



# Operating manual for universal centrifuge Z 306







<b>1. PRODUCT DESCRIPTION .....</b>	<b>3</b>
1.1 Usage in accordance with safety standards.....	3
1.2 Brief description.....	3
1.3 Delivery package.....	3
1.4 Operating and display elements .....	2
1.4.1 LCD-Display.....	3
1.5 Signs and indications of the centrifuge .....	3
1.5.1 General.....	3
1.5.2 Product-nameplate (Example).....	4
1.5.3 Warning and information signs.....	5
1.5.4 Danger, precautions and warranty .....	5
1.5.5 Following rules must strictly be adhered to:.....	6
1.5.6 Warranty .....	6
1.6 Installation of the centrifuge.....	7
1.6.1 Unpacking the centrifuge.....	7
1.6.2 Space requirements .....	7
1.6.3 Installation.....	7
1.7 Basic adjustments .....	8
1.7.1 Access to mode „Operating Data“ .....	8
1.7.2 Sound signal turn on / off .....	9
1.7.3 Volume pre-selection of sound signal .....	9
1.7.4 Song selection for sound signal - end of run.....	10
1.7.5 Keyboard sound turn on- / off.....	10
1.7.6 Call up operating data (by skilled personnel or service engineer only!) .....	11
<b>2. OPERATION .....</b>	<b>12</b>
2.1 Mounting and loading angle rotor .....	12
2.1.1 Installation of rotors .....	12
2.1.2 Loading angle rotors.....	12
2.1.3 Loading swing out rotors .....	13
2.1.4 Loading and overloading of rotors.....	14
2.1.5 Removing the rotor .....	14
2.2 Lid .....	15
2.2.1 Lid release .....	15
2.2.2 Lid lock.....	15
2.3 Preselection.....	16
2.3.1 Preselection of speed / RCF-value .....	16
2.3.2 Preselection of running time.....	16
2.3.3 Preselection of brake intensity and acceleration .....	17
2.4 Radius correction.....	18
2.5 Program.....	18
2.5.1 Storage of programs.....	18
2.5.2 Recall of stored programs .....	19
2.5.3 Leaving program mode.....	20

2.6	Starting and stopping the centrifuge.....	20
2.6.1	Starting the centrifuge .....	20
2.6.2	The „STOP“ key.....	20
2.7	Imbalance detection .....	21
<b>3.</b>	<b>Maintenance.....</b>	<b>22</b>
3.1	Maintenance and cleaning .....	22
3.1.1	General .....	22
3.1.2	Cleaning and disinfection of the unit .....	23
3.1.3	Cleaning and disinfection of the rotor.....	23
3.1.4	Disinfection of aluminium-rotors .....	23
3.1.5	Disinfection of PP-rotors.....	23
3.1.6	Glass breakage.....	24
3.2	Service life of rotors, round and rectangular buckets, accessories .....	24
<b>4.</b>	<b>Trouble Shooting.....</b>	<b>26</b>
4.1	Error messages: Cause / Solution .....	26
4.2	Survey of possible error messages and their solutions .....	26
4.2.1	Lid release during power failure (Emergency Lid Release).....	26
4.2.2	Description of the error message system .....	27
<b>5.</b>	<b>Receipt of centrifuges to repair .....</b>	<b>29</b>
<b>6.</b>	<b>TRANSPORT, STORAGE AND DISPOSAL .....</b>	<b>30</b>
6.1	Transport.....	30
6.2	Storage .....	30
6.3	Disposal .....	30
<b>7.</b>	<b>APPENDIX .....</b>	<b>XXXI</b>
	EC - Conformity Declaration.....	IV
	Table 1: Technical Data .....	V
	Table 2: Permissible net weight .....	VI
	Table 3: Max. speed and RCF-values for permissible rotors .....	VII
	Table 4: Acceleration and deceleration times.....	VIII
	Table 5: Error messages .....	IX
	Tabelle 6: Radius correction.....	X
	Table 7: Abbreviations used.....	XII
	Redemption form / Decontamination certificate.....	XIII

## 1. PRODUCT DESCRIPTION

### 1.1 Usage in accordance with safety standards



This symbol indicates safety instructions and points to potential dangerous situations. Before using the centrifuge the first time, please read the operating manual.

Failure to follow these instructions can result in personal injury and property damage.

Intended use includes the observance of all instructions in the instruction manual and carrying out inspection and maintenance.

This Hermle centrifuge was designed only for the separation of materials or mixtures with different density, specifically for the preparation and processing of samples from the human body in context of an in vitro diagnostic use, to allow the use of in-vitro diagnostic in accordance to its intended purpose. The designated device and its accessories listed in the technical documentation for this device are in accordance with Directive 98/79/EC on in vitro diagnostic medical devices.

Hermle centrifuges are intended exclusively for indoor use and for use by qualified personnel.

Only Hermle original rotors and accessories might be used. Any other use or intended use is considered improper. From the resulting damage the company Hermle Labortechnik is not liable.

### 1.2 Brief description

The unit type Z 306 is a non refrigerated universal centrifuge, which we offer in two voltage variations 230V or 120V.

The centrifuge can be used with swing-out and angle rotors.

All parameters are accessible via buttons and selected with the central adjuster. All pre-selected and current values will be shown permanently on the LCD-display.

The centrifuge is powered by a maintenance-free induction motor.

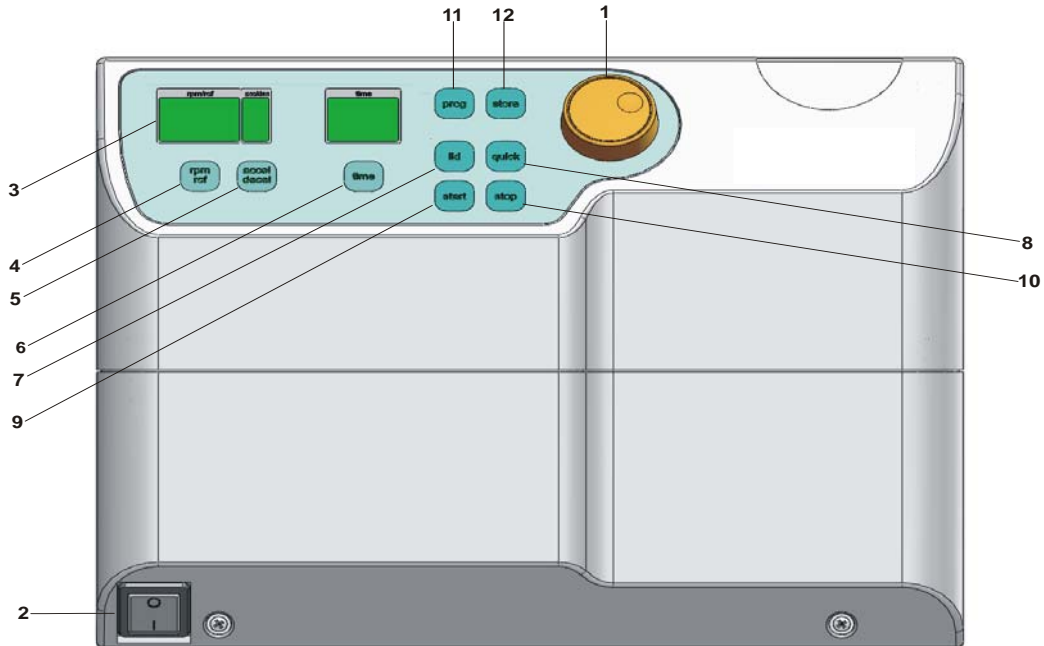
Detailed technical data are in "table 1 Technical data" (see APPENDIX P.V).

