biosan

Medical–Biological
Research & Technologies

ES-20, ES-20/60

Orbital Shaker-Incubators

User instructions

If you have any feedback on our products or services, we would like to hear from you. Please send all feedback to:

Manufacturer:

SIA Biosan
Ratsupites iela 7 k-2, Riga, LV-1067, Latvia

Phone: +371 674 261 37
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www.biosan.lv
Marketing: marketing@biosan.lv
Service: service@biosan.lv

Contents

1. About this edition of user instructions

The current edition of the user instructions applies to the following models and versions.

Model	Versions
ES-20, orbital shaker-incubator	V.2AD, V.2AE
ES-20/60, orbital shaker-incubator	V.2AD, V.2AE

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! Hot surface! Incubator surface and inner camera may become very hot during use. Always use protective cotton gloves to install or remove samples when the temperature is set higher than 60°C.

2.1. 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.
- After transportation or storage and before connecting it to the electric circuit, keep the unit under room temperature for 2-3 hrs.
- Store and transport the unit at ambient temperatures between -20°C and +60°C and maximum relative humidity of 80%.
- 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.

2.2. 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 the **Specifications** section.

2.3. During operation

- Make sure that all sample vessels are tightly sealed. Humidity caused by evaporation from unsealed vessels inside the incubator will damage the unit.
- 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 use outside laboratory rooms.
- Do not place a load exceeding the maximum load value mentioned in the **Specifications** section of this manual.

2.4. Biological safety

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

3. General information

ES-20 and **ES-20/60** orbital shaker-incubators are professional-level equipment for various laboratories, de-signed specifically for cultivation of microorganism cultures and eukaryotic cells, includ-ing animal, plant and insect cells. Devices are equipped with a direct-drive mechanism for platform motion. It ensures 30 days of reliable and stable non-stop operation for the long-term experiments.

Orbital shaker-incubators provide smooth or intensive mixing in volumes installed on the platform. Built-in thermoresistant brushless fan provides even temperature distri-bution inside the chamber. State-of-the-art motor, use of newest thermal insulation mate-rials, program-provided soft start of the platform motion and temperature regulation PID-control dramatically decrease the energy consumption and makes the devices highly energy efficient.

Model **ES-20** features a transparent casing for better observation and provides possibility of plant cell cultivation. The model is lightweight and easy to transport.

Model **ES-20/60** features a large stainless-steel chamber for prolonged incubation of large sample volumes and quantities.

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.

Caution! Due to the high weight of the **ES-20/60** model, its unpacking and installing must be carried out by two persons.

4.2. **Complete set.** Package contents:

4.2.1. **ES-20**

- Orbital shaker-incubator ..... 1 pce.
- Power cable ..... 1 pce.
- Control cable ..... 1 pce.
- Spare fuse (inside fuse holder) ..... 1 pce.
- Operating manual, declaration of conformity ..... 1 copy
- Assembling instructions ..... 1 copy
- UP-12 platform ..... on request
- HB-200 holding bar for UP-12 ..... on request
- PP-4 platform ..... on request
- SPM double-sided adhesive mat for PP-4 ..... on request
- P-12/100 platform ..... on request
- P-6/250 platform ..... on request
- P-16/88 platform ..... on request

UP-12

PP-4

SPM

P-12/100

P-6/250

P-16/88

4.2.2. **ES-20/60**

- Orbital shaker-incubator ..... 1 pce.
- Power cable ..... 1 pce.
- Spare fuse (inside fuse holder) ..... 1 pce.
- Four screws and a hex driver ..... 1 set
- Operating manual, declaration of conformity ..... 1 copy
- P-30/100 platform ..... on request
- P-16/250 platform ..... on request
- P-9/500 platform ..... on request
- P-6/1000 platform ..... on request
- PP-400 platform ..... on request
- UP-168 universal platform ..... on request
- SPML double-sided adhesive strips ..... on request
- FC-50, FC-100, FC-250, FC-500, FC-1000 clamps for UP-168 ..... on request
- TR-21/50 test tube rack for UP-168 ..... on request
- TR-44/15 test tube rack for UP-168 ..... on request

P-30/100

P-16/250

P-9/500

P-6/1000

PP-400

UP-168

SPML

TR-21/50

TR-44/15

4.3. **Setup**.

