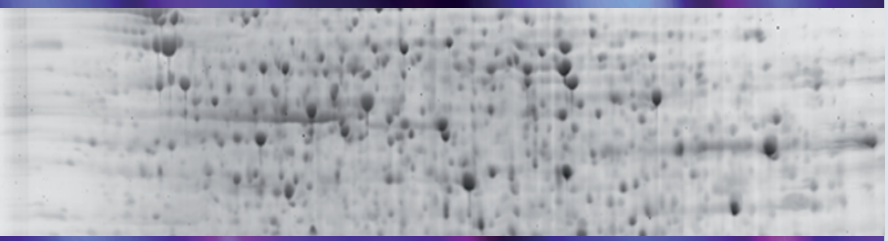
2D Electrophoresis

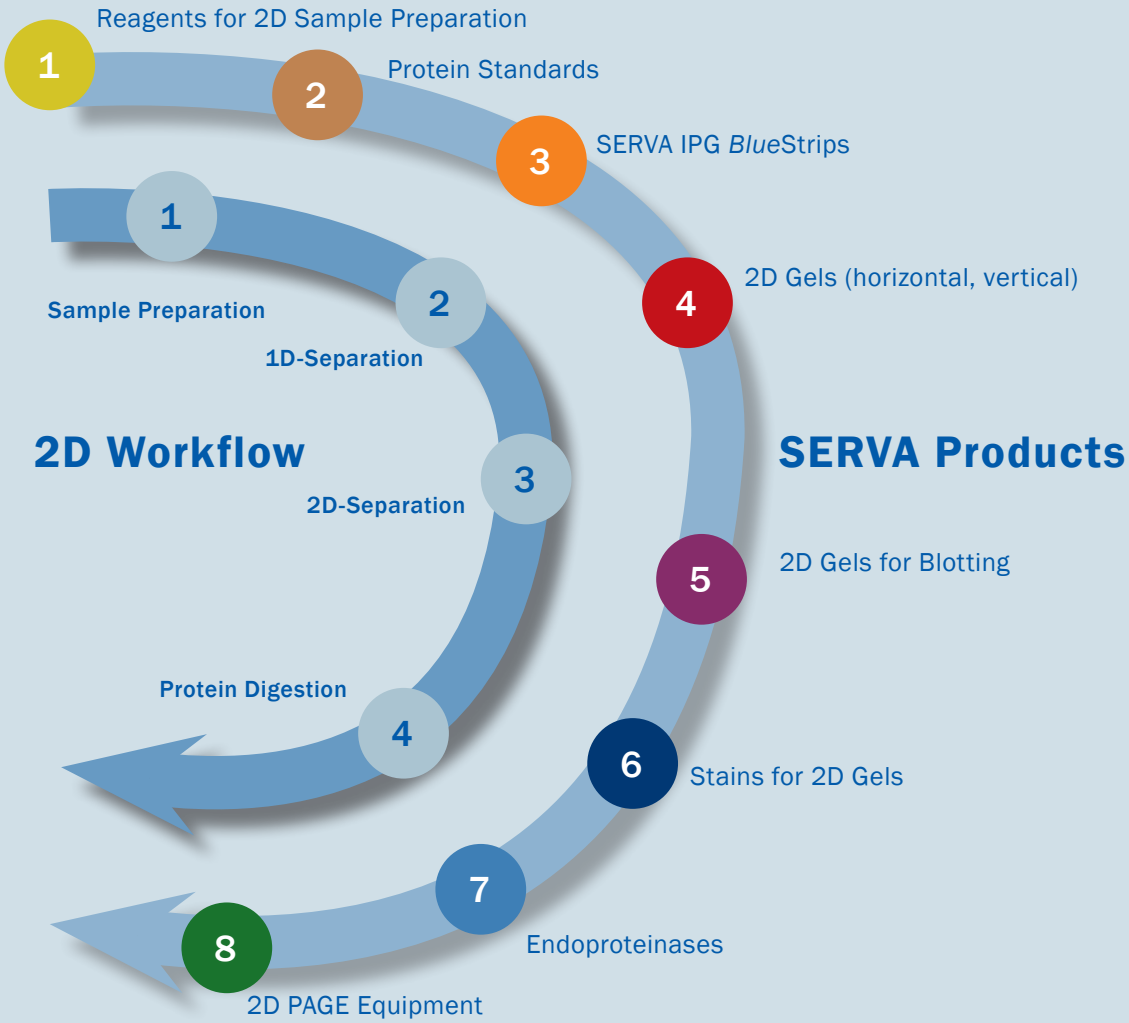
SERVA
serving scientists



Reagents and Equipment

All you need for... 2D Electrophoresis

SERVA offers a complete range of products for 2D gel electrophoresis. Starting with sample preparation and isoelectric focusing of proteins by applying SERVA IPG *Blue*Strips in the presence of urea, the focused proteins will be further processed on a PAA gel for second dimension electrophoresis applying separation by molecular weight in the presence of SDS. After staining the protein spots, or immediately if pre-labelling by SERVA Lightning Red has been done, the spots will be identified and further analyzed by spot picking and mass spectrometry or by Western blotting analysis.

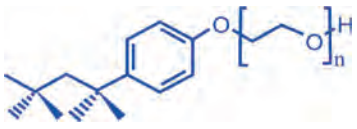


SERVA produces gels for more than 30 years – hard to find a place with more experience in manufacturing, developing and supporting the use of electrophoresis gels!

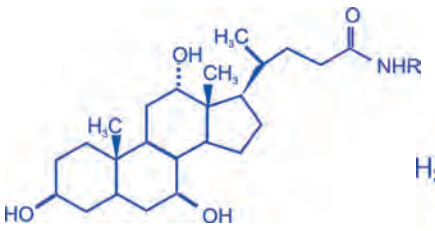
1 Reagents for 2D Sample Preparation

For lysis of cells and tissues by membrane disintegration, for release of proteins and protein complexes as well as for solubilization of proteins to be separated by 2D PAGE, SERVA offers a broad range of detergents. Find more details in the SERVA brochures "Detergents", "Dialysis", and "Sample Preparation", covering a broad range of detergents, inhibitors, enzymes and dialysis tubings often used in sample preparation of proteins.

