HERMLE
LABORTECHNIK

Service Instruction
for
Small Centrifuge
Z 206 A

 © HERMLE Labortechnik GmbH

CONTENT

 © HERMLE Labortechnik GmbH

Technical modification rights reserved.
© HERMLE Labortechnik GmbH 2007 / 01

5 TECHNICAL DATA

5.1 Acceleration times Z 206 A (120 V / 230 V) in seconds

Rotor-Number	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
221.54 V01	95	71	57	51	44	41	41	41	34	33
221.55 V01	91	72	57	55	44	41	41	39	34	33
220.95 V06	52	36	24	21	20	16	15	14	12	11
220.68 V04	31	20	16	14	12	11	9	9	8	8

5.2 Deceleration times Z 206 A (120 V / 230 V) in seconds

Rotor-Number	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
221.54 V01	257	198	191	183	165	149	125	99	70	51
221.55 V01	247	204	191	184	170	155	131	105	74	52
220.95 V06	24	21	20	19	18	17	15	13	11	10
220.68 V04	20	17	17	17	16	16	14	12	10	7

5.3 Imbalance shut off data Z 206 A (120 V / 230 V)

Rotor-Number	Shut off speed in rpm	Allowed imbalance in gramme	Shut off imbalance in gramme
221.54 V01		8	10
221.55 V01		8	10
220.95 V06		4	6
220.68 V04		4	6

There might occur low fluctuations from unit to unit regarding the acceleration and deceleration times and are therefore guide values only.

 © HERMLE Labortechnik GmbH

6 SERVICE INSTRUCTIONS

6.1 General technical description

Model **Z 206 A** is a micro processor controlled laboratory centrifuge.
The actuation is a DC-motor which is micro processor controlled by the power board.
Model **Z 206A** has an independent error detection program, displaying possible errors and therefore supporting the trouble shooting process.

The unit is equipped with several safety features:
- Imbalance detection
- Lid lock does not open until the standstill of the centrifuge
- Rotor over speed protection

Please follow below mentioned safety instructions for any kind of service actions:

- Do not leave units unsupervised, when parts of the housing have been removed and the unit is still connected to the main power supply.

- Do not bypass the lid's safety contacts and never work with the unit's lid open.

- The VDE regulations are valid for all electrical work that has to be done.

6.2 Electrical and electronical components

6.2.1 Power / Control board

The power board is serving the low voltage supply of the centrifuge control system, which is integrated in the board.
The power board is electrically isolated and has an dielectric strength of DC 2,2kV.
The board can only be exchanged complete.
If there is a defect you have to exchange the complete power board.
All signal lines lead to the control board.
The PCB controls the entire centrifuge.

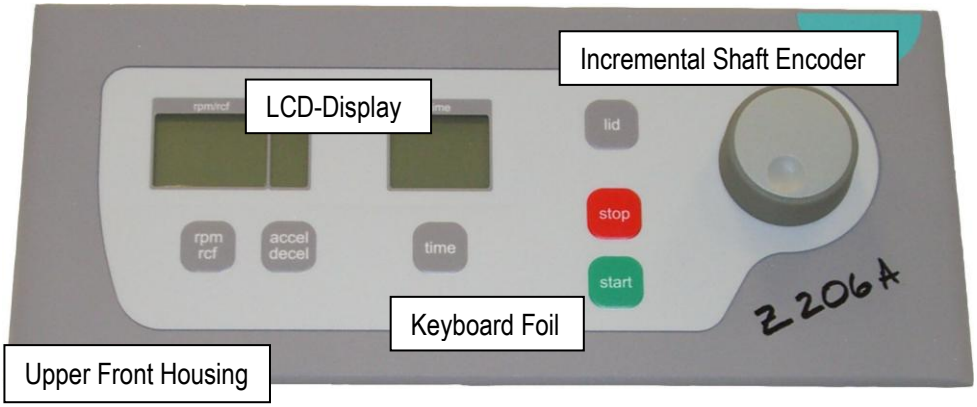
6.2.2 Transformator

The transformator is serving the low voltage supply of the centrifuge control system, which is integrated in the power board.

 © HERMLE Labortechnik GmbH

6.2.3 Control panel

The control panel consists of one LCD-display, one incremental shaft encoder, the upper front housing and the foil keyboard. These parts can be exchanged separate. The incremental shaft encoder regulates all parameters which are adjustable by pressing a key and which are indicated in the LCD-display. In the speed display of the control panel the error message is indicated if there should occur any trouble.



6.2.4 Rotor recognition and over speed protection

The centrifuge will recognize the inputted rotor through the set up in the control panel. As soon as the lid get closed the rotor number will be indicated in the speed display.
If the pre-selected rpm is higher than the permitted rpm of the rotor, the rpm pre-selection indication will flash when starting the centrifuge.
Butt he regulation will accelerate the rotor only to its permitted rpm.

6.2.5 Speed signal

The actual speed is extracted by a hall-effect-sensor placed on the lower side of the motor.
The actual-signal is regulated on the control board.

