HERMLE
LABORTECHNIK

Instruction Manual
for
Table Top Centrifuge
Z 383

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1.1 Usage in accordance with safety standards

1.1.1 General information

1.1.1.1 Hazards and precautions

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

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

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

- The HERMLE Z 383 is not explosion-proof and must therefore not be operated in explosion-endangered areas or locations. During centrifugation, it is prohibited to stay within the safety zone of 30 cm around the centrifuge or deposit hazardous substances within this area.
- Centrifugation of flammable, explosive and radioactive substances or substances, which chemically react with high energy, is strictly prohibited!
- Never spin toxic or pathogenic material without adequate safety precautions, i.e. centrifugation of buckets / tubes without or with defective hermetic sealings is strictly prohibited.
  The user is obligated to perform appropriate disinfection procedures in case dangerous substances have contaminated the centrifuge and / or its accessories. When centrifuging infectious substances, always pay attention to the General Laboratory Precautions. If necessary, contact your safety officer!
- It is prohibited to run the centrifuge with rotors other than listed for this unit.
- Under no circumstances open the lid of the centrifuge while the rotor is still running or rotating with a speed of > 2 m/s.

Following rules must strictly be adhered to:

- Do not operate the centrifuge in case it is not installed correctly.
- Do not operate the centrifuge when dismounted (e.g. without metal cover).
- Do not run the centrifuge when mechanical or electrical assembly groups have been tampered with by unauthorized persons.
- Do not use accessories such as rotors and buckets, which are not exclusively approved by HERMLE Labortechnik GmbH, except commercially available centrifuge tubes made of glass or plastic.
- Do not spin extremely corrosive substances, as they may cause material damages and impair mechanical resistance.
- Do not operate the centrifuge with rotors or buckets, which show any signs of corrosion or mechanical damage.

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

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

1.1.1.2 Brief description

Model Z 383 is a table top centrifuge. Various rotors are available for this unit.
Speed / RCF-value and running time can easily be set with turning knobs and are displayed on large LED's.
The pre-set run parameters are stored after the end of each run.
The lid is latched and released with an electric motor driven lid lock.
The centrifuge has a maintenance-free brushless induction drive with a low noise level.

1.1.1.3 Safety standards

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

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

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

1.1.1.4 Extent of supply

Following parts are supplied as accessories with each centrifuge:
- 2 fine-wire fuses 16 AT (230 V)
- 2 fine-wire fuses 15 AT (120 V)
- 1 instruction manual
- 1 Allan key for removing rotors

Spare fuses are at the rear side of the centrifuge.

1.1.1.5 Warranty

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

In the unlikely case of any manufacturing faults occurring, the centrifuge and rotors are covered by warranty for a period of one year from date of delivery.

This warranty becomes invalid in case of mishandling, damage and negligence and further in case of usage of inappropriate spare parts and / or accessories or unauthorized modification of the unit.

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

1.2 Installation

1.2.1 Installation of the centrifuge

1.2.1.1 Unpacking the centrifuge

Model Z 383 is supplied in a palletcarton.
Remove the strap retainer, open the carton, remove the cover carton and the centrifuge. The instruction manual must always be kept with the centrifuge.

1.2.1.2 Space requirements

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

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

1.2.1.3 Installation

Follow these steps:

- Check whether power supply corresponds with the one named on the manufacturer's rating label which is mounted on the rear panel.
- The line voltage circuit breaker is max. 16 A (type K) slow release for commonly used instruments.
- In case of emergency, there must be an emergency switch off installed outside the room in order to disconnect the power supply of the unit.
- Remove the transport spacer blocks from the motor shaft (see chapter 2.2.2).

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

1.3 Technische Daten

Manufacturer	HERMLE Labortechnik GmbH	
Type / Model	Z 383	
Dimensions Width Depth Height	 50 cm 59 cm 38 cm	
Weight	69 kg	
Noise level (max.)	67 +2,0 dB (A)	
Max. speed Max. volume Max. RCF Admissible density Admissible kinetic energy	17.000 rpm 4 x 500 ml 27.464 x g 1,2 kg/dm^3 31.000 Nm	
Electrical connection AC Current Connected load	230 V / 50 Hz 1 ph 8 A 1340 Watt	120 V / 60 Hz 1 ph 12 A 840 Watt
Interference suppression	VDE 0871, Funkentstörgrad B	
Test obligations	yes	
To be filled in by purchaser: Inventory-No.: Check-No.: Location: Maintenance contract:		
Your service department	HERMLE Labortechnik GmbH Siemensstrasse 25 78564 Wehingen Phone: +49-7426 / 96 22-17	
Your agent		

