Product specifications

analytikjena
An Endress+Hauser Company

multi N/C x300 Series
TOC/TN_b Analyzers

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General

The multi N/C x300 series offers a range of TOC analyzers for the determination of the parameters TOC, DOC, NPOC, TC, TIC and POC in aqueous samples. Parameters like COD and BOD_5 can be calculated from TOC results. For TIC removal in NPOC determination the samples are acidified and purged. The automatic TIC control function in NPOC mode checks for a complete elimination of the TIC during NPOC purge.

The combustion-based analyzers can optionally be upgraded for TN_b / DN_b determination in aqueous samples and/or for TC, TOC and TIC solids analysis.

Different TC/TOC/TIC solids options are available and a fully automated TC/TOC solids option with a robust catalyst-free combustion principle is provided by the multi N/C duo systems. multi N/C duo devices always consist of a combination of a multi N/C x300 basic unit and a HT 1300 solids furnace, equipped with both, a high throughput liquid autosampler and a solids autosampler.

The multi N/C 2300 N is a dedicated TN analyzer for total protein determination and equipped with a CLD detector and AS 60 autosampler by default, whereas the multi N/C 3300 HS is a dedicated pure water TOC analyzer on the high-temperature catalytic oxidation (HTCO) principle, which can also cover TN in cleaning validation.

The multi N/C 4300 UV is a dedicated TOC analyzer working with the high-power long-life UV reactor, which operates at two energy-rich wavelengths, 254 nm and 185 nm, featuring lowest detection limits.

Unique features

- Maintenance-free, wide-range **Focus Radiation NDIR (FR-NDIR)** detector for precise CO_2 detection, equipped with a pulsed, high-power IR radiation source, corrosion-free cell and highly sensitive micro detector. Covered by **5-year long-term warranty***).
- **Highly durable furnace unit** for combustion temperatures up to 950 °C for combustion-based multi N/C x300 analyzer models, covered by **5-year long-term warranty***).
- **High-Power Long-Life UV reactor** for analyzer models using wet-chemical digestion principle, covered by **3-year warranty***).
- **VITA Flow Management System:** highest operating safety and reliable analysis results, also when injecting large sample volumes
- **Easy Cal:** easy calibration with long-term stability, e.g. multipoint calibration with a single standard using different injection volumes, automatic selection of the optimum calibration curve for sample measurements
- **Auto-protection**: protection of valuable system components thanks to effective drying of measuring gas without using desiccants and efficient measuring gas cleaning including monitoring
- **Self Check System (SCS):** trouble-free operation and maximum uptime for high sample throughput thanks to automatic monitoring of all system parameters important for device safety and quality of the analysis results, including automatic and permanent system tightness check

*) according to the specified warranty conditions on our website: Warranty Conditions - Analytik Jena

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Options to extend the analyzer's application range

TN_b / DN_b analysis according to DIN EN ISO 20236 or DIN EN 12260

- Upgrade for determination of total or dissolved bound nitrogen (TN_b / DN_b) using the **chemiluminescence detector (CLD-300)**
- Determination of total protein nitrogen using CLD according to Pharm. Eur. <2.5.33>, Method 7B, USP <1057>, Method 7.2, JP XVII, Total Protein Assay, Method 7B
- **Maintenance-free solid-state chemo detector (ChD)** – no running costs, no additional gas consumption, no additional space requirements (no upgrade in the field)
- **Fully simultaneous TOC/TN_b determination** from a single injection using the same catalyst / combustion tube filling

Salt kit available for multi N/C 3300 – The Allrounder to reduced maintenance and operating costs for highly saline samples (e.g. brine, sea water, LIB cathode salt solutions).

Solids TOC analysis

Determination of TC/TOC in solid samples with integrated double furnace technique or with additional high-temperature solids module HT 1300.

