

# Skalar

your partner in chemistry automation



## Formacs<sup>HT</sup>

Carbon & Nitrogen Analyzers

# Formacs<sup>HT</sup> TOC / TN Analyzer



The Formacs<sup>HT</sup> TOC / TN analyzers provide fast, reliable analysis of Total Organic Carbon (TOC) and Total Nitrogen (TN) in liquid samples using high temperature catalytic combustion.

The units are designed to measure and handle the concentration of nitrogen and / or carbon fractions from various sample matrices. The analyzer can be operated as stand-alone analyzer, but for complete automation a random access autosampler is available.

The instrument is supplied customized for the sample type and optimized from a range of different catalysts and operation temperatures allowing the analysis of all carbon and nitrogen fractions present in the sample. The fractions can be measured sequentially or simultaneously with automated sample pretreatments such as acidification and purging.

A variety of options and accessories are available such as the Primacs<sup>MCS</sup> add-on module for Carbon determination in solid materials, the ND25 Total Nitrogen detector and the possibility of measuring Nitrates and Nitrites to provide a true Kjeldahl alternative.

The Formacs<sup>HT</sup> analyzer meets the latest requirements for any laboratory from low level up to extended high concentration ranges.

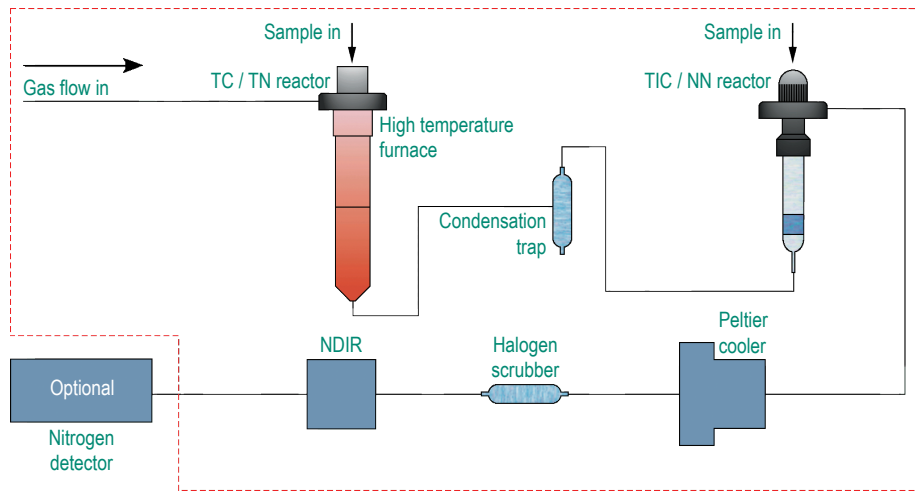
#### Application fields:

- Drinking water
- Waste water
- Surface water
- Sea water
- High saline waters
- Process control
- Pharmaceutical industry
- Soil extracts
- Others

#### FEATURES

- Stand-alone TOC operation or with auto-sampler
- Homogenization by automated stirring (rod or magnetic)
- Robust rotary septumless injection ports
- Integrated Peltier cooler for optimum moisture removal
- Large variety of vial sizes including septum-closed vials
- Allows a true system blank analysis
- Method according to EPA 415.1, Standard Methods 5310B, DIN 38409 H3, ASTM D-5173, USP <643>, EU 2.2.44, ISO 8245, EN 1484, USEPA 9060A

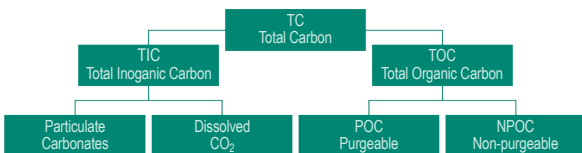
# Principle of operation



The Formacs<sup>HT</sup> analyzer can be operated as stand-alone analyzer. A random access auto sampler is available for complete automation.

The Formacs<sup>HT</sup> Analyzer measures Total Organic Carbon (TOC) by analyzing the Total Carbon (TC) and the Total Inorganic Carbon (TIC). Total Carbon (TC) is obtained by injection of the sample into a high temperature combustion furnace.

