Contents 目录

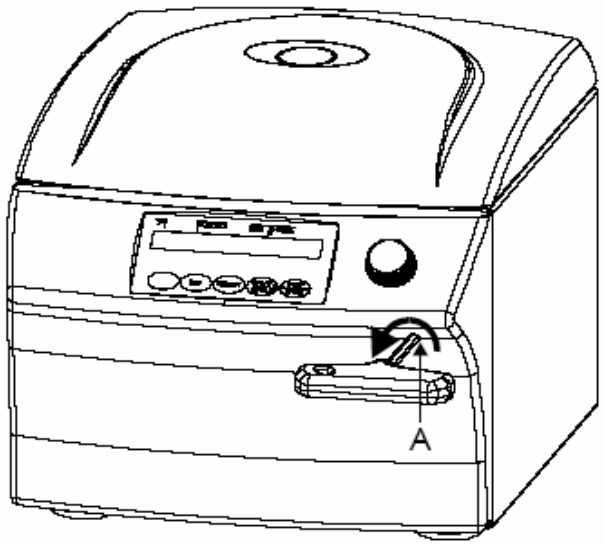


Fig. 1

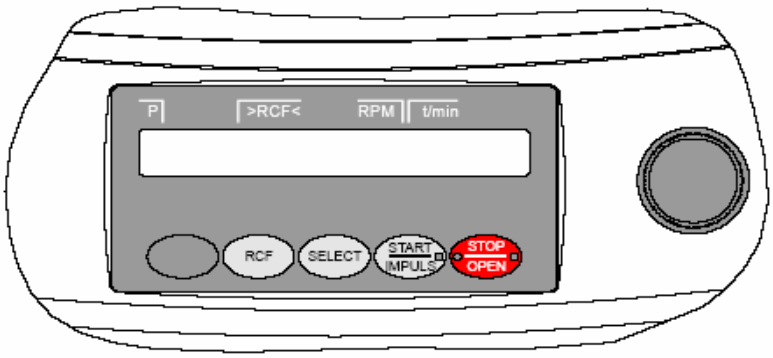


Fig. 2 MIKRO 200

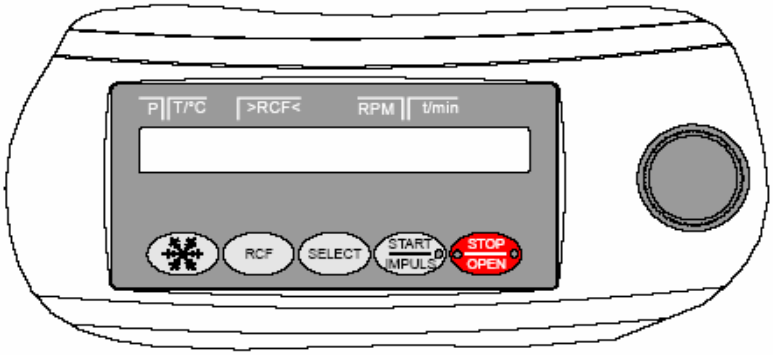


Fig. 3 MIKRO 200 R

1. Use according to specification 适用范围

The machine presented here is a medical product (laboratory centrifuge) according to the IVD guideline 98/79/EG. The centrifuge is used to separate substances or substance mixtures with a density of max. 1.2 kg/dm³ . This also includes substances and substance mixtures of human origin. The centrifuge is only intended to be used for this purpose. A different use or application over and above this is deemed not in accordance with the specifications. The company Andreas Hettich GmbH & Co. KG undertakes no liability for damages resulting therefrom. 根据 IVD 准则 98/79/EG，本手册涉及的机器属于医学产品（实验室离心机）。该离心机是用来分离最大密度为 1.2 kg/dm³的物质或者混合物。 分离的物质或者混合物也包含源自人体的物质或混合物。本离心机只适用于这些材料的分离。 如果使用本离心机来分离其他物质或者做其他用途，将被认为是不符合说明书。Andreas Hettich GmbH & Co. KG 不会为由此引起的损坏承担任何责任。

Belonging to the application according to specification is also the observance of all references contained in the Instruction Manual and compliance with the inspection and maintenance works.
符合说明书中的使用要求意味着遵守本指导手册中的一切相关要求，包括检验及保养工作。。

2. Residual risks 残留物的危险

The machine is constructed according to the state of the art and the recognized technical safety regulations. Improper use and handling can result in dangers to life and limb of the user or third parties and impairments to the machine or to other material assets. The machine is only to be used for the specified applications and only in an impeccable technical safety condition.
Disturbances that can interfere with the safety are to be immediately rectified. 该仪器是根据行业最新水平及被认可的技术安全规章制造的。使用或者搬运不当会对使用者或者其他人的生命及四肢产生危险，并且损害仪器及其他物质财产。 仪器只能用于指定的用途， 且只能在完善的技术安全条件下使用。存在安全隐患的障碍或者失调需要立刻纠正。

3. Technical specifications 技术规格

Manufacturer 制造商	Andreas Hettich GmbH & Co. KG D-78532 Tuttlingen				
Model 型号	MIKRO 220		MIKRO 220R		
Type 类型	2200	2200－01	2205	22405－07	2205－01

Mains voltage (+/- 10%) 电源电压	220-240 V 1~	100-127 V 1~	200-240 V 1~	200-240 V 1~	100-127 V 1~
Mains frequency 电压频率	50 – 60 Hz	50 – 60 Hz	50 Hz	50 – 60 Hz	50 – 60 Hz
Connected load 联接载荷	510 VA	510 VA	850 VA	950 VA	950 VA
Current consumption 电流	2.5 A	5.3 A	3.5 A	5.8 A	8.0A
Cooling medium 冷却介质	---		R 134a		
Max. capacity 最大容量	24X2.0ml				
Allowed density 可允许的浓度	1.2 kg/dm³				
Speed (RPM) 转速	18000				
Force (RCF) 相对离心力	31514				
Kinetic energy 动能	8700Nm				
Obligatory inspection (BGR 261) 强制性检查	no				
Ambient conditions (EN 61010-1) 环境条件 __ Set-up site 安装地点 __ Altitude 纬度 __ Ambient temperature 环境温度 __ Humidity 湿度	只用于户内 海平面 2000 米以上 2° C to 40° C　　5° C to 3 5 ° C 温度在 31°C 以下时，最大相对湿度为 80%，温度由 31°C 为 40°C 时，最大相对湿度线性地从 80%降到 50%。				
__ Pollution degree 污染等级	2				
Device protection class 设备安全防护等级	I				
Not suitable for use in explosion-endangered areas. 不适合用在有爆炸危险的区域。					

EMC __ Emitted interference (suppression of radio interference) 电磁干扰 __ Interference immunity 抗扰度	EN 55011, Group 1, Class B EN 61000-3-2 EN 61000-3-3 EN 61000-6-2	FCC Class B ----	EN 55011, Group 1, Class B EN61000-3-2 EN61000-3-3 EN61000-6-2	FCC Class B ----
Noise level (dependent on rotor) 噪音等级（取决于转子）	≤65 dB(A)		≤60 dB(A)	
Dimensions 尺寸 __ Width 宽 __ Depth 深 __ Height 高	 330mm 420 mm 313 mm		 330mm 650mm 313mm	
Weight 重量	Approx.21kg		approx. 42 kg	

4. Notes on safety 安全注意事项

No claim under guarantee will be considered by the manufacturer unless the above instructions have been adhered to.

除非遵守了上面的指导，否则制造商将不会理会任何针对保证事项的投诉。

Before the initial operation of your centrifuge you should read and pay attention to the operating instructions. Only personnel that has read and understood the operating instructions are allowed to operate the device.

在对离心机开始首次运行之前，你必须阅读并且注意操作说明。 只有已经阅读并且理解了操作说明的人员才可操作本仪器。

Along with the operating instructions and the legal regulations on accident prevention, you should also follow the recognised professional regulations for working in a safe and professional manner. These operating instructions should be read in conjunction with any other instructions concerning accident prevention and environmental protection based on the national regulations of the country where the

device is to be used.
除了要遵守操作说明及事故预防法规之外，您还需要遵循被认可的行规，以便安全专业地使用仪器。在读这些操作说明的时候您也需要结合离心机使用国在事故预防及环境保护方面立的相关法规。

This centrifuge is a state-of-the-art piece of equipment which is extremely safe to operate. However, it can lead to danger for users or others if used by untrained staff, in an inappropriate way or for a purpose other than that it was designed for.
该离心机属于行业最新水平的设备, 操作非常安全。 但如果未经过培训的人采用了不当的使用方式或者用来做规定之外的其他用途, 也可能会对使用者或其他人带来危险。

The centrifuge should be installed on a good, stable base.
离心机应该安装在一个稳固的水平基座上。

Before using the centrifuge absolutely check the rotor for firm placement.
在使用离心机之前，必须检查转子是否紧紧地固定好了。

When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.
根据 IEC 61010-2-020，当离心机在工作的时候，在其周围 300mm 的安全区域内不能有人、危险物质或者物体。

The centrifuge must not be moved or knocked during operation.
在运转过程中，不允许移动或者敲击离心机。

In case of fault or emergency release, never touch the rotor before it has stopped turning.
在盖锁紧急开启或者出现故障时，在转子停转之前，不可以触摸转子。

