

## FlashEA® 1112 N/Protein Nitrogen and Protein Analyzer



For cereal, cheese, beans, meat, forage, milk, baby food ...

The Thermo Scientific Flash 1112 analyzer allows users to determine Nitrogen concentration and the relative Protein content in every type of food and beverage. The instrument operates according to the Dynamic Flash Combustion technique, also known as the modified Dumas method.

The FlashEA 1112 is the direct result of more than 40 years experience incorporating this recognized precision and reliability technique in previous Carlo Erba and Fisons elemental analyzers.

The FlashEA 1112 N/Protein analyzer is the most suitable choice for food industries, in both Quality Control and in Research & Development laboratories which require precise and accurate determinations, limited cost per analysis, and a 24 hour hard worker able to analyze solid and liquid samples continuously.

The FlashEA 1112 N/Protein analyzer is a reliable solution to these needs, with the ability to overcome all the Kjeldahl method inadequacies such as low safety, incapacity to operate continuously, and being strongly dependent on operator's experience.

One of the strengths of the FlashEA 1112 is the Eager 300 dedicated software: An intelligent tool able to satisfy every analytical request (i.e. evaluate and present the data, personalized analytical reporting, dedicated features for QC labs).

The validity of the FlashEA 1112 principle in the Nitrogen/Protein field has been approved by official organizations (e.g. AOAC, AOCS, AACC).

In conclusion, the FlashEA 1112 N/Protein is a simple yet comprehensive instrument able to become an irreplaceable partner for every food and animal feed lab.

*Your samples,  
our experience*



# Flash Combustion: the *hot heart* of the method

The FlashEA 1112 is based on a simple process ensuring accurate results for any material requiring Nitrogen/Protein determination.

Its straightforward configuration includes a sample loader, oxidation and reduction reactors, adsorption traps, a GC separation column and a thermal conductivity detector.

The GC separation column is an open window on the analytical system; in fact the chromatogram (peak shape, peak separation, peak retention time etc.) demonstrates the real status of the instrument in every condition.

The FlashEA 1112 is a simple and precise response to Nitrogen/Protein determination, because it is capable of converting any compound into elemental gases without dilution, splitting or purge & trap pathway. Operations that could introduce deviations and errors are therefore completely eliminated.

The drastic and hot Flash Combustion avoids any matrix effect.

## Ideal for the widest range of compounds

As reported in the Food Analysis table of results (Table 2, page 4), both homogeneous and non-homogeneous samples can be successfully analyzed, from trace amounts to high percentage, with excellent accuracy and precision.

The **simplicity** of the FlashEA 1112 design, coupled to the accuracy provided by the electronic carrier gas controls, result in constant reproducibility for all analytical cycles reducing the number of calibrations required.

## Great flexibility

The FlashEA 1112 N/Protein analyzer can be configured with a number of different types of automatic sample loaders, according to the laboratory requirements:

### MAS 200R universal autosampler

The MAS 200R autosampler is a mechanically driven, reliable workhorse available for solid and liquid samples. The samples, loaded in Tin capsules, are automatically dropped into the combustion reactor. In the classical configuration, MAS 200R includes a 32-position sample carousel, but as laboratory work load increases, up to three more carousels can be added.

Therefore up to **125 samples** can be processed automatically.

Additional carousels can be loaded during the analytical routine without disturbing the operating cycle.

