

EBA 280 / 280 S



Inhalt des Dokuments / content of the document

Operating instructions (EN)

Rotoren und Zubehör / Rotors and accessories





Operating instructions

EBA 280 / 280 S



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
10	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 **EBA 280 / 280 S** 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 con- taminated 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

s in this document will help: ituations.
sts and downtime. lity and service life of the device. ble for compliance with company regulations, tws. on of the document separate from the docu- ent can be replaced in the correct revision. railable at the place where the device is used. to the buyer when the device is sold.
orking with the device may result in serious Fir tasks and the associated risks in accordance

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.



<u> WARNING</u>

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

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



WARNING

Contamination with hazardous substances and substance mixtures!

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

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

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	EBA 280		EBA 280 S			
Туре	1101	1101-01	1102	1102-01		
Mains voltage (±10%)	200-240 V 1~	100-127 V 1~	200-240 V 1~ 100-127 V 1~			
Mains frequency	50-60 Hz 50-60 Hz		50-60 Hz	50-60 Hz		
power consumption	185 VA 185 VA 3		330 VA	330 VA		
Power consumption	0.85 A 1.75 A		1.6 A	3.0 A		
max. capacity	6 x 50 ml					
max. permissible density	ible density 1.2 kg/dm ³					
max. speed (RPM)	6000					
max. acceleration (RCF)	4146		5071			
max. kinetic energy 2700 Nm						
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	igation to perform No ecks GUV Rules 100-500) id only in Germany)					
Ambient conditions (EN / IEC 61010-1):						
Installation site	indoors only					
Altitude	up to 2000 m above sea level					
Ambient temperature	2 °C to 40 °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	erference, EN / IEC 61326-1 FCC Class B e immunity Class B		EN / IEC 61326-1 FCC Class B Class B			
Noise level ≤51 dB(A) (rotor-dependent)		≤56 dB(A)				
Dimensions:						
Width 326 mm						
Depth	400 mm					
Altitude 242 mm						
Weight	approx. 11 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

TOP

Basic-UDI-DI

Basic-UDI-DI

SRN: DE-MF-000010680

040506740100089Y

Device assignment EBA 280 / 280 S (in vitro diagnostic medical device)

3.3 Important labels on the packaging



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



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



PROTECT FROM MOISTURE

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



TEMPERATURE LIMITATION

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



HUMIDITY LIMITATION

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



STACK LIMITATION BASED ON QUANTITY

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

3.4 Important labels on the device



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



Attention, general danger area.

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



Biohazard warning.



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



Direction of rotation of the emergency release.



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

Use in European Union countries, Norway and Switzerland.



3.5 Operating and indicator elements

3.5.1 Control



0

3.5.2 Indicator elements

- The indicator appears when the lid is unlocked.
- Fig. 3: 'Lid unlocked' indicator



Fig. 4: 'Lid locked' indicator



• The indicator light rotates when the rotor is turning.

The indicator appears when the lid is locked.

- The indicator above the button lights up when the RCF is displayed.
- The button lights up during the centrifugation run for as long as the rotor is not yet at a standstill.
- The right side of the button lights up when the centrifuge is in rampdown. 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.
- Switch the device on and off.

START PULSE

Fig. 5: 'Rotation' indicator

RCF

Fig. 6: [RCF] button

Fig. 7: [START/PULSE] button



Fig. 8: [STOP/OPEN] button

3.5.3 Controls



Fig. 9: [Mains switch]

AB1101en_SA

Device overview



	PROG
Fig.	10: [PROG] button





Fig. 12: [SELECT] button



Fig. 13: [START/PULSE] button



Fig. 14: [STOP/OPEN] button



- Fig. 15: Setting buttons
- 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:

- 2 Fuse link
- 1 hex key (SW5 x 100)
- 1 power cable
- 1 user manual
- 1 instruction sheet, transport lock
- 1 Emergency release instruction sheet

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

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Start centrifugation run.

Retrieve programs.

Save programs.

Speed, RPM.

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

Open *'MACHINE MENU'*. Scroll forward in the menus.

- 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.

Toggle between RCF indicator and RPM indicator.

Relative centrifugal force, RCF.

The RCF is displayed in brackets \rangle (.

Selecting the individual parameters.

- Unlock the lid.
- Exit parameter input and the menus
- Change the value of a parameter.
- The value changes at an increasing rate if the button is held down.



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 15. The device must be shipped in its original packaging.

4 Transport and storage

4.1 Transport and storage conditions

Transport conditions

. «ge						
	 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. 					
	The device must be stored in the original packaging. Only store the device in dry rooms.					

Storage conditions



- 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

The lid is closed.

The mains cable is disconnected from the device.

- **1.** Tilt the device on the back of the device.
- **2.** Insert 2 spacer sleeves (1).
- **3.** Screw in 2 screws (2).



Fig. 16: Transport lock

- 1 Spacer sleeves
- 2 Screws
- 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.

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. Open the box at the top.



- **2.** Remove the padding.
- **3.** Remove the device and accessories by lifting them up out of the box.
- 4. Place the device on a stable and level surface.

5.2 Remove the transport lock

Personnel:

Trained user

The lid is closed.

The mains cable is disconnected from the device.

