MICROCENTAUR R

User Manual

Please read this before use

CE IVD

MSE

	**WARNING**! Risk of injury.
	**DANGER!** Risk of electric shock with potential for severe injury or death.
	**DANGER!** Biohazard with potential for risk to health or death.
	**DANGER!** Risk of explosion with potential for severe injury or death.

This manual was prepared with special care. MSE Centrifuges may change the manual at any time and without notice because of improvements of device.
Changes will be incorporated in later editions of this user manual.

You will find the current version of the user manual on our website under: www.msecentrifuges.com ***DOWNLOADS*** *section.*

Contents

1 Application

The **MICROCENTAUR R** centrifuge is a table top laboratory centrifuge specifically for in-vitro diagnostic (IVD). The device is used for separation samples taken from people's, animal's and plant's components of different densities, under the influence of the centrifugal force, to provide information about their biological state.

Its construction ensures an easy operation, safe work and a wide range of applications at laboratories engaged in routine medical analyses, biochemical research works etc.

This centrifuge is not biotight and therefore during centrifugation of preparations requiring biotightness, the user will need to use biotightness certificated containers and rotors. It is prohibited to centrifuge caustic, inflammable and explosive preparations.

2 Technical specification

Manufacturer	MSE Centrifuges Ltd, Mytogen House, 11 Browning Road, Heathfield TN21 8DB				
Type	**MICROCENTAUR R**				
mains voltage (L1+N+PE)	230V	100V	110V	120V	127V
	±10%	±5%			
frequency, ±1%	50 Hz	60Hz			
Power consumption (max)	500W	500W			
current protection	T 6,3A	T 10A			
cooling medium t eq CO_2 GWP	R507 (CFC/HCFC free) = 0,14 kg 0,558 3985				
capacity (max)	90ml (6x15ml)				
Speed (rpm)	90 ÷ 15000 rpm (step 1 rpm)				
g-force (RCF)	21382 x g (step 1 x g)				
running time	00:00:01 ÷ 99:59:59 – [h. : min : s] (1s step)				
time counting	once start button is pressed / once preselected speed is reached				
short time operation mode (SHORT)	Yes				
continuous operation mode (HOLD)	Yes				
number of programmes	100				
adjustable temperature	-20 ÷ 40°C* (step 1°C)				
initial cooling (FASTCOOL)	Yes				
guaranteed temperature with max. rotor speed	≤4°C				
cooling without centrifuging	yes				
acceleration (ACEL)	10 linear characteristics				
deceleration (DECEL)	10 linear characteristics				
USB communication	yes				
electromagnetic compatibility	accordance with EN 61326-2-6:2006				
ambient conditions	PN-EN 61010-1 (pkt.1.4.1)				
set-up site	indoor only				
ambient temperature	2° ÷ 40°C				
humidity (maximum relative humidity)	< 80%				
installation category	II EN 61010-1				
pollution degree	2 EN 61010-1				
safety area	300 mm				
Degree of protection: (according to PN-IEC 34-5)	IP20				
noise level	≤60dB				
weight	30,5 kg	33kg			
dimensions: height (H) width (W) depth (D)	285 mm 299 mm 595 mm				
height with open lid (H_{oc})	565 mm				

*time taken and possibility of obtaining a set temperature is dependent on multiple factors including: rotor type, established RPM, ambient temperature; accuracy: - ±1°C appropriate for place of temperature sensor

Menu languages: English, French, Spanish, Italian, Portuguese, German, Russian, Polish, Swedish, Czech.

3 Installation

Open the package. Take out the box containing the accessories. Take out centrifuge from the container. Keep the box and packing materials in case of service shipping.

3.1 *Content of package*

name	pcs	cat. No
centrifuge MICROCENTAUR R	1	see nameplate
complete clamp	1	17142
spanner for a rotor	1	17099T
key for emergency lock release	1	18640
power cord 120V / power cord 230V	1	17150/17149
fuse WTA T10 250V / WTA T6,3 250V	2	17863/17862
petroleum jelly 20ml	1	17201
USB A-A cable	1	16655
user manual	1	20150R.EN

3.2 *Location*

- The device is heavy, so lifting and carrying the centrifuge can lead to back injuries. Risk of injury while lifting and carrying heavy loads.
- Lifting and transporting of the centrifuge should be done with a sufficient number of helpers. Use a transport aid for transporting the centrifuge.
- The device should be lifted by the underside in the vicinity of its feet and placed directly on a suitable lab table.

- Ensure safe location.
- The centrifuge should not be located near a source of heat and should not be subjected to direct sunlight.
- Centrifuge should be flat-levelled.
- Centrifuge should be set horizontally on a rigid base.
- It is necessary to ensure a ventilation zone of a minimum of 30cm round the centrifuge from every direction. Do not obstruct ventilation holes !
- Benching/Table for centrifuge should have a safety zone of a minimum of 30cm round the centrifuge from every direction (this is needed in case of malfunction according to EN 61010-020).
- Benching/Table for centrifuge should be free of restraints.
- Parameters of the centrifuge refer to the above temperatures (see 2.Technical specification).
- When moving the centrifuge from a cold to a warmer place, condensation of water will occur inside the centrifuge. It is important then that sufficient time be provided for drying the centrifuge prior to starting the centrifuge again (min. 4 hours).

	▪ Do not position the centrifuge so that it is difficult to operate the power switch. ▪ Supply voltage given on the rating plate has to be consistent with local supply voltage. MSE laboratory centrifuges are 1st Class safety devices and they are provided with the three-core cable with the plug resistant to dynamic loadings. Mains socket shall be provided with the safety pin - protective earth (PE). ▪ It is recommended to install an emergency cut-out that should be located far from the centrifuge, near the exit or outside the room.

	▪ **Before switching on, check whether the centrifuge is connected to the power supply correctly. It is compulsory to use the power cord recommended by the manufacturer (17866 for 230V, 17867 for 120V).** ▪ **Before use, check whether the device is correctly installed.**

3.3 *Current protection*

	The centrifuge is equipped with current protection (safety fuse). The fuse is situated in the plug-in socket unit at the back of the centrifuge.

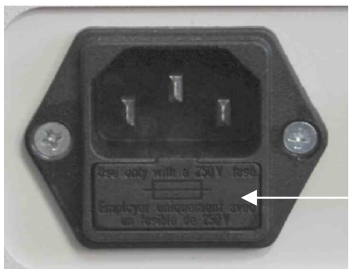


Fig.1 Plug-in socket unit

4 Safety of operation

4.1 *Operating personnel*

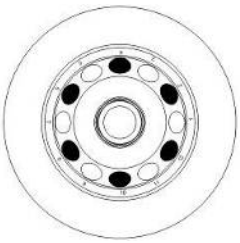
- The laboratory centrifuge can be operated by laboratory personnel after getting acquainted with user manual.
- **The User Manual should be kept near the centrifuge.**
- The centrifuge can not be misused.
- If the centrifuge is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

4.2 *Guarantee*

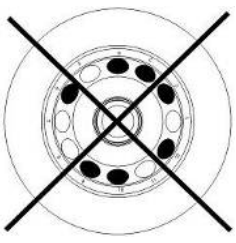
- The warranty period is **24 months** (unless otherwise specified in the purchase documents).
- The service life of the centrifuge specified by the manufacturer is **10 years**.
- After termination of the warranty period, it is necessary to carry out yearly technical inspections of the centrifuge.
- The Manufacturer reserves the right to make technical changes in manufactured products.
- The maximum period of storage of for centrifuges that are not used is **1 year.** After this period, a technical inspection of the centrifuge should be carried out by service personnel authorised by the manufacturer.

4.3 *Arrangement of tubes*

- Fix the rotor on the motor axis firmly.
- Avoid unbalance.
- Load opposite buckets with the same accessories.
- Centrifugation of the test tubes of different sizes:
  - There is a possibility to centrifuge test tubes of different sizes; however, it is absolutely necessary in such cases that opposite buckets and round carriers be the same.
  - The mass of different containers with test tubes spun at the same time has to be comparable.



CORRECT



INCORRECT

	It is necessary to insert test tubes symmetrically on opposite sides.

	**FILLING TUBES** ▪ Fill test tubes outside the centrifuge and according to the manufacturer's recommendations. ▪ Please pay special attention to the quality and proper thickness of the glass test tubes walls. Those needs to be test tubes for centrifuges. ▪ In order to protect the centrifuge against unbalance, fill in the test tubes up to the same weight.

4.4 *Safety hints*

	**ROTORS MAINTENANCE** ▪ Lubricate the swing-out rotor journal pins. ▪ Use only accessories in good condition. ▪ Protect equipment against corrosion using accurate preventative maintenance.

	**HS ACCESSORIES MAINTENANCE** ▪ Make sure that the rubber O-rings are lightly coated with petroleum jelly (to ensure vacuum). Use high vacuum grease, e.g. type „C” by LUBRINA.

	**HAZARDOUS MATERIALS** ▪ MSE Centrifuges accessories are not biotight. For centrifuging infectious materials, it is necessary to use hermetically closed tubes meeting demands of biotightness, in order to prevent germs migration into the centrifuge and beyond it. ▪ It is not allowed to subject to centrifugation toxic or infectious materials with damaged leak proof seals of the rotor or test-tube. Proper disinfection procedures have to be carried out after dangerous substances have contaminated the centrifuge or its accessories.

	**EXPLOSIVE AND COMBUSTIBLE MATERIALS** ▪ It is not allowed to centrifuge explosive and inflammable materials. ▪ It is not allowed to centrifuge substances prone to reacting in result of supplying high energy during centrifugation. ▪ The centrifuge can not be operated in explosion-endangered areas.

	▪ It is not allowed to centrifuge materials capable of generating inflammable or explosive mixtures when subjected to air.

4.5 *Maintenance conditions*

	**START-UP** ▪ Prior to switching the centrifuge on, the user must read carefully all sections of this user manual in order to ensure smooth operation and avoid damages of this device or its accessories. ▪ In order to protect the centrifuge against unbalance, fill in the test tubes up to the same weight.
	**TRANSPORTATION** ▪ Centrifuge must not be transported with the rotor mounted on the shaft.
	**GENERAL HINTS** ▪ Only original rotors, tubes and spare parts must be used. ▪ In case of faulty operation of the centrifuge, please contact MSE CENTRIFUGES LTD Service Department or its authorised representatives. ▪ It is not allowed to switch the centrifuge on if it is not installed properly or rotor is not fitted correctly..

	**CENTRIFUGING SUBSTANCES** It is not allowed to exceed load limit set by the manufacturer. Rotors are intended for fluids of average homogeneous density equal to **1,2 g/cm^3** or smaller when centrifugation is carried out at maximum speed. When fluids of higher density are used, it is necessary to change the density of the centrifuge's sample in **PARAM/DENSITY** field.

4.6 *Safety precautions*

For safety reasons, inspections of the centrifuge should be carried out by the authorised service personnel at least once a year after the period of warranty. The reason for more frequent inspections could be corrosion-inducing environment. Examinations should end with the issuing of a report of validation that confirms the checks undertaken on the technical state of the laboratory centrifuge. It is being recommended to establish a register where every repairs and reviews are being registered. Both these documents should be stored in the place of use of the centrifuge.

	**INSPECTION PROCEDURES CARRIED OUT BY THE OPERATOR** The Operator has to pay special attention to the fact that the centrifuge parts of key importance are not damaged. This remark is particularly important for: ▪ Centrifuge accessories and especially structural changes, corrosion, preliminary cracks, abrasion of metal parts. ▪ Screw connections. ▪ Inspection of bioseals of the buckets if such are used. Special attention must be paid to all of the rubber (seals) parts. In case of damage or visible structural changes, defective parts must be replaced for new immediately (set of seals Cat. No. **18591** available from the manufacturer). ▪ Yearly technical inspection of the centrifuge (after initial guarantee has expired). Only the manufacturer's specified buckets, included in the equipment list, as well as centrifuge tubes, which diameter, length and durability are suitable, should be used for spinning in this centrifuge. The use of equipment made by other manufacturers should be checked with the manufacturer of the centrifuge. ▪ It is not permitted to lift or shift the centrifuge during operation or rest on it. ▪ It is not permitted to stay in the safety zone (30 cm distance around the centrifuge) nor leave objects, e.g. glass vessels within this zone. ▪ It is not permitted to put any objects on the centrifuge.

	**LID OPENING**
	It is not permitted to open the cover manually in emergency procedure when the rotor is still turning.

	**ROTORS**
	• It is not permitted to use the rotors and round carriers with signs of corrosion or other mechanical defects. • It is not permitted to centrifuge highly corrosive substances which may cause material impairment and lower mechanical properties of rotor and round carriers. • It is not permitted to use rotors and accessories not agreed by the manufacturer. Only use commercial glass and plastic test tubes which are specifically made for centrifuging in this laboratory centrifuge. Do not use poor quality elements. Cracking of glass vessels and test tubes could result in dangerous vibration of the centrifuge. • It is not permitted to carry out centrifugation with the rotor caps taken off or not screwed tight.

4.7 *Residual risk*

The centrifuge is built according to state-of-the-art standards and recognised safety regulations.

Nevertheless, there still remains some level of residual risk due to improper operation and malfunctions. It is possible to decrease residual risk by applying strictly the user manual conditions and correcting any malfunction which could threaten safety immediately.

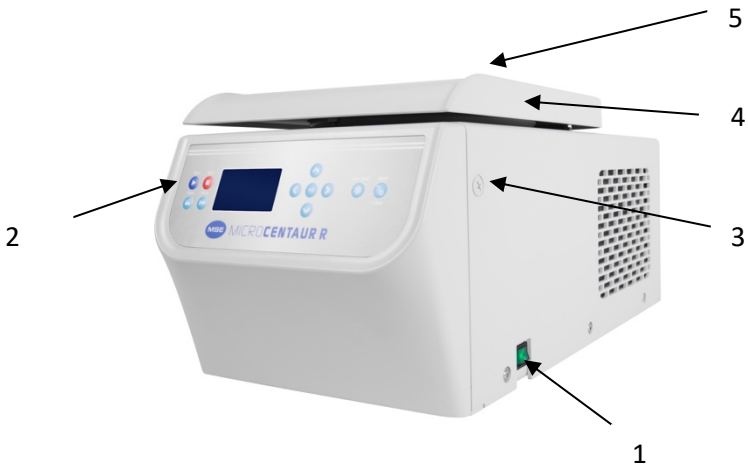
5 Operating

5.1. Centrifuge description

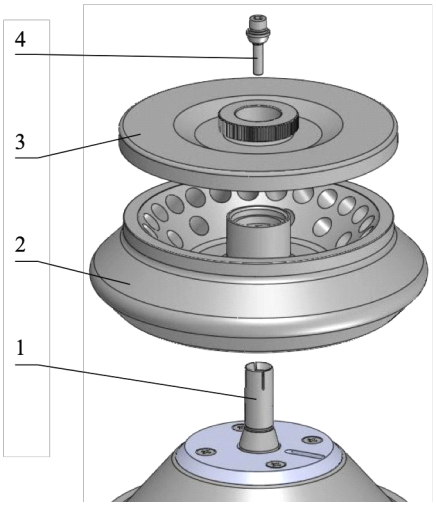
The new generation of MSE CENTRIFUGES LTD's laboratory centrifuges is provided with state-of-the-art microprocessor control systems, very durable and quiet asynchronous brushless motors and accessories consistent with requirements of the present-day user.

