

## Operating Instructions

### MIKRO 12-24

Please enter the following details :

- Stock no. ....
- Monitoring no. ....
- Location .....

This operating instruction has to be used for the centrifuges bearing the following Manufacturing Nos. :  
(the Manufacturing No. of a centrifuge can be see from its name plate)

Type of centrifuge	Voltage	Article No.	Manufacturing No.
MIKRO 12-24	230 V/240 V	2070	XXXX
MIKRO 12-24	115V	2070-01	XXXX
MIKRO 12-24	230 V	2070-07	XXXX



**Certificate of EU - Conformity**

as defined by the EU regulations

- for machines 98/37/EG
- electro-magnetic compatibility 89/336/EWG, amended by regulations 91/263/EWG, 92/31/EWG and 93/68/EWG
- for low voltage 73/23/EWG, amended by regulation 93/68/EWG

We, Messrs. Andreas Hettich  
Gartenstraße 100  
D-78532 Tuttlingen,

hereby certify that centrifuge model(s)

**MIKRO 12-24**

is (are) manufactured in accordance with the following standards and regulations:

EN 61010 part 1 and 2

EN 55011

in addition the following national standards and regulations are applied:

VBG 1                      DIN 58970

VBG 4                      BS 4402

VBG 7z

VBG 20

Tuttlingen 11.11.1998

Hettich Zentrifugen

i. V. H. Pistor, sales manager

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## 1. Intended application

The centrifuge is used for separating substances or mixtures with a density of up to max. 1.2 kg/dm<sup>3</sup>.

Through the production of centrifugal force it can separate mixtures or alter the proportions in a mixture.

If the substance or mixture to be centrifuged is denser than 1.2 kg/dm<sup>3</sup>, the rated speed should be reduced (see section "Centrifuging of denser substances").

## 2. Notes on safety



- 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.
- Before the initial operation of your centrifuge you should read and pay attention to the operating instructions.
- 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.
- The centrifuge should be installed on a good, stable base.
- When setting the equipment up you should pay attention to the following points:
  - A 300 mm safety zone must be established around the centrifuge in accordance with IEC 1010-2-2.
  - This safety zone must be kept clear of both people and hazardous substances at all times when the centrifuge is in operation.
- The centrifuge should always be loaded evenly.
- Centrifuge containers must not be filled beyond the capacity specified by the manufacturer.
  - Centrifuge containers should only be filled outside the centrifuge.
- Standard centrifuge containers of glass will not stand RCF values exceeding 4000 (DIN 58970, part 2).
- No attachments should be used other than those authorised by the manufacturer.
- Centrifuge containers may only be centrifuged with accessories (reducing adapters, frames, suspensions, etc.) authorised by the manufacturer (see section "Rotors and accessories").
- The centrifuge may only be operated when the balance is within the bounds of acceptability.
- The centrifuge must not be operated in areas subject to danger of explosions.
- The centrifuge must not be used with:
  - inflammable or explosive materials
  - materials that react with one another producing a lot of energy.

- If users have to centrifuge hazardous materials or compounds contaminated with toxic, radioactive or pathogenic micro-organisms, they must take appropriate measures.

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.

- For further details of available biosafety systems see section "Rotors and accessories".
- The centrifuge must not be operated with highly corrosive substances which could impair the mechanical integrity of rotors, hangers and accessories.
- Any rotors, hangers or accessories showing clear signs of corrosion or mechanical defects must not be used for centrifuging.
- In order to prevent corrosion developing through cleaning or disinfectant agents, it is most important that any specific instructions from the manufacturers of such agents should be followed carefully.

If in doubt, you should obtain relevant information from the manufacturers.

- Only original spare parts and authorised original accessories may be used.
- In case of fault or emergency release, never touch the rotor before it has stopped turning.
- This centrifuge is classified in Germany as a Group 3 device according to the *Medizinische Geräteverordnung MedGV* (the regulations on medical equipment).
- It conforms to safety regulations based on:

IEC 1010-1/-2

DIN - EN61010 Parts 1 and 2

- The safe operation and reliability of the centrifuge can only be guaranteed if:
  - the centrifuge is operated in accordance with the operating instructions,
  - repairs are carried out by engineers approved by the manufacturer,
  - the electrical installation on the site where the centrifuge is installed conforms to the demands of IEC stipulations,
  - prescribed tests to UVV-VBG7z are carried out by an expert.

