



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



# **START D**

Microwave Digestion System

# The unique **START D**

Milestone has been active for 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 continuously provide with best instrumentation for microwave sample preparation in terms of safety, quality and performance.

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

## **START D Microwave Digestion System**

The START D is equipped with a single industrial magnetron.

Typical delivered power is 1200 watts, allowing rapid heating of high throughput rotors.

A microwave diffuser located above the microwave cavity evenly distributes microwaves throughout the cavity, preventing localized hot and cold spots.

The chassis of the START D is made of corrosion-resistant stainless steel.

The cavity and the door are plasma-coated with PTFE to protect the unit.

Milestone's warranty covers the cavity coating against corrosion for 5 years!

The START D door is mounted on spring-loaded steel bars and it includes a shock resistant double-glass window, for easy viewing of the pressure vessels.

The door opens downward enabling the chemist to use it as working platform and facilitate the loading of the vessels into the microwave cavity.

Each vessel is loaded individually, so the user does not have to lift a fully loaded carousel into the microwave cavity.

The START D is equipped with a heavy duty air flow system, placed above the microwave cavity.

The air flow rapidly cools the external surfaces of the vessels.

An acid-resistant flexible hose connects the exhaust fan to a fume hood, ensuring a safe working environment.



- » High microwave power provides fast vessel heating
- » Homogeneous microwave distribution throughout the cavity
- » All stainless-steel construction
- » Convenient, user-centric design
- » Fast air cooling of vessels for high throughput

# START D *safety & control*

## EasyCONTROL Software

The START D terminal runs the Milestone's unique 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.



*Microwave program editing*



*Actual temperature profile.*

*The microwave power is automatically adjusted based on continuous feedback, allowing the reaction to follow the desired temperature profile.*

## Reaction Sensors

The START D is equipped with the most advanced reaction sensors for temperature and pressure control. Temperature is measured either with a snap-in direct sensor in a reference vessel, or via a contact-less high-sensitivity infrared sensor, which effectively measures and controls the temperature in all vessels.

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

A contact-less pressure sensor is also available; this sensor monitors and controls all vessels simultaneously, preventing any vessels from venting and subsequent loss of volatile compounds. All sensors, in addition to providing precise and accurate measurements, are extremely easy to operate.



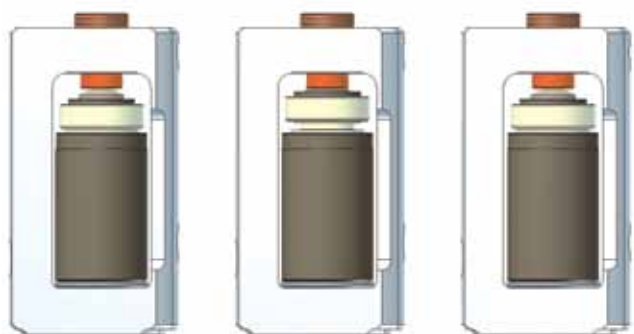
*Direct temperature control*

## 'Vent-and-Reseal' Pressure Vessels

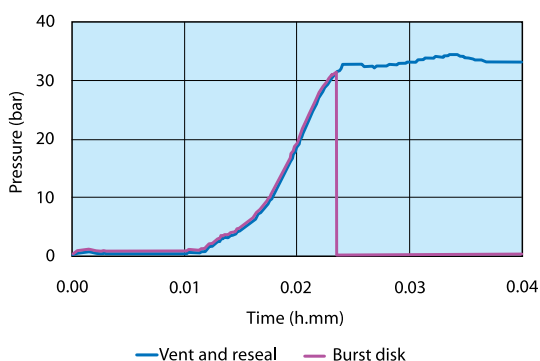
The 'vent-and-reseal' vessels are the foundation of Milestone's leadership in microwave digestion technology.

Continuously enhanced, this patented (US Patent 5,270,010) technology provides the operator with unsurpassed safety and performance capabilities. 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.



*'Vent-and-reseal' technology*



*'Vent-and-reseal' vs. Burst disk technology*

## Automation

The new Milestone vessel handling module TWISTER is a step forward in 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.

Finally, the TWISTER offers an increased safety of operation, as the operator is not exposed to acid vapors as the vessels are opened.

For the MULTIPREP-41, Q-20 and PRO rotors a dedicated automatic capping/uncapping system is also available.



*Milestone TWISTER*

- » Automatic opening and closing of SK rotors
- » Effortless and fast operation: less than 5 seconds!
- » Reproducible conditions
- » Higher productivity and increased sample throughput
- » Adjustable opening speed with the highest safety

# START D *digestion rotors*

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

## High Pressure

The high strength SK rotor body holds up to 12 digestion vessels made of high purity TFM, with a volume of 100 ml. These rotors ensure 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 method 3051A. It offers very easy handling and rapid cooling capabilities.



## 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.

The Q-20 allows for the complete digestion of a variety of organic samples, such as foods and feeds, plants, polymers, pharmaceuticals, clinical, biologicals and oils.



## High Temperature

The NOVA-8 rotor holds 8 TFM vessels, each with a volume of 75 ml, and enables the digestion of ceramics and refractory materials.





# START D *technical specifications*

## Microwave Hardware

- Single magnetron system with rotating diffuser for homogeneous microwave distribution in the cavity.
- Magnetron protected from reflected microwave power.
- Installed power 1.200 watts.
- Output power 1.200 watts, controlled via microprocessor.
- Large microwave cavity 37 x 34,5 x 33,5 (h) cm.
- Microwave cavity entirely made of 18/8 stainless steel housing with innovative multi-layer PTFE plasma coating applied at over 350°C.
- All hardware protected against acids/organic solvents with polymer coating both on inside and outside surfaces.
- Total of safety interlocks 4 micro-switches to prevent microwave emission with door open.
- Exhaust located in the side of the cavity, separate from electronics to prevent corrosion.

## Reaction sensors

- Direct temperature monitoring and control up to 300°C in a reference vessel
- Contact-less temperature monitoring and control up to 300°C in all vessels.
- Direct pressure monitoring and control up to 100 bar in a reference vessel.
- Contact-less pressure monitor and control up to the vessels highest working pressure

## Control terminal

- Monochrome touch-screen industrial grade controller 5" screen.
- Resolution 240 x 128 dots for sharp process graphic.
- 1 PS2 port for mouse, 1 RS 484 port for microwave unit, and 1 RS 232 port for external devices.
- Methods and process reporting data saved on internal memory.

## Weight and dimensions

- Weight ~ 75 kg - External dimensions 57 x 51 x 61 (h) cm - Power 220V/50-60Hz, 2,4 kW

## Pressure Vessels

Rotor	Vessels	Volume (ml)	Temp. (°C)	Pressure (bar)
SK	Up to 12	100	Up to 300	Up to 100
PRO	Up to 24	Up to 100	200	Up to 35
MultiPREP-41	Up to 41	65	200	20
NOVA-8	Up to 8	75	300	100
Q-20	Up to 20	45	250	40

## Standard Methods Compliance

- U.S. EPA Methods - 3052, 3051a, 3015a, 3546.
- ASTM (American Society of Testing and Materials) Methods - D4309-96, D-5765, D-6010.
- International Regulations Compliance - Suitable for RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical and Electronic Equipment) and ELV (End-of-Life vehicles) sample preparation.

*Specifications are subject to change without notice.*

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