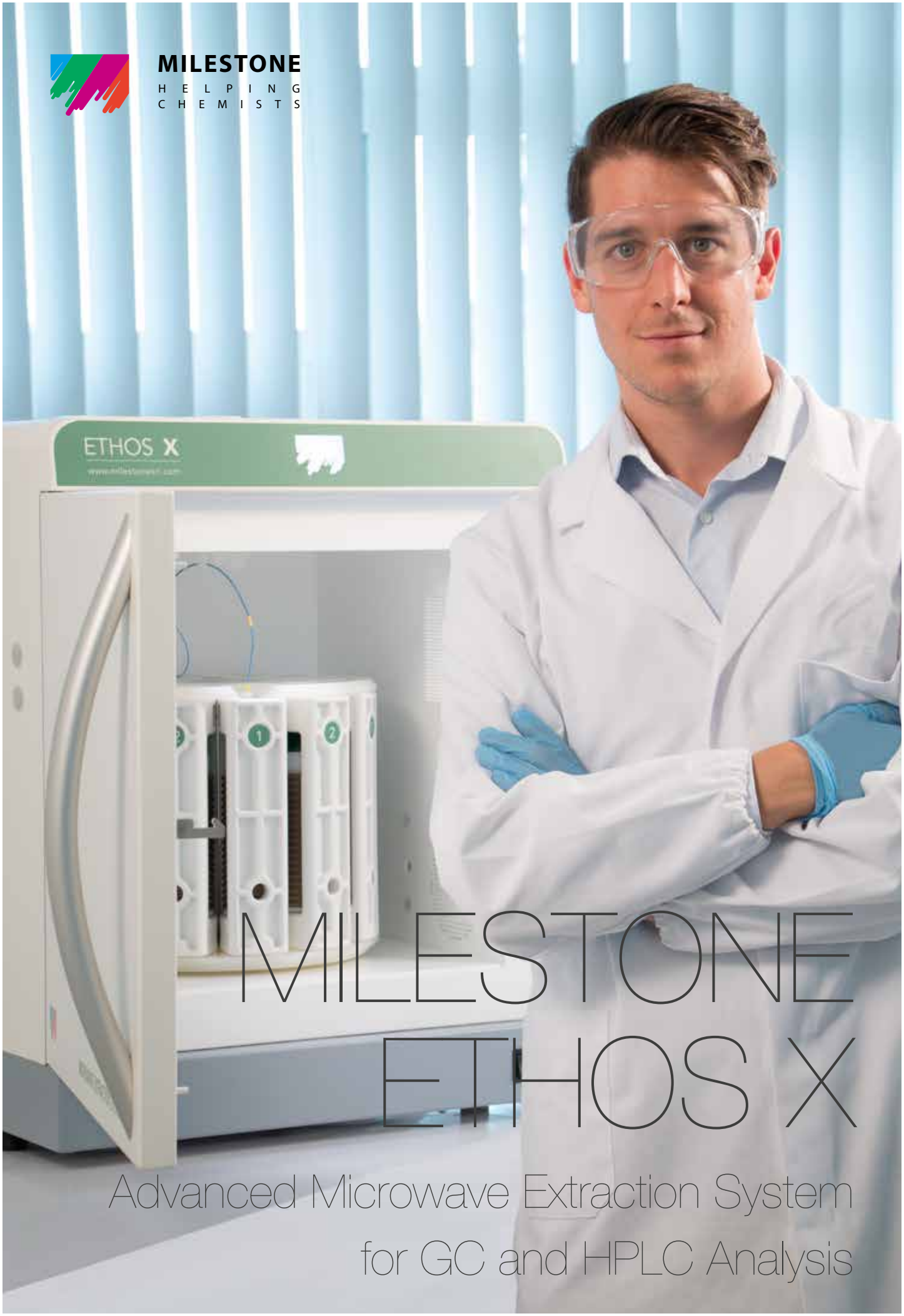
MILESTONE
HELPING CHEMISTS



MILESTONE ETHOS X

Advanced Microwave Extraction System for GC and HPLC Analysis

The ETHOS X Advanced Microwave Extraction System for GC and HPLC Analysis is available in several configurations to accomplish a wide range of applications.

MILESTONE

HELPING CHEMISTS – Milestone has been active since 1988 in the field of microwave sample preparation. With over 20000 instruments installed worldwide, we are the acknowledged industry leader in microwave technology. Milestone vision is to help chemists by providing the most technologically advanced instrumentation for research and quality control. Our products offer a wide range of applications, such as microwave acid digestion, solvent extraction, synthesis and ashing. Furthermore we manufacture products for acid purification and direct mercury determination in solid, liquid and gas samples. We offer our customers the highest level of application support, building up over the years a relationship based on trust and commitment.

