

LABSOLUTIONS

FOOD&FEED LINE

**NITROGEN/PROTEIN
DETERMINATION**

**DUMAS/COMBUSTION
METHOD**

**KJELDAHL
METHOD**

**SHELF LIFE
INVESTIGATION**

**FAT
EXTRACTION**

**RAW FIBER
EXTRACTION**

**DIETARY FIBER
EXTRACTION**



NITROGEN/PROTEIN DETERMINATION

NDA DUMAS NITROGEN ANALYZER

DUMAS METHOD

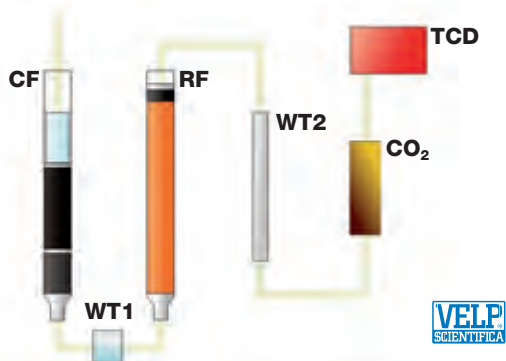
The Dumas method is used for the quantitative determination of nitrogen in chemical substances based on a technique first described by Jean-Baptiste Dumas, a French chemist. He introduced the combustion method for nitrogen analysis in 1831, but the original method was not accepted for routine analyses 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 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.

NDA is a powerful Dumas Nitrogen Analyzer, able to hold up to 4 discs of 30 positions each. Perform **precise analysis in a flash**, it is the best solution for **high productivity** and offers unique benefits, being **totally unsupervised**. This means that the NDA does not need to be controlled during its work and is able to **process samples 24/7**. Also under the **environmental aspect** it is a great solution: minimum wastes and residues are produced and the life of consumables is optimized by the software. Saving on consumables means **saving money**: with a consciousness lab managing, **the cost per analysis will be incredibly low**.



HELIUM as carrier gas on NDA 701

HELIUM or ARGON as carrier gas on NDA 702



Dumas method starts with an initial combustion, 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 pass through a reduction furnace, that eliminates oxygen and converts nitrogen oxide into elemental nitrogen. The gases 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.

NDA is entirely controlled via PC through the **intuitive DUMASoft™** Software. The several pre-installed methods and the numerous calibration curves that can be stored, increase the efficiency of the instrument. The software accepts weight values directly from the balance. Data management appears clear and detailed, thanks to the final reports and the graph. The analyses can be recalled by a database and can be saved in different formats (according to LIMS) on the PC, exported as test reports or printed. NDA offers a **very low detection limit** (0.001 mgN) and an **excellent RSD%** (<0.5% with EDTA standard).

NDA 701 works with Helium as a carrier gas, whilst **NDA 702** can operate with Argon and Helium.

GLP Good Laboratory Practice

| | | | | |
|--|--|---|---|-------------|
| AOAC | • | AACC | • | ASBC |
| ISO | • | IFFO | • | OIV |
| TIME SAVING: UNPARALLELED PRODUCTIVITY, RESULTS IN ONLY 3-4 MINUTES | ENERGY SAVING: EXCELLENT ENGINEERING, LOW CONSUMPTION | MONEY SAVING: LIMITED COST PER ANALYSIS, LESS GAS AND REAGENT USED (LOGAS™ AND DRISTEP™) | SPACE SAVING: JUST ONE SLIM UNIT REQUIRED FOR THE WHOLE ANALYSIS | |



Moreover the NDA incorporates **TEMS™ technology** for major **savings in Time, Energy, Money and Space**, pursuing VELP's contribution to environmental protection.

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| NDA 701 | 230 V / 50-60 Hz | F30800070 |
| NDA 702 | 230 V / 50-60 Hz | F30800080 |

① GENERAL FEATURES AND PERFORMANCE

| | |
|--------------------------|--|
| ANALYSIS TIME | 3/4 minutes |
| DETECTOR | Innovative autocalibrating TCD (no need for a reference gas) |
| AUTOSAMPLER CAPACITY | Up to 4 discs of 30 positions each |
| SAMPLE WEIGHT | Up to 1 gram |
| CARRIER GAS | NDA 701: Helium NDA 702: Helium or Argon |
| COMBUSTION TEMPERATURE | 1030 °C (1886 °F) |
| DETECTION LIMIT | NDA 701: 0.001 mg N (He) NDA 702: 0.001 mg N (He) or 0.01 mg N (Ar) |
| RECOVERY | > 99.5% |
| REPRODUCIBILITY (RSD) | < 0.5% for EDTA standards (9.57%N) |
| INTERFACE | USB and RS232 |
| HELIUM (He) / ARGON (Ar) | 2 bar - purity: 99.999% (grade 5.0) |
| OXYGEN (O ₂) | 2 bar - purity: 99.999% (grade 5.0) |
| POWER | 1400 W |
| DIMENSIONS (WxHxD) | 655x510x410 mm (H 690 mm with autosampler) 25.8x20.1x16.1 in (H 27.0 in with autosampler) |
| WEIGHT | 54 Kg (119 lb) |

Performance is ensured when NDA works with original VELP consumables.

