

MS Oven

Instruction manual

Catalog No. MO-AOR
MO-ARC
MO-ARK



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Version 01B
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Packing list

MO-AOR

1 x MS Hybridization/Orbital Shaker Oven (without Rotisserie)

1 x Power cord

1 x Instruction manual

3 x Spare O-ring for orbital motor belt replacement

And/or

1 x Rotisserie (Separate order required)

MO-ARC

1 x MS Hybridization/Reciprocal Shaking Oven (without Rotisserie)

1 x Power cord

1 x Instruction manual

And/or

1 x Rotisserie (Separate order required)

MO-ARK

1 x MS Hybridization/Rocking Oven (without Rotisserie nor Rocking Shaker)

1 x Power cord

1 x Instruction manual

And/or

1 x Rotisserie (Separate order required)

1 x Rocking Shaker Platform (Separate order required)

Signed by:

Date:

Major Science is liable for all missing or damaged parts / accessories within 7 days after customer received this instrument package. Please contact Major Science immediately regarding this issue. If no response within such time period from consignee party, that will be consignee party's whole responsibility.

Warning

Major Science oven series has been tested and found to comply with the limits for the CE regulation. Also, MS Oven series is RoHS compliant to deliver confident product which meets the environmental directive. These limits are designed to provide reasonable protection against harmful interference when the instrument series is operated in a commercial environment. This instrument series used together with power supply unit generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this instrument series in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. It is strongly recommended for the user to read the following points carefully before operating this equipment.

1. Read and follow the manual instructions carefully.
2. Do not alter the equipment. Failure to follow these directions could result in personal and/or laboratory hazards, as well as invalidate equipment warranty.
3. Use a properly grounded electrical outlet with correct voltage and current handling capacity.
4. Disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel.
5. Never use this instrument series without having the safety cover correctly in position.
6. Do not use the unit if there is any sign of damage to the external tank or cover. Replace damaged parts.
7. Do not use in the presence of flammable or combustible material; fire or explosion may result. This device contains components which may ignite such materials.
8. Refer maintenance and servicing to qualified personnel.
9. Ensure that the system is connected to electrical service according to local and national electrical codes. Failure to make a proper connection may create fire or shock hazard.
10. Use appropriate materials and operate correctly to avoid possible hazards

of explosion, implosion or release of toxic or flammable gases arising from overheated materials.

11. The unit shall be operated only by qualified personnel.

Safety Information

Use high level of precaution against any electrical device. Before connecting the electrical supply, check to see if the supply voltage is within the range stated at the rating label, and see to it that the device be seated firmly. Place the unit in a safe and dry location; it must NOT touch the surrounding. Follow the safety precautions for chemicals / dangerous materials. If needed, please contact qualified service representative or service@majorsci.com

Environmental Conditions

Ensure the instrument is installed and operated strictly under the following conditions:

1. Indoor use only
2. $\leq 95\%$ RH
3. 75 kPa – 106 kPa
4. Altitude must not exceed 2000 meters
5. Ambient to 40°C operating temperature
6. Pollution degree: 2
7. Mains supply voltage fluctuations up to $\pm 10\%$ of the normal voltage

Avoiding Electrical Shock

Follow the guidelines below to ensure safe operation of the unit.

The New Oven has been designed to utilize shielded wires thus minimizing any potential shock hazard to the user. Major Science recommends against the use of unshielded wires.

To avoid electrical shock:

1. In the event of solution spilling on the instrument, it must be dried out for at least 2 hours and restored to NORMAL CONDITION before each operation.
2. Never connect or disconnect wires loading from the power jacks when the red indicator light of power switch is on.
3. WAIT at least 5 seconds after stopping a run before handling output leads or any connected apparatus.
4. ALWAYS make sure that your hands, work area, and instruments are **clean** and **dry** before making any connections or operating the power supply.
5. ONLY connect the power cord to a properly grounded AC outlet.

Avoiding Damage to the Instrument

1. Do not attempt to operate the device if damage is suspected.
2. Protect this unit from physical damage, corrosive agents and extreme temperatures (direct sunlight, etc.).
3. For proper ventilation and safety concerns, keep at least 10 cm of space behind the instrument, and at least 5 cm of space on each side.
4. Use high level of precaution against the damages on the unit.
5. Do not operate the unit out of environmental conditions addressed above.
6. Prior to applying any cleaning or decontamination methods other than manufacturer's recommendation, users should check with the manufacturer's instruction to see if the proposed method will damage the equipment.