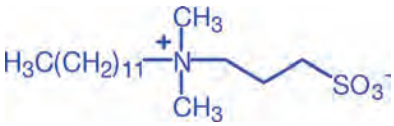
Product	Size	Cat. No.
Triton® X-100	500 g	37240.01
	5 kg	37240.02
16-BAC Benzyldimethyl-n-hexadecyl ammonium chloride	100 g	14836.02
CHAPS (3-[(3-Cholamidopropyl) dimethylammonio]-1-propanesulfonate)	1 g	17038.01
	5 g	17038.02
	25 g	17038.03
	100 g	17038.04
Sulfobetaine SB 12 (N-Dodecyl-N,N-dimethylammonio-3-propane sulfonate)	50 g	20761.03
Sulfobetaine SB 3-10 (N-Decyl-N,N-dimethyl-3-ammonio-1-propane sulfonate)	25 g	20756.02
ASB-14 (3-[N,N-Dimethyl-(3-myristoylaminopropyl)-ammonio]-propanesulfonate	1 g	20757.01
	5 g	20757.02
ASB-16 (3-[N,N-Dimethyl-N-(3-palmitamidopropyl)-ammonio]-propane-1-sulfonate)	5 g	20758.02
ASB-C7BzO (3-(4-Heptyl)phenyl-3-hydroxypropyl-dimetylammonio-propane sulfonate)	5 g	20759.02
NDSB-201 1-(3-Sulfopropyl)pyridinium betain	250 g	20762.02



Triton® X-100



CHAPS

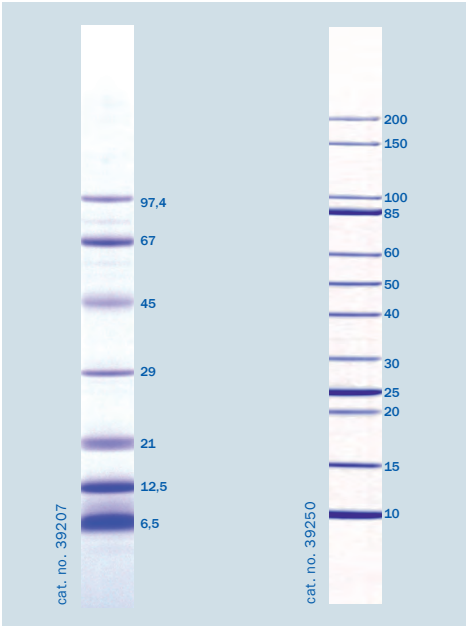


Sulfobetaine SB 12

High quality detergents in convenient pack sizes

2 Protein Standards

For 2D electrophoresis SERVA offers different protein standards for molecular weight determination as well as a set of proteome standards for pI and molecular weight identification.