VELP Scientifica offers a wide range of **superior quality consumables** for the day-to-day operation of your NDA including high-quality quartz tubes, crucibles, tin foils, long-life and premium reagents and catalysts, calibration standards, o-rings, seals and fittings. At VELP Scientifica we manufacture most of the consumables we supply in order to ensure the most suitable solution for your NDA. VELP 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

VELP 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

| | CODE No |
|--------------------------------|-----------|
| Start-up kit for 1000 analyses | A00000193 |
| DUMASoft™ 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

| | CODE No |
|-----------------------------|-----------|
| Disc 2 for autosampler | A00000199 |
| Disc 3 for autosampler | A00000200 |
| Disc 4 for autosampler | A00000201 |
| Tin foil cup closing device | A00000217 |

CONSUMABLES

| | CODE No |
|-------------------|-----------|
| 1000 analyses kit | A00000194 |
| Chromosorb, 10 g | A00000148 |

| | |
|---|-----------|
| Quartz wool, 50 g | A00000154 |
| Vcopper™ High Reduction Efficiency, 470 g | A00000240 |
| Copper oxide, 50 g | A00000157 |
| VHT catalyst, 50 g | A00000159 |
| VLT catalyst, 25 g | A00000160 |
| EDTA, 100 g | A00000149 |
| Rice flour, 30 g | A00000235 |
| Tin Foil Cups, 150 pcs | A00000153 |
| Tin Foil 50x50 mm, 450 pcs | A00000260 |
| Quartz reactor tube | A00000162 |
| Quartz ash insert | A00000161 |
| Ceramic ash insert | A00000198 |
| Anhydrone, 454 g | A00000225 |
| High temperature sealing grease | A00000236 |
| Pre-Packed Combustion Reactor | A00000158 |
| Pre-Packed Reduction Reactor | A00000158 |
| Mold for tin foil 50x50 mm | A00000262 |
| NDA IQ/OQ/PQ Manual | A00000192 |



NDA 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 starts reaching 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.



1



2



3

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 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

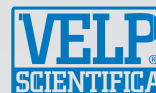
The weight of samples prepared can be automatically transmitted by a balance: fast, easy and accurate data transfer. In fact, an interface with an electronic balance eliminates any errors in data transfer. The NDA can be connected to several analytical balances with a resolution in grams of from 0.1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

NITROGEN/PROTEIN DETERMINATION

DK AND DKL DIGESTION UNITS



KJELDAHL METHOD

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!

CONSUMABLES

CODE No

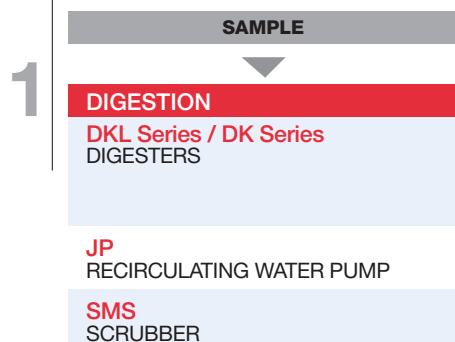
| CONSUMABLES | CODE No |
|--|-----------|
| Catalyst Tablets W, 1000 pcs/box 4.875 g Na ₂ SO ₄ , 0.075 g CuSO ₄ x 5H ₂ O, 0.050 g Se, 5 g | CT0006613 |
| Catalyst Tablets ST, 1000 pcs/box 3.5 g K ₂ SO ₄ , 3.5 mg Se | CT0006609 |
| Catalyst Tablets TCT, 1000 pcs/box 3.5 g K ₂ SO ₄ , 0.105 g CuSO ₄ x 5H ₂ O, 0.105 g TiO ₂ | CT0006621 |
| Catalyst Tablets CM, 1000 pcs/box 3.5 g K ₂ SO ₄ , 0.1 g CuSO ₄ x 5H ₂ O | CT0006650 |
| Antifoam S, 1000 pcs/box - 0.97 g Na ₂ SO ₄ , 0.03 g silicone | CT0006600 |
| Nitrogen-free weighing boats, 58x10x10 mm, 100 pcs/box | CM0486000 |
| Nitrogen-free weighing boats, 70x23x15 mm, 100 pcs/box | CM0486001 |

GLP Good Laboratory Practice
AOAC • DIN • EPA • ISO



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.



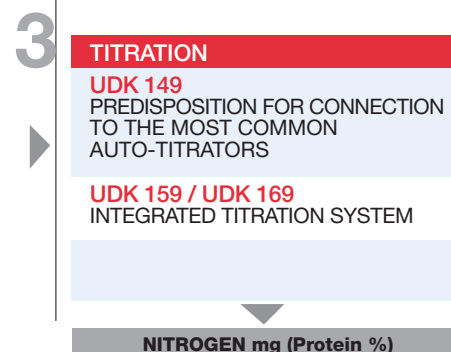
2) DISTILLATION

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 (NH₃). 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).