- **Double Furnace Module** for solid samples using **catalytic high-temperature combustion** up to **950 °C** in the quartz glass combustion tube of the T-furnace of the basic unit (only multi N/C 2300) ensures complete oxidation of stable organic compounds
- **Swab Test Module** provides an upgrade of the multi N/C 3300 HS for the **direct swab combustion** in TOC cleaning validation of water insoluble contaminants (only suitable for quartz-fiber swabs) operating with catalytic high-temperature combustion up to 950 °C ensuring complete oxidation of stable organic compounds
- **HT 1300** for **catalyst-free high-temperature combustion** of solid samples up to **1300 °C** in a robust high-temperature ceramic combustion tube (HTC technology) ensures complete oxidation of most complex matrices (organic / inorganic).
- Strongly extended range of solid applications, e.g. TC/TOC measurement in soil, sludge, sediments, waste, ash, slag, solid fuels, oil shale or renewable raw materials and biomasses
- **Sample weights** of up to **3 g** ensure representative results even for rather inhomogeneous samples
- HT 1300 furnace module in combination with multi N/C 3300 (duo) and multi N/C 2300 (duo) allows **fast switching between liquid and solid analysis** by just a few mouse clicks (built-in valve technology)
- **Fully automated solid analysis** with HT 1300 for up to 48 samples per sequence is available by multi N/C 3300 duo and multi N/C 2300 duo

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Instrument Models

multi N/C 2300 – The Specialist

TOC analyzer applying direct injection principle for all TOC/TN_b applications in environmental monitoring, process effluent testing and academia

- Thermocatalytic oxidation up to 950 °C ensures complete digestion of stable compounds
- Wide measuring ranges from 50 µg/L up to 30,000 mg/L C – even without sample dilution
- **Septum-free direct injection** by micro liter syringe with wide-bore needles of 0.7 mm I.D. for outstanding particle handling capability (shortest way of sample transport and wide inner diameter)
- Injection volumes from 10 – 500 µL
- **Intelligent injection volume reduction** for over-range samples
- Bake-out of the injection needle and optimized rinse performance for carry-over-free sample dosing
- Upgradeable with autosampler AS 60 for liquid samples with 60 or 112 positions
- Allows multiple replicate injections from 1.8 mL HPLC vials by utilization of minimum sample volumes (min. 1 mL)

multi N/C 2300 duo

Fully automated liquid and solid TOC analyzer applying direct injection principle for all TOC/TN_b applications in environmental monitoring, process effluent testing and academia

- Thermocatalytic oxidation up to 950 °C for water-based samples ensures complete digestion of stable compounds
- Wide measuring ranges from 50 µg/L up to 30,000 mg/L C – even without sample dilution
- **Septum-free direct injection** by micro liter syringe with wide-bore needles of 0.7 mm I.D. for outstanding particle handling capability (shortest way of sample transport and wide inner diameter)
- Injection volumes from 10 – 500 µL
- **Intelligent injection volume reduction** for over-range samples
- Bake-out of the injection needle and optimized rinse performance for carry-over-free sample dosing
- Including an autosampler for up to 60 liquid samples, upgradeable for 112 positions
- Allows multiple replicate injections from 1.8 mL HPLC vials by utilization of minimum sample volumes (min. 1 mL)
- Including automation for up to 48 samples in ceramic boats for catalyst-free high-temperature analysis of solid samples at up to **1300 °C** in a robust high-temperature ceramic combustion tube (HTC technology)
- Maximum **sample amounts** of up to **3 g** ensure representative results even for rather inhomogeneous samples

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- Extremely wide working ranges from 0 - 500 mg C absolute
- Ultra-fast switch-over from liquid to solid applications and vice versa by integrated valve technique (with just a few mouse clicks)

multi N/C 2300 N

Dedicated total protein analyzer for aqueous protein solutions (e.g. vaccines and further biopharmaceutical products) via total nitrogen determination

- Thermocatalytic oxidation up to 950 °C ensures complete digestion of stable compounds
- Wide measuring ranges from 5 µg/L up to 200 mg/L TN without sample dilution
- **Septum-free direct injection** by microliter syringe with 10–500 µL injection volume (shortest sample way from vial to furnace)
- **Intelligent injection volume reduction** for over-range samples
- Bake-out of the injection needle and optimized rinse performance for carry-over-free sample dosing
- Autosampler for liquid samples with 60 positions for 8 mL vials or 112 positions for 1.8 mL HPLC snap-cap vials making minimum sample volume requirements (down to 1 mL) available for replicate injections.

