Blue*Line*
Instruments for Electrophoresis

INSTRUCTION MANUAL

BlueSpin Cryo

(Cat. No. BSD-CRYO)

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1 Meanings of Symbols & Safety Precautions

1.1 Symbols on the device

Symbol	Meaning	Symbol	Meaning
	Indicate a hole for manual door opening in case of emergency		Attention and warning for electric shock
	Attention and warning for rotor coupling.		Attention and warning for door opening and closing
	Attention and warning for correct way of sample balancing in the rotor.		

1.2 Safety Precautions

Before using the instrument, please read this operation manual to ensure correct usage through understanding. Incorrect handling of the instrument could possibly result in personal injury or physical damage on the instrument or its accessories.

- ALWAYS locate the instrument on a flat, rigid and stable table capable of withstanding the weight of the instrument and its spinning operation.
- ALWAYS make a safety zone of 30 cm around the centrifuge to indicate that neither hazardous materials nor persons should be permitted within the area during operation.
- ALWAYS position the instrument with enough space on each side of instrument to ensure proper air circulation.
- ALWAYS install the instrument within a temperature and humidity controlled environment. (Permissible ambient temperature: +5 °C ~ +35 °C, Relative humidity: ≤ 85 %)
- Before connecting the power, check the rated voltage.

- Unapproved rotors and associated accessories should not be used.
- Before operating the instrument, check if the rotor and the rotor lid are securely fastened.
- The instrument should be operated with a rotor properly installed and secured to the motor shaft.
- Mount the rotor on the motor shaft properly, check it with spinning manually.
- Do not stop the rotor by touching with hand during the instrument is running.
- Emergency door open should be performed only when spinning is completely stopped.
- The rated speed or specific gravity should not be exceeded. Samples whose density is greater than 1.2 g/ml must have reduced maximum rotational speed to avoid rotor failure.
- The sample content should not exceed 80 % of total capacity of a tube. Otherwise, it would cause spillage of sample fluid and even the tube breakage.
- ALWAYS load the tubes symmetrically with evenly weighted samples to avoid rotor imbalance. If necessary, use the water blank to counterbalance the unpaired sample.
- The operation speed should not exceed the highest value of the individual guaranteed g-forces of each centrifuge, rotor, bucket or adaptors and sample container, especially the guaranteed g-force of sample container should not be neglected.
- The rotors should be cleaned and kept dry after every use for longer life and safety.
- ALWAYS disconnect the power supply prior to maintenance care and service to avoid electrical shock.
- ALWAYS use proven disinfection procedures after centrifuging biohazardous materials.
- Flammable, toxic, radioactive, explosive, or corrosive materials should not be centrifuged.
- When it is necessary to use toxic or radioactive materials or pathogenic micro-organisms which belong to the Risk Group II of WHO: “Laboratory Bio- safety Manual,” should follow national regulations.

Attention

- **Do not place dangerous materials within 30 cm distance around the instrument, and that is also recommended by IEC 61010-2-020.**
- **Use the emergency door open function only when the door button on the control panel is dumb under the condition of complete stop of rotor running.**
- **Never try to open or move the instrument if it is not completely stopped.**
- **If the power input is more than +/- 10% of the recommended voltage or fluctuates frequently, it may cause malfunction of the instrument and often result in serious damage.**
- **Install the instrument at a place without any kinds of corrosive gases.**

2 Packing List & Technical Specifications

2.1 Packing List

- Microcentrifuge
- 6 mm Wrench
- Rotor Locking Tool
- Emergency Open Tool
- Power cord
- Manual

2.2 Technical Specifications

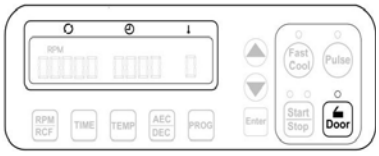
Max. RPM / RCF	17,000 rpm / 27,237 xg	
Max. capacity	30 x 2.0 ml tubes	8 x 8-tube PCR strips
Temp. range (°C)	-20 ~ +40	
FAST COOL button	Yes	
Time control	Pulse, timed < 100 min or continuous	
RPM / RCF conversion	Yes	
Noise level	≤ 56 dB	
Acc / Dec	9 / 10 steps	
Program memory	100	
Rotor Identification	Automation	
Imbalance cutout	Yes	
Display	Blue LCD	
Safety lid lock	Yes	
Power supply	220 V / 50~60 Hz	
Power requirement	2 kVA	
Dimension (W x D x H)	310 mm x 620 mm x 265 mm	
Weight without rotor	43 kg	

3 Installation

1. Connect the AC Power cord to the power socket on the back of the instrument.

2. Turn on the instrument by pressing the switch on the back of the instrument.

3. For opening the door, press the [DOOR] button.
4. Close the door until hearing a clank shut.
5. When the door is opened, the door LED turns on. When the door is closed, the door LED turns off.



