



MILESTONE
H E L P I N G
C H E M I S T S



SAMPLE PREP:
WE GOT IT SQUARED
FOR YOU



ETHOS™
Microwave Labstation



G R E A T

SAMPLE PREPARATION STARTS HERE

THE ULTIMATE EVOLUTION IN MICROWAVE DIGESTION

In today's elemental analysis workflows, sample preparation plays a pivotal role, with digestion remaining the key step to ensure both laboratory efficiency and analytical accuracy. Microwave closed-vessel digestion has become the gold standard, recognized for its reliability, safety, and ease of use, and is now the benchmark in thousands of laboratories across multiple industries.

With ETHOS, Milestone introduces the latest and most advanced evolution of microwave rotor-base digestion technology, delivering unmatched performance and reproducibility. At the same time, ETHOS goes beyond digestion: thanks to dedicated accessories, it becomes a true microwave labstation, extending its capabilities to applications such as solvent extraction, evaporation, concentration, high-temperature processes, and more.



UNMATCHED SAFETY • Rugged hardware and rotor design

RELIABLE DIGESTION • Precise and reproducible results

SMARTER SUPPORT • AI Agent (MAIA) always by your side

INTUITIVE OPERATION • Easy handling, simple setup

VERSATILITY AT ITS BEST • Digestion, extraction, high-temperature, and more

SAFETY AND CONTROL AT THE CORE

| SAFETY ENGINEERED INTO EVERY DETAIL

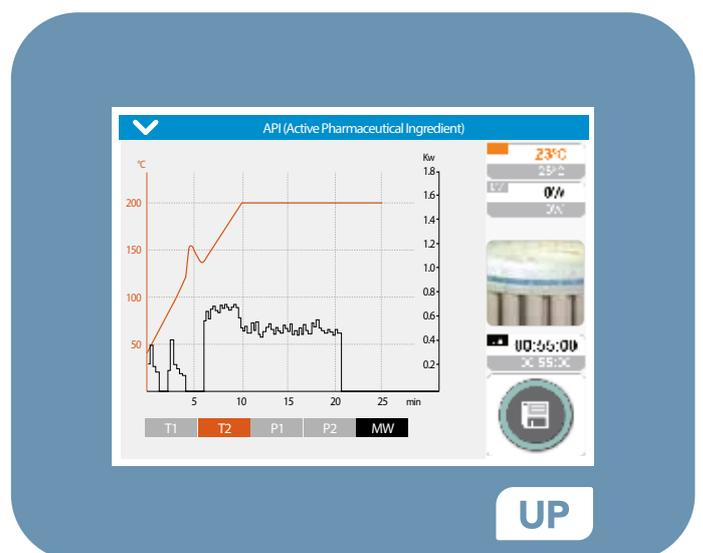
Microwave closed-vessel digestion operates at elevated temperatures and pressures with concentrated acids, so the system must ensure maximum protection under all conditions. ETHOS is designed with safety as a priority: its rugged stainless-steel construction guarantees durability, while the unique pressure-responsive door, mounted on loaded springs, provides the highest level of protection. Even in the unlikely event of an overpressure release from a vessel, the stainless-steel door fully contains the pressure, while the exhaust system safely directs acid fumes to the laboratory ventilation. The automatic door-locking mechanism prevents opening until a user-defined safe temperature is reached, and the integrated SafeVIEW camera provides continuous real-time monitoring of the cavity.



Stainless steel construction and pressure-responsive door ensure maximum protection

| ACCURATE, SAFE, REPRODUCIBLE

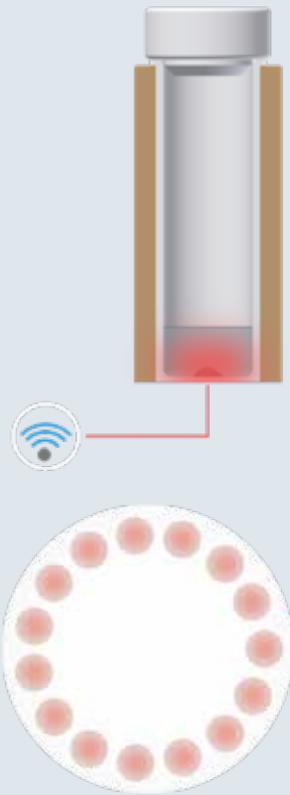
Temperature control is critical in microwave digestion, as it directly impacts both process quality and safety. ETHOS is equipped with easyTEMP, a contactless direct temperature sensor that combines the accuracy of an in-situ probe, measuring the actual temperature of the sample/solution, with the flexibility of infrared monitoring across all vessels. This dual advantage ensures continuous control and perfectly uniform digestion conditions, delivering reproducible results for every sample while avoiding the need for reprocessing.



