Blue*Line*
Instruments for Electrophoresis

INSTRUCTION MANUAL

BlueMarine 100
BlueMarine 200
BlueMarine HTS

Horizontal Electrophoresis Unit

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WARNING

These units are capable of delivering potentially lethal voltage when connected to a power supply and are to be operated only by qualified technically trained personnel.

The BlueMarine Horizontal Gel Systems are designed to give long service and reproducible results in your laboratory. A few moments spent reading these instructions will ensure that your expectations are reflected in the successful use of the apparatus. Please read the entire operator's manual thoroughly before operating this unit.

First check with the help of the packing list that the apparatus has been received complete and undamaged following shipment and check that all components and accessories are present. Any damages or missing parts must be notified to **SERVA Electrophoresis GmbH**, Heidelberg resp. to the responsible distributor immediately. **SERVA Electrophoresis GmbH** cannot accept responsibility for goods returned without prior notification.

Warranty is 12 months from the date of delivery.
Please retain all packaging materials until the warranty period has expired.

Vers. 10/08

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1. PACKING LIST

BlueMarine 100
Cat. No.: BM 100

No. of items	Description	Cat. no.
1	Main Unit	
1	Removable UV transparent gel tray, 7 x 10 cm	BM100-21
2	Gel Casting Gates	BM100-31
1	Comb, 1.0 mm, 8 samples	BM100-8-1.0

BlueMarine 200
Cat. No.: BM 200

No. of items	Description:	Cat. no.
1	Main Unit	
1	Removable UV transparent gel tray, 15 x 20 cm	BM200-20
1	Removable UV transparent gel tray, 15 x 15 cm	BM200-15
2	Gel Casting Gates	BM200-3
2	Combs, 1.0 mm, 16 samples	BM200-16-1.0

BlueMarine HTS
Cat. No.: BM-HTS

No. of items	Description:	Cat. no.
1	Main Unit	
1	Removable UV transparent gel tray, 17.5 x 19.20 cm	BM-HTS
2	Aluminum Gel Casting Gates	BM-HTS-3
6	Aluminum Combs, 1.0 mm, 17 samples	inquire

2. SPECIFICATIONS

- Rugged acrylic construction
- All acrylic joints chemically bonded
- Doubly insulated cables, rated safe up to 3000 volts
- Gold plated electrical connectors, corrosion-free and rated safe up to 1000 volts
- Recessed power connectors, integral with the safety lid
- Pure 0.2 mm diameter platinum electrodes
- User replaceable platinum electrodes
- Removable UV transparent UV gel casting tray

3. Operating conditions

	BM 100	**BM 200** 15 x 15 cm tray	**BM 200** 15 x 20 cm tray	**BM HTS**
Maximum operating voltage (volts)	300	500	500	500
Maximum operating current (mAmps)	200	300	300	300
Agarose gel volume for 5 mm gel thickness	35 ml	115 ml	150 ml	160 ml
Electrode separation	18 cm	28.5 cm	28.5 cm	28.5
Recommended volts per cm	14 - 140	20 - 200	20 - 200	20 - 200

Environmental Conditions:

- This apparatus is intended for indoor use only.
- The device can be safely operated at an altitude of 2000 m.
- The normal operating temperature range is between 4 ℃ and 65 ℃.
- Maximum relative humidity 80 % for temperatures up to 31 ℃ decreasing linearly to 50 % relative humidity at 40 ℃.

4. Additional accessories (optional)

Combs for BM 100 (gel width 7 cm)*

Cat. no.	Number of wells	Thickness of comb	Width of well	Depth of well*	Sample volume*
BM 100-14-1.5	14	1.5 mm	3.0 mm	10 mm	14 µl
BM 100-14-2.0	14	2.0 mm	3.0 mm	10 mm	18 µl
BM 100-12-1.0	12	1.0 mm	3.7 mm	10 mm	10 µl
BM 100-12-1.5	12	1.5 mm	3.7 mm	10 mm	17 µl
BM 100-12-2.0	12	2.0 mm	3.7 mm	10 mm	22 µl
BM 100-8-1.0	8	1.0 mm	6.0 mm	10 mm	18 µl
BM 100-8-1.5	8	1.5 mm	6.0 mm	10 mm	28 µl
BM 100-P1-20	1	2.0 mm	55.0 mm	10 mm	330 µl

* Indicated are the maximum sample volumes applicable to a 5 mm thick agarose gel in which the actual depth of a sample well is 3.5 mm.

