HERMLE **Z 207 M**

User Manual

HERMLE
LABORTECHNIK

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1. PRODUCT DESCRIPTION

1.1 Safety Instructions

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

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

Intended use includes: the observation of all instructions, in the instruction manual, and administering inspection and maintenance.

1.2 Indended Purpose

This Hermle centrifuge was designed only for the separation of materials or mixtures with different densities, 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, are in compliance with the Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices..

Hermle Centrifuges are intended exclusively for indoor use and for the use of qualified personnel.

Only Hermle original rotors and accessories should be used. Any other use or intended use is strictly prohibited. For any resulting damage, the company, Hermle Labortechnik, is not liable.

1.3 Brief Description

The unit type Z 207 M is a microlitre centrifuge, which we offer in two voltage variations 230V or 120V.

The centrifuge can be used with different angle rotors.

All parameters are accessible via buttons and selected with the control field. 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.I).

1.4 Delivery Package

- 1 Centrifuge Z 207 M
- 1 Operating Manual Z 207 M
- 1 Rotor key
- 1 Power Cord

Rotor(s) / Accessories will be packaged either inside the centrifuge or separately.

1.5 Installation of the Centrifuge

1.5.1 Unpacking the Centrifuge

Model **Z 207 M** is supplied in a carton.

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

1.5.2 Space Requirements

The centrifuge should be installed on an even, vibration free and 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 / 12 in on each side of the unit, according to EN 61010-2-020 standards.

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/73.4°F.

1.5.3 Installation

Follow these steps:

- Check whether the power supply corresponds with the one specified on the manufacturer's rating label, mounted on the rear panel.
- The line voltage circuit breaker is max. 10 A (Type K), slowly release for commonly used instruments.
- In case of emergency, there must be an emergency switch off installed outside of the room, in order to disconnect the power supply from the unit.
- Connect the centrifuge with the mains.
- (The socket for the power cord must be easy to reach, respectively easy to disconnect).
- Switch on, by using the mains power switch (2.2).
- Open the lid, by using the button LID.
- Remove the transport securing device of the motor

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1.6 Signs- and Indication of the Centrifuge

1.6.1 Product Nameplate (Example)

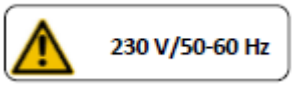
Company Address:	Hermle Labortechnik GmbH, Siemensstr. 25, D-78564 Wehingen
IVD	In-Vitro-Diagnostic Medical Device
TYPE:	Type Designation of the Product
REF:	Order No. of the Product
SN:	Serial No. of the Product
	Manufacturer
	Date of Manufacture
MAX. Drehzahl:	Max. Speed Allowed of the Unit
KIN. EN.:	Max. Kinetic Energy with Corresponding Rotor
U/I/f:	Allowable Voltage / Max. Current / Frequency
P:	Electrical Input Power
	Operating Manual Indication
	Labeling, Standards and Guidelines
	Instructions for Disposal
	RoHS Conformity

1.6.2 Warning and Information Signs

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

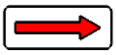
Attention! Check the fastening of the rotor nut before each run

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



Power Input

Fuse Value 4 AT



Direction of Rotation – clockwise rotation for the rotor drive

Biohazard Warning

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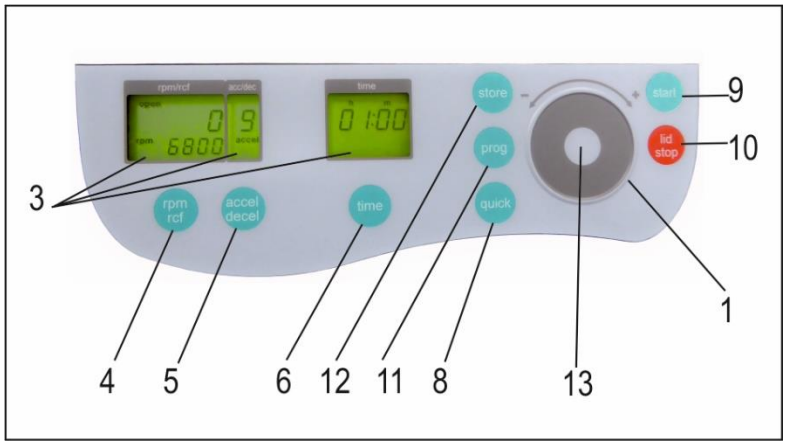
1.7 Operating and Display Elements



1	**control field**	Run Parameters
3	**LCD**	Control Panel Display
4	**rpm/rcf**	Speed/ g-force
5	**accel/decel**	Acceleration / Deceleration Intensity
6	**time**	Centrifugation Time
8	**quick**	Short Running
9	**start**	Start Centrifugation
10	**lid/stop**	Lid Release / Stop Centrifugation
11	**prog**	Retrieving Stored Programs
12	**store**	Program Store
13	**LED light**	Shows the status of the centrifuge

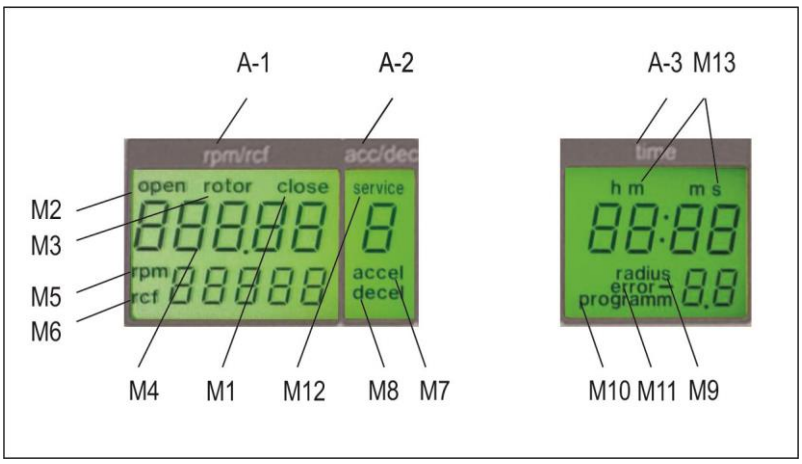
1.7.1 LED light

The LED light indicates the current operation state of the centrifuge. The following table shows all operating states.