### 1.3 Delivery package

- 1 Centrifuge Z 306
- 1 Operating Manual Z 306
- 1 Rotor key

Rotor(s) / Accessories will be packed separate.

1.4 Operating and display elements



- |    |                  |  |
|----|------------------|--|
| 1  | central adjuster | run parameters                         |
| 2  | 0-I              | power switch                           |
| 3  | LCD              | control panel display                  |
| 4  | rpm/rcf          | speed/ g-force                         |
| 5  | accel/decel      | acceleration- / Deceleration intensity |
| 6  | time             | centrifugation time                    |
| 7  | lid              | lid release                            |
| 8  | quick            | short running                          |
| 9  | start            | start centrifugation                   |
| 10 | stop             | stop centrifugation                    |
| 11 | prog             | calling stored programs                |
| 12 | store            | program store                          |



### 1.4.1 LCD-Display

The following picture shows the individual elements of the LCD-display.

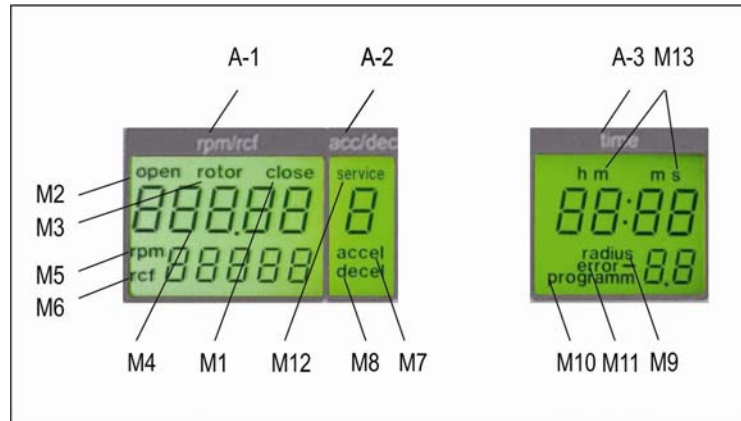


Figure 1

Display fields:

- A-1 Display field – „rpm/rcf“
- A-2 Display field – „acc/dec“
- A-3 Display field – „time“

Messages/logos of the display fields:

- |    |           |     |           |
|----|-----------|-----|-----------|
| M1 | „close“   | M8  | „decel“   |
| M2 | „open“    | M9  | „radius“  |
| M3 | „rotor“   | M10 | „program“ |
| M4 | Rotor-No. | M11 | „error“   |
| M5 | „rpm“     | M12 | „service“ |
| M6 | „rcf“     | M13 | h m s     |
| M7 | „accel“   |     |           |

### 1.5 Signs and indications of the centrifuge

#### 1.5.1 General



Instructions for disposal (see chapter 6, P. 28)



Direction of rotation – clockwise rotation for the rotor drive



Reference for loading rotors

1.5.2 Product-nameplate (Example)



Company address: Hermle Labortechnik GmbH, Siemensstr. 25, D-78564 Wehingen

TYPE: Type designation of the product

REF: Order no. of the product

SN: Serial number of the product



Date of manufacture

MAX. Drehzahl: max. allowed speed of the unit

KIN. EN.: max. kinetic energy with corresponding rotor

U/I/f: Allowable voltage / max. current / frequency

P: Electrical input power



Before operating, read the operating manual!

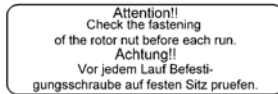


Labeling, standards and guidelines that are considered

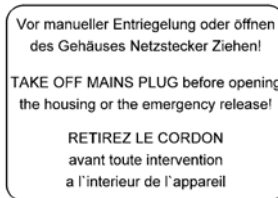
### 1.5.3 Warning and information signs



Four carrier must be used at all times on four place swing out rotors or damage will occur to the centrifuge. Such damage will not be covered under the product warranty.



Attention! Check the fastening of the rotor nut before each run.



Take off mains plug before opening the housing or the emergency release

### 1.5.4 Danger, precautions and warranty



This device may only be operated by trained specialist staff. They must have carefully read the operating manual and be familiar with the function of the device.

To protect people and environment the following precautions should be observed:

- During centrifugation, the presence of people and the setting up of hazardous materials is prohibited within 30 cm around the centrifuge according to the regulations of EN 61010-2-020.
- The HERMLE Z 306 is non explosion-proof and must therefore not be operated in explosion-endangered areas or locations. Centrifugation of flammable, explosive, radioactive, or such substances, which chemically react with high energy, is strictly prohibited. The final decision on the risks associated with the use of such substances is the responsibility of the user of the centrifuge.
- 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 obliged 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 > 2m/s

**1.5.5 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 dismantled (e.g. without housing).
- Do not run the centrifuge when mechanical or electrical assembly groups have been tampered with 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.

**1.5.6 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 two years 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!**

## 1.6 Installation of the centrifuge

### 1.6.1 Unpacking the centrifuge

Model **Z 306** is supplied in a carton.

Remove the strap retainer, open the carton and remove the centrifuge. The instruction manual must always be kept with the centrifuge!

### 1.6.2 Space requirements



The centrifuge should be installed on an even solid surface, if possible on a laboratory cabinet / table or some other solid vibration free surface.

During centrifugation, the centrifuge must be placed in a way, that there is a minimum space of 30 cm on each side of the unit according to the standards EN 61010-2-020.

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.

### 1.6.3 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. 10 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.
- Connect the centrifuge with the mains.  
(The socket for the power cord must be easy to reach respectively easy to disconnect).  
Switching it on using the mains power switch (I).  
Open the lid by using the button LID.
- Remove the transport securing device of the motor.

## 1.7 Basic adjustments

At commissioning of the centrifuge, you have the options to make the following basic settings:

- Acoustic signal turn on / off
- Keyboard sound turn on -/ off
- Volume pre-selection of sound signal
- Song selection of sound signal „end of run“

### 1.7.1 Access to mode „Operating Data“

If the centrifuge is still turned off, press simultaneously the keys „time“ (6) and „lid“ (7) 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 Figure 2).



Figure 2

Attention:

- Please notice that you must enter the program as described under point 1.7.1 to change the adjustments of the points 1.7.2 - 1.7.6. After you have stored the settings you change the normal program mode again by switch off the centrifuge for a short while.
- All changed settings must be confirmed by the key „start“ (9). As an optical confirmation appears the word „store“ in the display „rpm/rcf“(A-1) - Only then the pre-selections are valid! (see figure 3)

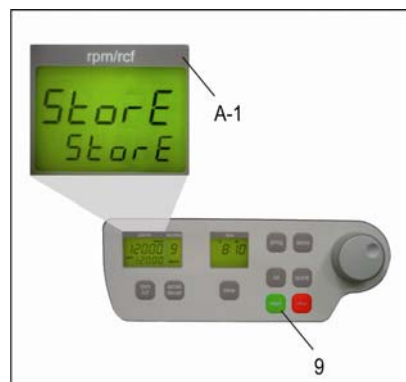


Figure 3

### 1.7.2 Sound signal turn on / off

Proceed as described under point 1.7.1 to enter this program mode and then press the key „accel/decel“ (5). In the display „accel/decel“ (A-2) flashes the word „service“. Now select the letter „L“ with the adjusting knob (1). As a result appear in the display „rpm/rcf“ (4) the words „On Sound“. If you press the key „rpm/rcf“ (4) now, the word „On“ flashes and you can switch off the sound with the adjusting knob (1) (see figure 4).

