HERMLE
LABORTECHNIK

Instruction Manual
for
Table Top Refrigerated Centrifuge
Z 36 HK

CONTENTS

1 PRODUCT DESCRIBTION

1.1 Usage in accordance with safety standards

1.1.1 General information

1.1.1.1 Hazards and precautions

Before setting the centrifuge into operation, please read this instruction manual carefully!

This centrifuge must not be operated by unqualified personnel not being familiar with the correct use of the unit.
Always, use the original accessories only!

For your personal safety, please pay attention to following precautions:

- The **HERMLE Z 36 HK** is not explosion-proof and must therefore not be operated in explosion-endangered areas or locations. During centrifugation, it is prohibited to stay within the safety zone of 30 cm around the centrifuge or deposit hazardous substances within this area.

- Centrifugation of flammable, explosive and radioactive substances or substances, which chemically react with high energy, is strictly prohibited!

- Never spin toxic or pathogenic material without adequate safety precautions, i.e. centrifugation of buckets / tubes without or with defective hermetic sealings is strictly prohibited.
  The user is obligated to perform appropriate disinfection procedures in case dangerous substances have contaminated the centrifuge and / or its accessories. When centrifuging infectious substances, always pay attention to the General Laboratory Precautions. If necessary, contact your safety officer!

- It is prohibited to run the centrifuge with rotors other than listed for this unit.

- Under no circumstances open the lid of the centrifuge while the rotor is still running or rotating with a speed of > 2 m/s.

Following rules must strictly be adhered to:

- Do not operate the centrifuge in case it is not installed correctly.

- Do not operate the centrifuge when dismounted (e.g. without metal cover).

- Do not run the centrifuge when mechanical or electrical assembly groups have been tampered with by unauthorized persons.

- Do not use accessories such as rotors and buckets, which are not exclusively approved by HERMLE Labortechnik GmbH, except commercially available centrifuge tubes made of glass or plastic.

- Do not spin extremely corrosive substances, as they may cause material damages and impair mechanical resistance.

- Do not operate the centrifuge with rotors or buckets, which show any signs of corrosion or mechanical damage.

The manufacturer is responsible for safety and reliability of the centrifuge, only if:

- the unit is operated in accordance with this instruction manual.
- modifications, repairs or other adjustments are performed by HERMLE-authorized personnel and the electrical installation of the related location corresponds to the IEC-regulations.

1.1.1.2 Brief description

Model **Z 36 HK** is a refrigerated high speed table top centrifuge. You can use swing out and angle rotors in this centrifuge. All relevant run parameters can easily be set with keys and be pre-selected with the main adjusting knob. All pre-selected, respectively actual values are permanent displayed on large LED's
The lid is latched and released with an electromagnetic lid lock.
The centrifuge has a powerful, maintenance-free brushless induction drive with a low noise level.
It also has an CFC-free hermetically sealed refrigeration system (refrigerant type R 404 a).

1.1.1.3 Safety standards

The centrifuge corresponds with the General Requirements for Medical Units Regulations (MedGV) (group 3).

Following standards have been considered for the production of our centrifuges:

- Accident Prevention Regulation for electrical units and installations UVV VBG 4
- Accident Prevention Regulation for centrifuges as per BGR 500; Chapter 2.11; Part 3
- DIN 58970 part 1, 2 and 4 for centrifuges and tubes
- Electrical Interference Suppression according to interference degree B as per VDE 0871
- Electrical Safety as per IEC 1010-1 and IEC 1010-2-D
- European Standard PR EN 61 010-1 and PR EN 61 010-2-2

1.1.1.4 Extent of supply

Following parts are supplied as accessories with each centrifuge:
• 1 instruction manual
• 1 Allan key for removing rotors
Spare fuses are at the rear side of the centrifuge.

1.1.1.5 Warranty

The centrifuge has been subjected to thorough testing and quality controls.

In the unlikely case of any manufacturing faults occurring, 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 mishandling, damage and negligence and further in case of usage of inappropriate spare parts and / or accessories or unauthorized modification of the unit.

Technical modification rights are reserved by the manufacturer in respect to technical improvement.

1.2 Installation

1.2.1 Installation of the centrifuge

1.2.1.1 Unpacking the centrifuge

Model **Z 36 HK** is supplied in a palletcarton.
Remove the strap retainer, open the carton, remove the cover carton and the centrifuge. The instruction manual must always be kept with the centrifuge.

1.2.1.2 Space requirements

The centrifuge should be installed on an even and solid surface, if possible on a laboratory cabinet / table or some other solid vibration free surface.
In order to enable a safe and smooth operation, level the centrifuge with a spirit level.
The centrifuge must be placed in a way, that there is a minimum space of 30 cm on each side of the unit in order to ensure necessary heat dissipation.
Do not place the centrifuge next to a window or a heater, where it could be disposed to excessive heat, as the performance of the unit is based on an ambient temperature of 23°C.

Safety regulations require that the safety area of 30 cm around the unit is marked in order to indicate that neither hazardous substances nor persons should be within this area during centrifugation.

1.2.1.3 Installation

Follow these steps:
- Check whether power supply corresponds with the one named on the manufacturer's rating label which is mounted on the rear panel.
- The line voltage circuit breaker is max. 16 A (type K) slow release for commonly used instruments.
- In case of emergency, there must be an emergency switch off installed outside the room in order to disconnect the power supply of the unit.

(• Remove the transport spacer blocks from the inside of the chamber (see following photos).)

The socket for the power cord must be easy to reach respectively easy to disconnect!

1.3 Technical Data

Manufacturer	HERMLE Labortechnik GmbH	
Type / Model	Z 36 HK	
Dimensions Width Depth Height	 71 cm 52 cm 42 cm	
Weight	83 kg	
Noise level (max.)	60 +2,0 dB (A)??	
Max. speed Max. volume Max. RCF Admissible density Admissible kinetic energy	30000 rpm 6 x 250 ml 65400 x g 1,2 kg/dm$^{3??}$ 4.440 Nm??	
Electrical connection AC Current Connected load	230 V / 50 Hz 1 ph	120 V / 60 Hz 1 ph
Interference suppression	VDE 0871, Funkentstörgrad B	
Test obligations	yes	
To be filled in by purchaser: Inventory-No.: Check-No.: Location: Maintenance contract:		
Your service department	HERMLE Labortechnik GmbH Siemensstrasse 25 78564 Wehingen Phone: +49-7426 / 96 22-17	
Your agent		

1.4 Conformity declaration

The **CE-**mark is always set by the manufacturer. Precondition is the issue of a declaration of conformity according to Standard DIN EN 45014 in which the manufacturer declares the conformity of the product with all relevant EU directions.

We, the company

Hermle Labortechnik GmbH
Siemensstrasse 25
78564 Wehingen

declare in mere responsibility that our product

Centrifuges

of models

Z 100 M; Z 160 M
Z 200 A
Z 233 M-2; Z 233 MK-2
Z 300; Z 300 K; SIEVA-2
Z 323; Z 323 K; Z 366; Z 36 HK
Z 383; Z 383 K; Z 400; Z 400 K;
Z 513; Z 513 K; SETA Oil test centrifuge

as from month/year of construction 01 / 05

to which this declaration refers to, have been manufactured according to the following standards or according to normative documents.

