



## 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

## 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.

NDA Series 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 Series** 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 Series offers a the **lowest detection limit** (0.001 mgN, with Helium) 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.

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



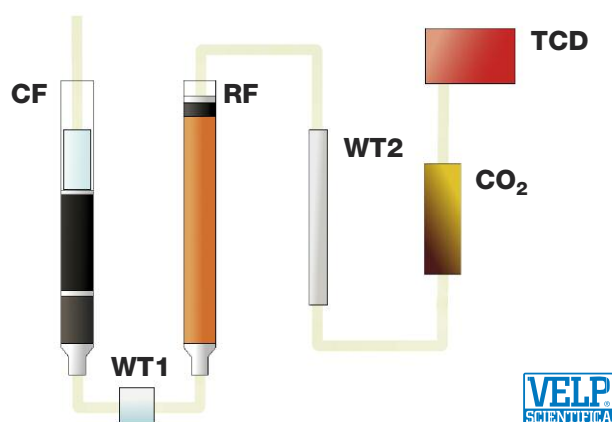
**TIME SAVING:**  
UNPARALLELED  
PRODUCTIVITY,  
RESULTS IN ONLY  
3-4 MINUTES

**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

GLP Good Laboratory Practice			
AOAC	•	AACC	•
ISO	•	IFFO	•
		ASBC	
		OIV	



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 CO<sub>2</sub> adsorbers and what remains is just nitrogen, that is detected by the **LoGas™** innovative Thermal Conductivity Detector (TCD) without requiring a reference gas.

**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**.

## NDA 701

NDA 701 uses Helium as carrier gas to provide reliable N/protein determination.



## NDA 702

NDA 702 is able to perform precise N/protein determination using either Helium or Argon as carrier gas. Particularly recommended for markets where Helium is scarce and its price is constantly increasing.



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

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

## 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 <sub>2</sub> )	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.

# NDA CONSUMABLES

VELP Scientifica offers a wide range of **superior quality consumables** for the day-to-day operation of your NDA Analyzer 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, 2000 & 4000\* ANALYSES

VELP Scientifica also offers consumables kits which contain all parts and reagents necessary for approximately 1000, 2000 and 4000 analyses: combustion and reduction tubes, reagents and instrument fittings.

**Pre-packed solutions** to save your time when ordering consumables for your analyzer!

\* 1000, 2000 and 4000 are estimated values. The effective life of the kit depends on the quantity and the kind of sample.

## TIN FOILS

With their conical shape, our tin foils are ideal for the encapsulation of any kind of samples, including solid, semi-solid and liquid ones, and also other samples that are difficult to handle (e.g. powder, sticky, etc.). Resistant and completely nitrogen-free, they facilitate the combustion process!

## ASH INSERTS

The ashes produced by the combustion are collected in a dedicated ash insert. Velp offers two versions of ash insert: the "traditional" one is in quartz, yet a ceramic type is available with great porosity and higher resistance to elevated temperature.

## VCOPPER™, SIMPLY REVOLUTIONARY

A simply revolutionary and patent-pending on the market for its resistance, finely developed along with universities. It provides a 3 times longer duration and increased comfort, as you are free from tedious work and time-consuming activities!

### 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
2000 analyses kit	A00000270
4000 analyses kit	A00000271

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
Anhydron, 454 g	A00000225
High temperature sealing grease	A00000236
Pre-Packed Combustion Reactor	A00000158
Pre-Packed Combustion Reactor	A00000158
Mold for tin foil 50x50 mm	A00000262
NDA IQ/OQ/PQ Manual	A00000192



**NDA Series** 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.

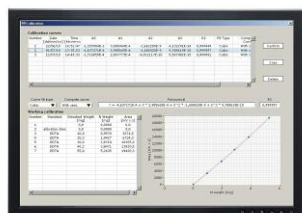
The more that the content of mg of nitrogen is centered in the range, the greater are the accuracy and precision of the analysis.

