# EMA 402XL

## Macro Elemental Analyzer CHNS

High-temperature combustion elemental analyzer designed for quantitative CHNS determination on large sample weights.

Driven by curiosity

# EMA 402XL
# Macro Analyzer CHNS

The EMA 402XL is the first high-temperature combustion elemental analyzer designed for the quantitative determination of carbon, hydrogen, nitrogen, and sulfur with exceptional automation and productivity. Its capability to handle macro sample weights, paired with an innovative preparation workflow using reusable ceramic crucibles, ensures accurate results even with challenging and heterogeneous matrices. These features make it an ideal solution for applications ranging from petrochemicals to environmental and agricultural analysis.

ERMES ENABLED

C 12.011 H 1.008 N 14.007 S 32.65

## Fully Automated Analysis

- Integrated 100-position electronic autosampler for sequential and non-sequential runs
- Automated workflow enables unattended operation and continuous sample processing
- Available in CHNS and CN operating modes

## Macro samples with re-usable Crucibles

- Simplified sample preparation for solid and liquid samples
- High sample capacity with up to 3 g per analysis for improved representativeness
- Automatic ash removal supports continuous 24/7 operation

## Adaptive Combustion

- Reagent free, high-efficiency furnace up to 1350 °C
- Automatic real-time combustion optimization
- Evaluation of the Total Oxygen Demand (TOD) during combustion

## Low Operating Costs

- Reagent-free combustion ensures minimal consumable usage
- Extended reagent lifetimes, ensuring long-lasting performance
- Use of helium or argon as carrier gas with no hardware modification

## Extra-Large Weighing Capacity for Solid and Liquid

The EMA 402XL can directly analyze solid and liquid samples up to 3 grams using reusable ceramic crucibles.

By accommodating larger portions, the crucibles simplify sample preparation and provide more representative results, making the system well suited for challenging, heterogeneous samples.

After analysis, the ashes remain in the crucible and are removed along with it. This automates ash handling, prevents build-up in the combustion zone, and eliminates the need for furnace tube maintenance.

# EMA 402XL Overview

**Adaptive Combustion**
The vertical ceramic furnace ensures complete oxidation of large and heterogeneous samples up to 1350 °C, with real-time monitoring and automatic optimization of combustion efficiency.

**Intuitive LED**
A built-in LED provides a clear visual indication of the instrument's status, allowing operators to monitor it quickly and easily from a distance.

**100 - position autosampler**
Vertical sample introduction system accommodates large reusable ceramic crucibles, facilitating handling of macro samples and automating ash removal. The autosampler supports sequential and non-sequential operation.

**Ceramic combustion tube**
Durable, break-resistant ceramic combustion tube for reliable long-term performance.

**Detection System**
Selective NDIR detectors for carbon, hydrogen, sulfur, and TCD detector for nitrogen, deliver full compliance with ISO and ASTM standards.

**Front maintenance**
Open access to all reagent tubes and common maintenance areas, with quick-release features that simplify preventive maintenance and minimize downtime, ensuring a robust and reliable instrument.

## Total Oxygen Demand of the combustion process

The EMA 402XL combustion system enables experimental determination of the Total Oxygen Demand (TOD), which represents the oxygen consumed during complete combustion.

By correlating the TOD with the sample's elemental composition, it is possible to estimate the calorific value — the energy a fuel sample can release. This method provides accurate calculations of the Gross Calorific Value (GCV) and Net Calorific Value (NCV), closely matching results obtained using a traditional bomb calorimeter.

# Optional Accessories

| | |
|---|---|
| EDTA Certified, 100 gr | A00000149 |
| Quartz wool, 50 g | A00000154 |
| Copper oxide, 50g | A00000157 |
| Quartz reactor tube | A00000162 |
| Adapter USB-RS232 | A00000195 |
| Anhydrone, 454g | A00000225 |
| Pre-packed reduction reactor | A00000226 |
| High temperature sealing grease, 30g | A00000236 |
| Vcopper High Reduction Efficiency, 470 g | A00000240 |
| Glass fiber thimbles 33x80mm, 25pcs/box | A00000313 |
| Vanadium pentoxide, 10g | A00000457 |
| Quartz Wool Discs 16mm, 25 pcs | A00000536 |
| $CO_2$ Absorbent with indicators, 500 g | A00000537 |
| Post-combustion reagent, 75 g | A00000538 |
| Coal certified, 50 gr | A00000544 |
| BBOT certified, 5 gr | A00000545 |
| Ceramic crucibles, 25 pcs/box | A00000546 |