Note. All **ES-20** model units arrive with the acrylic chamber disassembled for transportation. Please assemble the unit using the included instructions. After assembly, do not tilt the unit when moving.

- Place the unit upon even horizontal stable non-flammable surface 30 cm away from any flammable materials, and clear 20 cm around the device on all sides for ventilation.
- Remove the protective film from the display.
- Connect the power cable to the socket on the rear side of the unit, position it with easy access to the power switch, and plug.

4.4. Platform installation.

4.4.1. **ES-20**. Lift and remove the previous platform, if present. Install new platform by inserting the pins on the bottom of the platform into the holes on the moving part of the base.

4.4.2. **ES-20/60**. Remove the silicon mat and unscrew four screws from the previous platform using a hex driver, if a platform was present. Install and secure the new platform to the moving part of the base with four screws and replace the silicone mat.

4.4.3. **UP-168** platform for **ES-20/60**. The platform can be outfitted with flask clamps or a test tube rack. Arrange the components symmetrically in relation to the centre of the platform. Fix them in place with screws included with components. Maximum number of clamps or racks can be found in the table below.

FC-50	36
FC-100, FC-250	16
FC-500	8
FC-1000	4
TR-21/50, TR-44/15	2

4.4.4. **SPM** mat for **PP-4** on **ES-20** and **SPML** strips for **UP-168** on **ES-20/60**.

- Lift the silicon mat (**PP-4**) or remove any obstructing clamps or racks (**UP-168**).
- Degrease, clear and dry the platform as described in **8.3.2** on page **13**.
- Remove protective plastic sheet from one side of the mat/strip and place it on the platform. For **UP-168**, place up to three **SPML** strips symmetrically, in parallel to the longer edge.
- Remove the remaining protective sheet. Keep both sheets!

Note. Consult the manual enclosed with the **SPM**/**SPML** for recommendations on sample vessel choice, and for maintenance beyond stated in **8.3.4**

5. Operation

5.1. **Recommendations during operation**.

- Before shaking, to reduce the stress on the unit, place the samples symmetrically in relation to the centre of the platform.
- When using the **SPM** or **SPML** adhesive surfaces, test fit the vessels beforehand. For prolonged operations, check the adhesion every two weeks. If the operations are are at high speed/temperature, check the adhesion every week.

Caution! Do not fill the vessels inside the incubator. Please make sure that all vessels are tightly sealed. Humidity caused by evaporation from unsealed vessels inside the incubator will damage the unit!

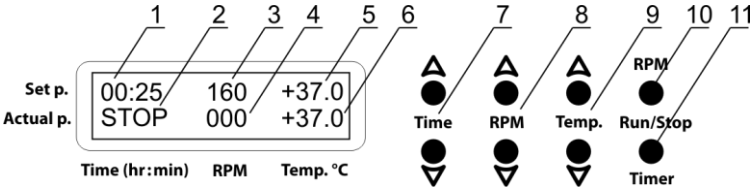

Figure 1. Control panel

5.2. Connect the unit to a grounded power socket. Set the **Power** switch to position **I** (ON).

5.3. The display turns on. The upper line shows the previously set time in hours and minutes (fig. 1/1), speed in RPM (fig. 1/3) and temperature in °C (fig. 1/5). The lower line shows current readings of the same parameters: the timer (indication STOP, fig. 1/2), speed (fig. 1/4) and chamber temperature (fig. 1/6) that automatically starts rising according to the set temperature.

5.4. **Setting the parameters**. Changed values are shown in the upper line of the display. The set parameters, except the timer, can also be changed during operation. Holding the key down longer than 3 seconds increases the change rate of the values.

5.4.1. **Setting time (Time)**. Using the ▲ and ▼ **Time** keys (fig. 1/7) set the required working time interval in hours and minutes (increment 1 min).

5.4.2. **Setting speed (RPM/Shaker)**. Using the ▲ and ▼ **RPM** keys (fig. 1/8) set the required shaking intensity in revolutions per minute (increment 10 rpm).

