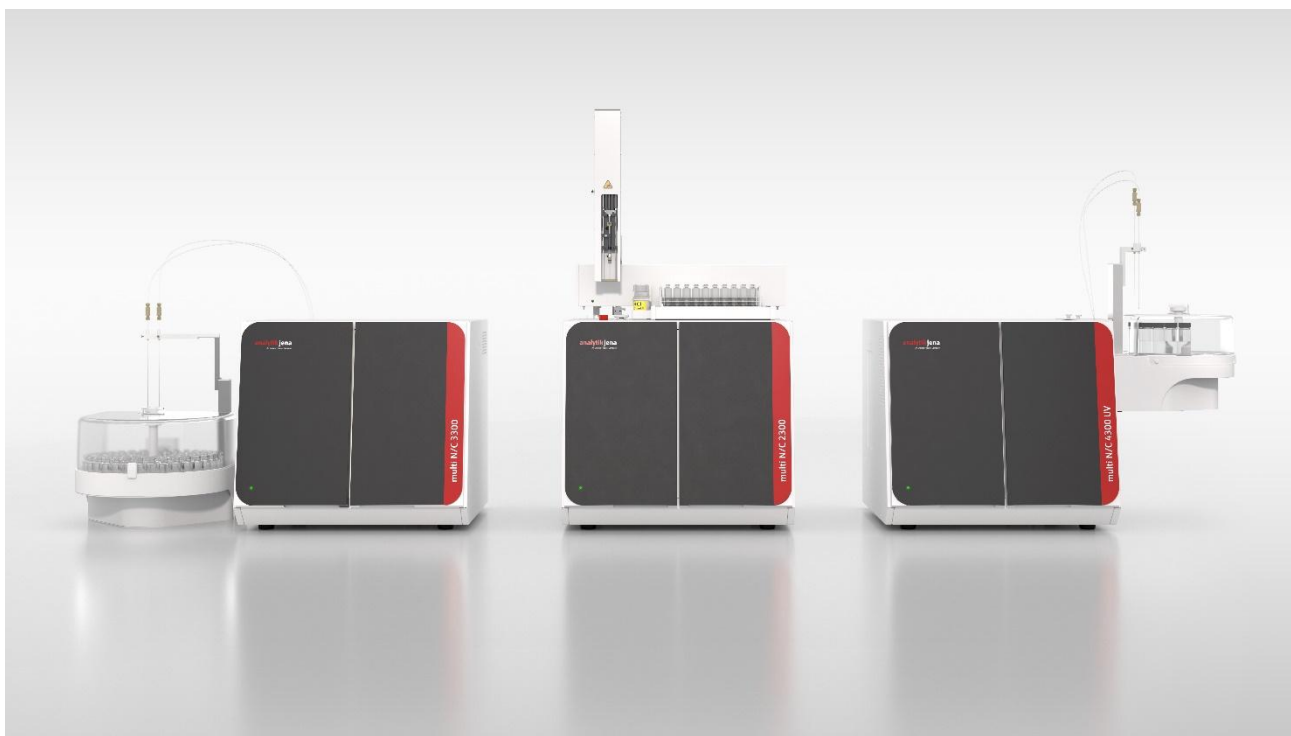


## multi N/C x300 series TOC/TN<sub>b</sub> Analyzers



## 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<sub>b</sub> 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.

## Standard Compliance

|                              | multi N/C 2300 N<br>(N analyzer) | multi N/C 2300,<br>multi N/C 2300 duo                      | multi N/C 3300,<br>multi N/C 3300 duo                                | multi N/C<br>3300 HS  | multi N/C 4300 UV<br>(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 <sub>b</sub> (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) <sup>1)</sup> | -                                | ISO 10694   DIN EN 13137   DIN EN 15936                    |                                                                      | Swab-Test-Module only | ISO 10694<br>DIN EN 13137<br>DIN EN 15936 |

