



**5**  
Year  
Milestone  
Warranty

# ETHOS One

The Best Choice in Microwave Sample Preparation



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



**MILESTONE**

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

*Milestone has been active for over two decades in the field of microwave sample preparation and with more than fifteen thousand instruments installed worldwide is the acknowledged industry leader in microwave technology.*

*Our commitment is to consistently provide the most effective, safest, and highest quality instrumentation for microwave sample preparation.*

*We offer our customers the highest level of application support, building over the years a relationship based on trust and commitment.*

### **ETHOS One, the best choice in microwave sample preparation**

The ETHOS One fully embodies Milestone's philosophy in microwave sample preparation. Specifically designed for closed vessel acid digestion, it offers a perfect integration between microwave hardware, user interface, reaction sensors and pressure vessels.

The ETHOS One is built from the ground up to offer the highest performance and the best safety features in the industry.

The ETHOS One encompasses Milestone's visionary concept of "Total Microwave Sample Preparation" and, with a comprehensive choice of accessories, it offers a complete first-class solution also for solvent extraction, protein hydrolysis, vacuum evaporation and alkaline fusion.

- 1 EASE OF USE
- 2 SAFETY AND CONTROL
- 3 PRODUCTIVITY
- 4 PERFORMANCE
- 5 FLEXIBILITY



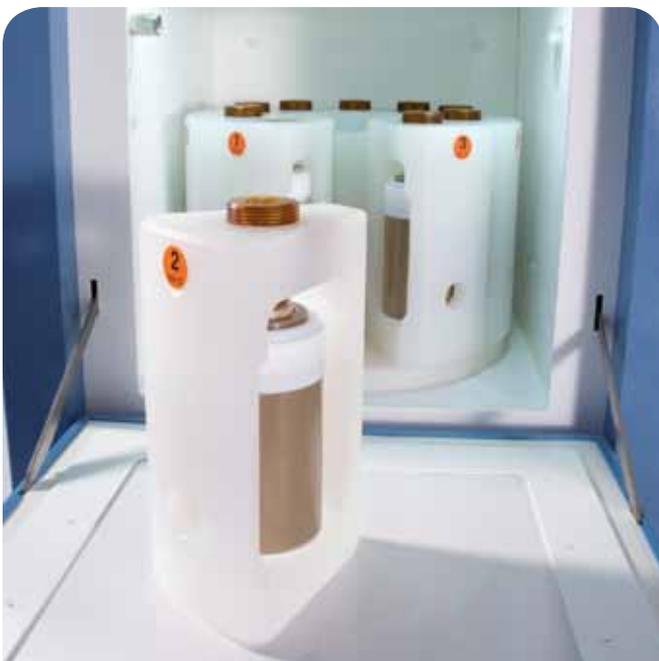
**3** The ETHOS One combines the highest level of technology with an unmatched ease of use. From the microwave hardware to the control terminal, from the reaction sensors to the pressure vessels, everything is built to the highest standard, allowing the user to take full advantage of the system capabilities, thus improving the sample preparation process productivity.



**1** Microwave digestion has clearly become the benchmark technology in preparing samples for AAS, ICP and ICP-MS. By providing the chemist with an easy to use microwave system from the hardware to the vessel technology, Milestone offers the perfect tool to enhance the productivity of your laboratory.



**2** Our ETHOS One is the safest microwave digestion system available. Increased safety is due to a combination of factors: the microwave hardware, a full control of all digestion parameters and extensive application knowledge.



**4** Milestone patented (US Patent 5,270,010) rotors provide the chemist with unsurpassed performance capabilities in closed vessel microwave digestion.



**5** Milestone was the first company to introduce the concept of Total Microwave Sample Preparation, enabling chemists to perform all sample preparation steps for AAS, ICP and ICP-MS in a single microwave unit. The ETHOS One further expands this approach, allowing to carry out open digestion, extraction, evaporation and fusion in a single microwave platform.