To avoid damage due to condensate, when changing from a cold to a warm room the centrifuge must either run hot in the cold room for 30 minutes, or warm up for 3 hours in the warm room, before connecting to the mains.
当把离心机从冷室换到热室时，为了避免冷凝造成的损坏，离心机必须先在冷室中运行 30 分钟来预热，或者在热室中先至少静置 3 个小时，然后再接上电源。

Load centrifuge rotor evenly. All positions on rotor must be filled.
均衡地加载离心转子。转子上的所有位置都必须被装上（吊篮或样品）。

Do not fill centrifuge containers inside the centrifuge.
请勿在离心机内向离心容器添加样品。

Centrifuge containers must not be filled beyond the capacity specified by the manufacturer.
离心容器的加注量不可超过制造商规定的容量。

Standard centrifuge containers of glass will not stand RCF values exceeding 4000 (DIN 58970, pg. 2)
标准的玻璃离心容器不能承受超过 4000（DIN 58970，pg.2）的相对离心力。

Only the rotors and accessories approved by the manufacturer for this device may be used (see section "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories")."
只可使用 Hettich 授权许可的转子及配件到这个仪器上（见 “附录， 转子及配件）。

When centrifuging with maxim revolutions per minute the density of the materials or the material mixtures may not exceed 1.2 kg/dm³ .
当离心机以每分钟最大转数运行时， 材料或者材料混合物的浓度不可以超过 1.2 kg/dm³ 。

The centrifuge may only be operated when the balance is within the bounds of acceptability.
只有当转子的负载平衡在可接受范围之内时，方可运行离心机。

The centrifuge may not be operated in explosion-endangered areas.
不能在存在爆炸危险的区域运行离心机。

The centrifuge must not be used with: 离心机不可用来分离如下物质：
__ inflammable or explosive materials 可燃或者爆炸性的物质
__ materials that react with one another producing a lot of energy. 互相反应可产生许多能量的物质

If users have to centrifuge hazardous materials or compounds contaminated with toxic, radioactive or pathogenic micro-organisms, they must take appropriate measures. Without additional proceedings (like an additional bioseal between bucket and lid of bucket or angle rotor with a special bioseal between rotor and lid) a centrifuge is not a biosafety system in accordance to the regulation EN

61010-2-020. In the case of material belonging to risk group II (see the World Health Organisation's "Laboratory Biosafety Manual") they should employ a biosafety system. Under this system small drips and aerosols are prevented from escaping by a bioseal (packing ring) located between the hanger and the lid. Centrifuge containers with special screw caps, as obtainable through trade suppliers, can also be used for hazardous substances. In the case of materials from the higher risk groups greater safety provision is required than the arrangements described above. In a biosafety system, centrifuge containers with special screw caps must be used.
如果用户必需分离危险物质或者有毒、放射性化合物或者致病微生物， 用户必须采用相应的措施。对于危险物质，必须采用带特殊螺帽的离心容器。对于危险等级为 3 或者 4 的物质，除了用带特殊螺帽的离心容器之外，还必须用生物安全装置（见世界卫生组织的"实验室生物研究安全手册"）。用了这个安全装置，液滴或者气雾都会被吊架及盖子之间的生物密封(密封环)所阻止，不能逃离。如果生物安全装置的吊架不带盖子，为了避免生物密封环在离心过程中被损坏，必须从吊架上移去。 损坏了的生物密封环不能再用来密封生物安全装置。根据 EN610101-2-020 标准， 没有用生物研究安全装置的话，从微生物学上来说，离心机是没有进行密封的。关于生物研究安全装置的详细信息，请看"附录/，转子及配件"。如有任何疑问，您需要向制造商寻求相关信息。

For further details of available biosafety systems see section "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories". If in doubt, you should obtain relevant information from the manufacturer.
关于生物研究安全设备的详细信息，请看"附录， 转子及配件"。如有任何疑问，您需要向制造商寻求相关信息。

The centrifuge must not be operated with highly corrosive substances which could impair the mechanical integrity of rotors, hangers and accessories.
绝不可用离心机来分离具有高度腐蚀性的材料, 这些材料会损坏转子、吊篮配件的机械性能。

Rotors, suspensions and accessories that possess traces of corrosion or mechanical damage or if their term of use has expired may not be used any longer.
任何有腐蚀痕迹，或者机械损坏，或者使用寿命已到期的转子、吊篮及配件均不可继续使用。

Repairs must only be carried out by personnel authorised to do so by the manufacturer.
维修只能由制造商授权的人员来进行。

Only original spare parts and original accessories licensed by the Andreas Hettich GmbH & Co. KG company are allowed to be utilised.
只可使用 Andreas Hettich GmbH & Co. KG 公司授权许可的原装备用零件及原装配件。

The following safety regulations apply: IEC 61010-1 and IEC 61010-2-020 as well as their national deviations.
适用于如下安全规则: IEC 61010-1 及 IEC 61010-2-020 及各国相对应的变更。

The safe operation and reliability of the centrifuge can only be guaranteed if:
__ the centrifuge is operated in accordance with the operating instructions,
__ the electrical installation on the site where the centrifuge is installed conforms to the demands of IEC stipulations,
__ prescribed tests to BGV A1, BGR 261are carried out by an expert.
只有在如下情况下，离心机的操作安全性及可靠性可得到保证：
__ 按照操作说明来运行离心机的。
__ 装离心机处的电力装置符合 IEC 规章的要求。
__ 专家对 BGV A1, BGR 261 进行了规定的测试。

5. Symbol meanings 标志释义

Symbol on the machine: 仪器上的标志
Attention, general hazard area. 注意， 通常有危险的区域。
Before using the centrifuge implicitly read the operating instructions and pay attention to the safety relevant references! 在使用离心机之前，绝对要阅读操作说明，并注意相关的安全提示。

Symbol in the operating instructions: 操作说明上的标志
Attention, general hazard area. 注意， 通常有危险的区域。
This symbol refers to safety relevant warnings and indicates possibly dangerous situations. 这个标志指相关的安全警告，表示可能会产生危险的情景。
The non-adherence to these warnings can lead to material damage and injury to personal. 不按照这些警告操作，会导致材料受损及人员受伤。

This symbol refers to important circumstances. 这个标志指示重要的场合

Symbol for the separate collection of electric and electronic devices according to the guideline 2002/96/EG (WEEE). The device belongs to Group 8 (medical devices). Applies in the countries of the European Union, as well as in Norway and Switzerland. 根据 2002/96/EG (WEEE)准则，这是电子电气设备单独回收的标志。这个设备属于第 8 类产品（医学产品）。适用于欧盟国家及挪威与瑞士。

6. Delivery checklist 产品配送清单

1 Connecting cable 1 条连接电缆

1 Hexagonal pin-type spanner 1 把六角单销式扳手

1 Operating instructions 1 本操作说明

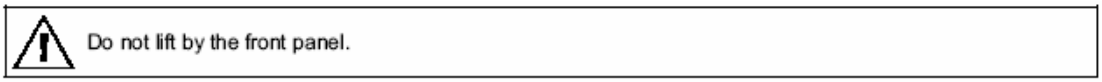
1 Notes on moving the equipment safely 关于安全移动设备的备注

The rotor(s) and associated accessories are included in the delivery in the quantity ordered.
转子及相关的配件都按照配置数量包含在包装中。

7. Unpacking the centrifuge 拆开离心机的包装

Lift the carton upward and remove the padding. 向上举起纸盒，去掉填料；

Lift the centrifuge on both sides with an appropriate number of helpers and place it on the laboratory table. 让几个帮手一起在两边举起离心机，把离心机放在实验室桌上。



不要从前面板处举行（离心机举起时必须保持水平状态）

8. Initial operation 首次运行

For devices weighing more than 18 kg, an emergency shut-down switch for disconnecting the device from the mains must be installed in the indoor installation according to the laboratory device standard EN 61010-2-20 in case of malfunction. This switch has to be placed remote from the centrifuge, prefered outside of the room in which the centrifuge is installed or near by the exit of this room.
对于重量超过 18kg 的仪器，根据实验室仪器标准 IEC 61010-2-020，在室内安装时必须安装一个紧急断开开关以便在出现故障时断开电源。这个紧急断开开关必须远离离心机， 最好装在离心机房外面或者靠近门口。

Remove the transportation safety device from the bottom of the housing, see sheet ”Transportation

safety device"
从离心机底部把用于运输的安全保护设备移去，见“运输安全保护设备”这一页。

Position the centrifuge in a stable and level manner in a suitable place. During set-up, the required safety margin of 300 mm around the centrifuge is to be kept according to IEC 61010-2-020.
把离心机平稳地放置在适当的地方。 在安装过程中， 根据 IEC61010-2-020 准则，在离心机周围必须留出 300mm 的安全区域。


When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.

