

## Kjeltec™ 8000 Kjeldahl Distillation Solutions for Food and Feed



### Tecator™ Line

The Kjeltec™ range offers a series of automated distillation units designed primarily for Kjeldahl analysis, but widely used for many different distillation chemistries.

Kjeltec™ features include variable steam output, intelligent cooling water and distillate temperature control, reagent addition, tube emptying and FOSS patented SAfE technology in all models.

A fully automated analyser, Kjeltec™ 8400, with on board self cleaning colorimetric titration system completes the range. Optional Kjeltec™ 8420/8460 Auto Samplers for 20 or 60 samples offer fully unattended operation of the analyser.

Sample	Parameters
Raw materials and finished products in Food, Feed and Agriculture	Nitrogen, Protein



## Effective laboratory operations

Thousands of laboratories around the globe have invested in Kjeltec™ instruments that go on working year after year. Based on the renowned accuracy, cost effectiveness and safety of FOSS Kjeldahl analysis solution, the Kjeltec™ 8000 series takes Kjeldahl analysis to new levels of efficiency with facilities to match today's demands, including:

- More versatility and reduced operational costs
- Self adjusting cooling water, saves water and reduces costs
- Automatic flow control function
- Minimal downtime and service with long-life components
- Routine maintenance schedule supports GLP routines (Good Laboratory Practice)
- Surfaces exposed to reagents made of corrosion-free materials
- Alkali resistant plastic splash/tube draining vessel head for long lifetime

## Easier handling

Laboratory staff will be grateful for the proven reliability, ease of use and time saving facilities that make everyday operations simpler, safer and more convenient. The Kjeltec™ 8000 series builds on the proven FOSS reputation for safe, high-performance instruments, with innovative features to make your laboratory operations even simpler; these include:

- Variable output steam generator broadens application area to other volatile components

- Officially approved (AOAC, EPA, DIN, ISO) for simplified validation
- Built-in safety systems for user protection
- Patented SAfE feature for safe distillation of samples that form salt cakes
- Bellows pumps for accurate reagent dispensing
- Alkali resistant plastic splash head for long lifetime

## The instrument to match your business

The Kjeltec™ 8000 series features a range of automatic distillation units with varied levels of automation to suit the needs of your laboratory.

## Future needs

For further security well into the future Kjeltec™ instruments 8200 and 8400 come with upgrade options, for fully automatic and unattended operation that allow your unit to grow as your business grows.

- Upgrade with a 20 or 60 place sampler providing the benefits of automation even at lower throughputs
- Upgrade with colorimetric titration system for unmatched accuracy, long-term stability, wide working range, speed and simplicity without the need for repeated and costly calibrations.
- Optional external titrator connection

# The Kjeltect™ Distillation range includes:

## Kjeltect™ 8100

- Automatic dilution, alkali addition, distillation and tube emptying provide ease of use.
- Variable output steam generator broadens application area to other volatile components.
- Official and accurate procedures (ISO, AOAC, EPA, DIN) simplify validation.
- Patented SAfE\* feature for safe distillation of tubes with salt cakes.
- Built-in safety systems for user protection.
- Self adjusting cooling water control saves water and reduces costs.
- Bellows pumps for accurate dispensing of reagents.
- Alkali resistant plastic splash head & tube emptying vessel for long lifetime.



## Kjeltect™ 8200

All the features of the Kjeltect™ 8100 plus:

- Receiver solution addition
- Automatic safety door
- External titration connection (Mettler, Metrohm, Schott, etc.)
- Modularly upgradeable to analyser and sampler system



## Kjeltect™ 8400

All the features of the Kjeltect™ 8200 plus:

- Titration, calculation and reporting.
- Upgradeable to 20 or 60 place auto sampler for fully unattended operation.
- Interchangeable burette for easy titrant exchange.
- Ethernet connection eliminates communication problems with printers and balances.
- Touch sensitive colour display
- Complete PC control of all registration and reporting through optional data management software - Compass.



