



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



ETHOS One

Operator Manual

MA133

Thank you for selecting our microwave system. We are sure that you will be completely satisfied with the performance of this new unit entering your laboratory.

We invite you to read carefully this user manual and to keep it in reach for convenient and fast consulting. The person who will be using this unit should have received an appropriate training from a Milestone trained technician.

The valid version of this manual is English.
In case of translation in other languages, please refer to the original version.

For any possible clarification or any request for assistance please contact either our Representative in your country:

or Milestone at the following address:

Milestone Srl

Via Fatebenefratelli, 1/5
I-24010 Sorisole (BG) Italy
Tel +39 035 573857
Fax +39 035 575498
Website www.milestonesrl.com
Email analytical@milestonesrl.com



Caution!
Please read the operator manual before using the instrument!

SYMBOLS USED IN THIS MANUAL



An instruction accompanied by this symbol provides a cautionary statement: **WARNING.** Failure to follow the instruction may endanger the user or cause damage to the instrument.



Please read carefully this instruction.

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Safety

Your personal safety is of the utmost importance for us, therefore, the precautions necessary to perform chemistry under these conditions must be strictly followed. All procedures also apply to synthesis procedures. Any and all persons involved in the use of this equipment must read the following precautions.

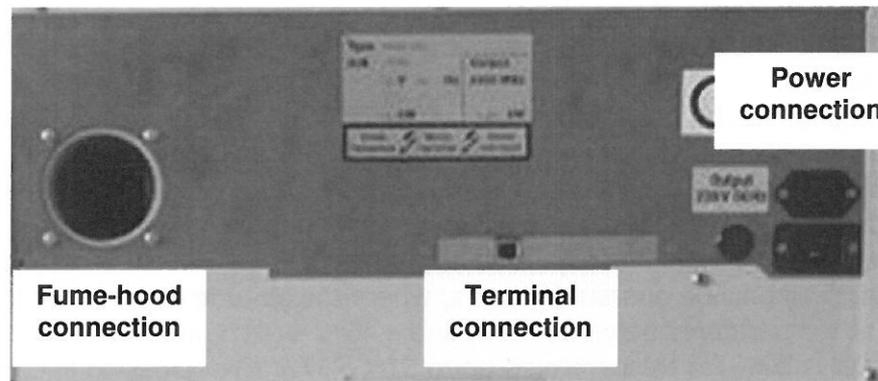
1. External fire protection should be installed according to local regulations for equipment operating unattended.
2. If materials inside the equipment should ignite, keep the cavity closed, switch off the equipment and disconnect the power cord or turn off the power at the fuse or circuit breaker.
3. Do not label or use metal objects of any kind in or on the vessels as arching and cracking may occur.
4. It is inadvisable to use some reagents (e.g. triethyl orthoformate) in high temperature microwave chemistry because of the risk of explosion associated with their chemical properties. Please consult MSDS data sheets for the specific properties of each chemical before use.
5. Reactions in which there may be a risk of explosion or that are extremely exothermic should not be performed with the system.
6. The system is a closed vessel system; specific precautions have to be applied to reactions or reagents that release gases, e.g. decarboxylations or ammonium hydroxide, respectively. Low concentrations and temperatures are recommended for this type of reaction.
7. Chemicals whose behaviors are unknown when exposed to microwave heating must be treated with caution e.g. test the reaction at lower temperatures and lower concentrations, use shorter reaction times and perform the reaction in a fume hood with the window closed.
8. Chemicals that absorb microwave energy well and that are not mixed properly in the reaction mixture may cause damage to the process vial. Examples are palladium on carbon or polyphosphoric acid. These chemicals can melt the vial if present on dry pieces adhering to the glass wall outside of the reaction mixture so it is important to check that they are contained within the reaction mixture.
9. The equipment shall not be used for heating and ventilation of laboratories. The equipment shall not be used as a sterilizing equipment.
10. The equipment shall not be used as a medical electrical equipment. The equipment shall not be used for heating food and beverages. The equipment shall not be used for mass production. The equipment shall not be used in an explosive atmosphere.
11. The equipment shall only be operated indoors, where the altitude does not exceed 2,000 meters (1,242 feet), at temperatures between +5°C and +40°C (+41°F and +104°F). The maximum relative humidity is 80% for temperatures up to 31°C (87.8°F) decreasing linearly to 50% relative humidity at 40°C (104°C).
12. The equipment shall be operated in places where fluctuations of the main supply voltage are not exceeding values of 1.10 times the nominal voltage and are not below 0.90 times the nominal voltage. The equipment shall only be operated in places where transient overvoltages on the main supply are not exceeding values of overvoltage category II specified in IEC 60364-4-443.
13. The equipment shall only be operated in places where normally only non-conductive pollution occurs and occasionally, however, a temporary conductivity caused by condensation may occur. The equipment shall not be stored or operated in places where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapor or gas).

