VDW
Crucial Temperature Solutions

biosan
Medical–Biological
Research & Technologies

CVP-2

Centrifuge vortex for PCR plates

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 7 k-2, Riga, LV-1067, Latvia

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Fax: +371 674 281 01

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Marketing: marketing@biosan.lv
Service: service@biosan.lv

Contents

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**
CVP-2, centrifuge-vortex for PCR plates	V.3A01

1.2 Edition 3.02 – April of 2022

2. Safety Precautions

2.1 **Symbols used in these instructions**.

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

2.2 **Symbols and icons used on the unit and packaging**.

	CE marking, manufacturer affirms conformity with European health, safety, and environmental protection standards, see **12.1**
	WEEE directive marking, see **12.1**
	Polarity of the power connector
	Equipment uses direct current
	Do not use without lid. Secure the safety cover and the lid as described in **5.6**
	Emergency opening location, see **5.18**

2.3 **General safety**.

- This unit is a state-of-the-art piece of equipment, which is extremely safe to operate. Nevertheless, it may lead to danger for users or others nearby if used by untrained staff, in an inappropriate way or for purposes other than for those it was designed.
- Save the unit from shocks or falling.
- Store and transport the unit as described in section **10. Storage and transportation**.
- Use only original accessories provided by the manufacturer and ordered specifically for this model.
- 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 to the design of the unit.

2.4 **Electrical safety**.

- Connect only to the external power supply with voltage corresponding to that on the serial number label.
- Use only the external power supply provided with this product.
- Ensure that the external power supply is easily accessible during use.
- Do not plug the unit into an ungrounded mains outlet, and do not use an ungrounded extension lead.
- Disconnect the unit from the electric circuit before moving.
- If liquid penetrates into the unit, disconnect it from the external power supply 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 **7. Specifications**.

2.5 **During operation**.

- Do not use rotors with visible signs of corrosion, wear or mechanical damage.
- Do not use the unit without the rotor safety cover.
- 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.
- Observe the safety area of 300 mm around the unit. Persons and hazardous materials must not be located in the safety area whilst the unit is operating.
- Do not centrifuge flammable or chemically active substances.
- Do not use outside laboratory rooms.
- Do not operate the unit if it is faulty or was installed incorrectly.
- Always fix rotor securely. Stop the operation immediately with the **Stop** key if any unusual noise occurs during acceleration, which can be due to improper rotor fixation.

2.6 **Biological safety**.

- According to EN 61010-2-020, a centrifuge without biological safety system is not considered a biologically safe and therefore cannot be used for centrifuging hazardous materials contaminated with toxic, radioactive or pathogenic microorganisms.
- Take additional measures if a contact of bare skin with hazardous substances is possible. Take care not to cut, puncture, or tear the gloves. Not one glove material is impervious to all substances. Disposable surgical or PVC gloves provide substantial but not complete protection. PVC gloves are probably more protective than surgical gloves, but they are stiffer and less tactile. Discard gloves after each use.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material spills on or penetrates into the equipment.
- Some inner components are susceptible to contamination. Only qualified specialists, who are experienced in deactivations procedures, must perform cleaning these components for their future use.
- The user is responsible for decontaminate the unit before its decommissioning and utilization.

3. General Information

After many years of Combined Centrifuge/Vortex concept success, we are proud to introduce the long-awaited Centrifuge/Vortex for PCR plates, CVP-2, to the sample preparation market. The application range of CVP-2 is PCR plates: with skirts, semi-skirts or without them.

The Spin-mix-spin technology is intended to spin-down micro volumes of reagents on the well's bottom (first centrifugation spin), following mixing (mix) and spin-down the reagents again (second spin). We named this repetitive algorithm **SMS**, spin-mix-spin. It aims at reducing the mistakes during sample preparation for PCR analysis. The algorithm was published for the first time and patented by Biol. Dr. V. Bankovskis (V. Bankovskis et al., Riga, Latvia, Pat. No. P94-74).

CVP-2 is a fully automatic device for reproducing **SMS** for 2 PCR plates at the same time, thus saving time considerably. A must-have instrument for PCR and DNA analyses laboratory.

