

## Dumatec™ 8000

Nitrogen analysis in food and feed according to Dumas



### Tecator™ Line

Dumatec™ 8000 gives busy laboratories reliable Dumas results in just three minutes at a low cost per sample. Innovative features reduce start-up time while extending consumable lifetime and software functions allow desktop-operation and traceability.

Sample	Parameters
Food and animal feed, liquid, paste and solid samples	Nitrogen/Protein



## Approved Dumas in as little as three minutes

When you need rapid and convenient nitrogen/protein analysis according to Dumas, Dumatec™ 8000 is the answer. No hazardous chemicals are involved and it's easy to adjust and maintain the instrument during analysis.

Instantaneous and direct analysis of all resulting nitrogen gives reliable Dumas measurements within three minutes. The innovative design also avoids calibration standardisation between batches of the same sample type. This gives a fast start up time of 30 minutes. You even have the flexibility to add urgent samples to the autosampler while a batch is in process.

### Lower your running costs

The technology behind Dumatec™ 8000 pays off for your laboratory operations.

The combustion conditions are optimised to reduce the cost-per-analysis of samples and to maximise the time between replacements of reactors.

The unique three-stage water removal system increases the lifetime of the water trap-packing many times. The software system makes it easy for you by controlling the combustion with great precision for minimal consumption of oxygen. The use of helium is minimized because there is no need for a reference gas flow.

Operator time is also low, for example, it is easy and quick to remove the crucible and replace the quartz combustion reactor. Run samples are monitored automatically and the certified quality catalysts last for more than 800 analyses (sample



The fast and reliable Dumatec™ 8000 system is approved for product declarations of protein content of food and feed. Approvals encompass organisations such as AOAC, AACC, ISO and ICC.

dependent). The Dumatec Software will remind you when it is time to replace it, and you won't have to keep ordering consumables.

### Reliable Dumas with reduced work

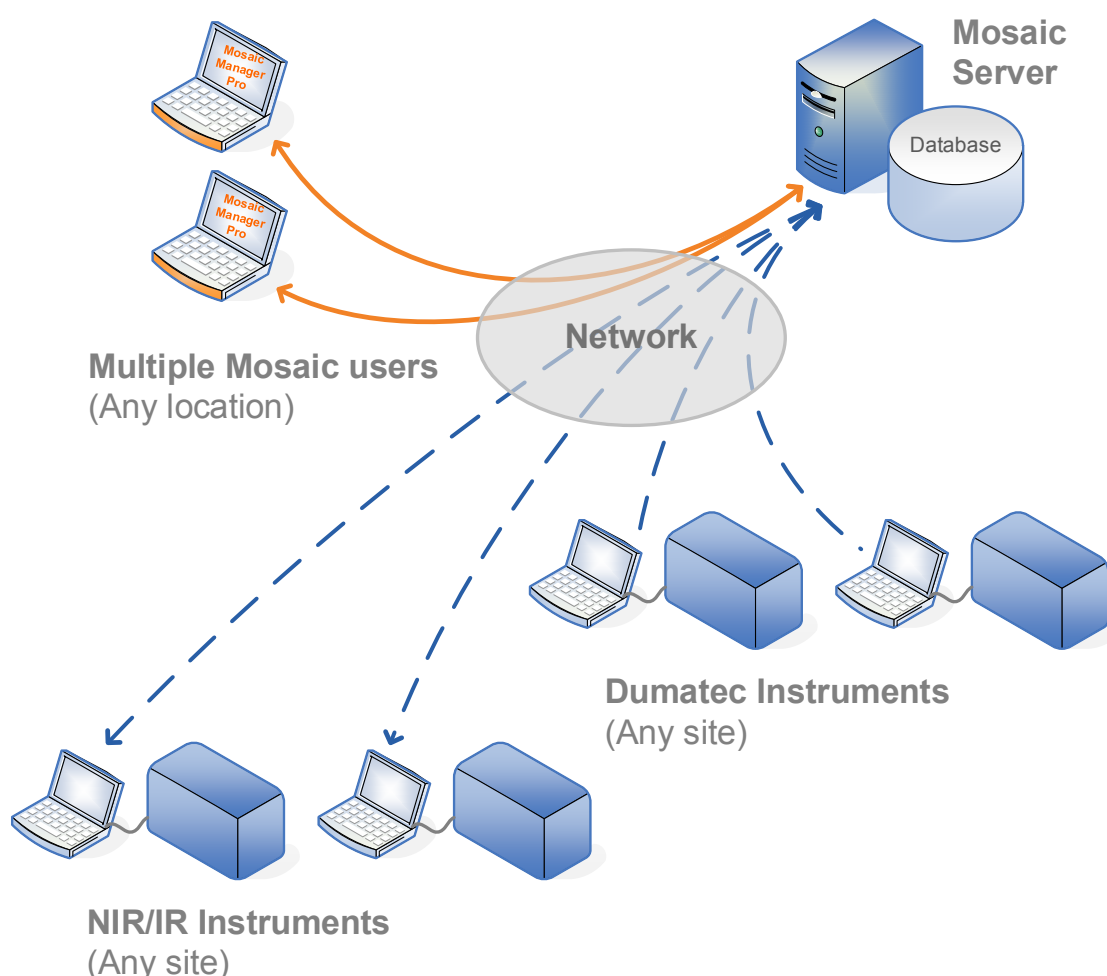
Free your laboratory resources. With Dumatec™ 8000 removal of CO<sub>2</sub> is done automatically with the patented self-regenerating adsorption trap within a six position carousel. A smart auto sampler disc system allows you to test up to 117 samples, giving you batch handling flexibility. Dumatec is versatile for all sample types and easy and quick to use – just weigh samples in tin foil, pop in the auto sampler disc and let it go.