DK SERIES

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 | F30100350 |
| 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 | F30100360 |

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



DK 20



DK 6



DK 8



DK 6/48



DK 20/26



DK 42/26

OPERATING ACCESSORIES

CODE No

| OPERATING ACCESSORIES | CODE No |
|--|-----------|
| DK 6 Sample rack with heat shields | A00001111 |
| DK 6 Suction cap | A00001096 |
| DK 6 Support system | A00001206 |
| DK 6/48 Sample rack with heat shields | A00001113 |
| DK 6/48 Suction cap | A00001101 |
| DK 6/48 Support system | A00001206 |
| DK 8 Sample rack with heat shields | A00000063 |
| DK 8 Suction cap | A00000065 |
| DK 8 Support system | A00000064 |
| DK 20/26 Sample rack with heat shields | A00001110 |
| DK 20/26 Suction cap | A00109626 |
| DK 20/26 Support system | A00001206 |
| DK 20 Sample rack | A00000168 |
| DK 20 Suction cap and drip tray | A00000169 |
| DK 20 Support system | A00000190 |
| DK 42/26 Sample rack | A00000180 |
| DK 42/26 Suction cap and drip tray | A00000179 |
| DK 42/26 Support system | A00000190 |
| DK 6 / DK 8 / DK 20 Test tubes Ø 42x300 mm, 250 ml, 3 pcs/box | A00000144 |
| DK 6/48 Test tube Ø 48x260 mm, 300 ml, 1 pcs/box | A00001088 |
| DK 20/26 / DK 42/26 Test tubes Ø 26x300 mm, 100 ml, 6 pcs/box | A00000146 |

OPTIONAL ACCESSORIES

CODE No

| | |
|---|-----------|
| DK 6, 8, 20 Glass cap | A00000243 |
| DK 6 / DK 6/48 Drip tray | A00001200 |
| DK 20 Drip tray | A00001202 |
| DK 6 / DK 6/48 / DK 20/26 Stand for sample rack | A00001097 |
| DK 8 Stand for sample rack | A00000067 |
| DK 20 Stainless steel stand for sample rack | A00000182 |
| DK 42/26 Stainless steel stand for sample rack | A00000182 |
| Printer | A00001009 |
| Null modem connector for printer | A00000010 |
| Serial cable | A00000005 |
| IQ/OQ Manual for DK Series | A00000075 |

ACCESSORIES FOR COD ANALYSIS *

CODE No

| | |
|---|-----------|
| COD Test tubes Ø 42x200 mm, 200 ml, 3 pcs/box | A00000145 |
| DK 6 COD Sample rack | A00001049 |
| DK 20 COD Sample rack | A00000237 |
| Air refrigerator with ground cone | A00001041 |
| Antisplash bell | A00001045 |
| PTFE sheat for 29/32 cone | A00001042 |

* 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.



DKL 20

| INSTRUMENT | POWER SUPPLY | CODE No |
|-------------|------------------|-----------|
| DKL 8 * | 230 V / 50-60 Hz | S30100200 |
| DKL 8 * | 115 V / 50-60 Hz | S30110200 |
| DKL 12 * | 230 V / 50-60 Hz | S30100190 |
| DKL 12 * | 115 V / 50-60 Hz | S30110190 |
| DKL 20 * | 230 V / 50-60 Hz | S30100210 |
| DKL 42/26 * | 230 V / 50-60 Hz | S30100180 |

* DKL Series comes including lift, suction cap, sample rack and test tubes

FULLY AUTOMATED AND UNSUPERVISED DIGESTION IN 3 STEPS



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



| TIME SAVING: | ENERGY SAVING: | MONEY SAVING: | SPACE SAVING: |
|--|---|---------------------------------------|---------------------------------|
| FROM AMBIENT TO 420 °C IN ONLY 22 MINUTES, WITH FAST PROGRAMMING | 35% REDUCTION IN ENERGY CONSUMPTION, CUTTING CO ₂ EMISSION | HUGE COST REDUCTION FOR EACH ANALYSIS | REDUCE UNNECESSARY USE OF SPACE |

ACCESSORIES FOR COD ANALYSIS * CODE No

| | |
|---|------------------|
| COD Test tubes Ø 42x200 mm, 200 ml, 3 pcs/box | A00000145 |
| DKL 20 COD Sample rack | A00000237 |
| Air refrigerator with ground cone | A00001041 |
| Antisplash bell | A00001045 |
| PTFE sheat for 29/32 cone | A00001042 |

* DKL 20 only



DKL 8

DKL 12

DKL 42/26

SUPPLIED WITH

CODE No

| | |
|---|------------------|
| DKL 8 Sample rack | A00000173 |
| DKL 8 Suction cap and drip tray | A00000175 |
| DKL 8 / DKL 12 / DKL 20 Test tube Ø 42x300 mm, 250 ml, 3 pcs/box | A00000144 |
| DKL 12 Sample rack | A00000172 |
| DKL 12 Suction cap and drip tray | A00000174 |
| DKL 20 Sample rack | A00000168 |
| DKL 20 Suction cap and drip tray | A00000169 |
| DKL 42/26 Sample rack | A00000180 |
| DKL 42/26 Suction cap and drip tray | A00000179 |
| DKL 42/26 Test tube Ø 26x300 mm, 100 ml, 6 pcs/box | A00000146 |

