

DUMATHERM® – Efficient, rapid nitrogen determination using the DUMAS method

# AUTOMATED PROTEIN ANALYSIS



## RAPID

Results in  
3 minutes

## PRECISE

Accurate results  
to a threshold of  
0.003 mg N

## VERSATILE

For solid and liquid  
samples up to 1 g

## EFFICIENT

Very low operating  
costs, consumables  
with long service life

## SAFE

Highest level of  
work safety in a  
closed system

“Reliable results in 3 minutes: nitrogen analysis has never been quicker, more precise and more cost-effective.”



Scan the QR code and watch our DUMATHERM® video.

# DUMATHERM® N Pro

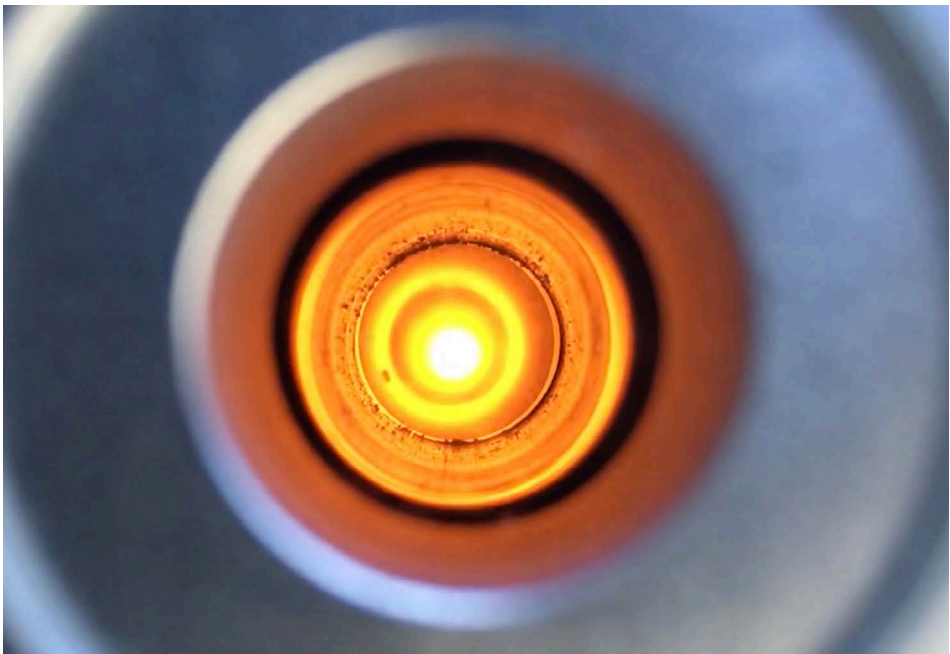
A particularly high degree of precision is required when determining the protein content of foods and animal feeds. One of the standard techniques used for this purpose is the Dumas method. This involves combustion of the sample material at high temperatures and, in the presence of a metallic copper surface, reduction of the nitrogen oxide produced to elementary nitrogen.

C. Gerhardt's environmentally friendly, chromium-free, high temperature catalysts make it possible to incinerate samples catalytically and without residue. As standard, up to 64 individual samples and eight additional samples can be processed fully automatically and non-stop in a single run, even overnight. With activated camera monitoring (optional), sample processing can be supervised, every sample is reliably tracked at all times. A comfortable interruption of the automatic analysis is also possible: the eight additional samples can be used at any time. Optionally, an even larger sample throughput can be analysed: an upgrade to 100 (+10) and 144 (+12) samples is now possible. The DUMATHERM® does not require an extractor and can be flexibly employed on a stand-alone basis in any location. Heating time is just 30 minutes and only 3 minutes are required for an individual analysis run. The DUMATHERM® can analyse almost all types of samples, whether solid or liquid, and is capable of reliably and precisely determining even trace content of proteins thanks to use of helium technology and total gas analysis. The detection limit is 0.003 mg nitrogen. Samples weighing up to 1 g can be readily processed.

