The Dumas method is used for the quantitative determination of nitrogen in chemical substances based on a technique first described by Jean-Baptiste Dumas, a French chemist. He introduced the combustion method for nitrogen analysis in 1831, but the original method was not accepted for routine analyses due to various difficulties (inaccurate results, lack of availability of the special gases and catalysts required for the analysis). Since 1831 the original combustion method has been modified and automated to improve the technique. An automated instrumental technique has been developed which is capable of rapidly measuring the total protein concentration of food samples. This method is beginning to compete with the Kjeldahl method as the standard method to determine the protein content of food samples as well as other types of sample. The NDA 701 can be considered as the modern development of the original Dumas technique and thanks to the technology developed by VELP’s internal R&D Department, the market now has an innovative solution for protein content determination by combustion of food and feed samples and environmental samples offering interesting results in terms of performance.

Dumas method starts with an initial combustion to burn the sample, obtaining elemental compounds as water, oxygen, carbon dioxide and nitrogen as well. NDA removes the water in two separate points with two different kinds of trap: the first is positioned after the combustion and is a physical trap (DriStep™), while the second is placed after the reduction and it is a chemical trap. Between the two, the elemental substances passed through a reduction furnace, that eliminates oxygen and converts nitrogen oxide into elemental nitrogen. The second water trap removes the water remained (a very few quantity) and the gas reach the auto-regenerative CO₂ adsorbers. After the CO₂ removal, what remains of the gas is just nitrogen, that is detected by the LoGas™ innovative Thermal Conductivity Detector (TCD) without requiring a reference gas.

Moreover the NDA 701 incorporates TEMS™ technology for major savings in Time, Energy, Money and Space, pursuing VELP’s contribution to environmental protection.
VLP Scientifica offers a wide range of superior quality consumables for the day-to-day operation of your NDA 701 including high-quality quartz tubes, crucibles, tin foils, long-life and premium reagents and catalysts, calibration standards, o-rings, seals and fittings. At VLP Scientifica we manufacture most of the consumables we supply in order to ensure the most suitable solution for your NDA 701. VLP offers a great advantage compared to competitors, instruments and consumables from a single source to optimize the performance of your analyzer.

**KIT FOR 1000* ANALYSES**
VLP Scientifica also offers a consumables kit that contains all parts and reagents necessary for approximately 1000 analyses: combustion and reduction tubes, reagents and instrument fittings. A pre-packed solution to save your time when ordering consumables for your analyzer!

* 1000 is an estimated value. The effective life of the kit depends on the quantity and the kind of sample.

**SUPPLIED WITH**
- Start-up kit for 1000 analyses: A00000193
- DUMAS™ NDA 701 Software: 40001504
- RS232 cable for balance: 10003926
- Autosampler with disc 1: 40001065
- USB cable for PC, 5 mt: 40001693

All the accessories for maintenance, connections, reactors and sample preparation are supplied with the instrument.

**OPTIONAL ACCESSORIES**
- Disc 2 for autosampler: A00000199
- Disc 3 for autosampler: A00000200
- Disc 4 for autosampler: A00000201
- Closing device tin foil cup: A00000217

**CONSUMABLES**

<table>
<thead>
<tr>
<th>Consumables Description</th>
<th>Code No</th>
</tr>
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<tr>
<td>1000 analyses kit for NDA 701</td>
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<tr>
<td>Tin Foil Cups, 100 pcs</td>
<td>A00000153</td>
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<td>Chromosorb, 10 g</td>
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<td>Quartz reactor tube</td>
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<td>A00000159</td>
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<tr>
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<tr>
<td>Ash collector</td>
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<tr>
<td>Quartz wool, 50 g</td>
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<tr>
<td>Reduced copper, 250 g</td>
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<tr>
<td>Copper oxide, 50 g</td>
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<tr>
<td>Sicapent, 100 g</td>
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<tr>
<td>EDTA, 100 g</td>
<td>A00000149</td>
</tr>
<tr>
<td>Anhydrone, 475 g</td>
<td>A00000225</td>
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</table>

Performance is ensured when NDA 701 works with original VLP consumables.
NDA 701 is completely controlled and operated by the DUMASoft™, offering all the most important info at a glance in one window!

1...BEFORE THE ANALYSIS
Simply position the capsule in the autosampler, enter sample name, type and weight and select the method and the calibration curve. Automatically, the software will set the analytical conditions according to the entered data. The dosing of gases is optimized by the software, in order to achieve complete combustion of the sample with minimum consumption. Create and save calibration curves using standards, pure test substances with a well-known nitrogen content. No need to create a new calibration curve every day. Recall it before starting the analysis.

A good calibration curve requires 5-6 points. These should represent different standard quantities (in mg) to create a range (in mg of nitrogen) that will then contain the nitrogen content of the analyzed sample. The more that the content of mg of nitrogen is centered in the range, the greater are the accuracy and precision of the analysis.

2...DURING THE ANALYSIS
In the main window the user can continuously check the instrument status, controlling the flow rate and the reactor temperatures on the right side of the page. Beneath, the user can also read suggestions about the maintenance, monitoring the number of analyses that can be performed before the next replacement. The real time graph shows the progress of the analysis, creating the peak as soon as the nitrogen reaches the Thermal Conductivity Detector (TCD).

3...AFTER THE ANALYSIS
Once the analysis is completed, the operator will find all the test information in the main window, with a real-time graph, info about the method and results in different formats (nitrogen mg, nitrogen % and protein %). All analysis data are stored into databases and can be exported in .xls, .txt and .csv format to PC or LIMS. The operator can also create test reports for a single test or multiple analyses for a better interpretation of the data. Results can be also recalculated using different calibration curves, without performing a new test, but only selecting the new curve. A particularly useful additional function can be the reintegration of the peak area. Results can be output to a printer.

LEAK SPOT IDENTIFICATION
Prior to analysis, particularly following replacement of reagents, it is possible to carry out a leak test to ensure that no time is wasted producing unusable results. Leak testing is fully automated, it even identifies in which zone a leak might be present. Indeed, it is possible to check specific areas only or the entire system:

- Test 1: autosampler, combustion reactor and water trap 1
- Test 2: Test 1 + reduction reactor
- Test 3: Test 2 + water trap 2 and CO₂ adsorbers
- Complete Test: on the whole system

Tests by zone are extremely useful when replacing parts and reagents; as the user is informed exactly where the leak is occurring. In addition, the time required for a test by zone is shorter compared to the complete test.