multi N/C 3300 – The Allrounder

Universally applicable TOC analyzer applying flow injection principle for TOC/TN_b applications – extremely robust and sensitive

- Thermocatalytic oxidation up to 950 °C ensures complete digestion of stable compounds
- Wide measuring ranges from 4 µg/L up to 30,000 mg/L C – even without sample dilution
- Robust flow injection from injection loop by ceramic valve technique and intelligent sample handling to prevent any carry-over
- Wide tubing inner diameters of minimum 0.8 mm for optimum particle handling
- Injection volumes from 50 – 1000 µL
- **Intelligent injection volume reduction** for over-range samples, as well as **automatic and intelligent dilution** available for specific autosampler configurations (e.g. AS 10e, AS 21hp, AS vario / ER with 72 pos. rack)
- High sample throughput by parallel purging and analyzing in NPOC mode
- Reduced maintenance and operating costs for highly saline samples (e.g. brine, sea water) with the **salt kit**
- Upgradeable with a range of different autosamplers for up to 146 liquid samples (AS 10e, AS 21hp, AS vario, AS vario ER, EPA sampler)

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- Automatic and intelligent dilution (free selectable dilution factor up to 1:100) in combination with AS 10e, AS 21hp and AS vario / AS vario ER

multi N/C 3300 duo

Fully automated liquid and solid TOC analyzer applying flow injection principle for all TOC/TN_b applications – extremely robust and sensitive

- Thermocatalytic oxidation up to 950 °C for water-based samples ensures complete digestion of stable compounds
- Wide measuring ranges from 4 µg/L up to 30,000 mg/L C – even without sample dilution
- Robust flow injection from injection loop by ceramic valve technique and intelligent sample handling to prevent any carry-over
- Wide tubing inner diameters of minimum 0.8 mm for optimum particle handling
- Injection volumes from 50 – 1000 µL
- **Intelligent injection volume reduction** for over-range samples, as well as **automatic and intelligent dilution** available for specific autosampler configurations (e.g. AS 10e, AS 21hp, AS vario / ER with 72 pos. rack)
- High sample throughput by parallel purging and analyzing in NPOC mode
- Reduced maintenance and operating costs for highly saline samples (e.g. brine, sea water) with the **salt kit**
- Including AS vario ER for up to 146 liquid samples and most effective carry-over control
- Automatic and intelligent dilution (free selectable dilution factor up to 1:100) with AS vario ER
- Including automation for up to 48 samples in ceramic boats for catalyst-free high-temperature analysis of solid samples at up to **1300 °C** in a robust high-temperature ceramic combustion tube (HTC technology)
- Maximum **sample amounts** of up to **3 g** ensure representative results even for rather inhomogeneous samples
- Extremely wide working ranges from 0 - 500 mg C absolute
- Ultra-fast switch-over from liquid to solid applications and vice versa by integrated valve technique (with just a few mouse clicks)

multi N/C 3300 HS

Designed for all trace TOC applications in power plants for boiler feed water and especially pharmaceutical industry, for the analysis of WFI (water for injection purposes), AP (purified water), TOC and/or TN cleaning validation (final-rinse, swab extracts, direct swab combustion)

- Thermocatalytic oxidation up to 950 °C ensures complete digestion of stable compounds

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- Sample feed by flow injection for variable and especially high injection volumes (50 to 3,000 µL)
- Upgradeable with a range of different autosampler for up to 72 liquid samples (AS 10e, AS 21hp, EPA sampler, AS vario)
- High sample throughput by parallel purging and analyzing in NPOC mode
- Highest sensitivity and repeatability for combustion-based TOC analyzers in the trace range down to 4 µg/L
- Availability of Swab Test Module for direct swab combustion in TOC cleaning validation
- Upgradable by chemiluminescence detector (CLD-300) for TN cleaning validation

multi N/C 4300 UV – The Trace Detector

High sensitivity combined with best matrix tolerance regarding total dissolved solids and acids/alkalis

