



Pole Ideal Tajhiz Co.

Operating Instructions

Universal Centrifuges

320 / 320R / Premium 20000 / Premium 20000R

www.medpit.com

Cat. No.: 97121

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1 Use according to specification

The machine presented here is a medical product (laboratory centrifuge). The centrifuge is used to separate substances or substance mixtures with a density of max. 1.2 kg/dm³. This also includes substances and substance mixtures of human origin. The centrifuge is only intended to be used for this purpose. A different use or application over and above this is deemed not in accordance with the specifications. The company Andreas undertakes no liability for damages resulting therefrom.

Belonging to the application according to specification is also the observance of all references contained in the Instruction Manual and compliance with the inspection and maintenance works.

2 Residual risks

The machine is constructed according to the state of the art and the recognized technical safety regulations. Improper use and handling can result in dangers to life and limb of the user or third parties and impairments to the machine or to other material assets. The machine is only to be used for the specified applications and only in an impeccable technical safety condition.

Disturbances that can interfere with the safety are to be immediately rectified.

3 Technical specifications

Manufacturer	Pole Ideal Tajhiz Co. (P.I.T.)			
Function	Classic		Cooled	
Model	Universal 320	Premium 20000	Universal 320R	Premium 20000R
Type	1401	2401	1406	2406
Mains voltage (± 10%)	210-230 ~V			
Mains frequency	50 Hz			
Connected load	400 VA		800 VA	
Current consumption	2.0 A		4.0 A	
Cooling medium	----		R 404A	
Max. capacity	4 x 100 ml			
Allowed density	1.2 kg/dm ³			
Speed (rpm)	15,000	20,000	15,000	20,000
Force (RCF)	21,382	25,938	21,382	25,938
Kinetic energy	8.600 Nm			
Temperature	----		-5 +40°C	
Ambient conditions	Indoors only			
– Set-up site	Up to 2000 m above sea level			
– Altitude	2°C to 40°C		5°C to 40°C	
– Ambient temperature	Maximum relative humidity 80% for temperatures up to 31°C, linearly decreasing to 50% relative humidity at 40°C.			
– Humidity				
– Excess-voltage category	II			
Device protection class	I			
(Not suitable for use in explosion-endangered areas.)				
Dimensions				
– Width	395 mm		401 mm	
– Depth	520 mm		695 mm	
– Height	346 mm		349 mm	
Weight	approx. 29 kg		approx. 53 kg	





No claim under guarantee will be considered by the manufacturer unless the above instructions have been adhered to

- Before the initial operation of your centrifuge you should read and pay attention to the operating instructions. Only personnel that has read and understood the operating instructions are allowed to operate the device.
- Along with the operating instructions and the legal regulations on accident prevention, you should also follow the recognised professional regulations for working in a safe and professional manner. These operating instructions should be read in conjunction with any other instructions concerning accident prevention and environmental protection based on the national regulations of the country where the device is to be used.
- This centrifuge is a state-of-the-art piece of equipment which is extremely safe to operate.
 - However, it can lead to danger for users or others if used by untrained staff, in an inappropriate way or for a purpose other than that it was designed for.
- The centrifuge should be installed on a good, stable base.
- Before using the centrifuge absolutely check the rotor for firm placement.
- When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.
- The centrifuge must not be moved or knocked during operation.
- In case of fault or emergency release, never touch the rotor before it has stopped turning.
- To avoid damage due to condensate, when changing from a cold to a warm room the centrifuge must either heat up for at least 3 hours in the warm room before being connected to the mains, or run hot for 30 minutes in the cold room.
- Only the rotors and accessories approved by the manufacturer for this device may be used see chapter Appendix.
- The centrifuge rotor may only be loaded in accordance with the chapter "Loading the rotor".
- When centrifuging with maximum revolutions per minute, the density of the materials or the material mixtures may not exceed 1.2 kg/dm^3 .
- The centrifuge may only be operated when the balance is within the bounds of acceptability.
- The centrifuge may not be operated in explosion-endangered areas.
- The centrifuge must not be used with:
 - inflammable or explosive materials
 - materials that react with one another producing a lot of energy.
- If users have to centrifuge hazardous materials or compounds contaminated with toxic, radioactive or pathogenic micro-organisms, they must take appropriate measures.

For hazardous substances centrifuge containers with special screw caps must strictly be used. In addition to the screw cap centrifuge containers, for materials in hazard category 3 and 4 a biosafety system must be used (see the World Health Organisation's "Laboratory Biosafety Manual").

Under a biosafety system small drips and aerosols are prevented from escaping by a bioseal (packing ring) located between the hanger and the lid.

If the hanger of a biosafety system is used without the lid, the packing ring must be removed from the hanger in order to prevent the packing ring from being damaged during the centrifugation run. Damaged packing rings must not be used to seal the biosafety system.

For further details of available biosafety systems see chapter Appendix.

If in doubt, you should obtain relevant information from the manufacturer.
- The centrifuge must not be operated with highly corrosive substances which could impair the mechanical integrity of rotors, hangers and accessories.
- Rotors, suspensions and accessories that possess traces of corrosion or mechanical damage or if their term of use has expired may not be used any longer.
- Repairs must only be carried out by personnel authorised to do so by the manufacturer.
- Only original spare parts and original accessories licensed by the Andreas PIT company are allowed to be utilized.
- The following safety regulations apply:

IEC 61010-1 and IEC 61010-2-020 as well as their national deviations.
- The safe operation and reliability of the centrifuge can only be guaranteed if:

- the centrifuge is operated in accordance with the operating instructions.
- the electrical installation on the site where the centrifuge is installed conforms to the demands of IEC stipulations.

5 Symbol meanings

Symbol on the machine:



Attention, general hazard area.

Before using the centrifuge implicitly read the operating instructions and pay attention to the safety relevant references!



Symbol on the device and in this document:

Beware of biohazard.



Symbol in the operating instructions:

This symbol refers to important circumstances.



Symbol on the machine and in the operating instructions:

Symbol for the separate collection of electric and electronic devices according to the guideline 2002/96/EG (WEEE).