OPTIONAL ACCESSORIES

CODE No

| | |
|---|------------------|
| DKL 8, 12, 20 Glass cap | A00000243 |
| DKL 42/26 Test tube Ø 26x300 mm, 100 ml, 6 pcs/box | A00000146 |
| DKL 8 / DKL 12 / DKL 20 Test tube Ø 42x300 mm, 250 ml, 3 pcs/box | A00000144 |
| DKL 12 / DKL 20 Test tube Ø 50x300 mm, 400 ml | A00000185 |
| DKL 8 Sample rack | A00000173 |
| DKL 12 Sample rack | A00000172 |
| DKL 12 Sample rack for 400 ml test tubes | A00000181 |
| DKL 20 Sample rack | A00000168 |
| DKL 20 Sample rack for 400 ml test tubes | A00000246 |
| DKL 42/26 Sample rack | A00000180 |
| DKL 8 Stand for sample rack | A00000184 |
| DKL 12 Stand for sample rack | A00000183 |
| DKL 20 / DKL 42/26 Stand for sample rack | A00000182 |
| USB cable A/B, 1.8 mt | 10003134 |
| IQ/OQ Manual for DKL Series | A00000186 |



| GENERAL FEATURES | DK SERIES | | DKL FULLY AUTO SERIES | | |
|---|--|---|---|--|--|
| | CONSTRUCTION MATERIAL | Epoxy painted stainless steel structure | | Stainless steel with chemical resistant coating | |
| NUMBER OF POSITIONS | DK 6: 6 pos. x 250 ml • DK 6/48: 6 pos. x 300 ml DK 8: 8 pos. x 250 ml • DK 20: 20 pos. x 250 ml DK 20/26: 20 pos. x 100 ml • DK 42/26: 42 pos. x 100 ml | | DKL 8: 8 pos. x 250 ml • DKL 12: 12 pos. x 250/400 ml DKL 20: 20 pos. x 250 ml • DKL 42/26: 42 pos. x 100 ml | | |
| SET TEMPERATURE | Digital readout in °C or °F | | Digital readout in °C or °F or K | | |
| TEMPERATURE RANGE | Ambient to 450 °C (842 °F) | | Ambient to 450 °C (842 °F) | | |
| COUNTDOWN | Digital readout | | Digital readout | | |
| LANGUAGES | UK, I, E, F, D, T | | UK, I, E, F, RUS, CN + Additional Customizable (downloadable) | | |
| INTERFACE | RS232 | | USB | | |
| POWER | DK 6: 1100 W • DK 6/48: 1100 W • DK 8: 1350 W DK 20: 2300 W • DK 20/26: 1100 W • DK 42/26: 2300 W | | DKL 8: 1150 W • DKL 12: 1500 W DKL 20: 2300 W • DKL 42/26: 2300 W | | |
| OVERALL DIMENSIONS (WxHxD) (including lift / support system) | DK 6: 295x462x549 mm (11.6x18x13.3 in) DK 6/48: 295x462x546 mm (11.6x18.2x13.3 in) DK 8: 235x566x587 mm (9.2x22.3x23.1 in) DK 20: 328x702x585 mm (12.9x27.6x23 in) DK 20/26: 295x462x546 mm (11.6x18x13.3 in) DK 42/26: 328x702x585mm (12.9x27.6x23 in) | | DKL 8: 210x690x540 mm (8.3x27.2x21.3 in) DKL 12: 266x690x540 mm (10.5x27.2x21.3 in) DKL 20: 322x690x584 mm (12.7x27.2x23.0 in) DKL 42/26: 322x690x584 mm (12.7x27.2x23.0 in) | | |
| OVERALL WEIGHT (including lift / support system) | DK 6: 16.2 kg (35.7 lb) • DK 6/48: 15.6 kg (34.4 lb) DK 8: 21.9 kg (48.3 lb) • DK 20: 20.0 kg (44.1 lb) DK 20/26: 18.8 kg (41.4 lb) • DK 42/26: 20.7 kg (45.6 lb) | | DKL 8: 19.7 kg (43.5 lb) • DKL 12: 23.3 kg (51.4 lb) DKL 20: 30.8 kg (68.0 lb) • DKL 42/26: 33.5 kg (74.0 lb) | | |
| SAFETY PERFORMANCE | PROGRAM LIBRARY | 20 user-programmable programs | | 54 programs (30 standard + 24 user-programmable) | |
| | SELECTABLE RAMPS | Up to 4 ramps per program | | Up to 4 ramps per program | |
| | DIGESTION TIME RANGE | From 1 to 999 minutes | | From 1 to 999 minutes | |
| | TIME SELECTION | 1 minute steps | | 1 minute steps | |
| | STABILITY AND PRECISION OF HEATING BLOCK TEMPERATURE | ± 0.5 °C | | ± 0.5 °C | |
| SAFETY | OVERTEMPERATURE | Thermostat | | Thermostat | |
| | DAMAGED TEMPERATURE PROBE | Automatic detection and alarm message | | Automatic detection and alarm message | |
| | LIFT MOVEMENT | - | | Automatic | |

SMS SCRUBBER



| | POWER SUPPLY | CODE No |
|-----|--------------|-----------|
| SMS | - | F307C0199 |

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 accessories required)

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

SMS

| | |
|-----------------------|---|
| CONSTRUCTION MATERIAL | Epoxy painted stainless steel structure |
| POWER | - |
| DIMENSIONS (WxHxD) | 300x500x190 mm (11.8x19.7x7.5 in) |
| WEIGHT | 3.5 kg (7.7 lb) |



JP RECIRCULATING WATER PUMP



| | POWER SUPPLY | CODE No |
|----|---------------|-----------|
| JP | 230 V / 50 HZ | F30620198 |
| JP | 230 V / 60 HZ | F30630198 |
| JP | 115 V / 60 HZ | F30640198 |

JP RECIRCULATING WATER PUMP

JP Recirculating Water Pump is the VELP 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).