Equipment Operation

Follow the guidelines below to ensure safe operation of the unit:

1. NEVER access dangerous chemicals or other materials to prevent possible hazard of explosion and damage.
2. Do not operate the unit without lids or covers to prevent possible hazards.
3. A temporary conductivity caused by condensation might occur even though this series is rated Pollution Degree 2 in accordance with IEC 664.

Symbol

The symbol used on MS Oven series is explained below.



Indicates an area where a potential shock hazard may exist. Consult the manual to avoid possible personal injury or instrument damage.



Indicates disposal instruction. **DO NOT** throw this unit into a municipal trash bin when this unit has reached the end of its lifetime. To ensure utmost protection of the global environment and minimize pollution, please recycle this unit.

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Section 1 Introduction

1.1 Overview

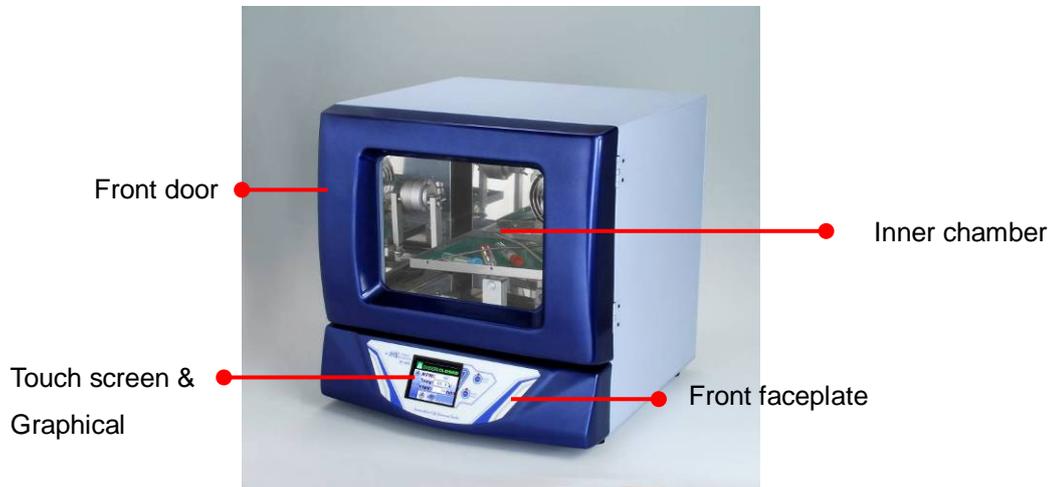
The **MS Oven Series** is the advanced and newly renovated version of MS incubators. It comes with a fashionable front door design (or panel) and a user-friendly touch screen interface. With excellent temperature accuracy and uniformity, users are able to perform temperature-controlled mixing or reaction precisely. The units are all equipped with a built-in Rotisserie function with one of the three shaker motion: Orbital, Reciprocal, or Rocking. Unique Orbital shaker design exhibits both clockwise and counterclockwise motion. MS Oven is ideal for nucleic acid hybridization and incubation such as Southern, Northern, and Western blot. Full accessories are also available upon request to meet different applications.