6 Delivery checklist

- Connecting cable
- Hexagonal pin-type spanner
- Lubricating grease for trunnions
- Operating instructions
- Notes on moving the equipment safely
- The rotor(s) and associated accessories are included in the delivery in the quantity ordered.

7 Unpacking the centrifuge

- Lift the carton upward and remove the padding.



Do not lift by the front panel.

Observe the weight of the centrifuge, refer to chapter "Technical specifications".

Lift the centrifuge on both sides with an appropriate number of helpers and place it on the laboratory table.

8 Initial operation

- According to the laboratory instrument standards IEC 61010-2-020 an emergency switch to separate power supply in the event of a failure must be installed in the building electrical system. This switch has to be placed remote from the centrifuge, preferred outside the room in which the centrifuge is installed or close to the exit of this room.
- Remove the transportation safety device from the bottom of the housing, see sheet "Transportation safety device"
- Position the centrifuge in a stable and level manner in a suitable place. During set-up, the required safety margin of 300 mm around the centrifuge is to be kept according to IEC 61010-2-020.



When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.

- Do not place any object in front of the ventiduct.
Keep a ventilation area of 300 mm around the ventiduct.



It is mandatory that the centrifuge be connected according to the enclosed instruction sheet. Make sure you observe the enclosed instruction sheet.

- Check whether the mains voltage tallies with the statement on the type plate.
- Connect the centrifuge with the connection cable to a standard mains socket. For connection ratings refer to Chapter "Technical specifications".
- Turn on the mains switch. Switch position "I".
The machine type and program version will be displayed and the LEDs light up. After 8 seconds, **OPEN** is displayed and the left LED on the **STOP / OPEN** key blinks.
- Open the lid.
The last used centrifuge data will be displayed.

9 Opening and closing the lid

9.1 Opening the lid



The lid can only be opened when the centrifuge is switched on and the rotor is at rest. If it cannot be opened under these circumstances, see the section on "Emergency release".

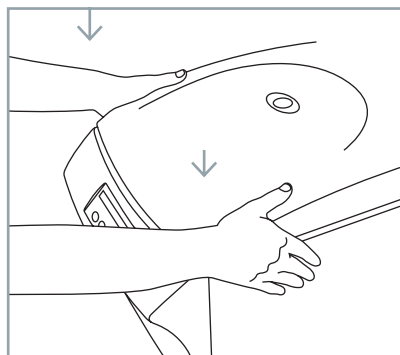
- Press the button **STOP / OPEN**. The lid unlocks via the motor and the left LED in the pushbutton **STOP / OPEN** extinguishes.

9.2 Closing the lid

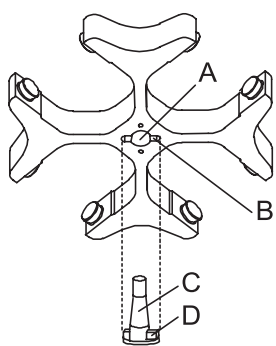


Do not put your fingers between lid and housing.
Do not bang the lid shut.

- Place the lid and lightly press down the front edge of the lid. The locking action is effected by motor. The left LED in the button **STOP / OPEN** lights up.



10 Installation and removal of the rotor



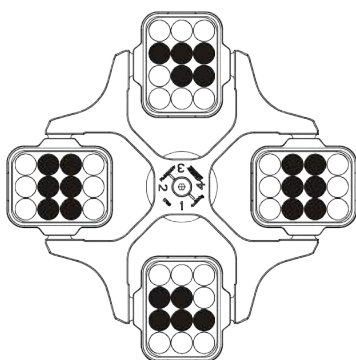
- Clean the motor shaft (C) and the rotor drilling (A), and lightly grease the motor shaft afterwards. Dirt particles between the motor shaft and the rotor hinder a perfect seating of the rotor and cause an irregular operation.
- Place the rotor vertically on the motor shaft. The motor shaft dog (D) has to fit in the rotor slot (B). The alignment of the groove is labelled on the rotor.
- Tighten the rotor tension nut with the supplied wrench by turning in a clockwise direction.
- Check the rotor for firm seating.
- Loosening the rotor: Loosen the tension nut by turning in a counter clockwise direction, and turning until the working point for lifting. After passing the working point for lifting the rotor is loosened from the motor shaft cone. Turn the tension nut until the rotor is able to be lifted from the motor shaft.

11 Loading the rotor

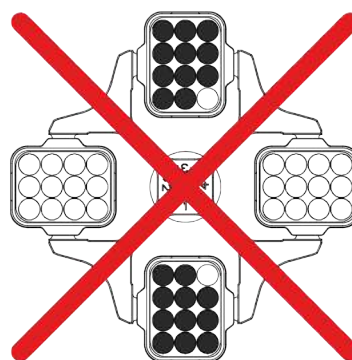


Standard centrifuge containers of glass will not stand RCF values exceeding 4000

- Check the rotor for firm seating.
- With swing-out rotors all rotor positions must be lined with identical hangers. Certain hangers are marked with the number of the rotor position. These hangers may only be used in the respective rotor position.
- The rotors and hangers may only be loaded symmetrically. For authorised combinations see Chapter Appendix.
- In the case of angle rotors all possible rotor positions must be loaded, see chapter Appendix.
- On certain suspensions, the weight of the maximum load and the maximum weight of the suspension when it is fully equipped is displayed. This weight may not be exceeded. The weight specified for the maximum loading includes the total weight of adapter, frame, centrifuging container and content.
- In containers with rubber inserts, the same number of rubber inserts must always be among the centrifuge containers.
- Always fill the centrifuge containers outside of the centrifuge.
- No liquid should be allowed to enter the centrifugal chamber during filling and swinging out of the hangers.
- The maximum filling quantity for the centrifuge containers specified by the manufacturer must not be exceeded.
- In order to maintain the weight differences within the centrifuge container as marginal as possible, a consistent fill level in the containers is to be heeded.



