LFE TOC-810

On-line TOC Analyzer

Continuous TOC analysis with High-temperature oxidation method

Typical Applications

- ⇨ Boiler feed water and condensate monitoring
- ⇨ Influent and effluent wastewater treatment monitoring
- ⇨ Monitoring of drinking water
- ⇨ Monitoring of airport de-icing water treatment

Key Features

- ⇨ Continuous analysis
- ⇨ High-temperature oxidation
- ⇨ Extraordinarily stable measuring characteristics
- ⇨ Highest operational reliability
- ⇨ Extensive self-monitoring

Description

The TOC-810 represents the newest generation of LFE's on-line TOC-analyzers. These have proven themselves with considerable success in use at many chemical plants as well as other important industrial companies since the beginning of the '80s.

The LFE TOC-810 has evolved out of real-world applications as an on-line analyzer for the continuous TOC registration of highly- as well as low contaminated water. The demands placed on every component of such an on-line TOC-analyzer require special design solutions.

Options

- ⇨ **Acidifier/ Sparger/ Multiplexer-unit** (ASM-unit; wall mounted)
  The basic TOC-810 instrument functions as a TC-analyzer. The ASM-unit facilitates the removal of inorganically bound carbon (TIC).
  This unit can be equipped with further options:
  - automatic calibration for 3 test solutions
  - Multiplex capability (3 sample streams)
  - Sample dilution stage
- ⇨ **Simultaneous, selective VOC- or TIC-analysis**
  in conjunction with 2nd NDIR measuring channel and the Acidifier/ Sparger/ Multiplexer-unit
- ⇨ **Analog expansion module**
  expands the system from 2 up to 6 configurable 0(4)-20mA analog outputs
- ⇨ **Digital expansion module**
  8 digital inputs plus expansion of system from 3 up to 10 digital outputs
- ⇨ **RS-232 serial interface**
- ⇨ **Built-in paperless recorder**

Features

Continuous analysis with high carbon conversion level

- ⇨ High temperature oxidation for the complete conversion of all organic carbon compounds
- ⇨ Continuous analysis

Special detail solutions for highest operational reliability

All components meet the highest requirements for long-term operational reliability.

- ⇨ Purgable cabinet section for NDIR photometer and main electronics as well as encapsulation of peripheral electronics
- ⇨ Spatial separation of water-bearing components
- ⇨ Consistent use corrosion resistant materials

Extraordinarily stable measuring characteristics

LFE develops and manufactures key components in order to attain exceptionally stable measuring characteristics.

- ⇨ Low-maintenance, high-precision metering pump
- ⇨ Modified BINOS® NDIR photometer system with a corrosion resistant analysis cell specially developed by LFE

Outstanding reactor service-life

- ⇨ The dimensioning of the analytical parameters allows maximum possible reactor service-life in combination with the fastest possible response time.
- ⇨ "Quick reactor change" design for high operational availability

Simple operation

- ⇨ All relevant instrument functions shown in plain text on the LC display
- ⇨ Intuitive user interface

Comprehensive intelligent self-monitoring

- ⇨ Distinction between operational and maintenance-related impairments
- ⇨ Output of alarm conditions via analog and digital outputs as well as a plain text description on the LC display

Optimized handling

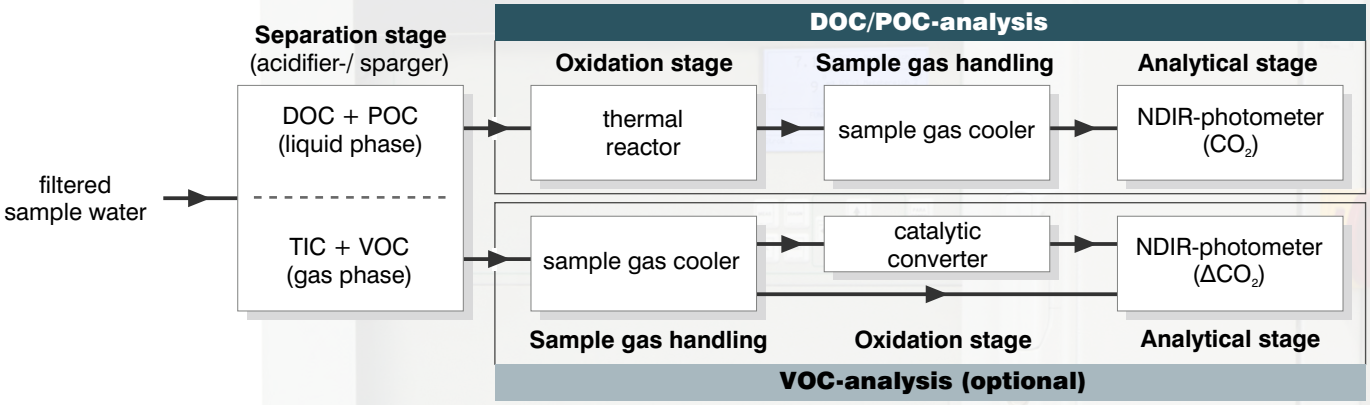
- ⇨ Optimized instrument design for ease of maintenance

Signal & status output

- ⇨ Up to 6 analog outputs (0(4)-20mA) for measured values as well as peripheral system values
- ⇨ Up to 8 digital inputs and 10 digital outputs
- ⇨ RS-232 interface

All inputs and outputs are individually configurable.