### 2...DURING THE ANALYSIS

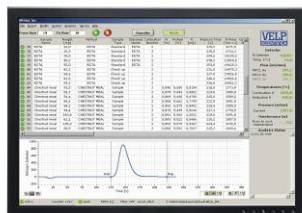
In the main window the user can continuously check the instrument status, controlling the flow rate and the reactor temperatures on the right side of the page. Beneath, the user can also read suggestions about the maintenance, monitoring the number of analyses that can be performed before the next replacement. 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

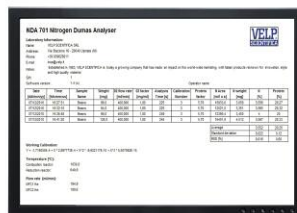
Once the analysis is completed, the operator will find all the test information in the main window, with a real-time graph, info about the method and results in different formats (nitrogen mg, nitrogen % and protein %). All analysis data are stored into databases and can be exported in .xls, .txt and .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 CO<sub>2</sub> 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 Series 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. NDA Series 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!

**GLP** Good Laboratory Practice  
AOAC • DIN • EPA • ISO

Accelerate your Kjeldahl digestion with genuine KJTabs by VELP, composed by sulfate and metal salts. VELP Scientifica is also producer of superior quality consumables to ensure top performance from your analytical instrument at all times: in this way you can achieve substantial savings with a low total cost of ownership.

#### CONSUMABLES

#### CODE No

KJTabs VCM 3,5g K <sub>2</sub> SO <sub>4</sub> + 0,1g CuSO <sub>4</sub> x 5H <sub>2</sub> O, 1000 pcs/box	A00000274
KJTabs VKPC 4,5g K <sub>2</sub> SO <sub>4</sub> + 0,5g CuSO <sub>4</sub> x 5H <sub>2</sub> O, 1000 pcs/box	A00000275
KJTabs VCT 5g K <sub>2</sub> SO <sub>4</sub> + 0,15g CuSO <sub>4</sub> x 5 H <sub>2</sub> O + 0,15g TiO <sub>2</sub> , 1000 pcs/box	A00000276
KJTabs VST 3,5g K <sub>2</sub> SO <sub>4</sub> + 3,5mg Se, 1000 pcs/box	A00000277
KJTabs VTCT 3,5g K <sub>2</sub> SO <sub>4</sub> + 0,105g CuSO <sub>4</sub> x 5 H <sub>2</sub> O + 0,105g TiO <sub>2</sub> , 1000 pcs/box	A00000281
KJTabs VW 4,875 g Na <sub>2</sub> SO <sub>4</sub> + 0,075 g CuSO <sub>4</sub> x 5 H <sub>2</sub> O + 0,050 g Se, 1000 pcs/box	A00000282
KJTabs VS Antifoam 0,97 g Na <sub>2</sub> SO <sub>4</sub> + 0,03g Silicone, 1000 pcs/box	A00000283
Nitrogen-free weighing boats, 58x10x10 mm, 100 pcs/box	CM0486000
Nitrogen-free weighing boats, 70x23x15 mm, 100 pcs/box	CM0486001





## 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.

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



DK 20



DK 6



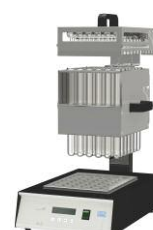
DK 8



DK 6/48



DK 20/26



DK 42/26

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.

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:**  
FROM AMBIENT  
TO 420 °C IN  
ONLY 22 MINUTES,  
WITH FAST  
PROGRAMMING

