

# MSH-300, Intelli-Stirrer MSH-300i Magnetic Stirrers with Hot Plate



If you have any feedback on our products or services, we would like to hear from you.  
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## 1. About this edition of user instructions

1.1 The current edition of the user instructions applies to the following models:

Model and name	Version
<b>MSH-300</b> , magnetic stirrer with hot plate	V.5AA, V.5AB, V.5A3
<b>Intelli-Stirrer MSH-300i</b> , magnetic stirrer with hot plate	V.4AD, V.4AE

1.2 Edition 4.-5.01 – May of 2022

## 2. Safety precautions



**Caution!** Make sure you have fully read and understood the present Manual before using the equipment. Please pay special attention to sections marked by this symbol.



**Caution!** Surfaces can become extremely hot during use.



**Caution! Magnetism!** Effects of a strong magnetic field on the biological systems have to be taken in to account. Magnetic fields can affect heart pace-maker, data carriers, etc.

### 2.1 Icons used on the unit and packaging

	CE marking, manufacturer affirms conformity with European health, safety, and environmental protection standards, see 11.1
	WEEE directive marking, see 11.1
	Caution! All parts of the working platform can become extremely hot!

### 2.2 General safety

- The protection provided can be ineffective if the operation of the appliance does not comply with the manufacturer's requirements.
- Save the unit from shocks and falling.
- Store and transport the unit as described in section **8.6. Disposal. Disposal** of the appliance requires special precautions and must be carried out at an appropriate disposal site, separate from normal household waste. To prevent pollution of the environment, all waste resulting from the disposal of the product must be collected and disposed of in the country of use, in accordance with the applicable requirements for the handling of electronic waste.
- Storage and transportation on page 13.
- Before using any cleaning or decontamination methods except those recommended by the manufacturer, check with the manufacturer that the proposed method will not damage the equipment.
- Do not make modifications in design of the unit.

### 2.3 Electrical safety

- Connect only to the mains with voltage corresponding to that on the serial number label.
- Do not plug the unit into an ungrounded power socket, and do not use an ungrounded extension lead.
- Ensure that the power plug is easily accessible during use.
- Disconnect the unit from the mains before moving.
- If liquid penetrates into the unit, disconnect it from the mains and have it checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in section **6. Specifications** on page 10.

#### 2.4 During operation

- Do not start operation at maximum speed.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not operate the unit if it is faulty or has been installed incorrectly.
- Do not leave the operating unit unattended.
- Do not use outside laboratory rooms.
- Avoid spilling alkaline solutions on an aluminium surface. Alkali can damage aluminium surfaces.

#### 2.5 Biological safety

- The user is responsible to carry out appropriate decontamination if hazardous material spills on or penetrates into the equipment.

### 3. General information

**MSH-300** and **Intelli-Stirrer MSH-300i** are magnetic stirrers of the new generation. Enclosures of stirrers are made of metal painted with powder enamel chemically resistant to acids and alkali. The stirrers are equipped with a detachable stand for supporting various sensor elements (temperature, pH and others) inside the stirred liquid.

The stirrers are supplied with a cylinder-shape magnetic stirring bar (6 × 25 mm) for universal use, covered with Teflon.

Units are equipped with the overheat protection providing an automatic switch-off of the device when overheating for the set temperature difference occurs.

Magnetic stirrers with heating can be used for laboratory operations such as organic synthesis, extraction, analysis of oil products, pH-measurements, dialysis, soil suspending, preparing buffer solutions, etc.

Additional protection disables the heating if the temperature of plate exceeds the set temperature for 30°C.

Operation temperature range +4°C to +40°C (from cold rooms to incubators) at maximal relative humidity 80%.

**Intelli-Stirrer MSH-300i** is a digital version of magnetic stirrer with heating; it is designed for laboratories with higher requirements. It offers digital setting and control of temperature and rotation speed.

A powerful magnet allows mixing solutions with glycerine viscosity level. Maximum volume of stirred liquid (water) is 20 litres.

An external probe for model **Intelli-Stirrer MSH-300i** provides direct control of the stirred liquids temperature.

