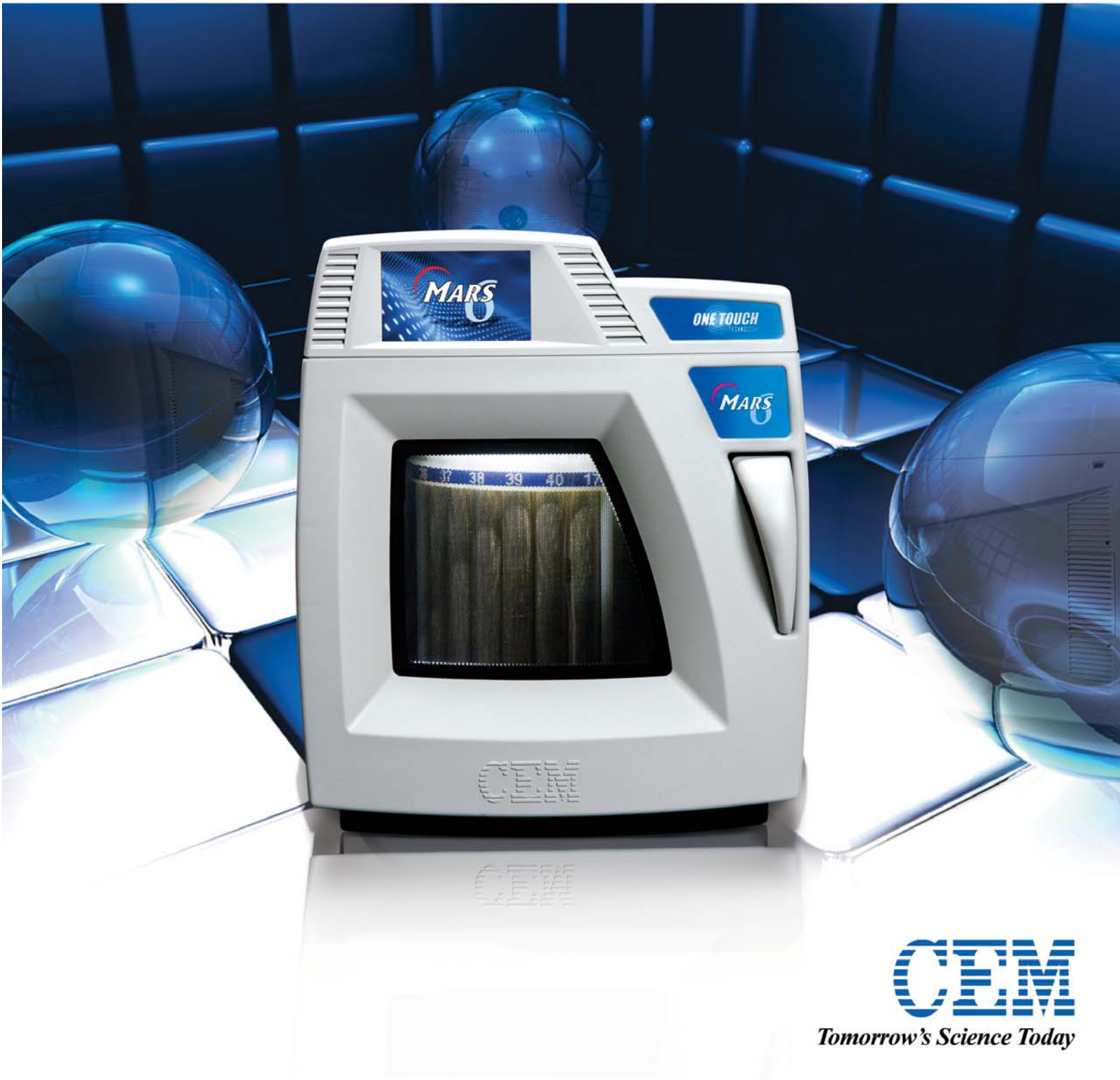
MARS 6
MICROWAVE REACTION SYSTEM
SOLUTIONS MADE SIMPLE



CEM

Tomorrow's Science Today



Versatility

The MARS 6 is incredibly versatile and can be configured for digestion, extraction, or both. It can also perform a variety of other chemistries including parallel or batch synthesis, protein hydrolysis, and evaporation/concentration.