5.4.3. **Setting temperature (Temp.°C)**. Using the ▲ and ▼ **Temp.** keys (fig. 1/9) set the required temperature (increment 0.1ºC). The chamber heating starts automatically.

Caution! The chamber heating can only be stopped manually by reducing the temperature with the ▼ **Temp.** key (fig. 1/9) until the OFF indication appears in the in upper line of the **Temp.°C** display segment.

5.5. **Program execution**.

5.5.1. Open the door and secure the samples on the platform. Close the door.

5.5.2. Press the **RPM Run/Stop** key (fig. 1/10, called the **Shaker Run/Stop** key on **ES-20/60**). The platform starts rotating and the timer starts counting the time interval, with 1-minute precision.

Note. If the speed is set to zero, pressing the **RPM** or **Shaker Run/Stop** key starts the timer, but the platform does not move.

5.6. **Finishing the program**. After the set time elapses, the platform motion stops and the display shows a flashing reading STOP (fig. 1/2) accompanied by a repetitive sound signal until the **RPM** or **Shaker Run/Stop** key is pressed.

5.7. If the working time is not set and the timer in the upper line (fig. 1/1) shows 00:00, pressing the **RPM** or **Shaker Run/Stop** key starts continuous operation of the unit. The **Time** segment of the display shows an OFF indication in the upper line (fig. 1/1) and a countdown timer in the lower line (fig. 1/2). Pressing the **RPM** or **Shaker Run/Stop** key stops the platform motion.

Caution! At the end of the set time, platform movement is stopped automatically, but heating can only be stopped manually by reducing the temperature with the ▼ **Temp.** key (fig. 1/9) until the OFF indication appears in the in upper line of the **Temp.°C** display segment.

5.8. The timer can be restarted during the unit operation if necessary. Press the **Timer Run/Stop** key twice (fig. 1/11), first time – to stop the timer, second – to restart it.

5.9. The platform motion can be stopped at any time by pressing the **RPM** or **Shaker Run/Stop** key. In this case, the platform stops and the timer switches into the STOP mode, resetting to the previously set time. Press the **RPM** or **Shaker Run/Stop** key to restart the operation with the same parameters.

5.10. After finishing the operation, set the **Power** switch in position **O** (off). Disconnect the power cable from the mains.

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.

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	**ES-20**	**ES-20/60**
Setting range, °C	25 ... 42	25 ... 80
Setting increment, °C	0.1	
Control range, °C	5 above RT[1] ... 42	10 above RT[1] ... 80
Stability, °C	±0.5	
Accuracy [2], °C	±2	
Uniformity [2], °C	±2	
Time to maximum temperature inside a flask, minutes	16	90

6.2. General specifications

Model	**ES-20**	**ES-20/60**
Speed setting range, RPM	50–250	
Speed setting increment, RPM	10	
Timer setting	1 min - 96 h / non-stop	
Timer increment	1 minute	
Maximum operating time [3], days	30	
Maximum load, kg	2.5	8
Orbit, mm	10	20
Display	2x16 characters, LCD	
Inner chamber dimensions (WxDxH), mm	305x260x250	460x400x310
Outer dimensions (WxDxH), mm	340x340x435	590x525x510
Weight [4], kg	13.2	41.1
Maximum noise level, dBa	45	
Operational voltage	230 V, 50 Hz *or 120 V, 60 Hz*	
Power consumption	160 W, 0.7 A *or 170 W, 1.6 A*	450 W, 2 A *or 450 W, 4.5 A*

Note. Operational voltage and power consumption depend on the versions of the models. See the table in **7.1** for further information.