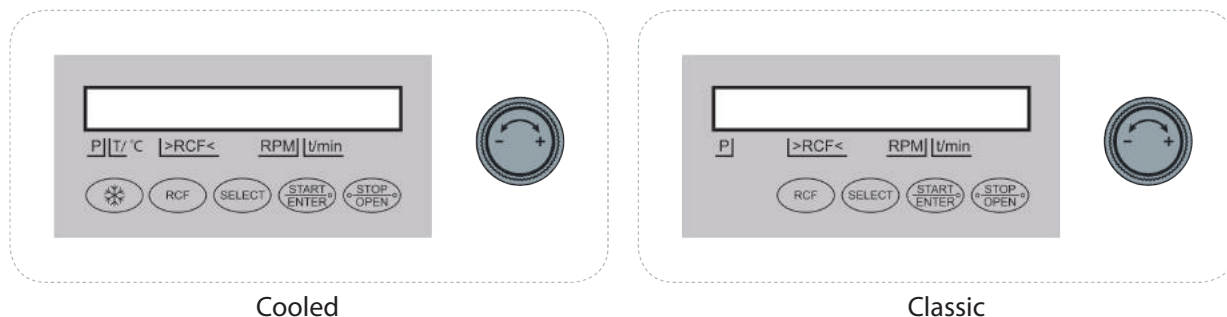
Rotor is evenly loaded



Not permitted!
Rotor is not evenly loaded

12 Control and display elements

See the following image.



Cooled

Classic

12.1 Control knob



For setting the individual parameters.
Turning anticlockwise reduces the value. Turning clockwise increases the value

12.2 Control panel pushbuttons (keys)



- Selection control key for selection of specific parameter.
The subsequent parameter is selected by every further keystroke.



- Start centrifugation run. The LED in the button lights up during the centrifugation run as long as the rotor is turning. Short-term centrifugation.
- The centrifugation run is effected as long as the button is held down. The LED in the button lights up during the centrifugation run as long as the rotor is turning.
- Store inputs and changes.



- End centrifugation run.
The rotor runs down with a pre-selected brake step. The right-hand LED in the button lights up until the rotor is stationary. Once the rotor is stationary the left-hand LED flashes in the button. Pressing the button twice triggers the EMERGENCY STOP.
- Unlock the lid.
The left-hand LED in the button goes out.
- Leave the parameter input.





- Switch between rpm and RCF display.
RCF values are displayed in > <.



- Start pre-cooling (only in cooled centrifuges).
The pre-cooling speed is settable. It is pre-adjusted to 2,800 rpm.

12.3 Adjustment possibilities

PROG RCL	Program position of the called-up program.
t/min	Running time. Settable from 0 - 99 min, in 1 min increments.
t/sec	Running time. Settable from 0 - 59 s, in 1 second increments. Continuous run "∞". Set parameter t/min and t/sec to zero.
RPM	Revolutions per minute. A numerical value from 500 rpm up to the maximum speed of the rotor can be set. Maximum speed of the rotor, see Chapter Appendix. Settable in increments of 10.
RAD/mm	Centrifugation radius. Input in mm. For centrifugation radius see Chapter Appendix. The input of the radius is only possible if the RCF display (> RCF <) is selected.
RCF	Relative Centrifugal Acceleration. A numerical value can be set, which gives a speed between 500 rpm and the maximum speed of the rotor. Adjustable up to 100 in intervals of 1, and from 100 in intervals of 10. The RCF value is automatically rounded up or rounded down with regard to the rpm interval. The input of the RCF is only possible if the RCF display (> RCF <) is selected.
	Starting steps 1 - 9. Step 9 = shortest starting time, Step 1 = longest starting time.
	Brake steps 0 - 9. Step 9 = shortest run-down time, Step 1 = long run-down time, Step 0 = longest run-down time (brakeless run-down)
T/°C	Temperature Set Point (only in centrifuges with cooling). Adjustable from -20°C to +40°C, in 1°C intervals. The lowest obtainable temperature depends on the rotor see Chapter Appendix.
PROG STO	Program position on which the program is stored. 9 programs can be stored (program positions 1 - 2 - 3 - ... 9). The programme position # serves as temporary storage for altered adjustments.

13 Entering centrifugation parameter



If no key is pressed for 8 seconds long after the selection or during the input of parameters, the previous values will be shown in the display. The input of parameter then has to be executed again.

- Select the rpm or RCF display with the key **(RCF)**. RCF values are displayed in > <.
- Select the desired parameters using the button **(SELECT)** and set using the knob . In order to set continuous operation, the parameters t/min and t/sec must be set to zero with the knob . Continual running is represented in the display by the following symbol, "∞".
- After input of all parameters, press the key **(START / ENTER)** in order to store the adjustments on the programme position #. As confirmation, *** ok *** will be displayed for a short period.



The data on the programme position # will be overwritten with every input of parameters and pressing of the key **(START / ENTER)**.

14 Programming

14.1 Program input/alteration



If no key is pressed for 8 seconds long after the selection or during the input of parameters, the previous values will be shown in the display. The input of parameter then has to be executed again.

- Select the rpm or RCF display with the key **(RCF)**. RCF values are displayed in > <.
- Select the desired parameters using the button **(SELECT)** and set using the knob . In order to set continuous operation, the parameters t/min and t/sec must be set to zero with the knob . Continual running is represented in the display by the following symbol, "∞".
- The parameter PROG STO can be selected using the button **(SELECT)** and the desired program position set using the knob .
- Press the button **(START / ENTER)** in order to store the setting on the desired program position. *** ok *** is displayed briefly as confirmation. If the key **(START / ENTER)** is pressed without the parameter PROG STO being activated, the settings are always stored in the program place #.



The previous data in the program position is overwritten during saving.

14.2 Program recall

- Select the parameter PROG RCL using the button **(SELECT)** and set the desired program position using the knob .
- Press the button **(START / ENTER)**. The centrifugation data of the selected program position is displayed.
- The parameters can be checked by pressing the button **(SELECT)**.
- To leave the parameter display press the button **(STOP / OPEN)** or press no button for a period of 8 seconds.

15 Centrifugation



When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.



