

UNIVERSAL 320 / 320 R



Inhalt des Dokuments / content of the document

Operating instructions (EN)

Rotoren und Zubehör / Rotors and accessories

Operating instructions

UNIVERSAL 320 / 320 R



Translation of the original operating instructions



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Table of contents

1	About this document.	5
1.1	Use of this document.	5
1.2	Gender reference.	5
1.3	Symbols and labels in this document.	5
2	Safety.	5
2.1	Intended use.	5
2.2	Personnel requirements.	6
2.3	Operator's responsibility.	7
2.4	Safety instructions.	7
3	Device overview.	9
3.1	Technical data.	9
3.2	European registration.	12
3.3	Important labels on the packaging.	13
3.4	Important labels on the device.	13
3.5	Operating and indicator elements.	14
3.5.1	Control.	14
3.5.2	Indicator elements.	15
3.5.3	Controls.	15
3.6	Original spare parts.	15
3.7	Scope of supply.	16
3.8	Returns.	16
4	Transport and storage.	16
4.1	Transport and storage conditions.	16
4.2	Fastening the transport lock.	17
5	Commissioning.	18
5.1	Unpacking the centrifuge.	18
5.2	Remove the transport lock.	18
5.3	Setting up and connecting the centrifuge.	19
5.4	Switching the centrifuge on and off.	21
6	Operation	21
6.1	Opening and closing the lid.	21
6.2	Removing and installing the rotor.	22
6.3	Inserting and removing buckets.	24
6.4	Inserting and removing adapters.	24
6.5	Loading.	25
6.6	Opening and closing the biosafety system.	27
6.6.1	Explanation.	27
6.6.2	Lid with screw cap and hole	28
6.6.3	Lid with bracket and spring-type lock.	28
6.6.4	Lid with screw cap.	29

6.7	Centrifugation.	29
6.7.1	Centrifugation in continuous operation.	29
6.7.2	Centrifugation with time preselection.	30
6.7.3	Short-term centrifugation.	30
6.8	Quick stop function.	30
7	Software operation.	31
7.1	Centrifugation parameters.	31
7.1.1	Relative centrifugal force, RCF.	31
7.1.2	Centrifugation of substances or mixtures of substances with a density higher than 1.2 kg/dm ³	31
7.2	Programming.	32
7.2.1	Write protection for programs.	32
7.2.2	Opening or loading programs.	32
7.2.3	Entering or changing programs.	32
7.3	Rotor detection.	33
7.4	Cooling (for centrifuges with cooling).	33
7.4.1	Instructions, cooling.	33
7.4.2	Standby cooling.	33
7.4.3	Precooling the rotor.	33
7.5	Machine Menu.	34
7.5.1	Querying system information.	34
7.5.2	Querying operating hours.	34
7.5.3	Audible signal.	35
7.5.3.1	General.	35
7.5.3.2	Setting an audible signal.	35
8	Cleaning and care.	35
8.1	Overview table.	35
8.2	Cleaning and disinfection instructions.	36
8.3	Cleaning.	36
8.4	Disinfection.	37
8.5	Maintenance.	38
9	Troubleshooting.	39
9.1	Fault description.	39
9.2	Perform a MAINS RESET.	40
9.3	Emergency release.	41
10	Disposal.	41
10.1	General instructions.	41
11	Index.	43

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
<i>[Buttons]</i>	Controls (for example: buttons, switches)
<i>'Indicator'</i>	Indicator elements (for example: signal lights, screen elements)

2 Safety

2.1 Intended use

Intended use

The centrifuge **UNIVERSAL 320 / 320 R** is an in vitro diagnostic medical device in accordance with the In Vitro Diagnostic Medical Devices Regulation (EU) 2017/746. The device is used for centrifugation as well as enrichment of sample material of human origin for subsequent further processing for diagnostic purposes. The user can set each of the variable physical parameters within the limits set by the device.

The centrifuge may only be used by qualified personnel in closed laboratories. The centrifuge is only intended for the use referred to above. Intended use also includes observing all instructions in the user manual and compliance with inspection and maintenance. 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.

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 micro-biologically 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	UNIVERSAL 320	
Type	1401	1401-01
Mains voltage ($\pm 10\%$)	200-240 V 1~	100-127 V 1~
Mains frequency	50-60 Hz	50-60 Hz
power consumption	400 VA	400 VA
Power consumption	2.0 A	4.0 A
max. capacity	4 x 200 ml	
max. permissible density	1.2 kg/dm ³	
max. speed (RPM)	16000	
max. acceleration (RCF)	24900	
max. kinetic energy	9800 Nm	
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	No	

Ambient conditions (EN / IEC 61010-1):			
Installation site	indoors only		
Altitude	up to 2000 m above sea level		
Ambient temperature	2 °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	FCC Class B	
Noise level (rotor-dependent)	≤68 dB(A)		
Dimensions:			
Width	401 mm		
Depth	529 mm		
Altitude	346 mm		
Weight	approx. 31 kg		
Manufacturer	Andreas Hettich GmbH & Co. KG, D-78532 Tuttlingen		
Model	UNIVERSAL 320 R		
Type	1406	1406-01	
Mains voltage (±10%)	200-240 V 1~	240 V 1~	115-127 V 1~
Mains frequency	50 Hz	60 Hz	60 Hz
power consumption	800 VA	950 VA	
Power consumption	4.0 A	8.0 A	
Refrigerant	R452A		
max. capacity	4 x 200 ml		
max. permissible density	1.2 kg/dm ³		

max. speed (RPM)	16000	
max. acceleration (RCF)	24900	
max. kinetic energy	9800 Nm	
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	No	
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	FCC Class B
Noise level (rotor-dependent)	≤64 dB(A)	
Dimensions:		
Width	407 mm	
Depth	698 mm	
Altitude	346 mm	
Weight	approx. 52 kg	

Rating plate

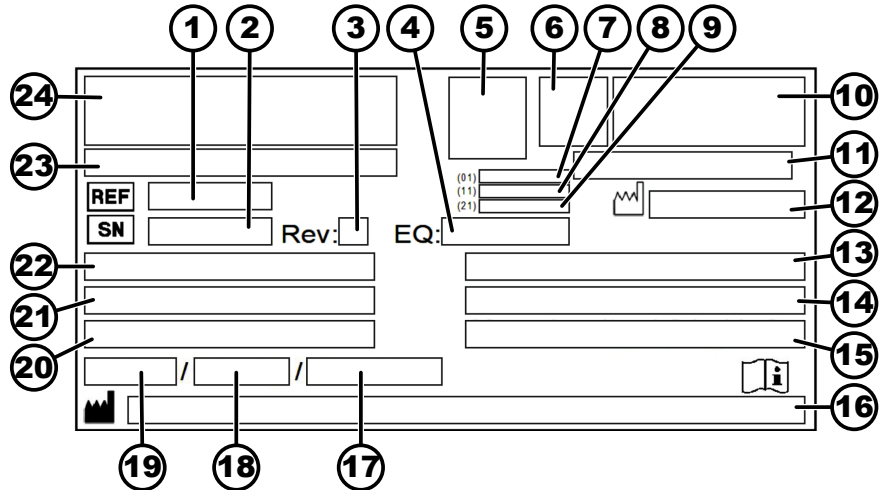


Fig. 1: Rating plate

- 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

Device conformity according to EU directives.



Single Registration Number

SRN: DE-MF-000010680

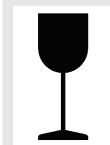
Basic-UDI-DI

Basic-UDI-DI	Device assignment
040506740100139R	UNIVERSAL 320 / 320 R (in vitro diagnostic medical device)

3.3 Important labels on the packaging


TOP

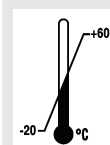
This is the correct upright position of the shipping container for transport and/or storage.


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.
- 

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.

3.5 Operating and indicator elements

3.5.1 Control

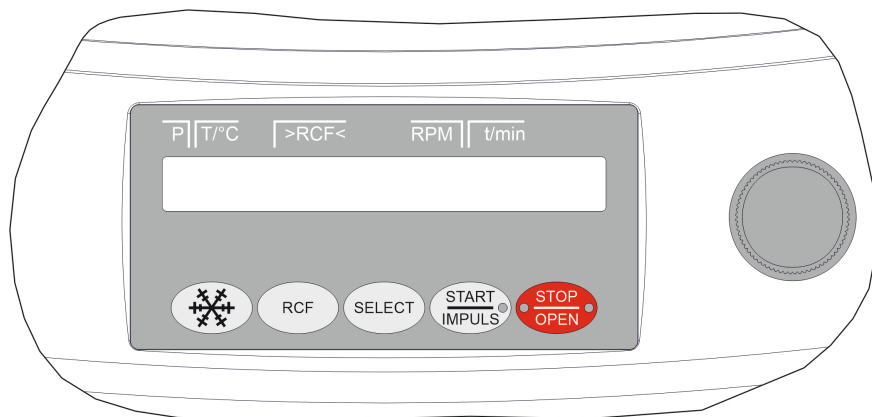


Fig. 2: Control (device with cooling)

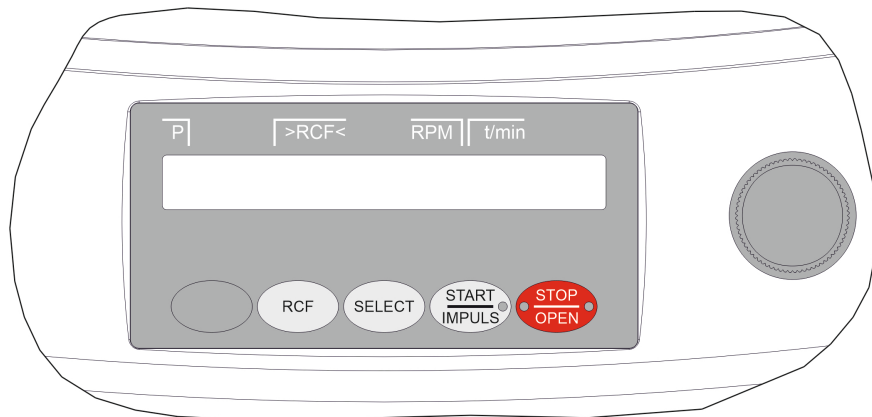


Fig. 3: Control (device without cooling)

3.5.2 Indicator elements



Fig. 4: [START/IMPULS] button

- The button lights up during the centrifugation run for as long as the rotor is not yet at a standstill.



Fig. 5: [STOP/OPEN] button

- The right side of the button lights up when the centrifuge is in ramp-down. The rotor has not yet stopped.
- The left side of the button lights up when the rotor is stationary.
- The light on the left side of the button goes out when the lid is unlocked.

3.5.3 Controls



Fig. 6: [Rotary knob]

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



Fig. 7: [Mains switch]

- Switch the device on and off.



Fig. 8: [Cooling] button

- Start the centrifugation run to pre-cool the rotor (only for centrifuges with cooling).
- The precooling speed is adjustable. The default value is 10,000 RPM.



Fig. 9: [RCF] button

- Toggle between RCF indicator and RPM indicator.
- Relative centrifugal force, RCF.
The RCF is displayed in brackets } {.
- Speed, RPM.



Fig. 10: [SELECT] button

- Selecting the individual parameters.
- Scroll forward in the menus.



Fig. 11: [START/IMPULSE] button

- Start centrifugation run.
- Short-term centrifugation. The centrifugation run takes place as long as the button is being pressed.
- Save entries and changes.



Fig. 12: [STOP/OPEN] button

- End the centrifugation run.
The rotor coasts to a stop with the preselected ramp-down parameter.
- Pressing the button twice triggers the quick stop function.
- Unlock the lid.
- Exit parameter input and the menus.

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 hex key (SW5 x 100)
- 1 grease for the trunnions

- 1 power cable
- 1 user manual
- 1 instruction sheet, transport lock

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 16*. 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%.

4.2 Fastening the transport lock

Personnel:

- Trained user

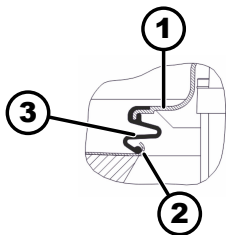
1. ➤ Open the lid.

2. ➤ For UNIVERSAL 320 R:

Check the bellows (3) underneath the motor cover for correct seating.

The bellows (3) must be placed over the edge of the motor cover (1) and over the edge of the centrifuging chamber (2).

3. ➤ Close the lid.



- 1 Motor cover
- 2 Edge of the centrifuging chamber
- 3 Bellows

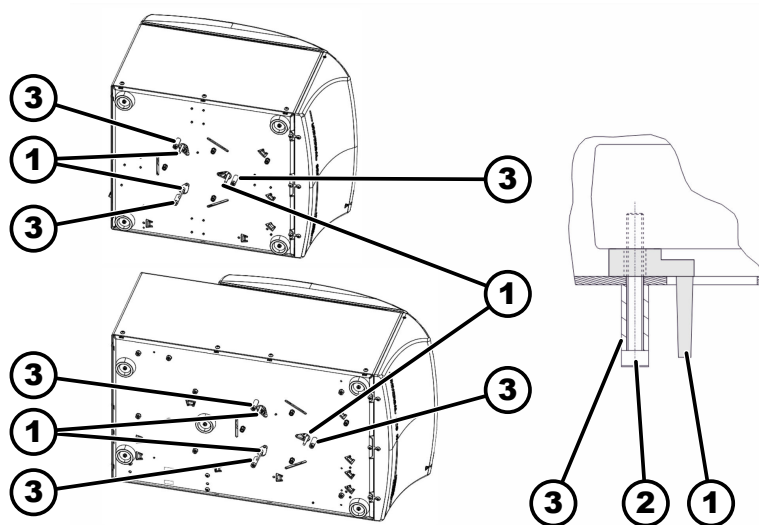




Fig. 13: Transport lock

- 1 Transport lock
- 2 Screw
- 3 Spacer sleeve

4. ➤ Lay the device down on its right-hand side.

5.  Insert 3 transport locks (1).
6.  Screw in 3 screws (2) with spacer sleeves (3).

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 9.










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

1.  Unscrew the screws on the lid of the wooden packaging and store them.
2.  Remove the lid.
3.  Unscrew the screws on the side panels of the wooden packaging and store them.
4.  Remove the side panels.
5.  Remove padding and strips.
6.  Remove the device and accessories by lifting them up out of the box.
7.  Place the device on a stable and level surface.

5.2 Remove the transport lock

Personnel:

- Trained user

The lid is closed.