| | |
|---|---|
| **Analytical balance 5-digit** | **R311A0730** |
| **Movable tech workstation for EA** | **A00000548** |
| IQ/OQ/PQ EMA 402XL Manual | A00000540 |
| Kit approx. 2000 analyses for EMA 402XL | A00000541 |
| Kit approx. 4000 analyses for EMA 402XL | A00000542 |
| Pre-packed post combustion reactor | A00000543 |
| Velp Ermes 1 Year Connection | E00010012 |
| Velp Ermes 3 Year Connection | E00010036 |

# Instrument - Code

| | | |
|---|---|---|
| EMA 402 XL CHNS | 230 V / 50-60 Hz | F30800110 |
| EMA 402 XL CN | 230 V / 50-60 Hz | F30800120 |

# Supplied with

The EMA 402XL Elemental Analyzer is supplied with all necessary parts to perform up to 2000 analyses CHNS (inclusive of crucibles, catalysts, copper, quartz wool, reagents and seals). In addition, it contains chemicals and small consumables spare for maintenance.

| | |
|---|---|
| Velp Ermes 1 Year Connection | E00010012 |

# Main Fields of Applications & Standard

### Environmental & Agro

Soil, sediments, compost, lime, growing media, soil improvers, biochar, sludge, biomass, plant, leaves, straw, roots, wood, energy crop, algae, fertilizers (organic and inorganic).

- ISO 15178 — S in soil
- EN 13654-2 — N in soil improvers and growing media
- EN 16168 — N in sludge, treated biowaste, soil
- ISO 13878 — N in soil
- ISO 10694 — C in soil
- AOAC 993.13 — N in fertilizers
- ISO 20620 — N in fertilizers, soil conditioners
- ISO 22887 — S in fertilizers, soil conditioners
- AOAC 2017.08 — S in fertilizers
- ISO 16948 — CHN in solid biofuels

### Waste Management

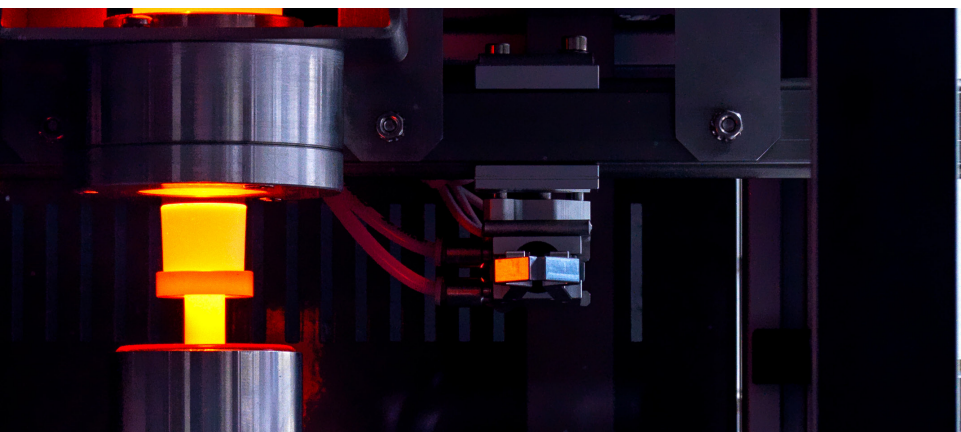
General waste, plastic, paper, textiles, wood, oil, municipal waste, and industrial waste.

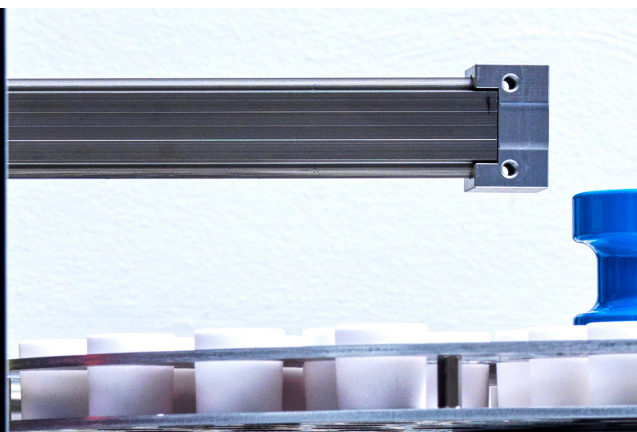
- ISO 21663 — CHNS in solid recovered fuels
- EN 16168 — N in sludge, treated biowaste, soil

### Chemical & Petrolchemical

Petroleum products, coal, coke, crude oil, lubricating oil, additives, carbon black, ash, graphite, solid mineral fuel, solid biofuel.