根据 IEC 61010-2-020 准则，当离心机在工作时，在其周围 300mm 的安全区域内不可有人、危险物质或者物体。

Do not place any object in front of the ventiduct. Keep a ventilation area of 300 mm around the ventiduct.
不要在通风口前面放置任何物体。在通风口周围保持 300mm 的通风区域。

Check whether the mains voltage tallies with the statement on the type plate.
检查电源电压与类型牌上的标示是否相符。

Connect the centrifuge with the connection cable to a standard mains socket. For connection ratings refer to Chapter "Technical specification".
用连接电缆把离心机连接到一个标准的电源插头。 对于接线等级，参考“技术规格”这一章。

Turn on the mains switch. Switch position 'I'. The machine type and program version will be displayed and the LEDs light up. After 8 seconds OPEN OEFFNEN will be displayed on centrifuges with cooling and the left LED in the key STOP / OPEN will flash. On centrifuges without cooling the cover will open automatically and the last used centrifuge data will be displayed.
打开电源开关。 把开关的位置转到"I"。仪器的类型及程序版本会显示出来，LED 灯会亮。8 秒钟之后，带冷却的离心机会显示 OPEN OEFFNEN， STOP / OPEN 键里面左边的 LED 会闪光。对于不带冷却的离心机，盖子将会自动打开，最近一次的离心数据会显示出来。

9. Opening and closing the lid 打开与关闭盖子

9.1 Opening the lid 打开盖子

The lid can only be opened when the centrifuge is switched on and the rotor is at rest. If it cannot be opened under these circumstances, see the section on “Emergency release”.

只有当离心机的开关打亮起并且转子是静止时，盖子才可打开。如不能打开，请看“盖锁紧急开启” 这一章节。

Press the button STOP / OPEN The lid opens automatically and the left LED in the button。
STOP / OPEN go off.
按STOP / OPEN 按钮。盖子会自动打开，按钮STOP / OPEN 左边的 LED 灯会熄灭。

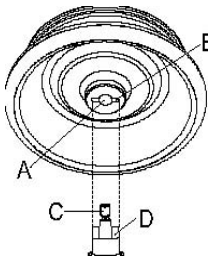
9.2 Closing the lid 关闭盖子

Do not put your fingers between lid and housing.
Do not bang the lid shut.

不要把手指放在盖子及离心室之间。
不要“砰”地一声把盖子关上。

Place the lid and lightly press down the front edge of the lid. The locking action is effected by motor.
The left LED in the button STOP / OPEN lights up.
放好盖子，轻轻下压盖子前面边缘，盖子会被自动锁上。按钮STOP / OPEN左边的 LED 灯会亮起。

10. Installation and removal of the rotor 转子的安装与卸载

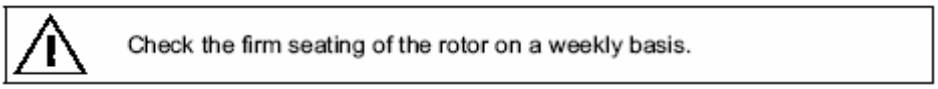


Clean the motor shaft (C) and the rotor drilling (A), and lightly grease the motor shaft afterwards. Dirt particles between the motor shaft and the rotor hinder a perfect seating of the rotor and cause an irregular operation.
清洁发动机轴(C)及装转子的孔(A)，并随后给发动机轴涂上一层薄润滑油。在发动机轴及转子之间的脏物会影响转子的放置，造成运行失调。

Place the rotor vertically on the motor shaft. The motor shaft dog (D) has to fit in the rotor slot (B). The alignment of the groove is labelled on the rotor.
把转子垂直地装在发动机轴上。 发动机轴的驱动区域(D)必须要位于转子的凹槽里面（B）。在转子上标出了与凹槽相对应的位置。

Tighten the rotor tension nut with the supplied wrench by turning in a clockwise direction.
用随机器提供的扳手朝顺时针方向拧紧转子的锁紧螺帽。

Check the rotor for firm seating. 检查转子是否稳固地安装好了。



每周要检查转子是否放置稳定。

Loosening the rotor: Loosen the tension nut by turning in a counter clockwise direction, and turning until the working point for lifting. After passing the working point for lifting the rotor is loosened from the motor shaft cone. Turn the tension nut until the rotor is able to be lifted from the motor shaft.
卸下转子。向逆时针方向旋转锁紧螺母，一直旋转到有效卸下点，也就是代表转子与发动机轴锥体已经分离的位置。必须旋转锁紧螺母超过有效卸下点，才可以把转子从发动机轴举起卸下。

11. Loading the rotor 转子的加载

The rotors and hangers may only be loaded symmetrically. For authorised combinations see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories".转子与吊架只能对称地装载。若想查阅已认证的配置组合，请见“附录，转子及配件”。

With swing-out rotors all rotor positions must be lined with identical hangers. Certain hangers are marked with the number of the rotor position. These hangers may only be used in the respective rotor position.
对于水平转子，所有的位置都必须装上相同的吊桶。某些吊桶可能标有转子位置，对于这些吊桶，必须将它们安装在相应的位置上。

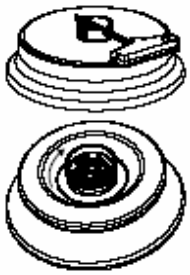
The rotors and hangers may only be loaded symmetrically. For authorised combinations see Chapter "Anhang/Appendix, Rotoren und Zubeh.r/Rotors and accessories".
转子及吊桶必须对称安装，在“配件”部分，列出了被允许使用的转子/吊桶组合。

On certain suspensions, the weight of the maximum load and the maximum weight of the suspension when it is fully equipped is displayed. This weight may not be exceeded. The weight specified for the maximum loading includes the total weight of adapter, frame, centrifuging container and content.
在某些转子上，标明了可允许的最大载重量，请保证样品不超过这个重量。此处的最大载重量指的是适配器，离心容器以及样品的总重量。

Always fill the centrifuge containers outside of the centrifuge. 总是在离心机外添加样品。

In order to maintain the weight differences within the centrifuge container as marginal as possible, a consistent fill level in the containers is to be heeded.
为了保证离心容器之间的负载差保持在被允许的范围，必须使不同离心容器中的加注量相当。

12. Aerosol tight sealing of angle rotos 角转子的气溶胶密封



To ensure aerosol sealing the lid of an aerosol sealed angular rotor must be firmly closed. 为了确保气溶胶密封，气溶胶密封的角转子盖子必须要盖紧。
This is performed with the help of the supplied spanner that is inserted through the borehole in the rotary handle. If the rotary handle does not have a borehole then the lid must be firmly closed by turning in clockwise direction.
将随机提供的扳手插入盖子的孔内（如图），把盖子旋紧。如果盖子上没有孔，必须用手顺时针转动盖子来把盖子拧紧。

For available aerosol tight angle rotors, please see chapter " Anhang/Appendix, Rotoren und Zubehor/Rotors and accessories".
关于气溶胶密封转子，见"附录，转子及配件"。

13. Control and display elements 控制及显示部分

See figure on page 3. 见第 3 页的图。

Fig. 2: Display and control panel 显示及控制面板

13.1 Control knob 控制旋钮

For setting the individual parameters. 用来设定单独的参数。
Turning anticlockwise reduces the value.Turning clockwise increases the value 逆时针方向旋转减小参数值，顺时针方向旋转增大参数值。

13.2 Control panel pushbuttons (keys) 控制面板上的推钮（按键）

Selection control key for selection of specific parameter. 选择按钮用来选择不同的参数。
The subsequent parameter is selected by every further keystroke. 每再按一次就可以选择下一项参数。

Start centrifugation run. The LED in the button lights up during the centrifugation run as long as the rotor is turning . 用于开始离心运行。在离心过程中，只要转子开始转动，该按钮中的 LED 就会发亮。

Short-term centrifugation. The centrifugation run is effected as long as the button is held down. The LED in the button lights up during the centrifugation run as long as the rotor is turning. 短暂离心。只要按住该按钮就可以开始离心。在离心过程中，只要转子开始转动，该按钮中的 LED 就会发亮。

Store inputs and changes. 也用于存储输入及更改。

End centrifugation run. 用于结束离心运行。

The rotor runs down with a pre-selected brake step. The right-hand LED in the button lights up until the rotor is stationary. Once the rotor is stationary the left-hand LED flashes in the button. Pressing the button twice triggers the EMERGENCY STOP. 转子会按照预先选择的减速步骤逐渐停转。该按钮右边的 LED 会发亮，一直到转子停止。 转子一停止，该按钮左边的 LED 就会闪光。 连按两次该按钮，就可以触发紧急停止

Open lid. The left-hand LED in the button goes out. Leave the parameter input. 打开盖子时，按钮左手边的 LED 会熄灭。也用于退出参数输入。

Switch between RPM and RCF display. 在 RPM 与 RCF 显示之间切换。

RCF values are displayed in >< RCF 值是以><标示。

Start pre-cooling 开始预冷

The pre-cooling speed is settable. It is pre-adjusted to 10000RPM

可以设定预冷速度。预设值为 10000RPM。

13.3 Adjustment possibilities 可调范围

PROG RCF Program position of the called-up program. 调用程序的位置。

t/min Running time. Settable from 0 - 99 min, in 1 min increments.
运行时间。 设置范围是 1-99 分；步进是 1 分钟。

t/sec Running time. Settable from 1 - 59 sec. in 1-sec. increments.
运行时间。 设置范围是 1-59 秒；步进是 1 秒钟。

Continuous run "∞" .Set parameter t/min and t/sec to zero.

需要持续运行（"∞"）时，把 t/min 及 t/sec 的参数值设定为 0。

RPM Revolutions per minute. A numerical value from 500 RPM up to the maximum speed of the rotor can be set. Maximum speed of the rotor, see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories". Settable in increments of 10.