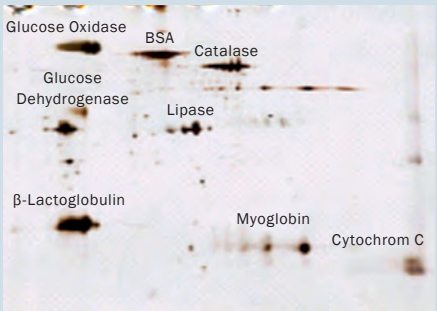


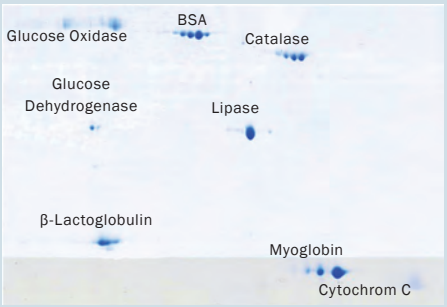
Protein Markers

To determine the molecular weight of proteins separated by a 2D gel in the presence of SDS SERVA offers various protein markers of natural and recombinant origin. Protein markers are either lyophilized (cat. no. 39207) or ready-to-use.

Proteome Standard

SERVA offers a unique set of proteome markers containing 8 proteins, spanning the entire pI region and ranging from 11.7 to 77.0 kDa. The marker proteins are characterized carefully by 2D electrophoresis and also by LC/MS, identity of each protein is verified by protein sequence analysis. The kit contains 5 vials of marker proteins (lyophilized) for 5 to 10 gels in 2D electrophoresis.





Product	Size	Cat. No.
Protein Test Mixture 6 for SDS PAGE	10 mg	39207.01
SERVA Unstained Protein Standard IV	500 µl	39215.01
SERVA Proteome Markers	1 kit	39250.01

Protein Marker: Precise determination of molecular weight

Proteome Standard: Unique tool to calibrate 2D gels

3

SERVA IPG *Blue*Strips

SERVA IPG *Blue*Strips are dried gel strips with immobilized pH gradient used in high resolution 2D gel electrophoresis of proteins. The homogeneous polyacrylamide gel matrix is covalently bound to GEL-FIX™ to stabilize the gel. Additionally, a nonbinding cover film (GEL-FIX™ for Covers) protects the gel from damage and contamination.

SERVA IPG *Blue*Strips (12 strips each)	7 cm	11 cm	17 cm	18 cm	24 cm
3 – 10	43001.01	43031.01	43041.01	43011.01	43021.01
3 – 10 NL	43002.01	43032.01	43042.01	43012.01	43022.01
3 – 6	43005.01	43035.01	43045.01	43015.01	43025.01
4 – 7	43003.01	43033.01	43043.01	43013.01	43023.01
5 – 8	43006.01	43036.01	43046.01	43016.01	43026.01
6 – 10	43004.01	43034.01	43044.01	43014.01	43024.01

For IPG strip rehydration and sample preparation SERVA offers the SERVA HPE™ IPG strip buffer, a 40 % (w/v) SERVALYT mixture. It works for all pH gradients. Due to the low molecular weight of the ampholyte buffer molecules there is no background staining in the 2D gels. To run SERVA IPG strip we recommend to cover the strips with the SERVA HPE™ IPG overlay. This helps to sharp protein spots in high resolution 2D gel electrophoresis. For easy applying the oil a separate dropping bottle is included.

Product	Size	Cat. No.
SERVA HPE™ IPG Strip Buffer	1 ml	43368.01
SERVA HPE™ IPG Overlay	1 L	43397.01

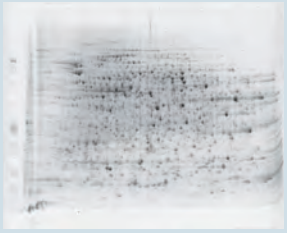
- **Consistent performance – 12 strips per package, all derived from the same production lot**
- **Reliability – accurate casting procedures ensures lot-to-lot reproducibility of pH profile**
- **GMP/GLP conformity – each strip has its individual lot number**

4 SERVA Gels for Horizontal and Vertical 2D PAGE

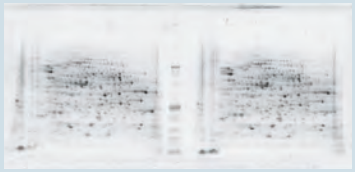
The HPE™ gels for horizontal 2D PAGE are film-backed gels. A pre-formed trench in the gel for applying the focused IPG strip guarantees high efficient sample transfer from 1st to 2nd dimension. Each kit contains 4 gels, equilibration and running buffers, wicks and cooling contact fluid.