MICROWAVE REACTION SYSTEM



CEM brings a remarkable intelligence and ease of use to microwave sample preparation with the new MARS 6 System. Totally redesigned with an impressive list of features and capabilities, MARS 6 was developed to make microwave sample preparation virtually effortless.

- Choose from simple CEM One Touch™ Technology* or MARS Classic method programming
- PowerMAX™ power control technology delivers maximum energy to the sample for more complete digestions
- 1800 Watts - more power delivery than any other microwave digestion system
- Large (7") wide-format, high-resolution, acid-resistant touchscreen – no external controllers needed
- Remarkably easy-to-use, intuitive onboard software
- Advanced sensor technology for vessel recognition, temperature and pressure control
- Improved connectivity – 6 USB ports and 2 Ethernet ports allow connections to multiple peripherals such as keyboards, printers, or computers

*Worldwide patents pending

Easy as 1, 2, 3

1 **LOAD YOUR SAMPLES.**



2 **CHOOSE YOUR SAMPLE TYPE.**



3 **Press "Start."**



CEM's innovative One Touch Technology does the rest.



Features

HIGH-RESOLUTION, FULL COLOR TOUCHSCREEN WITH SPEAKERS
Large 7" (800 x 480) glass capacitive LED screen serves as controller and display

8-GIGABYTE ONBOARD CONTROLLER
No need for a laptop or external controller

POWERMAX™ POWER CONTROL
Delivers maximum energy to the sample, ensuring complete digestions

ONE TOUCH OR MARS CLASSIC METHOD PROGRAMMING
Select which program is best for you

ACID- AND IMPACT-RESISTANT COMPOSITE SHELL
Better system protection in a laboratory environment than a metal wrap

I/O PORT
Standard 0.500" I.D. port or optional 0.3125" I.D. ports for 6mm tubing allows for introduction of multiple components into the cavity

METHOD LIBRARY
Pre-loaded with USEPA and other internationally recognized methods

DATA AT A GLANCE
Touchscreen interface provides easy access to stored methods, real-time data, results of past runs, and training videos

CONNECTIVITY
Available ports: 5 USB, 1 USB-B, 2 Ethernet, and1 RS-232

TOUCHSCREEN TRAINING VIDEOS
Learn more about your system, how to use different vessel sets and options, and running samples right on the MARS 6.