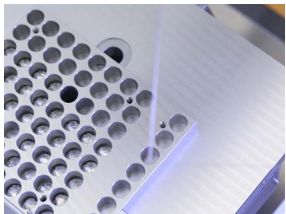
If you want to analyse carbon as additional parameter of elemental analysis, ask for our model DUMATHERM® CN. We will be pleased to advise you.



# RAPID PROTEIN ANALYSIS



Combustion reactor (picture of the integrated camera)



- RAPID**  
Combustion and analysis take 3 minutes. The unit is fully operational in 30 minutes, including a fully automatic system test and leak test.
- PRECISE**  
Thanks to helium technology and total gas analysis, the DUMATHERM® can determine even extremely low nitrogen content reliably and precisely. The detection limit is 0.003 mg N. Standard deviation is less than 0.5%.
- VERSATILE**  
The DUMATHERM® can be used for the analysis of almost all sample matrices. Due to its ingenious water separation technique, the DUMATHERM® is also particularly suitable for the analysis of liquid samples. Larger samples weighing up to 1 g can be readily processed.
- TRANSPARENT**  
The camera can be activated optionally. The processing of the samples is continuously monitored: either via live transmission at the workstation or as recorded photos for each individual sample.

- EFFICIENT**  
The following properties make the DUMATHERM® a particularly efficient 'continuous combustor': fully automated sample feed, low oxygen consumption due to stoichiometric input and rapid catalytic combustion, minimal blank values and very low maintenance costs.
- SAFE**  
The DUMATHERM® is completely software-controlled and can be operated safely in any location without the need for an extractor. Gas flow, temperature, pressure (leakproofing) and valve settings are monitored automatically.
- COST-EFFECTIVE**  
Low operating costs, long service life, low maintenance costs. The unit comprises high quality, durable components, which are partly capable of self-regeneration.

“Fully automatic and software-controlled: the DUMATHERM® delivers reliable, accurate results.”



# AUTOMATED SAMPLE INPUT



Exact positioning – precise traceability: all samples have preset positions.

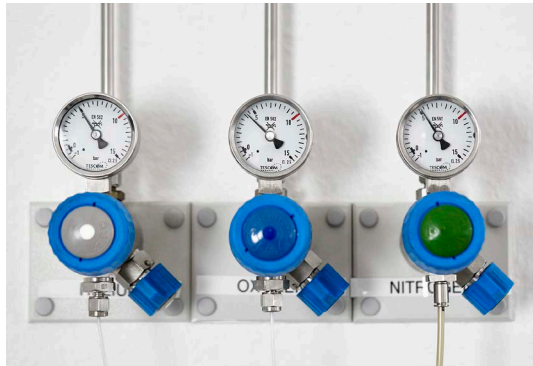
- ✦ As standard, the instrument analyses batches of up to 64 samples and eight additional samples fully automatically and without interruption, even overnight. The eight additional samples can easily be inserted during running batches. For even greater sample throughput, the number of samples per series can be optionally upgraded to 110 or up to 156.
- ✦ The autosampler is fed via a separate transfer plate: the samples land exactly in the predetermined position without the need for manual adjustment.
- ✦ The helium-filled purge chamber is hermetically sealed. There is no risk of falsification of analysis results by the nitrogen content of atmospheric air.
- ✦ A dustproof, transparent hood shields the process against external influences and disruptions, but provides a clear view of what is happening.



“The DUMATHERM® has a brand new type of autosampler with X-Y control.”

# EFFICIENT TECHNOLOGY

The combustion gases are analysed directly via a thermal conductivity detector. This significantly shortens the analysis process and the reference result is available in just three minutes. Helium technology and total gas analysis mean that even small samples with low nitrogen content can be accurately analysed. In addition, the sample sizes required reduce gas and energy consumption, process times and costs per analysis. Maintenance work, such as the replacement of the ash insert and reactors, can be carried out safely and easily at operating temperature using simple tools, without the need to shut down the DUMATHERM®.



