INSTRUCTION MANUAL

FOR

BENCH TOP CENTRIFUGE

Z 200 A

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1. General Information

1.1 Precautions and hazards

Before putting the centrifuge into operation, please read this instruction manual carefully.

The centrifuge must not be operated by unqualified persons not familar with the correct use and intended purpose of the machine. **Please use only the original spare parts.**
For personal and environmental safety, pay special attention to the following precautions:

The Hermle Centrifuges are neither explosion proof nor inert gas shielded and should therefore never be operated in explosive-hazardous locations.
Never stay in the safety zone of 30 cm around the centrifuge or deposit dangerous goods inside this zone during centrifugation.
The centrifugation of flammable, explosive or radioactive samples is not allowed.
Do not spin samples which can chemically react with each other exposed to air.
Never spin toxical or pathological material without adequate safety precautions i.e. centrifuging of buckets/tubes without or with defective hermetic sealing is not allowed.
The end user should perform appropriate disinfection procedures in case dangerous goods have contaminated the centrifuge or its accessories.
The general universal laboratory precautions should be observed in case infectious materials are centrifuged. If necessary, please contact a health safety officer!
It is prohibited to run the centrifuge with rotors not suited for this centrifuge model.
Under no circumstances, should the centrifuge lid be opened while the rotor is still turning (running with a speed of more than 2 meter per second).

The following rules must be strictly adhered to:

Do not operate the centrifuge if it is not installed correctly.
Never operate the centrifuge in a disassembled state (e.g. without metal cover)
Do not run the centrifuge if electrical or mechanical systems have been tampered with by unauthorized persons.
Never use accessories such as rotors and buckets which are not exclusively approved by **Hermle Labortechnik GmbH or National Labnet**, except commercially available centrifuge tubes of glass or plastic.
Do not spin corrosive samples which may cause damage to the centrifuge and impair the mechanic resistance.
Never operate the centrifuge with rotors or buckets which show any signs of corrosion or mechanical damage

The manufacturer is only responsible for the security and reliability of the centrifuge if:
The unit is operated according to the instruction manual.
Modifications, repairs and new adjustments are performed by HERMLE or Labnet authorized persons and the electrical installation of the location where the centrifuge is operated corresponds to the IEC-regulations.

1.2 Description

The Z 200 A is a small centrifuge for the medical laboratory. Available for this unit are 2 fixed angle rotors, 12 x 15ml and 6 x 50ml as well as a swing-out rotor 6 x 5ml

The 200A is microprocessor controlled with an induction drive motor (hence brushless). It has an ABS plastic housing and is shock and chemical resistant.

The centrifuge is equipped with a hybrid front panel (digital display with knob control).

Speed and running time are set with easy to use control knobs.

The precise parameters selected are shown on the large digital LED display.

1.3 Safety standards

The centrifuge corresponds to the general requirements set by German law for medical apparatus, "MedGV" group 3.

The following standards have been considered for the production of our centrifuges:

- Accident prevention rules for centrifuges, UVV-VBG 7z.
- Accident prevention rules for electrical equipment & installations, UVV-VBG 4.
- International Standard IEC 1010-1 and IEC 1001-2-D
- European Standard PR EN 61010-1 and PR EN 61010-2-2
- Electrical interference suppression according to interference degree B as per VDE 0871.

1.4 Technical data

Manufacturer	Hermle Labortechnik GmbH	
Type	Z 200 A	
Dimensions: Width Depth Height	 28 cm 37 cm 26 cm	
Weight	15 kg / 33lbs	
Noise level	60 dB(A)	
Max. speed Max. Volume Max. RCF Admiss. density Admiss. kinetic energy	6 000 rpm 6 x 50 ml 4 185 x g 1.2 kg/dm^3 2060 Nm	
Electrical connection Current Connected load	230 V/50-60 Hz 1Ph 0.5 A 100 Watt	120 V/50-60 Hz 1Ph 0.5 A 100 Watt
Interference suppression	VDE 0871, interference degree B	
Service dept. at Labnet	(732) 417-0700	

Address of service:

Labnet International, Inc.
31 Mayfield Avenue
Edison, NJ 08837

1.5 Accessories

The centrifuge comes with an instruction manual and a wrench for installing and removing the rotors.