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

**3. Warning symbols**



Caution! Follow instructions carefully.

**4. Delivery checklist**

The following items and accessories are delivered with the centrifuge:

		Order no.
1	Connecting cable	
	- 230 V version	4718
	- 115 V version	6038
2	Fuse for mains connection	
	- 230 V version      F 1.25 AH; 250 V	2384
	- 115 V version      T 3.5 A; 250 V	E770
1	Fuse T 0.5 AH; 250 V	E864
2	Carbon brushes	E603
1	Notes on moving the equipment safely	TS003
1	Release pin	E003
1	Operating instructions	B002
1	Rotor instructions	B032

The rotor(s) and associated accessories are included in the delivery in the quantity ordered.

## 5. Technical specifications

Manufacturer	Hettich Zentrifugen D-78532 Tuttlingen		
Model	MIKRO 12-24		
Product no.	2070	2070-07	2070-01
Mains voltage ( $\pm 10\%$ )	230 V ac	230 V ac	115 V ac
Mains frequency	50 Hz	60 Hz	60 Hz
Current consumption	0.57 A	0.57A	1.3 A
Power consumption	120 W	120 W	130 W
Fuses: Centrifuge	F 1.25 AH	F 1.25 AH	T 3.5 AH
Max. capacity MIKRO 12 MIKRO 24 Max. density	1.2 kg/dm <sup>3</sup>		
MIKRO 12 - Speed RPM	14600		
- Force RCF	15729		
MIKRO 24 - Speed RPM	13000		
- Force RCF	11525 / 13226		
Kinetic energy	$\leq 2500$ Nm		
Obligatory inspection	no		
Environment - Ambient temperature - Relative humidity	5°C up to 40°C max. 80% up to 31°C, descending in a linear pattern down to 50% at 40°C		
Sample overtemp.	15 K		
Class of protection	I		
Radio interference suppression	230 V, 50 / 60 Hz EN 55011 B 115 V, 60 Hz FCC Class B		
Noise level (dependent on rotor)	62 dB(A)		
Dimensions • Width • Depth • Height Weight ca.	245 mm 280 mm 180 mm 15 kg		

## 6. Initial operation

- The amount of space required is given under dimensions in the “Technical specifications” section.

The centrifuge should be set up in a suitable position on a good, firm surface.

When setting up the equipment, care should be taken to provide the required safety area of 300 mm around the centrifuge in accordance with IEC 1010-2-2.



The safety area must be clear of all persons and hazardous substances at all times when the centrifuge is in operation.

- You should check that the mains voltage corresponds to that stipulated on the model plate.
- Using the connecting cable provided, the centrifuge should be connected to a standard mains socket.  
The rotation light will come on briefly (operational check).
- Open the lid.



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”.

- Remove the transport safety device (see instruction sheet on “Moving the equipment safely.”).

## 7. Installing the rotor and fitting attachments

See Rotor Instructions B032 or the section “Changing the rotor”.