MILESTONE ETHOS ONE

Setting up your Milestone ETHOS One is easy. Simply follow this instruction to setup your Milestone ETHOS One. After you complete the setup, take some time to explore the features of your system. The user manual provides tips and instructions to help you learn the basics of your ETHOS One.



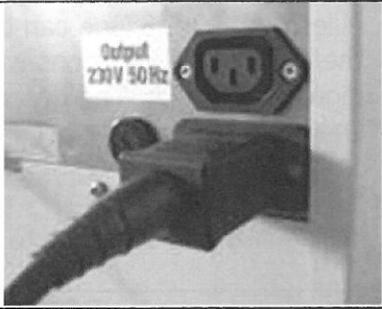
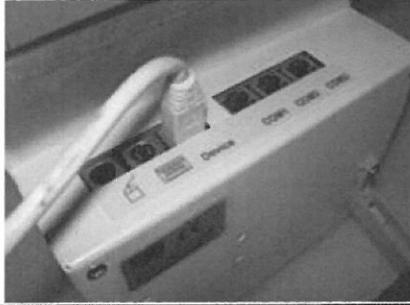
SETUP YOUR ETHOS One



Rear view of Milestone ETHOS One

M I L E S T O N E

GETTING STARTED GUIDE

Step	DESCRIPTION	PICTURE
1	Connect the power cord to the back side of the unit	
2	Plug-in the terminal cable to the back side of the unit and then to the Terminal	 
3	Connect the exhaust tube to the unit and place the opposite side into the fume-hood (or any connection to it)	
4	Place the flashcard into the terminal	



NOTE

Further information regarding the installation can be found in the ETHOS One user manual.

M I L E S T O N E

GETTING STARTED GUIDE

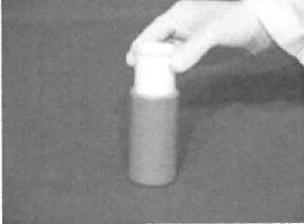
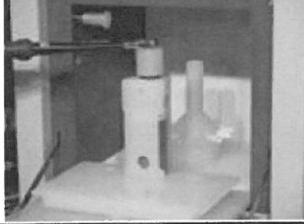
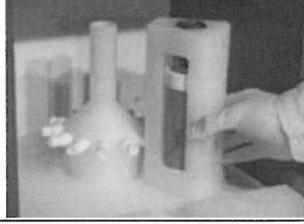
START USING YOUR ETHOS ONE

Milestone ETHOS One can be used with a wide range of rotors, inserts and accessories. In the following instructions we will quickly show the way to use a Milestone closed vessel digestion system. The description of Your configuration is fully reported into the ETHOS One user manual.



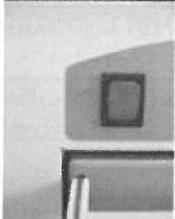
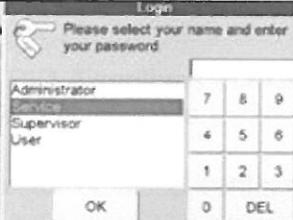
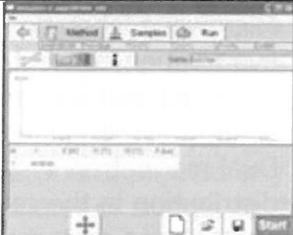
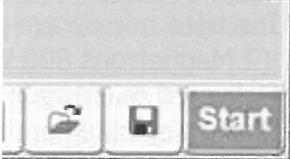
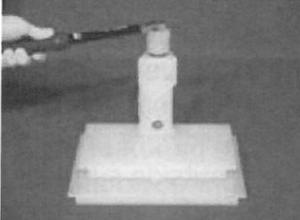
NOTE

Milestone suggests to **entirely** read the User Manual before to run the unit.