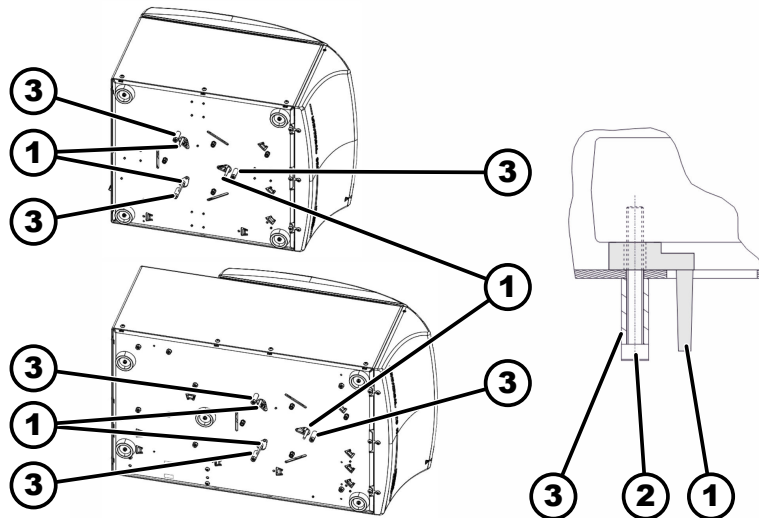


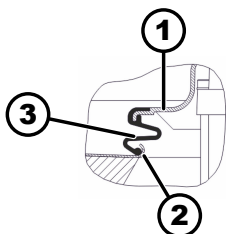
Fig. 14: Transport lock

- 1 Transport lock
- 2 Screw
- 3 Spacer sleeve

1. Lay the device down on its right-hand side.
2. Unscrew 3 screws (2) with 3 spacer sleeves (3).
3. Remove 3 transport locks (1).
4. Keep the screws, spacer sleeves and transport locks in a safe place.
5. Place the device upright.
6. Open the lid.
7. For UNIVERSAL 320 R:

Check the bellows (3) underneath the motor cover for correct seating.

The bellows (3) must be placed over the edge of the motor cover (1) and over the edge of the centrifuging chamber (2).



- 1 Motor cover
- 2 Edge of the centrifuging chamber
- 3 Bellows

5.3 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 'Device overview' on page 9*).

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. 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.

2.  Check whether the mains voltage matches the specification on the rating plate.
3.  Connect the device to a standard mains socket using the mains cable.

5.4 Switching the centrifuge on and off.

Switching the centrifuge on

Personnel:

- Trained user

 Set the mains switch to *[[/]*.

- ➔ The buttons flash, depending on the centrifuge type.

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

- the centrifuge model and program version
- When the lid is closed: 'OPEN OEFFNEN' indicator
- When the lid is open: The last centrifugation data used.

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 *[STOP/OPEN]* button.

- ➔ The lid unlocks by means of a motor.

The light on the left side of the *[STOP/OPEN]* button goes out.

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.



When the left side of the [STOP/OPEN] button flashes, press the [STOP/OPEN] button so that the motorised lid lock assumes the home position (open).

Personnel:

- Trained user
- Close the lid and press the front edge of the lid down gently.
 - ➔ The lid locks using a motor.
- The left side of the [STOP/OPEN] button lights up.

6.2 Removing and installing the rotor

Removing the rotor with a clamping nut

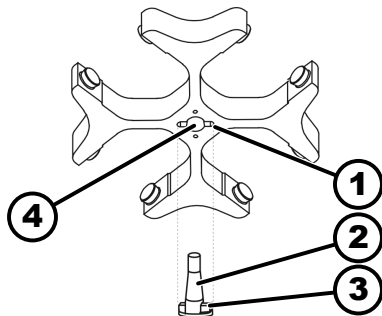


Fig. 15: Rotor installation and removal

- 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:

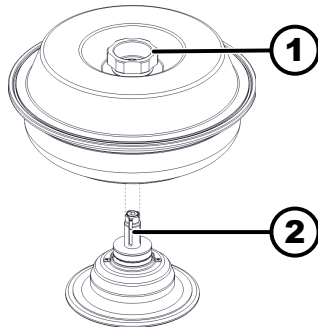
- Trained user
- The lid is open.
- 1. → Clean the motor shaft (2) and rotor hole (4).
- 2. → Lightly grease the motor shaft (2), see ➔ Chapter 8.2 'Cleaning and disinfection instructions' on page 36.
- 3. → Place the rotor vertically on the motor shaft (2).
 - The driver (3) of the motor shaft must 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.

Removing the rotor without a clamping nut

Removing the rotor

Personnel:

- Trained user

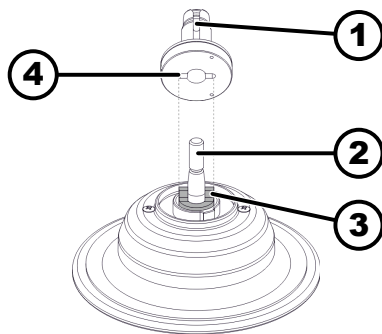


- ➔ Hold the rotor by the rotary handle (1) of the lid and lift it off the hub (2).

Fig. 16: Rotor installation and removal

- 1 Rotary handle
- 2 Hub

Removing the hub



1. ➔ Open the lid.
2. ➔ Unscrew the clamping nut.
 - After passing the working point for lifting the rotor, the hub (1) detaches from the cone of the motor (2).
3. ➔ Remove the hub.

Fig. 17: Hub installation and removal

- 1 Hub
- 2 Motor shaft
- 3 Driver
- 4 Groove

Installing the rotor without a clamping nut

Installing the hub

Personnel:

- Trained user
1. ➔ Open the lid.
 2. ➔ Clean the motor shaft (2) and rotor hole.
 3. ➔ Lightly grease the motor shaft (2), see ➔ Chapter 8.2 'Cleaning and disinfection instructions' on page 36.
 4. ➔ Place the hub (1) vertically on the motor shaft (2).
The driver (3) of the motor shaft must be in the groove (4) of the hub.
Check that the hub is firmly seated.
 5. ➔ Hand-tighten the clamping nut of the hub using the supplied hex key.
 6. ➔ Check that the hub is firmly seated.
- #### Installing the rotor
1. ➔ Clean the hub (2).
 2. ➔ Lift the rotor by the rotary handle and place it vertically on the hub (2).
 3. ➔ Push the rotor down as far as it will go.

6.3 Inserting and removing buckets

Inserting buckets



NOTICE

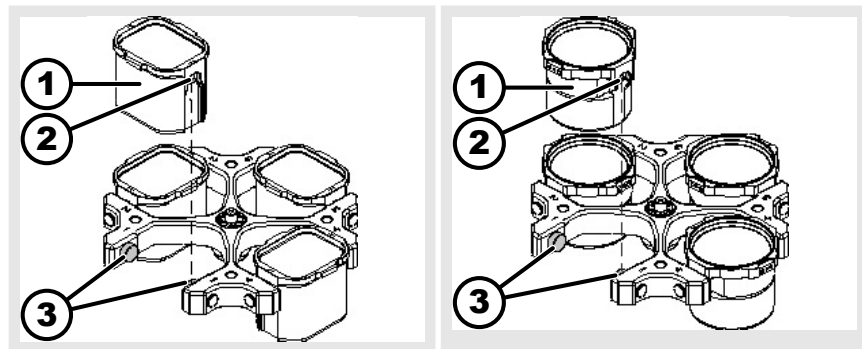
Damage to the device due to imbalances caused by incorrect loading of the rotor.

- 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.



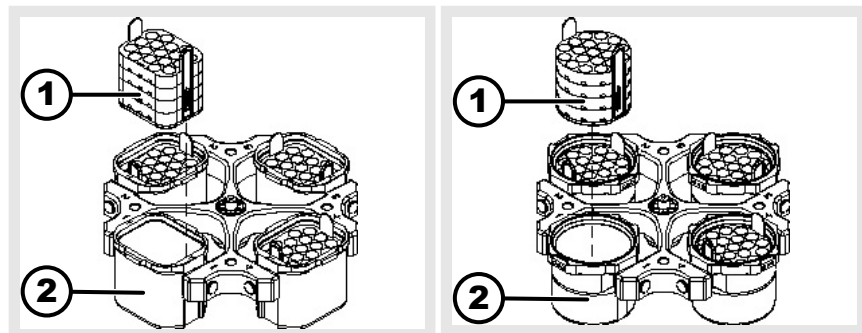
1. Check that the rotor is firmly seated.
2. Grease the trunnions (3).
3. Insert the bucket (1) into the rotor from above. The trunnions (3) must be in the grooves (2).
4. Push the bucket (1) down as far as it will go.

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).

Adapter with positioning pin

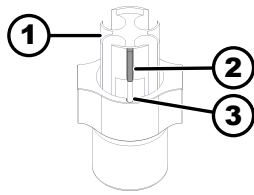


Fig. 18: Adapter with positioning pin

- 1 Inserting
- 2 Positioning pin
- 3 Groove

the adapter

- ➔ Insert the adapter (1) into the bucket
- The positioning pin (2) must be in the groove (3) of the bucket.

removing

- ➔ Remove the adapter (1) vertically upwards out of the bucket.

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.



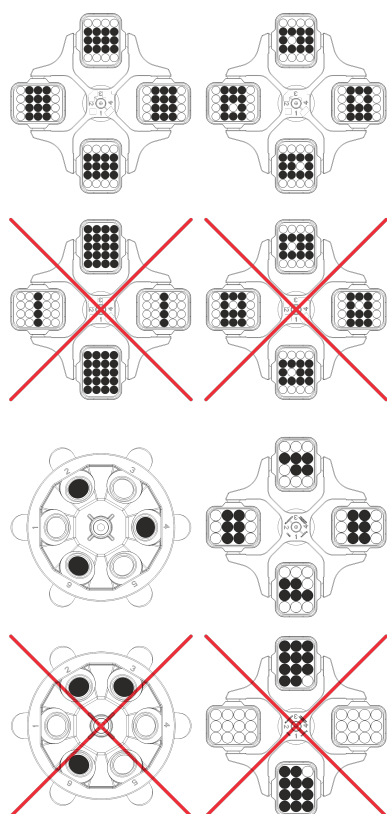
Standard glass centrifuge tubes can be loaded up to RCF 4000 (DIN 58970 part 2).

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.

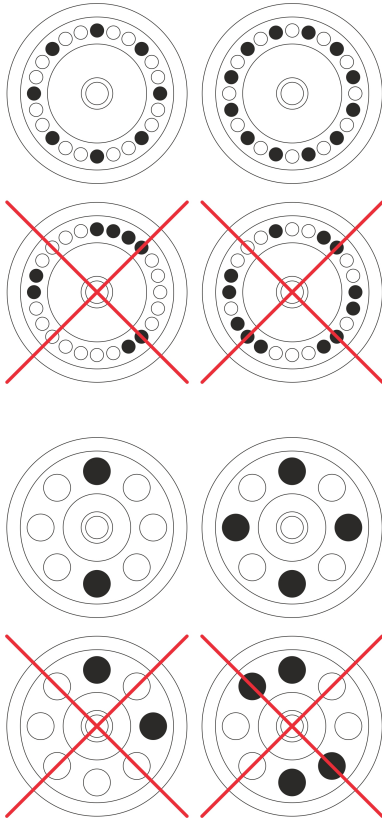
All rotor locations must be filled with the same buckets. Certain buckets are marked with the number of the rotor location. The buckets must only be inserted in the corresponding rotor location.

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

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

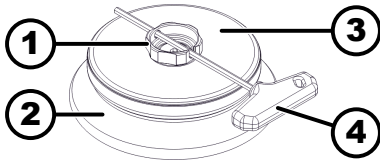


Fig. 19: Biosafety system

- 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 bracket and spring-type lock

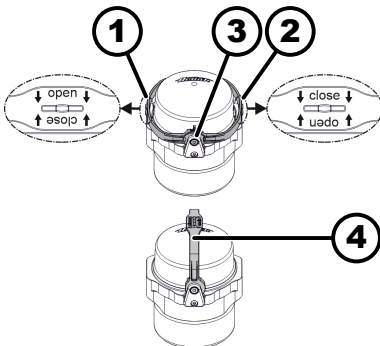


Fig. 20: Biosafety system

- 1 Bracket position "open"
- 2 Bracket opening operations
- 3 Bracket position "close"
- 4 Bracket carrying position

Closing

1. Swivel the bracket to the "open" position (1).
The arrows of the labelling must point downwards so that the word "open" is legible.
2. Place the lid centrally on the bucket.
The two pins of the lid must be in the two openings of the bracket (2).
3. Swivel the bracket to the "close" position (3).
The arrows of the labelling must point downwards so that the word "close" is legible.
The bracket must rest on the bucket so that the bucket can swing out during the centrifugation run.

4. ➤ For transport or when inserting and removing the bucket, swing the bucket into the carrying position (4) and hold the bucket by the bracket.

- The tightness of the biosafety system is also guaranteed in the carrying position.

Do not rock the biosafety system back and forth during transport, otherwise leak-tightness is no longer ensured.

Opening

1. ➤ Swivel the bracket to the "open" position (1).
The arrows of the labelling must point downwards so that the word "open" is legible.
2. ➤ Remove the lid from the bucket.

6.6.4 Lid with screw cap

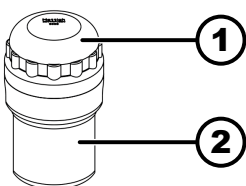


Fig. 21: Biosafety system

- 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 Centrifugation

6.7.1 Centrifugation in continuous operation

Personnel:



- Trained user

1. ➤ Set minutes and seconds at '∞' or retrieve a continuously running program.
2. ➤ Press the [START/IMPULSE] button.
 - The centrifugation run is started.
 - The [START/IMPULSE] button lights up during the centrifugation run.
 - The timing starts at '00:00'.
 - The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the elapsed time are displayed during the centrifugation run.
3. ➤ Press the [STOP/OPEN] button to cancel the centrifugation run.
 - Ramp-down takes place with the set brake level. The brake level is displayed.
 - An audible signal sounds when the rotor comes to a standstill.
 - 'OPEN' 'OEFFNEN' is displayed.


6.7.2 Centrifugation with time preselection

Personnel:

- Trained user

1.  Set centrifugation parameters or retrieve a program.
2.  Press the *[START/IMPULS]* button.
 - ➔ The centrifugation run is started.

The *[START]* button lights up during the centrifugation run.

The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the remaining time are displayed during the centrifugation run.
3.  Ramp-down takes place with the selected brake level after the time has elapsed or if the centrifugation run is cancelled.
 - ➔ The brake level is displayed.

An audible signal sounds when the rotor comes to a standstill.

'OPEN' 'OEFFNEN' is displayed.

The right side of the *[STOP/OPEN]* button lights up when the centrifuge is in ramp-down.


The left side of the *[STOP/OPEN]* button lights up when the rotor is at a standstill.

The light on the *[START/IMPULS]* button and the right side of the *[STOP/OPEN]* button go out.


6.7.3 Short-term centrifugation

Personnel:

- Trained user

1.  Press and hold the *[START/IMPULS]* button.
 - ➔ The *[START/IMPULS]* button lights up during the centrifugation run.

