ROTIXA 500 RS

Inhalt des Dokuments / content of the document

Operating instructions (EN)

Rotoren und Zubehör / Rotors and accessories

Operating instructions

ROTIXA 500 RS

Translation of the original operating instructions

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Table of contents

1 About this document

1.1 Use of this document

- Read this document carefully and in full before commissioning the device for the first time.
  Observe other enclosed instruction sheets where necessary.
- This document is part of the device and must be kept within easy reach.
- This document must be included if the device is passed on to a third party.
- The current version of the document in the available languages can be found on the manufacturer's website: ➦ *https://www.hettichlab.com/de/download-center/*

1.2 Gender reference

The employed masculine or feminine language form is to facilitate reading. In the spirit of equal treatment, corresponding terms apply in principle to all genders and do not imply any valuation.

1.3 Symbols and labels in this document

General symbols

The following markers are used in this document to highlight instructions, results, listings, references and other elements:

Marker	Explanation
1. ⟶ 2. ⟶ 3. ⟶ ... ⟶	Step-by-step instructions
➡	Results of action steps
➦	References to sections of the document and other applicable documents
■ ... ■ ...	Listings without a fixed order
[Buttons]	Controls (for example: buttons, switches)
'Indicator'	Indicator elements (for example: signal lights, screen elements)

2 Safety

2.1 Intended use

Intended use

This device is a laboratory centrifuge suitable for medical applications.

Their exclusive therapeutic purpose is to centrifuge blood in blood bag systems. The separated blood components are transferred by another device (separator) into corresponding satellite bags. The individual components obtained in this way are then used for transfusion or autotransfusion.

The centrifuge is only to be operated by qualified personnel working for blood donation services or hospitals.

The centrifuge is only intended for the uses referred to above.

Any other use or use beyond this is considered improper. Andreas Hettich GmbH & Co. KG shall not be liable for any damage arising from this.

Intended use also includes the observation of all instructions in the user manual and compliance with the required inspection and maintenance intervals.

Non-intended use

- The centrifuge is not suitable for use in explosive or radioactive, or biologically or chemically-contaminated atmospheres.
- The user must take appropriate actions when centrifuging hazardous substances or mixtures of substances that are toxic, radioactive or contaminated with pathogenic microorganisms.

  The manufacturer generally recommends using only centrifuge tubes with special screw caps for hazardous substances.

  Use sealable centrifuge tubes with a biosafety system for materials of risk groups 3 and 4.
- The manufacturer does not recommend centrifugation with flammable or explosive materials.
- The manufacturer does not recommend centrifugation with materials that react chemically with one another with high energy.

Foreseeable misuse

The manufacturer recommends using only accessories that it has approved for the intended purpose.

Only operate the centrifuge under supervision.

2.2 Personnel requirements

Required qualifications

The user has read the user manual in full and familiarised themselves with the device.

NOTICE

Damage to the device by unauthorised personnel

– Tampering with and modifications to devices by unauthorised persons are at the operating organisation's own risk and will result in the loss of all warranty and liability claims.

Trained user

The user is trained in laboratory practice and able to carry out the work assigned to them, and to recognise and prevent potential hazards independently.

Personal protective equipment

Lack of personal protective equipment or unsuitable personal protective equipment increases the risk of impaired health and injury.

- Only use personal protective equipment that is in proper condition.
- Only use personal protective equipment that is adapted to the person (correct size, for example).
- Observe instructions on other protective equipment for specific activities.

2.3 Operator's responsibility

Follow the instructions in this document for proper and safe use of the device.

Keep the user manual for future reference.

Provide information

- Following the instructions in this document will help:
  - To avoid dangerous situations.
  - To minimise repair costs and downtime.
  - To increase the reliability and service life of the device.
- The operator is responsible for compliance with company regulations, standards and national laws.
- Note and keep the revision of the document separate from the document. If lost, the document can be replaced in the correct revision.
- Keep the user manual available at the place where the device is used.
- Pass the user manual on to the buyer when the device is sold.

Training of personnel

Lack of knowledge when working with the device may result in serious injury or death.

- Instruct personnel on their tasks and the associated risks in accordance with the instruction.

2.4 Safety instructions

Reporting serious incidents and notifiable incidents

In the event of serious incidents or notifiable incidents involving the device or its accessories, these must be reported to the manufacturer and, where applicable, to the competent authority where the user and/or the patient is registered.

DANGER

Risk of contamination for the user due to inadequate cleaning or failure to observe the cleaning instructions.

- Observe cleaning instructions.
- Wear personal protective equipment when cleaning the device.
- Observe laboratory regulations (e.g. TRBAs, the German Protection against Infection Act, hygiene plan) for handling biological agents.

DANGER

Fire and explosion hazard due to hazardous substances in samples.

- Observe relevant regulations and directives for handling chemicals and hazardous substances.
- Do not use aggressive chemicals (for example: dangerous, corrosive extraction agents such as chloroform, strong acids).

WARNING

Dangers due to insufficient maintenance or maintenance not carried out on time.

- Follow maintenance intervals.
- Check the device for visible damage or defects.
  If any visible damage or defects are present, take the device out of service and inform a service technician.

WARNING

Risk of electric shock due to ingress of water or other liquids.

- Protect the device against external liquids.
- Do not pour any liquids into the interior of the device.
- Transport using original transport packaging.

WARNING

Contamination with hazardous substances and substance mixtures!

Observe the following actions for substances and substance mixtures that are toxic, radioactive and/or contaminated with pathogenic microorganisms:

- As a rule, use only centrifuge tubes with special screw caps for hazardous substances.
- Use sealable centrifuge tubes with a biosafety system for materials of risk groups 3 and 4.
- If no biosafety system is used, the device is not microbiologically tight in the sense of standard EN / IEC 61010-2-020.
- Contact the manufacturer if necessary.

WARNING

Risk of injury and damage to the device due to a loose rotor.

- The driver of the rotor shaft must be correctly seated in the groove of the rotor when mounting the rotor.
- Hand-tighten the nut securing the rotor.
- Check that the rotor is firmly seated.
- Follow maintenance intervals.

CAUTION

Risk of injury due to rotating rotor

Long hair and items of clothing can get caught on the rotor if the rotor is moved manually.

- Tie long hair back.
- Do not allow garments to hang in the centrifuging chamber.

NOTICE

Damage to the device electronics due to incorrect voltage or frequency at the device circuit breaker.

- Operate the device with the correct mains voltage and mains frequency.
  The value can be found in the technical data and on the rating plate.

NOTICE

Damage to the device and samples due to premature program termination.

Premature program termination is caused by power failure, switching off during the program or pulling out the mains plug.

- Do not switch off the device while the program is running.
- Do not trigger the emergency release on the device while the program is running.
- Do not pull out the mains plug while the program is running.

3 Device overview

3.1 Technical data

Manufacturer	Andreas Hettich GmbH & Co. KG, D-78532 Tuttlingen			
Model	ROTIXA 500 RS			
Type	4950, 4950-50		4950-70, 4950-80	
Mains voltage (±10%)	230-240 V 1~	220 V 1~	230-240 V 1~	220 V 1~
Mains frequency	50 Hz	60 Hz	50 Hz	60 Hz
power consumption	3800 VA			
Power consumption	16 A			
Refrigerant	R452A			
max. capacity	4 x 1000 ml			
max. permissible density	1.2 kg/dm³			
max. speed (RPM)	11500			
max. acceleration (RCF)	18038			
max. kinetic energy	59620 Nm			

Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	yes	
Ambient conditions (EN / IEC 61010-1):		
Installation site	indoors only	
Altitude	up to 2000 m above sea level	
Ambient temperature	5 °C to 35 °C	
Humidity	maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.	
Overvoltage category (IEC 60364-4-443)	II	
Pollution level	2	
Device protection class	I not suitable for use in potentially explosive atmospheres.	
EMC:		
Emitted EM interference, EM interference immunity	EN / IEC 61326-1 Class B	
Noise level (rotor-dependent)	≤65 dB(A)	≤63 dB(A)
Dimensions:		
Width	650 mm	
Depth	814 mm	
Altitude	973 mm	
Weight	approx. 219 kg	approx. 233 kg
Manufacturer	Andreas Hettich GmbH & Co. KG, D-78532 Tuttlingen	
Model	ROTIXA 500 RS	
Type	4950-08, 4950-58	4950-78, 4950-88
Mains voltage (±10%)	208 V 1~	
Mains frequency	60 Hz	
power consumption	3800 VA	
Power consumption	18 A	

Refrigerant	R452A	
max. capacity	4 x 1000 ml	
max. permissible density	1.2 kg/dm³	
max. speed (RPM)	11500	
max. acceleration (RCF)	18038	
max. kinetic energy	59620 Nm	
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	yes	
Ambient conditions (EN / IEC 61010-1):		
Installation site	indoors only	
Altitude	up to 2000 m above sea level	
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Overvoltage category (IEC 60364-4-443)	II	
Pollution level	2	
Device protection class	I not suitable for use in potentially explosive atmospheres.	
EMC:		
Emitted EM interference, EM interference immunity	FCC Class B	
Noise level (rotor-dependent)	≤65 dB(A)	≤63 dB(A)
Dimensions:		
Width	650 mm	
Depth	814 mm	
Altitude	973 mm	
Weight	approx. 225 kg	approx. 239 kg

Rating plate

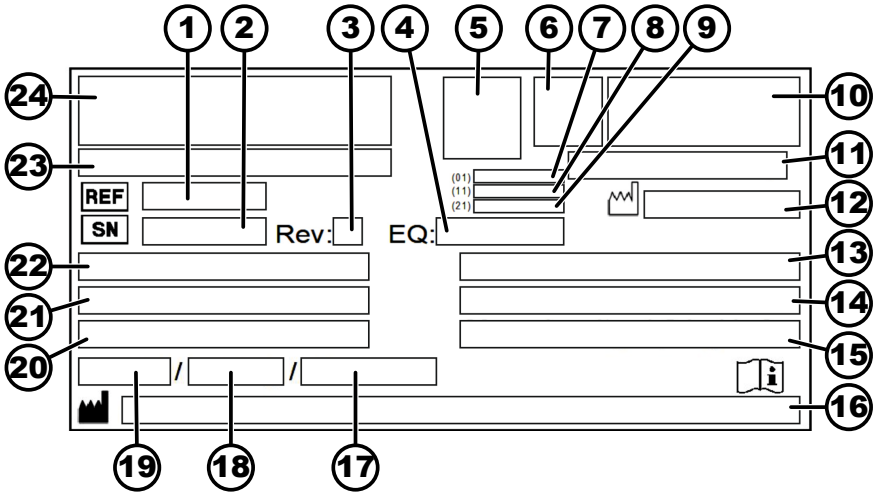


Fig. 1: Rating plate

1 Item number
2 Serial number
3 Revision
4 Equipment number
5 Data matrix code
6 any labelling indicating whether medical device or in vitro diagnostic medical device
7 Global Trade Item Number (GTIN)
8 Date of manufacture
9 Serial number
10 any EAC mark, CE mark
11 Country of manufacture
12 Date of manufacture
13 Mains frequency
14 Maximum kinetic energy
15 Maximum permissible density
16 Manufacturer's address
17 any Coolant circuit pressure
18 any Coolant capacity
19 any Coolant type
20 Revs per minute
21 Performance values
22 Mains voltage
23 any Device designation
24 Manufacturer's logo

3.2 European registration

Device conformity

CE 0483

Device conformity according to EU directives.

Notified body:

mdc medical device certification GmbH – Notified Body CE 0483

Tel: +49 (0)711 253597 0

Fax: +49 (0)711 258597 10

E-mail: mdc@mdc-ce.de

Website: www.mdc-ce.de

Address: Kriegerstrasse 6, D-70191 Stuttgart, Germany

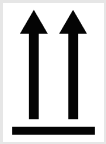
Single Registration Number

SRN: DE-MF-000010680

Basic-UDI-DI

Basic-UDI-DI	Device assignment
040506740100029L	ROTIXA 500 RS (medical device)

3.3 Important labels on the packaging



TOP

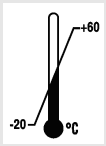
This is the correct upright position of the shipping container for transport and/or storage.

FRAGILE GOODS

The contents of the shipping container are fragile, so it must be handled with care.

PROTECT FROM MOISTURE

The shipping container must be kept away from rain and kept in dry conditions.



TEMPERATURE LIMITATION

The shipping container must be stored, transported and handled within the indicated temperature range (-20 °C to +60 °C).

HUMIDITY LIMITATION

The shipping container must be stored, transported and handled within the indicated air humidity range (10% to 80%).

STACK LIMITATION BASED ON QUANTITY

Maximum number of identical packages that may be stacked on the lowest package, "n" standing for the number of packages allowed. The lowest package is not included in "n".

3.4 Important labels on the device

The labels on the device must not be removed or covered, or have anything pasted over them.

Attention, general danger area.

Ensure you read the instructions for commissioning and operation and observe the safety instructions before using the device.

Biohazard warning.

Warning: hot surface.

Failure to observe this warning may result in damage to property and/or personal injury.

Direction of rotation of the rotor.

The orientation of the arrow indicates the rotor's direction of rotation.

Symbol for the separate collection of electrical and electronic equipment, in accordance with Directive 2012/19/EU (WEEE).

Use in European Union countries, Norway and Switzerland.

Key switch positions.

The centrifuge is equipped with an optical interface.

The optical interface is marked with a symbol.

The centrifuge can be controlled and data retrieved via the interface. The *[PROG]* button lights up during data communication.

Equipotential: Connector (PE plug) for equipotential bonding (only for centrifuges with a PE plug).

3.5 Operating and indicator elements

3.5.1 Control

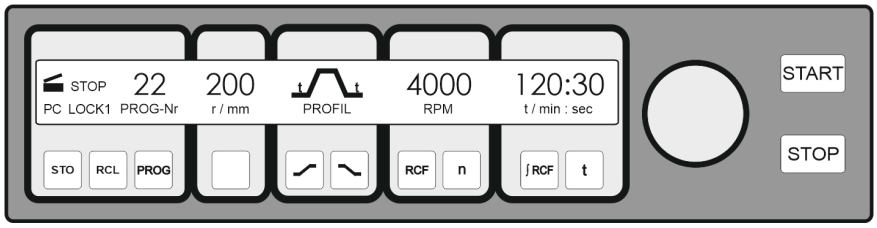


Fig. 2: Control

3.5.2 Indicator elements

Fig. 3: [Lid] button

- The button lights up when the lid is closed.

Fig. 4: 'Lid closed' indicator

- The indicator appears when the lid is closed.

Fig. 5: 'Lid open' indicator

- The indicator appears when the lid is open.

LOCK 1,
LOCK 2

Fig. 6: [Key switch position] indicator

- The indicator appears when the key switch is in this switch position.

LOCK 4,
LOCK 5

Fig. 7: [Key switch position] indicator

- The indicator appears when the program lock is enabled during serial communication (for centrifuges with serial communication only).

PC, ~~PC~~

Fig. 8: [Serial communication] indicator

- The indicator appears if the centrifuge has a serial interface and the centrifuge is connected respectively not connected.

Fig. 9: 'Rotation' indicator

- The indicator appears when the rotor is turning.