- If the door is opened, the instrument could not be operated even with pressing the [Start] button.
- For operational safety, this instrument has an automatic rotor recognition function.
- When you supply the power, the display shows "Searching Rotor" / “Change to Rotor ID”. If the rotor is absent, “Error 9” will be displayed. This message will be cleared after rotor coupling and running.
- The door is not automatically opened after finishing operation to keep the sample at proper temperature.
- Power Failure: If there is any power failure during operation, the door can not be opened by using the [Door] button. The door can be opened only when the operation is completely stopped and the power is on again. If you want to open the door during the power failure, please refer to chapter: “Emergency Door Open”.

6. Before coupling a rotor, clean the motor shaft and chamber with soft dry towel.

7. Mount a proper rotor into the motor shaft.

8. Grasp the rotor with one hand, and place Rotor Locking Tool at the center hole of the rotor.

   To assemble the rotor: Rotate the Rotor Locking Tool clockwise until tightly assembled.
   To disassemble the rotor: Rotate the Rotor Locking Tool counterclockwise

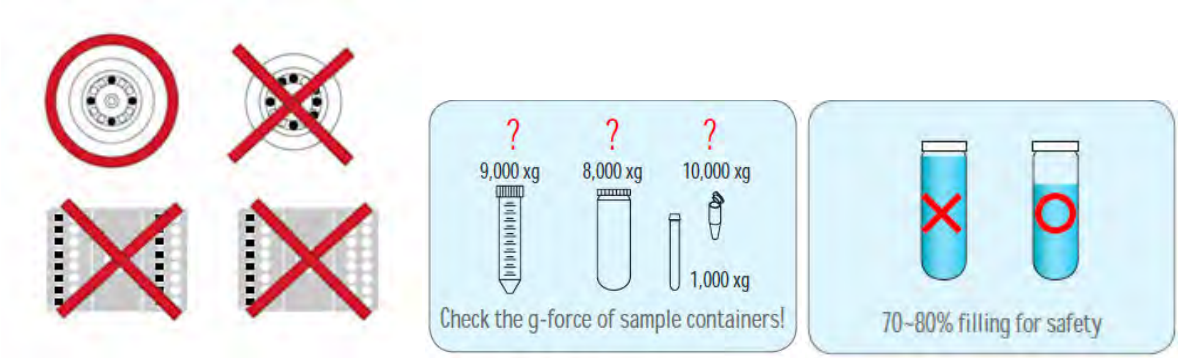
9. To close the rotor lid, rotate the rotor lid nut clockwise. For opening lid: rotate the rotor lid nut counterclockwise.

   When you run a fixed angle rotor, make sure that the rotor lid is tightly closed. If you don't close the rotor lid completely, it will be crushed.

10. Positioning of sample tubes:

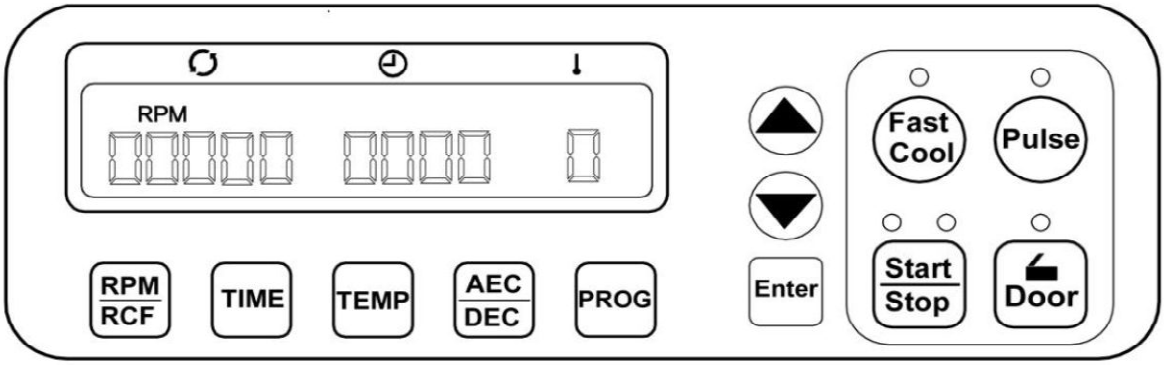
- Before loading sample tubes, check for water drops or dirt in the rotor hole or inner adaptor.
- If there is a water drop or dirt in the rotor hole or inner adaptor, remove it with soft dry cloth.
- Tubes should be placed in the rotor with same amount of samples at symmetrical positions.
- Only use appropriate centrifugal tubes and do not exceed the speed beyond the tube's max g-force.
- For safety, fill the sample for 70 ~ 80 % in the tubes.
- If the number of samples is not in pair, please load the control tubes at each symmetrical position. Otherwise, it results noise and vibration, and eventually damages the instrument.