### Liquid autosamplers

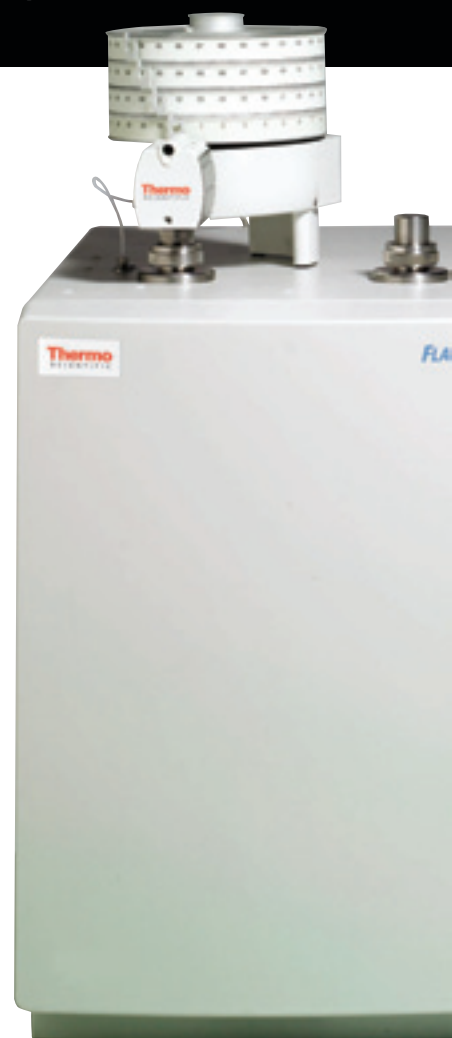
In Elemental Analysis applications the determination of liquid samples has become more and more important, and the characterization of water solutions and beverages (soft drinks, beer etc.) has gained large applicability in the food world.

For this specific application Thermo Fisher provides two liquid autosamplers suitable for all configurations of the FlashEA 1112 Elemental Analyzer: the AI 3000 and AS 3000.

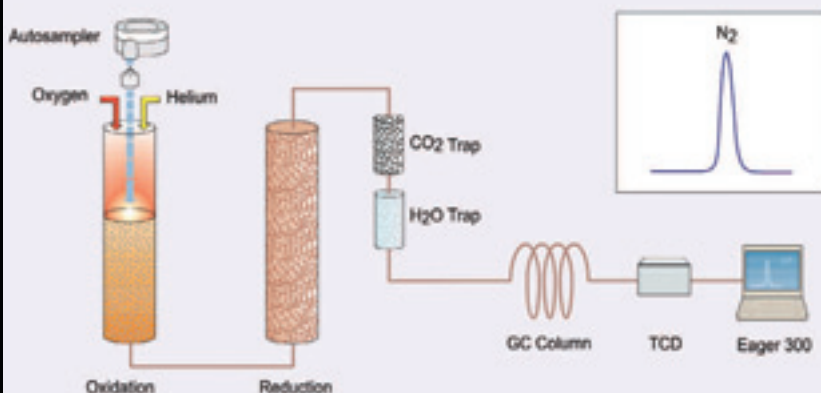
The AI 3000 has an 8-sample tray while the AS 3000 boasts a 105 position tray. Both liquid autosamplers are robust, precise, easy to install and easy to use.

### Change of application?

The modular design of the FlashEA 1112 N/Protein analyzer means that laboratories can change the configuration to any other Thermo Scientific Organic Elemental Analyzer, according to their needs.

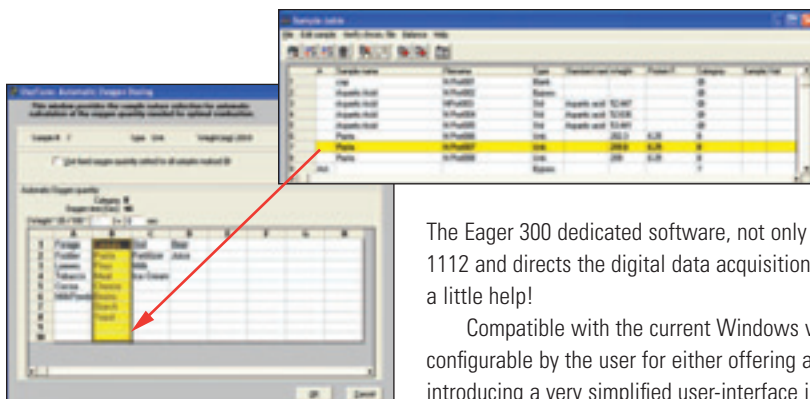


FlashEA 1112 with MAS 200R 4 drums



FlashEA 1112,  
MAS 200R  
and AS 3000  
Autosamplers

# Eager 300: more than a little help



Automatic Oxygen Dosing System

The Eager 300 dedicated software, not only controls the analytical parameters of FlashEA 1112 and directs the digital data acquisition, but it can provide the user with a lot more than a little help!