INTEGRATED PRINTER
Print graphs and data for documentation

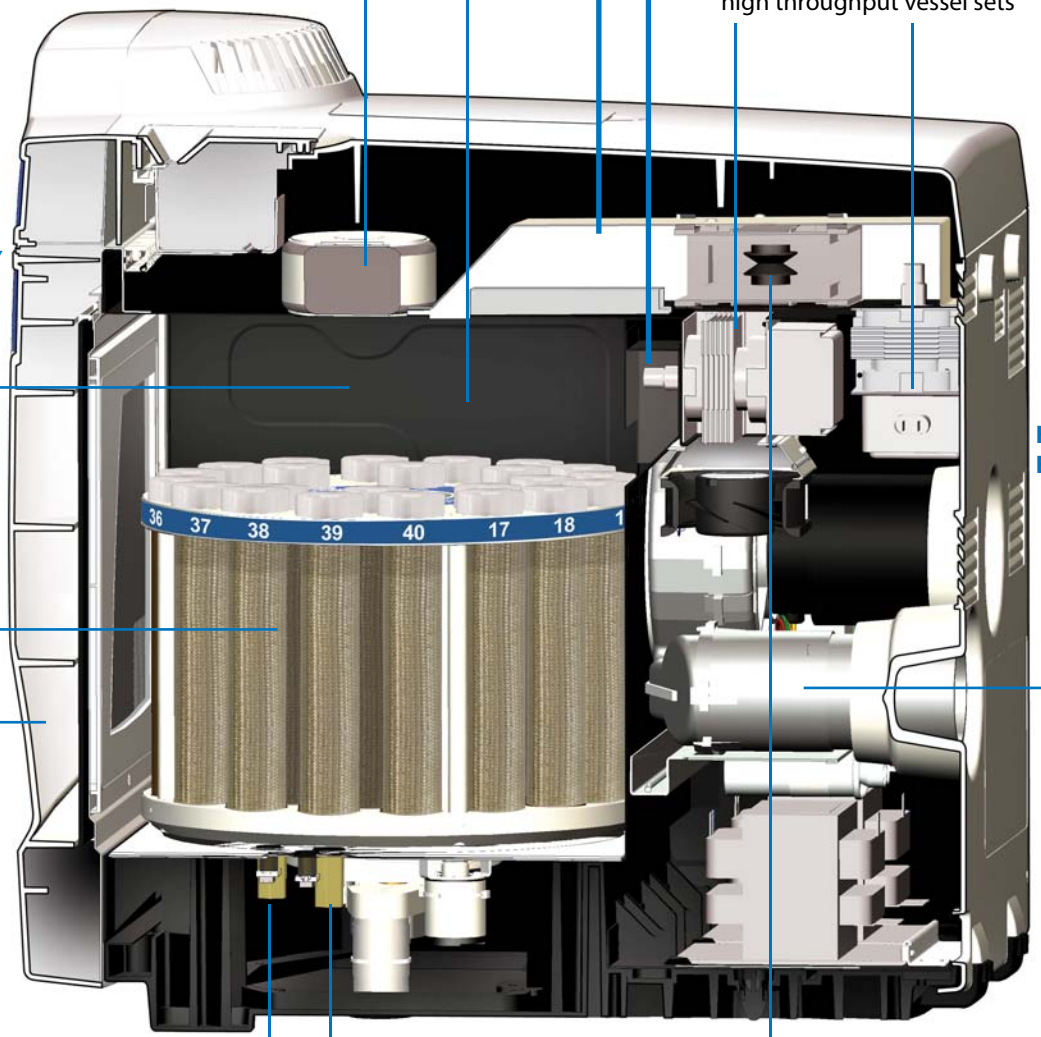
MICROWAVE REACTION SYSTEM

ISOLATION TRANSFORMER
Filters variations of incoming line current to protect electrical components

REACTIGUARD SENSOR
Constantly monitors cavity for vessel problems

SPECIALLY DESIGNED WAVEGUIDES
Ensures microwave uniformity and eliminates the need for motor-driven diffusers or mode stirrers

SEQUENTIAL MAGNETRONS
1800 watts of delivered energy, providing the power needed for difficult samples and high throughput vessel sets



LARGE MULTI-LAYERED TEFLON®-COATED CAVITY

RUGGED, HIGH-GRADE 316 SOLID-STEEL CAVITY

UP TO 40-VESSEL CAPACITY

HIGH-CAPACITY EXHAUST

HEAVY-DUTY, SPRING-MOUNTED, PRESSURE RELIEVING DOOR WITH SAFETY INTERLOCKS

FLOOR-MOUNTED IR SENSORS
- Temperature
- Vessel Recognition
- Vessel Counting

PATENTED ISOLATOR
Absorbs reflected microwave energy prior to reaching magnetron and allows magnetrons to run at 100% power

ONE TOUCH
MAKES ALL THE DIFFERENCE

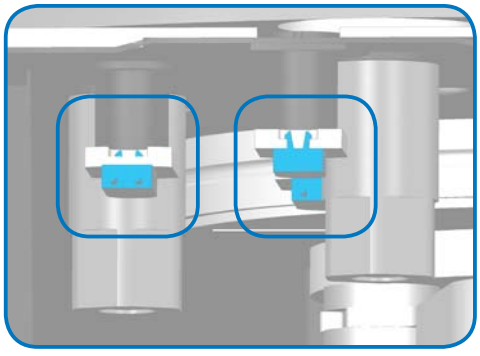
CEM's patent-pending **One Touch Technology** brings intelligent simplicity to microwave sample preparation. It's like having a CEM applications chemist built into the system. CEM's One Touch combines more than 30 years of microwave chemistry experience with today's most advanced software and hardware technologies to give laboratories the easiest-to-use microwave sample preparation system ever designed.

One Touch Methods

CEM's One Touch takes the guess work out of sample preparation. Simply choose from more than 70 preinstalled methods and the MARS 6 does the rest. One Touch automatically determines all of the parameters, adjusts power output, and performs the digestion for all major sample types including environmental and regulatory, foods, plant and animal tissues, inorganic chemicals, oils and plastics, organic compounds, semiconductors, pharmaceuticals, and more.