## Applications

– Some examples of official methods

**EN ISO 5983-2 (AOAC 2001:11)** which applies to Protein/ Nitrogen in Animal Feeds, Cereals, Forages, Oil seeds, Pet Foods and Fish Meal

This standard is also the reference method for the determination of nitrogen/protein by:

- Indirect spectroscopic determinations (NIR/NIT)
- Dumas combustion method (ISO 16634)

**ISO 20483** determination of the nitrogen content of cereals, pulses and derived products

**ISO 8968-2 (IDF/FIL 20-2)** determination of the nitrogen content of liquid milk, whole or skimmed, by the block-digestion principle

**ISO 8968-3 (IDF/FIL 20-3)** determination of the nitrogen content of liquid, whole or skimmed milk, semi-micro method

**ISO 8968-4 (IDF/FIL 20-4)** determination of the non-protein nitrogen content of liquid milk, whole or skimmed.

**ISO 937 (AOAC 981.10)** Meat and meat products - Determination of nitrogen content (Reference method)



# Technology



## Adaptable to your business

Whether you own a basic distillation unit or a fully automated sampler system, with a FOSS solution you can get on with your business without worrying about how to get the best from your investment. That's because you can rely on the extra FOSS dimension – the features and services designed to help you get the best out of your FOSS instrument with minimal impact on your time and resources. These include:

- Validated applications according to official standards
- Ongoing support to meet your needs
- Training by experienced local personnel
- Customised FossCare service programs to match the needs of your business

All of which ensures that your FOSS solution runs optimally, day after day and year after year.

In addition to these features the Kjelttec™ 8200 and 8400 models include upgrade options, which enables your system to grow as your business grows.

## Safety first

The patented SAfE\* technology improves safety by a mixing procedure, reducing the exothermic reaction between alkali and acid during distillation and removing the need for manual pre-dilution. A fast tube draining system removes the need for handling hot reagents after distillation.

The user is fully protected by the unique automatic safety door which must be closed with a tube in place before the unit will operate. The safety door and drip tray can be easily removed for cleaning.

Cooling water flow is controlled automatically and a temperature sensor stops the unit if the distillate is too hot. Sensors monitor tube in place, safety doors, reagent levels, water level and over-pressure in the steam generator providing safe conditions for users.

\* *Steam Addition for Equilibration*

## Unmatched accuracy with colorimetric titration (Kjeltec™ 8400)

The Kjeltec™ 8400 offers you the FOSS designed colorimetric titration system for unmatched accuracy. The superior performance of a Kjeltec™ titration system is based on colorimetric measurement of a precise chemical reaction for end-point detection. Accuracy is assured time after time with the additional benefits of long-term stability, wide working range, speed and simplicity without the need for repeated and costly calibration procedures.

Colorimetric titration is often the preferred methodology when new standards are issued by organisations such as the AOAC, ISO, and IDF.

## Easy maintenance

The smart design of the titration module eliminates much of the manual handling and the self-rinsing titration vessel ensures automatic cleaning after each batch. The system is always clean, ensuring a prolonged lifetime even with less manual maintenance. The titration module also minimises air bubbles in the system, allowing a quicker upstart while helping to ensure that you get correct results.

Your Kjeltec™ 8400 is designed to make your life easier - easier to use, easier to clean, easier to maintain.

## Compass Software for reliable registration

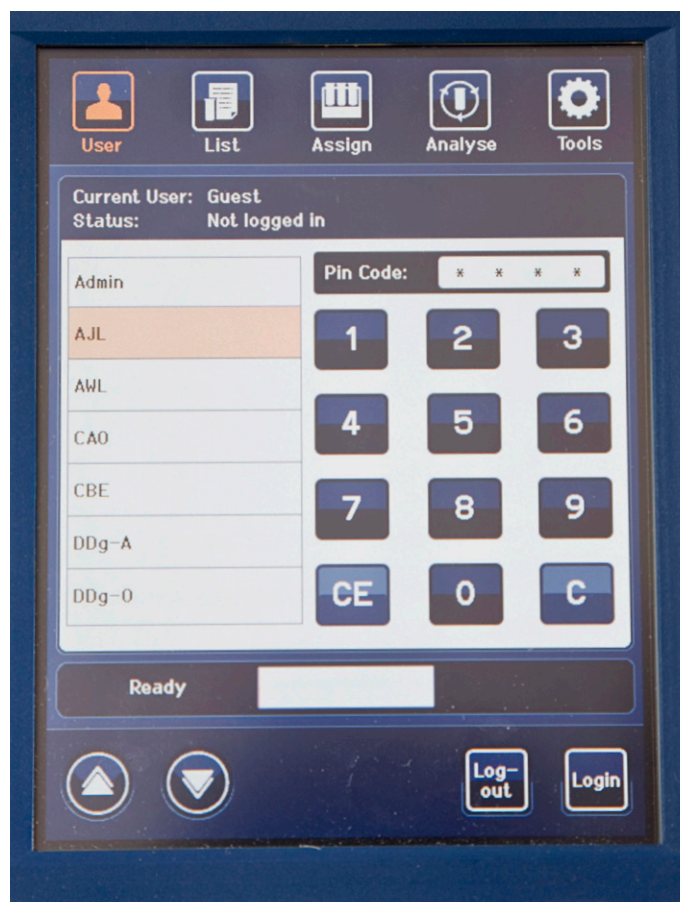
Good Laboratory Practice (GLP) routines are supported by sample registration and performance test routines and complete documentation of all events during analysis through Balance/Printer/LIMS connection.