Additional accessories for BM 100

Cat. no.	No. of items	Description
BM 100-21	1	Gel tray 7 x 10 cm
BM 100-31	2	Gel casting gates
BM 100-41	1	Replacement electrode

Combs for BM 200 (gel width 15 cm)*

Cat. no.	Number of wells	Thickness of comb	Width of well	Depth of well*	Sample volume*
BM 200-10-1.0	10	1.0 mm	12 mm	10 mm	35 µl
BM 200-10-1.5	10	1.5 mm	12 mm	10 mm	52 µl
BM 200-10-2.0	10	2.0 mm	12 mm	10 mm	70 µl
BM 200-16-1.0	16	1.0 mm	7 mm	10 mm	20 µl
BM 200-16-1.5	16	1.5 mm	7 mm	10 mm	30 µl
BM 200-16-2.0	16	2.0 mm	7 mm	10 mm	40 µl
BM 200-20-1.0	20	1.0 mm	5 mm	10 mm	15 µl
BM 200-20-1.5	20	1.5 mm	5 mm	10 mm	20 µl
BM 200-20-2.0	20	2.0 mm	5 mm	10 mm	25 µl
BM 200-M31-1.0 Multichannel pipette	31	1.0 mm	3 mm	10 mm	9 µl
BM 200-M26-1.0 Multichannel pipette	31	1.0 mm	4 mm	10 mm	12 µl
BM 200-M26-1.5 Multichannel pipette	31	1.5 mm	4 mm	10 mm	18 µl
BM 200-M26-2.0 Multichannel pipette	31	2.0 mm	4 mm	10 mm	24 µl
BM 200-P1-1.0	1+2	1.0 mm	125 mm	10 mm	375 µl
BM 200-P1-1.5	1+2	1.5 mm	125 mm	10 mm	565 µl
BM 200-P2-2.0	1+2	2.0 mm	125 mm	10 mm	750 µl

* Indicated are the maximum sample volumes applicable to a 5 mm thick agarose gel in which the actual depth of a sample well is 3.5 mm.

Additional accessories for BM 200

Cat. no.	No. of items	Description
BM 200-15	1	Gel tray 15 x 15 cm
BM 200-20	1	Gel tray 15 x 20 cm
BM 200-3	2	Gel casting gates
BM 200-4	1	Replacement electrode

Additional accessories for BM-HTS

Cat. no.	No. of items	Description
BM-HTS-20	1	Gel tray
BM-HTS-3	2	Gel casting gates

5. Operation of the unit

5.1. Safety Precautions

Important note: SERVA Electrophoresis GmbH will not accept responsibility for damage resulting from misuse and violation of the following conditions.

- **Read** the instructions before using the apparatus.
- **Before you remove the chamber lid,** disconnect the electrophoresis chamber from the power supply (pull plug).
- **Do not** exceed the maximum operating voltage or current (**see paragraph 3. operating conditions**).
- **Do not** operate the electrophoresis units in metal trays.
- **Do not** fill the apparatus with running buffer above the maximum fill line.
- **Following the replacement** of a platinum electrode, have **the unit inspected** and approved by your safety officer prior to use.

5.2. Care and maintenance of the device

- To remove the safety lid, push both thumbs down on the plastic bars and lift the lid vertically with your fingers.
- Before use clean and dry the apparatus with **distilled water only.** Use of **alcohol (over 25 %), ketones and hydrocarbons will lead to cracking of the material** and **should not be used for cleaning. Do not** use scouring agents or rough sponges (with scouring surface).
  Dry components with clean tissues prior to use.
- Before use, and then at monthly intervals, check the unit for any leaks at the bonded joints. Place the unit on a sheet of dry tissue and fill with **distilled water only** to the maximum fill line. Any leakage will easily be detectable on the tissue paper. If any leakage is seen, **do not attempt to repair or use the apparatus**, but notify **SERVA Electrophoresis GmbH** Heidelberg resp. the SERVA Electrophoresis GmbH distributor immediately.
- The replacement platinum electrodes are partially shrouded for protection. Even so, when cleaning the main tank **do not** use cleaning brushes in the electrode area. Usually a **thorough rinse with distilled water is all** that is **required**.
- Ensure that the **connectors are clean and dry** before usage or storage.
- For cleaning, combs must not be soaked in water for a longer period. This can cause softening of the used adhesive.