ETHOS X

Advanced Microwave Extraction System for GC and HPLC Analysis

Samples submitted for GC and HPLC analysis require pre-treatment. The fundamental step in sample pre-treatment is the extraction of the compounds of interest from the sample matrix. This is the least evolved -many people still use the Soxhlet method invented in 1879-, most error-prone step in the overall analytical procedure.

The use of microwave energy to accelerate solvent extraction procedures was first described by Ganzler et al. in 1984. These researchers used polar, microwave absorbing solvents or mixtures to extract crude fat from food and pesticides from soil matrices. Microwave extraction rates were found to be significantly faster, with recoveries comparable or superior to traditional Soxhlet extraction, and with a substantial reduction of the amount of solvent required.

The new Milestone ETHOS X is an advanced microwave extraction system offering the best technology currently available for GC, GC-MS and HPLC sample preparation.

- High sample throughput
- Low running cost
- Effectiveness and Consistency
- Simplicity

FAST
EASY
EFFECTIVE
CONSISTENT
ECONOMICAL




The applications of the ETHOS X include microwave extraction in the environmental, pharmaceutical, food and feed, and polymer fields.

THE NEW MILESTONE

FAST - Microwave extraction is completed in just few minutes. The Milestone ETHOS X can simultaneously process multiple samples in a matter of minutes. Microwave assisted extraction uses closed vessels to heat the extraction solvent above its atmospheric boiling point. The elevated temperature increases the solubility of the analytes of interest and lowers the viscosity of the solvent, allowing it to better penetrate the matrix. This leads to dramatically reduced extraction times.

EASY - An important feature of the ETHOS X system is that it easily adapts to existing extraction chemistry. This is accomplished through the use of a unique, patented material, called Weflon. Without Weflon, extractions could only be performed with polar solvents (Acetone, Methanol, etc.) or mixtures of polar and non-polar solvents, because non-polar solvents are not heated by microwaves. Weflon eliminates this problem by acting as a coupling agent. Weflon stir bars are heated by microwaves and they subsequently transfer this heat to the non-polar solvent.

EFFECTIVE and CONSISTENT - Microwave extraction produces equal or higher analyte recoveries than older methods. Thanks to a combination of higher extraction temperatures, closed vessels, magnetic stirring, and precisely controllable temperature conditions, users of microwave extraction can expect a better quality of the results. The homogeneity of the microwave field and the precision of the temperature control are key elements in microwave extraction.

ECONOMICAL - Lower solvent usage reduces the costs of solvent purchase and disposal. Microwave extractions are carried out in closed, sealed vessels. The matrix is constantly bathed with hot solvent in a self-promoting reflux action with no loss of volatile analytes or solvent. The use of closed vessels, with the speed and efficiency of microwave heating, allows extractions to be performed with significantly less solvent, without sacrificing accuracy or precision. The simplicity of the microwave technique, along with the ability to process multiple samples simultaneously, reduces the attended labor time and increases overall productivity.

E ETHOS X

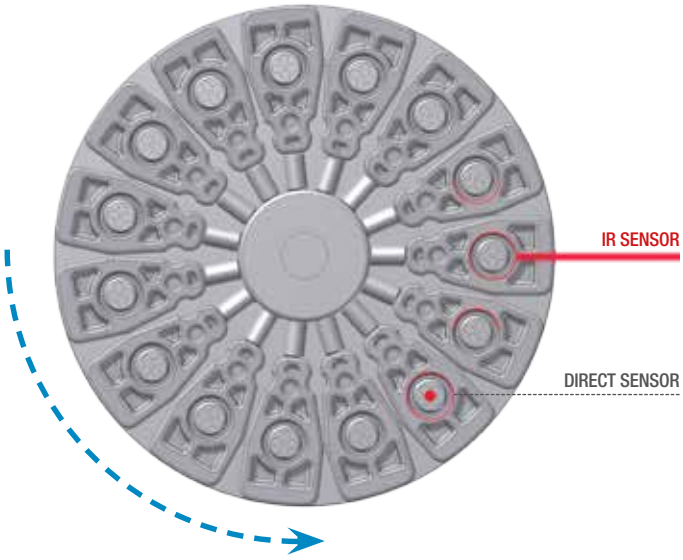
LARGEST MICROWAVE CAVITY - The new Milestone ETHOS X microwave cavity has a volume in excess of 70 liters, by far the largest currently available. Why is this important and what are the main implications of this design? Firstly, extraction rotors with more sample positions can be accommodated thus improving productivity and sample preparation throughput. Secondly, the microwave unit is inherently much safer, because a larger cavity better contains gases escaping from vessels, should there be a sudden over pressurization.

HIGHEST MICROWAVE POWER - The ETHOS X is equipped with two 950 Watt magnetrons for a total of 1900 Watt making it the most powerful microwave extraction system available. The system additionally employs a rotating diffuser that evenly distributes the microwaves throughout the cavity. High power coupled with the diffuser enables very fast heating of high throughput rotors.