## 4. Getting started

4.1 **Unpacking.** Remove packing materials carefully and retain them for future shipment or storage of the unit. Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage. Warranty covers only the units transported in the original package.

4.2 **Complete set.** Package contents:

4.2.1 Standard set:

- **MSH-300 / Intelli-Stirrer MSH-300i**..... 1 pce.
- Magnetic stirring element<sup>1</sup>..... 1 pce.
- SR-1 attachable stand ..... 1 pce.
- Power cable (**MSH-300i** only) ..... 1 pce.
- Spare fuse (**MSH-300i** only, inside the fuse holder) ..... 1 pce.
- User instructions, declaration of conformity ..... 1 copy

4.2.2 Optional accessories, on request:

- HTP-1, holder for probes..... 1 pce.
- External probe, K type thermocouple (**MSH-300i** only) ..... 1 pce.



HTP-1



External probe

4.3 **Setup.**

- Place the unit upon even horizontal non-flammable surface at least 30 cm away from any flammable materials.
- For **MSH-300i**, connect the power cable to the socket on the rear side of the unit.
- Position the unit so that the access to the mains plug is unobstructed.

4.4 **SR-1 stand installation.** Remove the screw on the fixing socket at the stirrer back (fig. 1/1) and retain for future. Screw the end of the stand with the counter-nut into the fixing socket. Secure the stand with the counter-nut. Screw in the second part of the stand into the attached first part.

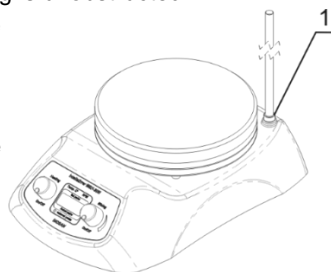


Figure 1. SR-1 stand installation

<sup>1</sup> Multipurpose cylinder-shaped magnetic stirring element (6x25 mm), encapsulated in PTFE

## 5. Operation

### 5.1 General recommendations during operation:

- Before using the unit for the first time or after storage, set the heating temperature to 100°C and preheat the plate for 30 minutes, therefore reducing moisture levels inside the unit.



**Note.** Vessel must be flat-bottomed and fit tightly to the working surface of the magnetic stirrer.



**Caution!** Do not touch surfaces, which become hot during operation to avoid burns.

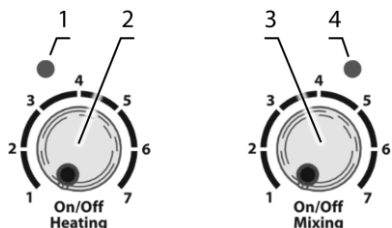


Figure 2. MSH-300 control panel

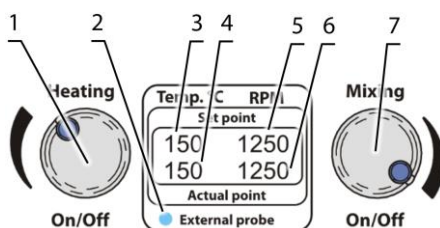


Figure 3. MSH-300i control panel3

### 5.2 Working with the model MSH-300.

- 5.2.1 Connect the unit to a properly grounded power socket.
- 5.2.2 Place a glass or another chemical vessel with liquid on the working plate and dip magnetic stirrer element in it.
- 5.2.3 Plate temperature control. Using the **Heating** knob (fig. 2/2), switch the heating **on** and set the required temperature, linearly, in the 30 to 330°C range. Heating indicator (fig. 2/1) lights up when heating, and starts flashing, 4 times per second, when the unit reaches the set temperature.



**Note.** The heating switches off when the plate temperature exceeds the set temperature for over 30°C.

- 5.2.4 Mixing control. Using the **Mixing** knob (fig. 2/3), switch the mixing mode **on** and set the required speed, linearly, in the 250 to 1250 rpm range. Mixing indicator turns on (fig. 2/4). Increase the speed smoothly.
- 5.2.5 After finishing the operation, turn the **Mixing** and **Heating** knobs counter-clockwise to the end to turn off mixing and heating.
- 5.2.6 Disconnect the unit from electric circuit.