每分钟转速。可以把每分钟转数设定为 500 到最大转子速度。关于转子的最大速度，见“附录， 转子与配件”。可以按照步进为 10 来设定每分钟转速。

RAD/mm Centrifugation radius. Input in mm. For centrifugation radius see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories". The input of the radius is only possible if the RCF display（>RCF<）is selected .

离心半径，输入单位为 mm。关于离心半径，见“附录， 转子与配件”。只有选择了 RCF（>RCF<）显示之后，才能输入离心半径。

RCF Relative Centrifugal Acceleration. A numerical value can be set, which gives a speed between 500 RPM and the maximum speed of the rotor. Adjustable up to 100 in intervals of 1, and from 100 in intervals of 10. The RCF value is automatically rounded up or rounded down with regard to the RPM interval. The input of the RCF is only possible if the RCF display（>RCF<）is selected. 相对离心加速度。可以设一个数值，对应从 500 RPM 到转子的最大转速。把这个值从零调到 100，步进为 1。从 100 接着往上调，步进为 10。RCF 值会自动根据相应的 RPM 进行四舍五入。只有选择了 RCF 显示之后（按键 RCF 中的 LED 亮起来了），才能输入 RCF 值。

Starting steps 1 - 9. Step 9 = shortest starting time, Step 1 = longest starting time. 启动步进 1-9。 步进 9＝最短的启动时间，步进 1＝最长的启动时间；

Brake steps 0 - 9. Step 9 = shortest run-down time, Step 1 = long run-down time, Step 0 = longest run-down time (brakeless run-down). 减速步进 0－9。步进 9＝最短的停转时间；步进 0＝最长的停转时间（没有减速的停转）；

T/°C Temperature Set Point (only in centrifuges with cooling). Adjustable from -20°C to +40°C, in 1°C intervals. The lowest obtainable temperature depends on the rotor (see Chapter

"Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories").温度设定点（只是针对带冷却的离心机）。温度可调范围为-20°C 到+40°C，步进为 1°C。可达到的最低温度取决于转子（见“附录， 转子与配件”）。

PROG STO Program position on which the program is stored. 4 programs can be stored (program positions 1 - 2 – 3－4). The programme position # serves as temporary storage for altered adjustments.
程序位置，即程序的编号。 可以保存 9 个程序。程序位置“#”代表临时位置。

14. Programming 程序

14.1 Programme input/alteration 程序输入/变更

If no key is pressed for 8 seconds long after the selection or during the input of parameters, the previous values will be shown in the display. The input of parameter then has to be executed again.

如果在选定参数后或者输入参数过程中，8 秒钟之内没有按任何键，将会显示以前的参数值。这样的话，需要重新输入参数。

Select the RPM or RCF display with the key RCF .RCF values are displayed in ><. 用RCF键来选择 RPM 或者 RCF 显示。RCF 值是以><来标示的。

Select the desired parameters using the button [SELECT] and set using the knob

. 用[SELECT]按钮来选择想要的参数，并用旋钮 来设定参数的大小。

If continuous run is desired the parameters t/min and t/sec need to be set to zero on the knob and the symbol is displayed. 如果想要持续运行，用旋钮 设定参数 t/min 及 t/sec 的值为 0，标志 会出现。

The parameter PROG STO can be selected using the button [SELECT] and the desired program position set using the knob .用[SELECT]钮来选择参数 PROG STO，用旋钮 选择想要的程序位置。

Press the button START / IMPULS in order to store the setting on the desired program position. *** ok *** is displayed briefly as confirmation. 按START / IMPULS钮来把设定保存在想要的程序位置。

*** ok ***会出现在显示屏上一会儿，以表示确认。

The previous data in the program position is overwritten during saving.

在保存的过程中，该程序位置处以前的数据会被覆盖。

14.2 Programme recall 程序调用

Select the parameter PROG RCL using the button [SELECT] and set the desired program position using the knob 用[SELECT]按钮选择参数 PROG RCF，并用旋钮来选择想要的程序位置。

Press the button [START / IMPULS]. The centrifugation data of the selected program position is displayed.按[START / IMPULS]按钮。选定程序位置的离心参数会显示出来。

The parameters can be checked by pressing the button [SELECT]. 按[SELECT]按钮可以查看参数。

To leave the parameter display press the button [STOP / OPEN] or press no button for a period of 8 seconds. 如果不想显示参数了，按[STOP / OPEN]按钮或者不按任何按钮，等 8 秒钟。

15. Centrifugation 离心

When the centrifuge is running, according to IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.

根据 IEC 61010-2-020，当离心机在工作的时候，在其周围 300mm 的安全区域内不许有人、危险物质或者物体。

☞ If the permissible weight difference within the rotor loading has been exceeded, the drive shutsdown during the start-up, the unbalance display lights up, and IMBALANCE is displayed.
如果转子不同位置的负载超过允许的重量差，在预备阶段发动机就会断开，不平衡显示会亮起来，显示 IMBALANCE。

A centrifugation run can be stopped at any time by pushing the key STOP / OPEN .
在任何时侯都可以按STOP / OPEN 键来中断离心运行。

All parameters can be selected and altered during the centrifugation run (see Chapter“Programming”).
在运行过程中可以对所有参数进行选定并更改。（见“程序”这一章）

You can switch-over at any time between the RPM and RCF display with the key RCF. The input of the centrifugation radius is necessary if you are working with the RCF display.
可以在任意时侯按RCF键来在 RPM 与 RCF 显示中切换。如果是用 RCF 显示，必需输入离心半径。

If OPEN OEFFNEN is displayed, a further operation of the centrifuge is only possibleafter opening the lid once.
如果显示OPEN OEFFNEN，盖子必须被打开一次之后，机器才能再次运行。

Turn on the mains switch. Switch position I,. 打开电源开关。开关位置I。

Load the rotor and close the centrifuge lid. 装载转子并且关闭离心机盖子。

15.1 Centrifugation with pre-set time 带预设时间的离心

Adjusting time or recall a programme with pre-set time (see Chapter "Programming").
调整时间或者根据调用一个预设时间程序（见“程序”这一章）。

Press the key START / IMPULS. The LED in the button START / IMPULS lights up for as long as the rotor turns. 按START / IMPULS键，只要转子在转，START / IMPULS按钮中的 LED 就会亮起来。

After expiration of the time or with truncation of the centrifugation run by pushing the key STOP / OPEN , the run-down is effected with the selected brake step. The brake step is displayed.
在运转时间到了后或者按下STOP / OPEN键，离心运行将停止， 转子会按照选择的减速步骤停转。减速步骤会被显示。

During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the remaining time will be displayed.
在运行过程中会显示转子的转速或者相应的 RCF 值、样品温度（只是在带冷却的离心机上会显示）及剩余的运行时间。

After the centrifuge has ended its run and the rotor has come to a halt, the lid opens automatically on centrifuges without cooling.在离心机停止运行，且转子停转之后，不带冷却的离心机的盖子会自动打开。

15.2 Continuous run 持续运行

Adjusting the symbol ∞ or recall a continuous run programme (see Chapter "Programming").调整标志 ∞ 或者调用一个持续运行的程序（见 “程序”这一章）。

Press the key START / IMPULS. The LED in the button START / IMPULS lights up for as long as the rotor turns. The time metering begins at 00:00. 按START / IMPULS键，只要转子开始转动，START / IMPULS按钮中的 LED 就会亮起来。时间计数从 00:00 开始。

Press the key STOP / OPEN in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed. After the centrifuge has ended its run and the rotor has come to a halt, the lid opens automatically on centrifuges without cooling.
按STOP / OPEN 键来停止离心过程。根据选择的减速步骤转子逐渐停转。减速步骤会被显示出来。在离心过程中，将会显示转子的转速或者对应的 RCF 值、样品温度（只针对带冷却的离心机）及已用时间。在离心机停止运行，且转子停转之后，不带冷却的离心机的盖子会自动打开。

15.3 Short-term centrifugation 短暂离心

Hold down the key START / IMPULS. The LED in the button START / IMPULS lights up for as long as the rotor turns. The time metering begins at 00:00.
按住START / IMPULS键，只要转子开始转动，START / IMPULS按钮中的 LED 就会亮起来。时间计数从 00:00 开始。

Let go of the key START / IMPULS again in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed.
放开START / IMPULS键来停止离心。转子根据选择的减速步骤逐渐停转。减速步骤会被显示出来。在离心过程中，将会显示转子的转速或者相应的 RCF 值、样品温度（只针对带冷却的离心机）及已用时间。

16. Emergency Stop 紧急停止

Press the key STOP / OPEN twice.
连按STOP / OPEN 键两次。

With Emergency Stop the run-down is effected with brake step 9 (shortest run-down time). Brake step 9 is displayed.
在紧急停止情况下，转子按照减速步骤 9（最短的减速时间）来减速。减速步骤 9 会显示出来。

17. Acoustic Signal 声音信号

The acoustic signal sounds: 声音信号在下面两种情况下会发出声音：
－Upon the appearance of a disturbance in 2 second intervals.
出现故障的时侯，每隔 2 秒钟响一次；

－After completion of a centrifugation run and rotor standstill in 30 second intervals.
完成了离心运行且转子停转之后，每隔 30 秒响一次。

The acoustic signal is stopped by opening the lid or pressing any key.
打开盖子或者按任何键，声音信号会停止；

The signal after completion of the centrifugation run can be activated or deactivated in the following manner, if the rotor is at standstill:
如果转子在静止状态，可以用如下方式来激活或者消除离心结束后的声音信号：

Hold down the key SELECT for 8 seconds. After 8 seconds, SOUND / BELL appears in the display.
按住SELECT 键 8 秒钟。8 秒钟之后，SOUND / BELL 会出现在显示屏上。

Set using the knob OFF or ON.