1.6 Warranty

The centrifuge has been subjected to thorough testing and quality control.
In the unlikely event of any manufacturing faults occuring, the centrifuge and rotors are covered by warranty for a period of one year from date of delivery.
This warranty becomes invalid in case of wrong operation, use of non-appropriate spare parts or accessories and non-authorized modification of rotor or centrifuge.

The manufacturer reserves the right for any technical modifications of the product in respect to technical improvement.

2. Installation

2.1 Unpacking the centrifuge

The centrifuges are supplied in a carton. Remove the tightening straps . Open the carton and take the centrifuge together with the corrugated cardboard packing out of the carton.

The instruction manual and the accessories mentioned under 1.5 should be kept with the centrifuge at all times. **Please note to keep box and all packaging materials in safe keeping for at least a period of 1 year for warranty purposes.**

2.2 Transport

Avoid impacts during transportation and do not drop the unit to prevent it from being damaged.

2.3 Required space

The centrifuge should be installed on a rigid, even surface. The centrifuge should only be operated on a stable laboratory table/cabinet etc. Balance the centrifuge with a spirit level. To guarantee the necessary heat dissipation, the unit must be situated so that there is a space of at least 15 cm on each side of the unit.
Never place the centrifuge in an area subject to excessive heat, e.g., strong sunlight, as the performance of the unit is based upon an ambient temperature of +23°C.

Attention:
The new safety rules require a safety margin of 30 cm around the centrifuge. Mark this area to indicate that no personnel and dangerous material (e.g. flammable or infectious liquids) should be kept outside this area during operation.

2.4 Installation

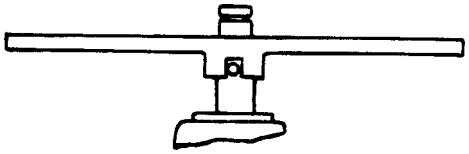
Check that:

- The power supply corresponds to that on the manufacturer's rating label which is mounted on the rear panel, then connect the power cord to the centrifuge and the socket.
- The line voltage circuit breaker has a maximum of 16 Amp. type K slow release for commonly used instruments.
- An emergency switch is installed outside the room to disconnect the power supply in case of a troubled run.
- The digital indications on the display are lighting up once plugged in.
- Press the "lid" key. You can open the centrifuge lid now.

3. How to install and load a rotor

3.1 Mounting and securing an angle rotor

Clean the motor shaft, as well as the rotor mounting hole with a piece of cloth and place the rotor on the motor shaft ensuring that the pins align correctly with the rotor slots (see Figure 1). Hold the rotor with one hand and secure the rotor to the shaft by turning the rotor nut counter-clockwise by hand. Then tighten **FIRMLY** with supplied rotor tool.



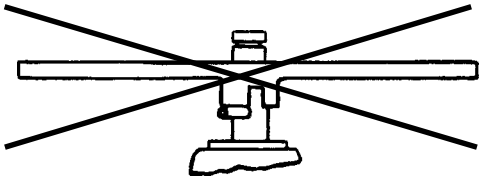


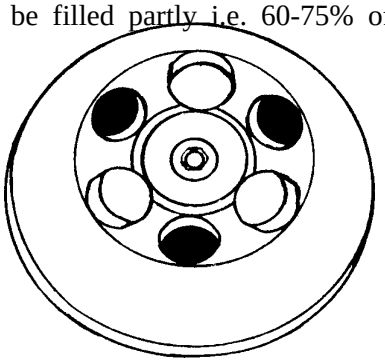
Figure 1

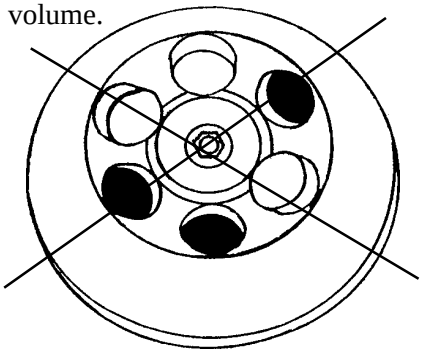
Correct **Incorrect**

ATTENTION!