1. Tilt the device on the back of the device.

- **2.** Unscrew 2 screws (*2*).
- **3.** Remove 2 spacer sleeves (1).
- **4.** Keep the screws and spacer sleeves in a safe place.



Fig. 17: Transport lock

- 1 Spacer sleeve
- 2 Screw

5.3 Setting up and connecting the centrifuge

Setting up the centrifuge



WARNING

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

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



CAUTION

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

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



NOTICE

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

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

Personnel:

- Trained user
- **1.** Place the device on a stable and level surface.
- 2. Maintain a distance of 300 mm around the device.
- 3. Comply with the ambient conditions in the technical data (→ *Chapter 3 'Device overview' on page 9*).

Connecting the centrifuge



Damage to the device by unauthorised personnel

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

NOTICE

Damage to the device due to condensation.

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

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

Personnel:

Trained user

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

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

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



5.4 Switching the centrifuge on and off.

Switching the centrifuge on

Trained user

Personnel:

- ▶ 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 machine type and program version
 - the rotor code (R) and the maximum speed (maxRPM) of the last rotor recognised by the rotor detection
 - When the lid is closed: For centrifuges with cooling, *'Open the lid'* indicator. The lid opens in centrifuges without cooling.
 - When the lid is open: The centrifugation data of the last program used or program 1.

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 'Lid unlocked' indicator appears.

Closing the lid



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.



Damage to the device caused by the lid slamming.

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

Personnel:

Trained user



- Close the lid and press the front edge of the lid down gently.
 - The lid locks using a motor.

The 'Lid locked' indicator appears.

6.2 Removing and installing the rotor

Removing a rotor with a

Personnel:

release knob

- Trained user
- 1. Den the lid.

2. Pull the release knob (1) up, hold it and lift the rotor off the motor shaft (2).



Fig. 18: Rotor installation and removal

- 1 Release knob
- 2 Motor shaft

Installing a rotor with a release knob

Personnel:

Trained user

The lid is open.

- **1.** \triangleright Clean the motor shaft (2) and rotor hole.
- 2. Lightly grease the motor shaft (2), see → Chapter 8 'Cleaning and care' on page 35.
- 3. Lift the rotor by the release knob (1) and place it vertically on the motor shaft (2).
 - The rotor engages automatically on the motor shaft.
- 4. Check that the rotor is firmly seated by holding the rotor on the left and right and pulling up gently.

Removing a rotor without a release knob

Trained user

Personnel:

- 1. Den the lid.
- **2.** \triangleright Hold the rotor by the handle (1) and lift it off the motor shaft (2).



Fig. 19: Rotor installation and removal

- Handle 1
- 2 Motor shaft



Installing a rotor without a release knob

Personnel:

- Trained user
- **1.** Clean the motor shaft (2) and rotor hole.
- **2.** Lightly grease the motor shaft (2).
- **3.** Hold the rotor by the handle (*1*), place it vertically on the motor shaft (*2*) and press it down as far as it will go.

6.3 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.



6.4 Centrifugation

6.4.1 Centrifugation in continuous operation

Personnel:

- Trained user
- **1.** If required: Press the *[RCF]* button.
 - The parameter RCF ('>RCF<') or RPM ('RPM') is displayed. Press the [RCF] button to toggle between the two parameters.
- 2. Enter the desired speed (RPM) or relative centrifugal force (RCF).

See → Chapter 7.2 'Programming' on page 27.

- 3. Set the parameters t/min and t/sec to zero.
 - - See → Chapter 7.2 'Programming' on page 27.
- 4. Press the [START/PULSE] button.
 - ➡ The centrifugation run is started.
 - The timing starts at '0:00'.

The rotor speed or the resulting RCF value and the elapsed time are displayed during the centrifugation run.

- 5. Press the [STOP/OPEN] button to cancel the centrifugation run.
 - Ramp-down takes place with the set brake level. The brake level is displayed.

When the rotor is at a standstill, the lid opens, an audible signal sounds and the remaining number of run cycles (centrifugation runs) is displayed.

6.4.2 Centrifugation with time preselection

Personnel:

Trained user

- 1. If required: Press the [RCF] button.
 - The parameter RCF ('>RCF<) or RPM ('RPM) is displayed. Press the [RCF] button to toggle between the two parameters.
- 2. Enter the desired speed (RPM) or relative centrifugal force (RCF).

See ← Chapter 7.2 'Programming' on page 27.

3. Set the parameters t/min and t/sec to the desired value.

See ← Chapter 7.2 'Programming' on page 27.

- 4. Press the [START/PULSE] button.
 - ➡ The centrifugation run is started.

The rotor speed or the resulting RCF value and the remaining time are displayed during the centrifugation run.

5. Press the *[STOP/OPEN]* button to cancel the centrifugation run.

or

Wait for the centrifugation time to elapse.

 Ramp-down takes place with the set brake level. The brake level is displayed.

When the rotor is at a standstill, the lid opens, an audible signal sounds and the remaining number of run cycles (centrifugation runs) is displayed.



6.4.3 Short-term centrifugation

Personnel:

Trained user

- 1. If required: Press the [RCF] button.
 - The parameter RCF ('>RCF<') or RPM ('RPM') is displayed. Press the [RCF] button to toggle between the two parameters.
- **2.** Enter the desired centrifugation parameters.