DIN EN 61 010-1; DIN EN 61 010-2-020;
EN 50501/B;
EN 61000-6-1; EN 61000-3-2; EN 61000-3-3;
EN 292-2; EN 292-2/A1; EN 61326;
73/23/EWG; 98/37/EG; 98/79/EG

Wehingen/Germany, 1st January 2005

Harald Hermle
President

1.5 Basic adjustments

At putting the centrifuge into operation, you have the possibility to set up the following basic adjustments:

1. Temperature indication in °C or °F
2. Sound signal turn on/off
3. Volume pre-selection of sound signal
4. Song selection of sound signal „end of run“
5. Keyboard sound turn on/off

You can also call up the operating data in this mode.
These are in detail:

1. Number of starts
2. Operating hours of the centrifuge
3. Software-version
4. Error list
5. Operation of imbalance sensor
6. Operation of keyboard
7. Display test

1.5.1 Access to mode „Basic Adjustments“

If the centrifuge is still turned off, press simultaneously the keys „time“ (10) and „prog“ (21) and turn on the main switch of the centrifuge. Now release both keys again. As a result a display test is executed for approx. 5 seconds. All possible indications will appear at the same time (see photo 1).

Photo 1

ATTENTION:
Please notice that you must enter the program as described under point 1.5.1 to change the adjustments of the points 1.5.2 – 1.5.7. After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

1.5.2 Temperature indication

Proceed as described under point 1.5.1 to enter this program mode and then press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“. Now select the letter „C“ with the adjusting knob (9). As a result in the display „rpm/rcf“ (17) appear the words „CELSI/temp“. If you press the key „rpm/rcf“ (8) now, the word „CELSI“ flashes and you can change the display into fahrenheit „FAREN“ with the adjusting knob (9) (see photo 2).
After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

Photo 2

1.5.3 Sound signal turn on / off

Proceed as described under point 1.5.1 to enter this program mode and then press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“. Now select the letter „L“ with the adjusting knob (9). As a result appear in the display „rpm/rcf“ (17) the words „On sound“. If you press the key „rpm/rcf“ (8) now, the word „On“ flashes and you can switch off the sound „Off“ with the adjusting knob (9) (see photo 3).
After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

Photo 3

1.5.4 Volume pre-selection of sound signal

Proceed as described under point 1.5.1 to enter this program mode and then press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“.Now select the letter „U“ with the adjusting knob (9). As a result appear in the display „rpm/rcf“ (17) the words „Vol=/Sound“. After pressing the key „rpm/rcf“ (8), you can adjust the desired volume between 0 (low) and 9 (loud) with the adjusting knob (9). (see photo 4)
After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

Photo 4

1.5.5 Song selection for sound signal – end of run

Proceed as described under point 1.5.1 to enter this program mode and then press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“.Now select the letter „G“ with the adjusting knob (9). As a result appears in the display „rpm/rcf“ (17) the word „Song“. After pressing the key „rpm/rcf“ (8), you can select a song with the adjusting knob(9). (see photo 5)
After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

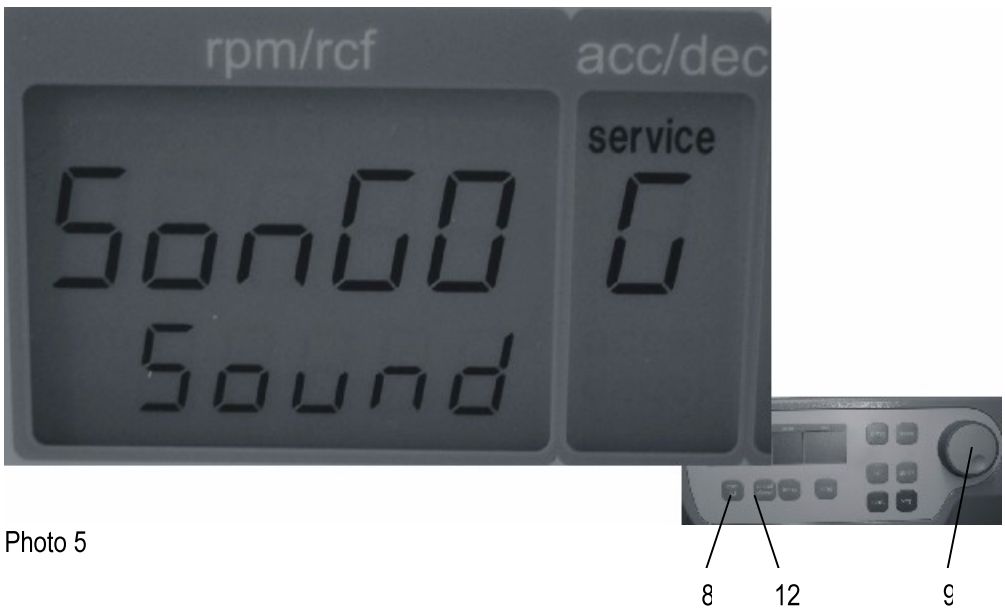

Photo 5

1.5.6 Keyboard sound turn on / off

Proceed as described under point 1.5.1 to enter this program mode and then press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“.Now select the letter „b“ with the adjusting knob (9). As a result appears in the display „rpm/rcf“ (17) the word „BeeP-x“. After pressing the key „rpm/rcf“ (8), you can turn the keyboard sound on (On) or off (Off) with the adjusting knob (9).
(see photo 6)
After you have stored the settings you change to the normal program mode again by switch off the centrifuge for a short while.

Photo 6

ATTENTION:
All changed settings must be confirmed by the key „store“ (20). As an optical confirmation appears the word „store“ in the display „rpm/rcf“ (17) – Only then the pre-selections are valid!! (see photo 7)

Photo 7

1.5.7 Call up of operating data

In the mode „Basic Adjustments“ you can call up the operating data of the centrifuge.
Please proceed as described under point 1.5.1 to enter this program mode.
Press the key „accel/decel“ (12). In the display „accel/decel“ appears the word „service“.
With the adjusting knob (9) the different information can be called up:

- A = previous starts of the centrifuge
- H = previous operating hours
- S = software version
- E = list of previous error messages

The list of the last 99 error messages can be looked over by pressing the key „rpm/rcf“ (8) and leaf through it by the adjusting knob (9). The respective error codes appear in the display „rpm/rcf“ (17).
Please look up in chapter 4.2.3 of this instuction manual for the relevant meanings. (see photo 8)
Here as well you must shortly switch off the centrifuge for changing to the normal program mode again.