If the permissible weight difference within the rotor loading has been exceeded, the drive shuts down during the start-up, the unbalance display lights up, and IMBALANCE is displayed. A centrifugation run can be stopped at any time by pushing the key **STOP / OPEN**. All parameters can be selected and altered during the centrifugation run (see Chapter "Entering centrifugation parameter"). You can switch-over at any time between the rpm and RCF display with the key **RCF**. The input of the centrifugation radius is necessary if you are working with the **RCF** display. If **OPEN** is displayed, a further operation of the centrifuge is only possible after opening the lid once. If R xx n-max xxxxx is displayed, then no centrifugation run has taken place as the rotor was changed beforehand, refer to Chapter "Rotor Identification".

- Turn on the mains switch. Switch position I.
- Load the rotor and close the centrifuge lid.

15.1 Centrifugation with pre-set time

- Adjusting time or recall a programme with pre-set time (see Chapter "Programming").
- Press the key **START / ENTER**. The LED in the button **START / ENTER** lights up for as long as the rotor turns.
- After expiration of the time or with truncation of the centrifugation run by pushing the key **STOP / OPEN**, the run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the remaining time will be displayed. After the centrifuge has ended its run and the rotor has come to a halt, the lid opens automatically on centrifuges without cooling.


15.2 Continuous run

- Adjusting the symbol ∞ or recall a continuous run programme (see Chapter "Programming").
- Press the key **START / ENTER**. The LED in the button **START / ENTER** lights up for as long as the rotor turns. The time metering begins at 00:00.
- Press the key **STOP / OPEN** in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed. After the centrifuge has ended its run and the rotor has come to a halt, the lid opens automatically on centrifuges without cooling.

15.3 Short-term centrifugation




- Hold down the key **START / ENTER**. The LED in the button **START / ENTER** lights up for as long as the rotor turns. The time metering begins at 00:00.
- Let go of the key **START / ENTER** again in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed. After the centrifuge has ended its run and the rotor has come to a halt, the lid opens automatically on centrifuges without cooling.

16 Emergency Stop

- Press the key  twice.
With Emergency Stop the run-down is effected with brake step 9 (shortest run-down time). Brake step 9 is displayed.
If brake step 0 was pre-selected, the run-down time is technically longer than with brake step 9.




17 Acoustic Signal

The acoustic signal sounds:

- Upon the appearance of a disturbance in 2 second intervals.
- After completion of a centrifugation run and rotor standstill in 15 second intervals.
The acoustic signal is stopped by opening the lid or pressing any key.
The signal after completion of the centrifugation run can be activated or deactivated in the following manner, if the rotor is at standstill:
- Hold down the key  for 8 seconds.
After 8 seconds, SOUND / BELL appears in the display.
- Set using the knob  OFF or ON.
- Press the key  in order to store the setting.
As confirmation, *** ok *** will be displayed for a short period.

18 Recall hours of operation

Recall hours of operation is only possible during rotor standstill.


- Hold down the key  for 8 seconds.
After 8 seconds, SOUND / BELL appears in the display.
- Press the key  once again.
The centrifuge's hours of operation (CONTROL:) are displayed.
- Press the key  to exit the hours of operation recall.

19 Cooling (only in centrifuges with cooling)





The temperature set-point can be adjusted from -2°C to +40°C. The lowest obtainable temperature is dependent on the rotor see Chapter Appendix.

19.1 Standby-cooling


With rotor standstill and closed lid the centrifugal chamber is cooled to the pre-selected temperature. The temperature set-point is shown in the display.

Standby cooling will be subject to a timed delay after a centrifuge run and the display will show  OPEN . The delay time can be pre-set in 1minute steps from 1 to 5 minutes. It is pre-set to 1 minute.

With the rotor standing still and the cover open the delay time can be set as follows:

- Hold down the key  for 8 seconds.
After 8 seconds, t/min = X appears in the display.
- Use the rotary button  to set the delay time.
- Press the key  in order to store the setting.
As confirmation, *** ok *** will be displayed for a short period.
To leave the delay time display press the key  or do not press any key for a period of 8 seconds.




19.2 Pre-cooling the rotor

- Press the key . The LED in the button **(START / ENTER)** lights up for as long as the rotor turns.
- Press the button **(STOP / OPEN)** to end the pre-cooling. The run-down is effected with the selected brake step. The brake step is displayed.

During the centrifugation run the rotational speed of the rotor or the subsequently resulting **(RCF)** value, the sample temperature and the expired time will be displayed.

The pre-cooling speed can be adjusted in decadic steps from 500 rpm to the max rpm of the rotor. It is pre-adjusted to 2800 rpm.

When the rotor is stationary and the lid open the pre-cooling speed can be set in the following manner:

- Hold down the key  for 8 seconds.
After 8 seconds, t/min = X appears in the display.
- Press the key  once again.
The set pre-cooling rpm - rpm = XXXX will be displayed.
- Set the desired pre-cooling speed using the knob .
- Press the key **(START / ENTER)** in order to store the setting.
As confirmation, *** ok *** will be displayed for a short period.
To leave the pre-cooling rpm display press the key **(STOP / OPEN)** or do not press any key for a period of 8 seconds.

20 Relative centrifugal force (RCF)

The relative centrifugal force (RCF) is given as a multiple of the acceleration of gravity (g). It is a unit-free value and serves to compare the separation and sedimentation performance.

These values are calculated using the formula below:

$$\text{RCF} = \left(\frac{\text{rpm}}{1000} \right)^2 \times r \times 1,118 \quad \Rightarrow \quad \text{rpm} = \sqrt{\frac{\text{RCF}}{r \times 1,118}} \times 1000$$

RCF = relative centrifugal force

rpm = rotational speed (revolutions per minute)

r = centrifugal radius in mm = distance from the centre of the turning axis to the bottom of the centrifuge.

For more on the centrifugal radius see the chapter Appendix



The previous data in the program position is overwritten during saving.

21 Centrifugation of materials with higher density

The rotors are designed to centrifuge substances up to a maximum mean homogenous density of 1.2 kg/dm³ when rotating at the stated speed.

Denser substances must be centrifuged at lower speed.