Color of LED light	Operating state
Green	Run complete, lid is closed
Yellow	Lid opened, no sleep mode
Red flashing fast	Error message
Red flashing slow	Centrifuge runs
Yellow flashing slow	Sleep mode
Red – Green flashing slow	Standard settings menu

1.7.2 LCD-Display

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



Display Fields:

A-1	Display Field – "rpm/rcf"
A-2	Display Field – "acc/dec"
A-3	Display Field– "time"

Messages/Logo of the Display Field:

M1	„close“	M8	„decel“
M2	„open“	M9	„radius“
M3	„rotor“	M10	„programm“
M4	Rotor-Nr.	M11	„error“
M5	„rpm“	M12	„service”
M6	„rcf“	M13	h m s
M7	„accel“		

Indication:

After switching on the centrifuge, the display "rpm/rcf"(A-1) shows the current software version and after the model type.

Figure 1

 © Hermle Labortechnik GmbH

1.7.3 Danger, Precautions and Warranty

This device may only be operated by a trained professional. Carefully, read the operating manual and be familiar with the functions of the device.

To protect people and the environment, the following precautions must be taken:

- During centrifugation, the presence of people and the arrangement of hazardous materials is strictly prohibited, within 30 cm/12 in around the centrifuge, according to the regulations of EN 61010-2-020.
- The HERMLE **Z 207 M** is non "explosion-proof" and must 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. If used in such environment, this is at the users own expense.
- Never spin toxic or pathogenic material without adequate safety precautions, i.e. centrifugation of tubes with or without defective hermetic sealing, 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 not manufactured 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.

1.7.4 Following Rules Must Strictly be Adhered To:

- Do not operate the centrifuge if not installed correctly.
- Do not operate the centrifuge when dismounted (e.g. without housing).
- Do not run the centrifuge, if mechanical or electrical assembly groups have been tampered with, by unauthorized personnel.
- Do not use accessories such as rotors and adapters, that are not 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 adapters, 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 to 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.

1.7.5 Warranty

The centrifuge has been subjected to thorough testing and quality control. 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 any case of mishandling, damage and/or negligence and further in any 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 regards to technical improvement!

1.8 Basic Adjustment

1.8.1 Adjustment of the Rotor Type

Before the first operation resp., after each rotor change, select the respective rotor type. Each rotor type is found, on the printed order number, on the rotor.

Example:

Angle Rotor 221.59 V01 ≙ rotortype "221.59"

Switch on the unit and open the lid. Now simultaneously press the keys, "lid/stop" (10) and "quick"(8). In the display, "rpm/rcf" (A-1), appears the previously selected rotor type, i. e. “221.59”. Now the buttons can be released. With the controle field (1), choose the previously used rotor, (see Figure 2). Select the data in the unit and press the “start” (9) or “store” key. Inside the display, (A-1), the word “store” appears, as the confirmation.

Now all important rotor parameters for the centrifuge are stored.

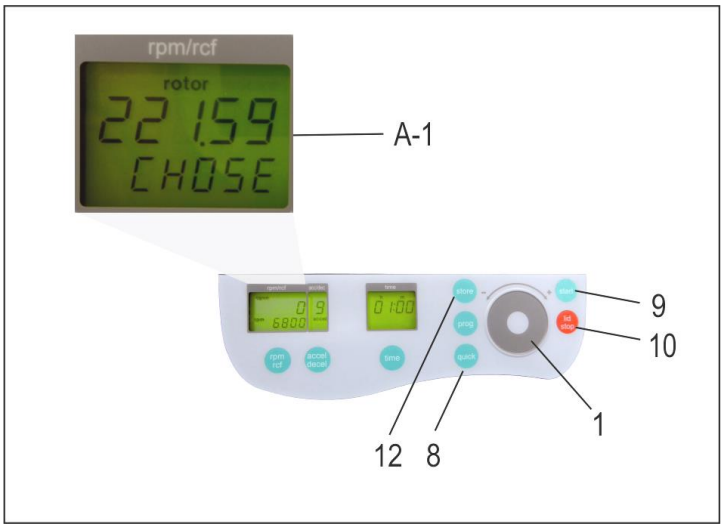


Figure 2

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1.8.2 Access to the Mode: “Standard settings“

While starting this model, the following basic settings can be performed:

- Signal Turn On / Off
- Keybord Sound On / Off
- Sleep Mode On / Off

The following operating data can be retrieved in this menu:

- Number of Starts
- Operating Hours of Centrifuge
- Operating Hours of Motor
- Software Version
- Error List
- Function of the Imbalance Switch
- Operation of Keyboard
- Hardware Version
- Intermediate Circuit Voltage in Volt
- Display Tests

Open the centrifuge lid and shut off the main switch. Now switch on again the main switch. For approximately 3 seconds the software version and the model type will be shown in the display (see Figure 1). Press during this time the keys “time“ (6) and “lid/stop“ (10) simultaneously. As a result, a display test is administered for approx. 3 seconds. All possible indications will appear at the same time (see Figure 3).

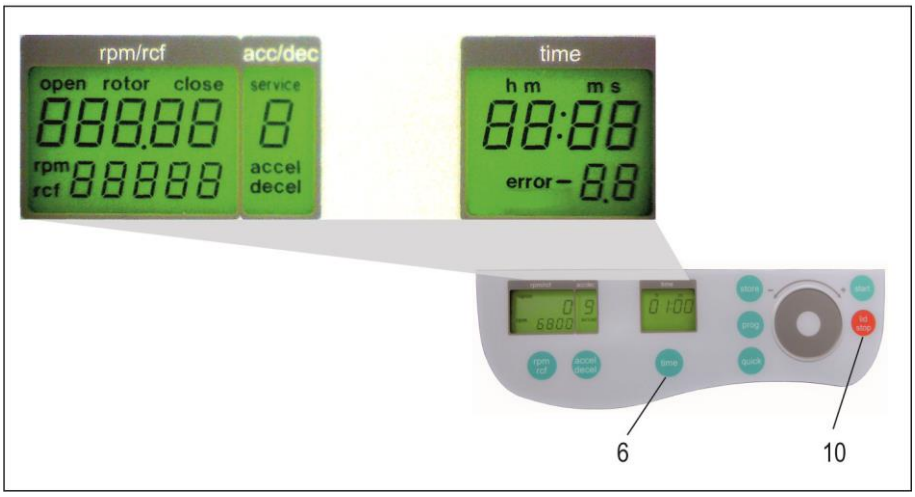

Figure 3

ATTENTION:

- **The normal program mode can be changed back again by switching off the centrifuge, for a short period!**

- **All changed settings must be confirmed by the key “store” or “start” (9). A confirmation screen will appear with the word, “store”, in the display “rpm/rcf” (A-1) - Only then the pre-selections are valid!**

1.8.3 Signal Turn On / Off

Proceed as illustrated, under point 1.8.2, to enter this program mode, press the key; "accel/decel" (5). In the display, "accel/decel" (A-2) flashes the word, "service". Select the letter, "L" with the control field (1). As a result, appearing in the display "rpm/rcf" (4), are the words, "On Sound". By

pressing the key, "rpm/rcf" (4), the word "On" flashes, and the sound can be switched off with the control field (1), (see Figure 4).