After you have stored the settings you changed to the normal program mode again by switch off the centrifuge for a short while.

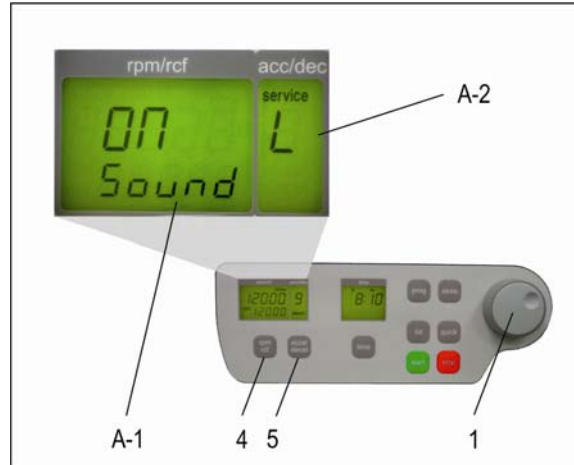


Figure 4

### 1.7.3 Volume pre-selection of sound signal

Proceed as described under point 1.7.1 to enter this program mode and then press the key „accel/decel“ (5). In the display „accel/decel“ (A-2) flashes the word „service“. Now select the letter „U“ with the adjusting knob (1). As a result appear in the display „rpm/rcf“ (A-1) the words „Vol=0-9/Sound“. After pressing the key „rpm/rcf“ (4), you can adjust the desired volume between 0 (low) and 9 (loud) with the adjusting knob (1) (see figure 5).

After you have stored the settings (see 1.7.1) you changed to the normal program mode again by switch off the centrifuge for a short while.

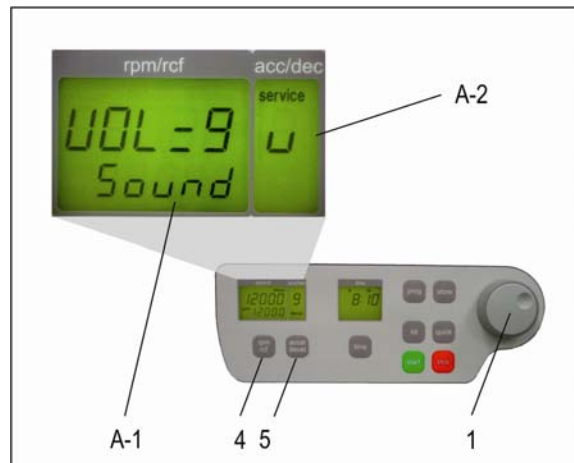


Figure 5

#### 1.7.4 Song selection for sound signal - end of run

Proceed as described under point 1.7.1 to enter this program mode and then press the key „accel/decel“ (5). In the display „accel/decel“ (A-2) flashes the word „service“. Now select the letter „G“ with the adjusting knob (1). As a result appears in the display „rpm/rcf“ (A-1) the word „SonGo/Sound“. After pressing the key „rpm/rcf“ (4), you can select a song with the adjusting knob (1). (see figure 6).

After you have stored the settings (see 1.7.1) you changed to the normal program mode again by switch off the centrifuge for a short while.

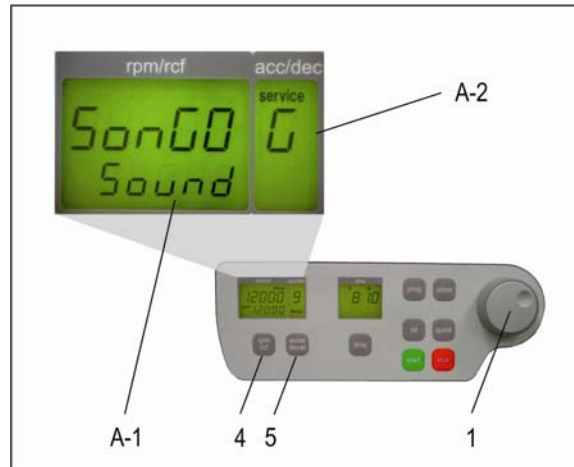


Figure 6

#### 1.7.5 Keyboard sound turn on- / off

Proceed as described under point 1.7.1 to enter this program mode and then press the key „accel/decel“ (5). In the display „accel/decel“ (A-2) flashes the word „service“. Now select the letter „b“ with the adjusting knob (1). As a result appears in the display „rpm/rcf“ (A-1) the word „ON/BEEP“. After pressing the key „rpm/rcf“ (4), you can turn the keyboard sound (On) or (Off) with the adjusting knob (1). (see figure 7).

After you have stored the settings (see 1.7.1) you changed to the normal program mode again by switch off the centrifuge for a short while.

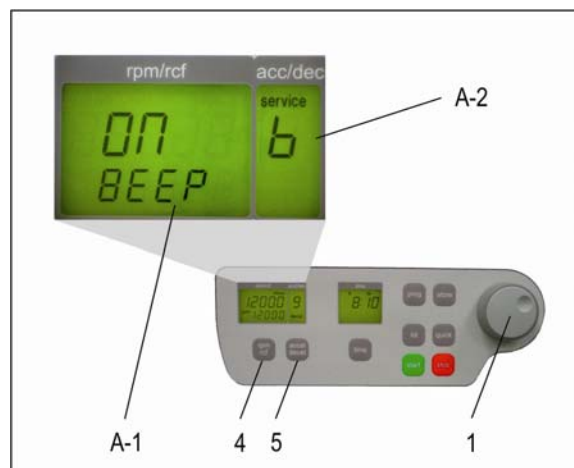


Figure 7



### 1.7.6 Call up operating data (by skilled personnel or service engineer only!)

In the mode „Basic Adjustments“ you can call up the operating data of the centrifuge. Please proceed as described under point 1.7.1 to enter this program mode. Press the key „accel/decel“ (5). In the display „accel/decel“ (A-2) flashes the word „service“.

With the adjusting knob (1) the different information can be called up:

- A = previous starts of the centrifuge
- H = previous operating hours
- S = software version
- r = converter software
- E = list of previous error message
- h = running time of the motor

The list of the last 99 error messages can be looked over by pressing the key „rpm/rcf“ (4) and scroll through it by the adjusting knob (1). The respective error codes appear in the display „rpm/rcf“ (A-1). Please look up in „Table 5: error messages“ (see APPENDIX S. IX).

Here as well you must shortly switch off the centrifuge for changing to the normal program mode again.