See ← Chapter 7.2 'Programming' on page 27.

- 3. Press and hold the [START/PULSE] button.
 - ➡ The centrifugation run is started.

The timing starts at '0:00'.

The rotor speed or the resulting RCF value and the elapsed time are displayed during the centrifugation run.

- 4. Release the *[START/PULSE]* button to end the centrifugation run.
 - Ramp-down takes place with the set brake level. The brake level is displayed.

When the rotor is at a standstill, the lid opens, an audible signal sounds and the remaining number of run cycles (centrifugation runs) is displayed.

6.4.4 Changing settings during centrifugation

The runtime, speed, relative centrifugal force (RCF) and ramp-up and rampdown parameters can be changed during centrifugation.

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

The original program is not overwritten.

6.5 Quick stop function

Personnel:

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

7 Software operation

- 7.1 Centrifugation parameters
- 7.1.1 Ramp-up and ramp-down parameters

Ramp-up level

- 1. Press the [SELECT] button repeatedly until _/ is displayed.
- 2. Use the *[Adjustment buttons]* to set the desired value.

A numerical value can be set from 1 to 9.

Adjustable in 1 second increments.

- 9 = shortest ramp-up time
- 1 = longest ramp-up time



- 3. Press the [START/PULSE] button.
 - ➡ The setting is transferred to the indicator.
- 1. Press the [SELECT] button repeatedly until _._ is displayed.
- 2. Use the [Adjustment buttons] to set the desired value.

A numerical value can be set from 0 to 9.

Adjustable in 1 second increments.

- 9 = shortest ramp-down time
- 1 = long ramp-down time
- 0 = longest ramp-down time (unbraked ramp-down).
- 3. Press the *[START/PULSE]* button.
 - ➡ The setting is transferred to the indicator.

7.1.2 Runtime Changing the runtime

Brake level

For continuous operation, the minutes and seconds must be set to zero. 1. Press the [SELECT] button repeatedly until 't/min' is displayed. 2. Use the [Adjustment buttons] to set the desired value. A numerical value can be set from 1 to 99 minutes. Adjustable in 1 minute increments. **3.** Press the *[SELECT]* button. 4. Use the [Adjustment buttons] to set the desired value. A numerical value can be set from 1 to 59 seconds. Adjustable in 1 second increments. 5. Press the [START/PULSE] button. The settings are shown in the indicator. Start of runtime count • The 'Dual time' function is enabled. The function is enabled ex works. 1. Press the [SELECT] button repeatedly until 'Begins at START' or 'Begins at SPEED' is displayed. 2. Use the [Adjustment buttons] to select the desired setting. • 'Begins at START' = Runtime counting begins after the start of the centrifugation run. '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 [START/PULSE] button. The settings are shown in the indicator.

7.1.3 Speed, RPM

1. Press the *[SELECT]* button repeatedly until *'RPM'* is displayed.



- **2.** Use the *[Adjustment buttons]* to set the desired value.
 - A numerical value from 200 RPM to the maximum rotor speed can be set.

Adjustable in 10 second increments.

- **3.** Press the *[START/PULSE]* button.
 - ➡ The setting is transferred to the indicator.

7.1.4 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

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

7.1.5 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.
 - ➡ The LED above the button lights up.
- 2. Press the [SELECT] button repeatedly until 'R:' and 'RCF' are displayed.
 - → Value of the '*RCF*' parameter is displayed in brackets \rangle (.
- 3. Use the [Adjustment buttons] to set the desired 'RCF'.

A numerical value can be set that gives a speed between 200 RPM and the maximum rotor speed.

Adjustable in 1 second increments.

The set centrifuging radius is displayed while entering the RCF.

- **4.** Press the *[SELECT]* button repeatedly until *'RAD/mm'* is displayed.
- Use the [Adjustment buttons] to set the desired centrifuging radius.
 A numerical value from 10 mm to 330 mm can be set.
 Adjustable in 1 millimetre increments

The value of the RCF adjusts automatically when the centrifuging radius is changed.

- 6. Press the *[START/PULSE]* button.
 - ➡ The setting is transferred to the indicator.

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7.1.6 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:

Reduzierte Drehzahl
$$(n_{red}) = \sqrt{\frac{1,2}{\text{höhere Dichte (kg/dm3)}} * \text{maximale Drehzahl (RPM)}}$$

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:

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 Opening or loading programs

- 1. Use the [PROG] button to select the 'PROG RCL' parameter.
- Use the [Adjustment buttons] to set the desired program location.
 Program locations 1 to 9 and # can be set.
- 3. Press the [START/PULSE] button.
 - \bullet '*** OK ***' is displayed briefly.

The centrifugation data of the desired program location is displayed

- **4.** To check the parameters: Press the *[SELECT]* button.
- 5. To exit the parameter indicator: Press the *[OPEN/STOP]* button or do not press any button for 8 seconds.



7.2.2 Entering or changing programs

)

Program locations 1-9 are available.

No programs may be stored in program location #. Program location # serves as a buffer for changed centrifugation parameters.