One Touch Sensor Technology

The MARS 6 features integrated sensor technologies designed to make the system so simple to operate, it's virtually effortless. Located in the top and bottom of the cavity, CEM's One Touch vessel recognition and vessel counting sensors automatically recognize the type and number of vessels that have been placed in the cavity. Based on this information, optimum digestion conditions for sample type and number of vessels are selected and temperature and pressure sensors monitor the reaction and adjust the microwave power to ensure a complete digestion.



One Touch Vessel Technology

One Touch samples can be digested in the MARSXpress and EasyPrep families of vessels. The simple-to-use MARSXpress and MARSXpress Plus are the easiest-to-assemble vessels on the market and are ideal for high-throughput labs. The simplest to assemble high-temperature and high-pressure vessels available are the EasyPrep and EasyPrep Plus, which are well suited for large or difficult applications.

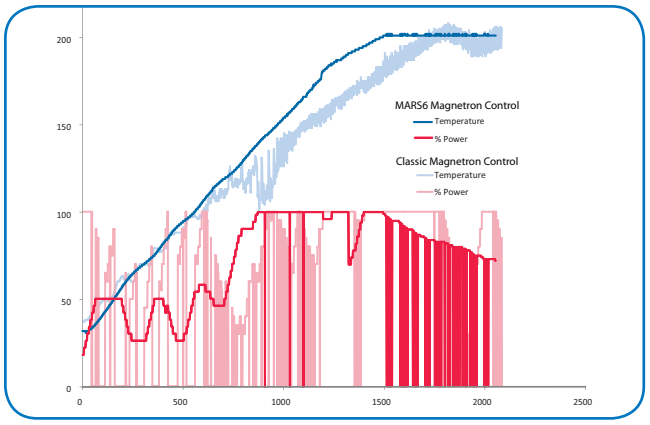
One Touch Sample & Vessel Preparation Technology

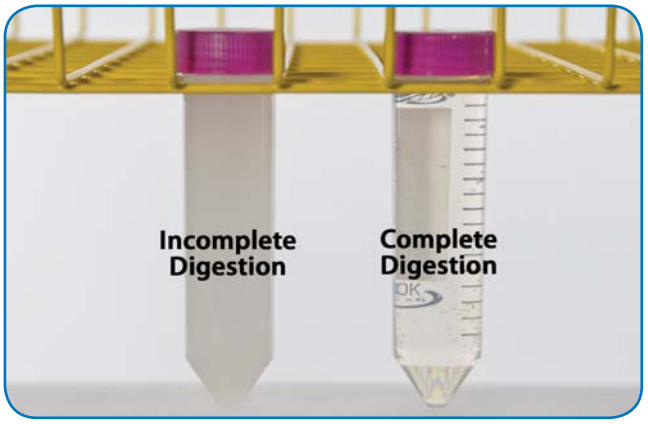
With the MARS 6, operators of all levels will be able to achieve complete digestions of even their most difficult samples. Every One Touch method contains recommendations for sample mass, acid type and volume, and preparation, as well as tips to ensure complete and safe digests every time. The MARS 6 also features onboard training videos for sample preparation, vessel assembly, system use, and maintenance that are viewable on the high resolution touchscreen.



PowerMAX™ Automatic Power Control

Consistent results every time. Traditional microwave systems introduce an excessive amount of power to the sample, causing fluctuations in temperature that result in the magnetron shutting down for significant amounts of time. This frequently results in incomplete digestions. The MARS 6 uses CEM's PowerMAX Technology to automatically maximize the amount of microwave energy to the reaction for a complete digest regardless of the number of vessels and sample size. PowerMAX dynamically adjusts the power throughout the run, providing the control necessary for complete digests, while preventing exothermic reactions.





1800 Watts of Delivered Microwave Energy

The MARS 6 employs sequential magnetrons to precisely deliver an industry-leading 1800 watts to completely digest even the most difficult matrices. These sequential magnetrons work with CEM's PowerMAX Technology to help fine tune and maximize microwave power throughout the runs.