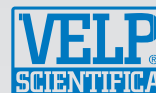
JP

| | |
|-----------------------|-----------------------------------|
| CONSTRUCTION MATERIAL | ABS |
| POWER | 160 W |
| DIMENSIONS (WxHxD) | 250x400x370 mm (9.8x15.7x14.6 in) |
| WEIGHT | 8.4 kg (18.5 lb) |



NITROGEN/PROTEIN DETERMINATION

UDK 129 DISTILLATION 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 acids, cyanides, alcohol content, sulphur dioxide, TVBN and Devarda nitrogen determination.

VELP Scientifica offers a wide choice with its 5-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 patented 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 1liter) to Kjeldahl flasks (500 ml).

UDK 139, 149, 159 and 169 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.

GLP GoodLaboratoryPractice
AOAC • DIN • EPA • ISO



TIME SAVING:
FAST AND FREQUENT ANALYSES; NO HEATING DELAY BETWEEN RUNS

ENERGY SAVING:
COOLING WATER CONSUMPTION STARTING FROM ONLY 0.5 L/MIN; EXCELLENT INSULATION OF INTERNAL PARTS

MONEY SAVING:
COST REDUCTION IS SUBSTANTIAL, IN LINE WITH REDUCED POWER CONSUMPTION

SPACE SAVING:
THE EXTREMELY COMPACT FOOTPRINT SAVES USEFUL LABORATORY BENCH SPACE

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**.



| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| UDK 129 | 230 V / 50-60 Hz | F30200120 |
| UDK 129 | 115 V / 50-60 Hz | F30210120 |

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 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.



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**.



| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|--------------|---------|
|------------|--------------|---------|

| | | |
|---------|------------------|-----------|
| UDK 139 | 230 V / 50-60 Hz | F30200130 |
|---------|------------------|-----------|

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**.

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|--------------|---------|
|------------|--------------|---------|

| | | |
|---------|------------------|-----------|
| UDK 149 | 230 V / 50-60 Hz | F30200140 |
|---------|------------------|-----------|

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 continuously 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** 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 55-program library (31 predefined + 24 customizable) covers the needs of any laboratory and the reporting system is comprehensive.



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.

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

MULTITASKING SOFTWARE

Improved communication leads to improved efficiency.

The display enables the operator to set all the parameters for a fully automatic control of the distillation and titration processes.

- Excellent usability
- Flexible, versatile and multi-language
- Intuitive data entry and programming
- Unlimited library with all the analyses
- Data export in .xls, .txt, .csv (according to LIMS) also on USB key
- Direct access to the archive from remote PC in real time without any download

UNPARALLELED PERFORMANCE WITH COLORIMETRIC TITRATION

VELP Scientifica state-of-the-art Kjeldahl solution includes **on-board colorimetric titration system** for outstanding performance. Based on precise chemical reaction, this technique offers superior reliability, being the preferred method used and suggested by the main International bodies and organization (AOAC just to name one). With VELP Scientifica solutions, the benefits go even further: **shorter analysis time, maintenance-free, automatic vessel cleaning** and **no need for frequent calibration** make the colorimetric titration the most appreciated on the market.



UDK 169 & AUTOKJEL AUTOMATIC KJELDAHL ANALYZER WITH AUTOSAMPLER

VELP response for maximum productivity is the completely automated UDK 169 combined with the **AutoKjel**, for fully unsupervised operation.

The **UDK 169** provides the same **premium technology and advanced performance** of UDK 159, including the colorimetric titration, but in addition it offers the possibility to be connected with AutoKjel autosampler.

The **AutoKjel** ensures high throughput and synchronizes all the procedures for achieving **accurate and reliable nitrogen and protein determination, unattended**. Tubes are directly transferred into the UDK 169 for further processing, preventing any sample transfer. Once the analysis is completed, the AutoKjel lowers the empty tube and automatically moves the next one in the correct position.

Two different sizes of test tubes are supported, with a standard rack of **24 positions (250 ml tubes)** or an optional one for 21 samples in 400 ml tubes, improving the **flexibility**.

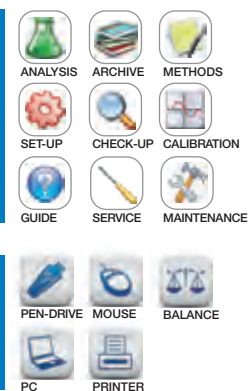
Robust and reliable, AutoKjel comes complete with all the accessories required for the connection to UDK 169 and dedicated tanks for NaOH, H₂O, H₃BO₃ and waste.

The system has been designed for the highest productivity available when using Kjeldahl method, significantly **reducing operator time and efforts** as just the sample loading into the AutoKjel is required.

| INSTRUMENT | POWER SUPPLY | CODE No |
|-----------------------|------------------|-----------|
| UDK 169 | 230 V / 50-60 Hz | F30200160 |
| AutoKiel | 230 V / 50-60 Hz | F30200430 |
| UDK 169 with AutoKiel | 230 V / 50-60 Hz | S30200160 |

21-position carousel,
400 ml tubes (optional)

24-position carousel,
250 ml tubes (standard)