After the settings have been stored by user, the normal program mode can be changed back again by switching off the centrifuge, for a short period.

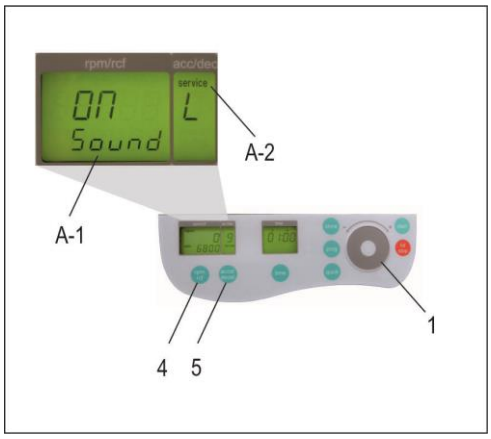

Figure 4

1.8.4 Keyboard Sound Turn On / Off

Proceed as illustrated, under point 1.8.2, to enter this program mode, press the key, "accel/decel" (5). In the display, "accel/decel" (A-2) flashes the word, "service". Select the letter "b" with the control field (1). As a result, appearing in the display, "rpm/rcf" (A-1), the word "ON/BEEP". After pressing the key, "rpm/rcf" (4), turn the keyboard sound (On) or (Off), with the rotorary field (1), (see Figure 5).

After the settings have been stored by user, the normal program mode can be changed back again by switching off the centrifuge, for a short period.

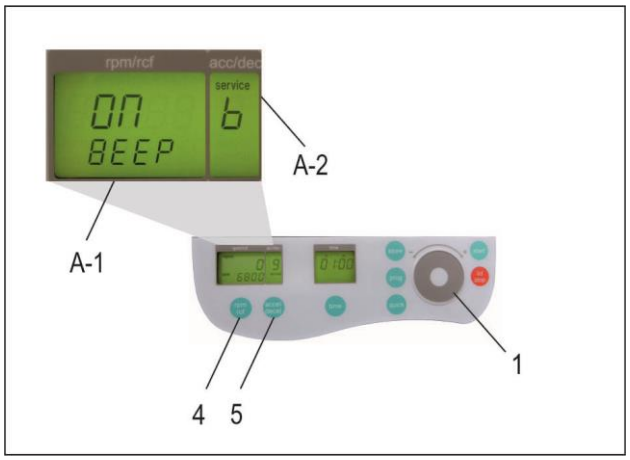

Figure 5

1.8.5 Sleep Mode On / Off

After not using the centrifuge for 5 minutes, the display automatically switches off. By pressing any bottom, it switches on again. Proceed as illustrated, under point 1.8.2, to enter this program mode, press the key, "accel/decel" (5). In the display, "accel/decel" (A-2) flashes the word, "service". Select the letter "I" with the control field (1). As a result, appearing in the display, "rpm/rcf" (A-1), the word "SLEEP". After pressing the key, "rpm/rcf" (4), turn the sleep mode function (On) or (Off), with the rotorary field (1).

After the settings have been stored by user, the normal program mode can be changed back again by switching off the centrifuge, for a short period.

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1.8.6 Retrieving Operation Data

In the function, "Basic Adjustments" the operating data, of the centrifuge, can be retrieved. Please proceed as described, under point 1.8.2, to enter this program mode.

Press the key "accel/decel" (5). In the display, "accel/decel" (A-2) flashes the word, "service".

With the control field (1) the following information can be retrieved:

A = Previous Starts of the Centrifuge
H = Previous Operating Hours
h = Running Time of the Motor
S = Software Version
E = List of Previous Error Messages
F = Function of the Imbalance Sensor
P = Operating of Keyboard
d = Hardware-Version
U = Intermediate Circuit Voltage in Volt

The list of the last 99 error messages can be looked over by pressing the key “rpm/rcf” (4) and leaf through it with the control field (1). The respective error codes appear in the display “rpm/rc” (A-1) (see Figure 4). The first two numbers indicate the appeared errors ongoing from 00 to 99, the last two numbers indicate the error code. Please refer to, Table 5: Error Messages, (see APPENDIX II).

Switch off the centrifuge, to return to the normal program mode.

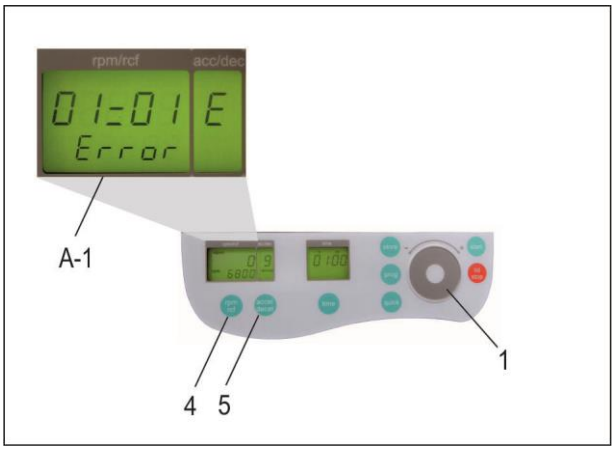

Figure 6

2. OPERATING

2.1 Mounting and Loading the Rotor

2.1.1 Installation of Rotors

Clean the drive shaft and the rotor shaft with a clean, grease-free piece of cloth. Place the rotor onto the drive shaft, (see Figure 7). Please be sure that the rotor is fully installed onto the motor shaft.

Figure 7

Figure 8

Hold the rotor with one hand and secure the rotor to the shaft, by turning the fixing nut clockwise (see Figure 8).

ATTENTION:

For safety, always ensure that the rotor nut is tightened before each run!

Do not operate the centrifuge with rotors or adapters that show any signs of corrosion or mechanical damage.