5.2. Centrifuge overview

Fig.1. Right side of centrifuge



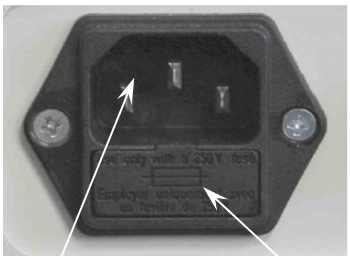
1. Power switch
2. Control panel
3. Point of emergency lid opening
4. Lid
5. Inspection glass



1. Motor axle
2. Rotor
3. Rotor lid
4. Complete clamp

Fig.3. Assembly of angle rotor

Fig.4. Mains socket back of the centrifuge

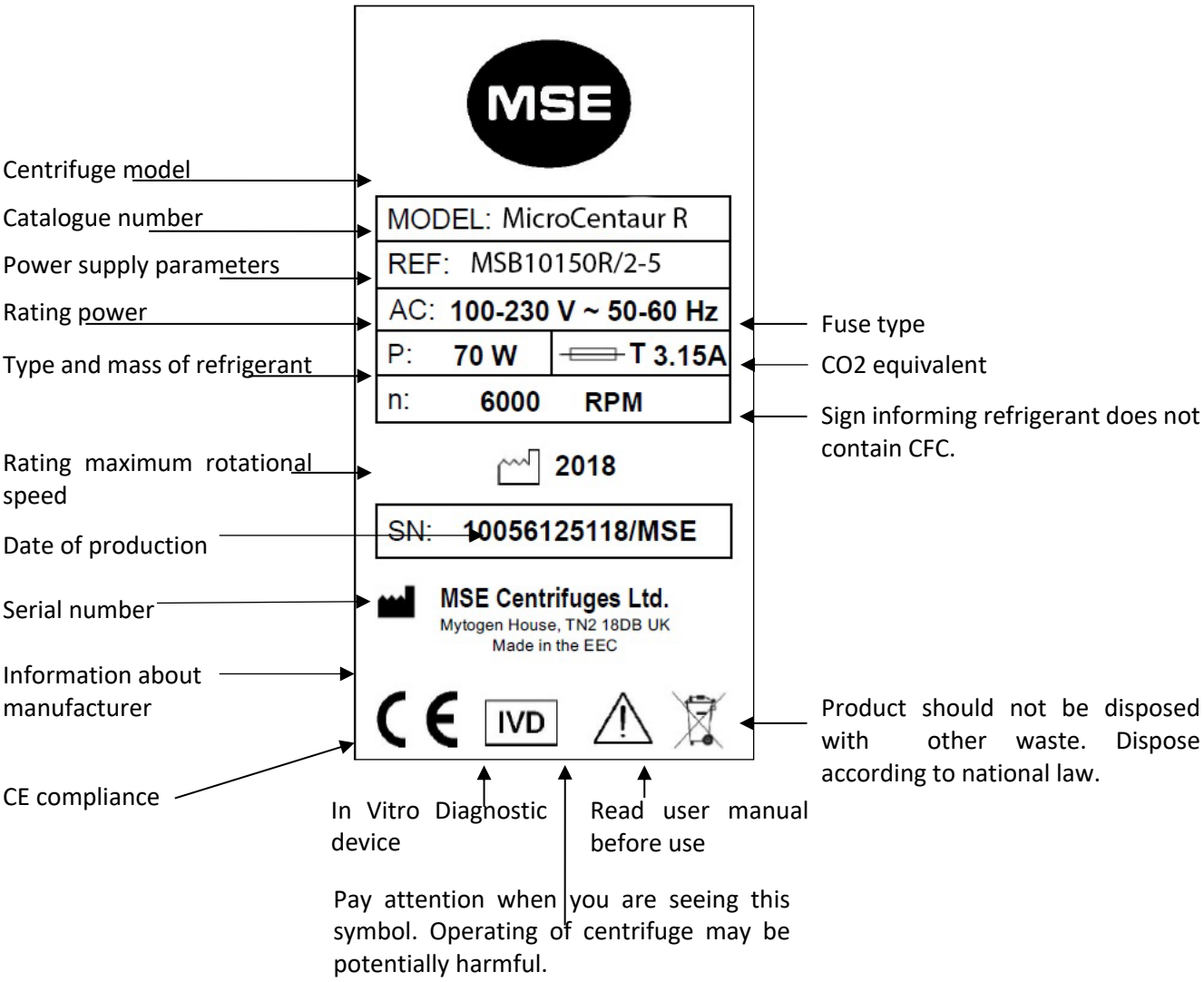


1. Plug-in socket
2. Fuse socket

5.3 *Construction*

The centrifuge has a rigid self-supporting structure. The housing is made of sheet aluminium, the back is made of steel sheet. Front and cover are made of ABS type plastic. The cover is fixed on steel axles of hinges and from the front, it is locked with an electromagnetic lock blocking any possibility of opening during centrifugation. The rotation chamber casing is made of thick steel sheet. The rotation chamber is made of stainless steel sheet.

5.4 *Name plate*

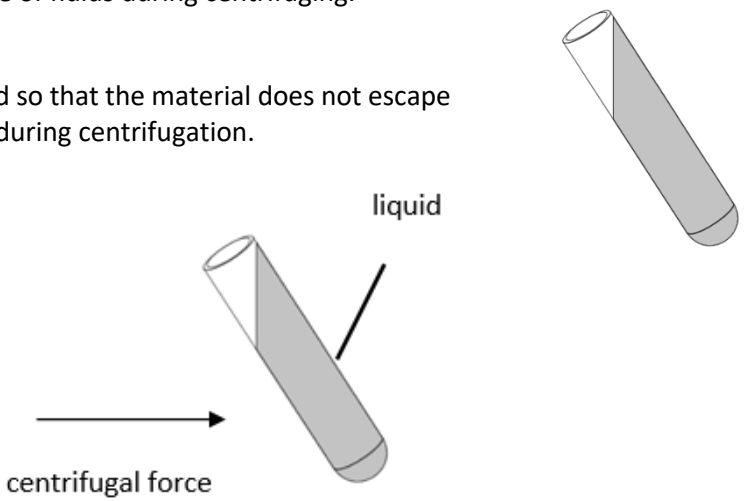


5.5 *Rotor and accessories installation*

- Connect the centrifuge to the mains (master switch on the back of the centrifuge).
- Turn on the centrifuge (button on the side of the centrifuge).
- Open the cover of the centrifuge by pressing the **COVER** key (see section Centrifuging/Control Panel). Prior to putting the rotor in, please ensure that the rotating chamber is free of impurities, e.g. such as dust, glass splinters, residues of fluids that must be taken away.
- Fit the rotor on the motor shaft screwing it tight on the cone.
- Screw-in the clamp for fixing the rotor (clockwise). Ensure it is tight with the supplied spanner for the rotor.

- Swing-out rotors have to be provided with the buckets in all seats. Please remember that every buckets swings individually and freely. Bucket suspension studs (trunnoin pins) should be lubricated periodically with petroleum jelly.
- In case of rotors designed with the cover (angled rotor), they must not be used without the rotor lid. Rotor covers must be closed tightly. Rotor covers ensure smaller drags of the rotors, proper setting of the test-tubes and airtight sealing.
- Please only use buckets intended for the selected types of the rotor.
- Fill test tubes outside the centrifuge.
- In case of centrifuging in an angle rotor, test tubes (buckets) have to be filled properly in order to prevent spillage of fluids during centrifuging.

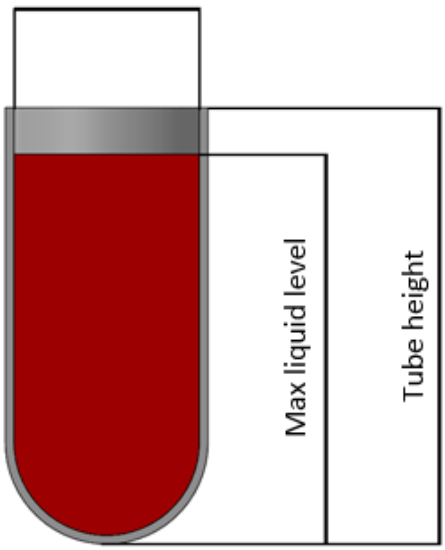
Tubes must be filled so that the material does not escape from the reservoir during centrifugation.



One shall fill tubes according to formula:

Max liquid level < Tube height – Internal tube diameter/2

Internal tube diameter



Observe the manufacturer's restrictions about the filling of the test tube.

	It is recommended to equalize vessels loads, as much as possible in order to ensure minimal vibrations during operation.

- In order to prolong the lifetime of the rotor and gaskets, rotors will need to be lubricated with the maintenance oil, while gaskets and threaded parts will need to be lubricated with petroleum jelly.
- For replacement of the rotor, please unscrew clamp and then grab the rotor with both hands at opposite sides, taking it away from drive shaft by pulling it up.

5.6 *Control device*

The microprocessor control unit of the centrifuge allows the selecting, programming and registering of work parameters.

5.7 *Setting parameters*

The data setting and read-out system are part of a hermetically closed keyboard with distinctly accessible operation points. Easily readable displays confirm the selected features and facilitate the operator's programming and recording of parameters and condition of the centrifuge.

The centrifuge is provided with the USB interface that enables connection of the centrifuge to an external PC unit with the printer and recording of the centrifugation parameters.

5.8 *Safety features*

Lid lock

The centrifuge can only be started when the lid is properly closed. Similarly, the lid can only be opened once the rotor has stopped. In case of emergency opening of the lid during operation, the centrifuge will be immediately switched-off and the rotor will slow to a complete stop.

Unbalance detecting

Should loads of opposite buckets or carriers in rotors be unbalanced, the drive will be switched-off during acceleration or operation of the centrifuge and an error message will be displayed.

Rotor verification and checking compatibility with loaded programme

Upon starting centrifuging, the unit verifies the type of the rotor installed and in the case of its incompatibility with the type indicated in the application or absence of the rotor, the spinning process will stop with simultaneous displaying of an error message. The conformity of the type of the rotor is signalled with a single audible signal. If the auto-identification (see 9.8 Other) option is checked, the proper rotor will be automatically chosen, without the user input.

Rest state inspection

Opening of the centrifuge's cover by pressing the **COVER** button is possible, but only when the rotor is in a state of rest. Use the inspection glass to ensure the rotor is in the rest state. When the rotor is being stopped, the brake symbol (see 6.2) is visible and goes off when it stops. The opening of the emergency cover during rotor running is prohibited.

Checking of excessive temperature

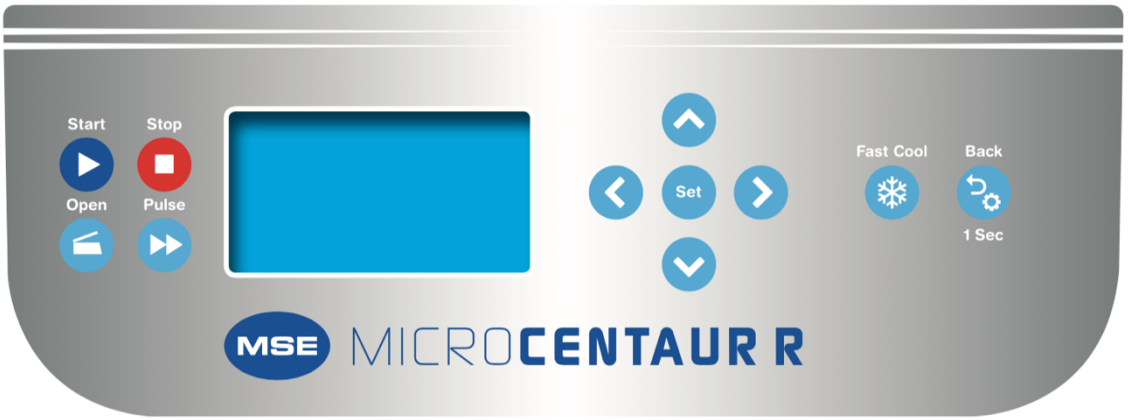
If the temperature in rotation chamber exceeds 50°C (Harrier) / 65°C (Harrier R/RH) caused by, for example, a malfunction of the cooling system, the drive will be switched off and an error message will be displayed. The reboot is only possible after the device has cooled down.

6 Centrifugation

The switching ON/OFF of the power is carried out via the master switch situated on the right side wall of the centrifuge. All other settings on the centrifuge are done by means of the control panel.

6.1 *Control panel*

The control panel placed on the front casing provides the control of the centrifuge operation.



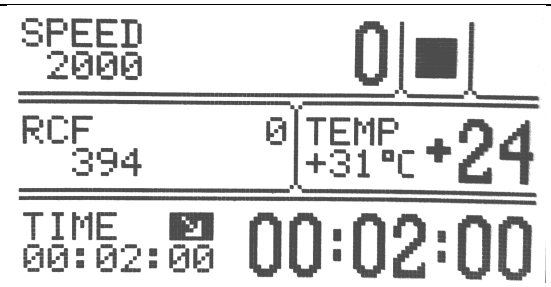
Control panel

▶▶	SHORT[1]	short-time centrifuging
▶	START	start centrifugation run
■	STOP[2]	end centrifugation run
	COVER	cover opening
	FAST COOL	start fast cooling mode
	BACK RPM/RCF	exit the current menu / cancelling switching between rpm display mode and rcf display mode
▲	UP	navigation in menu / increasing values
▼	DOWN	navigation in menu / decreasing values
◀	LEFT	navigation in menu
▶	RIGHT	navigation in menu
SET	SET	changing parameters / confirming changes

[1] the centrifuge is working as long as the key is pressed
[2] pressing once – will stop the centrifuging with acceleration features set in the current programme, pressing twice – will make the centrifuging as fast as possible (quickest feature). During the setting of parameters, you can use this button for exiting zones on the primary screen without introducing changes.

6.2 *Display*

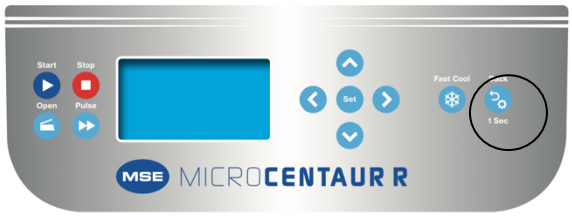
The display is located in the centre of the control panel. The main screen variants are presented below.

	After switching on of centrifuge, the welcome screen will appear. On the next screen, it is then possible to set up parameters.
	**Simplified** display mode is set as default, there is possible to switch to **normal** (see chapter 9.3) display mode (with two sub modes shown below).

Normal display

RPM display mode	**RCF display mode**
	

Switching between RPM and RCF display mode

	▪ For normal display, switch between RPM and RCF display mode by pressing and holding the key for 1s:  then select demand mode.