CVP-2 is 4 devices combined in 1:

1. Centrifuge – maximum 1500 rpm (RCF 185–225 × *g*)
2. Vortex (regulation timer 0 – 60 s)
3. Centrifuge/Vortex
4. SMS for realization of the **SMS** algorithm

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 **Standard set**. Package contents:

4.2.1 Standard set

- **CVP-2** Centrifuge/Vortex ..... 1 pce
- **R-2MP** rotor for PCR plates with fixation nut for fastening and safety cover ..... 1 pce
- **AP-96** adapter for semi-skirted and non-skirted PCR plates, 96 wells ..... 2 pcs
- Wrench for rotor removing ..... 1 pce
- Key for cover unblocking (fixed into rear panel of the unit) ..... 1 pce
- External power supply ..... 1 pce
- Power cable ..... 1 pce
- User instructions, declaration of conformity ..... 1 copy

4.2.2 Optional accessories, on request

- **AP-384** adapter 384-well PCR plates (Eppendorf) ..... 2 pcs.

Wrench

AP-96

AP-384

4.3 **Setup**.

- Place the unit on the even, stable, horizontal and clean surface.
- Remove protective film from the display.
- Plug the power cable into the external power supply.
- Plug the external supply into the power socket on the rear of the unit and position the unit so that there is easy access to the power switch and mains outlet.
- According to EN 61010-2-20 people and hazardous materials must not be within a 300 mm area around the device during the centrifuge operation.

4.4 **Rotor installation**.

- Connect the power cable to a properly grounded mains outlet. Switch on the power switch (**I** position) on the rear. Press the **Open** key and open the lid by lifting it upwards by hand.

Caution! Check the rotor, adapters for any signs of wear or corrosion, and replace if necessary.

Note. Lock on the lid unlocks only if the unit is powered up. If the unit cannot be powered up, see the opening procedure in **5.18**.

- Unscrew the fixation nut (fig. 1/1) counter clockwise using the wrench included in standard set and remove the nut.
- Place the rotor and secure it tightly with the fixation nut, placing the nut with the key holes up (fig.1/1) and turning it clockwise by the included wrench.
- Place the safety cover (fig. 1/2) on the rotor by pressing the cover clip (fig. 1/3) down.
- If the centrifuge will not be used, close the lid by pressing down the middle part of the edge until a click is heard. Switch off the power switch (position **O**) on the rear. Disconnect the cable from the mains.

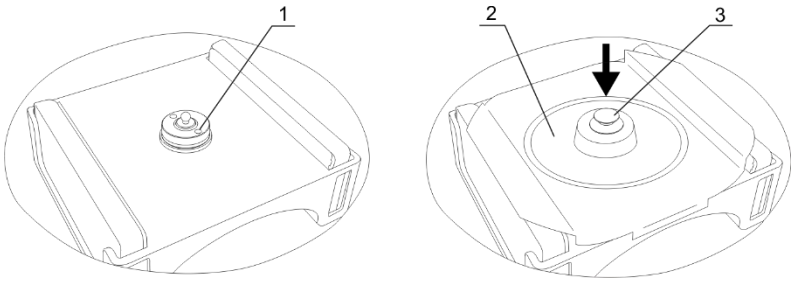

Figure 1. Rotor replacement

5. Operation

5.1 **Recommendations during operation**.

- Do not use rotors with visible signs of corrosion, wear or mechanical damage. Check the rotor, adapters for any signs of wear or corrosion, and replace if necessary.
- When using semi-skirted or non-skirted PCR plates, put the plate into an appropriate adapter. Insert the plate into the rotor with the adapter. Refer to section **6. How to choose a proper adapter**.
- Load both PCR plates to balance the unit during operation.
- Before operation check PCR plates and ensure that they are closed properly. Content can be spilled from open PCR plates, endangering personnel working with hazardous materials.
- For proper mixing, it is recommended to fill PCR plates not more than 75% of their nominal volume.
- Seal the microplates with an appropriate adhesive film to avoid spilling the sample.
- Relative centrifugal force (RCF) is slightly higher at the sides of the plate than in the middle, e.g., at 1500 rpm, it is 225 *g* versus 185 *g*.

