



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



QUALITY ANALYSIS
STARTS WITH
GREAT SAMPLE PREP



ETHOS UP

High Performance
Microwave Digestion System



ULTIMATE EASE OF USE
AND CONTROL



UNRIVALED PERFORMANCE
AND THROUGHPUT



EXPERTISE
AND KNOW-HOW



SUPERIOR SAFETY
AND RELIABILITY



FLEXIBILITY

THE FIRST STEP TO CONFIDENT RESULTS

It is a common misconception that all laboratory microwave systems are alike; at Milestone we know this is not true. Sample preparation is one of the most impactful steps in trace metals determination. The quality of analytical data obtained by ICP/ICP-MS is directly reliant on digestion quality. Today, microwave technology in sample preparation has been established in a variety of industries: Environmental, Food, Pharmaceutical, Agriculture, Consumer Product Testing, Specialty Chemicals, Geological, Mining, and many others. Milestone's sample preparation solutions maximize the AA/ ICP/ ICP-MS/ performance, and a lab's overall analytical capability.

| FOCUS ON WHAT MATTERS: YOUR APPLICATION

Choosing the right system and configuration is a key step in maximizing investment and expanding your lab's capabilities. Some of the most crucial parameters that should be considered when choosing a microwave digestion system include the following:

SAMPLE TYPE

LAB THROUGHPUT

SIMPLICITY AND EASE OF USE

RELIABILITY

FLEXIBILITY



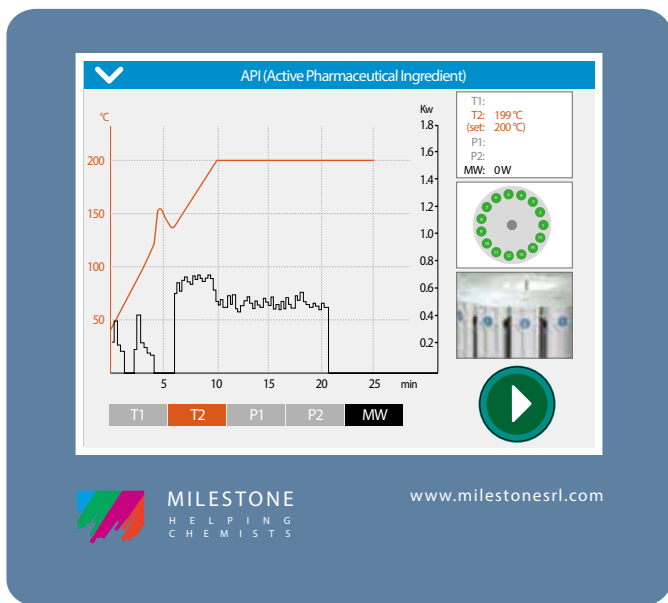
| SAFETY AND RELIABILITY IN SAMPLE PREPARATION

The ETHOS UP fully embodies Milestone's philosophy towards, and knowledge of, microwave sample preparation. Specifically designed for closed vessel acid digestion, it offers a perfect integration of microwave hardware, user interface, reaction sensor technology and pressure resistant vessels. The ETHOS UP is the most powerful system in the market, with two magnetrons and a total power of 1900 Watts. Microwave homogeneity is assured through a dedicated microwave diffuser. Safety and reliability are Milestone's priorities. Both factors are ever present in the foundation of the ETHOS UP's design. The cavity has a volume in excess of 70L, and is constructed entirely of stainless steel to ensure longevity and structural integrity. Our unique pressure responsive door, also made of stainless steel, ensures superior safety even with the most reactive samples. The safeVIEW high definition digital camera, allows to safely look into the microwave cavity.

EASE OF USE WITH UNPARALLELED DIGESTION CONTROL

In a digestion process the temperature controls the sample decomposition and directly affects digestion quality. Milestone pioneered the use of infrared sensors combined with an in-situ temperature sensor to more accurately control the digestion cycle. Today, Milestone innovates again by combining all the benefits of in-situ and infrared sensors into a single solution: **the Milestone easyTEMP, a direct contactless temperature sensor.**

