# UDK Distillation Units

The UDK distillation units are used to perform nitrogen and protein content analysis according to the Kjeldahl method. UDK Series covers a wide range of applications in food and feed industries and for several others in environmental control, chemical and pharmaceutical industries. UDK series works in accordance with a variety of standards such as AOAC, ISO, EPA, AACC.

**UNRIVALLED FLEXIBILITY**

With the UDK Series it is possible to choose from a complete range of distillers able to address any laboratory requirement from few samples per day to unattended operations with autosampler.

**COMPLETE SAFETY**

The UDK Series comprises a great set of safety features such as: safety thermostats, sensors, protective transparent door, flow rate detector and more.

**UNIQUE TECHNOLOGY**

The VELP Distillation Units are the only distillers in the market with the patented steam generator and titanium condenser (patent pending) that enables a low cost per analysis and the best-in-class performance.

**PREMIUM ROBUSTNESS**

The technopolymer structure of the UDK Series ensures the excellent durability and resistance to chemical attacks.

**RELIABLE AND ACCURATE**

The UDK Series is engineered to ensure precise results calculation of nitrogen content with an accuracy of ± 0,1 mgN.

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## VELP SOLUTIONS FOR KJELDAHL ANALYSIS

<table>
<thead>
<tr>
<th>SAMPLE</th>
</tr>
</thead>
</table>

### DIGESTION

- DKL SERIES / DK SERIES DIGESTERS
- JP
  - RECIRCULATING WATER VACUUM PUMP
- SMS
  - SCRUBBER

### DISTILLATION

- UDK SERIES DISTILLATION UNITS

### TITRATION

- UDK 149
  - CONNECTIVITY TO EXTERNAL TITRATION SYSTEMS
- UDK 159 / UDK 169
  - INTEGRATED COLORIMETRIC TITRATION SYSTEM

**NITROGEN** mg (Protein %)
Unique Features

PATENTED STEAM GENERATOR

SAFE WORKING CONDITIONS
A thermostat ensures the correct functioning of the steam generator, a safety thermostat eliminates risks for the operator.

NON-PRESSURIZED
No chance of leaks occurring even after an intensive use, completely maintenance-free.

RELIABLE
The high level of precision and accuracy ensures correct and detailed results.

TECHNOPOLYMER SPLASH HEAD

LONG LIFE
The best and most durable solution when a large number of samples are processed.

HIGH CHEMICAL RESISTANCE
Highly resistant to chemical especially alkalines, used during steam distillation.

NO RISK OF BREAKAGE
Ensures safe working conditions in the laboratory and will not cause down time.

MAINTENANCE-FREE AND EASY TO REPLACE
No maintenance required, extremely easy to replace when necessary.

PATENTED TITANIUM CONDENSER

EFFICIENT THERMAL EXCHANGE
Distillate temperature always below the Kjeldahl threshold value.

LIMITED WATER CONSUMPTION
From only 0.5 l/min at 15 °C (1 l/min at 30 °C).

NO NITROGEN LOSS, PRECISE RESULTS
Cost reduction thanks to high performance, minimal consumption and no external chiller.

MINIMAL MAINTENANCE
Easy to disassemble and clean.
UDK 129 Distillation Unit

The UDK 129 is the ideal solution for a laboratory running only a few samples per day and does not need advanced features.

**FEATURES**
- Automatic NaOH addition
- Delay time (Devarda’s alloy analysis)
- Alkali resistant technopolymer housing
- Selectable distillation time
- LCD display
- Safety guard and lever with sensors to protect the user

UDK 139 Semi-Automatic Distillation Unit

The UDK 139 is the semi-automatic model offering greater automation and a wider range of programming options.

**FEATURES**
- Automatic NaOH and H₂O addition
- Steam regulation (10-100%)
- Delay time (Devarda’s alloy analysis)
- 10-program library
- Alkali resistant technopolymer housing
- Reagent level warning via sensors in tanks
- Selectable distillation time
- Distillation residues removal
- 3.5” color touch screen
- 2 x USB ports
- Multiple languages selection
- Safety guard and lever with sensors to protect the user
- Connection to mouse and printer
The UDK 149 is a flexible solution for laboratories performing Kjeldahl distillation. UDK 149 can be connected to several external titrators models.