Photo 8

2.1 Installation of rotors

2.1.1 Mounting and loading angle rotors

Clean the drive shaft as well as the rotor mounting boring with a clean, grease-free piece of cloth. Place the rotor onto the drive shaft. (see photo 9)

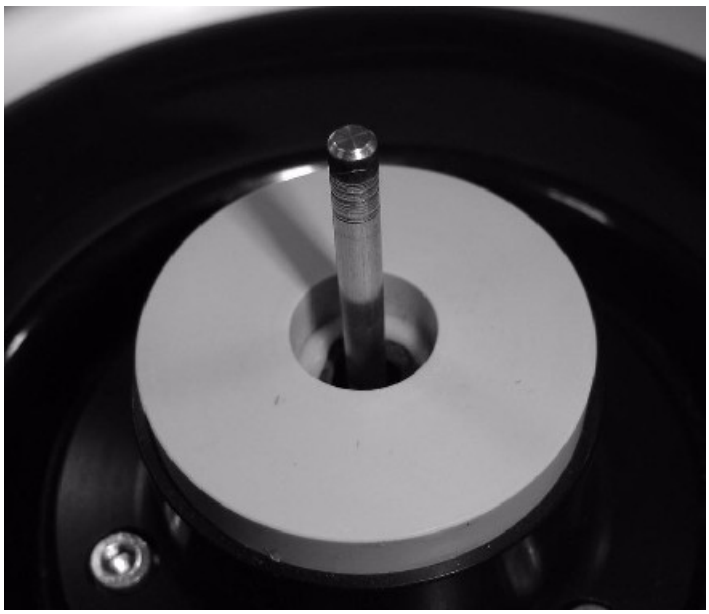

Photo 9

Photo 10

ATTENTION:
For reasons of safety you should check the fixing screw before each run!! (see photo 10)

Hold the rotor with one hand and secure the rotor to the shaft by turning the fixing screw (1) clockwise. Tighten fixing screw with enclosed allan key (see photo 11).

Photo 11

It is allowed to operate e.g. a 8-place-rotor with 2 or 4 loaded tubes only. But the loaded borings must be opposite each other.

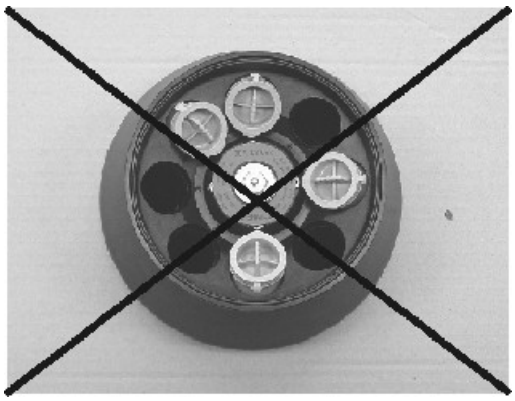

Photo 12: wrong

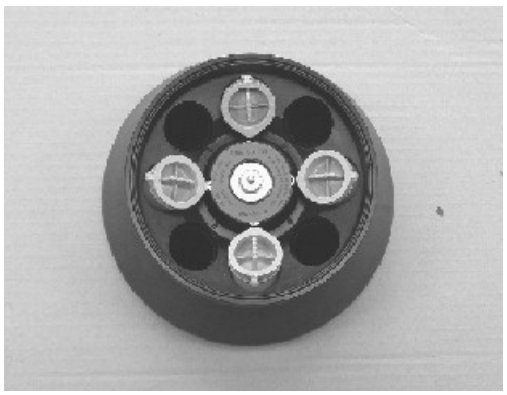

Photo 13: correct

ATTENTION:
Before operation, tighten the rotor lid, if existent!!

2.1.2 Mounting and loading swing out rotors

Clean the drive shaft, as well as the device hole of the rotor with a clean and grease-free cloth. Put the rotor to the motor shaft.

Hold the rotor with one hand and secure the rotor to the shaft by turning the rotor nut (1) clockwise. Tighten rotor nut with enclosed allan key (see photo 11).

The charging of the buckets and the adapters must be done appropriately photo 14 and photo 15.
In principle swing out rotors may be taken in operation first if all buckets or racks are put into the rotor.
The bolts at the rotor must be easily greased with silicone grease.
The glasses have to be filled evenly by eye and put into the drillings or tube racks. The weight difference of the loaded buckets should not exceed approx. 1.0 g.

It is allowed to operate e.g. a 4-place-rotor with 2 loaded buckets only. But the loaded buckets must be opposite to each other. Make sure that the unloaded buckets also be put inside the rotor (see photo 14 and 15).

ATTENTION:
Swing out rotors may be taken in operation only if all places are filled in with the same sorts of buckets or carriers!!

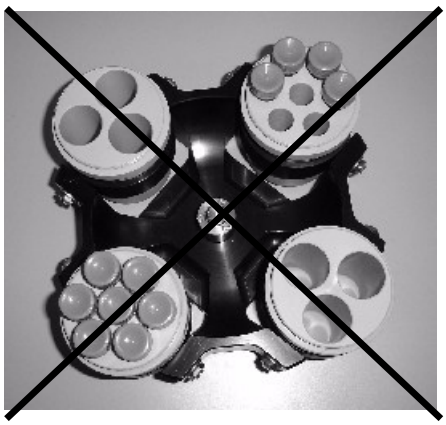

Photo 14: wrong

Photo 15: right

2.1.3 Overloading of rotors

The maximum load permitted for a rotor, which is determined by the manufacturer, as well as the maximum speed allowed for this rotor (see label on rotor), must not be exceeded.

The liquids the rotors are loaded with, should have an average homogeneous density of 1,2 g/ml or less when the rotor is running at maximum speed.

In order to spin liquids with a higher density, the speed has to be reduced according to the following formula:

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

Example:

$$n_{red} = \sqrt{\frac{1{,}2}{1{,}7}} \times 4.000 = 3.360 \text{ rpm}$$

ATTENTION:
Please read the manufacturer's notes referring the breaking point of the used tubes.
In case of any questions, please contact the manufacturer!

2.1.4 Removing the rotor

Untighten the rotor fixing screw and lift the rotor vertical out of the centrifuge.

ATTENTION:
Do not operate the centrifuge with rotors or buckets which show any signs of corrosion or mechanical damage.
Do not operate with extremely corrosive substances which could damage the rotor and buckets.

2.2 Operation

2.2.1 Power switch

The power switch is down below on the left side of the unit.
The power switch is also the main fuse of the centrifuge.
Attention:
After turn on the power switch you have to open the lid of the unit first, before starting the centrifuge.

2.2.2 Lid release

After the run, respectively closing the lid of the centrifuge, it appears in the display „rpm/rcf“ the word „close“ (1). If there is a rotor in the centrifuge, it appears additional the word „rotor“ (3), as well as the code number of the respective rotor, which is in the centrifuge i. e. „nr 15“ (4). During the run you can call up the rotor type at any time by pressing the key “lid” (5). If there is no rotor in the centrifuge it flashes the word „rotor“ (3) and additional the word „no“ (4). By pressing the key „lid“ (5) you can release the lid of centrifuge. As soon as the electromagnetic lid is completely released, it appears the word „open“ (2). Now you can open the lid of the centrifuge.