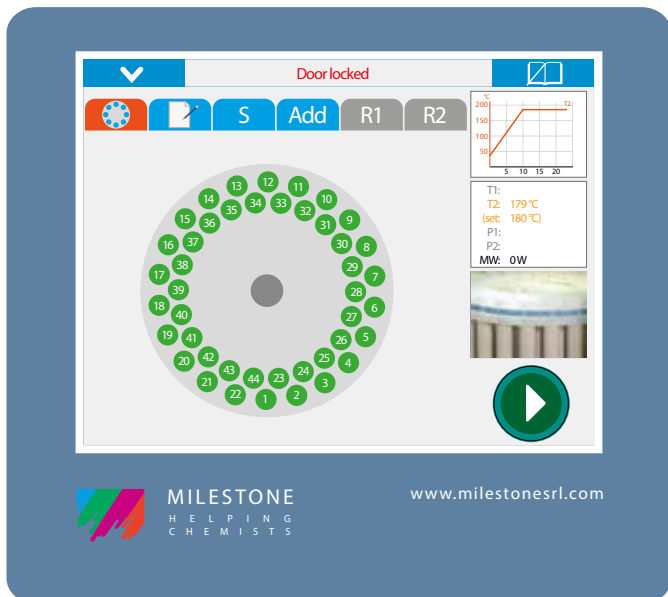
	MILESTONE easyTEMP	IN-SITU APPROACH	INFRARED APPROACH
EASE OF USE	★★★★★	★★★★★	★★★★★★
DIRECT CONTROL	★★★★★	★★★★★★	★★★★★
PRECISION AND ACCURACY	★★★★★	★★★★★★	★★★★★
CONTROL IN ALL VESSELS	★★★★★	★★★★★	★★★☆☆
SAFETY	★★★★★	★★★★★	★★★★★★
RUN ANY NUMBER OF VESSELS	★★★★★	★★★★★★	★★★★★



easyTEMP temperature control of an exothermic reaction during the digestion of an API with HNO_3 and HCl in the SK-15 rotor



Temperature profile of a soil digestion in accordance with US EPA 3051 using the MAXI-44 rotor



This rotor diagram represents the digestion temperature in all vessels. The green color indicates if the vessel has achieved the set conditions

The easyTEMP contactless sensor directly controls the temperature of all samples and solutions, providing accurate temperature feedback to ensure complete digestion in all vessels with superior safety. This technology combines the fast and accurate reading of an in-situ temperature sensor with the flexibility of an infrared sensor. The ETHOS UP software provides digestion history traceability and temperature measurement for every sample. Temperature diagrams and profiles are displayed in real-time, and can be saved on the ETHOS UP terminal.

INCREASED EASE OF USE AND PRODUCTIVITY

ENHANCED CONTROL IN ALL VESSELS

FAST, ACCURATE AND TRACEABLE

SUPERIOR DIGESTION QUALITY

LOWER RUNNING COSTS

e a s y T E M P
DIRECT CONTACTLESS
TEMPERATURE SENSOR
IN ALL VESSELS

FLEXIBILITY AND PERFORMANCE THAT MAKE THE DIFFERENCE



SK-15 ROTOR

Regardless of the samples you're trying to digest, the Milestone SK-15 rotor is always an effective option to simplify your journey from sample to analysis, even with hard-to-digest samples. The SK-15 is a high-pressure and high-temperature rotor with a capacity of up to 15 PTFE vessels of 100 mL suitable for digestion of polymers, large food and feed samples, pharmaceuticals, alloys and geological materials. The table shows the recovery study with the SK-15 on pharmaceutical samples. The simplified design of the rotor coupled with its large vessel capacity ensures high productivity without compromising on performance. Safety is assured by our unique vent-and-reseal technology, the foundation of Milestone's position as the leader in closed vessel microwave digestion. Milestone has recently evolved this already advanced technology (US Patent 5,270,010), providing the operator with unsurpassed safety and performance capabilities by further increasing the temperature and pressure capacities of the vessels.

Sample	As	Cd	Pb	Hg
Spike value (mg/L)	15	2	5	3
Capsules Recovery % (n=3)	91.1	92.3	102.3	97.6
Capsules RSD (%)	1.4	1.4	1.4	0.3
Dietary Supplement Recovery % (n=3)	100.2	95.4	95.2	97.5
Dietary Supplement RSD (%)	0.6	1.6	1.3	1.5



A safety spring built into the cover allows for precise venting of the vessel, if that should occur. Once the pressure has been reduced to a containable level, the cover closes again. Only the excess pressure, mainly generated by CO₂, NO_x fumes, is therefore released, allowing for a complete recovery of even volatile elements.