The permissible speed can be calculated using the following formula:

$$\text{Reduced speed (n}_{\text{red}}) = \sqrt{\frac{1.2}{\text{Greater density}}} \times \text{Rated speed}$$

e.g.: rpm 4000, density 1.6 kg/dm³

$$n_{\text{red}} = \sqrt{\frac{1.2}{1.6}} \times 4000 = 3464 \text{ rpm}$$

If in doubt you should obtain clarification from the manufacturer.

22 Rotor Identification

After every start of a centrifugation run the rotor utilized is identified.

After a change of rotor the drive switches off and the rotor code (R xx) as well as the maximum rotational speed (n-max=xxxxx) of the rotor are displayed.



A further operation of the centrifuge is only possible after a single opening of the lid. If, following a rotor change, the maximum speed of the rotor is less than the set speed, the speed is limited to the maximum speed of the rotor.

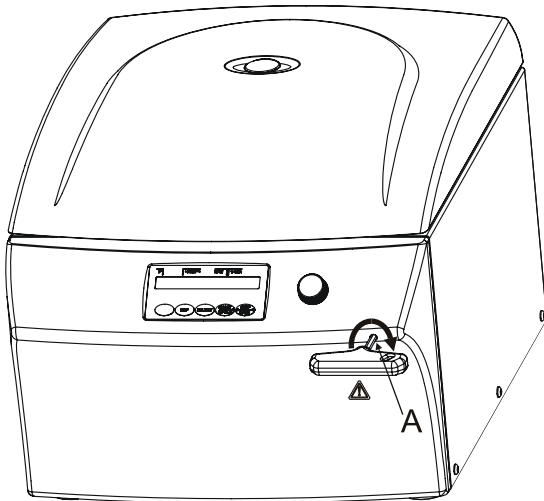
23 Emergency release

During a power failure the lid cannot be unlocked by motor. An emergency release has to be executed by hand.



For emergency release disconnect the centrifuge from the mains.
Open the lid only during rotor standstill.

See the following image.



- Switch off the mains switch (switch position "0").
- Look through the window in the lid to be sure that the rotor has come to a standstill.
- Insert the hexagonal wrench key into the bore hole (Fig. 1, A) and carefully rotate by half a turn in clockwise direction until the lid can be opened.
- Pull the hexagon socket head wrench out of the drilling again.
- After turning the centrifuge on again, press the button STOP / OPEN so that the motor-driven lid locking once again assumes the normal position (opened).

24 Maintenance and servicing



Pull the mains plug before cleaning.
Before any other cleaning or decontamination process other than that recommended by the manufacturer is applied, the user has to check with the manufacturer that the planned process does not damage the device.

- Cleaning agents and disinfectants which lie in the pH range 5 – 8 are to be utilized. Alkaline cleaning agents with a pH value > 8 are to be avoided.
- In order to prevent appearances of corrosion through cleaning agents or disinfectants, the application guide from the manufacturer of the cleaning agent or disinfectant are absolutely to be heeded.

24.1 Centrifuge

- Clean the centrifuge housing and the centrifuging chamber regularly, using soap or a mild detergent and a damp cloth if required. For one thing, this services purposes of hygiene, and it also prevents corrosion through adhering impurities.
- In the event of condensation water formation, dry the centrifugal chamber by wiping out with an absorbent cloth.
- If infectious materials penetrates into the centrifugal chamber this is to be disinfected immediately. For surface disinfection we recommend Bacillol® manufactured by Bode Chemie in Hamburg or Biocidal ZFTM from the company WAK-Chemie Medical GmbH in Steinbach.
Lightly grease the rubber seal of the centrifugal chamber after every cleaning.

24.2 Rotors and Attachments

- In order to prevent corrosion and material changes, rotors and accessories must be cleaned regularly with soap or a mild detergent and a damp cloth. Cleaning is recommended at least once a week, even better after every usage.
- If the rotor or accessory parts are contaminated by pathogenic or radioactive material, a suitable cleaning has to be executed. The rotors and accessory parts must be dried immediately after cleaning.
- Angle rotors, container and hanger made of aluminium are to be lightly greased after drying using acid-free grease, e.g. vaseline.
- In order to prevent corrosion as a result of moisture between the rotor and the motor shaft, the rotor should be disassembled and cleaned at least once a month, and the motor shaft should be lightly greased.
- The rotors and accessory parts are to be checked on a weekly basis for corrosion damage.



Rotors and attachments may no longer be utilized upon indication of wear and tear or corrosion.

- Check the firm seating of the rotor on a weekly basis.

24.2.1 Trunnions

With swing-out rotors the trunnions must be regularly lubricated (PIP Grease No. 4051) in order to ensure consistent swinging out of the hangers.

24.3 Autoclaving

Swing-out rotors, angle rotors made of aluminium, suspension made of metal, lids with biodegradable seals as well as stands and reductions can be autoclaved at 121°C / 250°F (20 mins).

Otherwise you must ask the manufacturer.





The lids of the rotors and containers must be removed prior to autoclaving. Autoclaving accelerates the ageing process of plastics. In addition, autoclaving may discolour plastics. After autoclaving, we recommend that the sealing rings be exchanged.

24.4 Centrifuge containers

- With leakiness or after the breakage of centrifuging containers broken container parts and leaked centrifugation material are to be completely removed.
- The rubber inserts as well as the plastic sleeves of the rotors are to be replaced after a glass breakage.



Remaining glass splitters cause further glass breakage!

- If this concerns infectious material, a disinfection process is to be executed immediately

25 Faults

If the fault cannot be eliminated with the help of the fault table, please inform Customer Service. Please state the type of centrifuge and the factory serial number. Both values are visible on the centrifuge type plate.

Perform a MAINS RESET:

- Switch off the mains switch (switch position "0").
- Wait at least 15 seconds and then switch on the mains switch again (switch position "I").