STOP

Fig. 10: [STOP] indicator

- The indicator appears during the centrifugation run as long as the rotor is turning.
  The indicator flashes after an emergency stop.
- The indicator flashes after an emergency stop.

3.5.3 Controls

Fig. 11: [Rotary knob]

- Setting the individual parameters.
  Turning anticlockwise decreases the value.
  Turning clockwise increases the value.

Fig. 12: [Mains switch]

- Switch the device on and off.

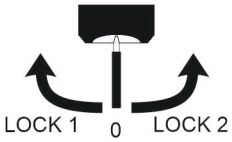


Fig. 13: [Key switch]

- The key switch switches various functions on and off, depending on the position.

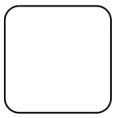


Fig. 14: [Temperature and centrifuging radius] button

- Temperature setpoint, parameter T/°C
  Adjustable from -20°C to +40°C, in 1°C increments (adjustable from -20°C to +60°C with heating/cooling option).
  The lowest achievable temperature is rotor dependent.
- Centrifuging radius
  Parameter r/mm. Input in mm.

Fig. 15: [Ramp-up parameters] button

- Ramp-up levels, parameters
  Level 9 = shortest ramp-up time, Level 1 = longest ramp-up time.
- Ramp-up time parameters
  The adjustable time range is dependent on the set speed.

Fig. 16: [Ramp-down parameters] button

- Brake levels, parameters
  R = Linear braking curve,
  B = similar to an exponential braking curve.
  Level R9, B9 = short ramp-down time, ...
  Level R1, B1 = long ramp-down time,
  Level R0 = unbraked ramp-down.
- Ramp-down time, parameters
  The adjustable time range is dependent on the set speed.
- Brake cut-off speed, parameter $n^{(\bullet)}$ /RPM
  Unbraked ramp-down takes place after reaching this speed.

Fig. 17: [Lid] button

- Open the lid.

Fig. 18: [∫RCF] button

- Querying the integral RCF, parameter ∫RCF

Fig. 19: [n] button

- Speed, parameter RPM.
  Adjustable from 50 RPM to the maximum rotor speed (n-max-Rotor)
- Querying the maximum rotor speed, parameter n-max-Rotor

Fig. 20: [PROG] button

- Select program location, parameter PROG No.

Fig. 21: [RCF] button

- Relative centrifugal force, parameter RCF/RZB.
  A numerical value can be set that gives a speed between 50 RPM and the maximum rotor speed (n-max-Rotor). Adjustable in 1 second increments.
- Querying the maximum RCF of the rotor, parameter RCF-max-Rotor.

Fig. 22: [RCL] button

- Retrieving programs.

Fig. 23: [START] button

- Start centrifugation run.
- Acceptance of changes during the centrifugation run.

Fig. 24: [STO] button

- Saving programs. 89 programs can be saved (program locations 1 to 89).
  The program locations "----" and 90 to 99 serve as an automatic buffer.
  No programs can be stored in these program locations.

Fig. 25: [STOP] button

- End the centrifugation run.
  The rotor ramps down to a stop at the preselected brake level.

Fig. 26: [t] button

- Runtime, parameter t/min:sec
  Parameter t/min: Adjustable from 1 to 999 min, in 1 minute increments.
  Parameter t/ :sec Adjustable from 1 - 59 s, in 1 second increments.
  Continuous operation "---:--"

3.6 Original spare parts

Only use original spare parts from the manufacturer and approved accessories.

3.7 Scope of supply

The following accessories are supplied with the centrifuge:

- 1 grease for the trunnions
- 1 single-end open-ended spanner (10 mm AF)
- 1 open-ended spanner (17 mm and 19 mm AF)
- 1 Hex key (5 mm x 170)
- 1 square spanner
- 10 covering caps ∅12

- 3 wood screws
- 3 washers
- 2 metal rails
- 4 wide head nails
- 1 power cable
- 1 user manual
- 3 program data sheets for S control unit

Additionally for types 4950-70, 4950-78, 4950-80 and 4950-88:

- 1 Notes on setup and installation

Additionally for delivery in Germany:

- 1 inspection book

Rotors and the corresponding accessories are supplied depending on the order.

3.8 Returns

An original Return Material Authorisation (RMA) form from the manufacturer must always be requested for a return. Secure and reliable acceptance and booking in of the goods with the manufacturer is not possible without an

original RMA form from the manufacturer. The Return Material Authorisation (RMA) form contains a Declaration of No Objection (UBE), which must be completed in full and enclosed with the return.

If the device and/or accessories are returned to the manufacturer, the complete return shipment must be cleaned and decontaminated by the sender. If returns are not cleaned and/or decontaminated or are insufficiently cleaned and/or decontaminated, this will be performed by the manufacturer and charged to the sender.

The original transport locks must be attached for return shipment, see ➦ *Chapter 4 'Transport and storage' on page 20*. The device must be shipped in its original packaging.

4 Transport and storage

4.1 Transport and storage conditions

Transport conditions

NOTICE

Damage to the device due to failure to use the transport locks.

- Secure the transport locks before transporting the device.

NOTICE

Damage to the device due to condensation.

There is a risk of condensation forming on electrical components when component surfaces are cold and the surrounding air is warmer. The condensation that forms may cause a short circuit and/or destroy electronics.

- Warm the device up for at least 3 hours in a warm room before connecting it to the mains.

  or

- Warm up for 30 minutes in a cold room.

- Before transporting, fasten the transport lock and disconnect the device from the mains socket.
- The transport temperature must be between -20 °C and +60 °C.
- Humidity must not be condensing. Humidity must be between 10% and 80%.
- Be aware of the weight of the device.
- When transporting using a transport aid (e.g., a pallet truck), the transport aid must be able to carry at least 1.6 times the transport weight of the device.
- Secure the device to prevent it tipping over and falling down during transport.
- Never transport the device sideways or upside down.

Storage conditions

- The device must be stored in the original packaging.
- Only store the device in dry rooms.
- The storage temperature must be between -20 °C and +60 °C.
- Humidity must not be condensing. Humidity must be between 10% and 80%.

5 Commissioning

5.1 Unpacking the centrifuge

CAUTION

Danger of crushing due to parts falling out of the transport packaging.

- Keep the device balanced during the unpacking process.
- Only open the packaging at the points provided for this purpose.

CAUTION

Risk of injury from lifting heavy loads.

- Provide an adequate number of helpers.
- Note the weight. See ➦ *Chapter 3 'Device overview' on page 10*.

NOTICE

Damage to the device due to improper lifting.

- Do not lift the centrifuge by the control panel or the control panel holder.

Personnel:

- Trained user

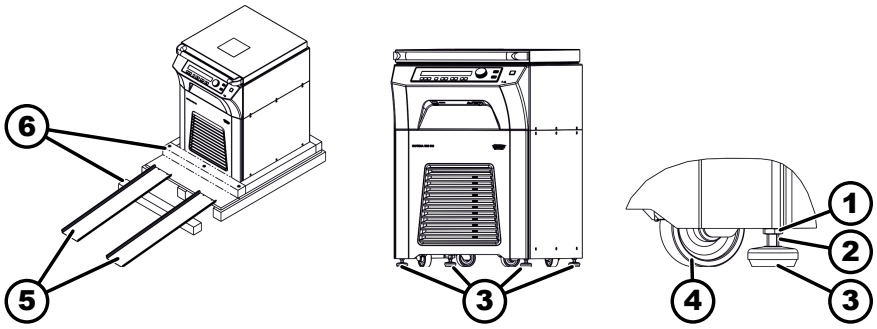


Fig. 27: Unpacking

1 Hexagon nut
2 Flat
3 Device feet
4 Castors
5 Metal rail
6 Wooden beams

1. Remove the packaging.
2. Remove the wooden beam (*6*).
3. Attach the metal rails (*5*) to the wooden pallet using two nails each.
4. Slide the wooden beam (*6*) under the metal rails (*5*) to support them.
5. Place an open-end spanner (size 10 mm) on the surfaces (*2*) and turn the device feet (*3*) upwards as far as possible.

6. Carefully roll the centrifuge off the wooden pallet over the metal rails (*5*).
7. Push the centrifuge to its installation location.
8. Place the open-end spanner (size 10 mm) on the flats (*2*) and turn the device feet (*3*) down until the castors (*4*) are no longer in contact with the ground.
9. Align the centrifuge so it is horizontal by turning the device feet (*3*).
10. Turn the hexagon nuts (*1*) upwards using the open-end spanner provided (size 19 mm) and screw them in to lock the device feet in position (*3*).

5.2 Setting up and connecting the centrifuge

Setting up the centrifuge

WARNING

Risk of injury due to failing to maintain a sufficient distance to the centrifuge.

- As per EN / IEC 61010-2-020, no persons, hazardous materials or objects may be present within a **safety zone of 300 mm** around the centrifuge during a centrifugation run.
- A distance of **300 mm** from the ventilation slots and ventilation openings of the centrifuge must be maintained.

CAUTION

Risk of crushing and damage to the device due to it falling down because of vibration-induced position alterations.

- Place the device on a stable and level surface.
- Select the installation surface dependent on the weight of the device.

NOTICE

Damage to the samples and the device if the ambient temperature exceeds or falls below the respective maximum/minimum permissible ambient temperature.

- Comply with the maximum and minimum permissible ambient temperatures for installation of the device.
- Do not place the device next to a heat source.
- Do not expose the device to direct sunlight.
- Do not expose the device to frost.

Personnel:

- Trained user

1. Place the device on a stable and level surface.
2. Maintain a distance of 300 mm around the device.
3. Comply with the ambient conditions in the technical data (➥ *Chapter 3.1 'Technical data' on page 10*).

Connecting the centrifuge

NOTICE

Damage to the device by unauthorised personnel

- Tampering with and modifications to devices by unauthorised persons are at the operating organisation's own risk and will result in the loss of all warranty and liability claims.

NOTICE

Damage to the device due to condensation.

There is a risk of condensation forming on electrical components when component surfaces are cold and the surrounding air is warmer. The condensation that forms may cause a short circuit and/or destroy electronics.

- Warm the device up for at least 3 hours in a warm room before connecting it to the mains.

  or

- Warm up for 30 minutes in a cold room.

Personnel:

- Trained user

1. Types 4950-08, 4950-58, 4950-78 and 4950-88 are permanently connected devices.

   With permanently connected devices, a switch must be fitted in the building installation to disconnect the mains supply to the device, in accordance with the laboratory equipment standard EN / IEC 61010-1.

   The switch must be located near the device, be readily accessible to the user and be marked as the means of isolation for this device.

   It must be possible to secure the switch to prevent it being switched on again.

2. A type B residual current circuit breaker must be used if the device is additionally protected with a residual current circuit breaker in the building installation.

   When using a different type, the residual current circuit breaker may either not switch off the unit if there is a fault on the unit, or it may switch off the unit even though there is no fault on the unit.

3. Types 4950-08, 4950-70, 4950-78, 4950-80 and 4950-88 must be connected in accordance with the instructions for setup and installation (AH4950).

4. Centrifuge with PE connector:

   If necessary, connect the PE connector on the back of the device to an additional medical potential equalisation system.

5. Centrifuge with optical interface:

   Connect the optical interface of the centrifuge to the PC using a fibre optic cable.

6. Check whether the mains voltage matches the specification on the rating plate.

7. For types 4950 and 4950-80:

   Connect the device to a standard mains socket using the mains cable.

5.3 Switching the centrifuge on and off.

Switching the centrifuge on

Personnel:

- Trained user

Set the mains switch to *[I]*.

➡ The buttons flash, depending on the centrifuge type.

The following indicators appear one after the other, depending on the centrifuge type:

- the centrifuge model
- the last rotor code recognised by the rotor detection and the maximum rotor speed
- the program version
- When the lid is closed: *'OPEN OEFFNEN'* indicator
- When the lid is open: The centrifugation data of the last program used or program 1.

Immediate display of centrifugation data after switching on

1. Set the mains switch to *[I]*.
2. Press any button (except the *[STOP]* button) at the first visual change in the display (inverse display).

➡ Centrifugation data is displayed.

Switching off the centrifuge

The rotor is stationary.

Set the mains switch to *[0]*.

6 Operation

6.1 Opening and closing the lid

Opening the lid

Personnel:

- Trained user

The centrifuge is switched on.

The rotor is stationary.

Press the *[Lid]* button.

➡ The lid unlocks by means of a motor.

The light on the *[Lid]* button goes out.

The *'Lid open'* indicator appears.

Closing the lid

⚠ CAUTION

Danger of crushing when closing the lid.

Danger of crushing fingers when the closing motor pulls the lid against the seal.

- No parts of the body should be in the hazard zone of the lid when closing the lid.
- To close the lid, press on the lid from above.

NOTICE

Damage to the device caused by the lid slamming.

- Close the lid slowly.
- Do not slam the lid.

Personnel:

- Trained user

Close the lid and press down gently on the handle strip.

➡ The lid locks using a motor.

The *[Lid]* button lights up.

The *'Lid closed'* indicator appears.

6.2 Removing and installing the rotor

Removing the rotor with a clamping nut

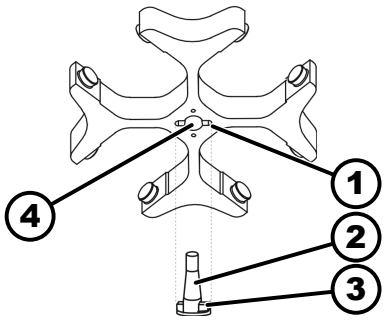


Fig. 28: Rotor installation and removal

1 Groove
2 Motor shaft
3 Driver
4 Hole

Personnel:

- Trained user

1. Open the lid.
2. Loosen the rotor clamping nut using the supplied spanner.

   ➡ After passing the working point for lifting the rotor, the rotor detaches from the cone of the motor shaft (*2*).
3. Turn the clamping nut until the rotor can be lifted off the motor shaft.
4. Remove the rotor.

Installing the rotor with a clamping nut

Personnel:

- Trained user

The lid is open.

1. Clean the motor shaft (*2*) and rotor hole (*4*).
2. Lightly grease the motor shaft (*2*), see ➦ *Chapter 8.2 'Cleaning and disinfection instructions' on page 43*.
3. Place the rotor vertically on the motor shaft (*2*).

   The driver (*3*) of the motor shaft must be in the groove (*1*) of the rotor. The orientation of the groove is marked on the rotor.
4. Hand-tighten the rotor clamping nut using the supplied spanner.
5. Check that the rotor is firmly seated.

6.3 Inserting and removing buckets

Inserting buckets

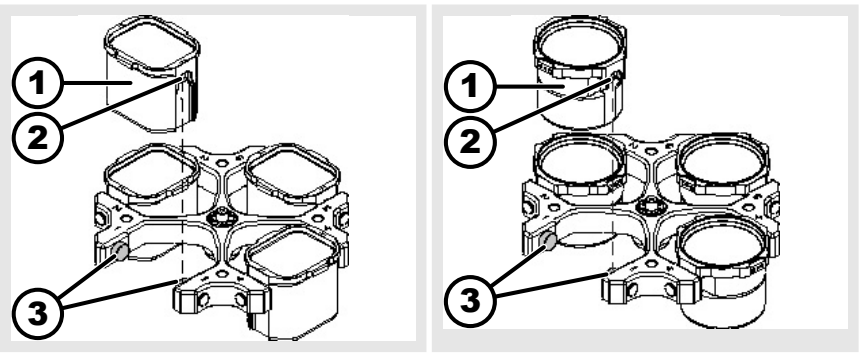
NOTICE

Damage to the device due to imbalances caused by incorrect loading of the rotor.