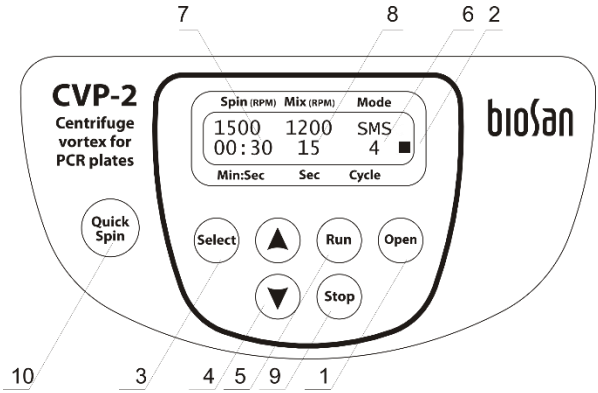

Figure 2. Front panel

5.2 Connect the external power supply to a properly grounded power socket. Turn on the power switch (**I** position) on the rear side of the unit. Lid unlocks automatically.

5.3 Press the **Open** key (fig. 2/1) and open the lid by lifting it upwards by hand (indication will appear in the Mode bottom line, fig. 2/2). Lid will open only with rotor stopped.

5.4 Remove the safety cover by lifting the safety cover clip.

5.5 Insert TWO microtest plates in rotor one opposite another.

5.6 Place the safety cover on the rotor and secure it by pressing the safety cover clip down tightly. Close the outer lid carefully and smoothly until the clicking sound is heard (indication ■ will appear in the Mode bottom line).

Note. To close the lid, press down the middle part of the edge of the lid until the clicking sound is heard. Otherwise, the lid will not be secured properly, which will cause operation malfunction.

5.7 **Quick centrifugation**. Press and hold the **QS** (fig. 2/10) button for quick sedimentation. Rotor picks up speed The unit stops automatically when the **QS** button is released.

5.8 **Setting parameters**.

5.8.1 By pressing **Select** key (fig. 2/3) choose a parameter to change. Each pressing of the **Select** key consecutively activates parameters in operation cycle; currently active parameter is indicated by blinking.

5.8.2 Use ▼ and ▲ keys (fig. 2/4) for setting the corresponding values. Pressing a key for longer than 2 seconds will increase change rate.

5.8.3 Speed (**RPM**) and spinning / mixing time (**Time**) can be changed during operation — when a new operation cycle starts, microprocessor automatically accept changes as current operation mode. Cycle count (**Cycle**) and operating mode (**Mode**) cannot be changed during operation.

5.8.4 **Mode** (fig. 3/1) parameter can be one of the following:

SMS	SMS-algorithm mode.
MS	alternating centrifugation and vortexing.
SPIN	centrifugation only.
MIX	vortexing only.

5.9 **SMS-algorithm**

5.9.1 Select the SMS-algorithm (indication **S.M.S.** of **Mode** parameter, fig. 3/6).

5.9.2 Set the required centrifugation speed, from 300 to 1500 rpm (increment 100 rpm, fig. 3/2).

5.9.3 Set the required centrifugation time, from 1 s to 30 min (increment 1 s, after 1 min - 1 min, fig. 3/1).

5.9.4 Set the required vortexing speed, from 300 to 1200 rpm (increment 100 rpm, fig. 3/4).

5.9.5 Set the required vortexing time, from 1 to 60 s (increment 1 s, fig. 3/3).

5.9.6 Set the required SMS-algorithm cycle count, from 1 to 999 (fig. 3/5).

5.10 **Centrifugation + vortexing**

5.10.1 Select the alternating centrifugation and vortexing algorithm (indication **M.S.** of **Mode** parameter, fig. 4/6).