**ENERGY SAVING:**  
35% REDUCTION  
IN ENERGY  
CONSUMPTION,  
CUTTING CO<sub>2</sub>  
EMISSION

**MONEY SAVING:**  
HUGE COST  
REDUCTION FOR  
EACH ANALYSIS

**SPACE SAVING:**  
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 sheet for 29/32 cone	A00001042

\* DKL 20 only



DKL 20



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	CONSTRUCTION MATERIAL	<b>DK SERIES</b> Epoxy painted stainless steel structure	<b>DKL FULLY AUTO SERIES</b> Stainless steel with chemical resistant coating
	NUMBER OF POSITIONS	<b>DK 6:</b> 6 pos. x 250 ml • <b>DK 6/48:</b> 6 pos. x 300 ml <b>DK 8:</b> 8 pos. x 250 ml • <b>DK 20:</b> 20 pos. x 250 ml <b>DK 20/26:</b> 20 pos. x 100 ml • <b>DK 42/26:</b> 42 pos. x 100 ml	<b>DKL 8:</b> 8 pos. x 250 ml • <b>DKL 12:</b> 12 pos. x 250/400 ml <b>DKL 20:</b> 20 pos. x 250 ml • <b>DKL 42/26:</b> 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	<b>DK 6:</b> 1100 W • <b>DK 6/48:</b> 1100 W • <b>DK 8:</b> 1350 W <b>DK 20:</b> 2300 W • <b>DK 20/26:</b> 1100 W • <b>DK 42/26:</b> 2300 W	<b>DKL 8:</b> 1150 W • <b>DKL 12:</b> 1500 W <b>DKL 20:</b> 2300 W • <b>DKL 42/26:</b> 2300 W
	OVERALL DIMENSIONS (WxHxD) (including lift / support system)	<b>DK 6:</b> 295x462x549 mm (11.6x18x13.3 in) <b>DK 6/48:</b> 295x462x546 mm (11.6x18.2x13.3 in) <b>DK 8:</b> 235x566x587 mm (9.2x22.3x23.1 in) <b>DK 20:</b> 328x702x585 mm (12.9x27.6x23 in) <b>DK 20/26:</b> 295x462x546 mm (11.6x18x13.3 in) <b>DK 42/26:</b> 328x702x585mm (12.9x27.6x23 in)	<b>DKL 8:</b> 210x690x540 mm (8.3x27.2x21.3 in) <b>DKL 12:</b> 266x690x540 mm (10.5x27.2x21.3 in) <b>DKL 20:</b> 322x690x584 mm (12.7x27.2x23.0 in) <b>DKL 42/26:</b> 322x690x584 mm (12.7x27.2x23.0 in)
	OVERALL WEIGHT (including lift / support system)	<b>DK 6:</b> 16.2 kg (35.7 lb) • <b>DK 6/48:</b> 15.6 kg (34.4 lb) <b>DK 8:</b> 21.9 kg (48.3 lb) • <b>DK 20:</b> 20.0 kg (44.1 lb) <b>DK 20/26:</b> 18.8 kg (41.4 lb) • <b>DK 42/26:</b> 20.7 kg (45.6 lb)	<b>DKL 8:</b> 19.7 kg (43.5 lb) • <b>DKL 12:</b> 23.3 kg (51.4 lb) <b>DKL 20:</b> 30.8 kg (68.0 lb) • <b>DKL 42/26:</b> 33.5 kg (74.0 lb)
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

ABS
160 W
250x400x370 mm (9.8x15.7x14.6 in)
8.4 kg (18.5 lb)



# NITROGEN/PROTEIN DETERMINATION

## 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 129 DISTILLATION UNIT

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 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

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
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UDK 139	230 V / 50-60 Hz	F30200130
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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
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UDK 149	230 V / 50-60 Hz	F30200140
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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

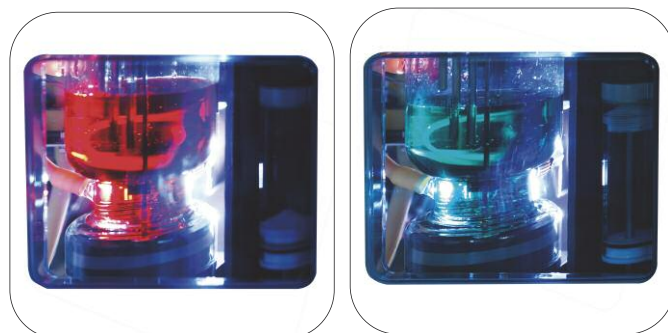
Improved communication leads to improved efficiency.

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.

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

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, H<sub>2</sub>O, H<sub>3</sub>BO<sub>3</sub> 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.



21-position carousel,  
400 ml tubes (optional)

24-position carousel,  
250 ml tubes (standard)

# STEAM GENERATOR

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

# TITANIUM CONDENSER

PATENTED

- **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
Titratör 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 <sub>2</sub> O tank with caps (all UDK Series)	A00000266
H <sub>3</sub> BO <sub>3</sub> tank with caps (UDK149,159,169)	A00000264
Residues tank with caps (UDK149,159,169)	A00000267



# SHELF LIFE INVESTIGATION

## SHELF LIFE STUDIES

The **Oxitest** is an innovative solution 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.

## OXITEST OXIDATION TEST REACTOR



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.