用 OFF or ON. 来进行设定。

Press the key START / IMPULS in order to store the setting. As confirmation, *** ok *** is displayed briefly.

按START / IMPULS键来保存设定。 *** ok ***会出现在显示屏上一会儿，以表示确认。

18． Recall hours of operation 机器运行时间

Recall hours of operation is only possible during rotor standstill.

只能在转子停转之后才可使用本功能。

Hold down the key SELECT for 8 seconds. After 8 seconds, SOUND / BELL appears in the display.

按住SELECT 键 8 秒钟。8 秒钟之后，SOUND / BELL会出现在显示屏中。

Press the key SELECT once again. The centrifuge's hours of operation (CONTROL:) are displayed.再次按SELECT 键。 离心机的运行时间（CONTROL: ）会显示出来。

Press the key STOP / OPEN to exit the hours of operation recall. 按STOP / OPEN键来退出恢复运行时间界面。

19． Cooling (only in centrifuges with cooling) 冷却（只针对带冷却的离心机）

The temperature set-point can be adjusted from -10° C to +40° C. The lowest obtainable temperature is dependent on the rotor (see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories").

温度设定值的可调范围是-20°C 到+40°C。实际可获得的最低温度取决于转子（见 “附录，转子及配件”）。

19.1 Standby-cooling 待机冷却

With rotor standstill and closed lid the centrifugal chamber is cooled to the pre-selected temperature. The temperature set-point is shown in the display.

当转子处于静止状态并且盖子盖上了时，离心腔将冷却到预先设定的温度，并在显示器上会显示温度设定值。

Standby cooling will be subject to a timed delay after a centrifuge run and the display will show OPEN OEFFNEN. The delay time can be pre-set in 1minute steps from 1 to 5 minutes. It is pre-set to 1 minute.
在每次离心完成后，待机冷却将在一个预设的时间后启动，可以设定延迟时间为 1－5 分钟，步进 1 分钟，出厂值是 1 分钟。在待机冷却时，显示屏会显示 OPEN OEFFNEN。

With the rotor standing still and the cover open the delay time can be set as follows:
当转子是静止且盖子打开的时候，可以按照如下设置延迟时间：

_ Hold down the key for 8 seconds. 按住键 8 秒钟。

After 8 seconds, t/min = X appears in the display. 8 秒钟后，t/min=X 会出现在显示屏中。

_ Use the rotary button to set the delay time. 用旋钮来设定延迟时间。

Press the key START / IMPULS in order to store the setting. As confirmation, *** ok *** is displayed for a short period. To leave the delay time display press the key STOP / OPEN or do not press any key for a period of 8 seconds.
按START / IMPULS键来保存设定。*** ok ***会出现在显示屏上一会儿，以表示确认。按STOP / OPEN键来退出延迟时间显示，或者 8 秒钟内不按任何键。

19.2 Pre-cooling the rotor 预冷转子

Press the key.The LED in the button START / IMPULS lights up for as long as the rotor turns.
按下键，转子开始转动，且START / IMPULS按钮中的 LED 会亮起来直至转子停止转动。

Press the button STOP / OPEN to end the pre-cooling. The run-down is effected with the selected brake step. The brake step is displayed. During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature and the expired time will be displayed.
按STOP / OPEN键来终止预冷过程。根据选择的减速步骤转子逐渐停转。减速步骤会显示出来。在离心过程中，将会显示转子的转速或者相应的 RCF 值、样品温度（只针对带冷却的离心机）及已用时间。

The pre-cooling speed can be adjusted in decadic steps from 500 RPM to the max RPM of the rotor. It is pre-adjusted to 2800 RPM.

可以把预冷速度从 500 RPM 调到转子的最大转速，调整步进为 10。预设值是 2800 RPM。

When the rotor is stationary and the lid open the pre-cooling speed can be set in the following manner:
当转子是静止且盖子打开的时侯，可以用下面的方式来设定预冷速度。

Hold down the key for 8 seconds. 按住 键 8 秒钟。

After 8 seconds, t/min = X appears in the display. 8 秒钟后，t/min = X会出现在显示屏中。

Press the key once again. The set pre-cooling RPM - RPM = XXXX will be displayed.

再次按 键。 将会显示设定的预冷 RPM: RPM = XXXX

Set the desired pre-cooling speed using the knob 用旋钮 来设定想要的预冷速度。

Press the key START / IMPULS in order to store the setting. As confirmation, *** ok *** is displayed for a short period.

按START / IMPULS键来保存设定。 *** ok ***会出现在显示屏上一会儿，以表示确认。

20． Relative centrifugal force (RCF) 相对离心力

The relative centrifugal force (RCF) is given as a multiple of the acceleration of gravity (g). It is a unit-free value and serves to compare the separation and sedimentation performance.
相对离心力（RCF）是重力加速度的倍数，没有单位，用来比较分离及沉淀性能。

These values are calculated using the formula below: 用下面的公式可以计算这些值。

$$RCF = \left(\frac{RPM}{1000}\right)^2 \times r \times 1{,}118 \qquad \Rightarrow \qquad RPM = \sqrt{\frac{RCF}{r \times 1{,}118}} \times 1000$$

RCF = relative centrifugal force 相对离心力

RPM = rotational speed (revolutions per minute) RPM= 旋转速度（每分钟的转数）

r = centrifugal radius in mm = distance from the centre of the turning axis to the bottom of the centrifuge. For more on the centrifugal radius see the chapter ” Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories”. r=以 mm 为单位的离心半径＝转轴的中心到离心管底部的距离。有关离心半径的更多信息，见“附录，转子与配件”这一章。

☞	The relative centrifugal force (RCF) stands in relation to the revolutions per minute and the centrifugal radius.

相对离心力(RCF)与每分钟的转数及离心半径成比例。

21．Centrifugation of materials with higher density 高浓度材料的离心

The rotors are designed to centrifuge substances up to a maximum mean homogenous density of 1.2 kg/ dm^3 when rotating at the stated speed. Denser substances must be centrifuged at lower speed.
转子的设计是用来在指定转速下分离最最大平均表观密度为 1.2 kg/ dm^3 的材料。对于密度更高的材料，必须用较慢的分离速度。

The permissible speed can be calculated using the following formula: 可用下面的公式计算可允许的速度。

$$\text{Reduced speed } (n_{red}) = \sqrt{\frac{1.2}{\text{Greater density}}} \times \text{Rated speed}$$

e.g.: RPM 4000, density 1.6 kg/dm^3 比如 RPM4000， 浓度为 1.6 kg/dm^3

$$n_{red} = \sqrt{\frac{1.2}{1.6}} \times 4000 = 3464 \text{ RPM}$$

If in doubt you should obtain clarification from the manufacturer. 如果有疑问的话，您需要联系制造商来确认。

22 Rotor Identification 转子识别

After every start of a centrifugation run the rotor utilised is identified.
在每次离心启动后，转子将会被自动识别。

After a change of rotor the drive switches off and the rotor code (R xx) as well as the maximum rotational speed (n-max=xxxxx) of the rotor are displayed.
如果转子被更换过，发动机将会停止，同时转子编号及最大离心力等信息将会被显示出来。

> A further operation of the centrifuge is only possible after a single opening of the lid.
> If, following a rotor change, the maximum speed of the rotor is less than the set speed, the speed is limited to the maximum speed of the rotor.

转子更换后，要再次使用离心机，必须重新开启盖子一次。
转子更换后，若转子的最高转速低于设定值，则设定的转速将自动调整为转子的最高转速。

23. Emergency release 盖锁紧急开启

The lid cannot be opened during power failure. An emergency release has to be executed by hand.
在断电后不能打开盖子的话，需要手动来进行盖锁紧急开启。

For emergency release disconnect the centrifuge from the mains.
Open the lid only during rotor standstill.

在进行盖锁紧急开启的时侯，先断开离心机的电源。
只能在转子停转之后打开盖子。
See figure on page 3. 见第 3 页的图。

Switch off the mains switch (switch position "0").关闭主电源（开关位置“0”）
Look through the window in the lid to be sure that the rotor has come to a standstill. 通过窗口来查看转子，确保转子已经停止了。

Insert the hexagonal wrench key into the bore hole (Fig. 1, A) and carefully rotate by half a turn in clockwise direction until the lid can be opened. Pull the hexagon socket head wrench out of the drilling again. After turning the centrifuge on again, press the button STOP / OPEN so that the motor-driven lid locking once again assumes the normal position (opened).
把六角单销式扳手插入钻孔(Fig. 1, A)，并且慢慢地顺时针旋转半圈，直到盖子可以打开。 把六角单销式扳手从钻孔里拔出来。接通离心机的电源后，按 STOP / OPEN 按钮，这一由发动机驱动的盖锁装置就会回到正常的位置（打开的）。

24. Maintenance and servicing 保养与维修

Pull the mains plug before cleaning.
Before any other cleaning or decontamination process other than that recommended by the manufacturer is applied, the user has to check with the manufacturer that the planned process does not damage the device.