Before operation, secure the rotor lid to the rotor by pressing the snap connector on the rotor nut. Load the rotor according to figure 2.

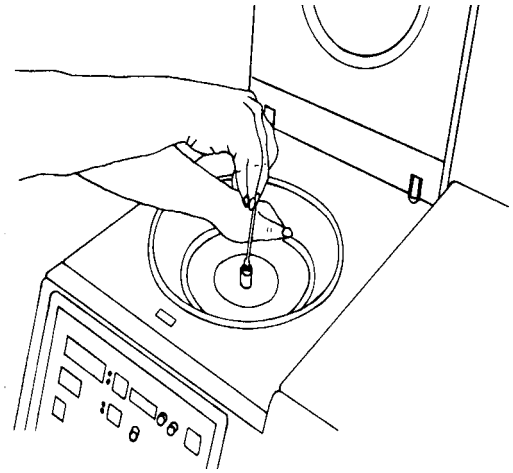
Fill the tubes equally by eye-measuring and insert them into the tube-holes of the rotor. The difference in weight between the tubes should not exceed 2 - 3 grams. When using tubes without lid in angle rotors please note that the tubes should only be filled partly i.e. 60-75% of the maximum tube volume.





3.2 Mounting and securing a swing out rotor

Clean the motor shaft, as well as the rotor mounting hole with a piece of cloth and place the rotor on the motor shaft ensuring that the pins align correctly with the rotor slots (see Figure 1, page 9).



- Hold the rotor with one hand and secure the rotor to the shaft by turning the rotor nut **counter-clockwise.** Then tighten **FIRMLY** with supplied rotor tool. To remove or close the rotor lid press both locking bolts together.

- **Note: Above pertains to all rotors!**

When loading the buckets and tube racks you should proceed according to Figure 3. It is very important to load the rotor with the complete set of buckets/tube racks. **The bucket insert bolts of the rotor should be regularly greased with silicone grease.**

Fill the tubes equally by eye-measuring and insert them into the tube-holes or tube racks. The difference in weight between the buckets should not exceed 2-3 grams.

Figure 3

Incorrect **Correct**

It is important that the rotor is loaded symmetrically by inserting tubes into spaces opposite from each other. The rotor must always be balanced in this fashion prior to operation.

When loading the rotor, make sure that the sealing is in good condition. The rubber should not be brittle, dirty or damaged by the capillaries. If necessary replace the sealing.

3.3 Removing the rotor

Using an adjustable or 1/4 inch wrench (some units are supplied with a wrench) loosen the screw and remove the rotor retaining screw/washer assembly by turning it counterclockwise. Lift the rotor directly upward in a straight vertical motion.

Caution: Be sure to secure the rotor screw and tighten with a wrench before further operation.

3.4 Overloading rotors

The maximum load of the rotor and the maximum speed have been established by the manufacturer. Do not attempt to exceed these values. The maximum speed of the rotor has been measured for liquids having a homogeneous density of 1.2g/ml or less. In order to centrifuge liquids with a higher density it is necessary to reduce the speed. **Failure to reduce the speed may result in damage to the rotor and centrifuge.** The revised maximum speed can be calculated with the following formula:

Reduced speed

$$n_{red} = \sqrt{\frac{1,2}{\text{higher density value}}} \times \text{max. speed } (n_{max})$$

Example :

$$n_{red} = \sqrt{\frac{1,2}{1,7}} \times 4000 = 3360 \text{ rpm}$$

If in doubt concerning maximum speeds, please contact the manufacturer for assistance.

