

ROTINA 420 / 420 R



Inhalt des Dokuments / content of the document

Operating instructions (EN)

Rotoren und Zubehör / Rotors and accessories

Operating instructions

ROTINA 420 / 420 R



Translation of the original operating instructions

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1 About this document

1.1 Use of this document

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

1.2 Gender reference

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

1.3 Symbols and labels in this document

General symbols

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

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

2 Safety

2.1 Intended use

Intended use

The centrifuge **ROTINA 420 / 420 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	ROTINA 420	
Type	4701	4701-01
Mains voltage ($\pm 10\%$)	200-240 V 1~	100-127 V 1~
Mains frequency	50-60 Hz	50-60 Hz
power consumption	870 VA	900 VA
Power consumption	4.3 A	9.0 A
max. capacity	4 x 600 ml	
max. permissible density	1.2 kg/dm ³	
max. speed (RPM)	15000	
max. acceleration (RCF)	24400	
max. kinetic energy	24000 Nm	
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	yes	

Ambient conditions (EN / IEC 61010-1):

Installation site	indoors only
Altitude	up to 2000 m above sea level
Ambient temperature	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)	≤63 dB(A)	

Dimensions:

Width	506 mm		
Depth	650 mm		
Altitude	423 mm		
Weight	approx. 75 kg	approx. 84 kg	

Manufacturer	Andreas Hettich GmbH & Co. KG, D-78532 Tuttlingen			
Model	ROTINA 420 R			
Type	4706, 4706-20, 4706-50	4706-07	4706-01	
Mains voltage (±10%)	200-240 V 1 ~		100-127 V 1 ~	100 V 1 ~
Mains frequency	50 Hz	60 Hz	60 Hz	50 Hz
power consumption	1600 VA	1300 VA	1850 VA	
Power consumption	7.5 A		16.0 A	
Refrigerant	R452A			
max. capacity	4 x 600 ml			
max. permissible density	1.2 kg/dm³			

max. speed (RPM)	15000		
max. acceleration (RCF)	24400		
max. kinetic energy	24000 Nm		
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	yes		
Ambient conditions (EN / IEC 61010-1):			
Installation site	indoors only		
Altitude	up to 2000 m above sea level		
Ambient temperature	5 °C to 35 °C		
Humidity	maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.		
IP ratings	IP 20		
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)	≤58 dB(A)	≤64 dB(A)	≤58 dB(A)
Dimensions:			
Width	713 mm		
Depth	654 mm		
Altitude	423 mm		
Weight	approx. 107.5 kg 109 kg (4706-50)		approx. 117 kg

Rating plate

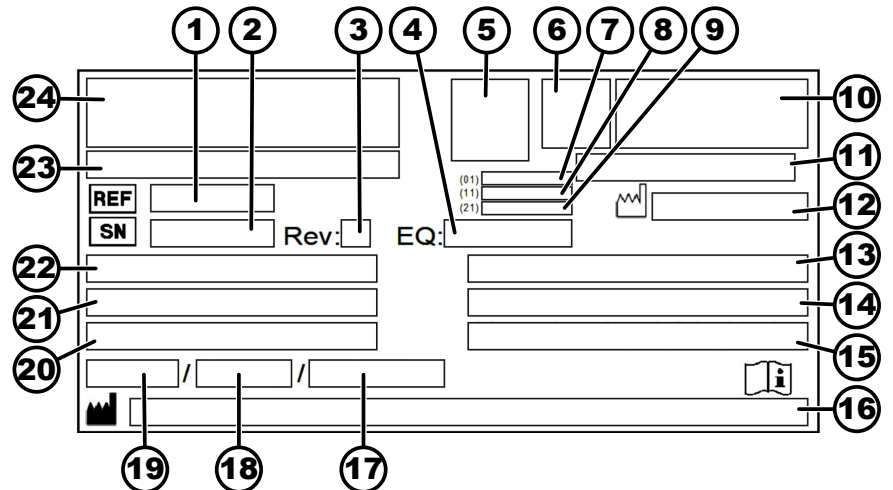


Fig. 1: Rating plate

- 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

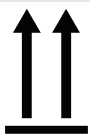
Basic-UDI-DI

040506740100159V

Device assignment

ROTINA 420 / 420 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.



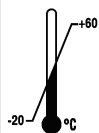
FRAGILE GOODS

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



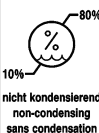
PROTECT FROM MOISTURE

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.



Warning: hot surface.

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



Warning against excessive temperature.

Plastic suspension may only be used at temperatures up to a maximum of 40 °C / 104 °F.

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



Direction of rotation of the rotor.

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



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

Use in European Union countries, Norway and Switzerland.



The centrifuge is equipped with an RS232 interface.

The RS232 interface is marked with a symbol.

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



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



Automatic circuit breaker

3.5 Operating and indicator elements

3.5.1 Control

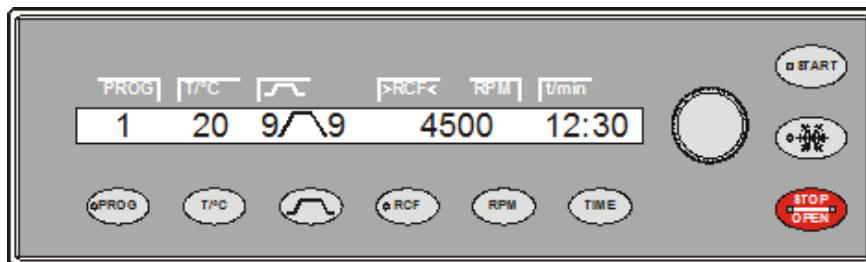


Fig. 2: Control (device with cooling)

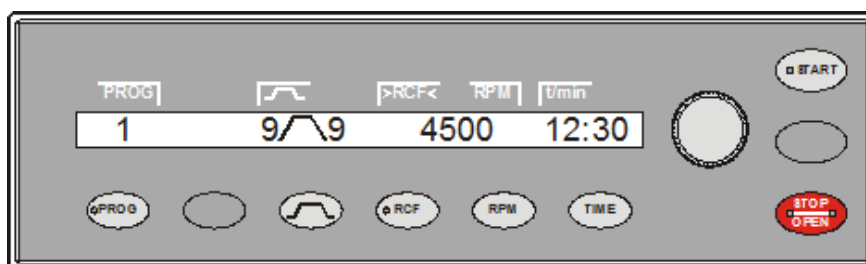


Fig. 3: Control (device without cooling)

3.5.2 Indicator elements



Fig. 4: [Cooling] button

- The button flashes until the rotor is read in.
- The button lights up during the centrifugation run to pre-cool the rotor for as long as the rotor is not yet at a standstill.



Fig. 5: [PROG] button

- The button lights up when data communication is taking place.



Fig. 6: [RCF] button

- The button lights up when the RCF is displayed.



Fig. 7: [START] button

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



Fig. 8: [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. 9: [Rotary knob]

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



Fig. 10: [Mains switch]



Fig. 11: [Ramp-up and ramp-down parameters] button



Fig. 12: [Cooling] button



Fig. 13: [PROG] button



Fig. 14: [RCF] button

- Switch the device on and off.
- Ramp-up levels, parameters
Level 9 = shortest ramp-up time, Level 1 = longest ramp-up time.
- Ramp-up time, parameters
Adjustable in 1 second increments.
- Brake levels, parameters
1-9 = Linear braking curve
Level 9 = shortest ramp-down time, ...Level 1 = long ramp-down time,
Level 0 = unbraked ramp-down.
- Ramp-down time, parameters
Adjustable in 1 second increments.
- Brake cut-off speed, parameter N Brake
Adjustable from 50 RPM to the maximum rotor speed ($N_{\max}$), in increments of 10. Unbraked ramp-down takes place after reaching this speed.
- Start centrifugation run to pre-cool the rotor (only for devices with cooling).
- Centrifugation run, for pre-cooling of the rotor, takes place automatically with the PREC program (PRECOOLING).
- Retrieve programs and program links, parameter RCL (Recall).
Programs: Program locations 1 to 99. Program links: Program locations A to Z.
- Save programs and program links, parameter STO (Store).
99 programs can be stored (program locations 1 to 99).
Program location 0 serves as a buffer for the centrifugation data of the last centrifugation run. No programs can be stored in this program location.
25 program links can be stored (program locations A to Z, program location J does not exist). A program link can consist of 20 programs.
- Link programs, parameter EDIT.
- Open the 'Machine Menu'.
- Scroll forward in the menus.
- Relative centrifugal force, parameter RCF.
The RCF is displayed in brackets > <.
A numerical value can be set that gives a speed between 50 RPM and the maximum rotor speed ($N_{\max}$).
Adjustable in 1 second increments.
- Centrifuging radius, parameter RAD.
Adjustable from 10 mm to 330 mm, in 1 millimetre increments.
- Querying the integral RCF.
The integral RCF can only be queried if the integral RCF indicator is enabled.
- Switch to RCF value.



Fig. 15: [RPM] button

- Speed, parameter RPM.
Adjustable from 50 RPM to the maximum rotor speed ($N_{\max}$), in increments of 10.
- Switch to RPM value.



Fig. 16: [START] button

- Start centrifugation runs.
- Save entries and changes.
- Go to 'Machine Menu' and open the submenus.



Fig. 17: [T/°C] button

- Temperature (for centrifuges with cooling)
Adjustable in degrees Celsius (°C) or degrees Fahrenheit (°F).
Parameter T/°C=degrees Celsius (°C). Adjustable from -20°C to +40°C, in 1°C increments.
Parameter T/°F=degrees Fahrenheit (°F). Adjustable from -4°F to +104°F, in 1°F increments.
The lowest achievable temperature is rotor dependent.
- Temperature (for centrifuges with heating)
Enable or disable heating, parameter Heater.
- Scroll backward in the menus (the button is blank for centrifuges without cooling).



Fig. 18: [TIME] button

- Runtime, parameter t/hms.
h: Hours. from 1 h to 99 h, in 1 hour increments.
m: Minutes. from 1 min to 59 min, in 1 minute increments.
s: Seconds. from 1 s to 59 s, in 1 second increments.
- Continuous operation "∞"
- Set the start of the runtime count.



Fig. 19: [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 grease for the trunnions
- 1 Hex key (5 mm x 170)
- 1 right-angled hex key (2.5 mm)
- 1 6-lobe (Torx) pin key wrench, short (T20 SG)
- 1 power cable
- 3 Cheese head screws M6 x 110
- 3 Spacer rollers

- 1 user manual
- 1 instruction sheet, transport lock

Additionally for delivery in Germany:

- 1 inspection book

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

3.8 Returns

An original Return Material Authorisation (RMA) form from the manufacturer must always be requested for a return. Secure and reliable acceptance and booking in of the goods with the manufacturer is not possible without an original RMA form from the manufacturer. The Return Material Authorisation (RMA) form contains a Declaration of No Objection (UBE), which must be completed in full and enclosed with the return.

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

The original transport locks must be attached for return shipment, see ➔ *Chapter 4 'Transport and storage' on page 19*. 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

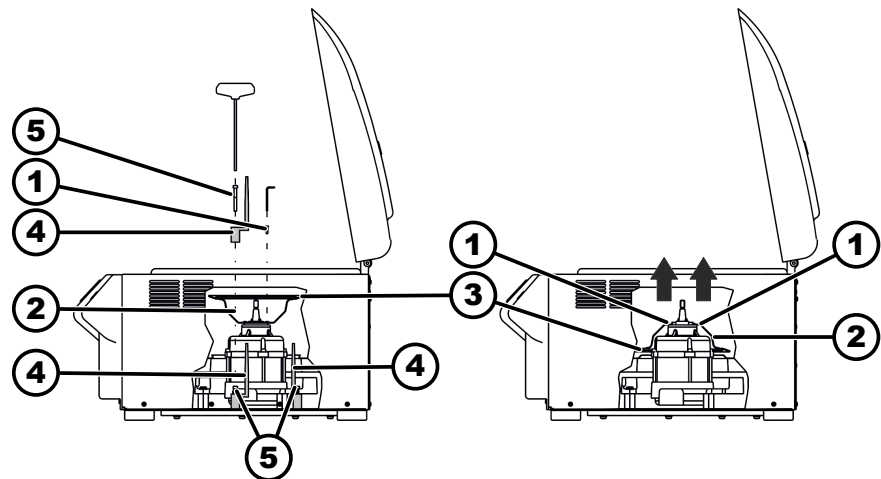


Fig. 20: Transport lock

- 1 Screws
- 2 Motor cover
- 3 *Bellows (only for centrifuges with cooling)
- 4 Transport lock
- 5 Transport lock screws
- 6 Spacer sleeve

1. ➤ Open the lid.
2. ➤ Unscrew the motor cover (2).
3. ➤ For ROTINA 420 R:
Remove the bellows (3).
4. ➤ Insert 3 transport locks (4) and 3 spacer sleeves (6) and screw them on using the 3 transport lock screws (5)
5. ➤ Turn over the motor cover (2) and insert it.
6. ➤ Screw in 4 screws (1).
7. ➤ For ROTINA 420 R:
Put the bellows (3) over the edge of the engine cover (2).

5 Commissioning

5.1 Unpacking the centrifuge

**CAUTION**

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

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

**CAUTION**

Risk of injury from lifting heavy loads.

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

**NOTICE**

Damage to the device due to improper lifting.

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

Personnel:

- Trained user

1. ➤ If present: Remove the packaging tapes.
2. ➤ Lift the box up and remove the padding.
3. ➤ Remove the accessories and store them safely.
4. ➤ Place the device on a stable and level surface.