A dash "-" appears in the indicator instead of the program location number if centrifugation parameters are changed but then not saved to a program location. The centrifugation parameters are automatically saved in program location # after starting the centrifugation run.

The centrifugation parameters in program location # are overwritten every time a centrifugation run is executed with changed centrifugation parameters that have not been saved to a program location.

- **1.** If required: Press the *[RCF]* button to toggle between RPM and RCF indicator.
 - ➡ The indicator above the button lights up.
- **2.** If required: Press the *[SELECT]* button to select the desired parameter and set it with the *[Adjustment buttons]*.

The parameters t/min and t/sec must be set to 0 with the *[Adjustment buttons]* to set continuous operation. Continuous operation is shown in the time indicator with '--:--'.

- 3. Use the *[SELECT]* button to select the *'PROG STO'* parameter.
- **4.** Use the *[Adjustment buttons]* to set the desired program location.
- 5. Press the [START/PULSE] button.
 - Settings are stored in the desired program location.

'*** OK ***' is displayed briefly.

The settings are always stored in program location # if the [START/ PULSE] button is pressed without the 'PROG STO' parameter being selected.

7.2.3 Saving programs

- **1.** Press the *[PROG]* button twice.

PROG STO: Program location where the centrifugation parameters are saved.

- **2.** Use the *[Adjustment buttons]* to set the desired program location.
- 3. Press the [START/PULSE] button.
 - Settings are stored in the desired program location. '*** OK ***' is displayed briefly.

The settings are always stored in program location # if the *[START/ PULSE]* button is pressed without the *'PROG STO'* parameter being selected.

7.2.4 Automatic buffer

The centrifugation data is saved to program location '#' every time a centrifugation run is started.

No programs can be stored in program location '#'.



Rotor detection

7.3

- Rotor detection is performed after starting a centrifugation run.
 - The centrifugation run is cancelled after rotor detection if the rotor code of the rotor is being read in for the first time. The rotor code (R) and the newly detected rotor's maximum speed (maxRPM) permissible for the centrifuge are displayed.
 - 1. Press any button after the rotor has stopped.
 - The maximum permissible number of run cycles ('Cyc lim') is displayed.
 - 2. Set the maximum permissible number of run cycles of the rotor or the bucket.
 - Every rotor in a centrifuge has a maximum permissible speed. The maximum rotor speed (*'ROTOR MAX*) is displayed briefly after the centrifugation run has started. The centrifugation run is cancelled if the set speed is greater than the permissible maximum rotor speed. The permissible maximum rotor speed is displayed.
 - Adjust the speed to the maximum rotor speed.
 - If the cycle counter is enabled, the remaining number of run cycles (centrifugation runs) of the rotor code used is displayed briefly after opening the lid.

7.4 Machine Menu

7.4.1 Querying system information

The following system information can be queried:

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

The rotor is stationary.

- 1. Press and hold the [SELECT] button.
- 2. Press the *[SELECT]* button.

'-> Info' is displayed.

- 3. Press the *[START/PULSE]* button.
 - ➡ The centrifuge model is displayed.
- 4. Press the [SELECT] button.
 - ➡ The following is displayed:
 - 'R': Rotor code of the rotor

'*': The rotor code of the rotor currently being used is marked with an asterisk.

'RPMmax': Maximum speed of the centrifuge rotor

- 5. If necessary: press [Adjustment buttons].
 - ➡ The maximum speeds of the various rotor codes are displayed.
- 6. Press the [SELECT] button.
 - The centrifuge program version CPFW= is displayed.



	7. Press the [SELECT] button.
	The type of frequency converter 'FC type LC' of the centrifuge is displayed.
	8. Press the [SELECT] button.
	The program version of the frequency converter 'FC FW=' of the centrifuge is displayed.
	9. Press the [STOP/OPEN] button twice to exit the '-> Info' menu
	Press the <i>[STOP/OPEN]</i> button three times to exit the <i>'*MACHINE MENU*'</i> .
7.4.2 Cycle counter	
	The centrifuge is equipped with a cycle counter. The cycle counter counts the run cycles (centrifugation cycles). The remaining number of run cycles (centrifugation runs) is displayed briefly after each centrifugation run.
	If the rotor is detected for the first time by the rotor detection, the centrifu- gation run is cancelled. ' <i>Cyc lim</i> = (50000)' is displayed after pressing any button. The maximum permissible number of run cycles indicated on the rotor must be entered before the centrifugation run can be restarted.
	If the maximum permissible number of rotor run cycles entered is exceeded, <i>'Cycles passed'</i> is displayed after each start of a centrifugation run. The centrifugation run must be restarted. The rotor must be replaced with a new one.
	Once the rotor has been replaced, the cycle counter must be reset to 'O'.
Entering the maximum per- missible number of run cycles	The maximum permissible number of run cycles must be entered after starting the first centrifugation run.
	Cyc lim = (50000)' is displayed.
	1. Use the <i>[Adjustment buttons]</i> to set the maximum permissible number of run cycles indicated on the rotor.
	2. Press the [START/PULSE] button.
	The setting is stored.
	'Store cycles' is displayed briefly.
Resetting the cycle counter	The cycle counter must be reset to $ {\cal O}'$ after installing a new rotor.
	1. Press and hold the [SELECT] button.
	 <i>**MACHINE MENU*</i>' is displayed after 8 seconds.
	2. Press the [SELEC7] button repeatedly until '-> Time & Cycles' is displayed.
	3. Press the [START/PULSE] button.
	4. Press the <i>[SELECT]</i> button repeatedly until <i>'Cyc sum='</i> is displayed.
	5. Press the <i>[RCF]</i> button.
	6. Press the /▼ / button.
	The number of run cycles completed is reset to zero.
	7. Press the <i>[START/PULSE</i>] button.