Correct Ways of Sample Balancing & Tube usage:



4 Operation

4.1 Control panel



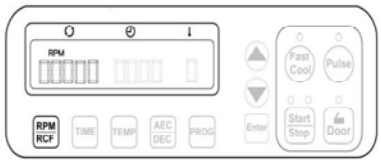
Button	Function
RPM / RCF	For automatic conversion of RPM / RCF and to set the speed
TIME	Use to set time, available range up to 99 min 59 sec (00:00: continuous)
Temp	Use to set temperature (-20 °C ~ 40 °C)
ACC / DEC	Use to set the acceleration & deceleration level from 1 to 9 steps. ‘0’ in deceleration step means natural deceleration. Larger number means faster acceleration or deceleration.
PROG	Use to save a set of setting values or recall the saved program number
Fast Cool	Use to reach rapid refrigeration up to the setting temperature.
Pulse	Use for quick runs
Enter	Use for completion of data setting
Start/Stop	Use to start and stop operation
Door	Use to open instrument lid

4.2 Setting RPM / RCF

4.2.1 Setting RPM

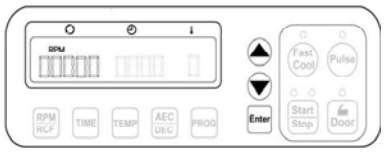
1. Speed setting unit: 10 rpm or 100 rpm
   RPM MODE is generated by pressing the [RPM / RCF] button once.

   RPM LED is flickering on the display window.



2. Press the [▲▼] buttons to change input value.

   After 5 seconds from touching the [▲▼] buttons, the unit of setting value is changed from 10 rpm to 100 rpm. If you do not touch the [▲▼] button for 5 seconds, the setting mode is cleared.

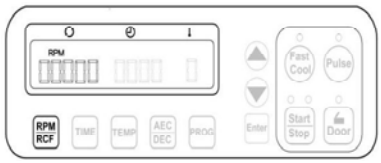


   Touch the [Enter] button to save and complete the setting.

4.2.2 Setting RCF

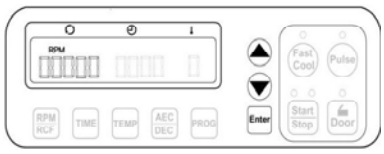
1. Speed setting unit: 1 rcf or 10 rcf
   RCF MODE is generated by pressing the [RPM / RCF] button twice.

   RCF LED is flickering on the display window.



2. Press the [▲▼] buttons to change input value.

   After 5 seconds from touching the [▲▼] buttons, the unit of setting value is changed from 1 rcf to 10 rcf. If you do not touch the [▲▼] button for 5 seconds, the setting mode is cleared.

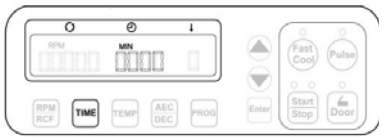


   Touch the [Enter] button to save and complete the setting.

4.3 Setting Time

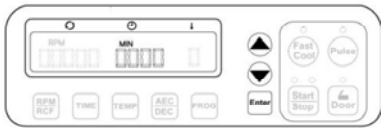
1. Speed setting unit: 1 min or 10 min / 1 sec or 10 sec
   Time is down-counted after starting centrifugation.

   Press the [TIME] button once.
   MIN LED is flickering.