SPEED	rotor speed	assigned/measured
RCF	centrifugal force	assigned/measured
TIME	centrifuging time	assigned/measured
TEMP	temperature	assigned/measured
PRG	program no.	
11944	rotor no.	
PARA	parameters of the centrifuge	
MENU	configuration menu	

	changing values		
	density > 1,2 g/cm^3		
	centrifuging radius changed		
	counting time down (decreasing)		counting time up (increasing)
	centrifuging		centrifuging (with automatic cover opening)
	rotor stopped / closed cover		rotor stopped / opened lid
	braking		fastest decelerating
	rotor identification		
	thermal chamber		
	temperature delay		
	time delay		
	currently enlarged digits of TIME field		
 	drop-down list		
	temporarily disabled		
	locked		
	time counting (flashing)		
	disabled option		active option

6.3 *Setting up RPM, RCF, time, temperature*

On the main screen, it is possible to set:

rotating speed – RPM	**SPEED**
relative centrifugal force (multiple of g-force)	**RCF**
centrifuging time	**TIME**
centrifuging temperature	**TEMP**

Change of **SPEED** setting exemple:

- Press **SET** (to enter edit mode) – appears.
- Via ▲▼◄► keys, select **SPEED** field (highlighted).
- Press **SET-** flashing.
- With ▲▼, choose requested value.
- Via ◄►, choose order of magnitude of changing value (highlighted).
- Repeat above two steps for other orders of magnitude.
- Confirm settings by pressing **SET**.
- Press **BACK**.

When RPM is changed, RCF is automatically corrected.

Change of **RCF** setting example:

- Press **SET** (to enter edit mode) – appears.
- Via ▲▼◄► keys, select **RCF** field (highlighted).
- Press **SET-** flashing.
- With ▲▼, choose required value.
- Via◄►, choose order of magnitude of changing value (highlighted).
- Repeat above two steps for other orders of magnitude.
- Confirm settings by pressing **SET**.
- Press **BACK**.

When RCF is changed, RPM is automatically corrected.

Switching between SPEED and RCF.	
	On the screen, there is an additional window, in which you can: ▪ Via ▲▼ keys, select field . ▪ Press **SET**. Change of screen mode will be active to switch off the centrifuge
Switching between basic and simplified screens is described in **9.3 Main screen modes.**	

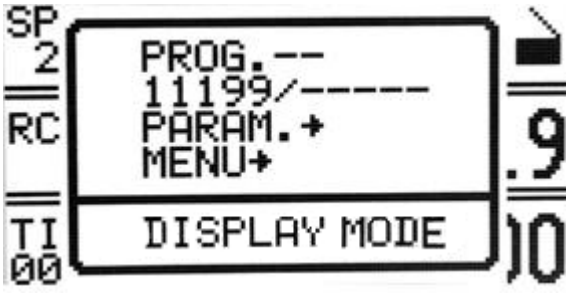
Change of **TIME** setting example:	
	▪ Press **SET** (to enter edit mode) - appears. ▪ Via▲▼◄► keys, select **TIME** field (highlighted).
00:02:00 **[hh : mm : ss]** e.g.: centrifuging time – 2 minutes 00 seconds	▪ Press **SET** - flashing. ▪ With▲▼, choose required value. ▪ Via◄►, choose order of magnitude of changing value (highlighted). ▪ Repeat above two steps for other orders of magnitude. ▪ Confirm settings by pressing **SET**. ▪ Exit edit mode by pressing **BACK**.
	set value
	current value (most significant digits)

HOLD mode	continuous run mode
	▪ To run centrifuging in **HOLD** mode set **00:00:00** time. ▪ To end centrifuging in **HOLD** mode press **STOP**.

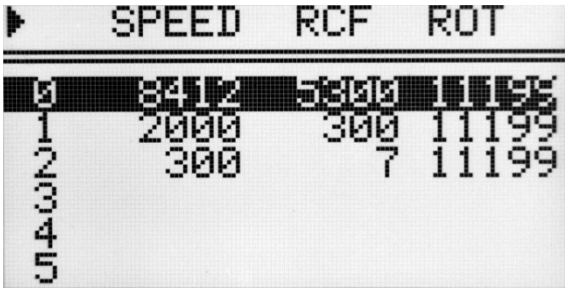
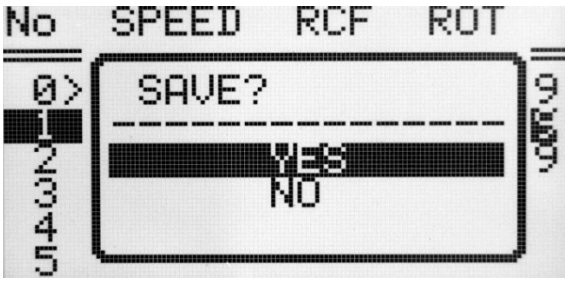
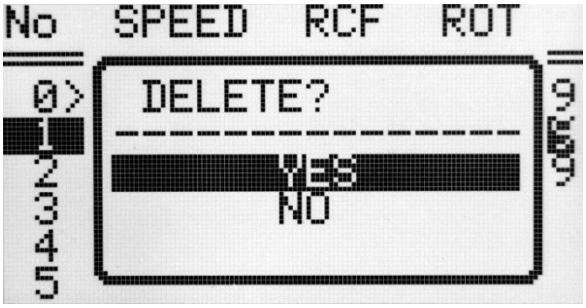
Change of **TEMP** setting example:	
	▪ Press **SET** (to enter edit mode) – appears. ▪ Via ▲▼◄► keys, select **TEMP** field (highlighted). ▪ Press **SET** key. ▪ With ▲▼, choose required value. ▪ Confirm settings by pressing **SET**. ▪ Press **BACK**.

6.4 *Users programmes*

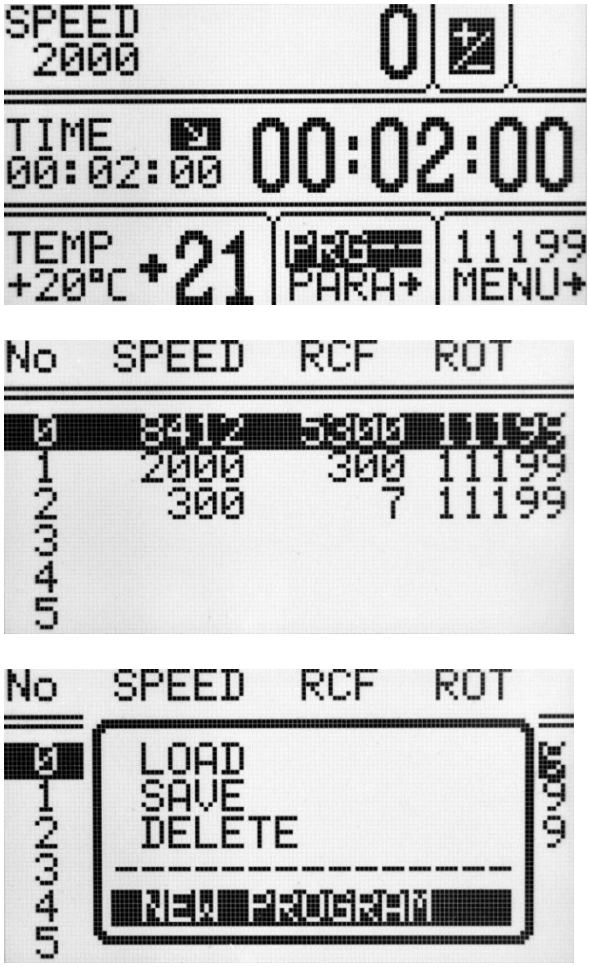
	After switching centrifuge on, the programme used in previous session will load automatically. If a programme was not used in the previous session, centrifuge will start with the last chosen parameters.

Selecting a Programme:	
Simplified display mode	
	▪ Press and hold BACK 1SEC for 1 second. ▪ Choose **PROG** with ▲▼ ▪ Press **SET**. ▪ Follow **Normal display mode** (**Normal Display Mode** below)

Normal display mode	
	▪ Press **SET** key – appears. ▪ Via▲▼◄► keys, select **PRG– –** field (highlighted) ▪ Press **SET** key – list of programmes is visible.

	▪ Via▲▼, choose required programme. ▪ Confirm with **SET** key.
	**LOAD**, **SAVE**, **DELETE, NEW PROGRAM** Select highlighted programme.
	**SAVE** – save settings as a programme (confirm by selecting **YES** and pressing **SET**)
	**DELETE** – delete programme (confirm by selecting **YES** and pressing **SET**)
	NEW PROGRAM – enter to create new programme mode (as below)

Creating a new programme:



- Press **SET** key.
- Via▲▼◄► keys, select **PRG** field (highlighted).)
- Press **SET** key. List of programmes is visible.
- Press **SET** key - menu of programme settings will appear.
- Choose **NEW PROGRAM** and then press requested parameters of centrifuging (See chapter 6. Centrifugation).

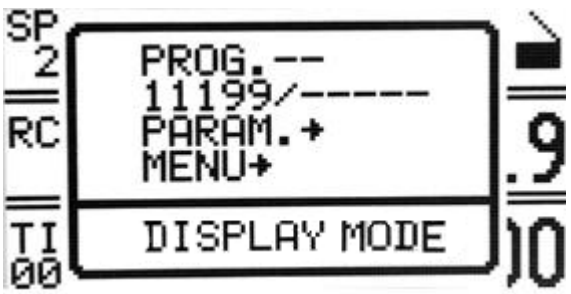
Changing parameters during centrifuging

It is a possible to change parameters: **SPEED, RCF, TIME, TEMP** during centrifuging.
Such modifications inactivate the existing running programme. Modification during run is represented by **PRG – –** symbol (instead of the programme number).

6.5 *Rotor choosing*

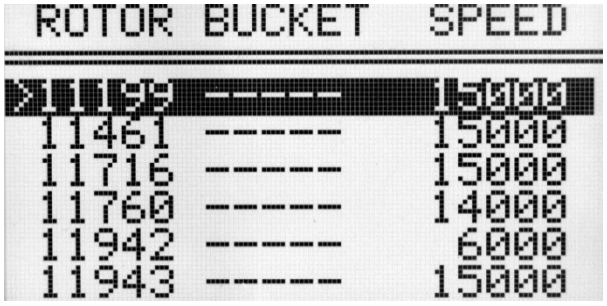
Rotor choosing

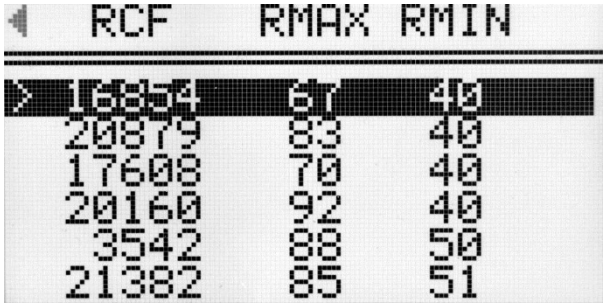
Simplified display mode



- Press and hold BACK 1 SEC for 1 second.
- Choose rotor number (exemplary **11199/-----)** with▲▼.
- Press **SET**.

	▪ Follow **Normal display mode** (**Normal Display Mode** below)
Normal display mode	
	▪ Press **SET**– appears. ▪ Via ▲▼◄► , select rotor choosing field. Press **SET** (Rotor list will appear).

	▪ Via▲▼keys, select requested rotor number ▪ Confirm by pressing **SET**. ▪ Press **BACK**.

	▪ With ◄► keys, the user may switch between screens of rotors parameters
It is possible to set **AUTOMATIC ROTOR IDENTIFICATION**. The procedure is described in subsection **9.8**.	

6.6 *SHORT mode*

	SHORT MODE
	The **SHORT** mode is activated by pressing and holding ▶▶(**SHORT**). In **SHORT** mode, the centrifuge is working as long as the **SHORT** key is pressed or when set time is over.

6.7 *Finishing the centrifuging*

	END OF CENTRIFUGING
	When preselected time is reached, centrifugation will end automatically.
 X1	Before the preselected time has elapsed, the user may stop centrifugation. Pressing **STOP** for the first time will stop centrifuging with the charasteristic set in loaded programme. Confirm message by pressing any key (apart from **COVER**). 
 x2	Pressing **STOP** a second time will stop centrifuging with the fastest characteristic. 
The message can be cancelled with the **STOP**, **SET, COVER, ▲▼◄►** or **BACK** keys.	

7 Temperature control

The centrifuge is equipped with ecological refrigerating system with temperature control. During centrifugation, differences in temperature may appear on the display and temperature of the samples in the rotor. This depends on the thermal conductivity of the rotor, samples and centrifugation time, initial temperature of rotor and samples.

Change of **TEMP** setting example:

	▪ Press **SET** (to enter edit mode) –  appears. ▪ Via▲▼◄► keys, select TEMP field (highlighted). ▪ Press **SET**. ▪ Via▲▼, set value. ▪ Confirm via **SET** key.
	When the chamber is being cooled,  symbol is visible on the screen (flashing).

7.1 *Initial cooling during centrifuging - FAST COOL*

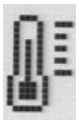
	▪ The parameters allowable to change at **FAST COOL** mode: ▪ temperature (lower than current temperature shown by centrifuge) ▪ In order to centrifuge reduced temperature samples (eg. storage in the external refrigerator), the centrifuge chamber, rotor and centrifuge container must be pre-cooling to the predetermined temperature. This allows for the minimalization of temperature differences. ▪ The initial cooling may be activated by the **FAST COOL** key (lid must be closed – rotor is spinning at **FAST COOL** mode) ▪ When **FAST COOL** mode is active, the cooling system will automatically set the parameters to obtain the required temperature in the fastest way. ▪ It is possible to exit **FAST COOL** mode at any time by pressing **STOP** key.

	**FAST COOL** mode is marked by symbol  flashing in the right upper side of display.
	**ATTENTION** - to use **FASTCOOL** mode, the set temperature must be lower than the current temperature shown by the centrifuge. When the set temperature is higher, the **!** symbol will appear and a sound signal emitted.
	It is possible to exit **FAST COOL** mode at any time by pressing the **STOP** key. Interruption of the function is signalled by a message.

7.2 *Initial cooling without centrifuging – THERMAL CHAMBER*

	PARA → **THERMAL CHAMBER**
	▪ There is a possibility of cooling the chamber without centrifuging. ▪ Activation of the **THERMAL CHAMBER** is described in chapter **„Parameters of centrifugation/Thermal chamber".**

7.3 *Cooling in "START DELAY – OF TEMPERATURE" mode*

	PARA→ **START DELAY/OF TEMPERATURE**
	▪ Centrifuging process will start, when preselected temperature is reached. ▪ How to enable run **START DELAY – OF TEMPERATURE** function is described in Parameters of centrifugation chapter.

7.4 *Cooling in „SHORT" mode*

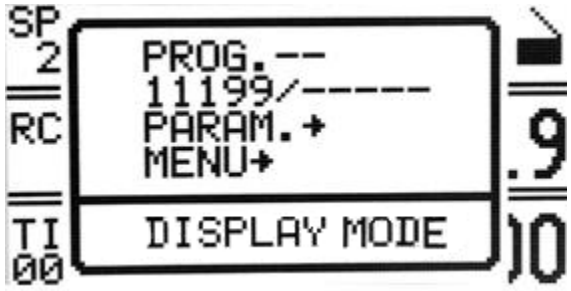
	Cooling feature is avalaible in **SHORT** mode. How to enable run centrifugation in **SHORT** mode is described in Centrifugation/**SHORT** mode.

7.5 *Cooling notes*

The MICROCENTAUR R centrifuge is equipped with an efficient cooling system. It allows for the desired temperatures in the chamber even at maximum spin speed or fast to be reached quickly (e.g. 4°C and 36°C). Note that the amount of time needed to reach a set temperature is dependent on multiple factors, including: the power of the cooling system, the shape of the rotor, the rotor speed, ambient temperature, etc. The accuracy of the temperature stability of ± 1 ° C is determined by the installation place of the temperature sensor.