Timing starts at 00:00.

The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the elapsed time are displayed during the centrifugation run.
2.  Release the *[START/IMPULSE]* button to end the centrifugation run.
 - ➔ Ramp-down takes place with the set brake level. The brake level is displayed.


An audible signal sounds when the rotor comes to a standstill.

'OPEN' 'OEFFNEN' is displayed.

6.8 Quick stop function

Personnel:

- Trained user

-  Press the *[STOP/OPEN]* button twice.
 - ➔ Ramp-down with brake level "9" (shortest ramp-down time) is displayed and executed.

7 Software operation

7.1 Centrifugation parameters

7.1.1 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.

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

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

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.

7.1.2 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 Programming






7.2.1 Write protection for programs

The programs can be protected to prevent unintentional changes.







When the rotor is at a standstill, write protection can be enabled or disabled as follows:

1.  Press and hold the *[SELECT]* button.
 - 'SOUND/BELL' is displayed after 8 seconds.
2.  Press the *[SELECT]* button.
 - 'LOCK' is displayed.
3.  Use *[Rotary knob]* to set 'OFF' or 'ON'.
 - OFF = The programs are not write-protected
 - ON = The programs are write-protected
4.  Press the *[START/IMPULS]* button.
 - The setting is stored.
 - If ON is set: '*** lock ***' is displayed briefly.
 - If OFF is set: '*** ok ***' is displayed briefly.

7.2.2 Opening or loading programs

1.  Use the *[SELECT]* button to select the 'PROG RCL' parameter.
2.  Use the *[Rotary knob]* to set the desired program location.
3.  Press the *[START/IMPULS]* button.
 - '*** ok ***' is displayed briefly.
 - The centrifugation data of the desired program location is displayed
4.  To check the parameters: Press the *[SELECT]* button several times.
5.  To exit the parameter indicator: Press the *[OPEN/STOP]* button or do not press any button for 8 seconds.

7.2.3 Entering or changing programs

1.  Retrieve program.
2.  If required: Press the *[RCF]* button to toggle between RPM and RCF indicator ('>' '<').
3.  If required: Press the *[SELECT]* button to select the desired parameter and set it with the *[Rotary knob]*.
 - The parameters t/min and t/sec must be set to 0 using the *[Rotary knob]* to set continuous operation. Continuous operation is shown in the indicator with '∞'.
4.  Use the *[SELECT]* button to select the 'PROG STO' parameter.
5.  Use the *[Rotary knob]* to set the desired program location.
6.  Press the *[START/IMPULS]* button.
 - Settings are stored in the desired program location.
 - '*** ok ***' is displayed briefly.
 - The settings are always stored in program location # if the *[START/IMPULS]* button is pressed without the 'PROG STO' parameter being selected.

7.3 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 (red) is displayed.
- If the maximum speed of the rotor used is less than the set speed, the speed is limited to the maximum rotor speed.

7.4 Cooling (for centrifuges with cooling)

7.4.1 Instructions, cooling





The temperature setpoint can be adjusted from -20 °C to +40 °C.

The lowest achievable temperature is rotor dependent.

7.4.2 Standby cooling

After a centrifugation run, standby cooling is delayed and the display shows 'Lid unlocked'.



The delay time is adjustable from 1 to 5 minutes, in 1-minute increments. It is preset to 1 minute.

- The rotor is stationary.
 - The lid is open
1.  Press and hold the [Cooling] button.
 - ➡ 't/min = X' is displayed after 8 seconds.
 2.  Use the [Rotary knob] to set the delay time.
 3.  Press the [START/IMPULS] button.
 - ➡ The setting is stored.
 - *** ok *** is displayed briefly.
 4.  Press the [STOP/OPEN] button twice or wait 8 seconds to exit the menu.

7.4.3 Precooling the rotor




Starting



The rotor is stationary.

1.  Press the [Cooling] button.
2.  Press the [STOP/OPEN] button.
 - ➡ Precooling of the rotor is terminated.
 - Ramp-down takes place with the selected brake level.
 - The brake level is displayed.

Set

The precooling speed is adjustable from 500 RPM up to the maximum rotor speed in increments of 10 RPM. It is preset to 10000 RPM.

- The rotor is stationary.
 - The lid is open.
1.  Press and hold the [Cooling] button.
 - ➡ 't/min = X' is displayed after 8 seconds.
 2.  Press the [Cooling] button.
 - ➡ Precooling speed 'RPM = XXXX' is displayed.
 3.  Use the [Rotary knob] to set the precooling speed.











4.  Press the *[START/IMPULS]* button.
 - ➔ The setting is stored.
 - **** *ok* **** is displayed briefly.
5.  Press the *[STOP/OPEN]* button twice or wait 8 seconds to exit the menu.

7.5 Machine Menu

7.5.1 Querying system information




Parameter query

The rotor is stationary.

1.  Press and hold the *[SELECT]* button for 8 seconds.
 - ➔ 'SOUND/BELL' is displayed.
2.  Press the *[SELECT]* button repeatedly until 'FU/CCI – S.' is displayed.
Program version for the frequency inverter
3.  Press the *[SELECT]* button repeatedly until 'HOURS' is displayed.
Internal operating hours (the time during which the centrifuge was switched on)
4.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'STARTS' is displayed.
 - Number of centrifugation runs
5.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'ROTORCHG1' is displayed.
 - Internal operating hour of the last rotor change
6.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'ROTORCHG2' is displayed.
 - Internal operating hour of the penultimate rotor change
7.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'OPhoursCHG' is displayed.
 - Internal operating hour of the last operating hours change
8.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'IMBALCHG' is displayed.
 - Internal operating hour of the last imbalance cut-off change
9.  Turn to the right with the *[Rotary knob]*.
 - ➔ 'OffsetCHG' is displayed.
 - Internal operating hour of the last offset adjustment
10.  Press the STOP/OPEN button to exit the menu.

7.5.2 Querying operating hours

The rotor is stationary.

1.  Press and hold the *[SELECT]* button.
 - ➔ 'SOUND/BELL' is displayed after 8 seconds.
2.  Press the *[SELECT]* button repeatedly until 'CONTROL:' is displayed.
 - ➔ 'CONTROL:' and the operating hours are displayed.
3.  Press the *[STOP/OPEN]* button to exit the menu.

7.5.3 Audible signal

7.5.3.1 General

The audible signal sounds:

- after a problem occurs in the 2 s interval.
- after completion of the centrifugation run and rotor standstill in the 30 s interval.

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

7.5.3.2 Setting an audible signal

1. ➤ Press and hold the *[SELECT]* button.
 - 'SOUND / BELL ON' or 'SOUND / BELL OFF' is displayed after 8 seconds.
2. ➤ Use *[Rotary knob]* to set 'OFF' or 'ON'.
 - OFF = audible signal disabled
 - ON = audible signal enabled
3. ➤ Press the *[START/IMPULS]* button.
 - The setting is stored.
 - **** ok **** is displayed briefly.

8 Cleaning and care

8.1 Overview table

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8	Cleaning and care					35
8.3	Cleaning					36
8.3	Cleaning the device		X			36
8.3	Cleaning the biosafety systems			X		37
8.3	Cleaning the accessories			X		37
8.4	Disinfection					37
8.4	Disinfecting the device	X				37
8.4	Disinfecting the accessories	X				37
8.5	Maintenance					38
8.5	Greasing the rubber seal of the centrifuging chamber			X		38
8.5	Greasing the rubber seal of the biosafety system			X		38
8.5	Trunnion greasing			X		38

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8.5	Checking the accessories			X		38
8.5	Checking the biosafety system			X		38
8.5	Inspecting the centrifuging chamber for damage				X	38
8.5	Greasing the motor shaft				X	38
8.5	Accessories with a limited service life	X				39
8.5	Replacing centrifuge tubes	X				39

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 35



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.

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. Overcurrent protection fuse has tripped.	<ul style="list-style-type: none"> ■ Check the supply voltage. ■ Set the mains switch to <i>///</i>.
TACHO - ERROR 1, 2, 96	Tacho defective. Motor, electronics defective.	<ul style="list-style-type: none"> ■ Open the lid. ■ Set the mains switch to <i>/0/</i>. ■ Wait at least 10 seconds. ■ Turn the rotor vigorously by hand. ■ Set the mains switch to <i>///</i>. The rotor must rotate while switching on.
IMBALANCE 3*	The rotor is unevenly loaded.	<ul style="list-style-type: none"> ■ Open the lid. ■ Check the loading of the rotor. ■ Repeat the centrifugation run.
CONTROL - ERROR 4, 6	Lid lock error.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.

Fault description	Cause	Remedy
CONTROL - ERROR 8	Lid lock error	<ul style="list-style-type: none"> ■ Open the lid. ■ Set the mains switch to [0]. ■ Wait at least 10 seconds. ■ Turn the rotor vigorously by hand. ■ Set the mains switch to [I]. The rotor must rotate while switching on.
N > MAX 5	Overspeed.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
N < MIN 13	Underspeed.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
MAINS INTERRUPT 11*	Loss of mains power during the centrifugation run. The centrifugation run was not completed.	<ul style="list-style-type: none"> ■ Open the lid. ■ Press the [START/IMPULS] button. ■ If required: Repeat the centrifugation run.
ROTORCODE 10.1, 10.2	Rotor coding error.	<ul style="list-style-type: none"> ■ Open the lid.
CONTROL-ERROR 21, 22, 25, 27, 29	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
CONTROL-ERROR 23	Error/defect in control panel.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SER I/O-ERROR 30, 31, 33, 36	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
°C * -ERROR 51-53, 55	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
FU/CCI-ERROR 60-64, 67, 68, 82-86	Error/defect in electronics/motor.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SYNC-ERROR 90	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SENSOR-ERROR 91-93	Error/defect in imbalance sensor.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
KEYBOARD-ERROR	Error/defect in control panel.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
NO ROTOR	No rotor installed.	<ul style="list-style-type: none"> ■ Open the lid and install the rotor.
N > ROTOR MAX	Speed in the selected program greater than the maximum rotor speed.	<ul style="list-style-type: none"> ■ Check and correct the speed.
N > ROTOR MAX	The rotor has been changed. The built-in rotor has a higher maximum speed than the previously used rotor, and it has not yet been detected by the rotor detection function.	<ul style="list-style-type: none"> ■ Set a speed up to the maximum speed of the previously used rotor. Press the [START/IMPULS] button to perform rotor detection.
 The left half of the display lights up.	-	<ul style="list-style-type: none"> ■ 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.

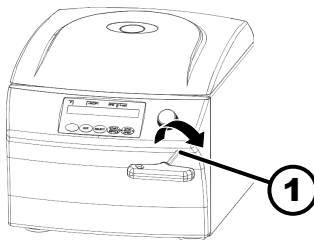


Fig. 22: Emergency release

1 Hole

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. → Check whether the left side of the [STOP/OPEN] button flashes when power is restored.

When the left side of the [STOP/OPEN] button flashes, press the [STOP/OPEN] button so that the motorised lid lock assumes the home position (open) again.

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)
- Group 4 (large devices)

The crossed-out wheellie 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. 23: Household waste ban

11 Index

A

Akustisches Signal	
aktivieren/deaktivieren.	35
Allgemeine Sicherheitshinweise.	7
Anschließen der Zentrifuge.	20
Aufstellen der Zentrifuge.	19
Auspacken.	18
Ausschalten.	21
Autoklavieren.	37

B

Befüllen.	25
Beladen.	25
Betriebsstunden	
abfragen.	34
Bio-Sicherheitssystem	
prüfen.	38
reinigen.	37

D

Dauerlauf.	29
Desinfektion.	37

E

Einschalten.	21
Entsorgung.	41
Ersatzteile.	15

F

Fehlermeldungen.	39
-----------------------	----

G

Gerät	
desinfizieren.	37
reinigen.	36
Gummidichtung	
fetten.	38

K

Kurzzeitzentrifugation.	30
------------------------------	----

L

Lid	
the lid.	21
Lieferumfang.	16

M

Motorwelle	
fetten.	38

N

NETZ-RESET.	40
Nicht vorgesehene Zweckbestimmung.	6

O

Originalersatzteile.	15
---------------------------	----

P

Personalunterweisung.	7
Persönliche Schutzausrüstung.	6

Personnel qualifications.	6
Pflege	
Intervalle.	35

Programm

ändern.	32
aufrufen.	32
eingeben.	32
laden.	32
Schreibschutz.	32

R

Reinigung.	36
-----------------	----

Reinigung und Desinfektion

Hinweise.	36
----------------	----

Relative Zentrifugalbeschleunigung

RCF.	31
-----------	----

Rotor

ausbauen.	22
beladen.	26
einbauen.	22

Rotorerkennung.	33
----------------------	----

Rücksendung.	16
-------------------	----

S

Schilder

am Gerät.	13
auf der Verpackung.	13

Schleuderraum

prüfen.	38
--------------	----

Schutzausrüstung.	6
------------------------	---

Sicherheitshinweise.	7
---------------------------	---

Storage conditions.	17
--------------------------	----

Störungsbehebung.	39
------------------------	----

Symbole.	5
---------------	---

Systeminformationen

abfragen.	34
----------------	----

T

Tragzapfen

fetten.	38
--------------	----

Transport condition.	16
---------------------------	----

Transportsicherung

befestigen.	17
entfernen.	18

Trouble shooting.	39
------------------------	----

Typenschild.	12
-------------------	----

V

Verantwortung des Betreibers.	7
------------------------------------	---

Vorgesehene Zweckbestimmung.	5
-----------------------------------	---

Vorhersehbare Fehlanwendung.	6
-----------------------------------	---

W

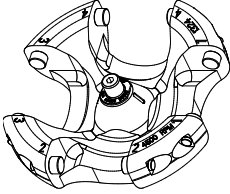

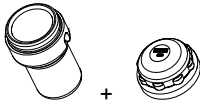

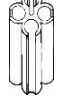






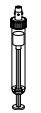
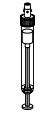




Wartung.	38
---------------	----

Intervalle.	35
------------------	----

Z

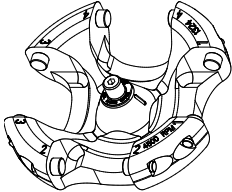
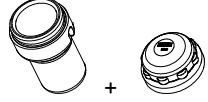














Zentrifugation	
im Dauerlauf.	29
mit höherer Stoffdichte.	31
mit Zeitvorwahl.	30
Zentrifugationsläufe	
abfragen.	34
Zentrifugiergefäße	
tauschen.	39
Zubehör.	15
desinfizieren.	37
mit begrenzter Verwendungsdauer.	39
prüfen.	38
reinigen.	37