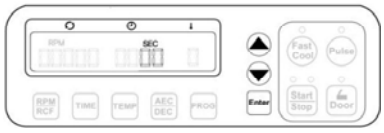
2. Press the [▲▼] buttons to change the minute value.

   After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed from 1 min to 10 min. If you do not touch the [▲▼] button for 5 seconds, the setting mode is cleared.



3. Press the [ENTER] button to pass the sec value setting.

   After keeping holding finger on the [▲▼] buttons for 5 seconds, the unit of setting value is changed from 1 sec to 10 sec. If you do not touch the [▲▼] button for 5 seconds, the setting mode is cleared.



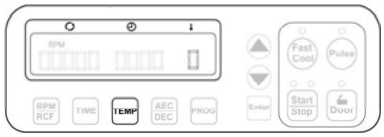
4. Touch the [Enter] button to complete the setting.

4.4 Setting Temperature and Fast Cool

4.4.1 Setting Temperature

1. Temperature can be set from -20 °C to 40 °C
   Temp setting unit: 1 °C

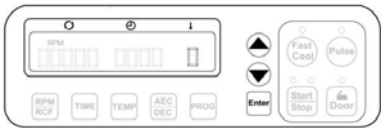
   Touch the [TEMP] button.
   Temperature value blinks on the display window.



2. Press the [▲▼] buttons to change input value.

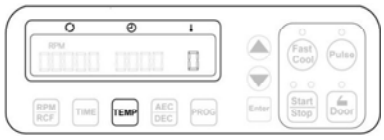
   If you do not touch the [▲▼] button for 5 seconds, the setting mode is cleared.

   Touch the [Enter] button to save and complete the setting.



4.4.2 Fast Cool

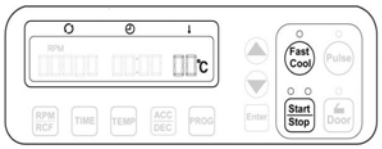
1. Set the temperature as described in the chapter: “Setting temperature”



2. Touch the [Fast Cool] buttons for fast cooling.

   “Fast Cool” on LED is turned on. The display shows a message as follows: “Searching Rotor” >> “recognition OK!”

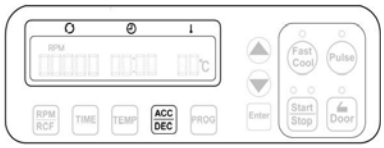
   By touching the [Fast Cool] button, the instrument is refrigerated down to the set temperature in a short time. During the fast cooling, the rotor runs at low speed (1,000 rpm). The passed time is showed on the display window.



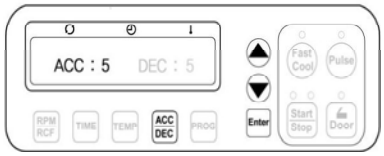
   If you’d like to load your sample tubes before pressing the [Fast Cool] button, please check if the sample is safe during spinning at 1,000 rpm. Before starting Fast Cooling, please check the rotor coupling and symmetry of sample tubes.

4.5 Acceleration / Deceleration

1. Touch [ACC / DEC] button.



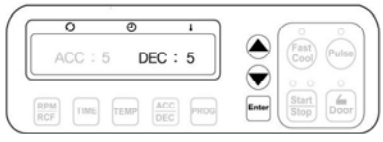
2. Touch the [▲▼] buttons to change input ACC value. ACC blinks on the ACC / DEC display. Input the desired level of ACC from 1 to 9 (Level 9: The fastest acceleration).



   If you do not touch the [▲▼] button for 5 second, the setting mode is cleared.

3. Fix the ACC level by touching [Enter] button.

4. Touch the [▲▼] buttons to change input DEC value. DEC blinks on the ACC / DEC display. Input the desired level of DEC from 0 to 9 (Level 0: Natural deceleration / Level 9: The fastest deceleration).



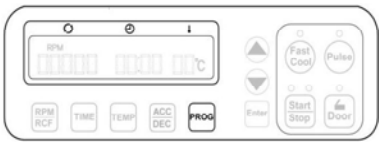
   If you do not touch the [▲▼] button for 5 second, the setting mode is cleared.