– Load all swing-out rotor locations with the same buckets.

Buckets marked with the number of the rotor location may only be used there.

Buckets marked with a set number may only be used together.



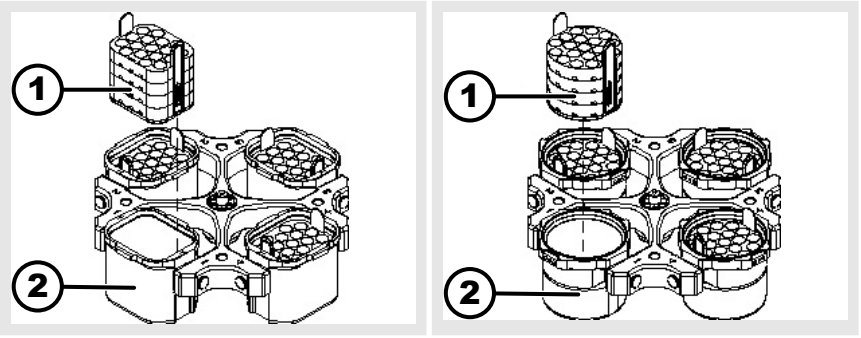
1. Check that the rotor is firmly seated.
2. Grease the trunnions (3).
3. Insert the bucket (1) into the rotor from above. The trunnions (3) must be in the grooves (2).
4. Push the bucket (1) down as far as it will go.

Removing the bucket

→ Pull the bucket (1) vertically upwards out of the rotor.

6.4 Inserting and removing adapters

Inserting



the adapter

→ Insert the adapter (1) vertically into the bucket (2) from above.

removing

→ Remove the adapter (1) vertically upwards out of the bucket (2).

6.5 Loading

Filling centrifuge tubes

WARNING

Risk of injury from contaminated sample material.

Contaminated sample material escapes from the sample tube during centrifugation.

- Use centrifuge tubes with special screw caps for hazardous substances.
- For risk group 3 and 4 materials, use a biosafety system in addition to the sealable centrifuge tubes (see WHO's 'Laboratory Biosafety Manual').

NOTICE

Damage to the device due to highly corrosive substances.

Highly corrosive substances may impair the mechanical strength of rotors, buckets and accessories.

- Do not centrifuge highly corrosive substances.

Standard glass centrifuge tubes can be loaded up to RCF 4000 (DIN 58970 part 2).

Personnel:

- Trained user

→ Fill centrifuge tubes outside the centrifuge.

The maximum capacity of the centrifuge tubes specified by the manufacturer must not be exceeded.

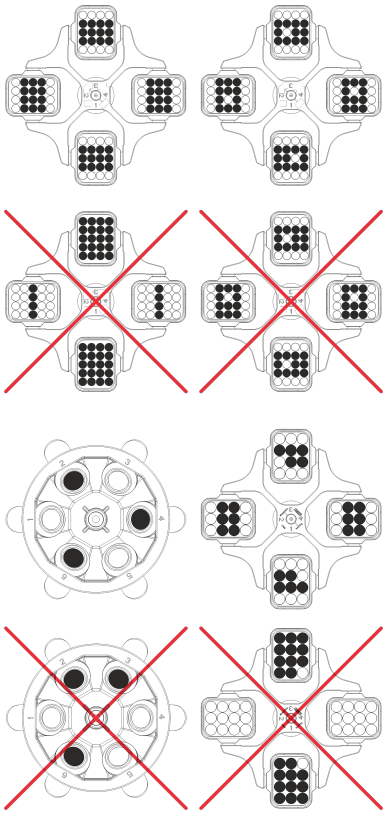
With angle rotors, the centrifuge tubes must only be filled to the extent that no liquid can be ejected from the tubes during the centrifugation run.

It must be ensured that there is a uniform fill level in the tubes in order to keep the weight differences in the centrifuge tubes as low as possible.

Loading the swing-out rotors

Personnel:

- Trained user



1. Check that the rotor is firmly seated.
2. The centrifuge tubes must be distributed symmetrically across all rotor locations.

   The weight of the permissible filling capacity is indicated on each rotor. The weight must not be exceeded.

   No liquid must be allowed to enter the buckets and the centrifuging chamber when loading the buckets and swinging them out during the centrifugation run.

   For containers with rubber inserts, there must always be the same number of rubber inserts under the centrifuge tubes.

   All rotor locations must be filled with the same buckets. Certain buckets are marked with the number of the rotor location. The buckets must only be inserted in the corresponding rotor location.

   Buckets marked with a set number (for example S001/4) must only be used in the set.

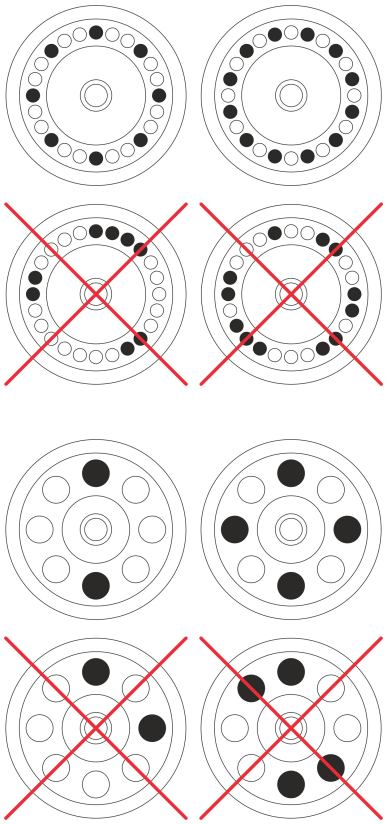
The following must be observed when using blood bags:

1. The differences can be compensated with balancing weights if the buckets are not filled with the same weight.
2. Empty buckets can be loaded with compensating inserts if there are insufficient blood bag systems available to load the rotor fully.
3. If necessary, fine-tune with the tare weights supplied.

Loading the angle rotors

Personnel:

- Trained user



1. Check that the rotor is firmly seated.
2. The centrifuge tubes must be distributed evenly over all locations on the rotor.

   No liquid must be allowed to enter the rotor and the centrifuging chamber when loading the rotor.

   With rotors, the centrifuge tubes must only be filled to the extent that no liquid can be ejected from the tubes during the centrifugation run.

   The weight of the permissible filling capacity is indicated on each rotor. The weight must not be exceeded.

6.6 Opening and closing the biosafety system

6.6.1 Explanation

The user must take appropriate actions when centrifuging hazardous substances or mixtures of substances that are toxic, radioactive or contaminated with pathogenic microorganisms.

Centrifuge tubes with special screw caps for hazardous substances must always be used.

For materials of risk group 3 and 4, a biosafety system must be used in addition to the sealable centrifuge tubes (see the World Health Organisation's "Laboratory Biosafety Manual").

In a biosafety system, a bioseal (sealing ring) prevents droplets and aerosols from escaping.

If the bucket of a biosafety system is used without the lid, the sealing ring must be removed from the bucket to prevent damage to the sealing ring during the centrifugation run.

Damaged biosafety systems are no longer microbiologically tight.

If no biosafety system is used, a centrifuge is not microbiologically tight in the sense of the EN / IEC 61010-2-020 standard.

Storage of biosafety systems

Biosafety systems must only be stored with the lid open to avoid damage to the sealing rings during storage.

6.6.2 Lid with screw cap and hole

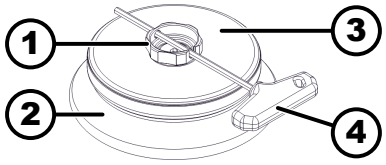


Fig. 29: Biosafety system

1 Rotary handle
2 Rotor
3 Lid
4 Key

Closing

1. Place the lid (*3*) centrally on the rotor (*2*).
2. Insert the supplied key (*4*) into the hole in the rotary handle (*1*).
3. Turn the lid (*3*) at the key (*4*) clockwise until it is tightly closed.

Opening

1. Insert the supplied key (*4*) into the hole in the rotary handle (*1*).
2. Turn the lid (*3*) at the key (*4*) anticlockwise until it is open.
3. Remove the lid (*3*) from the rotor (*2*).

6.6.3 Lid with screw cap

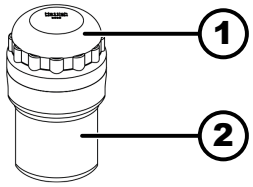


Fig. 30: Biosafety system

1 Lid
2 Bucket

Closing

1. Place the lid (*1*) centrally on the bucket (*2*).
2. Turn the lid (*1*) clockwise until it is tightly closed.

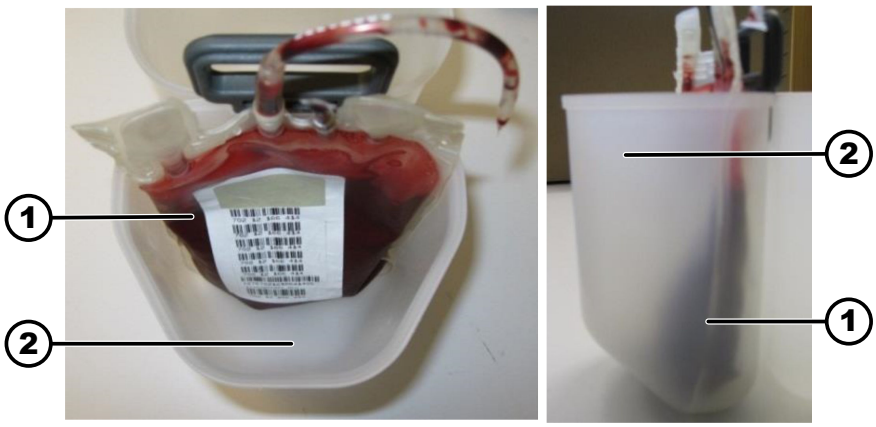
Opening

1. Turn the lid (*1*) anticlockwise until it is open.
2. Remove the lid (*1*) from the bucket (*2*).

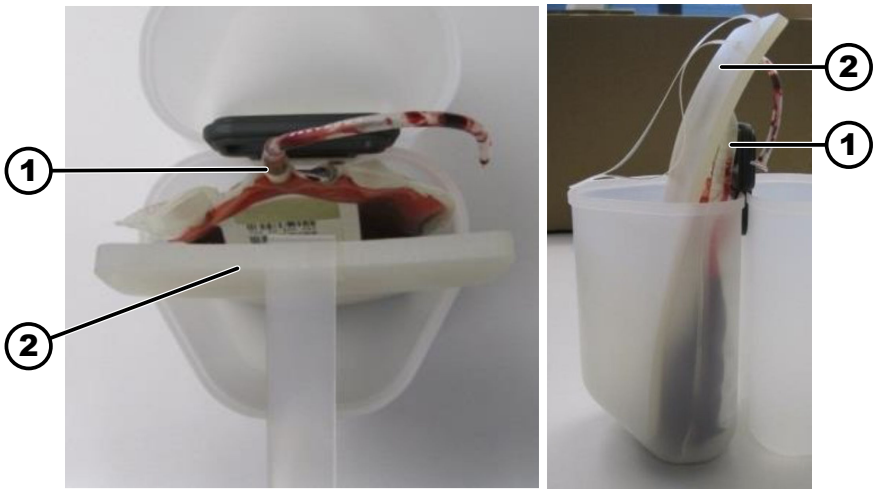
6.7 Packing instructions, HettLiner

Packing before centrifugation

Ensure that the plastic insert cannot tip over when loading and unloading the inserts (if necessary, use loading aid 4509).



1. Insert the blood bag (1) into the insert (2).



2. Hold the blood bag by the connectors (1) and push the support plate (2) on the outer side of the blood bag into the insert from top to bottom.

   Ensure that the lower edge of the support plate stands on the floor as completely as possible.

3. Fold the support plate outwards and press it down until the folded edge of the support plate is level with the liquid level of the blood bag.

   The upper edge of the support plate must not project too far out of the insert during centrifugation due to the risk of its becoming caught in the rotor arms.

   Note the position of the loop (1) so that it can be reached after centrifugation.

4. If available, fold empty satellite bag(s) and pack differently depending on the appropriate accessories and filling volume of the blood bag. It is advantageous to fold the satellite bags and pack them on the outside between the folded-down support plate and the outer wall of the insert.

   Ensure that the silicone plate does not slip when doing this.

   If necessary, the silicone plate can be retained and held against the loop when packing the satellite bag.

   The position of the loop must be checked afterwards.

5. Place the connections over the support plate so that the valves cannot break.

   Ensure that the hoses do not project out of the insert.

   Stow hose sections projecting over the edge of the insert between the folded-down support plate and the insert wall.

6. If necessary, balance weights should be placed between the folded-down support plate and the receptacle wall.

Unpacking after centrifugation

1. Pull the satellite bag out of the insert while holding the silicone plate in place with one hand.
2. Slowly pull out the folded-down part of the support plate at the loop provided for this purpose.

   Return the support plate to its original shape in a controlled manner. The folded-down part of the support plate may spring back and mix blood components.
3. Remove the remaining blood bag either together with the support plate or after removing the support plate from the insert.

6.8 Centrifugation

6.8.1 Centrifugation in continuous operation

Personnel:

- Trained user

1. Press the *[t]* button repeatedly until the input field of the *'t/min:'* parameter is reverse highlighted.
2. Select the value 0 using the rotary knob.
3. Press the *[t]* button repeatedly until the input field of the *'t/ :sec'* parameter is reverse highlighted.
4. Select the value 0 using the rotary knob.
   ➡ The input field displays *'---:--'*.
5. Press the *[START]* button.
   ➡ The centrifugation run is started.

   The *'Rotation'* indicator is lit up while the rotor is turning.

   The timing starts at 00:00.

   The rotor speed or the resulting RCF value, the temperature in the centrifuging chamber and the elapsed time are displayed during the centrifugation run.
6. Press the *[STOP]* button to cancel the centrifugation run.

   Ramp-down takes place with the set ramp-down parameters.

   ➡ *'OPEN OEFFNEN'* is displayed.

6.8.2 Centrifugation with time preselection

Personnel:

- Trained user

1. Press the *[t]* button repeatedly until the input field of the *'t/min:'* parameter is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.
3. Press the *[t]* button repeatedly until the input field of the *'t/ :sec'* parameter is reverse highlighted.
4. Use the *[Rotary knob]* to set the desired value.
5. Press the *[START]* button.
   - ➡ The centrifugation run is started.

     The *'Rotation'* indicator is lit up while the rotor is turning.

     The rotor speed or the resulting RCF value, the temperature in the centrifuging chamber and the remaining time are displayed during the centrifugation run.
6. Ramp-down takes place with the selected ramp-down parameters after the time has elapsed or if the centrifugation run is cancelled by pressing the *[STOP]* button.
   - ➡ *'OPEN OEFFNEN'* is displayed.

6.8.3 Changing settings during centrifugation

The runtime, speed, relative centrifugal force (RCF/RZB), ramp-up and ramp-down parameters, and the temperature (only for devices with cooling) can be changed during centrifugation.