**FEATURES**

- Automatic NaOH, H₂O and H₃BO₃ addition
- Steam regulation (10-100%)
- Delay time (Devarda's alloy analysis)
- Automatic titration vessel washing
- Washing
- 20-program library
- Alkali resistant technopolymer housing
- Reagent level warning via sensors in tanks
- Selectable distillation time
- Distillation and titration residues removal
- Distillation in series for repeat analysis
- Archive for on-board data storage
- 3.5” color touch screen
- Ethernet, 2 x USB ports, RS232 and TTL
- Multiple languages selection
- Safety lever and sensors to protect the user
- Connection to external titrators supported
- Connection to mouse, printer and PC

**External Potentiometric Titrator**

The UDK 149 connectivity is optimized for the most common automatic titrators to guarantee fully automated operations.

The optional TITROLINE 5000 Automatic Titrator is a very compact titrator for simple routine titrations. GLP compliant results with titration curve can be documented on a connected printer or USB-memory stick.

**TITRATION FEATURES**

- Automatic Titration
- Real time volume dosing of the titrant
- Automatic cleaning and washing of the titrant solution vessel
- Titrations to pH, mV - endpoint (2 EP)
- Titrations with dynamic or linear titration solution additions
- Maximum versatility
The colorimetric titration is based on precise chemical reactions of indicators. VELP integrated titrator is maintenance-free and is AOAC recommended. It works by dosing an acidic titrant solution to the boric acid containing the ammonia distilled from the sample. This titration process results in a color change that is evaluated by the system.

**FEATURES**
- Automatic NaOH, H₂O and H₃BO₃ addition
- Steam regulation (10-100%)
- Delay time (Devarda’s alloy analysis)
- Washing and blank analysis
- Automatic titration vessel washing
- 55-program library (31 pre-defined + 24 customizable)
- Alkali resistant technopolymer housing
- Reagent level warning via sensors in tanks
- Distillation and titration residues removal
- Distillation in series
- Reporting
- Archive for on-board data storage
- 6” color touch screen
- Ethernet, 2 x USB ports and RS232
- Balance connection
- Electronic user guide
- Multiple languages selection
- Safety lever and sensors to protect the user
- Connection to mouse, printer and PC

**Colorimetric Titration (UDK 159 - 169)**

The colorimetric titration is based on precise chemical reactions of indicators. VELP integrated titrator is maintenance-free and is AOAC recommended. It works by dosing an acidic titrant solution to the boric acid containing the ammonia distilled from the sample. This titration process results in a color change that is evaluated by the system.

**VRECEIVER™**

VELP unique Vreceiver™ is a certified formula composed of Boric Acid powder and a mixture of indicators mentioned by AOAC methods (bromocresol green and methyl red) allowing fast and standardized receiving solution preparation for colorimetric titration.

Code A00000316

1. **RED**
   - Absence of ammonia

2. **GREEN**
   - Significant amount of ammonia is flowing into the receiving solution

3. **GREY/PINK**
   - End point of the analysis
UDK 169 Distillation & Titration System with Autosampler

The UDK 169 is the top of the range solution to quantify the nitrogen/protein content with Kjeldahl method. A fully automated Kjeldahl analyzer, with an integrated colorimetric titrator for premium performance and continuous operation. It offers the highest sample throughput available when connected to the Autokjel autosampler, for the most productive system available. Just load your samples and walk away: the system will carry out analysis of all samples unattended and store the results.

FEATURES AND BENEFITS

- Automatic NaOH, H₂O and H₃BO₃ addition
- Steam regulation (10-100%)
- Delay time (Devarda’s alloy analysis)
- Washing and blank analysis
- Automatic titration vessel washing
- 55-program library (31 pre-defined + 24 customizable)
- Alkali resistant technopolymer housing
- Reagent level warning via sensors in tanks
- Tanks included with AutoKjel (2x20-liter, 1x10-liter, 1x5-liter)
- Smart reagent consumptions estimation
- Multi-tasking software with full autosampler control
- Distillation and titration residues removal
- Distillation in series
- Instantaneous reporting
- Archive for on-board data storage
- 6” color touch screen
- Ethernet, 2 x USB ports and RS232
- Balance connection
- Electronic user guide
- Multiple languages selection
- Safety lever and sensors to protect the user
- Connection to mouse, printer and PC

24-position carousel  
250 ml tubes (standard)

21-position carousel  
400 ml tubes (optional)
Main Applications and Methods

UDK Series complies with many official methods for different applications such as the determination of ammoniacal nitrogen, protein determination, nitrogen content (Kjeldahl or direct alkaline distillation), nitric nitrogen (after reduction/Devarda), phenols, volatile acids, sulphur, cyanides and alcohol content. A short list of the most common samples with the corresponding references follows, but many others can be tested according to official methods (AOAC, ISO, DIN, EPA, AACC etc.).