1.4 Conformity declaration

We, the company

Hermle Labortechnik GmbH
Siemensstrasse 25
78564 Wehingen

declare in mere responsibility that our product

Centrifuges

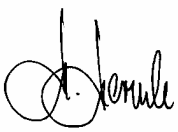
of models

Z 100 M; Z 160 M
Z 206 A
Z 233 M-2; Z 216 MK
Z 300; Z 300 K; SIEVA-2; Z 323; Z 323 K;
Z 366; Z 36 HK; Z 383; Z 383 K
Z 400; Z 400 K; Z 513; Z 513 K
SETA Oil test centrifuge

as from month/year of construction 06 / 07

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

DIN EN 61 010-1; EN 61 010-2-020;
EN 61000-6-1 ; EN61000-6-2 ;
EN 61000-3-2 ; EN 61000-3-3;
EN 55011
89/336/EWG ; 92/31/EWG ; 93/68/EWG ;
93/42/EG ; 98/37/EG; 98/79/EG;
DIN EN ISO 12100-1; DIN EN ISO 12100-2



Wehingen/Germany, 13th July 2007

Harald Hermle
President

2.1 Installation of rotors

2.2.1 Mounting and loading angle rotors

Clean the motor shaft as well as the rotor mounting boring with a clean, grease-free piece of cloth. Place the rotor onto he motor shaft, ensuring that the pin aligns correctly with the rotor slot (see photos 1 and 2).

For reasons of safety you should check the correct position of the rotor before each run!!

Photo 1: correct

Photo 2: wrong

Hold the rotor with one hand and secure the rotor to the shaft by turning the rotor nut (1) counter-clockwise. Tighten rotor nut with enclosed allan key (see photo 3).

Photo 3

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

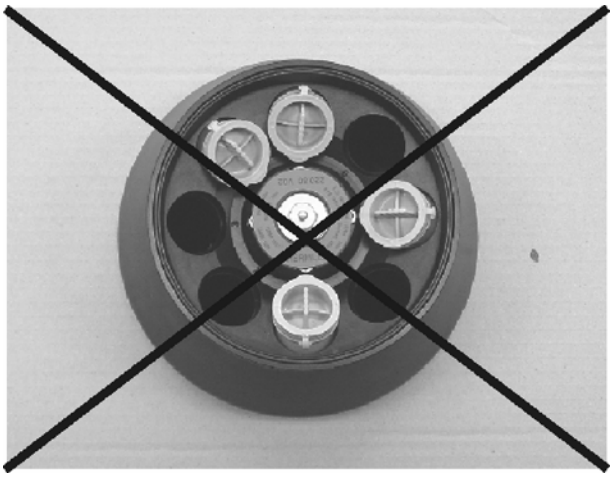


Photo 4: wrong

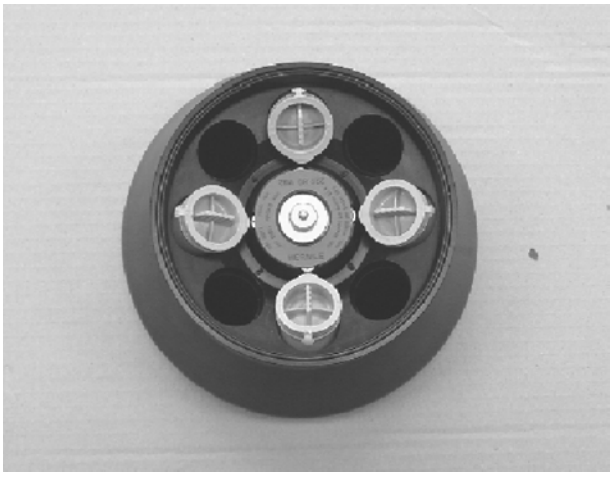


Photo 5: correct

ATTENTION:
Before operation, secure the rotor lid to the rotor by pressing the snap connector lightly onto the rotor nut. Take care the lid is correctly placed into the guide.

