO₂. It is oxidized by use of a carrier gas that is supplied by filtered pressurized air. Optionally, the QuickTOCpurity can prepare the gas itself requiring no extra external gas supply at all. With LAR's oxidation method lowest measurement ranges of TOC, TC and TNb are reliably detected.

Difference Or Direct. The Measurement Task Defines The Method

Generally, in low TOC ranges the direct method is the preferred analyses method. Here, the sample is transferred to a sample vessel, in which an acid is added as required. As a result, the demand for acid of the QuickTOCpurity has been minimized. The sample mixture is stripped with air, and the inorganics are removed from the sample. Finally, the stripped sample is fed into the oven through the injection loop and the organic content of the sample is oxidized and detected. If volatile organic carbons (VOC) have to be considered, then the TOC difference method can be used – even in low concentrations. The decisive advantage of the QuickTOCpurity: Due to the closed loop system the VOC and POC (purgeable organic carbon) will be determined reliably.

The CO₂ Detection. Reliable And Simple

First the gas that is produced by the combustion condenses in the cooler. The remaining combustion gas is purified by a filter before its CO₂ concentration is determined by the NDIR-detector.

QuickCalibration. No Expensive Standards Anymore

Common calibration and validation methods requires liquid standards whose concentration ranges are lower than those of conventional drinking water. Therefore, they are only short-term durable and can be produced or purchased only with great effort.

Alternatively to the use of liquid standards, the innovative calibration and validation method is standard feature of the QuickTOCpurity. A contamination of the sample within the loop system is technically impossible.

The internationally patented QuickCalibration provides a fully automatic and ready at any time validation of the system using a defined gas (for example Methane). Such a test gas is stable for a long time and is ideal for automated use.

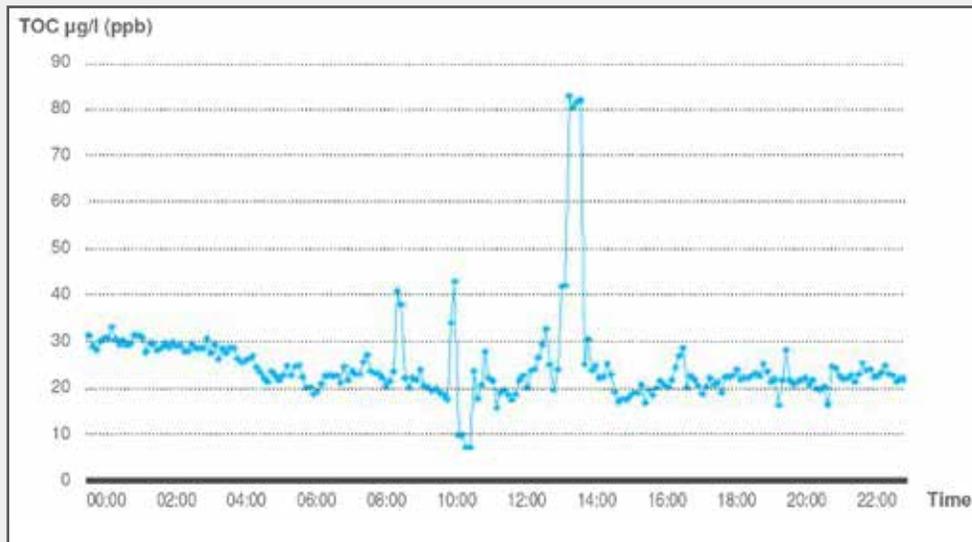


Fig. 3

Measurement peaks during a daily cycle with a measurement cycle of 3 minutes.

The rapid increases and decreases of loads are rapidly detected – without memory effects.

ALL cLeAR?

Process Analysers AG: Water is our Element. We do everything for its protection.

We are the leading provider for water analysis instruments for industrial and communal waste water technology, process monitoring, as well as for pure water analysis. Further products in the areas of industrial process and environmental technology complete our product range. We offer application specific analyzers developed by our research and development team. Maintenance is carried out globally by our own technicians or by our local qualified service partners. Technical support per telephone or email is available at all times.

TOC-ANALYSIS – From complex industry waste water to pharmaceutical pure water, our TOC analysers determine parameters quickly and precisely.