8 Parameters of centrifugation

Simplified display mode



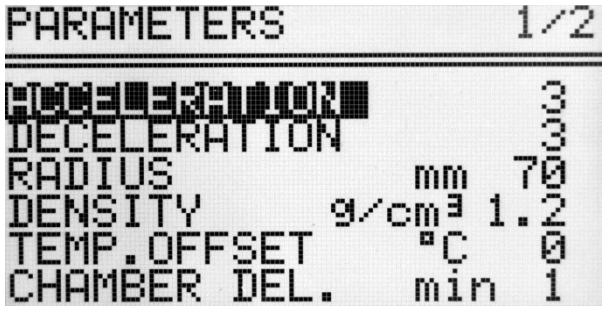
- Press and hold BACK 1 SEC for 1 second.
- Choose **PARAM** with ▲▼
- Press **SET**.

Follow points described below (**Normal display mode**)

Normal display mode

- Press **SET**– appears.
- With ▲▼◄► **keys** mark **PARA field**
- Press **SET**.

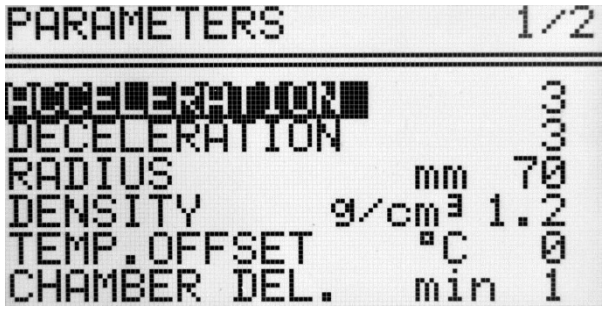
It is possible to switch between two different screens via▲▼ ◄►keys in **PARA** field



ACCELERATION	chosen acc. characteristic (0-the fastest, 9-the slowest)
DECELERATION	chosen dec. characteristic (0-the fastest, 9-the slowest)
RADIUS [mm]	current rotor radius [mm]
DENSITY (g/cm^3)	sample density [g/cm^3]
TEMP. OFFSET (^{O}C)	value of temperature correction
CHAMBER DEL. (min)	delay between set thermal chamber mode and start it

THERMAL CHAMBER	cooling of the chamber without centrifuging
AUTOM. LID OPENING	automatic opening of cover after centrifuging
START DELAY	start delayed (after pressing START)

8.1 *Acceleration/deceleration – characteristics choosing*



ACCELERATION – linear accelerating characteristics assigned to every rotor **(0 ÷ 9)**

DECELERATION – linear decelerating characteristics assigned to every rotor **(0 ÷ 9)**.

0-the fastest possible acceleration/deceleration, 9-the slowest possible acceleration/deceleration.

8.2 *Radius*

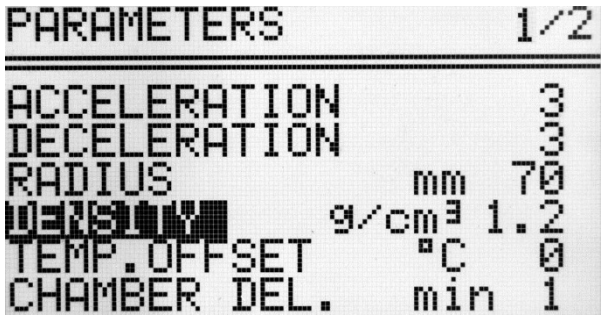
RADIUS [mm] - control of the radius of the rotor within the range from R_{min} to R_{max}. Available values depend on the chosen rotor, see — / — (LIST OF ROTORS field).

- With ▲▼ keys, select **RADIUS**
- Press **SET**-+/− appears.
- Via▲▼ keys, choose requested values.
- Press **SET**.
- Press **BACK**.

When radius change is activated, symbol is visible on the screen.

Displayed **RCF** will be computed in accordance with changed value of radius.

8.3 *Density*



DENSITY (g/cm³) - default density is set to **1,2 g/cm³** (possible values **1,2 ÷ 9,9 g/cm³**).

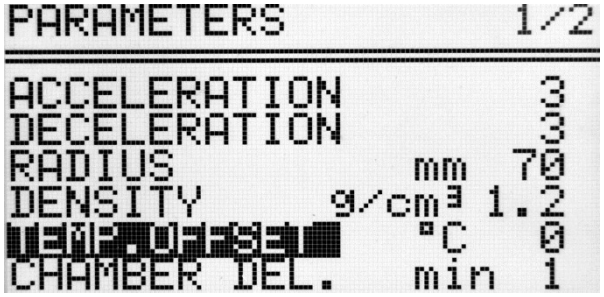
- With ▲▼ keys, select **DENSITY**
- press ►
- Via▲▼ keys, choose requested values.
- Press **SET**-+/− appears.
- Press **BACK**

When density is changed, symbol is visible on the screen.

Changing of **DENSITY** value is compulsory when density of sample placed into rotor is higher than 1.2 g/cm^3.

Increasing the density reduces the maximum speed of the rotor.

8.4 *Temperature offset*



- With ▲ ▼ keys select **TEMP. OFFSET**.
- Press **SET**- +/− appears.
- Use the ▲ ▼ keys to select the difference between the temperature that the cooling system will aim for, and set temperature.
- Confirm selection by pressing **SET**.
- Press **BACK**

Attention!
The use of the offset cannot extend the temperature range achieved by the centrifuge.

Function description

At a set temperature of 20°C and the set offset value equal to -5°C, the cooling system will actually strive to reach 15°C. With a setpoint temperature of 20°C and a set offset value of 5°C, the system will actually try to reach 25°C.

The temperature displayed on the main screen is corrected for offset value.

Offset can be selected from the range of

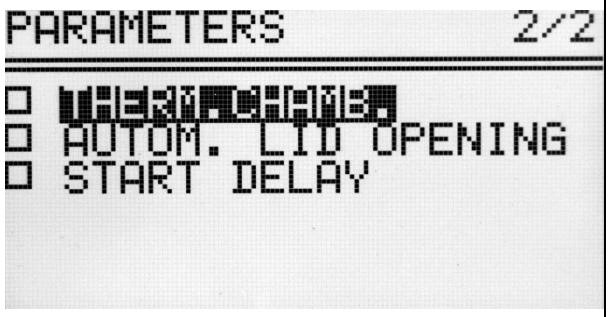
-20°C to +20°C.

Activation of the function is signaled on the main screen with  or  depending on the offset value sign.

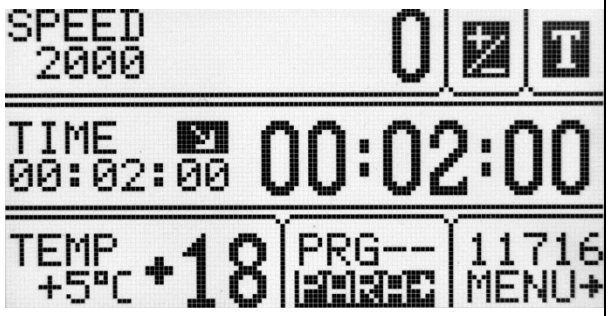
8.5 *Thermal Chamber delay*

- With ▲▼ keys, choose **CHAMBER DEL**.
- Press **SET** - +/- appears.
- With ▲▼ keys, select time value.
- Set required value by pressing ▲▼.
- Press **SET**.
- Press **BACK**.

8.6 *Thermal chamber (Constant temperature in chamber without centrifuging)*



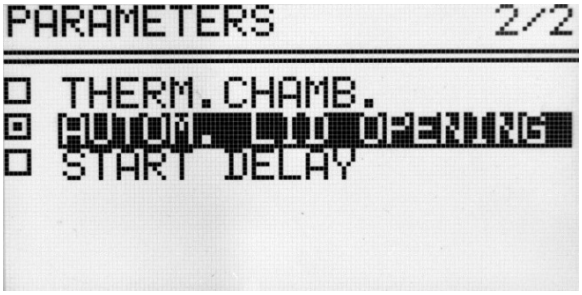
- Via ▲▼◄► keys, choose **THERM. CHAMB.**
- Press **SET** (to switch off/on).
- Via ◄► keys, select temperature value.
- Press **SET** - +/- appears.
- Via ▲▼ keys, **SET** requested temperature.
- Press **BACK**.
- Activation of thermal chamber is delayed as per chapter 8.5 Thermal chamber delay.



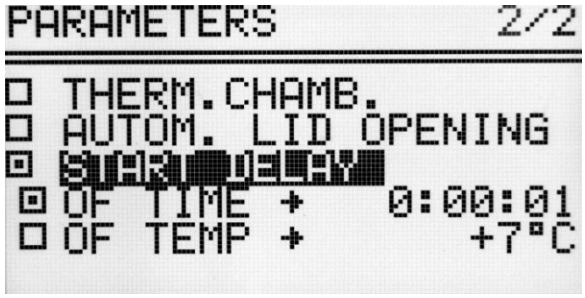
- When **THERMAL CHAMBER** function is activated, T symbol is flashing on the screen.
- Changing temperature from the main screen is not possible.
- Opening cover terminates **THERM. CHAMB**. function (closing cover back turns it back on).

- If **THERMAL CHAMBER** is turned on (in **PARAM** fold) and centrifugation completes, **THERMAL CHAMBER** will activate itself.
- **THERMAL CHAMBER** can be only activated when no other programmes are running.

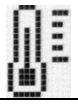
8.7 *Automatic lid opening*

Automatic lid opening	**OPEN LID AFTER RUN**
	▪ Via▲▼◄► keys, choose **AUTOM. LID OPENING.** ▪ Press **SET** (to switch off/on). ▪ When centrifuge process is finished, cover will open automatically. ▪ When centrifuging is terminated by pressing **STOP**, opening of the cover is possible by pressing **COVER**. ▪ Press **BACK**.
	▪  symbol means that **OPEN LID AFTER RUN** is active.

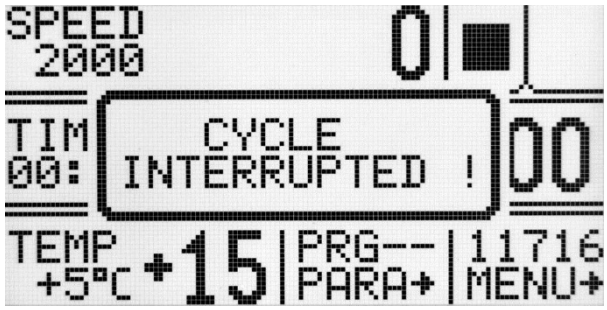
8.8 *Start delay - of time*

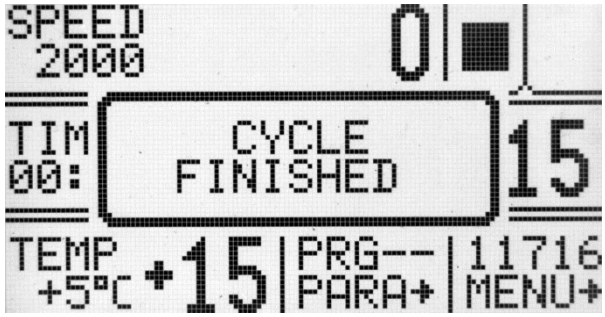
 Start centrifuging once preselected delay is reached.	STARY DELAY/**OF TIME**
	▪ Via▲▼ keys, select **START DELAY.** ▪ Press **SET.** ▪ Via ▼keys, select **OF TIME**. ▪ Press **SET** - +/- appears. ▪ Via ► keys, select field 0 : 0 0 : 05 (for example). ▪ Press **SET**. ▪ Start delay can be set from 0 : 0 0 : 0 1 to 9 : 5 9 : 5 9. ▪ Confirm by pressing **SET**. ▪ Press **BACK**.
	When **START DELAY-OF TIME** function is activated,  symbol is visible on the screen.
It is possible to exit **START DELAY – of time** mode at any time by pressing **STOP** key.	
START DELAY / **OF TIME** function cannot be run when START DELAY / **OF TEMP.** is activated.	

8.9 *Start delay – of temperature*

<table>
<tr><td>  </td><td>Start centrifuging once preselected delay is reached.</td><td>START DELAY / OF TEMP</td></tr>
<tr><td colspan="2"> 
</td><td>▪ Via▲▼ keys, select START DELAY.
▪ Press SET.
▪ Via▲▼ keys, select OF TEMP.
▪ Press SET.
▪ Via◄► keys, select temperature zone.
▪ Press SET- +/- appears.
▪ Via▲▼ keys, set requested value.
▪ Press SET.
▪ Press BACK.</td></tr>
<tr><td colspan="2"> 
</td><td>When START DELAY – OF TEMP is turned on,  symbol is visible on the screen.</td></tr>
<tr><td colspan="3">When the function is active, the speed can be reduced to the optimum values for the FAST COOL function, when the set speed is lower than the optimum value, the rotor rotates at the set speed.</td></tr>
<tr><td colspan="3">It is possible to exit START DELAY – of temperature mode at any time by pressing the STOP key.</td></tr>
<tr><td colspan="3">START DELAY / OF TEMP. function cannot be run when START DELAY / OF TIME is activated.</td></tr>
</table>

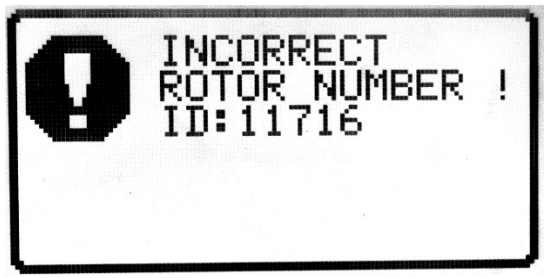
8.10 *Screen messages*

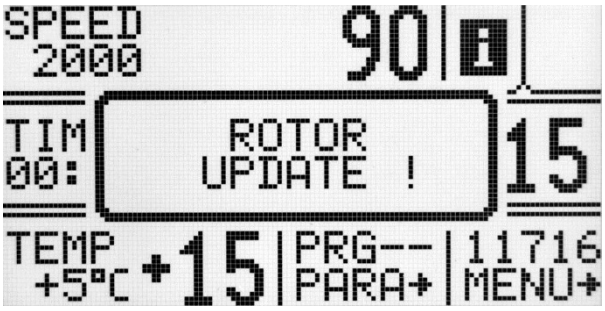
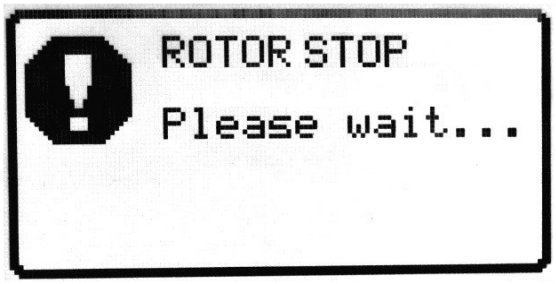
<table>
<tr><td colspan="2">End of centrifuging – manual mode</td></tr>
<tr><td> 
</td><td>Centrifuging may be stopped at any moment via the STOP key. The information message:

CYCLE INTERRUPTED will be displayed.</td></tr>
<tr><td colspan="2">End of centrifuging – manual mode</td></tr>
<tr><td> 
</td><td>Completion of centrifuging in accordance with the set time will be marked by a multi-ton audible signal (after rotor has stopped) and display of the following message:

CYCLE FINISHED</td></tr>
<tr><td colspan="2">Additional messages</td></tr>
<tr><td> 
</td><td>In case of power shortage while centrifuging, the following error screen will be displayed:

SUPPLY DECAY WHILE CENTRIFUGING</td></tr>
<tr><td> 
</td><td>After operating for 2,000 hours, the error screen will be displayed with information about the need to carry out servicing activities.

