



## QuickTOC<sub>ultra</sub>

TOC-ANALYSIS

Online TRUE TOC for every kind of water.  
Especially for the rough stuff.

Fast. Precise. Reliable.



# A MEASUREMENT SYSTEM FOR THE ROUGH STUFF.

With the right method, organic waste can be quickly measured without problems even in difficult waters with course material content.



Whether you have to measure emulsified water from a flavouring production plant, industrial waste water in an aeration tank of a clarification plant or the waste water from dairies, paper or paint factories: The QuickTOC<sub>ultra</sub> is very versatile and able to handle the most diverse applications and types of water.

With regards to ecology as well as company economy, industrial and municipal applications, such as the influent and effluent of a clarification plant, should be continually monitored. Through continual measurements, the chemical and food industries are also able to detect production loss.

## Clumps, algae and slime are what a measurement system has to be able to deal with.

Difficult types of water like process water and industrial waste water can contain course materials as well as fluids which must be detected and analysed. Additionally, the measurement system should work continuously and reliably, so that impurities can be recognised early on and the appropriate countermeasures can be put in place. Plus, it should also be able to cope with waters with a high salt concentration without an increase in maintenance.

## 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 sample's organic loads and is thus an important indicator for water quality.

The TOC content is best detected by using the difference method. Through a combustion at 1,200°C all organic and inorganic carbon bonds are broken, producing CO<sub>2</sub> which can then be detected and quantitatively measured. As an intermediate value the total carbon (TC) of the sample is given. Finally, a separate analysis of the inorganic carbon (TIC) takes place. The TIC value is subtracted from the TC value. The result being the organic carbon, TOC (↗ Fig. 1).

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

### 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, LAR Process Analysers 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 this: For example, the 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 at LAR talk of the TRUE TOC.

### Catalysts.

#### For our analysers simply not necessary.

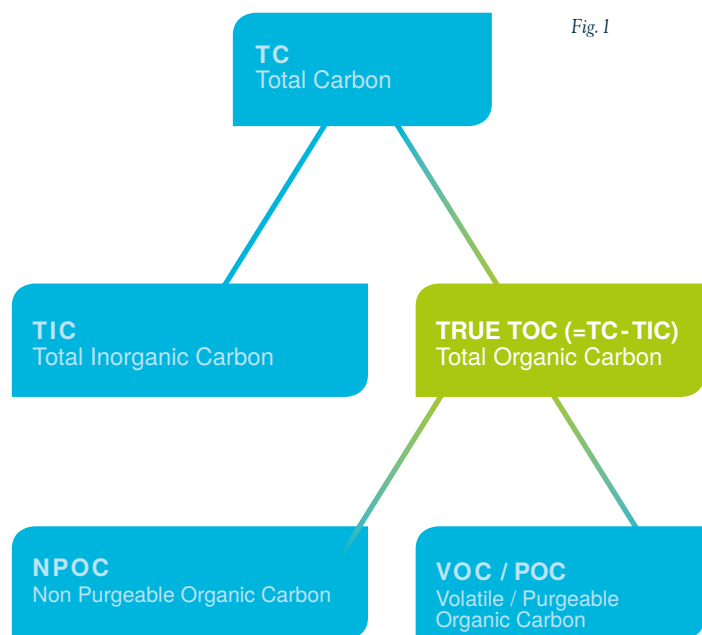
Because of their high temperatures our analysers do not need any catalysers. Catalysers are only necessary for the low temperature catalytic “high temperature” oxidation (680 – 1,100°C) to support the oxidisation of the carbon bonds. However, the performance of the catalysers is lowered over time. This affects the measurement results, necessitates continual new calibration and eventually requires that the catalysers are replaced. We want to save you the trouble: With the QuickTOC<sub>ultra</sub>.

### The direct method. An alternative.

In contrast to the difference method used by LAR, the direct method does not detect the complete TOC. At this, by using an acid the inorganic carbon (TIC) is removed from the sample prior to the combustion process. Moreover, the volatile organic carbon (VOC) and the purgeable organic carbon (POC) are also expelled. Thus, after the combustion, only the non-purgeable organic car-

bon (NPOC) value can be calculated. The direct method suits best for samples without VOC or with a high TIC content.