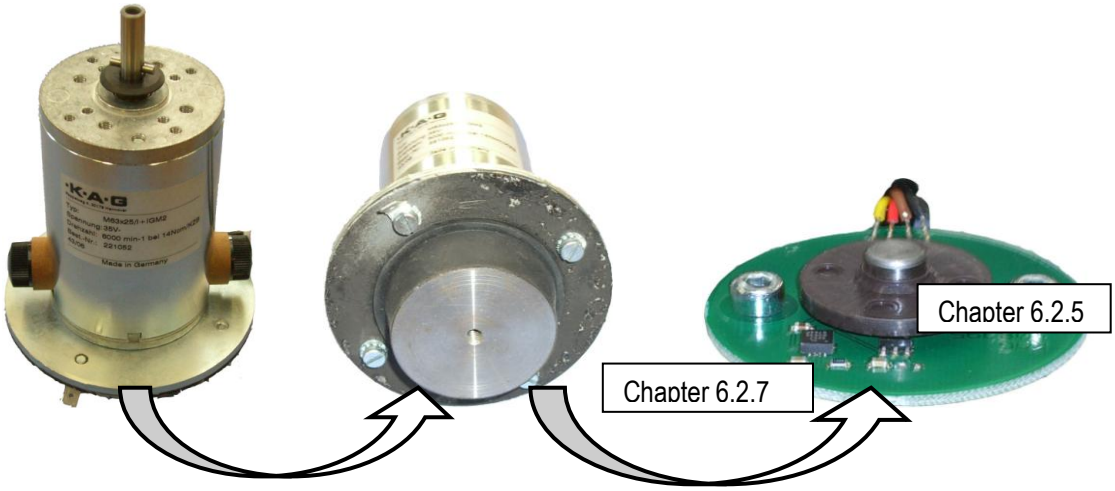
6.2.6 Lid contact

The micro switch in the mechanism of the lid lock controls the correct closing of the centrifuge lid.
The switch may never be bypassed.
The lid lock is unlatched by an electro motor at the end of each run and receives its signal from the control board.

6.2.7 Imbalance detection

The imbalance detection is effected by a movement sensor, which is placed on the lower side of the motor and is controlling the oscillating motion of the motor. The unit stopps when the oscillating motions are too strong. Therefore you have to follow the adjustment instructions stated by the manufacturer.

 © HERMLE Labortechnik GmbH



6.3 Operation menu

6.3.1 Activation of the operation menu (Part 1)

The operation menu helps the service personnel to locate defects. It is divided in two parts, which are graded in several areas again from chapter 6.3.1.1 to 6.3.2.3.

Part 1 is accessible fort he user and different points can be read respectively settled.

Part 2 is for internal use respectively for trained service personnel outdoors Hermle Labortechnik only. The control board can be adjusted to different units. Here the different parameters are determined on the respective unit after an exchange of the control board.

The menu can be started as follows:

- Open lid of centrifuge and switch off main switch.
- Press the keys "time" and “lid“ hold them and at the same time switch on the unit.
- After the indication display flash on, let go of the keys "time" and “lid“.

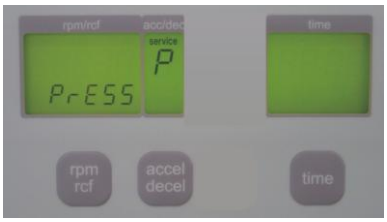
Now it follows a display test for about 5 seconds as shown here under.

 © HERMLE Labortechnik GmbH

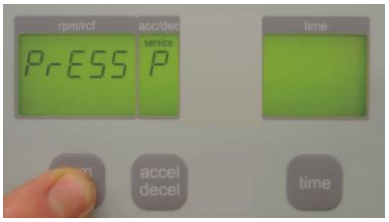
6.3.1.1 Keyboard test

The keyboard test is used for checking the correct function of the foil keyboard.

- Activate the operation menu part 1 as described in chapter 6.3.1.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "P" appears in the service display. In the display “rpm“ appears the word “PrESS“.
- By pressing each key the indication changes now from small to big letters. The key “accel/ decel“ excepted.



to



In case one of these keys does not change the indication display, or the keyboard test can not be started or exited, you will have to replace the entire control panel.

6.3.1.2 Checkup of the imbalance sensor

- Activate the operation menu part 1 as described in chapter 6.3.1.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "F" appears in the service display. In the display “rpm“ appears a between 110 and 120.

6.3.1.3 Activation / deactivation of the imbalance sensor

- Activate the operation menu as described in chapter 6.3.1.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "u" appears in the service display. In the display “rpm“ appears the word „unbAL“.
- By pressing the key “accel/decel“ the menu is activated. Turn the potentiometer until the words „on“ or „off“ are indicated in the display.

 © HERMLE Labortechnik GmbH

on = imbalance sensor is activated
off = imbalance sensor is deactivated

6.3.2 Activation of the operation menu (Part 2)

- Activate the operation menu part 1 as described in chapter 6.3.1.
- By pressing the key „stop“ longer than one second there will be asked for a code in the display „rpm“. Now adjust the code „9876“ by the turning knob and press once again the key „stop“.