Step	DESCRIPTION	PICTURE
1	Remove the vessel from the rotor	
2	Place the vessel on the balance and weight the sample*	
3	Add the reagents*	
4	Close the vessel	
5	Connect the temperature sensor	
6	Place the vessel complete into the rotor	

M I L E S T O N E

GETTING STARTED GUIDE

7	Switch "ON" the unit	
8	Enter the administrator password (123456)	
9	Push "PressPREP" icon	
10	Set the microwave program*	
11	Close the door and press "START"	
12	After the cooling remove and open the vessels	
13	Transfer the solution into a marked flask. Dilute it and rinse the vessels with distilled water	

*The sample amount, the reagents and the microwave program must be chosen in accordance with the Milestone guidelines (see Milestone application notes included in your CD)



More information can be found into the ETHOS One User Manual

ETHOS ONE**ETHOS ONE TECHNICAL SPECIFICATIONS**

- Microwave labstation for quality control for digestion, drying and evaporation/concentration procedures.
- Patented, self-sealing, pressure responsive, stainless steel door with protected glass window for visual inspection.
- Dual magnetron system with pyramid- shaped diffuser for homogeneous microwave distribution in the cavity.
- Magnetrons protected from reflected microwave power.
- Installed microwave power 1.600 Watts
(2 Magnetrons 800 Watts x2).
- Delivered microwave power 1.500 Watts in 1 Watt increments.
- User-selectable continuous and pulsed microwave emission.
- Large microwave cavity 35 x 35 x 35(h) cm.
- Cavity illumination.
- Microwave cavity all made of 18/10 stainless steel housing with multilayer Teflon plasma coating applied at 350°C.
- All hardware protected against acid/organic solvents with polymer coating both inside and outside surfaces.
- Total of : micro-switches of which 4 safety interlocks to prevent microwave emission with open door.
- Exhaust located above the cavity separate from electronics to prevent any corrosion.
- Weight: ca. 90 kg
- Dimensions 55cm x 55cm x 65cm
- Power 220V/50-60Hz, 3.5 kW

Advanced Controls

- ATC-400CE Automatic Temperature Control for direct monitoring of vessel content, reaction temperature up to 300°C

Control Terminal 640

- Control terminal 640, touch screen, industrial grade controller 6.5" screen with 65.000 colours.
- VGA resolution 640x480 for sharp process graphic.

- 1 USB port to connect printer, 2 PS2 ports for mouse and keyboard, 3 RS 232 for external devices.
- Virtually unlimited storage of microwave digestion methods inclusive of multiple steps each; each step includes microwave power, time interval and external temperature, and pressure.
- Removable Windows-compatible Flash card for automatic saving and downloading of microwave methods and runs.

Software

- "Easy-Control" Software for full GLP documentation with PID Algorithms to exactly duplicate the required temperature curve, and for full Quality Assurance.

System control options includes the following devices

- APC-55 Automatic Pressure Control for direct sensing monitor of vessel content, reaction pressure control up to 55bar.
- IRT Infra Red Temperature Control, advanced non-contact monitor to protect rotors and vessels with optional magnetron regulation or system shutdown.
- QP Automatic Pressure limit control in all vessels.
- ASM-400, automatic stirring in all vessels with variable speed range of 10-400 rpm.

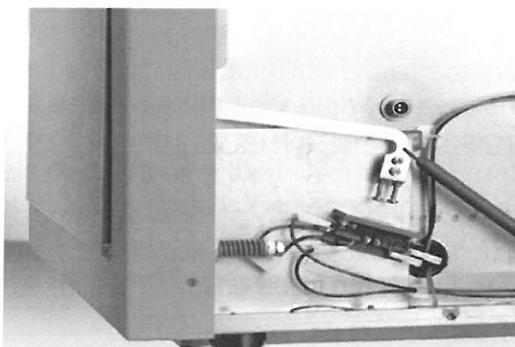
INTRODUCTION TO MILESTONE ETHOS ONE

The ETHOS One fully embodies Milestone's philosophy in microwave sample preparation. Specifically designed for closed vessel acid digestion, it offers an integrated approach to microwave sample preparation, with full control of all reaction parameters. The ETHOS One is built from the ground up to offer the highest performance and best safety features in the industry. A wide choice of rotors is available, allowing the ETHOS One to process any kind of samples, from the relatively easy environmentals, such as wastewater or sludge, to the most challenging, such as ceramics or refractory materials. Furthermore, Milestone's visionary concept of Total Microwave Sample Preparation, finds in the ETHOS One its highest expression.

