



# UDK Series

## Distillation Units

A Full Range of Solutions for Kjeldahl Distillation



# 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.

## UNRIVALED 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  $\pm 0,1$  mgN.



## VELP SOLUTIONS FOR KJELDAHL ANALYSIS

### SAMPLE



#### 1 DIGESTION

DKL SERIES / DK SERIES  
DIGESTERS

JP  
RECIRCULATING WATER VACUUM PUMP

SMS  
SCRUBBER

#### 2 DISTILLATION

UDK SERIES  
DISTILLATION UNITS

#### 3 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

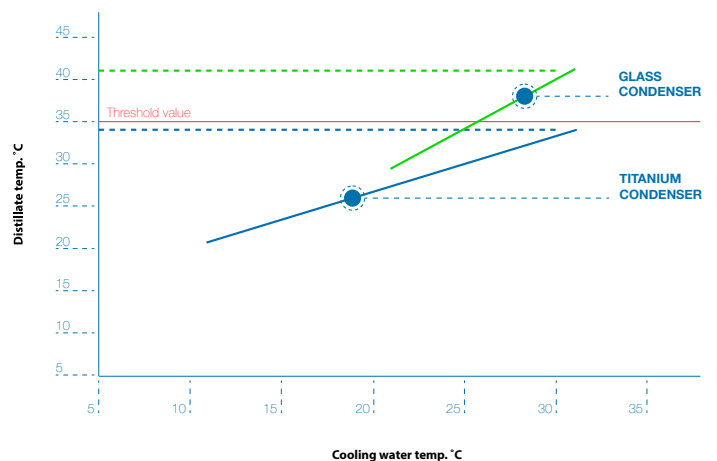
From only 0.5 l/min at 15 °C (1 l/min at 30 °C).

### 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

### Automatic Addition of NaOH



# 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 H<sub>2</sub>O 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

### Automatic Addition of NaOH . H<sub>2</sub>O



# UDK 149 Automatic Distillation Unit, with Titrator Connection

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

## Automatic Addition of NaOH . H<sub>2</sub>O . H<sub>3</sub>BO<sub>3</sub>



## 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



# UDK 159 Automatic Distillation & Titration System

The UDK 159 combines all the advantages of a fully automatic distillation with the added benefits of integrated colorimetric titration (AOAC approved) for a high-performance all-in-one system.

## FEATURES

- Automatic NaOH, H<sub>2</sub>O and H<sub>3</sub>BO<sub>3</sub> 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

Automatic Addition of  
**NaOH . H<sub>2</sub>O . H<sub>3</sub>BO<sub>3</sub>**  
Titrant Solution

Integrated  
**Colorimetric Titrator**  
AOAC Recommended

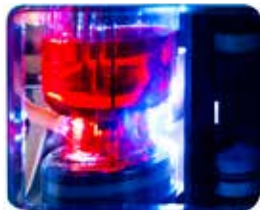


## Colorimetric Titration (UDK 159 - 169)

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.

**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



## 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**



# 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, H<sub>2</sub>O and H<sub>3</sub>BO<sub>3</sub> 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

Automatic Addition of  
**NaOH . H<sub>2</sub>O . H<sub>3</sub>BO<sub>3</sub>**  
Titrant Solution

Integrated  
**Colorimetric Titrator**  
AOAC Recommended

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

DESCRIPTION	METHODS (main reference, many others are complied)
Animal feed and pet food	AOAC 984.13, EN ISO 5983-2 (AOAC 2001:11)
Beer (and its ingredients: barley, malt, wort)	AOAC 920.53, AOAC 950.09
Bread and baked products	AOAC 950.36
Milk and derived products (including cheese)	ISO-IDF 8968-1/20-1:2014, ISO 20483, ISO 8968-2, ISO 8968-3, ISO 8968-4
Cereals and grains (wheat, oats, barley, corn, rice, rye, soy beans, lupins, etc.)	AOAC 979.09 EN ISO 5983-2 (AOAC 2001:11)
Malt	AOAC 950.09
Meat and derived products (bacon, ham, salami, sausage, liver patè, etc.)	ISO 937 (AOAC 981.10)
Nuts and nut products (almonds, coconuts, peanuts, etc.)	AOAC 950.48
Pasta (e.G. Macaroni, etc.)	AOAC 930.25
Plants (vegetables, forage, straw, seeds, tea, etc.)	AOAC 978.04
Yeast	AOAC 962.10
Oil seeds	EN ISO 5983-2 (AOAC 2001:11)

## Nitrogen on Other Samples

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

## Other Applications

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

## TEMS



**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/PQ Manual	A00000205
UDK 139 IQ/OQ/PQ Manual	A00000204
UDK 149 IQ/OQ/PQ Manual	A00000203
UDK 159 IQ/OQ/PQ Manual	A00000202
UDK 169 IQ/OQ/PQ Manual	A00000254
AutoKjel IQ/OQ Manual	A00000256
Waterproof mouse (for UDK 139, 149, 159, 169)	A00000215
Titration 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
H <sub>2</sub> O 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
H <sub>2</sub> BO <sub>3</sub> 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