PRESSURE-RESPONSIVE DOOR - The ETHOS X features a full stainless steel door with an innovative opening and self-resealing mechanism. Should there be a sudden over-pressurization of the cavity, the door slightly opens for rapid and safe pressure release and the microwave power is instantaneously cut off. Immediately afterward, the door is pulled back, resealing the cavity. For additional safety, an automatic door locking system does not allow the user to open the ETHOS X door during the microwave run. At the end of the run, the door remains locked until the solutions have cooled down to a user preset temperature. This prevents misuse of the instrument and in turn exposure of the chemist to high pressure vessels.

TEMPERATURE AND PRESSURE SENSORS - The new Milestone ETHOS X is equipped with the most advanced yet easy to use reaction sensors for complete quality control of the extraction conditions. Direct temperature and pressure control are used in a single reference vessel. In all vessels, contact-less temperature is used where the actual temperature of each and every vessel is continuously shown on the instrument control terminal during the microwave run, allowing an instant visual check of the extraction conditions. In addition, a contact-less pressure sensor monitors and controls all vessels simultaneously, preventing any leakage or venting.

Left: Pressure-responsive door schematics.
Right: Direct and contact-less temperature control in all vessels are available with the ETHOS X.



PRESSURE ROTORS - A variety of different pressure rotors are available for the ETHOS X, to accomplish any kind of extraction task, from environmental samples to food and feed, from pharmaceutical matrices to polymers. The SK-12 and the SR-12 rotors consists of a carousel holding up to 12 high-pressure TFM vessels, with a volume of 100 mL, while the EK-24 consists of a 24-positions carousel, which holds large pressure vessels made of an innovative and unique inert polymer material. At the core of the vessel there is a disposable and inexpensive 100 mL glass vial. A self-regulating pressure cover assures safe operations of the system. Fast, easy-to-use automatic capping tools makes sure all vessels are properly tightened prior the microwave run.

USER INTERFACE - The ETHOS X is controlled via a compact terminal with an easy-to-read, bright, full-color, touchscreen display. The terminal is provided with multiple USB and Ethernet ports for interfacing the instrument to external devices and to the local laboratory network. The terminal runs a completely new user-friendly, icon-driven, multi-language software to provide easy control of the microwave run. Simply recall a previously stored method or create a new one, press 'START' and the system will automatically follow the user defined temperature utilising a sophisticated PID algorithm. Several applications, including all US EPA and ASTM methods available, are preloaded in the ETHOS X terminal. There is no need to input the number of samples or weights being extracted, as the software will automatically regulate the microwave power accordingly. This assures a consistent quality of extraction and simplifies the use of the instrument.

ETHOS X User Interface

TECHNICAL SPECIFICATIONS

Milestone ETHOS X Advanced Microwave Extraction System for GC and HPLC Analysis

The complete system includes:

- Microwave cavity: 18/8 stainless steel housing; largest microwave cavity: 43 x 40 x 41 (H) cm (70,5 liters); inlet/outlet ports: upper flange 36 mm ID, plus additional ports on the side walls; chassis protected against corrosive media with polymer coating; door completely made of 18/8 stainless steel with multiple independent safety interlocks to prevent microwave emission in case of improper closure or misalignment.
- Built-in exhaust system located above the cavity and separated from electronics to prevent corrosion.
- Microwave emission with dual magnetron system with rotating diffuser for homogeneous microwave distribution in the cavity; two 950 Watt rated magnetrons, for a total of 1900 Watt; exclusive magnetron protection from reflected microwave power; continuous and PID-controlled microwave emission at all power levels.
- Built-in fiber optic temperature control.
- Built-in contact-less infrared temperature control.
- Built-in contact-less pressure control.
- Built-in magnetic stirrer.
- Built-in software-controlled digital camera.
- Safety standards: EN61010-1:2001; EN61010-2-010:2003; UL61010-1:2004; CAN/CSA-C22.2 No 61010-1:2004; CAN/CSA-C22.2 No 61010-2-010:2004; IEC 61010-2-010:2003; EN61326-1:2006.
- Control terminal 660, touch screen; 6,5” TFT display; 640x480 VGA resolution with 64k colors; 5 USB ports, 1 RS-232 port, 1 LAN port, 2 video ports.
- Icon-driven multi-language operating software (Chinese, English, French, German, Italian, Japanese, Polish, Portuguese, Russian, Spanish and Turkish) software allowing the user to edit, save and run a virtually unlimited number of methods.
- Weight: ca. 84 kg.
- Dimensions: 54 x 64 x 69 (H) cm.
- Power supply: 220-240V/50 or 60Hz, 3,5 kWatt.

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 - email: 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 - email: 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 - email: 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 - email: mws@mls-mikrowellen.de

CAT377EN-001 • 2016-08