With the proper choice of accessory, the ETHOS One turns into a first-class instrument for open vessel acid digestion, sample drying, solution evaporation, and even solvent extraction or protein hydrolysis. All in a single microwave system: the all new ETHOS One.

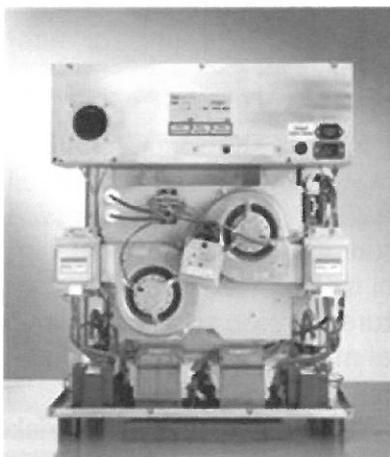
HIGHEST SAFETY THROUGH UNIQUE PRESSURE RESPONSIVE DOOR

In our continuing commitment to making the world's safest laboratory microwave systems, Milestone has further improved the safety of the ETHOS One system, featuring a 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 opens slightly for immediate 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.



HIGHEST MICROWAVE POWER PROVIDES FAST VESSEL HEATING

The ETHOS One is equipped with two magnetrons. Installed power is 1.600 Watts (1500W delivered) allowing rapid heating of even high throughput rotors.

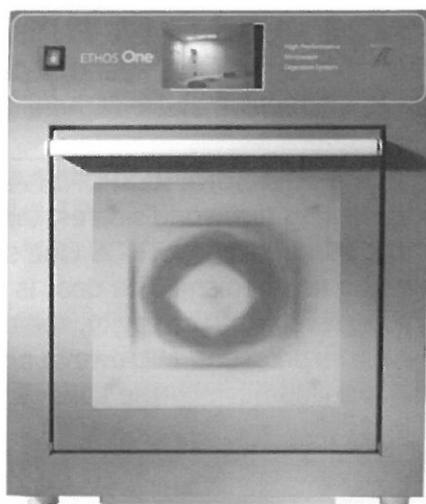


ALL STAINLESS-STEEL CONSTRUCTION

The chassis of the ETHOS One is made of corrosion-resistant stainless steel, not melted plastic. The cavity and the door are plasma-coated with PTFE to protect the unit.

HOMOGENEOUS MICROWAVE DISTRIBUTION

A pyramid-shaped rotating diffuser evenly distributes the microwaves in the cavity. This unique design ensures optimal microwave distribution, preventing localized hot and cold spots.



FAST VESSELS AIR COOLING FOR HIGHER THROUGHPUT

The ETHOS One 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.

ETHOS ONE FLEXIBILITY

Milestone offers a wide range of closed vessel rotors to completely answer to your needs. See below a brief description of all the options.

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 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. Just 3 ml of nitric acid are sufficient to digest 250 mg of organics!

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



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.



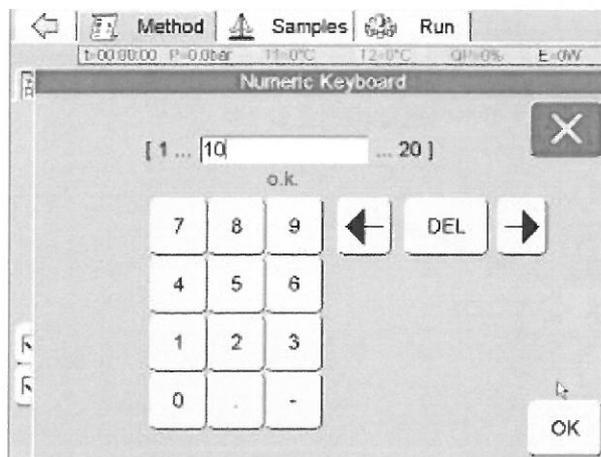
HIGH TEMPERATURE

The NOVA-8 rotor holds 8 TFM vessels with a volume of 75 ml, and allows the digestion of ceramics and refractory materials, samples that often pose a challenge to users, as the very high temperatures and pressures required to digest them may result in damaging conventional pressure vessels or shortening their lifetime.

