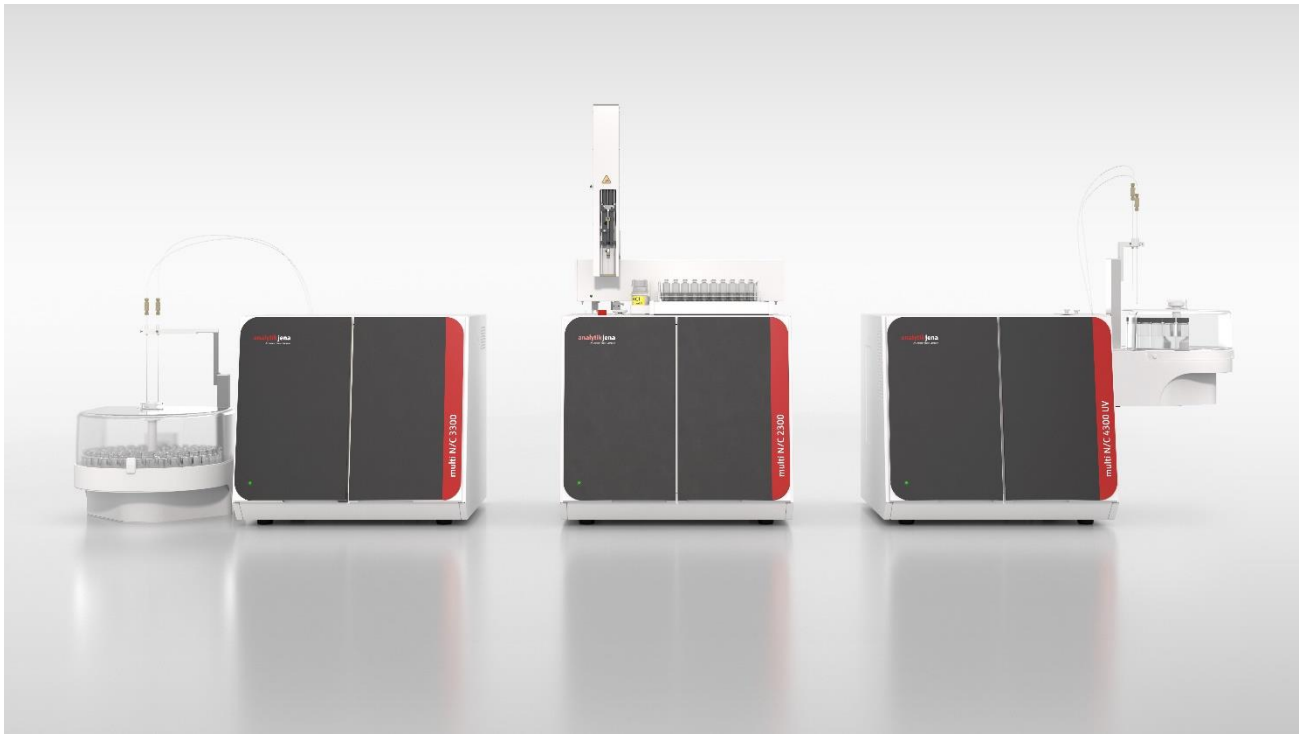
Technical Data

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. Sample digestion in the multi N/C 2300 and multi N/C 3300 series devices is carried out using catalytic high-temperature combustion, while the multi N/C 4300 UV uses wet-chemical UV oxidation.
- The high-temperature combustion systems can be optionally upgraded for TN_b determination in aqueous samples using chemiluminescence detection (CLD) or electrochemical detection (ChD).
- The multi N/C 4300 UV is a special C analyzer with wet-chemical UV digestion technology. N analysis is not possible here.
- For TIC, TC and TOC analysis in solids, the HT 1300 and the TIC solids manual module are available as add-on modules. For the multi N/C 2300, it is also possible to use the internal furnace of the basic device for the catalytic high-temperature oxidation of solid samples with the Double Furnace (DF) module (after appropriate system conversion).
- For the high-temperature combustion systems the following special models are available:
  - The multi N/C 2300 duo and multi N/C 3300 duo models enable fully automated TC/TOC solids measurement with robust catalyst-free sample oxidation in the ceramic combustion tube. These measuring systems always consist of a combination of a multi N/C 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 special N analyzer for total protein determination in aqueous samples and is equipped with a CLD detector and an AS 60 autosampler as standard. C analysis and a solids option are not available here.
  - The multi N/C 3300 HS is a high-temperature combustion system for largely particle-free samples in the drinking and ultrapure water sector (pharmaceuticals, power plants, semiconductor industry). With the swab test module, it offers a special option for direct swab combustion for TOC cleaning validation.