Dumatec™ 8000 is operated from your desktop using the Dumatec Software for easy handling of calibrations, traceability of data and report creation to mention just some of the features.

### NIR reference data-sets made easy with networked instruments

Connect your Dumatec to a Mosaic network and save time loading new sample sets to your near infrared (NIR) instruments for calibration adjustment or development. You can also keep an eye on the performance of your Dumatec and keep all reference data safe in one place.

- Handle reference data at the click of a button
- Keep an eye on the performance of your Dumatec instruments from the convenience of your desktop or anywhere with a connection
- Secure all your data on the Mosaic server for consistent operations and traceability



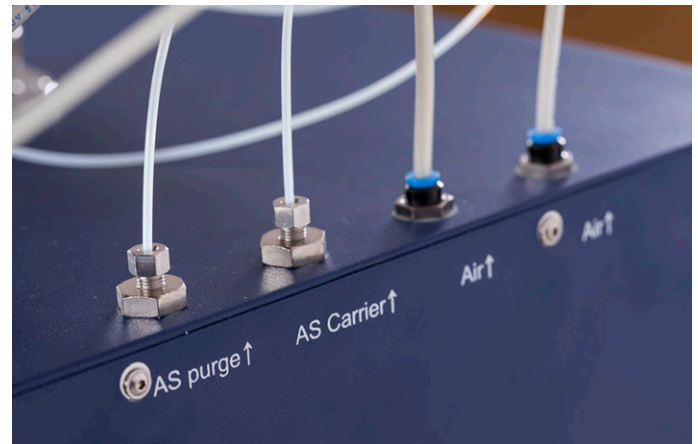
# Technology

Solid or liquid samples are combusted in the presence of catalysts into oxides. The resulting nitrogen oxides are reduced to elemental nitrogen and the water and carbon dioxide by-products are separated completely. The total resulting nitrogen is registered by the thermal conductivity detector (TCD).