8. Press the [STOP/OPEN] button twice to exit the '-> Time & Cycles' menu

or

Press the [STOP/OPEN] button three times to exit the '*MACHINE MENU*'.

7.4.3 Querying operating hours and centrifugation runs

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

- Internal operating hours: Total time for which the device has been switched on.
- External operating hours: Total time of centrifugation runs to date.

The rotor is stationary.

- **1.** Press and hold the *[SELECT]* button.
- 2. Press the [SELECT] button repeatedly until '-> Time & Cycles' is displayed.
- 3. Press the [START/PULSE] button.

TimeExt: External operating hours

- 4. Press the [SELEC7] button.
 - 'TimeInt=' is displayed.
 TimeInt: Internal operating hours
- 5. Press the *[SELECT]* button.
 - 'Starts=' is displayed.
 Starts: Number of all centrifugation runs
- 6. Press the [STOP/OPEN] button twice to exit the '-> Time & Cycles' menu

or

Press the [STOP/OPEN] button three times to exit the '*MACHINE MENU*'.

7.4.4 Enabling or disabling dual time

The *'Dual time'* function must be enabled to allow the *'Begins at SPEED'* parameter to be set. The function is enabled ex works.

The rotor is stationary.

- 1. Press and hold the *[SELECT]* button.
- 2. Press the [SELECT] button repeatedly until '-> Settings' is displayed.
- 3. Press the *[START/PULSE]* button.
 - ♦ 'End beep = on' or 'End beep = off' is displayed.
- 4. Press the [SELECT] button repeatedly until 'Dual time = on ' or 'Dual time = off' is displayed.
- 5. Use [Adjustment buttons] to set 'off ' or 'on'.
 - off = The function is disabled
 - on = The function is enabled.



- 6. Press the *[START/PULSE]* 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*'.

- 7.4.5 Audible signal
- 7.4.5.1 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.

7.4.5.2 Setting an audible signal

- **1.** Press and hold the *[SELECT]* button.
- **2.** Press the *[SELECT]* button repeatedly until '-> Settings' is displayed.
- 3. Press the [START/PULSE] button.
 - ♦ 'End beep = on' or 'End beep = off' is displayed.
- 4. Use [Adjustment buttons] to set 'off' or 'on'.

off: Audible signal after completion of the centrifugation run is disabled.

on: Audible signal after completion of the centrifugation run is enabled.

- **5.** Press the *[SELECT]* button.
 - *Error beep = on'* or *Error beep = off'* is displayed.
- 6. Use [Adjustment buttons] to set 'off' or 'on'.

off: Audible signal after the occurrence of a malfunction is disabled.

on: Audible signal after the occurrence of a malfunction is enabled.

- 7. Press the *[SELECT]* button.
 - 'Beep volume = min', 'Beep volume = mid' or 'Beep volume = max' is displayed.
- 8. Use [Adjustment buttons] to set 'min', 'mid' or 'max'.
 min: The volume of the audible signal is set to low.
 mid: The volume of the audible signal is set to medium.
 Max: The volume of the audible signal is set to loud.
- 9. Press the *[START/PULSE]* button.

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The setting is stored.

Store Settings...' is displayed briefly.

'-> Settings' is then displayed.



10. 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 Visual signal

The indicator backlight flashes as a visual signal after the centrifugation run is finished.

Switching on and off

- **1.** Press and hold the *[SELECT]* button.
- **2.** Press the *[SELECT]* button repeatedly until '-> Settings' is displayed.
- 3. Press the *[START/PULSE]* button.
 - 'End beep = on' or 'End beep = off' is displayed.
- **4.** Press the *[SELECT]* button repeatedly until *'End blinking=off'* or *'End blinking=on'* is displayed.
- 5. Use [Adjustment buttons] to set 'off' or 'on'.
 - off: Backlight does not flash.

on: Backlight flashes.

- 6. Press the [START/PULSE] button.
 - ➡ The setting is stored.

'Store setting ... ' 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*'.

7.4.7 Automatic unlocking of the lid

Setting whether or not the lid unlocks automatically after the centrifugation run.

The rotor is stationary.

- **1.** Press and hold the *[SELECT]* button.
- **2.** Press the *[SELECT]* button repeatedly until '-> Settings' is displayed.
- **3.** Press the *[START/PULSE]* button.
 - *'End beep = on'* or *'End beep = off'* is displayed.
- **4.** Press the *[SELECT]* button repeatedly until *'Lid AutoOpen=off'* or *'Lid AutoOpen=on'* is displayed.
- Use [Adjustment buttons] to set 'off' or 'on'.
 off: Lid does not unlock automatically.
 on: Lid unlocks automatically.
- 6. Press the [START/PULSE] button.
 - ➡ The setting is stored.