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**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 course material in water.
- At 1,200°C, a complete oxidation is guaranteed which is why catalysers are unnecessary.

# THE ANALYSER.

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 centrepiece of the QuickTOC<sub>ultra</sub>. 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 QuickTOC<sub>ultra</sub> can be delivered with a number of different housings, depending on the intended location. That way the analyser itself can be safely at high corrosive places as well as in Ex-Zones.

The determination is in accordance to 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 device for

example. Furthermore, it can be decided whether to build in additional detectors to determine the TN<sub>b</sub> and COD parameters alongside measuring the TOC value.

## The QuickTOC<sub>ultra</sub>. Ultra quick measurements and maintenance.

The TRUE TOC measurement takes place in less than 3 minutes. Thereby, short measurement value peaks can also be reliably shown. The maintenance service that is required is also fast: Less than 30 minutes per week are necessary. The analyser's availability is over 98%. Moreover, all areas of the analyser have been designed for easy maintenance: From the filterless sample extraction with the patented FlowSampler® (↗ Fig. 3), by way of the generously measured and blockage-free tubes, to the catalyst-free high temperature oven with the removable oven foot for the quick removal of salt residues.

## High salt concentrations.

### No problem for the QuickTOC<sub>ultra</sub>.

In contrast to many other analysers, the QuickTOC<sub>ultra</sub> can handle salt concentrations up to 10 g/l. There is also an extra high salt option available that can handle up to even 300 g/l sodium chloride (NaCl). That means that even with a high salt concentration the sample does not need to be diluted. This, again, has a positive effect on the accuracy of the measurements.

## 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 QuickTOC<sub>ultra</sub> is easy to operate. Another option would be to control the analyser via remote control using a PC, which is connected to your network.

With QuickTOC<sub>ultra</sub> the electronic compartment is separated from the analytical compartment.

The separated compartments are easily accessible.





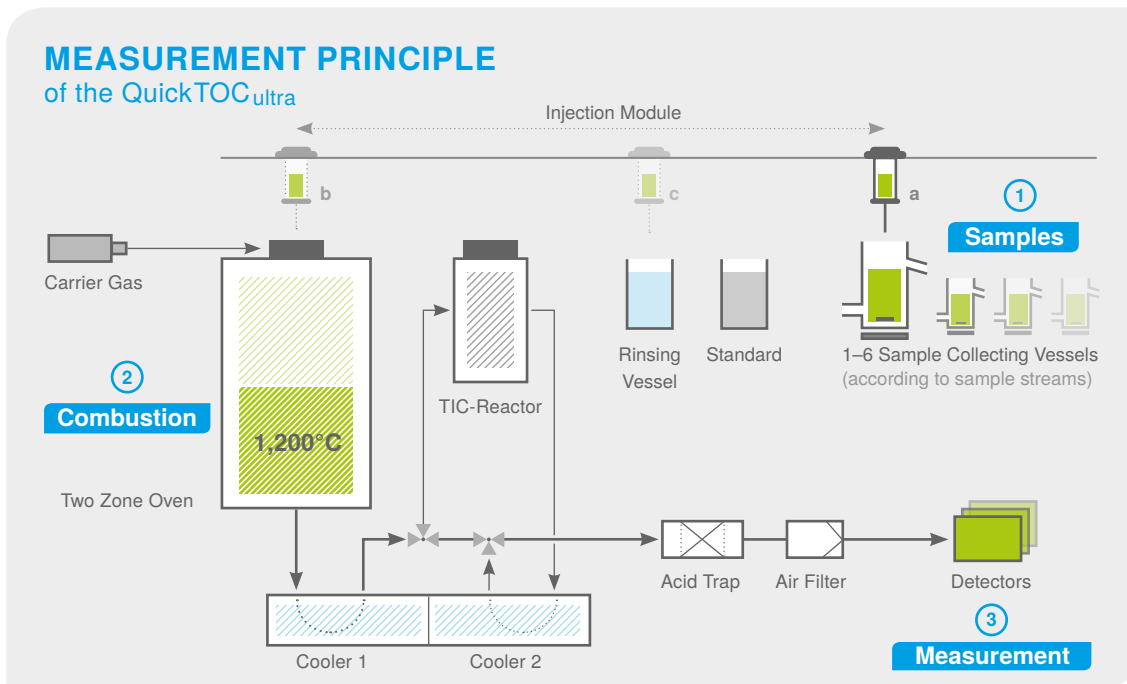


Fig.2

- 1) Sample transport via injection system
  - a) Extraction of sample from sample stream
  - b) Injection through valve
  - c) Rinsing of the injection needle.
- 2) Combustion, oxidation to CO<sub>2</sub>
- 3) CO<sub>2</sub> concentration measurement

## THE PRINCIPLE.

Even when the water is dirty - the measurement is clean!