1.2 Feature

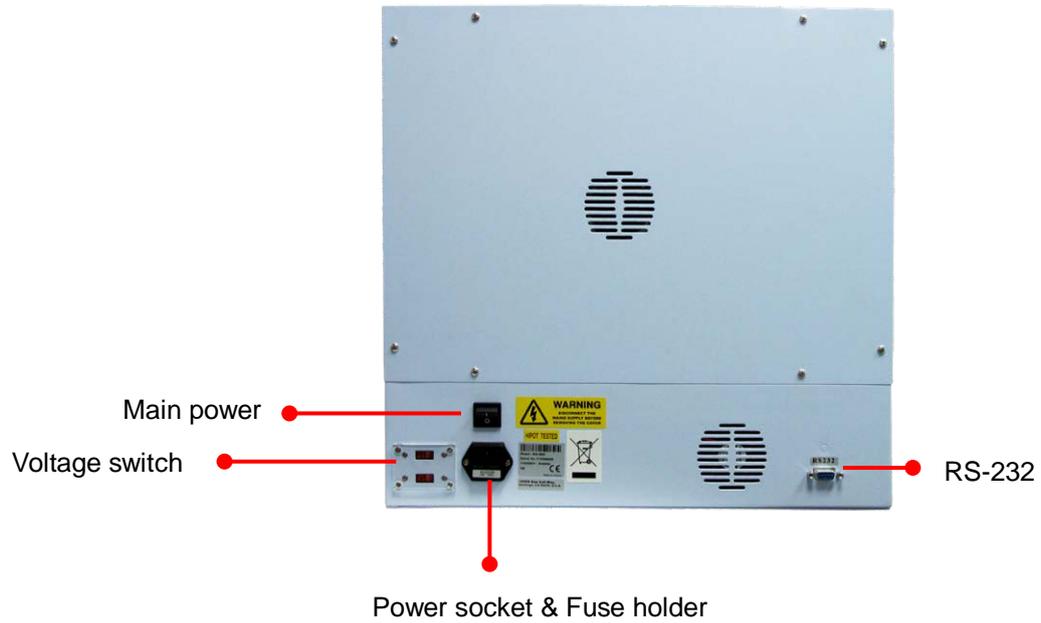
- 3.5" Large display
- Touch screen & graphical control interface
- Built-in Rotisserie function for all modules
- Orbital (Bi-directional) / Reciprocal / Rocking motion
- User temperature calibration
- Broad temp. control range
- Timer with alarm function
- Safety device while system malfunction
- Safety door switch device
- Full accessories available

1.3 Components guide

Front view (MO-ARK)



Rear view



Section 2 Technical Specification

Model no.	MO-AOR	MO-ARC	MO-ARK
Display	3.5" 64K color TFT display		
Controller	32-bits Microprocessor		
Control interface	Touch screen & Graphical interface		
Rotisserie function	Yes		
Rotisserie speed / Inc.	5 – 100 rpm / 1 rpm		
Timer	1 – 9999 min with alarm, continuous		
Shaker motion	Orbital	Reciprocal	Rocking
	Clockwise / Counterclockwise		
Shaker speed	0 – 200rpm	5 -100rpm	5 – 100rpm
Temperature control range	Ambient +5°C to 85°C		
Temperature increment	0.1°C		
Temperature uniformity at 37°C	±0.2°C		
Temperature accuracy at 37°C	±0.2°C		
User temperature calibration	Yes		
Inner chamber dimension	340 x 225 x 260mm (W x L x H)		
Overall dimension	442 x 462 x 452mm (W x L x H)		
Platform	270 x 200mm (W x D)		
Data logging	RS-232		
Weight	Approx. 29 kg		
Rated voltage	110/220V~ 50/60Hz (Selectable)		
Construction	Painted iron metal; ABS front door		
Safety device	Safety door switch Thermal safety switch Auto shut off upon fan failure Power failure auto recovery		

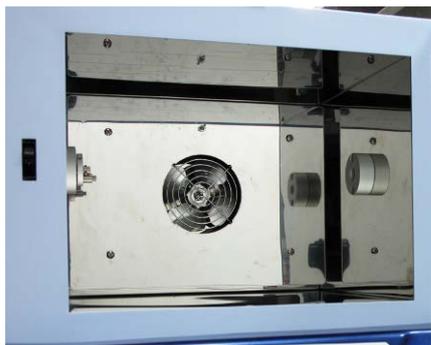
Section 3 Installation Instructions

The *MS Oven* is a pre-installed instrument. Orbital and Reciprocal shaker platforms are pre-installed with no adjustments needed while Rocking shaker platform will have to be adjusted to install the Rotisserie. Place the unit on a sturdy, level safe and dry place, then follow the instruction below for the Rotisserie installation.

3.1 Installing and assembling the Rotisserie and Rocking shaker

Rotisserie installation

Step 1 Insert the rotisserie shaft into the right side of the rotisserie holder



Step 2 On the left side, align the rotisserie notch with the pin, and release



Rocking shaker platform installation

Step 1 Place the rocking shaker platform into the inner chamber. The magnet on the bottom will automatically attach to the chamber.

Note: Please REMOVE the rotisserie before assembling the rocking shaker platform.



Step 2 Fix the arm with the rotisserie holder by tightening the screw.



3.2 User temperature calibration

The system allows users to calibrate the temperature parameter to their environment standard. Normally there is no need to perform this action unless there is a temperature discrepancy between the factory environment and your working environment. In such cases, follow the guidelines below to perform user temperature calibration.