STAND-BY and HELIUM SAVING MODE
Right from the start of the analysis, the user can configure the NDA 701 so that it switches automatically to standby mode or helium saving mode. Standby configuration involves reactor temperatures, carrier flow and valves, whilst helium saving mode affects only the carrier flow reducing the consumption of helium.

AUTOMATIC WEIGHING
The weight of samples prepared can be automatically transmitted by a balance: fast, easy and accurate data transfer. In fact, an interface with an electronic balance eliminates any errors in data transfer. The NDA 701 can be connected to several analytical balances with a resolution in grams of from 0.1 mg to 0.01 mg.

Alternatively, the user can enter the sample weight manually in the relative database column.

UNLIMITED LIBRARY
The pre-installed methods and the possibility to create new programs or modify the existing ones allows the user to customize the instrument according to the most diverse requirements. Unlimited calibration curves can be created, saved and recalled at any time for an easy and fast recalculation of the result, without the need of repeating the analysis.
Johan Kjeldahl was a Danish chemist who while studying the changes of protein content during the transformation of barley into malt process developed the method for determining nitrogen, which then took its name from him. Because of its high degree of precision, reproducibility and versatility, the Kjeldahl method is used today to determine the content of nitrogen and proteins according to the official methods (AOAC, EPA, DIN, ISO). The Kjeldahl method is the official method for determining nitrogen and protein contents in:

- Foods (raw materials and finished products)
- Animal feeds
- Soils, fertilizers, etc.
- Wastewater, sludge, etc.
- Lubricants, fuel oils, etc.

VELP Scientifica offers a complete package for Kjeldahl analysis, made up of a mineralization unit, aspiration and fume neutralization systems followed by distillation/titration units.

VELP digesters are suitable for a variety applications in food&feed, beverage (nitrogen, protein, Total Kjeldahl Nitrogen), environmental (COD, Total Kjeldahl Nitrogen), chemical and pharmaceutical (organic nitrogen) industries.

Choose the best solution according to your needs between DK and DKL Series!

**GLP** Good Laboratory Practice

**AOAC** • **DIN** • **EPA** • **ISO**

### CONSUMABLES

| Kjeltabs MT | 3.5 g K$_2$SO$_4$, 0.175 g HgO | CT0006602 |
| Kjeltabs ST | 3.5 g K$_2$SO$_4$, 3.5 mg Se | CT0006609 |
| Kjeltabs W | 97.5 parts Na$_2$SO$_4$, 3.5 parts CuSO$_4$ x 5H$_2$O, 1 part Se, 5 g | CT0006613 |
| Kjeltabs TCT | 3.5 g K$_2$SO$_4$, 0.105 g CuSO$_4$ x 5H$_2$O, 0.105 g TiO$_2$ | CT0006621 |
| Kjeltabs CM | 3.5 g K$_2$SO$_4$, 0.1 g CuSO$_4$ x 5H$_2$O | CT0006650 |
| Antifoam S | 0.97 g Na$_2$SO$_4$, 0.03 g silicone | CT0006600 |
| Nitrogen-free weighing boats, 58x10x10 mm | CM0486000 |
| Nitrogen-free weighing boats, 70x23x15 mm | CM0486001 |

---

**1) DIGESTION**

The sample is heated to a high temperature after being mixed with concentrated sulfuric acid and other reagents. An ammonium sulfate solution is obtained from this reaction.

**2) DISTILLATION**

The sulfuric acid used for digestion is neutralized by a concentrated sodium hydrate solution. By adding an excess of alkali, the balance is shifted from ammonium ions to free ammonia (NH$_3$). The free ammonia is isolated during steam distillation and transferred to a receiver solution.

**3) TITRATION**

The ammonia produced can be quantitatively determined by means of acid base titration (colorimetric, potentiometric, etc.) or other methods. It is then possible to calculate the quantity of nitrogen (% proteins).

---

**SAMPLE**

**DIGESTION**

DKL Series / DK Series DIGESTERS

**JP** RECIRCULATING WATER PUMP

**SMS** SCRUBBER

**DISTILLATION** with steam generator

UDK Series DISTILLATION UNITS

**TITRATION**

UDK 149 PREDISPOSITION FOR CONNECTION TO THE MOST IMPORTANT AUTO-TITRATOR

UDK 159 INTEGRATED TITRATION SYSTEM

**NITROGEN mg (Protein %)**
The DK Series is made of an aluminum heating block, that needs to be combined with a support system, sample rack (with heat shields), suction cap and test tubes.

The heating block offers an excellent thermal homogeneity, precision and accuracy and its temperature is controlled by a dedicated microprocessor. A graphic display shows up to 20 programs with 4 temperature ramps for each program, completely user-programmable. DK digestion units have a very compact size aimed to meet the most demanding laboratories needs in terms of space saving.

**INSTRUMENT** | **POWER SUPPLY** | **CODE No**
--- | --- | ---
DK 6 | 230 V / 50-60 Hz | F30100182
DK 6 | 115 V / 50-60 Hz | F30110182
DK 6/48 | 230 V / 50-60 Hz | F30100188
DK 6/48 | 115 V / 50-60 Hz | F30110188
DK 8 | 230 V / 50-60 Hz | F30100020
DK 8 | 115 V / 50-60 Hz | F30110020
DK 20 | 230 V / 50-60 Hz | F30100181
DK 20 | 115 V / 50-60 Hz | F30110185
DK 20/26 | 230 V / 50-60 Hz | F30100185
DK 20/26 | 115 V / 50-60 Hz | F30110185
DK 42/26 | 230 V / 50-60 Hz | F30100186

*The “Operating Accessories” indicated below are necessary for the correct functioning of the DK Series.

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<thead>
<tr>
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<td>DK 6/48 Test tube Ø 48x260 mm, 300 ml, 1 pcs/box</td>
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<tr>
<td>PTFE sheat for 29/32 cone</td>
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* with DK 6 and DK 20 only
DKL FULLY AUTOMATIC SERIES

The fully auto DKL Series is composed of an aluminum heating block offering excellent temperature homogeneity, precision and accuracy: an auto lift and an auto suction cap and is supplied as a complete package including test tubes, sample rack and drip tray.