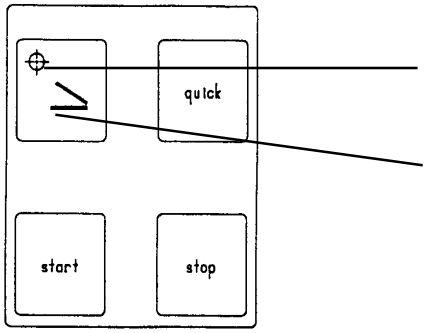
4. Operation

4.1 Power

Connect the cord plug to the appropriate wall socket.
After connecting the digital displays will light up.
The control panel is equipped with a stand by function.

4.2 Lid release

When the green control lamp of the "lid" key lights, the rotor stands still and centrifuge lid is ready to open.
Press the "lid" key (see figure 5) to open the lid. The green control lamp will extinguish as soon as the lid is opened or the unit is started.



Control lamp (rotor is stationary):
Shows that the lid is closed correctly.

"Lid" key:
Opens the centrifuge lid

Figure 5

4.3 Lid lock

Close the centrifuge lid, after the rotor has been fixed correctly as described.
The centrifuge can only be started when the lid is closed correctly.
The green control lamp of the "lid" key will light as soon as the lid is closed correctly. When the rotor starts accelerating the control lamp of the "lid" key extinguishes and the lid cannot be opened.

4.4 Preselection of speed / RCF

You can preset the speed between: 250 rpm and 6000 rpm with the Z200A
250 rpm and 14000 rpm with the Z200 M/H

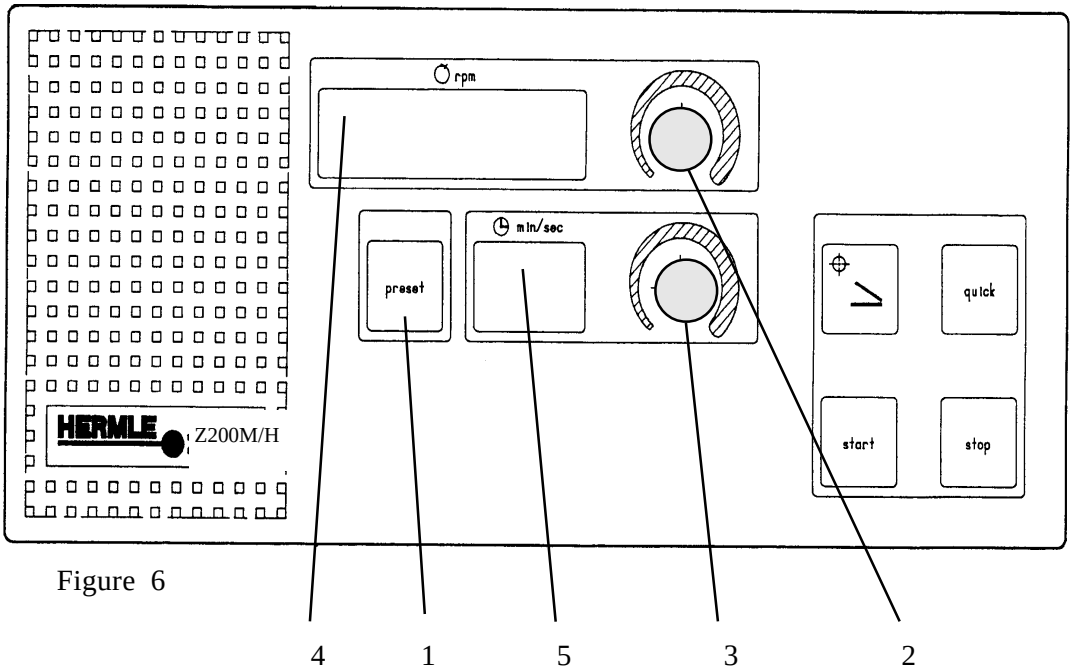


Figure 6

When the centrifuge lid is open, you can preset the required speed/rcf with the knob (2). If the centrifuge lid is closed and running, the speed can be changed as follows:
Press the "preset" key(1), hold it and at the same time change the speed with the knob (2). The preselected speed will be indicated in the speed display (4).