Nitrogen / Protein on Food&Feed Samples

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>METHODS (main reference, many others are complied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal feed and pet food</td>
<td>AOAC 984.13, EN ISO 5983-2 (AOAC 2001:11)</td>
</tr>
<tr>
<td>Beer (and its ingredients: barley, malt, wort)</td>
<td>AOAC 920.53, AOAC 950.09</td>
</tr>
<tr>
<td>Bread and baked products</td>
<td>AOAC 950.36</td>
</tr>
<tr>
<td>Cereals and grains (wheat, oats, barley, corn, rice, rye, soy beans, lupins, etc.)</td>
<td>AOAC 979.09 EN ISO 5983-2 (AOAC 2001:11)</td>
</tr>
<tr>
<td>Malt</td>
<td>AOAC 950.09</td>
</tr>
<tr>
<td>Meat and derived products (bacon, ham, salami, sausage, liver paté, etc.)</td>
<td>ISO 937 (AOAC 981.10)</td>
</tr>
<tr>
<td>Nuts and nut products (almonds, coconuts, peanuts, etc.)</td>
<td>AOAC 950.48</td>
</tr>
<tr>
<td>Pasta (e.g. Macaroni, etc.)</td>
<td>AOAC 930.25</td>
</tr>
<tr>
<td>Plants (vegetables, forage, straw, seeds, tea, etc.)</td>
<td>AOAC 978.04</td>
</tr>
<tr>
<td>Yeast</td>
<td>AOAC 962.10</td>
</tr>
<tr>
<td>Oil seeds</td>
<td>EN ISO 5983-2 (AOAC 2001:11)</td>
</tr>
</tbody>
</table>

Nitrogen on Other Samples

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>METHODS (main reference, many others are compiled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>ISO 333:1996</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>AOAC 920.03</td>
</tr>
<tr>
<td>Lubricating oils and fuel oils</td>
<td>ASTM D3228-96</td>
</tr>
<tr>
<td>Paper and paperboard (gelatin, casein)</td>
<td>TAPPI STD T418 05-61</td>
</tr>
<tr>
<td>Rubber, raw natural, and rubber latex</td>
<td>ISO 1656:1996</td>
</tr>
<tr>
<td>Soil</td>
<td>“Method of soil analysis” part 2 – Chemical and microbiological properties, 2 ed.</td>
</tr>
<tr>
<td>Urea</td>
<td>ISO 1592:1977</td>
</tr>
<tr>
<td>Water</td>
<td>AOAC 973.48</td>
</tr>
</tbody>
</table>

Other Applications

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>METHODS (main reference, many others are compiled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol determination</td>
<td>Reg. (CEE) 2870/2000, EBC 9.2.1</td>
</tr>
<tr>
<td>Cyanides in waste water</td>
<td>EPA 9010C</td>
</tr>
<tr>
<td>Nitric nitrogen on water after reduction (devarda method)</td>
<td>ISO 10048:1991</td>
</tr>
<tr>
<td>Phenols in water, saline water, domestic and industrial wastes</td>
<td>EPA 9065; APAT CNR IRSA 5070</td>
</tr>
<tr>
<td>Total volatile basic nitrogen (tvbn) in fresh/frozen fish</td>
<td>Conway &amp; Byrne Method (1933)</td>
</tr>
<tr>
<td>Urea and ammoniacal nitrogen in animal feed</td>
<td>AOAC 941.04</td>
</tr>
<tr>
<td>Volatile acidity of tomato paste</td>
<td>Reg. (CEE) 1764/86</td>
</tr>
<tr>
<td>Volatile acidity of wines</td>
<td>Reg. (CEE) 266/90</td>
</tr>
<tr>
<td>Sulphur</td>
<td>AOAC 962.16, AOAC 990.28</td>
</tr>
</tbody>
</table>