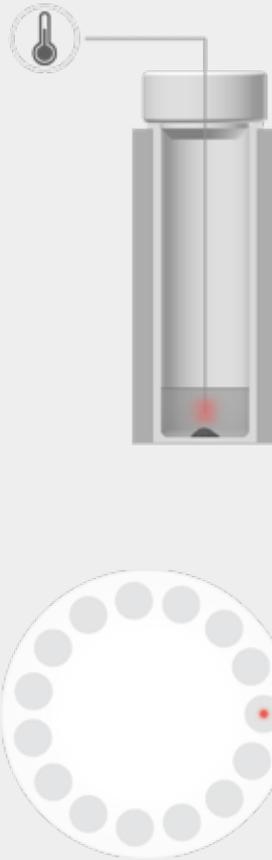
easyTEMP temperature control of an exothermic reaction during the digestion of an API with HNO₃ and HCl in the SK-15 rotor



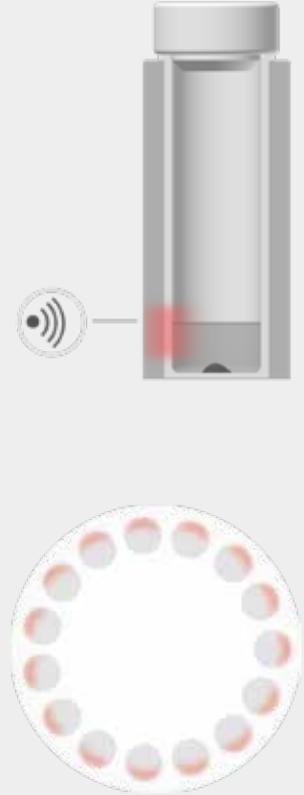
MILESTONE easyTEMP



IN-SITU APPROACH



INFRARED APPROACH



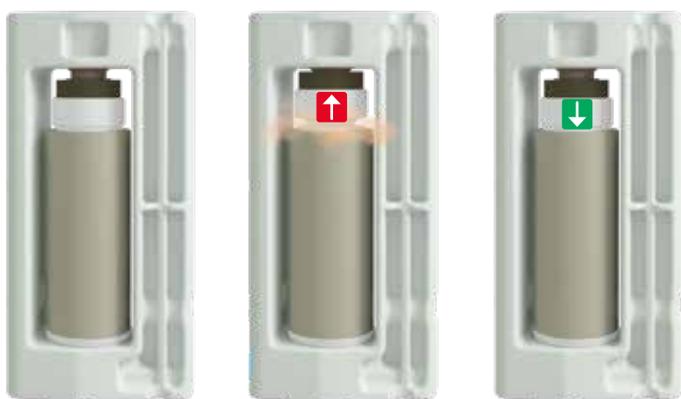
| | | | |
|---------------------------|-------|-------|-------|
| EASE OF USE | ★★★★★ | ★★★★☆ | ★★★★★ |
| DIRECT CONTROL | ★★★★★ | ★★★★★ | ★★★★☆ |
| PRECISION AND ACCURACY | ★★★★★ | ★★★★★ | ★★★★☆ |
| CONTROL IN ALL VESSELS | ★★★★★ | ★★★☆☆ | ★★★★★ |
| SAFETY | ★★★★★ | ★★★★☆ | ★★★★★ |
| RUN ANY NUMBER OF VESSELS | ★★★★★ | ★★★★★ | ★★★☆☆ |

THE HEART OF DIGESTION: ROTORS AND VESSELS

WHERE SAFETY AND PERFORMANCE MEET

Digestion vessels are the core of any microwave system, as this is where sample decomposition actually takes place. Their components must combine chemical purity with mechanical strength: some must resist concentrated acids, while others must safely contain the pressure generated during digestion. All Milestone rotors are engineered to deliver both safety and performance. They are built with high-purity PTFE vessels and covers, which ensure broad chemical compatibility and ultra-low blanks, while reinforced PEEK shields withstand high pressure even at elevated temperatures.