[1] Room temperature

[2] For **ES-20/60**, at 37°C

[3] Recommended time between operation sessions - not less than 8 hours

[4] Accurate within ±10%

7. Ordering information

7.1. Models and versions available:

Model	Version	Description	Catalogue number
ES-20	V.2AD	230 V, 50/60 Hz	BS-010111-AAA
	V.2AE	120 V, 50/60 Hz	
ES-20/60	V.2AD	230 V, 50/60 Hz	BS-010135-AAA
	V.2AE	120 V, 50/60 Hz	

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

7.3. Optional accessories for **ES-20**:

Description	Catalogue number
PP-4, flat metal platform with non-slip rubber mat. Working dimensions 215x215 mm	BS-010108-BK
UP-12, universal platform with adjustable bars for different types of flasks, with non-slip rubber mat. Working dimensions 265x185 mm	BS-010108-AK
HB-200, additional holding bar for UP-12	BS-010108-FK
P-12/100, platform with clamps for 100 ml flasks, 12 places	BS-010108-EK
P-6/250, platform with clamps for 250 ml flasks, 6 places	BS-010108-DK
P-16/88, platform with spring holders for up to 88 tubes up to 30 mm diameter (e.g. 10 ml, 15 ml, 50 ml tubes). Working dimensions 275x205x75 mm	BS-010116-BK
SPM, double-sided adhesive mat for PP-4, dimensions 210x210x3 mm	BS-010111-BK

7.4. Optional accessories for **ES-20/60**

Description	Catalogue number
P-30/100, platform with clamps for 30 flasks of 100 ml	BS-010135-BK
P-16/250, platform with clamps for 16 flasks of 250 ml	BS-010135-CK
P-9/500, platform with clamps for 9 flasks of 500 ml	BS-010135-AK
P-6/1000, platform with clamps for 6 flasks of 1000 ml	BS-010135-DK
PP-400, flat platform with non-slip silicone mat	BS-010135-FK
UP-168, universal platform for custom arrangement	BS-010135-JK
FC-50, clamp for 50 ml flask for UP-168 platform (ø 51 mm)	BS-010126-MK
FC-100, clamp for 100 ml flask for UP-168 platform (ø 64 mm)	BS-010126-HK
FC-250, clamp for 250 ml flask for UP-168 platform (ø 85 mm)	BS-010126-JK
FC-500, clamp for 500 ml flask for UP-168 platform (ø 105 mm)	BS-010126-LK
FC-1000, clamp for 1000 ml flask for UP-168 platform (ø 132 mm)	BS-010126-IK
TR-21/50, variable angle test tube rack for 21 tubes of 50 ml for UP-168 platform	BS-010135-KK
TR-44/15, variable angle test tube rack for 44 tubes of 15 ml for UP-168 platform	BS-010135-LK
SPML, set of 3 double-sided adhesive strips for UP-168, dimensions 390x80x3 mm	BS-010135-MK

8. Care and maintenance

8.1. If the unit requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

8.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

8.3. Cleaning and disinfection.

8.3.1. The door and side panels of **ES-20** model are made of acrylic glass (polymethyl methacrylate, Plexiglas®) and are prone to scuffing and scratches if improperly cleaned. Care during cleaning of the door and side panels is recommended to reduce the wear on the acrylic glass surface. The table below shows how acrylic glass reacts to some solvents:

Solvent	Effect on acrylic glass
Biosan PDS-250	No reaction
DNA-Exitus Plus™	No reaction
RNase-Exitus Plus™	No reaction
H_2O_2 6%	No reaction
Ethyl alcohol ≤20%	No reaction
Ethyl alcohol >20%	Increasing reaction. Do not use!

8.3.2. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for degreasing, cleaning and decontamination of the steel and non-acrylic surfaces.

8.3.3. For decontamination, it is recommended to use a special DNA/RNA removing solution (e.g. Biosan PDS-250, DNA-Exitus Plus™, RNase-Exitus Plus™).

8.3.4. **SPM** and **SPML** adhesive material maintenance. Clean the adhesive surfaces with water or mild soap solution, rinse and air dry before reattaching. Adhesive properties work only when the surface is clean, dry and dust-free. Do not subject to UV radiation, do not place in high humidity (i.e. do not autoclave). Read the enclosed manual for additional info.