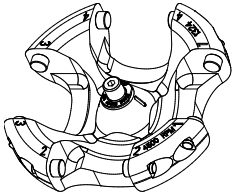
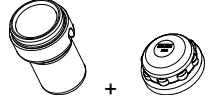

















Rotoren und Zubehör / Rotors and accessories

1324		1490 + 1492							
Ausschwingrotor 4-fach / Swing out rotor 4-times  		 mit Bioabdichtung / with bio-containment ⁵⁾							
		0765		1329				1330	1331
									
		0534 ⁴⁾	0535						
									
Kapazität / capacity	ml	30		9	15	9 - 10	10	25	50
Maße / dimensions	∅ x L	44 x 105		14 x 100	17 x 100	16 x 92	15 x 102	24 x 100	34 x 100
Anzahl p. Rotor / number p. rotor		4		16	16	16	16	4	4
Drehzahl / speed	RPM	4500		4500	4500	4500	4500	4500	4500
RZB / RCF	³⁾	3170		3170	3170	3170	3328	3034	3011
Radius / radius	mm	140		140	140	140	147	134	133
 g (97%)	sec	27							
 g	sec	30							
Temperatur / temperature	°C ¹⁾	- 6							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Stopfen zentrifugierbar, Skal. 10µl-300µl, 15ml, 30ml
- 5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten
- 6) Die Einlagen entfernen

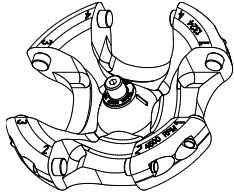

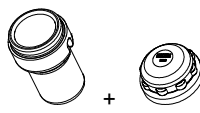

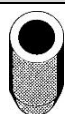












- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) can not be centrifugated when plug is attached, Scal. 10µl-300µl, 15ml, 30ml
- 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".
- 6) Remove the inserts

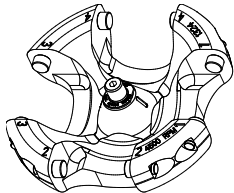

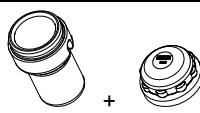



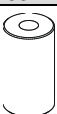



















1324	1490 + 1492								
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 mit Bioabdichtung / with bio-containment 5)								
	1339	1343		1347	1348				
									
	Rhesus								
Kapazität / capacity	ml	1	3	4	15	10	8	4 – 5,5	4 - 7
Maße / dimensions $\varnothing \times L$	mm	6 x 45	10 x 60	10 x 88	17 x 120	16 x 80	16 x 81	15 x 75	16 x 75
Anzahl p. Rotor / number p. rotor		108	36	36	4	16	16	16	16
Drehzahl / speed	RPM	4500	4500	4500	4500	4500	4500	4500	4500
RZB / RCF	³⁾	3237	3283	3283	3328	3147	3147	3147	3147
Radius / radius	mm	143	145	145	147	139	139	139	139
 9 (97%)	sec	27							
 9	sec	30							
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 6							
Probenerwärmung/Sample temp. rise	κ ²⁾	+ 10							

1324	1490 + 1492										
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 mit Bioabdichtung / with bio-containment 5)										
	1348	1351		1363	1365	1383					
											
											
Kapazität / capacity	ml	5 - 10	1,5	2,0	0,5	25	30	5	6	7	2,7 - 3
Maße / dimensions $\varnothing \times L$	mm	16 x 100	11 x 38		10,7 x 46	25 x 90	25 x 110	12 x 75	12 x 82	12 x 100	11 x 66
Anzahl p. Rotor / number p. rotor		16	20		4	4	4	20		20	20
Drehzahl / speed	RPM	4500	4500		4500	4500	4500	4500		4500	4500
RZB / RCF	³⁾	3147	3056		2966	2920	3328	3192		3192	3192
Radius / radius	mm	139	135		131	129	147	141		141	141
 9 (97%)	sec	27									
 9	sec	30									
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 6									
Probenerwärmung/Sample temp. rise	κ ²⁾	10									

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

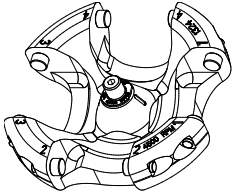

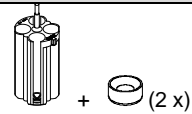
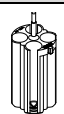






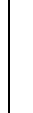



- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

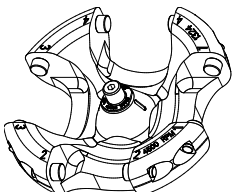

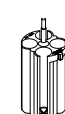
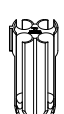









1324	1490 + 1492							
Ausschwingrotor 4-fach / Swing out rotor 4-times  	 mit Bioabdichtung / with bio-containment 5)							
	1383		1384		1396		1457	
								
								
Kapazität / capacity ml	2,6 – 2,9	4,9	4,5 - 5	1 -5	4 -7	50	85	1,1 – 1,4
Maße / dimensions Ø x L mm	13 x 65	13 x 90	11 x 92	13 x 75	13 x 100	29 x 115	38 x 106	8 x 66
Anzahl p. Rotor / number p. rotor	20	20	20	20	20	4	4	28
Drehzahl / speed RPM	4500	4500	4500	4500	4500	4500	4500	4500
RZB / RCF ³⁾	3192	3192	3192	3129	3129	3328	3260	3215
Radius / radius mm	141	141	141	141	141	147	144	142
 9 (97%) sec	27							
 9 sec	30							
Temperatur / temperature °C ¹⁾	- 6							
Probenerwärmung/Sample temp. rise K ²⁾	10							

1324	1490 + 1492													
Ausschwingrotor 4-fach / Swing out rotor 4-times  	 mit Bioabdichtung / with bio-containment 5)													
	1459		4416		4417		6311		6318		1356		0761	
														
														
Kapazität / capacity ml	4 – 5,5	7,5 – 8,2	50	30	12	50	15	100						
Maße / dimensions Ø x L mm	15 x 75	15 x 92	29 x 107	26 x 95	17 x 100	29 x 115	17 x 120	44 x 100						
Anzahl p. Rotor / number p. rotor	16	16	4	4	4	4	12	4						
Drehzahl / speed RPM	4500	4500	4500	4500	4500	4500	4500	4500						
RZB / RCF ³⁾	3215	3215	3283	3056	3328	3328	3328	3192						
Radius / radius mm	142	142	145	135	147	147	147	141						
 9 (97%) sec	27													
 9 sec	30													
Temperatur / temperature °C ¹⁾	- 6													
Probenerwärmung/Sample temp. rise K ²⁾	10													

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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) nicht mit Deckel verschließbar

- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) 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) not possible to close the lid

1324		1398							
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°									
		1482A + 2 x 0716				1482A			
									
									
Kapazität / capacity	ml	2,6 –3,4	4 – 5,5	9 – 10	10	12	4 - 7	5 – 10	9
Maße / dimensions	∅ x L mm	13 x 65	15 x 75	16 x 92	15 x 102	17 x 100	16 x 75	16 x 100	14 x 100
Anzahl p. Rotor / number p. rotor		16	16	16	16	16	16	16	16
Drehzahl / speed	RPM	4500	4500	4500	4500	4500	4500	4500	4500
RZB / RCF	³⁾	2875	2875	3192	3192	3192	3034	3034	3192
Radius / radius	mm	127	127	141	141	141	134	134	141
 g (97%)	sec	27							
 g	sec	30							
Temperatur / temperature	°C ¹⁾	- 6							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

1324		1398							
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°									
		1482A	1483A	1484	1484				
				 ohne / without E2110-A					
		Falcon®							
									
Kapazität / capacity	ml	15	15	50	50				
Maße / dimensions	∅ x L mm	17 x 100	17 x 120	29 x 115	29 x 115				
Anzahl p. Rotor / number p. rotor		16	16	4	4				
Drehzahl / speed	RPM	4500	4500	4500	4500				
RZB / RCF	³⁾	3192	3305	3260	3260				
Radius / radius	mm	141	146	144	144				
 g (97%)	sec	27							
 g	sec	30							
Temperatur / temperature	°C ¹⁾	- 6							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

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

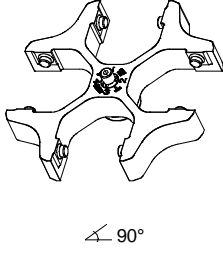
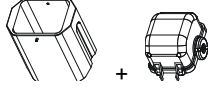


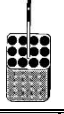
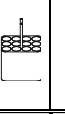







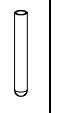

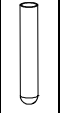
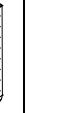
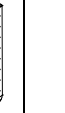
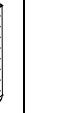
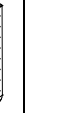


2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)

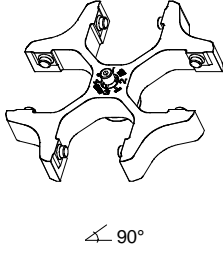
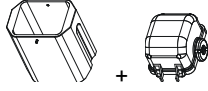






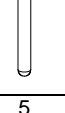

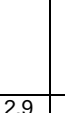


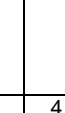
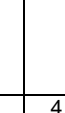
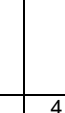
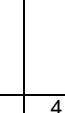


3) Angaben des Röhrchenherstellers beachten.

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

2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

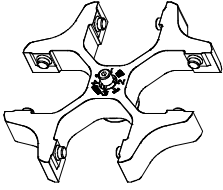





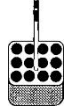

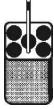











3) Observe the tube manufacturer's instructions.

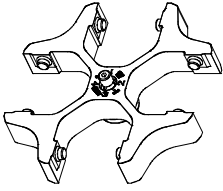






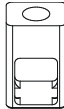





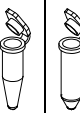
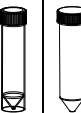
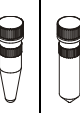
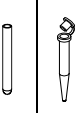
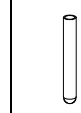
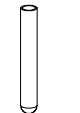


1494	1427 + 1421										
Ausschwingrotor 4-fach / Swing out rotor 4-times  ↙ 90°											
	1357	5229 ⁷⁾	5229	1326	5230	5230	5231	5231 ⁷⁾			
											
Rhe- sus											
Kapazität / capacity	ml	1	0,4	4,5 – 5	2,7 - 3	6	4	7	4,5 – 5	15	5 - 10
Maße / dimensions	Ø x L	mm	6 x 45	11 x 92	11x 66	^{12 x} 82	^{12 x} 60	12 x 100	11 x 92	17 x 100	16 x 100
Anzahl p. Rotor / number p. rotor		120	48	48	48	48	48	48	48	24	24
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
RZB / RCF	³⁾	4081	4053	4053	4053	4053	3941	3941	3941	3941	3941
Radius / radius	mm	146	145	145	145	145	141	141	141	141	141
 9 (97%)	sec	30									
 9	sec	32									
Temperatur / temperature	°C ¹⁾	- 7									
Probenerwärmung/Sample temp. rise	K ²⁾	+ 15									

1494	1427 + 1421										
Ausschwingrotor 4-fach / Swing out rotor 4-times  ↙ 90°											
	1731	1732			1732		5237	5279			
											
											
Kapazität / capacity	ml	25	5	1 – 5	2,6 – 2,9	4,9	4 – 7	9	4 – 5,5		
Maße / dimensions	Ø x L	mm	25 x 90	12/13x75	13 x 75	13 x 65	13 x 90	13 x 100	14 x 100	15 x 75	
Anzahl p. Rotor / number p. rotor		8	32	32	32	32	32	24	20		
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF	³⁾	3969	4025	4025	4025	4025	4025	3941	4109		
Radius / radius	mm	142	144	144	144	144	144	141	147		
 9 (97%)	sec	30									
 9	sec	32									
Temperatur / temperature	°C ¹⁾	- 7									
Probenerwärmung/Sample temp. rise	K ²⁾	15									

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 7) nicht mit Deckel verschließbar

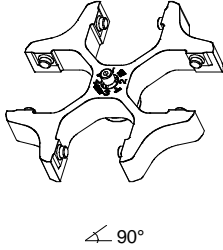

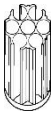






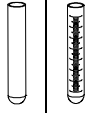








- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 7) not possible to close the lid

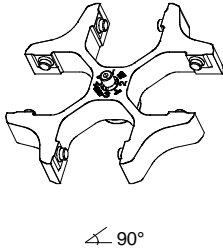












1494		1427 + 1421								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°		 + 								
		5279	5278	1327	5233	5271	5232	5275 ⁷⁾		
										
					 ⁶⁾					
Kapazität / capacity	ml	7,5 – 8,2	1,1 – 1,4	3	50	9 - 10	4 - 7	25	15	
Maße / dimensions	Ø x L	mm	15 x 92	8 x 66	10 x 60	34 x 100	16 x 92	16 x 75	24 x 100	17 x 120
Anzahl p. Rotor / number p. rotor		20	48	48	4	20	20	8	4	
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF	³⁾	4109	4109	4053	3941	3969	3969	3941	4165	
Radius / radius	mm	147	147	145	141	142	142	141	149	
 g (97%)	sec	30								
 g	sec	32								
Temperatur / temperature	°C ¹⁾	- 7								
Probenerwärmung/Sample temp. rise	K ²⁾	+ 15								

1494		1427 + 1421						1425		
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°		 + 								
		5276	5277	5272	5273	1432	1433	1434		
										
	 ⁷⁾									
Kapazität / capacity	ml	50	1,5 2,0	30	1,5 2,0	1 0,4	3	6	7	
Maße / dimensions	Ø x L	mm	29 x 115	11 x 38	25 x 110	11 x 38	6 x 45	10 x 60	12 x 82	12 x 100
Anzahl p. Rotor / number p. rotor		4	36	4	48	144	56	48	48	
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF	³⁾	4053	4109	4025	4053	3969	3913	3913	3913	
Radius / radius	mm	145	147	144	145	142	140	140	140	
 g (97%)	sec	30								
 g	sec	32								
Temperatur / temperature	°C ¹⁾	- 7								
Probenerwärmung/Sample temp. rise	K ²⁾	15								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 7) nicht mit Deckel verschließbar
- 6) Die Einlagen entfernen

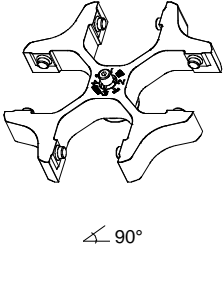





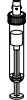









- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 7) not possible to close the lid
- 6) Remove the inserts

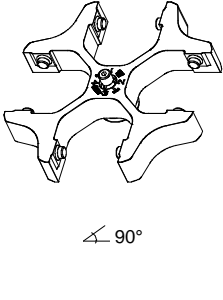
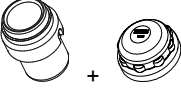














1494	1425								
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°									
	1431			1436	1437	1458	1435	1439	
									