Photo 6

2.1.2 Mounting and loading swing out rotors

Clean the motor shaft, as well as the device hole of the rotor with a clean and fat free cloth. Put the rotor to the motor shaft (take care that the cross pin is sitting right to the driving disk of the rotor) (s. photo 1 and photo 2).
Hold the rotor with one hand and secure the rotor to the shaft by turning the rotor nut (1) counter-clockwise. Tighten rotor nut with enclosed allan key (see photo 3).

The charging of the buckets and the adapters must be done appropriately figure 7 and figure 8.
In principle swing out rotors may be taken in operation first if all buckets or racks are put into the rotor.
The bolts at the rotor must be easily greased with silicone grease.
The glasses have to be filled evenly by eye and put into the drillings or tube racks. The weight difference of the loaded buckets should not exceed approx. 6 gramme.

It is allowed to operate e.g. a 4-place-rotor with 2 loaded buckets only. But the loaded borings must be opposite to each other. Make sure that the unloaded buckets also be put inside the rotor (see Figure 7 and 8).

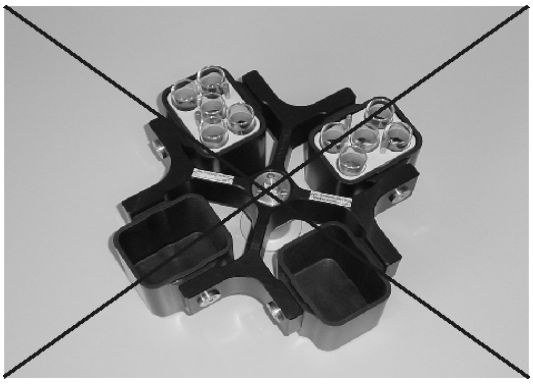


Photo 7: wrong

Photo 8: correct

2.1.3 Overloading of rotors

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

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

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

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

Example:

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

In case of any questions, please contact the manufacturer!

2.1.4 Removing the rotor

Take off the lid of the rotor. Hold the rotor with one hand. Losen the rotor nut with the included allan key by turning it clockwise.

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

2.2 Operation

2.2.1 Power switch / Main fuse

The power switch is down below on the left side of the unit. The main fuse of the centrifuge is on the backside at the power inlet. After switch on the centrifuge the displays on the control panel will flash up. The disconnection from the network just happens by unplugging the main plug.

2.2.2 Lid release

When the green control lamp on the key „LID“ (4) is flashing, the rotor is standing still and the lid of the centrifuge is ready to open.
Press the key „LID“(3) (see photo 9), and the lid will open automatically. While the lid is opening itself it appears the word “OPEN” in the actual value display (see photo 9).
After approx. 6 seconds the word disappears in the actual value display and the lid can be opened.

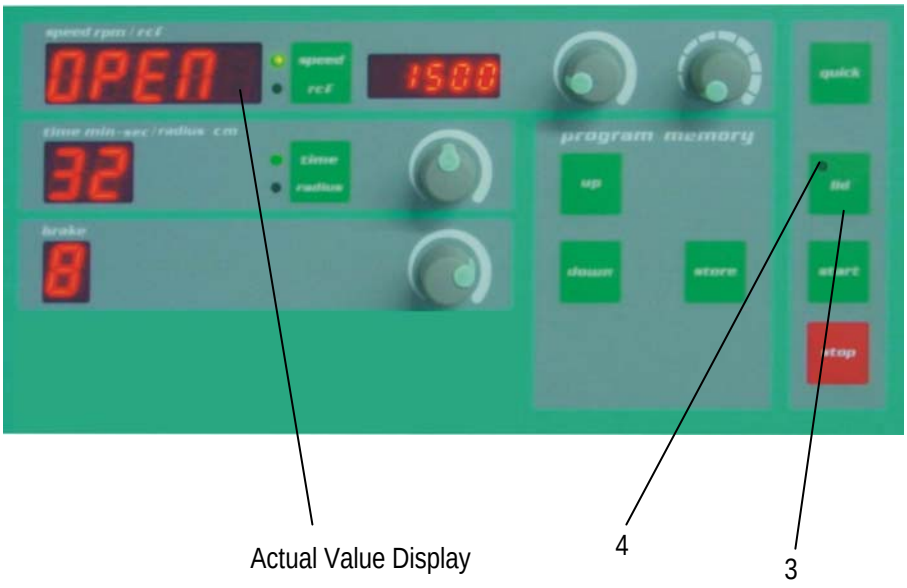


Photo 9

2.2.3 Lid lock

After mounting and loading the rotor correctly as described, the lid may be closed.
Please proceed as follows:

- The lid must only be lay down slightly until you feel that the lid will be tightened.
- Afterwards the lid will close automatically within 6 seconds.
  While the closing of the lid it appears the word „CLOSE“ in the actual value display.
  (see photo 9)
- As soon as the lid is closed correctly the word „CLOSE“ disappears in the actual value display.
- When the control lamp (4) on the key „LID“ flashed up, the centrifuge can be started.