High-tech but simple to use, a microprocessor controls the block temperature whilst an electronic auto-calibration system ensures excellent reliability and repeatability of analysis.

A practical interface with LCD graphic display allows access to all the data including the multi-language library and the 54 programs available, 24 of which are user-programmable. DKL digestion units are extremely compact with a narrow footprint for optimum use of space on the lab bench. Data can be printed or stored in a PC.

FULLY AUTOMATED AND UNSUPERVISED DIGESTION IN 3 STEPS

TIME SAVING: FROM AMBIENT TO 420 °C IN ONLY 22 MINUTES, WITH FAST PROGRAMMING
ENERGY SAVING: 35% REDUCTION IN ENERGY CONSUMPTION, CUTTING CO₂ EMISSION
MONEY SAVING: HUGE COST REDUCTION FOR EACH ANALYSIS
SPACE SAVING: REDUCE UNNECESSARY USE OF SPACE

DKL Series incorporates VELP’s revolutionary TEMS™ technology for unprecedented savings in terms of Time, Energy - as much as 35%, Money and Space.

SUPPLIED WITH

<table>
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<tr>
<th>INSTRUMENT</th>
<th>POWER SUPPLY</th>
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<tbody>
<tr>
<td>DKL 8</td>
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<td>DKL 8</td>
<td>115 V / 50-60 Hz</td>
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<td>DKL 42/26</td>
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* DKL Series comes including lift, suction cap, sample rack and test tubes

OPTIONAL ACCESSORIES

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<tr>
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<tr>
<td>DKL 12 Sample rack</td>
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<tr>
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</table>
SMS SCRUBBER

SMS Scrubber is designed for the neutralization of toxic and corrosive fumes. Its working process is generally composed by 3 stages:
- Condensation
- Neutralization with acids and bases
- Absorption with activated carbon (optional)

Thanks to the elevated surface of contact between gas and liquid, SMS prevents hazardous emission into the laboratory and environment.

JP RECIRCULATING WATER PUMP

JP Recirculating Water Pump is the innovative solution for aspirating toxic fumes. JP provides a considerable water saving thanks to the principle of water recirculation in its tank. VELP Recirculating Water Pump is made with high-quality materials and equipped with special features. JP is designed to last and to offer high performance in terms of efficiency (up to 35 l/min flow rate).
The UDK 129 runs automatically, after setting sodium hydroxide addition and distillation time using the LCD display in order to get reliable and accurate results. The high-precision pumps ensure constant accurate dosing of reagents and the cooling water is automatically stopped during pauses, thus cutting down on its consumption. The new UDK 129 incorporates the same high level of technology as the top of the range, with the VELP patented steam generator that offers high performance, safety (no pressure inside) and is maintenance-free. Another unique VELP component is the titanium condenser offering reduced water consumption, ensuring that distillate temperature always remains below the threshold value. The unit works with a technopolymer splash head that ensures durability to protect your investment and requires no maintenance. The technopolymer housing ensures high resistance to chemicals and long life.

UDK 129 DISTILLATION UNIT

The UDK 129 has numerous safety features in order to provide maximum protection for the user. Continuous monitoring indicates incorrect tube and handle positioning; the cooling water flow detector provides a high level of safety. With a novel design, a lever is used to displace the tube support enabling sample tubes to be inserted without any effort and clamped in place securely.

Technologically advanced, the UDK 129 includes many features that ensure efficient and reliable distillation, far beyond expectations of an ordinary entry level unit.

UDK DISTILLATION UNITS

VELP Scientifica distillation units are the ideal solution for performing analyses concerning different applications such as determining ammoniacal nitrogen, protein nitrogen, (Kjeldahl or direct alkaline distillation), nitric nitrogen (after reduction), phenols, volatile fatty acids, cyanides, alcohol content and Devarda nitrogen determination.

VELP Scientifica offers a wide choice with its 4-model series for performing efficient and reliable steam distillations, according to the different needs of the users. All the units support the most advanced technology, consisting in a unique patented steam generator and an outstanding efficient patent pending titanium condenser that are wisely combined with a technopolymer splash head.

Designed with a strong and chemical-resistant structure made of technopolymer, UDK Series has been designed to last in time and to perform reliable analysis for many years. Different safety features have been assembled on the units to improve the safety level of our users:

- safety lever avoids contact with soiled surfaces
- protective door with sensor shields test tube and prevents spills; completely closed
- service door + automatic electrical shutdown for extraordinary maintenance
- cooling water flow-rate detector activates low flow-rate warning signal
- test tube sensor ensures the presence of the test tube
- drip tray collects any drops

UDK Series supports different sizes of test tubes, from straight tubes (100, 250, 300, 400 ml and 1 liter) to Kjeldahl flasks (500 ml).

UDK 139, 149 and 159 software can be easily upgraded.

UDK Series also incorporates TEMS™ technology for major savings in Time, Energy, Money and Space pursuing VELP’s contribution to environmental protection.
UDK 139
SEMI-AUTOMATIC DISTILLATION UNIT

The UDK 139 runs automatically, after setting distillation time, water and sodium hydroxide addition and steam generation output level between 10 and 100% using the innovative 3.5" color touch screen. The high-precision pumps ensure constant accurate dosing of reagents. Accessing the 10 customizable methods available in 6 different languages is simple and intuitive. The new UDK 139 incorporates a considerably high level of technology, with the VELP patented steam generator that offers high performance, safety (no pressure inside) and is maintenance-free. Another unique VELP component is the titanium condenser offering reduced water consumption, ensuring that distillate temperature always remains below the threshold value.

The unit works with a technopolymer splash head ensures durability to protect your investment requires no maintenance. A technopolymer housing ensures high resistance to chemicals used during the operation. The UDK 139 is specially conceived to provide absolute user protection. Non-stop monitoring indicates incorrect tube and handle positioning; the cooling water flow detector and reagent level alarms provide a high level of safety. With a novel design, a lever is used to displace the tube support enabling sample tubes to be inserted without any effort and clamped in place securely. The instrument can be connected to a printer in order to print the data concerning the tests in progress and ensure traceability for the samples and system. The UDK 139 combines excellent value-for-money with high reliability and advanced performance.