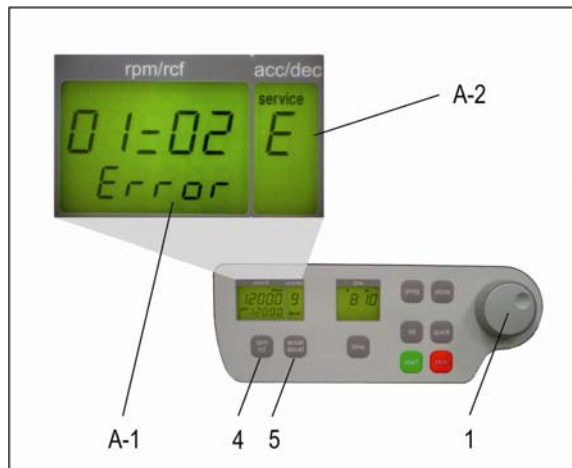


Figure 8

## 2. OPERATION

### 2.1 Mounting and loading angle rotor

#### 2.1.1 Installation of rotors

Clean the drive shaft as well as the collet with a clean, grease-free piece of cloth. Place the rotor onto the drive shaft. (see figure 9) Take care that the rotor is fully installed onto the motor shaft.



Figure 9

Hold the rotor with one hand and secure the rotor to the shaft by turning the fixing nut clockwise. Tighten fixing nut with enclosed allen key (see figure 10)



Figure 10



Figure 11



**ATTENTION:** For safety always ensure that rotor fixing screw is tightened before each run!! (see figure 10)

#### 2.1.2 Loading angle rotors

Rotors must be load symetrically and with equal weight (see figure 12+13). The adapter may only be load with the appropriate vessels. The weight differences between the filled vessels are as low as possible to keep. Therefore we recommend to weighting with a balance. This reduces the wear of drive and the acoustic operating noise.

On each rotor is designated how large the maximum load per hole is. (It is allowed to operate e.g a 12-place-rotor with 2 or 4 loaded tubes only. But the loaded borings must be opposite each other).



Figure 12: wrong



Figure 13: correct (4 tubes)

### 2.1.3 Loading swing out rotors

Loading of the buckets / vessels must be made in accordance to **figure 15**

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 figure 14 and 15).

**In principle swing out rotors may not be taken in operation until all buckets or racks are put into the rotor.**

The bolts at the rotor must be greased with the HERMLE High EF oil (Order No. 34-5147). The sample tubes 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.

#### ATTENTION!

Swing out rotors may be taken in operation only if all locations are filled in with either four buckets or four carriers – do not mix buckets and carriers up!!

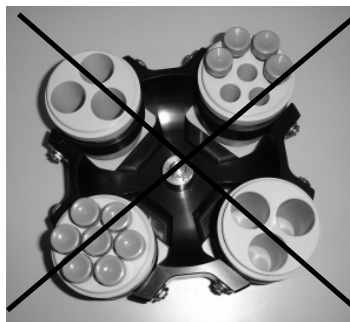


Figure 14: wrong



Figure 15: correct

#### 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.

**In case of any questions, please contact the manufacturer!**

### 2.1.4 Loading and overloading of rotors

All approved rotors are listed with their maximum speed and maximum filling weight in „table 2: permissible net weight“ (see APPENDIX P. VI).

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 max. 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:

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

Example:

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

**If In case of any questions, please contact the manufacturer!**

### 2.1.5 Removing the rotor

Untighten the rotor fixing nut complete (2. screw over the stiff point) and lift the rotor vertical out of the centrifuge. (See figure 10 and 11)

## 2.2 Lid

### 2.2.1 Lid release

After the run, respectively closing the lid of the centrifuge, it appears in the display „rpm/rcf“(A-1) the word „close“ (M1). If there is a rotor in the centrifuge, it appears additional the word „rotor“ (M3), as well as the code number of the respective rotor, which is in the centrifuge i. e. „221.28“ (M4). If there is no rotor in the centrifuge it flashes the word „rotor“ (M3) and additional the word „no“ (M4). ). By pressing the key „lid“ (7) you can release the lid of centrifuge. As soon as the electromagnetic lid is completely released, it appears the word „open“ (M2). Now you can open the lid of the centrifuge.

All with number marked passages refer to figure 16

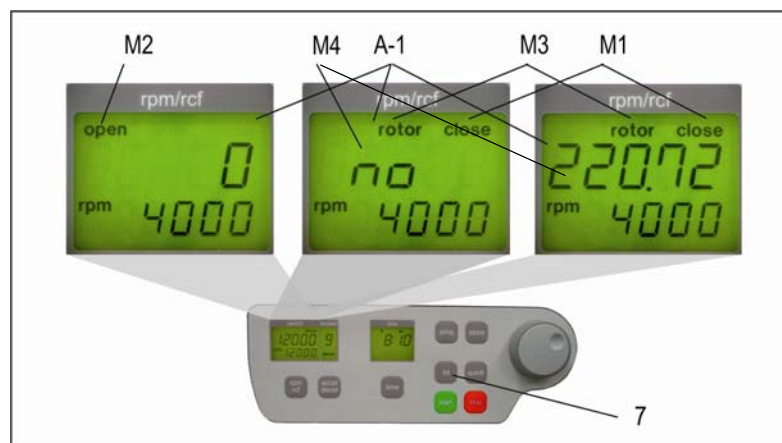


Figure 16

During the run you can call up the rotor type at any time by pressing the key "lid" (7).

### 2.2.2 Lid lock

The lid must be pressed down. An electromagnetic lid lock closes the lid, at the same time disappears the word „open“ (M2).

As a sign that the centrifuge is ready for starting it appears in the display „rpm/rcf“(A-1) the word „close“ (M1). Simultaneously it appears in that display the word „rotor“ (M3), as well as the code number of the rotor, which is in the centrifuge i. e. „nr 22x.xx“ (M4). With that all rotor specifically data, like e. g. max. speed, acceleration etc., are adopted.

All with number marked passages refer to figure 16

**⚠ ATTENTION:** Don't grip your fingers between lid and device or locking mechanism when closing the lid!

## 2.3 Preselection

### 2.3.1 Preselection of speed / RCF-value

Through the key „rpm/rcf“ (4) this pre-selection is activated. By pressing the key once the word „rpm“ (M5) flashes. By pressing the key once again the pre-selection of the centrifugal forces may be chosen. Then it appears the flashing word „rcf“ (M6). You can set the desired values with the adjusting knob (1). In the display (A-1) the regulated value is shown permanently, before, during and after the run.

All with number marked passages refer to figure 17

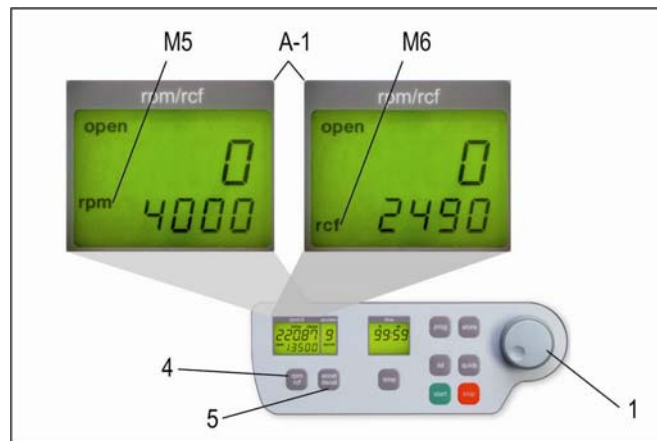


Figure 17

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.

See „table 3: max. speed and RCF-values for permissible rotor“ (see APPENDIX P. VII). There are listed all important values.