### 5.3 Working with the model MSH-300i.

5.3.1 Connect the unit to a properly grounded power socket.

5.3.2 Switch on the power switch on the rear panel of the unit.

5.3.3 The following readouts appear on the display:

- On the upper line, **Set point**: temperature mode indication (OFF) or previously set temperature (fig. 3/3) of a heating surface or liquid (if external probe is activated) and set speed of magnetic stirring element (fig. 3/5).
- On the lower line, **Actual point**: current temperature (fig. 3/4) of the surface or liquid (if the external probe is active) and current speed (fig. 3/6).

5.3.4 Place a glass or another chemical vessel with liquid on the working plate and dip magnetic stirrer element in it.

5.3.5 **Plate temperature control.** Using the **Heating** knob (fig. 3/1), switch the heating **On** and set the required temperature (in the 30 to 330°C range).



**Note.** The heating will be switched off when the actual temperature exceeds the set temperature over 30°C. Actual temperature readings (fig. 3/4) start flashing until set temperature (fig. 3/3) is reached.

5.3.6 **External probe temperature control.**

- Connect the external probe to the unit via K type connector located on the rear side of the unit. Fasten the external probe on the unit using the double clamp, secure the external probe on the stand SR-1.
- The external probe indicator lights up on the control panel (fig. 3/2), showing that the temperature control is now performed via the external probe.
- Dip the external probe into the vessel with liquid.
- Using the **Heating** knob (fig. 3/1), switch the heating on and set the required liquid temperature (in the 20°C to 150°C range).
- The external temperature control probe will maintain the set temperature.



**Caution!** The indicator lamp (fig. 3/2) flashing shows that the external probe is not dipped into the liquid and the plate temperature has reached its maximum of 340°C. This can cause an emergency situation, so dip the external probe in-to liquid or switch off the unit.

5.3.7 **Mixing speed control.** Using the **Mixing** knob (fig. 3/7) switch the mixing mode on and set the required speed (100–1250 rpm range).

5.3.8 After finishing the operation, turn the **Mixing** and **Heating** knobs counterclockwise to the end and switch off the power switch at the rear panel.

5.3.9 Disconnect the unit from electric circuit.

## 6. Specifications

The unit is designed for operation in cold rooms and closed laboratory rooms at ambient temperature from +4°C to +40°C in a non-condensing atmosphere and maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C. Operating altitude above sea level is up to 2000 m.

Biosan is committed to a continuous programme of improvement and reserves the right to alter design and specifications of the equipment without additional notice.

### 6.1 Temperature specifications

Model	MSH-300	Intelli-Stirrer MSH-300i
Setting range	+30 ... +330 °C	
Setting range with probe	–	+20 ... +150 °C
Setting resolution	Linear	1 °C
Uniformity across the plate	±3 °C	
Heat up time to maximum	15 min	11 min

### 6.2 Stirring specifications



**Note.** Maximum speed depends on the size of the magnetic element, stirred liquid volume, viscosity, glassware shape, etc.

Model	MSH-300	Intelli-Stirrer MSH-300i
Speed setting range <sup>1</sup>	250–1250 rpm	100–1250 rpm
Speed setting resolution	Linear	10 rpm
Maximum continuous stirring time	168 h	
Maximum stirring volume	15 L	20 L
Maximum viscosity of stirrable liquid	1170 mPa·s	
Stirring element length	10–50 mm	20–70 mm

### 6.3 General specifications

Model	MSH-300	Intelli-Stirrer MSH-300i
Working plate diameter	160 mm	
Working plate material	Aluminium alloy	
SR-1 attachable stand dimensions	Ø8x320 mm	
Unit dimensions w/o SR-1	190x270x100 mm	
Display	–	LCD
Error diagnostics	Overheating stop	Overheating stop, error codes on display
Consumed power (heating)	550 W	
Consumed power (stirring)	8.5 W	
Operating current (see 7.1)	100–230 V~, 50/60 Hz	
Weight, accurate within ±10%	2.9 kg	3.2 kg