After pressing the SET key, the device proceeds to the main screen and the device may operate.</td></tr>
<tr><td> 
</td><td>Identified number of the installed rotor is not compatible with the number of rotor registered in the programme.</td></tr>
</table>

<table>
<tr><td> 
</td><td>The rotor is automatically updated (when auto-identification is enabled).</td></tr>
<tr><td> 
</td><td>Rotor is slowing down.
(only when centrifuge is switched off during the running of the rotor).</td></tr>
<tr><td colspan="2">After pressing the SET or STOP key, the device returns to the main screen.</td></tr>
</table>

Screen messages that may occur during operation.

MESSAGE	EXPLANATION
"SPEED OF ROTOR" "IDENTIFICATION <> 90 RPM"	SPEED OF ROTOR IDENTIFICATION <> 90 RPM
"IMBALANCE FAST STOP !" "PLEASE REMOVE CAUSE" "THEN RESTART"	UNBALANCE DETECTED
"NO ROTOR OR IDENTIFICATION" "SENSOR DAMAGED !"	ERROR OF ROTOR IDENTIFICATION {LIMIT OF 6SEC. IS OVER}
"INCORRECT ROTOR NUMBER !"	ROTOR'S ID NOT CORRECT
"WRONG DIRECTION OF ROTATION" "OR UNKNOWN ROTOR !"	WRONG DIRECTION OF ROTATION / UNKNOWN ROTOR
"PLEASE CLOSE THE LID" "HAND !"	CLOSE THE LID MANUALLY
"ROTOR STOPPING !" "Please wait..."	INITIALIZING AFTER MAINS FAILURE WITH ROTATING ROTOR
" CYCLE'S ABORTED !"	CENTRIFUGING ENDED BECAUSE OF PRESSING STOP
" CYCLE'S FINISHED"	CENTRIFUGING ENDED {WITHOUT ERRORS}

Emergency messages

In case of emergency messages (centrifuge is not working properly), contact the manufacturer's authorised service centre.

MESSAGE
"OVERHEATING MOTOR !"
INVERTER ERROR !"
"INVERTER SERIAL BUS ERROR !"
"TEMPERATURE SENSOR ERROR"
"OPENING COVER in RUN!"
"SPEED METER ERROR"
"I2C BUS ERROR"
"OVERHEATING CENTRIFUGE !"
"ROTOR OVERSPEED !"
"COVER LOCK MALFUNCTION !"
"WORKING 2000 HOURS:" "CALL SERVICE FOR"

8.11 *Unbalance*

The centrifuge is provided with a rotor unbalance sensor and when activated, the centrifugation process will be stopped through fast braking and at the same time an error message will be displayed. Cancellation of this error is possible only by pressing the **COVER** key after the rotor has come to a complete stop.

Once the rotor is correctly loaded, close the cover and re-start the programme. In order to protect the rotor against incorrect work, it has to be provided with identically filled buckets, carriers, test-tubes etc. for getting the best balance possible

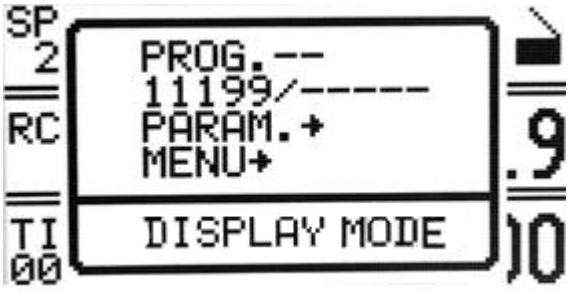
	Unbalance causes noise and vibrations during operation, and adversely affects power transmission system (motor, shock absorbers). The better balance, the smoother the centrifuge operation and therefore the longer life of the machine.

Emergency stop

At any time during centrifuging, it is possible to interrupt the process and fast stop the rotor. A single press of the **STOP** key will make centrifuging stop with the acceleration features set in the programme (after pressing either **SET** or **STOP** keys, the device returns to the main screen). Pressing and holding for key for up to 1s will make the centrifuging stop with the strictest feature.

9 MENU

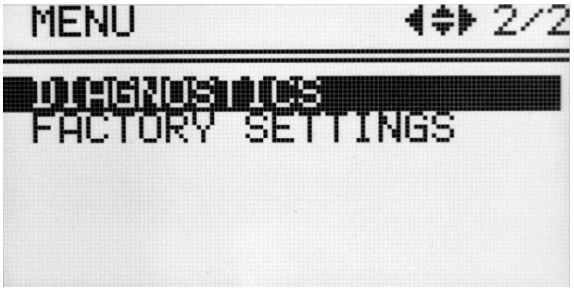
Simplified display mode



- Press and hold BACK 1 SEC for 1 second.
- Choose **PARAM** with ▲▼
- Press **SET**.
- Execute points below (**Normal display mode** description)

Normal display mode

- Press **SET** – +/- appears.
- With ▲▼◄► keys, select **MENU** (highlighted).
- Press **SET**.



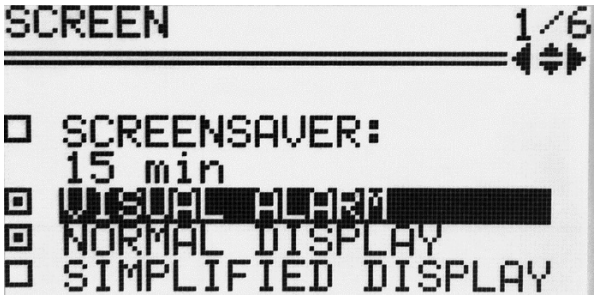
- Moving in the **MENU** is possible via ▲▼◄►keys.
- To open requested field, the user needs to select it and press **SET**.

CONFIGURATION	centrifuge configuration
PASSWORD	password protection
LAST 10 CYCLES	10 last centrifugation cycles history
WORK TIME	total working time, working cycles counter
ROTOR RUNTIME	counting time mode
CONTACT US	manufacturer's details
DIAGNOSTICS	error codes (service field)
FACTORY SETTINGS	restore factory settings

9.1 *Screen saver*

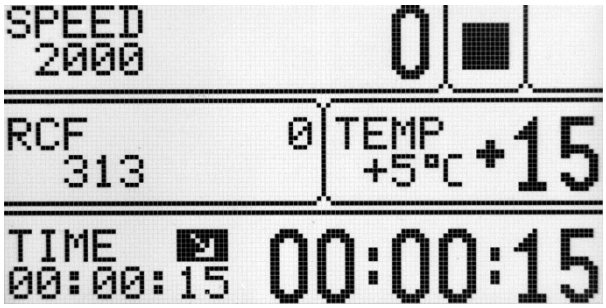
Setting time of screen saver	MENU / CONFIGURATION / **SCREEN MODE**
	▪ With ▲▼ keys select **SCREENSAVER**. ▪ Press **SET**. ▪ With ▲▼ keys choose 15 min (highlighted). ▪ Press **SET**-+/− appears. ▪ With ▲▼ keys select required value from 1 to 60 minutes. ▪ Mark selection by pressing **SET.** ▪ Leave the menu by pressing **BACK**.

9.2 *Visual alarm*

Visual alarm	MENU / CONFIGURATION / **SCREEN MODE**
	▪ Via ▲▼ keys, choose **VISUAL ALARM** ▪ Select it by pressing **SET**. ▪ Leave the menu by pressing **BACK**. Selecting **VISUAL ALARM** means that the screen will flash after centrifuging programme has ended or after an error.

9.3 *Types of main screen*

Default setting is **NORMAL DISPLAY**.
To switch to **SIMPLIFIED SCREEN**, follow the rules in section 9.3.1.

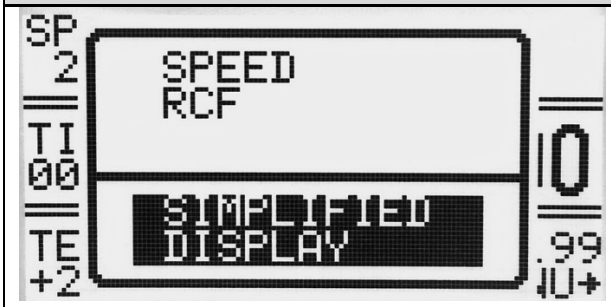
Types of main screen	
NORMAL DISPLAY	**SIMPLIFIED DISPLAY**
	

9.3.1 Switching the normal display to simplified screen

Method 1

- **Press SET** – appears.
- Via▲▼◄► keys, select **MENU.**
- Press **SET**.
- Via ▲▼ keys, select **CONFIGURATION** tab.
- Press **SET**.
- Via▲▼ keys, select **SIMPLIFIED DISPLAY**.
- Press **SET**.
- Leave menu via **BACK** key.

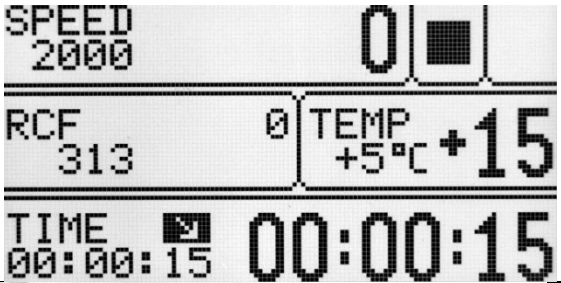
Method II



Press the **BACK** button for **1 sec.** to return to the basic display (a short menu is displayed on the screen), then:

- Via▲▼ keys, select **SIMPLIFIED DISPLAY**.
- Press **SET**.

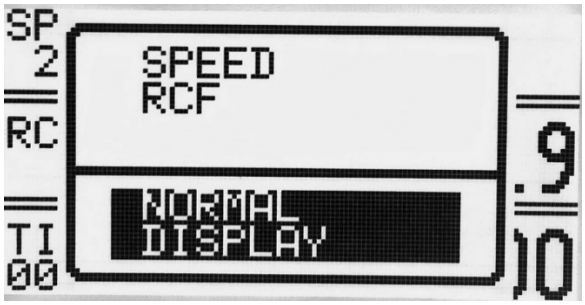
9.3.2 Switching the simplified screen to normal display



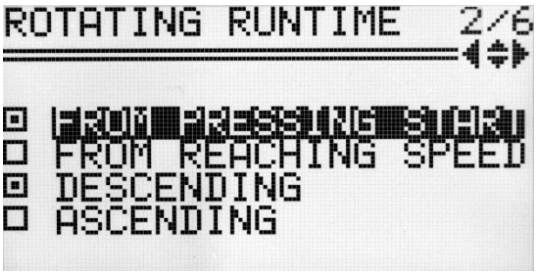
Press the **BACK** button for **1 sec.** to return to the basic display (a short menu is displayed on the screen), then:

- Via ▲▼ keys, select **DISPLAY** tab.
- Press **SET**.

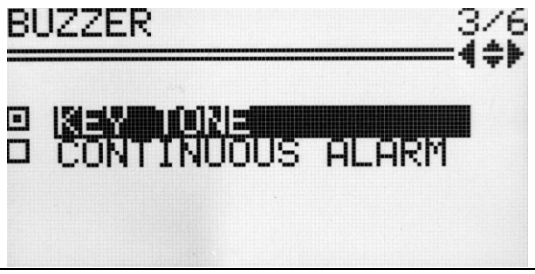
(a new selection window is displayed on the screen)

	▪ Via ▲▼ keys, select **NORMAL DISPLAY** tab. ▪ Press **SET**.

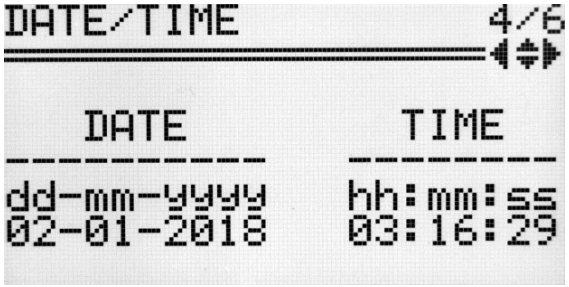
9.4 *Rotating time*

The method of counting time centrifuging	MENU/CONFIGURATION/ **ROTATING RUNTIME**
	▪ Via ▲▼, choose required option. ▪ Select it by pressing **SET**. ▪ Leave menu via **BACK** key
Counting from:	
FROM PRESSING START	COUNTING ONCE ROTOR IS IDENTIFIED
FROM REACHING SPEED	COUNTING FROM ASSIGNED SPEED
Presenting mode:	
DESCENDING	COUNTING DOWN
ASCENDING	COUNTING UP

9.5 *Buzzer*

Switching ON/OFF short audible signals accompanying every pressing of any key.	MENU/ CONFIGURATION /**BUZZER**
	▪ With ▲▼ keys, select required option. ▪ Confirm selection by pressing **SET**. ▪ Leave menu via **BACK** key
Warning signals are always switched on.	

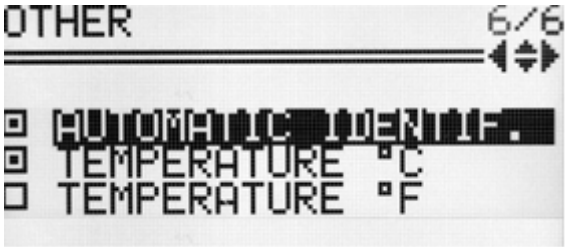
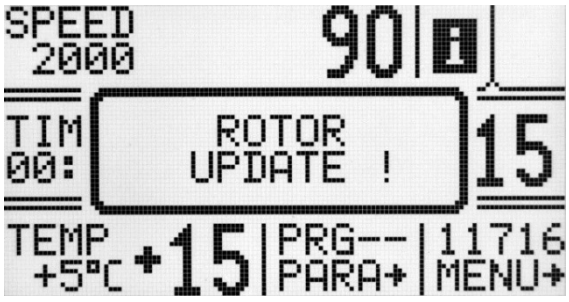
9.6 *Date/time*

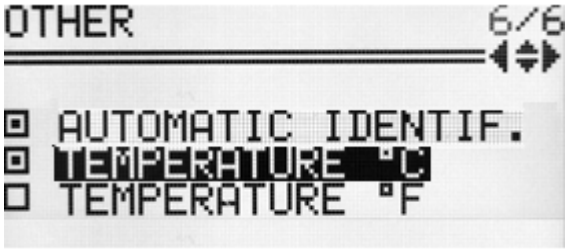
Setting up time and date	MENU/ CONFIGURATION /**DATE/TIME**
	▪ Press **SET**. ▪ Via◄► keys, choose required value. ▪ Press **SET** - +/- appears. ▪ Via ▲▼ keys, change to chosen value. ▪ Repeat above steps for other values. ▪ Confirm by pressing **SET**. ▪ Press **BACK.**
Set date and time are still active even after a restart of the centrifuge.	