Scheme of the Vent-And-Re seal technology

MAXI-44 ROTOR

Many laboratories need to increase productivity and reduce the turn-around-time in metals analyses. The MAXI-44 perfectly matches these needs, providing high productivity, reliability and superior ease of use. The MAXI-44 is a high-throughput rotor featuring up to 44 PTFE vessels of 100 ml suitable for a wide range of samples, such as environmental, agriculture, food, and feed. The MAXI-44 is perfect for routine applications, combining an unmatched ease of use with the highest sample throughput available on the market today. The table shows the recovery study with MAXI-44 on Lake sediment BCR280R.



THE IDEAL TOOL FOR
HIGH PRODUCTIVITY
LABORATORIES

Sample	Certified value (mg/Kg)	Recovery % (n=3)	RSD (%)
As	33.4 ± 2.9	98.4	2.1
Co	16.8 ± 0.9	91.3	2.4
Cr	126 ± 7	95.2	2.0
Cu	53 ± 6	90.3	1.7
Zn	224 ± 25	93.4	2.1

SK-15 APPLICATIONS



Agriculture



Beverage



Ceramics



Chemicals



Clinical



Cosmetics



Environmental



Food & Feed



Geochemistry



Metals



Petrochemical



Officials



Pharmaceutical



Pigments



Polymers

MAXI-44 APPLICATIONS



Agriculture



Beverage



Environmental



Food & Feed



Officials



Pharmaceutical



SMART SOFTWARE TO SAVE YOUR TIME

The ETHOS UP comes with a dedicated touch screen terminal with easyCONTROL software which incorporates our expertise and knowledge in microwave sample preparation. The ETHOS UP user-interface provides full control of all digestion parameters, complete documentation and improves the overall procedure. The terminal is equipped with multiple USB and Ethernet ports for interfacing the instrument to external devices and to the laboratory network. The ETHOS UP controller is user-friendly, icon-driven, multi-language and 21 CFR Part 11 compliant. To find the method which best suits your application, simply select one of the hundreds of preloaded methods or create a

new one yourself using our intuitive software. Once you press 'START' the system will automatically follow the user defined temperature profile using a sophisticated PID algorithm. The preloaded applications, including all US EPA methods, virtually eliminate any need for method development. Each preloaded method includes a temperature profile, sample size and choice of reagents. To further simplify the workflow in the lab the ETHOS UP is equipped with a backlit logo that indicates the digestion progress, showing to the operator the actual status of the process, such as heating, cooling, sample ready and error messages.



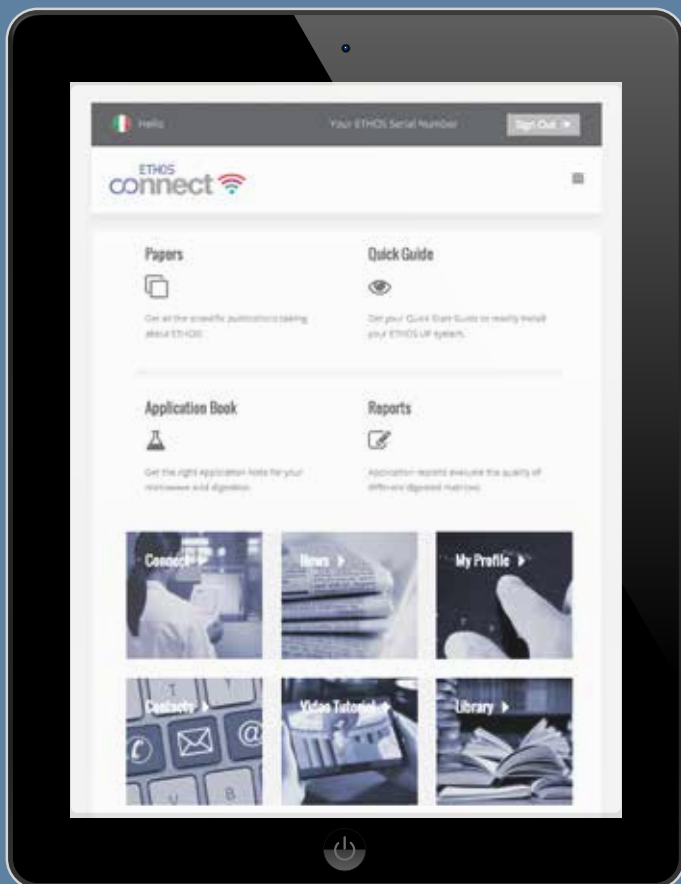
List of food & feed methods, part of the expansive library containing over 300 built-in methods