UDK 149
AUTOMATIC DISTILLATION UNIT WITH TITRATOR CONNECTION

The UDK 149 operates automatically, after setting on the multi-function 3.5" color touch screen water, boric acid and sodium hydroxide addition, distillation time and the steam generation output level between 10 and 100%. Different automatic titrator models can be connected to the UDK 149 for direct output of the final result and offering choice and versatility to the user. The high-precision pumps ensure constant accurate dosing of reagents. All the parameters concerning distillation and titration phase are easily programmable. Simple, time-saving and intuitive operation is assured by direct access to the 20 customizable methods available in 6 different languages (additional languages are also available). The UDK 149 offers powerful archiving features. The interfaces enable results to be downloaded to a pen drive or directly to a PC. The .xls format permits operators to use well-known software for extracting reports with maximum flexibility.

The new UDK 149 incorporates the latest technology. The VELP patented steam generator is maintenance-free and offers high performance and an outstanding level of safety (no pressure inside). Also unique from VELP is the titanium condenser offering reduced water consumption, a high resistance to breakage and the guarantee that distillate temperature always remains below the safe threshold value to retain total nitrogen. A technopolymer splash head significantly increases the life expectancy and requires no maintenance. All chemical reagents used during the process are resisted by the technopolymer housing. Full user protection is top of the benefits of the UDK 149. Incorrect tube and handle positioning are continuous monitored and high safety levels are provided by the cooling water flow detector and reagent level. A range of sample tube sizes can be inserted without any effort using a lever to displace the tube support and clamping the tube in place securely because of the innovative design. The versatility of the UDK 149 is underlined by input from a titrator and data output to PC, pen drive and printer, in a common format, via USB, Ethernet and RS232 plus an on-board archive for sample data storage. Offering an upgrade pathway to combine distillation and titration, the UDK 149 will be instrument of choice for many laboratories.
**UDK 159 AUTOMATIC DISTILLATION & TITRATION SYSTEM**

The UDK 159 offers powerful archiving features. In compliance with GLP (Good Laboratory Practice), the interfaces enable results to be downloaded to a pen drive or directly to a PC. The .csv format permits operators to use well-known software for extracting reports with maximum flexibility. Full understanding and ease of use are ensured the choice of preferred language. 6 languages are supplied as standard; others are downloadable from VELP. The new UDK 159 incorporates a considerably high-tech level, with the VELP patented steam generator that offers high performance, safety (no pressure inside) and is maintenance-free. Another unique VELP component is the titanium condenser, offering reduced water consumption, ensuring that distillate temperature always remains below the threshold value. The unit works with a technopolymer splash head to increase the life expectancy substantially and ensures no maintenance. A technopolymer housing provides high chemical resistance against all the reagents used during the process. The UDK 159 is specifically designed to provide full protection of the user. Continuous monitoring indicates incorrect tube and handle positioning; the cooling water flow detector and reagent level alarms provide a high level of safety. Thanks to an innovative system, sample tubes are inserted without any effort using a lever to displace the tube support and clamping the tube in place securely. On-board archive for data storage sample data, input from a balance and output to PC, pen drive and printer, in a common format, via Ethernet, USB and RS232 confirm the versatility of the UDK 159.

The UDK 159 runs automatically, after setting distillation time and water, boric acid and sodium hydroxide addition, the steam generation output from 10 to 100% using the innovative 6'' color touch screen. The high-precision pumps and burette ensure constant accurate dosing of reagents and with the integrated colorimetric titrator (AOAC recommended) you will have reliable results concerning your determinations. Automatic titration vessel cleaning provides significant advantages including reducing maintenance to a minimum. A 54-program library (30 predefined + 24 customizable) covers the needs of any laboratory and the reporting system is comprehensive.

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**PERFORMANCE**

<table>
<thead>
<tr>
<th>Analysis Time</th>
<th>UDK 129</th>
<th>UDK 139</th>
<th>UDK 149</th>
<th>UDK 159</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min to collect 100 ml of distillate</td>
<td>4 min to collect 100 ml of distillate</td>
<td>3 min to collect 100 ml of distillate</td>
<td>from 4 min (titration included)</td>
<td></td>
</tr>
</tbody>
</table>

**Reproducibility (RSD)**
- ≤ 1%
- ≤ 1%
- ≤ 1%
- ≤ 1%

**Recovery (at nitrogen level between 1-200 mg)**
- ≥ 99.5%
- ≥ 99.5%
- ≥ 99.5%
- ≥ 99.5%

**Detection Limit**
- ≥ 0.1 mg N
- ≥ 0.1 mg N
- ≥ 0.1 mg N
- ≥ 0.1 mg N

**Automatic Sodium Hydroxide Addition**
- •
- •
- •
- •

**Automatic Boric Acid Addition**
- •
- •
- •
- •

**Selectible Distillation Time**
- •
- •
- •
- not necessary with titration

**Distillation Residues Removal**
- •
- •
- •
- •

**Steam Flow Regulation (10-100%)**
- •
- •
- •
- •

**Delay Time (Devarda Alloy Analysis)**
- •
- •
- •
- •

**Distillation in Series**
- •
- •
- •
- •

**Limited Water Consumption**
- •
- •
- •
- •

**Display**
- LCD
- 3.5" color touch screen
- 3.5" color touch screen
- 6" color touch screen

**Programs**
- 1
- 10
- 20
- 54

**Language Selection**
- •
- •
- •
- •

**Archive (on-board data storage)**
- •
- •
- •
- •

**Password (user/super user)**
- •
- •
- •
- •

**Titratation Residues Removal**
- •
- •
- •
- •

**Automatic Titratation Vessel Cleaning**
- •
- •
- •
- •

**Interchangeable Burette**
- •
- •
- •
- •

**Mouse**
- •
- •
- •
- •

**Printer**
- •
- •
- •
- •

**PC (for data storage)**
- •
- •
- •
- •

**Pen Drive (for data transfer)**
- •
- •
- •
- •

**Balance**
- •
- •
- •
- •

**Dimensions**
- Overall Dimensions in mm (in) (WxHxD): 385x780x416 (15.2x30.7x16.4)
- Overall Weight in kg (lbs): 24 (52.9)
- Power Supply: 230 V / 115 V
- Power: 2100 W / 1700 W

**INSTRUMENT POWER SUPPLY CODE No**
- UDK 159: 230 V / 50-60 Hz F30200150

**Temperature**
- ANALYSIS TIME
  - 5 min to collect 100 ml of distillate
  - 4 min to collect 100 ml of distillate
  - 3 min to collect 100 ml of distillate
  - from 4 min (titration included)