- Wet chemical sample digestion by hard UV radiation, optionally supported with the oxidation reagent peroxydisulfate at elevated temperatures (> 80°C) inside the High-Power Long-Life UV reactor
- Complete oxidation of stable compounds using two energy-rich wavelengths, 254 nm and 185 nm, enables UV-digestion without the use of blank-value prone oxidation agents for reliable ultra-pure water analyses (TOC <1 ppm)
- Sample feed by flow injection for variable, in particular very high injection volumes (50 to 20,000 µL) for rather particle-free samples (preferably particle size < 0.45 µm)
- Wide measuring ranges from 1 µg/L up to 10,000 mg/L C – even without sample dilution
- Effective blank value reduction by means of automated purge of the reagents
- High sample throughput by parallel purging and analyzing in NPOC mode
- Minimum operating costs – thanks to the use of a highly durable UV radiation source, self-made reagent preparation (according to instructions) and minimal maintenance compared to high-temperature TOC analyzers
- Upgradeable with a range of different autosamplers for up to 146 liquid samples (AS 10e, AS 21hp, AS vario, AS vario ER, EPA sampler)
- Upgrades for solids TC/TOC by HT 1300 module or for solids TIC by TIC solids module (manual)

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Software multiWin pro

- Intuitive user guidance by control and evaluation software multiWin pro in 10 different languages
- All information at a glance during sequence run, e.g., live result updates in sequence table, peak graph and replicates, vital instrument parameters
- Flexible sequences
  - Measure with different methods in one sequence
  - Mix calibrations, samples, QC standards, various blank types, and SSTs in one sequence
  - Use control steps like instrument standby or rinse for worry-free unattended operation
  - While the sequence is running, freely add, delete or change samples in the sequence.
  - Automatically assign sample names when creating the sequence
  - Create templates and re-use them over and over again for routine analysis
- Easy calibration
  - Easy Cal – multi-point calibration from a single standard
  - Extension of existing calibration curves by simple adding of calibration points
  - One calibration can be used for several methods
  - Up to 3 calibration ranges per parameter and method can be used
- Comprehensive user-oriented functions
  - Freely write new methods and sequences, evaluate and print results or change settings even when the analyzer is measuring.
  - Automatic results correction through evaluation of blanks (e.g. preparation, dilution or eluate blank).
  - Easy recalculation of results
  - Conversion of TOC results into COD and BOD_5 with sample specific conversion factors (default conversion factor provided), conversion of TIC into CO_2 results and TN into total protein results.
  - Free choice of results dimension
  - User-defined checklist for quick start of operation
  - Search, sort and filter functions for methods, calibration and result files
- Individual User Management (optional)
- Comfortable management and storage of data and parameters
- Automatic or manual data export (PDF, XML, CSV), freely editable

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Pharma Module multiWin pro

- multiWin pro pharma module contains a **server-based central data management** (CDM module), fulfilling all data integrity and FDA 21 CFR part 11 requirements.
- **Individual electronic signatures** can be used to sign methods, calibrations, SSTs and measurement results in a 3-stage process: created, checked and released. The principle of dual control is established. Users can be prohibited to measure with unreleased methods and calibrations.
- **Versioning of methods** and measurement results enables full insight into the history of changes.
- **Audit trail** with filter/search functions automatically records all user and instrument activities, as well as record changes. The audit trail not only logs the activity, but also logs details of the change with previous and current values.
- The **role-based user management concept** offers freely adjustable user roles warranting full control on who can do what based on their assigned user role.
- **Individual passwords** of adjustable complexity and expiration times guarantee that no unauthorized person has access to the system.
- Synchronization of user accounts with external user management systems, e.g. **Active Directory access**, enables users to use e.g. their Windows account info to log in to multiWin pro.
- **System suitability test** (SST) sequence for USP, EP, JP and KP integrated with automatic SST evaluation and report generation.

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