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Standard Compliance

	multi N/C 2300 N (N analyzer)	multi N/C 2300, multi N/C 2300 duo	multi N/C 3300, multi N/C 3300 duo	multi N/C 3300 HS	multi N/C 4300 UV (C analyzer)
TOC (liquid)	-	DIN EN ISO 20236 | ISO 8245 | DIN EN 1484			ISO 8245 | DIN EN 1484
	-	ASTM G144 | ASTM D7573			ASTM D4839
	-	US EPA 415 | US EPA 9060			
	-	APHA 5310B			APHA 5310C
	-	-	USP <643> | USP <661.1> | USP <661.2> | Pharm. Eur. 2.2.44 | JP 2.59		
TN_b (liquid)	DIN EN ISO 20236 |DIN EN 12260				-
	APHA 4500-N E | ASTM D8083				-
	EP 2.5.33, 7B | USP <1057>, 7.2 | JP XVIII <G3-12-172>, 7B				-
TC/TOC (solid)[1)]	-	ISO 10694 | DIN EN 13137 | DIN EN 15936		Swab-Test-Module only	ISO 10694 | DIN EN 13137 | DIN EN 15936

[1)] refers to HT 1300 furnace module (component of multi N/C 2300 duo and multi N/C 3300 duo) and double furnace module in combination with the multi N/C 2300 basic unit

Control and Data Evaluation

Control	PC
Operation and data evaluation software	multiWin pro with user management, back-up and export functions, e.g., for LIMS systems in CSV and PDF format
21 CFR Part 11 Module	The optional Pharma software module supports FDA 21 CFR Part 11 compliance for every device model of the multi N/C x300 series (including all requirements regarding data integrity, electronic signatures, audit trail and assignment of rights in user management)
Software	multiWin 4.X with user management, export function in .csv, .pdf and LIMS-system
Minimum requirements PC	▪ Desktop PC or laptop ▪ Operating system: Windows 10 (32-Bit or 64-Bit) or higher ▪ Processor: 3.2 GHz ▪ 4 GB RAM, 40 GB hard disk drive ▪ Interfaces: USB 2.0 (1 x required for connection to basic unit) ▪ Monitor: Graphic resolution 1024 × 768 pixels

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Overview

	multi N/C 2300 N (N analyzer)	multi N/C 2300, multi N/C 2300 duo	multi N/C 3300, multi N/C 3300 duo	multi N/C 3300 HS	multi N/C 4300 UV (C analyzer)
Digestion mode	High temperature combustion up to 950 °C				UV digestion with oxidation reagent
Parameters	TN (CLD)	TC, TIC, TOC, DOC, NPOC, NPOCplus, POC			
Measurement range	0-200 mg/L N	0–30,000 mg/L C			0–10,000 mg/L C
Limit of Detection	5 µg/L N	50 µg/L C	4 µg/L C		1 µg/L C
Optional parameters	-	TN (ChD/CLD)	TN (ChD/CLD) POC direct	TN (CLD)	-
Reproducibility	CV 2–3%	CV 1–2%			
Measuring time	Approx. 3–5 min for each parameter				
Sample injection	Septum-free direct injection		Loop injection technique	Automatic flow injection	
Injection volume	10–500 µL variable		50–1,000 µL variable	50–3,000 µL variable	50–20,000 µL variable
Automatic dilution	–		Dilution factor 1:5 – 1:100	–	
Sampler options	AS 60		AS 10e, AS 21hp, AS vario, AS vario ER[1], EPA sampler		
Gas supply[2]	Oxygen 4.5 or synthetic air[3]				Nitrogen 5.0 or Argon 4.6
Gas consumption (8 h/d, 5 d/w)	Approx. 1,800 L/month		Approx. 2,200 L/ month	Approx. 1,400 L/ month	Approx. 1,600 L/month
Upgrade for solid samples[4]	-	Double furnace HT 1300 TIC manual	HT 1300 TIC manual	Swab test module	HT 1300 TIC manual
TC/TOC solid automation	-	multi N/C duo devices for up to 48 solid samples			-

[1] AS vario ER not available for multi N/C 3300 HS

[2] For carrier gas quality requirements, see table “Solid Options”, page 9

[3] TOC grade purified air can be supplied from gas cylinders or after clean-up of pressurized air by a TOC gas generator. Purity specifications to be met: CO_2 < 1 ppm, hydrocarbons <0.5 ppm (as CH_4), supply pressure: min. 4 bar (72 psi), provided flow rate: min. 300 mL/min, recommendations for TOC gas generator models on request.