Now you can carry out the below shown adjustments.

6.3.2.1 Adjustment of the centrifuge type

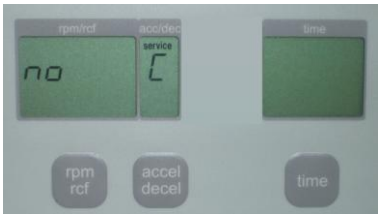
- Activate the operation menu part 2 as described in chapter 6.3.2.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "t" appears in the service display.
  In the display “rpm“ appears a number which shows the centrifuge type.
- By pressing the key „rpm/rcf“ the turning knob is activated again. You can adjust the different unit types with it.

- By pressing the key „start“ the adjusted value (unit type) is adopted.

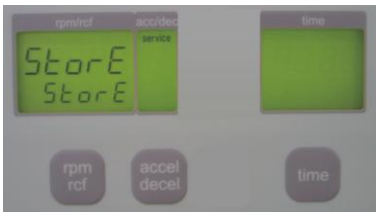
 © HERMLE Labortechnik GmbH

6.3.2.2 Adjustment of the operation mode

- Activate the operation menu part 2 as described in chapter 6.3.2.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "C" appears in the service display.
  In the display “rpm“ appears the operation mode adjustment „no; COOL; HEAt“.
- By pressing the key „rpm/rcf“ the turning knob is activated again. Now you can adjust the operation mode with it.
- Adjust your centrifuge to the respective function:
  COOL matches a refrigerated unit
  HEAt matches a heatable unit
  no matches none of both functions (air cooling).



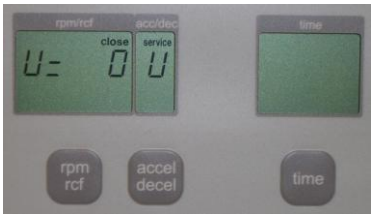
- By pressing the key „start“ the adjusted value (operation mode) is adopted.



ATTENTION:
In case this should be the first initiation of the control board it follows a „running indication“ from „00“ to „99“ followed by „PrESS rPM“. Confirm this „running indication“ with the key „rpm/rcf“. During this stage the internal E-Eprom is formatted.

6.3.2.3 Checkup of the intermediate circuit voltage

- Activate the operation menu part 2 as described in chapter 6.3.2.
- By pressing the key “accel/decel“ the several sub-menus are activated.
- Turn the potentiometer until the special digit "c" appears in the service display. In the display “rpm“ appears the intermediate circuit voltage from „55 to 70“ Volt when the lid is closed.



 © HERMLE Labortechnik GmbH

6.4 Mounting support

After performing any kind of assembling work, please make sure all the grounded contacts are connected correctly!

6.4.1 Replacing the front housing; incremental shaft encoder and the display

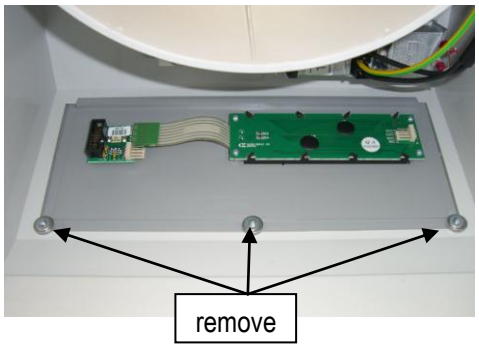
Replacing the front housing

Attention: There are two diffenrent versions of the front housing resp. of the control panel

a) without notches

Begin with chapter 6.4.2

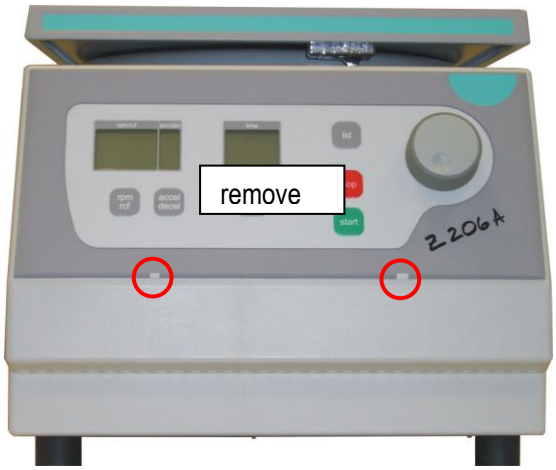
- Remove the interface cable on the control board.
- Remove the connections of the lid lock and the cord of the emergency lid release.
- Remove the three screws that fix the control panel.



b) with notches

- Remove the lower covering by putting a screw driver into the 2 notches and then lever the front part out.
- Pull the lower edge of the covering away from the mounting plate of the housing.
- Pull the covering out of the upper guiding rails downwards.
- Remove the interface cable on the control board.