ETHOS One



High Performance  
Microwave  
Digestion System



2

3

4

## SafeVIEW

The ETHOS One is equipped with the SafeVIEW, a high definition digital camera combined with a 5,6" TFT-LCD module.

The SafeVIEW allows the chemist to visually monitor the course of the digestion although fully protected by the all-stainless steel door of the instrument.

Additionally, a video of the entire digestion run can be recorded and saved as MPEG file on a Windows-compatible memory card.

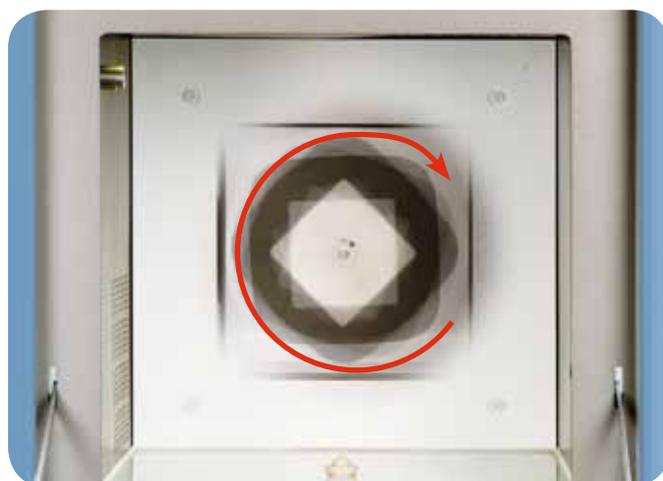


## Highest microwave power

The ETHOS One is equipped with two 1800 Watt-rated magnetrons (2 x 900 Watt).

This enables a very fast heating of high-throughput rotors and the complete digestion of the most difficult matrices.

A pyramid-shaped rotating diffuser evenly distributes the microwaves in the cavity. This unique design ensures optimal microwave distribution.



# MICROWAVE HARDWARE

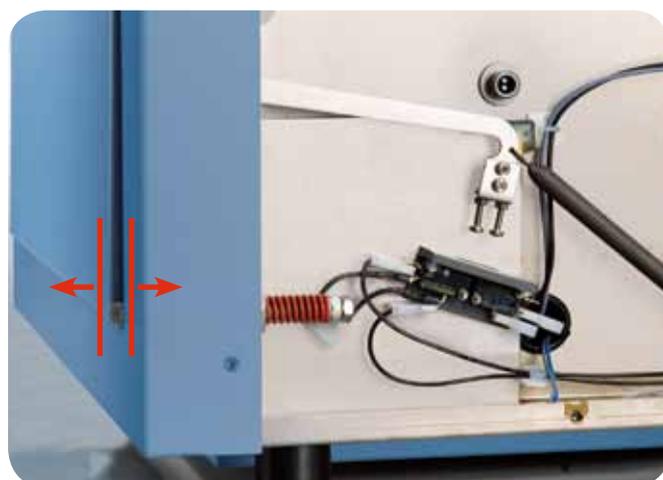
## Door locking system

An automatic door locking system does not allow the user to open the ETHOS One door during the course of the microwave run and until the solutions have been cooled down to a preset temperature, avoiding misuse of the instrument and in turn exposure of the chemist to high pressure vessels. This device further enhances the overall safety of the ETHOS One.

## Pressure-responsive door

The ETHOS One features a full stainless steel door with an innovative opening and self-resealing mechanism. The door is mounted on spring-loaded steel bars. In case of sudden over-pressurization of the cavity, the door slightly opens for rapid and safe release of the overpressure.

Microwave power is instantaneously cut off. Immediately afterward, the door is pulled back by the springs, resealing the cavity.





The ETHOS One is operated via a compact control terminal with easy-to-read, bright, full-color, touch-screen display.