8.4. **Fuse replacement**. Disconnect the power cable from the mains. Disconnect the power cable from the socket on the rear of the unit. Open the fuse holder, located near the socket. Check and replace with a correct fuse if necessary, see table below:

Model & version	Fuse[1]
ES-20 **V.2AD** (230 V)	M 1 A
ES-20 **V.2AE** (120 V)	M 2 A
ES-20/60 **V.2AD** (230 V)	M 3.15 A
ES-20/60 **V.2AE** (120 V)	M 5 A

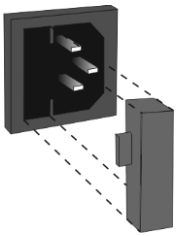

Figure 2. Fuse holder

[1] Fuse type M - time lag Medium

9. Warranty

9.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

9.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months. For extended warranty, see **9.5**.

9.3. Warranty covers only the units transported in the original package.

9.4. 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.

9.5. Extended warranty.

- For **ES-20/60**, 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 **ES-20**, 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.

9.6. 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

Registration

biosan.lv/register-en

Product class description

biosan.lv/classes-en

9.7. 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
ES-20 & **ES-20/60**, Orbital shakers-incubators		

10. EU Declaration of conformity

EU Declaration of Conformity

Unit type	Shakers-incubators
Models	**ES-20, ES-20/60, ES-20/80**
Serial number	14 digits styled XXXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.
Manufacturer	SIA BIOSAN Latvia, LV-1067, Riga, Ratsupites str. 7/2

The objects of the declaration described above is in conformity with the following relevant Union harmonization legislations:

LVD 2014/35/EU	**LVS EN 61010-1:2011** Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. **LVS EN 61010-2-010:2015** Particular requirements for laboratory equipment for the heating of materials. **LVS EN 61010-2-051:2015** Particular requirements for laboratory equipment for mixing and stirring.
EMC 2014/30/EU	**LVS EN 61326-1:2013** Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.
RoHS3 2015/863/EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
WEEE 2012/19/EU	Directive on waste electrical and electronic equipment.

I declare that the Declaration of Conformity is issued under sole responsibility of the manufacturer and belongs to the above-mentioned objects of the declaration.

Svetlana Bankovska
Managing director

Signature

07.02.2020.
Date

Edition 2.07 – February of 2021

how to choose
A PROPER SHAKER, ROCKER, VORTEX

biosan
Medical–Biological Research & Technologies

Sample volume 10^3 ... 10^2 ml
Erlenmeyer flask and Cultivation flask

PSU-20i, Orbital Shaker

ES-20/80, Orbital Shaker-Incubator

Applications:
- *Microbiology*
- *Extraction*
- *Cell cultivation*

PSU-10i, Orbital Shaker

ES-20, Orbital Shaker-Incubator

Applications:
- *Agglutination*
- *Gel staining/destaining*

MR-12, Rocker-Shaker

Sample volume 10^1 ml
Petri dishes, vacutainers and tubes up to 50 ml

Multi Bio RS-24, Programmable rotator

Multi RS-60, Programmable rotator

Bio RS-24, Mini-Rotator

Applications:
- *Microbiology*
- *Extraction*
- *Cell cultivation*
- *Hematology*

V-1 plus, Vortex

RTS-1 and RTS-1C, Personal bioreactor

MSV-3500, Multi Speed Vortex

MR-1, Mini Rocker-Shaker

Multi Bio 3D, Mini Shaker

Applications:
- *Agglutination*
- *Extraction*
- *Blot hybridisation*
- *Gel staining/destaining*

Sample volume 10^0 ... 10^{-3} ml
PCR plates, microtest plates and Eppendorf type tubes

PST-60HL-4, Thermo-Shaker

PST-100HL, Thermo-Shaker

TS-DW, Thermo-Shaker for deep well plates

PST-60HL, Thermo-Shaker

Applications:
- *ELISA Analysis*
- *Genomic Analysis*
- *Hybridization*
- *Immunology*

Applications:
- *Nucleic acid Analysis*
- *Molecular Analysis*
- *Protein Analysis*
- *Genomic Analysis*

MPS-1, Multi Plate Shaker

PSU-2T, Mini-Shaker

CVP-2, Centrifuge vortex for PCR plates

TS-100, TS-100C, Thermo-Shakers

V-32, Multi-Vortex

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