These parameters can only be changed individually and one after the other.

1. Change the value of the desired parameter using the *[Rotary knob]*
2. Press the *[START]* button.
   - ➡ The values of the current program are copied to program location *'----'* and updated with the changed value.

     The original program is not overwritten.

6.9 Quick stop function

Personnel:

- Trained user

Press the *[STOP]* button twice.

- ➡ The *'STOP'* indicator flashes.

  Ramp-down with brake level "R9" (shortest ramp-down time) is displayed and executed.

  If brake level "R0" was selected, the ramp-down time is longer than with brake level "R9" for technical reasons.

7 Software operation

7.1 Key switches

The keys must be stored in such a way that they are protected from unauthorised access.

Key position	Function
Left key position	*'LOCK 1'* is displayed. Programs can only be retrieved, not changed.
Right key position	*'LOCK 2'* is displayed. No programs can be retrieved or changed.
Middle key position	no status indicator. No program lock. Programs can be retrieved and changed.

7.2 Centrifugation parameters

7.2.1 Ramp-up and ramp-down parameters

The set ramp-up and ramp-down parameters are displayed.

x: 1-9 = ramp-up level, t = ramp-up time

y: R1-R9, B1-B9 = brake level, R0 = unbraked ramp-down, t = ramp-down time, $n^{(\bullet)}$ = brake cut-off speed

Ramp-up level

1. Press the *[Ramp-up parameters]* button repeatedly until the *'Ramp-up level'* parameter or the *'Ramp-up time'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired level.

Ramp-up time

1. Press the *[Ramp-up parameters]* button repeatedly until the *'Ramp-up time min:sec'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired level.

   If a ramp-up time is set that is longer than the runtime, the centrifugation run ends before the set speed is reached.

Brake level

1. Press the *[Ramp-down parameters]* button repeatedly until the *'Ramp-down level'* parameter or the *'Ramp-down time'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired level.

   B-brake levels can only be set for special rotors.

Ramp-down time

No ramp-down time can be set if a brake cut-off speed is set.

1. Press the *[Ramp-down parameters]* button repeatedly until the *'Ramp-down level min:sec'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired level.

Brake cut-off speed

1. Press the *[Ramp-down parameters]* button repeatedly until the *'$n^{(\bullet)}$/RPM'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired level.

7.2.2 Runtime

For continuous operation, the minutes and seconds must be set to zero.

Continuous operation is indicated in the indicator by means of the '---:--' symbol.

1. Press the *[t]* button repeatedly until the input field of the *'t/min:'* parameter is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.
3. Press the *[t]* button repeatedly until the input field of the *'t/ :sec'* parameter is reverse highlighted.
4. Use the *[Rotary knob]* to set the desired value.

7.2.3 Speed, RPM

1. Press the *[n]* button repeatedly until the *'RPM'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.

Maximum rotor speed indicator

1. Press the *[n]* button repeatedly until the *'RPM'* parameter is displayed and the input field is reverse highlighted.
2. Press and hold the *[n]* button.
   ➡ The maximum rotor speed (n-max rotor) is displayed.

7.2.4 Integral RCF

Integral RCF is a measure of the sedimentation effect ($\int n^2\,dt$). The value is used to compare centrifugation runs.

- Press and hold the *[Integral RCF]* button.
  ➡ *'Integral RCF'* is displayed.

7.2.5 temperature

1. Press the *[Temperature and centrifuging radius]* button repeatedly until the *'T/C°'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.

7.2.6 Relative centrifugal force, RCF

The relative centrifugal force RCF is dependent on the speed and the centrifuging radius.

The relative centrifugal force RCF is stated as a multiple of the acceleration due to gravity (g).

The relative centrifugal force RCF is a dimensionless numerical value and is used to compare the separation and sedimentation performance.

$$\mathrm{RCF} = \left(\frac{\mathrm{RPM}}{1000}\right)^2 * \mathrm{r} * 1{,}118$$

$$\mathrm{RPM} = \sqrt{\frac{\mathrm{RCF}}{\mathrm{r} * 1{,}118}} * 1000$$

RCF = Relative Centrifugal Force

RPM = speed

r = centrifuging radius in mm = distance from the centre of the axis of rotation to the bottom of the centrifuge tube.

7.2.7 Setting the relative centrifugal force (RCF/RZB)

1. Press the *[RCF]* button repeatedly until the *'RCF/RZB'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.

Maximum rotor RCF indicator

1. Press the *[RCF]* button repeatedly until the *'RCF/RZB'* parameter is displayed and the input field is reverse highlighted.
2. Press and hold the *[RCF]* button.
   ➡ The maximum RCF of the rotor (RCF-max rotor) is displayed.

7.2.8 Centrifugation of substances or mixtures of substances with a density higher than 1.2 kg/dm³

The density of the substances or mixtures of substances must not exceed 1.2 kg/dm³ during centrifugation at maximum speed. The speed must be reduced for substances or substance mixtures with a higher density. The permissible speed can be calculated using the following formula:

$$\text{Reduzierte Drehzahl } (n_{red}) = \sqrt{\frac{1{,}2}{\text{höhere Dichte (kg/dm}^3)}} * \text{maximale Drehzahl (RPM)}$$

For example: Maximum speed 4000 RPM, density 1.6 kg/dm³

$$n_{red} = \sqrt{\frac{1{,}2(\text{kg/dm}^3)}{1{,}6(\text{kg/dm}^3)}} * 4000 \text{ RPM} = 3464 \text{ RPM}$$

If, in exceptional cases, the maximum load indicated on the bucket is exceeded, the speed must also be reduced. The permissible speed can be calculated using the following formula:

$$\text{Reduzierte Drehzahl } (n_{red}) = \sqrt{\frac{\text{maximale Beladung (g)}}{\text{tatsächliche Beladung (g)}}} * \text{maximale Drehzahl (RPM)}$$

For example: Maximum speed 4000 RPM, maximum load 300 g, actual load 350 g

$$n_{red} = \sqrt{\frac{300 \text{ g}}{350 \text{ g}}} * 4000 \text{ RPM} = 3703 \text{ RPM}$$

Please contact the manufacturer if you are not sure.

7.2.9 Centrifuging radius

1. Press the *[Temperature and centrifuging radius]* button repeatedly until the *'r/mm'* parameter is displayed and the input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired value.

Changing the radius, automatically adjusts the RCF/RZB value: this is indicated by flashing.

7.3 Programming

7.3.1 Opening or loading programs

1. Use the *[PROG]* button to select the *'PROG no.'* parameter. The input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the desired program location.

3. Press the *[RCL]* button.
   ➡ The centrifugation data of the desired program location is displayed.

7.3.2 Entering or changing programs

1. Set the desired parameters.
2. Use the *[PROG]* button to select the *'PROG no.'* parameter. The input field is reverse highlighted.
3. Use the *[Rotary knob]* to set the desired program location.
   If the program location indicator flashes, this program location is already assigned centrifugation data. In this case, set a free program location, or overwrite the centrifugation data by continuing.
4. Press the *[STO]* button.
   ➡ Settings are stored in the desired program location.
5. Press the *[STO]* button twice.
   ➡ Centrifugation data that is already stored will be overwritten.

7.3.3 Automatic buffer

The buffer includes the program locations "----" and 90 to 99.

Changed centrifugation data is automatically saved to program location "----" every time a centrifugation run is started.

The changed centrifugation data, of the last 11 centrifugation runs, are stored in the buffer and can be retrieved.

7.4 Rotor detection

- Rotor detection is performed after starting a centrifugation run.
- If the rotor has been changed, the centrifugation run is cancelled after rotor detection. The rotor code (R) and the maximum rotor speed (n-max) of the newly detected rotor are displayed.
- If the maximum speed of the rotor used is less than the set speed, the speed is limited to the maximum rotor speed.

7.5 Cooling (for centrifuges with cooling)

7.5.1 Instructions, cooling

For centrifuges with the heating/cooling option, the temperature setpoint can be adjusted from -20 °C to +60 °C. If the actual temperature deviates from the set temperature by more than 5 °C, this is signalled by a flashing temperature value indicator.

The lowest achievable temperature is rotor dependent.

7.5.2 Standby cooling

The centrifuging chamber is cooled to the preselected temperature when the rotor is at a standstill and the lid is closed. The display shows the temperature setpoint.

7.5.3 Precooling the rotor

For rapid precooling of the unloaded rotor and accessories, we recommend a centrifugation run with the continuous operation settings and a speed of approx. 20% of the maximum rotor speed.

7.6 Heating (for centrifuges with heating)

During the centrifugation run, the centrifuging chamber is heated to the preselected temperature if required. The heating is switched off when the rotor is at a standstill.

CAUTION

Danger of burns from hot surfaces.

The surface temperature of the heating element in the centrifuging chamber can be up to 500 °C or 932 °F.

– Do not touch the heating element.

NOTICE

Damage to plastic buckets due to excessive temperature

– Plastic buckets may only be used at temperatures up to a maximum of 40 °C or 104 °F.

7.7 Machine Menu

7.7.1 Querying system information

The following system information can be queried:

- Centrifuge model
- Maximum speeds of the various rotor codes
- Centrifuge program version
- Frequency converter type
- Program version for the frequency inverter

The rotor is stationary.

1. Press and hold the *[t]* button.
   ➡ The audible signal *'SOUND / BELL'* [sounds] after 8 seconds.
2. Press the *[t]* button.
   ➡ The operating hours *'CONTROL:'* are displayed.
3. Press the *[t]* button.
   ➡ The date and time are displayed.
4. Press the *[t]* button.
   ➡ The machine and cooling version *'VERS 12 °C / * 03'* is displayed.
5. Press the *[t]* button.
   ➡ The operating hours of the frequency converter *'FC/CCI XX h'* are displayed.
6. Press the *[t]* button.
   ➡ The type of frequency converter *'FU/CCI'* is displayed.
7. Press the *[t]* button.
   ➡ The program version of the frequency converter *'FU/CCI – S.'* is displayed.
8. Press the *[t]* button.
   ➡ The program version of the power supply circuit board *'°C / * – S. 01.07'* is displayed.
9. Press the *[STOP/OPEN]* button to exit the menu

7.7.2 Querying operating hours

The rotor is stationary.

1. Open the lid.
2. Press and hold the *[t]* button.
   ➡ *'SOUND / BELL XXX'* is displayed after 8 seconds.
3. Press the *[t]* button.
   ➡ *'CONTROL:'* and the operating hours are displayed.
   The operating hours indicator goes off automatically after 10 seconds.

7.7.3 Audible signal

7.7.3.1 General

The audible signal sounds after the following settings:

OFF	■ after a problem occurs in the 2 s interval.
ON1	■ after a problem occurs in the 2 s interval. ■ after completion of the centrifugation run and rotor standstill in the 30 s interval.
ON2	■ after a problem occurs in the 2 s interval. ■ after completion of the centrifugation run and rotor standstill in the 30 s interval. ■ every time the button is pressed.

Opening the lid or pressing any button stops the audible signal.

7.7.3.2 Setting an audible signal

1. Open the lid.
2. Press and hold the *[t]* button.
   ➡ *'SOUND / BELL ON1'*, *'SOUND / BELL ON2'* or *'SOUND / BELL OFF'* is displayed after 8 seconds.
3. Use *[Rotary knob]* to set *'OFF'*, *'ON1'* or *'ON2'*.
4. Press the *[START]* button.
   ➡ The setting is stored.
   *'*** OK ***'* is displayed briefly.

7.7.4 Centrifugation data displayed after switching on

The centrifugation data of program 1 or the last program used is displayed after switching on.

1. Set the mains switch to *[I]*.
2. Press the *[STOP]* button at the first visual change in the display (inverse display).
   ➡ *'PROGRAM 1, LAST PROGRAM'* is displayed.
3. Use the *[Rotary knob]* to set the desired function.

4. Press the *[START]* button.
   ➡ The settings are stored.
   *'*** OK ***'* is displayed briefly.

7.7.5 Setting the date and time

The rotor is stationary.

1. Open the lid.
2. Press and hold the *[t]* button.
   ➡ *'SOUND / BELL'* is displayed after 8 seconds.
3. Press the *[t]* button twice.
   ➡ The date and time are displayed
   a: Year
   mon: Month
   d: Day
   h: Hours
   min: Minutes
4. Press the *[Temperature and centrifuging radius]* button repeatedly until the desired parameter is displayed and the input field is reverse highlighted.
5. Use the *[Rotary knob]* to set the desired value.
6. Press the *'Start'* button.
   ➡ The settings are stored.
   *'*** OK***'* is displayed briefly.

7.8 Program links

7.8.1 Linking programs or changing a program link

Program linking is only possible with programs where ramp-up and brake levels are set.

The programs must be saved in the desired order before linking, by means of either program entry or program retrieval.

The program locations must be consecutive (e.g. program locations 10+11+12).

Linking programs

1. Use the *[PROG]* button to select the *'PROG no.'* parameter. The input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the program location of the initial program (XX+).
3. Press the *[RCL]* button.
   ➡ The centrifugation data of the desired program location is displayed
4. Press the *[PROG]* button twice.
   ➡ Parameter PR-PART is selected.
   The input field is reverse highlighted.

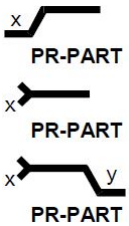
5. Press the *[STO]* button twice.
   ➡ The program is linked and the program number of the next program location (+XX+) is displayed.
6. Press the *[RCL]* button twice.
   ➡ The centrifugation data of the desired program location is displayed
7. Press the *[STO]* button twice.
   ➡ The program is linked and the program number of the next program location (+XX+) is displayed.
8. Repeat the last two steps until all programs are linked.
9. Press the *[PROG]* button.
   ➡ The program number of the end program (+XX) is displayed.

Changing a program link

1. Open the desired program.
2. Change the desired parameter.
3. Save the changed centrifugation data to the same program location again.
   ➡ Saving removes the program link.
4. Link programs again.

7.8.2 Centrifugation run with program link

1. Press the *[PROG]* button twice.
   ➡ Parameter PR-PART is selected.
   The input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the program location of the initial program (XX+).
3. Press the *[RCL]* button.
   ➡ The centrifugation data of the desired program location is displayed
4. Press the *[START]* button.
   ➡ The centrifugation run is started.
   The *'Rotation'* indicator appears as long as the rotor is turning.
   The ramp-up and brake levels of the program link are displayed.



   - Initial program (XX+)
     x: Ramp-up level of the initial program x
   - Follow-up program (+XX+)
     x: Ramp-up level of the follow-up program x
   - End program (+XX)
     x: Ramp-up level of the end program
     y: Brake level of the end program
5. Ramp-down takes place with the brake level of the end program after the time in the end program has elapsed.
   If the centrifugation run is cancelled by pressing the *[STOP]* button, ramp-down takes place at the brake level of the program currently running.

7.8.3 Deleting program links

1. Use the *[PROG]* button to select the *'PROG no.'* parameter. The input field is reverse highlighted.
2. Use the *[Rotary knob]* to set the program location of the initial program (XX+).
3. Press the *[RCL]* button.
   ➡ The centrifugation data of the desired program location is displayed
4. Press the *[PROG]* button twice.
   ➡ Parameter *'PR-PART'* is displayed.
   The input field is reverse highlighted.
5. Press the *[STO]* button twice.
6. Press the *[PROG]* button.