## 7. Ordering information

### 7.1 Models and versions available:

Model	Version	Description	Catalogue number
MSH-300	V.5AA	230 V, 50 Hz, EU plug (type E/F)	BS-010302-OAA
	V.5AB	230 V, 50 Hz, UK plug (type G)	
	V.5A3	230 V, 50 Hz, AUS plug (type I)	
Intelli-Stirrer MSH-300i	V.4AD	230 V, 50 Hz, EU plug (type E/F)	BS-010309-AAA
	V.4AE	120 V, 60 Hz, US plug (type B)	

7.2 To inquire about or order the optional accessories or the replacement parts, contact Biosan or your local Biosan representative.

### 7.3 Optional accessories:

Optional accessory	Catalogue number
HTP-1 holder for probes	BS-010309-FK
External temperature probe for Intelli-Stirrer MSH-300i Connection type K. Cable is covered with Teflon, mechanically strong, elastic and chemically stable against oils, acids, aggressive reagents and liquids. Operation temperature range -50°C to +250°C, cable length 1 m.	BS-010309-BK

### 7.4 Replacement parts

Optional accessory	Catalogue number
SR-1 attachable stand. Ø8x320 mm	BS-010302-AK
Magnetic stirring element. Cylinder-shaped (6x25 mm), encapsulated in PTFE	BS-010302-S12

## 8. Care and maintenance

### 8.1 Service.

8.1.1 If the unit is disabled (e.g., no stirring or heating, no reaction to knob turning, etc) or requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

8.1.2 All maintenance and repair operations (except listed below) must be performed only by qualified and specially trained personnel.

8.1.3 Operating integrity check. If the unit follows the procedure described in section **Operation**, then no additional checks are required.

### 8.2 Cleaning and disinfection.

8.2.1 Use mild soap and water with a soft cloth or sponge for cleaning the exterior. Rinse remaining washing solution with distilled water. Wipe dry the excess water with clean, soft cloth or sponge.

8.2.2 To disinfect the plastic parts, use 75% ethanol or DNA/RNA removing solution (e.g., Biosan PDS-250). After disinfecting it is necessary to wipe the surfaces dry.

8.2.3 The magnetic elements are autoclavable, at 120°C, for 20 min.

8.3 **Fault diagnosis.** If the fault or cause are not described in the table below, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

Fault	Possible Cause	Action required
The unit does not operate	The unit is not plugged to electric circuit	Plug in to electric circuit (all), switch on the unit ( <b>MSH-300i</b> )
	Electric circuit failure	Check if the other electrical appliances on the same circuit are working
	The <b>MSH-300i</b> is not switched on	Switch on the unit
	Unit's fuse blow-out	See <b>8.4</b>
The temperature does not rise when working with the external probe ( <b>MSH-300i</b> )	The set temperature is lower than the liquid temperature	Check the set temperature
	Temperature control circuit fault	Have unit checked by a qualified person
Display shows the reading ER-RORX, repetitive sound signal is heard ( <b>MSH-300i</b> )	Plate internal temperature sensor fault	Switch off the unit and have the unit checked by a repair and maintenance technician
Operating with external probe, temperature rises while current temperature on the display stays the same ( <b>MSH-300i</b> )	Thermal contact loose with heated liquid	Provide an external probe contact with heated liquid
	Temperature control circuit fault	Switch off the unit and have the unit checked by a repair and maintenance technician
Stirring element does not mix but breaks away	Set mixing speed is too high	Restart mixing and reduce the speed
	Stirring element magnetic properties decreasing	Return initial magnetic properties of the stirring element. See <b>8.5</b> .

## 8.4 Fuse replacement.

- 8.4.1 In the **MSH-300** model, the fuse is internal and can be replaced only by qualified and specially trained personnel.
- 8.4.2 In the **Intelli-Stirrer MSH-300i** model, the fuse is located inside its holder near the power socket (fig. 3/A). Disconnect the unit from the mains and unplug the power cable. Pull out the fuse holder by applying leverage in the recess. Check the fuse and replace, if necessary, with a correct one, see table below. Fuse type **M** – time delay Medium.