5.2 Remove the transport lock

Personnel:

- Trained user

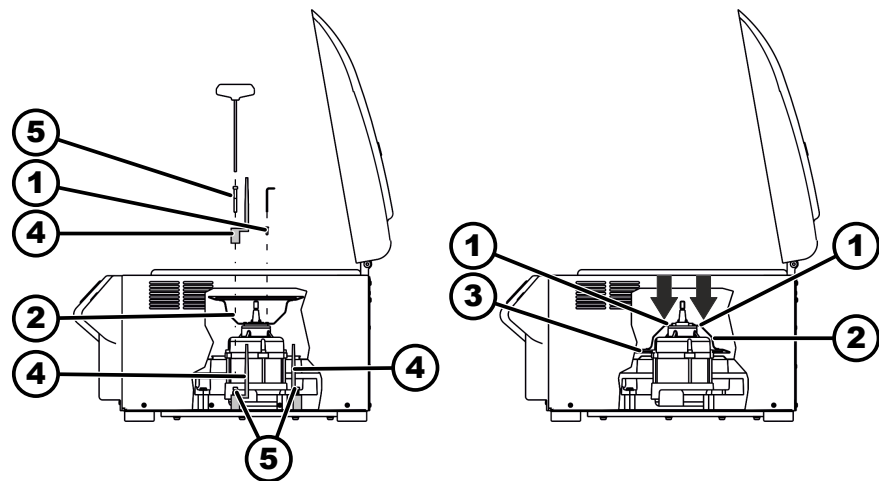


Fig. 21: Transport lock

- 1 Screws
- 2 Motor cover
- 3 *Bellows (only for centrifuges with cooling)
- 4 Transport lock
- 5 Transport lock screws
- 6 Spacer sleeve

1. ➤ Open the lid.
2. ➤ Unscrew 4 screws (1).
3. ➤ Remove the motor cover (2).
4. ➤ Unscrew 3 transport lock screws (5).
5. ➤ Remove the transport lock screws (5), spacer sleeves (6) and transport locks (4) and store them safely.
6. ➤ Turn over the motor cover (2) and insert it. Note the recess for the cable.
7. ➤ For ROTINA 420 R:
Push the bellows (3) over the edge of the centrifuging chamber.
8. ➤ Screw in 4 screws (1).

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 10).

Connecting the centrifuge



NOTICE

Damage to the device by unauthorised personnel

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



NOTICE

Damage to the device due to condensation.

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

- Warm the device up for at least 3 hours in a warm room before connecting it to the mains.
or
- Warm up for 30 minutes in a cold room.

Personnel:

- Trained user

1. ➤ 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. ➤ Centrifuge with serial interface:
Connect the centrifuge's RS232 interface to the PC using an RS232 connection cable.
3. ➤ Centrifuge with PE connector:
If necessary, connect the PE connector on the back of the device to an additional medical potential equalisation system.
4. ➤ For the centrifuge, order no. 4706-20: connect the nitrogen supply according to the enclosed instruction sheet AH4706-20XX.
5. ➤ Check whether the mains voltage matches the specification on the rating plate.
6. ➤ 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
- the program version and mains voltage
- the rotor code (Rotor), the maximum rotor speed (Nmax) and the centrifuging radius (R) of the last rotor recognised by the rotor detection.

The centrifuging radius displayed is a default value that must be adjusted depending on the accessories used.

- When the lid is closed: 'OPEN OEFFNEN' indicator
- When the lid is open: The centrifugation data of the last program used or program 1.

Immediate display of centrifugation data after switching on

1. ➤ Set the mains switch to *///*.

2. ➤ Press and hold any button at the first visual change in the display (inverse display).

- ➡ Centrifugation data is displayed.

Switching off the centrifuge

The rotor is stationary.

➤ Set the mains switch to */0/*.

6 Operation

6.1 Opening and closing the lid

Opening the lid

Personnel:

- Trained user

The centrifuge is switched on

The rotor is stationary.

- ➔ Press the *[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

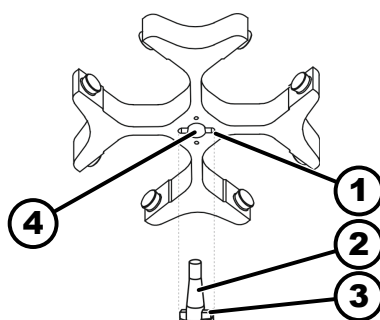


Fig. 22: Rotor installation and removal

- 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 52.
3. ➤ Place the rotor vertically on the motor shaft (2).
The driver (3) of the motor shaft must be in the groove (1) of the rotor. The orientation of the groove is marked on the rotor.
4. ➤ Hand-tighten the rotor clamping nut using the supplied spanner.
5. ➤ Check that the rotor is firmly seated.

6.3 Inserting and removing buckets

Inserting buckets



NOTICE

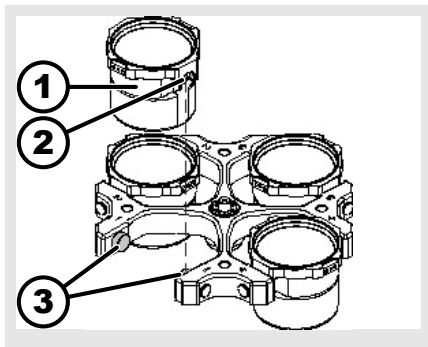
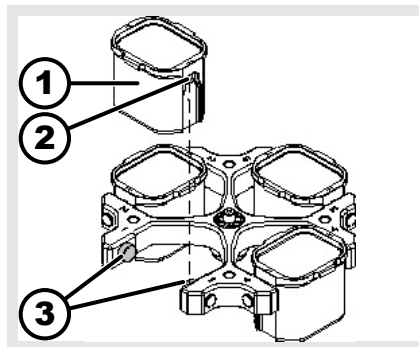
Damage to the device due to imbalances caused by incorrect loading of the rotor.

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



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

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



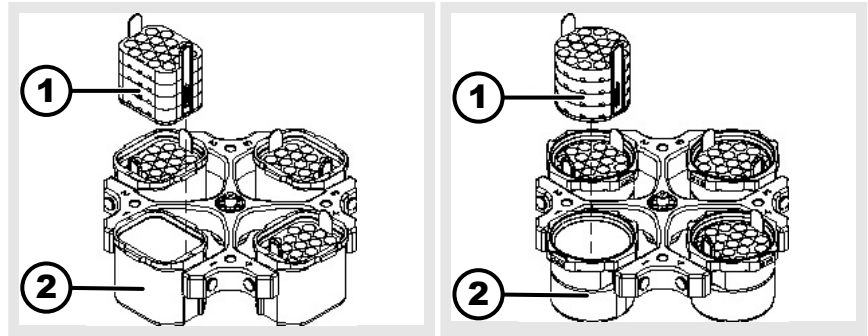
1. ➤ Check that the rotor is firmly seated.
2. ➤ Grease the trunnions (3).
3. ➤ Insert the bucket (1) into the rotor from above. The trunnions (3) must be in the grooves (2).
4. ➤ Push the bucket (1) down as far as it will go.

Removing the bucket

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

6.4 Inserting and removing adapters

Inserting



the adapter

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

removing

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

6.5 Loading

Filling centrifuge tubes



WARNING

Risk of injury from contaminated sample material.

Contaminated sample material escapes from the sample tube during centrifugation.

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



NOTICE

Damage to the device due to highly corrosive substances.

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

- Do not centrifuge highly corrosive substances.



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

Personnel:

- Trained user

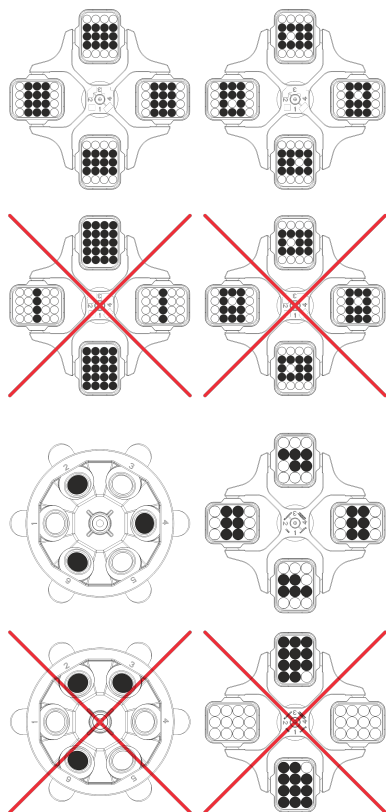
➔ Fill centrifuge tubes outside the centrifuge.

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

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

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

Loading the swing-out rotors



Personnel:

- Trained user

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

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

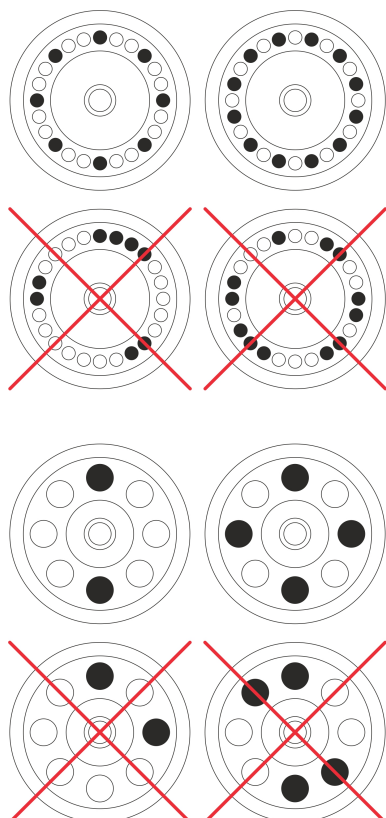
No liquid must be allowed to enter the buckets and the centrifuging chamber when loading the buckets and swinging them out during the centrifugation run.

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

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

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

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

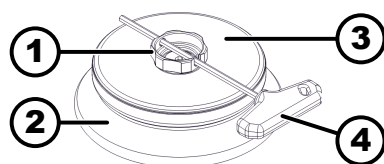


Fig. 23: Biosafety system

- 1 Rotary handle
- 2 Rotor
- 3 Lid
- 4 Key

Closing

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

Opening

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

6.6.3 Lid with screw cap

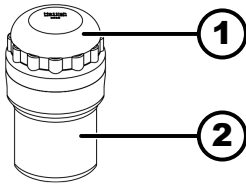


Fig. 24: Biosafety system

- 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, seconds and hours on '0' or retrieve a continuously running program.
2. ➤ Press the *[START]* button.
 - The centrifugation run is started.
 - The *[START]* button flashes until the rotor is read in.
 - The *[START]* button lights up during the centrifugation run.
 - The timing starts at '00:00'.
 - The rotor speed or the resulting 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 end the centrifugation run.
 - Ramp-down takes place with the selected ramp-down parameter.
 - The ramp-down parameter 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]* button and the right side of the *[STOP/OPEN]* button go out.

6.7.2 Centrifugation with time preselection

Personnel:

- Trained user

1. ➤ Set centrifugation parameters or retrieve a program or a program link.

2. ➤ Press the *[START]* button.
 - The centrifugation run is started.

The *[START]* button flashes until the rotor is read in.

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

The rotor speed or the resulting 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 ramp-down parameter after the time has elapsed or if the centrifugation run is cancelled.
 - The ramp-down parameter 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]* 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]* button.
 - The *[START]* button flashes until the rotor is read in.

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

Timing starts at 00:00.

The rotor speed or the resulting 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]* button to end the centrifugation run.
 - The ramp-down parameter 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]* button and the right side of the *[STOP/OPEN]* button go out.

6.7.4 Changing settings during centrifugation

It is not possible to change settings during centrifugation when working with program links or when a program lock has been set.

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

- ➞ Change the value of the desired parameter.
 - ➡ The values of the current program are copied to program location '0' and updated with the changed value.

The original program is not overwritten.

The program location number is displayed in brackets '()'. The centrifugation data in the indicator does not match the stored centrifugation data of the program location.

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.

If brake level "0" is preselected, ramp-down takes place with brake level "9d". With brake level "9d", the ramp-down time is longer than with brake level "9".

7 Software operation

7.1 Centrifugation parameters

7.1.1 Ramp-up and ramp-down parameters



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

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

y: 1-9 = brake level, 0 = unbraked ramp-down, t = ramp-down time

Ramp-up level and ramp-up time

The 'Ramp-up time' function is enabled.

1. ➞ Press the *[Ramp-up and ramp-down parameters]* button.
 - ➡ The ramp-up level parameter or ramp-up time parameter is displayed.
2. ➞ Press the *[TIME]* button to toggle between the ramp-up level and the ramp-up time.
3. ➞ Use the *[Rotary knob]* to set the desired level or time.
4. ➞ If required: Press the *[Ramp-up and ramp-down parameters]* button to set the next parameter.
5. ➞ Press the *[START]* button.

or

Press the *[Ramp-up and ramp-down parameters]* button repeatedly until the centrifugation data is displayed.

Brake level and ramp-down time

The 'Ramp-down time' function is enabled.

1. ➞ Press the *[Ramp-up and ramp-down parameters]* button repeatedly until the 'Brake level' parameter or the 'Ramp-down time' parameter is displayed.
2. ➞ Press the *[TIME]* button to toggle between the brake level and the ramp-down time.
3. ➞ Use the *[Rotary knob]* to set the desired level or time.

4. ➤ If required: Press the *[Ramp-up and ramp-down parameters]* button to set the next parameter.
5. ➤ Press the *[START]* button.
or
Press the *[Ramp-up and ramp-down parameters]* button repeatedly until the centrifugation data is displayed.

Brake cut-off speed

1. ➤ Press the *[Ramp-up and ramp-down parameters]* button repeatedly until the '*N Brake*' parameter is displayed.
2. ➤ Use the *[Rotary knob]* to set the desired value.
3. ➤ The *[Ramp-up and ramp-down parameters]* button
or
Press the *[START]* button.
➤ Settings are shown in the indicator.

7.1.2 Runtime TIME

Changing the runtime



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

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

1. ➤ Press the *[TIME]* button.
➤ '*t/hms*' is displayed.
The minutes are displayed in brackets < >.
2. ➤ Use the *[Rotary knob]* to set the desired value.
3. ➤ Press the *[TIME]* button.
➤ The seconds are displayed in brackets < >.
4. ➤ Use the *[Rotary knob]* to set the desired value.
5. ➤ Press the *[TIME]* button.
➤ The hours are displayed in brackets < >.
6. ➤ Use the *[Rotary knob]* to set the desired value.
7. ➤ Press the *[START]* button.
or
Press the *[TIME]* button repeatedly until the centrifugation data is displayed.
➤ Settings are shown in the indicator.

Start of runtime count

- The '*Dual time mode*' function is enabled. The function is enabled ex works.
1. ➤ Press the *[TIME]* button repeatedly until '*Timing begins at Start*' or '*Timing begins at Speed*' is displayed.

2. ➤ Use the *[Rotary knob]* to select the desired setting.
 - *'Timing begins at Start'* = Runtime counting begins after the start of the centrifugation run.
 - *'Timing begins at Speed'* = Timing of the runtime starts after the set speed is reached.
This is indicated by the *'f'* symbol in the indicator to the left of the time.
3. ➤ Press the *[TIME]* button.
or
Press the *[START]* button.
 - ➡ Settings are shown in the indicator.

