



## QuickTOC<sub>UV</sub>

TOC-ANALYSIS

The continuous TOC monitoring system.  
Green light at a glance.

Fast. Reliable. Compact.



# A MEASURING SYSTEM FOR CLEAN AND PURE WATER.

Organic contaminants can be rapidly and economically analysed with the right measuring system, even in pure water e.g. condensate return or boiler feed water.



The QuickTOC<sub>UV</sub> is suitable for the determination of TOC in ultra-pure water (condensates, boiler feed water) - especially in the petrochemical and chemical industries, as well as in refineries. Surface water and drinking water can also be monitored reliably.

**The quality of pure or ultrapure water must be guaranteed in a cost-intensive manner. Continuous monitoring of the water for organic impurities to safeguard high purity and to ensure that product spills or leaks contaminating process water are rapidly detected, is essential to safe operation of a plant.**

## Ultrapure water.

### High demand and high potential for savings.

Ultrapure water is required in numerous industrial plants to safeguard processes. Process water includes boiler feed water, cooling water, condensate/condensate return, added water and many more uses of water.

Petrochemistry, chemistry and refineries, in particular, require large quantities of process water that is cost-intensive to produce and heat.

Recycling process water and its thermal energy, promises considerable savings potential - however, only if the water complies with purity specifications.

Organic impurities cause deposits in the pipework, corrosion in boilers, damage to heat exchangers or the failure of entire plants or plant components. Rapid and continuous process monitoring is required to safeguard plant operation.

### The meaning of TOC and how it is measured.

In most cases, the analytical effort required to determine all organic compounds that can occur in water is untenable. A so-called sum parameter is used: The TOC is considered as a reference for the organic load in water and is therefore an important indicator for its quality. As a rule, TOC is determined by oxidising an aqueous sample. The resulting CO<sub>2</sub> is then detected and quantified.

QuickTOC<sub>UV</sub> convinces with its ease of use, low investment costs and high operational safety.

#### Photochemical oxidation using UV light.

In this procedure, TOC is oxidised using UV light and a digestion reagent (sodium persulphate). The generated CO<sub>2</sub> is then measured by a NDIR (non-dispersive infra-red) detector.

#### Safe monitoring of drinking and surface water.

The procedure is recommended, in particular, for particle-free process water and for monitoring drinking and surface water, as not all particles can be fully oxidised by photochemical oxidation.

#### Determination of TC. Rapidly advantageous.

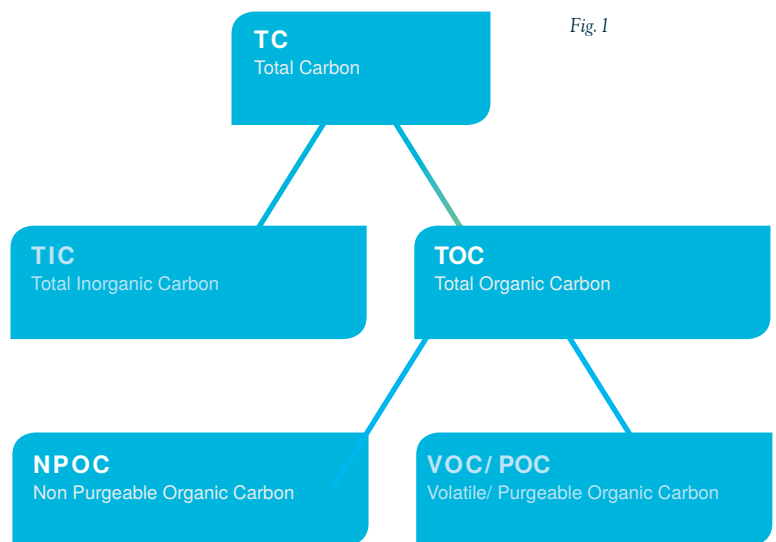
In the boiler, inorganic carbon (carbonate) reacts under high pressure to produce carbonic acid and other acidic products. These compounds can cause substantial damage to industrial plants. Monitoring of total carbon (TC) including volatile organic compounds is safeguarded using the UV persulphate method.

#### QuickTOC<sub>UV</sub>. User-friendly.

LAR's QuickTOC<sub>UV</sub> can be run both in the TOC and in the TC mode. It provides the option of monitoring two parallel sample streams. The clear, compact measuring system complies with common safety standards and has been designed to be particularly maintenance- and user-friendly. In addition, the large glass door allows rapid viewing of the processes that are running.