'Store setting ... ' 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*'.

7.4.8 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 *[SELECT]* button.
- **2.** Press the *[SELECT]* button repeatedly until '-> Settings' is displayed.
- **3.** Press the *[START/PULSE]* button.
 - *End beep = on'* or *End beep = off'* is displayed.
- **4.** Press the *[SELECT]* button repeatedly until 'Start Pr = First' or 'Start Pr = Last' is displayed.
- 5. Use [Adjustment buttons] to set 'Last' or 'First'.

Last = last program used

First = program 1

- 6. Press the *[START/PULSE]* button.
 - ➡ The setting is stored.

'Store setting ... ' 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*'.

7.4.9 Indicator backlight

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

- **1.** Press and hold the *[SELECT]* button.
- **2.** Press the *[SELECT]* button repeatedly until '-> Settings' is displayed.
- **3.** Press the *[START/PULSE]* button.
- **4.** Press the *[SELECT]* button repeatedly until *'Power save=off'* or *'Power save=on'* is displayed.
- Use [Adjustment buttons] to set 'off' or 'on'.
 off: Backlight is switched off.
 on: Backlight is switched on.
- 6. Press the *[START/PULSE]* button.
 - The setting is stored.

Store setting...' 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
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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

Cleanin	a the	device
oloaimi	9	401100

- 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 accessories

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

8.4 Disinfection

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

See → Chapter 8 'Cleaning and care' on page 35

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



Disinfecting the device	CAUTION Risk of injury due to ingress of water or other liquids. - Protect the device against external liquids. - Do not disinfect the device using spray.							
	 Open the lid. Switch off the device and disconnect it from the power supply. Remove accessories. Clean the housing and centrifuging chamber using disinfectant. Remove any disinfectant residues with a damp cloth after using disinfectants. The surfaces must be dried immediately after cleaning. 							
Disinfecting the accessories	 Disinfect the accessories using the disinfectant. Wet all cavities with bubble-free disinfectant. 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. 							
8.5 Maintenance Greasing the rubber seal of the centrifuging chamber	Rub the sealing ring lightly with a rubber care product.							
Trunnion greasing	 Remove accessories. Clean the trunnions. Remove any detergent residues with a damp cloth after using detergents. Grease the trunnions and suspension with Hettich Tubenfett 4051. 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.



Inspecting the centrifuging chamber for damage

Greasing the motor shaft

- ____ Check the centrifuging chamber for damage.
- **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. Mains input fuses defective.	 Check the supply voltage. Check the mains input fuse. The mains switch is in switch position [/]
IMBALANCE	The rotor is unevenly loaded.	Open the lid.Check the loading of the rotor.Repeat the centrifugation run.



Fault description	Cause	Remedy
RPM > ROTOR MAX	Speed in the selected program greater than the maximum rotor speed.	 Check and correct the speed.
MAINS INTERRUPT	Loss of mains power during the centrifugation run. The centrifugation run was not completed.	 Open the lid. Press the <i>[START/PULSE]</i> button. If required: Repeat the centrifugation run.
R WRONG ROTOR (R = rotor code)	The rotor being used is not approved for the device.	 Install a rotor that is approved for the device.
KEYBOARD-ERROR	Error/defect in electronics.	Perform a MAINS RESET.
TACHO - ERROR 1, 2, 96.1	Speed pulse failure. No rotor inserted. Electronics defective.	 Perform a MAINS RESET after the displayed waiting time (150 seconds) has elapsed. Check whether the rotor is inserted.
LID ERROR 4.1-4.127	Lid lock error.	Perform a MAINS RESET.
OVER SPEED 5	Overspeed.	Perform a MAINS RESET.
ROTOR ERROR 10.1-10.6	Rotor coding error.	Perform a MAINS RESET.
VERSION ERROR 12	Wrong centrifuge model detected. Error / defect in the electronics.	 Perform a MAINS RESET.
UNDER SPEED 13	Underspeed.	Perform a MAINS RESET.
CTRL ERROR 22-25.4	Error/defect in electronics.	Perform a MAINS RESET.
CRC ERROR 27, 27.1	Error/defect in electronics.	Perform a MAINS RESET.
COM ERROR 31-36	Error/defect in electronics.	Perform a MAINS RESET.
FC ERROR 60, 61.1-61.21, 61.64-61.142	Error/defect in electronics.	Perform a MAINS RESET.
TACHO ERR 61.22	Speed measurement error.	 The device must not be switched off while the message "Wait" is displayed. Perform a MAINS RESET when the message "wait!" is no longer displayed.
FC ERROR 61.23	Speed measurement error.	 The device must not be switched off while the message "Wait" is displayed. Perform a MAINS RESET when the message "wait!" is no longer displayed.
FC ERROR 61.153	Error/defect in electronics.	Perform a MAINS RESET.Check the loading of the rotor.Repeat the centrifugation run.



Fault description	Cause	Remedy
VERS. ERR 61.154	Invalid machine version.	Perform a MAINS RESET.