7.1.3 Speed, RPM

1. ➤ Press the *[RPM]* button.
 - ➡ The *'RPM'* parameter is displayed.
2. ➤ Use the *[Rotary knob]* to set the desired value.
3. ➤ Press the *[RPM]* button or the *[START]* button.
 - ➡ The setting is transferred to the indicator.

7.1.4 Integral RCF

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

Querying integral RCF



The integral RCF is not saved. The integral RCF is deleted after starting the next centrifugation run or switching off the device.

If the 'Timing begins at Speed' function is selected, calculation of the integral RCF only starts after the set speed has been reached.

- Integral RCF is enabled.
1. ➤ Press the *[RCF]* button repeatedly until the integral RCF is displayed.
 2. ➤ Press the *[RCF]* button.
 - ➡ The centrifugation data is displayed.
 3. ➤ If necessary, press the *[RPM]* button.
 - ➡ The RPM is displayed.

Enabling or disabling integral RCF

1. ➤ Press and hold the *[PROG]* button.
 - ➡ ****Machine Menu**** is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until *'-> Settings'* is displayed.
3. ➤ Press the *[START]* button.
 - ➡ *'SOUND / BELL = on'* or *'SOUND / BELL = off'* is displayed.
4. ➤ Press the *[PROG]* button repeatedly until *'RCF Integral = on'* or *'RCF Integral = off'* is displayed.
5. ➤ Use *[Rotary knob]* to set *'off'* or *'on'*.
off = integral RCF disabled
on = integral RCF enabled.

6. ➤ Press the *[START]* button.
 - The setting is stored.
 - 'Store Settings ...' is displayed briefly
 - '-> Settings' is then displayed.
7. ➤ Press the *[OPEN/STOP]* button once to exit the 'Settings menu' or
Press the *[OPEN/STOP]* button twice to exit the 'Machine Menu'.

7.1.5 Temperature (for centrifuges with cooling)

1. ➤ Press the *[T/°C]* button.
 - The parameter T/°C or T/°F is displayed.
2. ➤ Use the rotary knob to set the desired value.
3. ➤ Press the *[T/°C]* button or the *[START]* button.
 - The setting is transferred to the indicator.

7.1.6 Relative centrifugal force, RCF

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

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

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

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

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

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.

7.1.7 Relative centrifugal force RCF and centrifuging radius RAD

The relative centrifugal force RCF is dependent on the centrifuging radius RAD. The centrifuging radius must be set before setting the relative centrifugal force.

1. ➤ Press the *[RCF]* button repeatedly until the 'RAD', 'RCF' parameters are displayed and the value of the 'RAD' parameter is displayed in brackets < >.
 - The *[RCF]* button lights up.
2. ➤ Use the *[Rotary knob]* to set the desired centrifuging radius.
The value of the RCF adjusts automatically when the centrifuging radius is changed.
3. ➤ Press the *[RCF]* button.
 - The value of the 'RCF' parameter is displayed in brackets < >
4. ➤ Use the *[Rotary knob]* to set the desired 'RCF'.

5. ➤ Press the *[PROG]* button.
 - ➡ The set RCF value is saved.

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

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

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

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

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

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

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

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

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

Please contact the manufacturer if you are not sure.

7.2 Programming

7.2.1 Write protection for programs

Write protection can be enabled or disabled when the rotor is at a standstill.

1. ➤ Open the desired program.
2. ➤ Press the *[PROG]* button.
 - ➡ The RCL parameter is displayed.
3. ➤ Press and hold the *[PROG]* button.
 - ➡ The STO parameter is displayed.
 - 'Set Protection = 1-' is displayed after 8 seconds.
4. ➤ Use *[Rotary knob]* to set '+' or '-'.
 - + = The program is write-protected
 - = The program is not write-protected
5. ➤ Press the *[START]* button.
 - ➡ The setting is stored.

7.2.2 Opening or loading programs

1. ➤ Press the *[PROG]* button.
 - ➡ The RCL parameter is displayed.

2. ➤ Use the *[Rotary knob]* to set the desired program location.
3. ➤ Press the *[START]* button.
 - *'Program recall...'* is displayed briefly.
 - The centrifugation data of the desired program location is displayed

7.2.3 Entering or changing programs



The previous data in the program location is overwritten upon saving.

If "Protected !!" is displayed, the data in the program location is write-protected and saving is not possible.

1. ➤ Set the desired parameters.
2. ➤ Press the *[PROG]* button repeatedly until the *'STO'* parameter is displayed.
3. ➤ Use the *[Rotary knob]* to set the desired program location.



If a "+" is displayed after the program location, the data is write-protected.

The write protection must be removed before data can be saved.

4. ➤ Press the *[START]* button.
 - Settings are stored in the desired program location.
 - 'Program store...'* is displayed briefly.

7.2.4 Automatic buffer

The centrifugation data is temporarily stored at program location *'0'* and can be retrieved after each start of a centrifugation run.

No programs can be stored in program location *'0'*.

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 (Rotor), the maximum rotor speed (Nmax) and the centrifuging radius (R) of the newly detected rotor are displayed.
- If the maximum speed of the rotor used is less than the set speed, the speed is limited to the maximum rotor speed.
In this case, the program location number is displayed in brackets *'()*'.
- If the cycle counter is enabled, the number of completed run cycles (centrifugation runs) of the rotor code used is displayed briefly after opening the lid.

7.4 Cooling (for centrifuges with cooling)

7.4.1 Instructions, cooling

The temperature setpoint can be adjusted from -20 °C to +40 °C or from -4 °F to +104 °F.

For centrifuges with the heating/cooling option, the temperature setpoint can be adjusted from -20 °C to +90 °C or from -4 °F to +194 °F .

The lowest achievable temperature is rotor dependent.

7.4.2 Standby cooling

When the rotor is at a standstill and the lid is closed, the centrifuging chamber is cooled to the preselected temperature if this is less than 20 °C or 68 °F.

The preselected temperature is displayed during standby cooling.

7.4.3 Precooling the rotor

For rapid pre-cooling of the unloaded rotor and accessories, we recommend a centrifugation run with the continuous run settings and a speed of

- Swing-out rotor: approx. 20% of the maximum rotor speed used.
- Angle rotor: approx. 40% of the maximum rotor speed used.

The centrifugation run, for precooling of the rotor, takes place automatically with the PREC program (PRECOOLING).

A centrifugation run, for precooling the rotor, cannot be executed when working with program links.

The rotor is stationary.

1. ➤ Press the *[Cooling]* button.

- The button flashes until the rotor is read in for precooling.

The button lights up once the rotor has been read in.

The rotor speed or the resulting RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the remaining or elapsed time are displayed during the centrifugation run.

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.

7.4.4 Delayed cooling

If required, the settings can be adjusted so that cooling takes place with a time delay after the centrifugation run has started. The delay time is adjustable from 15 to 900 seconds, in 1 second increments. No delay time is set ex works.

1. ➤ Press and hold the *[PROG]* button.

- '***Machine Menu***' is displayed after 8 seconds.

2. ➤ Press the *[PROG]* button repeatedly until '*-> Settings*' is displayed.

3. ➤ Press the *[START]* button.

- '*SOUND / BELL = on*' or '*SOUND / BELL = off*' is displayed.

4. ➤ Press the *[PROG]* button repeatedly until '*Cool acc time = 0*' is displayed.

5. ➤ Use the *[Rotary knob]* to set the desired value.

0 = no delay time

6. ➤ Press the *[START]* button.
 - The setting is stored.
 - 'Store Settings...' is displayed briefly.
 - '-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu'
or
Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

7.4.5 Preventing cooling from switching on during ramp-down

The settings can be adjusted so that the cooling no longer switches on during the ramp-down at the end of the centrifugation run after reaching a set speed.

This can prevent any potential stirring up of sediments in the sample.

This speed can be set from 0 RPM up to the maximum rotor speed (Nmax) in increments of 10 RPM.

1. ➤ Press and hold the *[PROG]* button.
 - '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
 - 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.
4. ➤ Press the *[PROG]* button repeatedly until 'Cool dec speed = ... rpm' is displayed.
5. ➤ Use the *[Rotary knob]* to set the desired value.
6. ➤ Press the *[START]* button.
 - The setting is stored.
 - 'Store Settings...' is displayed briefly.
 - '-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu'
or
Press the *[STOP/OPEN]* button twice to exit the '***Machine Menu***'.

7.4.6 Temperature monitoring

Temperature monitoring is used to protect temperature-sensitive samples.

The temperature is monitored after reaching the set temperature range. The target temperature range is set to target temperature $\pm 3^{\circ}\text{C}$.

The centrifugation run is aborted and the error message ' $^{\circ}\text{C}/ * -\text{ERROR } 58.6$ ' is displayed if the temperature in the centrifuging chamber exceeds the set temperature by the value 'Error 58 Temp' for more than 2 minutes.

The centrifugation run is aborted and the error message ' $^{\circ}\text{C}/ * -\text{ERROR } 58.7$ ' is displayed if the temperature in the centrifuging chamber falls below the set temperature by the value 'Error 58 Temp' for more than 2 minutes.

1. ➤ Press and hold the *[PROG]* button.
 - '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
 - 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.

4. ➤ Press the *[PROG]* button repeatedly until 'Error 58 Temp 15 °C' is displayed.
5. ➤ Use the *[Rotary knob]* to set the desired value.
Adjustable from 4 °C to 25 °C, in 1 °C increments, as well as the "disabled" setting. Temperature monitoring is deactivated when "disabled" is set.
6. ➤ Press the *[START]* button.
➡ The setting is stored.
'Store Settings...' is displayed briefly.
'-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu'
or
Press the *[STOP/OPEN]* button twice to exit the '***Machine Menu***'.

7.5 Heating (for centrifuges with heating)

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

Swing-out rotors and angle rotors must run at maximum speed.



CAUTION

Danger of burns from hot surfaces.

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

- Do not touch the heating element.



NOTICE

Damage to plastic buckets due to excessive temperature

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

enable / disable

The rotor is stationary.

1. ➤ Press the *[T/°C]* button repeatedly until 'Heater = off' or 'Heater = on' is displayed.
2. ➤ Use *[Rotary knob]* to set 'off' or 'on'.
off = heating disabled
on = heating enabled
3. ➤ Press the *[T/°C]* button or the *[START]* button.
➡ The settings are stored.
Centrifugation data is displayed.

7.6 Machine Menu

7.6.1 Querying system information

The following system information can be queried:

- Centrifuge model
- Mains voltage

- Rotor information
- Centrifuge program version
- Program version for the frequency inverter

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
 - ****Machine Menu**** is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until *'-> Info'* is displayed.
3. ➤ Press the *[START]* button.
 - The centrifuge model is displayed.
4. ➤ Press the *[PROG]* button.
 - The mains voltage is displayed
5. ➤ Press the *[PROG]* button.
 - The rotor code (Rotor), the maximum rotor speed (Nmax) and the centrifuging radius (R) of the last rotor recognised by the rotor detection are displayed.

The last rotor recognised is marked with an asterisk (*).

The *[Rotary knob]* can be used to display the information of the rotors approved for the centrifuge.
6. ➤ Press the *[PROG]* button.
 - The program version of the centrifuge is displayed.
7. ➤ Press the *[PROG]* button.
 - The program version of the frequency converter is displayed.
8. ➤ Press the *[STOP/OPEN]* button twice to exit the *'-> Info'* menu
or
Press the *[STOP/OPEN]* button three times to exit the ****Machine Menu****.

7.6.1.1 Centrifuge address

The address of the centrifuge is set to]=29 ex works. Address set.

7.6.2 Cycle counter

The centrifuge is equipped with a cycle counter. The cycle counter counts the run cycles (centrifugation cycles) of the various rotor codes.

For swing-out rotors, the cycle counter is used to record the run cycles (centrifugation runs) of the buckets.

If the rotor is detected for the first time by the rotor detection, the centrifugation run is cancelled. *'Enter max cycles = (30000)'* is displayed after pressing any button. The maximum permissible number of run cycles indicated on the bucket must be entered before the centrifugation run can be restarted.

The cycle counter can be disabled for rotors and buckets that are not marked with the maximum permissible number of run cycles. The number of run cycles (centrifugation runs) of the rotor code used is displayed briefly every time the lid is opened.

If the maximum permissible number of bucket run cycles entered is exceeded, *"MAX CYCLES PASSED"* is displayed after each start of a centrifugation run.

The centrifugation run must be restarted. The buckets must be replaced with new ones.

If the buckets have been replaced, the cycle counter must be reset to '0'.

Entering the maximum permissible number of run cycles

The maximum permissible number of run cycles must be entered after starting the first centrifugation run.

'Enter max cycles = {30000}' is displayed.

1. ➤ Use the *[Rotary knob]* to set the maximum permissible number of run cycles indicated on the bucket.
 2. ➤ Press the *[START]* button.
 - The setting is stored.
- 'Store max cycles ...' is displayed briefly.

Resetting the cycle counter and entering the maximum permissible number of run cycles

The cycle counter must be reset to '0' after inserting new buckets. The maximum permissible number of run cycles must be entered.

1. ➤ Press and hold the *[PROG]* button.
 - '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Operating Time' is displayed.
3. ➤ Press the *[START]* button.
 - The external operating hours are displayed.
4. ➤ Press the *[PROG]* button repeatedly until the run cycles are displayed.
5. ➤ Press the *[RCF]* button.
 - The number of run cycles is displayed in brackets { }.
6. ➤ Turn the *[Rotary knob]* to the left to reset the number of run cycles to '0'.
7. ➤ Press the *[RCF]* button.
 - The maximum permissible number of run cycles is displayed in brackets { }.
8. ➤ Use the *[Rotary knob]* to set the maximum permissible number of run cycles indicated on the bucket.
9. ➤ Press the *[START]* button.
 - The settings are stored.

'Store cycles ...' is displayed briefly.

The run cycles are displayed.
10. ➤ Press the *[OPEN/STOP]* button twice to exit the 'Operating Time' menu

or

Press the *[OPEN/STOP]* button three times to exit the 'Machine Menu'.

Enabling the cycle counter

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
 - '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Operating Time' is displayed.
3. ➤ Press the *[START]* button.
 - The external operating hours are displayed.