清洁之前先拔掉电源插头。
在开始任何非制造商建议的清洁或者消毒程序之前, 用户需要先联系制造商来确保这些程序将不会对设备造成损害。

Cleaning agents and disinfectants which lie in the pH range 5 – 8 are to be utilised. Alkaline cleaning agents with a pH value > 8 are to be avoided.
所用的清洁剂及消毒剂必须是在 5-8 这个 pH 值范围内。 避免用 pH 值大于 8 的碱性清洁剂。

In order to prevent appearances of corrosion through cleaning agents or disinfectants, the application guide from the manufacturer of the cleaning agent or disinfectant are absolutely to be heeded.
为了避免清洁剂或者消毒剂造成的表面腐蚀, 务必遵循清洁剂或者消毒剂制造商的使用说明。

24.1 Centrifuge 离心机

Regularly clean the centrifuge housing and the centrifugal chamber; and if necessary, clean with soap or a mild cleaning agent and water. For one thing, this services purposes of hygiene, and it also prevents corrosion through adhering impurities.
需要定期清洁离心容器及离心腔。 如果有必要的话, 也可以用肥皂或者中性的清洁剂及一块湿布。 需要一提的是， 清洁既是为了卫生，也是为了防止粘性杂质引起的腐蚀。

In the event of condensation water formation, dry the centrifugal chamber by wiping out with an absorbent cloth.
如果形成了冷凝水，请用吸水布把离心腔擦干。

If infectious materials penetrates into the centrifugal chamber this is to be disinfected immediately. For surface disinfection we recommend Bacillol® Plus from the company Bode Chemicals in Hamburg.
如果传染性的材料渗入了离心容器中，需要立刻进行消毒。建议用 Hamburg 的 Bode Chemie 生产的 Bacillol® Plus 来去消毒。

Lightly grease the rubber seal of the centrifugal chamber after every cleaning.
每次清洁之后给离心腔的橡胶密封圈抹上薄薄的润滑油。

24.2 Rotors and Attachments 转子与附件

Rotors and accessory parts must be regularly cleaned with soap or a mild cleaning agent and water in order to prevent corrosion and changes of material. Cleaning is recommended at least once a week, even better after every usage.
为了避免腐蚀及材料的变化， 必须定期用肥皂或者中性清洁剂及水对转子及配件进行清洁。建议每周至少清洁一次， 最好每次用完之后清洁一次。

If the rotor or accessory parts are contaminated by pathogenic or radioactive material, a suitable cleaning has to be executed. For disinfection we recommend Helipur® H plus N from the company B. Braun Melsungen. For the removal of radioactive material we recommend decon® neutracon from

the company Decon® Laboratories Limited.
如果转子或者配件被致病性或者放射性材料污染了， 需要进行适当的清洁。 对于消毒，建议用 B. Braun Melsungen 公司的 Helipur ®H plus N 来去污。对于去除放射性物质，建议用 Decon® Laboratories Limited 的 decon® neutracon。

The rotors and accessory parts must be dried immediately after cleaning.
在清洁之后必须立刻吹干转子及配件。

Angle rotors, container and hanger made of aluminium are to be lightly greased after drying using acid-free grease, e.g. vaseline.
用铝材做的角转子、容器及吊篮在干燥后需要涂上薄薄的非酸性的润滑油，如凡士林。

With aerosol-sealed rotors and bio safety systems (see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories") the sealing rings are to be checked and cleaned regularly (weekly). The sealing ring is to be replaced immediately upon indication of crack formation, embrittlement or abrasive wear. To prevent the sealing ring from twisting when the lid is opened and closed, the sealing ring must be lightly greased with acid-free grease, such as Vaseline.
对于气溶胶密封的转子及生物研究安全装置（见“附件，转子及配件”)， 需要定期(每周)查看并清洁密封圈。 如果密封圈出现了任何龟裂、脆裂或者磨损的迹象， 需要立刻更换密封圈。 为了防止开关盖时密封圈翘曲，必需要对密封圈涂上薄薄的非酸性的润滑油，如凡士林。

In order to prevent corrosion as a result of moisture between the rotor and the motor shaft, the rotor should be disassembled and cleaned at least once a month, and the motor shaft should be lightly greased.
为了防止转子及发动机轴之间的水分导致腐蚀，至少每个月要把转子卸下来清洁一次， 发动机轴需要涂上薄薄的润滑油。

The rotors and accessory parts are to be checked on a monthly basis for corrosion damage.
需要每个月对转子及配件进行检查，防止腐蚀。


Rotors and attachments may no longer be utilised upon indication of wear and tear or corrosion.

如果转子及配件出现了磨损或者腐蚀的迹象，就不能继续使用了。

24.2.1 Rotors and accessories with limited term of use 在使用限期内的转子及配件

The use of specific rotors, suspensions and accessories is time limited. They are marked with an expiry date, e.g. "einsetzbar bis Ende: / usable until end of: ‚V. Quartal 2011" (applicable until the end of: ‚Vth quarter 2011).

转子、 吊篮及配件都是有一定的使用期限的。它们都标明了到期日期，比如“可以用到 2011 年的第四季度末”。

The rotors, suspensions and accessories may not be used for longer periods for safety reasons once the marked expiry date has been reached.

如果到了标注的到期日期，出于安全考虑，不要再继续用这些转子、吊篮及配件。

24.3 Autoclaving 高压灭菌

Swing-out rotors, angle rotors made of aluminium, suspension made of metal, lids with biodegradable seals as well as stands and reductions can be autoclaved at 121° C / 250° F (20 mins). Otherwise you must ask the manufacturer.

用铝材做的水平转子、角转子及金属做的吊篮及带生物可降解的密封盖子及支架可以在 121° C / 250°F (20 mins)下进行高压灭菌。如果要用其他方式，必须咨询制造商。

The lids of the rotors and containers must be removed prior to autoclaving.
Autoclaving accelerates the ageing process of plastics. In addition, autoclaving may discolour plastics.
After autoclaving, we recommend that the sealing rings of the aerosol-tight and bio-safety systems be exchanged.

在进行高压灭菌之前，必须取下转子及容器的盖子。高压灭菌会加快塑料的老化过程。此外， 高压灭菌可能会导致塑料褪色。在高压灭菌之后， 建议更换密封圈及生物安全装置。

24.4 Centrifuge containers 离心容器

With leakiness or after the breakage of centrifuging containers broken container parts and leaked centrifugation material are to be completely removed.

如果离心容器发生泄漏或者被破坏，需要彻底清除被破坏的容器碎片及泄漏的材料。

The rubber inserts as well as the plastic sleeves of the rotors are to be replaced after a glass breakage. 在发生玻璃碎裂之后，转子的橡胶垫及塑料护套需要更换。

Remaining glass splitters cause further glass breakage!

残余的玻璃碎片会对新放入的玻璃容器造成损坏。

If this concerns infectious material, a disinfection process is to be executed immediately.

如果进行离心的是传染性样品， 需要立刻进行消毒。

24. Faults 故障

If the fault cannot be eliminated with the help of the fault table, please inform Customer Service.

如果根据故障表格里面的指导不能消除故障，请通知 Hettich 的客户服务部。

Please state the type of centrifuge and the factory serial number. Both values are visible on the centrifuge type plate.

请说明离心机的类型及工厂序列号。 在离心机的型号牌上面能够看得到这些信息。

Perform a MAINS RESET: 进行电源重设;

Switch off the mains switch (switch position "0").

关掉电源开关（开关位置"0"）;

Wait at least 10 seconds and then switch on the mains switch again (switch position "I").

至少 10 秒钟之后再重新打开电源开关（开关位置"I"）。

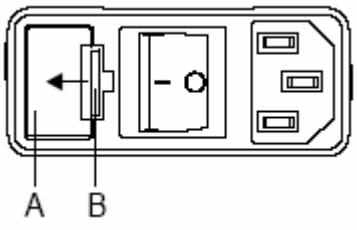
Message / fault 信息/故障		Cause 原因	Remedy 解决方法
No display 没有显示	———	No voltage. 没有电压 Mains input fuses defective 电源输入保险丝有问题	Check supply voltage.检查供电电压。 Check mains input fuses 检查电源输入保险丝。 Mains switch ON. 打开电源开关
TACHO – ERROR 转速器错误	1	Faulty speedometer. 速度计有故障	Open the cover. 打开盖子 Switch off the mains switch (swithch position"0") 关掉电源开关（开关位置"0"） Wait at least 10 seconds. 至少等 10 秒钟 Turn the rotor vigorously by hand. 用手用力转动转子 Switch on the mains switch again (switch position"1").打开电源开关（开关位置"1"） The rotor must turn during switch-on。 在电源打开的时侯，转子必须保持转动。
	2	Motor, electronics defective 发动机，电气部分有问题	
IMBALANCE 失衡	———	Imbalance about motor axis through weight differential rotor assembly. 由于转子不同位置负载的重量不一致，发动机轴出现不平衡	Open lid 打开盖子 Correct imbalance.纠正不平衡
CONTROL-ERROR 控制部分出错位	4, 6，8	Error in lid locking or lid closure. 盖锁或关闭上出问题了	Perform a Mains Reset 重启电源
N> MAX	5	Rotation too fast 转速过快	
N< MIN	13	Rotation too slow 转速过慢	
MAINS INTERRUPT 电源中断	———	Power failure, centrifuging not properly completed 断电，离心过程未顺利完成。	Open lid. Push START / IMPULS button. 打开盖子，按