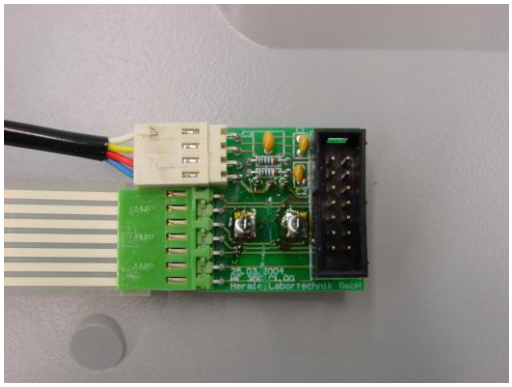
 © HERMLE Labortechnik GmbH



Replacing the incremental shaft encoder

- Remove the cap on top of the incremental shaft encoder.
- With a socket wrench you can loosen the fastening nut, now.

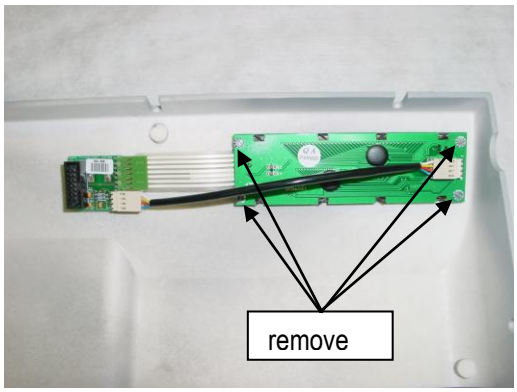
- Loosen all electrical contacts to the shaft encoder on the back of the front housing.



 © HERMLE Labortechnik GmbH

Replacing the display

- Loosen all electrical contacts to the display on the back of the front housing.
- Remove the 4 fastening screws of the display and pull away the display upwards.



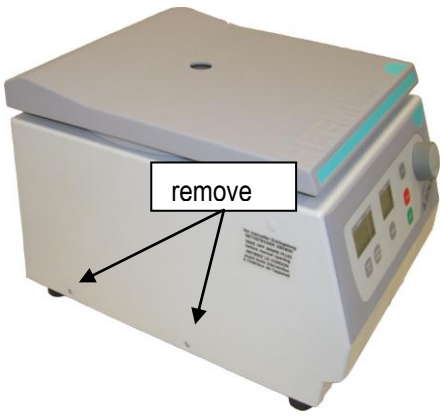
Replacing the foil keyboard

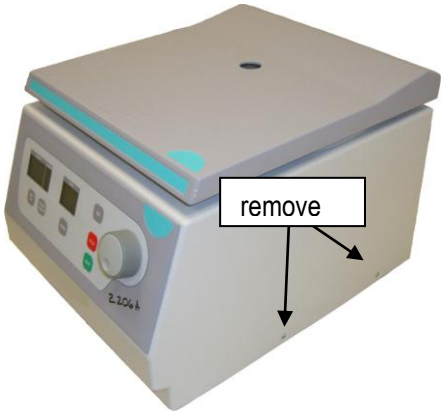
- Remove the incremental shaft encoder and the display.
- Peel off the defective foil keyboard and clean the remaining glued joints.
- Glue the new foil keyboard precisely in the recess.
  Make sure the foil matches precisely and the window of the foil keyboard lies exactly over the display.

  Attention: If the foil keyboard is once glued – she is defective after peeling her off!
- Re-assemble the control panel in reversed order and mount it back in the front housing.

6.4.2 Removing the housing

- Remove the control panel as described in chapter 6.4.1.
- Remove all screws on the lower side of the housing.



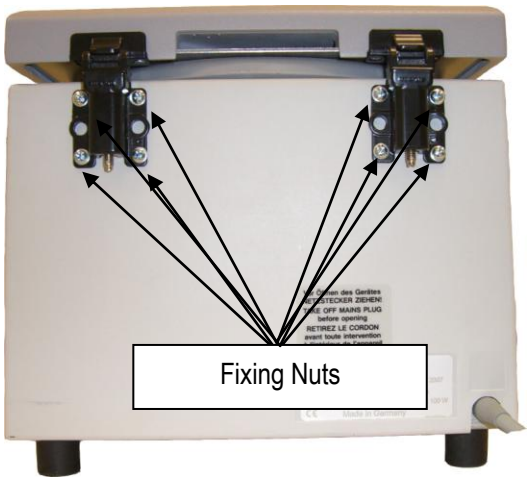


 © HERMLE Labortechnik GmbH

- Remove the housing upwards and remove all relevant electrical contacts on the control board.
- Re-assemle the unit in reverse order.