Product	Size	Cat. No.
2D HPE™ Triple Gel NF 12.5 % Kit	1 kit	43300.01
2D HPE™ Triple Gel NF 10 - 15 % Kit	1 kit	43301.01
2D HPE™ Double Gel NF 12.5 % Kit	1 kit	43302.01
2D HPE™ Double Gel NF 10 - 15 % Kit	1 kit	43303.01
2D HPE™ Large Gel NF 12.5 % Kit	1 kit	43304.01
2D HPE™ Large Gel NF 10 - 15 % Kit	1 kit	43305.01
2D HPE™ Triple Gel 12.5 % Kit	1 kit	43306.01
2D HPE™ Triple Gel 10 - 15 % Kit	1 kit	43307.01
2D HPE™ Double Gel 12.5 % Kit	1 kit	43308.01
2D HPE™ Double Gel 10 - 15 % Kit	1 kit	43309.01
2D HPE™ Large Gel 12.5 % Kit	1 kit	43310.01
2D HPE™ Large Gel 10 - 15 % Kit	1 kit	43311.01

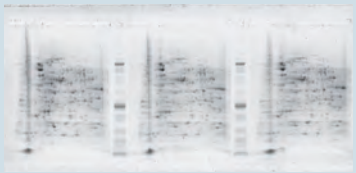
NF = non-fluorescent film backing



2D HPE™ Large Gel NF 12.5 %, stained with SERVA Purple



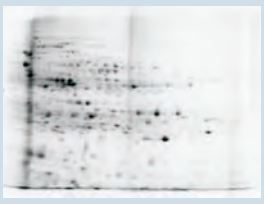
2D HPE™ Double Gel NF 12.5 %, stained with SERVA Purple



2D HPE™ Triple Gel NF 12.5 %, stained with SERVA Purple

For 2D in mini vertical systems use the SERVA*Gel*™ PRiME for 2D PAGE. Gels are cast into stable cassettes (10 cm x 10 cm x 0.7 cm) with one very planar 2D slot for optimum transfer from a 7 cm IPG strip to gel.

Product	Size	Cat. No.
SERVA*Gel*™ TG PRiME 12 %, 2D well	10 gels	43268.01
SERVA*Gel*™ TG PRiME 14 %, 2D well	10 gels	43271.01
SERVA*Gel*™ TG PRiME 8 - 16 %, 2D sample well	10 gels	43281.01
SERVA*Gel*™ Neutral HSE, 2D well	10 gels	43247.01



2D electrophoresis on SERVA*Gel*™ TG PRiME™ 14 % vertical mini gel stained with SERVA HPE™ Lightning Red

- **2D HPE™ Large Format Gel (gel size 260 x 205 mm) accommodating one 24 cm IPG strip**
- **2D HPE™ Double Gel and 2D HPE™ Triple Gel (gel size 250 x 115 mm) accommodating two 11 cm IPG strips and three 7 cm IPG strip, respectively**
- **SERVA*Gels*™ 2D Gels accomodating one 7 cm IPG Strip**

5 SERVA Gels for 2D Western Blotting

The newly developed 2D HPE™ Double BlotGel combines high-resolution 2D gel electrophoresis with the Western Blotting detection method. The gel is not covalently bound to the (non-fluorescent) carrier foil as usual. After electrophoresis, the carrier foil, which interferes with the downstream process, can be removed from the gel easily and allows direct and efficient transfer of separated proteins by semi-dry blotting.

Special Application: HCP Analysis by 2D Western Blotting

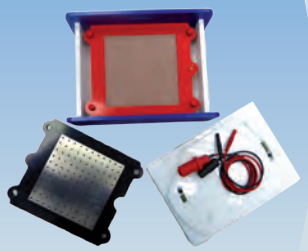
One application of 2D Western blotting is host cell protein (HCP) analysis in the biotechnological production of antibodies or other recombinant proteins. Here, high-resolution horizontal 2D HPE™ gel electrophoresis can show all its advantages, especially the high resolution in protein separation and the efficient semi-dry transfer of protein spots from the gel onto the membrane.