Do not operate with extremely corrosive substances, which could damage the rotor and the centrifuge.

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2.1.2 Loading the Angle Rotor

Rotors must be loaded symmetrically and with equal weight, (see Figures 9 and 10). The adapter may only be loaded with the appropriate vessels. The weight differences between the filled vessels should be kept as low as possible. Therefore, we recommend to weigh with a balance. This reduces the wear of drive and the acoustic operating noise.

Each rotor indicates what the maximum capacity is per hole. (It is allowed to operate e.g. a 24-place-rotor with 2 or 4 loaded tubes only, but the loaded borings must be opposite of each other).

Figure 9: WRONG

Figure 10: RIGHT

2.1.3 Loading and Overloading of Rotors

All approved rotors are listed with the maximum speed and maximum filling weight in, Table 2: Permissible Net Weight, (see APPENDIX P. II).

The maximum load permitted for the rotor is determined by the manufacturer, as well as the maximum speed allowed for this rotor (see label on rotor), must not be exceeded. The liquid the rotors are loaded with, should have a 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:

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

Example:

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

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

2.1.4 Removing the Rotor

Untighten the rotor nut completely, counter-clockwise. Lift the rotor vertically out of the centrifuge (see Figure 8).

2.2 Power Switch and Fuse

The power switch and the fuse are located on the back side of the centrifuge

Figure 11

In case of a faulty fuse, first disconnect the power cord from the mains supply.
Then open the fuse drawer and replace the fuse with 4 AT.

If the fuse triggers again after mains connection, please search the cause of the error and eliminate it.

ATTENTION:

After turning on the power switch, open the centrifuge lid first, before starting the centrifuge.

2.3 Lid

2.3.1 Lid Release

After the run, properly close the lid of the centrifuge, appearing in the display, "rpm/rcf"(A-1) with the word, "close" (M1). At the same time the actual rotor type “221.59” is shown in the display. By pressing the key, "lid/stop" (10), the lid of centrifuge can be released. As soon as the lid is completely released, the word, "open" (M2) appears. The lid of the centrifuge is now able to be opened.

For all number marked text, please refer to Figure 12.

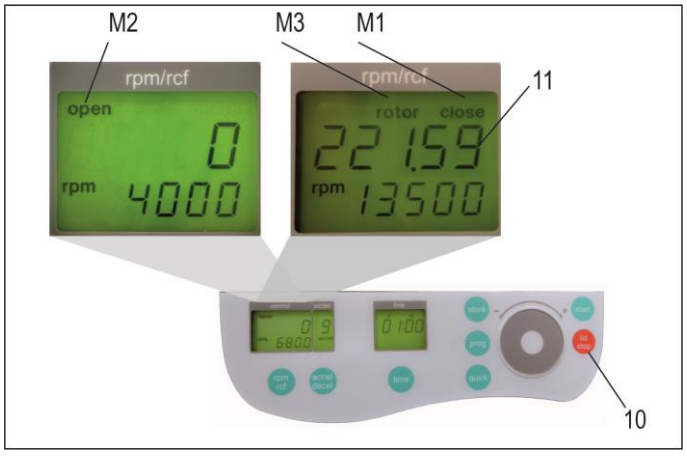

Figure 12

 © Hermle Labortechnik GmbH

2.3.2 Lid Lock

The lid must only be closed slightly. After closing the lid, the word "open" (M2) will no longer be displayed. As a sign that the centrifuge is ready for starting, appearing in the display, "rpm/rcf"(A-1), the word "close" (M1). Simultaneously, the word "rotor" (M3) appears, as well as the code number of the rotor, which is in the centrifuge, “221.57“ (11) along with all rotor specific data, for example: max. speed, acceleration etc., are available.

please refer to Figure 12.

ATTENTION:

Before closing the lid, please check if the rotor is tightened.

2.4 Pre-Selection

2.4.1 Pre-Selection of Speed and RCF-Value

By Selecting the key, "rpm/rcf" (4), pre-selection is activated. By pressing the key once, the word "rpm" (M5) flashes. By pressing the key again, the pre-selection of the centrifugal forces can be chosen. The flashing word, "rcf" (M6), will appear.

The desired values can be selected, with the control field (1). In the display (A-1), the regulated value is shown permanently: before, during and after the run.

This pre-selected value will be stored, as long as a new pre-selection is made.

For all number marked text, please refer to Figure 13.

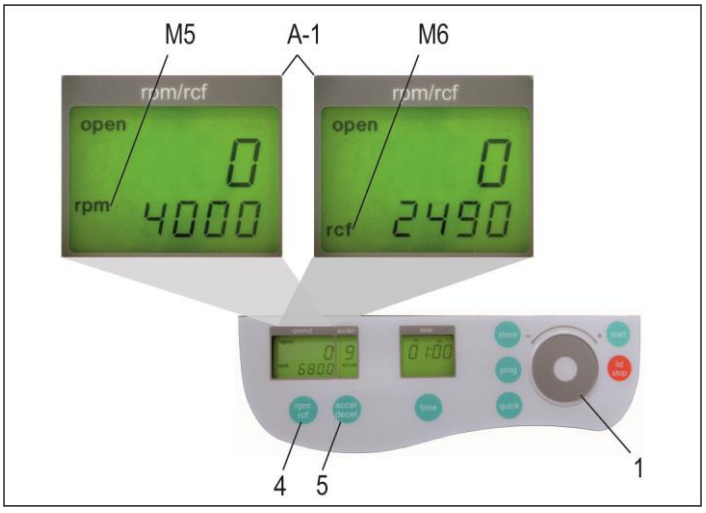

Figure 13

As long as the centrifuge lidis opened, the speed is adjustable between 200 rpm and the maximum revolution of the centrifuge.

If the centrifuge lid is closed, the speed can only be pre-selected up to the maximum permissible revolution of the selected rotor type. 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 Rotors, (see APPENDIX P. II). All important values are listed on this table.

ATTENTION:

Please notice the maximum permissible revolutions of the test tubes (Producer Indication)! See also chapter 3.1.5

2.4.2 Pre-Selection of Running Time

The running time can be pre-selected in 3 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", can be interrupted by the key, "stop" (10).

- The running time can be pre-selected, with the lid opened 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 control field (1). After exceeding 59 min 50 sec, the indication changes automatically to, "h : m". After exceeding 99 hours 59 min, the word "cont" appears in the display, "time" (A-3).