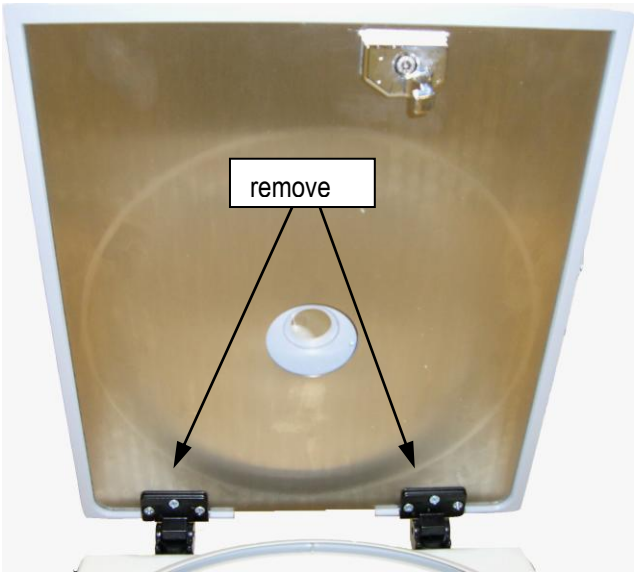
6.4.3 Removing the lid and the hinges

- Open the lid as wide as possible.
- Hold the lid with one hand and remove the fixing nuts of the hinges.
- The lid can now be removed completely.



Remove the hinges

- Remove the screws of the hinges.



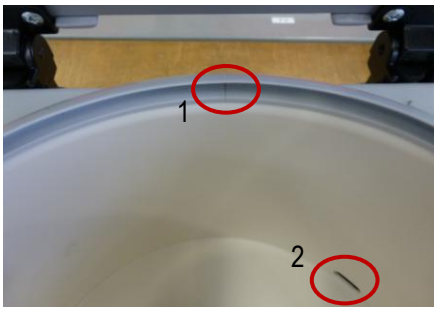
 © HERMLE Labortechnik GmbH

- Re-assemble the lid in reverse order.

- Make sure the lid rests on the lid gasket straight and continuous.
  Thighten the fastening screws firmly after the adjustment.

6.4.4 Replacing the rotor chamber or lid gasket

- Grasp under the lid gasket and lift out the rotor chamber piece for piece. Take care that the fixing ends are at the back part of the chamber (1). Start the mounting always with this glued ends.



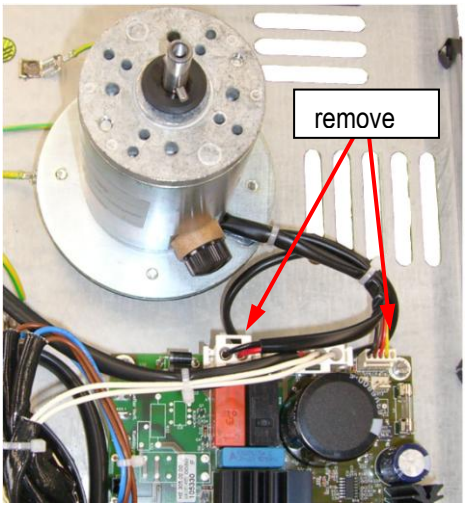
- When mounting the rotor chamber make sure that the ventilation drilling behind on the right points to the corner of the housing (2).

6.4.5 Replacing the motor

- Remove the housing as described above.

- Remove the connection cable to the motor on the control board.

  a.) Current supply of the motor
  b.) Speed and imbalance sensor



- Turn the motor fixing screws out of the rear side of the ground plate.

- Lift the motor out of the unit.

 © HERMLE Labortechnik GmbH

- When re-assembling the spare motor, take care of the wirings, as they must not be jammed.
- Re-assemble the unit in reverse order.

6.4.6 Replacing of the imbalance sensor

Remark:

- As this is a electric movement sensor you can not adjust it anymore as in other units.
- Should appear any difficulties with the imbalance, please give us an exact description of it as well as the serial number of the unit and the rotor type.
- You can check up the imbalance sensor with the operation menu. Look up in chapter 6.3.1.2

Replacing the imbalance and speed sensor

- Remove the lower covering of the front housing as described in chapter 6.4.1.
- Remove the motor as described in chapter 6.4.5.
- Lay the motor down on ist side and remove the 4 fixing screws of the swinging rubber and the two fixing screws of the green board on the rear side (look up in chapter 6.2.7).
- Pull off the speed magnet carefully.
  Attention: Risk of breakage!
- Replace the board.
- Glue the speed magnet with super glue again in the right position and re-assemble the unit in reverse order.

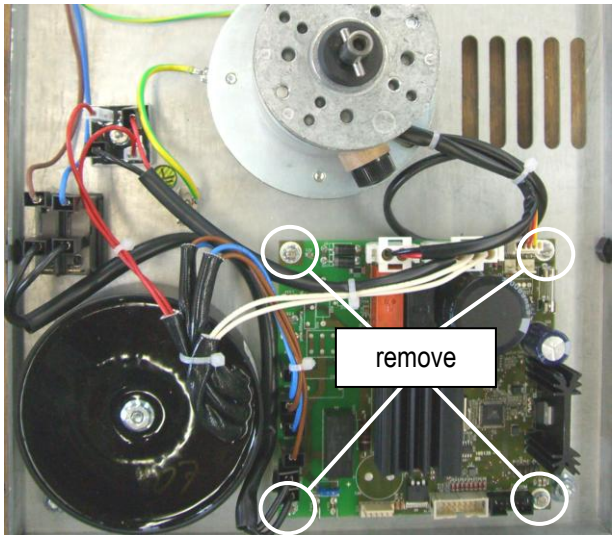
6.4.7 Replacing the carbon brushes

- Remove the rotor chamber as describedin chapter 6.4.4.
- Lateral at the rear side of the motor are the carbon brushes behind the black knurled screws. Turn them out and replace the carbon brushes. For loosening the knurled srews you can also take a coin.