Wave Guide Power Delivery Ensures Microwave Uniformity

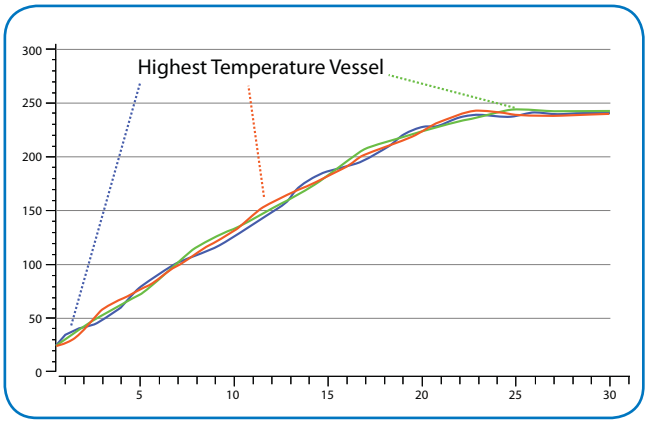
CEM engineers designed precisely tuned wave guides for the MARS 6, eliminating the need for motor driven diffusers or attenuators. The MARS 6 wave guides deliver microwave energy directly to the center of the cavity and disperse it uniformly across the vessels, ensuring reproducible results every time.

DuoTemp™ Control

DuoTemp & MARSXpress DuoTemp All Vessel Temperature Control

The patented DuoTemp technology provides the ultimate control by automatically choosing the "Control Vessel" based upon reaction conditions. The control vessel will dynamically change during the run to always control the temperature based on the most reactive vessel, providing reproducible, safe digests every time without excessive venting or exothermic reactions. DuoTemp's combination of fiber optic and IR temperature sensors with the innovative built-in software controls of the MARS 6 creates a temperature control option that is unmatched.

Control Vessel Shifts to Most Reactive



Patented DuoTemp Control automatically measures the temperature in each vessel and dynamically controls the run based on the most reactive vessel.

SENSORS AND CONTROLS

CEM offers a complete line of sensors and control options to meet the sample preparation needs of your laboratory.

Direct Fiber Optic Temperature Sensor of the Reference Vessel

The fiber optic temperature probe is the gold standard in temperature measurement. Unlike metal thermocouples, which can self-heat in the microwave and give imprecise readings, CEM's fiber optic temperature probe provides accurate measurement every time. An optional NIST-traceable fiber optic temperature probe is also available.

Single Vessel Reference Pressure Sensor

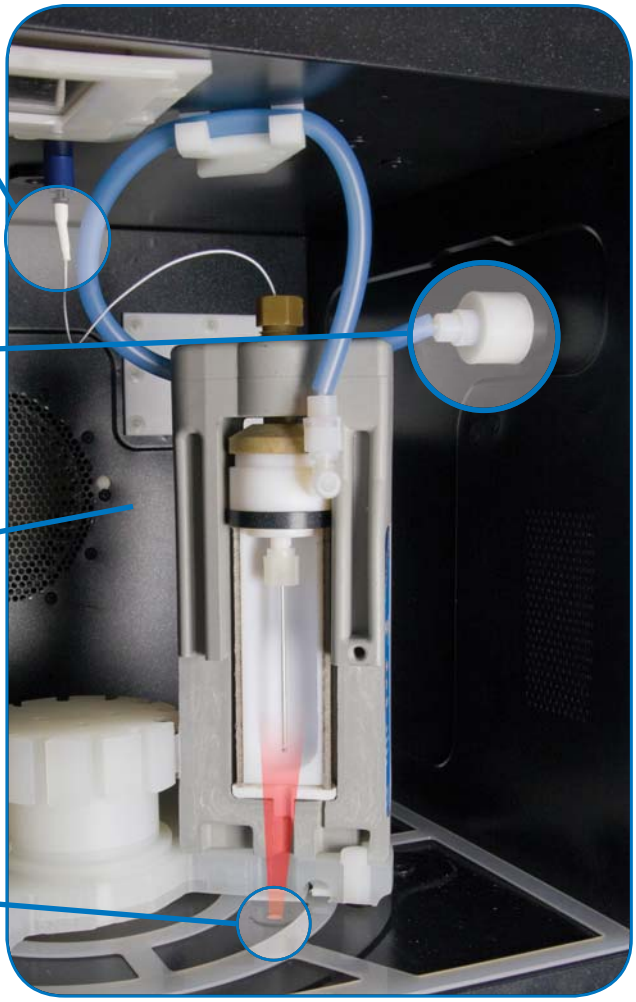
Accurate and simple to use, the ESP-1500 Plus is a simple pop-in device that can be immediately removed from the cavity after the run for fast processing of multiple vessel racks. It measures and controls pressure up to 1500 psi.