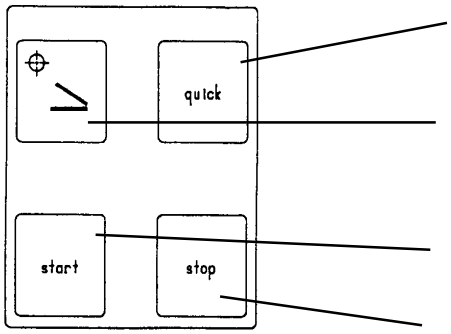
Rotors should not be operated above their designated maximum speed.
Each rotor has a different designated max.speed, please see chart below for the correct maximum speed for your rotor.

Z 200 M/H		**Z 200 A**	
Rotor	**Max Speed**	**Rotor**	**Max Speed**
C0200-95 (18 x 1.5ml)	14,000 rpm	C0200-18 (Swing-out 6 x 5ml)	3,500 rpm
C0230-2A (24 x 1.5ml)	13,000 rpm	C0200-96 (12 x 15ml)	6,000 rpm
		C0200-96 (6 x 50ml)	6,000 rpm

4.5 Preselection of operating time

You can adjust the desired operating time between 1 and 30 minutes or hold in steps of 0.5 min. With the centrifuge lid open you can preset the operating time with the knob (3).
During the run and with the centrifuge lid closed you have to additionally press the "preset" key (1) to change the operating time during the run.
The preselected running time will be indicated on the time display (5).
The 0.5 min will be symbolized with a point behind the minutes.
At the end of a run the preset operating time will be kept for further runs.
For continuous runs turn the knob clockwise to the stop limit. The continuous run will be indicated on the digital display with two minus signs "--".
You can stop a continuous run with the "stop" key.

4.6 Keyboard - Starting the centrifuge - "quick"-key



1 "Quick" key: For short time runs (only on Z 200 M/H)

2 "Lid" key: To open the centrifuge lid. If the green LED of the "lid" key is lit, the lid is closed correctly.

3 "Start" key: To start the centrifuge.

4 "Stop" key: To stop the centrifuge before the preset operating time has expired or to stop the centrifuge during a continuous run.

Figure 7

Starting the centrifuge

The rotor has to be fixed correctly and completely loaded (see point 3).
Close the centrifuge lid. As soon as the green LED of the "lid" key is lit the centrifuge can be started. Therefore press the "start" key.

"quick"-key - Short time runs
For short centrifuge runs you can start the run with the "quick" key. Press the "quick" key. The centrifuge starts and keeps running as long as you press the "quick" key. The operating time will be indicated in seconds on the digital "time" display.

4.7 "Stop" key

Press the "stop" key if you want to interrupt a centrifuge run. The centrifuge decelerates according to the fixed adjusted brake intensity. You can not change the brake intensity.

5. Temperature Features

5.1 Temperature

During centrifugation, heat is generated by air friction between the rapidly spinning rotor and the air inside the rotor chamber.
The temperature rise depends on the rotor (swing-out or angle rotor),bucket type, ambient temperature, running time and the speed of the rotor.

The continous air flow through the centrifuge housing restricts the temperature rise of the samples from the standard value of 40°C, regardless of rotor type even at maximum speed.

6. Safety facilities

6.1 Imbalance

In case of unequal loading of opposite buckets/tube racks or tube-holes, the operation will be interrupted during the acceleration phase. The rotor will be decelerated to standstill. Additionally the error message "ERROR" appears on the preset "speed" display.

If the actual "speed" display shows error no. 1, the difference in weight of the samples is too big. Fill the tubes and load the rotor as described under point 3.
If the actual "speed" display shows error no. 2, there can be several reasons:
- The imbalance switch is not adjusted correctly.
- The imbalance switch is defective.