#### ATTENTION:

Please also check the maximum permissible revolutions of your test tubes! (Producer Indication)

### 2.3.2 Preselection 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 „cont“, which can be interrupted by the key “stop” (10).

The running time can be pre-selected with the lid open or closed.

To activate the setting of the running time press the key „time“ (6).

In the display „time“ (A-3) flashes the indication „m : s“ or „h : m“, depending on the previous setting.

To set the desired value use the adjusting knob (1). After exceeding of 59 min 50 sec the indication changes automatically into „h : m“. After exceeding of 99 hours 59 min the word „cont“ appears in the display „time“ (A-3). That continuous run can only be interrupted by pressing the key „stop“ (10). The time countdown as soon as the setted speed is reached.

The display shows always the remaining running time. (see figure 18)

All with number marked passages refer to figure 18

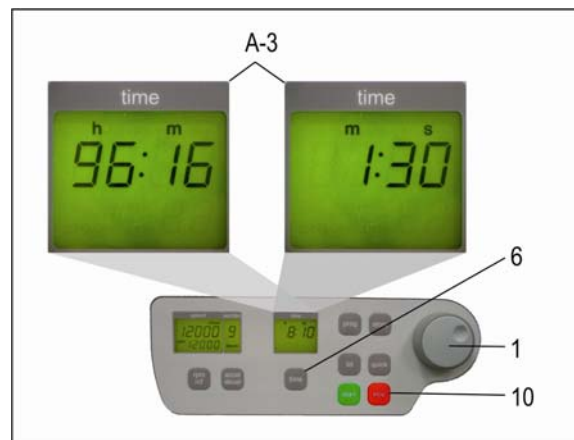


Figure 18

### 2.3.3 Preselection of brake intensity and acceleration

Through the key „accel/decel“ (5) this function is activated.

By pressing the key once the word „accel“ (M7) flashes in the display „accel/decel“ (A-2). The desired acceleration can be pre-selected by the adjusting knob (1). The value 0 is equivalent to the lowest and the value 9 to the highest acceleration.

By pressing the key „accel/decel“ (5) twice, in the display „accel/decel“ (A-2) indicates the word „decel“ (M8). Now the desired brake intensity can be pre-selected by the adjusting knob (1). The value 9 is equivalent to the shortest and the value 0 to longest possible brake time.

All with number marked passages refer to figure 19

See „table 4: acceleration and deceleration times“ (APPENDIX P. VIII). There are shown the acceleration and deceleration times for the acceleration and deceleration stages 0 to 9 for permissible rotors.

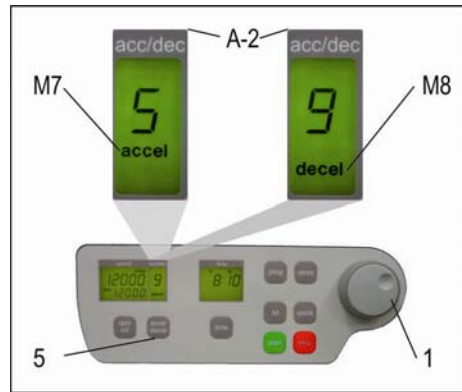


Figure 19

## 2.4 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“ (9) and the key „prog“ (11) at the same time and hold them.

In the display „time“ (A-3) appears the word „radius“ (M9). By the adjusting knob (1) you can pre-select then the respective radius correction (see table 6, APPENDIX P. X) in steps of 0,1 cm.

As soon as you have set a radius correction the word „radius“ (M9) appears. This hint is as long visible as you put the radius correction back to 0 again.

All with number marked passages refer to figure 20

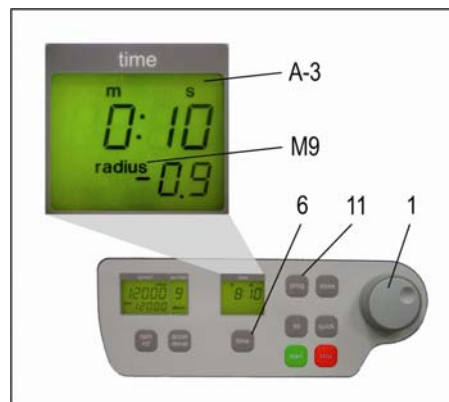


Figure 20

## 2.5 Program

### 2.5.1 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“ (11) in the display „time“ (A-3) appears the word „program“. With the adjusting knob (1) you can chose the desired program number.



If a program number is already occupied in the display „rpm/rcf“ (A-1) will appear the words „rotor“ (M3) and „22x.xx“ (M4). In case of free program numbers it appears 0.

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“ (12) for approx. 1 second. As a result the word „program“ (M10) disappears. As soon as the key „store“ (12) is no longer anymore, it reappears the word „programm xx“ (M10) – the (xx) stands for the chosen program place.

If all program numbers are occupied you can take an old number that is not necessary anymore and just put in the new parameters.

All with number marked passages refer to figure 21.

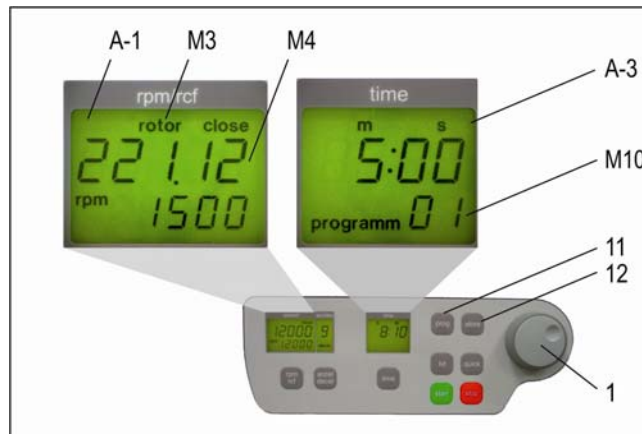


Figure 21

## 2.5.2 Recall of stored programs

To recall stored programs press the key „prog“ (11) while the lid is already closed. Inside the display „time“ (A-3) appears „programm --“ (M10). With the adjusting knob (1) 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 inside the centrifuge for the pre-selected program, in the display „rpm/rcf“ (A-1) flashes the word „rotor“ (M3). At the same time the word „FALSE“ and the stored rotor number „22x. xx“ (M4) will flashing by turns.

All with number marked passages refer to figure 22.

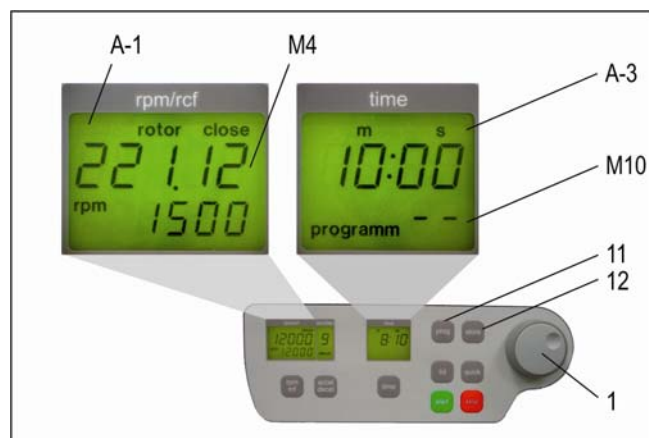


Figure 22

### 2.5.3 Leaving program mode

To leave the program mode just press the key „prog“ (11). Then inside the display „time“ appears the word „Programm“.