Audit trail tacking in full compliance with 21 CFR part 11

milestone connect

Included with the ETHOS UP is a unique web-based application: Milestone Connect. This app allows you to become a part of the Milestone community and gain exclusive access to a robust library of information: lists of parts, technical notes, user manuals, video tutorials, continuously updated application notes and all relevant scientific articles. Milestone Connect also extends instrument control to your smartphone, tablet or PC, allowing remote monitoring of the system. With Milestone Connect you have instant support 24/7.



MILESTONE CONNECT

30 YEARS OF EXPERIENCE AT YOUR FINGERTIPS

MILESTONE ETHOS UP MUCH MORE THAN A DIGESTION SYSTEM

The ETHOS UP embraces Milestone's philosophy of a "microwave labstation". The ETHOS UP platform is capable of several applications beyond microwave digestion. Extraction of pollutants from environmental samples can be done in just few minutes, consuming less solvent than other technologies, thereby improving productivity while decreasing costs, all in full accordance with the US EPA 3546. Additional

| fastEX-24

Extraction rotor for environmental applications

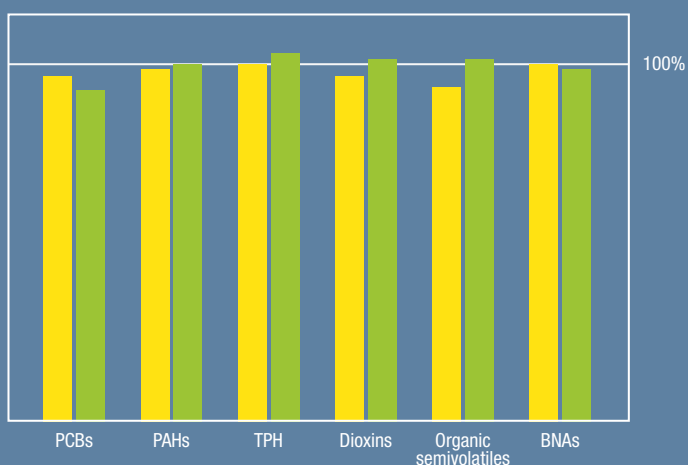


| SK-10/12

High-pressure digestion rotor



■ Soxhlet ■ fastEX-24



Milestone fastEX-24 recovery study and comparison vs Soxhlet for various organic compounds.

| SR-12

Extraction rotor for total fat determination in food samples



accessories are available to further expand the ETHOS UP capabilities: additional digestion rotors, inserts and micro-inserts to reduce blanks in the digestion processes, a dedicated configuration for total fat determination in food samples which greatly improves turn-around-time, and an ashing accessory which converts the digestion system into a microwave muffle.

| MMR-15

Evaporation/Concentration rotor



| ultraFAST

High-temperature muffle furnace
(up to 1200°C)



MEETING REGULATIONS: MILESTONE'S VALIDATION PACKAGE

Compliance with regulations and data traceability requirements are paramount in the modern analytical lab, such as pharmaceutical, nutraceutical or other regulated industries. Milestone's operating software, easyCONTROL, is fully compliant with FDA regulation 21 CFR part 11. The Milestone Validation Package gives access to our factory trained engineers and specialists during the qualification process, enabling a fast implementation of the ETHOS UP in full accordance with Good Manufacturing Practice (GMP) guidelines. The comprehensive Milestone Validation Package (MVP) assures the complete qualification of the instrumentation. Different validation packages are available based on your specific needs: DQ (Design Qualification), IQ (Installation Qualification), OQ (Operational Qualification), PQ (Performance Qualification) and re-qualification.



MILESTONE HELPING CHEMISTS

Established in 1988, Milestone is headquartered in Italy and has offices in Germany, Switzerland, the United States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers 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 providing you the highest return on investment possible.

ADDITIONAL MILESTONE SOLUTIONS FOR ELEMENTAL ANALYSIS



ultraWAVE

The Game Changer in
Microwave Digestion



duoPUR/subCLEAN

Acid Purification
System



traceCLEAN

Acid Steam
Cleaning System



DMA-80 *evo*

Direct Mercury Analyzer

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MILESTONE



HELPING
CHEMISTS

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