With Compass PC software you can throw away those crumpled notebooks. Kjeltec™ 8400 allows you to register samples and track results online for improved operations and traceability. Samples can be registered via a PC connected to the instrument – simply click and send the batch to the analyser. You can also connect the instrument to your laboratory network. The PC software works perfectly with your LIMS system so you won't need to enter sample weights twice. Plus, you will have all the information you need for reporting in one place.

- Easy data-handling for reporting and traceability
- Samples registration via PC connected to the instrument
- LIMS system compatible software.



*Just load your sample racks directly from the digestion block and Kjeltec™ will perform accurate analysis unattended for more than four hours.*



*Simple to use interface of Kjeltec™ 8400*

# Technical Specifications



DISTILLATION UNIT	KJELTEC™ 8100	KJELTEC™ 8200	KJELTEC™ 8400
Variable output steam generator	X	X	X
Water saving system	X	X	X
Cooling water flow control	X	X	X
Distillate temperature monitor	X	X	X
Polypropylene splash head	X	X	X
Polypropylene tube emptying vessel	X	X	X
Bellows pumps for reagent addition	X	X	X
Automatic alkali addition	X	X	X
Automatic dilution water addition	X	X	X
Automatic receiver solution addition		X	X
Tube emptying/Waste collection	X	X	X
Reagent alarms	X	X	X
Removable drip tray	X	X	X
Automatic safety door		X	X
Interlocked safety door	X	X	X
Removable safety door	X	X	X
Tube-in-place safety	X	X	X
Tube replacement sensor	X	X	X
Colorimetric titration system		Upgradeable	X
External titrator connection		Optional	Optional
Interchangeable burette			X
Titration bypass			X
Results calculation			X
Storage of raw data in instrument			40 batches
Data management PC software			X
Storage of raw data with PC software			Unlimited
Ethernet connection for:			
PC			X
Balance			X
Printer			X
Autosampler system 8420: <i>1 rack, 8 or 20 tubes, 250 &amp; 400ml</i>		Upgradeable	Optional
Autosampler system 8460: <i>3 racks, 8 or 20 tubes, 250ml &amp; 400ml</i>		Upgradeable	Optional

<b>Performance data at 230 V:</b>	
Autosampler capacity:	Kjeltec™ sampler 8420, 1 rack with 20 Kjeldahl tubes 250 ml or 400 ml Kjeltec™ sampler 8460, 3 racks with 20 Kjeldahl tubes 250 ml or 400 ml
Storage capacity:	40 batches (with Compass unlimited)
Analysis time:	3.5 minutes at 30 mg N (6.5 minutes at 200 mg N)
Distillation capacity:	~ 40 ml/min
Measuring range:	0.1 – 200 mg N
Reproducibility:	1% RSD (including the digestion step)
Recovery:	> 99.5% at nitrogen levels between 1 – 200 mg N
Tube draining:	200 ml in less than 10 seconds
Burette volume:	35 ml
Burette resolution:	2.4 µl/step
Burette speed:	>0.5 ml/second
Reagent pump volumes:	0 – 150 ml in steps of 10 ml
Delay:	0 – 1800 seconds
SAfE <sub>Patented</sub> :	0 – 15 seconds