“The DUMATHERM® – durable, reliable, resource-saving precision technology by C. Gerhardt.”

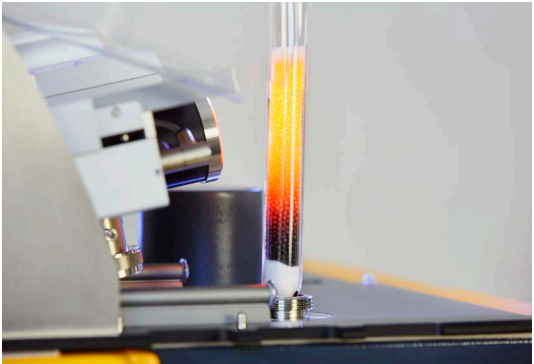


The DUMATHERM® process

**Stoichiometric oxygen input:** the software calculates the required oxygen input and combustion time individually. This saves time and money. The parameters for common sample matrices are preset.



**Catalytic combustion:** combustion at 1,000°C in the vertical, chromium-free combustion reactor takes place catalytically and thus particularly rapidly and economically.



**Residue-free ash:** samples are sealed in airtight tinfoil capsules and are combusted in a heat resistant ash insert leaving virtually no residue



# THE DUMATHERM® MANAGER

- The clear control software runs the entire analysis process independently. In the event of irregularities, it automatically interrupts the process without laboratory personnel needing to be present.
- ✚ The DUMATHERM® is entirely operated and monitored via the user-friendly software DUMATHERM® Manager. All data for analysis is entered via a PC or LIMS connection.
  - ✚ The software automatically calculates the analysis parameters, such as gas dosage or combustion times, required for the different types of samples and saves these to sample tables.

- ✚ The DUMATHERM® Manager continuously monitors gas flow, temperature, pressure and valve settings and records the measurements in a log table (history).
- ✚ The software automatically interrupts the analysis process in the event of irregularities, transmits specific error messages for rapid diagnosis and switches to carrier gas saving mode.
- ✚ The software issues individual maintenance instructions according to the service intervals specified depending on sample type and quantity.

“The DUMATHERM® Manager facilitates preparation of the documentation required of accredited laboratories by ISO 17025.”