 © HERMLE Labortechnik GmbH

6.4.8 Replacing the power / control board

- Remove the front housing as described in chapter 6.4.1.
- Remove all electrical connections on the control board.
- Remove the 4 screws and take the control board out.

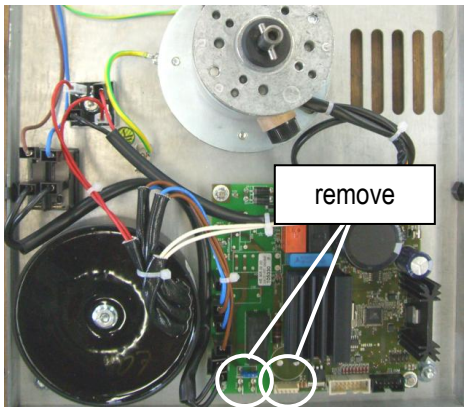


- Put in the new control board, connect all electrical contacts and re-assemble the unit in reverse order.

Attention:
If you change the control board you have to re-adjust the unit as described in chapter 6.3.2.

6.4.9 Replacing the lid lock

- Remove the control panel as described in chapter 6.4.1.
- Remove the electrical contact of the lid lock on the control board.
- Remove the string of the emergency release of the lod lock on the control board.



- Remove the fixing screws on the housing and put in the new lid lock.
- Make sure that the lid rests on the lid gasket straight and continuous while the adjustment. Tighten the fastening screws firmly after the adjustment.

 © HERMLE Labortechnik GmbH

7 TROUBLE SHOOTING

7.1 Error messages: Cause / Solution

Preface:

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

The diagnose referred to in this chapter may not always bet he case, as they are only theoretically occuring errors and solutions.

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

Many thanks in advance for your support.

HERMLE Labortechnik GmbH

7.2 Survey of possible error messages and their solutions

7.2.1 Lid release during power failure (Emergency Lid Release)

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

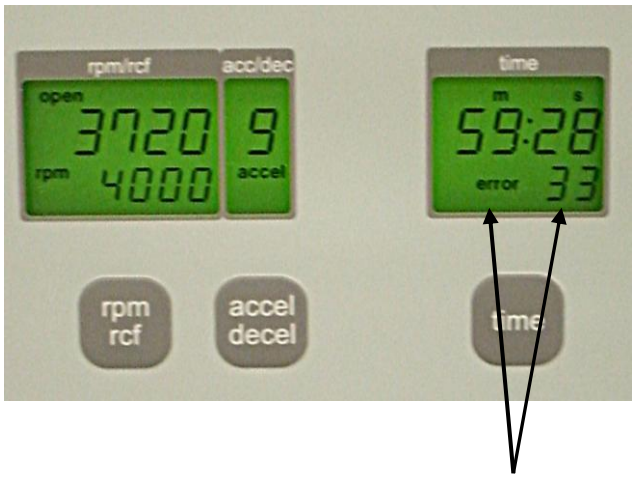
Please proceed as follows:

- Switch the centrifuge off and unplug the power cord.
- At the left side of the centrifuge there is a plastic stopper.
- Remove this stopper. Behind it there is a string.
- Now open the lid of the centrifuge by pulling this string.
- Put he string and the plastic stopper back again.
- Switch the centrifuge on again, for go on working.

 © HERMLE Labortechnik GmbH

7.2.2 Description of the error message system

The error message is shown in the „time“ display through particular figures (26). At the same time the word „Error“ (26) is indicated in the display.



26

7.2.3 Errors that may be indicated in the LCD display:

Error No. 01: Imbalance arose

- Cause: Incorrect loading of the rotor (see chapter 2.2.1)
- Solution: Balance your samples

Error No. 02: Permanent imbalance signal

- Cause: Imbalance sensor is defective (see chapter 6.4.6)
- Solution: Imbalance sensor has to be replaced

Error No. 14: Leap of speed is to obig between two measurements

- Cause: Shaft encoder defective or parting of a cable at the shaft encoder, possibly loose magnet
- Solution: Call service department
  Make sure speed magnet has a firm fit, fix it with super glue.

Error No. 30: Motor stalls or is defective

- Cause: Tubes are too long (brushes against the lid)
- Solution: Take shorter tubes

- Cause: Motor bearings are defective
- Behebung: Motor has to be replaced

Error No. 33: Open lid while the motor is running

- Cause: The lid of the centrifuges has been opened while centrifuge was running.
- Solution: Close the lid of the centrifuge. DANGER OF ACCIDENT!

- Cause: Control switch of the lid lock is defective
- Solution: Call service department

 © HERMLE Labortechnik GmbH

Error No. 34: Lid contact defective

- Cause: Control switch of the lid lock is defective
- Solution: Call service department

Error No. 55: Overspeed

- Cause: Speed sensor is defective
- Solution: Re-start the unit. In case this error occurs again – call service department. Possibly loose speed magnet, fix with super glue.