8 Cleaning and care

8.1 Overview table

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8	**Cleaning and care**					42
8.3	**Cleaning**					43
8.3	Cleaning the device		X			43
8.3	Cleaning the biosafety systems			X		44
8.3	Cleaning the accessories			X		44
8.4	**Disinfection**					44
8.4	Disinfecting the device	X				44
8.4	Disinfecting the accessories	X				44
8.5	**Maintenance**					45
8.5	Greasing the rubber seal of the centrifuging chamber			X		45
8.5	Greasing the rubber seal of the biosafety system			X		45
8.5	Trunnion greasing			X		45
8.5	Checking the accessories			X		45
8.5	Checking the biosafety system			X		45
8.5	Inspecting the centrifuging chamber for damage				X	45
8.5	Greasing the motor shaft				X	45

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8.5	Accessories with a limited service life	X				46
8.5	Calculation of the number of run cycles performed	X				46
8.5	Replacing centrifuge tubes	X				46

8.2 Cleaning and disinfection instructions

DANGER

Risk of contamination for the user due to inadequate cleaning or failure to observe the cleaning instructions.

- Observe cleaning instructions.
- Wear personal protective equipment when cleaning the device.
- Observe laboratory regulations (e.g. TRBAs, the German Protection against Infection Act, hygiene plan) for handling biological agents.

- The device and its accessories must not be cleaned in dishwashers.
- Only perform hand cleaning and liquid disinfection.
- The water temperature must not exceed 25 °C.
- To prevent any corrosion due to use of detergents or disinfectants, it is essential to follow the special application instructions provided by the manufacturers of the detergent or disinfectant.

Disinfectant:

- Surface disinfectant (not disinfectant for hands or instruments)
- Ethanol as the sole active substance.
  Do not use an ethanol-propanol mixture to disinfect the viewing window in the lid of the device.
- Concentration is not less than 30 %
- pH: 6 – 8
- Non-corrosive

8.3 Cleaning

Cleaning the device

1. Open the lid.
2. Switch off the device and disconnect it from the power supply.
3. Remove accessories.
4. Clean the centrifuge housing and the centrifuging chamber with soap or a mild detergent and a damp cloth.
5. Remove any detergent residues with a damp cloth after using detergents.
6. The surfaces must be dried immediately after cleaning.
7. Dry the centrifuging chamber with an absorbent cloth if condensation forms.

Cleaning the biosafety systems

1. Clean the biosafety system using the detergent and a damp cloth.
2. Remove any detergent residues with a damp cloth after using detergents.
3. Dry the accessories immediately after cleaning using a lint-free cloth and oil-free compressed air. Dry all cavities completely using oil-free compressed air.

Cleaning the accessories

1. Clean the accessories using the detergent and a damp cloth.
2. Remove any detergent residues with a damp cloth after using detergents.
3. Dry the accessories immediately after cleaning using a lint-free cloth and oil-free compressed air. Dry all cavities completely using oil-free compressed air.

8.4 Disinfection

Disinfection must always be preceded by cleaning of the components concerned.

See ➦ Chapter 8 'Cleaning and care' on page 42

Disinfectant concentration and application time according to the manufacturer's instructions.

Disinfecting the device

CAUTION

Risk of injury due to ingress of water or other liquids.

- Protect the device against external liquids.
- Do not disinfect the device using spray.

1. Open the lid.
2. Switch off the device and disconnect it from the power supply.
3. Remove accessories.
4. Clean the housing and centrifuging chamber using disinfectant.
5. Remove any disinfectant residues with a damp cloth after using disinfectants.
6. The surfaces must be dried immediately after cleaning.

Disinfecting the accessories

1. Disinfect the accessories using the disinfectant.
2. Wet all cavities with bubble-free disinfectant.
3. Remove the disinfectant residues or leave them to dry after using disinfectants.

Autoclaving

The following accessories may be autoclaved at 121 °C / 250 °F (20 min):

- Swing-out rotors
- Aluminium angle rotors
- Metal buckets

- Lid with bioseal
- Inserting

No statement can be made about the resulting degree of sterility.

The lids of the rotors and bucket must be removed before autoclaving.

Autoclaving accelerates the ageing of materials. It may cause changes to colours. After autoclaving, the rotors and accessories are to be visually inspected for damage and any damaged parts are to be replaced immediately.

The sealing ring in question is to be replaced if there are signs of cracking, embrittlement or wear. For lids with non-replaceable sealing rings, the whole lid must be replaced.

The sealing rings must be replaced after autoclaving to ensure the tightness of the biosafety systems.

8.5 Maintenance

Greasing the rubber seal of the centrifuging chamber

→ Rub the sealing ring lightly with a rubber care product.

Greasing the rubber seal of the biosafety system

→ Rub the sealing ring lightly with a rubber care product.

Trunnion greasing

1. → Remove accessories.
2. → Clean the trunnions.
3. → Remove any detergent residues with a damp cloth after using detergents.
4. → Grease the trunnions and suspension with Hettich Tubenfett 4051.
5. → Excess grease in the centrifuging chamber must be removed.

Checking the accessories

1. → The accessories are to be checked for wear and corrosion damage.
2. → Check that the rotor is firmly seated.

Checking the biosafety system

1. → Visually check all parts of the biosafety system for damage.
2. → Check the correct installation position of the sealing ring(s) of the biosafety system.
3. → Replace the damaged parts of the biosafety system.
4. → Replace the sealing ring in question immediately if there are signs of cracking, embrittlement or wear. For lids with non-replaceable sealing rings, the whole lid must be replaced.

Inspecting the centrifuging chamber for damage

→ Check the centrifuging chamber for damage.

Greasing the motor shaft

1. → Remove accessories.
2. → Clean the motor shaft.
3. → Remove any detergent residues with a damp cloth after using detergents.
4. → Grease the motor shaft with Hettich Tubenfett 4051.
5. → Excess grease in the centrifuging chamber must be removed.

Accessories with a limited service life

The use of certain accessories is time-limited. For safety reasons, the accessories must no longer be used when either the maximum number of permissible run cycles marked on them or the expiry date marked on them has been reached.

- The maximum permissible number of run cycles or the expiry date can be seen marked on the accessories.
- The centrifuge is equipped with a cycle counter.

Calculation of the number of run cycles performed

The runtime per centrifugation run and the operating hours of the device are required to calculate the number of run cycles performed (centrifugation runs). Querying the operating hours, see ➥ *Chapter 7.7 'Machine Menu' on page 38*.

The shortest runtime is to be used for the calculation if centrifugation runs with different runtimes have been carried out.

The number of run cycles performed (centrifugation runs) is calculated as follows:

Number of run cycles performed = operating hours [h] x 60 / runtime [min]

e.g.: Operating hours 2000 h, runtime 5 min

Number of run cycles performed = 2000 x 60 / 5 = 24000

Replacing centrifuge tubes

CAUTION

Risk of injury from broken glass.

Broken glass may cause glass splinters and contaminated liquids to be found inside the centrifuge.

- Wear cut-resistant gloves.
- Wear protective goggles and a face mask.

Broken parts of the tube, glass splinters and spilled centrifuge material must be removed completely in the event of leakage or if a centrifuge tube breaks. Glass splinters that are not removed will cause further glass breakage.

The rubber inserts and the plastic sleeves of the rotors must be replaced after a glass breakage.

Disinfection must be carried out if the material is infectious.

9 Troubleshooting

9.1 Fault description

Customer service must be notified if the fault cannot be rectified based on the fault table. State the centrifuge type and serial number. Both numbers can be seen on the type plate of the centrifuge.

* Error number does not appear on the display.

Fault description	Cause	Remedy
no display	No power. Triggering of the overcurrent protection fuse.	■ Check the supply voltage. ■ The mains switch is in switch position *[I]*
TACHO - ERROR 01, 02	Tacho defective. Motor, inverter, electronics defective.	■ Open the lid. ■ Set the mains switch to *[0]*.

Fault description	Cause	Remedy
TACHO - ERROR 01, 02	Tacho defective. Motor, inverter, electronics defective.	■ Wait at least 10 seconds. ■ Turn the rotor vigorously by hand. ■ Set the mains switch to *[I]*. The rotor must rotate while switching on.
IMBALANCE / UNWUCHT	The rotor is unevenly loaded.	■ Open the lid or hatch. ■ Check the loading of the rotor. ■ Repeat the centrifugation run.
CONTROL - ERROR 04, 06-09	Lid lock error.	■ Perform a MAINS RESET.
N > MAX 05	Overspeed error	■ Perform a MAINS RESET.
N < MIN 13	Underspeed error.	■ Perform a MAINS RESET.
ROTORCODE 10	Rotor coding error.	■ Perform a MAINS RESET.
MAINS INTERRUPT	Loss of mains power during the centrifugation run. The centrifugation run was not completed.	■ Open the lid. ■ Press the *[START]* button. ■ If required: Repeat the centrifugation run.
VERSION-ERROR 12	No conformity of the electronic components, error/defect in electronics.	■ Perform a MAINS RESET.
SER I/O - ERROR 30-38	Error/defect in interface.	■ Perform a MAINS RESET.
° C * - ERROR 50-56, 58	Error/defect in cooling.	■ Perform a MAINS RESET.
LOCK - ERROR 57	Error/defect in program lock.	■ Perform a MAINS RESET.
FU/CCI-ERROR 60-83	Error/defect in motor control.	■ Perform a MAINS RESET.
CONTROL - ERROR 26, 90-95, 97 - 99	Error/defect in control section.	■ Perform a MAINS RESET.
N > ROTOR MAX 96	Speed in the selected program greater than the maximum rotor speed.	■ Check and correct the speed.
	The rotor has been changed. The built-in rotor has a higher maximum speed than the previously used rotor. The rotor has not yet been recognised by the rotor detection.	■ Set a speed up to the maximum speed of the previously used rotor. Press the *[START]* button to perform rotor detection.
The entire display lights up.	-	■ Notify customer service.

9.2 Perform a MAINS RESET

1. Set the mains switch to *[0]*.
2. Wait 10 seconds.

3. Set the mains switch to *[I]*.

9.3 Emergency release

The lid cannot be unlocked by the motor in the event of a power failure. Emergency unlocking by hand must be performed.

WARNING

Risk of electric shock due to maintenance and servicing work on live device.

- Disconnect the device from the mains before carrying out repairs and maintenance.

WARNING

Danger of cutting and crushing due to moving rotor.

- Do not open the lid until the rotor has stopped.

Personnel:

- Trained user

1. Look through the window in the lid to ensure that the rotor is stationary.
2. Insert the hex key horizontally into the hole (*1*) and turn clockwise until the lid opens.
3. Remove the hex key from the hole (*1*).
4. When the power is restored, press the *[Lid]* button so that the motorised cover lock returns to the home position (open).

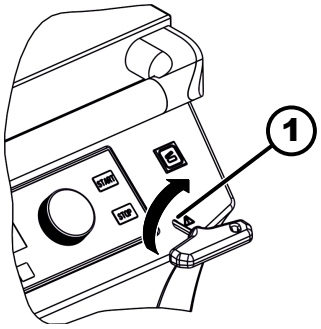


Fig. 31: Emergency release

1 Hole

10 Disposal

10.1 General instructions

The device can be disposed of via the manufacturer.

A Return Material Authorisation (RMA) form must always be requested for a return.

If necessary, contact the Technical Service Department of the manufacturer.

- *Andreas Hettich GmbH & Co. KG*
- *Föhrenstrasse 12*
- *78532 Tuttlingen, Germany*
- *Phone: +49 7461 705 1400*
- *E-mail: service@hettichlab.com*

WARNING

Risk of pollution and contamination for people and the environment.

When disposing of the centrifuge, people and the environment may be polluted or contaminated by incorrect or improper disposal.

- Removal and disposal may be carried out only by a trained and authorised service personnel.

The device is intended for the commercial sector ("Business to Business" - B2B).

According to Directive 2012/19/EU, the devices may no longer be disposed of with household waste.

The devices are assigned to the following groups according to the Stiftung Elektro-Altgeräte Register (EAR (German foundation under civil law)):

- Group 1 (heat exchangers)

The crossed-out wheelie bin symbol indicates that the device must not be disposed of with household waste. Regulations governing disposal of such devices may differ in individual countries. If necessary, contact the supplier.

Fig. 32: Household waste ban

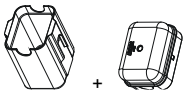
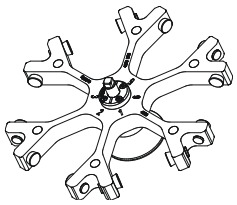
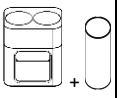
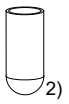
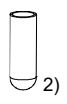
11 Index

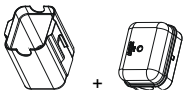
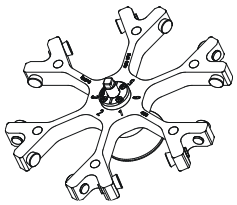
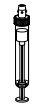
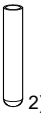
V

W

Z

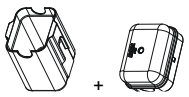
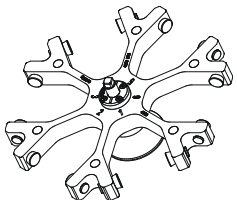
Rotoren und Zubehör /
Rotors and accessories

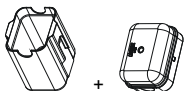
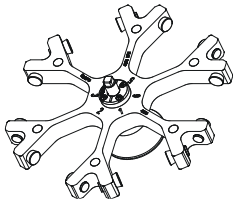
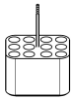
4296	5051 + 5053									
Ausschwingrotor 6-fach / Swing out rotor 6-times										
	max. Beladung / max. load: 500 g									
	- - -									
	5262	**5249**	**5243**	**5243 + 2x 6316**	**5242**	**5247**	**5227**		**5257**	
										
∠ 90°	- - -	- - -	- - -	**Falcon ®**	- - -	- - -	- - -	- - -	- - -	- - -
max. Laufzyklen / max. cycles 120000	 2)	 2)	 2)	 3)	 2)	 2)	 2)	 2)		
Kapazität / capacity ml	100	100	50	50	25	7	5	6	1,5	2
Maße / dimensions ∅ x L mm	44 x 100	40 x 115	34 x 100	29 x 115	24 x 100	12 x 100	12 x 75	12 x 82	11 x 38	
Anzahl p. Rotor / number p. rotor	6	6	12	12	30	120	120		240	
Drehzahl / speed RPM	4000									
RZB / RCF 2)	3291	3291	3291	3291	3291	3291	3309		2486 / 3363	
Radius / radius mm	184	184	184	184	184	184	185		139/188	
9 (97%) sec	33									
9 sec	50									
Temperatur / temperature °C 1)	0									