**Reproducibility (RSD)**
- ≤ 1%
- ≤ 1%
- ≤ 1%
- ≤ 1%

**Recovery (at nitrogen level between 1-200 mg)**
- ≥ 99.5%
- ≥ 99.5%
- ≥ 99.5%
- ≥ 99.5%

**Detection Limit**
- ≥ 0.1 mg N
- ≥ 0.1 mg N
- ≥ 0.1 mg N
- ≥ 0.1 mg N

**Automatic Sodium Hydroxide Addition**
- •
- •
- •
- not necessary with titration

**Automatic Boric Acid Addition**
- •
- •
- •
- •

**Selectible Distillation Time**
- •
- •
- •
- •

**Distillation Residues Removal**
- •
- •
- •
- •

**Steam Flow Regulation (10-100%)**
- •
- •
- •
- •

**Delay Time (Devarda Alloy Analysis)**
- •
- •
- •
- •

**Distillation in Series**
- •
- •
- •
- •

**Limited Water Consumption**
- •
- •
- •
- •

**Display**
- LCD
- 3.5" color touch screen
- 3.5" color touch screen
- 6" color touch screen

**Programs**
- 1
- 10
- 20
- 54

**Language Selection**
- •
- •
- •
- •

**Archive (on-board data storage)**
- •
- •
- •
- •

**Password (user/super user)**
- •
- •
- •
- •

**Titratation Residues Removal**
- •
- •
- •
- •

**Automatic Titratation Vessel Cleaning**
- •
- •
- •
- •

**Interchangeable Burette**
- •
- •
- •
- •

**Mouse**
- •
- •
- •
- •

**Printer**
- •
- •
- •
- •

**PC (for data storage)**
- •
- •
- •
- •

**Pen Drive (for data transfer)**
- •
- •
- •
- •

**Balance**
- •
- •
- •
- •

**Dimensions**
- Overall Dimensions in mm (in) (WxHxD): 385x780x416 (15.2x30.7x16.4)
- Overall Weight in kg (lbs): 24 (52.9)
- Power Supply: 230 V / 115 V
- Power: 2100 W / 1700 W

**INSTRUMENT POWER SUPPLY CODE No**
- UDK 159: 230 V / 50-60 Hz F30200150
STEAM GENERATOR

- **Safe Working Conditions**
  A thermostat ensures the correct functioning of the steam generator, a safety thermostat eliminates risks for the operator
- **Non-Pressurized**
  No chance of leaks occurring even after an intensive use, completely maintenance-free
- **Extremely Reliable**
  The high level of precision and accuracy ensure correct and detailed results
- **Deionized Water**
  The use of deionized water prevents misleading results (no nitrogen in deionized water) and the formation of limescale

TITANIUM CONDENSER

- **Efficient Thermal Exchange**
  Distillate temperature always below the threshold value
- **Limited Water Consumption**
  From only 0.5 l/min at 15 °C (1 l/min. at 30 °C)
- **No Nitrogen Loss, Precise Results**
  Cost reduction thanks to high performance, minimal consumption and no external chiller
- **Minimal Maintenance**
  Easy to disassemble and clean

**TECHNOPOLYMER SPLASH HEAD**

- **Long-Life**
  The best and most durable solution when a large number of samples are processed
- **High Chemical Resistance**
  Highly resistant to alkaline and chemical solutions, used during steam distillation
- **No Risk of Breakage**
  Ensures safe working conditions in the laboratory
- **Maintenance-free and Easy to Replace**
  No maintenance required, extremely easy to replace when necessary

**TECHNOPOLYMER HOUSING**

- **High Durability**
  Unique structure able to resist to chemical attacks for unprecedented resistance
- **Long-Life**
  Extremely compact and robust, designed to last
- **Space Saving**
  Narrow footprint for optimum use of the lab bench
- **Safety Lever, Protective Door and Service Door**
  Improved safety and comfort

**UDK ACCESSORIES**

<table>
<thead>
<tr>
<th>SUPPLIED WITH</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test tube Ø 42x300 mm, 250 ml</td>
<td>A00001080</td>
</tr>
<tr>
<td>Collecting flask, 250 ml</td>
<td>10001106</td>
</tr>
<tr>
<td>Pincer for test tubes</td>
<td>10000247</td>
</tr>
<tr>
<td>Touch pen (for UDK 139, 149, 159)</td>
<td>10004936</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTIONAL ACCESSORIES</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test tube Ø 26x300 mm, 100 ml, 6 pcs/box</td>
<td>A00000146</td>
</tr>
<tr>
<td>Test tube Ø 42x300 mm, 250 ml, 3 pcs/box</td>
<td>A00000144</td>
</tr>
<tr>
<td>Test tube Ø 48x260 mm, 300 ml</td>
<td>A00001088</td>
</tr>
<tr>
<td>Test tube Ø 50x300 mm, 400 ml</td>
<td>A00000185</td>
</tr>
<tr>
<td>Test tube Ø 80x300 mm, 1 liter</td>
<td>A00001083</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTIONAL ACCESSORIES</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacer for test tube Ø 48x260 mm</td>
<td>A00000206</td>
</tr>
<tr>
<td>Test tube connection Ø 26 mm, Ø 48 mm and 500 ml Kjeldahl balloon</td>
<td>A00000043</td>
</tr>
<tr>
<td>Syringe 50 ml volume (for UDK 159 burette)</td>
<td>A00000066</td>
</tr>
<tr>
<td>Printer (UDK 139, 149 and 159)</td>
<td>A00001009</td>
</tr>
<tr>
<td>Printer Adapter (UDK 139, 149 and 159)</td>
<td>A00000195</td>
</tr>
<tr>
<td>IQ/OQ/PQ UDK 129 Manual</td>
<td>A00000205</td>
</tr>
<tr>
<td>IQ/OQ/PQ UDK 139 Manual</td>
<td>A00000204</td>
</tr>
<tr>
<td>IQ/OQ/PQ UDK 149 Manual</td>
<td>A00000203</td>
</tr>
<tr>
<td>IQ/OQ/PQ UDK 159 Manual</td>
<td>A00000202</td>
</tr>
<tr>
<td>Waterproof mouse (for UDK 139, 149, 159)</td>
<td>A00000215</td>
</tr>
<tr>
<td>USB cable</td>
<td>10003134</td>
</tr>
<tr>
<td>Titrator Titroline Easy K for UDK 149</td>
<td>R30800194</td>
</tr>
</tbody>
</table>
The Oxitest is an innovative solution, entirely controlled by the powerful OXISoft™, able to provide high added-value information concerning fat oxidation processes in foods, oils and fats. The Oxitest works directly on the whole sample without the need for preliminary fat separation, and is suitable for the determination of the quality and the state of preservation of the food sample.