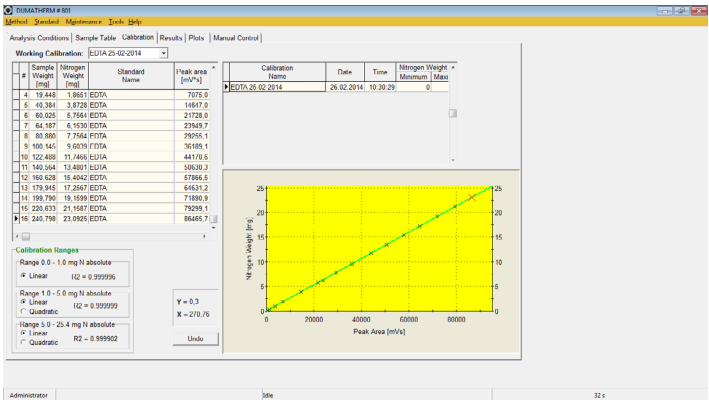


### ADDITIONAL FEATURES

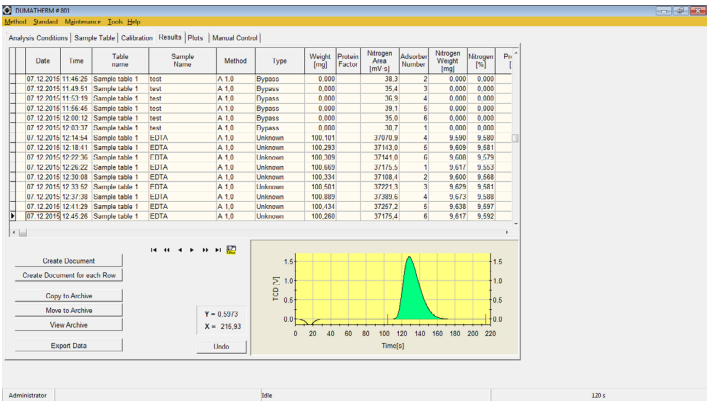
- ✚ In-house method libraries can be compiled
- ✚ Different user levels with different user rights
- ✚ Complete traceability of all analysis data, such as dates, results, operator, program data, etc.
- ✚ Printout of results of serial and individual sample analyses
- ✚ Results database with various filter and sort functions
- ✚ Direct transfer of balance data to PC
- ✚ Data transfer to and from LIMS systems in various file formats
- ✚ Documentation in accordance with ISO 17025

# FLEXIBLE CALIBRATION

- ✚ The innovative thermal conductivity detector can be individually calibrated for different nitrogen contents with the help of standard substances (e.g. EDTA).
- ✚ Very different sample materials can thus be analysed following optimum calibration.
- ✚ Calibration remains stable for many weeks: no subsequent adjustment is required as part of daily work routine.



Long-term stability of EDTA calibration of the DUMATHERM®

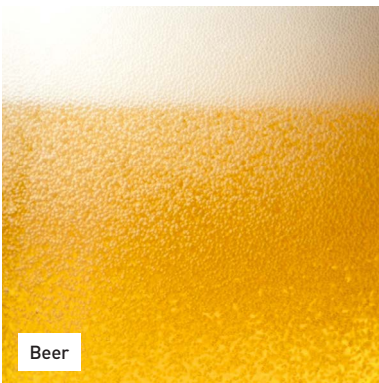


The DUMATHERM® Manager displays the results of analysis in graph and table form

“At the core of the DUMATHERM® is its special thermal conductivity detector. It works without a reference gas flow.”



“The DUMATHERM® is also eminently suitable for the analysis of liquids, such as milk and dairy products, beer and soya sauce.”



# VERSATILITY

- ✦ **Wide range of uses:** Protein and nitrogen determination in many analytical applications. Application sheets available for all common analytical requirements
- ✦ **Three-stage water separation** via a condensation trap, intelligent membrane system and chemical-free absorption trap with colour change.
- ✦ **No extractor or laboratory facilities required:** the DUMATHERM® can be used virtually anywhere. Only a power supply and gas connections for oxygen, nitrogen/air and helium (or alternatively argon) are required.
- ✦ Suitable for **solid and liquid samples**.

### Can be used for analysis of protein content in:

- ✦ Milk and dairy products, e.g. AOAC 992.15, DIN EN ISO 14891 (IDF 185), § 64 LFGB 01.00-60, § 64 LFGB 02.00-24, § 64 LFGB 03.00-27 ...
- ✦ Cereals, e.g. AOAC 992.23, AACC 46-30, ICC Standard No. 167, GB/T 31578-2015, NYT 2007-2011
- ✦ Egg and egg products, e.g. § 64 LFGB 05.00,15 (German Food and Animal Feed Code)
- ✦ Meat and meat products, e.g. AOAC 992.15 or § 64 LFGB 06.00-20
- ✦ Malt and raw materials for brewing, e.g. AOAC 997.09
- ✦ Animal feeds, e.g. AOAC 968.06 and 990.03, GAFTA Methode 4:2, VDLUFA NDLXP 4.13.1 ...
- ✦ Cereal products, oilseeds DIN EN ISO 16634
- ✦ Beer, wort, brewing grains, e.g., AOAC 997.09, MEBAK 2.6.1.2
- ✦ Starch etc.