9.7 *Language*

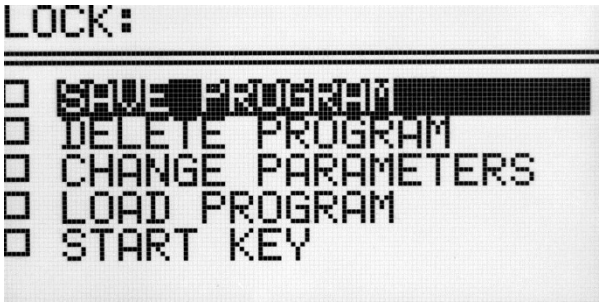
Changing menu language	MENU / CONFIGURATION / **LANGUAGE**
	▪ Via▲▼◄► keys, choose preferred menu language ▪ Select it by pressing **SET.** ▪ Press **BACK.**

9.8 *Other*

Rotor automatic identification	MENU / CONFIGURATION / **OTHER**
 	Thanks to the **AUTOMATIC IDENTIFICATION**, the centrifuge automatically identifies the rotor in the chamber. Rotor identification is indicated by the message. When the function is deactivated, it is necessary to manually select the desired rotor as described in "6.5 Choosing rotors". The **AUTOMATIC IDENTIF.** is turned on by default. To enable the function: Via ▲▼ keys, choose ☐ **AUTOMATIC IDENTIF.** Press **SET** (☐ change to ▣). After rotor automatic correction, **ROTOR UPDATE!** is visible

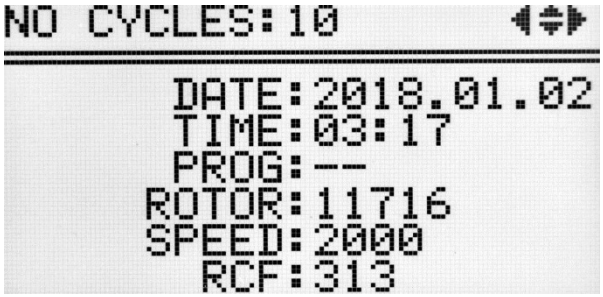
Choice of temperature unit	MENU / CONFIGURATION / **OTHER**
	The TEMPERATURE in °C is turned on by default. To change the temperature unit: ▪ Via ▲▼ keys, select unit ▪ Confirm by pressing **SET**.

9.9 *Password protection*

Setting up password	MENU / **PASSWORD**
To prevent from an unauthorized use, a **PASSWORD** can be set. **Note:** No PASSWORD is set by default. The PASSWORD can be set as follows when the rotor is at a standstill.	
	▪ Press the ▲▼ keys until **PASSWORD.** ▪ Press **SET**-+/− appears. ▪ With ◄► keys, set the valid 1000s place of the PASSWORD. e.g.: **1xxx**. With ▲▼ keys, set correct value. ▪ Repeat above steps for all places. ▪ Press **SET**.
	▪ As a confirmation, repeat instructions described above.
When the **PASSWORD** is set, the Key sign is displayed in the **CODE** zone. It is also displayed in the main menu (lower right corner of the screen).	
	

From then on, access to the **MENU** is possible after entering the password. In case of incorrect password, it will show message: **ACCESS DENIED!**
To delete the PASSWORD, "**0000**" must be set. If the **PASSWORD** is forgotten, the emergency code "**7654**" should be used to clear password and remove all locks.

9.10 *Cycles history*

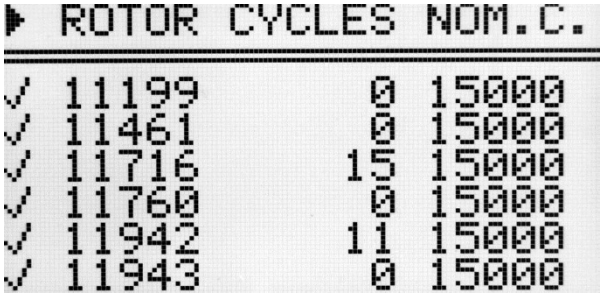
Information concerning the parameters of the last 10 centrifuging cycles.	CONFIGURATION / **LAST 10 CYCLES**
	▪ Number of cycle can be changed by using ◄► keys. ▪ The list can be scrolled using ▲▼ keys. ▪ To exit press **BACK** key.

9.11 *Total work time*

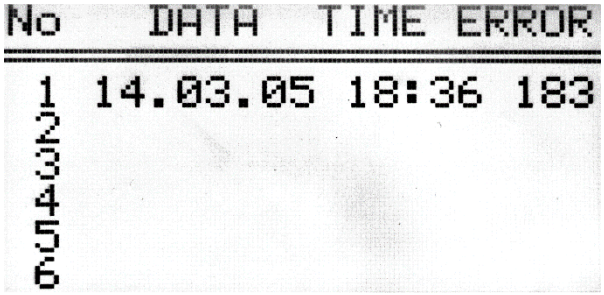
Total working time of centrifuge	CONFIGURATION / **WORK TIME**
	In the CYCLES menu, the following statistics are displayed: ▪ total working (centrifugation) time ▪ working cycles counter ▪ To exit, press **BACK** key.

9.12 *Rotor cycles*

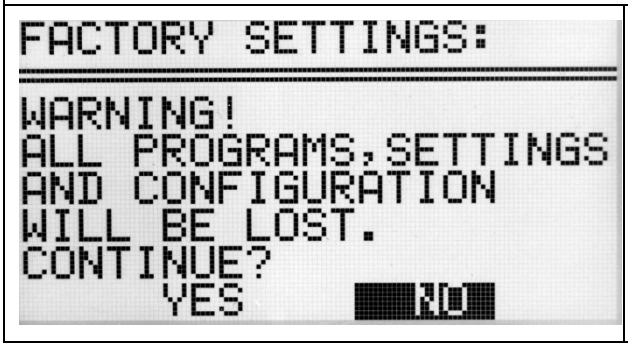
Information about the time of centrifuging and of the quantity of the working cycles of each rotor. The table also contains icons icons confirming successful validation of the centrifuging.	CONFIGURATION / **ROTOR RUNTIME**

	▪ The list can be scrolled using the ▲▼ keys. ▪ To exit, press **BACK** key. Symbols: – more than 100 cycles left – less than 100 cycles left – worn rotor

9.13 *Diagnostics*

Information about errors arising during centrifuging.	CONFIGURATION / **DIAGNOSTICS**
	▪ Use the ▲▼ keys to select the error. ▪ To exit press **BACK** key.

9.14 *Factory settings*

Restoring factory settings.	MENU/ **FACTORY SETTINGS**
All settings of user programs will be deleted.	
	▪ Via ◄► keys, choose **YES** or **NO**. ▪ Confirm by pressing **SET**.

9.15 *Manufacturer's details*

Information about the type of the centrifuge, firmware version, and contact details.	CONFIGURATION / **CONTACT US**
	▪ The list can be scrolled using ▼►◄►keys.

	▪ To exit press **BACK** key.

10 Maintenance

10.1 *Cleaning of the centrifuge*

	Attention! ▪ Pull the mains plug before cleaning. ▪ Before any cleaning or decontamination process other than that is recommended by the manufacturer, the user should refer to the manufacturer if case the planned process does damage the device.
	▪ For cleaning, water with soap or other water soluble mild detergent should be used. ▪ The user should avoid corrosive and aggressive substances. It is prohibited to use alkaline solutions, inflammable solvents or agents containing abrasive particles. ▪ Do not lubricate the centrifuge motor shaft. ▪ The unused centrifuge should have its cover opened. **Once a week** Using a wiping cloth, remove condensate or residues of the products from the rotor chamber. **Once a month** Check the rotor clamping thread. In case of damage, replace it. Check the centrifuging chamber for damage. In case of damage, the instrument should no longer be put into operation. Notify an authorised service workshop.

10.2 *Maintenance of centrifuge elements*

	▪ In this way, uniform deflection of the buckets and quiet centrifuge operation are ensured.

Cleaning of the accessories

	▪ In order to ensure safe operation, the user should carry out **regular** periodical maintenance of the accessories. ▪ Rotors, buckets and round carriers have to withstand high stresses originating from the centrifugal force. Chemical reactions as well as corrosion (combination of variable pressure and chemical reactions) can cause destruction of metals. Hard to observe surface cracks increase gradually and weaken material without visible symptoms. Wipe rotor's pins clean and dry with a paper towel after approx. 400 uses, cleaning or/and autoclaving and then lubricate socket with the petroleum jelly (catalog no.**17201**).

	▪ In case of surface damage, crevice or other change, as well as corrosion, the part (rotor, bucket, etc.) should be immediately replaced. ▪ Clamping rotor, containers and reducer inserts must be cleaned regularly to prevent corrosion. ▪ Cleaning of the accessories should be carried out outside of the centrifuge at least **once every week** if not after each use. Use a neutral agent of pH value 6÷8 for cleaning the accessories. It is forbidden to use alkaline agent of **pH > 8**. Parts should then be dried using soft fabric or in the chamber drier at ca. 50°C. ▪ Angle rotor should be placed on a fabric with holes facing down, for effective drying. ▪ Do not use bleach on plastic parts of the rotor. ▪ In this way, the useful service life of the device is substantially increased and susceptibility to corrosion is diminished. Accurate maintenance increases the service life as well and protects against premature rotor failures. Do not use bleach on plastic parts of the rotor. As recommended by laboratory standards, minimize the immersion time in each solution. ▪ Parts made of aluminium are especially prone to the corrosion. ▪ Corrosion and damages resulting from insufficient maintenance may not be subject of claims lodged against the manufacturer. ▪ The unused rotor should have the lid removed.

- **HS** accessories maintenance.

	▪ Check the general condition of seals. ▪ Make sure that rubber O-rings are lightly coated with silicone grease. Use high vacuum grease, e.g. type „C” by LUBRINA. ▪ The rotor pins should always be lubricated with **petroleum jelly**.

10.3 *Sterilization*

Plastics - legend to abbreviations

PS	polystyrene	**ECTFE**	ethylene/chlorotrifluoroethylene
SAN	styrene-acrylonitrile	**ETFE**	ethylene/tetrafluoroethylene
PMMA	polymethyl methacrylate	**PTFE**	polytetrafluoroethylene
PC	polycarbonate	**FEP**	tetrafluoroethylene/perfluoropropylene
PVC	polyvinyl chloride	**PFA**	tetrafluoroethylene/perfluoroalkylvinylether
POM	acetal polyoxymethylenel	**FKM**	fluorcarbon rubber
PE-LD	low density polyethylene	**EPDM**	ethylene propylene diene
PE-HD	high density polyethylene	**NR**	natural rubber
PP	polypropylene	**SI**	silicon rubber
PMP	polymethylpentene		

All standard disinfectants can be used. Centrifuges and devices are made of different materials, please refer to list below.

	radiation β radiation γ 25 kGy	**C_2H_4O** (ethylene oxide)	**formalin, ethanol**
PS	●	○	●
SAN	○	●	●
PMMA	●	○	●
PC	●	●	●
PVC	○	●	●
POM	●	●	●
PE-LD	●	●	●
PE-HD	●	●	●
PP	●	●	●
PMP	●	●	●
ECTFE, ETFE	○	●	●
PTFE	○	●	●
FEP, PFA	○	●	●
FKM	○	●	●
EPDM	○	●	●
NR	○	●	●
SI	○	●	●

● may be used

○ cannot be used

In the centrifuge, disinfectants and cleaning agents generally used in medical care should be used (e.g. Aerodesina-2000, Lysoformin 3000, Melseptol, Melsept SF, Sanepidex, Cutasept F).

10.3.1 Autoclaving

- Rotors, buckets and round carriers can be sterilized in autoclave with temperature of up to 121°C during 20 min (215 kPa), unless otherwise specified in the OPTIONAL ACCESSORY list.
- During sterilization (autoclaved) by means of steam one should to consider temperature resistance of individual materials.
- Deformation of the accessories (carriers or lids made of plastic) may occur during autoclaving.
- Do not autoclave disposable materials (e.g. tubes, cyto-container).
- The life of the accessory depends on the frequency of autoclaving and use.
- Autoclaving reduces the lifespan of plastic and mechanical components. PC tubes may become useless.
- Pressure in closed containers can cause plastic deformation or explosion.
- Prior to autoclaving the rotors and accessories, wash thoroughly and rinse them with distilled water.
- Never exceed the permissible autoclaving temperature and time.
- If you want to keep the hermetic seals, replace the sealing rings after each autoclave.

Chemical resistance of plastics

	autoclaving 121 °C, 20 min		**autoclaving** 121 °C, 20 min
PS	○	**PMP**	●
SAN	○	**ECTFE, ETFE**	●
PMMA	○	**PTFE**	●
PC	●	**FEP, PFA**	●
PVC	○[1)]	**FKM**	●
POM	●	**EPDM**	●
PE-LD	○	**NR**	○
PE-HD	○	**SI**	●
PP	●		

● may be used

○ cannot be used

1) Except PVC hoses which are resistant to the steam sterilization in the temperature 121°C.

10.4 *Chemical resistance*

Chemical resistance of plastics

	aldehydes	cyclic alcohols	esters	ether	ketones	strong or concentrated acids	weak or diluted acids	oxidizing substances	cyclic hydrocarbons	ahs	haloid hydrocarbons	alkalis
PS	○	●	○	○	○	○/●	○/●	○	○	○	○	●
SAN	○	●	○	○	○	○	○/●	○	○	○	○	●
PMMA	○/●	●	○	○	○	○	○/●	○	○/●	○	○	○
PC	○/●	●	○	○	○	○	○/●	○	○/●	○	○	○
PVC	○	●	○	○	○	●	●	○	●	○	○	●
POM	○/●	●	○	●	●	○	○	○	●	●	●	●
PE-LD		●	●	●	○/●	●	●	○	●	●	●	●
PE-HD	●	●	○/●	○/●	○/●	●	●	○	●	○/●	○/●	●
PP	●	●	○/●	○/●	○/●	●	●	○	●	○/●	○/●	●
PMP	○/●	●	○/●		○/●	●	●	○	○/●	○	○	●
ECTFE ETFE	●	●	●	●	○	●	●	●	●	●	●	●
PTFE FEP PFA	●	●	●	●	●	●	●	●	●	●	●	●
FKM	●	○	○	○	○	○	●	○/●	○/●	○/●	○/●	○/●
EPDM	●	●	○/●	○	○/●	●	●	○/●	○	○	○	●
NR	○/●	●	○/●	○	○	○	○/●	○	○	○	○	●
SI	○/●	●	○/●	○	○	○	○/●	○	○	○	○	○/●

●	very good	Permanent action of the substance is resistant to damage over 30 days. The material is able to be resistant through years
○/●	good to limited	Continuous action of the substance causes insignificant and partly reversible damage through a period of 7-30 days (e.g. puffing up, softening, reduced mechanical durability, discolouring).
○	limited	The material should not have continuous contact with the substance. The immediate occurrence of damage is possible (e.g. the loss of mechanical durability, deformation, discolouring, bursting, dissolving).

Rubber inserts should be cleaned thoroughly or even replaced. Centrifuges and accessories are made of different materials.

Do not use bleach on plastic parts of the rotor.

DANGER!

MSE centrifuges accessories are not biotight. For the centrifuging of infectious materials, it is necessary to use hermetically closed tubes meeting the demands of biotightness, in order to prevent germs migration into the centrifuge and beyond it.

The user is responsible for proper disinfections of the centrifuge in the event of some dangerous material spillage inside or outside of the centrifuge. During the above mentioned works, the user must wear safety gloves.