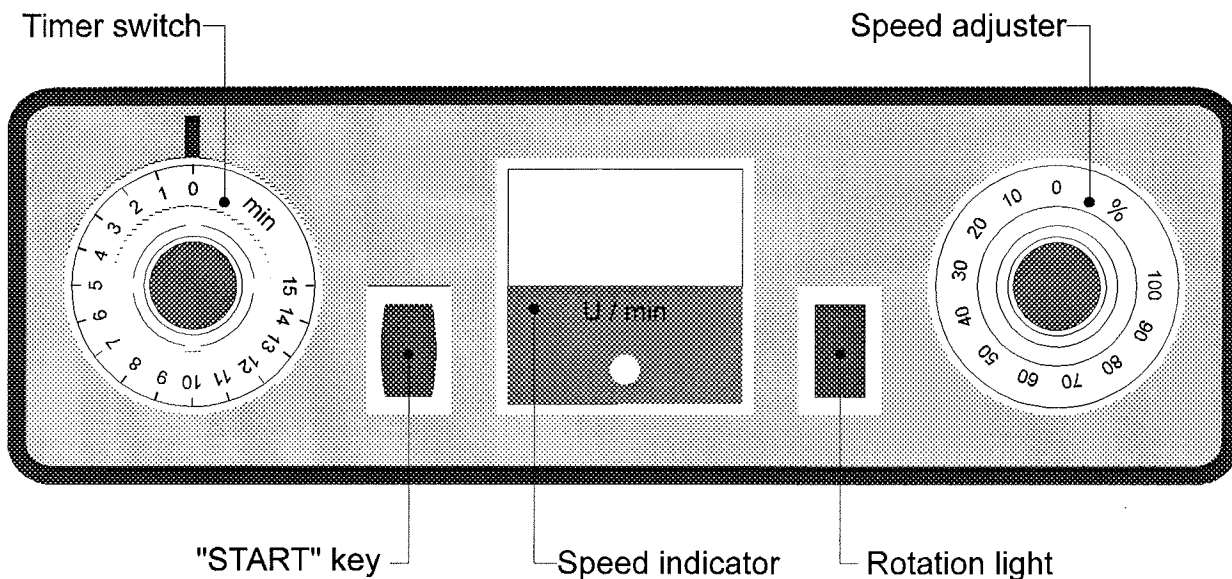
### 7.1. Angle rotor 12- times

- Remove the rotor lid by pressing the pressure lock.
- Always check by eye that reaction receptacles to be placed opposite one another are filled to the same level.
- Opposite places must always be occupied.
- Press the lid centrally on the rotor. The lid must latch audibly.
- Close the lid of the centrifuge.

### 7.2. Haematocrite plate 24- times

- Remove the rotor lid by pressing the pressure lock.
- Insert a HETTICH Haematocrite capillary (Order No. 2074) closed on one side, filled about 80%, into the centrifuge disk.  
The closed side must make contact outside with the elastic ring of the disk.
- Opposite places must always be occupied.
- Press the lid centrally on the rotor. The lid must latch audibly.
- Close the lid of the centrifuge.

### 8. Control panel



#### 8.1. Timed operation

- Set the centrifuging time on the timer switch.



For short times wind the timer switch up before setting it back to the required time setting.

- Press the "START" key. The rotation light will come on. Use the speed adjuster to set the rotational speed. The lowest allowable speed is 1200 RPM. The numbers on the speed adjuster should be used only as a guide.
- To run the centrifuge at the same speed only the new time parameter needs to be set before pressing the "START" key.
- At the end of the set time the timer switches the drive off. The brake is applied during the running-down phase until the rotor comes to rest.



The centrifuge lid can only be opened when the rotor is stationary.

- Centrifuging can be stopped at any time by turning the timer back to "0".
- When the rotor has stopped, open the lid and remove the centrifuged matter.
- When the centrifuge is out of operation for longer periods it should be switched off.

## 8.2. Pulse mode

- Set timer switch to "0".  
Press and hold down the "START" key. The centrifuge will spin for as long as the "START" key is pressed.
- The centrifuge spins at the speed set.

## 9. Changing the rotor

- Open the lid.
- Remove the rotor lid.
- Unscrew the rotor tensioning nut from the motor shaft by turning it counter-clockwise.
- Lift or press off the rotor vertically from the motor shaft.
- Place the new rotor vertically on the motor shaft and press it down. The motor-shaft carrier pin must be located in the groove on the rotor.
- Tighten the tensioning nut.
- Check that the rotor is seated securely.

## 10. Centrifuging denser substances

The rotors are designed to centrifuge substances up to a maximum mean homogenous density of 1.2 kg/dm<sup>3</sup> when rotating at the stated speed.

Denser substances must be centrifuged at lower speed.

The permissible speed can be calculated using the following formula:

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

e.g.: RPM 4000, density 1.6 kg/dm<sup>3</sup>

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

If in any doubt you should obtain clarification from the manufacturer.

## 11. Calculating rotational speed RPM and relative centrifugal force RCF

These values are calculated using the formulas below:

$$\text{RCF} = \left( \frac{\text{RPM}}{1000} \right)^2 \times r \times 1.118 \qquad \text{RPM} = \sqrt{\frac{\text{RCF}}{r \times 1.118}} \times 1000$$

RCF = Relative centrifugal force

RPM = Rotational speed (revolutions per minute)

r = Radius in mm = Distance from the centre of the axle to the floor of the centrifuge container. For further details on radius see "Rotor and accessories" section.