Compatible with the current Windows version, Eager 300 is a flexible platform, configurable by the user for either offering a complete setting of all parameters or introducing a very simplified user-interface incorporating pre-set methods.

## OxyTune: optimize the method, reduce the cost

With the introduction of OxyTune, the Automatic Oxygen Dosing System, the analyst's dream is fulfilled. With this capability – a Thermo Fisher patent – the FlashEA 1112 is able to supply the proper amount of Oxygen in an easy and simple way.

After weighing the sample, the first step is to establish the family of the sample compound such as forage, fertilizer, sausage, milk, beer etc. A family group can be also prepared by the user according to the samples to analyze.

On the basis of the sample weight and family, the Eager software automatically computes the tailor-made quantity of Oxygen required to achieve quantitative combustion of the samples without excess.

This automatic optimization decreases the Oxygen quantity need for combusting the sample and the user involvement in setting-up the analyzer.

Without Oxygen excess, the lifetime of the catalyst is dramatically increased. Besides reducing the Oxygen quantity and extending the lifetime of the catalyst, the OxyTune drastically decreases instrument downtime for maintenance, therefore saving significant costs.

## Green/Red light function

Quality control labs are simply interested in knowing if the Nitrogen percentage is within an expected range of value.

The green/red light function introduced within the Eager 300 software provides this information *at-a-glance*, immediately illustrating if a sample has passed or failed the preset range.

The acceptable range can be a default value or user defined, according to the characteristics of the compound, sample nature and precision required.

In addition to complete system control, monitoring of the catalyst lifetime, taking advance of *Auto-Ready*, *Auto-Off*, *Auto-Standby* functions, a substantial reduction of the instrument downtime is obtained. For all of these reasons, the FlashEA 1112 exhibits low cost per analysis.



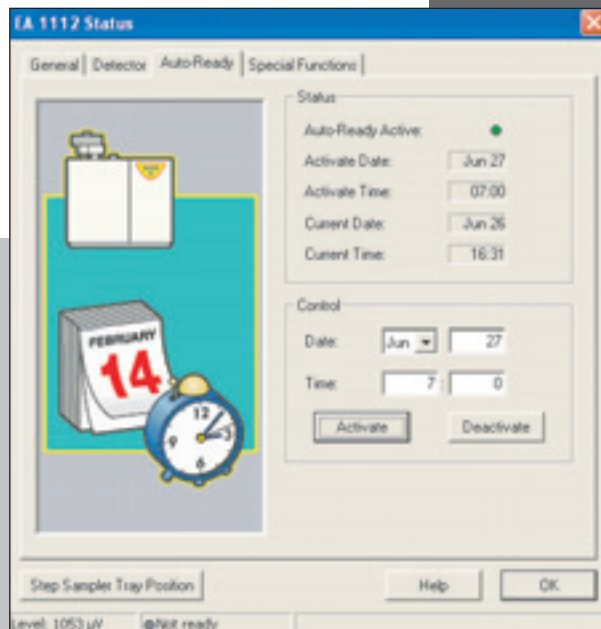
## N/Protein in animal feed (bone, meat and fat mix)

N %	Protein %
9.7579	60.9867
9.7730	61.0812
9.6028	60.0176
9.4569	59.1055
9.6035	60.0221
9.9775	62.3596
9.7380	60.8622
9.7282	60.8010
9.7199	60.7496
9.6364	60.2277