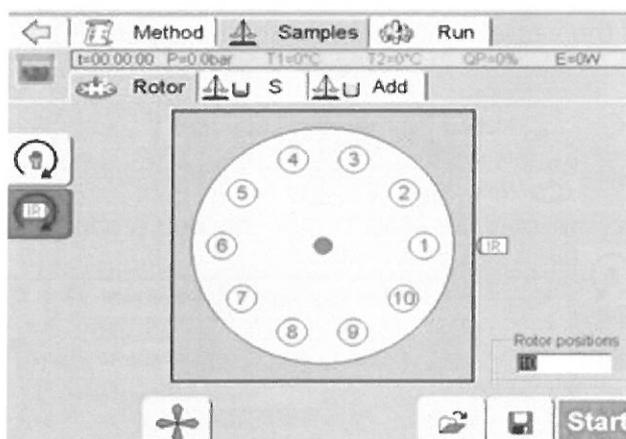
The Milestone NOVA-8 rotor is especially designed to work at sustained high temperature up to 300°C, allowing for a safe and complete digestion of the most difficult matrices



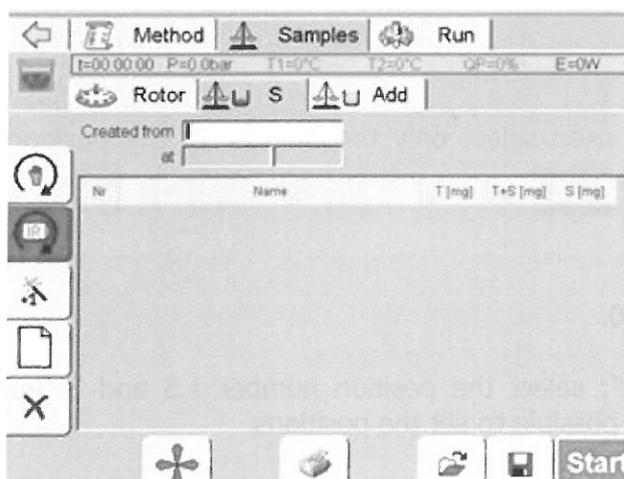
Reference vessel must be placed in position number one on rotor plate.



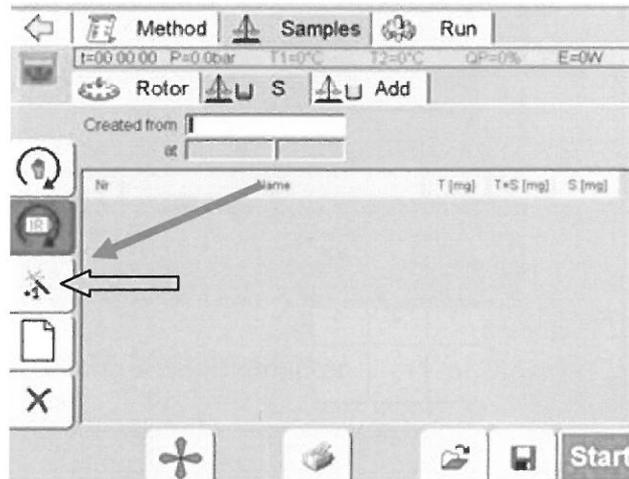
Press **"Samples"**. The screen shows the diagram of the rotor. Pressing on the number (yellow circle), the carousel will rotate until the selected position is in front on the infrared sensor (IR).



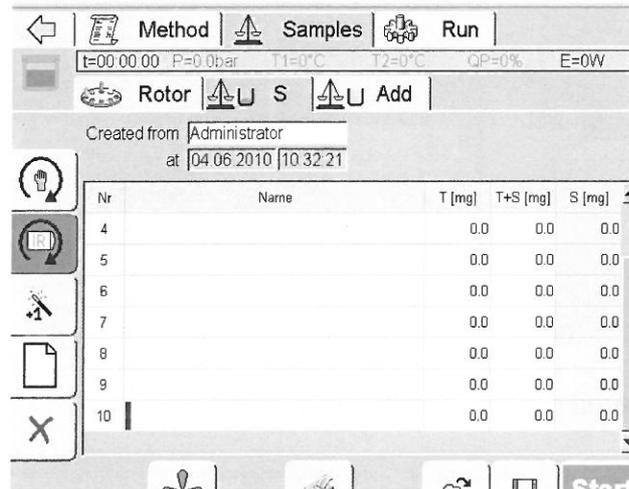
For Multiple reading of Infrared sensor (TempSURE), press **"S"**.