			START / IMPULS按钮。
N＞ROTOR MAX		Speed in the selected program greater than the maximum speed of the rotor 设定的转速高于使用的转子的最高转速	Check the set speed. 检查设定的速度 Reduce the set speed 降低设定的速度
ROTORCODE 转子编号	10	Incorrect rotor coding 转子编号错误	Open lid. 打开盖子
CONTROL-ERROR 控制问题	22 ，25-27	Error/defect electronics 电气部分出错	Perform a MAINS RESET 重启电源
CONTROL-ERROR 控制问题	23	Error/defect controls 控制部分有出错	
SER 1/O ERROR SER 1/O 问题	30-36	Error/defect electronics 电气部分出错	
^{0}C* ERROR 温度问题	51-53,55	Error/defect electronics 电气部分出错	
FU/CCI-ERROR FU/CCI- 问题	60-64,67,68,82-85	Error/defect electronics/motor 电气或者发动机部分出错	
SYNC-ERROR SYNC 问题	90	Error/defect electronics 电气部分出错	
SENSOR-ERROR 感应器有问题	91,92	Error/defect unbalance sensor 平衡感应器出错	
KEYBOARD-ERROR 键盘故障	---	Error/defect controls 控制部分出错	

25. Change mains input fuse 更改电源输入保险丝

Switch off the mains switch and separate the centrifuge from the mains!

关掉电源开关, 把离心机与电源断开!



The fuse holder (A) with the mains input fuses is located next to the mains switch. 装有电源输入保险丝的保险支座（A）紧挨着电源开关。

- Remove the connecting cable from the machine plug socket.
  把电线从仪器插座上拔掉。

- Press the snap-fit (B) against the fuse holder (A) and remove.

向保险丝支座按压搭扣配合，然后移开。

Only use fuses with the rating defined for the type. See the following table.

只能用与各型号相对应等级的保险丝。见下表。

- Exchange defective mains input fuse.
  更换坏了的电源保险丝。
- Reinsert the fuse holder until the snap-fit clicks shut.
  重新把保险丝插入保险支座直到搭扣配合关闭。

Reconnect the centrifuge to the mains supply. 重新给离心机接上电源

Model	Type	Fuse	Order no.
MIKRO 200	2400	T 3,15 AH/250V	E997
MIKRO 200	2400-01	T 5 AH/250V	E914
MIKRO 200 R	2405, 2405-07	T 5 AH/250V	E914
MIKRO 200 R	2405-01	T 8 AH/250V	E738

26. Acceptance of the centrifuges for repair 离心机的维修受理

If the centrifuge is returned to the manufacturer for repair, it must be decontaminated and cleaned to protect persons, environment and material.

如果发回离心机给制造商维修,必须对离心机进行消毒及清洁来保护工作人员、环境及材料。

We reserve the right to accept contaminated centrifuges.

Hettich 保留是否接受被污染了的离心机的权利。

Costs incurred for cleaning and disinfection are to be charged to the customer.

清洁及消毒引起的费用需要顾客来承担。

We ask for your understanding in this matter. Hettich

请顾客理解。

27. Disposal 报废

When you are disposing of the device, the respective statutory rules must be observed. Pursuant to guideline 2002/96/EC (WEEE), all devices supplied after August 13, 2005 may not be disposed as part of domestic waste. The device belongs to group 8 (medical devices) and is categorized in the business-to-business field.

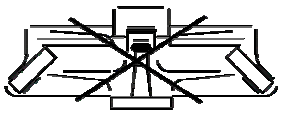
当报废该仪器时，必须遵守相应的法规。根据 2002/96/EC (WEEE)准则， 所有自 2005 年 8 月 13 号后销售的设备不可作为生活垃圾来处理。该仪器属于第 8 类（医学设备）产品， 被划入到商业间类别。

The icon of the crossed-out trash can shows that the device may not be disposed as part of domestic waste. 划掉的垃圾桶图像表示该仪器不可以作为生活垃圾来处理。

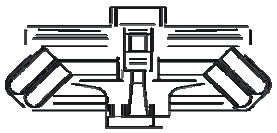
The waste disposal guidelines of the individual EC countries might vary. If necessary, contact your supplier.
欧盟每个国家的废物处置准则可能不同，如果有必要的话，联系供应商。

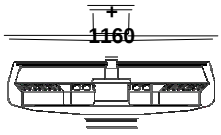
29 Appendix 附录

29.1 Rotors and accessories 转子及配件

	1189 / 1195	
		**Not permitted in MIKRO 220 / 220 R.** **不允许使用于MIKRO 220 / 220 R.**

29.1.1 MIKRO 220 / MIKRO 220R

1158-L									
Angle rotor 48-times **48位角转子**  ∠ 45° with bio-containment [4] 含生物密封盖	2031 3)	2023		2024		---		
								
	2078	---	---	---	---	0536		
								
Kapazität / capacity ml	1,5	0,5	0,8	0,2	0,4	2,0		
Maße / dimensions ⌀ x L mm	11 x 38	8 x 30	8 x 45	6 x 18	6 x 45	11 x 38		
Anzahl p. Rotor / number p. rotor	48	48	48	48	48	48		
Drehzahl / speed RPM	14000	14000	14000	14000	14000	14000		
RZB / RCF	21255 / 18845	21255 / 18845	21255 / 18845	21255 / 18845	21255 / 18845	21255 / 18845		
Radius / radius mm	97 / 86	97 / 86	97 / 86	97 / 86	97 / 86	97 / 86		
9 (97%) sec	21	21	21	21	21	21		
9 sec	22	22	22	22	22	22		
0 sec	420	420	420	420	420	420		
Temperatur / temperature °C [1]	-4	-4	-4	-4	-4	-4		
Probenerwärmung/Sample temp. rise K [2]	11	11	11	11	11	11		

1162 + 1160								
Winkelrotor 6-fach / **Angle rotor 6-times** **1162**  **1160**								
	PCR-Strips							
Kapazität / capacity ml	0,2	0,2						
Maße / dimensions ⌀ x L mm		6 x 18						
Anzahl p. Rotor / number p. rotor	6	48						
Drehzahl / speed RPM	14000	14000						
RZB / RCF	18845	18845						
Radius / radius mm	86	86						
9 (97%) sec	20	20						
9 sec	22	22						
0 sec	377	377						
Temperatur / temperature °C [1]	-4	-4						
Probenerwärmung/Sample temp. rise K [2]	13	13						

1) 在环境温度为20度时，使用最高转速时离心1小时可以达到的温度

2) 使用最高转速离心1小时，样品温度的上升

3) 推荐用于高速离心

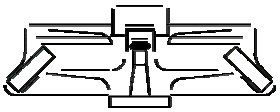
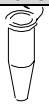
4) 符合DIN EN 61010， part2-020

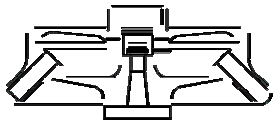
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

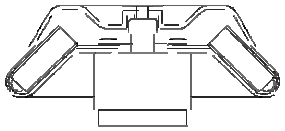
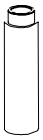
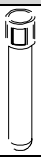
2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

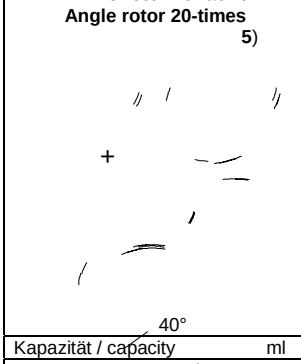
3) recommended for high-speed centrifugation

4) in conformity with DIN EN 61010, part 2 – 020. Observe the notes for bio safety systems in chapters "Notes on safety" and Maintenance and servicing".