Error No. 60: Intermediate circuit undervoltage

- Cause:
- Solution:

Error No. 70: Relay hang-up

- Cause:
- Solution:

 © HERMLE Labortechnik GmbH

8 MAINTENANCE

8.1 Service and maintenance

8.1.1 Maintenance and cleaning

Maintenance:

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

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

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

Corrosive substances are for instance:

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

Cleaning:

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

I 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!

 © HERMLE Labortechnik GmbH

8.1.2 Glass breakage

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

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

8.1.3 Desinfection

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 121°C, except rotor 220.58 V08, which must not be autoclaved.

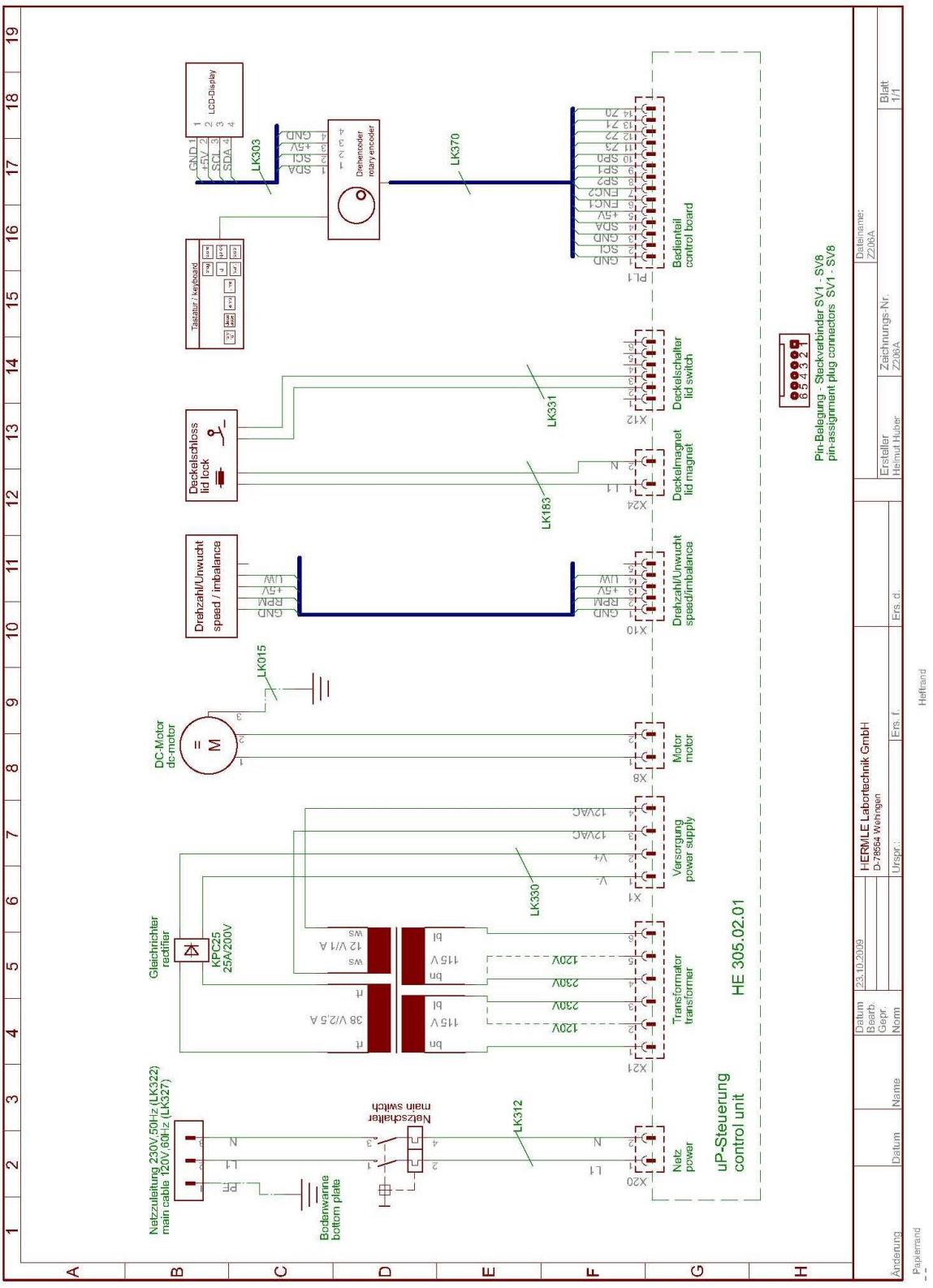
The rotor and rotor chamber should be cleaned with a universal, neutral disinfection agent, e. g. on formalin base. A disinfection spray is most suitable in order to easily reach all difficult to access spots.