Step 1 Place a certified thermometer in the oven chamber

Step 2 Switch on the main power and press the  button simultaneously. Don't release until display between 1000 and 1500 (On the upper left corner) is presented. Once the figure reaches between 1000 and 1500, release both keys, and the oven is now under Calibration Mode.

**Note: You can press the  together with main power switch and  to accelerate this process.*

Step 3 **CAUTION: DO NOT** press the "ZERO" button, it will change the zero calibration point, which requires in-factory calibration. Press START to initialize temp. calibration.



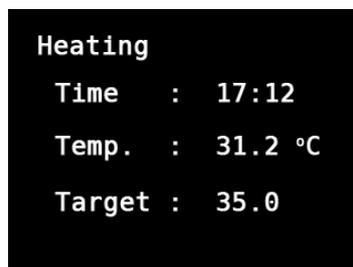
Step 4 Key in the working temperature value to be calibrated as the target temperature, press

“Enter”, and then start temperature control by pressing the  button



**Note: The calibration value varies accordingly to Users' preference. The input value should be the temperature where you control your experiment at most frequently.*

Step 5 Once the temperature reaches the set point, the system will **count** for 30 minutes to ensure temperature uniformity inside the unit. After 30 min, you are ready to input the calibration value.

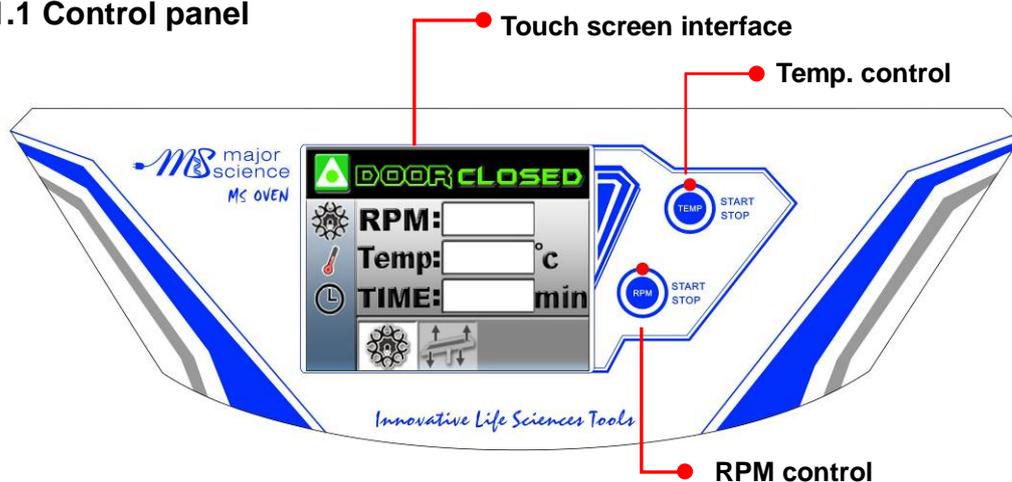


Step 6 Read the thermometer inside the oven chamber, and input that value into the system using the touch screen. The system will automatically take the temperature difference into account, and compensate for that difference by automatically adjusting the temperature.

Section 4 Operation Instructions

4.1 Control interface

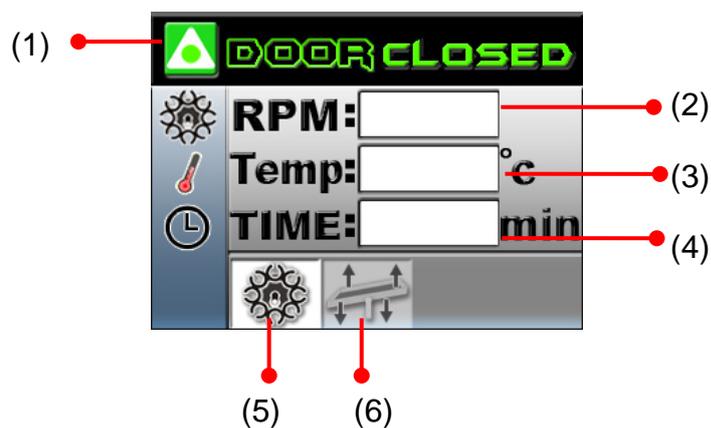
4.1.1 Control panel



- (1) **Touch screen interface:** Control parameters such as temp. or RPM can be operated through touch screen interface. Detailed descriptions are mentioned in **Section 4.1.2**.
- (2) **TEMP Start/Stop:** Start or Stop the temperature control
- (3) **RPM Start/Stop:** Start or Stop a motion (Either Rotisserie or Shaker)

4.1.2 Touch screen and graphical interface

The system is equipped with a 3.5-inch color touch screen as the control interface. Parameters such as temp. or RPM can be adjusted through the graphical interface.