A. Sample prep, desalting and pre-labelling

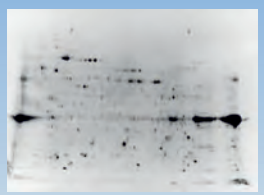
B. 1st dimension on SERVA IPG BlueStrip, 2nd dimension on 2D HPE™ Double BlotGel NF

C. In-Gel-Fluorescence Detection

D. Carrier foil removal & Semi-Dry Blotting



E. On-Membrane Fluorescence Detetction



F. Blocking and AB Probing

G. Chemiluminescence Detection

H. Imaging and Analysis

For more details please refer to the SERVA brochure "HCP Analysis and Beyond"

The format of the 2D HPE™ Double BlotGels is 250 mm x 110 mm x 0.65 mm and allows the use of 2 IPG strips of 11 cm length each and one protein molecular weight standard. Kit comprising 4 plastic-backed gels, running and equilibration buffers, wicks and cooling contact fluid.

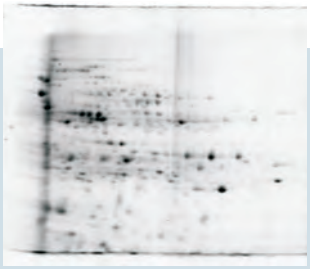
Product	Size	Cat. No.
2D HPE™ Triple BlotGel NF 12.5 % Kit	1 kit	43429.01
2D HPE™ Double BlotGel NF 12.5 % Kit	1 kit	43430.01
2D HPE™ Large BlotGel NF 12.5 % Kit	1 kit	43432.01

NF=non-fluorescent film backing

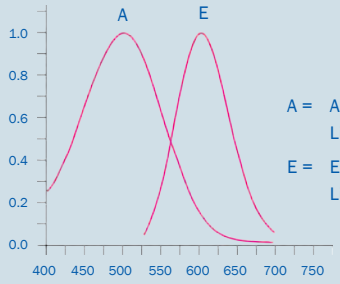
6 SERVA Stains for 2D Gels

To detect separated proteins as spots in the gel proteins have to been stained, either before or after electrophoresis. There are versatile staining methods available. You may pre-label the proteins before loading on the IPG strip or you may process the 2D gel after electrophoresis. Here is a selection of different stains available from SERVA for 2D gel staining.

	Pre-Staining	Post Staining	Fluorescent	Silver	Coomassie
HPE™ Lightning Red	✓		✓		
SERVA Purple		✓	✓		
HPE™ Silver Staining Kit		✓		✓	
HPE™ Coomassie Staining Kit		✓			✓

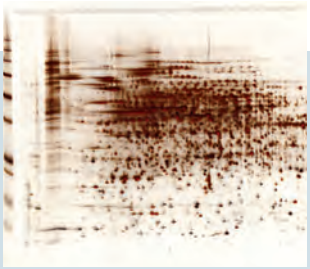


SERVAGel™ TG PRiME™ 14 % 2D vertical mini gel stained with SERVA HPE™ Lightning Red

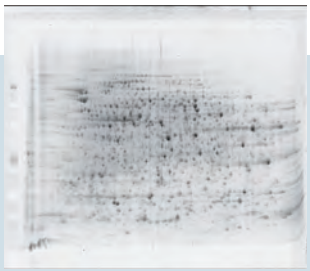


A = Absorption spectrum of conjugated form of SERVA Lightning Red

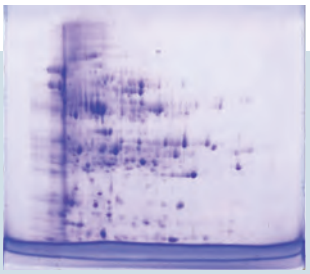
E = Emission spectrum of conjugated form SERVA Lightning Red