[4] HT 1300 is already included with the multi N/C duo systems, Double furnace module is not available with multi N/C 2300 duo

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TN options: ChD + CLD (liquid samples only)

	ChD	CLD
Detection principle	Electrochemical solid-state detector	Chemiluminescence detector
Parameters	TN_b (Total bound Nitrogen)	TN_b (Total bound Nitrogen)
Measuring range	0 – 100 mg/L TN_b, up to 10.000 mg/L TN_b [1)]	0 – 200 mg/L TN_b, up to 20.000 mg/L TN_b [1)]
Limit of detection	50 µg/L TN_b	5 µg/L TN_b
Reproducibility	RSD 2–3%	RSD 2–3%
Analysis time	3–5 min	3–5 min
Ozone source gas	No	Synthetic air (recommended) or oxygen, 60 mL/min
Dimensions W × D × H	Built in (inside TOC analyzer)	Approx. 296 mm × 582 mm × 464 mm
Weight	Approx. 0.5 kg	Approx. 12,5 kg

[1)] With automatic dilution (multi N/C 3300 and multi N/C 3300 duo), with max. dilution ratio: 1: 100

Autosampler AS 60 - Automation for multi N/C 2300 (component of multi N/C 2300 duo)

	No. of positions	Vials	Syringe size
Standard rack	60	8 mL / 100 pc. + magnetic stir bars 60 pcs. incl.	500 µL incl.
Optional racks	112	2 mL / 200 pcs. + 200 septa/caps incl.	250 µL incl.
Automatic acidification / Reverse rinse	Yes		
Automatic purging (NPOC)	Yes		
Parallel purge and analyzing (NPOC)	No		
Automatic / intelligent dilution	No		
Intelligent inj. vol. reduction	Yes		
Sample homogenization	Yes		
Dimensions W × D × H	Approx. 500 mm × 380 mm × 500 mm		
Weight	Approx. 9 kg		

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Autosampler AS vario / ER (ER: external needle rinse function)

Automation for multi N/C 3300, multi N/C 3300 HS and multi N/C 4300 UV (AS vario ER is a component of multi N/C 3300 duo, not suitable for multi N/C 3300 HS)

	No. of positions	Vials
Optional racks (no default rack included)	72 / ER [1]	40 mL / 100 pcs. + magnetic stir bars 100 pcs. incl.
	100 / ER [1]	20 mL / 100 pcs. + magnetic stir bars 100 pcs. incl.
	146 / ER [1]	12 mL / 156 pcs. + magnetic stir bars 150 pcs. incl.
	52 [2]	100 mL / 100 pcs. incl.
	20 [2]	100 mL (Schott bottles) / 20 pcs. incl.
Automatic acidification / Reverse rinse [3]	Yes [4]	
Automatic purging (NPOC)	Yes	
Parallel purge and analyzing (NPOC)	Yes [5]	
Automatic / intelligent dilution	Yes [6]	
Intelligent inj. vol. reduction	Yes [6]	
Sample homogenization	Yes	
Dimensions W × D × H	Approx. 350 mm × 400 mm × 470 mm	
Weight	Approx. 15 kg	

[1] for particle containing samples
[2] for pure water samples (particle-free)
[3] additional external needle rinse with AS vario ER
[4] not available with multi N/C 3300 HS
[5] not available for rack with 20 positions
[6] only available with multi N/C 3300 / 3100 and multiWin pro software

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Autosampler AS 21hp - Automation for multi N/C 3300, multi N/C 3300 HS and multi N/C 4300 UV

	No. of positions	Vials
Standard rack included	21	50 mL / 21 pcs. + magnetic stir bars 21 pcs. incl. (supports automatic & intelligent dilution with multi N/C 3300; 10 pos. for original sample, 10 pos. for dilution)
Automatic acidification / Reverse rinse	No	
Automatic purging (NPOC)	Yes	
Parallel purging and analyzing (NPOC)	Yes	
Sample homogenization	Yes	
Automatic / intelligent dilution	Yes [1)]	
Intelligent inj. vol. reduction	Yes [1)]	
Dimensions W × D × H	Approx. 260 mm x 320 mm x 390 mm	
Weight	Approx. 4.5 kg	

[1)] only available with multi N/C 3300 / 3100 and multiWin pro software

Autosampler AS 10e - Automation for multi N/C 3300, multi N/C 3300 HS and multi N/C 4300 UV

	No. of positions	Vials
Standard rack	10	50 mL / 10 pcs.
Optional racks	21	50 mL / 21 pcs. (for automatic & intelligent dilution with multi N/C 3300; 10 pos. for original sample, 10 pos. for dilution)
Automatic acidification / Reverse rinse	No	
Automatic purging (NPOC)	Yes	
Parallel purging and analyzing (NPOC)	No	
Sample homogenization	No	
Automatic / intelligent dilution	Yes [1)]	
Intelligent inj. vol. reduction	Yes [2)]	
Dimensions W × D × H	Approx. 260 mm x 320 mm x 390 mm	
Weight	Approx. 4.5 kg	

[1)] only available with 21 pos. dilution rack, multi N/C 3300 / 3100 and multiWin pro software

[2)] only available with multi N/C 3300 / 3100 and multiWin pro software

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EPA Sampler - with "piercing function", for sampling from polymer septum-capped vials

Automation for multi N/C 3300, multi N/C 3300 HS and multi N/C 4300 UV

	No. of positions	Vials
Standard rack	64	40 mL / 100 pcs. + 100 septa / caps + magnetic stir bars 70 pcs. incl.
Automatic acidification / Reverse rinse [1)]	Yes	
Automatic purging (NPOC)	Yes	
Parallel purging and analyzing (NPOC)	Yes	
Automatic / intelligent dilution	No	
Intelligent inj. vol. reduction	Yes [2)]	
Sample homogenization	Yes	
Dimensions W × D × H	Approx. 500 mm × 540 mm × 550 mm	
Weight	Approx. 15 kg	

[1)] not available with multi N/C 3300 HS
[2)] only available with multi N/C 3300 / 3100 and multiWin pro software

FPG 48 - solid autosampler for multi N/C 2300 duo and multi N/C 3300 duo systems

Sample positions	48 ceramic boats, 50 pcs. incl.
Max. sample mass	Up to 3 g
Boat sensor	Yes
Dimension W × D × H	500 mm × 550 mm × 460 mm
Weight	Approx. 20 kg

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Solid Options

Double Furnace Solid Module / Swab Test Module, HT 1300 Furnace and TIC Module for C determination only

	Double Furnace Solid Module (DF) / Swab Test Module	HT 1300 Furnace (component of multi N/C duo systems)	TIC Module (manual)
Available for the following basic units	multi N/C 2300 und multi N/C 3300 HS	multi N/C 2300, multi N/C 3300 und multi N/C 4300 UV	
Method	Catalytic high temperature combustion	High temperature combustion, catalyst-free	Acid digestion
Max. furnace temperature	950 °C	1300 °C	Up to 80°C
Type of combustion tube	Quartz glass	Al_2O_3 ceramic	-
Parameters	TC, TOC (after acidification)	TC, TOC (after acidification)	TIC
Measuring range	0 – 100 % C at 0.1 g sample or 100 mg C absolute	0 – 100 % C at 0.5 g sample or 500 mg C absolute	0 - 500 mg C absolute
Detection limits	0.5 µg C abs., equivalent to 1 mg/kg at max. sample weight	30 µg C abs., equivalent to 10 mg/kg at max. sample weight	30 µg C
Sample amount	Up to 0.5 g	Up to 3 g	Up to 3 g
Analysis time	3 – 5 min	2 – 3 min	3 – 10 min
Carrier gas	Oxygen 99.5% at 24 L/h	Oxygen 99.5% at 120 L/h	Oxygen 99,5% / synth. air at 16 L/h
Dimensions W × D × H	Approx. 300 mm × 80 mm × 80 mm	Approx. 510 mm × 550 mm × 470 mm	Approx. 300 mm × 550 mm × 470 mm
Weight	Approx. 3 kg	Approx. 22 kg	Approx. 10 kg

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Physical Data (Basis Unit)

Dimensions	▪ multi N/C[1)]:	513 × 547 × 464 mm (W × D × H)
	▪ multi N/C 2300 duo:	1865 × 650 × 970 mm (W × D × H)
	▪ multi N/C 3300 duo:	2215 × 650 × 464 mm (W × D × H)
Weight	▪ multi N/C:	Approx. 21 kg
	▪ multi N/C 2300 duo:	Approx. 86 kg
	▪ multi N/C 3300 duo:	Approx. 76 kg
Installation Requirements	▪ Ambient temperature:	10 – 35 °C
	▪ Relative humidity:	5 – 90%
	▪ Air pressure:	0.7 – 1.06 bar
Power requirements	multi N/C 2300, multi N/C 2300 duo, multi N/C 3300, multi N/C 3300 duo and multi N/C 3300 HS: ▪ 115/230 V AC; 50/60 Hz; T6.3 A H; typical power consumption: 400 VA, max.: 500 VA multi N/C 4300 UV: ▪ 100-240 V AC, 50/60 Hz; T4.0 A H; typical power consumption: 150 VA, max.: 200 VA HT 1300 solids module (an integral component of multi N/C 2300 duo and multi N/C 3300 duo): ▪ 230 V AC; 50/60 Hz; T10 A H; typical power consumption: 700 VA, max.: 1000 VA	

1) multi N/C 2300, multi N/C 3300 and multi N/C 4300 UV

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