The continuous run can only be interrupted by pressing the key, "stop" (10). The time counts down, as soon as the set speed is reached.

For all number marked text, please refer to Figure 14.

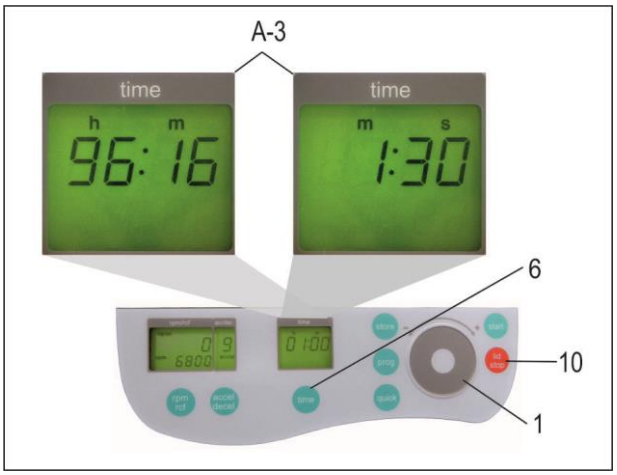

Figure 14

2.4.3 Pre-Selection of Brake Intensity and Acceleration

Selecting 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, with the control field (1). The value 0 is equivalent to the lowest acceleration and the value 9 is equivalent 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, with the control field (1). The value 9 is equivalent to the shortest possible brake time and the value 0 to longest possible brake time.

For all number marked text, please refer to Figure 15.

See Table 4: "Acceleration and Deceleration Times", (APPENDIX P. IV). This table shows the acceleration and deceleration times, for the acceleration and deceleration stages 0 and 9, for permissible rotors.

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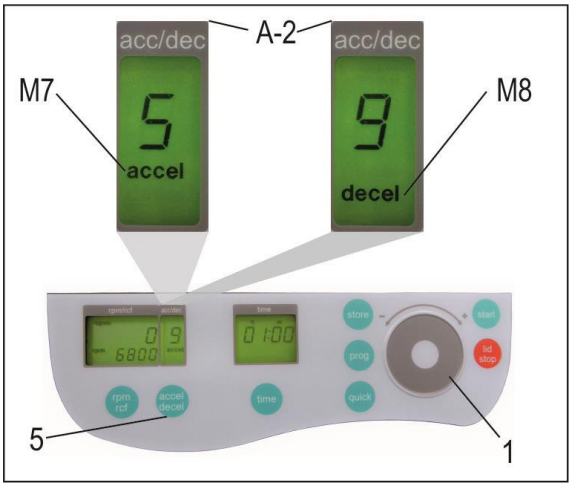

Figure 15

2.5 Radius Correction

If adapters or reducers are being used, it could change the centrifugal radius of the respective rotor. In that case, the radius can be corrected manually.

Please proceed as follows:

First close the centrifuge lid and press afterwards the key "time" (6) and the key "prog" (11) at the same time and hold down.

In the display, "time" (A-3), appears the word "radius" (M9). With the control field (1), pre-select the respective radius correction, (see Table 3, APPENDIX P. IV), in steps of 0.1cm.

As soon as the radius correction is set, the word "radius" (M9) appears. This text remains visible until the radius correction is set back to 0.

For all number marked text, please refer to Figure 16.

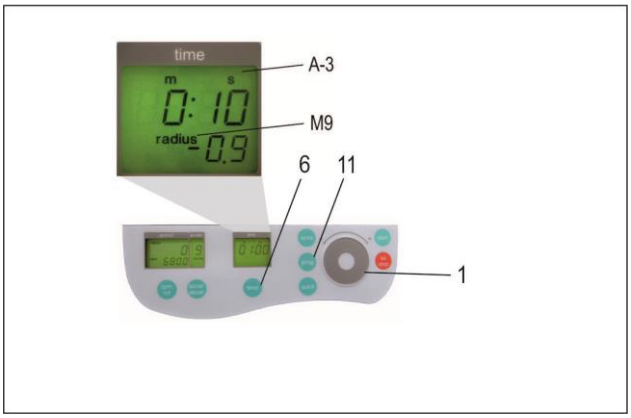

Figure 16

2.6 Program

2.6.1 Storage of Programs

The program stores up to 99 runs, with all relevant parameters, including the used rotors. Any free program number is available and can be retrieved.

Put the rotor into the centrifuge. By pressing the key, "prog" (11), in the display "time" (A-3) appears the word "program", (see Figure 17). With the control field (1), choose the desired program number.

If a program number is already occupied, in the display "rpm/rcf" (A-1), the words "rotor" (M3) and e.g. "221.57" (M4) will appear, (see Figure 17). Free program numbers will appear as 0.

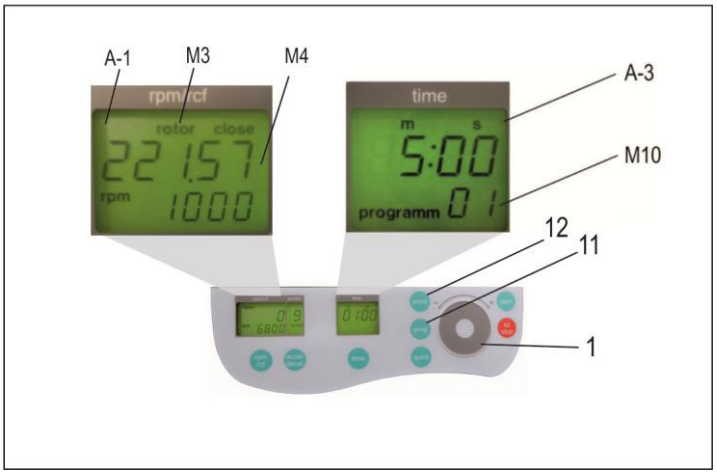

Figure 17

Close the lid of the centrifuge, now proceed as described above, to set all important run parameters. If the lid isn´t closed, when storing the program in the display "rpm/rcf" (A-1), flashes alternately the word "FirSt" and "CLOSE Lid" (see Figure 18). When starting the run without storing the program, in the display "rpm/rcf" (A-1), flashes alternately the word "First" and "PrESS StoreE", (see Figure 19).