Message/fault	Cause	Remedy
No display	No voltage.	Check supply voltage. Mains switch ON.
ERROR – MAIN	Error / electronics defective	Switch off the mains switch. Wait at least 15 seconds and then switch on the mains switch again.
ERROR – HEAD	Rotor not detected Incorrect rotor coding	
TACHO – ERROR	Motor / electronics defective	
OPEN – ERROR	The lid not opening due to power failure during the centrifugation run or the rotor rotating	Open lid. Check the loading of the rotor, see chapter "Loading the rotor". Repeat the centrifugation run.
IMBALANCE	Rotor is unevenly loaded.	Open lid. Check the loading of the rotor, see chapter "Loading the rotor". Repeat the centrifugation run.
ERR TEMP SENSOR	Temperature sensor not accurate	Switch off the mains switch. Wait at least 15 seconds and then switch on the mains switch again.
TEMP ERROR T>50	Temperature rising over 50°C	Open the lid. Switch off the mains switch and wait at least 10 seconds and then switch on the mains switch again.
SYS – ERROR XX (XX is a number from 11 to 20)	Error / electronics defective	Switch off the mains switch. Wait at least 15 seconds and then switch on the mains switch again.

26 Disposal

When you are disposing of the device, the respective statutory rules must be observed. Pursuant to guideline 2002/96/EC (WEEE), all devices supplied after August 13, 2005 may not be disposed as part of domestic waste. The device belongs to group 8 (medical devices) and is categorized in the business-to-business field.



The icon of the crossed-out trash can shows that the device may not be disposed as part of domestic waste.

The waste disposal guidelines of the individual EC countries might vary. If necessary, contact your supplier.

27 Acceptance of the centrifuges for repair

If the centrifuge is returned to the manufacturer for repair, it must be decontaminated and cleaned to protect persons, environment and material.

We reserve the right to accept contaminated centrifuges.

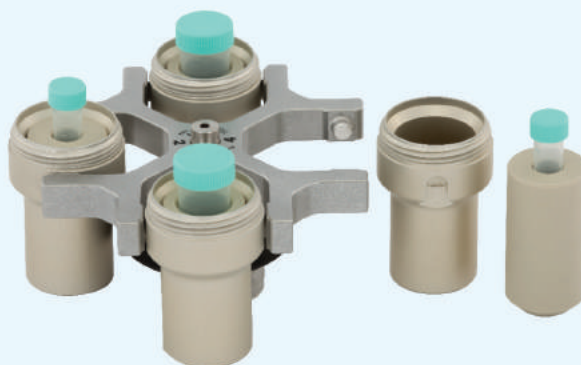
Costs incurred for cleaning and disinfection are to be charged to the customer.

We ask for your understanding in this matter.















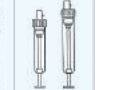

















































Swing-out rotor, 4-place

$\Delta 90^\circ$
 $n = 4,000 \text{ min}^{-1}$
 max.RCF 2,719



Cat. No. (without carriers) 1624

Capacity in ml	1.5	2.0	1	3	5/6/7	9	15	25	50	94	100	1.1-1.4	2.7-5	2.6-4.9	4-8.5
$\varnothing \times L$ in mm	11x38		6x45	10x60	12x75/82/100	14x100	17x100	24x100	34x100	38x102	44x100	8x66	11x66/92	13x65/90	15x75/92
 Cat. No. 1492															
carrier Cat. No. 1481															
Cat. No.	1351	1339	1343	1383	1329	1330	1331	1396	0761	1457	1383	1459			
boring $\varnothing \times L$ in mm	11.2x38	6.5x34	10.5x43	13.4x48	17.6x91	25.2x87	35.2x87	38.5x92	45.6x98	9x47	13.4x48	15.6x47			
Tubes per rotor	20	108	36	20	16	4				28	20	16			
Max. RCF	2,504	2,647	2,683	2,612	2,594	2,486	2,469	2,665	2,612	2,630	2,612	2,630			
Radius in mm	140	148	150	146	145	139	138	149	146	147	146	147			
run-up in sec	20														
run-down in sec, braked	20														
Temperature in $^\circ\text{C}^{1)}$	-2														

Capacity in ml	9-10	10	1.6-7	4-10	15	50	12	25	30	50	10	30	50	85	30
$\varnothing \times L$ in mm	16x92	15x102	13x75/100	16x75/100	17x120	29x115	17x100	25x90	25x110	29x115	16x80	26x95	29x107	38x106	44x105
 Cat. No. 1492															
carrier Cat. No. 1481															
Cat. No.	1329	1329	1383	1348	1347	1384	6311	1363	1365	6318	1348	4417	4416	1396	0765
boring $\varnothing \times L$ in mm	17.6x91		13.4x48	16.5x56	17x90	30x90	17x80	26x72	26x80	29.5x80	16.5x56	26x83	29x93	38.5x92	45.9x98
Tubes per rotor	16		20	16	4				16		4				
Max. RCF	2,594	2,719	2,612	2,576	2,719		2,397	2,719		2,576	2,504	2,683	2,665	2,594	
Radius in mm	145	152	146	144	152		134	152		144	140	150	149	145	
run-up in sec	20														
run-down in sec, braked	20														
Temperature in $^\circ\text{C}^{1)}$	-2														

1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)







































Swing-out rotor, 4-place












$\angle 90^\circ$
 $n = 4,000 \text{ min}^{-1}$
 max.RCF 2,719



Cat. No. (without carriers) 1624

Capacity in ml	5	6	7	9	15	20	25	45	50	1.1-1.4	2.6-3.4	4-5.5	
$\emptyset \times L$ in mm	12×75	12×82	12×100	14×100	17×100	21×100	24×100	31×100	34×100	8×66	13×65	15×75	
 rotor Cat. No. 1624		 											
	 with decanting aid		 with decanting aid		 +0701						 +0701	 +0716	
Cat. No.	1369-91	1372	1369-91	1370	1741	1369	1742	1346	1745	1345	1746	1741	1742
boring $\emptyset \times L$ in mm	12.5×64.4	13.5×65	12.5×71.5	14.6×74	14.6×78	17.6×74	17.6×78	21.5×74	26×78	32×74	35×78	14.6×78	17.6×78
Tubes per rotor	16	68	16	20	40	16	28	8	4	40	40	28	
Max. RCF	2,111	2,218	2,361	2,469	2,361	2,504	2,415	2,504	2,415	2,504	2,469	2,379	
Radius in mm	118	124	132	138	132	140	135	140	135	140	138	133	
run-up in sec	20												
run-down in sec, braked	20												
Temperature in °C ⁽¹⁾	-2												