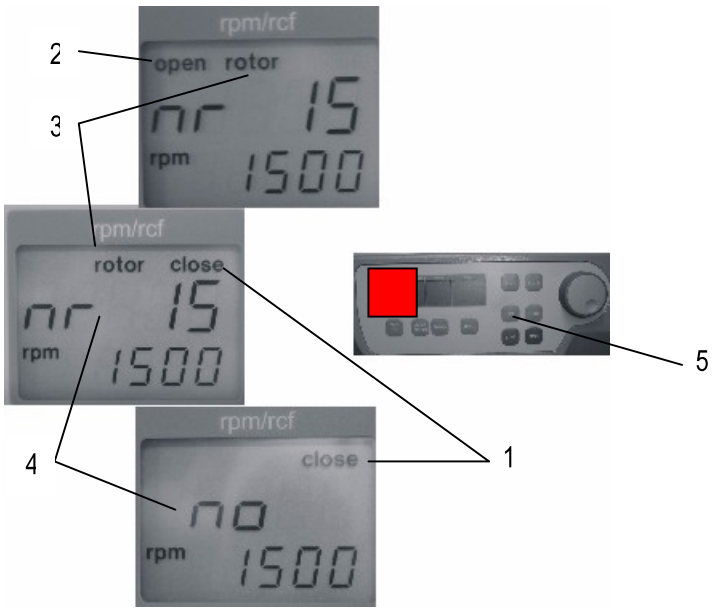

Photo 16

2.2.3 Lid lock

Attention:
Before closing the lid please check if the rotor is tighten, and that all 4 buckets have been put in the swing out rotors.
The lid must only be lay down slightly. An electromagnetic lid lock closes the lid automaticaly, at the same time disappears the word „open“ (2).
As a sign that the centrifuge is ready for starting it appears in the display „rpm/rcf“ the word „close“ (1). Simultaneously it appears in that display the word „rotor“ (3), as well as the code number of the rotor, which is in the centrifuge i. e. „nr 15“ (4).
With that all rotor specifically datas, like e. g. max. speed, acceleration etc., are adopted.

2.2.4 Pre-selection of speed / RCF-value

Through the key „rpm/rcf“ (8) this pre-selection is activated. By pressing the key once the word „rpm“ (6) flashes.
By pressing the key once again the pre-selection of the centrifugal forces may be chosen. Then it appears the flashing word „rcf“ (7).
You can set the desired values with the adjusting knob (9). In the display (17) the regulated value is shown permanently, before, during and after the run.
As long as no rotor is inserted, the speed is adjustable between 200 rpm and maximum revolution of the centrifuge.
If there is a rotor in the centrifuge the speed can only be pre-selected until the maximum permissible revolution of that rotor.
It is the same with the pre-selection of the RCF-value. The setting range is between 20 xg and the maximum permissible centrifugal force of the rotor.
The maximum speed of the Z 36 HK is 30000 rpm.

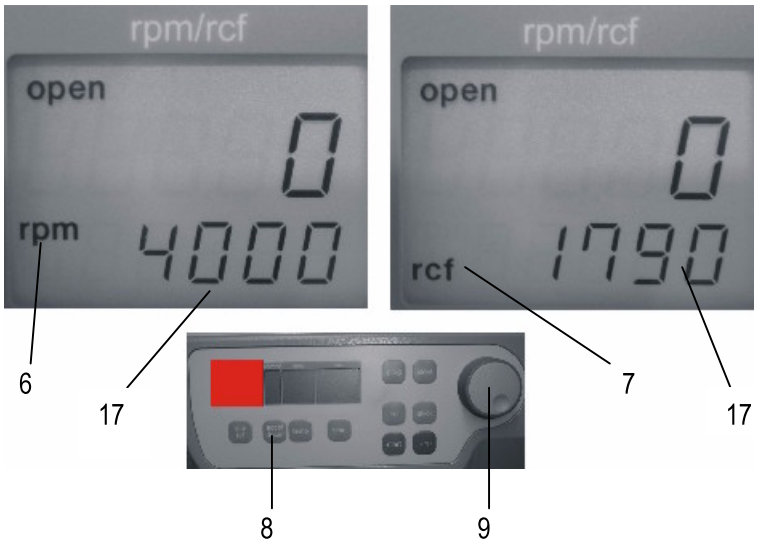

Photo 17

Max. Revolution per minutes of the valid rotors Z 36 HK

Rotor-Number	Max. Revolution	RCF Value
221.21 V01	10000 rpm	15650 xg
221.18 V01	12000 rpm	18510 xg
221.20 V01	20000 rpm	41140 xg
221.22 V01	21000 rpm	41410 xg
221.17 V01	20000 rpm	42030 xg
221.23 V01	30000 rpm	65390 xg
221.19 V01	4500 rpm	2830 xg
221.15 V01	4000 rpm	2990 xg
221.16 V01	4500 rpm	2720 xg

Attention:
Please notice the maximum permissible revolutions of your test tubes!! (Producer Indication)

2.2.5 Pre-selection of running time

The running time can be pre-selected in three different ranges from 10 seconds up to 99 hours 59 minutes.

1. Range from 10 seconds up to 59 minutes 50 seconds in steps of 10 seconds
2. Range from 1 hour up to 99 hours 59 minutes in steps of 1 minutes
3. Range continuous run, which can be interupted by the key “stop” (25).

The running time can be pre-selected whether with open or closed lid of the centrifuge.
To activate the setting of the running time press the key „time“ (10).
In the display „time“ flashes the indication „m : s“ or „h : m“ (11), depending on the previous setting.
To set the desired value use the adjusting knob (9). After exceeding of 59 min 50 sec the indication changes automatically in „h : m“. After exceeding of 99 hours 59 min the word „cont” appears in the display „time”. That continuous run can only be interupted by pressing the key „stop” (25).
The display shows always the remaining running time.

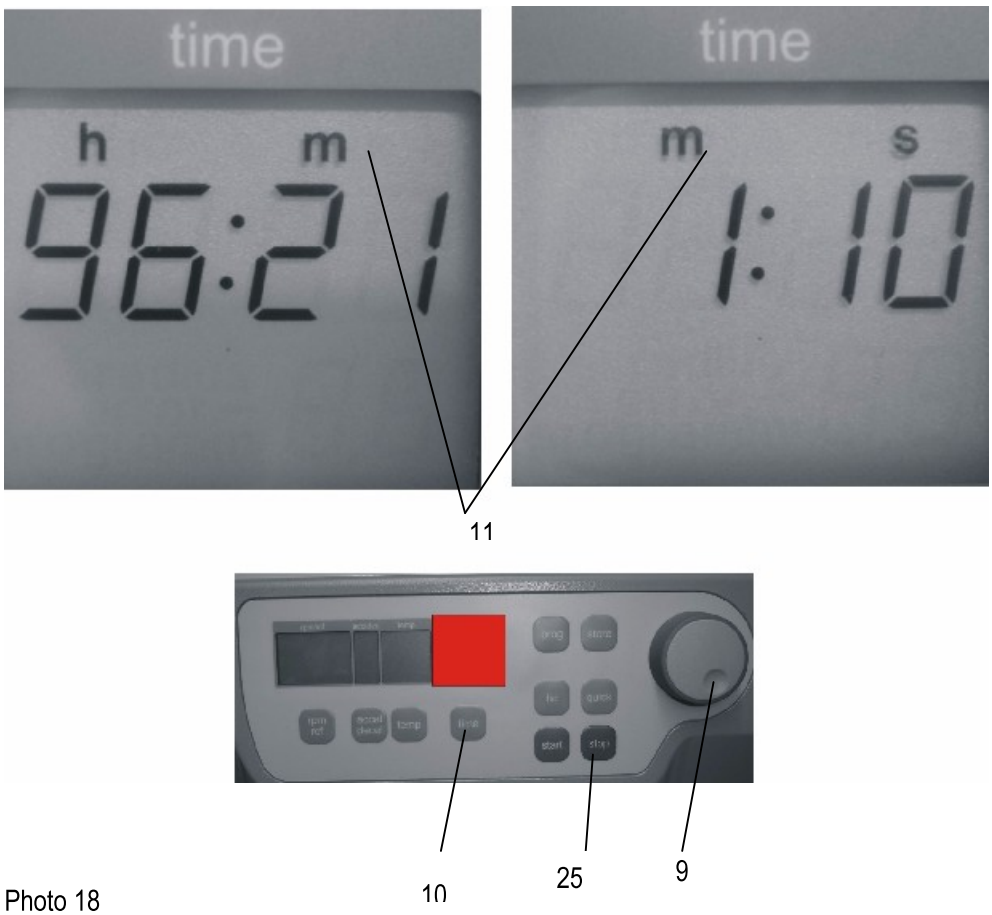

Photo 18

2.2.6 Pre-selection of brake intensity and acceleration

Through the key „accel/decel“ (12) this function is activated.
By pressing the key once the word „accel“ (13) flashes in the display „acc/dec“. The desired acceleration can be pre-selected by the adjusting knob (9). The value 0 is equivalent to the lowest and the value 9 to the highest acceleration.
By pressing the key „accel/decel“ (12) twice, in the display „acc/dec“ indicates the word „decel“ (14). Now the desired brake intensity can be pre-selected by the adjusting knob (9). The value 9 is equivalent to the shortest and the value 0 to longest possible brake time.