Functional Scheme



Unique VOC Analysis Package (Optional)

Background

Aside from the intentional removal of inorganically bound carbon (TIC) the sparger air can also inadvertently expel volatile organic carbon (VOC) compounds which escape detection.

The TOC-810 can be fitted with an optional package in conjunction with a 2nd photometer channel which **simultaneously and continuously** measures the VOC-level independent of the TOC- (or DOC-) analysis.

Functional Principle

The potentially VOC enriched sparger air is split into two parallel gas streams each containing a CO_2 background level representative of the TIC level of the water sample as well as possible VOC.

- ⇨ The 1st gas stream is passed unaltered through the reference cell of the differential CO_2 photometer channel.
- ⇨ The 2nd gas stream is passed through a catalytic converter stage in which any VOC is oxidized to CO_2 and added to the background CO_2 level. This stream is sent to the sample side of the differential CO_2 photometer.

The difference in IR radiation absorption in the photometer channel corresponds to the VOC concentration of the water sample.

The inherent response of a differential NDIR photometer to varying background levels is dynamically corrected for by the implementation of **LFE's patented gain stabilization** / **common mode rejection algorithm**. This is made possible by the use of a specially modified BINOS® photometer system (Emerson Process). First introduced by LFE in 1989, this unique method **totally eliminates** the need for a CO_2 scrubber. The resultant maintenance requirements for the VOC analysis are minimal.

Technical Data

General technical data

	TOC-Analyzer (main instrument cabinet)
Cabinet	2-section 19" cabinet on lockable rollers; active ventilation via filtered fans, electronics section purgeable
Dimensions	height: 169 cm width: 65 cm depth: 65 cm
Power	220/230VAC - 50/60Hz (other line voltages on request) continuous operation: 550 VA (Warm-up phase: 800 VA)
	Acidifier / Sparger / Multiplexer unit (option)
Construction	Components on polypropylene panel for wall mounting
Available options	acidifier-/sparger stage, automatic calibration, stream multiplex, supplemental peristaltic bypass feed pumps
Dimensions (h x w)	Basic unit: 500 x 500mm Extended unit: 500 x 665mm (provides room for additional optional peristaltic pumps)

Analytical-/Operational data

Measured quantity: Basic instrument: TC
with optional sparger-unit: TOC or DOC & VOC (as further option)

	DOC measurement principle	VOC measurement principle (option)
Measurement principle	High temperature combustion (typically 950°C) of water sample with subsequent photometric CO_2 analysis in the dried reactor exhaust	Sparger air analyzed for volatile organic carbon components utilizing catalytic conversion with subsequent photometric CO_2 analysis in a dedicated channel. The differential operation of this channel alleviates the need for a CO_2-scrubber.
Ranges	lowest range : 0 - 5 mg C/l (lower ranges on request) highest range : 0 - 5000 mg C/l	lowest range : 0 - 10 mg VOC/l highest range : 0 - 300 mg VOC/l
Response time (τ_{90})	typically 5 min (continuous measurement)	typically 2 min (continuous measurement)
Precision	< ±1% of FSO (full scale output)	< ±1% of FSO (full scale output)
Accuracy	< ±1% of FSO	< ±2.5% of FSO

Range specifications are given using standard instrument parameters; without optional sample dilution
Other specifications are dependent on instrument configuration.

Inputs and outputs

Read-out	LC-display (40 characters x 16 lines) and user interface based on NAMUR recommendation Language switchable between English and German
Instrument Status	Plain text description on the LC-display as well as categorization into one of the following states (NAMUR recommendation): INSTRUMENT FAULT, MAINTENANCE REQUIRED, MAINTENANCE
Analog signal output	2 current outputs (standard; optionally expandable to a total of 6 outputs) 0(4) - 20 mA (R_{Load} = 600Ω max.; all outputs isolated and individually configurable) • 0-20 mA or 4-20mA • 4-20mA with superimposed instrument status (NAMUR NE43 compliant) • Test signal levels
Digital outputs (standard)	3 digital outputs for instrument status (NAMUR NE107 compliant) (relay contacts 28V max.; 350mA max.) INSTRUMENT FAULT, MAINTENANCE REQUIRED, MAINTENANCE
Digital I/O (optional)	Digital inputs • 8 configurable inputs (6 – 24VDC; 10mA max.) • Sample stream selection, calibration solution selection, initiation and cancellation of AutoCal Digital outputs • 7 configurable outputs (relay contacts 28V max.; 350mA max.) • thresholds, feedback as to sample stream, calibration solution and AutoCal etc.

Note:

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