An extremely simple and intuitive instrument equipped with two separate titanium chambers in order to analyze the same sample in duplicate or different samples at the same time and under the same conditions. The stability of the sample is evaluated by accelerating the oxidation process using high temperatures (from 20 to 110 °C) and a pre-determined oxygen pressure. Oxygen is consumed during fat oxidation and it is this decrease in oxygen pressure that enables us to obtain useful information concerning the food sample. The intuitive software controls the entire process in a user friendly way and the operator can record data in a database, compare tests, export the data to an Excel file, filter and order the data quickly and simply.

The Oxitest is the versatile VELP solution suitable for a wide range of applications, including:

- Prediction of the oxidation stability during shelf-life studies, by analyzing the product at defined time intervals and building an experimental curve;
- Evaluation of the adequacy of storage conditions;
- Evaluation of the best packaging solution;
- Comparison of the oxidation stability of different formulas for food preparations;
- Evaluation of the oxidative stability of vegetable oils of different botanical origin;
- Evaluation of the effectiveness of antioxidants;
- Information on product oxidation when the oxidation flex is not visible, especially for products with a low fat content (4-5%). In this case, product oxidation can be achieved by combining the Oxitest with the gas chromatographic technique.

**RESULTS**

Induction Period (IP) 24h 0min (Graphical method)

Test duration 94:48:39

Curve 1

\[ Y = 0.020X + 6.26 \]

Curve 2

\[ Y = 0.200X + 10.58 \]

**OXITEST OXIDATION TEST REACTOR**

**GENERAL FEATURES AND PERFORMANCE**

<table>
<thead>
<tr>
<th>CONSTRUCTION MATERIAL</th>
<th>Epoxy painted stainless steel structure and anodized aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF OXIDATION CHAMBERS</td>
<td>2</td>
</tr>
<tr>
<td>CAPACITY OF SINGLE CHAMBER</td>
<td>Up to 100 ml</td>
</tr>
<tr>
<td>TEMPERATURE RANGE</td>
<td>Ambient to 110 °C</td>
</tr>
<tr>
<td>PRESSURE RANGE</td>
<td>0 - 8 bar</td>
</tr>
<tr>
<td>OVERPRESSURE</td>
<td>Safety valve</td>
</tr>
<tr>
<td>OUT-RANGE TEMPERATURE</td>
<td>Visual warning</td>
</tr>
<tr>
<td>DAMAGED PROBE</td>
<td>Visual warning</td>
</tr>
<tr>
<td>INTERFACE</td>
<td>USB</td>
</tr>
<tr>
<td>POWER</td>
<td>900 W</td>
</tr>
<tr>
<td>DIMENSIONS (WxHxD)</td>
<td>365x190x485 mm (14.6x7.6x19.4 in)</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>16.5 Kg (36.3 lb)</td>
</tr>
</tbody>
</table>

**SUPPLIED WITH**

<table>
<thead>
<tr>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>OXISoft™ OXITEST Software 10002948</td>
</tr>
<tr>
<td>USB cable 10003134</td>
</tr>
<tr>
<td>Sample holder 10001985*</td>
</tr>
<tr>
<td>Spacer 10001984*</td>
</tr>
</tbody>
</table>

*the unit comes with 6 sample holders and 4 spacers

GLP Good Laboratory Practice
Solvent extraction is used to determine the quantity of various components contained in agricultural, industrial or environmental samples. Soxhlet extraction is one of the most widely used analytical techniques. Adaptations of the technique have been introduced over time in order to reduce lengthy extraction times, for example by increasing the temperature of the solvent used. The modifications introduced by the American chemist Edward L. Randall are some of the most effective for this purpose. VELP Scientifica solvent extractors operate according to the Randall technique.

**SOXHLET TECHNIQUE**
The solubilization of extractable components is performed by a cold solvent dropping from a reflux condenser. Consequently a complete extraction lasts many hours.

**RANDALL TECHNIQUE**
The first phase of extraction is performed by immersing a sample - containing thimble in boiling solvent followed by a washing with cold refluxing solvent. The fast solubilization achieved by the hot solvent results in a sharp reduction of extraction time.

**SUPPLIED WITH**
- SER 148/3 Extraction cup, 3 pcs/box A00001141
- SER 148/3 Heat shield 40000210
- SER 148/6 Extraction cup, 6 pcs/box A00000142
- SER 148/6 Heat shield 40000220
- Extraction thimbles 33x80 mm, 25 pcs/box CM0111148
- Extraction thimbles holder A00001142
- Inlet tube 10000280
- Viton seal 10000008
- Butyl seal 10000009

**CONSUMABLES**
- Extraction thimbles 33x80 mm, 25 pcs/box CM0111148

**OPTIONAL ACCESSORIES**
- Printer A00001009
- Serial cable A00000011
- Thimbles weighing cup A00001146
- Thimbles stand A00001149
- Handling device for extraction cups A00001145
- Pincer for weighing cups A00001147
- Extraction cup, 6 pcs/box A00000142
- Vatton seal A00000061
- IQ/OQ/PQ Manual for SER 148 A00000073

* only for SER 148/6

The SER 148/3 and SER 148/6 can be used to separate a substance or a group of elements (e.g. fat) from solid and semi-solid samples according to the Randall technique (consisting of immersion, washing and solvent recovery). This technique has three great benefits over the traditional Soxhlet technique:

- up to 5 times faster than Soxhlet (hot solvent vs. cold solvent)
- low solvent consumption (solvent recovery)
- limited cost per analysis

In addition, the SER 148 offers full operator safety in compliance with IP55. The main field of application is the determination of the content of soluble products such as fats, detergents, plasticizers and pesticides in food, animal feeds, detergents, rubber and plastic formulas, pharmaceutical products, soil, etc.
### HU 6

**HYDROLYSIS UNIT**

The HU 6 offers the optimum solution for the acid hydrolysis of food and feed samples prior to solvent extraction for total fat analysis. Very often the samples to be analyzed have a high fat content and need to be prepared for fat extraction. The HU 6 is a 6-position hydrolysis unit that combines safety with performance, reducing manual handling to the minimum. Hydrolysis is carried out with hydrochloric acid for approximately one hour at a temperature of 170 °C. The hydrolyzed sample is then filtered in a glass crucible and washed with warm de-ionized water in order to eliminate the residues of hydrochloric acid. The sample is now ready to be processed using the SER 148. The HU 6 is suitable for both acid and basic hydrolysis.