## Carbon Fractions



TC is converted to Carbon dioxide (CO<sub>2</sub>) at temperatures up to 950°C by catalytic oxidation. The CO<sub>2</sub> formed is subsequently dispersed into the carrier gas and the CO<sub>2</sub> concentration is measured by a non-dispersive infrared detector (NDIR).

TIC is determined by injecting the sample into a reactor containing acid, converting inorganic carbon (IC) to CO<sub>2</sub>. The NDIR measures the CO<sub>2</sub> concentration formed during acidification. The TOC concentration is calculated by automatically subtracting the TIC from the TC.

In addition, Non Purgeable Organic Carbon (NPOC) can be measured by automatic acidification and purging of the sample. TIC and the Purgeable Organic Carbon (POC) are then removed. NPOC remains in the sample and is measured directly by injecting the sample into the high temperature combustion furnace. The NPOC equals the TOC if the POC concentration is insignificant (TOC = NPOC + POC).

Optionally, the Formacs<sup>HT</sup> can be configured to measure POC directly. POC is purged from the liquid sample. The carrier gas + POC are injected in the high temperature combustion furnace and measured by NDIR.



# TN & TKN analysis



The ND25 detector can be added to the Formacs<sup>HT</sup> Analyzer for Total Nitrogen (TN) analysis.

A wide concentration range of TN can be measured with high accuracy in a short analysis time using chemiluminescence detection (CLD).

The sample is injected into the high temperature furnace where it is catalytically combusted. Oxidative pyrolysis causes the chemically bound nitrogen to be converted to Nitric Oxide (NO). In the ND25 detector, NO reacts to form metastable Nitrogen dioxide. The photons emitted from the rapid decay of the metastable nitrogen dioxide are detected by a photomultiplier tube.

The FormacsHT analyzer also provides a unique cost-effective and safer alternative for Total Kjeldahl Nitrogen (TKN) analysis, by an integrated NN-reactor for the analysis of Nitrate + Nitrite (NN).

The TKN value is determined in two steps, i.e. the analysis of TN and the analysis of NO<sub>3</sub> + NO<sub>2</sub> via chemical reduction, where NO<sub>3</sub> and NO<sub>2</sub> are reduced to NO and detected via CLD detection. The TKN value is obtained automatically by subtraction:  
 $TKN = TN - NN$ .

This unique alternative method of TKN analysis results in a very fast analysis time (5 min.) and eliminates the use of hazardous digestion acids.

The FormacsHT TOC/TN analyzer combines the automation of TOC, TN and TKN all in one system.



NO<sub>2</sub> and NO<sub>3</sub> Reactor

## FEATURES

- Simultaneous TOC and TN measurements
- CLD detector for analysis of TN and NO<sub>2</sub> + NO<sub>3</sub>
- Excellent alternative for Total Kjeldahl Analysis
- Low detection limits
- Fast analyses using no hazardous reagents
- No sample preparation required
- Wide dynamic range
- Low maintenance unit
- Method according to EN 12260, ISO 11905-2, ASTM D5176-91, DIN 38409 H27

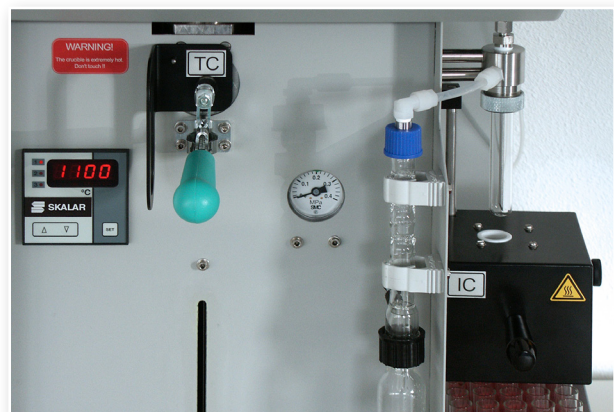
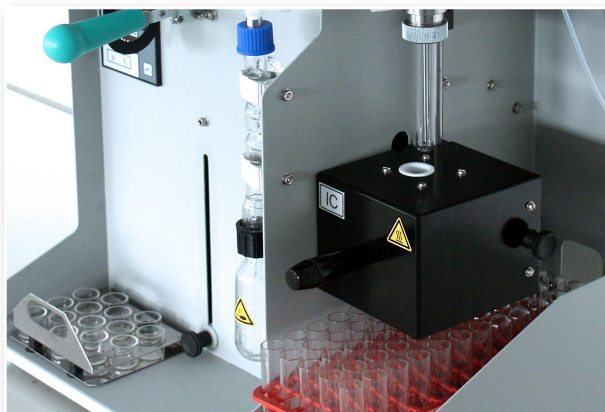
# Primacs<sup>MCS</sup> TOC module for solid samples