5.10.2 Set the required centrifugation speed, from 300 to 1500 rpm (increment 100 rpm, fig. 4/2)

5.10.3 Set the required centrifugation time, from 1 s to 30 min (increment 1 s, after 1 min - 1 min, fig. 4/1).

5.10.4 Set the required vortexing speed, from 300 to 1200 rpm (increment 100 rpm, fig. 4/4).

5.10.5 Set the required vortexing time, from 1 to 60 s (increment 1 s, fig. 4/3).

5.10.6 Set the required SMS-algorithm cycle count, from 1 to 999 (fig. 4/5).

5.11 **Centrifugation**

5.11.1 Select the centrifugation mode (indication **SPIN** of **Mode** parameter, fig. 5/3).

5.11.2 Set the required centrifugation speed, from 300 to 1500 rpm (increment 100 rpm, fig. 5/2)

5.11.3 Set the required centrifugation time, from 1 s to 30 min (increment 1 s, after 1 min - 1 min, fig. 5/1).

5.12 **Vortexing**

5.12.1 Select the vortexing mode (indication **MIX** of **Mode** parameter, fig. 6/3).

5.12.2 Set the required vortexing speed, from 300 to 1200 rpm (increment 100 rpm, fig. 6/2).

5.12.3 Set the required vortexing time, from 1 to 60 s (increment 1 s, fig. 6/1).

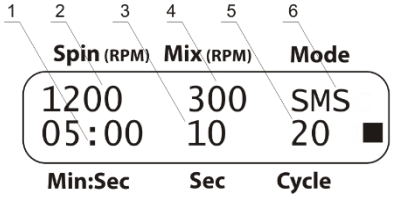

Figure 3. SMS-algorithm

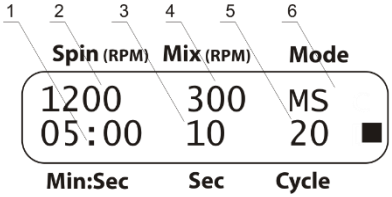

Figure 4. Centrifugation + vortexing

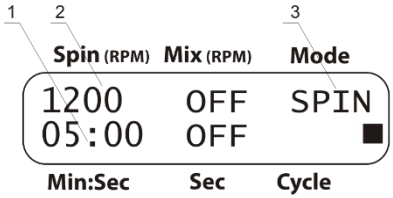

Figure 5. Centrifugation

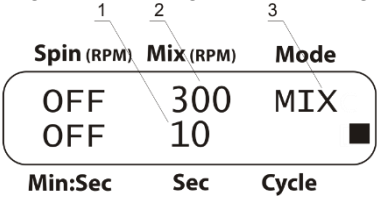

Figure 6. Vortexing

5.13 Press **Run** key (fig. 2/5) to start operation.

5.14 Rotor will begin rotating and, on the display, indication ▶ (fig. 2/2), cycle countdown (fig. 2/6) and changing parameters of the current mode (fig. 2/7 and fig. 2/8).

5.15 Operation can be stopped before the set number of cycles elapses, if necessary, by pressing the **Stop** key (fig. 2/9).

5.16 Unit stops automatically after executing set number of cycles (blinking indication ■ on display, fig. 2/2) and the lid unlocks automatically. A sound signal is emitted after full stop of the rotor. Press **Stop** key (fig. 2/9) to stop the signal.

5.17 At the end of operation set the power switch in position **O** (OFF) on the rear. Disconnect the external power supply from electric circuit.

Note. The electrical lid lock allows opening the lid only when the unit is connected to the mains and is turned on.

5.18 **Lid emergency opening**. Disconnect the power cord from external power supply unit. Wait until the rotor stops completely. Insert the provided lid-unblocking key (found on the rear panel of the unit) into the marked opening on the right side of the unit and press to unlock the lid.

6. How to choose a proper adapter

6.1 Displayed in the table below are PCR plate types in relation to available adapters.

●	Effective mixing
	Do not use

Plate type	No adapter	**AP-96** adapter	**AP-384** adapter
96-well skirted PCR plate	●		
Piko PCR plates, in frame, 4 pcs/frame	●		
96-well semi-skirted PCR plate		●	
96-well non-skirted PCR plate		●	
384-well PCR plate (Eppendorf)			●

Caution! PCR plate height inside an adapter should not be bigger than 17 mm.