STEAM GENERATOR

PATENTED

TITANIUM CONDENSER

PATENTED



- 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

- Extremely Reliable

High level of precision and accuracy ensures correct results

- Deionized Water

Deionized water prevents misleading results and limescale

- 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



PERFORMANCE

| | UDK 129 | UDK 139 | UDK 149 | UDK 159 | UDK 169 |
|---|--------------------|--------------------|--------------------|---------------------------------|---------------------------------|
| ANALYSIS TIME | 5 min (for 100 ml) | 4 min (for 100 ml) | 3 min (for 100 ml) | from 4 min (titration included) | from 4 min (titration included) |
| REPRODUCIBILITY (RSD) | ≤ 1% | ≤ 1% | ≤ 1% | ≤ 1% | ≤ 1% |
| RECOVERY (at nitrogen level between 1-200 mg) | ≥ 99.5% | ≥ 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 | ≥ 0.1 mg N |
| AUTOMATIC SODIUM HYDROXIDE ADDITION | • | • | • | • | • |
| AUTOMATIC DILUTION WATER ADDITION | | • | • | • | • |
| AUTOMATIC BORIC ACID ADDITION | | | • | • | • |
| SELECTABLE DISTILLATION TIME | • | • | • | not necessary with titration | 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" touch screen | 3.5" touch screen | 6" touch screen | 6" touch screen |
| PROGRAMS | 1 | 10 | 20 | 55 | 55 |
| LANGUAGE SELECTION | | • | • | • | • |
| ARCHIVE (on-board data storage) | | | • | • | • |
| PASSWORD (user/super user) | | | • | • | • |

TITRATION

| | | | | | |
|------------------------------------|--|--|---|---|---|
| TITRATION RESIDUES REMOVAL | | | • | • | • |
| AUTOMATIC TITRATION VESSEL WASHING | | | • | • | • |

CONNECTION

| | | | | | |
|-------------------------------|--|---|---|---|---|
| MOUSE | | • | • | • | • |
| PRINTER | | • | • | • | • |
| PC (for data storage) | | | • | • | • |
| PEN DRIVE (for data transfer) | | | • | • | • |
| BALANCE | | | | • | • |
| AUTOSAMPLER | | | | | • |

GENERAL FEATURES

| | | | | | |
|---------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| OVERALL DIMENSIONS IN MM (in) (WxHxD) | 385x780x416 (15.2x30.7x16.4) | 385x780x416 (15.2x30.7x16.4) | 385x780x416 (15.2x30.7x16.4) | 385x780x416 (15.2x30.7x16.4) | 385x780x416 (15.2x30.7x16.4) |
| OVERALL WEIGHT IN KG (lb) | 24 (52.9) | 26 (57.3) | 27 (59.5) | 31 (68.3) | 31 (68.3) |
| POWER SUPPLY | 230 V / 115 V | 230 V | 230 V | 230 V | 230 V |
| POWER | 2100 W / 1700 W | 2100 W | 2100 W | 2200 W | 2200 W |

UDK ACCESSORIES

SUPPLIED WITH

CODE No

| | |
|--|-----------|
| Test tube Ø 42x300 mm, 250 ml | A00001080 |
| Collecting flask, 250 ml | 10001106 |
| Pincer for test tubes | 10000247 |
| Touch pen (for UDK 139, 149, 159, 169) | 10004936 |

OPTIONAL ACCESSORIES

CODE No

| | |
|---|-----------|
| Test tube Ø 26x300 mm, 100 ml, 6 pcs/box | A00000146 |
| Test tube Ø 42x300 mm, 250 ml, 3 pcs/box | A00000144 |
| Test tube Ø 48x260 mm, 300 ml | A00001088 |
| Test tube Ø 50x300 mm, 400 ml | A00000185 |
| Test tube Ø 80x300 mm, 1 liter | A00001083 |
| Spacer for test tube Ø 48x260 mm | A00000206 |
| Test tube connection Ø 26 mm, Ø 48 mm and 500 ml Kjeldahl balloon | A00000043 |

OPTIONAL ACCESSORIES

CODE No

| | |
|--|-----------|
| IQ/OQ/PQ UDK 129 Manual | A00000205 |
| IQ/OQ/PQ UDK 139 Manual | A00000204 |
| IQ/OQ/PQ UDK 149 Manual | A00000203 |
| IQ/OQ/PQ UDK 159 Manual | A00000202 |
| IQ/OQ/PQ UDK 169 Manual | A00000254 |
| IQ/OQ AutoKiel Manual | A00000256 |
| Waterproof mouse (for 139, 149, 159, 169) | A00000215 |
| USB cable | 10003134 |
| Titration Titroline Easy K for UDK 149 | R30800194 |
| Acid resistant pump kit | A00000220 |
| AutoKiel carousel for 21x400 ml test tubes | A00000220 |
| NaOH tank with caps (all UDK Series) | A00000265 |
| H ₂ O tank with caps (all UDK Series) | A00000266 |
| H ₃ BO ₃ tank with caps (UDK149,159,169) | A00000264 |
| Residues tank with caps (UDK149,159,169) | A00000267 |

SHELF LIFE INVESTIGATION

OXITEST OXIDATION TEST REACTOR

SHELF LIFE STUDIES

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.

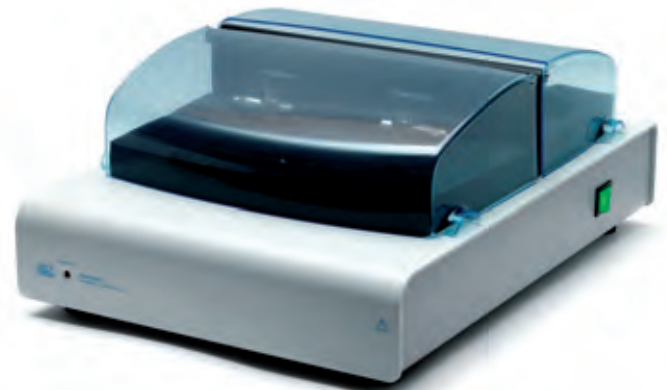
The Oxitest is the versatile VELP solution suitable for a wide range of applications, including:

- 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.