In addition, Milestone rotors incorporate the exclusive vent-and-reseal technology, which keeps vessels completely sealed during digestion. Only in the rare event of overpressure does the system activate, safely venting the excess gas before automatically resealing. This unique design guarantees maximum safety and allows every digestion to be completed without the loss of volatile elements.



Step 1

Step 2

Step 3

*Under normal conditions, the vessel remains fully sealed (1).
If pressure unexpectedly exceeds the vessel limit,
the safety spring allows controlled venting (2).
Once the pressure returns below the limit,
the cover reseals automatically (3).*

TYPICAL APPLICATIONS



Agriculture



Beverage



Cannabis



Ceramics



Chemicals



Clinical



Cosmetics



Environmental



Food & Feed



Geochemistry



Metals



Officials



Petrochemical



Pharmaceutical



Pigments



Polymers

| HIGH PERFORMANCE AND THROUGHPUT IN ONE ROTOR

The MAXI-24 High Performance (HP) rotor combines double pressure limits with greater capacity than standard high-throughput rotors. It processes larger volumes and a wide variety of matrices within a single platform. Its quick-assembly vessels, made of only three components, can be closed within seconds, boosting efficiency and daily productivity. With 24 positions, it is the perfect choice for routine digestion of diverse sample types.



| HIGH-PRESSURE ROTOR FOR THE TOUGHEST SAMPLES

The SK-15 is a high-pressure, high-temperature rotor with a capacity of up to 15 PTFE-TFM vessels of 100 mL. Its broad working range makes it ideal for virtually any matrix, including hard-to-digest, reactive, or large sample masses. Reliable and versatile, it simplifies the journey from sample to analysis, even under the most demanding conditions.



| MAXIMUM PRODUCTIVITY FOR LARGE SAMPLE BATCHES

For laboratories processing high numbers of samples, such as soils, sediments, or aqueous matrices, the MAXI-44 offers unmatched productivity. Featuring up to 44 PTFE-TFM vessels of 100 mL, it delivers high throughput, reliability, and superior ease of use. The MAXI-44 is the natural solution for labs that demand efficiency in handling large sample batches.



INTUITIVE CONTROL POWERFUL CAPABILITIES

| SIMPLE AND FUNCTIONAL

Operating ETHOS is straightforward: select a method from the library, press START, and the digestion begins. The user interface displays all key parameters, time, power, and temperature, in real time, while full documentation of each run can be saved for traceability. Behind this simplicity lies easyCONTROL 3, which continuously adjusts microwave power to follow the programmed temperature profile with precision and reproducibility. All ETHOS configurations are powered by easyCONTROL 3. Three terminals—Easy, Up, and Plus—offer different capabilities, so every laboratory can choose the solution that best matches its workflow, regulatory requirements, and connectivity needs.



| |  Plus <i>configuration</i> |  Up <i>configuration</i> |  Easy <i>configuration</i> |
|---------------------------|--|---|--|
| Touch screen | 10.1" display | 6.5" display | 5" display |
| Built-in library | ● | ● | ● |
| SafeVIEW (camera) | ● | ● | |
| USB | ● | ● | ● |
| CFR 21 part 11 compliant | ● | ● | ● |
| Connection to balance | ● | ● | |
| Milestone connect | Integrated into the terminal | ● | ● |
| Milestone AI Agent (MAIA) | ● | | |

I MILESTONE CONNECT POWERED BY AI

Since 2014, Milestone Connect has provided instant access to our know-how, anytime and anywhere. Today, it takes a major step forward with MAIA, the Milestone AI Agent, setting a new standard in customer support with a virtual product specialist always at your side. MAIA gives immediate access to valuable information on sample handling, method selection, maintenance, troubleshooting, and more, streamlining your daily operations and reducing downtime.

Users can interact with MAIA through a built-in chat or simply by using voice commands, making support faster and more intuitive.