Press the **"Magic Wand"** icon and the display will show the first empty line:



Press the **"Magic Wand"** icon until the number of vessels present in the carousel is reached, for instance 10. The Infrared sensor will automatically recognize the position of the vessels and display the temperature of the vessels during the heating program.

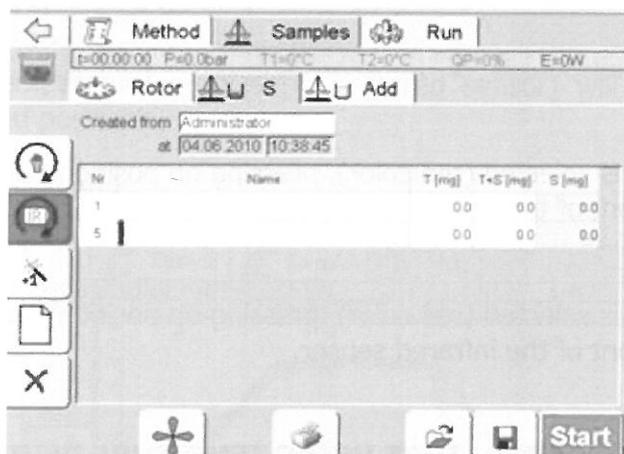
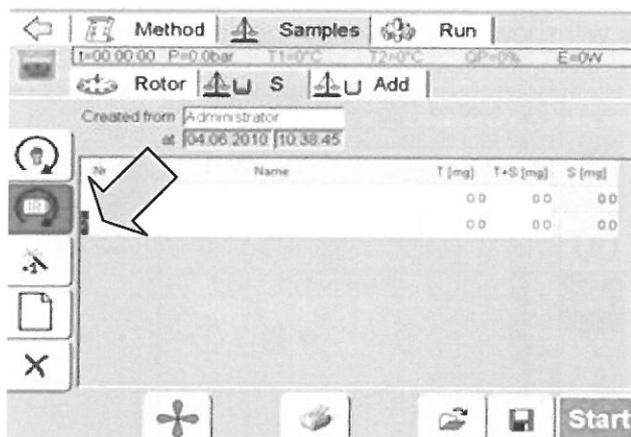


When incomplete rotor is used select only the number of the positions where the vessels are placed.

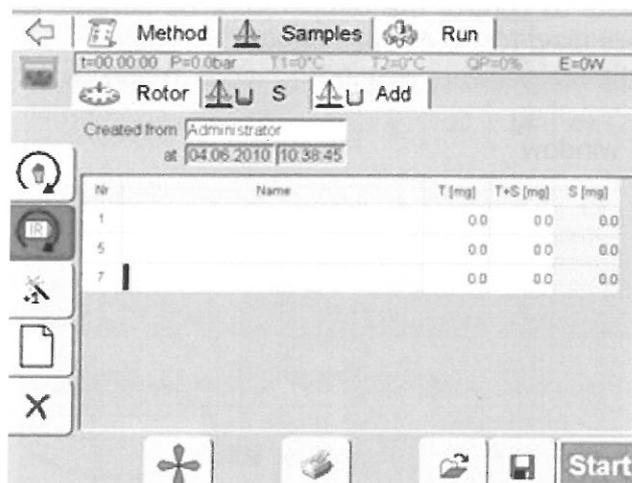
Example

Rotor: SK10 (10 positions)
Set the rotor positions to 10.

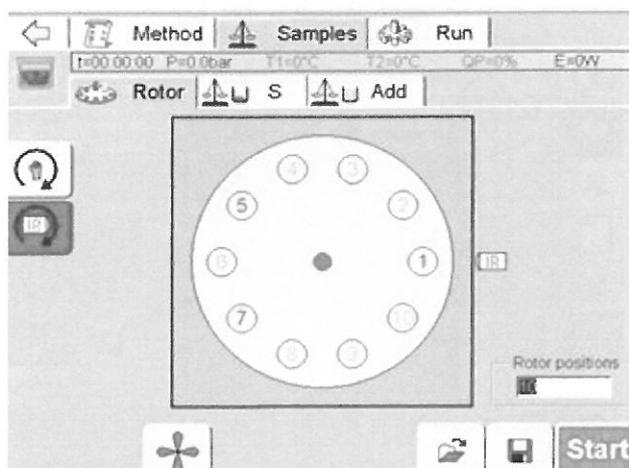
Press **"Samples"** and **"S"**; select the position number 1,5 and 7. Pushing on the number of vessels (**"Nr"** column) it is possible to set the positions.