### Sample extraction: Almost as though taken by hand.

The water flows through the patented FlowSampler<sup>®</sup>. In the middle of the FlowSampler<sup>®</sup> there is a stainless steel tube (→ Fig. 3), through which the sample is sucked into the analyser by a pump. The trick: Big and small solid particles, for example sand grains or wood splinters, carry on past the tube due to the flow speed. However, all other particles relevant to the measurement are captured, even the solid particles. Therefore, the taken sample corresponds 98% with that of a grabbed sample. While at the same time it is free of maintenance. These results cannot be reached with any kind of filter, filter sieve or rotating sieve.

### The robotic injection system for the perfect sample dosage.

Inside the analyser, the samples are kept in collection vessels in a homogenous state. The robotic horizontally and vertically moving needle takes an exact sample dose and injects it into the oven

through the valve. This patent pending valve ensures that the oven (→ Fig. 2) stays 100% sealed from the ambient air at all times. After every injection, the needle is cleaned.

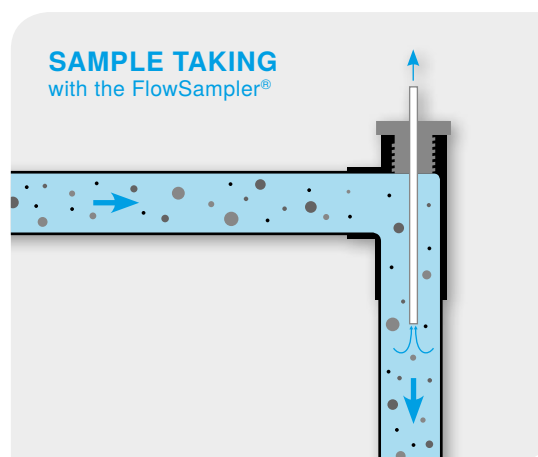


Fig.3

- maintenance-free
- blockage-free
- representative samples

The maintenance-free and patented sample taking system „FlowSampler<sup>®</sup>“

### Inside of the ceramic oven: We like it hot.

And it is that hot, that - without catalysts - the inorganic and organic carbon is completely converted into CO<sub>2</sub>. It is oxidised with a carrier gas, whose supply is provided by filtered ambient air.

Optionally, the QuickTOC<sub>ultra</sub> can prepare the gas itself. Thus, requiring no extra external gas supply at all.

Through the high temperature, the salts present can easily be discharged. They move through the oven in fluid form and are eventually carried out of the oven by the condensate. Finally, they are deposited in a retaining device, from which they can easily and quickly be removed. That way, no salt deposits can form in the oven.

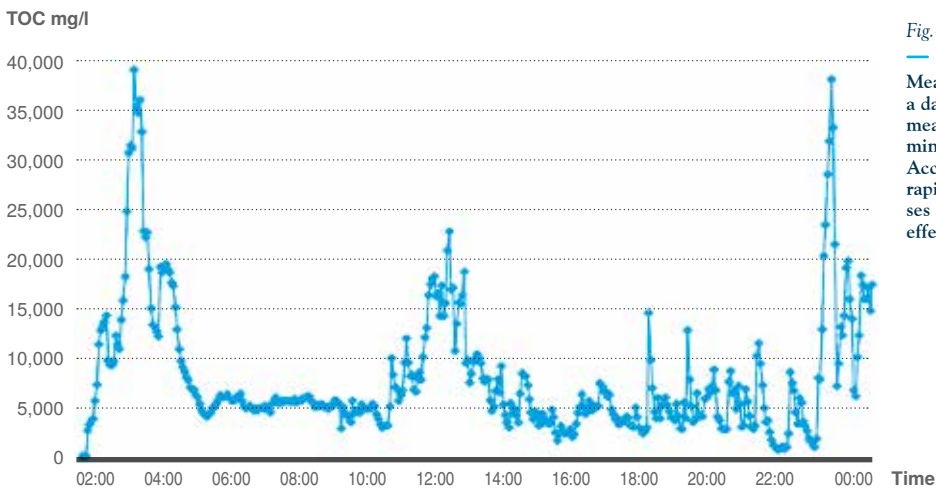
**The CO<sub>2</sub> detection. Reliable and simple.**