A unique feature is MAIA Lens, which identifies consumables and provides step-by-step guidance for their maintenance or replacement, simplifying the overall care of your ETHOS.

MAIA helps you with:

- **Instant answers** – guidance on samples, methods, and troubleshooting.
- **Chat or voice interaction** – access MAIA through text or voice commands for faster, easier support.
- **AI Lens recognition** – identify consumables and receive step-by-step maintenance instructions.
- **Streamlined operations** – reduce downtime and simplify daily workflows
- **Expert knowledge** – best practices always available, in any language.

Available for the Plus configuration on terminal or through Milestone Connect, MAIA is always ready to support your microwave digestion tasks.

EXPERTISE
AT YOUR
FINGERTIPS

MILESTONE
connect
powered by 



ONE PLATFORM MULTIPLE APPLICATIONS

VERSATILITY AT ITS BEST

ETHOS is more than a digestion system: it is a microwave labstation designed to support laboratories across many different sectors. With the appropriate selection of rotors and accessories, ETHOS can address diverse and demanding sample preparation processes, ranging from the analysis of organic pollutants, PFAS, microplastics, and other environmental contaminants, to the determination of fat, FAMEs, and amino acids in food and feed, as well as MOAH & MOSH analysis. Its scope extends further to advanced materials and geological studies, where high-temperature fusions and fire assays are required, and even to synthetic chemistry workflows.



FastEX-24

Extraction rotor for environmental applications



XTR-44

Extraction rotor with disposable polypropylene vials



SR-15

Rotor for total fat determination in food and feed



UltraFAST

High-temperature muffle furnace



MMR-15

Evaporation and concentration rotor



RAR-15

Evaporation rotor with disposable cups

| MILESTONE VALIDATION PACKAGE

Compliance with regulations and data traceability is essential in today's analytical laboratories, particularly in pharmaceutical, nutraceutical, and other regulated industries.

ETHOS, powered by easyCONTROL 3 software, is fully compliant with FDA 21 CFR Part 11. To support laboratories, the Milestone Validation Package (MVP) provides access to factory-trained engineers and specialists, ensuring fast implementation in line with Good Manufacturing Practice (GMP) guidelines.

The MVP covers the complete qualification of the instrument, with packages tailored to specific needs, including:

- **DQ** – Design Qualification
- **IQ** – Installation Qualification
- **OQ** – Operational Qualification
- **PQ** – Performance Qualification
- Re-qualification



| SUSTAINABILITY YOU CAN MEASURE

At Milestone, sustainability is more than a statement, it is a guiding principle in the way we design our solutions. With ETHOS, laboratories benefit from a single versatile platform that minimizes the need for multiple instruments, reducing energy use, consumables, and overall footprint.

To make this commitment measurable, Milestone has developed the Green Prep MW Score, a unique framework to assess the sustainability of microwave sample preparation. The score evaluates key aspects such as chemistry, workflow efficiency, and technology in use, helping laboratories to make informed, responsible choices without compromising performance.

Check the sustainability
of your method now!



milestoneconnect.com/greenprep

MILESTONE HELPING CHEMISTS

Established in 1988, Milestone is headquartered in Italy with its R&D and manufacturing centre in Germany and Switzerland and offices in the United States, China, Japan and Korea. We

operate worldwide through a network of over 100 exclusive distributors, all providing our customers with premium application and service support. Milestone's mission is to help chemists by offering them the most advanced instrumentation for sample preparation and direct mercury analysis in the world. Our industry-leading technology, in combination with fast, responsive service and applications support, allows Milestone to support our goal of giving you the highest return on investment possible.

ADDITIONAL MILESTONE SOLUTIONS FOR ELEMENTAL ANALYSIS



ultraWAVE 3

Single Reaction Chamber
Microwave Digestion
System



ultraWAVE 2 eco

Single Reaction Chamber
Microwave Digestion
System



duoPUR/subCLEAN

Acid Purification
System



traceCLEAN

Acid Steam
Cleaning System



easyFILL

Automated
Dosing Station



DMA-80 *evo*

Direct
Mercury Analyzer

WWW.MILESTONESRL.COM

MILESTONE



HELPING
CHEMISTS

UNI EN ISO 9001:2008
CERTIFIED

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