Contactless Pressure Sensor

CEM's UPS Sensor provides pressure control for every vessel by monitoring the exhaust system. This controller is not limited to NO_x fumes, but can identify small quantities of all acid vapors. It will automatically reduce power or turn off the magnetron based upon the concentration of gas in the cavity.

Contactless All-Vessel Temperature Sensors

The MARS 6 features patented, NIST-traceable, calibrated, dual IR sensors with the shortest path length to the vessel, ensuring more accurate readings and better control than systems with side-mounted IR sensors.



SOFTWARE CONTROL & FLEXIBILITY

The MARS 6 can be controlled using the onboard touchscreen interface or an external computer with SynergyPrep software.

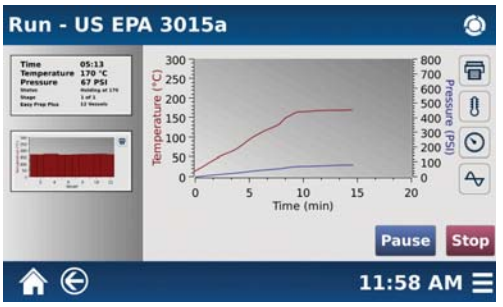
Simple Method Programming

MARS 6 gives you the flexibility to select the method programming style which best suits your needs. With over 70 to choose from, One Touch methods take the guess work out of sample preparation by automatically determining the digestion parameters and performing the digestion. If you need to set your own method parameters, you can choose a Classic Method and quickly develop a program that contains your unique method parameters. The choice is yours.



Graphical Output

The large, high-resolution, full color touchscreen provides a convenient, built-in interface. Easily monitor an active run from the graphical output of the touchscreen. Navigate between screens to view temperature, pressure, and microwave power, or view the relative temperature of all vessels with the temperature viewer.



Easily Manage System Settings

The Tools and Settings menus can be easily accessed from anywhere in the software. Set up Administrator and User login privileges, check and calibrate temperature and pressure sensors, and customize your MARS 6 by selecting from seven language settings.

Data Management

Data management is easy with the MARS 6. Import or export methods, instrument settings, and data using any of the 6 USB ports or print results and reports with the internal printer or by connecting to an external printer.

Onboard Help and Training Videos

Have a question about your MARS 6 or vessel assembly? Watch detailed training videos or access the Operator's Manual right on the touchscreen of the MARS 6.

SynergyPrep

The MARS 6 can be run entirely from the onboard touchscreen interface; however, the system can also be run from an external computer or laptop running SynergyPrep™ software. SynergyPrep offers real-time graphic display of temperature and pressure profiles, method storage, and full documentation support with data collection and report writing capabilities.



VESSEL TECHNOLOGY

As the proven innovator in CAD-designed vessel technology, CEM led the way with the original patented vent-and-reseal vessel for our first generation MDS-81D in 1985. Since then, we have designed and improved upon a wide variety of vessels for an array of chemistries. Our revolutionary open architecture, closed vessel design cools faster than any other microwave vessel — no need for chillers, water baths or external cooling systems — and our composite vessel sleeves give added strength, ensuring that you can depend on CEM vessels to be strong and effective. Our newest vessel designs continue to improve upon our vent-and-reseal technology, providing the most reliable mechanism available without the cost or maintenance of springs or membranes.

Vessels for CEM's One Touch Technology

The introduction of the MARS 6 adds two new vessels to the CEM line of microwave digestion accessories. These vessels may be utilized with CEM's One Touch Methods or MARS Classic Methods.