**Standard: Nicotinamide (N % : 22.94)**  
**Standard weight: 50 - 90 mg**  
**Sample weight : 200 - 250 mg**

**N % average: 9.6994**  
**Protein % average: 60.6213**  
**RSD % : 1.4179**

Table 1: Example Data



Auto-Ready Eager 300 function

## Food Analysis

Sample type	Weight range	No. of analysis	Protein %	RSD %
Flour	200 – 300 mg	10	12.12	0.39
Corn	200 – 300 mg	10	7.62	0.85
Rice	200 – 300 mg	10	6.87	0.75
Soya	200 – 300 mg	10	43.68	0.46
Bran	200 – 300 mg	10	31.90	0.72
Oat whit mix	200 – 300 mg	10	17.96	0.64
Yeast	200 – 300 mg	10	49.18	0.49
Pasta	200 – 300 mg	10	13.75	0.39
Milk	100 – 200 mg	10	3.38	0.56
Milk powder	100 – 200 mg	10	11.61	0.42
Yogurt	100 – 200 mg	10	4.66	0.64
Cheese: Emmenthal	200 – 500 mg	5	21.08	0.87
Cheese: Parmesan	200 – 500 mg	5	32.98	0.72
Cheese: Mozzarella	200 – 500 mg	5	19.91	0.41
Beef	200 – 400 mg	5	24.96	0.91
Wurstel	200 – 400 mg	5	15.14	0.83
Ham	200 – 400 mg	5	30.09	0.85
Bacon	200 – 400 mg	5	15.93	0.88
Chocolate	200 – 300 mg	10	7.52	0.56
Cocoa	200 – 300 mg	10	27.18	0.64
Cookie	200 – 300 mg	10	9.06	0.22
Fruit cake	200 – 300 mg	10	7.21	0.30
Baby Food	200 – 500 mg	10	7.92	0.76
Fodder Plant	100 – 200 mg	10	9.03	0.93
Fish Meal	200 – 300 mg	10	65.45	0.49
Beer	100 uL	20	0.39	0.75
Wort	100 -200 mg	10	0.73	0.96
Other materials				
Leaves	100 – 200 mg	10	1.12	1.97
Tobacco	100 – 200 mg	10	2.83	0.88
Soil	100 mg – 1g	10	0.18	1.05

Table 2: Typical Results for Food Analysis

## FlashEA 1112 N/Protein

Almost all protein results are generated using an N/Protein factor of 6.25.

For specific food types it is possible to use different factors: for milk products the N/Protein factor is 6.38, for soya beans 5.71 etc. The Eager 300 software easily accepts any N/Protein factor value.

Nowadays Dynamic Flash Combustion (modified Dumas method) is an accepted and established alternative to Kjeldhal method. The combustion technique has already received the approval by a large array of official organizations such as AOAC (Association of Official Analytical Chemists), AOCS (American Oil Chemist Society), AACC (American Association of Cereal Chemists), ASBC (American Society of Brewing Chemists) and many others.

An N/Protein Food reference material suitable for every food and animal feed determinations has been used for this data set. The Food Reference Material, quality certified by an authorized lab, is included in the FlashEA 1112 N/Protein analyzer standard outfit.

### Crude Protein in animal feed (AOAC 990.03)

Sample Element %	Nicotinic acid N %	Lysine-HCl N %	AOAC mix N %	AOAC mix Protein %
	11.298	15.307	3.271	20.444
	11.299	15.227	3.247	20.295
	11.350	15.164	3.261	20.381
	11.292	15.224	3.245	20.283
	11.370	15.274	3.283	20.522
	11.421	15.114	3.267	20.419
	11.422	15.226	3.258	20.363
	11.440	15.194	3.263	20.391
	11.480	15.192	3.260	20.372
	11.394	15.250	3.278	20.488
Average %	11.376	15.217	3.263	20.396
SD	0.067	0.055	0.012	0.373
RSD %	0.590	0.361	0.0763	0.374

Table 3: Typical Results for Crude Protein in Animal Feed

### AOAC 990.03 Performance Requirements

System must meet or exceed following minimum performance specification:

- 1) System must be capable of measuring Nitrogen in feed materials containing **0.2-20 % Nitrogen**.
- 2) Accuracy of system is demonstrated by making 10 successive determinations of Nitrogen in Nicotinic acid and Lysine-HCl. **Means** of determinations must be **within ± 0.15 of the respective theoretical values**, with **standard deviations < 0.15**.
- 3) Suitable fineness of grind is that which gives **relative standard deviation (RSD) < 2.0 %** for 10 successive determinations of Nitrogen in mixture of corn grain and soya beans (2+1) that has been ground for analysis.  $RSD \% = (SD/mean \% N) \times 100$ . Fineness (**ca. 0.5 mm**) required to achieve this precision must be used for all mixed feeds and other no homogenous materials.