Set the display to „programm--“ (M10) with the adjusting knob (1).

All with number marked passages refer to figure 22.

## 2.6 Starting and stopping the centrifuge

### 2.6.1 Starting the centrifuge

You can start the centrifuge either with the „start“ key (9) or the „quick“ key (8).

By the „start“ key (9) 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 (8) you can start runs, which will last just a few seconds.

By pressing the „quick“ key (8) the centrifuge accelerates up to the pre-selected revolution.

In the display „time“ (A-3) the passed running time is indicated from the date of pressing the „quick“ key (8).

By releasing the „quick“ key (8) the centrifuge stops and the running time is indicated until the opening of the lid.

All with number marked passages refer to figure 23

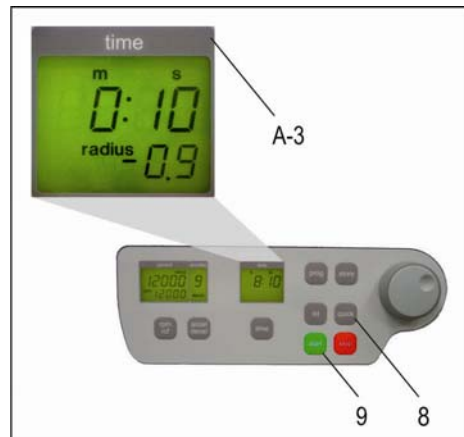


Figure 23

### 2.6.2 The „STOP“ key

By the „stop“ key (10) (see figure 24) 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.

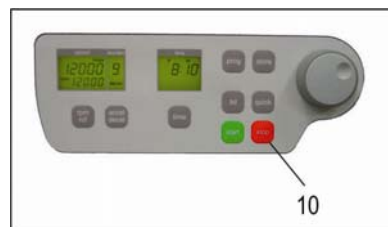


Figure 24

## 2.7 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" (A-3) the word "error" (M11) together with the number "01" appear, the weight difference of the samples is too huge. Weigh out the samples exactly!

Load the rotor as described in chapter 2.1.1 and 2.1.2.

When inside the display "time" (A-3) the word "error" together with the number "02" (see figure 25) appear, there could be following reasons: The imbalance switch is defective.

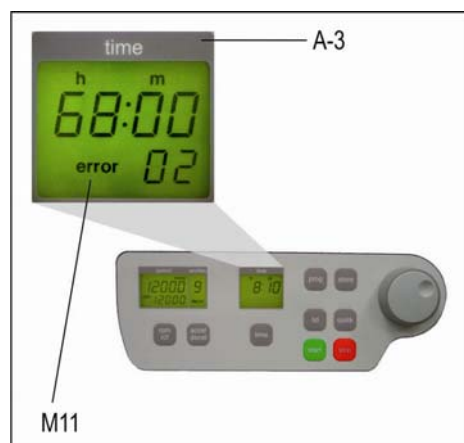


Figure 25

### 3. Maintenance

#### 3.1 Maintenance and cleaning

##### 3.1.1 General

###### Care:

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).

The most suitable lubricant is the offered HERMLE High TEF oil – Order no.: 34-5147.

Lubricants containing molybdate 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, phenol, halogenated hydrocarbons.



###### Cleaning – units, rotors, accessories:

- Turn the device off and disconnect it from the power supply before you begin any cleaning or disinfecting. Do not pour liquids into the housing interior.
- Do spray disinfectant on the device.
- 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!

- Connect the unit to the power supply, after the equipment is completely dry.
- Do not carry out disinfection with UV-, beta- and gamma-rays or other high energy radiation.
- Metal rotors can be autoclaved.
- Rotor lid and adapters can also be autoclaved (max. 121°C, 20 min).
- The tube racks are made of PP and can **not** be autoclaved at 134°C.

### 3.1.2 Cleaning and disinfection of the unit

1. Open the lid before you turn off the unit. Disconnect it from the power supply.
2. Open the rotor nut by turning the rotor key counter clockwise.
3. Remove the rotor.
4. For cleaning and disinfection of the unit and the rotor chamber using the above mentioned cleaner.
5. Clean all accessible areas of the device and its accessories, including the power cord with a damp cloth.
6. Wash the rubber seals and rotor chamber thoroughly with water.
7. Rub the dry rubber seals with glycerol or talc to prevent these to becoming brittle. Other components of the unit, e.g. the lid lock, motor shaft and rotor must not be greased.
8. Dry the motor shaft with a soft, dry and lint-free cloth.
9. Control the unit and accessories for damage.

Remove at least every six months adherent dust from the ventilation slots in the centrifuge by using a soft brush.

### 3.1.3 Cleaning and disinfection of the rotor

1. Clean and disinfect the rotors, rotor lids and adapters with the above mentioned cleaner.
2. Use a bottle brush to clean and disinfect the rotor bores.
3. Rinse the rotors, rotorlid and adapter with clear water. Particular the drillings of angle rotors.
4. For drying of the rotors and accessories set them on a towel. Place the angle rotors with bores down, to dry them to.
5. Dry the rotor cone with a soft, dry and lint-free cloth and look for damage. Do not grease the rotor cone.

### 3.1.4 Disinfection of aluminium-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.

### 3.1.5 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

Adapters, 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, adapters and bottles must not be closed respectively must be totally unscrewed

Chemical sterilization

Bottles, adapters and rotors may be treated with the usual liquid disinfectants.



**ATTENTION:** Before applying any other cleaning resp. Decontamination method than recommended by the manufacturer, contact the manufacturer to ensure that it will not damage the unit or the rotor.

3.1.6 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.

If necessary, replace the adapters, tubes and accessories to avoid further damages. Check the rotor bores regularly for residues and damages.



**ATTENTION:** Please check the relevant specifications of the tubes centrifuges with the manufacturer!

3.2 Service life of rotors, round and rectangular buckets, accessories

Rotors and rotor lid made of aluminium or stainless steel, have a operating life of max. 7 years from first use.

Transparent rotor lids and caps made of PC or PP as well as rotors, tube racks and adapters of PP have a maximum service life up to 3 years from first use.

Condition for the operating life:

Proper use, damage-free condition, recommended care.



## 4. Trouble Shooting

### 4.1 Error messages: Cause / Solution

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

The diagnose referred to 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 operation 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 (see Figure 26):

- ⚠ • **Switch the centrifuge off and unplug the power cord, wait until the rotor stands still (this may take several minutes)**  
At the right side of the centrifuge there is a plastic stopper (Figure 26). Remove this stopper, which is connected to the lid lock, horizontally from the housing until the centrifuge lid opens.
- Now open the lid of the centrifuge.



Figure 26



#### 4.2.2 Description of the error message system

The error message „error“ (M11) is shown in the „time“ (A-3) display (see figure 27). Detailed information about possible error messages are in „table 5: error messages“ (see Appendix P.IX).