4. ➤ Press the *[PROG]* button repeatedly until '*Cycles = disabled*' is displayed when the cycle counter is disabled.
If run cycles are displayed, the cycle counter is already enabled.
5. ➤ Press the *[RCF]* button repeatedly until the maximum permissible number of run cycles is displayed in brackets *< >*.
6. ➤ Use the *[Rotary knob]* to set the maximum permissible number of run cycles indicated on the bucket.
7. ➤ Press the *[START]* button.
 - The settings are stored.
 - '*Store cycles ...*' is displayed briefly.
 - The run cycles are displayed.
8. ➤ Press the *[OPEN/STOP]* button twice to exit the '*Operating Time*' menu
or
Press the *[OPEN/STOP]* button three times to exit the '*Machine Menu*'.

Disabling the cycle counter

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
 - '****Machine Menu****' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '*-> Operating Time*' is displayed.
3. ➤ Press the *[START]* button.
 - The external operating hours are displayed.
4. ➤ Press the *[PROG]* button repeatedly until, with the cycle counter enabled, the run cycles are displayed.
If '*Cycles = disabled*' is displayed, the cycle counter is already disabled.
5. ➤ Press the *[RCF]* button repeatedly until the maximum permissible number of run cycles is displayed in brackets *< >*.
6. ➤ Use *[Rotary knob]* to set the maximum permissible number of run cycles to '*0*'.
7. ➤ Press the *[START]* button.
 - The settings are stored.
 - '*Store cycles ...*' is displayed briefly.
 - '*Cycles = disabled*' is displayed.
8. ➤ Press the *[OPEN/STOP]* button twice to exit the '*Operating Time*' menu
or
Press the *[OPEN/STOP]* button three times to exit the '*Machine Menu*'.

7.6.3 Querying operating hours, centrifugation runs and cycle counter

The operating hours are divided into internal and external operating hours.

- Internal operating hours '*OP Time int =*': Total time for which the device has been switched on.
- External operating hours '*OP Time ext =*': Total time of centrifugation runs to date.

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
➤ ****Machine Menu**** is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until *'-> Operating Time'* is displayed.
3. ➤ Press the *[START]* button.
➤ *'OP Time ext ='* is displayed.
4. ➤ Press the *[PROG]* button.
➤ *'OP Time int ='* is displayed.
5. ➤ Press the *[PROG]* button.
➤ *'Number of Starts ='* is displayed.
This is the number of all centrifugation runs.
6. ➤ Press the *[PROG]* button.
➤ *'Cycles ='* is displayed.
This is the number of run cycles (centrifugation runs) of the rotor code used since the last cycle counter reset to *'0'* and the maximum permissible number of run cycles.
7. ➤ Press the *[PROG]* button.
➤ *'Rotor cycles total ='* is displayed.
This is the number of all run cycles (centrifugation runs) of the rotor code used.
8. ➤ Press the *[STOP/OPEN]* button twice to exit the *'-> Operating Time'* menu
or
Press the *[STOP/OPEN]* button three times to exit the ****Machine Menu****.

7.6.4 Enabling or disabling dual time mode

It is possible to set when runtime counting starts during a centrifugation run if the *'Dual time mode'* function is enabled. The function is enabled ex works.

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
➤ ****Machine Menu**** is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until *'-> Settings'* is displayed.
3. ➤ Press the *[START]* button.
➤ *'SOUND / BELL = on'* or *'SOUND / BELL = off'* is displayed.
4. ➤ Press the *[PROG]* button repeatedly until *'Dual time mode enabled'* or *'Dual time mode disabled'* is displayed.
5. ➤ Use *[Rotary knob]* to set *'enabled'* or *'disabled'*.
disabled = The function is disabled
enabled = The function is enabled.
6. ➤ Press the *[START]* button.
➤ The settings are stored.
'Store Settings...' is displayed briefly.
'-> Settings' is then displayed.

7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

7.6.5 Enabling or disabling ramp-up and ramp-down times

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
➤ '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
➤ 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.
4. ➤ Press the *[PROG]* button repeatedly until 'Ramp Unit = Steps' or 'Ramp Unit = Steps / Time' is displayed.
5. ➤ Use *[Rotary knob]* to set 'Steps' or 'Steps / Time'.
Steps = ramp-up and ramp-down times disabled,
Steps / Time = ramp-up and ramp-down times enabled.
6. ➤ Press the *[START]* button.
➤ The setting is stored.
'Store Settings...' is displayed briefly.
'-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

7.6.6 Program lock

The following program locks can be set when the rotor is at a standstill:

LOCK 1	LOCK 1 is displayed. Programs can only be retrieved, not changed.
LOCK 2	LOCK 2 is displayed. No programs can be retrieved or changed. The centrifuge can be controlled via the interface (only for centrifuges with an interface).
LOCK 3	no status indicator No program lock. Programs can be retrieved and changed.

1. ➤ Press and hold the *[PROG]* button.
➤ '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Change Lock' is displayed.
3. ➤ Press the *[START]* button.
➤ Lock status is displayed.
If no PIN is entered, e.g. 'LOCK = {3} confirm by START' is displayed.
If a PIN is entered, e.g. 'LOCK = 3' is displayed.

4. ➤ Use the *[Rotary knob]* to set the desired status.
'PIN = ---- confirm by START' is displayed if a PIN is entered. In this case, the valid PIN must first be set with the *[Rotary knob]* and then the *[START]* button must be pressed before the lock status can be set.
5. ➤ Press the *[START]* button.
 ➤ The setting is stored.
 e.g. *'Store LOCK 2'* is briefly displayed.
'-> Change Lock' is then displayed.
6. ➤ Press the *[STOP/OPEN]* button once to exit the *'Settings menu'*
 or
 Press the *[STOP/OPEN]* button twice to exit the *'Machine Menu'*.

7.6.7 PIN (Personal Identification Number)

A PIN can be set to prevent unauthorised persons from changing the program lock. No PIN is set ex works.

Setting or changing the PIN

1. ➤ Press and hold the *[PROG]* button.
 ➤ ****Machine Menu**** is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until *'-> Change PIN'* is displayed.
3. ➤ Press the *[START]* button.
 ➤ *'old PIN = ---- <START>'* is displayed.
4. ➤ Use the *[Rotary knob]* to set the valid PIN.
 If you are setting the PIN for the first time, skip this step or set *'0000'*.
 Input help: Press and hold down the relevant button.

<i>[Ramp-up and ramp-down parameters]</i> button	only the thousands digit of the PIN is changed.
<i>[RCF]</i> button	only the hundreds digit of the PIN is changed.
<i>[RPM]</i> button	only the tens digit of the PIN is changed.

5. ➤ Press the *[START]* button.
 ➤ *'new PIN = ---- <START>'* is displayed.
 If an incorrect PIN was set, *'old PIN = ---- <START>'* is displayed again. In this case, set the valid PIN with the *[Rotary knob]* and press the *[START]* button.
6. ➤ Use the *[Rotary knob]* to set the new PIN.
'0000' must be set in order to disable the PIN.
7. ➤ Press the *[START]* button.
 ➤ The setting is stored.
'Store PIN ...' is displayed briefly.
'-> Change PIN' is then displayed.

8. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

Procedure if the PIN is lost

What is known as a Help number can be retrieved if the PIN is lost. The manufacturer can use this number to calculate a PIN that replaces the previously valid PIN.

1. ➤ Hold down the *[PROG]* button for 8 seconds.
'***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button until '-> Change PIN' is displayed.
3. ➤ Press the *[START]* button.
➤ 'old PIN = ---- <START>' is displayed.
4. ➤ Press the *[PROG]* button.
➤ 'Get HELP # no' is displayed.

The previous PIN becomes invalid after retrieving the Help number.

5. ➤ Use *[Rotary knob]* to set 'yes'.
6. ➤ Press the *[START]* button.
➤ 'Are you sure ? no' is displayed.
7. ➤ Use *[Rotary knob]* to set 'yes'.
8. ➤ Press the *[START]* button.
➤ 'HELP # = 5487' is displayed.

Note down this Help number and use it to request the required PIN. Setting a new PIN using the PIN received

7.6.8 Audible signal

7.6.8.1 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.

7.6.8.2 Enabling or disabling an audible signal

The rotor is stationary.

1. ➤ Press and hold the *[PROG]* button.
➤ '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
➤ 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.
'SOUND / BELL': Signal after completion of the centrifugation run
4. ➤ Use *[Rotary knob]* to set 'off' or 'on'.
off = audible signal disabled
on = audible signal enabled

5. ➤ Press the *[PROG]* button.
 - ➡ 'SOUND / BELL error = on' or 'SOUND / BELL error = off' is displayed.
 - 'SOUND / BELL error': Signal after the occurrence of a fault
6. ➤ Use *[Rotary knob]* to set 'off' or 'on'.
 - off = audible signal disabled
 - on = audible signal enabled
7. ➤ Press the *[START]* button.
 - ➡ The setting is stored.
 - 'Store Settings...' is displayed briefly.
 - '-> Settings' is then displayed.
8. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
 Press the *[STOP/OPEN]* button twice to exit the '***Machine Menu***'.

7.6.9 Centrifugation data displayed after switching on

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

1. ➤ Press and hold the *[PROG]* button.
 - ➡ '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
 - ➡ 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.
4. ➤ Press the *[PROG]* button repeatedly until 'Start program = Last' or 'Start program = First' is displayed.
5. ➤ Use *[Rotary knob]* to set 'Last' or 'First'.
 - Last = last program used
 - First = program 1
6. ➤ Press the *[START]* button.
 - ➡ The settings are stored.
 - 'Store Settings...' is displayed briefly.
 - '-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
 Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

7.6.10 Setting a temperature unit (for centrifuges with cooling)

The temperature can be entered in degrees Celsius (°C) or degrees Fahrenheit (°F).

1. ➤ Press and hold the *[PROG]* button.
 - ➡ '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
 - ➡ 'SOUND / BELL = on' or 'SOUND / BELL = off' is displayed.

4. ➤ Press the *[PROG]* button repeatedly until '*Temp Unit = Fahrenheit*' or '*Temp Unit = Celsius*' is displayed.
5. ➤ Use *[Rotary knob]* to set '*Celsius (°C)*' or '*Fahrenheit (°F)*'.
Celsius = values in Celsius (°C)
Fahrenheit = values in Fahrenheit (°F)
6. ➤ Press the *[START]* button.
 - The setting is stored.
 - '*Store Settings ...*' is displayed briefly.
 - '-> *Settings*' is then displayed.
7. ➤ Press the *[OPEN/STOP]* button once to exit the '*Settings*' menu
or
Press the *[OPEN/STOP]* button twice to exit the '*Machine Menu*'.

7.6.11 Indicator backlight

For centrifuges with a program version from V01.18:

The indicator backlight can be switched off after 2 minutes to save energy.

1. ➤ Press and hold the *[PROG]* button.
 - '****Machine Menu****' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '*-> Settings*' is displayed.
3. ➤ Press the *[START]* button.
 - '*SOUND / BELL = on*' or '*SOUND / BELL = off*' is displayed.
4. ➤ Press the *[PROG]* button repeatedly until '*Power save = on*' or '*Power save = off*' is displayed.
Power save : Automatic switching off of the backlight
5. ➤ Use *[Rotary knob]* to set '*off*' or '*on*'.
off = disable automatic switch-off
on = automatic switch-off enabled
6. ➤ Press the *[START]* button.
 - The setting is stored.
 - '*Store Settings...*' is displayed briefly.
 - '-> *Settings*' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the '*Settings menu*'
or
Press the *[STOP/OPEN]* button twice to exit the '*Machine Menu*'.

7.7 Program links

7.7.1 Linking programs or changing a program link



25 program links can be stored (program locations A to Z, program location J does not exist).

A program link can consist of a maximum of 20 programs.

In a program link, the speed from one program to the next is always adjusted with the ramp-up parameter of the next program.

No centrifugation parameters can be changed in a program link. Changing the parameters is only possible in the individual programs.

No continuous operation programs or programs with ramp-up and ramp-down times may be linked.

The [TIME] button can be used to retrieve the total runtime of the program link and the runtime of the currently running program during the centrifugation run.

Program links are enabled.

1. ➤ Press the [PROG] button repeatedly until 'EDIT A...Z' is displayed.
2. ➤ Use the [Rotary knob] to set the desired program location where the program link is to be saved.
3. ➤ Press the [START] button.
 - The program location of the program link and the first program of the program link are displayed.
4. ➤ Use the [Rotary knob] to set the first program of the program link.
5. ➤ Press the [PROG] button.
 - The next program in the program link is displayed.
6. ➤ Use the [Rotary knob] to set the next program of the program link.
7. ➤ Press the [PROG] button.
 - The next program in the program link is displayed.
8. ➤ Repeat steps 6 and 7 until all programs are set.
9. ➤ Use [Rotary knob] to set 'END'. For this, turn the rotary knob anti-clockwise.

No 'END' can be set after the 20th program in the case of program links consisting of 20 programs.
10. ➤ Press the [START] button.
 - 'STO B' is displayed.
11. ➤ Press the [START] button to save the program link.
 - 'Multi program store...' is displayed briefly.

7.7.2 Opening a program link

1. ➤ Press the [PROG] button repeatedly until 'RCL A...Z' is displayed.
2. ➤ Use the [Rotary knob] to set the desired program location.

3. ➤ Press the *[START]* button.
 - 'Multi program recall...' is displayed briefly.

The centrifugation data of the first program of the program link is displayed, along with the total runtime of the program link.

7.7.3 Enabling or disabling program links

1. ➤ Press and hold the *[PROG]* button.
 - '***Machine Menu***' is displayed after 8 seconds.
2. ➤ Press the *[PROG]* button repeatedly until '-> Settings' is displayed.
3. ➤ Press the *[START]* button.
 - 'SOUND / BELL = off' or 'SOUND / BELL = on' is displayed.
4. ➤ Press the *[PROG]* button repeatedly until 'Multi programs = off' or 'Multi programs = on' is displayed.
5. ➤ Use *[Rotary knob]* to set 'off' or 'on'.
 - off = program link disabled
 - on = program link enabled
6. ➤ Press the *[START]* button.
 - The setting is stored.
 - 'Store Settings...' is displayed briefly.
 - '-> Settings' is then displayed.
7. ➤ Press the *[STOP/OPEN]* button once to exit the 'Settings menu' or
Press the *[STOP/OPEN]* button twice to exit the 'Machine Menu'.