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| OXITEST | 230 V / 50-60 Hz | F30900248 |

GENERAL FEATURES AND PERFORMANCE

| | |
|------------------------------|---|
| CONSTRUCTION MATERIAL | Epoxy painted stainless steel structure and anodized aluminum |
| NUMBER OF OXIDATION CHAMBERS | 2 |
| CAPACITY OF SINGLE CHAMBER | Up to 100 ml |
| TEMPERATURE RANGE | Ambient to 110 °C |
| PRESSURE RANGE | 0 - 8 bar |
| OVERPRESSURE | Safety valve |
| POWER | 900 W |
| DIMENSIONS (WxHxD) | 365x190x485 mm (14.6x7.6x19.4 in) |
| WEIGHT | 16.5 Kg (36.3 lb) |



GLP Good Laboratory Practice

SUPPLIED WITH

CODE No

| | |
|---------------------------------|-----------|
| OXISoft™ OXITEST Software | 10002948 |
| USB cable | 10003134 |
| Sample holder | 10001985* |
| Spacer | 10001984* |
| High temperature sealing grease | A00000236 |
| IQ/OQ Oxitest | A00000242 |

*the unit comes with 6 sample holders and 4 spacers

REPEATABILITY TEST



a series of tests run on the same sample or standard to verify its IP period, to calculate accuracy and repeatability of the data

FRESHNESS TEST



to verify the quality of different lots, and compare them

FORMULAS COMPARISON



what is required to identify the most stable formula of a finished product, under the same conditions

PACKAGING COMPARISON



particularly useful for testing which packaging maintains the product in the freshest condition

IP DURING AGEING



same samples are tested at different times to fix the linear equation and the decreasing of the Induction Period with the going by of the time

ESTIMATED SHELF LIFE TEST



it shows a prediction of the oxidation stability during the shelf life

FAT EXTRACTION

SER 148 SOLVENT EXTRACTOR



FAT EXTRACTION USING SOLVENTS

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**.

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.

GLP Good Laboratory Practice
 AOAC • TAPPI • UNI • EPA
 ASTM • APHA • AWWA • WEF

SER 148/6



SER 148/3

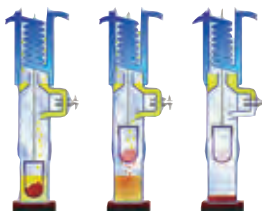
SOXHLET TECHNIQUE

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.



CONSUMABLES

CODE No

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



SUPPLIED WITH

CODE No

| | |
|--|-----------|
| 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 |

OPTIONAL ACCESSORIES

CODE No

| | |
|-------------------------------------|-------------|
| 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 |
| Vafon seal | A00000061 |
| IQ/OQ/PQ Manual for SER 148 | A00000073 |

* only for SER 148/6

HU 6 HYDROLYSIS UNIT

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| SER 148/3 | 230 V / 50-60 Hz | F30300240 |
| SER 148/3 | 115 V / 50-60 Hz | F30310240 |
| SER 148/6 | 230 V / 50-60 Hz | F30300242 |
| SER 148/6 | 115 V / 50-60 Hz | F30310242 |

① 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 | From 50 to 75% |
| REPRODUCIBILITY (RSD) | ≤ 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) |

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.



| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| HU 6 | 230 V / 50-60 Hz | F30300110 |
| HU 6 | 115 V / 50-60 Hz | F30310110 |

① GENERAL FEATURES AND PERFORMANCE

| | |
|--|---|
| CONSTRUCTION MATERIAL | Epoxy painted stainless steel structure |
| NUMBER OF SAMPLES | 6 samples |
| SET TEMPERATURE AND COUNTDOWN | Digital readout |
| DISPLAY | LCD |
| PROGRAM LIBRARY | 20 programs |
| LANGUAGES | I, F, UK, E, D, T |
| TEMPERATURE RANGE | Ambient to 200 °C |
| TEMPERATURE PRECISION, STABILITY AND HOMOGENEITY | ± 0.5 °C |
| POWER | 1350 W |
| DIMENSIONS (WxHxD) | 355x590x450 mm (14.0x23.2x17.7 in) |
| WEIGHT | 14.5 Kg (32.0 lb) |

SUPPLIED WITH

| | |
|-------------------------|-----------|
| Celite, 1 Kg | A00000097 |
| Glass sand, 2 Kg | A00000089 |
| EDPM tube Ø 6.4x11.2 mm | 10002412 |

OPERATING ACCESSORIES

| | |
|------------------------------------|-----------|
| Glassware kit 3 positions for HU 6 | A00000085 |
|------------------------------------|-----------|

OPTIONAL ACCESSORIES

| | |
|---|-----------|
| Celite, 1 Kg | A00000097 |
| Glass sand, 2 Kg | A00000089 |
| Glass crucibles P1, 6 pcs/box | A00000086 |
| Glass crucibles P3, 6 pcs/box | A00000087 |
| Glass bottle for waste collection | A00000088 |
| Test tubes Ø 42x300 mm, 250 ml, 3 pcs/box | A00000144 |

RAW FIBER EXTRACTION

FIWE RAW FIBER EXTRACTOR



RAW FIBER EXTRACTION

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 including nutritional, economic and legal reasons.