Clicking on the **"Magic Wand"** add a new line and change the number to 7.



Press **"Rotor"** the display will show in yellow only the selected positions.



If this icon is selected (red color), pressing on position number it automatically move in front of the user.



If this icon is selected (red color), pressing on position number it automatically move in front of the infrared sensor.

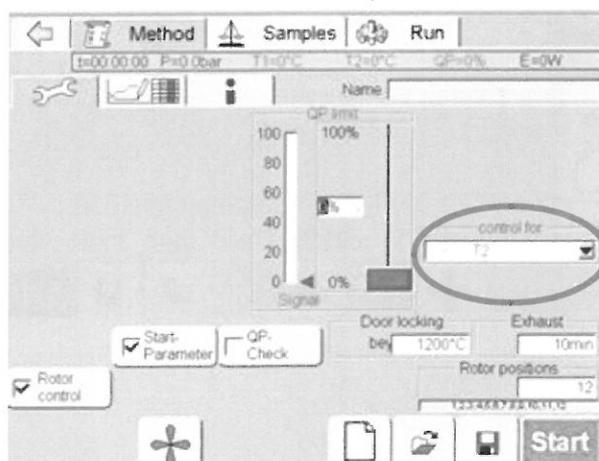
HOW TO CONTROL THE TEMPERATURE USING TEMP-SURE DEVICE.



Warning

Milestone suggests to control the temperature by infrared sensor **only** when glass or quartz vessels are used (Q-20 or open vessels digestion)
Do not control the temperature by infrared when Teflon vessel are used.

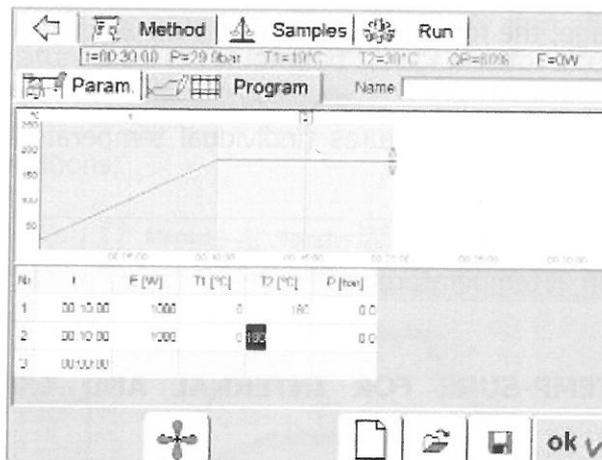
Set **"T2"** into "control for" window



Set all the parameters (QP, Twist, etc.) and rotor positions as described in the previous paragraph.
Set the microwave program accordingly to Milestone application notes:

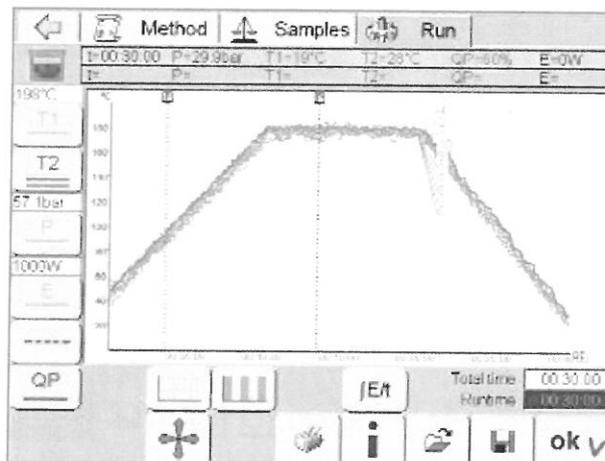
MILESTONE

USER MANUAL



Press "Run" and then "Start" automatically after a few seconds the program will start. During the run three temperature profiles (for infrared sensor) will appear on the screen in accordingly to the selected positions.

Program finished for **10** positions:



Program finished for **3** positions:

