

multi N/C Series TOC/TN_b Analyzers / multi N/C duo Systems



General

The multi N/C series offers a range of TOC analyzers for the determination of the parameters TOC, NPOC, TC, TIC and POC in aqueous samples. For TIC removal in NPOC determination the samples are acidified and purged. The automatic TIC control function ensures a complete elimination of the TIC. The analyzers can optionally be upgraded for TN_b determination and/or TOC 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 basic unit and a HT 1300 solids furnace, equipped with both, a high throughput liquid autosampler and a solids autosampler.

Standard compliance

	multi N/C 2100S	multi N/C 3100	multi N/C 2100S duo	multi N/C 3100 duo	multi N/C UVHS
TOC (liquid)	ISO 20236 ISO 8245 EN 1484				ISO 8245 EN 1484
	ASTM G144 ASTM D7573 ¹⁾				ASTM D4839
	US EPA 415				US EPA 415
	US EPA 9060				US EPA 9060
	APHA 5310B				APHA 5310C
TN _b (liquid)	ISO 20236 EN 12260 ASTM D8083				-
TC/TOC (solid) ²⁾	ISO 10694 EN 13137 EN 15936				

¹⁾ In ASTM D7573, a combustion temperature of 680 °C is recommended. This is basically configurable for multi-N/C analyzers, but for reasons of analytical performance, temperatures in the range of 720–800 °C are highly recommended when using Pt-catalysts.

²⁾ Refers to HT 1300 furnace module (component of multi N/C duo devices) and double furnace module in combination with the multi N/C 2100S basic unit.

Control and data evaluation

Software	multiWin 4.X with user management, export function in .csv, .pdf and LIMS-system
Requirements	<ul style="list-style-type: none"> ▪ Operating system: PC – Windows 7 (32-Bit or 64-Bit) or higher, ▪ PC: Processor 3.2 GHz or higher, min. 4 GB RAM, min 40 GB hard disk drive, CD-ROM drive, Interfaces: USB 2.0 (min. 1 for connection to BU) ▪ Monitor: Graphic resolution 1024×768 pixels or higher

Overview

	multi N/C 2100S / 2100S duo	multi N/C 3100 / 3100 duo	multi N/C UVHS
Digestion mode	High temperature combustion up to 950 °C		Wet chemical oxidation by UV radiation (254 nm+185 nm) / persulfate
Parameters	TC, TIC, TOC, NPOC, NPOCplus, POC		
Optional parameters	TN (ChD/CLD)	TN (ChD/CLD), POC direct	-
Measurement range	0–30,000 mg/L C		0–10,000 mg/L C
Limit of Detection	50 µg/L C	4 µg/L C	1 µg/L C
Reproducibility ¹⁾	CV 1–2%	CV 1–2%	CV 1–2%
Measuring time	Approx. 3–5 min for each parameter		
Sample injection	Septum-free direct injection	Automatic flow injection with intelligent rinsing	Automatic flow injection
Injection volume	50–500 µL variable	100–1,000 µL variable	50–20,000 µL variable
Automatic leak check	yes	yes	yes
Automatic dilution	-	Dilution factor 1:5 – 1:100	-
Sampler options	AS 60	AS 10e, AS 21hp, AS vario, AS vario ER, 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. 1800 L/month	Approx. 2200 L/month	Approx. 1600 L/month
Upgrade for solid samples ⁴⁾	Double furnace solid module (DF), HT 1300, TIC manual	HT 1300, TIC manual	HT 1300, TIC manual
TC/TOC solid automation	multi N/C duo devices for up to 48 solid samples		-

¹⁾ CV = coefficient of variation, equivalent to RSD (relative standard deviation)

²⁾ For carrier gas quality requirements, see table "Solid Options", page 8

³⁾ 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: CO₂ <1 ppm, hydrocarbons <0.5 ppm (as CH₄), supply pressure: min. 5 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, DF is not available with multi N/C 2100S duo

Technical Data
multi N/C series

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 ¹⁾	0–200 mg/L TN _b , up to 20.000 mg/L ¹⁾
Limit of detection	0.05 mg/L TN _b	0.005 mg/L TN _b
Reproducibility ²⁾	CV 2–3%	CV 2–3%
Analysis time	3–5 min	3–5 min
Ozone source gas	No	Synthetic air (recommended) or oxygen, 60 mL/min
Dimensions	Built in (inside TOC analyzer)	Approx. 300 mm × 460 mm × 550 mm
Weight	ca. 0.5 kg	ca. 12.5 kg

¹⁾ With automatic dilution (N/C 3100), with max. dilution ratio: 1 : 100 (further dilution ratios: 1 : 5, 1 : 10, 1 : 25, 1 : 50)

²⁾ CV = coefficient of variation, equivalent to RSD (relative standard deviation)

Autosampler AS 60 – automation for multi N/C 2100S (implemented for multi N/C 2100S duo)

	No. of positions	Vials	Syringe size
Standard rack	60	8 mL/100 pc. + magnetic stir bars 60 pc. incl.	500 µL incl.
Optional racks	112	1.8 mL/200 pc. + 200 septa/caps incl.	250 µL incl.
Automatic Acidification / Reverse rinse	Yes		
Automatic Purging	Yes		
Parallel purge and analyzing	No		
Sample homogenization	Yes		
Dimensions W × H × D	Approx. 500 mm × 500 mm × 380 mm		
Weight	Approx. 9 kg		

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

Automation for multi N/C 3100 and UV HS (AS vario ER is already included in multi N/C 3100 duo system)