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 extractions including boiling, rinsing and filtration.

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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.

FIWE 6

FIWE 3

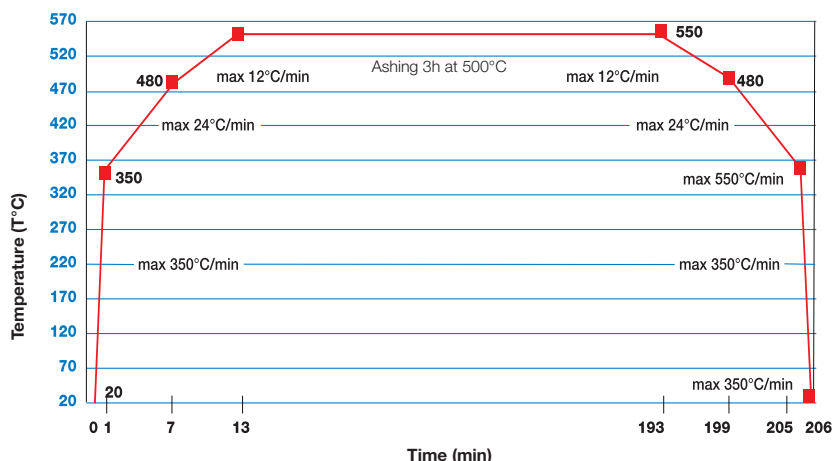


TIPS FOR CRUCIBLE TREATMENT IN A MUFFLE FURNACE

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 follows:

| Heating °C | Cooling °C | Rate °C/min | Required time min |
|------------|------------|-------------|-------------------|
| 20 to 350 | 350 to 20 | 350 | 1 |
| 350 to 480 | 480 to 350 | 24 | 6 |
| 480 to 550 | 550 to 480 | 12 | 6 |



COEX COLD EXTRACTOR

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|---------------|-----------|
| FIWE 3 | 230 V / 50 Hz | F30520201 |
| FIWE 3 | 230 V / 60 Hz | F30530201 |
| FIWE 3 | 115 V / 60 Hz | F30540201 |
| FIWE 6 | 230 V / 50 Hz | F30520200 |
| FIWE 6 | 230 V / 60 Hz | F30530200 |
| FIWE 6 | 115 V / 60 Hz | F30540200 |

i 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) | 530x620x390 mm (20.9x24.4x15.4 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) |

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.

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|---------------|-----------|
| COEX | 230 V / 50 Hz | F30520204 |
| COEX | 230 V / 60 Hz | F30530204 |
| COEX | 115 V / 60 Hz | F30540204 |

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SUPPLIED WITH

CODE No

| | |
|--|-----------|
| 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

CODE No

| | |
|-------------------------------|-----------|
| Glass crucibles P2, 6 pcs/box | A00000140 |
| Water spray device | A00001135 |
| Vaffon seal (Scharrer method) | A00000099 |
| IQ/OQ Manual FIWE | A00000074 |

i 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

CODE No

| | |
|-------------------------------|-----------|
| Glass crucibles P2, 6 pcs/box | A00000140 |
|-------------------------------|-----------|

OPTIONAL ACCESSORIES

CODE No

| | |
|-------------------------------|-----------|
| Glass crucibles P2, 6 pcs/box | A00000140 |
|-------------------------------|-----------|

DIETARY FIBER EXTRACTION



DIETARY FIBER EXTRACTION

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. 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.

GDE

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**.

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|------------------|-----------|
| GDE | 230 V / 50-60 Hz | F30400209 |
| GDE | 115 V / 50-60 Hz | F30410209 |



CSF 6

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.

Temperature: up to 550 °C

| INSTRUMENT | POWER SUPPLY | CODE No |
|------------|---------------|-----------|
| CSF 6 | 230 V / 50 Hz | F30420210 |
| CSF 6 | 230 V / 60 Hz | F30430210 |
| CSF 6 | 115 V / 60 Hz | F30440210 |



GENERAL FEATURES AND PERFORMANCE

| | |
|--------------------|------------------------------------|
| TEMPERATURE RANGE | Ambient to 105 °C |
| POWER | 900 W |
| DIMENSIONS (WxHxD) | 413x295x410 mm (16.2x11.6x16.1 in) |
| WEIGHT | 6.2 Kg (13.66 lb) |

OPTIONAL ACCESSORIES

| | CODE No |
|------------------------|-----------|
| Beaker, 400 ml | A00000999 |
| Stirring bar, 6x35 mm | A00001056 |
| Pool balls 800 pcs/box | A00000241 |
| IQ/OQ Manual for GDE | A00000249 |

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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 | A00000140 |
|-------------------------------|-----------|

OPTIONAL ACCESSORIES

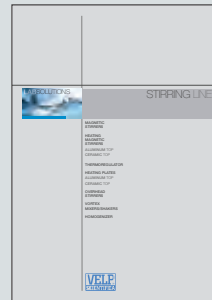
| | |
|-------------------------------|-----------|
| Glass crucibles P2, 6 pcs/box | A00000140 |
|-------------------------------|-----------|



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