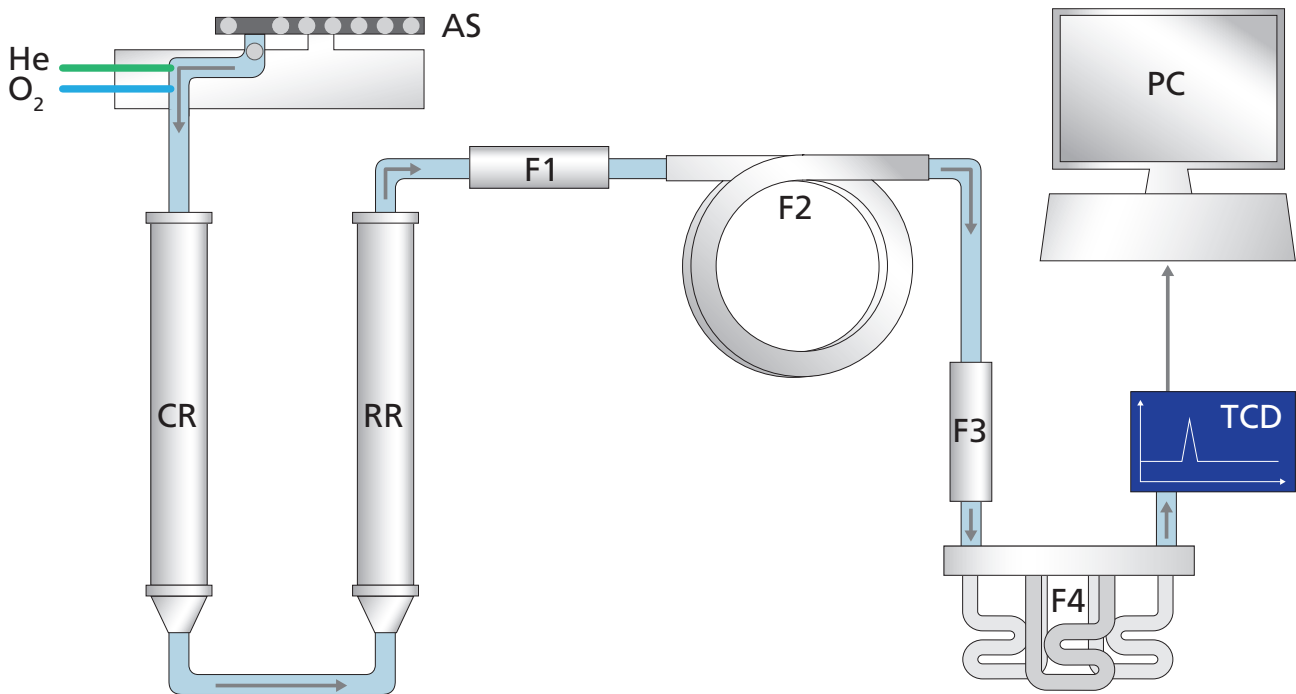
The Dumatec™ 8000 has a very low detection limit (0.003 mg N). The unit can process up to one gram of a sample, but as for normal food and feed samples, quantities of around 100 - 300 mg give optimum results with minimum consumption.

## An innovative approach to Dumas

The operating principle of Dumatec 8000™ is based on the Dumas method – quick combustion of a sample in pure oxygen atmosphere, followed by an analysis of all the resulting nitrogen in the combustion gases. The nitrogen is registered by a thermal conductivity detector (TCD), resulting in a signal that corresponds to the amount of nitrogen (N<sub>2</sub>) in the combusted sample.



Helium is used as a carrier gas to transport the resulting gases from the combustion reactor through various filters to the TCD. The system consists of an auto-sampler (AS), a combustion reactor (CR), a reduction reactor (RR), three water traps (F1, F2 and F3) and a carbon dioxide adsorber (F4), and the thermal conductivity detector (TCD).



AS Autosampler  
 CR Combustion reactor  
 RR Reduction reactor

F1 Water condenser  
 F2 Membrane system  
 F3 Adsorption trap

F4 Self-regenerating adsorption trap  
 TCD Thermal conductivity detector  
 PC Personal computer

Before the sample drops from the autosampler into the combustion reactor, the flow is switched from helium (He) to oxygen (O<sub>2</sub>). The exothermic reaction when the oxygen reacts with the tin capsule containing the sample, raises the temperature in the reactor from 1000 °C up to 1700 - 1800 °C within seconds. At this temperature, and in the presence of specially designed and patented oxidation catalysts, the sample is completely converted into its elemental oxides.

After combustion, the oxygen flow is switched back to helium, which serves as the carrier gas to transport the combustion products through the rest of the system. Excess oxygen is reduced in the reduction reactor (RR).

### Three-stage water filtering system

The by-product water (H<sub>2</sub>O) is separated from the gas mixture by three water traps – F1, F2 and F3. F1 is a water condensation tube and F2 is a Perma Pure gas membrane, which separates the majority of the water from the gas mixture. The third water trap F3 is packed with silica gel and removes the residual amount of water from the gas stream.

### Automatic removal of CO<sub>2</sub>

Carbon dioxide is separated from the gas mixture in the carbon dioxide adsorber tubes (F4). The carbon dioxide adsorber tubes are regenerated in the degassing furnace. Six tubes packed with carbon dioxide adsorbent are mounted on a patented carousel.