2D HPE™ Large Gel 12.5 % stained with HPE Silver Staining Kit



2D HPE™ Large Gel NF 12.5 %, stained with SERVA Purple



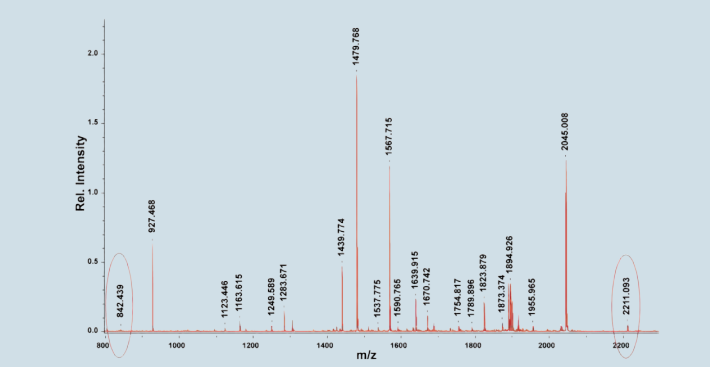
SERVAGel™ TG PRiME™ 14 % 2D vertical mini gel stained with SERVA HPE™ Coomassie Staining Kit

Product	Size	Cat. No.
SERVA HPE™ Lightning Red	1 kit	43400.01
SERVA Purple, 250x concentrate	5 ml	43386.03
	25 ml	43386.01
SERVA Purple HiSens, 250x concentrate	5 ml	43408.01
	25 ml	43408.02
SERVA HPE™ Coomassie Staining Kit	1 kit	43396.01

Pre-labeling of protein samples with SERVA HPE™ Lightning Red allows direct spot detection without staining and washing steps after the run.

7 Endoproteinases

Trypsin MS approved is suitable for digestion of proteins for mass spectrometry analysis. Reductive methylation of the lysine residues of trypsin results in a stable product that is extremely resistant to autolytic degradation. The enzyme is purified by chromatography. No chymotryptic activity is detectable. Every lot is approved for use in in-gel digestion and mass spectrometry analysis.



Spectrogram of BSA digested with Trypsin MS approved.

Lysyl Endopeptidase (LysC) is an approved quality for use with in-gel digestion, protein sequence analysis and mass spectrometric analysis. It cleaves specifically the peptide bonds at the carboxy-terminal side of Lysine residues and S-aminoethylcysteine residues with a high degree of specificity. An added feature of Lysyl Endopeptidase is its ability to retain complete activity after incubation in 4 M urea or in 0.1 % SDS solution for up to 6 hours at 30 °C.

Endoproteinase Glu-C (V8), MS approved is tested for in-gel digestion and mass spectrometry analysis. It is a serine endoproteinase isolated from *Staphylococcus aureus V8*. The specificity of Glu-C is primarily determined by the buffer pH and composition. Using phosphate buffers (pH 7.8), Glu-C will cleave at both glutamyl and aspartyl bonds. Ammonium bicarbonate buffer (pH 7.8) will lead to a preferential cleavage of glutamyl bonds. The presence of proline residues on the carboxy side of the peptide bond inhibits the cleavage.

Product	Size	Cat. No.
Trypsin MS approved, from porcine pancreas	100 µg	37286.01
	150 µg	37286.02
	1 mg	37286.03
	4 x 25 µg	37286.04
Endoproteinase Glu-C (V8 proteinase), MS approved from *S. aureus*	2 x 25 µg	20986.01
Lysyl Endopeptidase®, MS approved	20 µg	20987.01

- **Approved quality for use with in-gel digestion and mass spectrometric analysis**
- **High purity & specificity**
- **For peptide mapping and protein sequence work**

8 2D PAGE Equipment

In 2D PAGE analysis of proteins there are many crucial steps, namely sample preparation, the quality of the reagents used, but also some physically parameters like temperature, formation of the electric field applied to the gel and so on. These physical parameters are mostly influenced by the equipment used in 2D PAGE. The HPE™ BlueHorizon™ System and the HPE™ BlueTower System - the first true „High Performance Electrophoresis (HPE™)“ systems for horizontal 2D PAGE analysis outperforming any conventional 2D PAGE system. Both systems are delivered with the following system components: HPE™ BlueHorizon™ or HPE™ BlueTower, respectively, power supply with monitoring software to log the electrical parameters during gel electrophoresis and one external cooling unit.

SERVA developed the 2D core equipment HPE ™ BlueHorizon™, HPE™ BlueTower, BlueVertical PRiME™, BluePower™ Power Supply and BlueShake in close cooperation with researchers throughout the world. Devices are manufactured in Germany according to the specifications determined by SERVA.