TEM STRENGTHS

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.
OPTIONAL ACCESSORIES

- Spacer for test tube Ø 48x260 mm A00000206
- Test tube connection Ø 26 mm, Ø 48 mm and 500 ml Kjeldahl balloon A00000043
- Printer Adapter (UDK 139, 149, 159, 169) A00000195
- UDK 129 IQ/OQ/PO Manual A00000205
- UDK 139 IQ/OQ/PO Manual A00000204
- UDK 149 IQ/OQ/PO Manual A00000203
- UDK 159 IQ/OQ/PO Manual A00000202
- UDK 169 IQ/OQ/PO Manual A00000254
- AutoKjel IQ/OQ Manual A00000256
- Waterproof mouse (for UDK 139, 149, 159, 169) A00000215
- Titrator Titroline Easy K for UDK 149 R30800194
- Acid pump kit UDK1X9 230V A00000220
- Kjeldahl balloon, 500 ml A00000082
- Glass splash head kit UDK129 A00000238
- Acid pump kit UDK129 115V A00000259
- NaOH tank with caps (UDK1X9) A00000265
- H2O tank with caps A00000266
- Alcoholic strength kit A00000285
- Receiver TKN formula for 1L sol., 40g (1-25 bags) A00000316
- Glass splash head kit UDK A00000216
- Residues tank with caps A00000267
- Printer A00001009
- Connect. kit Mettler DL50-53-55-58 TTL A00000208
- Connect. kit Metrohm 848-877 TTL A00000209
- Connect. kit Metrohm 848-877 RS232 A00000210
- Connect. kit Schott RS232 A00000211
- Kit Mettler DL15-22-28,T50-70-90,G20 TTL A00000212
- Connect. kit KEM AT500-510 A00000213
- Connect. kit Mettler T50,70,90,G20 RS232 A00000214
- H3BO3 tank with caps (UDK149,159,169) A00000264
- Serial cable RS232 A00000005
- AUTOKJEL carousel for 21x400 ml tubes A00000247
- Guide for test tube Ø50 AUTOKJEL A00000255
- Printer (UDK 139, 149, 159, 169) A00001009

INSTRUMENT - CODE

- UDK 129 230 V / 50-60 Hz F30200120
- UDK 129 115 V / 50-60 Hz F30210120
- UDK 139 230 V / 50-60 Hz F30200130
- UDK 149 230 V / 50-60 Hz F30200140
- UDK 159 230 V / 50-60 Hz F30200150
- UDK 169 230 V / 50-60 Hz F30200160
- AutoKjel 230 V / 50-60 Hz F30200430
- UDK 169 & AutoKjel 230 V / 50-60 Hz S30200160

SUPPLIED WITH

- 100001080 Test tube Ø 42x300 mm
- 100001083 Test tube Ø 60x300 mm
- 100001088 Test tube Ø 48x260 mm
- 10000144 Test tube Ø 42x300 mm
- 10000146 Test tube Ø 26x300 mm
- 10000185 Test tube Ø 50x300 mm