- ASTM D1552-23 — S in petroleum products, additives
- ASTM D1619-22 — S in carbon black
- ASTM D4239-18e1 — S in coal, coke
- ASTM D5016-24 — S in coal, coke
- ISO 19579 — S in hard coal, brown coal, lignite
- ASTM D5291-21 — CHN in petroleum products, lubricants
- ASTM D5373-21 — CHN in coal, coke, carbon
- ISO 29541 — CHN in coal, coke



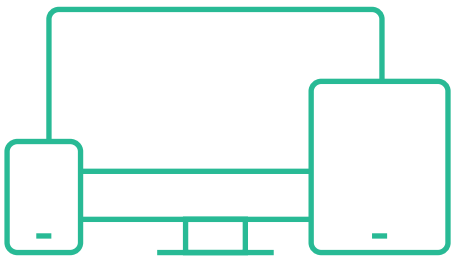


# EMASoft XL™ Software

Velp's proprietary EMASoft XL™ software centralizes all daily operations in a single, user-friendly analysis interface. Designed for speed, simplicity, and intuitive use, it streamlines sample management, monitoring, and data processing, enabling seamless control of the entire workflow. Its advanced features support precise measurements, efficient handling of large sample batches, and flexible customization to meet the specific needs of each laboratory.

- **AUTO Mode**
  Monitor the combustion process in real time, automatically tracking progress from start to complete combustion and adjusting analysis conditions based on the sample's behavior.
- **Real-Time Graphs**
  Monitor multiple elements simultaneously or view individual CHNS channels in real time.
- **Automatic Leak Detection**
  Scan all sections of the instrument automatically, with no manual intervention required.
- **Balance Interface**
  Enter sample weights manually or automatically. Compatible with a wide range of balances to eliminate transcription errors.
- **Priority Samples**
  Add, edit, or remove samples and positions even during ongoing analyses.
- **Automatic Backup**
  Results are backed up automatically on selected dates and can be exported in XLS, TXT, CSV, or LIMS formats.
- **Customizable Analysis**
  Adjust settings for each sample, including moisture and protein factors, or select different measurement units.
- **Remote cloud control through Velp Ermes**
  Turn on the instrument, start and monitor analyses in real time, and download results directly from any network-connected device.

## Connection to Velp Ermes Cloud Platform



Connect the EMA 402XL CHNS Analyzer to the exclusive Velp Ermes Cloud Platform to improve your laboratory experience. The Velp Ermes Cloud Platform connection will unburden you from tedious tasks improving your lab productivity.

- Enhanced service support
- Real time monitor and control of the instrument from PC, smartphone and tablet whenever you want, wherever you are
- Immediate alert and notification with the possibility to stop the instrument for maximum safety
- Regular software updates will guarantee the best performance and new features with just one-click

# Technical Data

| | EMA 402XL |
|---|---|
| Operating modes | CHNS, CHN, CNS, CN, TOD |
| Combustion temperature | Up to 1350 °C |
| Analysis time | 15 min (CHNS version) |
| Sample weight | Up to 3 g |
| Sample feeding | Re-usable Ceramic Crucibles |
| Ash removal | Automatic |
| Autosampler | 100 position |
| Detection ranges | C: up to 150 mg abs. (or 100 %)<br>H: up to 10 mg abs. (or 100 %)<br>N: up to 100 mg abs. (or 100 %)<br>S: up to 5 mg abs. (or 100 %) |
| Detector | N = TCD (Thermal Conductivity Detector)<br>CHS = IR (Non-Dispersive Infrared Detectors) |
| Gas | Carrier Gas: Helium or Argon (grade 4.5)<br>Combustion gas: Oxygen (grade 4.5) |
| Connectivity | Ermes Cloud Platform via Wi-Fi or LAN connected to a PC |
| Dimensions (WxHxD) | 980 x 1220 x 490 mm |
| Weight | 120 kg / 265 lb |

## Service & Support

Velp 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:

- Help-desk and Remote support
- Technical Assistance
- Analytical Support

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Rev 2.1.2026