First the gas that is produced by the combustion condenses in the cooler. The remaining combusti-

on gas is purified by a filter before its CO<sub>2</sub> concentration is determined by the detector.

**The inorganic component measurement. Without TIC no TRUE TOC.**

In the second reactor the inorganic compounds are purged out of the sample by using acid. Again, the combustion gas is cooled, filtered and finally the CO<sub>2</sub> concentration is measured. The TIC value is subtracted from the previously measured total carbon (TC) value. Hence, determining the total organic carbon, the TRUE TOC.



*Fig. 4*  
Measurement peaks during a daily cycle with a measurement cycle of 3 minutes. Accurately capturing the rapid increases and decreases of load without memory effects.

**ALL cLeAR?**

**LAR 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.

LAR offers application specific analysers 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 e-mail is available at all times.

**TOC-ANALYSIS**

From complex industry waster water to pharmaceutical pure water, our TOC analysers determine parameters quickly and precisely.

**COD-ANALYSIS**

With our analysers 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<sub>b</sub>/TP-ANALYSIS**

TN<sub>b</sub> 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**

LAR offers a specific solution for nearly all applications. With our protective housings, you are always on the safer side. Find out more: [www.lar.com](http://www.lar.com)

# QuickTOC<sub>ultra</sub> AN OVERVIEW

**Online TRUE TOC for every kind of water. Especially for the rough stuff.**

QuickTOC<sub>ultra</sub> continually checks the TOC content of waste water. Optionally, other sum parameters can be detected, too. At 1,200°C, samples are completely oxidised and within 3 minutes the TRUE TOC result is determined.

## TECHNICAL DATA

### Measurement Technique and Sample Preparation

Measurement Method	Thermal oxidation at 1,200°C
Measurement Ranges	0.1 - 50,000 mg/l TOC, with optional dilution up to 500,000 mg/l possible
Parameters	TOC, TC, TIC, combinations with COD, TN <sub>b</sub> possible
Response Time TOC	3 minutes
Sample Preparation	<ul style="list-style-type: none"> <li>• FlowSampler - Maintenance-free particle separator</li> <li>• Optional homogeniser for the continuous homogenisation of samples</li> </ul>

### 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 600/848 x H 1,062 x D 608 mm
Weight	from 125 kg (standard housing)

### Electric and Hydraulic Specifications

Inflow and Outflow	Tube 4,8 mm ID, Tube 8 mm ID, Tube 12 mm ID
Power Supply	230/115 V~, 50/60 Hz
Analogue Output	0/4 – 20 mA
Serial Interface	RS 232
Safety	2/6 A internal, 16 A external
Internet Capability	LAN, Option for WLAN
Option	Remote control via TCP/IP protocol

### Equipment Devices and Data Output

High resolution and back lit TFT touchscreen graphic display, 10.4"
Self explanatory software, Autostart function
Standard data interfaces to office PC (USB 2.0)



Fast, precise and reliable the QuickTOC<sub>ultra</sub> is dependable.

## ADVANTAGES & FEATURES

- ✓ exact determination of TC, TOC, (TRUE TOC) and TIC
- ✓ proven thermal oxidation principle
- ✓ highest combustion temperature available (1,200°C)
- ✓ catalyst-free
- ✓ fast response time of one minute (TC)
- ✓ multi-stream measurements (optional)
- ✓ individual programmable operator access levels
- ✓ analyser availability minim. 98%
- ✓ maintenance and service max. 30 min per week
- ✓ exceptionally low maintenance and operational costs

## LAR Process Analysers AG

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TÜV certified company

## TOC-ANALYSIS

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# QuickTOC<sub>ultra</sub>

### 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**