MARSXpress™ & MARSXpress™ Plus

The easiest-to-use, high-throughput vessel on the market, this patented three-piece vessel assembles in seconds. The open turntable design and composite sleeves allow for quick cooling. MARSXpress vessels have a self-regulating pressure control to eliminate the risk of over pressurization. MARSXpress vessels work in conjunction with CEM's patented Contactless All-Vessel Temperature Control and now MARSXpress Plus with DuoTemp combines the fiber optic and IR temperature sensors in a high throughput format.



EasyPrep™ & EasyPrep™ Plus

The gold standard in high-temperature, high-pressure reaction vessels. Simple-to-use EasyPrep vessels have fewer pieces to assemble and do not require membranes or springs for reliable pressure control. Process up to 12 samples simultaneously. EasyPrep vessels feature a control cover with an integrated thermowell for an all TFM-wetted surface, while EasyPrep Plus vessels feature a control cover that utilizes a sapphire thermowell for greater temperature control.

MARS 6 Digestion Vessels

						
	MARSXpress TFM	**MARSXpress PFA**	**MARSXpress Plus**	**MARSXpress Plus w/ DuoTemp**	**EasyPrep**	**EasyPrep Plus**
Number of Vessels	8 to 40	8 to 40	8 to 24	1 to 24	1 to 12	1 to 12
Temperature Control	IR	IR	IR	IR and Fiber Optic	IR and Fiber Optic	IR and Fiber Optic
Thermowell	n/a	n/a	n/a	Sapphire	TFM-encased Sapphire	Sapphire
Liner Material	TFM	PFA	TFM	TFM	TFM	TFM
Volume	55 mL	10, 25, 55, or 75 mL	100 mL	100 mL	100 mL	100 mL
Max Pressure	500 psi/35 bar	500 psi/35 bar	500 psi/35 bar	500 psi/35 bar	1500 psi/103 bar	1500 psi/103 bar
Max Temperature	260 °C	230 °C	260 °C	260 °C	310 °C	310 °C
HF Resistant	yes	yes	yes	yes	yes	yes
Typical Applications	Plant materials, animal tissues, foods, fertilizers, feed grains, ores, filters, pharmaceuticals, some precious metals and alloys, polyethelyene, propylene, and extractions, soils, motor oil, mixed edible oils, polymers, wastewater				MARSXpress samples plus ceramics, soils, precious metals and alloys, oils, plastics, electrical boards, coal, slags, high-temperature inorganics, & more.	



MARS Classic Vessel Technology

Designed with flexibility in mind, MARS 6 also runs all previous vessels from the CEM MARS and MDS vessel families.

Service & Support

All CEM Systems are backed by our experienced applications support team and award-winning service department. CEM's factory-trained field technicians and in-house service team are well known in the industry for their prompt response and problem-solving capabilities.

About CEM

Since 1978, CEM has been the world's leading provider of microwave laboratory systems with a complete portfolio of award-winning instruments and industry-leading, CAD-designed technology for the analytical laboratory, synthetic chemistry, bioscience, and process control markets.

CEM systems can be found in Fortune 500 companies, leading universities, and research facilities around the world. From ceramics to organic materials to moon rocks, chances are we already have an application method for your sample. If not, we will work diligently with you to solve any of your sample preparation questions. Our commitment to you does not end when your system is shipped; it begins.