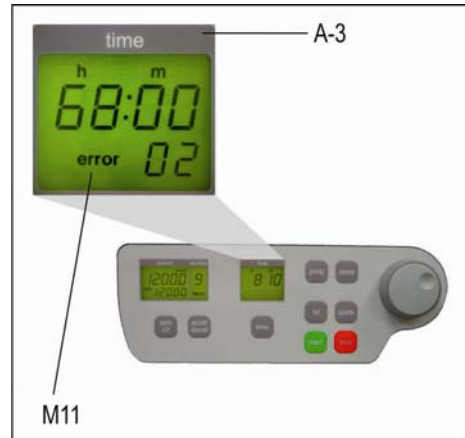


Figure 27



## 5. Receipt of centrifuges to repair



### Health risk from contaminated equipment, rotors and accessories

In case of returning the centrifuge for repairing to the manufacturer, please notice the following:

The centrifuge **must** be decontaminated and cleaned before the shipment for the protection of persons, environment and material.

### Decontamination certificate at goods return delivery (see APPENDIX P. XIV)

We reserve the right to accept contaminated centrifuges.

Further on all costs occurred for the cleaning and disinfection of the units will go to the debit of the customer's account.

## 6. TRANSPORT, STORAGE AND DISPOSAL

### 6.1 Transport

Before transporting, take out the rotor.

Only transport the unit in the original packaging.

Use a transport aid for transporting over longer distances to fix the motor shaft.

	Air temperature	rel. humidity	Air pressure
General transportation	-25 bis 60 °C	10 bis 75 %	30 bis 106 kPa

### 6.2 Storage

During storage of the centrifuge the following environmental conditions must be observed:

	Air temperature	rel. Humidity	Air pressure
in transport packaging	-25 bis 55 °C	10 bis 75 %	70 bis 106 kPa

### 6.3 Disposal

In the event of disposing of the product, please observe the applicable legal regulations.

**Information on the disposal of the electrical and electronic devices in the European Community:.**

The disposal of the electrical devices is regulated within the European Community by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE).

In accordance with this, any devices delivered after 13/08/2005 on a business-to-business basis, which includes the product, may no longer be disposed of in household waste. To document this they have been marked with the following identification:



Because disposal regulations may differ from one country to another within the EU please contact your supplier if necessary.

## 7. APPENDIX

EC - Conformity Declaration .....	IV
Table 1: Technical Data .....	V
Table 2: Permissible net weight.....	VI
Table 3: Max. speed and RCF-values for permissible rotors.....	VII
Table 4: Acceleration and deceleration times .....	VIII
Table 5: Error messages.....	IX
Tabelle 6: Radius correction .....	X
Table 7: Abbreviations used .....	XII
Redemption form / Decontamination certificate .....	XIII

*EC - Conformity Declaration*

**EG Konformitätserklärung  
EC Conformity Declaration**



Hermle Labortechnik GmbH - Siemensstr. 25 - D-78564 Wehingen – Germany

Das bezeichnete Produkt entspricht den einschlägigen grundlegenden Anforderungen der aufgeführten EG-Richtlinien und Normen. Bei einer nicht mit uns abgestimmten Änderung des Produktes oder einer nicht bestimmungsgemäßen Anwendung verliert diese Erklärung ihre Gültigkeit.

The Product named below fulfills the relevant fundamental requirements of the EC directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Produkttyp  
Product type

**Laborzentrifugen mit Zubehör nach „IVD (andere)“  
Laboratory centrifuge with accessories to “IVD (others)”**

Typenbezeichnung  
Typ designation

**Z 100 M; Z 160 M; Z 206 A; Z 233 M-2; Z 306; Z 326; Z 366; Z 383; Z 400; Z 513;  
Z 216 MK; Z 32 HK; Z 326 K; Z 36 HK; Z 383 K; Z 400 K; Z 513 K**

Einschlägige EG-Richtlinien / Normen  
Relevant EC directives / standards

**98/79/EG ; 2006/95/EG ; 2004/108/EG  
EN 61 010-1; EN 61 010-2-020; EN 61 010-2-101  
EN ISO 14971:2007; DIN ISO 13485**

**HERMLE**  
LABORTECHNIK 



Alexander Hermle  
Geschäftsführer, Managing Director

Wehingen, den 01.01.2012

Table 1: Technical Data

Weight without rotor	30 kg			
max. speed	13500 min <sup>-1</sup>			
max. volume	4 x 100 ml			
max. RCF	18625 x g			
allowable density	1,2 kg/dm <sup>3</sup>			
allowable kinetic energy	5595 Nm ( Rotor 221.17 V03)			
Mains power connection AC	230 V / 50 Hz 1 ph	120 V / 60 Hz 1 ph		
Voltage fluctuation	± 10 %	± 10 %		
Current consumption	1,3 A	2,4 A		
Power consumption	0,24 KW	0,3 KW		
Radio interference	VDE 0871, radio interference B			
Audit requirement (BGR 500)	no			
Ambient conditions (EN/IEC 61010-1)				
Environement	for indoor use only			
High	Use up to an altitude of 2000 m above MSL			
Ambient temperature	2°C up to 35 °C			
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50% relative humidity up to 35°C			
Overvoltage category (IEC 60364-4-443)	II			
Degree of contamination	2			
Class of protection	I			
Not suitable for use in hazardous environments				
EMV	EN / IEC	FCC Class B	EN / IEC	FCC Class B
Interference emission, noise immunity	61326-1		61326-1	
	Category B		Category B	
Noise level (depending on the rotor)	≤ 63dB(A)			
Write from operator				
Inventory-No.:	_____			
Monitoring-Nr.:	_____			
Environement:	_____			
Maintenance contract:	_____			
responsible service office	HERMLE Labortechnik GmbH		or dealer service office	
	Siemensstrasse 25		_____	
	78564 Wehingen		_____	
	Tel.: (49)7426 / 96 22-17		_____	
	Fax: (49)7426 / 96 22-49		_____	
responsible dealer				

*Table 2: Permissible net weight*

Rotor number	Max. speed	Permissible net weight
220.50 V08	3500 min-1	4 x 200 g
220.72 V06	4000 min-1	4 x 465 g
220.87 V09	13500 min-1	24 x 3,4 g
220.87 V10	13500 min-1	24 x 3,4 g
220.96 V04	6000 min-1	12 x 25 g
220.97 V04	6000 min-1	6 x 72 g
221.12 V03	4500 min-1	4 x 340 g
221.16 V03	4500 min-1	2 x 400 g
221.17 V03	12000 min-1	30 x 3,4 g
221.19 V02	4500 min-1	30 x 32 g
221.24 V02	3250 min-1	2 x 70 g
221.25 V03	5000 min-1	6 x 110 g



*Table 3: Max. speed and RCF-values for permissible rotors*

Rotor number	Max. speed	RCF value
220.50 V08	3500 min-1	1424 xg
220.72 V06	4000 min-1	3885 xg
220.87 V09	13500 min-1	17319 xg
220.87 V10	13500 min-1	17319 xg
220.96 V04	6000 min-1	4185 xg
220.97 V04	6000 min-1	3823 xg
221.12 V03	4500 min-1	3350 xg
221.16 V03	4500 min-1	2716 xg
221.17 V03	12000 min-1	15133 xg
221.19 V02	4500 min-1	2830 xg
221.24 V02	3250 min-1	1700 xg
221.25 V03	5000 min-1	3801 xg