The adsorption and desorption operations proceed simultaneously. While one tube is always in-line with the analytical circuit and adsorbs all the carbon dioxide from the current sample analysis, other tubes are in the degassing furnace desorbing the trapped carbon dioxide to atmosphere. This patented process drastically reduces the total analysis time.

The remaining nitrogen and helium mixture passes through the TCD from which the output signal is proportional to the nitrogen concentration in the sample.

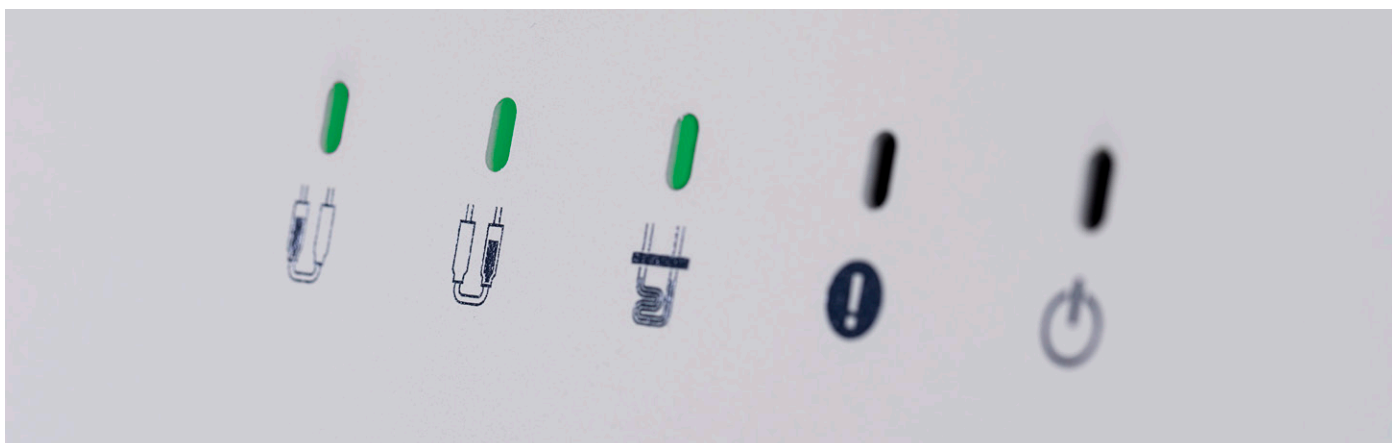


The resulting analysis diagram will show the TCD output signal as a function of the measuring time. The total amount of nitrogen is calculated by the instrument and displayed.

### Easy to use autosampler

The autosampler provides high-quality performance, both for the sample loading and the sample conditioning, where the sample is placed into a dedicated chamber and purged with helium in order to eliminate any trace of nitrogen present in the atmosphere before starting the analysis.

Up to three discs can be loaded simultaneously allowing up to 117 samples to be analysed unattended.



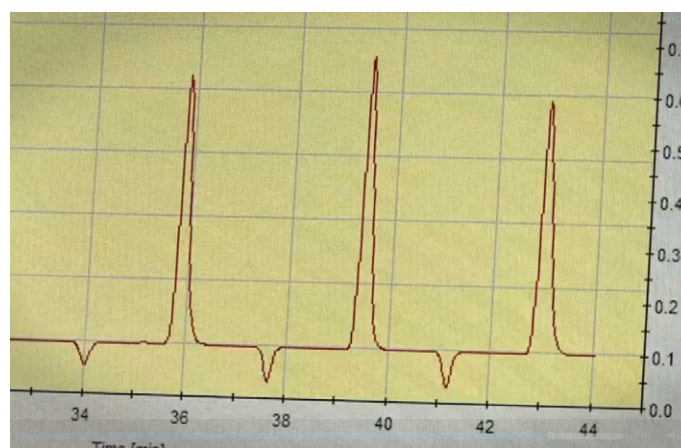
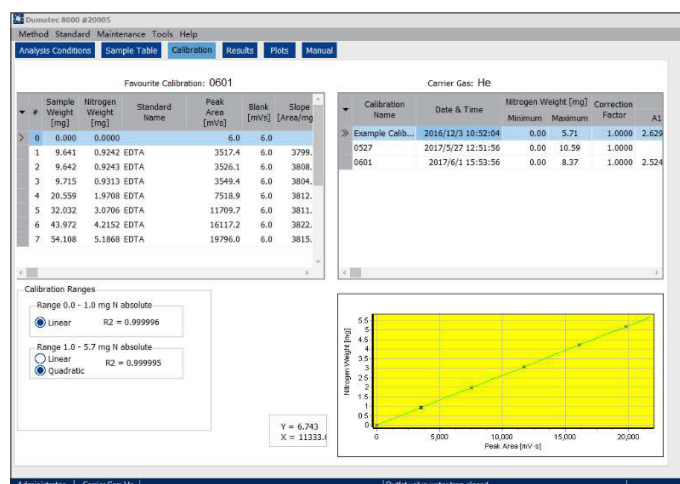
## Software for effective operations