4296	5051 + 5053									
Ausschwingrotor 6-fach / Swing out rotor 6-times										
	max. Laufzyklen / max. cycles: 50000									
	max. Beladung / max. load: 500 g									
	- - -									
	5248-91	**5247-91**	**5266**	**5258**	**5264**		**5227**		**5248**	
	 10)	 10)	 3)							
∠ 90°	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
max. Laufzyklen / max. cycles 120000	 2)	 2)	 2)	 2)	 2)	 2)	 2)	 2)	 2)	 2)
Kapazität / capacity ml	15	7	30	9 - 10	4 - 5,5	7,5 - 8,2	2,7 - 3	4,5 - 5	15	
Maße / dimensions ∅ / L mm²	17 x 100	12 x 100	25 x 110	16 x 92	15 x 75	15 x 92	11 x 66	11 x 92	17 x 100	
Anzahl p. Rotor / number p. rotor	72	120	30	66	72		120		72	
Drehzahl / speed RPM	4000									
RZB / RCF 2)	3291	3291	3291	3291	3309		3309		3291	
Radius / radius mm	184	184	184	184	185		185		184	
9 (97%) sec	33									
9 sec	50									
Temperatur / temperature °C 1)	0									

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) nicht mit Deckel 5053 verschließbar
10) mit Dekantierhilfe

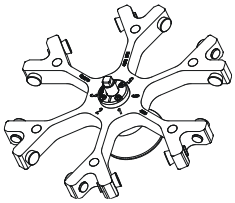
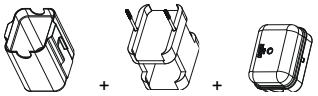
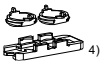
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) not possible to close the lid 5053
10) with decanting aid

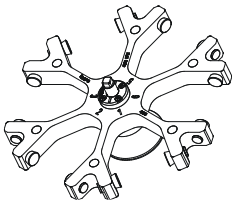
4296		5051 + 5053								
Ausschwingrotor 6-fach / Swing out rotor 6-times										
		max. Laufzyklen / max. cycles: 50000								
		max. Beladung / max. load: 500 g								
		- - -								
		5259	**6306**	**5248**	**5264**		**5267**		**5281**	
		 3)	 3)							
90°		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
max. Laufzyklen / max. cycles 120000						 2)		 2)		
Kapazität / capacity	ml	50	15	5 - 10	4 - 7	9	1,1 - 1,4	3	1,5	2,0
Maße / dimensions ∅ x L	mm	29 x 115	17 x 120	16 x 100	16 x 75	14 x 100	8 x 66	10 x 60	11 x 38	
Anzahl p. Rotor / number p. rotor		12	42	72	72		120		96	
Drehzahl / speed	RPM	4000								
RZB / RCF	2)	3363	3434	3291	3309		3274		3363	
Radius / radius	mm	188	192	184	185		183		188	
9 (97%)	sec	33								
9	sec	50								
Temperatur / temperature	°C 1)	0								

4296		5051 + 5053							
Ausschwingrotor 6-fach / Swing out rotor 6-times									
		max. Laufzyklen / max. cycles: 50000							
		max. Beladung / max. load: 500 g							
		- - -							
		5268					- - -	- - -	- - -
							- - -	- - -	- - -
90°		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
max. Laufzyklen / max. cycles 120000				 2)			- - -	- - -	- - -
Kapazität / capacity	ml	1 - 5	4 - 7	5	2,6 – 2,9	4,9	- - -	- - -	- - -
Maße / dimensions ∅ x L	mm	13 x 75	13 x 100	13 x 75	13 x 65	13 x 90	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor		72					- - -	- - -	- - -
Drehzahl / speed	RPM	4000					- - -	- - -	- - -
RZB / RCF	2)	3345					- - -	- - -	- - -
Radius / radius	mm	187					- - -	- - -	- - -
9 (97%)	sec	33					- - -	- - -	- - -
9	sec	50					- - -	- - -	- - -
Temperatur / temperature	°C 1)	0					- - -	- - -	- - -

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) nicht mit Deckel 5053 verschließbar

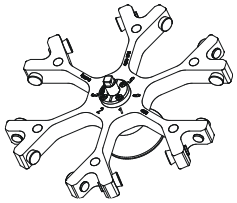
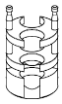
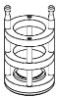
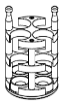
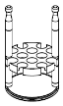
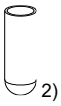
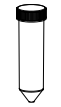
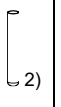
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) not possible to close the lid 5053

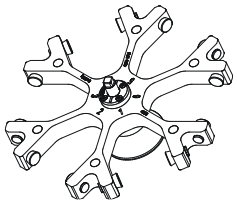
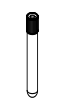
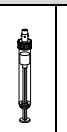
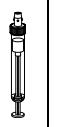
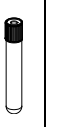
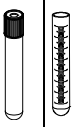
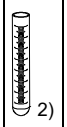
4296	5051 + 5280 + 5053							
Ausschwingrotor 6-fach / Swing out rotor 6-times 								
	max. Laufzyklen / max. cycles: 50000							
	max. Beladung / max. load: 500 g							
	- - -							
	1662						**1670**	
							 4)	
90°	**1663**	**1664**	**1665**	**1666**	**1667**	**1668**	**1663**	**1664**
max. Laufzyklen / max. cycles 120000								
Kapazität / capacity ml	1	2	4	8	3 x 2	4 x 1	1	2
Maße / dimensions ∅ / A mm²	6,2 / 30	8,7 / 60	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	6,2 / 30	8,7 / 60
Anzahl p. Rotor / number p. rotor	12	12	12	12	12	12	12	12
Filterkarten / filter cards	**1675**	**1675**	**1675**	**1676**	**1677**	**1678**	**1692**	**1692**
Drehzahl / speed RPM	4000							
RZB / RCF 2)	2290 / 3274							
Radius / radius mm	128 / 183							
9 (97%) sec	33							
9 sec	50							
Temperatur / temperature °C 1)	0							

4296	5051 + 5280 + 5053							
Ausschwingrotor 6-fach / Swing out rotor 6-times 								
	max. Laufzyklen / max. cycles: 50000							
	max. Beladung / max. load: 500 g							
	- - -							
	1670				**- - -**		**- - -**	**- - -**
	 4)				- - -		- - -	- - -
90°	**1665**	**1666**	**1667**	**1668**	**- - -**	**- - -**	**- - -**	**- - -**
max. Laufzyklen / max. cycles 120000					- - -	- - -	- - -	- - -
Kapazität / capacity ml	4	8	3 x 2	4 x 1	- - -	- - -	- - -	- - -
Maße / dimensions ∅ / A mm²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	- - -	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor	12	12	12	12	- - -	- - -	- - -	- - -
Filterkarten / filter cards	**1692**	**1691**	**1694**	**1693**	- - -	- - -	- - -	- - -
Drehzahl / speed RPM	4000				- - -	- - -	- - -	- - -
RZB / RCF 2)	2290 / 3274				- - -	- - -	- - -	- - -
Radius / radius mm	128 / 183				- - -	- - -	- - -	- - -
9 (97%) sec	33				- - -	- - -	- - -	- - -
9 sec	50				- - -	- - -	- - -	- - -
Temperatur / temperature °C 1)	0				- - -	- - -	- - -	- - -

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
4) Objektträger nur belastbar bis RZB 1100

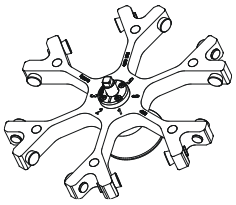
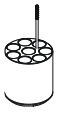
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
4) Object slide will not stand RCF values exceeding 1100

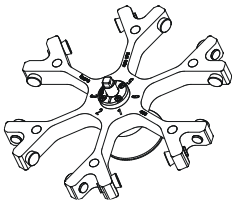
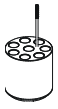
4296		5092 + 5093								
Ausschwingrotor 6-fach / Swing out rotor 6-times										
		max. Laufzyklen / max. cycles: 30000								
		max. Beladung / max. load: 500 g								
		mit Bioabdichtung / with bio-containment **5)**								
		5126	**5125**	**5123**	**5124**	**5122**		**5128**		
										
90°		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
max. Laufzyklen / max. cycles 120000		 2)	 2)	 2)	 2)	 2)		 2)	 2)	 2)
Kapazität / capacity	ml	100	100	50	50	25	30	4	5	6
Maße / dimensions ∅ x L	mm	40 x 115	44 x 100	29 x 115	34 x 100	24 x 100	25 x 110	12 x 60	12 x 75	12 x 82
Anzahl p. Rotor / number p. rotor		6	6	12	6	24		72		72
Drehzahl / speed	RPM	4000								
RZB / RCF	2)	3488	3488	3631	3488	3434		3542		
Radius / radius	mm	195	195	203	195	192		198		
9 (97%)	sec	33								
9	sec	50								
Temperatur / temperature	°C 1)	- 2								

4296		5092 + 5093									
Ausschwingrotor 6-fach / Swing out rotor 6-times											
		max. Laufzyklen / max. cycles: 30000									
		max. Beladung / max. load: 500 g									
		mit Bioabdichtung / with bio-containment **5)**									
		5120			**5121**						**- - -**
											- - -
90°		- - -	- - -	- - -	- - -	- - -		- - -	**3)**	- - -	- - -
max. Laufzyklen / max. cycles 120000		 2)								 2)	 2)	- - -
Kapazität / capacity	ml	7	4,5 - 5	4 - 7	2,6 – 2,9	9 - 10	10	5 - 10	8	15	- - -
Maße / dimensions ∅ x L	mm	12 x 100	11 x 92	13 x 100	13 x 65	16 x 92	15 x 102	16 x 100	16 x 125	17 x 100	- - -
Anzahl p. Rotor / number p. rotor		72			42						- - -
Drehzahl / speed	RPM	4000									- - -
RZB / RCF	2)	3542			3542						- - -
Radius / radius	mm	198			198						- - -
9 (97%)	sec	33									
9	sec	50									
Temperatur / temperature	°C 1)	- 2									

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Lauf zeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) nicht mit Deckel 5093 verschließbar
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

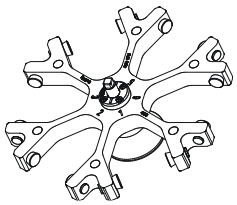
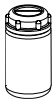
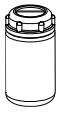
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) not possible to close the lid 5093
5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

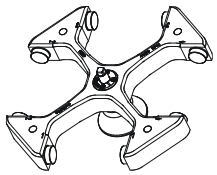
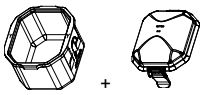
4296		5092 + 5093								
Ausschwingrotor 6-fach / Swing out rotor 6-times  ∠ 90° max. Laufzyklen / max. cycles 120000		 + max. Laufzyklen / max. cycles: 30000 max. Beladung / max. load: 500 g mit Bioabdichtung / with bio-containment **5)**								
		5136 								
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
			 2)	 2)	- - -						
Kapazität / capacity	ml	10	15		- - -	4 – 5,5	7,5 - 8,2	9 - 10	10	4 - 7	5 - 10
Maße / dimensions ∅ x L	mm	16 x 80	17 x 100		- - -	15 x 75	15 x 92	16 x 92	15 x 102	16 x 75	16 x 100
Anzahl p. Rotor / number p. rotor		48									
Drehzahl / speed	RPM	4000									
RZB / RCF	**2)**	3488									
Radius / radius	mm	195									
9 (97%)	sec	33									
9	sec	50									
Temperatur / temperature	°C 1)	- 2									

4296		5092 + 5093							
Ausschwingrotor 6-fach / Swing out rotor 6-times  ∠ 90° max. Laufzyklen / max. cycles 120000		 + max. Laufzyklen / max. cycles: 30000 max. Beladung / max. load: 500 g mit Bioabdichtung / with bio-containment **5)**							
		5137 							
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
									 2)
Kapazität / capacity	ml	1 - 5	4 - 7	4,9	1,1 - 1,4	2,6 – 2,9	2,7 - 3	4,5 - 5	5
Maße / dimensions ∅ x L	mm	13 x 75	13 x 100	13 x 90	8 x 66	13 x 65	11 x 66	11 x 92	13 x 75
Anzahl p. Rotor / number p. rotor		48							
Drehzahl / speed	RPM	4000							
RZB / RCF	**2)**	3488							
Radius / radius	mm	195							
9 (97%)	sec	33							
9	sec	50							
Temperatur / temperature	°C 1)	- 2							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

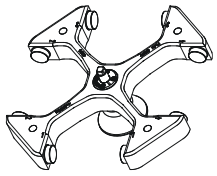
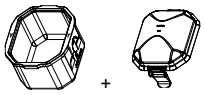
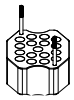
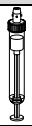
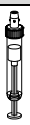
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

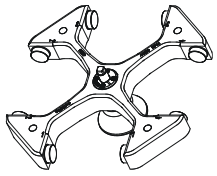
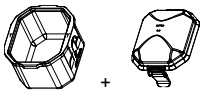
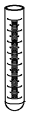
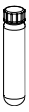
4296		5092 + 5093								5092
Ausschwingrotor 6-fach / Swing out rotor 6-times  90° max. Laufzyklen / max. cycles 120000										
		max. Laufzyklen / max. cycles: 30000								
		max. Beladung / max. load: 500 g								
		mit Bioabdichtung / with bio-containment **5)**								- - -
		1791	**5134**	**5135**	**5129**	**5138**			**6319**	**6319**
										
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	**5127**	- - -
		 2)								 12)	 12)
Kapazität / capacity	ml	250	25	50	15	1.1 – 1.4	2,7 - 3	2,6 – 2,9	1 – 5	250	290
Maße / dimensions ∅ x L	mm	65 x 115	25 x 90	29 x 115	17 x 120	8 x 66	11 x 66	13 x 65	13 x 75	62 x 122	62 x 137
Anzahl p. Rotor / number p. rotor		6	18	12	42	72				6	6
Drehzahl / speed	RPM	4000									
RZB / RCF	2)	3631	3363	3560	3631	3077				3631	3631
Radius / radius	mm	203	188	199	203	172				203	203
9 (97%)	sec	33									
9	sec	50									
Temperatur / temperature	°C 1)	- 2									

4294		4290 + 4291							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles: 30000 (4500 - 4001 RPM) 45000 (4000 – 3501 RPM) 60000 (3500 - 50 RPM)							
		max. Beladung / max. load: 1200 g							
		mit Bioabdichtung / with bio-containment **5)**							
		4273							
									
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		 2)	 2)	 2)					- - -
Kapazität / capacity	ml	5	6	7	2,6 - 2,9	4,9	1 - 5	4 - 7	- - -
Maße / dimensions ∅ x L	mm	12 x 75	12 x 82	12 x 100	13 x 65	13 x 90	13 x 75	13 x 100	- - -
Anzahl p. Rotor / number p. rotor		200							- - -
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	4551							
Radius / radius	mm	201							
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	2							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

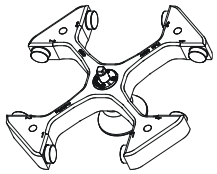
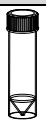
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