The centrifuge may only be started with closed lid (Lid lock according to BGR 500; Chapter 2.11; Part 3).
As soon as the rotor starts, the control lamp (4) on the key „LID“ turns off and an opening of the lid is impossible.
If the control lamp (4) on the key „LID“ flashes after pressing the "START" - key, you have to open the lid once again. This safty precaution shows the end of the run.

2.2.4 Pre-selection of speed / RCF-value

With the key "SPEED/RCF" (7) you can switch between speed and RCF-value to be shown in the display. The green control lamps (8) indicate, which mode is activated.
Select the desired mode. With the speed potentiometer (4) you can pre-select the speed/RCF-value in steps of 500 or you can change the values during the run.
With the speed potentiometer (5) you can pre-select the speed/RCF-value in steps of 10 or you can change the values during the run.
The pre-selected value is indicated in the nominal value display (1). The actual speed is indicated in the actual value display (2).

The pre-selected speed should not be higher than the max. speed of the rotor. If the pre-selected speed is too high the nominal value display (1) flashed after approx. 200 rpm. (see photo 10). However the centrifuges accelerates only up to the maximum speed of the placed rotor.
The maximum speed of the Z 383 is 17.000 rpm.

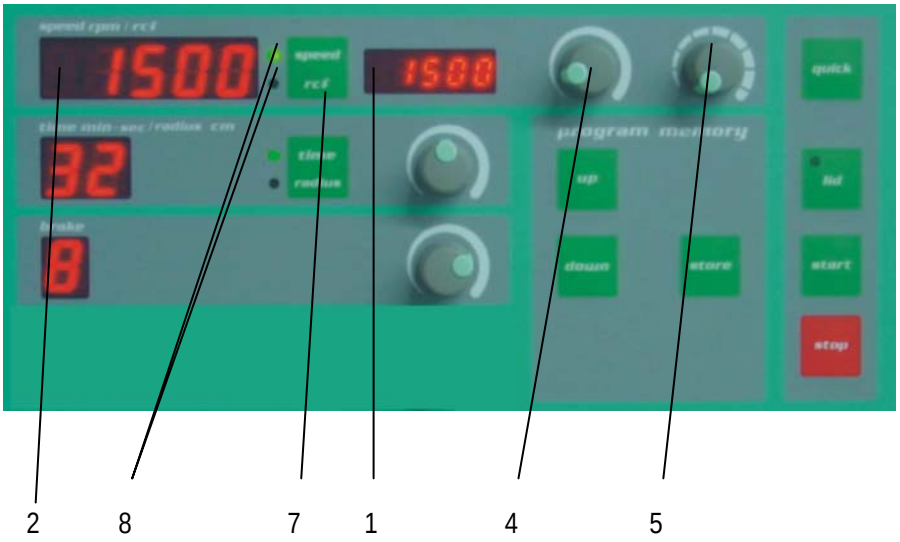


Photo 10

Max. Revolution per minutes of the valid rotors Z 383 and Z 383 K

Rotor Number	Max. Speed
220.86 V01	5.000 rpm
221.08 V01	4.500 rpm
221.02 V01	5.000 rpm
221.03 V01	4.250 rpm
220.34 V04	9.200 rpm
220.78 V02/V03	15.000 rpm
220.80 V02/V03	15.000 rpm
220.87 V03/V04	17.000 rpm
220.97 V02	6.000 rpm
220.85 V01	15.000 rpm
220.96 V02	6.000 rpm
221.16 V01	4.500 rpm
220.50 V06	3.500 rpm
220.88 V01	13.500 rpm
220.92 V01	13.500 rpm
220.81 V06	3.500 rpm
220.73 V02	8.000 rpm

2.2.5 Pre-selection of running time

Running time is adjustable from 1 to 60 min. with the time potentiometer (12) or continuous.
The running time is indicated in the display (10). The preset running time will be stored after the run.
For continuous run, turn the time potentiometer (12) clockwise to the limit stop.
The display (10) indicates continuous run with two dashes " - -".
You can stop the run by pressing the „stop“ key.