5.3. Agarose gel electrophoresis

5.3.1. Agarose gel preparation for DNA analysis

Required reagents and stock solutions

Reagent	**Amount**	**Cat. no.**
DNA Agarose		s. page 9
500 mM EDTA, pH 8.0		
Na_2EDTA	186.2 g/l	11280
TBE buffer, 10x, pH 8.3		42557 (ready-to-use buffer)
Tris	109 g/l	37190
Boric acid	55.6 g/l	15165
500 mM Na_2EDTA pH 8.0	40 ml/l	see above
TAE buffer, 10x, pH 8.4		42553 (ready-to-use buffer))
Tris	48.4 g/l	37190
Glacial acetic acid	11.4 ml/l	-
500 mM EDTA pH 8.0	40 ml/l	see above
Sample buffer, 5x		
Ficoll 400	15 %	21373
Bromophenol Blue 0.25 %		15375
Xylene Cyanol	0.25 %	38505
Orange G	0.25 %	-
Ethidium bromide solution, 1 %		21251 (Ready-to-use solution)
Ethidium bromide	1 %	21238

Safety note: *Ethidium bromide is a powerful mutagen and moderately toxic. Gloves should always be worn when working with solutions that contain this dye.*

Casting of the agarose gel

1. Choose the appropriate concentration for the agarose gel depending on the separation range. The following table serves as a guideline:

Agarose concentration (%)	Separation range DNA (bp)
0.3	5 000 -60 000
0.6	1 000 -20 000
0.8	800 -10 000
1	400 - 8 000
1.2	300 - 7 000
1.5	200 - 4 000
2	100 - 3 000

Melt the agarose by heating in buffer (1x TAE or 1x TBE). You need following volumes of agarose solution for a 5 mm thick gel (see as well p. 4):

	Agarose volume (Gel thickness ca. 5 mm)
BM 100	35 ml
BM 200 15 x 15 cm gel tray	115 ml
15 x 20 cm gel tray	150 ml
BM-HTS	160 ml

2. Let the agarose solution **cool down to approx. 50 to 60 ℃** (this will prevent distortion or cracking of the gel tray and the main unit).

3. **Insert the gel casting gates in the slots provided** in the gel casting tray. Place the gel casting tray in the apparatus or on a level surface. The casting gates are designed in such a way that further sealing is usually not required. Optional, sealing can be achieved by using a Pasteur pipette to apply a bead of agarose along the inside edges of the casting gates and allow to set before pouring the gel.

3. Position one or, if desired, multiple combs in the slots provided.

4. Allow the agarose to set (approx. 30 minutes), ensuring that the gel casting tray is level and undisturbed. Eventually, store the solified gel at 4 ℃ for rapid cooling for a short period of time. Then, place the tray in the apparatus.

5.3.2. Performance of electrophoresis

1. Overlay the gel with running buffer (e.g. 1x TBE or 1x TAE) to the required depth. **Do not fill above the maximum fill line.**

2. Carefully remove the comb and casting gates.

3. Mix samples 5:1 with loading buffer 5x, and load samples into wells. It is possible to use other common loading buffers that contain e.g. sucrose or glycerol (for increasing density and thus, facilitating loading into the wells).

4. Close chamber with safety lid **before** connecting the leads to the power supply.

5. Set voltage and current to suit gel and apparatus (**see paragraph 3. operating conditions**). As a guideline for separating unknown samples, run gel at 150 V until the yellow dye has reached the margin of the gel (approx. 60 min. with BM 100, 100-150 min. using BM 200).

Important: Do not exceed the permissible voltage or current values as this may result in damage to the chamber.

6. After end of run **stain** the gel e.g. **with ethidium bromide solution:**
100 µl of an aqueous 1 % ethidium bromide solution (cat. no. 21251) in 100 ml running buffer).

   Rinse the gel twice with running buffer. The bands can be visualized with an UV transilluminator. Wear protective clothing and face shield.

7. At the end of a run, rinse the chamber with deionised water (**see paragraph 5.2. care and maintenance of the device**). **Never** use organic solvents. Dry the electrical connectors carefully with a tissue before storage or reuse.

If you need additional information about the SERVA BlueLine, please do not hesitate to contact the Technical Service at SERVA Electrophoresis GmbH in Heidelberg (+49-06221-1384044).

6. Recommended reagents for horizontal submarine electrophoresis

SERVA reagents for electrophoresis underlie stringent quality and application controls to ensure best performance and results. We recommend the usage of SERVA electrophoresis reagents especially along with BlueLine electrophoresis instruments as the quality of consumables is fine-tuned to the equipment (applications test).

Product	**Cat.-No.**
Agarose SERVA	11380
Agarose SERVA Premium	11381
Agarose SERVA for DNA	11404
Agarose SERVA for PCR	11383
Agarose SERVA Low Melting	11408
Agarose SERVA for PCR Low Melting	11384
Agarose SERVA Tablets	11405
Tris	37190
Boric acid	15165
EDTA	11280
TBE Buffer, 10x	42557
TAE Buffer, 10x	42553
Ethidium Bromide	21238
Ethidium Bromide, 1% solution	21251
Sucrose	35580
Bromophenol Blue	15375
Xylene Cyanol	38505
Sucrose	35580
Ficoll 400	21373

A comprehensive range of products for electrophoresis is available listed in the SERVA Main Catalogue. Please inquire.