<b>Installation requirements:</b>			
Power supply:	200 – 240 V 50 – 60 Hz		
Tolerable voltage variation:	± 10 %		
Power consumption:	2 200 W		
Water consumption: (during distillation only)	3 l/min at water temp of 25°C * 1 l/min at water temp of 15°C * Circulating Cooler recommended at >25°C		
Ambient temperature:	5 - 40°C		
Ambient humidity:	max. 80% relative		
Drain:	For cooling water only		
Weight net:	Kjeltec™ 8400	Sampler Kjeltec™ 8420	Sampler Kjeltec™ 8460
	35 kg	71 kg	89 kg
Dimensions: (WxDxH)	Kjeltec™ 8400	Sampler Kjeltec™ 8420	Sampler Kjeltec™ 8460
	480 × 580 × 690 mm	645 × 840 × 900 mm	1000 × 800 × 900 mm

# System description

Kjeltec™ 8100 Distillation Unit, 200-240 V 50-60 Hz comprising:

Microprocessor controlled distillation unit with tube draining and automatic addition of water and alkali, built-in steam generator for deionised water or tap water, complete with alkali/water/waste tanks with level sensors, receiver flask, combi-adapter for 100, 250, 400 and 750 ml tubes and digestion tubes for 100 and 250 ml

Kjeltec™ 8200 Distillation Unit, 200-240 V 50-60 Hz comprising:

Microprocessor controlled distillation unit with tube draining and automatic addition of water, alkali and receiver solution, built-in steam generator for deionised water or tap water, complete with alkali/water/receiver/waste tanks with level sensors, receiver flask, combi-adapter for 100, 250, 400 and 750 ml tubes and digestion tubes for 100 and 250 ml, and handling device for digestion tubes. Possibility to upgrade Kjeltec 8200 Distillation Unit to Kjeltec 8400 Analyzer Unit

Kjeltec™ 8400 Analyzer Unit, 200-240 V, 50-60 Hz comprising:

Automatic distillation / titration unit with tube draining and built-in steam generator for deionised water or tap water, Complete with alkali/water/receiver/ waste tanks with level sensors, combi-adapter 100, 250, 400 and 750 ml tubes and a digestion tube for 100 & 250 ml, Handling device

Kjeltec™ 8400/Kjeltec™ sampler 8420 200-240 V, 50-60 Hz comprising:

84000001 including 84200011 Kjeltec™ sampler 8420 for 20 samples\*

Kjeltec™ 8400/Kjeltec™ sampler 8460 200-240 V, 50-60 Hz comprising:

84000001 including 84600011 Kjeltec™ sampler 8460 for 60 samples\*

Kjeltec™ sampler 8420 200 – 240 V, 50-60 Hz with accessories needed to be connected and run with Kjeltec™ 8400\*

Kjeltec™ sampler 8460 200 – 240 V, 50-60 Hz with accessories needed to be connected and run with Kjeltec™ 8400 With integrated water tank\*

*\*Autosamplers can only be used with racks for: 8 x 250 or 400 ml tubes and 20 x 250 or 400 ml tubes*



## Optional accessories:

For a complete Kjeldahl system a Digester with appropriate accessories such as Exhaust, Scrubber, test tubes and catalyst tablets should be selected.

### **Kjeltec™ 8100 & 8200**

- Titration unit complete, 50 ml
- Basket for 20 receiver flasks (250 ml)
- Receiver flasks, 250 ml (set of 10)

### **Kjeltec™ 8200**

- Kit for distillation by-pass
- Cable for connection of external titrator
- Kit for upgrade of Kjeltec 8200 Distillation Unit to Kjeltec 8400 Analyzer Unit

### **Kjeltec™ 8400**

- Compass, PC software for Kjeltec™ 8400 Analyzer unit
- Tank for titrant, complete with tubing
- Burette Dosing device for calibration of burette
- Top loaded level sensor for waste tank
- Top loaded level sensor for reagent tank
- Tank 20 l (Alkali/water/waste) without level sensors.
- Level sensor kit for waste
- Level sensor kit for reagents
- Adapter for Büchi tubes
- Handling device for digestion tubes

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