(1) DOOR OPEN/CLOSE: Shows the front door status. If the door is open, this area will show “Door open”, if the door is closed, this area will show “Door close”. **The RPM and Temp. control will be disabled while the door is in open status.**

(2) Rotisserie or Shaker speed control: Rotisserie and Shaker speed can be adjusted in this area. To change between Rotisserie and Shaker motion, press Switch (5) or (6).

(3) Temperature control: Use the number keypad to adjust the temp. set point.

(4) Timer: Use the touch number keypad to set up time control

(5) Rotisserie mode: Press this button to switch to rotisserie mode

(6) Shaker mode: Press this button to change and switch to shaker mode (Orbital, Reciprocal or Rocking shaker). The icon varies depending on the shaker module. The figure shown above is a rocking shaker.

4.2 Start the operation

Step 1 Prepare the samples according to lab protocol. Place the sample into the oven chamber. Make sure the door closes all the way.

Step 2 To set the temperature value, press **Temp:** °C in the blank box. A number keypad will pop up. Enter the temperature value, and then press okay.

Step 3 To set the RPM value, press **RPM:** in the blank box. A number keypad will pop up. Enter the RPM value, and then press okay.

Step 4 To set the time, press **TIME:** min in the blank box. A number keypad will pop up. Enter the time, and then press okay.

**Note: Timer is for temperature control only. Timer activates when the target temperature has been reached for the first time.*

Timer description:

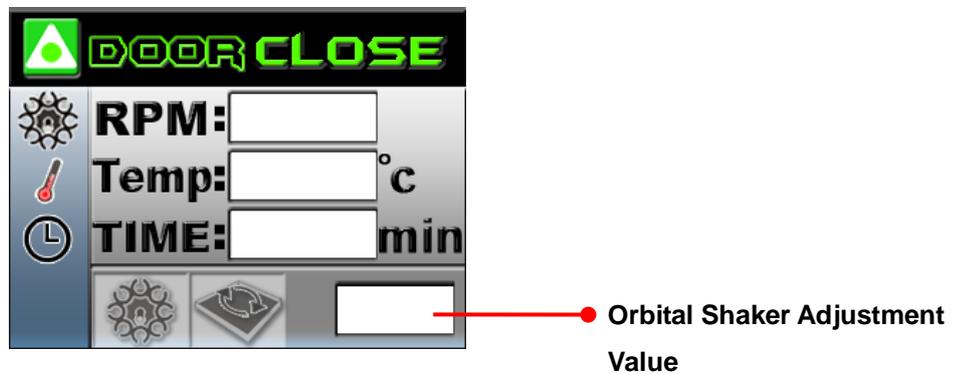
1. Timer is for temperature control only
2. Timer activates when the target temperature has been reached for the first time. If a value is set for time, it will count down from that value to 0, with alarm sounding for 1 minute. If no value is set for timer (ie. 0), timer will up count up to 9999, in which case the time will not increase anymore, but temperature control will remain.
3. After timer starts counting, if you reset the target temperature value, the timer will NOT reset the countdown.

Step 5 To start temperature control, press the  button. Once temperature control starts, the thermometer icon will start flashing.

Step 6 To start rotisserie or shaker motion, press the  button.

4.3 Orbital Shaker Setting

The orbital shaker has a slightly different control interface.



Step 1 Orbital Shaker Adjustment Value range: 0 and/or 0.1 – 10.

Step 2 When the value is set to 0, the shaker is uni-directional, in a counter-clockwise fashion.

Step 3 When the value is set to any value between 0.1 – 10, the shaker is bi-directional.

Step 4 Take 10 for example, if the value entered is 10, the shaker will go in the clockwise direction for 10 times, then counter-clockwise for 10 times, and so on.