The Dumatec™ 8000 software allows for effective analytical operations and all data is stored for later reporting and traceability.

All information can be constantly monitored from the main screen, including a real time graph showing progress with the analysis. A library of methods is pre-installed to support the user with valuable information on the analysis. It's also possible to create a library of the calibration curves, ready to use for different purposes. An automated leak test can be performed after changing consumables. This ensures that there is no gas leak, securing accurate analysis results.

The sample weight can be transferred directly from the balance to the software so you don't need to type it in twice. It is also possible to transfer data to your LIMS system.

After the analysis, the user can create and export customised test reports.



# System Description

## Dumatec™ 8000, 220-240 VAC 50 - 60 Hz comprising:

- Pneumatic Autosampler PN 120 incl: main Piston O-ring 3 pcs, Silicon rubber disc, sample tray 0-39 position, plastic lid, teflon tube 1.5 x 3 mm, 0,45 m, tool for autosampler piston
- Dumatec Manager – Software Dumatec 8000 USB memory
- Standard Accessory kit:  
Glass bottle, reactor tube extractor, reactor tube filling rod, crucible extractor, tweezers, spatula, wrench, silicone seals for water traps 2 pcs, reactor bottom insulation insulation collars 2 pcs, reactor top insulation collars 2pcs, connecting set for CO<sub>2</sub> trap, 2 pcs, polyurethane tubing 4x0.75 mm, 4m, Stainless steel tubing 1 x 2 mm , 3m, teflon tubing 1 x 2 mm, 3 m, USB cable, main cable, sample holder, nuts M6x0.75 for 2 mm tubing 10 pcs, Ferrules for 2 mm tubing 10 pcs main cable

## Consumable and accessory kit, must be ordered separately:

Tin foil 10 x 100 pcs, seal for bottom connector 4 pcs, seal for top of quartz tube 4 pcs, CO<sub>2</sub> adsorber tube, absorbent for liquid samples 25g, crucible 10 pcs, EDTA 10g, Copper 450g 2 pcs, stand for reactor tubes, quartz tube 2 pcs, adsorbent for water trap 100g, wool pads (30pcs small and 30 pcs big), wool for water trap 5g, pre-packed reactor, adapter 1/4" for stainless steel gas line 2 mm 2 pcs, 1/4" for PU gas line 4 mm, funnel.

## Optional Accessories:

Sample tray 2 and 3 cpl with cover, Capsule forming and closing device, Sample preparation plate with plunger

# Performance data

Sample weight	0,5 mg - 300 mg (Typically 100 mg). Samples with low organic matter up to 1000 mg
Autosampler capacity	Three discs with 39 positions in each; a total of 117 positions (Disc 2 and 3 is optional)
Analysis time	2 - 5 min, depending on the sample substance and weight
Recovery	> 99,5 %
Detection limit	0,003 mg N
Relative Standard Deviation	< 0,5 % with 150 mg test substance (EDTA)
Measuring range; Nitrogen	Minimum <0,01 mg Maximum 50 mg

## Installation requirements

Helium supply	Quality grade 5.0 (99.999%)
Oxygen supply	Quality grade 5.0 m (99.999%)
Compressed air or industrial nitrogen (auto sampler drive)	Quality grade 2.6 (99.6%), without dust, oil and water vapour, dew point below -40C
Inlet pressure helium	3 bar
Inlet pressure oxygen	3 bar
Inlet pressure compr. air / nitrogen	4 bar
Power supply	220-240 VAC, 50/60 Hz*
Use	Indoor
Current	6 A
Transient overvoltage	Category II (according to IEC/EN 60364)
Pollution degree	2 (according to IEC 664-1)
Protection class	IP20
Fuse rating	T 6A h 250 v

\*For use in USA and Canada (110/120 VAC), a transformer with a minimum output corresponding to the input rating of the instrument is required.