### Determination of the nitrogen content in

- ✦ Soils (fertilisers) e.g. AOAC 993.13, DIN EN 13654-2, DIN ISO 13878, NY/T 5242-2014, SN/T 3097-2012, ...
- ✦ Water e.g. DEV (Data Collection Regulation), H11, H28
- ✦ Soil improvers and culture substrates
- ✦ Urine
- ✦ Cellulose
- ✦ Paper
- ✦ Crude oil
- ✦ Coffee
- ✦ Tobacco
- ✦ Environmental e.g. DIN EN 16168, DIN ISO 10694 (C), ISO 18611-2, GB/T 35176.2-2017 GB/T 35809-2018, GB 29518-2013, LY/T 1228-2015
- ✦ Plastics / Rubber
- ✦ Explosives
- ✦ Wine e.g. OIV-MA-AS323-02A
- ✦ Pharmacy e.g. European Pharmacopoeia 5, 2.5.33 Total protein, Method 7

# WIDE RANGE OF ACCESSORIES

To help you operate your DUMATHERM®, we can supply the DumaSet® consumables package and other service accessories. These enable you to both maintain the device and have complete control of costs over the long term.

### DUMASET®

Affordable set of consumables for the analysis of 1000 solid samples, comprising: Quartz reactor tube, combustion reactor, ash insert (ceramic), tin foils.

#### ✦ MULTIPLE COMBINATIONS

A DumaSet® provides for the analysis of up to 1000 solid samples.

#### ✦ COST SAVINGS

It is more convenient to buy DumaSet® than to order individual components.

#### ✦ CERTIFICATION

A quality certificate is supplied with each DumaSet®.

#### ✦ EASE OF ORDERING

When placing an order, it is not necessary to list all the individual components; a single article number is enough to order a DumaSet®.

#### ✦ LONG SHELF LIFE

Special packaging ensures a long shelf life.

**There are other consumables available that can be employed for specific applications of the DUMATHERM®:**

- ✦ DumaReact® Combustion catalysts (chromium-free)
- ✦ DumaCop® Copper for reduction
- ✦ DumaPad® Quartz wool pads
- ✦ DumaDry Absorbent for the water absorption trap (chemical-free)
- ✦ DumaEDTA® Calibration standard
- ✦ DumaSorb® Absorbent for liquid samples, content 25 g
- ✦ Superabsorber Absorbent, special, for low salt- and low fat liquid samples of up to max. 400 mg, content 50 g
- ✦ DumaCO<sub>2</sub>® CO<sub>2</sub> absorber (regenerating and chemical-free)
- ✦ DumaPress Tool for encapsulating samples
- ✦ Helium saving kit To save helium when the unit is on standby
- ✦ DumaCollect® steel Starterkit reusable stainless steel ash insert including a tool for cleaning the ash insert

“The DumaSet® and customised maintenance programmes ensure reliable operation and complete cost control over the long term.”

Good to know: the DUMATHERM® is environmentally friendly! The catalysts are chromium-free, no chemicals are used in water and CO<sub>2</sub> separation and the water absorbent is also chemical-free.





# TECHNICAL DATA

Sample size	up to 1 g
Sample capacity	1 – 72 samples (64+8) optional up to 110 samples (100 + 10) optional up to 156 samples (144 + 12)
Analysis time	3 – 5 min, depending on sample type and quantity
Recovery rate	> 99.5%
Helium detection limits:	0.003 – 50 mg N absolute
Standard deviation	< 0.5% (assuming standard preparation of the samples for the method in question)
Operation	via PC* using the DUMATHERM® Manager
Gases required for operation	Helium (alternatively argon), grade 5.0 (99.999%) Oxygen, grade 5.0 (99.999%) nitrogen, grade 2.6 (99.6%, oil- and water-free)
Gas equipment	Ultra high grade gas pressure regulators, size 1/4" cylindrical screw thread
Gas input pressure	3 – 6 bar
Ambient temperature	15°C < t < 35°C
Power rating	230 VAC
Dimensions (W x D x H)	870 x 710 x 860 mm (closed) 1108 x 710 X1118 mm (open)
Weight	approx. 85 kg
DUMATHERM® power consumption	1380 W
Autosampler power consumption	90 W
Current	max. 6A
Digital balance required	optional, min. precision 0.1 mg
Integrated camera	optional



For more details of technical specifications and ordering information, please request our product data sheet.