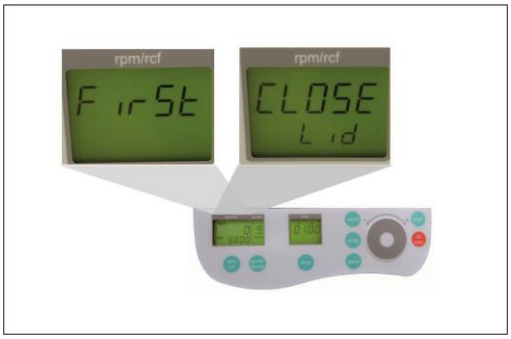

Figure 18

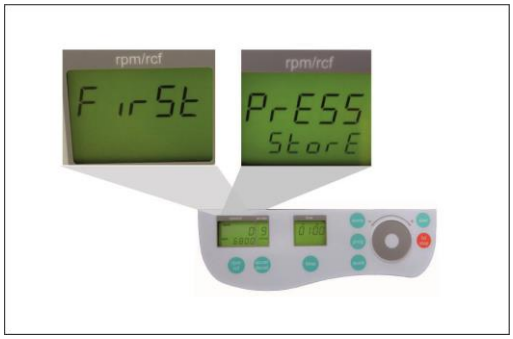

Figure 19

For alteration of data, press the key "store" (12), for approx. 1 second. If the program is stored correctly, the word "StorE" appears in the display "rpm/rcf" (A-1). As a result, the word "program" (M10) disappears. As soon as the key "store" (12) is no longer displayed, the word "programm xx" (M10) reappears, (the xx stands for the chosen program place).

If all program numbers are occupied, take an old number that is not needed any longer and replace it with the new parameters.

2.6.2 Recall of Stored Programs

To recall stored programs, press the key "prog" (11), with the lid already closed. Inside the display "time" (A-3), appears "programm --"(M10). With the control field (1), pre-select the desired program number. In the respective displays, the stored values, for that program, will appear.

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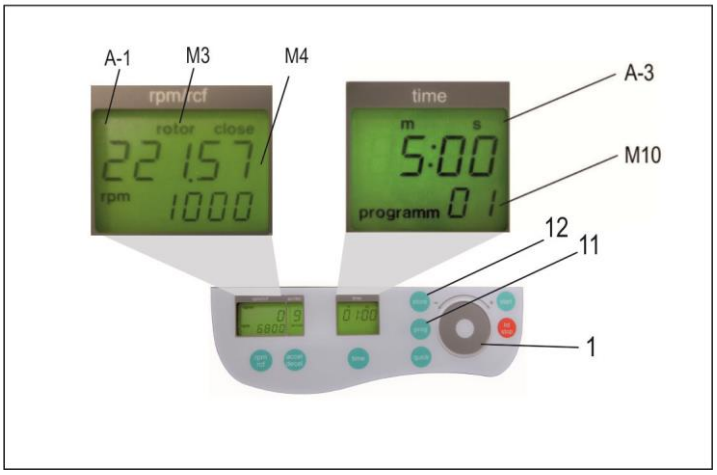

Figure 20

2.6.3 Leaving Program Mode

To leave the program mode, press the key, "prog" (11). Then, inside the display "time", appears the word "programm".

Set the display to "programm--" (M10) with the control field (1).

For all number marked text, please refer to Figure 20.

2.7 Starting and Stopping the Centrifuge

2.7.1 Starting the Centrifuge

Start the centrifuge with either the "start" key (9), or the "quick" key (8).
With the "start" key (9), stored runs or runs with manually pre-selected parameters can be started.
When the respective pre-selected running time has ended, the centrifuge will stop automatically.
With the "quick" key (8), start runs, which will last a few seconds, can be initiated.
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 moment the "quick" key (8) is pressed.
By releasing the "quick" key (8), the centrifuge stops and the running time is indicated, until the lid is opened.
For all number marked text, please refer to Figure 21.

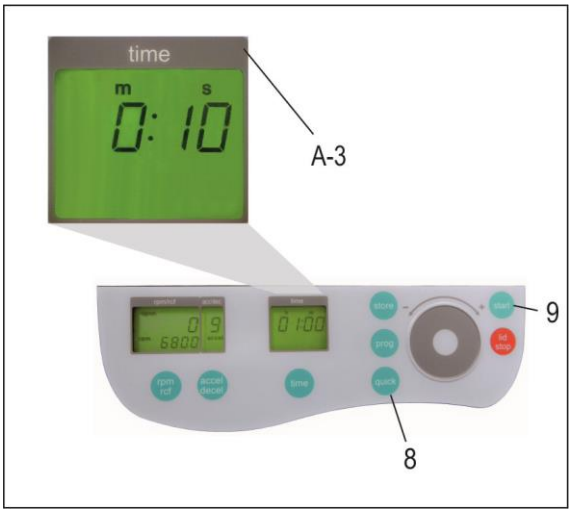

Figure 21

2.7.2 The “STOP” KEY

With the "stop" key (10), the run time can be interrupted, at any time, (see Figure 22). After pressing the key, the centrifuge decelerates with the respective pre-selected intensity, down to a standstill.

Figure 22

2.8 Imbalance Detection

In case the rotor is not equally loaded, the drive will turn off, during acceleration. The rotor decelerates to a standstill.

When in the display "time" (A-3), the word "error" (M11) along with the number "01" appears, the weight difference of the samples are too large. Weigh out the samples exactly!

Load the rotor as described in Chapters: 2.1.2 and 2.1.3.

When inside the display "time" (A-3), the word "error" along with the number "02" appears, (see Figure 23). Potential reason for this error can be: The imbalance switch is defective.

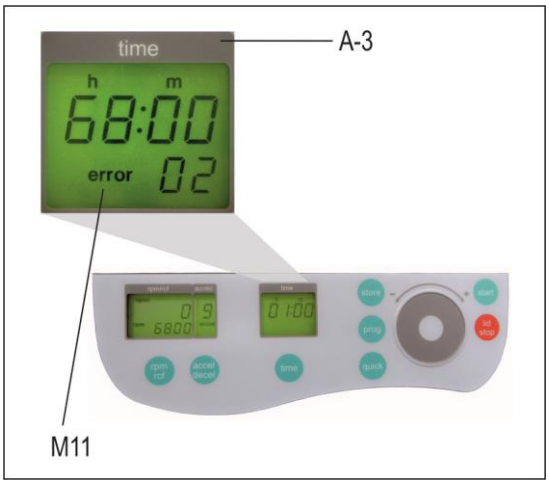

Figure 23

 © Hermle Labortechnik GmbH

3. MAINTENANCE

3.1 Maintenance and Cleaning

3.1.1 General

Maintenance:

Maintenance of the centrifuge is dependent on prolonging the life of the rotor, the rotor chamber and the rotor accessories.