Table 4: Acceleration and deceleration times

Rotor number	Acceleration values		Deceleration values	
	level 0	level 9	level 0	level 9
220.50 V08	110	14	250	19
220.72 V06	110	14	170	17
220.87 V09	200	22	230	35
220.87 V10	200	25	230	35
220.96 V04	105	13	200	13
220.97 V04	105	13	200	13
221.12 V03	110	14	170	19
221.16 V03	230	25	340	26
221.17 V03	250	27	280	34
221.19 V02	157	19	370	20
221.24 V02	95	12	230	15
221.25 V03	206	24	870	30
in seconds				
Accelerataion time from 0 min <sup>-1</sup> -> U <sub>max</sub>		Decelertaion time from U <sub>max</sub> -> 0 min <sup>-1</sup>		

Table 5: Error messages

Error-No.:	Description
1	Imbalance arose
2	Imbalance sensor is defective
4	Imbalance switch has been activated for longer than 5 seconds
8	Transponder in the rotor is defective
14	Leap of speed is too big between two measurements
<b>CLOSE lid</b>	
33	Open lid while motor is running
40	Communication with frequency converter disturbed during start
41	Communication with frequency converter disturbed during 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
<b>FALSE</b>	Inserted rotor does not exist in the program
<b>rotor no</b>	Rotor is not detected

Tabelle 6: Radius correction

<i>Rotor no.</i>	<i>Adapter/Tube-rack Order no.</i>	<i>Drawing. no.</i>	<i>Radius (cm)</i>	<i>Correction (cm)</i>
<b>Swing out rotor 220.72 V04</b>	605.004	220.72.60.03	14,6	0
	605.005	220.72.61.03	14,6	<b>0,0</b>
	605.000/001	220.72.06.03	14,2	<b>-0,4</b>
	705.002	220.72.73.04	14,0	<b>-0,6</b>
	705.003	220.72.74.04	14,0	<b>-0,6</b>
	705.005	220.72.76.04	13,7	<b>-0,9</b>
	705.007	220.72.79.14	14,0	<b>-0,6</b>
	705.008	220.72.80.14	14,0	<b>-0,6</b>
	705.009	220.72.84.04	14,6	<b>0</b>
	705.010	220.72.85.04	14,0	<b>-0,6</b>
	705.012	220.72.62	14,0	<b>-0,6</b>
	705.013	220.72.63	13,9	<b>-0,7</b>
	705.014	220.72.64	13,1	<b>-1,5</b>
	705.015	220.72.65	14,0	<b>-0,6</b>
	705.016	220.72.66	14,0	<b>-0,6</b>
		220.72.88	13,9	<b>-0,7</b>
<b>Angle rotor 220.87 V09 220.87 V10</b>			8,6	0
	704.004	220.56.55.04	8,2	<b>-0,4</b>
	704.005	220.56.56.04	7,5	<b>-1,1</b>
<b>Angle rotor 220.96 V04</b>	601.005	220.96.05.04	10,5	0
	Special	220.96.17	9,8	<b>-0,6</b>
	220.96.17	With 220.96.08.04	9,0	<b>-1,5</b>
		220.96.12.04	10,7	
	220.96.12.04	With 220.96.08.04	9,8	<b>-0,6</b>
	220.96.05.04	With 220.96.08.04	9,7	<b>-0,8</b>
	701.011	220.96.06.04	9,7	<b>-0,8</b>
	701.012	220.96.07.04	8,3	<b>-2,2</b>
<b>Angle rotor 220.97 V04</b>	603.000	220.97.04.04	9,8	0
<b>Swing out rotor 220.50 V08</b>			10,2	<b>0</b>

Table 6 (part 2): Radius correction

<i>Rotor no.</i>	<i>Adapter/Tube-rack Order no.</i>	<i>Drawing no.</i>	<i>Radius (cm)</i>	<i>Correction (cm)</i>
<b>Swing out rotor 221.12.01.02</b>	626.003	221.12.09.03	14,8	0
	626.000	221.12.08.03	14,1	-0,7
	626.001	221.12.10.03	14,1	-0,7
	626.002	221.12.07.03	14,6	-0,2
	626.004	221.12.11.03	14,5	-0,3
	626.005	221.12.13.03	14,2	-0,6
	626.006	221.12.06.03	14,2	-0,6
	626.007	221.12.12.03	14,0	-0,8
	626.008	221.12.16	14,2	-0,6
	626.009	221.12.17	14,2	-0,6
	626.010	221.12.18	14,3	-0,5
	626.011	221.12.19	13,8	-1,0
	626.012	221.12.20	14,4	-0,4
	626.013	221.12.21	14,5	-0,3
	626.014	221.12.22	9,9	-4,9
	626.015	221.12.24	11,6	-3,2
<b>Swing out rotor 221.16.01.02</b>			10,2	0
	706.000	220.50.25.04	10,2	0
<b>Angle rotor 221.17.01</b>			9,5	0
	704.004	220.56.55.04	9,1	-0,4
	704.005	220.56.56.04	8,4	-1,1
<b>Angle rotor 221.19.01</b>			12,5 10,9	0
	701.000	225.52.71.04	8 6,4	-4,5
	701.010	220.96.08.04	11,3 9,7	-1,2
	701.011	220.96.06.04	12,2 10,6	-0,3
	701.012	220.96.07.04	10,5 8,9	-2,0
<b>Swing out rotor 221.24.01</b>		221.24.03	14,36	0
<b>Angle rotor 221.25.01</b>			13,6	0
		221.25.06	13,3	-0,3

Table 7: Abbreviations used

Symbol / Abbreviation	Unit	Description
U (=rpm)	[min <sup>-1</sup> ]	revolutions per minute
RZB(=rcf)	[x g]	relative centrifugal force
PP	-	Polypropylen
PC	-	Polycarbonat
accel	-	acceleration
decel	-	deceleration

## Redemption form / Decontamination certificate

## Decontamination certificate at goods return delivery

Enclose at all returns of equipment and assemblies absolutely!

The completely full declaration about the decontamination is prerequisite for the assumption and further processing of the return. If no corresponding explanation is enclosed, we carry out decontamination with costs at your expense.

**Surname; last name:** \_\_\_\_\_  
**Organization / company:** \_\_\_\_\_  
**Street:** \_\_\_\_\_  
**ZIP CODE:** \_\_\_\_\_ **place:** \_\_\_\_\_  
**Telephone:** \_\_\_\_\_ **fax:** \_\_\_\_\_  
**E-Mail:** \_\_\_\_\_

Please fill out in block capitals!

Pos.	Crowd	Decontaminated object	Serial number	Description / Comment
1				
2				
3				
4				

**Are these parts listed above in touch with the following substances?**

Health endangering watery solutions, buffers, acids, alkalis:.....  Yes  No  
 Potentially infectious agents: .....  Yes  No  
 Organic reagents and solvent: .....  Yes  No  
 Radioactive substances: .....   $\alpha$ ..   $\beta$ ..   $\gamma$ ..  Yes  No  
 Health endangering proteins: .....  Yes  No  
 DNA: .....  Yes  No  
 These substances have reached the equipment/assembly? .....  Yes  No

Which one, if yes:

\_\_\_\_\_

Description of the measures for the decontamination of the listed parts:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I confirm the proper decontamination:

Company/dept . \_\_\_\_\_ place and date: \_\_\_\_\_

APPENDIX

Signature of the authorized person: \_\_\_\_\_







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