The terminal is provided with multiple USB and RS-232 ports for direct printout of microwave methods and runs, and for interfacing the instrument to external peripherals.

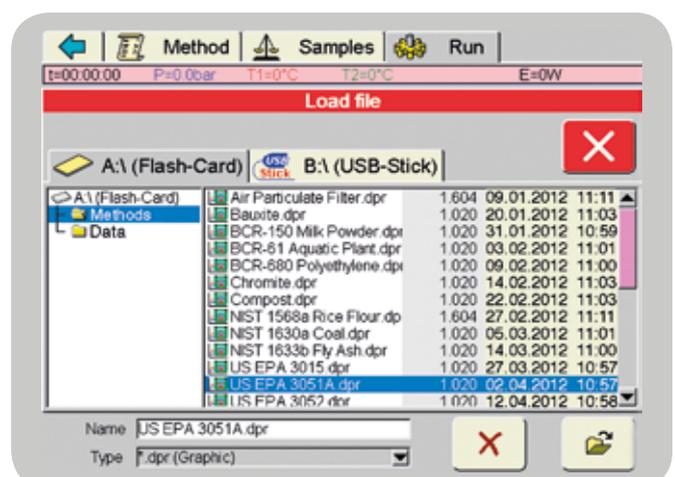
The terminal runs the Milestone's unique multi-language EasyCONTROL software, to provide simple, user-friendly control of the microwave sample preparation process with automatic, real-time monitoring and feedback-based control of multiple parameters.

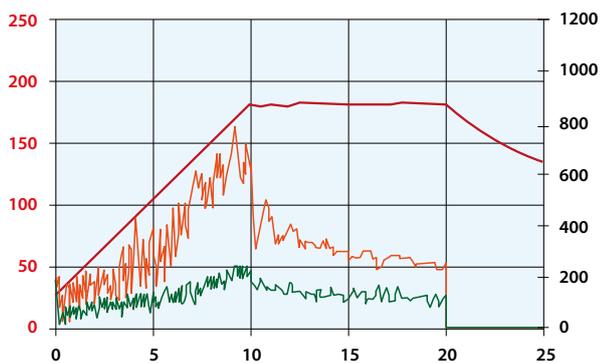
Simply recall a factory-stored method or create a new one; press 'START' and the system will automatically follow the user defined temperature or pressure profile, utilizing a sophisticated PID algorithm to regulate the microwave power.

### Built-in methods library

Hundreds of applications, including all US EPA methods, are preload in the ETHOS One terminal. Each application includes all digestion parameters, such as time, temperature, pressure, sample weight, reagent volumes etc.

The chemist has just to recall a stored method and run it!

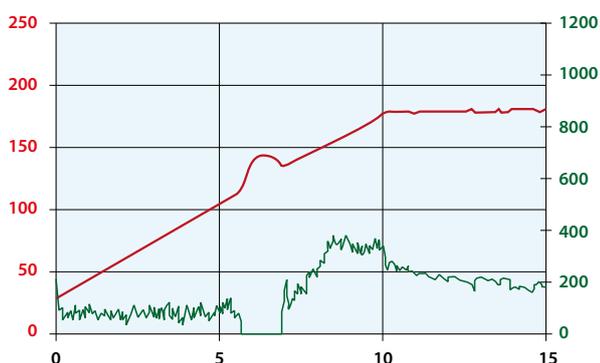




## One method fits any vessels number

There is no need to adapt the digestion method to the number of samples or to set the number of vessels. The software automatically regulates the microwave power accordingly, while the reaction temperature remains the same regardless of the number of samples. This assures a consistent quality of digestion and simplifies the use of the instrument.

*Digestion of 0,25 grams feed sample with 10 mL HNO<sub>3</sub>. Green profile 1 vessel, orange profile multiple vessels.*



## Better control of exothermal reactions

With the EasyCONTROL software, the digestion temperature is controlled during the complete course of the run, and not just at a set point. This allows a far better control of exothermal reactions.