Don´t use acid detergents and/or burnished polish.

Breakage of rotors can be caused by the slightest damages.

In case of metallic rotor parts or the motor shaft becoming in touch with corrosive substances, the affected area must be cleaned, thoroughly.

Corrosive substances, such as, must be avoided: 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.

Maintenance – Unit, Rotor, Accessories:

- Turn the device off and disconnect from the power supply, before beginning any cleaning or disinfecting. Do not pour liquids into the housing interior.
- Spray disinfectant on the device.
- Thorough cleaning not only has its purpose in hygiene, but also in avoiding pollution based corrosion.
- 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 must not be used, (pH-value > 8).
- After cleaning, please ensure all parts are dried thoroughly, either by hand or in a hot-air cabinet (Max. Temperature + 50°C/122°F).
- It is necessary to coat anodized aluminium parts with anti-corrosion oil regularly, in order to increase their life-span and reduce corrosion predisposition.
- Due to humidity or not hermetically sealed samples, condensation may form. The condensation 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 at week!

- Connect the unit to the power supply, after the equipment is completely dry.
- Do not implement disinfection with UV-, beta- and gamma-rays or other high energy radiation.

3.1.2 Cleaning and Disinfection of the Unit

1. Open the lid, before turning off the unit. Disconnect 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, use 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 from becoming brittle. Other components of the unit, e.g. the lid lock, motor shaft and rotor, should **not** be greased.
8. Dry the motor shaft with a soft, dry and lint-free cloth.
9. Examine the unit and accessories for damage.

Remove adherent dust, at least every 6 months, from the ventilation slots in the centrifuge, by using a soft brush.

*Before doing so, please switch off the unit and disconnect from the power supply.

3.1.3 Cleaning and Disinfection of the Rotor

1. Clean and disinfect: the rotors and adapters, with the cleaner previously mentioned above.
2. Use a bottle brush to clean and disinfect the rotor bores.
3. Rinse the rotor and adapter, with clear water. Particularly, the drillings of the angle rotors.
4. When drying the rotor and adapter, set on a towel. Place the angle rotor, with bores down, to dry.
5. Dry the rotor cone with a soft, dry and lint-free cloth, check for damage. Do not grease the rotor cone.
6. Put the dry rotor back on the motor shaft.
7. Fix the rotor by turning the rotor nut clockwise.

3.1.4 Disinfection of PP-Rotors

ATTENTION: Polypropylene rotors **must not** be autoclaved!

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Gas Sterilization

Adapters, bottles and rotors may be gas sterilized, with Ethylenoxyd. According to the duration of the application, allow items to properly air out, after the sterilization and before usage.

ATTENTION: The temperature may rise during the sterilization; rotors, adapters and bottles should not be fully closed, keep completely unscrewed.

Chemical Sterilization

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

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

For additional information on aerosol-tight rotors, lids and buckets, please see below.

The aerosol tightness of rotors, rotor lids, buckets and caps have been tested and certified by the "TÜV Nord CERT GmbH, Certification Body Consumer Products, Essen (Germany)", in accordance with Annex AA of IEC 61010-2-020. The certificates can be downloaded on our webpage, **www.hermle-labortechnik.de**. Aerosol-tight rotors and buckets are marked with the label, "aerosol-tight".

ATTENTION: Autoclaving, mechanical stresses and contamination, by chemicals or other aggressive solvents, can impair the aerosol-tightness of the rotors and buckets.

- Check the integrity of the seals of the aerosol-tight rotor lids or caps, before each use.
- Use only aerosol-tight rotor lids or caps, if the seals are undamaged and clean.
- **Aerosol-tight plastic rotors as well as plastic lids and seals of aerosol-tight aluminum rotors and buckets must be replaced after 10 autoclaving cycles.**
- **Never** store aerosol-tight rotors or buckets closed.
- Plastic lids and seals of aerosol-tight aluminum rotors and aluminum buckets must be replaced after ten autoclaving cycles.

3.1.5 Glass Breakage

With high g-values, the rate of glass tube breakage increases. Glass splinters have to be removed immediately from rotor, 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 severely pollute the rotor chamber, the rotor and the samples.

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

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

3.2 Lifetime of Rotors and Accessories

Rotors and adapter made of PP have an operating time of **max. 3 years** from first use.

Conditions for the Operating Time: Proper use, damage-free condition, recommended care.

4. TROUBLE SHOOTING

4.1 Error Message: Problem / Solution

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

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

Always keep us informed about any kind of error occurring, which is not listed in this chapter. With this information provided, 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 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 samples.

Please proceed as follows:

- Switch off the centrifuge and unplug the power cord, wait until the rotor has come to a standstill (this may take several minutes)
- On the left hand, bottom side of the centrifuge housing, there is a plastic stopper (see Figure 24). Remove this stopper. Fastened to it, is a string which is connected to the lid lock..
- Pull the string slightly and the lid will open.
- Open the lid of the centrifuge.
- Switch the centrifuge on again, to proceed with regular function.

Figure 24

 © Hermle Labortechnik GmbH

4.2.2 Description of the Error Message System

The error message, "error" (M11), is shown in the "time" (A-3) display, (see Figure 25). For more detailed information, refer to Table 2: "Error Messages", (see Appendix P. IV).

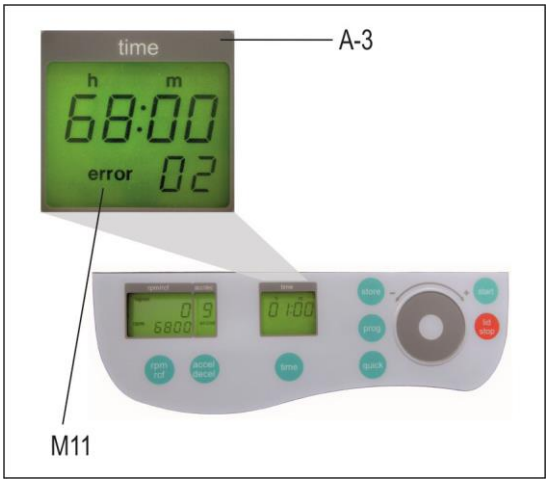

Figure 25

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 know the following:

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

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

We reserve the right to accept contaminated centrifuges.