**A00001080**  
Test tube  
Ø 42x300 mm



**10001106**  
Collecting  
flask 250 ml



**10000247**  
Princer for  
test tubes

Inlet tube, discharge tube and protective film for touch screen are supplied with the instrument

## TEST TUBES



**A00001083**  
Test tube  
Ø 80x300 mm



**A00001088**  
Test tube  
Ø 48x260 mm



**A00000144**  
Test tube  
Ø 42x300 mm



**A00000146**  
Test tube  
Ø 26x300 mm



**A00000185**  
Test tube  
Ø 50x300 mm

## FIELDS OF APPLICATION

FOOD, FEED AND BEVERAGE INDUSTRY

ENVIRONMENTAL INDUSTRY

PHARMACEUTICAL AND CHEMICAL INDUSTRY

# TECHNICAL DATA

	UDK 129	UDK 139	UDK149	UDK159	UDK 169
ANALYSIS TIME	5 min (for 100ml)	4 min (for 100ml)	3 min (for 100ml)	for 4 min (titration included)	for 4 min (titration included)
MEASURING RANGE	0.1 - 200 mgN	0.1 - 200 mgN	0.1 - 200 mgN	0.1 - 200 mgN	0.1 - 200 mgN
REPRODUCIBILITY (RSD)	≤ 1%	≤ 1%	≤ 1%	≤ 1%	≤ 1%
RECOVERY	≥ 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	Yes	Yes	Yes	Yes	Yes
AUTOMATIC DILUTION WATER ADDITION	-	Yes	Yes	Yes	Yes
AUTOMATIC BORIC ACID ADDITION	-	-	Yes	Yes	Yes
SELECTABLE DISTILLATION TIME	Yes	Yes	Yes	not necessary with tration	not necessary with tration
DISTILLATION RESIDUES REMOVAL	-	Yes	Yes	Yes	Yes
STEAM FLOW REGULATION	-	Yes	Yes	Yes	Yes
DELAY TIME (DEVARDA ALLOY ANALYSIS)	Yes	Yes	Yes	Yes	Yes
DISTILLATION IN SERIES	-	-	Yes	Yes	Yes
LIMITED WATER CONSUMPTION	Yes	Yes	Yes	Yes	Yes
DISPLAY	LCD	3.5" touch screen	3.5" touch screen	6" touch screen	6" touch screen
PROGRAMS	1	10	20	55	55
LANGUAGE SELECTION	-	Yes	Yes	Yes	Yes
ARCHIVE (on-board data storage)	-	-	Yes	Yes	Yes
PASSWORD (user / super user)	-	-	Yes	Yes	Yes
TITRATION RESIDUES REMOVAL	-	-	Yes	Yes	Yes
AUTOMATIC TITRATION VESSEL WASHING	-	-	Yes	Yes	Yes
MOUSE	-	Yes	Yes	Yes	Yes
PRINTER	-	Yes	Yes	Yes	Yes
PC (FOR DATA STORAGE)	-	-	Yes	Yes	Yes
PEN DRIVE (FOR DATA TRANSFER)	-	-	Yes	Yes	Yes
BALANCE	-	-	-	Yes	Yes
AUTOSAMPLER	-	-	-	-	Yes
OVERALL DIMENSIONS (WxHxD)	385x780x416 mm 15.2x30.7x16.4 in	385x780x416 mm 15.2x30.7x16.4 in	385x780x416 mm 15.2x30.7x16.4 in	385x780x416 mm 15.2x30.7x16.4 in	385x780x416 mm 15.2x30.7x16.4 in
OVERALL WEIGHT	24 Kg 52.9 lb	26 Kg 57.3 lb	27 Kg 59.5 lb	31 Kg 68.3 lb	31 Kg 68.3 lb
POWER SUPPLY	230 V / 115 V	230 V	230 V	230 V	230 V
POWER	2100 W / 1700 W	2100 W	2100 W	2100 W	2100 W



## 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



We reserve the right to make technical alterations  
We do not assume liability for errors in printing, typing or transmission

VELP Official Partner

### DESIGNED AND MANUFACTURED IN ITALY



**ITALY – HQ**  
Via Stazione 16  
20865 Usmate (MB) Italy  
Tel. +39 039 628811  
velpitalia@velp.com

**INDIA**  
velpindia@velp.com

**USA**  
155 Keyland Court, Bohemia  
NY 11716 - U.S.  
Tel. +1 631 573 6002  
velpusa@velp.com

**CHINA**  
Xinlong Rd Building 28, Lane 1333  
Shanghai city - China  
Tel. +86 18616509163  
velpchina@velp.com