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>POWER SUPPLY</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>SER 148/3</td>
<td>230 V / 50-60 Hz</td>
<td>F30300240</td>
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<tr>
<td>SER 148/3</td>
<td>115 V / 50-60 Hz</td>
<td>F30310240</td>
</tr>
<tr>
<td>SER 148/6</td>
<td>230 V / 50-60 Hz</td>
<td>F30300242</td>
</tr>
<tr>
<td>SER 148/6</td>
<td>115 V / 50-60 Hz</td>
<td>F30310242</td>
</tr>
</tbody>
</table>

### GENERAL FEATURES AND PERFORMANCE

- **CONSTRUCTION MATERIAL**: Epoxy painted stainless steel structure
- **NUMBER OF SAMPLES**: 3 (SER 148/3) or 6 (SER 148/6)
- **MAX VOLUME EXTRACTION CUP**: 150 ml
- **DISPLAY**: Working temperature / settable parameters
- **WORKING TEMPERATURE**: From 100 to 260 °C
- **IMMERSION TIME**: From 0 to 999 minutes
- **WASHING TIME**: From 0 to 999 minutes
- **RECOVERY TIME**: From 0 to 999 minutes
- **SAMPLE QUANTITY**: From 0.5 to 15 g (generally 2-3 g)
- **SOLVENT RECOVERY**: ≤ 1%
- **INTERFACE**: RS232
- **POWER**: 500 W (SER 148/3) or 950 W (SER 148/6)
- **DIMENSIONS (WxHxD)**: 480x620x390 mm (18.9x24.4x15.4 in) (SER 148/3)
  700x620x390 mm (27.6x24.4x15.4 in) (SER 148/6)
- **WEIGHT**: 30 Kg (66 lb) (SER 148/3)
  40 Kg (88 lb) (SER 148/6)

### SUPPLIED WITH

<table>
<thead>
<tr>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A00000097</td>
</tr>
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<td>A00000089</td>
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<tr>
<td>10002412</td>
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### OPERATING ACCESSORIES

<table>
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<tr>
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<tr>
<td>A00000085</td>
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### OPTIONAL ACCESSORIES

<table>
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<tr>
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</tr>
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<tbody>
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<td>A00000087</td>
</tr>
<tr>
<td>A00000088</td>
</tr>
<tr>
<td>A00000144</td>
</tr>
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</table>
Vegetables and derived products are made up of substances belonging to different categories:
- carbohydrates, proteins, fats, mineral salts;
- a non-digestible component consisting of polymers (lignin, cellulose, hemicellulose, pectin) called “fiber”.

There are many reasons why it is very important to determine the fiber content:

**NUTRITIONAL REASON**
The quantity of fiber in the diet of human beings and animals is important in order to maintain the digestive system healthy and functional; too much fiber can cause digestive problems whereas a low fiber intake can cause irregularities in the functioning of the digestive tract.

**ECONOMIC REASON**
Manufacturers of food and animal feeds use as much fiber as a raw material as they are allowed since it is a low-cost component.

**LEGAL REASON**
The authorities of almost all countries require manufacturers of packaged foods and animal feeds to declare the fiber content on the packaging as part of the nutritional table.

**CRUCIBLE**
Crucibles are consumables and their lifetime is closely tied to correct use and proper cleaning. The average lifetime is 20-30 analyses.

Crucibles have class 2 porosity according to Jena’s definition, with 45 μm (40 – 60 μm) (ASTM) holes, class C in the USA.

The correct use of crucibles in the muffle furnace for analyzing ashes and proper cleaning in accordance with the recommendations in the operating manual are crucial.

**TIPS FOR CRUCIBLE TREATMENT IN A MUFFLE FURNACE**
The heating and cooling of glass crucibles for determining ash content requires special care in order to prevent breakages. Thermal shock can lead to breakage, particularly in stressed areas such as the junction between the crucible body and the filter disk.

A temperature of 550 °C corresponds to the beginning of glass’s plastic state and should not be exceeded.

Maximum rates recommended for heating and cooling glass crucibles are as follows:

<table>
<thead>
<tr>
<th>Heating</th>
<th>Cooling</th>
<th>Rate</th>
<th>Required time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 to 350</td>
<td>350 to 20</td>
<td>350</td>
<td>1</td>
</tr>
<tr>
<td>350 to 480</td>
<td>480 to 350</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>480 to 550</td>
<td>550 to 480</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

The FIWE 3 and FIWE 6 are suitable for raw fiber determination, conventionally known as an indigestible residue. **Rapid analysis, reliable results and high reproducibility** are some of the most relevant benefits of these units which are ideal for the following applications:

- total raw fiber determination (according to Weende)
- neutral detergent fiber and acid detergent fiber determination (NDF and ADF according to Van Soest)
- acid detergent lignin determination (ADL according to Van Soest)
- different fractions of fiber (cellulose, hemicellulose and pectin)

Raw fiber determination is useful for nutritional, economic and legislative aspects. FIWE performs single or sequential extraction including boiling, rinsing and filtration.
In order to perform a reliable raw fiber determination test, the sample must have a low fat content (<1%). For those samples that exceed this value, preliminary fat extraction is required using acetone, hexane or petroleum. The COEX performs rapid fat extraction directly in the same glass crucibles that are used by the FIWE 3 and FIWE 6. A great benefit as the user can start raw fiber extraction immediately after completing fat extraction.