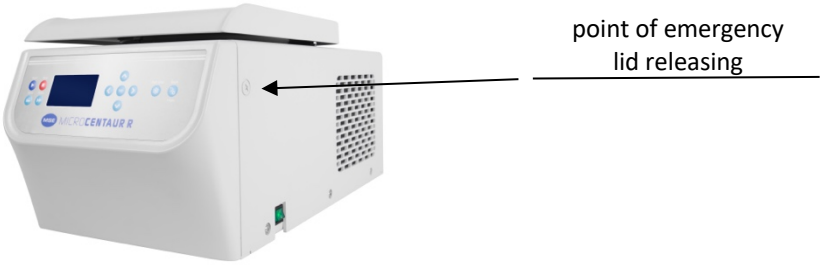
11 Troubleshooting

The majority of faults can be removed by restarting the centrifuge. After switching the centrifuge ON, parameters of the last programme will be displayed and sound signals comprising four successive tones will be generated. In case of short-duration power failure, the centrifuge terminates the cycle and displays PROGRAM ERROR code.

problem	question	remedy
Centrifuge does not start	*Is supply cable plugged into mains?*	*Plugs supply cable correctly.*
	Is master switch ON?	*Switch ON power supply.*
Motor error is displayed		Call service.
Centrifuge does not start (indications appears in progress but motor does not start)	*Is*  *symbol displayed?*	Wait till rotor stops and the  symbol goes off.
	Is  *symbol displayed?*	Close cover.  symbol must switch off.
	Is  *symbol flashing?*	Centrifugation cycle in progress, press **STOP** key or wait till cycle ends.
Centrifuge does not accelerate *(unbalance error)*	*Unequal rotor load.*	Centrifuge load needs to be balanced.
	Inclined centrifuge.	Centrifuge needs to be levelled.
	Faulty drive (mechanical damage).	Call service.
	Was centrifuge moved during operation.	Switch ON the centrifuge again after opening and closing the cover.
(rotor error)	*After stopping error rotor message is displayed*	Check if rotor number in started programme is consistent with the number of the rotor installed in the centrifuge. Check rotor status (if there are coding magnets inserted)
	Centrifuge does not recognise the rotor and does not stop.	Switch the centrifuge OFF, then ON and check correctness of loaded programme
It is not possible to open the cover	 *symbol on the display is flashing, after pressing COVER key, single tone is audible*	Rotor is still rotating. Wait for stopping of the rotor and displaying of the  symbol.
	The sensor is connected correctly, and the error is still applying.	Call service.
Mains failure during run	*The message will be displayed about the decay of tension.*	Wait for the complete stop of the rotor, clear the error by pressing the SET key.
Temperature sensor error	*The overheating message will be displayed.*	Switch the centrifuge OFF, then ON.
		Call service.
Error re exceeding temperature (50°C) in the chamber	*The overheating message will be displayed.*	Call service.

Emergency lid release

In case of mains failure, it is possible to open the lid manually. On the right side of the machine, the plug can be located and this can be unscrewed (via key for emergency lid release 18640 basic accessories). Then, the user should pull the plug .



It is not allowed to use the emergency lid releasing when rotor is running!
The user must be sure that rotor is not in motion (use the inspection glass).

Screen failure

If the information displayed on the screen disappears and there is no display backlight, press the **STOP** button twice to stop the centrifuging. Then, make sure to look through the glass into the centrifuge chamber that the rotor has stopped rotating and turn off the power supply with the power switch.
For safety reasons, do not use the lid emergency opening in case of screen failure. Turn on the power supply using the power switch 5 minutes after the rotor has stopped.

12 Guarantee

The manufacturer grants the Buyer the guarantee on the conditions specified in the Guarantee Certificate. The buyer forfeits the right to guarantee repair if using the device inconsistently with the User manual provisions, when damage results from the User's fault.

Repairs should be carried out in authorised service workshops, granted with the MSE Centrifuges Certificate.

The centrifuge shall be sent to repair after decontaminating disinfections. Information about authorised service workshops can be obtained from the Manufacturer.

13 Disposal

- When you are disposing of the device, the respective statutory rules must be observed.
- Pursuant to guideline 2002/96/EC (WEEE).
- The device belongs to the 8th group (medical devices) and is categorised in business to business field.
- The icon of the crossed-out rubbish bin shows that the device may not be disposed of as part of domestic waste. The waste disposal guidelines of the individual EC countries might vary. If necessary, contact your supplier.

14 Manufacturer's info

MSE Centrifuges LIMITED	+44	**1435 517 000**	sales department
Mytogen House		1435 517 005	service
11 Browning Road		1825 700 471	fax
Heathfield			
TN21 8DB	http://	**www.msecentrifuges.com**	
UNITED KINGDOM	e-mail:	sales@msecentrifuges.com	

DISTRIBUTOR:

15 Annexes

Part No	OPTIONAL ACCESSORIES Name	• Tube Ref
11199	**Angle rotor 12 x 2/1.5ml. with Hermetically Sealed Lid (angle 45°)** **(max RPM: 18000 max RCF: 24270 x g R max: 6.7 cm)**	• 15011.15128
14084	Round carrier for 0.5ml tube (O 8mm)	• 15127
14126	Round carrier for 0.4ml tube (O 5.8mm)	• 15124
14133	Round carrier for 0.2ml tube (O 6.2mm)	• 15125
11210C/A	**Angle rotor 24 x 15/10ml. complete with buckets 13080 (O 17x100/120mm) (angle 30°)** **(max RPM: 5000 max RCF: 3996 x g R max: 14.3 cm)**	• 15048.15050. 15053.15118
14082	Round carrier (O 13.3mm)	• 15119
11210C/B	**Angle rotor 24 x 10ml. complete with buckets 13081 (O 17x70/85mm) (angle 30°)** **(max RPM: 5000 max RCF: 3996 x g R max: 14.3 cm)**	• 15053
14082	Round carrier (O 13.3mm)	• 15054.15120. 15419
11211C/A	**Angle rotor 10 x 50ml for Falcon® tubes. complete with Buckets 13275 or 13278 with PC caps 17151 (angle 30°)** **(max RPM: 5500 max RCF: 4498 x g R max: 13.3 cm)**	• 15052. 15055. 15117
14248	Round carrier for 30/25ml tube (O 26x102mm)	• 15055. 15117
11211C/B	**Angle rotor 10 x 50ml for Falcon® tubes. complete with Buckets 13276 (angle 30°)** **(max RPM: 5500 max RCF: 4498 x g R max: 13.3 cm)**	• 15052
14035	Round carrier for 14ml tube (O 28.5/17x105mm) 25.00	• 15046
14036	Round carrier for 5ml tube (O 28.5/14x92mm)	•
14043	Round carrier for 5ml tube (O 29/13x85mm)	• 15120. 15419
14071	Round carrier for 30ml tube (O 25x100mm)	• 15055. 15056. 15117. 15424
14089	Round carrier for 15ml Falcon® tube (O 17x120mm)	• 15050

14248	Round carrier for 30/25ml tube (O 26x102mm)	• 15055. 15117
11213C/A	**Angle rotor 8 x 50ml for Falcon® tubes. complete with Buckets 13275 or 13278 with PC caps 17151 (angle 30°)** **(max RPM: 5500 max RCF: 4227 x g R max: 12.5 cm)**	• 15051. 15052 (z/with 13275)
14248	Round carrier for 30/25ml tube (O 26x102mm)	• 15055. 15117
11213C/B	**Angle rotor 8 x 50ml for Falcon® tubes. complete with Buckets 13276 (angle 30°)** **(max RPM: 5000 max RCF: 4227 x g R max: 12.5 cm)**	• 15052
14035	Round carrier for 14ml tube (O 28.5/17x105mm)	• 15046
14036	Round carrier for 5ml tube (O 28.5/14x92mm)	•
14043	Round carrier for 5ml tube (O 29/13x85mm)	• 15120. 15419
14071	Round carrier for 30ml tube (O 25x100mm)	• 15055. 15056. 15117. 15424
14089	Round carrier for 15ml Falcon® tube (O 17x120mm)	• 15050
14248	Round carrier for 30/25ml tube (O 26x102mm)	• 15055. 15117
11259	**Angle rotor 30 x 2/1.5ml. with Hermetically Sealed Lid (angle 45°)** **(max RPM: 15000 max RCF: 24400 x g R max: 9.7 cm)**	• 15011. 15128
14084	Round carrier for 0.5ml tube(O 8.0mm)	• 15127
14126	Round carrier for 0.4ml tube(O 5.8mm)	• 15124
14133	Round carrier for 0.2ml tube(O 6.2mm)	• 15125
11273	**Angle rotor 8 x 30ml for Negene tubes. with Hermetically Sealed Lid (angle 30°)** **(max RPM: 12000 max RCF: 14006 x g R max: 8.7 cm)**	• 15056
11456C/A	**Angle rotor 36 x 15/10ml. complete with buckets 13080 (O 17x100/120mm) (angle 30°)** **(max RPM: 5000 max RCF: 3997 x g R max: 14.3 cm)**	• 15048.15050. 15053.15118
14082	Round carrier	• 15119
11456C/B	**Angle rotor 36 x 10ml. complete with buckets 13081 (O 17x70/85mm) (angle 30°)** **(max RPM: 5000 max RCF: 3996 x g R max: 14.3 cm)**	• 15053
14082	Round carrier	• 15054.15120. 15419

11457		15052
	Angle rotor 6 x 50ml for Falcon® tubes. with Hermetically Sealed Lid (angle 30°) **(max RPM: 10000 max RCF: 10733 x g R max: 9.6 cm)**	
14043	Round carrier for 5ml tube (O 29/13x85mm)	15120. 15419
14071	Round carrier for 30ml tube (O 25x100mm)	15055. 15056. 15117. 15424
14073	Round carrier for 10ml tube (O 17x100mm)	15053. 15118
14089	Round carrier for 15ml Falcon® tube (O 17x120mm)	15050
14868C/A	Round carrier 14868 with 14089 round carrier for 5ml Eppendorf® reaction cap or screw cap tube	
11458		15056
	Angle rotor 6 x 30ml for Nelgene tubes. with Hermetically Sealed Lid (angle 30°) **(max RPM: 15000 max RCF: 19621 x g R max: 7.8 cm)**	
11459		15053
	Angle rotor 12 x 10ml (O17x77mm). with Hermetically Sealed Lid (angle 30°) **(max RPM: 15000 max RCF: 21382 x g R max: 8.5 cm)**	
14149	Round carrier for 4ml flat-bottom tube	
11460		15127
	Angle rotor 36 x 0.5ml. with Hermetically Sealed Lid (angle 45 **(max RPM: 18000 max RCF: 29703 x g R max: 8.2 cm)**	
14134	Round carrier for 4ml flat-bottom tube	15125
11461		15011. 15128
	Angle rotor 24 x 2/1.5ml. with Hermetically Sealed Lid (angle 45°) **(max RPM: 18000 max RCF: 30065 x g R max: 8.3 cm)**	
14084	Round carrier for 0.5ml tube (O 8.0mm)	15127
14126	Round carrier for 0.4ml tube (O 5.8mm)	15124
14133	Round carrier for 0.2ml tube (O 6.2mm)	15125
11462		15011. 15128
	Angle rotor 36 x 2/1.5ml. with Hermetically Sealed Lid (angle 45°) **(max RPM: 18000 max RCF: 30065 x g R max: 8.3 cm)**	
14084	Round carrier for 0.5ml tube (O 8.0mm)	15127
14126	Round carrier for 0.4ml tube (O 5.8mm)	15124
14133	Round carrier for 0.2ml tube (O 6.2mm)	15125

11462	**Angle rotor 36 x 2/1.5ml. with Hermetically Sealed Lid (angle 45°)** **(max RPM: 18000 max RCF: 30065 x g R max: 8.3 cm)**	15011. 15128
14084	Round carrier for 0.5ml tube (O 8.0mm)	15127
14126	Round carrier for 0.4ml tube (O 5.8mm)	15124

14133	Round carrier for 0.2ml tube (O 6.2mm)	15125

11465C/A	**Angle rotor 30 x 15/10ml. complete with buckets 13080 (O 17x100/120mm) (max RPM: 5200 max RCF: 4020 x g R max: 13.3 cm)**	15048.15050. 15053.15118
14082	Round carrier (O 13.3mm)	15119
11465C/B	**Angle rotor 30 x 10ml. complete with buckets 13081 (O 17x70/85mm) (angle 30°) (max RPM: 5200 max RCF: 4020 x g R max: 13.3 cm)**	15053
14082	Round carrier (O 13.3mm)	15054.15120. 15419
11466	**Angle rotor 10 x 15ml for Falcon® tubes. with Hermetically Sealed Lid (angle 30°) (max RPM: 10000 max RCF: 10733 x g R max: 9.6 cm)**	15050
14047	Round carrier for 5ml tube (O 13x85mm)	15419
14868C/A	Round carrier 14868 with 14089 round carrier for 5ml Eppendorf® reaction cap or screw cap tube	
11467	**Angle rotor 12 x 10ml (O17x109mm). with Hermetically Sealed Lid (angle 30°) (max RPM: 12000 max RCF: 15133 x g R max: 9.4 cm)**	15053
11468	**Angle rotor 6 x 8 x 0.2ml PCR-strip tubes. with Hermetically Sealed Lid (angle 45°) (max RPM: 12000 max RCF: 15294 x g R max: 9.5 cm)**	15122. 15130
11469	**Angle rotor 6 x 50ml for Nalgene® tubes. with Hermetically Sealed Lid (angle 30°) (max RPM: 12000 max RCF: 14489 x g R max: 9.0 cm)**	15051
14035	Round carrier for 14ml tube (O 28.5/17x105mm)	15046
14036	Round carrier for 5ml tube (O 28.5/14x92mm)	
11496	**Angle rotor 4 x 85ml or 4 x 30ml for Nalgene® tubes. with Hermetically Sealed Lid (angle 30°) (max RPM: 10000 max RCF: 10621 x g R max: 9.5 cm)**	15051. 15067
11501C/A	**Angle rotor 30 x 15/10ml. complete with 13080 buckets (O 17x100/120mm) (angle 30°) (max RPM: 5200 max RCF: 4021 x g R max: 13.3 cm)**	15048.15050. 15053.15118
14082	Round carrier (O 13.3mm)	15119
11501C/B	**Angle rotor 30 x 10ml. complete with 13081 buckets (O 17x70/85mm) (angle 30°) (max RPM: 5200 max RCF: 4021 x g R max: 13.3 cm)**	15053
14082	Round carrier (O 13.3mm)	15054.15120. 15419