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

 © HERMLE Labortechnik GmbH

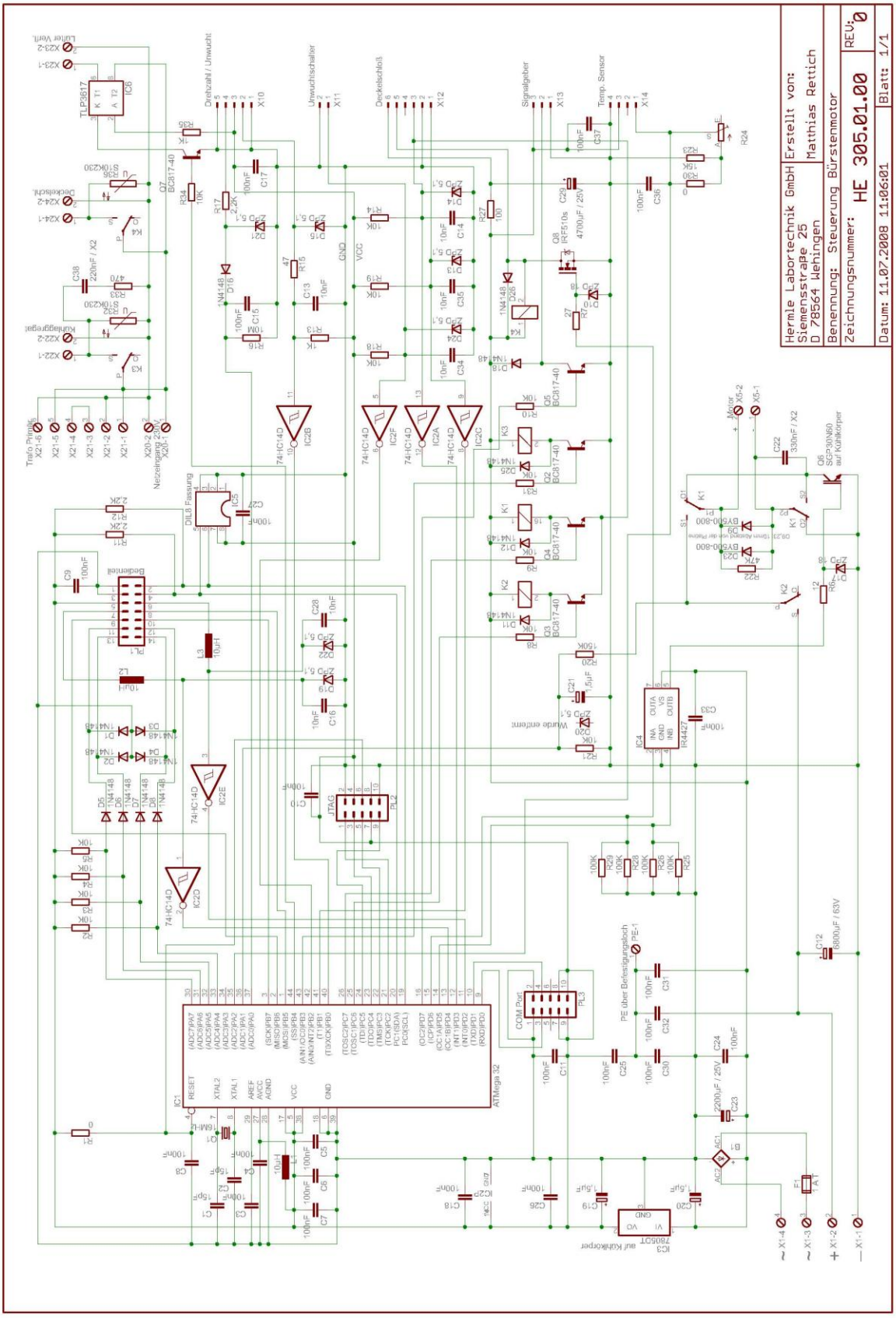
9 SCHALTPLÄNE

9.1 Stromlaufpläne



 © HERMLE Labortechnik GmbH

9.2 Steuerungsteil



 © HERMLE Labortechnik GmbH

10 SPARE PART LIST

ARTICLE	ORDER NO.	IDENT.-NO.
LCD module	914.005	
Rotary knob with PCB for front board	914.006	
Control board	914.010	
Front panel complete	914.011	
Motor; 230 / 120 V	924.002	
Chamber	934.008	
Housing	934.009	
Lid	934.010	
Chamber gasket	934.011	
Front panel (plastic part only)	934.012	
Lid lock; 120 V	940.193	
Lid lock; 230 V	940.194	
Carbon brushes	940.204	32-0219
Imbalance / speed sensor		
Rotary knob	944.007	
Lid for potentiometer	944.012	
Membran keyboard	944.015	
Termical curcuit breaker (main switch); 230 V	944.016	
Termical curcuit breaker (main switch); 120 V	944.017	
Trafo	944.018	
Bridge rectifier	944.019	
Power cord; 230 V	944.020	
Power cord; 120 V	944.021	
Lid latch	950.008	
Hinge	950.131	38-5597
Gasket for lid lock	950.139	
Sight glass	950.173	
Rotor screw	954.004	
Motor rubber mount	954.005	306.01.24
Rubber foot	954.006	

 © HERMLE Labortechnik GmbH