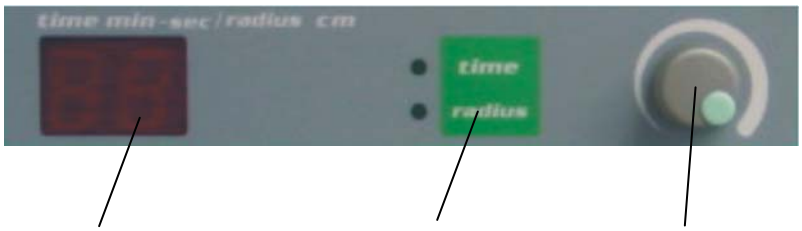


Photo 11 10 11 12

2.2.6 Pre-selection of radius correction (IMPORTANT FOR THE RCF-VALUE DISPLAY)

Explanation:
The Z 383 has an automatic rotor identification therefore the control system of the centrifuge knows the maximum centrifugal radius of the respective rotors to indicate the correct RCF-Values. If you use adapters it could change the centrifugal radius of the respective rotors.
That the control system of the centrifuge is supposed to calculate the right RCF-Value, the respective radius must be corrected.

Pre-selection:
Please look up the correction value in the following table under the respective rotor and adapter.

While pressing the key “time/radius“ (11) you can adjust your value with the potentiometer (12) (see photo 11). If you press the key “time/radius“ (11) this value is indicated during the run, too. After release the key “time/radius” (11),the display (10) indicates the running time again.

ATTENTION:
After the key is released the adjusted value is stored and must be readjusted for an other adapter or rotor.

Radius correction values of the usable rotors

Z 383 and Z 383 K				
Rotor-number	**Bucket**	**Adapter**	**Radius-correction**	**Comment**
Swing out rotor; Rectangular bucket; 4 x 250 ml, R-max.: 16,6 cm				
220.86 V01	610.000	710.000	0,3	
		710.001	0,4	
		710.002	0,6	
		710.003	0,4	
		710.004	0,6	
		710.005	0,6	
		710.006	0,4	
		710.007	0,4	
		710.009	0,6	
		710.010	0,7	
		710.011	0,3	
		710.013	0,6	
		710.014	0,6	
		710.015	0,4	
		710.016	0,4	
		710.017	0,4	
		710.018	0,4	
		710.019	0,4	
		710.020	0,4	
		710.021	0,4	
		710.022	0,6	
Swing out rotor; Round bucket; 4 x 250 ml, R-max.: 16,8 cm				
	611.000	711.003	0,7	
		711.004	0,7	
		711.005	0,2	
		711.006	0,3	
		711.007	0,5	
		711.008	0,5	
		711.009	0,1	
		711.010	0,5	
		711.011	0,5	
		713.001	0,2	
		713.002	0,2	
		713.003	0,2	
		713.004	0,5	
		713.005	0,7	
		713.006	0,5	
		713.007	0,2	
		713.008	0,2	
		713.009	0,2	
		713.010	0,2	
		713.011	0,2	
		without	0	

Z 383 and Z 383 K				
Rotor-number	**Bucket**	**Adapter**	**Radius-correction**	**Comment**
Swing out rotor; Round bucket; 4 x 500 ml, R-max.: 18,6 cm				
221.08 V01	625.000	without	0,2	
	625.001	without	0,5	
	625.002	without	0,2	
	625.003	without	0,8	
	625.004	without	0,9	
	625.005	without	0,3	
	625.006	without	0,3	
	625.007	without	0,5	
	625.008	without	0,3	
	625.009	without	4,0	
	625.010	without	1,7	
	625.013	without	5,8	
Swing out rotor; Mikrotitre carrier for 4 x 2 Plates				
	625.020	without	4,3	
Swing out rotor; 20 x 15 ml, R-max.: 18,6 cm				
221.02 V01		701.010	2,2	
		701.011	2,2	
		701.012	4,7	
Swing out rotor; 12 x 50 ml, R-max.: 17,7 cm				
221.03 V01	603.000	without	0	
	603.001	without	0,7	
		701.010	0,9	
		701.011	0,9	
		701.012	2,0	
Drum rotor; 8 Places, R-max.: 11,0 cm				
220.34 V04		715.000	0,4	
		715.001	0,6	
		715.002	0,4	
		715.003	0,4	
		715.004	0,4	
		715.005	1,9/1,2/0,4	
		715.006	0,4	
		715.007	0,4	
		715.008	0,2	220.34.35.04
		715.009	1,1/0,3	220.34.37.04
		715.010	0,4	220.34.38.04
		715.011	0,2	220.34.90.04