<sup>1)</sup> 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; multiWin pro is classified as GAMP5 category 3.                                                                                                                                                                                                                                                                                             |
| 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 and comes along with a server-based, centralized data management, active directory log-in, electronic signatures, audit trail and assignment of user roles and rights in the user management. This way fulfilling all data integrity requirements.                                                                          |
| Minimum requirements PC                | <ul style="list-style-type: none"> <li>▪ Desktop PC or laptop</li> <li>▪ Operating system: Windows 11 (32-Bit or 64-Bit)</li> <li>▪ Processor: Intel Core i5 series, AMD Ryzen 5 series or similar</li> <li>▪ Min. 8 GB RAM, min. 64 GB hard disk drive</li> <li>▪ Interfaces: USB 2.0 (1 x required for connection to basic unit)</li> <li>▪ Display resolution: 1920x1080 pixels</li> <li>▪ Graphic card: compatible with DirectX 12 or later</li> </ul> |

## Overview

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

<sup>1)</sup> AS vario ER not available for multi N/C 3300 HS

<sup>2)</sup> For carrier gas quality requirements, see table "Solid Options", page 9

<sup>3)</sup> 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<sub>2</sub> < 1 ppm, hydrocarbons < 0.5 ppm (as CH<sub>4</sub>), supply pressure: min. 4 bar (72 psi), provided flow rate: min. 300 mL/min, recommendations for TOC gas generator models on request.

<sup>4)</sup> TOC grade purified nitrogen can be supplied alternatively by customized nitrogen gas generators (e.g. LNI Swissgas NG SIRIO 1500 AJ with integrated compressor module)

<sup>5)</sup> HT 1300 is already included in the multi N/C duo systems, Double furnace module is not available with multi N/C 2300 duo

### TN options: ChD + CLD (liquid samples only)

|                      | ChD                                                                            | CLD                                                                            |
|----------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Detection principle  | Electrochemical solid-state detection                                          | Chemiluminescence detection                                                    |
| Parameters           | TN <sub>b</sub> (Total bound Nitrogen)                                         | TN <sub>b</sub> (Total bound Nitrogen)                                         |
| Measuring range      | 0 – 100 mg/L TN <sub>b</sub> , up to 10.000 mg/L TN <sub>b</sub> <sup>1)</sup> | 0 – 200 mg/L TN <sub>b</sub> , up to 20.000 mg/L TN <sub>b</sub> <sup>1)</sup> |
| Limit of detection   | 50 µg/L TN <sub>b</sub>                                                        | 5 µg/L TN <sub>b</sub>                                                         |
| Reproducibility      | RSD 2–3% or ± 20 µg/L max.                                                     | RSD 2–3% or ± 5 µg/L max.                                                      |
| Analysis time        | 3–5 min                                                                        | 3–5 min                                                                        |
| Ozone source gas     | No                                                                             | Synthetic air (recommended) or oxygen,<br>60 mL/min                            |
| Dimensions W × D × H | Built in (inside TOC analyzer)                                                 | Approx. 296 × 582 × 464 mm                                                     |
| Weight               | Approx. 0.5 kg                                                                 | Approx. 12.5 kg                                                                |

<sup>1)</sup> With automatic dilution (multi N/C 3300 and multi N/C 3300 duo), example 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 × 380 × 500 mm |                                                   |              |
| Weight                                  | Approx. 9 kg               |                                                   |              |

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

<sup>1)</sup> for particle containing samples

<sup>2)</sup> for pure water samples (particle-free)

<sup>3)</sup> additional external needle rinse with AS vario ER

<sup>4)</sup> not available with multi N/C 3300 HS

<sup>5)</sup> not available for rack with 20 positions

<sup>6)</sup> only available with multi N/C 3300 / 3100 and multiWin pro software

## **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.<br>(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 <sup>1)</sup>          |                                                                                                                                                                          |
| Intelligent inj. vol. reduction         | Yes <sup>1)</sup>          |                                                                                                                                                                          |
| Dimensions W × D × H                    | Approx. 260 x 320 x 390 mm |                                                                                                                                                                          |
| Weight                                  | Approx. 4.5 kg             |                                                                                                                                                                          |