Capacity in ml	4.9	1.6-5	4-7	8.5-10	30
$\emptyset \times L$ in mm	13×90	13×75	16×75	16×100	26×95
 rotor Cat. No. 1624		 			
					
Cat. No.	1741	1742	1369	1745	
boring $\emptyset \times L$ in mm	14.6×78	17.6×78	17.6×74	26×78	
Tubes per rotor	40	28	16	8	
Max. RCF	2,504	2,379	2,361	2,504	
Radius in mm	140	133	132	140	
run-up in sec	20				
run-down in sec, braked	20				
Temperature in °C ⁽¹⁾	-2				

Capacity in ml	1.5	2.0	1	3	4
$\emptyset \times L$ in mm	11×38	6×45	10×60	12×60	
 carrier Cat. No. 1366	 				
					
Cat. No.	5277	1357	1327	1326	
boring $\emptyset \times L$ in mm	11.5×38	6.5×23	10.5×23	12.5×44	
Tubes per rotor	36	120	48		
Max. RCF	2,021	2,003	1,986		
Radius in mm	113	112	111		
run-up in sec	20				
run-down in sec, braked	20				
Temperature in °C ⁽¹⁾	-2				

1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)

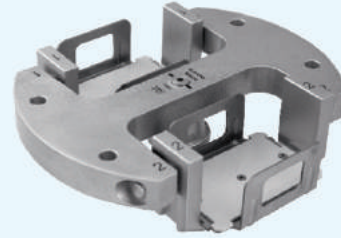
Swing-out rotor, 4-place

Δ 90°
n = 4,500 min⁻¹
max. RCF 3,328




















Swing-out rotor, 2-place

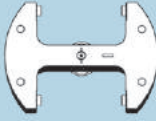

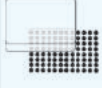








Δ 90°
n = 4,000 min⁻¹
max. RCF 2,218



Cat. No. (without carriers) 1324

Cat. No. (without carriers) 1460

Capacity in ml	4-5.5	4-7	9	9-10	10	12	15	15	50	50
Ø × L in mm	15x75	16x75	14x100	16x92	15x102	17x100	17x100	17x120	29x115	29x115
 carrier Cat. No. 1398										
	+2 x 0716	+0716								
										
Cat. No.	1482A							1483A	1484	1484²⁾
boring Ø × L in mm	17.5x81							17x100	30x98	
tubes per rotor	16							16	4	
max. RCF	2,875	3,034			3,192			3,305	3,260	
radius in mm	127	134			141			146	144	
run-up in sec					37					
run-down in sec, braked					39					
Temperature in °C ¹⁾					-2					

D x W x H in mm	86×128×15/17.5		86×128×22	86×128×44.5	86×128×46	86×128×83	59×84×11	82×124×20	-	
Capacity in ml									0.2	
 rotor Cat. No. 1460										
										
Cat. No.	1453 - A									
boring Ø × L in mm									-	-
Tubes per rotor	10	8	6	2	2	2	4	2	24×8	
Max. RCF	2,218									
Radius in mm	124									
run-up in sec	39									
run-down in sec, braked	39									
Temperature in °C ¹⁾	-2									

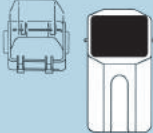















1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)
2. Take the height adjustment rubber out.


























Swing-out rotor, 4-place

$\Delta 90^\circ$
 $n = 5,000 \text{ min}^{-1}$
 max.RCF 4,193



Cat. No. (without carriers) 1494

Capacity in ml	5	2.6-3.4	4.9	1.6-5	4-7	7	4.5-5	15	8.5-10	9-10	4-7	
Ø × L in mm	12×75	13×65	13×90	13×75	13×100	12×100	11×92	17×100	16×100	16×92	16×75	
												
carrier Cat. No. 1427												
Cat. No.	1732		5230				5231		5271			
boring Ø × L in mm	13.4×58		12.4×87				17.8×87		17×66			
Tubes per rotor	32		48				24		20			
Max. RCF	4,025		3,941				3,941		3,969			
Radius in mm	144		141				141		142			
run-up in sec						32						
run-down in sec, braked						32						
Temperature in °C ⁽¹⁾						-2						

Capacity in ml	1.5	2.0	5	6	7	9	15	1.6-5	4-7	4-7	8.5-10	15	50	50
Ø × L in mm	11×38		12×75	12×82	12×100	14×100	17×100	13×75	13×100	16×75	16×100	17×120	29×115	29×115
														
carrier Cat. No. 1425														
Cat. No.	1444	1438	1434	1431		1438		1441		1442	1443	1737		
boring Ø × L in mm	11.5×38		13.4×50	12.7×60		17.5×84		13.4×50		16.5×50		17×90	30×90	30×90
Tubes per rotor	36		28	48		28		28		28		4		
Max. RCF	3,885				3,913		3,913		3,913		3,913		4,081	
Radius in mm	139				140		140		140		146		146	
run-up in sec						32								
run-down in sec, braked						32								
Temperature in °C ⁽¹⁾						-2								

⁽¹⁾ Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)

Angle rotor, 12-place

$\Delta 35^\circ$
 $n = 6,000 \text{ min}^{-1}$
 max. RCF 4,146
























Cat. No.1613


























Angle rotor, 6-place

$\Delta 35^\circ$
 $n = 9,000 \text{ min}^{-1}$
 max. RCF 9,509
























Cat. No.1620A










Capacity in ml	4	5	6	15	1.1-1.4	2.6-3.4	2.7-3	4.5-5	4.9	7.5-10	10	1.6-5	4-7	8-10	15
$\emptyset \times L$ in mm	10x88	12x75	12x82	17x100	8x66	13x65	11x66	11x92	13x90	15/16x92	15x102	13x75	13x100	16x100/125	17x120
															
rotor Cat. No. 1613															
Cat. No.	6305	1054-A	-	1054-A								1054-A	1058		
boring $\emptyset \times L$ in mm	11.5x67.5	13.5x60	17.7x88	13.5x60					17.7x88			13.5x60	13.5x79	17.7x88	
Tubes per rotor				12								12	12	12	6
Max. RCF	3,502	3,300	4,146	3,300					4,146			3,300	4,146	4,146	
Radius in mm	87	82	103	82					103			82	103	103	
run-up in sec									15						
run-down in sec, braked									15						
Temperature in $^\circ\text{C}^{(1)}$									-5						