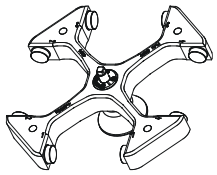
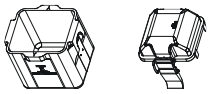
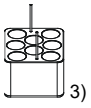
4294		4290 + 4291						
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000								
		max. Laufzyklen / max. cycles: 30000 (4500 - 4001 RPM) 45000 (4000 – 3501 RPM) 60000 (3500 - 50 RPM)						
		max. Beladung / max. load: 1200 g						
		mit Bioabdichtung / with bio-containment **5)**						
		4310	**4311**		**4313**	**4314**	**4321**	- - -	- - -
								- - -	- - -
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
								- - -	- - -
Kapazität / capacity	ml	12	10	9 - 10	50	15	50	- - -	- - -
Maße / dimensions ∅ x L	mm	16,8 x 100	15 x 102	16 x 92	29 x 115	17 x 120	29 x 115	- - -	- - -
Anzahl p. Rotor / number p. rotor		112	132		32	68	32	- - -	- - -
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	4437	4573		4528	4618	4618	- - -	- - -
Radius / radius	mm	196	202		200	204	204	- - -	- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	2							

4294		4290 + 4291								
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000										
		max. Laufzyklen / max. cycles: 30000 (4500 - 4001 RPM) 45000 (4000 – 3501 RPM) 60000 (3500 - 50 RPM)								
		max. Beladung / max. load: 1200 g								
		mit Bioabdichtung / with bio-containment **5)**								
		4338								
										
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		 2)	 2)	 2)	 2)					
Kapazität / capacity	ml	9	14	15		4 - 5,5	7,5 - 8,2	4 - 7	5 - 10	10
Maße / dimensions ∅ x L	mm	14 x 100	16 x 101	17 x 100		15 x 75	15 x 92	16 x 75	16 x 100	16 x 80
Anzahl p. Rotor / number p. rotor		168								
Drehzahl / speed	RPM	4500								
RZB / RCF	2)	4551								
Radius / radius	mm	201								
9 (97%)	sec	115								
9	sec	116								
Temperatur / temperature	°C 1)	2								

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

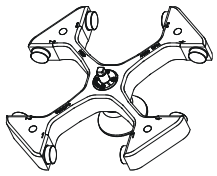
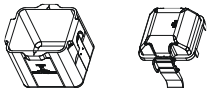
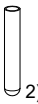
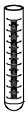
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

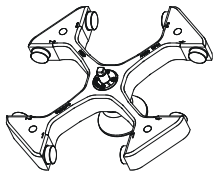
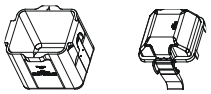
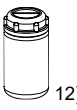
4294		4290							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 30000 (4500 - 4001 RPM) 45000 (4000 – 3501 RPM) 60000 (3500 - 50 RPM)							
		max. Beladung / max. load: 1200 g							
		- - -							
		4339	**4323**	**4320**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**
					- - -	- - -	- - -	- - -	- - -
		- - -	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**
					- - -	- - -	- - -	- - -	- - -
Kapazität / capacity	ml	50	50	15	- - -	- - -	- - -	- - -	- - -
Maße / dimensions ∅ x L	mm	29 x 115	29 x 115	17 x 120	- - -	- - -	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor		40	40	112	- - -	- - -	- - -	- - -	- - -
Drehzahl / speed	RPM	4500			- - -	- - -	- - -	- - -	- - -
RZB / RCF	2)	4528	4618	4618	- - -	- - -	- - -	- - -	- - -
Radius / radius	mm	200	204	204	- - -	- - -	- - -	- - -	- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	2							

4294		4295-A + 4229-B							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM)							
		max. Beladung / max. load: 1060 g							
		- - -							
		4226	**4225**	**4224**	**4241**	**4245-A**	**4213**		
						 3)			
		- - -	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**
				2)			2)	2)	
Kapazität / capacity	ml	0.8	1.5 / 2.0	4	25	50	6	7	4.5 - 5
Maße / dimensions ∅ x L	mm	8 x 45	11 x 38	10 x 88	25 x 90	29 x 115	12 x 82	12 x 100	11 x 92
Anzahl p. Rotor / number p. rotor		312	336	252	32	32	192		
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	4777	3690 / 4887	4777	4777	4958	4777		
Radius / radius	mm	211	163 / 215	211	211	219	211		
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	6							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Lauf zeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) nicht mit Deckel 4229-B verschließbar

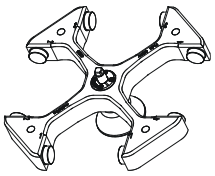
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) not possible to close the lid 4229-B

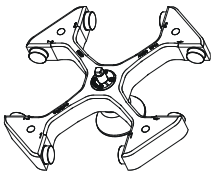
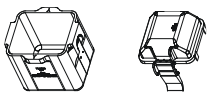
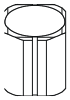
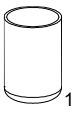
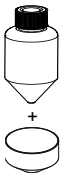
4294		4295-A + 4229-B							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM) max. Beladung / max. load: 1060 g - - -							
		4213-93			4214				4214-93
									
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		 2)	 2)		 2)	 2)				
Kapazität / capacity	ml	5	6	2,7 - 3	15		7,5 – 8,2	5 - 10	10	4 - 7
Maße / dimensions ∅ x L	mm	12 x 75	12 x 82	11 x 66	17 x 100		15 x 92	16 x 100	15 x 102	16 x 75
Anzahl p. Rotor / number p. rotor		192			120					120
Drehzahl / speed	RPM	4500								
RZB / RCF	2)	4777			4777					4777
Radius / radius	mm	211			211					211
9 (97%)	sec	115								
9	sec	116								
Temperatur / temperature	°C 1)	6								

4294		4295-A + 4229-B							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM) max. Beladung / max. load: 1060 g - - -							
		4214-93	- - -	4216	4218		4238	SK 18.03	- - -
			- - -						- - -
		- - -	- - -	- - -	- - -	- - -	5127	Schott	- - -
			- - -	 2)	 2)	 2)	 12)	 2)	- - -
Kapazität / capacity	ml	4 – 5,5	- - -	50	100	94	250	250	- - -
Maße / dimensions ∅ x L	mm	15 x 75	- - -	34 x 100	40 x 115	38 x 102	62 x 122	56 x 144	- - -
Anzahl p. Rotor / number p. rotor		120	- - -	24	16		4	4	- - -
Drehzahl / speed	RPM	4500							- - -
RZB / RCF	2)	4777	- - -	4777	4777		4777	4641	- - -
Radius / radius	mm	211	- - -	211	211		211	205	- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	6							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Lauf zeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

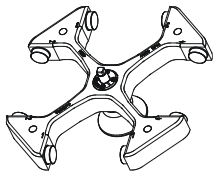
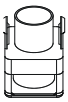
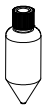
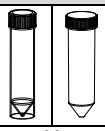
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

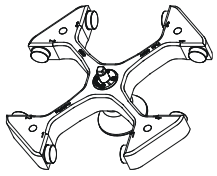
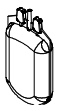
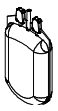
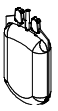
4294		4295-A + 4229-B							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM)							
		max. Beladung / max. load: 1060 g							
		- - -							
		4220		**4222**		**4223**			**- - -**
									- - -
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	**- - -**
					 2)	 2)	 2)		- - -
Kapazität / capacity	ml	9 - 10	12	4 - 7	7	9	12	8	- - -
Maße / dimensions ∅ x L	mm	16 x 92	16,8 x 100	13 x 100	12 x 100	14 x 100	16 x 101	16 x 125	- - -
Anzahl p. Rotor / number p. rotor		64		120		100			
Drehzahl / speed	RPM	4500							- - -
RZB / RCF	2)	4777		4777		4777			- - -
Radius / radius	mm	211		211		211			- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	6							

4294		4295-A + 4229-B							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM)							
		max. Beladung / max. load: 1060 g							
		- - -							
		- - -	**4249**	**4222-93**		**4258**			
		- - -							
		- - -	- - -	- - -	- - -	- - -	**0512**	**Corning + 4449**	**0554**
		- - -				 12)	 12)		 12)
Kapazität / capacity	ml	- - -	50	2,6 – 2,9	1 - 5	750	750	500	650
Maße / dimensions ∅ x L	mm	- - -	29 x 115	13 x 65	13 x 75	96 x 135	97 x 152	96 x 147	97 x 139
Anzahl p. Rotor / number p. rotor		- - -	24	120		4			
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	- - -	4867	4777		4958			
Radius / radius	mm	- - -	215	211		219			
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	6							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

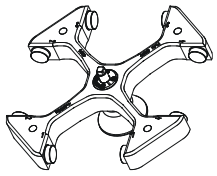
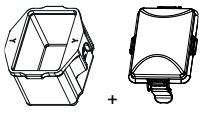
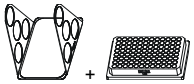
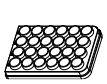
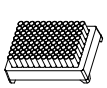
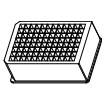
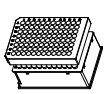
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

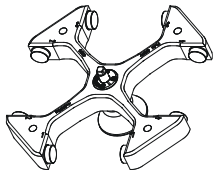
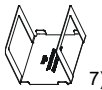
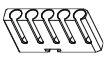
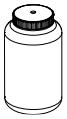
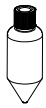
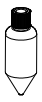
4294		4295-A + 4229-B					4295-A		
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 							
		max. Laufzyklen / max. cycles: 15000 (4500 - 4001 RPM) 50000 (4000 - 50 RPM)							
		max. Beladung / max. load: 1060 g							
		- - -					- - -		
		6322	**- - -**	**4232**	**4215**		**SK15.16**		
		 3)	- - -	 3)	 - - - / 3)		 3)		
		Corning	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**	**- - -**
			- - -		 2)		- - -	Blut-Dopingtest	- - -
Kapazität / capacity	ml	250	- - -	15	25	30	- - -	- - -	- - -
Maße / dimensions ∅ x L	mm	60 x 162	- - -	17 x 120	24 x 100	25 x 110	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor		4	- - -	92	44		- - -	24	- - -
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	4777	- - -	4958	4777		- - -	- - -	- - -
Radius / radius	mm	211	- - -	219	211		- - -	- - -	- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	6							

4294		4298-A				4293			
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles 50000				max. Laufzyklen / max. cycles 50000			
		max. Beladung / max. load: 1150 g				max. Beladung / max. load: 1150 g			
		- - -							
		- - -	**4237-A**			**4244-A**			
		- - -							
		1-fach/ 1-times	**4-fach/ 4-times**	**4-fach/ 4-times**	**1-fach/ 1-times**	**3-fach/ 3-times**	**2-fach/ 2-times**	**3-fach/ 3-times**	**- - -**
									- - -
Kapazität / capacity	ml	1000	450	500	750	450	500	500	- - -
Maße / dimensions ∅ x L	mm	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor		4	4	4	4	4	4	4	- - -
Drehzahl / speed	RPM	4500							- - -
RZB / RCF	2)	5071	5003			5252			- - -
Radius / radius	mm	224	221			232			- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	3				2			

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) nicht mit Deckel 4229-B verschließbar

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) not possible to close the lid 4229-B

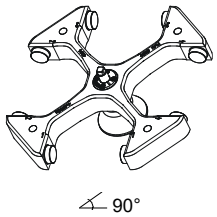
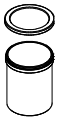
4294		4280 + 5629							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 50000 max. Beladung / max. load: 690 g mit Bioabdichtung / with bio-containment **5)**							
		4279						**4279 + 1485**	
									
		MTP	**MTP**	**CP**	**MS**	**DWP**	**QP**	**96-PCR-Platte / plate**	**PCR-Strips**
									
Kapazität / capacity	ml	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0,2
Maße / dimensions TxBxH / DxWxH	mm	86x128x15	86x128x17,5	86x128x22	86x128x46	86x128x44,5	86x128x 83	82x124x20	- - -
Anzahl p. Rotor / number p. rotor		24	24	20	4	8	4	4	48 x 8
Drehzahl / speed	RPM	4500							
RZB / RCF	2)	4573						4573	
Radius / radius	mm	202						202	
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C 1)	5							

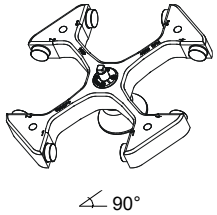
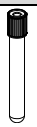
4294		4257		4254 + 4255 / 4255-P 8)						
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000		 max. Laufzyklen / max. cycles: 20000 max.		 +  9) max. Laufzyklen / max. cycles: 30000						
		max. Beladung / max. load: 800		max. Beladung / max. load: 800 g (4500 – 4021 RPM) 1000 g (4020 – 3671 RPM) 1200 g (3670 - 50 RPM)						
		- - -		- - -						
		- - -	**4259-A**	**- - -**	**- - -**	**- - -**	**4449**	**4430**		
		- - -	 7)	- - -	- - -	- - -				
		Hitachi-Racks		**0554**	**0512**	**4239**	**Corning**	**Cor-ning**	**Nagene**	**Nunc**
				 12)	 12)	 12)				
Kapazität / capacity	ml	- - -	- - -	650	750	1000	500	250	175	200
Maße / dimensions ∅ x L	mm	20 x 118 x 70	20 x 118 x 70	97 x 139	97 x 152	96 x 176	96 x 147	60 x 162	61,5 x 139,2	60 x 130
Anzahl p. Rotor / number p. rotor		20	20	4	4	4	4	4		
Drehzahl / speed	RPM	4500								
RZB / RCF	2)	4822	4867	5184						
Radius / radius	mm	213	215	229						
9 (97%)	sec	115								
9	sec	116								
Temperatur / temperature	°C 1)	7		6						

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Lauf zeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
7) Bei Verwendung von Entnahmehilfe 4259-A die Einlage (E2435) aus Gehänge 4257 herausnehmen. Entnahmehilfe 4259-A nur voll beladen zentrifugieren.
8) 4255-P: spezielle Oberflächenbehandlung für höchste hygienische Ansprüche
9) ohne Deckel
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
7) When using removal frame 4259-A please take insert (E2435) out of hanger 4257. Centrifuge removal frame 4259-A only when fully loaded.
8) 4255-P: special surface treatment for highest hygienic requirements
9) without lid
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

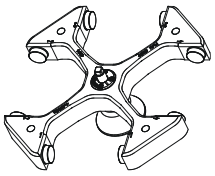
MTP Mikrotiterplatte / Microtitre plate
CP Kulturplatte / Culture plate
DWP Deep Well Platte / Deep well plate
MS Micronic System / Micronic system
QP Filterplatte / Filter plate

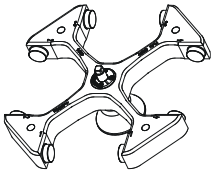
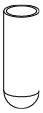
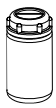
4294		4254	4254 + 4255 / 4255-P [8]							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90°										
			max. Laufzyklen / max. cycles: 30000							
		- - -	max. Beladung / max. load: 800 g (4500 – 4021 RPM) 1000 g (4020 – 3671 RPM) 1200 g (3670 - 50 RPM)							
		- - -	- - -							
		- - -	4432		4433				4434	
		- - -								
max. Laufzyklen / max. cycles 40000		4255 / 4255-P [8]	- - -		- - -	- - -	- - -	- - -	- - -	- - -
		 13)			 2)	 2)			 2)	- - -
Kapazität / capacity	ml	1000	1,5	2,0	5	7	2,7 - 3	4,5 - 5	9	- - -
Maße / dimensions ∅ x L	mm	98 x 138	11 x 38		12 x 75	12 x 100	11 x 66	11 x 92	14 x 100	- - -
Anzahl p. Rotor / number p. rotor		4	168		120				76	- - -
Drehzahl / speed	RPM	4500								
RZB / RCF	[2]	5184	3600/4686		4618				4777	- - -
Radius / radius	mm	229	159/207		204				211	- - -
9 (97%)	sec	115								
9	sec	116								
Temperatur / temperature	°C [1]	6								

4294		4254 + 4255 / 4255-P [8]								
Ausschwingrotor 4-fach / Swing out rotor 4-times  90°										
		max. Laufzyklen / max. cycles: 30000								
		max. Beladung / max. load: 800 g (4500 – 4021 RPM) 1000 g (4020 – 3671 RPM) 1200 g (3670 - 50 RPM)								
		- - -								
		4434								
										
max. Laufzyklen / max. cycles 40000		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		 2)	 2)		 2)					 3)
Kapazität / capacity	ml	15	10	8	4 – 5,5	9 - 10	4 - 7	5 - 10	10	
Maße / dimensions ∅ x L	mm	17 x 100	16 x 80	16 x 81	15 x 75	16 x 92	16 x 75	16 x 100	15 x 102	
Anzahl p. Rotor / number p. rotor		76								
Drehzahl / speed	RPM	4500								
RZB / RCF	[2]	4777								
Radius / radius	mm	211								
9 (97%)	sec	115								
9	sec	116								
Temperatur / temperature	°C [1]	6								

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) 4255 nicht mit Deckel verschließbar
8) 4255-P: spezielle Oberflächenbehandlung für höchste hygienische Ansprüche
13) Maximale Beladung 800g. Bei einer Beladung über 800g muss die Drehzahl reduziert werden, siehe Beschriftung auf dem Becher. Berechnung der reduzierten Drehzahl siehe Kapitel "Zentrifugation von Stoffen oder Stoffgemischen mit einer höheren Dichte als 1,2 kg/dm3 ".