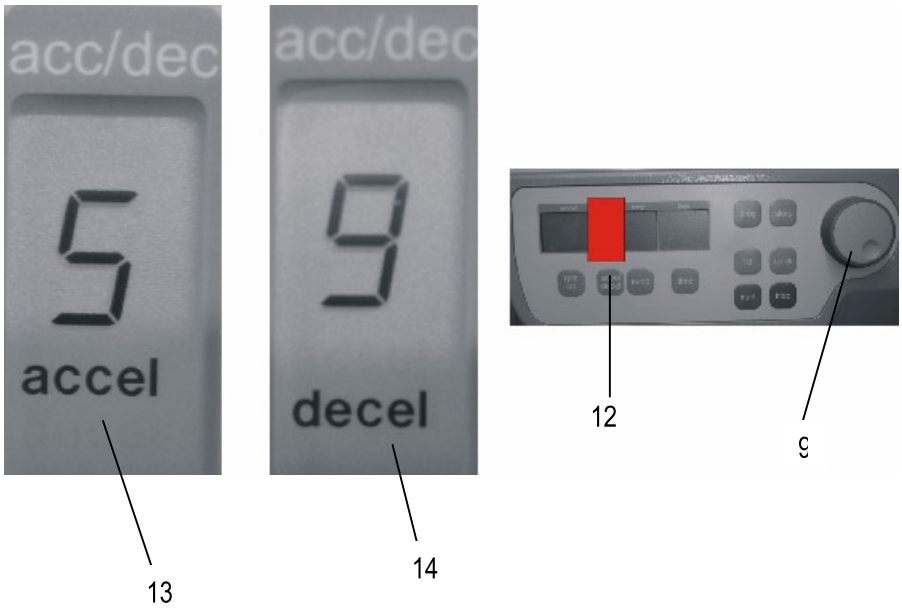

Photo 19

Acceleration- and deceleration times Z 36 HK (120 V / 230 V) in seconds

	Acceleration values		Deceleration values	
Rotor-Number	**Level 0**	**Level 9**	**Level 0**	**Level 9**
221.21 V01	**700**	**130**	**3000**	**130**
221.18 V01	**500**	**60**	**1700**	**70**
221.20 V01	**510**	**110**	**1700**	**90**
221.22 V01	**900**	**80**	**700**	**80**
221.17 V01	**660**	**70**	**600**	**75**
221.23 V01	**440**	**50**	**380**	**70**
221.19 V01	**110**	**15**	**930**	**20**
221.15 V01	**160**	**18**	**440**	**20**
221.16 V01	**180**	**25**	**300**	**30**

2.2.7 Pre-selection of temperature

This funktion is activated by the key „temp“ (15). After pressing that key in the display „temp“ flashes the indication „°C“ (16). By the adjusting knob (9) the desired test temperature can be pre-selected in steps of 1°C in a range from -20°C up to +40°C.
The value is indicated permanetly in the display (18) - before, during and after rhe run.
Please notice the respective lowest temperatures of the rotors at maximum speed!

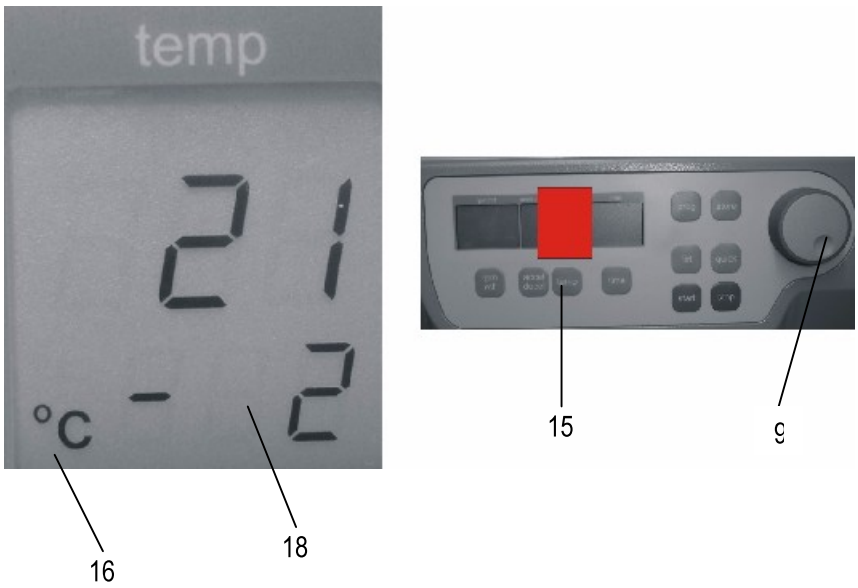

Photo 20

Lowest temperatures Z 36 HK (120 V / 230 V)

Rotor-Number	max. rpm
221.21 V01	+1°C
221.18 V01	-10°C
221.20 V01	+18°C
221.22 V01	+10°C
221.17 V01	+8°C
221.23 V01	+6°C
221.19 V01	-20°C
221.15 V01	-20°C
221.16 V01	-7°C

All temperature indications refer to a room temperature of 23°C. By exceeding this value or direct solar radiation to the centrifuge, these values can’t be kept up.

2.2.8 Pre-cooling

If the samples are temperature-sensitive it is useful to pre-cool the centrifuge, the rotor and eventually the buckets to the needed working temperature. Therefore insert the desired rotor and pre-set the respective temperature. By simultaneous pressing of the keys “temp” (15) and “time” (10) you start the run. While running the unit chooses automatically a rotational speed that is equivalent to 20 % of the permitted rotational speed of the respective rotor. After the pre-set temperature is reached you can leave the pre-cooling run with the “stop” key (25).

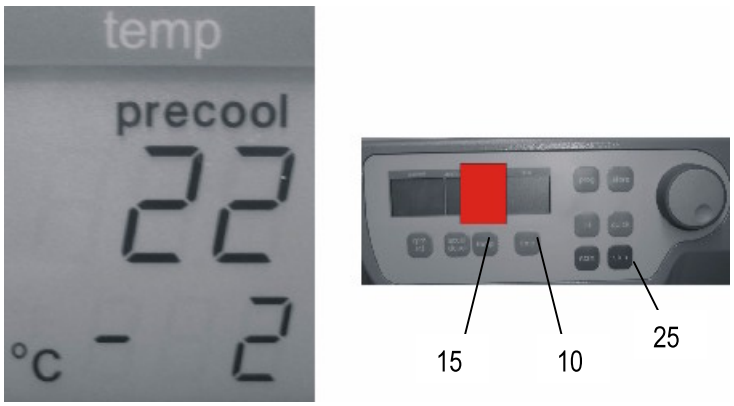

Photo 21

Depending on the inserted rotor the pre-cooling goes between approx. 10 and 20 min.