COD-ANALYSIS – With our analyzers the chemical oxygen demand is cleanly and safely determined online, without using chemicals.

BOD/TOXICITY – We detect the BOD with the plant's own biomass and determine the toxicity with highly sensitive bacteria. Fast and reliably.

TN_b/TP-ANALYSIS – TN_b and TP are important parameters for waste water treatment. We are the only ones who offer them in combination with TOC and COD in one system.

FURTHER PRODUCTS – We offer a specific solution for nearly all applications. With our protective housings, you are always on the safer side. Find out more: www.process-insights.com

QuickTOCultra An Overview

Online TOC for pure water – especially for boiler feed water.

QuickTOCpurity continually checks the TOC content of pure water with lowest concentrations. Even the smallest impurities are detected. At 1,200 °C, samples are completely oxidized and within 3 minutes the TRUE TOC is determined.

Advantages & Features

- Exact determination of TC, TOC (TRUE TOC), TIC, TN_b
- Highest combustion temperature available (1,200 °C)
- Catalyst-free
- Calibration and validation at any time
- Fast response time of one minute (TC)
- Multi-stream measurements (optional)
- Certified housings for EX zones (EX p) (options for ATEX, IEC, etc.)
- Analyzer availability min. 98%
- Maintenance and service max. 30 min per month
- Exceptionally low maintenance and operational costs

TECHNICAL DATA

Measurement Technique	
Measuring Technique	Thermal oxidation
Measurement Ranges	0.1–20 mg/l (ppm); 1-2,000 µg/l (ppb) further options on request
Parameter	TOC, combinable with TNb, COD
Response Time TC	1 minute
Calibration Type	Multi point calibration
Calibration/Validation	QuickCalibration
Dimensions and Weight	
Housing	Steel IP 54, powdercoated
Options	Stainless steel, IP 65, EXp Zone 1 and 2 for T3, T4 classes (ATEX, IECex)
Dimensions	W 600/812 x H 1,062 x D 585 mm
Weight	From 120 kom g (Standard)
Electric and Hydraulic Specifications	
Inflow and Outflow	Tube 4,8mm ID
Power Supply	230 /115 V~, 50 / 60 Hz
Analogue Output	0/4– 20 mA
Serial Interface	RS 232
Safety	10 A intern, 16 A extern
Option	Remote control via TCP/IP protocol
Equipment Devices and Data Output	
TFT Touchscreen-Graphic-Display, 10,4", high resolution, back lit	
Autostart function	
Self explanatory software	
Standard data interfaces to office PC (USB)	

Areas of application

Environment / Municipal Facilities / Industry

Industries

Environmental Monitoring / Waste Water Treatment / Waste Processing / Pharmaceutical / Laboratory / Petro-Chemical / Refineries / Chemical / Coal And Steel / Power / Airports / Automobile / Paper Manufacture / Breweries / Food Manufacture / Drink Manufacture / Milk Processing / Semiconductor Manufacture

Types of water

Groundwater / Surface Water / Drinking Water / Water Influent / Water Effluent / Discharge Control / Industrial Waste Water / De-Icing Water / Process Water / High Salt Concentration / Oil-In-Water / Cooling Water / Pure Water / Boiler Feed Water / Condensate Return / Pharma Hpw / Pharma WFI / Semiconductor UPW

GAIN REAL-TIME INSIGHT INTO YOUR PROCESS

Process Insights manufactures and delivers premium sensors, monitors, detectors, analyzers, instrumentation, and software that are mission-critical to keep your operations, personnel, and the environment safe – every day across the globe.

Get the most reliable, precision analytical technologies available on the market today. We will work to match your needs and budget, and provide the optimal, and most stable process analysis solution for your application.

CENTERS OF EXCELLENCE | PROVIDING PROVEN SOLUTIONS

Process Insights is committed to solving our customers' most complex analytical, process, and measurement challenges everyday.

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For a complete range of products, applications, systems, and service options, please contact us at: info@process-insights.com

For a complete list of sales & manufacturing sites, please visit: <https://www.process-insights.com/about-us/locations/>

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REVOLUTIONIZING MEASUREMENT

EVERYWHERE