QuickTOC<sub>UV</sub> is fast and easy to use thanks to its large display and integrated keyboard. Further measurements can be displayed in addition to the current value and the status of the device. Functions such as auto-calibration and the automatic system check minimize servicing expenditures and guarantee high operational safety as well as reliable and precise measurements.

#### Composition of the parameters.



#### AT A GLANCE

- The quality of pure or ultrapure water must be guaranteed.
- Organic contaminants in drinking and surface water must also be continuously monitored.
- A TOC measurement indicates the organic contamination in the sample.
- Process safety can be safeguarded through continuous TOC monitoring.
- QuickTOC<sub>UV</sub> has been designed to be particularly maintenance- and user-friendly.

# THE ANALYSER.

We light up the dark.

## Continuous TOC determination.

### Using the UV persulphate method.

QuickTOC<sub>UV</sub> is an online measuring system that determines the parameters TC and TOC using the UV persulphate method. In addition, different versions of the measuring device can be supplied and it can thus also be used in Ex zones. TOC determination is carried out in accordance with the standards DIN EN 1484:1997 and US-EPA 415.2.

### The reactor. High resistance to wear and tear.

The reactor forms the heart of the QuickTOC<sub>UV</sub> as this is where UV oxidation takes place. A special external tube protects the user from hazardous UV rays. In addition, an internal tube made of quartz glass protects the UV lamp from direct contact with the sample. This allows us to guarantee safe operation for over 2 years.

### Operation and maintenance. Simple and fast.

The standard chemicals required for operation in TOC mode are reduced to a minimum. All servicing tasks are easy and simple to carry out

due to compact and functional construction of the measuring device. At a glance, the user is informed about current operating status thanks to the large glass door. The result: very low maintenance requirements with high uptime levels of >98%.

### The measuring technology. Reliable.

The QuickTOC<sub>UV</sub> process controls have been optimised in all areas. Additional sensors and carrier gas preparation are optional. Reliable operation is guaranteed by the separation of the analytical compartment from the electronics and by the use of high-quality materials.

### System checks. Automatic.

QuickTOC<sub>UV</sub> automatically carries out regular checks to assess correct function of NDIR detector by zero point correction and sensitivity tests. This ensures that any deviations are rapidly detected and guarantees precise results.

### Software and operation.

QuickTOC<sub>UV</sub> is operated using an 8.4 inch graphic TFT display and a keyboard that is integrated into the device. The software contains numerous settings for different applications, large storage capacity for measurement and calibration data and a variety of graphical functions for depicting the measuring values, e.g. as a 24h curve or table.

### Ex protection. With custom-made housing.

Solutions for ex zones are available as the QuickTOC<sub>UV</sub> can be supplied with ex-proof compliant housing option for zones 1 and 2. LAR housings are certified according to international guidelines.

QuickTOC<sub>UV</sub> can also be supplied in ex-proof housing (pressurized encapsulation).

Additional safety cabins can be dispensed with thanks to the internationally certified housing.