2.2.9 Radius correction

If you use adapters or reducers it could change the centrifugal radius of the respective rotor. In that case you can correct the radius manually. Please proceed as follows:
Press the key „time“ (10) and the key „prog“ (21) at the same time and hold them.
In the display „time“ appears the word „radius“ (22). By the adjusting knob (9) you can pre-select then the respective radius correction in a range of -0,1 cm up to -9,9 cm in steps of 0,1 cm.
As soon as you have set a radius correction the word „radius“ (22) appears. This hint is as long visible as you put the radius correction back to 0 again, as described.

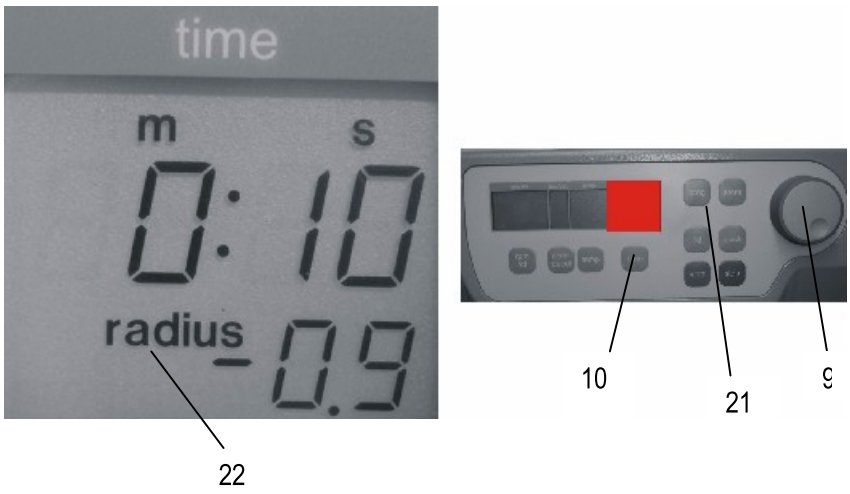

Photo 22

2.2.10 Storage of programs

You can store up to 99 runs with all relevant parameters, incl. the used rotors. You can use any free program number and call it up again.
Put the needed rotor into the centrifuge. By pressing the key „prog“ (21) in the display „time“ appears the word „programm“ (19). With the adjusting knob (9) you can chose the desired program number.
If a program number is already occupied in the display „rpm/rcf“ appears the word „nr ??“. In case of free program numbers it appears 0 in there. (see photo 23)
Close the lid of the centrifuge. Now proceed as already described to set all important run parameters.
For adaption of data press the key „store“ (20) for approx. 1 second. As a result the word „programm“ (19) disappears. As soon as the key „store“ (20) is not pressed anymore, it reappears the word „programm xx“ – the (xx) stands for the chosen program place.
If all program numbers are occupied you can take an old number that is not neccesary anymore and just put in the new parameters.

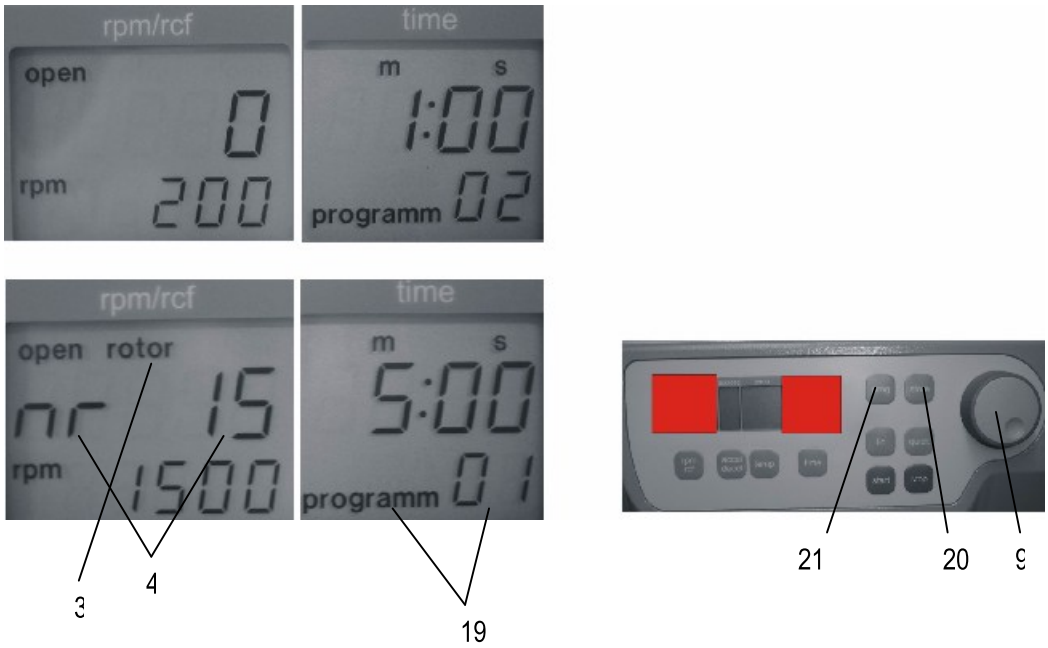

Photo 23

2.2.11 Recall of stored programs

To recall stored programs press the key „prog“ (21) while the lid is already closed. In the display „time“ appears „programm --“(19). With the adjusting knob (9) you pre-select the desired program number.
In the respective displays there will appear the stored values for that program.
If there is not the right rotor in the centrifuge for the pre-selected program, in the display „rpm/rcf“ flashes the word „rotor“ (3). The word „FALSE“ (4) and the stored rotor number „nr xx“ (4) will flashing by turns.

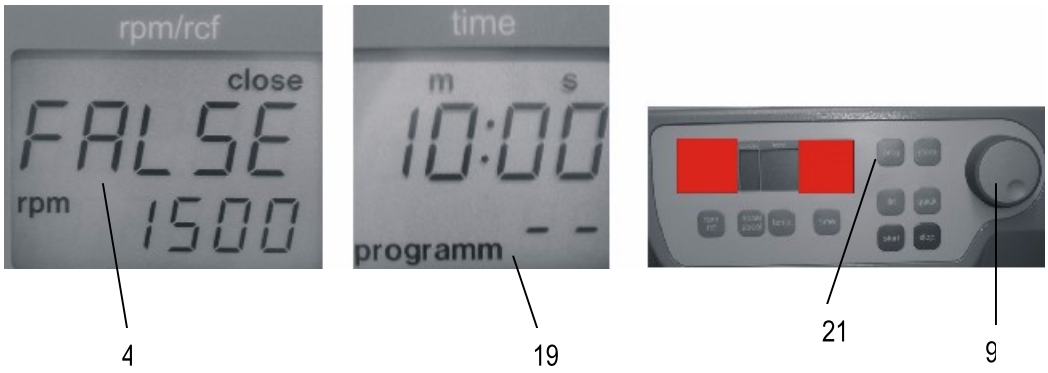

Photo 24

2.2.12 Leaving program mode

To leave the program mode just press the key „prog“ (21). Then in the display „time“ appears the word „Programm XX“ (19).
Set the display to „programm--“ with the adjusting knob (9).