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



**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

### 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)



OXITEST is completely controlled and operated by the **OXISoft™**, offering all the most important info at a glance in one window!

### 1...BEFORE THE ANALYSIS

The samples are weighed in titanium sample holders and placed into the two independent titanium chambers, where temperature and oxygen pressure are automatically adjusted to by the software according to the entered data.

### 2...DURING THE ANALYSIS

In the main window the user can continuously check the instrument status, pressure and the temperature on the right side of the page. Up to 4 OXITEST can be managed by the same software at the same time, for the maximum productivity. The real time graph constantly shows the progress of the analysis.

### 3...AFTER THE ANALYSIS

Once the analysis is completed, the operator will find all the test information in the main window, with graph, info about the method and results. 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 report a comparison between multiple analyses for a better interpretation of the data.

All the results and reports can be output to a printer or saved for GLP compliance.

Results can be output to a printer.

#### 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

## RANDALL HOT SOLVENT EXTRACTION

Solvent extraction is used to determine the quantity of various components (e.g. Fat) contained in agricultural, industrial or environmental samples.

Soxhlet extraction, is one of the most widely used analytical technique which performs extraction with cold solvent. Adaptation of Soxhlet have been introduced over time, reducing extraction time by increasing the temperature of the solvent as with the Randall technique.

The solvent extractors of VELP Scientifica operate a solid-liquid extraction process that removes soluble components from solid samples using a liquid solvent according to the Randall technique, offering significant benefits in term of time saving and solvent recovery.

This method is performed in 3 main steps: Immersion, Washing and Recovery although other two intermediate steps, Removing and Cooling, can be added (with the SER 158) in order to maximize the performance.

Hot solvent extraction works in accordance with national and international standards and can be used in various industries and analytical fields.

### APPLICATIONS:

FAT DETERMINATION (CRUDE AND TOTAL)

OIL/FAT CONTENT DETERMINATION

SAMPLE PREPARATION FOR THE EXTRACTION OF POLLUTANTS AND CONTAMINATED ELEMENTS

### MAIN INDUSTRIES:

FOOD AND FEED

ENVIRONMENTAL, TEXTILE, PULP & PAPER

PLASTIC & PETROLEUM, ENVIRONMENTAL

**GLP** Good Laboratory Practice  
AOAC • ISO • EPA • APHA • UNI

## THE SER SERIES

The fully automatic SER 158 and the semi-automatic SER 148 guarantee safe operations and low solvent consumption for all sort of hot solvent extractions. The VELP extractors come with 3 or 6 positions.

The automatic and semi-automatic SER are fully equipped, versatile and with a complete range of accessories providing total flexibility in all fields of application.

Solvent extraction with the SER series can be performed not only for Fat extraction (crude and total) in food and non-food samples but also for sample preparation for additional test such as Hydrocarbons from soil, Oil in sludge, Paraffin in wood chips, and many more.

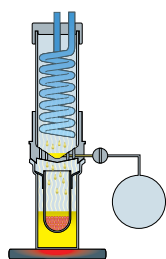


### SOXHLET TECHNIQUE



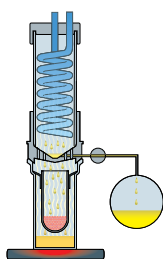
The solubilization of extractable components is performed by a cold solvent dropping from a reflux condenser. Consequently a complete extraction lasts many hours.

### FULLY AUTOMATIC EXTRACTION PROCESS



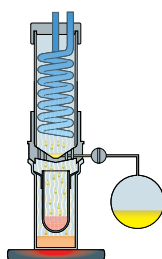
#### IMMERSION

The sample is immersed into boiling solvent



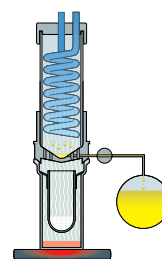
#### REMOVING\*

Solvent volume is reduced



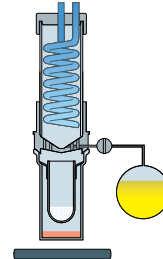
#### WASHING

The solvent flows through the thimble



#### RECOVERY

Solvent is recovered



#### COOLING\*

Prevention of extracted matter overheating

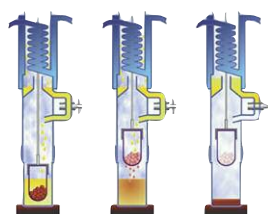
\*Performed only with the SER 158.