*Digestion of 1,2 grams rice sample with 10 mL HNO<sub>3</sub>. At 120 degrees C, when the sample decomposition takes place, the microwave power is automatically reduced to zero to prevent runaway reactions.*

# USER INTERFACE



## Easy data transfer

Methods and runs are saved on a flash card or on a USB pen-drive, readable by any PC. This capability offers virtually unlimited memory for storing all your sample preparation data. Furthermore, with Milestone's Windows-based EasyDOC software, it is possible to convert all sample preparation data into standard formats readable by any database or spreadsheet software (Excel, etc.).

## REACTION SENSORS

The ETHOS One is equipped with the most advanced reaction sensors, including direct temperature and pressure control in a single reference vessel and contact-less temperature and pressure control in all vessels.



### Direct temperature control

The ATC Automatic Temperature Control system allows for direct continuous monitoring and control of a reference vessel up to 300 degrees C. The temperature sensor is housed in a thermowell and protected from chemical attack by multiple layers of PTFE and inert material.

## TEMPSURE

The TEMPSURE integrates a direct temperature control device and an infrared sensor, interfaced to a microprocessor-controlled vessels positioning system.

The TEMPSURE allows for accurate and precise temperature control in all vessels.

The actual temperature profiles of all vessels are displayed in real time by the control terminal. Indeed a perfect quality control feature for your sample preparation process.



### Contact-less temperature control in all vessels

The ETHOS One features a focused, high-sensitivity infrared sensor for contact-less temperature monitor and control of all vessels, with individual temperature profiles for each vessel.