Z 383 and Z 383 K				
Rotor-number	**Bucket**	**Adapter**	**Radius-correction**	**Comment**
Angle rotor; 6 x 85 ml, R-max.: 10,3 cm				
220.78 V02 / V03		707.000	0,1	
		707.001	0,6	
		707.002	0,8	
		707.003	0,3	
		707.004	0,6	
		707.003 with 708.001	0,6	
		707.003 with 708.008	1,6	
Angle rotor; 8 x 50 ml, R-max.: 9,6 cm				
220.80 V02 / V03		708.000	0,6	
		708.001	0,3	
		708.002	0,7	
		708.003	0,5	225.50.50.04
		708.004	0,5	
Angle rotor; 24 x 1,5 / 2,0 ml, R-max.: 8,5 cm				
220.87 V03 / V04		704.004		Dep. on Manufacturer
		704.005		Dep. on Manufacturer
Angle rotor; 6 x 50 ml, R-max.: 9,7 cm				
220.97 V01 / V02	603.000	without	0	
		without	0	
		708.002	0,7	
		708.003	0,5	
		708.004	0,5	
	603.001	without	0,7	
		701.010	0,9	
		701.011	0,9	
		701.012	2,0	
Angle rotor; 12 x 12 ml, R-max.: 9,9 cm				
220.85 V01 / V02		701.003	0,5	
Angle rotor; 12 x 15 ml, R-max.: 10,4 cm				
220.96 V01 / V02		701.010	0,9	
		701.011	0,9	
		701.012	2,0	
Swing out rotor; Mikrotitre carrier for 2 x 3 Plates, R-max.: 12,2 cm				
221.16 V01		706.000	0,2	
Swing outrotor; Mikrotitre carrier for 2 x 3 Plates, R-max.: 10,4 cm				
220.50 V06		706.000	0,2	

Z 383 and Z 383 K				
Rotor-number	**Bucket**	**Adapter**	**Radius-correction**	**Comment**
Angle rotor; 44 x 1,5 / 2,0 ml, R-max.: 7,1 / 8,6 cm				
220.88 V01		704.004		Dep. on Manufacturer
		704.005		Dep.on Manufacturer
Angle rotor; 64 x 0,4 ml, R-max.: 6,9 / 8,2 cm				
220.92 V01		704.004		Dep. on Manufacturer
Angle rotor; 24 x 15 ml, R-max.: 14,4 cm				
220.81 V06		701.010	0,9	
		701.011	0,9	
		701.012	2,0	
Swing out rotor; 4 x 15 ml, R-max.: 14,4 cm				
220.73 V02		701.010	0,9	
		701.011	0,9	
		701.012	2,0	
Swing out rotor; 4 x 15 ml, R-max.: 14,4 cm				
221.06 V02		without	0	
Angle rotor; 8 x 30 ml, R-max.: 9,5 cm				
220.76 V02 / V03		709.000	0,3	
		709.001	0,3	
		without	0	

2.2.7 Pre-selection of brake intensity and acceleration

With the potentiometer (13) (see photo 12) you can choose different brake levels from 0 to 9. With the level 0 the unit accelerates and brakes slowly and gently. With the level 9 the unit accelerates and brakes as fast as possible.