SPECIFICATIONS

Overall Instrument Dimensions	63.5 cm (25 in.) height x 53.3 cm (21 in.) width X 63.5 cm (25 in.) depth
Weight	63.6 kg (140 lbs.)
Touchscreen	7" (800 x 480) TFT-LED glass capacitive touchscreen display
One Touch	A combination of vessel recognition and vessel counting sensor technology, software technology, and applications knowledge that enables a user to select a One Touch method that matches their sample type. Based on the sample type, One Touch Technology determines the vessel type and count, digestion temperature, ramp and hold times, and microwave power input.
PowerMAX	Power control technology provides the maximum amount of energy to the sample to ensure complete digestions.
Ports	5 USB, 2 Ethernet, 1 USB-B, 1 RS-232
Sensors	All sensors, including pressure and temperature sensing devices located within the microwave cavity, are microwave-transparent or shielded to ensure accurate readings and to eliminate arcing (ignition) hazards.
Languages	Software available in English, German, French, Italian, Spanish, Chinese, and Japanese.
Sample Stirring	In-vessel magnetic stirring of samples at three levels of speed.
Turntable Design	PerfectCircle™ design provides absolute radial symmetry. Turntable operates in alternating or continuous mode.
Door Lock	An optional software controlled solenoid lock is engaged to lock the door at the beginning of a digestion run and automatically unlocks after the digestion run at a user defined temperature.
Inlet/Outlet Ports	Standard 0.500" I.D. port or optional 0.3125" I.D. ports for 0.250" (6mm) tubing
Microwave Cavity	Heavy-duty, multi-layer Teflon® coating
Electrical Requirements	200/208/230 VAC (200-253 VAC), 60 Hz, 15A @ 230 VAC 220/240 VAC (202-250 VAC), 50 Hz, 15A @ 240 VAC
Magnetron Frequency	2450 MHz
Power Output	1800 W – Continuous power available at all power levels to provide more control for reactions. (IEC 705 Method – 1988)
Magnetron Protection	Solid-state isolator (US patent 4,835,354) to protect magnetron from reflected energy, ensuring constant power output.
Speakers	8 Ω, 2 W, 86 dB
Printer	Onboard thermal printer and USB-B compatible printer port
Safety Features	Three independent door safety interlocks, including an interlock monitoring system plus three independent thermal switches, are used in each instrument to prevent instrument operation and microwave emissions in case of improper door closure or misalignment. The instrument complies with HHS standards under 21 CFR, Part 1030.10, Subparts (C)(1), (C)(2) and (C)(3). Reactiguard continuously monitors the cavity and disables the magnetron if disturbances occur inside the cavity.
Emissions and Safety Approvals	Conforms to Globally Harmonized EN61010-1 Standard for Safety Requirements for Electric Equipment for Measurement, Control, and Laboratory Use Part 1: General Requirements (CAN/CSA-C22.2 No. 1010.1-1992).
Patents	CEM microwave systems and vessel designs may be covered by any one of the following US patents: 04835354, 04080168, 05369034, 04672996, RE034373, 05230865, 04877624, 04672996, 05206479, 05427741. Other patents pending.

Teflon® is a registered trademark of DuPont. TFM® is a registered trademark of Hoechst A.G.

MARS™, MARSXpress™, One Touch™, PowerMAX™, DuoTemp™, EnergySeal™, SynergyPrep™, and Thermo-Optic™ are all trademarks of CEM Corporation.

©2012 CEM Corporation

CEM Corporation

P.O. Box 200
Matthews, NC 28106
United States

Tel: (800) 726-3331 [USA & Canada]
Tel: (704) 821-7015
Fax: (704) 821-7894
e-mail: info@cem.com
www.cem.com

UNITED KINGDOM
CEM Microwave Technology Ltd.
2 Middle Slade
Buckingham Industrial Park
Buckingham MK18 1WA
Tel: (44) 1280-822873
Fax: (44) 1280-822873
e-mail: info.uk@cem.com

GERMANY
CEM GmbH
Carl-Friedrich-Gauss -Str. 9
47475 Kamp-Lintfort
Tel: (49) 2842-9644-0
Fax: (49) 2842-9644-11
e-mail: info@cem.de
www.cem.de

ITALY
CEM S.R.L.
Via Dell' Artigianato, 6/8
24055 Cologno al Serio (Bg)
Tel: (39) 35-896224
Fax: (39) 35-891661
e-mail: info.srl@cem.com

FRANCE
CEM μWave S.A.S.
Immeuble Ariane
Domaine Technologique de Saclay
4, rue Rene' Razel
91892 ORSAY Cedex
Tel: (33-1) 69 35 57 80
e-mail: info.fr@cem.com

JAPAN
CEM Japan K.K.
5-8-8 Shinjuku
Shinjuku-Ku, Tokyo
160-0022
Tel: +03-5368-2507
Fax: +03-5368-2508
e-mail: info@cemjapan.jp
www.cemjapan.jp

IRELAND
CEM Technology (Ireland) Ltd
Sky Business Centre
9a Plato Business Park
Damastown
Dublin 15
Tel +353 (0)1 885 1752
Fax +353 (0)1 885 1601
Email: info.ireland@cem.com