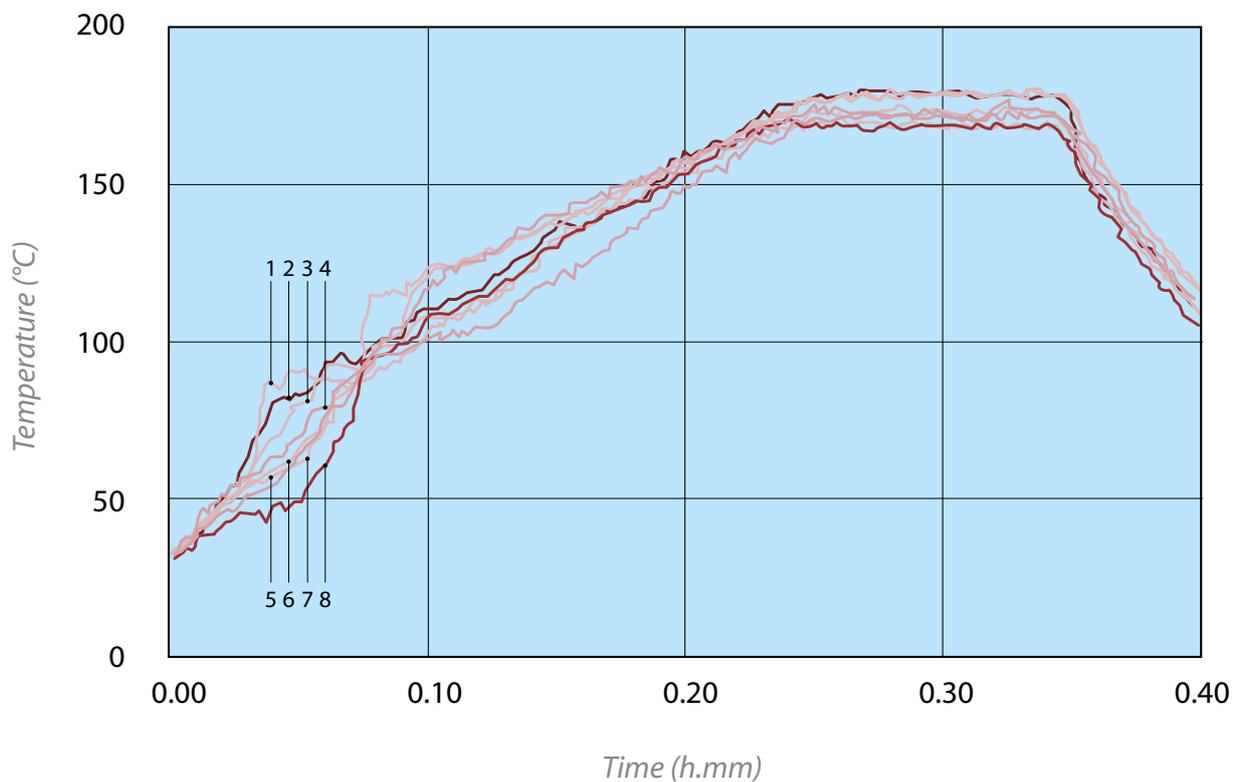
### Direct pressure control

The APC Automatic Pressure Control system allows for direct monitoring and control of a reference vessel up to 100 bar. This is ideal for highly reactive organic samples or 'unknowns', and for method development, to maintain pressure limits within the vessel's specifications.



### Contact-less pressure control in all vessels

This sensor monitors and controls all vessels simultaneously, preventing any leakage or venting. In combination with our vessel technology and the EasyCONTROL software, this sensor ensures complete and safe digestions without any loss of volatile compounds.



*TEMPSURE: temperature control in all vessels with individual temperature profiles for each vessel*

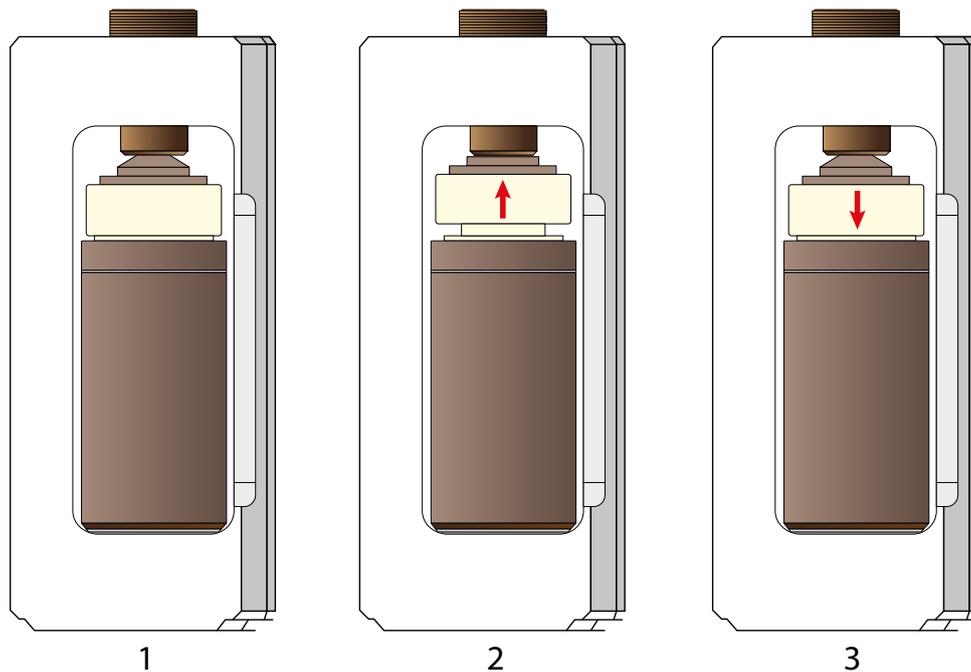
## 'Vent-and-reseal' vessels

The 'vent-and-reseal' vessels are the foundation of Milestone's leadership in microwave digestion technology. Continuously enhanced, this patented (US Patent 5,270,010) technology provides the operator with unsurpassed safety and performance capabilities.