7. Service and Maintenance

7.1 Service and inspection of the centrifuge

Centrifuge service and inspection should be done regularly and only by authorized and qualified personnel. **Use only original spare parts!**

7.2 Maintenance and cleaning

Maintenance

The maintenance of the centrifuge involves essentially keeping the rotor chamber, the rotor and the accessories clean. Please pay special attention to anodized aluminium parts. Breakage of rotors can be caused even by slight damages. In the case of rotor, buckets or tube racks contacting corrosive liquids, the respective spots and parts have to be cleaned carefully.
Corrosive liquids are for example:

- alkaline soup-solution
- alkaline amino
- strong acids
- solutions containg heavy metals
- waterfree and chlorinated solvents
- salt solutions e.g. sea-water

Cleaning:

The purpose of a thorough cleaning is, beside hygienic reasons, the avoidance of corrosion by soiling. In order to avoid the damage of anodized parts such as rotors, reduction plates etc., only neutral cleaning agents with a ph-value 6-8 should be used.
Never use an alkaline cleaning agents (ph > 8). After cleaning please ensure that all parts are dried thoroughly by hand or in a warm-air-cabinet (max. temperature +50°C).

It is recommended that all anodized aluminum parts are regularly treated with anti-corrosion oil, so that their durability will be increased and the corrosion risk reduced.

Usually when used in a cold room, humidity and non hermetically closed samples, may cause condensation to form. The condensation should be removed regularly with a cloth from the rotor chamber. Unplug the centrifuge when it is not being used, allow the chamber to reach room temperature, and dry out the chamber with a cloth.

7.3 Cleaning the centrifuge after breakage of glass tubes/glass bottles

With high g-values, there is a possibility that tube breakage will occur. Should this happen, the centrifuge, rotor, buckets, adapters and the rotor chamber must be thoroughly cleaned and all broken particles removed immediately.

If this is not done, they could scratch the protective coating of the rotor.

If the rotor chamber has not been properly cleaned, this will produce a fine black dust which can cause significant damage to the centrifuge chamber, rotor, buckets and the samples.

7.4 Disinfection

If, for example through tube breakage, infectious material is spilled into the centrifuge, the rotor, rotor chamber, buckets etc. should be disinfected !!!
Rotor can be autoclaved.

Rotor and rotor chamber should then be treated with a neutral disinfection agent, for example: 10% bleach solution. A disinfectant spray should be used to thoroughly clean the rotor chamber, rotor, bucket, tube rack etc..

8. Breakdown

8.1 Emergency lid release

In case of power failure or any malfunction, the lid can be opened manually to protect your samples.
Please proceed as follows:

- Switch off the centrifuge and unplug the power cord.
- There is a plastic plug at the left side of the centrifuge housing. Behind that plastic plug there is a red cord.
- Remove the plastic plug and pull the red cord.
  The lid can then be opened (see Figure 8).

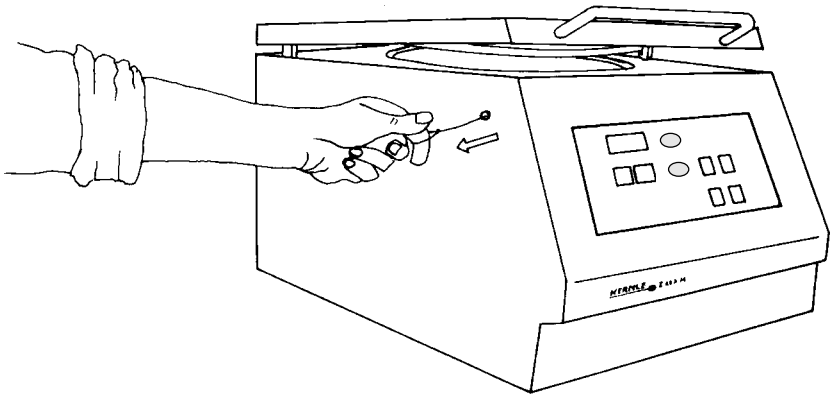


Figure 8

8.2 Check list / Trouble shooting

The error message will be indicated by a certain number on the digital speed display. At the same time "ERROR" appears on the preset display.
There is a distinction between two different kinds of errors. The digits on the indication "speed" have the following meaning:

Error no. 1 - 49 (Forced stop)
If one of those errors occurs, the rotor will be braked from the preset speed to 0. As soon as the rotor has stopped, the error message can be reset by opening and closing the centrifuge lid.