Version	Voltage / frequency	Fuse
V.4AD	230 V / 50 Hz	M 3.15 A
V.4AE	120 V / 60 Hz	M 6.3 A

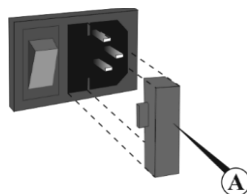


Figure 3. Fuse replacement in MSH-300i

## 8.5 Loss of magnetic properties of the stirring element.

- 8.5.1 Probable causes:
- Storing elements together, causes unpredictable magnetic domain disorientation.
  - Working at temperatures close to Curie point of the elements (200 °C).
- 8.5.2 Restoration. Place an element on the working surface exactly in the centre in conformity with the poles. Leave the element for 8-12 hours.
- 8.6 **Disposal.** Disposal of the appliance requires special precautions and must be carried out at an appropriate disposal site, separate from normal household waste. To prevent pollution of the environment, all waste resulting from the disposal of the product must be collected and disposed of in the country of use, in accordance with the applicable requirements for the handling of electronic waste.

## 9. Storage and transportation

- 9.1 Store and transport the unit in a horizontal position (see package label) at ambient temperatures between -20°C and +60°C and maximum relative humidity of 80%.
- 9.2 After transportation or storage and before connecting it to the electric circuit, keep the unit under room temperature for 2-3 hrs.
- 9.3 Store the magnetic stirring elements separately to avoid loss of magnetic properties, see 8.5.
- 9.4 For extended storage, the unit does not require special procedures.

## 10. Warranty

- 10.1 The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.
- 10.2 The warranted service life of the unit from the date of its delivery to the Customer is 24 months. For extended warranty, see **10.5**.
- 10.3 Warranty covers only the units transported in the original package.
- 10.4 If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment report shall be compiled, certified and sent to the local distributor address. To obtain the claim form, visit **Technical support** page on our website at link below.
- 10.5 Extended warranty.
- For **Intelli-Stirrer MSH-300i**, the *Premium* class model, one year of extended warranty is available free of charge after registration, during 6 months from the date of sale. Online registration form can be found in section **Warranty registration** on our website at the link below.
  - For **MSH-300**, the *Basic Plus* class model, extended warranty is a paid service. Contact your local Biosan representative or our service department through the **Technical support** section on our website at the link below.
- 10.6 Description of the classes of our products is available in the **Product class description** section on our website at the link below.

### Technical support



[biosan.lv/en/support](https://biosan.lv/en/support)

### Registration



[biosan.lv/register-en](https://biosan.lv/register-en)

### Product class description



[biosan.lv/classes-en](https://biosan.lv/classes-en)

- 10.7 The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your records.

Model	Serial number	Date of sale
<b>MSH-300</b> <b>Intelli-Stirrer MSH-300i</b> , Magnetic stirrers with heating		

- 10.8 **Production date.** Production date is placed in the serial number, on the label of the unit. Serial number consists of 14 digits styled XXXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.

# 11. EU Declaration of conformity

11.1 Magnetic stirrers with heating **MSH-300** and **Intelli-Stirrer MSH-300i** are in conformity with the following relevant Union legislations:

<b>LVD 2014/35/EU</b>	<b>LVS EN 61010-1:2011</b> Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. <b>LVS EN 61010-2-010:2015</b> Particular requirements for laboratory equipment for the heating of materials. <b>LVS EN 61010-2-010:2015</b> Particular requirements for laboratory equipment for mixing and stirring.
<b>EMC 2014/30/EU</b>	<b>LVS EN 61326-1:2013</b> Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.
<b>RoHS3 2015/863/EU</b>	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
<b>WEEE 2012/19/EU</b>	Directive on waste electrical and electronic equipment.

11.2 Declaration of Conformity is available for download on the page for the relevant model on our website by links below, in the **Downloads** section:



[MSH-300](#)



[Intelli-Stirrer MSH-300i](#)

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