FIELDS OF APPLICATION

FOOD, FEED AND BEVERAGE INDUSTRY

ENVIRONMENTAL INDUSTRY

PHARMACEUTICAL AND CHEMICAL INDUSTRY
## TECHNICAL DATA

<table>
<thead>
<tr>
<th></th>
<th>UDK 129</th>
<th>UDK 139</th>
<th>UDK 149</th>
<th>UDK 159</th>
<th>UDK 169</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANALYSIS TIME</strong></td>
<td>5 min (for 100ml)</td>
<td>4 min (for 100ml)</td>
<td>3 min (for 100ml)</td>
<td>for 4 min (titration included)</td>
<td>for 4 min (titration included)</td>
</tr>
<tr>
<td><strong>MEASURING RANGE</strong></td>
<td>0.1 - 200 mgN</td>
<td>0.1 - 200 mgN</td>
<td>0.1 - 200 mgN</td>
<td>0.1 - 200 mgN</td>
<td>0.1 - 200 mgN</td>
</tr>
<tr>
<td><strong>REPRODUCIBILITY (RSD)</strong></td>
<td>≤ 1%</td>
<td>≤ 1%</td>
<td>≤ 1%</td>
<td>≤ 1%</td>
<td>≤ 1%</td>
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<tr>
<td><strong>RECOVERY</strong></td>
<td>≥ 99.5%</td>
<td>≥ 99.5%</td>
<td>≥ 99.5%</td>
<td>≥ 99.5%</td>
<td>≥ 99.5%</td>
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<tr>
<td><strong>DETECTION LIMIT</strong></td>
<td>≥ 0.1 mg N</td>
<td>≥ 0.1 mg N</td>
<td>≥ 0.1 mg N</td>
<td>≥ 0.1 mg N</td>
<td>≥ 0.1 mg N</td>
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<tr>
<td><strong>AUTOMATIC SODIUM HYDROXIDE ADDITION</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>AUTOMATIC DILUTION WATER ADDITION</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>AUTOMATIC BORIC ACID ADDITION</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>SELECTABLE DISTILLATION TIME</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>yes</td>
<td>not necessary with tration</td>
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<tr>
<td><strong>DISTILLATION RESIDUES REMOVAL</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td><strong>STEAM FLOW REGULATION</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>DELAY TIME (DEVARDA ALLOY ANALYSIS)</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>DISTILLATION IN SERIES</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>LIMITED WATER CONSUMPTION</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>DISPLAY</strong></td>
<td>LCD</td>
<td>3.5” touch screen</td>
<td>3.5” touch screen</td>
<td>6” touch screen</td>
<td>6” touch screen</td>
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<tr>
<td><strong>PROGRAMS</strong></td>
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<td>20</td>
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<tr>
<td><strong>LANGUAGE SELECTION</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>ARCHIVE (on-board data storage)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td><strong>PASSWORD (user / super user)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>TITRATION RESIDUES REMOVAL</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>AUTOMATIC TITRATION VESSEL WASHING</strong></td>
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<td>-</td>
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<td>-</td>
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<td><strong>MOUSE</strong></td>
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<td>Yes</td>
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<td><strong>PRINTER</strong></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>PC (FOR DATA STORAGE)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>PEN DRIVE (FOR DATA TRANSFER)</strong></td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>BALANCE</strong></td>
<td>-</td>
<td>-</td>
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<tr>
<td><strong>AUTOSAMPLER</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>OVERALL DIMENSIONS (WxHxD)</strong></td>
<td>350x780x416 mm 15.2x30.7x16.4 in</td>
<td>350x780x416 mm 15.2x30.7x16.4 in</td>
<td>350x780x416 mm 15.2x30.7x16.4 in</td>
<td>350x780x416 mm 15.2x30.7x16.4 in</td>
<td>350x780x416 mm 15.2x30.7x16.4 in</td>
</tr>
<tr>
<td><strong>OVERALL WEIGHT</strong></td>
<td>24 Kg 52.9 lb</td>
<td>26 Kg 57.3 lb</td>
<td>27 Kg 59.5 lb</td>
<td>31 Kg 68.3 lb</td>
<td>31 Kg 68.3 lb</td>
</tr>
<tr>
<td><strong>POWER SUPPLY</strong></td>
<td>230 V / 115 V</td>
<td>230 V</td>
<td>230 V</td>
<td>230 V</td>
<td>230 V</td>
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<tr>
<td><strong>POWER</strong></td>
<td>2100 W / 1700 W</td>
<td>2100 W</td>
<td>2100 W</td>
<td>2100 W</td>
<td>2100 W</td>
</tr>
</tbody>
</table>

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### SERVICE & SUPPORT

VELP Scientifica products are designed by our engineers to resist years of laboratory use. Our products are manufactured with premium materials to guarantee the best performance with maximum safety. According to our experience, a proper and regular maintenance is necessary to ensure the highest performance of analytical instrument. VELP Service Department and VELP Official Partners are always ready to offer you maintenance and service support tailored to your needs.

### GET THE SUPPORT YOU NEED CHOOSING THE OPTIONS:

- Installation
- Preventive Maintenance
- Help-desk and Remote support
- Technical Assistance
- Analytical Support
- Calibration Certification

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**Designed and Manufactured in Italy**