5. Fix the DEC level by touching [Enter] button.

4.6 Program Saving & Recalling

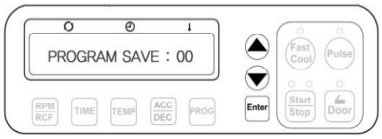
4.6.1 Saving

1. Set parameters.



2. Touch the [PROG] button longer than 3 seconds.

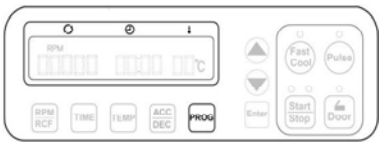
3. Touch the [▲▼] buttons to change input Program number. If you do not touch the [▲▼] button for 5 second, the setting mode is cleared.



   Save up to 100 programs. (Program numbers from 00 to 99)

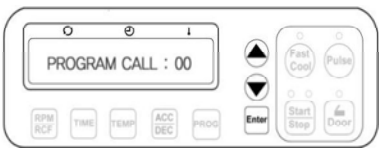
4. Touch the [Enter] button to complete the saving

4.6.2 Recalling



1. To recall the saved program, just touch the [PROG] button shortly (less than 1 sec).

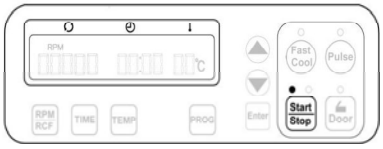
2. Touch the [▲▼] buttons to select program number you want to recall and then touch the [Enter] button. If you do not touch the [▲▼] button for 5 second, the setting mode is cleared.



   When you touch the [Enter] button, display window shows the saved setting parameters (RPM / RCF, TIME, TEMP).

4.7 Start/Stop

1. After setting RPM / RCF, Time and Temp., press [Start / Stop] button.

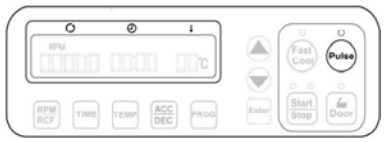


   During running, a ‘Start LED’ is turned on. The instrument is running only when the door is closed.

   By touching the [Start / Stop] button during centrifugation, the operation is stopped.

4.8 Pulse

1. If you press the [Pulse] button and release at the point you want to stop, the centrifuge decelerates immediately.



4.9 Emergency Door Open

1. The door can be unlocked manually using the Emergency Door Open Tool through the emergency opening hole. Find the emergency hole on the left side of the instrument. Insert the Emergency Door Open Tool into the hole and push it until the door is released.

Manual opening should be performed only when spinning is completely stopped. Otherwise, harmful damage will be accompanied to not only operators but samples.
After opening the door manually, it is recommended to wait until normal electricity comes back.

4.10 Fuse replacement

1. Replace the fuse only if the centrifuge is switched off and the power cord is disconnected from the device.

   You find the fuse case below the power outlet. Push with a flat-head screwdriver for bring out the fuse case.
   Replace the damaged fuse with new one from the fuse case and then re-connect the power.

5 Maintenance

5.1 Outer part of Instrument

- Clean the outside of the instrument with dry soft cloth. If necessary, dip the cloth in neutral detergent and clean contaminated area. Keep completely dry after cleaning.
- Do not use any volatile chemicals such as alcohol and benzene, etc.
- Be careful not to make scratches on the surface of the instrument. The scratches can cause corrosion on the surface of the instrument.
- If any rust appears, clean it with neutral detergents and keep dry.

5.2 Chamber

- Keep dry inside the chamber after every use.
- If the chamber is contaminated, dip the cloth in neutral detergent and clean contaminated area.

5.3 Shaft

- Always make special attention to clean the motor shaft to avoid any imbalance problem due to the contaminants.
- After using the instrument, take out the rotor from the shaft, and clean the shaft with dry soft cloth to keep dry.

5.4 Rotor

- If any parts are contaminated with samples, clean the rotor with soft wet cloth and keep the rotor dry.
- Be careful not to make scratches inside or on the surface of rotors. Any small scratches can cause corrosion of the rotor and big damage to the instrument.
- If you do not use the instrument, keep the rotor separately from the motor shaft and stand it upside down.

5.5 Transportation of Instrument

- If you need to move or ship the instrument, be cautious to protect the motor shaft from any physical impact or turbulence.
- Do not mount a rotor in any cases of movement. Fill inside the chamber with proper materials to keep the motor shaft on place and not to be influenced by physical pressure.