									
Kapazität / capacity	ml	9	15	7,5 - 8,2	50	100	1,1 – 1,4	25	9 – 10
Maße / dimensions	∅ x L	14 x 100	17 x 100	15 x 92	34 x 100	44 x 100	8 x 66	24 x 100	16 x 92
Anzahl p. Rotor / number p. rotor		28	28	28	4	4	36	8	16
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000
RZB / RCF	³⁾	3913	3913	3913	3913	3801	4025	3913	3913
Radius / radius	mm	140	140	140	140	136	144	140	140
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	°C ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	12							

1494	1425								
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°									
	1438								
									
									
Kapazität / capacity	ml	2,6 – 2,9	2,7 – 3	4,9	4,5 – 5	1 – 5	4 – 7	5	4
Maße / dimensions	∅ x L	13 x 65	11 x 66	13 x 90	11 x 92	13 x 75	13 x 100	12/13x75	12 x 60
Anzahl p. Rotor / number p. rotor		28	28	28	28	28	28	28	28
Drehzahl / speed	RPM	5000							
RZB / RCF	³⁾	3913							
Radius / radius	mm	140							
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	°C ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	12							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

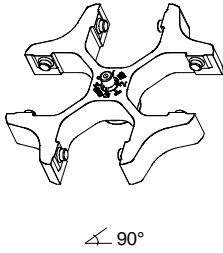
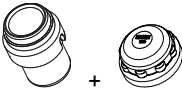









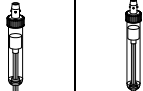


- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

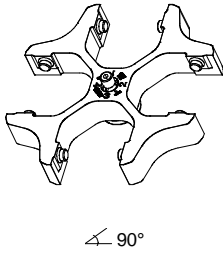
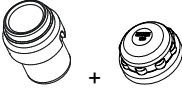







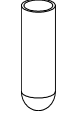



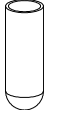

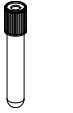
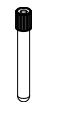


1494	1425								
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$									
	1441		1443		1444		1737		
									
									
Kapazität / capacity	ml	4 – 5,5	7,5 – 8,2	4 – 7	8,5 – 10	50	1,5	2,0	50
Maße / dimensions $\varnothing \times L$	mm	15 x 75	15 x 92	16 x 75	16 x 100	29 x 115	11 x 38	11 x 38	29 x 115
Anzahl p. Rotor / number p. rotor		28	28	28	28	4	36	36	4
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000
RZB / RCF	³⁾	3913	3913	3913	3913	4081	3885	3885	4081
Radius / radius	mm	140	140	140	140	146	139	139	146
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	+ 12							

1494	1495 + 1492								
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 mit Bioabdichtung / with bio-containment ⁵⁾								
	1363		1365		1348			0761	
									
									
Kapazität / capacity	ml	25	30	10	8	4 – 5,5	4 - 7	5 - 10	100
Maße / dimensions $\varnothing \times L$	mm	25 x 90	25 x 110	16 x 80	16 x 81	15 x 75	16 x 75	16 x 100	44 x 100
Anzahl p. Rotor / number p. rotor		4	4	16	16	16	16	16	4
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000
RZB / RCF	³⁾	3689	4193	4025	4025	4025	4025	4025	4025
Radius / radius	mm	132	150	144	144	144	144	144	144
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	14							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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

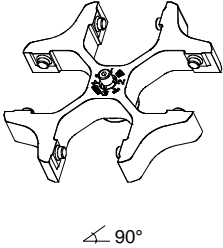
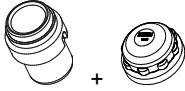



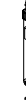







- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

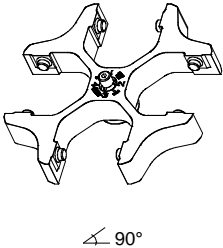
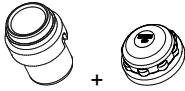








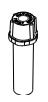








1494	1495 + 1492										
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 +										
	mit Bioabdichtung / with bio-containment 5)										
	1339	1343	1329				1330	1459			
											
Rhe- sus											
											
Kapazität / capacity	ml	1	0,4	3	4	9	15	9 - 10	25	4 - 5,5	7,5 - 8,2
Maße / dimensions	∅ x L	mm	6 x 45	10 x 60	10 x 88	14 x 100	17 x 100	16 x 92	24 x 100	15 x 75	15 x 92
Anzahl p. Rotor / number p. rotor		108	36		16	16	16	4	16	16	
Drehzahl / speed	RPM	5000	5000		5000	5000	5000	5000	5000	5000	
RZB / RCF	³⁾	4081	4137		3997	3997	3997	3829	4053	4053	
Radius / radius	mm	146	148		143	143	143	137	145	145	
 9 (97%)	sec	30									
 9	sec	32									
Temperatur / temperature	°C ¹⁾	- 10									
Probenerwärmung/Sample temp. rise	K ²⁾	14									

1494	1495 + 1492									
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 +									
	mit Bioabdichtung / with bio-containment 5)									
	1331	1396	4416	4417	0761	1457	1383			
										
										
Kapazität / capacity	ml	50	85	50	30	100	1,1 - 1,4	1 - 5	4 - 7	
Maße / dimensions	∅ x L	mm	34 x 100	38 x 106	29 x 107	26 x 95	44 x 100	8 x 66	13 x 75	13 x 100
Anzahl p. Rotor / number p. rotor		4	4	4	4	4	28	20	20	
Drehzahl / speed	RPM	5000	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF	³⁾	3801	4109	4137	3857	4025	4053	4025	4025	
Radius / radius	mm	136	147	148	138	144	145	144	144	
 9 (97%)	sec	30								
 9	sec	32								
Temperatur / temperature	°C ¹⁾	- 10								
Probenerwärmung/Sample temp. rise	K ²⁾	14								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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

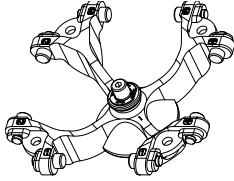

















- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

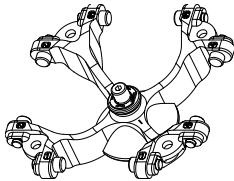



















1494	1495 + 1492							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 + mit Bioabdichtung / with bio-containment 5)							
	1383							
								
								
Kapazität / capacity ml	2,6 – 2,9	2,7 – 3	4,9	4,5 - 5	6	7	5	
Maße / dimensions $\varnothing \times L$ mm	13 x 65	11 x 66	13 x 90	11 x 92	12 x 82	12 x 100	12/13x75	
Anzahl p. Rotor / number p. rotor	20	20	20	20	20	20	20	
Drehzahl / speed RPM	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF ³⁾	4025	4025	4025	4025	4025	4025	4025	
Radius / radius mm	144	144	144	144	144	144	144	
 9 (97%) sec	30							
 9 sec	32							
Temperatur / temperature $^\circ\text{C}$ ¹⁾	- 10							
Probenerwärmung/Sample temp. rise K ²⁾	14							

1494	1495 + 1492								
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 + mit Bioabdichtung / with bio-containment 5)								
	1351		1347	1384	0765		6311	6318	
									
									
Kapazität / capacity ml	1,5	2,0	0,5	15	50	30	12	50	
Maße / dimensions $\varnothing \times L$ mm	11 x 38	11 x 38	10,7 x 46	17 x 120	29 x 115	44 x 105	17 x 100	29 x 115	
Anzahl p. Rotor / number p. rotor	20		20	4	4	4	4	4	
Drehzahl / speed RPM	5000	5000	5000	5000	5000	5000	5000	5000	
RZB / RCF ³⁾	3857	3745	4193	4193	3997	4193	4193	4193	
Radius / radius mm	138	134	150	150	143	150	150	150	
 9 (97%) sec	30								
 9 sec	32								
Temperatur / temperature $^\circ\text{C}$ ¹⁾	- 10								
Probenerwärmung/Sample temp. rise K ²⁾	14								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Stopfen zentrifugierbar, Skal. 10µl-300µl, 15ml, 30ml
- 5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten

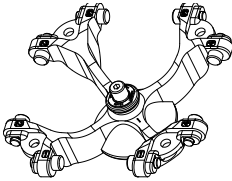















- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) can not be centrifugated when plug is attached, Scal. 10µl-300µl, 15ml, 30ml
- 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".

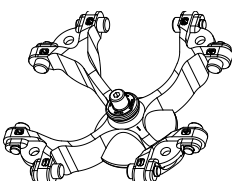

















1554	1560 + 1561 / 1565							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000	 +  / 							
	mit Bioabdichtung / with bio-containment 5)						-----	
	max. Laufzyklen / max. cycles: 80000							
	max. Beladung / max. load: 290 g							
		1571	1593	1589			1588	
								
								
Kapazität / capacity	1,5	2,0	5	5	6	7	9	15
Maße / dimensions $\varnothing \times L$	11 x 38		17 x 59		12 x 75		12 x 100	
Anzahl p. Rotor / number p. rotor	56		16		28		20	
Drehzahl / speed	RPM 4500							
RZB / RCF	3328/2332			3328			3215	
Radius / radius	147/103		147		142			
 g (97%)	sec 28							
 g	sec 31							
Temperatur / temperature	°C ¹⁾ -8							
Probenerwärmung/Sample temp. rise	K ²⁾ 10							

1554	1560 + 1561 / 1565							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000	 +  / 							
	mit Bioabdichtung / with bio-containment 5)						-----	
	max. Laufzyklen / max. cycles: 80000							
	max. Beladung / max. load: 290 g							
		1572	1573	1574	1575	1576	1594	---
								
								
Kapazität / capacity	15	25	50	85	100	125	150	200
Maße / dimensions $\varnothing \times L$	18 x 102		24 x 100		34 x 100		38 x 101	
Anzahl p. Rotor / number p. rotor	16		4					
Drehzahl / speed	RPM 4500							
RZB / RCF	3260	3056	3124	3260	3124	3328		
Radius / radius	144	135	138	144	138	147		
 g (97%)	sec 28							
 g	sec 31							
Temperatur / temperature	°C ¹⁾ -8							
Probenerwärmung/Sample temp. rise	K ²⁾ 10							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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) nicht mit Deckel verschließbar

- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) 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) not possible to close the lid

1554		1560 + 1561 / 1565									
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000		 mit Bioabdichtung / with bio-containment 5) -----									
		max. Laufzyklen / max. cycles: 80000 max. Beladung / max. load: 290 g									
		1589					1588				
											
											
Kapazität / capacity	ml	1,1 - 1,4	2,6 - 3,4	4,9	2,7 - 3	4 - 5,5	4 - 5,5	7,5 - 8,2	9 - 10	10	
Maße / dimensions $\varnothing \times L$	mm	8 x 66	13 x 65	13 x 90	11 x 66	11 x 92	15 x 75	15 x 92	16 x 92	15 x 102	
Anzahl p. Rotor / number p. rotor		28					20				
Drehzahl / speed	RPM	4500									
RZB / RCF	³⁾	3215									
Radius / radius	mm	142									
 9 (97%)	sec	28									
 9	sec	31									
Temperatur / temperature	°C ¹⁾	- 8									
Probenerwärmung/Sample temp. rise	K ²⁾	10									

1554		1560 + 1561 / 1565							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000		 mit Bioabdichtung / with bio-containment 5) -----							
		max. Laufzyklen / max. cycles: 80000 max. Beladung / max. load: 290 g							
		1589	1588	1591	1581 + E2109	1577	1595		
									
									
Kapazität / capacity	ml	1 - 5	4 - 7	4 - 7	5 - 10	12	11	15	
Maße / dimensions $\varnothing \times L$	mm	13 x 75	13 x 100	16 x 75	16 x 100	17 x 102	16 x 110	17 x 120	
Anzahl p. Rotor / number p. rotor		28		20		12	16	8	12
Drehzahl / speed	RPM	4500							
RZB / RCF	³⁾	3215				3260		3328	
Radius / radius	mm	142				144		147	
 9 (97%)	sec	28							
 9	sec	31							
Temperatur / temperature	°C ¹⁾	- 8							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

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

2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) 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) nicht mit Deckel verschließbar

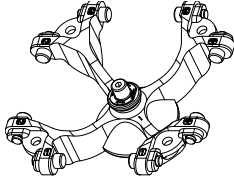
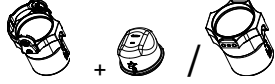










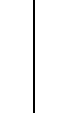

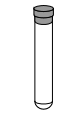
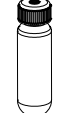


1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

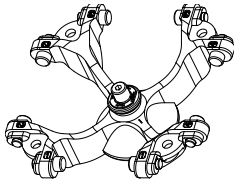
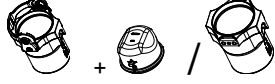



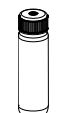

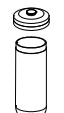
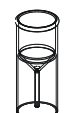


2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

3) 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".