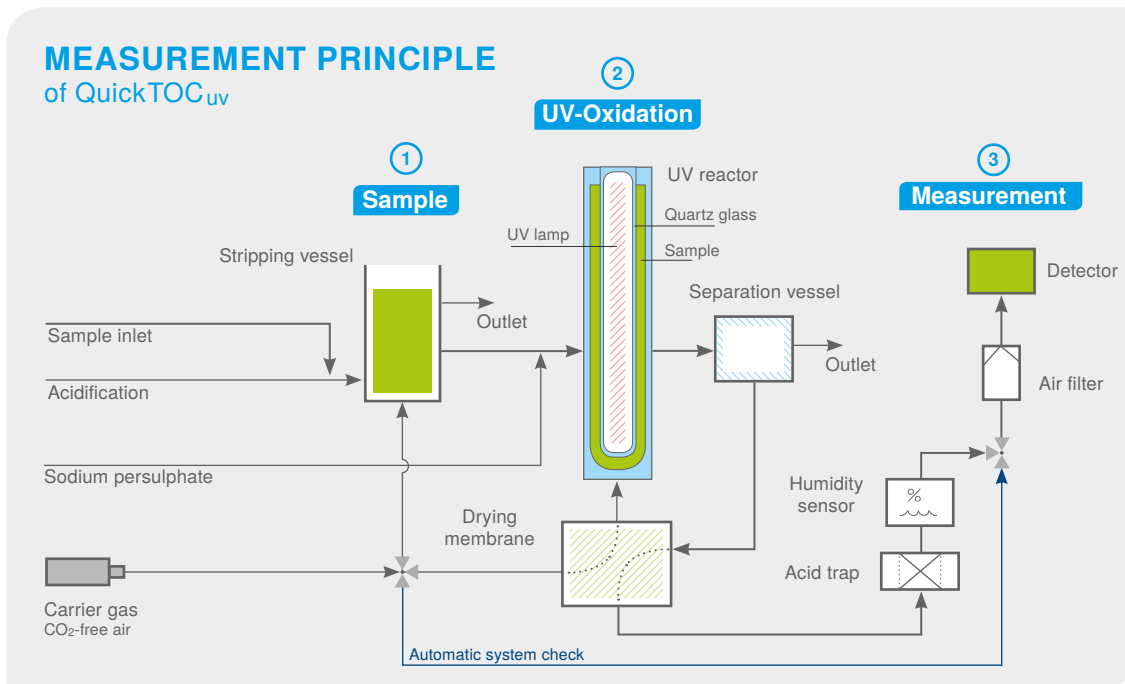


Fig.2

- 1) Sample preparation
  - a) Reduction of the sample pH to <2 by adding a weak acid
  - b) Conversion of the inorganic carbon into CO<sub>2</sub>
- 2) UV oxidation of the organic carbon to CO<sub>2</sub> using hydroxyl radicals
- 3) Measurement of CO<sub>2</sub> via NDIR detector

## THE PRINCIPLE.

We play it safe when making measurements!

### UV persulphate method.

#### Photochemical TOC determination.

The oxidizing agent sodium persulphate (Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>) is added to the sample to oxidize organic molecules to CO<sub>2</sub> using the UV persulphate method. The mixture is exposed to strong UV light, whereby hydroxyl radicals are produced that convert the organic carbon in the sample into CO<sub>2</sub>. This CO<sub>2</sub> is then measured using a sensitive NDIR detector and the carbon content is quantified.

#### TOC direct method or TC measurement.

Using the TOC-direct method, inorganic compounds are removed from the sample before oxidation, so that the organic compounds are digested within the uv-reactor.

The TC method dispenses the initial stripping, so that the result of the measurement comprises the entire carbon content including TIC and possible VOC/ POC.

### The procedure. Achieving the goal in three steps.

First the sample is acidified with a weak acid in a so-called stripping vessel and purged with air. At a pH level of 2, the inorganic content is removed from the sample in the form of CO<sub>2</sub>, which is channeled off. The sample only contains NPOC at the end of the procedure.

In the next step, the sample stream is fed constantly into the UV reactor together with the digestion reagent (sodium persulphate) and the carrier gas. Exposed to the ultraviolet light, the organic carbon is converted into CO<sub>2</sub> by the hydroxyl radicals that have been produced.

### HYDROXYL RADICALS



Free radicals (\*) are produced in UV light.

The sulphate anion radical produces hydroxyl radicals (\*OH) with water.

These react with organic compounds forming carbon dioxide and water.

The reaction product is then dried using a separation vessel and a specific drying membrane and is fed into the NDIR detector to quantify CO<sub>2</sub> content.



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

## Online TOC measurement - the easy way to analyse pure water.

The QuickTOC<sub>UV</sub>, manufactured by LAR Process Analysers, is a measuring device for continuous online determination of total carbon (TC) and total organic carbon (TOC) in pure water, e.g. condensate return and boiler feed water.



Fast and safe -  
you can rely on QuickTOC<sub>UV</sub>!

## ADVANTAGES & FEATURES

- ✓ Recognized UV persulphate method
- ✓ Continuous determination of TOC, TC, NPOC, DOC
- ✓ Accuracy of +/- 2 %
- ✓ Auto-calibration
- ✓ Automatic system check (zero point correction, sensitivity)
- ✓ Reduced consumption of chemicals
- ✓ Certified housing for EX zones (EX p) (options for ATEX, IECex, etc.)
- ✓ Analyser availability of minim. 98%
- ✓ Maintenance and service max. 15 minutes/ week
- ✓ Very low operating and maintenance costs