6 Trouble Shooting

6.1 Check List

Symptom	Check list
Power failure	Connect the AC Power cord and make sure that the line is completely connected between the instrument and power outlet. Check the power switch is turned on.
Can't be started	If the door is not closed completely, the instrument can't run. Check the Door LED on the display window and close the door completely.
Can't open the door	If the power is out, check the main fuse for the laboratory to supply the power. If it is not solved in shortly, open the door with spikes for safety of sample.
Can't close the door	Remove the dirt at the door latch and then close the door completely again. If the door seems not being closed by mechanical reason, please contact your distributor.
Noise and vibration during running	Please check the balanced status of both the table and the instrument.
	Please re-check the coupling status of the following three matches to minimize the noise 1. the balanced way of coupling of the rotor into the motor shaft 2. the completeness of fixing of the Rotor Locking Nut on the rotor 3. the matching status of Rotor Lid with the rotor
	Check balances of samples in the rotor. Load the same weight of samples symmetrically.

6.2 Error code

If the instrument shows the error code with beeping sound, press [STOP] button to stop the beeping sound and press [Enter] button to release of the error status and make the instrument go to the default setting again.

Error	Possible Causes	Actions
Error 1	RPM Sensor	• Shut off the power supply, and then, turn on the power switch again to check the instrument. • If the error code shows continuously although you try to operate again, please contact your distributor.
Error 2	Door	• The door is not closed completely. • Remove the dirt at the door latch and then close the door completely again. Check the Door LED on the display window. If it is not solved in shortly, open the door with emergency door tool manually for safety of sample.
Error 3	Motor Overheating	• The motor is overheated. • Shut off the power supply for an hour, and then turn on the power switch for checking the instrument. • If the error code shows continuously, please contact your distributor.
Error 4	Low Voltage	• The power input of Power supply (V / Hz) is 10 % less than required power. • Shut off the power supply and then check the voltage of the Power supply (V / Hz). • Use AVR to provide proper power.
Error5	High Voltage	• The power input of Power supply (V / Hz) is 10 % more than required power. • Shut off the power supply and then check the voltage of the Power supply (V / Hz). • Use AVR to provide proper power.
Error 6	Over Speed	• The instrument is spun with over speed, due to problems in the overload of motor and the output of motor. • Shut off the power supply, and then, turn on the power switch again to check the instrument.
Error 7	Software	• The installed software has bugs. • Tuning the firmware (Download)
Error 8	Imbalance	• Check weight-balances of samples. Turn off and on the instrument for checking.

Error 9	Rotor ID or RPM Sensor	• If the function of rotor recognition is failed, this message is appeared. • This message will be cleared by coupling an appropriate rotor. • If the error code shows continuously, please contact your distributor.
Error 11	Chamber Temp. Error	• The instrument is not reached to setting temperature within an hour. • No user action. Please contact your distributor.
Error 12	Temp. Sensor Error	• There is a faulty in the temperature sensing of chamber or over heated. • No user action. Please contact your distributor.
Error 15	Motor Temp. Sensor	• The motor temperature sensor can’t recognize. • No user action. Please contact your distributor.
Error 16	Comp. Temp. Sensor	• The temperature of compressor is over heated. • No user action. Please contact your distributor.

7 Rotors and Accessories

Product	Cat. No.
A Fixed Angle Microtube Rotor with aluminum lid for 24 microtubes	BS-MRR24
A Fixed Angle Microtube Rotor with aluminum lid for 30 microtubes	BS-MRR30
A Fixed Angle PCR-tube Rotor for 8 rows of PCR strips, no lid	BS-MRP64
0.2 ml Adaptor of microtube rotors	BS-A02
0.5 ml Adaptor of microtube rotors	BS-A05

EC-Declaration of Conformity

We hereby certify that the following described machine in it´s conception, construction and form is in accordance with all the relevant essential health and safety requirements of the EC EMC Directive 2004/108/EC (21st May 2007) and the EC Low Voltage Directive 2006/95/EC (12th December 2006) is adopting these directives.

This declaration is no longer valid if the machine is modified without our consent.

Authorized representative:

SERVA Electrophoresis GmbH
Carl-Benz-Str. 7
D-69115 Heidelberg
Tel: +49-6221-13840-0

Description of the machine:
Function: Centrifuge
Type/modell : BlueSpin Cryo

The agreement with further valid guidelines/regulations following for the product is explained:

- EN 61010-1:2001: Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- EN 61010-2-020:2006: Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-020: Particular requirements for laboratory centrifuges
- EN 61326-1:2006: Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
- EN 55011:2007: Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

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