Error no. 50 - 99 (Emergency stop)
If this occurs, the frequency converter will be switched off. This means that the rotor will be stopped brakeless. To reset the error message you have to unplug and plug in the power cord.

If the unit stops due to an error indication you should restart the unit to check if the error occurs again.

The error numbers which are not listed in this chapter are not in use at the time of publication and they are reserved for future use in widening the error recognition program.

Error no.: 1 Imbalance

Reason:	*Incorrect loading of the rotor*
Action:	Balance your samples

Reason:	*Incorrect adjustment of the imbalance switch*
Action:	Imbalance switch has to be readjusted (call service)

Error no.: 2 Permanent imbalance signal

Reason:	*Position of the imbalance switch not correct*
Action:	Imbalance switch has to be readjusted (call service)

Reason:	*Imbalance switch is defective*
Action:	Imbalance switch has to be replaced (call service)

Error no.: 10 Overtemperature in the rotor chamber (more than + 50 ° C)

Reason:	*Breakdown of the refrigeration system / Electronic failure*
Action:	Call service

Reason:	*Temperature sensor defective / Electronic failure*
Action:	Call service

Error no.: 11 Temperature sensor

Reason:	*Short circuit at the temperature sensor or at the sensor cable*
Action:	Call service

Reason:	*Chamber temperature is too low, below - 25°C*
Action:	Solenoid valve is not working. Call service

Error no.: 20 No rotor identification

Reason:	*No rotor inserted*
Action:	Insert rotor into the unit

Reason:	*Rotor identification sensor defective*
Action:	Call service

Reason:	*Inserted rotor has no indicator ring*
Action:	Use a correct rotor

Reason:	*Rotor is not fixed correctly to the motor shaft*
Action:	Insert rotor correctly. The pins has to align correctly with the rotor slots (see chapter 3)

Error no.: 21 Start Bit is missing

Reason:	*A magnet of the indicator ring is missing*
Action:	Check indicator ring and call service

Error no.: 22 **Rotor is not mentioned in the rotor chart**

Reason:	*Rotor is not authorized for this unit*
Action:	Insert only rotors authorized for this unit

Error no.: 25 **Power failure**

Reason:	*Power failure while rotor is in motion*
Action:	Open and reclose the lid, restart the centrifuge

Error no.: 30 **Radius correction**

Reason:	*Radius correction value too big*
Action:	Adjust the radius correction to the correct value

Error no.: 36 **Relay for the frequency converter cannot be released**

Reason:	*Defect on the power board*
Action:	Call service

Error no.:50,51 **Memory failure**

Reason:	*Internal or external memory failure*
Action:	Restart the unit, if the failure occurs again, call service

Error no.: 55 **Overspeed**

Reason:	*Overspeed sensor or engine speed sensor defective*
Action:	Call service

Error no.: 60 **Engine speed sensor signal is missing**

Reason:	*Engine speed sensor defective or parting of a cable at the sensor*
Action:	Call service

Error no.: 70 Interface of the frequency converter

Reason:	*Communication of controller, power board, interface cable and frequency converter is not working*
Action:	Call service

Error no.: 82-83 Cutoff power board - frequency converter

Reason:	*Overcurrent or undervoltage due to power supply fluctuations*
Action:	Restart the unit, take care that the power supply is stable

Error no.: 84 Overtemperature at the driving

Reason:	*Temperature at the converter or motor too high*
Action:	Switch off the centrifuge. Wait for about 15 min. and switch the unit on again

Error no.: 85-87 Failures

Reason:	*Internal defect*
Action:	Call service

Error no.: 90 Emergency lid release

Reason:	*The centrifuge lid has been opened by the emergency lid release during the run*
Action:	Close centrifuge lid. Danger of accident!

Reason:	*Control switch of the lid lock is defective*
Action:	Call service

Error no.: 94 Voltage loss during run

Reason:	*The power supply is below the tolerance for a short moment*
Action:	Wait till stillstand of the rotor. Open centrifuge lid after the yellow LED "lid" is lighting. Switch off and on the main switch.

9. Appendix

9.1