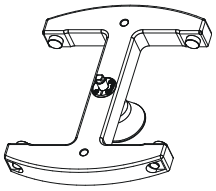
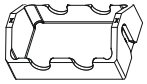
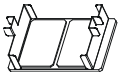
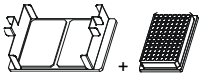
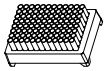
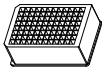
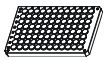
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) 4255 not possible to close the lid
8) 4255-P: special surface treatment for highest hygienic requirements
13) Maximum load 800g. With a load higher than 800g the speed has to be reduced, see label on the bucket. Calculation of the reduced speed see chapter "Centrifugation of materials or mixtures of materials with a density higher than 1.2 kg/dm3 ".

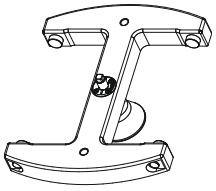
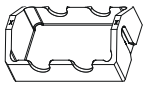
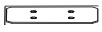
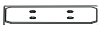
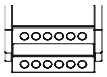
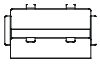
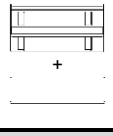
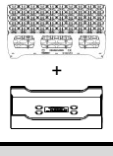
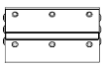
4294		4254 + 4255 / 4255-P [8]							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles: 30000							
		max. Beladung / max. load: 800 g (4500 – 4021 RPM) 1000 g (4020 – 3671 RPM) 1200 g (3670 - 50 RPM)							
		- - -							
		4435				**4437**	**4438**		**4438 + 0726**
									
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
								 	 2)
Kapazität / capacity	ml	2,6 – 2,9	4,9	1 - 5	4 – 7	15	25	30	25
Maße / dimensions ∅ x L	mm	13 x 65	13 x 90	13 x 75	13 x 100	17 x 120	25 x 90	25 x 110	24 x 100
Anzahl p. Rotor / number p. rotor		84				48	28		28
Drehzahl / speed	RPM	4500							
RZB / RCF	[2]	4618				4890	4709		4505
Radius / radius	mm	204				216	208		199
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C [1]	6							

4294		4254 + 4255 / 4255-P [8]							
Ausschwingrotor 4-fach / Swing out rotor 4-times  90° max. Laufzyklen / max. cycles 40000									
		max. Laufzyklen / max. cycles: 30000							
		max. Beladung / max. load: 800 g (4500 – 4021 RPM) 1000 g (4020 – 3671 RPM) 1200 g (3670 - 50 RPM)							
		- - -							
		4439	**4440**		**4441**	**4442**	**4443**		**- - -**
									- - -
		- - -	**Falcon**	**Falcon**	- - -	- - -	**5127**	- - -	- - -
		 2)	 3)	 3)		 2)	 12)	 3) 12)	- - -
Kapazität / capacity	ml	50	225	175	50	100	250	290	- - -
Maße / dimensions ∅ x L	mm	34 x 100	61 x 137	61 x 118	29 x 115	44 x 100	62 x 122	62 x 137	- - -
Anzahl p. Rotor / number p. rotor		16	4		20	8	4		- - -
Drehzahl / speed	RPM	4500							- - -
RZB / RCF	[2]	4573	5184		4890	4551	5003		- - -
Radius / radius	mm	202	229		216	201	221		- - -
9 (97%)	sec	115							
9	sec	116							
Temperatur / temperature	°C [1]	6							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Angaben des Röhrchenherstellers beachten.
3) 4255 nicht mit Deckel verschließbar
8) 4255-P: spezielle Oberflächenbehandlung für höchste hygienische Ansprüche
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Observe the tube manufacturer's instructions.
3) 4255 not possible to close the lid
8) 4255-P: special surface treatment for highest hygienic requirements
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

4282		4285-A							
Ausschwingrotor 2-fach / Swing out rotor 2-times  ∠ 90°									
		max. Laufzyklen / max. cycles: 12000 (3600 - 3001 RPM) 30000 (3000 - 50 RPM)							
		max. Beladung / max. load: 2320 g							
		- - -							
		4281						4281 + 2x 1485	
									
max. Laufzyklen / max. cycles 100000		**MTP**	**MTP**	**MS**	**CP**	**DWP**	**Microtest-platten / plate Terasaki**	**96-PCR-Platte / plate**	**PCR-Strips**
									
Kapazität / capacity	ml	- - -	- - -	- - -	- - -	- - -	- - -	- - -	0,2
Maße / dimensions TxBxH / DxWxH	mm	86x128x15	86x128x17,5	86x128x46	86x128x22	86x128x44,5	59x84x11	82x124x20	- - -
Anzahl p. Rotor / number p. rotor		16	16	4	12	4	4	4	48 x 4
Drehzahl / speed	RPM	3600							
RZB / RCF	2)	2434							
Radius / radius	mm	168							
◢ 9 (97%)	sec	87							
◣ 9	sec	94							
Temperatur / temperature	°C 1)	- 5							

4282		4285-A							
Ausschwingrotor 2-fach / Swing out rotor 2-times  ∠ 90°									
		max. Laufzyklen / max. cycles: 12000 (3600 - 3001 RPM) 30000 (3000 - 50 RPM)							
		max. Beladung / max. load: 2320 g							
		- - -							
		4263-A	**SK 01.14**	**4283-B**	**4287-B**	**4288-A**	**SK 25.10 + SK 25.10-1**	**SK 06.21-01 + SK 06.21-02**	**SK 32.07**
									
max. Laufzyklen / max. cycles 100000		**S-Monovette® / Rack Sarstedt**	**AutoMate™ Rack / Beckman Coulter**	**Olympus-Racks**	**Hitachi-Racks**	**Behring Rack**	**- - -**	**- - -**	**Sysmex-Rack**
		50 Positionen/ positions	50 Positionen/ positions	- - -	- - -	- - -	- - -	- - -	- - -
Kapazität / capacity	ml	- - -	- - -		- - -	- - -	- - -	- - -	- - -
Maße / dimensions TxBxH / DxWxH	mm	209x109x45	209x109x45	20x41x176	20x70x118	25x60x193	- - -	- - -	- - -
Anzahl p. Rotor / number p. rotor		2	2	12	20	10	2	2	10
Drehzahl / speed	RPM	3600							
RZB / RCF	2)	2579	2579	2652	2652	2652	2594	2492	2652
Radius / radius	mm	178	178	183	183	183	179	172	183
◢ 9 (97%)	sec	87							
◣ 9	sec	94							
Temperatur / temperature	°C 1)	- 5							

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)

2) Angaben des Röhrchenherstellers beachten.

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

2) Observe the tube manufacturer's instructions.

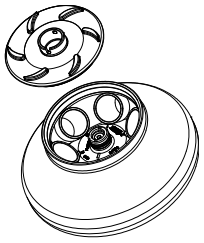
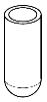
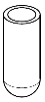
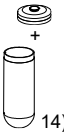
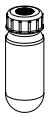
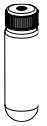
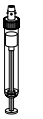
MTP Mikrotiterplatte / Microtitre plate

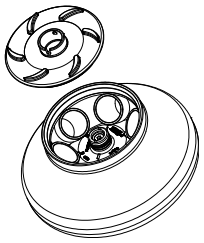
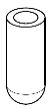
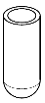
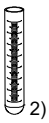
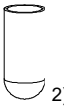
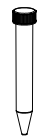
CP Kulturplatte / Culture plate

DWP Deep Well Platte / Deep well plate

MS Micronic System / Micronic system

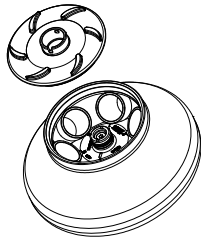
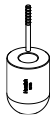
QP Filterplatte / Filter plate

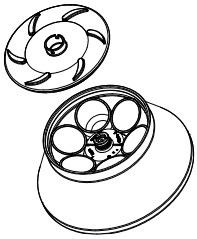
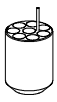
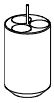
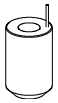
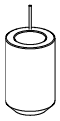
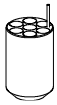
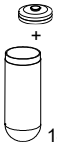
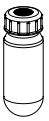
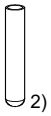
4246		- - -							
Winkelrotor 6-fach / Angle rotor 6-times  45° max. Laufzyklen / max. cycles 15000 Hülsen / reduction (6x inclusive) max. Laufzyklen: 15000 einsetzbar bis / usable until: 5 Jahre / year mit Bioabdichtung / with bio-containment [5]		- - -							
		- - -							
		- - -							
		- - -							
		- - -		**1446**	**1447**		**1451**		
		- - -							
		- - - / - - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		 14)			 2)				
Kapazität / capacity	ml	94	85	50	25	30	7,5 - 8,2	9 - 10	10
Maße / dimensions ∅ x L	mm	38 x 110	38 x 106	29 x 107	24 x 100	26 x 95	15 x 92	16 x 92	15 x 102
Anzahl p. Rotor / number p. rotor		6	6	6	6		6		
Drehzahl / speed	RPM	11500							
RZB / RCF	[2]	18038		17299	16560		17003		
Radius / radius	mm	122		117	112		115		
9 (97%)	sec	64							
9	sec	64							
Temperatur / temperature	°C [16]	2							

4246		- - -							
Winkelrotor 6-fach / Angle rotor 6-times  45° max. Laufzyklen / max. cycles 15000 Hülsen / reduction (6x inclusive) max. Laufzyklen: 15000 einsetzbar bis / usable until: 5 Jahre / year mit Bioabdichtung / with bio-containment [5]		- - -							
		- - -							
		- - -							
		- - -							
		1451			**1463**		- - -	**1448**	**1466**
							- - -		
		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
			 2)	 2)	 2)	 2)	 2)		
Kapazität / capacity	ml	5 - 10	15	15	50	75	94	10	15
Maße/ dimensions ∅ x L	mm	16 x 100	17 x 100	17 x 100	34 x 100	35 x 105	38 x 102	16 x 80	17 x 120
Anzahl p. Rotor / number p. rotor		6			6		6	12	6
Drehzahl / speed	RPM	11500							
RZB / RCF	[2]	17003			17743		18038	17003	17299
Radius / radius	mm	115			120		122	115	117
9 (97%)	sec	64							
9	sec	64							
Temperatur / temperature	°C [16]	2							

2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
14) Maße mit Deckel 38 x 110 mm
16) Niedrigste Probentemperatur bei Vorkühlung und maximaler Drehzahl

2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
14) Dimensions with cap 38 x 110 mm
16) Lowest sample temperature with pre-cooling and maximum speed (only with cooling centrifuges)

4246		- - -							
Winkelrotor 6-fach / Angle rotor 6-times  45°		- - -							
max. Laufzyklen / max. cycles 15000		- - -							
		- - -							
		- - -							
		1449				**1403**	**1476**	**1454**	- - -
									- - -
Hülsen / reduction (6x inclusive) max. Laufzyklen: 15000 einsetzbar bis / usable until: 5 Jahre / year		- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
mit Bioabdichtung / with bio-containment [5]					 2)				- - -
Kapazität / capacity	ml	1,5	2,0	0,5	3	4	5	50	- - -
Maße / dimensions ∅ x L	mm	11 x 38	11 x 38	10,7 x 44,5	10 x 60	12 x 40	17 x 59	29 x 115	- - -
Anzahl p. Rotor / number p. rotor		24				24	6	6	- - -
Drehzahl / speed	RPM	11500							- - -
RZB / RCF	[2]	17299				17003	16856	17595	- - -
Radius / radius	mm	117				115	114	119	- - -
9 (97%)	sec	64						- - -	- - -
9	sec	64						- - -	- - -
Temperatur / temperature	°C [16]	2						- - -	- - -

4266		- - -									
Winkelrotor 6-fach / Angle rotor 6-times  25°		- - -									
max. Laufzyklen / max. cycles 15000		- - -									
		- - -									
		- - -									
		- - -	**5641**	**5642**		**5643**	**5644**			**5646**	
		- - -									
Hülsen / reduction (6x inclusive) max. Laufzyklen: 15000 einsetzbar bis / usable until: 5 Jahre / year		**5127**	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
mit Bioabdichtung / with bio-containment [5]		 12)			 2)		 14)		 2)	 2)	 2)
Kapazität / capacity	ml	250	10	30	25	50	94	85	94	15	
Maße / dimensions ∅ x L	mm	61 x 122	16 x 80	26 x 95	24 x 100	29 x 107	38 x 110	38 x 106	38 x 102	17 x 100	
Anzahl p. Rotor / number p. rotor		6	48	18		6	6			42	
Drehzahl / speed	RPM	9500									
RZB / RCF	[2]	14025	13420	12915		12108	12310			13319	
Radius / radius	mm	139	133	128		120	122			132	
9 (97%)	sec	82									
9	sec	96									
Temperatur / temperature	°C [16]	2									

2) Angaben des Röhrchenherstellers beachten.
5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.
14) Maße mit Deckel 38 x 110 mm
16) Niedrigste Probentemperatur bei Vorkühlung und maximaler Drehzahl (nur bei Kühlzentrifuge)

2) Observe the tube manufacturer's instructions.
5) In conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
15) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.
14) Dimensions with cap 38 x 110 mm
16) Lowest sample temperature with pre-cooling and maximum speed (only with cooling centrifuges)