\*PC and printer are not supplied with the DUMATHERM®.

# SERVICE AND MAINTENANCE

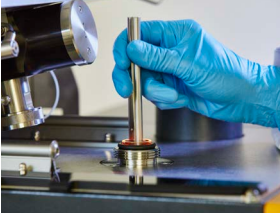
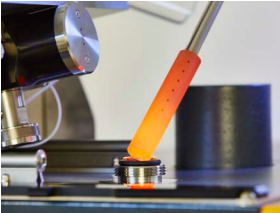
C. Gerhardt products are high quality products for routine laboratory use. We employ only high quality, durable materials in order to ensure maximum functionality and reliability. Laboratory apparatus is subject to high levels of use. Consumables, heat and high sample throughput leave their mark on any item of equipment. Hoses, seals and glass components must be regularly checked, cleaned and if necessary replaced.

A maintenance and service agreement from C. Gerhardt maintains the serviceability and reliability of your DUMATHERM®.

- DUMATHERM® MAINTENANCE PROGRAMME**
- + General visual inspection and cleaning
  - + Verification and calibration of the autosampler
  - + Zero point calibration of the flow controller
  - + Leak testing of the entire system
  - + Software updating (if available)
  - + Hardware updating (if available)
  - + Complete function test
  - + Analytical testing of the unit
  - + Electrical testing in accordance with VDE 0701
  - + Record of the work carried out

- ADDITIONAL SERVICES**
- + Repairs in situ or at C. Gerhardt's premises
  - + Cost estimates
  - + Telephone and email support
  - + Individual solutions for your equipment pool

**QUALIFICATION IQ / OQ / PQ**  
It goes without saying that we also perform the IQ / OQ / PQ in accordance with our manufacturer specifications.



Our authorized C. Gerhardt Partner is happy to develop an individual maintenance and service contract with you for equipment from our company.

C. Gerhardt – Qualität made in Germany

# AUTOMATING STANDARD ANALYSES

Completely automated laboratory analysis systems from C. Gerhardt are highly developed special equipment. They automate recurring analysis processes in accordance with national and international standards and norms. They continuously provide precise and reproducible analysis results quickly, at low cost, economically and highly efficiently.

## An excerpt from our product portfolio

### + COMPLETELY AUTOMATIC HYDROLYSIS

HYDROTHERM – automatic acid hydrolysis system for fat determination according to Weibull-Stoldt. When combined with SOXTHERM®, HYDROTHERM is an ideal system solution for total fat determination.

### + COMPLETELY AUTOMATIC FAT EXTRACTION

SOXTHERM® – automatic fast extraction system for fat determination

### + COMPLETELY AUTOMATIC WATER STEAM DISTILLATION

VAPODEST® – fast distillation system for Kjeldahl nitrogen/protein determination and water steam distillation as sample preparation for further analysis.

### + COMPLETELY AUTOMATIC CRUDE FIBRE EXTRACTION

FIBRETHERM® – completely automated processing of the boiling and filtration processes for determining crude fibre, ADF and NDF.

### + COMPLETELY AUTOMATIC ELEMENTAL ANALYSIS

DUMATHERM® CN – nitrogen/protein/carbon determination of solid and liquid samples according to the Dumas combustion method. A fast and convenient alternative to the classic Kjeldahl method for almost all sample matrices.



Date: 03/2019 | We reserve the right to introduce technical modifications without prior notification