## TECHNICAL DATA

### Measurement Technique and Sample Preparation

Measurement Method	UV persulphate oxidation
Measurement Ranges	0,1–1 mg/l, 0,5–10 mg/l, 1–50 mg/l, 10–100 mg/l, 50–500 mg/l, 100–1.000 mg/l further options on request
Response Time TOC	<5 Minutes (T90)
Parameter	TOC, NPOC, TC, DOC
Calibration	Automatic and manual
Sample Streams	1 or 2 (optional)
Sample Preparation	Overflow vessel (optional)

### Dimensions and Weight

Housing	Steel IP 54, powder coated
Options	Stainless steel, IP 65,(Nema 4x), EXp Zone 1 and 2 (Atex, IECex)
Dimensions	W 600 x H 762 x D 397 mm
Weight	45 kg (Standard)

### Electric and Hydraulic Specifications

Inflow and Outflow	Tube 6 mm ID and 8 mm ID
Power Supply	230 / 115 V~, 50 / 60 Hz
Analogue Output	0/4–20 mA
Serial Interface	RS 232, collective alarm, Life-Zero, USB
Safety	2/6 A intern, 16 A extern
Remote Control	via TCP/IP protocol (Internet)(Optional)

### Equipment Devices and Data Output

Graphic TFT-Display, 8,4" back lit
Autostart function
Self explanatory software
Automatic system check

# ALL cLeAR?

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

We are the leading manufacturer of water analysers for industrial and municipal waste water treatment, process monitoring, as well as for pure water analysis. Further products in the areas of environmental technology and industrial processing complete our product portfolio.

#### Unique and state of the art.

##### LAR's Ultra High Temperature Method at 1,200°C!

LAR formed in 1986, gained prominence through their TOC and COD analysers. LAR is the only company worldwide that, using a high temperature method at 1,200°C, can completely oxidise a sample to accurately determine sum parameters. Particularly when measuring the TRUE TOC with differing concentrations.

#### LAR is only satisfied once the customer is.

We offer application specific analysers developed by our research and development team. In addition, we maintain close contact with our clients and continually analyse the exact problem areas of every application.

Since the availability of our devices is a deciding criteria, they are constructed in a very user-friendly way. All important areas require little effort

to be accessed and the protective housing offers additional safety.

#### After Sales. A familiar word to us.

Servicing is carried out by our qualified partners worldwide. Technical support, via telephone or e-mail is available at all times. Additionally, we offer practically orientated seminars and trainings, operator meetings and workshops, that leave no questions unanswered.

#### We always take a closer look.

Setting ourselves the highest quality standards, we closely cooperate with our partners to fulfill the customers expectations throughout the world. Thus, we regularly evaluate our distributors and when necessary, introduce measures to improve our collaboration with them.

LAR has established its own system for guaranteeing its standards of quality. Not only do we fulfill the requirements of the ISO 9001, but we also work continually on improving our standards of quality. To enable this, we collect information about all applications in our database that are subsequently analysed and evaluated. Regular meetings are held to address every issue guaranteeing highest quality standards.

#### TOC-ANALYSIS



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

#### COD-ANALYSIS



With our analysers, the chemical oxygen demand is cleanly and safely determined online, without using hazardous 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 a combination of these 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. Learn more about our product range at [www.lar.com](http://www.lar.com).

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TÜV certified company

## TOC-ANALYSIS

# QuickTOC<sub>UV</sub>

### AREAS OF APPLICATION

**ENVIRONMENT / MUNICIPAL FACILITIES / INDUSTRY**

### INDUSTRIES

**ENVIRONMENTAL MONITORING / WASTE WATER TREATMENT /  
POWER / WASTE PROCESSING / AIRPORTS / AUTOMOBILE /  
PHARMACEUTICAL / LABORATORY / CHEMICAL / PETROCHEMICAL /  
REFINERIES / COAL AND STEEL / PAPER MANUFACTURE /  
BREWERIES / FOOD MANUFACTURE / DRINK MANUFACTURE /  
MILK PROCESSING**

### TYPES OF WATER

**GROUNDWATER / SURFACE WATER / DRINKING WATER /  
WATER INFLUENT / WATER EFFLUENT / DISCHARGE CONTROL /  
INDUSTRIAL WASTE WATER / DE-ICING WATER / PROCESS  
WATER / OIL-IN-WATER / COOLING WATER / PURE WATER /  
BOILER FEED WATER / CONDENSATE RETURN /  
HIGH SALT CONCENTRATION / PHARMA HPW / PHARMA WFI**