The Formacs<sup>HT</sup> TOC analyzer can be extended with the Primacs<sup>MCS</sup> module which consists of two integrated reactors for both TC and TIC analysis without any sample preparation. The TC is determined by catalytic oxidation of the sample at 1100°C, which converts the Carbon to CO<sub>2</sub>. TIC is determined by acidification of the sample in a separate reactor, which converts IC to CO<sub>2</sub>. The Primacs<sup>MCS</sup> uses the NDIR detector of the Formacs<sup>series</sup> for the detection of CO<sub>2</sub>. The Primacs<sup>MCS</sup> analyses TC, TIC and TOC. The software calculates the TOC concentration of the samples by subtraction - (TC - TIC = TOC).

## FEATURES

- Automatic balance interfacing
- Sample weights up to 3 grams
- Range of 1 mg to 40 mg absolute carbon
- Unique vertical sample introduction system
- Reusable quartz sample crucibles
- Economical concept
- Requires minimal bench space
- Integrated TC and TIC reactors
- No sample pretreatment required
- Method according ISO 10649, ISO 13137, EN 13639 EPA 415.1, ASTM D-2579, US EPA 9060A



# Data Acquisition & Instrument Control

The analyzer is controlled by Skalar's flexible HTAccess™ V5 data acquisition software.

HTAccess™ V5 is a user-friendly software package, which operates in Windows 11 environment. Accurate data processing, reporting, automated quality control features and enhanced analytical tools such as analysis methods with optimized validated settings for a specific analysis and dynamic automatic dilutions are included in this software package.

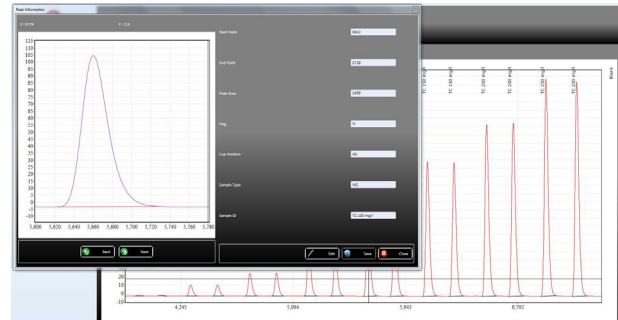
Once the analyzer has been configured to the laboratory preferences and the analysis methods have been validated, the operator simply creates a new analysis table, imports the sample ID's and selects per sample the validated analysis method. A method contains the optimized settings such as oven temperature, injection volume, sample time etc. for a specific analysis. The advantage is that each individual sample can be run with optimized conditions.

During the run the analysis progress can be followed in the analysis window. Each peak is automatically marked and identified in the graphical display of the run with realtime editing functions. The dual channel software displays the peaks and results of Carbon and Nitrogen analysis simultaneously. In case multiple calibration curves are stored, the software automatically selects the best-fit curve for every individual sample. Samples can be added or deleted during an analysis run and the running sequence can be changed in case of priority samples.

Analysis results can be exported to LIMS or Excel, including the statistical data of the analysis such as the calibration curve, CV values and average concentrations. Export and print layouts can be customized by the user.

## SOFTWARE FEATURES

- Specific optimized validated analysis methods per individual sample
- User defined alarm levels for safe and unattended operation
- User defined access levels to prevent unauthorized actions, like modifying validated analysis methods
- Automatic preparation of working standards
- Extended dilution functions with dynamic dilution factor
- Real-time graphs of analysis integration data for calibration
- Dual or single screen views of Carbon and Nitrogen
- Possibility of opening multiple analysis runs
- Availability of peak editing mode, during or after analysis, for optimizing analysis data before reporting
- Possibility of using Quality samples and creating QC Charts
- Possibility of exporting results during analysis
- Windows 11 compatible



Peak Information Window

# Other Skalar TOC & TN Analyzers

Skalar offers a variety of TOC and TN analyzers that are available for liquid or solid samples, all based on international standard regulations.