## Technical specification

Dimensions (W x D x H)	800 x 450 x 590 mm (710 mm with auto sampler)
Weight	65 kg
Digital balance	Precision 0.1mg (calibration starts 5mg abs Nitrogen) 0.01mg or better (calibration starts 1mg abs Nitrogen)
Temperature range	Combustion furnace 400 - 1100 °C Reduction furnace 400 - 1100 °C Desorption furnace 50 - 350 °C

## Requirements for PC

CPU	Intel Core i5 or higher
RAM	Minimum 4 GB
Free hard disc space	Minimum 20 GB
Operating system	Windows 7 and 10
Additional software	Microsoft excel
Ports	Minimum two USB 2.0
Screen	Minimum 19 inch monitor
Printer	A4 Printer (optional)



## Applications

Dumatec observes international and national analysis standards and thus, meets the required analysis quality. Dumatec can be used for:

### Protein determination in:

- Feed, e.g. AOAC 990.03
- Grain, e.g. AOAC 979.09, 920.87, 992.23
- Grain products, oil seeds DIN EN ISO 16634
- Meat and meat products, e.g. AOAC 992.15 or AOAC 928.08, § 64 LFGB L 06.00-20
- Beer, wort, grain for breweries, e.g. AOAC 997.09
- Malt and raw material for breweries, e.g. AOAC 920.53, 950.09
- Milk and dairy products, e.g. § 64 LFGB L 01.00-60, L 02.00-24
- Dairy and dairy products - GB 5009.5-2016
- Feed - GB/T 24318-2009
- Grain products, Oil seed - GB/T 31578-2015

### Nitrogen determination in:

- Soil (Fertiliser) e.g. DIN 11512-20, DIN 19684-Teil 4 or AOAC 973.48
- Soil improvement and culture media
- Fertiliser, e.g. AOAC 993.13, DIN EN 13654-2
- Petroleum
- Coffee
- Plastics
- Paper
- Tobacco
- Urine
- Water e.g. DEV, H11, H28
- Pulp

## Legal data

- Electro Magnetic Compatibility (EMC) Directive 2014/30/EU
- Low Voltage Directive (LVD) 2014/35/EU
- Machinery directive 2006/42/EC
- Packaging and packaging waste Directive 94/62/EC
- WEEE Directive 2012/19/EC
- REACH Directive 1907/2006/EC

### THREE MINUTE DUMAS ANALYSIS

- Reliable results within 3-5 minutes with instantaneous analysis of all resulting gases
- Rapid start up (30 min.) for high uptime and less calibration work due to the innovative design and advanced TCD detector
- Flexibility to add urgent samples to the autosampler while a batch is in process

### LOWER RUNNING COST THAN ANY OTHER DUMAS SOLUTION

- Low Oxygen and Helium consumption through patented catalyser, combustion control and innovative TCD detector with no need for a reference gas flow; low frequency of calibration checks
- Low operator time, for example, it is easy and quick to remove the crucible and replace the quartz combustion reactor
- Optimised usage of consumables: automatic monitoring of run samples, certified quality catalysts lasting for more than 800 analyses (sample dependent)

### RELIABLE DUMAS WITH REDUCED WORK

- Total Nitrogen accuracy ensured over the full calibration range by complete combustion of the sample, plus patented 6 position carousel with self-regenerating adsorption traps for separation of CO<sub>2</sub>
- Measure up to 117 samples by the unique autosampler wheel system – expandable from 1-117, batch handling, versatile for all sample types which ensures a more rational use of lab resources
- Effective analytical operations from your desktop with the unique Dumatec software including storage of calibrations for reuse, user friendly interface, reporting and traceability



## FOSS

Представительство FOSS UA

пр. Голосеевский 58А, офис 15,  
Киев, 03039

+380 44 494-30-15,  
+380 44 494-30-05,  
+380 67 569-63-88

info@foss-ua.com  
www.foss.dk  
www.foss-ua.com