	No. of positions	Vials
Standard rack	No	
Optional racks	72/ER ¹⁾	40 mL/100 pc. + magnetic stir bars/ 100 pc. incl.
	100/ER ¹⁾	20 mL/100 pc. + magnetic stir bars/ 100 pc. incl.
	146/ER ¹⁾	12 mL/156 pc. + magnetic stir bars/ 150 pc. incl.
	47/ER (dilution rack) ¹⁾²⁾	50/100 pc. +12 mL/78 pc. + magnetic stir bars/ 100 pc. incl.
	52 ³⁾	100 mL/100 pc. incl.
	20 ³⁾	100 mL (Schott bottles)/20 pc. incl.
Automatic acidification	Yes	
Automatic purging / Reverse rinse	Yes ⁴⁾	
Parallel purge and analyzing	Yes ⁵⁾	
Sample homogenization	Yes	
Dimensions W × H × D	Approx. 350 mm × 400 mm × 470 mm	
Weight	Approx. 15 kg	

¹⁾ for particle containing samples

²⁾ only for multi N/C 3100 and multi N/C 3100 duo

³⁾ for pure water samples (particle-free)

⁴⁾ additional external needle rinse with AS vario ER

⁵⁾ not available for rack with 20 positions

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Autosampler AS 21hp – automation for multi N/C 3100 and UV HS

	No. of positions	Vials
Standard rack	21	50 mL/21 pc. + magnetic stir bars 21 pc. incl.
Optional racks	No	
Automatic Acidification / Reverse rinse	No	
Automatic Purging	Yes	
Parallel purging and analyzing	Yes	
Sample homogenization	Yes	
Dimensions W × H × D	Approx. 250 mm x 350 mm x 310 mm	
Weight	Approx. 4.5 kg	

Autosampler AS 10e – automation for multi N/C 3100 and UV HS

	No. of positions	Vials
Standard rack	10	50 mL/10 pc.
Optional racks	No	
Automatic Acidification / Reverse rinse	No	
Automatic Purging	Yes	
Parallel purging and analyzing	No	
Sample homogenization	No	
Dimensions W × H × D	Approx. 250 mm x 350 mm x 310 mm	
Weight	Approx. 4.5 kg	

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EPA sampler – with “piercing function”, for sampling from septum-capped vials

Automation for multi N/C 3100 and UV HS

	No. of positions	Vials
Standard rack	64	40 mL/100 pc. + 100 septa/caps + magnetic stir bars 70 pc. incl.
Optional racks ¹⁾	61	40 mL/5 pc. + septa/caps 5 pc. incl.
Automatic Acidification / Reverse rinse	Yes	
Automatic Purging	Yes	
Parallel purging and analyzing	Yes	
Sample homogenization	Yes	
Dimensions W × H × D	Approx. 500 mm × 550 mm × 540 mm	
Weight	Approx. 15 kg	

¹⁾ included in the POC automatic module only available for multi N/C 3100, multi N/C 3100 duo

FPG 48 – solid autosampler for multi N/C duo systems (included in system configuration)

Sample positions	48 ceramic boats, 50 pc. incl.
Max. sample mass	3.0 g
Boat sensor	Yes
Dimension W × H × D	500 mm × 460 mm × 550 mm
Weight	Approx. 25 kg

Solid options

Double Furnace Solid Module, HT 1300 Furnace and TIC Module (C determination only)

	Double Furnace Solid Module	HT 1300 Furnace (included in multi N/C duo systems)	TIC Module (manual)
Available for the following basic units	multi N/C 2100S	multi N/C 2100S / 3100 and UV HS	
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 ₂ O 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 abs
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 4.5 at 24 L/h	Oxygen 2.5 at 120 L/h	Oxygen 2.5 / synth. air at 16 L/h
Dimensions	Approx. 300 mm × 80 mm × 80 mm	Approx. 490 mm × 460 mm × 500 mm	Approx. 300 × 500 × 550 mm
Weight	Approx. 3 kg	Approx. 22 kg	Approx. 10 kg

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Physical data (basic unit)

Dimensions (W × D × H)	<ul style="list-style-type: none"> ▪ multi N/C: 513 × 464 × 550 mm ▪ multi N/C 2100S duo: 1865 × 650 × 970 mm ▪ multi N/C 3100 duo: 2215 × 650 × 550 mm
Weight	<ul style="list-style-type: none"> ▪ multi N/C: Approx. 30 kg ▪ multi N/C 2100S duo: Approx. 95 kg ▪ multi N/C 3100 duo: Approx. 85 kg
Installation Requirements	<ul style="list-style-type: none"> ▪ Ambient temperature: 10–35 °C ▪ Relative humidity: 5–90% ▪ Air pressure: 0.7–1.06 bar
Power requirements	<p>multi N/C 2100S, multi N/C 3100 and multi N/C duo systems:</p> <ul style="list-style-type: none"> ▪ 115/230 V AC; 50/60 Hz; T6.3 A H; typical power consumption: 400 VA, max.: 500 VA <p>multi N/C UV HS:</p> <ul style="list-style-type: none"> ▪ 100-240 V AC, 50/60 Hz; T4.0 A H; typical power consumption: 150 VA, max.: 200 VA <p>HT 1300 solids module (an integral component of multi N/C duo systems)</p> <ul style="list-style-type: none"> ▪ 230 V AC; 50/60 Hz; T10 A H; typical power consumption: 700 VA, max.: 1000 VA

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