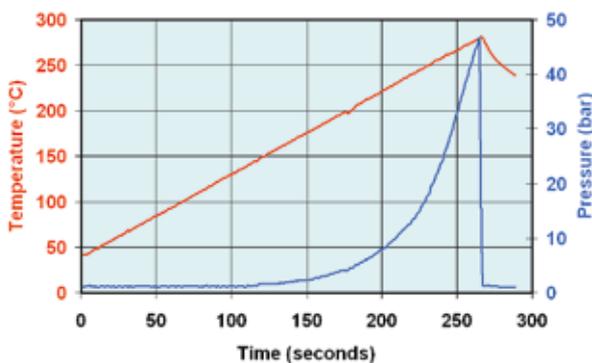
- Highest temperature and pressure
- Highest safety standards
- Ease of use
- Fast cooling

While other devices use membranes or burst disks that render a vessel useless after venting the Milestone system releases only the excess pressure from the vessel.

This ensures that there is no stress to the door of the microwave system, as it could happen in the case of a vessel's bursting.

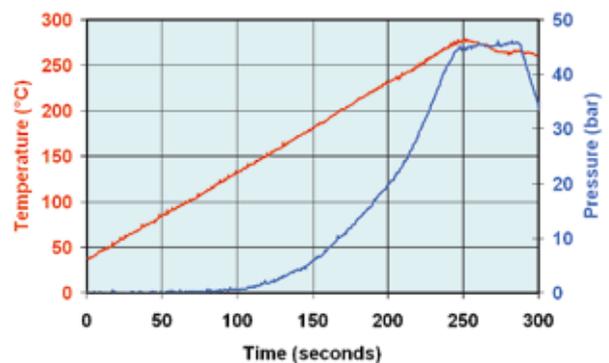


The 'dome-shaped' spring is temporarily flattened in case of overpressure (1), allowing the cap to lift-up (2) slightly and release the pressure. Once the pressure has been released, the cap closes again (3), and the microwave program can continue.



### *Burst disk venting.*

*When a specific pressure is achieved, the disk bursts, and the pressure dramatically drops to zero. Sample is lost, and the program must be manually stopped.*



### *Milestone unique vent-and-reseal venting.*

*Only the excess pressure is released from the vessel, and the digestion process can be completed in full safety.*



### High pressure

The high strength SK rotor body holds up to 12 digestion vessels made of high purity TFM. This rotor ensures complete digestion of any sample, including relatively difficult organic and inorganic refractory materials.



### High versatility

The PRO-24 is a very versatile rotor, suitable for easy organic samples or environmental applications, according to the US EPA methods. It offers very easy handling and rapid cooling capabilities.



### Automation

The new Milestone vessel-handling module TWISTER is a step ahead toward automation in microwave digestion and it represents a perfect complement to the SK rotors. The TWISTER eliminates the bottleneck associated with the handling of multiple digestion vessels, thus dramatically improving the sample preparation throughput. Furthermore, it improves the overall quality of digestion, as it assures constant and reproducible closing of the vessels.

VESSEL TECHNOLOGY



### High throughput

The MULTIPREP-41 is a very high throughput rotor holding TFM or PFA vessels, and can perform easy digestions or leaching-type reactions on a variety of samples, such as soils, sediments, wastewater etc.



### High purity

The Q-20 rotor holds 20 high-purity quartz vessels and it offers superior performances, especially for ultra trace analysis, with unmatched ease of use and full control of all digestion parameters in all vessels. Minimal quantities of acid are needed, lowering the analytical blank.