Photo 12

13

Acceleration- and deceleration times Z 383 and Z 383 K (120 V / 230 V) in seconds

	Acceleration values	Deceleration values	
Rotor - Number		Brake level 0	Brake level 9
220.86 V01	37	169	50
221.08 V01	50	240	40
221.02 V01	30	47	10
221.03 V01	15	37	8
220.34 V04	37 to 320	210	37
220.78 V02/V03	83	550	83
220.80 V02/V03	66	390	50
220.87 V03/V04	30	320	39
220.97 V02	18	160	21
220.85 V01	54	330	41
220.96 V02	22	125	18
221.16 V01	20	89	15
220.50 V06	20	89	15
220.88 V01	17	153	22
220.92 V01	13	154	16
220.81 V06	22	105	16
220.73 V02	36	225	36

2.2.8 Keyboard – Starting the centrifuge – "QUICK"-key

1 Key "QUICK": For short spins
Centrifuge is running as long as you hold the key.

2 Key "LID": To open the lid of the centrifuge.
Control lamp indicates the correctly closed lid.

3 Key "START": To start the pre-set run of the centrifuge.

4 Key "STOP": To stop the centrifuge before the pre-set operating time has expired or to stop the centrifuge at continuous run.

Photo 13

Starting the centrifuge

Insert a correctly and fully loaded rotor and tighten it to the motor shaft (see chapter 2.1.2). Close the lid of the centrifuge. As soon as the control lamp at the key "LID"is flashing, the centrifuge run can be started. Therefore press key "START".
ATTENTION: The rotor has to be checked and / or tightened previous to each run!

"QUICK" –Key – Short runs

For short centrifuge runs you can start the run with key "QUICK". Press the key "QUICK". The centrifuge starts and runs as long as you hold the key "QUICK". The running time is shown in the display "TIME" in seconds.

"STOP" -Key

Press the key „STOP“, to break off the centrifuge run.
The unit decelerates then with the adjusted brake intensity. The brake intensity can also be changed during the deceleration.

2.2.9 Storage of programs

1 Key „up“: to call up and count forward the storage numbers

2 Key „store“: to store and leave the program mode

3 Key „down“: to call up and count backwards the storage numbers

Photo 14

Storage of runs:

Insert a correctly and fully loaded rotor and tighten it to the motor shaft. Close the lid of the centrifuge.
Pre-select the desired run parameters, as i.e. speed and running time.
Press the key „START“
As soon as the actual speed display indicates more than 200 rpm the run can be stored.
Press the key „UP“ or „DOWN“. The storage number is indicated with the numbers 0 to 9 in the actual value speed display.
Press the key „UP“ or „DOWN“ that long until the desired storage number is indicated and then press the key „STORE“.
Now the actual speed display indicates on the right side the rotor type of the indicated program. (see photo 15)

If the display indicates the rotor type 0, this storage number is free.
To store the run press the key „STORE“ and hold on for 3 seconds. The actual value display flashes as long as the storage lasted.

Recall of stored programs:

Press the key „UP“ or „DOWN“. The actual value display indicated on the left side the program number and on the right side the rotor number.

Photo 15

Select with the key „UP“ or „DOWN“ the desired and stored program number.
The display indicates a rotor number. Place this rotor in the centrifuge. (see. point 2.1). Close the lid of the unit and press the key „start“.
The centrifuge is in the program mode.
You can stop the run at any time by pressing the key „Stop“.
While running in the program mode the potentiometers are out of function.

Leave the program mode:

The centrifuge is in the program mode and indicates the program number as well as the rotor number on the actual value display. Open the lid and press the key „STORE“ for 3 seconds. If the program number and the rotor number have disappeared, the centrifuge can be operated as usual.

Overwrite of a program:

Insert a correctly and fully loaded rotor and tighten it to the motor shaft. Close the lid of the centrifuge.
Pre-select the desired run parameters, as i.e. speed and running time.
Press the key „START“
As soon as the actual speed display indicates more than 200 rpm the run can be stored.
Press the key „UP“ or „DOWN“. The storage number is indicated with the numbers 0 to 9 in the actual speed display.
Press the key „UP“ or „DOWN“ that long until the desired storage number is indicated and then press the key „STORE“.
Now the actual speed display indicates on the right side the new rotor type of the indicated program. (see photo 15)

If the display indicates the rotor type 0, this storage number is free.
To store the run press the key „STORE“ and hold on for 3 seconds. The actual value display flashes as long as the storage lasted.

You can not erase a program but just overwrite.

2.3 Safety features

2.3.1 Imbalance detection

In case of the rotor not being equally loaded (see chapter 2.1.1), the drive will turn off during acceleration. The rotor decelerates to stand still. The actual “SPEED” display indicates “ERROR”.

When error message "1" appears in the actual "SPEED" display, the weight difference of the samples is too huge. Weigh out the samples exactly.
Load the rotor as described in chapter 2.1.1.