## Liquid Samples

### Formacs<sup>HT-I</sup> TOC Analyzer

The Formacs<sup>HT-I</sup> TOC / TN analyzers provide fast, reliable analysis of TOC and TN in liquid samples by direct sample injection in a high temperature catalytic combustion furnace. The Formacs<sup>HT-I</sup> units are especially designed for particulate laden samples (suspensions) like waste waters, but can handle the concentration of nitrogen and/or carbon fractions from various other sample matrices as well.



## Solid Samples

### Primacs<sup>SNC-100</sup> TOC - TN / Protein Analyzer

The Primacs<sup>SNC-100</sup> is a flexible solid sample analyzer with integrated 100-position autosampler for determination of Nitrogen (N) / Protein, Total Carbon (TC), Total Elemental Carbon (TEC), Total Inorganic Carbon (TIC) and Total Organic Carbon (TOC). The analyzer provides fast, accurate and low level analysis for these parameters in applications such as soil & plant, sludges & sediments, animal feed & grain, food, malt, fertilizer etc.

To check which analyzer is the best solution to automate your application(s) visit our website [www.skalar.com](http://www.skalar.com) or contact us directly via E-mail or phone.

# Contact information

## Skalar's Headquarters Skalar Analytical B.V.

**Tinstraat 12**  
4823 AA, Breda  
The Netherlands

+31 (0)76 5486 486  
+31 (0)76 5486 400  
[info@skalar.com](mailto:info@skalar.com)

## USA Headquarters Skalar, Inc.

**5012 Bristol Industrial Way #107**  
Buford, GA 30518  
Toll Free: 1 800 782 4994

+ 1 770 416 6717  
+ 1 770 416 6718  
[info@skalar-us.com](mailto:info@skalar-us.com)

## Canada Skalar, Inc.

Unit #200, **270 Orenda Road**  
**Brampton**, L6T 4X6  
Toll Free: 1 800 782 4994

+ 1 770 416 6717  
+ 1 770 416 6718  
[info@skalar-us.com](mailto:info@skalar-us.com)

## United Kingdom Skalar (UK) Ltd.

**The Pentagon,**  
3365 Century Way,  
Leeds, LS15 8ZB, UK

+ 44 (0)1908 410168  
[info.uk@skalar.com](mailto:info.uk@skalar.com)

## Germany Skalar Analytic GmbH

**Gewerbestraße Süd 63**  
41812 Erkelenz  
Germany

+ 49 (0)2431 96190  
+ 49 (0)2431 96190  
[info.germany@skalar.com](mailto:info.germany@skalar.com)

## France Skalar Analytique S.A.R.L.

**35 - 37, rue Berthollet**  
94110 Arcueil  
France

+ 33 (0)1 4665 9700  
+ 33 (0)1 4132 1100  
[info.france@skalar.com](mailto:info.france@skalar.com)

## Portugal Skalar Portugal, Lda

**Alameda dos Oceanos**  
nº7; 1º andar; S2  
1990-º196 Lisboa

+ 351 21 896 3003  
[info.skalarportugal@skalar.com](mailto:info.skalarportugal@skalar.com)

## Czech Republic Skalar s.r.o.

**Nademlejská 600**  
198 00 Praha 9  
Czech Republic

+ 420 242 481 706  
[info.cz@skalar.com](mailto:info.cz@skalar.com)

## Asia / Middle East Skalar Analytical India Pvt. Ltd.

**No. 7/4, Pappathiammal Street**  
Jain Colony, Kodambakkam  
Chennai - 600024 - India

+ 9144 2483 7007  
+ 9144 2483 6006  
[info.skalarindia@skalar.com](mailto:info.skalarindia@skalar.com)

Skalar is represented in over 80 countries Worldwide for details of your local agent please contact Skalar's headquarters in the Netherlands.



 [www.skalar.com](http://www.skalar.com)