<sup>1)</sup> 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 <sup>1)</sup>          |                                                                                                                               |
| Intelligent inj. vol. reduction         | Yes <sup>2)</sup>          |                                                                                                                               |
| Dimensions W × D × H                    | Approx. 260 x 320 x 390 mm |                                                                                                                               |
| Weight                                  | Approx. 4.5 kg             |                                                                                                                               |

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

<sup>2)</sup> only available with multi N/C 3300 / 3100 and multiWin pro software

## 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 <sup>1)</sup> | Yes                        |                                                                        |
| Automatic purging (NPOC)                              | Yes                        |                                                                        |
| Parallel purging and analyzing (NPOC)                 | Yes                        |                                                                        |
| Automatic / intelligent dilution                      | No                         |                                                                        |
| Intelligent inj. vol. reduction                       | Yes <sup>2)</sup>          |                                                                        |
| Sample homogenization                                 | Yes                        |                                                                        |
| Dimensions W × D × H                                  | Approx. 500 × 540 × 550 mm |                                                                        |
| Weight                                                | Approx. 15 kg              |                                                                        |

<sup>1)</sup> not available with multi N/C 3300 HS

<sup>2)</sup> 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 × 550 × 460 mm              |
| Weight              | Approx. 20 kg                   |

## Solid Options

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

|                                         | <b>Double Furnace Solid Module (DF) / Swab Test Module</b> | <b>HT 1300 Furnace (component of multi N/C duo systems)</b> | <b>TIC Solids Module (manual)</b>                               |
|-----------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------|
| 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 <sub>2</sub> O <sub>3</sub> 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 4.5 (99.995%) at 24 L/h                             | Oxygen 2.5 (99.5%) at 120 L/h                               | Oxygen 2.5 / synth. air (Argon 4.6 / Nitrogen 5.0) *) at 16 L/h |
| Dimensions W × D × H                    | Approx. 300 × 80 × 80 mm                                   | Approx. 510 × 550 × 470 mm                                  | Approx. 300 × 550 × 470 mm                                      |
| Weight                                  | Approx. 3 kg                                               | Approx. 22 kg                                               | Approx. 10 kg                                                   |

\*) Optional carrier gas supply if the module is installed on a multi N/C 4300 UV.

## Physical Data (Basis Unit)

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions<br>(W × D × H)    | <ul style="list-style-type: none"> <li>multi N/C<sup>1)</sup>: 513 × 547 × 464 mm</li> <li>multi N/C 2300 N: 813 × 547 × 970 mm</li> <li>multi N/C 2300 duo: 1865 × 650 × 970 mm</li> <li>multi N/C 3300 duo: 2215 × 650 × 464 mm</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                              |
| Weight                       | <ul style="list-style-type: none"> <li>multi N/C: approx. 21 kg</li> <li>multi N/C 2300 N: approx. 43 kg</li> <li>multi N/C 4300 UV: approx. 18 kg</li> <li>multi N/C 2300 duo: approx. 72 kg</li> <li>multi N/C 3300 duo: approx. 78 kg</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |
| Installation<br>Requirements | <ul style="list-style-type: none"> <li>Ambient temperature: 10 – 35 °C</li> <li>Relative humidity: 5 – 90%</li> <li>Air pressure: 0.7 – 1.06 bar</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Power requirements           | <p>multi N/C 2300, multi N/C 2300 duo, multi N/C 3300, multi N/C 3300 duo and multi N/C 3300 HS:</p> <ul style="list-style-type: none"> <li>115/230 V AC; 50/60 Hz; T6.3 A H; typical power consumption: 400 VA, max.: 500 VA</li> </ul> <p>multi N/C 4300 UV:</p> <ul style="list-style-type: none"> <li>100-240 V AC, 50/60 Hz; T4.0 A H; typical power consumption: 150 VA, max.: 200 VA</li> </ul> <p>HT 1300 solids module (an integral component of multi N/C 2300 duo and multi N/C 3300 duo):</p> <ul style="list-style-type: none"> <li>230 V AC; 50/60 Hz; T10 A H; typical power consumption: 700 VA, max.: 1000 VA</li> </ul> |

<sup>1)</sup> multi N/C 2300, multi N/C 3300 and multi N/C 4300 UV – for devices with TN detector, see additional information under "TN option"

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