# SER 148 SOLVENT EXTRACTOR

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).

The SER 148 Series is a semi-automatic solution with no compromises on **operator safety (IP55)** and **solvent consumption** also guaranteeing a **limited cost per analysis**.

Robust design and large install base make the SER 148 Series the reliable choice for any laboratory aiming at reducing the time per analysis compared to the traditional Soxhlet method. As for the automatic version, 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.



## 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

A00000295



## SUPPLIED WITH

## CODE No

Extraction Cups SER 148/3	A00001141
Extraction Cups SER 148/6	A00000142
Extraction Thimbles 33X80, 25pcs/box	A00000295
Inlet Tube	10000280
Heat Shield SER 148/3	40000210
Heat Shield SER 148/6	40000220
Viton Seal SER 148	10000008
Butyl Seal SER 148	10000009

## OPTIONAL ACCESSORIES

## CODE No

Printer	A00001009
Serial cable	A00000011
Thimble weighing cup	A00001146
Vafion seal SER 148 3pcs/box	A00000061
Extraction cup, 6pcs/box	A00000142
IQ/OQ SER 148 Manual	A00000073
Handling device for extraction cup	A00001145 *
Pincer for weighing cups	A00001147 *
Thimbles stand (6 places)	A00001149 *
Extraction thimbles 33x80, 25pcs/box	A00000295
Crucible holder HU6 for SER148	A00000309
Glass fiber thimbles 33x80, 25pcs/box	A00000313

\*Available only for Solvent Extractor SER148/6.

## 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

## SER 148/6



## SER 148/3

## GENERAL FEATURES AND PERFORMANCE

CONSTRUCTION MATERIAL	Epoxy painted stainless steel structure
MAX VOLUME EXTRACTION CUP	150 ml
DISPLAY	Working temperature / settable parameters
WORKING TEMPERATURE	From 100 to 260 °C
IMMERSION, WASHING & 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)

# SER 158 SOLVENT AUTOEXTRACTOR

The SER 158 is a fully automated solvent extractor offering state-of-the-art technology, precision and smart data management. The operator has to simply prepare the sample and start the analysis with one click, Load&go. The automatic shutdown feature permits unattended operations 24/7.

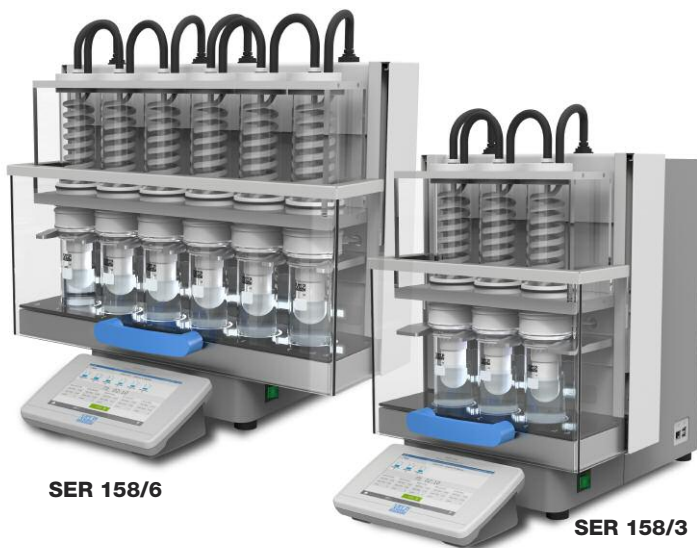
The innovative **ControlPad** is able to control up to 4 SER 158 units independently and features the immediate display of results calculation on the on-board storage.

Unparalleled performance are ensured by the **titanium condensers** (patent pending) and by a vast set of sensors. More than 90% of the solvent used is recovered and stored on the internal recovery tank.

The SER 158 units are equipped with LED indicating the active position during the extraction steps.

VELP Scientifica guarantees total safety to the operators thanks to **SolventXpress™** the hermetically sealed solvent dispensing system ensuring no exposure to the solvent and to **SafeEnd™** the automatic cooling technology that lifts the extract not permitting the overheating.

The SER 158 incorporates **TEMS™** technology for major savings in **Time, Energy, Money and Space** pursuing VELP's contribution to environmental protection.