8 Cleaning and care

8.1 Overview table

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8	Cleaning and care					51
8.3	Cleaning					52
8.3	Cleaning the device		X			52
8.3	Cleaning the biosafety systems			X		53
8.3	Cleaning the accessories			X		53
8.4	Disinfection					53
8.4	Disinfecting the device	X				53
8.4	Disinfecting the accessories	X				54
8.5	Maintenance					54

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8.5	Greasing the rubber seal of the centrifuging chamber			X		54
8.5	Greasing the rubber seal of the biosafety system			X		54
8.5	Trunnion greasing			X		54
8.5	Checking the accessories			X		54
8.5	Checking the biosafety system			X		54
8.5	Inspecting the centrifuging chamber for damage				X	55
8.5	Greasing the motor shaft				X	55
8.5	Accessories with a limited service life	X				55
8.5	Replacing centrifuge tubes	X				55

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 51



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

Disinfecting the device



CAUTION

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

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

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

Disinfecting the accessories

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

Autoclaving

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

- Swing-out rotors
- Aluminium angle rotors
- Metal buckets
- Lid with bioseal
- Inserting

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

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

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

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

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

8.5 Maintenance

Greasing the rubber seal of the centrifuging chamber

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

Greasing the rubber seal of the biosafety system

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

Trunnion greasing

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

Checking the accessories

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

Checking the biosafety system

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

Inspecting the centrifuging chamber for damage

- ➔ Check the centrifuging chamber for damage.

Greasing the motor shaft

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

Accessories with a limited service life

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

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

Replacing centrifuge tubes



CAUTION

Risk of injury from broken glass.

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

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

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

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

Disinfection must be carried out if the material is infectious.

9 Troubleshooting

9.1 Fault description

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

* Error number does not appear on the display.

Fault description	Cause	Remedy
No display	No power. Triggering of the over-current protection fuse.	■ Check the supply voltage. ■ Set the mains switch to <i>/I/</i>.
TACHO-ERROR 1, 2, 96	Tacho defective. Motor, electronics defective.	■ Open the lid. ■ Set the mains switch to <i>/0/</i>. ■ Wait at least 10 seconds.

Fault description	Cause	Remedy
TACHO-ERROR 1, 2, 96	Tacho defective. Motor, electronics defective.	- 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.	- Open the lid. - Check the loading of the rotor. - Repeat the centrifugation run.
CONTROL-ERROR 4.1-4.5, 6	Lid lock error.	Perform a MAINS RESET.
N > MAX 5.0, 5.1	Overspeed error.	Perform a MAINS RESET.
N < MIN 13	Underspeed error.	Perform a MAINS RESET.
ROTORCODE 10.1-10.3	Rotor coding error.	Perform a MAINS RESET.
MAINS INTERRUPT 11*	Loss of mains power during the centrifugation run. The centrifugation run was not completed.	- Open the lid. - Press the <i>[START]</i> button. - If required: Repeat the centrifugation run.
VERSION-ERROR 12	No conformity of the electronic components, error/defect in electronics.	Perform a MAINS RESET.
CONTROL-ERROR 25.1-25.4	Error/defect in electronics.	Perform a MAINS RESET.
CRC ERROR 27, 27.1	Error/defect in electronics.	Perform a MAINS RESET.
SER I/O-ERROR 31, 34, 36	Error/defect in electronics.	Perform a MAINS RESET.
° C * -ERROR 51, 53-55	Error/defect in electronics.	Perform a MAINS RESET.
° C * -ERROR 52.0, 52.1	Overtemperature in the centrifuging chamber. Error/defect in electronics	Perform a MAINS RESET.
° C * -ERROR 58.0, 58.1	Temperature deviation too great.	Perform a MAINS RESET.
° C * -ERROR 58.6, 58.7	Temperature deviation too great.	- Perform a MAINS RESET. - Increase the "Error 58 Temp" value.
FU/CCI-ERROR 60, 61.2-61.20, 61.128-61.132, 62	Error/defect in electronics/motor.	Perform a MAINS RESET.
FU/CCI-ERROR 61.1	Mains voltage too low. Error/defect in electronics/motor.	- Check the mains voltage. - Perform a MAINS RESET.
SENSOR-ERROR 90	Error/defect in electronics.	Perform a MAINS RESET.
SENSOR-ERROR 91-93	Error/defect in imbalance sensor.	Perform a MAINS RESET.
° C * -ERROR 97, 98	Error/defect in electronics.	Perform a MAINS RESET.

Fault description	Cause	Remedy
NO ROTOR OR ROTORCODE ERROR	No rotor installed. Tacho defective.	■ Open the lid. ■ Install the rotor.
N > ROTOR MAX	Speed in the selected program greater than the maximum rotor speed.	■ Check and correct the speed.
	The rotor has been changed. The built-in rotor has a higher maximum speed than the previously used rotor. The rotor has not yet been recognised by the rotor detection.	■ Set a speed up to the maximum speed of the previously used rotor. Press the <i>[START]</i> button to perform rotor detection.
N > ROTOR MAX in Prog: e.g. 3	There is a program in the displayed program location where the speed is greater than the maximum rotor speed.	■ Check and correct the speed.
	The rotor has been changed. The built-in rotor has a higher maximum speed than the previously used rotor. The rotor has not yet been recognised by the rotor detection.	■ Set a speed up to the maximum speed of the previously used rotor. Press the <i>[START]</i> button to perform rotor detection.
Runtime 00:00 in Prog: e.g. B.3	There is a continuous program in the displayed program location.	■ Replace the continuous program in the program link with a program with time preselection.
Empty Program	There is no program link stored in the displayed program location .	■ Open a program link.
Ramp Unit Time in Prog: e.g. B. 3	There is a program in the displayed program location that has a start-up and/or run-down time.	■ Replace the program in the program link with a program with a start-up and braking stage.
Acc time > Run time	The set start-up time is longer than the run time.	■ Set a start-up time that is shorter than the run time.
Protected !!	The program is write-protected.	■ Disable write protection for the program.
FC INIT ERROR	Error/defect in electronics.	■ Perform a MAINS RESET.
FC VERSION ERROR	Error/defect in electronics.	■ Perform a MAINS RESET.
FATAL EEPROM ERROR 1-5	Error/defect in electronics.	■ Perform a MAINS RESET.
WATCHDOG RESET	Error/defect in electronics.	■ Perform a MAINS RESET.
MAX CYCLES PASSED	The maximum permissible number of run cycles entered has been exceeded.	■ Replace the buckets with new buckets for safety reasons. ■ Reset the cycle counter to "0" after replacing the buckets.
Enter max cycles = <30000>	Request to enter the maximum permissible number of run cycles indicated on the buckets.	■ Enter the maximum permissible number of run cycles.

Fault description	Cause	Remedy
 The left half of the display lights up.	-	■ Notify customer service.

9.2 Perform a MAINS RESET

1. ➔ Set the mains switch to [0].
2. ➔ Wait 10 seconds.
3. ➔ Set the mains switch to [I].

9.3 Emergency release

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



! WARNING

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

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



WARNING

Danger of cutting and crushing due to moving rotor.

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

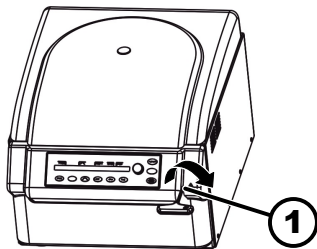


Fig. 25: Emergency release

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.

9.4 Switching on the automatic circuit breaker

Personnel:

- Trained user

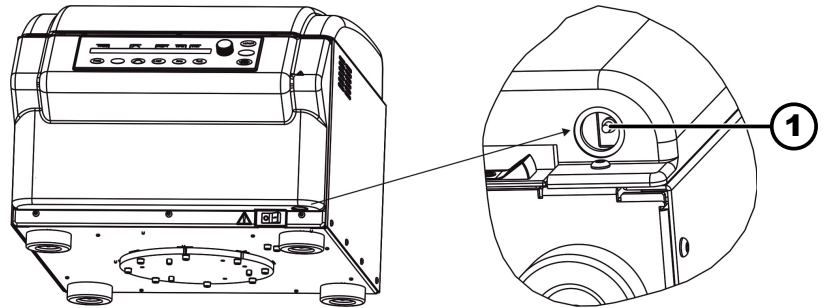


Fig. 26: Automatic circuit breaker

1 Plastic pin

The mains switch is in switch position [O]

The centrifuge is disconnected from the mains.

1. ➤ Press the plastic pin (1) of the automatic circuit breaker.
2. ➤ Reconnect the device to the mains.

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 wheeled 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. 27: Household waste ban

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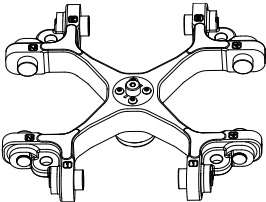
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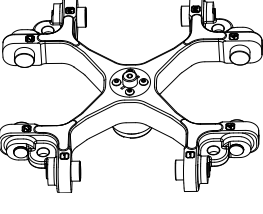
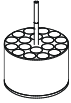
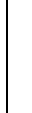
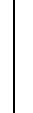
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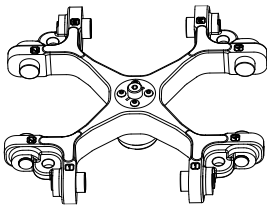
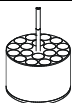
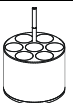
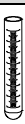
Rotoren und Zubehör / Rotors and accessories

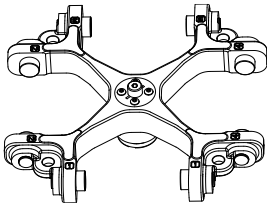
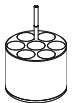
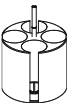
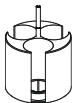
4784-A	4780 + 4783 / 4785								
Ausschwingrotor 4-fach / Swing out rotor 4-times  									
	mit Bioabdichtung / with bio-containment 10)								
		4761				4762A			
									
0551	----	----			----	0553	0501		
 ¹²⁾									
Kapazität / capacity	ml	600	3	4	1,1 – 1,4	4,5 - 5	4	5	6
Maße / dimensions Ø x L	mm	93 x 134	10 x 60	10 x 88	8 x 66	11 x 92	12 x 60	12 x 75	12 x 82
Anzahl p. Rotor / number p. rotor		4	140	140	140	140	104	104	104
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4740	4585	4585	4585	4585	4585	4585	4585
Radius / radius	mm	184	178	178	178	178	178	178	178
 9 (97%)	sec	54							
 9	sec	38							
Temperatur / temperature	°C ¹⁾	4							
Probenenerwärmung/Sample temp. rise	K ²⁾	11							

4784-A	4780 + 4783 / 4785											
Ausschwingrotor 4-fach / Swing out rotor 4-times  												
	mit Bioabdichtung / with bio-containment ¹⁰⁾											
	4762A						4763A					
												
	0578						2079	0507				
												
Kapazität / capacity	ml	7	5	4,9	2,6 – 3,4	1,6 – 5	4 - 7	8	10	15	10	4,5 - 5
Maße / dimensions Ø x L	mm	12 x 100	13 x 75	13 x 90	13 x 65	13 x 75	13 x 100	16 x 125	17 x 70	17 x 100	16 x 80	15 x 75
Anzahl p. Rotor / number p. rotor		104	104	104	104	104	104	24	72	72	72	72
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4585	4585	4585	4585	4585	4585	4585	4585	4585	4585	4585
Radius / radius	mm	178	178	178	178	178	178	178	178	178	178	178
 9 (97%)	sec	54										
 9	sec	38										
Temperatur / temperature	°C ¹⁾	4										
Probenenerwärmung/Sample temp. rise	K ²⁾	11										

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenenerwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) Nur inneren Lochkreis belegen. Nicht mit Deckel 4751 verschließbar
- 10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.
- 12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

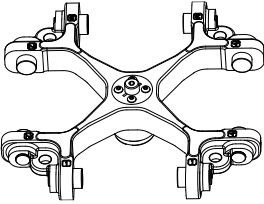
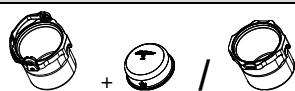
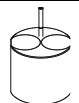
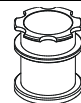
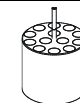
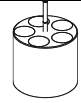
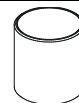
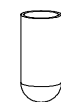
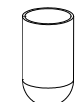
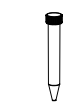
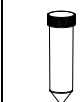
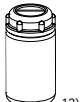
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) Load only the inner hole circle. Not closeable with lid 4751
- 10) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
- 12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

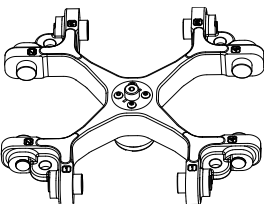
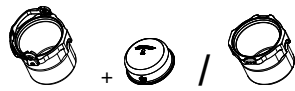
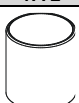
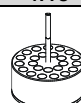
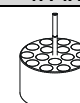
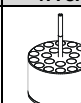
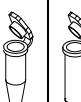
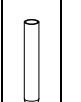
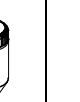
4784-A	4780 + 4783 / 4785								
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 mit Bioabdichtung / with bio-containment 10)								
	4763A				4764				
									
									
	Kapazität / capacity	ml	7,5 - 8,2	9 - 10	4 – 7	8,5 – 10	15	25	30
Maße / dimensions Ø x L	mm	15 x 92	16 x 92	16 x 75	16 x 100	17 x 100	24 x 100	26 x 95	25 x 90
Anzahl p. Rotor / number p. rotor		72	72	72	72	72	28	28	28
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4585	4585	4585	4585	4585	4585	4585	4585
Radius / radius	mm	178	178	178	178	178	178	178	178
 9 (97%)	sec	54							
 9	sec	38							
Temperatur / temperature	°C ¹⁾	4							
Probenenerwärmung/Sample temp. rise	K ²⁾	11							

4784-A	4780 + 4783 / 4785								
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 mit Bioabdichtung / with bio-containment 10)								
	4764		4765		4766				
									
									
	Kapazität / capacity	ml	30	30	50	75	100	85	94
Maße / dimensions Ø x L	mm	25 x 110	25 x 110	34 x 100	35 x 105	40 x 115	38 x 106	38 x 102	38 x 106
Anzahl p. Rotor / number p. rotor		28	28	16	16	12	12	12	12
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4585	4585	4559	4559	4534	4534	4534	4534
Radius / radius	mm	178	178	177	177	176	176	176	176
 9 (97%)	sec	54							
 9	sec	38							
Temperatur / temperature	°C ¹⁾	4							
Probenenerwärmung/Sample temp. rise	K ²⁾	11							