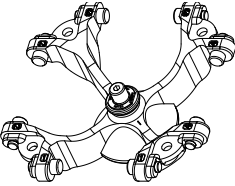



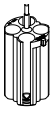
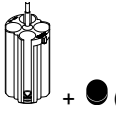


















7) not possible to close the lid

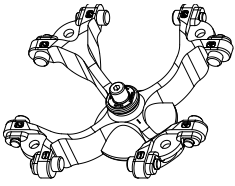




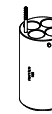

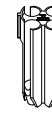

















1554		1560 + 1561 / 1565							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000		 + /							
		mit Bioabdichtung / with bio-containment 5)				----			
		max. Laufzyklen / max. cycles: 80000							
		max. Beladung / max. load: 290 g							
		1578	1579	1581	1582	1583	1584	1585	
									
									
Kapazität / capacity	ml	30	50	12	25	30	50	10	30
Maße / dimensions \varnothing x L	mm	25 x 110	30 x 115	17 x 100	25 x 90	25 x 110	29 x 115	16 x 80	26 x 95
Anzahl p. Rotor / number p. rotor		4		16		4		20	
Drehzahl / speed	RPM	4500							
RZB / RCF	³⁾	3328		3260		3328		3215	3260
Radius / radius	mm	147		144		147		142	144
 9 (97%)	sec	28							
 9	sec	31							
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 8							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

1554		1560 + 1561 / 1565							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$ max. Laufzyklen / max. cycles 100 000		 + /							
		mit Bioabdichtung / with bio-containment 5)				----			
		max. Laufzyklen / max. cycles: 80000							
		max. Beladung / max. load: 290 g							
		1586	1575	1587					
									
					0534 ⁴⁾				
Kapazität / capacity	ml	50	85	94	30				
Maße / dimensions \varnothing x L	mm	29 x 107	38 x 106	38 x 110 ¹⁶⁾	44 x 105				
Anzahl p. Rotor / number p. rotor		4							
Drehzahl / speed	RPM	4500							
RZB / RCF	³⁾	3260		3192					
Radius / radius	mm	144		141					
 9 (97%)	sec	28							
 9	sec	31							
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 8							
Probenerwärmung/Sample temp. rise	K ²⁾	10							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Stopfen zentrifugierbar, Skal. 10µl-300µl, 15ml, 30ml
- 5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
- 16) Maße mit Deckel

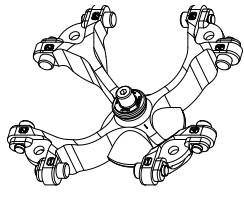

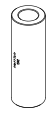
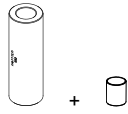







- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) can not be centrifugated when plug is attached, Scal. 10µl-300µl, 15ml, 30ml
- 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".
- 16) Dimensions with lid

1554	1559														
Ausschwingrotor 4-fach / Swing out rotor 4-times   max. Laufzyklen / max. cycles 100 000	 max. Laufzyklen / max. cycles: 80000 max. Beladung / max. load: 200 g														
	1486			1482A			1482A + 4 x 0715			1486			1482A		
															
															
Kapazität / capacity	ml	5	6	7	9	15	4 - 7	4 - 5,5	2,6 - 3,4	2,7 - 3	4,5 - 5	4,9	9-10	10	
Maße / dimensions $\varnothing \times L$	mm	12 x 75	12 x 82	12 x 100	14 x 100	17 x 100	16 x 75	15 x 75	13 x 65	11 x 66	11 x 92	13 x 90	16 x 92	15 x 102	
Anzahl p. Rotor / number p. rotor		20			16			16			20		20		16
Drehzahl / speed	RPM	4500													
RZB / RCF	³⁾	3215			3260			3215			3215			3260	
Radius / radius	mm	142			144			142			142			144	
 9 (97%)	sec	28													
 9	sec	31													
Temperatur / temperature	°C ¹⁾	- 8													
Probenerwärmung/Sample temp. rise	K ²⁾	9													

1554	1559															
Ausschwingrotor 4-fach / Swing out rotor 4-times   max. Laufzyklen / max. cycles 100 000	 max. Laufzyklen / max. cycles: 80000 max. Beladung / max. load: 200 g															
	1486		1482A		1488		1487		1483A		1484		1482A		1484	
																
																
Kapazität / capacity	ml	1 - 5	4 - 7	4 - 7	8,5-10	8	12	15	50	12	50	12	50	12	50	
Maße / dimensions $\varnothing \times L$	mm	13 x 75	13 x 100	16 x 75	16 x 100	16 x 125	17 x 102	17 x 120	29 x 115	17 x 100	29 x 115	17 x 100	29 x 115	17 x 100	29 x 115	
Anzahl p. Rotor / number p. rotor		20		16		12		16		4		16		4		
Drehzahl / speed	RPM	4500														
RZB / RCF	³⁾	3215	3260	3328	3147	3351	3305	3260	3305	3260	3305	3260	3305	3260	3305	
Radius / radius	mm	142	144	147	139	148	146	144	146	144	146	144	146	144	146	
 9 (97%)	sec	28														
 9	sec	31														
Temperatur / temperature	°C ¹⁾	- 8														
Probenerwärmung/Sample temp. rise	K ²⁾	9														

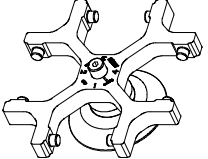



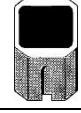








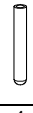





- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

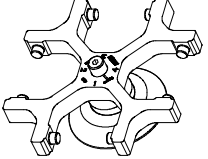




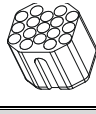










- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

1554		1563					
Ausschwingrotor 4-fach / Swing out rotor 4-times  max. Laufzyklen / max. cycles 100 000							
		max. Laufzyklen / max. cycles: 80000 max. Beladung / max. load: 160					
		1592	1592 + E2109	E2110-A			
							
							
Kapazität / capacity	ml	12	15	50	50		
Maße / dimensions	∅ x L mm	17 x 100	17 x 120	29 x 115	29 x 115		
Anzahl p. Rotor / number p. rotor		8					
Drehzahl / speed	RPM	4500					
RZB / RCF	³⁾	3260					
Radius / radius	mm	144					
 9 (97%)	sec	28					
 9	sec	31					
Temperatur / temperature	°C ¹⁾	- 8					
Probenerwärmung/Sample temp. rise	K ²⁾	10					

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

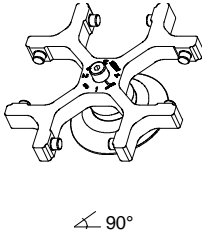
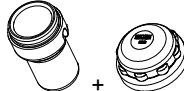




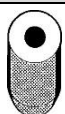


- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

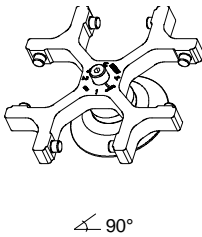







1624		1308	1345	1346	1366					
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$										
					1326	1357	5277			
										
					Rhe- sus					
										
Kapazität / capacity	ml	50	45	20	4	0,4	1	3	1,5	2,0
Maße / dimensions $\varnothing \times L$	mm	34 x 100	31 x 100	21 x 100	12 x 60	6 x 45		10 x 60	11 x 38	
Anzahl p. Rotor / number p. rotor		4	4	8	48	120		36	36	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000		4000	4000	4000
RZB / RCF	³⁾	2290	2361	2361	1932	1950		1968	1968	1968
Radius / radius	mm	128	132	132	108	109		110	110	110
 9 (97%)	sec						20			
 9	sec						25			
Temperatur / temperature	$^\circ\text{C}^{1)}$						- 15			
Probenerwärmung/Sample temp. rise	K ²⁾						8			

1624										
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$										
		1369	1369-91	1369-92	1370	1372				
										
										
Kapazität / capacity	ml	15	5 - 10	5	7	6	9	5		
Maße / dimensions $\varnothing \times L$	mm	17 x 100	16 x 100	12 x 75	12 x 100	12 x 82	14 x 100	12 x 75		
Anzahl p. Rotor / number p. rotor		16	16	16	16	16	20	68		
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000		
RZB / RCF	³⁾	2308	2308	2057	2308	2308	2308	2164		
Radius / radius	mm	129	129	115	129	129	129	121		
 9 (97%)	sec						20			
 9	sec						25			
Temperatur / temperature	$^\circ\text{C}^{1)}$						- 17			
Probenerwärmung/Sample temp. rise	K ²⁾						8			

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

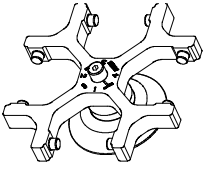

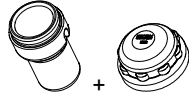











- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

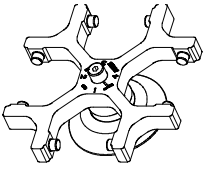

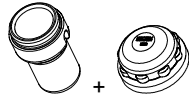


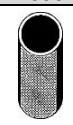
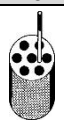

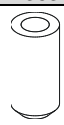











1624	1481 + 1492									
Ausschwingrotor 4-fach / Swing out rotor 4-times  ↙ 90°	 + mit Bioabdichtung / with bio-containment ⁵⁾									
	1329		1330		1331		1339		1347	
										
							Rhesus			
Kapazität / capacity	ml	9	15	9 - 10	10	25	50	1	15	
Maße / dimensions	∅ x L	mm	14 x 100	17 x 100	16 x 92	15 x 102	24 x 100	34 x 100	6 x 45	17 x 120
Anzahl p. Rotor / number p. rotor		16	16	16	16	4	4	108	4	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	
RZB / RCF	³⁾	2540	2540	2540	2540	2433	2415	2594	2665	
Radius / radius	mm	142	142	142	142	136	135	145	149	
 9 (97%)	sec	20								
 9	sec	25								
Temperatur / temperature	°C ¹⁾	- 15								
Probenerwärmung/Sample temp. rise	K ²⁾	7								

1624	1481 + 1492									
Ausschwingrotor 4-fach / Swing out rotor 4-times  ↙ 90°	 + mit Bioabdichtung / with bio-containment ⁵⁾									
	1348		1351		6311		6318			
										
Kapazität / capacity	ml	10	4 - 7	5 - 10	8	1,5	2,0	0,5	12	50
Maße / dimensions	∅ x L	mm	16 x 80	16 x 75	16 x 100	16 x 81	11 x 38	10,7 x 46	17 x 100	29 x 115
Anzahl p. Rotor / number p. rotor		16	16	16	16	20	20	20	4	4
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2522	2522	2522	2522	2451	2379	2665	2665	
Radius / radius	mm	141	141	141	141	137	133	149	149	
 9 (97%)	sec	20								
 9	sec	25								
Temperatur / temperature	°C ¹⁾	- 15								
Probenerwärmung/Sample temp. rise	K ²⁾	7								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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
- 6) Die Einlagen entfernen

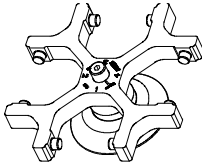

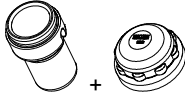

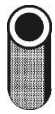






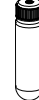







- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
- 6) Remove the inserts

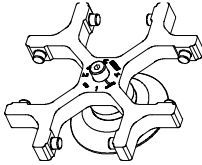

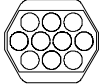
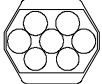














1624	1481 + 1492							
Ausschwingrotor 4-fach / Swing out rotor 4-times  	 mit Bioabdichtung / with bio-containment 5)							
	1383							
								
								
Kapazität / capacity ml	6	7	4,9	4,5 - 5,0	2,7 - 3,0	2,6 - 2,9	1 - 5	5
Maße / dimensions $\varnothing \times L$ mm	12 x 82	12 x 100	13 x 90	11 x 92	11 x 66	13 x 65	13 x 75	12 x 75
Anzahl p. Rotor / number p. rotor	20	20	20	20	20	20	20	20
Drehzahl / speed RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF ³⁾	2558	2558	2558	2558	2558	2558	2558	2558
Radius / radius mm	143	143	143	143	143	143	143	143
 9 (97%) sec	20							
 9 sec	25							
Temperatur / temperature °C ¹⁾	- 15							
Probenerwärmung/Sample temp. rise K ²⁾	7							

1624	1481 + 1492							
Ausschwingrotor 4-fach / Swing out rotor 4-times  	 mit Bioabdichtung / with bio-containment 5)							
	1383	1384	1396	1457	1343	1363	1365	
								
								
Kapazität / capacity ml	4 - 7,0	50	85	1,1 - 1,4	3	4	25	30
Maße / dimensions $\varnothing \times L$ mm	13 x 100	29 x 115	38 x 106	8 x 66	10 x 60	10 x 88	25 x 90	25 x 110
Anzahl p. Rotor / number p. rotor	20	4	4	28	36	36	4	4
Drehzahl / speed RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF ³⁾	2558	2665	2612	2576	2630	2630	2343	2665
Radius / radius mm	143	149	146	144	147	147	131	149
 9 (97%) sec	20							
 9 sec	25							
Temperatur / temperature °C ¹⁾	- 15							
Probenerwärmung/Sample temp. rise K ²⁾	7							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) 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".


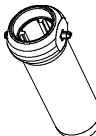
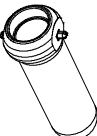










1624	1481 + 1492									
Ausschwingrotor 4-fach / Swing out rotor 4-times  	 mit Bioabdichtung / with bio-containment 5)									
	1459	4416	4417	0761	0765	1745	1746			
										
										
Kapazität / capacity	ml	4,0 - 5,5	7,5 - 8,2	50	30	100	30	25	30	50
Maße / dimensions Ø x L	mm	15 x 75	15 x 92	29 x 107	26 x 95	44 x 10	44 x 105	24 x 100	26 x 95	34 x 100
Anzahl p. Rotor / number p. rotor		16	4	4	4	4	4	8	4	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	
RZB / RCF	³⁾	2576	2630	2451	2558	2540	2540	2451	2451	
Radius / radius	mm	144	147	137	143	142	142	137	137	
 g (97%)	sec									20
 g	sec									25
Temperatur / temperature	°C ¹⁾									- 15
Probenerwärmung/Sample temp. rise	K ²⁾									7

1624	1741			1742				1739			
Ausschwingrotor 4-fach / Swing out rotor 4-times  											
	0701					0716					
											
											
Kapazität / capacity	ml	9	1,1 – 1,4	4,9	15	15	1 – 5	4 – 7	2,6 – 2,9	4 – 5,5	4 – 7
Maße / dimensions Ø x L	mm	14 x 100	8 x 66	13 x 90	17 x 100	17 x 100	13 x 75	16 x 75	13 x 65	15 x 75	13 x 100
Anzahl p. Rotor / number p. rotor		40	40	40	28	28	28	28	28	28	28
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2415	2415	2451	2451	2451	2325	2325	2325	2325	2451
Radius / radius	mm	135	135	137	137	137	130	130	130	130	137
 g (97%)	sec									20	
 g	sec									25	
Temperatur / temperature	°C ¹⁾									- 15	
Probenerwärmung/Sample temp. rise	K ²⁾									9	

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Stopfen zentrifugierbar, Skal. 10µl-300µl, 15ml, 30ml
- 5) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten

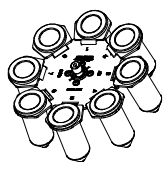





- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) can not be centrifugated when plug is attached, Scal. 10µl-300µl, 15ml, 30ml
- 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".