9.2 Perform a MAINS RESET

- 1. Set the mains switch to [0].
- 2. Wait 10 seconds.
- 3. Set the mains switch to [/].

WARNING

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.



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

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



WARNING

Danger of cutting and crushing due to moving rotor.

Do not open the lid until the rotor has stopped.

Personnel:

- Trained user
- **1.** Look through the window in the lid to ensure that the rotor is stationary.
- **2.** Insert the hex key horizontally into the hole (1) and turn anticlockwise until the lid opens.
- **3.** Remove the hex key from the hole (1).

Fig. 20: Emergency release 1 Hole

9.4 Replacing the mains input fuse



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.

Personnel:

Trained user







The mains fuses are located next to the mains switch.

The mains switch is in switch position [O]

- 1. Disconnect the mains cable from the device plug.
- **2.** Press the snap locks (2) against the fuse holder (1) and pull them out.
- **3.** Replace the defective mains input fuses.

Only use fuses with the nominal value specified for the type: see the table below.

- Fig. 21: Mains input fuse
- 1 Fuse holder
- 2 Snap lock

- 4. \blacktriangleright Push in the fuse holder (1) until the snap lock engages.
- 5. Reconnect the device to the mains.

Model	Туре	Fuse	Order no.
EBA 280	1101	T 3.15 AH/250 V	E997
EBA 280	1101-01	T 6.3 AH/250 V	2266
EBA 280 S	1102	T 3.15 AH/250 V	E997
EBA 280 S	1102-01	T 6.3 AH/250 V	2266

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)):





Fig. 22: Household waste ban

Group 5 (small devices)

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



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Rotoren und Zubehör / Rotors and accessories

1146		1147 1147 + 1063-6							3-6				
Ausschwingrotor 6-fach / Swing out rotor 6-times											+ +		
	051	18									2078	0536	
 ✓ 90° EBA 280: 4700 RPM EBA 280S: 6000 RPM 							Ũ			3			
Kapazität / capacity r	nl 14	5	4,9	4,5 - 5	7,5 – 8.5	9 – 10	4 – 7	8,5 - 10	12	0,5	1,5	2,0	
Maße / dimensions Ø x L m	m 17 x	100	13 x 90	11 x 92	15 x 92	16 x 92	13 x 100	16 x 100	17 x 102	10,7 x 36	11 x 38	11 x 38	
Anzahl p. Rotor / number p. roto	or							(6				
Drehzahl / speed RI	PM							4700	/ 6000				
RZB / RCF)	3112 / 5071 1877 / 3059 1902 / 3099							/ 3099				
Radius / radius m	m	126 76 77											
9 (97%) s	ec	9 / 11											
∽_ .9 s	ec							11	/ 13				
Probenerwärmung/Sample K temp. rise	1)							10	/ 15				

1146		1147		1147 + 1053-6							
Ausschwingrotor 6-fach / Swing out rotor 6-times											
			0501+0767	0553							
∠_90° EBA 280: 4700 RPM EBA 280S: 6000 RPM] + 0								
Kapazität / capacity ml	4	4 – 5,5	6	Ę	5	1,1 – 1,4	2,7 - 3	2,6-3,4	1,6 – 5,0	4 - 7	
Maße / dimensions Ø x L mm	10 x 88	15 x 75	12 x 82	12 x 75	13 x 75	8 x 66	11 x 66	13 x 65	13 x 75	16 x 75	
Anzahl p. Rotor / number p. rotor		•	•	6							
Drehzahl / speed RPM					4700	/ 6000					
RZB / RCF ²⁾	3112	/ 5071	2865 / 4669				2816	4266			
Radius / radius mm	12	26	116				1()6			
9 (97%) sec		9 / 11									
<u>∼_</u> 9 sec					11	/ 13					
Probenerwärmung/Sample K ¹⁾ temp. rise					10	/ 15					

Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit
 Angaben des Röhrchenherstellers beachten.

Sample temp. rise during maximum speed and 1 hour running time 1)

Observe the tube manufacturer's instructions 2)

1142			112	7-A			
Ausschwingrotor 12-fac Swing out rotor 12-time							
)	0553					
		Ĵ		}-1 1111			
Kapazität / capacity	ml	5	1,6 - 5	2,6 - 3,4	2,7 - 3		
Maße / dimensions Ø x L	mm	13 x 75	13 x 75	13 x 65	11 x 66		
Anzahl p. Rotor / number p.		1	2				
Drehzahl / speed	RPM		50	00			
RZB / RCF	2)		29	63			
Radius / radius	mm		10	06			
 9 (97%)	sec		1	0			
<u>∼ </u> 9	sec		1	2			
Probenerwärmung/Sample temp. rise	K ¹⁾		1	0			

1148				1132-A							
Ausschwingrotor 8-fach / Swing out rotor 8-times											
		0553				0501		2079			
✓ 90°						Ĵ					
Kapazität / capacity	nl	5	1,6 - 5	2,6 - 3,4	2,7 – 3	6	4 - 5,5	10	4 - 7		
Maße / dimensions Ø x L m	nm	13 x 75	13 x 75	13 x 65	11 x 66	12 x 82	15 x 75	17 x 70	16 x 75		
Anzahl p. Rotor / number p. rote	or				8						
Drehzahl / speed R	PM				50	00					
RZB / RCF	2)				29	91					
Radius / radius n	nm	107									
9 (97%) s	ес	8									
<u>∼.</u> 9 s	ес				1	0					
Probenerwärmung/Sample k temp. rise	(1)				9	9					

1)

Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit
 Angaben des Röhrchenherstellers beachten.