Furthermore, all costs that may have occurred during the cleaning and disinfection of the units will go to the debit of the customer's account.

Return of Power Cords

In case of a return of a centrifuge, we also ask you to send its power cord. This eliminates the risk of a faulty power cord. If no power cord is attached to the centrifuge, a new one will be delivered and charged.

We ask for your understanding.

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6. TRANSPORT, STORAGE AND DISPOSAL

6.1 Transport

Before transporting, take out the rotor.
Only transport the unit in its' 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 to 60 °C	10 to 75 %	30 to 106 kPa

6.2 Storage

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

	Air Temperature	Rel. Humidity	Air Pressure
Transport Packaging	-25 to 55 °C	10 to 75 %	70 to 106 kPa

6.3 Disposal

Information on the disposal of electrical and electronic equipment in the European Community:

Within the European Community, disposal for electrically powered equipment is dictated by national regulations based on the EU Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE2).

According to this directive, all devices supplied **after** 13.08.2005 in the business-to-business sector, in which this product is classified, may no longer be disposed of with municipal waste or household waste. To document this, they are marked with the following label:

As this device is a device used exclusively for business purposes (B2B), it must not be handed into public waste disposal companies.

The device can be disposed of by stating the date of purchase and the device number at:

Hermle Labortechnik GmbH, Siemensstraße 21, 78564 Wehingen,WEEE-Reg. No. DE 55649821

For all devices delivered before 13.08.2005, the last user is responsible for proper disposal.

RoHS Declaration of Conformity

HERMLE Labortechnik GmbH, Siemensstraße 25, 78564 Wehingen, Germany, hereby declares that all components produced are in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 08.06.2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

7. APPENDIX

Table 1: Technical Data I
Table 2: Permissible Net Weight II
Table 3: Max. Speed and RCF-Values for Permissible Rotors II
Table 4: Acceleration and Deceleration Times II
Table 5: Error Messages II
Table 6: Radius Correction III
Table 7: Symbols- / Abbreviations III
Redemption Form: Decontamination Certificate IV

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Table 1: Technical Data

Manufacturer	HERMLE Labortechnik GmbH, 78564 Wehingen			
Type	Z 207 M			
Dimensions				
Width	28 cm			
Depth	35 cm			
Height	23 cm			
Weight without rotor	12.5 kg			
Max. Speed	13,500 min^{-1}			
Max. Volume	24 x 2..0ml			
Max. RCF	17,317 x g			
Allowable Density	1.2 kg/dm^3			
Allowable Kinetic Energy	2,332 Nm			
Mains Power Connection AC	230 V / 50-60 Hz 1 ph		120 V / 50-60 Hz 1 ph	
Voltage Fluctuation	± 10 %		± 10 %	
Current Consumption	1.05 A		1.9 A	
Power Consumption	170 W		170 W	
Radio Interference	IEC 61326-1			
Audit Requirement (BGR 500)	no			
Ambient Conditions (EN/IEC 61010-1)				
Environment	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 Interference Emission, Noise Immunity	EN / IEC 61326-1 Category B	FCC Class B	EN / IEC 61326-1 Category B	FCC Class B
Noise Level (depending on the rotor)	≤ 60 dB(A)			
Write from Operator				
Inventory-No.:				
Monitoring-No.:				
Environment:				
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
221.59 V01	13500 rpm	82 g
221.59 V02	13500 rpm	82 g
221.58 V01	13500 rpm	68 g
221.75 V04	13500 rpm	82 g
221.89 V01	13500 rpm	14 g

Table 3: Max. Speed and RCF-Values for Permissible Rotors

Roto Number	Max. Speed	RCF-Value
221.59 V01	13500 rpm	17317 xg
221.59 V02	13500 rpm	17317 xg
221.58 V01	13500 rpm	15484 xg
221.75 V04	13500 rpm	17317 xg
221.89 V01	13500 rpm	14669 xg

Table 4: Acceleration and Deceleration Times

	Acceleration Values		Deceleration Values	
Rotor Number	Level 0	Level 9	Level 0	Level 9
221.59 V01	108	15	116	13
221.59 V02	108	15	116	13
221.58 V01	109	13	121	13
221.75 V04	136	19	171	18
221.89 V01	108	15	116	14
	In seconds			
	Acceleration Time from 0 rpm-> Umax		Deceleration Time from Umax -> 0 rpm	

Table 5: Error Messages

Error-No.	Describtion
1	Imbalance
2	Imbalance sensor is defective
14	Problem with speed sensor
15	Standstill monitoring defective
16	Wrong dircention of rotoration of the motor
33	Open lid while motor is running
34	Lid contact defective
43	Undervoltage frequency converter
44	Overvoltage frequency converter

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47	Error current detection
55	Overspeed
80	Memory Error intern EEPROM

Table 6: Radius Correction

Rotor No.	*Adapter Order-No.*	*Radius (cm)*	*Correction (cm)*
Angle Rotor **221.59 V01**		8.5	**0**
	704.004	8.2	**-0.3**
	704.005	7.4	**-1.1**
Angle Rotor **221.59 V02**		8.5	**0**
	704.004	8.2	**-0.3**
	704.005	7.4	**-1.1**
Angle Rotor **221.58 V01**		7.6	**0**
Angle Rotor **221.58 V01**		7.6	**0**
Angle Rotor **221.75 V04**		8.5	**0**
Angle Rotor **221.89 V01**		7.2	**0**

Table 7: Symbols- / Abbreviations

Symbol /	Unit	Describtion
n (=rpm)	[min^{-1}]	revolutions per minute
RZB(=rcf)	[x g]	relative centrifugal force
PP	-	Polypropylen
PC	-	Polycarbonat
accel	-	acceleration
decel	-	deceleration
prog	-	program

Redemption Form: Decontamination Certificate

Decontamination Certificate of Goods Returned Upon Delivery

Enclose all returned shipping items and modules necessary!

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.	Quantity	Decontaminated Object	Serial No.	Description / Comment
1				
2				
3				
4				

Are the 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: ……..…☐ α..☐ β..☐ γ.. ☐ Yes ☐ No

Health endangering proteins: ……..... ☐ Yes ☐ No

DNA: ……. ☐ Yes ☐ No

Have these substances reached the equipment/assembly? …….. ☐ Yes ☐ No

If so, which ones:

_____

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

I confirm the proper decontamination:

Company/Dept ._____ Place and Date: _____

Signature of the authorized person: _____

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