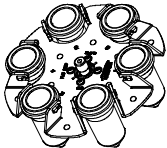
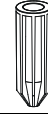




1611	1131-A				1132-A			
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$								
								
Kapazität / capacity	ml	5	6	2,7 – 3,0	2,6 – 2,9	1 – 5	4 – 5,5	4 - 7
Maße / dimensions $\varnothing \times L$	mm	12 x 75	12 x 82	11 x 66	13 x 65	13 x 75	15 x 75	16 x 75
Anzahl p. Rotor / number p. rotor		8						
Drehzahl / speed	RPM	4000						
RZB / RCF	³⁾	1914						
Radius / radius	mm	107						
 g (97%)	sec	20						
 g	sec	20						
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 16						
Probenerwärmung/Sample temp. rise	K ²⁾	4						

1611	1643				1644			
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$								
								
Kapazität / capacity	ml	7	4 – 7	10	4,5 - 5	15	7,5 – 8,2	5 - 10
Maße / dimensions $\varnothing \times L$	mm	12 x 100	13 x 100	13 x 100	11 x 92	17 x 100	15 x 92	16 x 100
Anzahl p. Rotor / number p. rotor		8						
Drehzahl / speed	RPM	4000						
RZB / RCF	³⁾	2415						
Radius / radius	mm	135						
 g (97%)	sec	20						
 g	sec	20						
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 16						
Probenerwärmung/Sample temp. rise	K ²⁾	7						

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

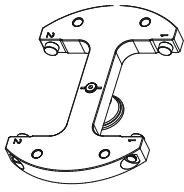
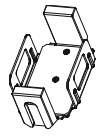
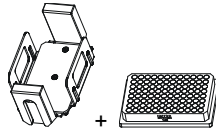
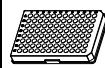
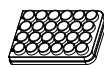
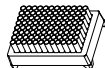
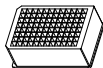
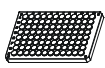



- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

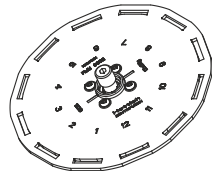



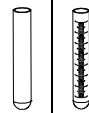










1617								
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 45^\circ$		1462-A						
			---					
								
Kapazität / capacity	ml	15	50					
Maße / dimensions	$\varnothing \times L$ mm	17 x 120	29 x 115					
Anzahl p. Rotor / number p. rotor		8	8					
Drehzahl / speed	RPM	5000	5000					
RZB / RCF	³⁾	3857	3857					
Radius / radius	mm	138						
 g (97%)	sec	20						
 g	sec	19						
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 10						
Probenerwärmung/Sample temp. rise	K ²⁾	14						

1619								
Ausschwingrotor 6-fach / Swing out rotor 6-times  $\angle 90^\circ$		1462-A						
			---					
								
Kapazität / capacity	ml	15	50					
Maße / dimensions	$\varnothing \times L$ mm	17 x 120	29 x 115					
Anzahl p. Rotor / number p. rotor		6	6					
Drehzahl / speed	RPM	4000	4000					
RZB / RCF	³⁾	2701	2701					
Radius / radius	mm	151	151					
 g (97%)	sec	20						
 g	sec	22						
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	- 15						
Probenerwärmung/Sample temp. rise	K ²⁾	9						

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

1460		1453-A				1453-A + 1485			
Ausschwingrotor 2-fach / Swing out rotor 2-times  ↙ 90°									
		MTP	CP	MS	DWP	PCR-Platte, 96-fach PCR plate, 96 wells	PCR-Strips		
									
Kapazität / capacity	ml						0,2		
Maße / dimensions TxBxH / DxWxH	mm	86 x 128 x 15	86 x 128 x 22	86 x 128 x 46	86 x 128 x 44,5	82x124x20	---		
Anzahl p. Rotor / number p. rotor		10	8	2	2	2	24 x 8		
Drehzahl / speed	RPM	4000							
RZB / RCF	³⁾	2218							
Radius / radius	mm	124							
 9 (97%)	sec	40							
 9	sec	45							
Temperatur / temperature	°C ¹⁾	- 6							
Probenerwärmung/Sample temp. rise	K ²⁾	11							

1628		1621		1122			1127-A				
Ausschwingrotor 12-fach / Swing out rotor 12-times  ↙ 80° mit / with 1621 ↙ 60° mit / with 1122 ↙ 55° mit / with 1127-A											
											
Kapazität / capacity	ml	15	7,5 – 8,2	5 - 10	10	4 – 5,5	4 – 7	5	1 – 5	2,7 – 3	2,6 – 2,9
Maße / dimensions Ø x L	mm	17 x 100	15 x 92	16 x 100	17 x 70	15 x 75	16 x 75	12/1 3 x 75	13 x 75	11 x 66	13 x 65
Anzahl p. Rotor / number p. rotor		12	12	12	12	12	12	12	12	12	12
Drehzahl / speed	RPM	5000									
RZB / RCF	³⁾	4193	4193	4193	3522	3522	3522	3466	3466	3466	3466
Radius / radius	mm	150	150	150	126	126	126	124	124	124	124
 9 (97%)	sec	16									
 9	sec	16									
Temperatur / temperature	°C ¹⁾	- 10									
Probenerwärmung/Sample temp. rise	K ²⁾	20									

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

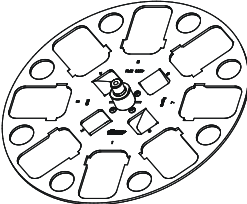

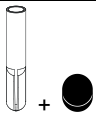
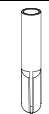











- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

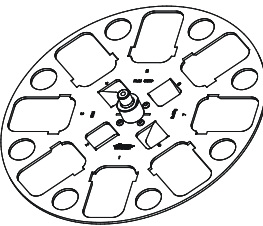

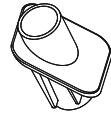














MTP Mikrotiterplatte /
Microtitre plate

CP Kulturplatte /
Culture plate

DWP Deep Well Platte /
Deep well plate

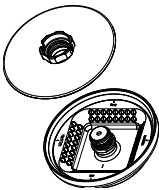





MS Micronic System /
Micronic system

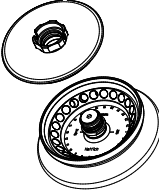






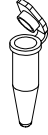




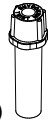


1418		1467								
Winkelrotor 8-fach / Angle rotor 8-times  45°										
		1054-A + 0701		1054-A					0716	
										
										
Kapazität / capacity	ml	4	5	1,1 – 1,4	2,7 - 3	2,6 – 2,9	1 - 5	5	9-10	
Maße / dimensions	Ø x L	mm	12 x 60	12 x 75	8 x 66	11 x 66	13 x 65	13 x 75	13 x 75	16 x 92
Anzahl p. Rotor / number p. rotor			32	32	32	32	32	32	32	32
Drehzahl / speed	RPM		4500	4500	4500	4500	4500	4500	4500	4500
RZB / RCF	³⁾		2694	2762	2762	2762	2762	2762	2762	3215
Radius / radius	mm		119	122	122	122	122	122	122	142
 9 (97%)	sec	30								
 1	sec	31								
Temperatur / temperature	°C ¹⁾	- 5								
Probenerwärmung/Sample temp. rise	K ²⁾	20								

1418		1467					1468				
Winkelrotor 8-fach / Angle rotor 8-times  45°											
		0716				E2109				E2110-A	
											
											
Kapazität / capacity	ml	15	5 - 10	12	12	4 – 7	15	50	50	50	
Maße / dimensions	Ø x L	mm	17 x 100	13 x 100	17 x 102	17 x 100	13 x 100	17 x 120	29 x 107	29 x 115	29 x 115
Anzahl p. Rotor / number p. rotor			32	32	32	32	32	8	8	8	
Drehzahl / speed	RPM		4500	4500	4500	4500	4500	4500	4500	4500	
RZB / RCF	³⁾		3215	3215	3215	3305	3283	3147	3147	3147	
Radius / radius	mm		142	142	142	146	145	139	139	139	
 9 (97%)	sec	30									
 9	sec	31									
Temperatur / temperature	°C ¹⁾	- 5									
Probenerwärmung/Sample temp. rise	K ²⁾	20									

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

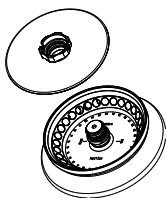





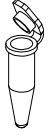







- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

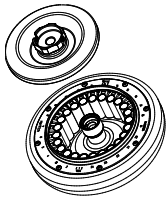

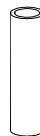









1551							
Winkelrotor 8-fach / Angle rotor 8-times   mit Bioabdichtung / with bio-containment 5)							
							
Kapazität / capacity	ml	0,2	0,2				
Maße / dimensions	∅ x L mm	6 x 18					
Anzahl p. Rotor / number p. rotor		64	8 x 8				
Drehzahl / speed	RPM	13000					
RZB / RCF	³⁾	13604					
Radius / radius	mm	max. 72					
 (97%)	sec	36					
 g	sec	31					
Temperatur / temperature	°C ¹⁾	- 4					
Probenerwärmung/Sample temp. rise	K ²⁾	20					

1552									
Winkelrotor 24-fach / Angle rotor 24-times   mit Bioabdichtung / with bio-containment 5		---	8) 2031	2023	2024	0788			
									
									
Kapazität / capacity	ml	2,0	1,5	0,8	0,5	0,2	0,4	0,5	
Maße / dimensions	∅ x L mm	11 x 38	11 x 38	8 x 45	8 x 30	6 x 18	6 x 45	10,7 x 46	
Anzahl p. Rotor / number p. rotor		24	24	24	24	24	24	12	
Drehzahl / speed	RPM	16000							
RZB / RCF	³⁾	24900						23755	
Radius / radius	mm	87						83	
 g (97%)	sec	30							
 g	sec	29							
Temperatur / temperature	°C ¹⁾	2							
Probenerwärmung/sample temp. rise	K ¹⁴⁾	20							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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
- 8) bei hochtouriger Zentrifugation empfohlen
- 9) Nur jeden zweiten Platz des Rotors beladen
- 14) Bei einer Laufzeit länger als 20 min. beträgt die Probenerwärmung > 20°K (nur bei Zentrifuge ohne Kühlung)

- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) 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".
- 8) recommended for high-speed centrifugation
- 9) Load only each second position of the rotor
- 14) With running time longer than 20 min., the sample temp. rise up will be > 20°K (only with cooling centrifuges)

1553									
Winkelrotor 30-fach / Angle rotor 30-times  45° mit Bioabdichtung / with bio-containment ⁵⁾		8) 2031	2023	2024	0788				
		---							
									9)
Kapazität / capacity	ml	2,0	1,5	0,8	0,5	0,4	0,2	0,5	
Maße / dimensions	Ø x L	mm	11 x 38	11 x 38	8 x 45	8 x 30	6 x 45	6 x 18	10,7 x 46
Anzahl p. Rotor / number p. rotor		30	30	30	30	30	30	15	
Drehzahl / speed	RPM	14150	14150	14150	14150	14150	14150	14150	
RZB / RCF	³⁾	21713	21713	21713	21713	21713	21713	20818	
Radius / radius	mm	97	97	97	97	97	97	93	
 g (97%)	sec				35				
 g	sec				32				
Temperatur / temperature	°C ¹⁾				- 1				
Probenerwärmung/Sample temp. rise	K ¹⁵⁾				20				

1555										
Ausschwingrotor 24-fach / Swing out rotor 24-times  90° mit Bioabdichtung / with bio-containment ⁵⁾		2024	2023	8) 2031						
					---					
										
Kapazität / capacity	ml	0,2	0,4	0,5	0,8	1,5	2,0			
Maße / dimensions	Ø x L	mm	6 x 18	6 x 45	8 x 30	8 x 45	11 x 38	11 x 38		
Anzahl p. Rotor / number p. rotor		24								
Drehzahl / speed	RPM	13000								
RZB / RCF	³⁾	18327								
Radius / radius	mm	97								
 g (97%)	sec	36								
 g	sec	31								
Temperatur / temperature	°C ¹⁾	3								
Probenerwärmung/Sample temp. rise	K ¹⁰⁾	20								

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

3) 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

8) bei hochtouriger Zentrifugation empfohlen

9) Nur jeden zweiten Platz des Rotors beladen

10) Bei einer Laufzeit länger als 10 min. beträgt die Probenerwärmung > 20°K (nur bei Zentrifuge ohne Kühlung)

15) Bei einer Laufzeit länger als 15 min. beträgt die Probenerwärmung > 20°K (nur bei Zentrifuge ohne Kühlung)

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

3) Observe the tube manufacturer's instructions.

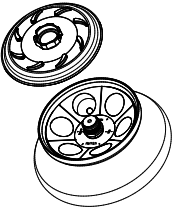
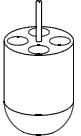







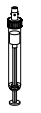






5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

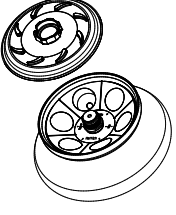

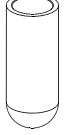
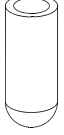
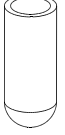
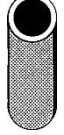




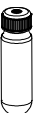






8) recommended for high-speed centrifugation

9) Load only each second position of the rotor

10) With running time longer than 10 min., the sample temp. rise up will be > 20°K (only with cooling centrifuges)

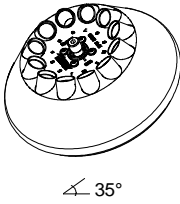

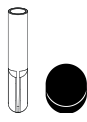











15) With running time longer than 15 min., the sample temp. rise up will be > 20°K (only with cooling centrifuges)

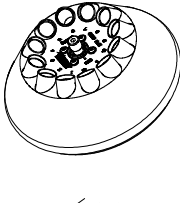







1556		1449		1477		1478					
Winkelrotor 6-fach / Angle rotor 6-times  35° mit Bioabdichtung / with bio-containment ⁵⁾											
											
		Kapazität / capacity	ml	1,5	2,0	0,5	10	15	7,5 – 8,2	9 - 10	10
Maße / dimensions	∅ x L	mm	11 x 38	10,7x46	16 x 80	17 x 100	15 x 92	16 x 92	15 x 102	16 x 100	
Anzahl p. Rotor / number p. rotor			24	24	12	6					
Drehzahl / speed	RPM	9000									
RZB / RCF	³⁾	10324	10324	10414	10052						
Radius / radius	mm	114	114	115	111						
 9 (97%)	sec	36									
 9	sec	32									
Temperatur / temperature	°C ¹⁾	0									
Probenerwärmung/Sample temp. rise	K ²⁾	20									

1556		1466		1454		1447		1446		1463	
Winkelrotor 6-fach / Angle rotor 6-times  35° mit Bioabdichtung / with bio-containment ⁵⁾											
											
		Kapazität / capacity	ml	85	94	15	50	30	50	85	50
Maße / dimensions	∅ x L	mm	38 x 106	38 x 110 ¹⁶⁾	17 x 120	29 x 115	26 x 95	29 x 107	38 x 101	35 x 105	34 x 100
Anzahl p. Rotor / number p. rotor		6									
Drehzahl / speed	RPM	9000									
RZB / RCF	³⁾	10595	10052		9690	10142	10595	10414			
Radius / radius	mm	117	111		107	112	117	115			
 9 (97%)	sec	36									
 9	sec	32									
Temperatur / temperature	°C ¹⁾	0									
Probenerwärmung/Sample temp. rise	K ²⁾	20									

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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
- 16) Maße mit Deckel

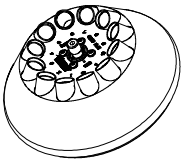




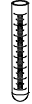







- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
- 16) Dimensions with lid

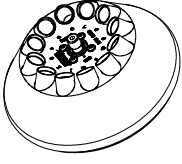

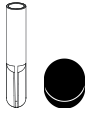











1613		1054-A					1054-A /0701			
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°										
										