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

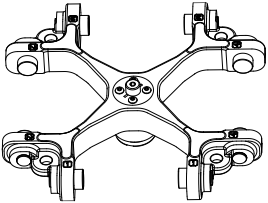
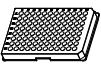
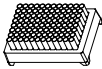
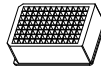
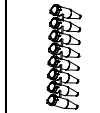
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 10) in conformity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

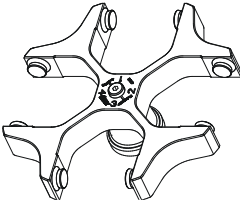
4784-A	4780 + 4783 / 4785								
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 mit Bioabdichtung / with bio-containment 10)								
	4767	4768	4769A	4770A	4770A 5)	4770A 5)	4771	4772	
									
	0526	0530	0509	0513		0546	5127	---	
							 ¹²⁾	 ¹²⁾	
Kapazität / capacity	ml	100	250	15	50	50	50	250	400
Maße / dimensions Ø x L	mm	44 x 100	65 x 115	17 x 120	29 x 115	29 x 115	29 x 107	62 x 122	81 x 136
Anzahl p. Rotor / number p. rotor		8	4	52	20	20	20	4	4
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4534	4534	4740	4688	4688	4688	4740	4740
Radius / radius	mm	176	176	184	182	182	182	184	184
 9 (97%)	sec	54							
 9	sec	38							
Temperatur / temperature	°C ¹⁾	4							
Probenenerwärmung/Sample temp. rise	K ²⁾	11							

4784-A	4780 + 4783 / 4785											
Ausschwingrotor 4-fach / Swing out rotor 4-times  ∠ 90°	 mit Bioabdichtung / with bio-containment 10)											
	4772	4773	4774A	4775A	4776	4777						
												
	---	2078	0536					Nalgene®	Nunc®			
	 ¹²⁾											
Kapazität / capacity	ml	400	1,5	2,0	12	1,6 - 7		225	175	175	200	
Maße / dimensions Ø x L	mm	84 x 134	11 x 38		17 x 100	13 x 75	13 x 100	61 x 137	61 x 118	62 x 144	60 x 130	
Anzahl p. Rotor / number p. rotor		4	96		60	84		4	4	4	4	
Drehzahl / speed	RPM	4800	4800		4800	4800		4800	4800	4800	4800	
RZB / RCF	³⁾	4740	4585		4688	4740		4740	4740	4740	4740	
Radius / radius	mm	184	178		182	184		184	184	184	184	
 9 (97%)	sec	54										
 9	sec	38										
Temperatur / temperature	°C ¹⁾	4										
Probenenerwärmung/Sample temp. rise	K ²⁾	11										

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

- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 5) Take the inserts out of the frame / adapter
- 10) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".
- 12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

4784-A	4782							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$								
								
	MTP	MS	CP	DWP	MTP	Microtest- platten / plate Terasaki	96-PCR- Platte / plate	PCR-Strips
								
Kapazität / capacity	ml	---	---	---	---	---	---	0,2
Maße / dimensions TxBxH / DxWxH	mm	86x128x15	86x128x46	86x128x22	86x128x44,5	86x128x17,5	59x84x11	82x124x20
Anzahl p. Rotor / number p. rotor		16	4	12	4	16	8	4
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800
RZB / RCF	³⁾	4096	4096	4096	4096	4096	4096	4096
Radius / radius	mm	159	159	159	159	159	159	159
 9 (97%)	sec	54						
 9	sec	38						
Temperatur / temperature	°C ¹⁾	4						
Probenerwärmung/Sample temp. Rise	K ²⁾	11						

4753	5051 + 5053							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$	 							
	5227				5242	5243 ⁴⁾	5243	5247
						 2 x 6316		
		0501			0519		0521	0578
								
Kapazität / capacity	ml	5	6	2,7 – 3	4,5 – 5	25	50	50
Maße / dimensions Ø x L	mm	12 x 75	12 x 82	11 x 66	11 x 92	24 x 100	29 x 115	34 x 100
Anzahl p. Rotor / number p. rotor		80	80	80	80	20	8	8
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2773	2773	2773	2773	2755	2755	2755
Radius / radius	mm	155	155	155	155	154	154	154
 9 (97%)	sec	18						
 9	sec	16						
Temperatur / temperature	°C ¹⁾	-1						
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Deckel 5053 verschließbar

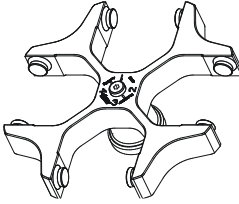
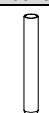
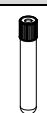
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) not closeable with lid 5053

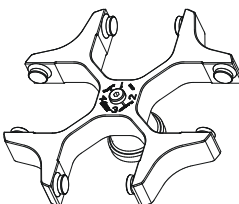
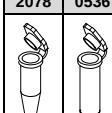
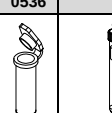
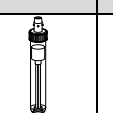
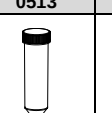
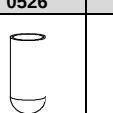
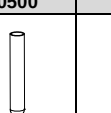
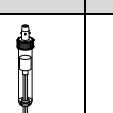
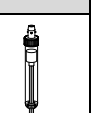
MTP Mikrotiterplatte /
Microtitre plate

CP Kulturplatte /
Culture plate

DWP Deep Well Platte /
Deep well plate

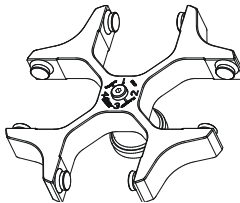
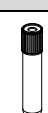
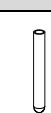
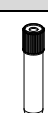
MS Micronic System /
Micronic system

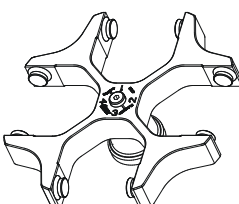
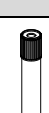
4753	5051 + 5053									
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°	 									
	5247-91	5248			5248-91		5249	5257		
	 6)				 6)					
	0578	0507	----	0518	0507	0518	0523	---	---	
										
Kapazität / capacity	ml	7	15	8,5 - 10	15	15	15	100	1,5	2,0
Maße / dimensions Ø x L	mm	12 x 100	17 x 100	16 x 100	17 x 100	17 x 100	17 x 100	40 x 115	11 x 38	
Anzahl p. Rotor / number p. rotor		80	48	48	48	48	48	4	160	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	
RZB / RCF	³⁾	2755	2755	2755	2755	2755	2755	2755	1950/2826	
Radius / radius	mm	154	154	154	154	154	154	154	109/158	
 9 (97%)	sec	18								
 9	sec	16								
Temperatur / temperature	°C ¹⁾	-1								
Probenenerwärmung/Sample temp. rise	K ²⁾	7								

4753	5051 + 5053									
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°	 									
	5281	5258	5258	5259	5262	5264				
		 4)		 4)						
	2078	0536		0513	0526	0500				
										
Kapazität / capacity	ml	1,5	2,0	10	9 - 10	50	100	9	4 - 5,5	7,5 - 8,2
Maße / dimensions Ø x L	mm	11 x 38	15 x 102	16 x 92	29 x 115	44 x 100	14 x 100	15 x 75	15 x 92	
Anzahl p. Rotor / number p. rotor		64	44	44	8	4	48	48	48	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	
RZB / RCF		2826	2755	2755	2826	2755	2773	2773	2773	
Radius / radius	mm	158	154	154	158	154	155	155	155	
 9 (97%)	sec	18								
 9	sec	16								
Temperatur / temperature	°C ¹⁾	-1								
Probenenerwärmung/Sample temp. rise	K ²⁾	7								

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

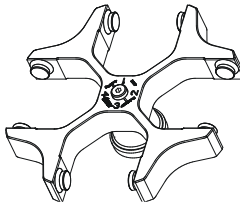
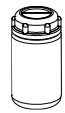
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) not closeable with lid 5053
- 6) with decanting aid

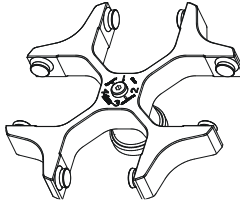
4753	5051 + 5053								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	5264		5266		5267		5268		
									
									
Kapazität / capacity	ml	4 - 7	30	30	3	1,1 - 1,4	2,6 -2,9	4,9	1,6 - 5
Maße / dimensions Ø x L	mm	16 x 75	25 x 110	25 x 110	10 x 60	8 x 66	13 x 65	13 x 90	13 x 75
Anzahl p. Rotor / number p. rotor		48	20	20	80	80	48	48	48
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2773	2755	2755	2737	2737	2808	2808	2808
Radius / radius	mm	155	154	154	153	153	157	157	157
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
Probenerwärmung/Sample temp. rise	K ²⁾	7							

4753	5051 + 5053								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°	 								
	5268	6306	6306	SK 113/88					
		 ⁴⁾							
									
Kapazität / capacity	ml	4 - 7	15	12	25				
Maße / dimensions Ø x L	mm	16 x 75	17 x 120	17 x 100	25 x 90				
Anzahl p. Rotor / number p. rotor		48	28	28	20				
Drehzahl / speed	RPM	4000	4000	4000	4000				
RZB / RCF	³⁾	2808	2898	2898	2826				
Radius / radius	mm	157	162	162	158				
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 4) nicht mit Deckel 5053 verschließbar

- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 4) not closeable with lid 5053

4753	5092 + 5093									
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°										
	mit Bioabdichtung / with bio-containment 10)									
	1791	6319	5120			5121				
										
	0530	5127	0578			0507				
	 ¹²⁾									
Kapazität / capacity	ml	250	250	7	4,5 - 5	4 - 7	15	2,6 – 2,9	9 - 10	
Maße / dimensions	Ø x L	mm	65 x 115	62 x 122	12 x 100	11 x 92	13 x 100	17 x 100	13 x 65	16 x 92
Anzahl p. Rotor / number p. rotor		4	4	48	48	48	28	28	28	
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	
RZB / RCF	³⁾	3095	3095	3005	3005	3005	3005	3005	3005	
Radius / radius	mm	173	173	168	168	168	168	168	168	
 9 (97%)	sec	18								
 9	sec	16								
Temperatur / temperature	°C ¹⁾	-1								
Probenerwärmung/Sample temp. rise	K ²⁾	7								

4753	5092 + 5093								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	mit Bioabdichtung / with bio-containment 10)								
	5121				5121-93		5122		
									
									
Kapazität / capacity	ml	8,5 - 10	10	12	15	4 - 7	25	30	30
Maße / dimensions Ø x L	mm	16 x 100	15 x 102	17 x 100	17 x 100	16 x 75	24 x 100	25 x 110	25 x 110
Anzahl p. Rotor / number p. rotor		28	28	28	28	28	16	16	16
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	3)	3005	3005	3005	3005	3005	2898	2898	2898
Radius / radius	mm	168	168	168	168	168	162	162	162
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C 1)	-1							
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) Angaben des Röhrchenherstellers beachten.

10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

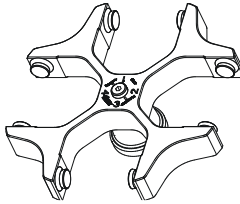
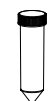
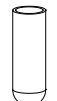
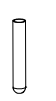
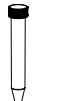
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

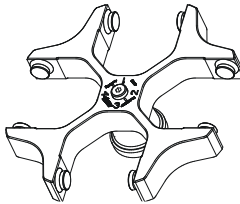
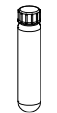
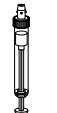
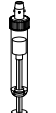
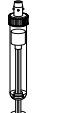
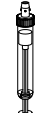
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)

3) Observe the tube manufacturer's instructions.

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

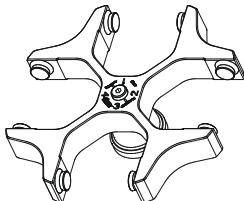
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

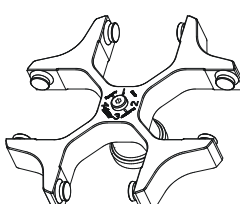
4753	5092 + 5093								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	mit Bioabdichtung / with bio-containment 10)								
	5123	5124	5125	5126	5128		5129	5134	
									
	0513	0521	0526	0523	0501		0509		
									
Kapazität / capacity	ml	50	50	100	100	6	5	15	25
Maße / dimensions Ø x L	mm	29 x 115	34 x 100	44 x 100	40 x 115	12 x 82	13 x 75	17 x 120	25 x 90
Anzahl p. Rotor / number p. rotor		8	4	4	4	48	48	28	12
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	3)	3095	2952	2952	2952	3005	3005	3095	2826
Radius / radius	mm	173	165	165	165	168	168	173	158
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C 1)	-1							
Probenerwärmung/Sample temp. rise	K 2)	7							

4753	5092 + 5093								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	mit Bioabdichtung / with bio-containment 10)								
	5135	5136							
									
	---	2079	0507						
									
Kapazität / capacity	ml	50	10	15	10	4 – 4,5	7,5 – 8,2	9 - 10	10
Maße / dimensions Ø x L	mm	29 x 115	17 x 70	17 x 100	16 x 80	15 x 75	15 x 92	16 x 92	15 x 102
Anzahl p. Rotor / number p. rotor		8	32	32	32	32	32	32	32
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	3023	2952	2952	2952	2952	2952	2952	2952
Radius / radius	mm	169	165	165	165	165	165	165	165
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

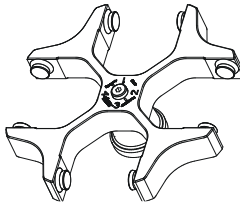
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 10) in conformity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

4753	5092 + 5093								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	mit Bioabdichtung / with bio-containment ¹⁰⁾								
	5136			5137					
									
			0518 		0501 				
Kapazität / capacity	ml	8,5 – 10	4 - 7	15	5	6	1,1 – 1,4	2,7 - 3	2,6 – 2,9
Maße / dimensions Ø x L	mm	16 x 100	16 x 75	17 x 100	12 x 75	12 x 82	8 x 66	11 x 66	13 x 65
Anzahl p. Rotor / number p. rotor		32	32	32	32	32	32	32	32
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2952	2952	2952	2952	2952	2952	2952	2952
Radius / radius	mm	165	165	165	165	165	165	165	165
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
Probenenerwärmung/Sample temp. rise	K ²⁾	7							

4753	5092 + 5093									
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°										
	mit Bioabdichtung / with bio-containment 10)									
	5137						SK 21.00			
										
										
Kapazität / capacity	ml	4,9	4,5 - 5	1,6 - 5	4 - 7	5	3	4	1,5	2,0
Maße / dimensions	Ø x L	mm	13 x 90	11 x 92	13 x 75	13 x 100	13 x 75	10 x 60	10 x 88	11 x 38
Anzahl p. Rotor / number p. rotor		32	32	32	32	32	40	40	40	40
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	2952	2952	2952	2952	2952	2916	2916	2916	2916
Radius / radius	mm	165	165	165	165	165	163	163	163	163
 9 (97%)	sec	18								
 9	sec	16								
Temperatur / temperature	°C ¹⁾	-1								
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 10) 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 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 10) 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".