SER 158/6

SER 158/3

INSTRUMENT	POWER SUPPLY	CODE No
SER 158/3	115/230V-50/60Hz	S303A0390
SER 158/6	115/230V-50/60Hz	S303A0380
SER 158/3 no ControlPad	115/230V-50/60Hz	F303A0390
SER 158/6 no ControlPad	115/230V-50/60Hz	F303A0380

## TECHNICAL SPECIFICATIONS

POSITIONS	3-positions (SER158/3) or 6-positions (SER158/6)
MAX. CAPACITY	21 samples/day/unit (SER158/3) or 42 samples/day/unit (SER158/6)
SCALABILITY	12-pos. (up to 4 units) (SER158/3) or 24-pos. (up to 4 units) (SER158/6)
DISPLAY	7" color touch screen - extractable ControlPad
SOLVENTS ACCEPTED	Capable of being used with the majority of solvents
SOLVENT RECOVERY	> 90%
AUTOMATION	Immersion, Removing, Washing, Recovery, Cooling
LIGHTING	LED show 3/6 active positions
HEATING ELEMENT	Glass ceramic – 3/6 positions independent switch on/off
SAMPLE SIZE	0.5 to 15 g in 33x80 mm thimbles (generally 2-3 g)
SEALS	Viton, Butyl, and Vafion
CONDENSERS	Titanium (VELP Patent Pending)
INTERFACES	3 x USB (balance, mouse, USB stick), Ethernet (Pc)
RESULT CALCULATION	Automatic, archived on ControlPad
WATER CONSUMPTION	From 1.0 l/min
DIMENSIONS (WXHDX)	358x546x450 mm (14x21,5x17,7 inch) (SER158/3) 546x546x450 mm (21,5x21,5x17,7 inch) (SER158/6)
DIMENSIONS WITH CONTROLPAD	358x546x570 mm (14x21,5x22,4 inch) (SER158/3) 546x546x570 mm (21,5x21,5x22,4 inch) (SER158/6)
WEIGHT (SER 158/CONTROLPAD)	Kg 29 / 1 ( 64 / 2,2 lb.) (SER158/3) Kg 36 / 1 (80,3 / 2,2 lb.) (SER158/6)
POWER SUPPLY	115/230– 50/60 V-Hz
POWER CONSUMPTION	630/850 W

## SUPPLIED WITH

## CODE No

ControlPad*	A00000286
Grey butyl seal 3pcs/box	A00000298
Green viton seal 3pcs/box	A00000297
Extraction cup Ø 56x120mm 3pcs/box	A00000290
Extraction thimbles holder Ø 33mm	A00000312
Boiling stones, 80g	A00000305
Cellulose thimbles 33x80mm, 25pcs/box	A00000295
Inlet water tube	10000280
Teflon tube Ø 4x6mm	10002866
Connection 1/8 NPT - tube 6x4	10006054

\* Included only in codes S303A0390 and S303A0380

## OPTIONAL ACCESSORIES

## CODE No

White vafion seal SER158 3pcs/box	A00000288
Extraction cup Ø 48x120mm 3pcs/box	A00000303
Extraction cup Ø 65x120mm 3pcs/box	A00000302
Extraction thimbles holder Ø 25mm	A00000291
Extraction thimbles holder Ø 40mm	A00000292
Cellulose thimbles 25x80mm, 25pcs/box	A00000294
Cellulose thimbles 40x80mm, 25pcs/box	A00000296
Glass fiber thimbles 25x80mm, 25pcs/box	A00000314
Glass fiber thimbles 33x80mm, 25pcs/box	A00000313
Thimble weighing cup	A00000310
Thimbles stand 6 places	A00000311
Handling device extraction cups SER158/6	A00000304
Crucible holder HU 6 for SER158	A00000293
Complete Glass bottle solvent collection	A00000301
Inlet Connection 1/4NPT-tube Ø 4,3÷4,5mm	A00000299
Inlet Connection 1/4NPT-tube Ø 4,8÷5mm	A00000300
Slave connection cable	A00000287
Adapter USB-RS232	A00000195
PC Connection cable	A00000289
Extension lead 2m for Control Pad	A00000315
IQ/OQ SER158	A00000306