HPE™ BlueHorizon™

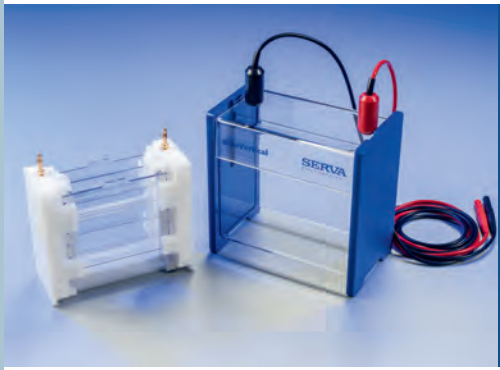
The HPE™ BlueHorizon™ is a flatbed system for optimized performance in cooled flatbed gel electrophoresis using precast 2D HPE™ gels. Main applications are 2D PAGE but also other flatbed techniques like 1D SDS PAGE, native PAGE or isoelectric focusing.

HPE™ Blue Horizon™ Multi Deck

The HPE™ BlueHorizon™ modular deck combinations of 2, 3 or 4 flat bed systems into one space and budget saving unit temperature controlled by one chiller and driven by one single power supply. The Multi Decks offer high throughput capacity for 1D applications like SDS PAGE or IEF and 2D PAGE.

HPE™ BlueTower

The SERVA HPE™ Tower System is a multilevel flatbed electrophoresis device providing unmatched resolution, reproducibility and sensitivity. Up to four polyacrylamide gels can be operated simultaneously to conduct either 1- and 2-dimensional separations.



BlueVertical™ PRiME™

The BlueVertical™ PRiME™ electrophoresis mini tank system has been developed to run precast gels in 2D PAGE, but also in 1D SDS PAGE, native PAGE, IEF or nucleic acid PAGE applications. The unique innovative clamp system keeps the gel cassettes in their correct position at the inner core running module, leak-free and ready to start within seconds.

BluePower™ Power Supplies

The BluePower™ Power Supplies are easy to operate and fully programmable. Change parameters without interrupting the run. They have a stable metal housing and a large LC display. Monitor V, mA and W over time as well as loading and storing of program settings.

SERVA BlueStain

SERVA BlueStain automatically stains polyacrylamide gels. Accurate, reproducible, user-friendly. The device is equipped with a staining tray measuring 30 cm x 25 cm for large-format 2D HPE™ and other gels. For a gentle staining process, the angle of inclination of the table is 4°. The SERVA BlueShake shaker table is essentially the same in design, the only difference being the software installed on the device.

Product	Size	Cat. No.
HPE™ BlueHorizon™	1 unit	HPE-BH
HPE™ BlueHorizon™ PS	1 system	HPE-BHP
HPE™ BlueHorizon™ C	1 system	HPE-BHC
HPE™ BlueHorizon™ System	1 system	HPE-BHS
HPE™ BlueHorizon™ Double Deck	1 unit	HPE- BHD
HPE™ BlueHorizon™ Triple Deck	1 unit	HPE-BHT
HPE™ BlueHorizon™ Quadra Deck	1 unit	HPE-BHQ
HPE™ BlueTower	1 unit	HPE-TO2
HPE™ BlueTower System	1 system	HPE-TS2
BlueVertical PRiME™	1 unit	BV-104
BluePower 3000 V PRiME Power Supply	1 unit	BP-3000-HPE
BluePower 600 V PRiME™ Power Suply	1 unit	BP-600-PRI
HPE™ Cooling Unit	1 unit	HPE-CU1
SERVA BlueShake	1 unit	BSH-01
SERVA BlueStain	1 unit	BST-01

SERVA

serving scientists

SERVA WORLDWIDE

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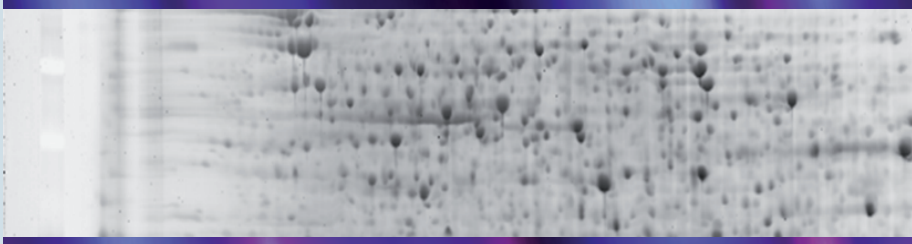

Version 20/10