4753	5092 + 5093								
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°									
	mit Bioabdichtung / with bio-containment 10)								
	SK 21.00		SK 94.89 4)	SK 94.89	5138 				
									
	Kapazität / capacity	ml	1,1 – 1,4	2,7 - 3	225	175	1,1 – 1,4	2,7-3	2,6 - 2,9
Maße / dimensions	Ø x L	mm	8 x 66	11 x 66	61 x 137	61 x 118	8 x 66	11 x 66	13 x 75
Anzahl p. Rotor / number p. rotor		40	40	4	4	48	48	48	48
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	3)	2916	2916	3095	3095	2540	2540	2540	2540
Radius / radius	mm	163	163	173	173	142	142	142	142
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C 1)	-1							
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) Angaben des Röhrchenherstellers beachten.

4) nicht mit Deckel 5053 verschließbar

10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

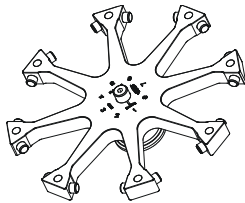
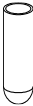
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

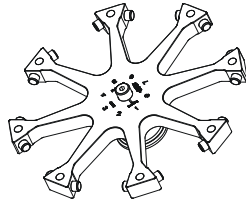
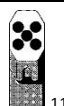
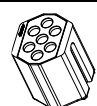
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)

3) Observe the tube manufacturer's instructions.

4) not closeable with lid 5053

10) 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".

4758	1308	1345	1346	1366					
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$		 11)	 11)						
									
									
	0521					Rhesus		---	2078 0536
Kapazität / capacity	ml	50	45	20	4	3	1	0,4	1,5 2,0
Maße / dimensions $\varnothing \times L$	mm	34 x 100	31 x 100	21 x 100	12 x 60	10 x 60	6 x 45	6 x 45	11 x 38
Anzahl p. Rotor / number p. rotor		8	8	16	96	96	240	240	72
Drehzahl / speed	RPM	3800	3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2761	2825	2825	2438	2438	2454	2454	2470
Radius / radius	mm	171	175	175	151	151	152	152	153
 9 (97%)	sec	19							
 9	sec	16							
Temperatur / temperature	$^{\circ}\text{C}$ ¹⁾	0							
Probenerwärmung/Sample temp. rise	K ²⁾	11							

4758	1369			1369-91	1369-92		1370	1739	
Ausschwingrotor 8-fach / Swing out rotor 8-times  ∠ 90°	 11)			 6) 11)	 6) 11)		 11)		
	0507		0518		0501	0578	0500		
									
Kapazität / capacity	ml	15	8,5 - 10	15	5	6	7	9	4 - 7
Maße / dimensions $\varnothing \times L$	mm	17 x 100	16 x 100	17 x 100	12 x 75	12 x 82	12 x 100	14 x 100	13 x 100
Anzahl p. Rotor / number p. rotor		32	32	32	32	32	32	40	56
Drehzahl / speed	RPM	3800	3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2825	2825	2825	2551	2777	2777	2777	2906
Radius / radius	mm	175	175	175	158	172	172	172	180
 9 (97%)	sec	19							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	0							
Probenerwärmung/Sample temp. rise	K ²⁾	11							

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

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

3) Angaben des Röhrenherstellers beachten.

6) mit Dekantierhilfe

11) Kunststoff-Nutgehänge dürfen nur bei Temperaturen bis maximal 40°C / 104°F verwendet werden.

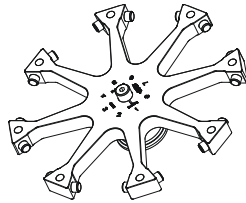
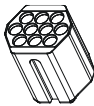
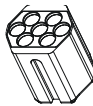
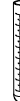
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

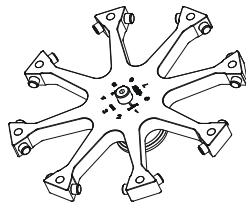
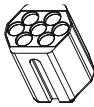
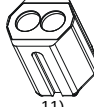
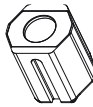
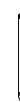
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)

3) Observe the tube manufacturer's instructions.

6) with decanting aid

11) Plastic suspension can only be used in temperatures up to a maximum of 40°C / 104°F.

4758	1741				1742							
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$	 11)				 11)							
	0701							0716				
												
					 *)							
Kapazität / capacity	ml	4,9	4,5 - 5	9	1,1 – 1,4	15	15	15	2,6 - 2,9	4 - 4,5	1,6 - 5	4-7
Maße / dimensions $\varnothing \times L$	mm	13 x 90	11 x 92	14 x 100	8 x 66	17 x 100	17 x 120	17 x 100	13 x 65	15 x 75	13 x 75	16 x 75
Anzahl p. Rotor / number p. rotor		80	80	80	56	24	56	56	56	56	56	56
Drehzahl / speed	RPM	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2906	2874	2874	2906	2906	2906	2906	2793	2793	2793	2793
Radius / radius	mm	180	178	178	180	180	180	180	173	173	173	173
 9 (97%)	sec	19										
 9	sec	16										
Temperatur / temperature	°C ¹⁾	0										
Probenenerwärmung/Sample temp. rise	K ²⁾	11										

4758		1742		1745	1746					
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$		 11)		 11)	 11)			SK 13.06 11)		
							1641	1641		
								1462		
					0545	0521	0513	0509	0519	
				 *)						
Kapazität / capacity	ml	7,5-8,2	9-10	10	8,5 - 10	30	50	50	15	25
Maße / dimensions $\varnothing \times L$	mm	15 x 92	16 x 92	15 x 102	16 x 100	26 x 95	34 x 100	29 x 115	17 x 120	24 x 100
Anzahl p. Rotor / number p. rotor		56		24	56	16	8	8	8	8
Drehzahl / speed	RPM	3800		3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2906		2906	2906	2906	2906	2906	2906	2793
Radius / radius	mm	180		180	180	180	180	180	180	173
 9 (97%)	sec	19								
 9	sec	16								
Temperatur / temperature	°C ¹⁾	0								
Probenerwärmung/Sample temp. rise	K ²⁾	11								

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

2) Probenenerwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)

3) Angaben des Röhrchenherstellers beachten.

*) nur die mittlere Reihe belegen

11) Kunststoff-Nutgehänge dürfen nur bei Temperaturen bis maximal 40°C / 104°F verwendet werden.

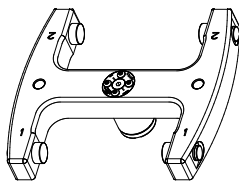
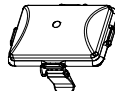
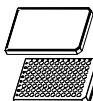
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

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

3) Observe the tube manufacturer's instructions.

*) load only the middle row

11) Plastic suspension can only be used in temperatures up to a maximum of 40°C / 104°F.

4728	4745 + 4627								
Ausschwingrotor 2-fach / Swing out rotor 2-times   90°									
	mit Bioabdichtung / with bio-containment 10)								
	max. Laufzyklen / max. cycles: 50000								
	max. Beladung / max. load: 500 g								
	4626				1485				
									
MTP	MS	CP	DWP	QP	Microtest- platten / plate Terasaki	96-PCR- Platte / plate	PCR-Strips		
									
Kapazität / capacity	ml						0,2		
Maße / dimensions TxBxH / DxWxH	mm	86x128x17,5/ 86x128x15 9)	86x128x46	86x128x22	86x128x44,5	86x128x83	59x84x11	82x124x20	---
Anzahl p. Rotor / number p. rotor		10 / 12 9)	2	8	2	2	4	2	24 x 8
Drehzahl / speed	RPM	5100							
RZB / RCF	3)	3926							
Radius / radius	mm	135							
 9 (97%)	sec	67							
 9	sec	41							
Temperatur / temperature	°C 1)	4							
Probenerwärmung/Sample temp. Rise	K 2)	13							

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

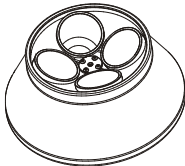
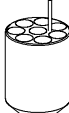
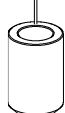
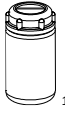
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
 3) Observe the tube manufacturer's instructions.
 10) in conformity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

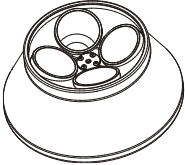
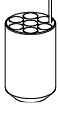
MTP Mikrotiterplatte /
Microtitre plate
9) MTP ohne Deckel

CP Kulturplatte /
Culture plate

DWP Deep Well Platte /
Deep well plate
9) MTP without lid

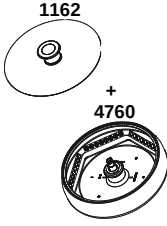
MS Micronic System /
Micronic system

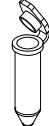
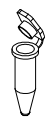
4795	5641		5642		5643	5644			
Winkelrotor 4-fach / Angle rotor 4-times  45°									
	5127	---	0519	0545	0546	0547	0538	0549	
	 ¹²⁾								
Kapazität / capacity	ml	250	10	25	30	50	85	94	85
Maße / dimensions $\varnothing \times L$	mm	62 x 122	16 x 80	24 x 100	26 x 95	29 x 107	38 x 106	38 x 106	38 x 106
Anzahl p. Rotor / number p. rotor		4	32	12	12	4	4	4	4
Drehzahl / speed	RPM	9500	9500	9500	9500	9500	9500	9500	9500
RZB / RCF	³⁾	12007	11402	10897	10897	10090	10292	10292	10292
Radius / radius	mm	119	113	108	108	100	102	102	102
 9 (97%)	sec	45							
 9	sec	55							
Temperatur / temperature	°C ¹⁾	2							
Probenerwärmung/Sample temp. rise	K ²⁾	12							

4795	5646						
Winkelrotor 4-fach / Angle rotor 4-times  $\angle 45$							
	0507	0518					
							
Kapazität / capacity	ml	15	15				
Maße / dimensions $\varnothing \times L$	mm	17 x 100	17 x 100				
Anzahl p. Rotor / number p. rotor		28	28				
Drehzahl / speed	RPM	9500	9500				
RZB / RCF	³⁾	11301	11301				
Radius / radius	mm	112	112				
 9 (97%)	sec	45					
 9	sec	55					
Temperatur / temperature	$^\circ\text{C}$ ¹⁾	2					
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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
3) Angaben des Röhrchenherstellers beachten.
12) Bei Temperaturen über 40 °C und/oder geringer Befüllung der Gefäße können sich diese verformen.

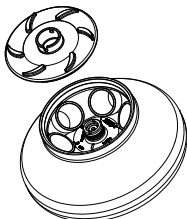
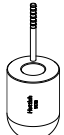
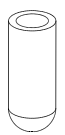
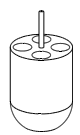
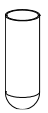
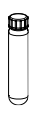
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
3) Observe the tube manufacturer's instructions.
12) At temperatures above 40 °C and/or poor filling of the tubes, these can go out of shape.

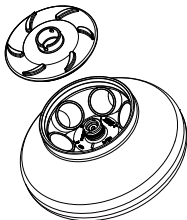
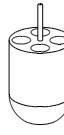
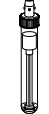
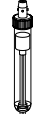
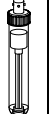
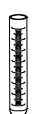
4760 + 1162								
Winkelrotor 6-fach / Angle rotor 6-times  $\angle 45^\circ$								
	PCR-Strips	---						
								
Kapazität / capacity	ml	0,2	0,2					
Maße / dimensions $\varnothing \times L$	mm	----	6 x 18					
Anzahl p. Rotor / number p. rotor		6	48					
Drehzahl / speed	RPM	14000	14000					
RZB / RCF	³⁾	18845	18845					
Radius / radius	mm	86	86					
 9 (97%)	sec	15						
 9	sec	15						
Temperatur / temperature	$^{\circ}\text{C}$ ¹⁾	1						
Probenerwärmung/sample temp. rise	K ²⁾	19						

4790-A								
Winkelrotor 30-fach / Angle rotor 30-times  $\angle 45^\circ$ mit Bioabdichtung / with bio-containment 10)		2031 9)	2023	2024				
								
	0536	2078	---	---	---	---		
								
Kapazität / capacity	ml	2,0	1,5	0,8	0,5	0,4	0,2	
Maße / dimensions $\varnothing \times L$	mm	11 x 38	11 x 38	8 x 45	8 x 30	6 x 45	6 x 18	
Anzahl p. Rotor / number p. rotor		30	30	30	30	30	30	
Drehzahl / speed	RPM	15000	15000	15000	15000	15000	15000	
RZB / RCF	³⁾	24400	24400	24400	24400	24400	24400	
Radius / radius	mm	97	97	97	97	97	97	
 9 (97%)	sec	19						
 9	sec	24						
Temperatur / temperature	$^{\circ}\text{C}$ ¹⁾	4						
Probenerwärmung/sample temp. rise	K ²⁾	19						

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

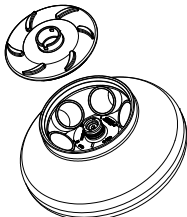
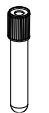
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 9) recommended for high-speed centrifugation
- 10) 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".