Kapazität / capacity	ml	5	1 – 5	6	2,6 – 2,9 13 x 65	2,7 – 3 11 x 66	1,1 – 1,4	4	8,5 - 10	8
Maße / dimensions	∅ x L mm	12/13 x 75	13 x 75	12 x 82			8 x 66	12 x 60	16 x 100	16 x 125
Anzahl p. Rotor / number p. rotor		12	12	12	12	12	12	12	12	6
Drehzahl / speed	RPM	6000	6000	6000	6000	6000	6000	6000	6000	6000
RZB / RCF	³⁾	3300	3300	3300	3300	3300	3300	3260	4146	4146
Radius / radius	mm	82	82	82	82	82	82	81	103	103
 g (97%)	sec	15								
 g	sec	15								
Temperatur / temperature	°C ¹⁾	- 16								
Probenerwärmung/Sample temp. rise	K ²⁾	4								

1613									
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°									
									
Kapazität / capacity	ml	4,5 - 5	4,9	7,5 – 8,2	9 – 10	10			
Maße / dimensions	∅ x L mm	11 x 92	13 x 90	15 x 92	16 x 92	15 x 102			
Anzahl p. Rotor / number p. rotor		12	12	12	12	12			
Drehzahl / speed	RPM	6000	6000	6000	6000	6000			
RZB / RCF	³⁾	4146	4146	4146	4146	4146			
Radius / radius	mm	103	103	103	103	103			
 g (97%)	sec	15							
 g	sec	15							
Temperatur / temperature	°C ¹⁾	- 16							
Probenerwärmung/Sample temp. rise	K ²⁾	4							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

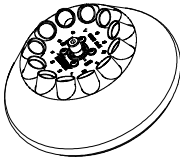








- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

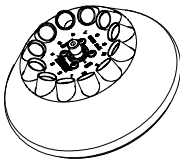











1613					6305		1063-6			
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°										
										
	Kapazität / capacity	ml	4 – 7	15	15		4	0,5	1,5	2,0
Maße / dimensions	∅ x L	mm	13 x 100	17 x 100	17 x 120		10 x 88	10,7 x 46	11 x 38	11 x 38
Anzahl p. Rotor / number p. rotor			12	12	6		12	12	12	12
Drehzahl / speed	RPM		6000	6000	6000		6000	6000	6000	6000
RZB / RCF	³⁾		4146	4146	4146		3502	2777	2737	2737
Radius / radius	mm		103	103	103		87	69	68	68
 9 (97%)	sec	15								
 9	sec	15								
Temperatur / temperature	°C ¹⁾	- 16								
Probenerwärmung/Sample temp. rise	K ²⁾	4								

1615		1054-A					1054-A /0701			
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°										
										
	Kapazität / capacity	ml	5	1 – 5	6	2,6 – 2,9 13 x 65	2,7 x 3 11 x 66	1,1 – 1,4	4	5 - 10
Maße / dimensions	∅ x L	mm	12/13 x 75	13 x 75	12 x 82		8 x 66	12 x 60	16 x 100	16 x 125
Anzahl p. Rotor / number p. rotor			12	12	12	12	12	12	12	6
Drehzahl / speed	RPM		12000	12000	12000	12000	12000	12000	12000	12000
RZB / RCF	³⁾		13201	13201	13201	13201	13201	13040	16582	16582
Radius / radius	mm		82	82	82	82	82	81	103	103
 9 (97%)	sec	40								
 9	sec	40								
Temperatur / temperature	°C ¹⁾	- 2								
Probenerwärmung/Sample temp. rise	K ²⁾	14								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.

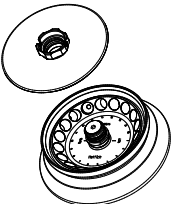

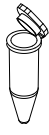


- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

1615								
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°								
								
Kapazität / capacity	ml	4,5 - 5	4,9	7,5 - 8,2	9 - 10	10		
Maße / dimensions	∅ x L	mm	11 x 92	13 x 90	15 x 92	16 x 92	15 x 102	
Anzahl p. Rotor / number p. rotor			12	12	12	12	12	
Drehzahl / speed	RPM		12000	12000	12000	12000	12000	
RZB / RCF	³⁾		16582	16582	16582	16582	16582	
Radius / radius	mm		103	103	103	103	103	
 9 (97%)	sec						40	
 9	sec						40	
 0	sec						840	
Temperatur / temperature	°C ¹⁾						- 2	
Probenerwärmung/Sample temp. rise	K ²⁾						14	

1615						6305	1063-6		
Winkelrotor 12-fach / Angle rotor 12-times  ∠ 35°									
									
Kapazität / capacity	ml	4 - 7	15	15		4	0,5	1,5	2,0
Maße / dimensions	∅ x L	mm	13 x 100	17 x 100	17 x 120		10 x 88	10,7 x 46	11 x 38
Anzahl p. Rotor / number p. rotor			12	12	6		12	12	
Drehzahl / speed	RPM					12000			
RZB / RCF	³⁾		16582	16582	16582		14006	11108	10947
Radius / radius	mm		103	103	103		87	69	68
 9 (97%)	sec						40		
 9	sec						40		
Temperatur / temperature	°C ¹⁾						- 2		
Probenerwärmung/Sample temp. rise	K ²⁾						14		

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.

1627							
Winkelrotor 18-fach / Angle rotor 18-times							
							
 mit Bioabdichtung / with bio-containment ⁵⁾							
							
Kapazität / capacity	ml	5					
Maße / dimensions	∅ x L mm	17 x 59					
Anzahl p. Rotor / number p. rotor		18					
Drehzahl / speed	RPM	14150					
RZB / RCF	³⁾	22161					
Radius / radius	mm	99					
 9 (97%)	sec	35					
 9	sec	32					
Temperatur / temperature	°C ¹⁾	2					
Probenerwärmung/Sample temp. rise	K ¹⁰⁾	20					

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

3) 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

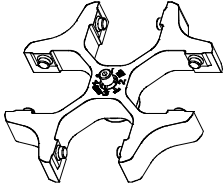

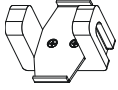

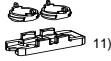










10) Bei einer Laufzeit länger als 10 min. beträgt die Probenerwärmung > 20°K (nur bei Zentrifuge ohne Kühlung)

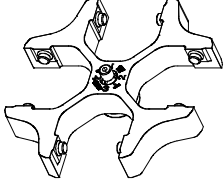

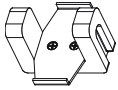







1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

3) 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".

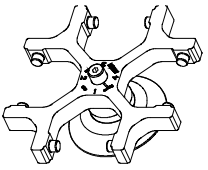
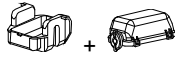

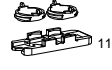










10) With running time longer than 10 min., the sample temp. rise up will be > 20°K (only with cooling centrifuges)

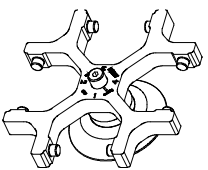
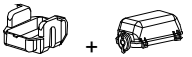

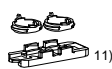









1494	1452								
Ausschwingrotor 4-fach / Swing out rotor 4-times  									
	1662						1670		
							 ¹¹⁾		
	1663	1664	1665	1666	1667	1668	1663	1664	
									
Kapazität / capacity	ml	1	2	4	8	3 x 2	4 x 1	1	2
Maße / dimensions \varnothing / A	mm ²	6,2 / 30	8,7 / 60	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	6,2 / 30	8,7 / 60
Anzahl p. Rotor / number p. rotor		4	4	4	4	4	4	4	4
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692
Drehzahl / speed	RPM	5000							
RZB / RCF	³⁾	2879							
Radius / radius	mm	103							
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	°C ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	12							

1494	1452								
Ausschwingrotor 4-fach / Swing out rotor 4-times  									
	1670								
	 ¹¹⁾								
	1665	1666	1667	1668					
									
Kapazität / capacity	ml	4	8	3 x 2	4 x 1				
Maße / dimensions \varnothing / A	mm ²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30				
Anzahl p. Rotor / number p. rotor		4	4	4	4				
Filterkarten / filter cards		1692	1691	1694	1693				
Drehzahl / speed	RPM	5000	5000	5000	5000				
RZB / RCF	³⁾	2879	2879	2879	2879				
Radius / radius	mm	103	103	103	103				
 9 (97%)	sec	30							
 9	sec	32							
Temperatur / temperature	°C ¹⁾	- 10							
Probenerwärmung/Sample temp. rise	K ²⁾	12							

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
 - 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
 - 3) Angaben des Röhrchenherstellers beachten.
- 11) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
 - 3) Observe the tube manufacturer's instructions.
- 11) Object slide will not stand RCF values exceeding 1100

1624		1660 + 1661							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$									
		1662						1670	
								 ¹¹⁾	
		1663	1664	1665	1666	1667	1668	1663	1664
									
Kapazität / capacity	ml	1	2	4	8	3 x 2	4 x 1	1	2
Maße / dimensions \varnothing / A	mm ²	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		4	4	4	4	4	4	4	4
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692
Drehzahl / speed	RPM	4000							
RZB / RCF	³⁾	1646							
Radius / radius	mm	92							
 9 (97%)	sec	20							
 9	sec	25							
Temperatur / temperature	°C ¹⁾	- 16							
Probenerwärmung/Sample temp. rise	K ²⁾	3							

1624		1660 + 1661				1680		
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$								
		1670				1662		
		 ¹¹⁾						
		1665	1666	1667	1668	1671	1672	1673
								
Kapazität / capacity	ml	4	8	3 x 2	4 x 1	[1] 0,5	[1] 0,5	[1] 0,5
Maße / dimensions \varnothing / A	mm ²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	6,2 / 30	8,7 / 60	12,4 / 120
Anzahl p. Rotor / number p. rotor		4	4	4	4	4	4	4
Filterkarten / filter cards		1692	1691	1694	1693	[1] 1696	[1] 1697	[1] 1698
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	1646	1646	1646	1646	1467	1467	1467
Radius / radius	mm	92	92	92	92	82	82	82
 9 (97%)	sec	20						
 9	sec	25						
 0	sec	390						
Temperatur / temperature	°C ¹⁾	- 16						
Probenerwärmung/Sample temp. rise	K ²⁾	3						

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

2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) Angaben des Röhrchenherstellers beachten.

11) Objektträger nur belastbar bis RZB 1100

[1] Einschritt-Methode

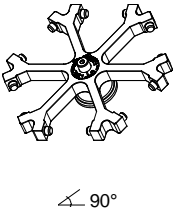
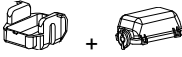

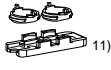








1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

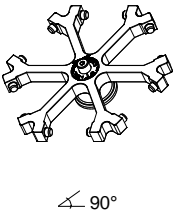
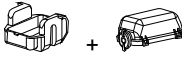

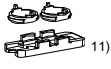








2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

3) Observe the tube manufacturer's instructions.

11) Object slide will not stand RCF values exceeding 1100

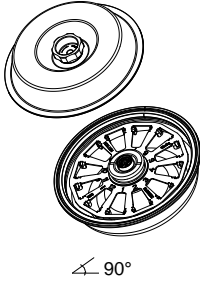
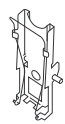
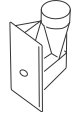
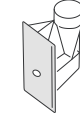



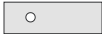




[1] One-step method

1626	1660 + 1661								
Ausschwingrotor 6-fach / Swing out rotor 6-times  ∠ 90°									
	1662 						1670  ¹¹⁾		
	1663	1664	1665	1666	1667	1668	1663	1664	
									
Kapazität / capacity	ml	1	2	4	8	3 x 2	4 x 1	1	2
Maße / dimensions	∅ / A	mm ²	6,2 / 30	8,7 / 60	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	8,7 / 60
Anzahl p. Rotor / number p. rotor		6	6	6	6	6	6	6	6
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692
Drehzahl / speed	RPM	4000							
RZB / RCF	³⁾	2039							
Radius / radius	mm	114							
9 (97%)	sec	20							
9	sec	22							
Temperatur / temperature	°C ¹⁾	- 16							
Probenerwärmung/Sample temp. rise	K ²⁾	7							

1626	1660 + 1661				1680					
Ausschwingrotor 6-fach / Swing out rotor 6-times  ∠ 90°										
	1670  ¹¹⁾				1662 					
	1665	1666	1667	1668	1671	1672	1673			
										
Kapazität / capacity	ml	4	8	3 x 2	4 x 1		[1] 0,5	[1] 0,5	[1] 0,5	
Maße / dimensions	∅ / A	mm ²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30		6,2 / 30	8,7 / 60	12,4 / 120
Anzahl p. Rotor / number p. rotor		6	6	6	6		6	6	6	
Filterkarten / filter cards		1692	1691	1694	1693		[1] 1696	[1] 1697	[1] 1698	
Drehzahl / speed	RPM	4000	4000	4000	4000		4000	4000	4000	
RZB / RCF	³⁾	2039	2039	2039	2039		1842	1842	1842	
Radius / radius	mm	114	114	114	114		103	103	103	
9 (97%)	sec	20								
9	sec	22								
0	sec	330								
Temperatur / temperature	°C ¹⁾	- 16								
Probenerwärmung/Sample temp. rise	K ²⁾	7								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 11) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 11) Object slide will not stand RCF values exceeding 1100

1515-A		1524						
<p>Rotor 12-fach</p>  <p>∠ 90°</p>								
		1531 / 1534 ¹²⁾	1532 ¹²⁾	1536 ¹²⁾	1538 ¹²⁾			
								
				1537 ¹²⁾	1539 ¹²⁾			
								
Kapazität / capacity	ml	0,5	0,2	6 ¹³⁾	0,5			
Maße / dimensions Ø / A	mm ²	6 / 28,3	6 / 28,3	-	6 / 28,3			
Maße (L x B) / dimensions (L x W)	mm	-	-	13,4 x 22	-			
Anzahl p. Rotor / number p. rotor		12						
Drehzahl / speed	RPM	2000						
RZB / RCF	³⁾	438						
Radius / radius	mm	98						
 9 (97%)	sec	19						
 9	sec	18						
Temperatur / temperature	°C ¹⁾	- 10						
Probenerwärmung/sample temp. rise	K ²⁾	3						

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

2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) 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) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

3) Observe the tube manufacturer's instructions.

12)	Bestell-Nr. / Cat. No.	Menge / Quantity	Bestell-Nr. / Cat. No.	Menge / Quantity
	1531, 1532	50 St. / 50 pcs.	1536, 1538	12 St. / 12 pcs.
	1534	500 St. / 500 pcs.	1539	200 St. / 200 pcs.
	1537	100 St. / 100 pcs.		

13) Dies ist das maximale Fassungsvermögen, die empfohlene Füllmenge der Kammern beträgt 4 ml.

13) This is the maximum capacity. The recommended quantity to be used per chamber is 4 ml.