1189-A									
Winkelrotor 30-fach / Angle rotor 30-times	2031 3)	2023		2024		---			
									
	2078	---	---	---	---	0536			
45°									
mit Bioabdichtung / with bio-containment 4)									
Kapazität / capacity ml	1,5	0,5	0,8	0,2	0,4	2,0			
Maße / dimensions | x L mm	11 x 38	8 x 30	8 x 45	6 x 18	6 x 45	11 x 38			
Anzahl p. Rotor / number p. rotor	30	30	30	30	30	30			
Drehzahl / speed RPM	14000	14000	14000	14000	14000	14000			
RZB / RCF	21255	21255	21255	21255	21255	21255			
Radius / radius mm	97	97	97	97	97	97			
9 (97%) sec	20	20	20	20	20	20			
9 sec	22	22	22	22	22	22			
0 sec	385	385	385	385	385	385			
Temperatur / temperature °C 1)	3	3	3	3	3	3			
Probenerwärmung/Sample temp. rise K 2)	13	13	13	13	13	13			

1195-A									
Winkelrotor 24-fach / Angle rotor 24-times	2031 3)	2023		2024		---			
									
	2078	---	---	---	---	0536			
45°									
mit Bioabdichtung / with bio-containment 4)									
Kapazität / capacity ml	1,5	0,5	0,8	0,2	0,4	2,0			
Maße / dimensions | x L mm	11 x 38	8 x 30	8 x 45	6 x 18	6 x 45	11 x 38			
Anzahl p. Rotor / number p. rotor	24	24	24	24	24	24			
Drehzahl / speed RPM	18000	18000	18000	18000	18000	18000			
RZB / RCF	31514	31514	31514	31514	31514	31514			
Radius / radius mm	87	87	87	87	87	87			
9 (97%) sec	26	26	26	26	26	26			
9 sec	23	23	23	23	23	23			
0 sec	371	371	371	371	371	371			
Temperatur / temperature °C 1)	3	3	3	3	3	3			
Probenerwärmung/Sample temp. rise K 2)	17	17	17	17	17	17			

2218								
Winkelrotor 12-fach / Angle rotor 12-times  45°	2031 3)	2023		2024			---	
								
	2078	---	---	---	---	0536		
								
Kapazität / capacity ml	1,5	0,5	0,8	0,2	0,4	2,0		
Maße / dimensions ⌀ x L mm	11 x 38	8 x 30	8 x 45	6 x 18	6 x 45	11 x 38		
Anzahl p. Rotor / number p. rotor	12	12	12	12	12	12		
Drehzahl / speed RPM	18000	18000	18000	18000	18000	18000		
RZB / RCF	25718	25718	25718	25718	25718	25718		
Radius / radius mm	71	71	71	71	71	71		
9 (97%) sec	11	11	11	11	11	11		
9 sec	10	10	10	10	10	10		
0 sec	216	216	216	216	216	216		
Temperatur / temperature °C 1)	-5	-5	-5	-5	-5	-5		
Probenerwärmung/Sample temp. rise K 2)	13	13	13	13	13	13		

2219								
Winkelrotor 20-fach / Angle rotor 20-times 5)  40°								
Kapazität / capacity ml	1,8							
Maße / dimensions ⌀ x L mm	Cryo Röhrchen/ Cryo-tubes							
Anzahl p. Rotor / number p. rotor	20							
Drehzahl / speed RPM	14000							
RZB / RCF	18407							
Radius / radius mm	84							
9 (97%) sec	21							
9 sec	21							
0 sec	277							
Temperatur / temperature °C 1)	-9							
Probenerwärmung/sample temp. rise K 2)	10							

1) 在环境温度为20度时，使用最高转速离心1小时可以达到的最低温度

2) 最高转速离心1小时后，样品温度的上升

3) 推荐用于高速离心

5) 2423 耐酚，可高压灭菌
2425 可高压灭菌

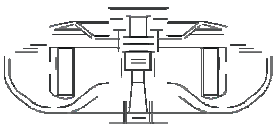
1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

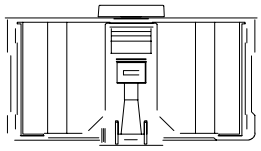
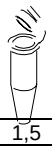
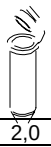
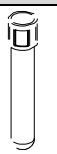
2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

3) recommended for high-speed centrifugation

5) 2423 phenol resistant, autoclavable, with bio-containment (in conformity with DIN EN 61010, part 2 – 020).

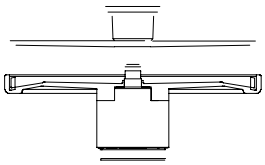
2425 autoclavable, with bio-containment (in conformity withDIN EN 61010, part 2 – 020). Observe the notes for bio safety systems in chapters "Notes on safety" and "Maintenance and servicing".

1154-L									
Ausschwingrotor 24-fach / Swing out rotor 24-times  ∠ 90°	2031 3)	2023 		2024 					
	2078 	--- 	--- 	--- 	--- 	0536 			
Kapazität / capacity	ml	1,5	0,5	0,8	0,2	0,4	2,0		
Maße / dimensions | x L	mm	11 x 38	8 x 30	8 x 45	6 x 18	6 x 45	11 x 38		
Anzahl p. Rotor / number p. rotor		24	24	24	24	24	24		
Drehzahl / speed	RPM	13000	13000	13000	13000	13000	13000		
RZB / RCF		18516	18516	18516	18516	18516	18516		
Radius / radius	mm	98	98	98	98	98	98		
9 (97%)	sec	26	26	26	26	26	26		
9	sec	27	27	27	27	27	27		
0	sec	425	425	425	425	425	425		
Temperatur / temperature	°C 1)	-2	-2	-2	-2	-2	-2		
Probenerwärmung/Sample temp. rise	K 2)	15	15	15	15	15	15		

1161									
Topfrotor 6-fach / Pot rotor 6-times  ∠ 90°	1377		1379		1378				
	2078 	**0536** 	--- 	--- 					
Kapazität / capacity	ml	1,5	2,0	0,5	0,8	0,2	0,4		
Maße / dimensions | x L	mm	11 x 38		8 x 30	8 x 45	6 x 18	6 x 45		
Anzahl p. Rotor / number p. rotor		60		126	126	192	192		
Drehzahl / speed	RPM	13000		13000	13000	13000	13000		
RZB / RCF		14171		14171	14171	14171	14171		
Radius / radius	mm	75		75	75	75	75		
9 (97%)	sec	17		17	17	17	17		
9	sec	18		18	18	18	18		
0	sec	403		403	403	403	403		
Temperatur / temperature	°C 1)	-3		-3	-3	-3	-3		
Probenerwärmung/Sample temp. rise	K 2)	10		10	10	10	10		

1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Lauf
zeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)
2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)
3) bei hochtouriger Zentrifugation empfohlen

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)
2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)
3) recommended for high-speed centrifugation

1023								
Hämatokritrotor 24-fach / Haematocrite rotor 24-times 								
		2077 Verschlusskitt / sealing putty						
	1071	1072	2074					
Kapazität / capacity ml								
Maße / dimensions x L mm	1,4 x 75	1,6 x 75	1,4 x 75					
Anzahl p. Rotor / number p. rotor	24	24	24					
Drehzahl / speed RPM	15000	15000	15000					
RZB / RCF	21382	21382	21382					
Radius / radius mm	85	85	85					
9 (97%) sec	11	11	11					
9 sec	12	12	12					
0 sec	98	98	98					
Temperatur / temperature °C [1]	-11	-11	-11					
Probenerwärmung/Sample temp. rise K [2]	14	14	14					

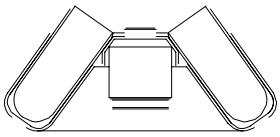
1) Tiefste erreichbare Temperatur bei maximaler Drehzahl, 1 h Laufzeit und 20°C Raumtemperatur (nur bei Kühlzentrifuge)

2) Probenerwärmung bei maximaler Drehzahl und 1 Stunde Laufzeit (nur bei Zentrifuge ohne Kühlung)

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

2) Sample temp. rise during maximum speed and 1 hour running time (only with centrifuges without cooling)

29.1.2 MIKRO 220R

1016									
Winkelrotor 6-fach / Angle rotor 6-times									
		1634	1633		1635			1631	1632
 35°	0521	0546	0519	0545	0518	0507		0509	0578
									
Kapazität / capacity ml	50	50	25	30	15		9-10	10	15	7
Maße / dimensions ⌀ x L mm	34 x 100	29 x 107	24 x 100	26 x 95	17 x 100		16 x 92	15 x 102	17 x 120	12 x 100
Anzahl p. Rotor / number p. rotor	6	6	6	6	6		6		6	6
Drehzahl / speed RPM	6000	6000	6000	6000	6000		6000		6000	6000
RZB / RCF	4025	3904	3622	3703	3783		3783		3824	3944
Radius / radius mm	100	97	90	92	94		94		95	98
9 (97%) sec	14	14	14	14	14		14		14	14
9 sec	17	17	17	17	17		17		17	17
0 sec	373	373	373	373	373		373		373	373
Temperatur / temperature °C [1]	-20	-20	-20	-20	-20		-20		-20	-20

1016		1015						
Winkelrotor 6-fach / Angle rotor 6-times		**Winkelrotor 12-fach / Angle rotor 12-times**		1054-A				1054-A
	1641							
 35	0513	35°	0518	0507	0553	---	0509		0501
									
Kapazität / capacity ml	50	Kapazität / capacity ml	15		5		15	1,6 – 5,0	6
Maße / dimensions ⌀ x L mm	29 x 115	Maße / dimensions ⌀ x L mm	17 x 100		12 x 75	13 x 75	17 x 120	13 x 75	12 x 82
Anzahl p. Rotor / number p. rotor	3	Anzahl p. Rotor / number p. rotor	12		12		6	12	
Drehzahl / speed RPM	6000	Drehzahl / speed	6000		6000		6000	6000	
RZB / RCF	3824	RZB / RCF [2]	4146		3300		4146	3300	
Radius / radius mm	95	Radius / radius mm	103		82		103	82	
9 (97%) sec	14	9 (97%) sec	14		14		14	14	
9 sec	17	9 sec	16		16		16	16	
0 sec	373	0 sec	291		291		291	291	
Temperatur / temperature °C [1]	-20	Temperatur / temperature °C [1]	-20		-20		-20	-20	

1) Lowest possible temperature during maximum speed, 1 h running time and 20°C ambient temperature (only with cooling centrifuges)

2) Centrifuge containers of glass will not stand RCF values exceeding 4000