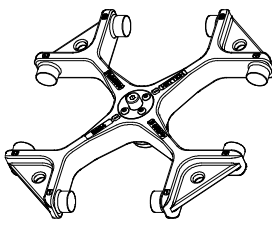
4794				1476	1446	1447		1448	1449
Winkelrotor 6-fach / Angle rotor 6-times  45° mit Bioabdichtung / with bio-containment 10)									
	054 7	054 9	0538	----	0546	0519	0545	---	---
									
Kapazität / capacity	ml	85	94	5	50	25	30	10	3
Maße / dimensions Ø x L	mm	38 x 106	38 x 106	17 x 51	29 x 107	24 x 100	26 x 95	16 x 80	10 x 60
Anzahl p. Rotor / number p. rotor		6	6	6	6	6	6	12	24
Drehzahl / speed	RPM	11000	11000	11000	11000	11000	11000	11000	11000
RZB / RCF	³⁾	16504	16504	16504	15828	15151	15151	15557	15828
Radius / radius	mm	122	122	122	117	112	112	115	117
 9 (97%)	sec	40							
 9	sec	63							
Temperatur / temperature	°C ¹⁾	4							
Probenerwärmung/Sample temp. rise	K ²⁾	19							

4794	1449		1403	1451						1454	
Winkelrotor 6-fach / Angle rotor 6-times  45° mit Bioabdichtung / with bio-containment 10)											
	2078	0536		0507					0518	0513	
											
Kapazität / capacity	ml	1,5	2	4	6	7,5 – 8,2	9 - 10	10	8,5 - 10	15	20
Maße / dimensions Ø x L	mm	11 x 38		12 x 40	17 x 100	15 x 92	16 x 92	15 x 102	16 x 100	17 x 100	29 x 115
Anzahl p. Rotor / number p. rotor		24		24	6	6	6		6	6	6
Drehzahl / speed	RPM	11000		11000	11000	11000	11000		11000	11000	11000
RZB / RCF	³⁾	15828		15557	15557	15557	15557		15828	15557	16098
Radius / radius	mm	117		115	115	115	115		117	115	119
 9 (97%)	sec	40									
 9	sec	63									
Temperatur / temperature	°C ¹⁾	4									
Probenerwärmung/Sample temp. rise	K ²⁾	19									

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

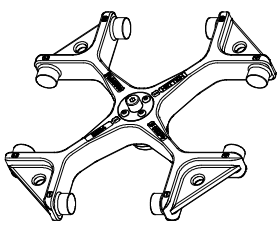
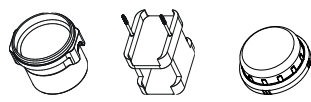
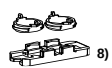
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 10) in conformity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

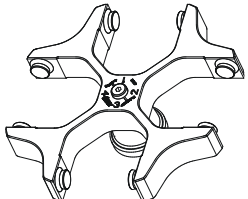
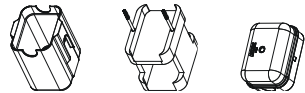
4794	1463		1466	SK 63.98					
Winkelrotor 6-fach / Angle rotor 6-times  45° mit Bioabdichtung / with bio-containment 10)									
	0521	0548	0509	---	0501			---	
									
Kapazität / capacity	ml	50	75	15	5	6	2,6 – 2,9	1,6 - 5	5
Maße / dimensions Ø x L	mm	34 x 100	35 x 105	17 x 120	12 x 75	12 x 82	13 x 65	13 x 75	13 x 75
Anzahl p. Rotor / number p. rotor		6	6	6	12	12	12	12	12
Drehzahl / speed	RPM	11000	11000	11000	11000	11000	11000	11000	11000
RZB / RCF	³⁾	16233	16233	15828	14745	14745	14745	14745	14745
Radius / radius	mm	120	120	117	109	109	109	109	109
 9 (97%)	sec	40							
 9	sec	63							
Temperatur / temperature	°C ¹⁾	4							
Probenenerwärmung/Sample temp. rise	K ²⁾	19							

4723	4750						5280		4751	
Ausschwingrotor4-fach / Swing out rotor 4-times   90°										
	mit Bioabdichtung / with bio-containment 10)									
	1662						1670			
	 2 x in 5280						 8) 2 x in 5280			
	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 Ø / 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 x 60	
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8	8	8	
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692	
Drehzahl / speed	RPM	4500	4500	4500	4500	4500	4500	4500	4500	
RZB / RCF	³⁾	2717/4030	2717/3985	2717/3985	2717/3985	2717/3985	2717/3985	2717/3985	2717/3985	
Radius / radius	mm	120 / 176	120 / 176	120 / 176	120 / 176	120 / 176	120 / 176	120 / 176	120 / 176	
 9 (97%)	sec	54								
 9	sec	38								
Temperatur / temperature	°C ¹⁾	4								
Probenenerwärmung/Sample temp. rise	K ²⁾	11								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Proben erwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
3) Angaben des Röhrchenherstellers beachten.
8) Objektträger nur belastbar bis RZB 1100
10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

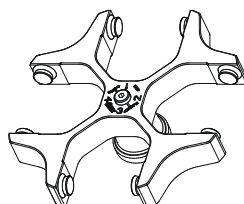
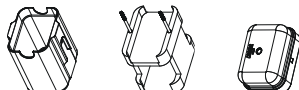
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
3) Observe the tube manufacturer's instructions.
8) Object slide will not stand RCF values exceeding 1100
10) 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".

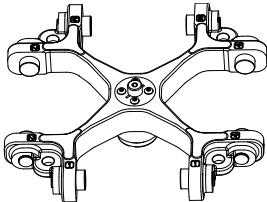
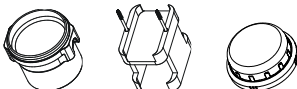
4723	4750 5280 4751							
Ausschwingrotor 4-fach / Swing out rotor 4-times   90°								
	mit Bioabdichtung / with bio-containment 10)							
	1670			1470				
	 8)							
	1665	1666	1667	1668	1471	1475		
								
Kapazität / capacity	ml	4	8	3 x 2	4 x 1	1 x 8	2 x 8	
Maße / dimensions Ø / A	mm ²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	17,5 / 240	17,5 / 240	
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8	
Filterkarten / filter cards		1692	1691	1694	1693	---	---	
Drehzahl / speed	RPM	4500	4500	4500	4500	4500	4500	
RZB / RCF	³⁾	2717/3985	2717/3985	2717/3985	2717/3985	2604/3871	2604/3871	
Radius / radius	mm	120 / 176	120 / 176	120 / 176	120 / 176	115 / 171	115 / 171	
 9 (97%)	sec	54						
 9	sec	38						
Temperatur / temperature	°C ¹⁾	4						
Probenerwärmung/Sample temp. rise	K ²⁾	11						

4753	5051 + 5280 5053								
Ausschwingrotor4-fach / Swing out rotor 4-times   90°									
	1662						1670		
	 2 x in 5280						 ⁸⁾ 2 x in 5280		
	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 Ø / 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 x 60
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8	8	8
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000	4000	4000
RZB / RCF	³⁾	1735/2737	1735/2737	1735/2737	1735/2737	1735/2737	1735/2737	1735/2737	1735/2737
Radius / radius	mm	97 / 153	97 / 153	97 / 153	97 / 153	97 / 153	97 / 153	97 / 153	97 / 153
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
Probenenerwärmung/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 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
3) Angaben des Röhrchenherstellers beachten.
8) Objektträger nur belastbar bis RZB 1100
10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

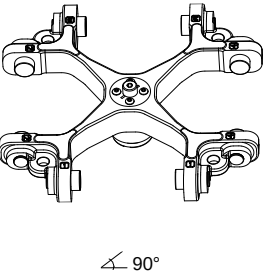
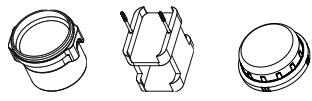
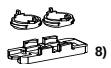
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
3) Observe the tube manufacturer's instructions.
8) Object slide will not stand RCF values exceeding 1100
10) 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".

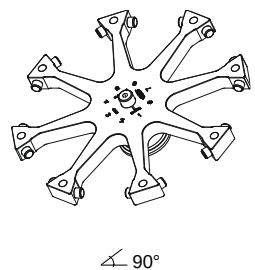
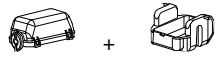
4753	5051 + 5280 5053								
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$									
	1670				1470				
	 8) 2 x in 5280								
	1665	1666	1667	1668	1471	1475			
									
Kapazität / capacity	ml	4	8	3 x 2	4 x 1	1 x 8	2 x 8		
Maße / dimensions $\varnothing$ / A	mm ²	12,4 x 120	17,5 x 240	8,7 / 60	6,2 / 30	17,5 / 240	17,5 / 240		
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8		
Filterkarten / filter cards		1692	1691	1694	1693	---	---		
Drehzahl / speed	RPM	4000	4000	4000	4000	4000	4000		
RZB / RCF	³⁾	1735/2737	1735/2737	1735/2737	1735/2737	1664/2665	1664/2665		
Radius / radius	mm	97 / 153	97 / 153	97 / 153	97 / 153	93 / 149	93 / 149		
 9 (97%)	sec	18							
 9	sec	16							
Temperatur / temperature	°C ¹⁾	-1							
Probenerwärmung/Sample temp. rise	K ²⁾	18							

4784-A	4781						5280		4751	
Ausschwingrotor4-fach / Swing out rotor 4-times  ∠ 90°										
	mit Bioabdichtung / with bio-containment 10)									
	1662						1670			
	 2 x in 5280						 8) 2 x in 5280			
	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 Ø / A	mm²	6,2 / 30	8,7 / 60	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	6,2 / 30	8,7 x 60	
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8	8	8	
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692	1692	
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	4800	4800	
RZB / RCF	3)	3065/4508	3065/4508	3065/4508	3065/4508	3065/4508	3065/4508	3065/4508	3065/4508	
Radius / radius	mm	119 / 175	119 / 175	119 / 175	119 / 175	119 / 175	119 / 175	119 / 175	119 / 175	
 9 (97%)	sec	54								
 9	sec	38								
Temperatur / temperature	°C 1)	4								
Probenerwärmung/Sample temp. rise	K 2)	11								

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 8) Objektträger nur belastbar bis RZB 1100
- 10) Nach DIN EN 61010, Teil 2 – 020. Die Hinweise für Bio-Sicherheitssysteme in den Kapiteln "Sicherheitshinweise" und "Pflege und Wartung" beachten.

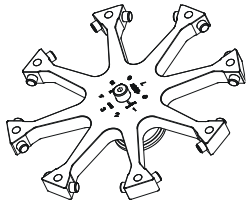
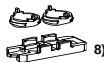
- 1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
- 2) Sample temp. rise during maximum speed and 1 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 8) Object slide will not stand RCF values exceeding 1100
- 10) 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".

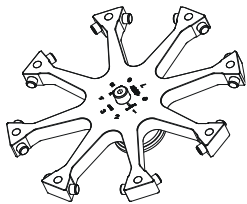
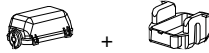
4784-A	4781 5280 4751							
Ausschwingrotor 4-fach / Swing out rotor 4-times  $\angle 90^\circ$								
	mit Bioabdichtung / with bio-containment ¹⁰⁾							
	1670			1470				
								
	1665	1666	1667	1668	1471	1475		
								
Kapazität / capacity	ml	4	8	3 x 2	4 x 1	1 x 8	2 x 8	
Maße / dimensions $\varnothing$ / A	mm ²	12,4 / 120	17,5 / 240	8,7 / 60	6,2 / 30	17,5 / 240	17,5 / 240	
Anzahl p. Rotor / number p. rotor		8	8	8	8	8	8	
Filterkarten / filter cards		1692	1691	1694	1693	---	---	
Drehzahl / speed	RPM	4800	4800	4800	4800	4800	4800	
RZB / RCF	³⁾	3065/4508	3065/4508	3065/4508	3065/4508	2962/4405	2962/4405	
Radius / radius	mm	119 / 175	119 / 175	119 / 175	119 / 175	115 / 171	115 / 171	
 9 (97%)	sec	54						
 9	sec	38						
Temperatur / temperature	°C ¹⁾	4						
Probenerwärmung/Sample temp. rise	K ²⁾	11						

4758	1661 1660							
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$								
	1662				1670			
								
	1663	1664	1665	1666	1667	1668	1663	1664
								
Kapazität / capacity	ml	1	2	4	8	3 x 2	4 x 1	
Maße / dimensions $\varnothing$ / 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		8	8	8	8	8	8	8
Filterkarten / filter cards		1675	1675	1675	1676	1677	1678	1692
Drehzahl / speed	RPM	3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2179	2179	2179	2179	2179	2179	2179
Radius / radius	mm	135	135	135	135	135	135	135
 9 (97%)	sec	19						
 9	sec	16						
Temperatur / temperature	°C ¹⁾	0						
Probenerwärmung/Sample temp. rise	K ²⁾	11						

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
- 2) Probenerwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
- 3) Angaben des Röhrchenherstellers beachten.
- 8) Objektträger nur belastbar bis RZB 1100
- 10) 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 h running time (only with centrifuges without cooling)
- 3) Observe the tube manufacturer's instructions.
- 8) Object slide will not stand RCF values exceeding 1100
- 10) 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".

4758	1661 1660				1680			
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$								
	1670				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 $\varnothing$ / 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		8	8	8	8	8	8	8
Filterkarten / filter cards		1692	1691	1694	1693	[1] 1696	[1] 1696	[1] 1696
Drehzahl / speed	RPM	3800	3800	3800	3800	3800	3800	3800
RZB / RCF	³⁾	2179	2179	2179	2179	2018	2018	2018
Radius / radius	mm	135	135	135	135	125	125	125
 9 (97%)	sec	19						
 9	sec	16						
Temperatur / temperature	°C ¹⁾	0						
Probenerwärmung/Sample temp. rise	K ²⁾	11						

4758	1661 1660							
Ausschwingrotor 8-fach / Swing out rotor 8-times  $\angle 90^\circ$								
	1470							
								
	1471	1475						
								
Kapazität / capacity	ml	1 x 8	2 x 8					
Maße / dimensions $\varnothing$ / A	mm ²	17,5 / 240	17,5 / 240					
Anzahl p. Rotor / number p. rotor		8	8					
Filterkarten / filter cards		---	---					
Drehzahl / speed	RPM	3800	3800					
RZB / RCF	³⁾	2099	2099					
Radius / radius	mm	130	130					
 9 (97%)	sec	19						
 9	sec	16						
Temperatur / temperature	°C ¹⁾	0						
Probenerwärmung/Sample temp. rise	K ²⁾	11						

- 1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Probenerwärmung bei maximaler Drehzahl und 1 h Laufzeit (nur bei Zentrifuge ohne Kühlung)
3) Angaben des Röhrchenherstellers beachten.
8) 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 h running time (only with centrifuges without cooling)
3) Observe the tube manufacturer's instructions.
8) Object slide will not stand RCF values exceeding 1100
[1] One-step method