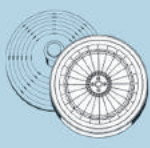


Capacity in ml	1.5	2.0	15	50	75	94	7.5-8.5	9-10	10	8.5-10	15	50	10	30	50	85
$\emptyset \times L$ in mm	11x38	17x100	34x100	35x105	38x102	15x92	16x92	15x102	16x100	17x120	29x115	16x80	26x95	29x107	38x106	
																
rotor Cat. No. 1620A																
Cat. No.	1449	1451	1463	-			1451				1466	1454	1646	1448	1447	1446
boring $\emptyset \times L$ in mm	11.4x39	17.5x92	35x89	38.6x90.2	17.5x92	17x106	29.8x97	-	16.5x74	26x85	29x92	38.6x90.2				
Tubes per rotor	24	6	6	6	6	6	6	6	6	6	6	12	6	6	6	
Max. RCF	9,237	8,784	9,327	9,509	8,784	8,965	8,784	8,965	8,784	8,603	9,056	9,509	9,509	9,509	9,509	
Radius in mm	102	97	103	105	97	99	97	99	97	95	100	105	105	105	105	
run-up in sec									30							
run-down in sec, braked									30							
Temperature in $^\circ\text{C}^{(1)}$									-2							

1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)

Angle rotor, 12-place	Angle rotor, 24-place	Hematocrit rotor, 24-place
 <p>∠ 35° n = 12,000 min⁻¹ max. RCF 16,582</p>	 <p>∠ 40° n = 15,000 min⁻¹ max. RCF 21,382</p>	 <p>n = 15,000 min⁻¹ max. RCF 21,382</p>
Cat. No. 1615	Cat. No. 1420-A	Cat. No. 1650

Capacity in ml	4	5	6	15	1.1-1.4	2.6-3.4	2.7-3	4.5-5	4.9	7.5-10	10	1.6-5	4-7	8-10	15
∅ × L in mm	10×88	12×75	12×82	17×100	8×66	13×65	11×66	11×92	13×90	15/16×92	15×102	13×75	13×100	16×100/125	17×120
 rotor Cat. No. 1615															
rotor Cat. No. 1615															
Cat. No.	6305	1054-A	-	-	1054-A			-			1054-A	1058	-	1647	
boring ∅ × L in mm	11.5×67.5	13.5×60	17.7×88	13.5×60	17.7×88			13.5×60			13.5×79	17.7×88	17×104		
Tubes per rotor				12						12	12	12	6	6	
Max. RCF	14,006	13,201	16,582	13,201	16,582			13,201			16,582	16,582	15,455		
Radius in mm	87	82	103	82	103			82			103	103	96		
run-up in sec								40							
run-down in sec, braked								40							
Temperature in °C ⁽¹⁾								-1							

Capacity in ml	0.2	0.4	0.5	0.8	1.5	2.0
∅ × L in mm	6×18	6×45	8×30	8×45	11×38	
 rotor Cat. No. 1420-A						
rotor Cat. No. 1420-A						
Cat. No.	2024	2023	-	-		
boring ∅ × L in mm	6.2×40	8.2×40	11.2×40			
Tubes per rotor	24					
Max. RCF	21,382					
Radius in mm	85					
run-up in sec	25					
run-down in sec, braked	25					
Temperature in °C ⁽¹⁾	-2					

Standard capillaries, heparinised	Basic	Self-sealing and mylar-coated
 rotor Cat. No. 1650		
rotor Cat. No. 1650		
Cat. No.	2077	-
boring ∅ × L in mm	-	
capillaries per rotor	24	
Max. RCF	21,382	
Radius in mm	85	
run-up in sec	12	
run-down in sec, braked	12	
Temperature in °C ⁽¹⁾	-1	

1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)



Angle rotor, 12-place ²⁾

∠ 40°
n = 20,000 min⁻¹
max.RCF 25,938



Cat. No. 200 P

Swing-out rotor, 12-place

∠ 90°
n = 2,000 min⁻¹
max. RCF 470



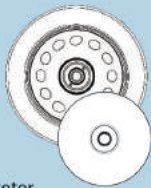












Cat. No. JC301P







Angle rotor, 6-place, for PCR strips ³⁾




∠ 45°
n = 14,000 min⁻¹
max. RCF 20,817



Cat. No. 160P

Capacity in ml	0.2	0.4	0.5	0.8	1.5	2.0
Ø × L in mm	6×18	6×45	8×30	8×45	11.2×38	
						
rotor Cat. No. 200P						
Cat. No.	2024	2023	-	-	-	-
boring Ø × L in mm	6.2×40	8.2×40	11.2×40			
Tubes per rotor	12					
Max. RCF	25,938					
Radius in mm	58					
run-up in sec	25					
run-down in sec, braked	25					
Temperature in °C ¹⁾	-2					

Disposable cyto chambers			
Cat. No.	1531	1530	1535
Filter cards/seals			
Cat. No.	1531F	1530F	1535F
Chambers per rotor	12		
Max. RCF	470		
run-up in sec	20		
run-down in sec, braked	20		
Temperature in °C ¹⁾	-2		

Capacity in ml	0.2	0.2
Ø × L in mm	6×18	-
Cat. No.	-	PCR strips
		
rotor Cat. No. 160P		
Cat. No.	-	
boring Ø × L in mm	6.5×20	
Tubes per rotor	48	6×8
Max. RCF	20,817	
Radius in mm	95	
run-up in sec	39	
run-down in sec, braked	44	
Temperature in °C ¹⁾	-2	

1. Lowest attainable temperature in precooled refrigerated centrifuges at max. speed (the ambient temperature and installation shall be according to the User Manual)
2. Rotor 200P can only be used in Premium series.
3. Rotor 160P can only be used in Cooled series.