Sample temp. rise during maximum speed and 1 hour running time Observe the tube manufacturer's instructions

2)

1137			1634	1634 1633				1635				
Winkelrotor 6-fach / Angle rotor 6-times												
		0521	0546	0519	0545			0518				
∠ 36°												
Kapazität / capacity	ml	50	50	25	30	9-10	10	15	4 - 7			
Maße / dimensions \varnothing x L	mm	34 x 100	34 x 100 29 x 107		26 x 95	16 x 92	15 x 102	17 x 100	13 x 100			
Anzahl p. Rotor / number p.	rotor	6										
Drehzahl / speed	RPM				6000							
RZB / RCF	2)	4025	3904	3703	3703	37	83	3783	3783			
Radius / radius	mm	100	97	92	92	9	4	94	94			
 9 (97%)	sec	20										
~ _9	sec		17									
Probenerwärmung/Sample temp. rise	K ¹⁾					7						

1137		1632	1641	1631	1635 + 1054-A		
Winkelrotor 6-fach / Angle rotor 6-times			0))	0)			
		0578	0513	0509			
∠ 36°				V			
Kapazität / capacity	ml	7	50	15	1,6 – 5,0		
Maße / dimensions \varnothing x L	mm	12 x 100	29 x 115	17 x 120	13 x 75		
Anzahl p. Rotor / number p. r	otor	18	3	6	6		
Drehzahl / speed	RPM						
RZB / RCF	2)	3944	3824	3824	2978		
Radius / radius	mm	98	95	95	74		
- 9 (97%)	sec			20			
<u>∼_9</u>	sec			17			
Probenerwärmung/Sample temp. rise	K ¹⁾			7			

Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit
 Angaben des Röhrchenherstellers beachten.

Sample temp. rise during maximum speed and 1 hour running time Observe the tube manufacturer's instructions 1)

2)

1139		1054-A											
Winkelrotor 12-fach / Angle rotor 12-times													
		0553										0518	
∡_35°				3)							0701		
Kapazität / capacity	ml	ţ	5	12	1,6 – 5,0	1,1 – 1,4	2,6 _ 3,4	2,7 - 3	4,5 - 5	4,9	4	15	
Maße / dimensions \varnothing x L	mm	12 x 75	13 x 75	17 x 102	13 x 75	8 x 66	13 x 65	11 x 66	11 x 92	13 x 90	12 x 60	17 x 100	
Anzahl p. Rotor / number p.	rotor					1	2						
Drehzahl / speed	RPM					60	00						
RZB / RCF	2)	33	00	4146	3300	3300	33	00	41	46	3260	4146	
Radius / radius	mm	8	2	103	82	82	8	2	10	03	103		
- 9 (97%)	sec		16										
~ 9	sec					1	6						
Probenerwärmung/Sample temp. rise	K ¹⁾					(6						

1139					1058					6305	106	3-6	
Winkelrotor 12-fach / Angle rotor 12-times					0					0	Hetrich	1003	
								0509	0507	-		2078	0536
<i>4</i> −35°								V	0		8		
Kapazität / capacity	ml	7,5 – 8,5	9 - 10	10	4 - 7	8	8,5 - 10	1	5	4	0,5	1,5	2,0
Maße / dimensions \varnothing x L	mm	15 x 92	16 x 92	15 x 102	13 x 100	16 x 125	16 x 100	17 x 120	17 x 100	10 x 88	10,7 x 36 11		k 38
Anzahl p. Rotor / number p. I	rotor	1	2		12	6	12	6	12	12	1	2	
Drehzahl / speed	RPM						60	00					
RZB / RCF	2)	4146			4146	41	46	41	46	3502	2777	27	37
Radius / radius	mm	103			103	1()3	1()3	87	69	68	
 9 (97%)	sec		16										
~_ .9	sec						1	6					
Probenerwärmung/Sample temp. rise	K ¹⁾						6	6					

Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit
 Angaben des Röhrchenherstellers beachten.
 ohne Deckel

Sample temp. rise during maximum speed and 1 hour running time Observe the tube manufacturer's instructions. without lid 1)

2) 3)

1133							
Winkelrotor 12-fach (mit Dekantierhilfe) Angle rotor 12-times (with decanter aid)							
		0553	0501	0578			
Kapazität / capacity	ml	5	6	7			
Maße / dimensions Ø x L	mm	12 x 75	12 x 82	12 x 100			
Anzahl p. Rotor / number p.	rotor		12				
Drehzahl / speed	RPM		5000				
RZB / RCF	2)		2879				
Radius / radius	mm		103				
 9 (97%)	sec		8				
~ 9	sec		10				
Probenerwärmung/Sample temp. rise	K ¹⁾		18				

Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit
 Angaben des Röhrchenherstellers beachten.

Sample temp. rise during maximum speed and 1 hour running time Observe the tube manufacturer's instructions. 1)

2)