When error message "2" appears in the actual "SPEED" display, there could be following reasons:

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

3.1 Service and maintenance

3.1.1 Maintenance and cleaning

Maintenance:

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

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

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

Corrosive substances are for instance:

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

Cleaning:

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

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

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

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

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

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

3.1.2 Glass breakage

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

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

3.1.3 Disinfection

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, 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!

4.1 Error messages: cause / solution

Preface:

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

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

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

Many thanks in advance for your support.

HERMLE Labortechnik GmbH

4.2 Survey of possible error messages and their solutions

4.2.1 Lid release during power failure (Emergency Lid Release)

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

Please proceed as follows:

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

Photo 16

4.2.2 Description of the error message system

The error message is shown in the "SPEED" display through particular figures (see photo 17).

There is a distinction between two different kinds of errors.

The digits in the "SPEED" display have the following meaning:

- Error No. 1 – 49 (forced stop)

  In case of one of these errors occurring, the rotor decelerates from pre-set speed down to 0. As soon as the rotor stops, the error message can be reset by opening and closing the lid of the centrifuge.

- Error No. 50 – 99 (emergency stop)

  In case one of these errors occurring, the frequency converter switches off. This means, the rotor stops without applying the brakes. To reset the error message you have to switch off the unit and turn it on again (power switch).

In case the unit stops due to an error indication, you should restart the unit to check whether the error occurs again.

The error message figures not listed in this chapter are currently not in use. They are reserved for future use in completing the error message recognition program.

Example: figures are flashing

Photo 17

4.2.3 Error messages

Error No. 1: Imbalance

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

- Cause: Incorrect adjustment of the imbalance sensor
- Solution: Imbalance sensor has to be re-adjusted (call service department)

Error No. 2: Permanent imbalance signal

- Cause: Incorrect position of the imbalance sensor
- Solution: Imbalance sensor has to be readjusted (call service department)

- Cause: Imbalance sensor is defective
- Solution: Imbalance sensor has to be replaced (call service department)

Error No. 25: Power failure

- Cause: Power failure while rotor was in motion
- Solution: Open and close the lid of the centrifuge, restart the unit;
  check contact of plug in (loose contact)

Error No. 36: Relay of the frequency converter cannot be released / lid cannot be opened

- Cause: Power board malfunction
- Solution: Call service department

- Cause: Lid of the centrifuge is jammed
- Solution: Open the lid of the centrifuge manually when rotor is at stand still. Grease the lid lock slightly. In case this error occurs again, call service department;
  check coil of lid lock

- Cause: Lid lock is defective
- Solution: Call service department, replace lid lock

Error No. 50 / 51: Memory failure

- Cause: Internal or external memory failure
- Solution: Restart the unit. In case this error occurs again, call service department;
  replace control panel

Error No. 55: Over speed

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

Error No. 60: Engine speed sensor signal is missing

- Cause: Speed sensor is defective or cable breakage at speed sensor, possibly lose magnet
- Solution: Call service department;
  check speed magnet, fix with super glue

Error No. 70: Converter interface

- Cause: Communication of regulator, power board, interface cable and converter failed.
- Solution: Call service department

Error No. 82: Cut off power board – frequency converter

- Cause: Over current or under voltage due to power supply fluctuations
- Solution: Restart the unit, take care the power supply is stable

Error No. 83: Preset speed cannot be reached

- Cause: Preset speed cannot be reached
- Solution: Call service department

Error No. 84: Over temperature frequency converter

- Cause: Frequency converter cut off due to over temperature
- Solution: Take care, there is enough space around the centrifuge for heat dissipation

Error No. 85: Over temperature motor

- Cause: Temperature protection switch of motor turns off
- Solution: Take care, there is enough space around the centrifuge for heat dissipation.
  Motor mounting is defective, replace motor

Fehler Nr. 87: Converter Release

- Cause: Converter don't drive the motor.
- Solution: Check cable, internal conduction error
  Check configuration of the control panel
  Converter is defective. Call service department

Error No. 90: Emergency switch off lid lock

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

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

Error No. 94: Voltage drop during the run

- Cause: The voltage supply drops under the limit for a little time
- Solution: Wait until the stand still of the rotor.
  If the green control lamp „LID" flashes, open the lid of the centrifuge.
  Restart the centrifuge.