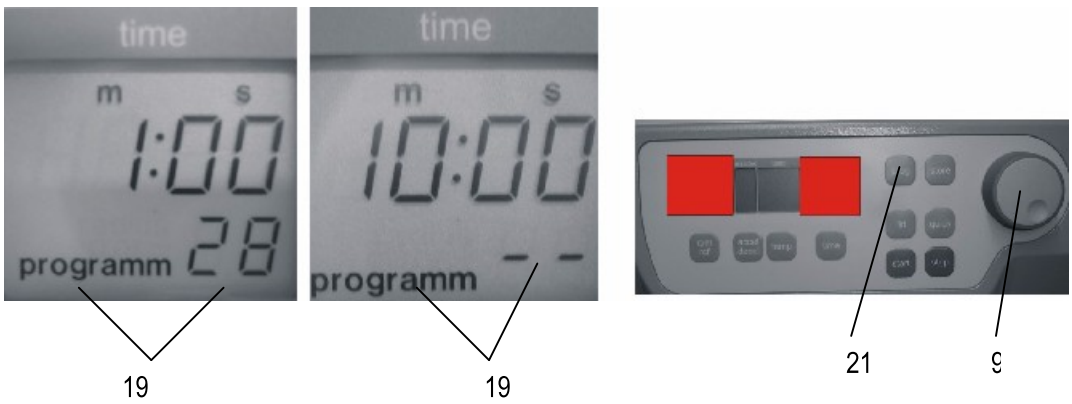

Photo 25

2.2.13 Starting the centrifuge

You can start the centrifuge either with the „start“ key (23) or the „quick“ key (24).
By the „start“ key (23) you can start stored runs or runs with manually pre-selected parameters.
When the respective pre-selected running time has ended then the centrifuge will stop automatically.
By the „quick“ key (24) you can start runs, which will last just a few seconds.
By pressing the „quick” key (24) the centrifuge accelerates up to the pre-selected revolution.
In the display „time“ the passed running time is indicated after reaching the pre-selected revolutions.
By releasing the „quick” key (24) the centrifuge stops and the running time is indicated until the stand still of the rotor.

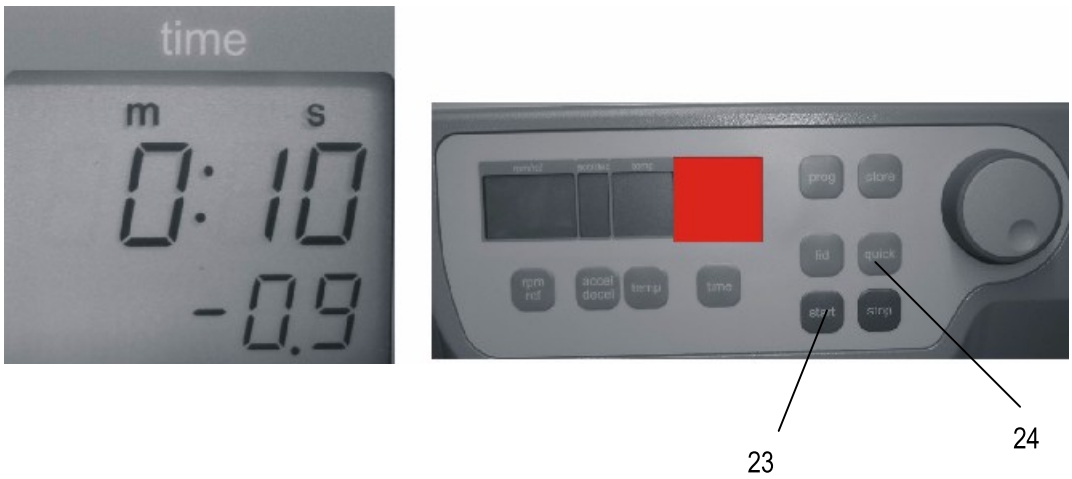

Photo 26

2.2.14 The „STOP“ key

By the „stop“ key (25) you can interrupt the run at any time. After pressing the key the centrifuge decelerates with the respective pre-selected intensity down to stand still.

Photo 27

2.3 Safety features

2.3.1 Imbalance detection

In case of the rotor not being equally loaded, the drive will turn off during acceleration. The rotor decelerates to stand still.

When in the display “time” the word “error” together with the number “01” (26) appear, the weight difference of the samples is too huge. Weight out the samples exactly.
Load the rotor as described in chapter 2.1.1.

When in the display “time” the word “error” together with the number “02“ (26) appear, there could be following reasons:

- The imbalance switch is not correctly adjusted.
- The imbalance switch is defective.

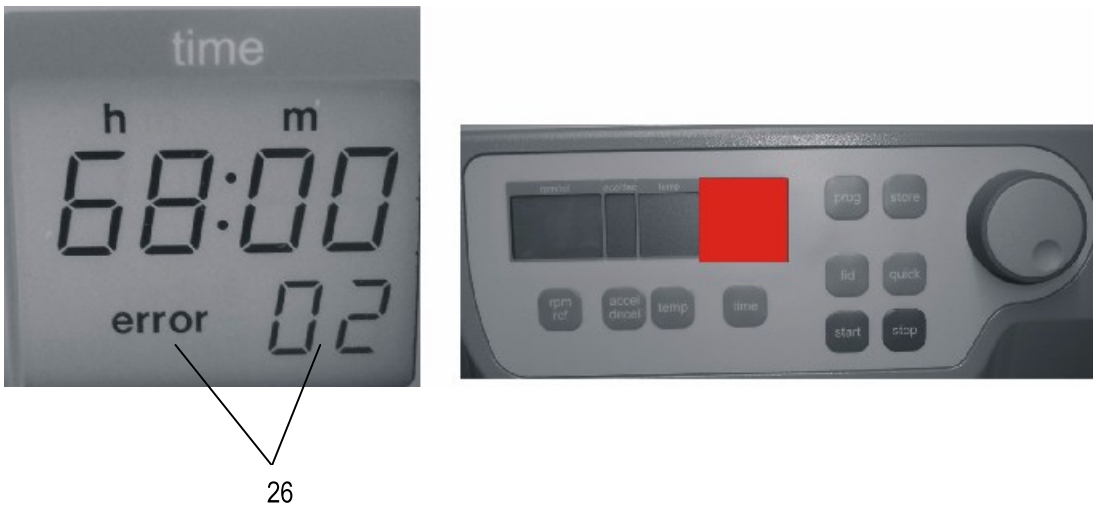

Photo 28

3 MAINTENANCE

3.1 Service and maintenance

3.1.1 Maintenance and cleaning

Maintenance:

Maintenance of the centrifuge is confined to keeping the rotor, the rotor chamber and the rotor accessories clean as well as to regularly lubricating the rotor insert bolts of a swing out rotor (if available).
Vaseline, available in nearly each store, is the most suitable lubricant. The Vaseline must be free of resin and acids. Lubricants containing molycote and graphite are not allowed.

Please pay special attention to anodized aluminium parts. Breakage of rotors can be caused even by slightest damages.

In case of rotors, buckets or tube racks getting in touch with corrosive substances the concerned spots have to be cleaned carefully.