**GENERAL FEATURES AND PERFORMANCE**

- **CONSTRUCTION MATERIAL**: Epoxy painted stainless steel structure
- **NUMBER OF SAMPLES**: 3 (FIWE 3) or 6 (FIWE 6)
- **DIGITAL TIMER**: 0 - 99 minutes with acoustic signal at the end of the cycle
- **TYPE OF EXTRACTIONS**: Hot and cold
- **SAMPLE REMOVAL**: Air pump
- **REAGENT DISCHARGE**: Peristaltic pump
- **TEMPERATURE**: Electronic regulation
- **REAGENTS AND COOLING WATER**: Separated outlets
- **SAMPLES**: Individually processed
- **SAMPLE QUANTITY**: From 0.5 to 3 g
- **REPRODUCIBILITY (RSD)**: ± 1%
- **POWER**: 900 W (FIWE 3) or 1200 W (FIWE 6)
- **DIMENSIONS (WxHxD)**: 730x300x380 mm (29.5x11.0x15.0 in) (FIWE 3), 760x620x390 mm (29.5x24.4x15.4 in) (FIWE 6)
- **WEIGHT**: 35 Kg (77 lb) (FIWE 3), 46 Kg (101.2 lb) (FIWE 6)

**SUPPLIED WITH**

- Heat shield (FIWE 3) 40000167
- Heat shield (FIWE 6) 40000161
- Glass crucible P2, 1 pcs/box (3 boxes with FIWE 3) A00001140
- Glass crucibles P2, 6 pcs/box (FIWE 6) A00000140
- Holder for 3 crucibles 40000166
- Holder for 6 crucibles 40000160
- PVC tube, 2 mt 10001086
- 2-place hot plate, RC2 type F20700172
- Reagent glass bottles 10001112
- Pincer for crucibles 10000247
- Inlet tube 10000280

**OPTIONAL ACCESSORIES**

- Glass crucibles P2, 6 pcs/box A00000140
- Water spray device A00001135
- IQ/OQ Manual FIWE A00000074

**GENERAL FEATURES AND PERFORMANCE**

- **CONSTRUCTION MATERIAL**: Epoxy painted stainless steel structure
- **TYPE OF EXTRACTION**: Cold
- **REAGENT DISCHARGE**: Peristaltic pump
- **POWER**: 120 W
- **DIMENSIONS (WxHxD)**: 730x300x380 mm (29.5x11.0x15.0 in)
- **WEIGHT**: 19 Kg (41.8 lb)

**SUPPLIED WITH**

- Glass crucibles P2, 6 pcs/box A00000140

**OPTIONAL ACCESSORIES**

- Glass crucibles P2, 6 pcs/box A00000140
DIETARY FIBER EXTRACTION

What is the difference between dietary fiber and raw fiber?

It is basically an analytical type of difference. Both procedures are aimed at calculating the indigestible residue of a food substance, or, everything that is not fat, protein or carbohydrate. Whereas the procedure for determining dietary fiber foresees the use of enzymes, raw fiber determination involves chemical reagents only (acids and bases).

The procedure for determining dietary fiber exposes the sample to a series of enzymatic digestions that simulate the real digestive process which takes place in the human and animal digestive tract, calculating the undigested residue remaining at the end of the analysis.

On the other hand, in analyzing raw fiber the sample is digested using diluted solutions of acids and bases. Again the final undigested residue of the sample is measured. In this case the most widely used official procedure is the Weende method (official in Italy, France, England, Sweden and the USA).

Generally speaking, dietary fiber analysis is carried out on foods intended for human consumption whereas raw fiber analysis is carried out on animal feeds or on raw materials of vegetable origin, e.g. cereals.

The GDE performs enzymatic digestion, a delicate phase where samples are immersed in a thermostatic water bath and stirred. Continuous and constant sample mixing is necessary in order to prevent the sample from overheating. The unit consists of an immersion heating head, a transparent tank and a VELP 6-place magnetic stirrer to ensure excellent thermoregulation and precision.

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>POWER SUPPLY</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDE</td>
<td>230 V / 50-60 Hz</td>
<td>F30400209</td>
</tr>
<tr>
<td>GDE</td>
<td>115 V / 50-60 Hz</td>
<td>F30410209</td>
</tr>
</tbody>
</table>

GENERAL FEATURES AND PERFORMANCE

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMPERATURE RANGE</td>
<td>Ambient to 105 °C</td>
</tr>
<tr>
<td>POWER</td>
<td>900 W</td>
</tr>
<tr>
<td>DIMENSIONS (WxHxD)</td>
<td>413x295x410 mm (16.2x11.6x16.1 in)</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>6.2 Kg (13.66 lb)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTIONAL ACCESSORIES</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaker, 400 ml</td>
<td>A00000999</td>
</tr>
<tr>
<td>Stirring bar, 6x35 mm</td>
<td>A0001056</td>
</tr>
</tbody>
</table>
The CSF 6 filtration unit carries out the final filtration and washing phase foreseen by the enzymatic method for dietary fiber determination. The CSF 6 used in combination with the GDE is suitable for the determination of total dietary fiber and reduces the time required compared to manual procedures considerably. The glass funnels facilitate the introduction of the digested sample and solvents into the instrument. The filtering and final washing stages are speeded-up thanks to the vacuum function.

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>POWER SUPPLY</th>
<th>CODE No</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF 6</td>
<td>230 V / 50 Hz</td>
<td>F30420210</td>
</tr>
<tr>
<td>CSF 6</td>
<td>230 V / 60 Hz</td>
<td>F30430210</td>
</tr>
<tr>
<td>CSF 6</td>
<td>115 V / 60 Hz</td>
<td>F30440210</td>
</tr>
</tbody>
</table>

AOAC

GENERAL FEATURES AND PERFORMANCE

- **CONSTRUCTION MATERIAL**: Epoxy painted stainless steel structure
- **PERISTALTIC PUMP**: High suction capacity
- **RESIDUES COLLECTING**: Separate
- **COUNTERPRESSURE**: Electronic setting
- **FILTRATION TIME**: Shortening
- **POWER**: 220 W
- **DIMENSIONS (WxHxD)**: 750x420x380 mm (28.7x16.5x15.0 in)
- **WEIGHT**: 28 Kg (61.6 lb)

**SUPPLIED WITH**

- Glass crucibles P2, 6 pcs/box
  - **CODE No**: A00000140

**OPTIONAL ACCESSORIES**

- Glass crucibles P2, 6 pcs/box
  - **CODE No**: A00000140
Constant Commitment to Knowledge Development

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