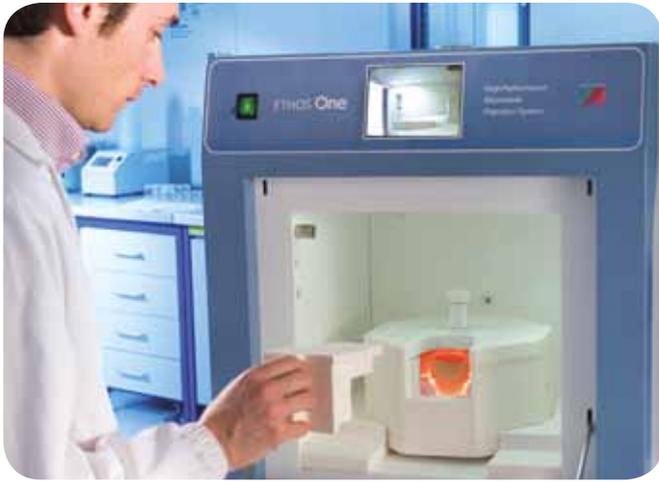


### High temperature

The Milestone NOVA-8 rotor is especially designed to work at sustained high temperature up to 300 degrees C, allowing for a safe and complete digestion of the most difficult matrices, such as ceramics and refractory materials.



A large selection of high purity quartz and TFM inserts is available for all Milestone pressure vessels, for smaller sample amounts or to minimize the dilution factor of the analytical solution.



## Fusion

The new MultiFAST enables performing fusion in the ETHOS One. A variety of difficult samples, such as cements, ores, slag, sediments, soils, rocks, ceramics, pigments, and glasses, can be successfully prepared for XRF, AA and ICP analysis. The MultiFAST consists of a muffle furnace with a rotating carousel, which accommodates microwave heated silicon carbide heating elements, containing the actual fusion crucibles.

## Open Vessel Digestion

Milestone's exclusive MOD package converts the ETHOS One to a fully automated microwave open vessel digestion system, to rapidly and safely digest multiple large amounts of organic samples, such as food, feed, pharmaceuticals, polymers, oils, etc.



## Vacuum Evaporation

With Milestone's unique vacuum evaporation technology, the ETHOS One turns into a true microwave evaporator, allowing the user to carry out safe and complete evaporation of acids and organic solvents.

No sample transfer is required, as evaporation takes place in the same vessels previously used for digestion/extraction.

## Solvent Extraction

The ETHOS One performs a wide range of solvent extraction procedures, including extraction of pesticides and PCBs from environmental samples, additives from polymers, fat from food and feed samples.

Extractions are completed in 10-20 minutes, and require a fraction of the solvent volume needed by other techniques.

**VESSEL TECHNOLOGY**



**MILESTONE**



HELPING  
CHEMISTS

UNI EN ISO 9001: 2008  
CERTIFIED

**MILESTONE Srl** - Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy  
Tel: +39 035 573857 - Fax: +39 035 575498  
[www.milestonesrl.com](http://www.milestonesrl.com) - email: [analytical@milestonesrl.com](mailto:analytical@milestonesrl.com)

**MILESTONE INC.** - 25 Controls Drive - Shelton, CT 06484 - USA  
Tel: (203) 925-4240 - Toll-free: (866) 995-5100 - Fax: (203) 925-4241  
[www.milestonesci.com](http://www.milestonesci.com) - email: [mwave@milestonesci.com](mailto:mwave@milestonesci.com)

**MILESTONE GENERAL K.K.** - KSP, 3-2-1, Sakado - Takatsu-Ku, Kawasaki 213-0012 - Japan - Tel: +81 (0)44 850 3811 - Fax: +81 (0)44 819 3036  
[www.milestone-general.com](http://www.milestone-general.com) - email: [info@milestone-general.com](mailto:info@milestone-general.com)

**MLS GmbH** - Auenweg 37 D-88299 Leutkirch im Allgau - Germany  
Tel: +49 (0)7561 9818-0 - Fax: +49 (0)7561 9818-12  
[www.mls-mikrowellen.de](http://www.mls-mikrowellen.de) - email: [mws@mls-mikrowellen.de](mailto:mws@mls-mikrowellen.de)

In your country:

CAT288EN-003