Section 5 Trouble shooting and Maintenance

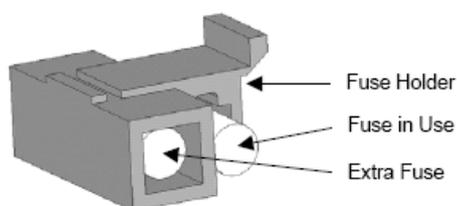
Fault	Possible causes and solution
1. The system does not heat up	<ul style="list-style-type: none">a. Door is not tightly closed. Check if the DOOR CLOSE icon is shown on the displayb. Temperature control is not activated.
2. Rotisserie or Shaking is not working	Check if the door is properly closed.
3. The system cannot be powered up	Broken fuse. Replace the fuse by following the procedure on the next page
4. Error_01	Communication error. The motor is malfunctioning. The system must be returned to the factory for full inspection
5. Temperature discrepancy between the display and thermometer	There might be some temp. discrepancies between factory setting and your environment. Adjust the temperature to your environmental standard by following the Section 3.2 User Temperature Calibration
6. Fan failure window	The system must be returned to the factory for full inspection
7. Thermal safety window	Temperature control malfunction. Temp. is 5°C over the set value, which means there may be components failure. The system will automatically shut off to prevent over heat. The system must be returned to the factory for full inspection

Replacing the Fuse

For additional fuses, contact Major Science co. Ltd.

To replace the fuse:

1. Turn off the main power switch at the rear of image system and detach the power cord from the rear of image system.
2. Open the fuse compartment located inside the Power Entry Module by inserting a small flathead screwdriver into the slot below the ON/OFF switch. Turn the screwdriver to gently pry open the fuse compartment. **Note:** the fuse compartment will not open with the power cord in place.
3. Pull the fuse holder out of the compartment and inspect the fuse. If the fuse is burned or there is a break in the fuse element, replace the fuse with an identical type of fuse (**5A/250V~**) as provided in the fuse holder (see figure below)
4. Place the fuse holder back into the compartment.
5. Snap the cover close.



Cleaning and maintenance

The oven interior can be cleaned with a mild detergent or water. To clean the oven, please make sure the power cord is disconnected.

The system should NEVER come into contact with the following reagents, which could cause irreversible damage:

Acetone, Phenol, Chloroform, Carbon Tetrachloride, Ethanol, Methanol, Isopropyl alcohol, Alkalis

Section 6 Ordering Information

Cat. No.	Description
MO-AOR	1 x MS Hybridization/Orbital Shaking Oven (without rotisserie), 110/220V~
MO-ARC	1 x MS Hybridization/Reciprocal Shaking Oven (without rotisserie), 110/220V~
MO-ARK	1 x MS Hybridization/Rocking Oven (without rotisserie and rocking shaker platform), 110/220V~

Accessories

MO-HY-8RT	1 x 40mm tube rotisserie for 8 tubes
MO-HY-16RT	1 x 50ml conical tube rotisserie for 16 tubes
MO-HY-24RT	1 x 15ml conical tube rotisserie for 24 tubes
MO-SEESAW	1 x Rocking shaker platform for MO-ARK
MO-P2320	1 x Additional 23 x 20 cm platform for orbital and reciprocal shaker (with 4 of attachable 10 cm pillars)
MO-FH-250	1 x 250ml flask holder without platform (only for MO-AOR and MO-ARC)
MO-FH-500	1 x 500ml flask holder without platform (only for MO-AOR and MO-ARC)
MO-FH-250-SET	5 x 250ml flask holders without platform (only for MO-AOR and MO-ARC)
MO-FH-500-SET	4 x 500ml flask holders without platform (only for MO-AOR and MO-ARC)
MO-BT40 x 150	1 x Glass bottle 40 x 150mm (diameter x length)
MO-BT40 x 200	1 x Glass bottle 40 x 200mm (diameter x length)
MO-BT40 x 300	1 x Glass bottle 40 x 300mm (diameter x length)

Section 7 Warranty

Major Science warrants apparatus of its manufacture against defects in materials and workmanship, under normal service, for **one year from the shipping date to purchaser**. This warranty excludes damages resulting from shipping, misuse, carelessness, or neglect. Consumable parts (MO-BT40x150, MO-BT40x200, MO-BT40x300, and O-ring Belts) are not covered by our warranty. Major Science's liability under the warranty is limited to the receipt of reasonable proof by the customer that the defect is embraced within the terms of the warranty. All claims made under this warranty must be presented to Major Science within one year following the date of delivery of the product to the customer.

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