Corrosive substances are for instance:

- Alkalis
- Alkaline soap solutions
- Alkaline amines
- Concentrated acids
- Solutions containing heavy metals
- Water-free chlorinated solvents
- Saline solutions, e.g. salt water

Cleaning:

Thorough cleaning not only has its purpose in hygiene but also in avoiding corrosion based on pollution.

In order to avoid damaging anodized parts such as rotors, reduction plates etc., only pH-neutral Detergents with a pH-value of 6-8 may be used for cleaning.
Alkaline cleaning agents (pH-value > 8) must not be used.

After cleaning, please ensure all parts are dried thoroughly, either by hand or in a hot-air cabinet (max. Temperature + 50°C).

It is necessary to coat anodized aluminium parts with anti-corrosion oil regularly in order to increase their life-spans and reduce corrosion predisposition.

Due to humidity or not hermetically sealed samples, condensate may be formed. The condensate has to be removed from the rotor chamber with a soft cloth regularly.

The maintenance procedure has to be repeated every 10 to 15 runs, but at least once a week.

3.1.2 Glass breakage

With high g-values, the rate of glass tube breakage increases. Glass splinters have to be removed immediately from rotor, buckets, adapters and the rotor chamber itself. Fine glass splinters will scratch and therefore damage the protective surface coating of a rotor.

If glass splinters remain in the rotor chamber, fine metal dust will build up due to air circulation. This very fine, black metal dust will extremely pollute the rotor chamber, the rotor, the buckets and the samples.

ATTENTION:
Please notice the producer indication!

3.1.3 Disinfection of alu-rotors

In case of infectious material spilling into the centrifuge, the rotor and rotor chamber have to be disinfected right after the run. Rotors may be autoclaved at a maximum temperature of 121°C.

The rotor and rotor chamber should be cleaned with a universal, neutral disinfection agent, e.g. on formalin base. A disinfection spray is most suitable in order to easily reach all difficult to access spots.

ATTENTION:
Before applying any other cleaning resp. Decontamination method than recommended by the manufacturer, contact the manufacturer to ensure yourself, you would not damage the unit or the rotor by applying the designated method!

3.1.4 Disinfection of PP-rotors

Autoclaving
The recommended time for autoclaving: 15 – 20 min at 121°C (1 bar)
ATTENTION: The sterilization time of 20 min. must not be exceeded. Sterilization again and again will cause reduction of the mechanical resistance of the plastic material.

Before the autoclaving the PP-rotor and adapter must thoroughly be cleaned to avoid the burning in of dirty residues.
You can disregard the consequences of some chemical residues to plastic materials at ambient temperatures. But at the high temperatures of the autoclaving those residues may corrode and destroy the plastic. The objects must be thoroughly washed up with distilled water after the cleaning but before the autoclaving. Residues of any cleaning liquids may cause fissures, whitening and stains.

Gassterilization
Boxes, bottles and rotors may be gassterilized with Ethylenoxyd. According to the duration of the application you may give long enough an airing to the items after the sterilization and before using them again.
ATTENTION: Because the temperature may rise during the sterilization, rotors, boxes and bottles must not be closed respectively must be totally unscrewed.

Chemical sterilization
Bottles, boxex and rotors may be treated with the usual liquid disinfectants.

4.1 Error messages: cause / solution

Preface:

The error messages are listed to help localize possible errors faster.

The diagnose referred to in this chapter may not always be the case, as they are only theoretically occurring errors and solutions.

Always, please keep us informed about any kind of error occurring, which is not listed in this chapter. Only through your information we are able to improve and complete this instruction manual.

Many thanks in advance for your support.

HERMLE Labortechnik GmbH

4.2 Survey of possible error messages and their solutions

4.2.1 Lid release during power failure (Emergency Lid Release)

In case of power failure or malfunction, the lid of the centrifuge can be opened manually in order to protect your samples.

Please proceed as follows:

- Switch the centrifuge off and unplug the power cord.
- At the left side of the centrifuge housing there is a plastic stopper. Remove this stopper and behind it there is a hexagon nut.
- Take the delivered box spanner, put him in the hole and lock the box spanner with the hexagon nut.
- Now turn the box spanner to the left side (counter clockwise) up to the limit.
  ATTENTION: Just turn to the limit, don't tighten the nut.
- Now open the lid of the centrifuge.
- Turn the hexagon nut back to the start position up to the limit.
- Switch the centrifuge on again, for go on working.
  (see photo 29)

Photo 29

4.2.2 Description of the error message system

The error message is shown in the "time" display through particular figures (26). At the same time the word “error” (26) is indicated in the display (see photo 30).

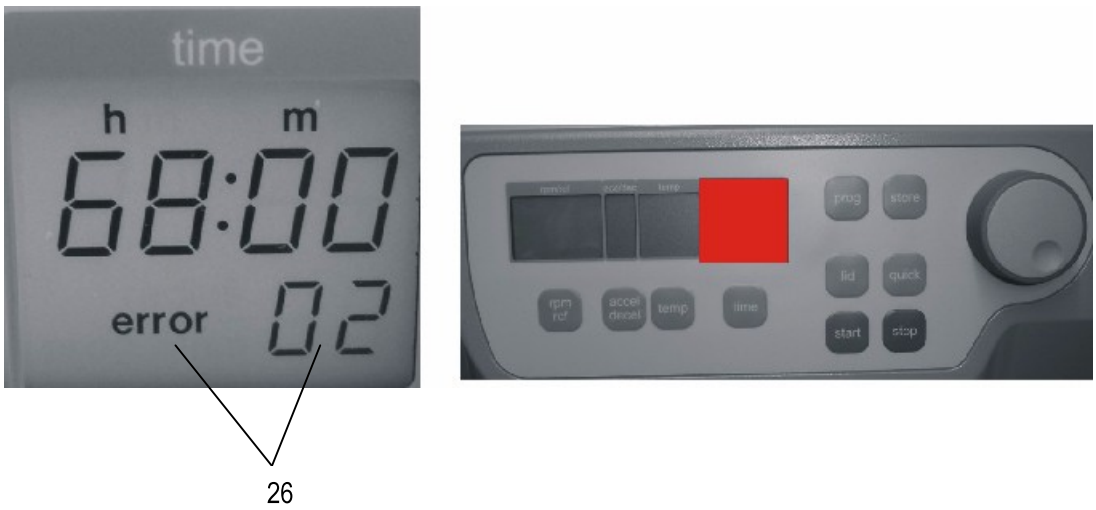

Photo 30

4.2.3 Error messages

Errors that may be indicated in the LCD display:

Error No.:	Description
01	Imbalance arose
02	Imbalance sensor is defective
08	Transponder in the rotor is defective
11	Temperature sensor is defective
12	Chamber over temperature
14	Leap of speed is too big between 2 measurements
33	Open lid while the motor is running
34	Lid contact defective
38	Lid motor is blocked
40	Communication with frequency converter disturbed during the start
41	Communication with frequency converter disturbed during the stop
42	Short circuit in the frequency converter
43	Undervoltage frequency converter
44	Overvoltage frequency converter
45	Over temperature frequency converter
46	Over temperature motor
47	Over current frequency converter
48	Timeout between control unit and frequency converter
49	Other error frequency converter
55	Overspeed
99	Rotor is not allowed in this centrifuge