7. Specifications

The unit is designed for operation in cold rooms, incubators 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.

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

7.2 Motion specifications

Speed setting range
- Centrifugation ..... 300–1500 rpm
- Vortexing ..... 300–1200 rpm

Speed setting increment ..... 100 rpm
Relative centrifugal force ..... 185–225 × *g* at 1500 rpm
Centrifugation mode time range ..... 1 s – 30 min
Centrifugation mode time increment ..... 1 s; after 1 min – 1 min
Vortex mode time range ..... 0–60 s
Vortex mode time increment ..... 1 s
Number of programmable cycles ..... 1–999 cycles

7.3 General specifications

Maximum plate height ..... 17 mm
Display ..... LCD, 2x16 characters
Safety measures ..... Safety cover, lid with a lock
Dimensions ..... 285x350x190 mm
Weight, accurate within ± 10% ..... 6.15 kg
Operating voltage and current ..... 12 V=, 1.5 A
Power consumption ..... 18 W
External power supply input ..... in 100–240V~, 50/60 Hz, out 12 V=

7.4 Workroom requirements

Workroom description ..... Cold rooms, incubators (except CO2 incubators) and closed laboratory rooms
Temperature range ..... +4 °C … +40 °C
Humidity requirements ..... Maximum of 80% RH at 31 °C, decreasing linearly to 50% RH at 40 °C. Non-condensing atmosphere.
Operating height, maximum ..... 2000 m ASL

8. Ordering information

8.1 Models and versions available.

Model	Version	Catalogue number
CVP-2, centrifuge-vortex for PCR plates	V.3A01	BS-010219

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

8.2.1 Optional accessory.

Description	Catalogue number
AP-384, set of 2 adapters for 384-well PCR plates (Eppendorf)	BS-010219-EK

8.2.2 Replacement parts.

Description	Catalogue number
R-2MP, rotor for PCR plates, with a fixator lid	BS-010219-AK
AP-96, set of 2 adapters for semi skirted and unskirted 96-well PCR plates	BS-010219-DK

9. Care and maintenance

9.1 **Service**.

9.1.1 If the unit is disabled (e.g., no centrifugation or vortexing, no reaction to key presses, etc) or requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

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

9.1.3 Operating integrity check. If the unit follows the procedure described in section **5. Operation**, then no additional checks are required.

9.2 **Cleaning and disinfection**.

9.2.1 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.

9.2.2 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.

9.2.3 To access the rotor, open the lid. For powered unit, see **5.3**. For unpowered unit, see **5.18**. Hold the rotor with one hand, unscrew rotor fixation nut, turning it counter clockwise using included wrench. Retrieve the rotor, clean, and disinfect, as necessary. Replace the rotor and secure it tightly with the fixation nut, placing the nut with the key holes up and turning it clockwise by securing wrench. Replace the rotor safety cover on the rotor by pressing the cover clip down tightly.

9.2.4 The rotor and adapters are autoclavable (15 min 121°C), the unit itself is not autoclavable.

9.3 **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.

10. Storage and transportation

10.1 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%.

10.2 After transportation or storage and before connecting it to the electric circuit, keep the unit under room temperature for 2-3 hrs.

10.3 For extended storage, the unit does not require special procedures.

11. Warranty. Production date

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

11.2 The warranted service life of unit from date of delivery to the Customer is 24 months (excluding optional accessories). For extended warranty, register the unit, see **11.5**.

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

11.4 If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor address. To obtain the claim form, visit **Technical support** on our website at link below.

11.5 Extended warranty. For **CVP-2**, a *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.

11.6 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

Warranty registration

biosan.lv/register-en

Product class description

biosan.lv/classes-en

11.7 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
CVP-2, centrifuge-vortex for PCR plates		

11.8 **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.

12. EU Declaration of conformity

12.1 Centrifuge-vortex for PCR plates **CVP-2** is in conformity with the following relevant Union 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 61010-2-020:2016** Particular requirements for laboratory centrifuges.
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.

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

CVP-2

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

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

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*

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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