# 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.

INSTRUMENT	POWER SUPPLY	CODE No
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HU 6	230 V / 50-60 Hz	F30300110
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HU 6	115 V / 50-60 Hz	F30310110
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## GENERAL FEATURES AND PERFORMANCE

CONSTRUCTION MATERIAL	Epoxy painted stainless steel structure
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NUMBER OF SAMPLES	6 samples
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SET TEMPERATURE AND COUNTDOWN	Digital readout
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DISPLAY	LCD
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PROGRAM LIBRARY	20 programs
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LANGUAGES	I, F, UK, E, D, T
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TEMPERATURE RANGE	Ambient to 200 °C
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TEMPERATURE PRECISION, STABILITY AND HOMOGENEITY	± 0.5 °C
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POWER	1350 W
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DIMENSIONS (WxHxD)	355x590x450 mm (14.0x23.2x17.7 in)
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WEIGHT	14.5 Kg (32.0 lb)
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SUPPLIED WITH	CODE No
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Celite, 1 Kg	A00000097
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Glass sand, 2 Kg	A00000089
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EDPM tube Ø 6.4x11.2 mm	10002412
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OPERATING ACCESSORIES	CODE No
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Glassware kit 3 positions for HU 6	A00000085
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Crucible holder HU 6 for SER158	A00000293
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Crucible holder HU 6 for SER148	A00000309
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OPTIONAL ACCESSORIES	CODE No
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Celite, 1 Kg	A00000097
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Glass sand, 2 Kg	A00000089
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Glass crucibles P1, 6 pcs/box	A00000086
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Glass crucibles P3, 6 pcs/box	A00000087
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Glass bottle for waste collection	A00000088
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Test tubes Ø 42x300 mm, 250 ml, 3 pcs/box	A00000144
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IQ/OQ Manual	A00000251
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# 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.

### AOAC • AACC

### 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  $\mu\text{m}$  (40 – 60  $\mu\text{m}$ ) (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

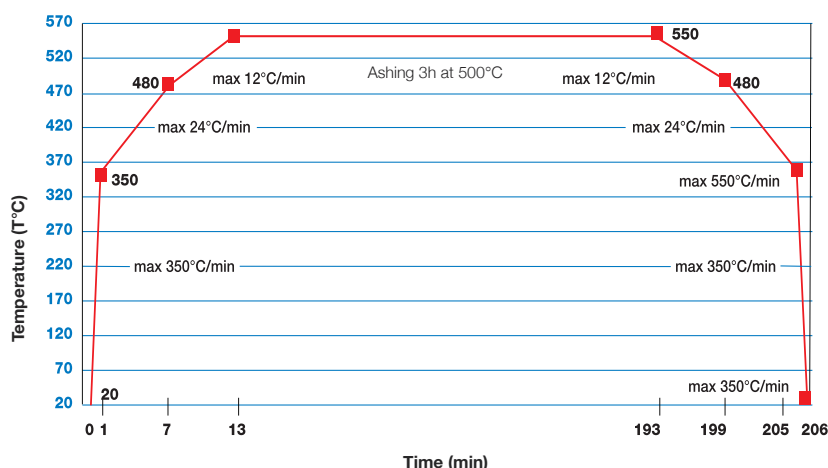


#### TIPS FOR CRUCIBLE TREATMENT IN A MUFFLE FURNACE

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

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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### 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

#### CODE No

A00000140

#### OPTIONAL ACCESSORIES

Glass crucibles P2, 6 pcs/box

#### CODE No

A00000140

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

### 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)

#### 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
Vaflon seal (Scharer method)	A00000099
IQ/OQ Manual FIWE	A00000074

# 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

### 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)

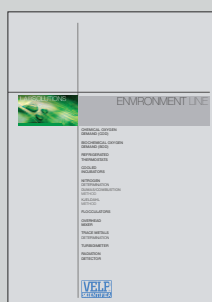
SUPPLIED WITH	CODE No
Glass crucibles P2, 6 pcs/box	A00000140

OPTIONAL ACCESSORIES	CODE No
Glass crucibles P2, 6 pcs/box	A00000140

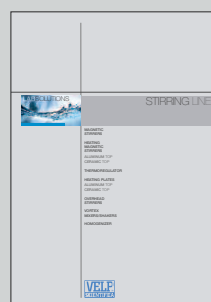


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