11503C	**Angle rotor 8 x BABCOCK® bottle (GERBER 5406). complete with 13504 buckets and 14505 round carriers (angle 40°) (max RPM: 2000 max RCF: 733 x g R max: 16.4 cm)**	
11585	**Angle rotor 12 x 8 x 0.2ml PCR-strip tubes. with Hermetically Sealed Lid (angle 45°) (max RPM: 14000 max RCF: 20817 x g R max: 9.5 cm)**	15122. 15130
11586C	**Angle rotor 6 x 85ml for Nalgene® tubes. complete with buckets 13587 (angle 35°) (max RPM: 7000 max RCF: 6081 x g R max: 11.1 cm)**	15067
14855	Round carrier for 50ml Falcon® tube (O 30 x 120mm)	15052
14856	Round carrier 15ml for Falcon® tube (O 17 x 120mm)	15050
11718C	**Angle rotor 4 x 100ml. complete with buckets 13719 (angle 30°) (max RPM: 6300 max RCF: 5014 x g R max: 11.3 cm)**	
14024	Round carrier 15ml for Falcon® tube (O 17x120mm)	15050
14188	Pad (rubber) under 100/50/30/25ml glass	15052. 15115. 15116. 15117
14189C	Round carrier 50ml for Falcon® tube (O 30 x120mm) or Nalgene®. complete with rubber pad	15051. 15052
14190C	Round carrier 30/25ml (O 25.5 x100mm). complete with rubber pad 14188	15055. 15056. 15117
14192C	14192C Round carrier 50ml (O 35 x100mm). complete with rubber pad 14188	15116
14196	PA pad under 100ml PP tube	15040
14226	Round carrier for 50ml conical bottom tube. with skirt - GREINER® (O 13.1x100mm / max height of tube: 117mm)	
14249	Pad under 50ml conical bottom tube	
11740C/A	**Angle rotor 12 x 15/10ml. complete with buckets 13080 (O 17x100/120mm) (angle 30°) (max RPM: 5500 max RCF: 4058 x g R max: 12 cm)**	15048.15050. 15053.15118
14082	Round carrier (O 13.3mm)	15119
11740C/B	**Angle rotor 12 x 10ml. complete with buckets 13081 (O 17x70/85mm) (angle 30°) (max RPM: 5500 max RCF: 4058 x g R max: 12 cm)**	15053
14082	Round carrier (O 13.3mm)	15054.15120. 15419

11741C/A	**Angle rotor 8 x 15/10ml. complete with buckets 13080 (O 17x100/120mm) (angle 30°) (max RPM: 6000 max RCF: 4226 x g R max: 10.5 cm)**	15048.15050. 15053.15118
14082	Round carrier (O 13.3mm)	15119
11741C/B	**Angle rotor 8 x 10ml. complete with buckets 13081 (O 17x70/85mm) (angle 30°) (max RPM: 6000 max RCF: 4226 x g R max: 10.5 cm)**	15053
14082	Round carrier (O 13.3mm)	15054.15120. 15419
11743C	**Angle rotor 12 x 30/25ml. complete with buckets 13329 (angle 30°) (max RPM: 85500 ma x RCF: 4058 x g R max: 12 cm)**	15055. 15056
14255	Round carrier for 7ml tube (O 13/100mm)	15054. 15119
14256	Round carrier for 15/10ml tube (O 17/120mm)	15046. 15048. 15053. 15118
11746C	**Angle rotor 6 x 50ml for Falcon® tubes. complete with buckets 13276 (angle 30°) (max RPM: 6000 max RCF: 4427 x g R max: 11 cm)**	15052
14035	Round carrier for 14ml tube (O 28.5/17x105mm)	15046
14036	Round carrier for 5ml tube (O 28.5/14x92mm	
14043	Round carrier for 5ml tube (O 29/13x85mm)	15120. 15419 15055. 15056. 15117. 15424
14071	Round carrier for 30ml tube (O 25x100mm)	15055. 15056. 15117. 15424
14089	Round carrier for 15ml Falcon® tube (O 17x120mm)	15050
14248	Round carrier for 30/25ml tube (O 26x102mm)	15055. 15117
11760	**Angle rotor 24 x 2ml for filter tubes/spin columns. with Hermetically Sealed Lid (angle 45°) (max RPM: 15000 max RCF: 23143 x g R max: 9.2 cm)**	15011. 15128
14084	Round carrier for 0.5ml tube(O 8.0mm)	15127
14126	Round carrier for 0.4ml tube (O 5.8mm)	15124
14133	Round carrier for 0.2ml tube (O 6.2mm)	15125
11944	**Angle rotor 12 x 5ml for Eppendorf® tubes (angle 45°) (max RPM: 15000 max RCF: 21382 x g R max: 8.5 cm)**	
12177	**Swing-out rotor 4 x 250ml (max RPM: 5000 max RCF: 4724 x g R max: 16.9 cm)**	
13174	Bucket 250ml (O 62x107mm)	15175. 15176
14017	Pad (PP) under round bottom bottle 250ml	15017

14120	Round carrier 2x30ml Sterilin® tubes (O 61x80mm)	
14151	Round carrier for 100ml tube (O 46x100mm) and for 14159 round carrier for 50ml round-bottom test tube	15115
14151C	Round carrier 14151 with 14159 round carrier for 50ml round-bottom test tube	
14152	Round carrier 50ml for Falcon® tube (O 30x120mm)	15052
14153	Round carrier 5 x 15ml for conical bottom tubes (O 17/22x120mm)	15050
14154	Round carrier 9 x 5ml (O 13.5x81mm). hermetic type. Short	
14155	Round carrier 12 x 5/7ml (O 13x100mm). open type	15054. 15119. 15120. 15419
14156	Round carrier 8 x 15/10ml (O 17x120mm). hermetic type	15046. 15048. 15118
14157	Round carrier 4 x 15ml (O 61/17x122mm). round-bottom	15053.15118.
14158	Round carrier 12 x 2ml for Eppendorf® tubes (O 61/11x38.5mm)	13174. 13178
14160	Round carrier 3 x 30/25ml (O 61/25.5x100mm)	15116
14175	Pad (PP) under flat-bottom bottle 250ml	
14869	Pad (PP) under 175ml and 225ml FALCON® tubes	
13178C	Bucket 250ml. complete with 17179 cap (Al)	15015. 15017. 15040. 15046. 15048. 15050. 15052. 15053. 15054. 15115.
14017	Pad (PP) under round bottom bottle 250ml	15017
14151	Round carrier for 100ml tube (O 46x100mm) and for 14159 round carrier for 50ml round-bottom test tube	15115
14151C	Round carrier 14151 with 14159 round carrier for 50ml round-bottom test tube	
14152	Round carrier 50ml for Falcon® tube (O 30x120mm)	15052
14153	Round carrier 5 x 15ml for conical bottom tubes (O 17/22x120mm)	15050
14154	Round carrier 9 x 5ml (O 13.5x81mm). hermetic type. Short	
14155	Round carrier 12 x 5/7ml (O 13x100mm). open type	15054. 15119. 15120. 15419
14156	Round carrier 8 x 15/10ml (O 17x120mm). hermetic type	15046. 15048. 15118
14157	Round carrier 4 x 15ml (O 61/17x122mm). round-bottom	15053.15118.
14158	Round carrier 12 x 2ml for Eppendorf® tubes (O 61/11x38.5mm)	13174. 13178

14160	Round carrier 3 x 30/25ml (O 61/25.5x100mm)	15116
14175	Pad (PP) under flat-bottom bottle 250ml	
14869	Pad (PP) under 175ml and 225ml FALCON® tubes	
13180	Bucket 2 x 50ml for Falcon® tubes (O 30x120mm)	15050. 15052
14089	Round carrier for 15ml Falcon® tube (O 17x120mm)	15050
14868C/A	Eppendorf® z zatrzaskiwaną pokrywką lub nakrętką Round carrier 14868 with 14089 round carrier for 5ml Eppendorf® reaction cap or screw cap tube	
12285C	**Microtiter. swing-out rotor head. complete with 2 buckets 13286 for microtiter plates or blocks (85x 130 x 60mm)** **(max RPM: 4500 max RCF: 2626 x g R max: 11.6 cm)**	15102
12300	**Hematocrite rotor for 24 capillaries 75mm** **(max RPM: 13000 max RCF: 16816 x g R max: 8.9 cm)**	15098. 15100
16164	Hematocrite reader - round	
12436	**Swing-out rotor 4 x 200ml** **(max RPM: 5200 max RCF: 4413 x g R max: 14.6 cm)**	
13042	Bucket 2 x 50ml for Falcon® tubes (O 30 x120mm)	15050. 15052
13044	Hanger 4 x 15ml for Falcon® tubes. complete with 13080 buckets (O 17x100/120mm)	15048. 15050. 15053. 15118
14082	Round carrier (O 13.3mm)	15119
13045	Bucket 50ml for Falcon® tube (O 30x120mm)	15051
13437	Bucket 200ml (O 57/100mm)	15440
14072	Round carrier for 50ml tube (O 35x100mm)	15116
14106	Round carrier 7 x 7ml (O 13.5x100mm)	15054. 15119
14108	Round carrier 7 x 10ml (O 17x75mm). short	13437. 13438C
14109	Round carrier 7 x 5ml (O 13.5x75mm). short	15120. 15419
14110	Round carrier 7 x 15/10ml (O 17x110mm)	15046. 15048. 15118
14111	Round carrier 5 x 15ml (O 16.7x110mm)	15048*. 15053. 15118 *- linked only to 13437 and 13438 without lids
14113	Round carrier for 50ml Falcon® tube (O 30x120mm)	15052

14197	Round carrier 100ml (O 46x103.7mm)	15040. 15115
14441	Round carrier 12 x 7ml (O 12.1x100mm)	15119
14446	Round carrier 12 x 5ml (O 12.1x75mm). short	15120. 15419
14447	Round carrier 12 x 1.2ml for S-Monovette® tubes (O 9x66mm)	15016
14449	Round carrier 4 x 12ml (O 56.5/17.1x105). short	15046. 15053. 15118
14450	Round carrier 9 x 2/1.5ml (O 11x38.5mm)	15128
13438C	Round carrier 200ml. complete with lid 17111	15440
14072	Round carrier for 50ml tube (O 35x100mm)	15116
14104	Round carrier 100ml (O 45.5x100mm)	15115
14106	Round carrier 7 x 7ml (O 13.5x100mm)	15054. 15119
14108	Round carrier 7 x 10ml (O 17x75mm). short	13437. 13438C
14109	Round carrier 7 x 5ml (O 13.5x75mm). short	15120. 15419
14110	Round carrier 7 x 15/10ml (O 17x110mm)	15046. 15048. 15118
14111	Round carrier 5 x 15ml (O 16.7x110mm)	15048*. 15053. 15118 *- linked only to 13437 and 13438 without lids
14113	Round carrier for 50ml Falcon® tube (O 30x120mm)	15052
14197	Round carrier 100ml (O 46x103.7mm)	15040. 15115
14441	Round carrier 12 x 7ml (O 12.1x100mm)	15119
14446	Round carrier 12 x 5ml (O 12.1x75mm). short	15120. 15419
14447	Round carrier 12 x 1.2ml for S-Monovette® tubes (O 9x66mm)	15016
14449	Round carrier 4 x 12ml (O 56.5/17.1x105). short	15046. 15053. 15118
14450	Round carrier 9 x 2/1.5ml (O 11x38.5mm)	15128
13593	Bucket 100ml (O 45x94mm)	15040
14181	Round carrier 5 x 2/7ml (O 44.5/12.5x100mm)	13174. 13178
14186	Round carrier 4 x 7ml for Vacutainer® tubes (O 13.1x100mm)	15054. 15119. 15120. 15419
14187	Round carrier 4 x 15/10ml for Vacutainer® tubes (O 16.5x112mm)	15046. 15048. 15053. 15118

14188	Pad (rubber) under 100/50/30/25ml glass tubes	15052. 15115. 15116. 15117
14189C	Round carrier 50ml for Falcon® tube (O 30 x120mm) or Nalgene®. complete with rubber pad 14188	15051. 15052
14190C	Round carrier 30/25ml (O 25.5 x100mm). complete with rubber pad 14188	15055. 15056. 15117
14192C	Round carrier 50ml (O 35 x100mm). complete with rubber pad 14188	15116
14196	PA pad under 100ml PP tube	15040
14226	Round carrier for 50ml conical bottom tube. with skirt - GREINER® (O 13.1x100mm / max height of tube: 117mm)	
12451C	**Microtiter. swing-out rotor head. complete with 2 buckets 13307 for microtiter plates or blocks (85 x 130 x 60mm)** **(max RPM: 3000 max RCF: 1036 x g R max: 10.3 cm)**	15102
12452C	**Cyto rotor. complete with 4 hangers 13606** **(max RPM: 2500 max RCF: 768 x g R max: 10.7 cm)**	
16610	Set of cyto-containers (included positions: 16610.15123.16614. 16616. 16617 - 100 pcs of each)	
12582C	**Swing-out rotor 4 x 40ml for CPT tubes. complete with 13583 buckets and 17185 caps (Al)** **(max RPM: 3200 max RCF: 1809 x g R max: 15.8 cm)**	
14181	Round carrier 5 x 2/7ml (O 44.5/12.5x100mm)	15054. 15119. 15120. 15419
14186	Round carrier 4 x 7ml for Vacutainer® tubes (O 13.1x100mm)	15054. 15119. 15120. 15419
14187	Round carrier 4 x 15/10ml for Vacutainer® tubes (O 16.5x112mm)	15046. 15048. 15053. 15118
14584	Round carrier 4 x 8ml for CPT tubes (O 16 x130mm)	

Item Ref	Name Test tubes
15011	Polypropylene tube 2ml (O 10.8x40mm). round - bottom
15017	Policarbonate bottle 250ml (O 62x122mm). round bottom
15040	Polypropylene tube 100ml with cap (O 44.7/47x103.7mm)
15046	Polypropylene tube 14ml with cap (O 16.8/17.7x106mm)
15048	Polypropylene tube 15ml Nalgene® (O 16x113mm)
15050	Polypropylene tube 15ml with conical bottom
15051	Polypropylene tube 50ml Nalgene® (O 28.8x106.7mm)
15052	Polypropylene tube 50ml with conical bottom. with cap (O 29.5/34x117mm)
15053	Polypropylene tube 10ml with cap (O 16x100mm)
15054	Polypropylene tube 6ml with cap (O 11.7/13.5x95mm)
15055	Polypropylene tube 30ml with cap (O 24.9x103mm)
15056	Policarbonate tube 30ml Nalgene® with cap (O 25.5x94mm)
15067	Polycarbonate tube 85ml Nalgene® with cap (O 37.8x106mm)
15098	Stopper for Capillaries
15100	Capillary tubes heparinized (1.4 x 75mm. 37µl)
15102	Microtiter plate with cap (85.5x127mm)
15115	Glass tube 100ml (O 45x100mm)
15116	Glass tube 50ml (O 35x100mm)
15117	Glass tube 25ml (O 25x100mm)
15118	Glass tube 10ml (O 16x100mm)
15119	Glass tube 7ml (O 12x100mm)
15120	Glass tube 5ml (O 12x75mm)
15122	Polypropylene PCR tube 8x0.2ml with integrated caps (O 6x21mm)
15124	Polypropylene tube 0.4ml with cap (O 5.7x46mm)
15125	Polypropylene tube 0.2ml PCR (O 6x21mm)
15127	Polypropylene tube 0.5ml with cap (O 7.8x30mm)
15128	Polypropylene tube 1.5ml with cap (O 10.8x39mm)
15130	Polypropylene PCR stripe 8x0.2ml (O 6x21mm)
15175	Polypropylene bottle 250ml Herolab (O 62x122mm)
15176	Polycarbonate bottle 250ml Herolab (O 62x122mm)
15419	Polypropylene tube 5ml (O12x85mm) with cap
15424	Polypropylene tube 30ml with cap (O 25.5x94mm)
15440	Polypropylene bottle 200ml with cap (O 56.5x113mm)

DECLARATION OF DECONTAMINATION

In order to protect our employees please fill out the declaration of decontamination fully before sending centrifuge back to MSE (repair).

1. **Device**
   – type: ……
   – serial No.: ……

2. **Description of decontamination**
   (see user manual)
   ……
   ……
   ……
   ……

3. **Decontamination carried out by:**
   – name: ……

4. **Date and signature** ……

DECLARATION OF DECONTAMINATION

In order to protect our employees, please fill out the declaration of decontamination fully before sending back centrifuge to the MSE (return).

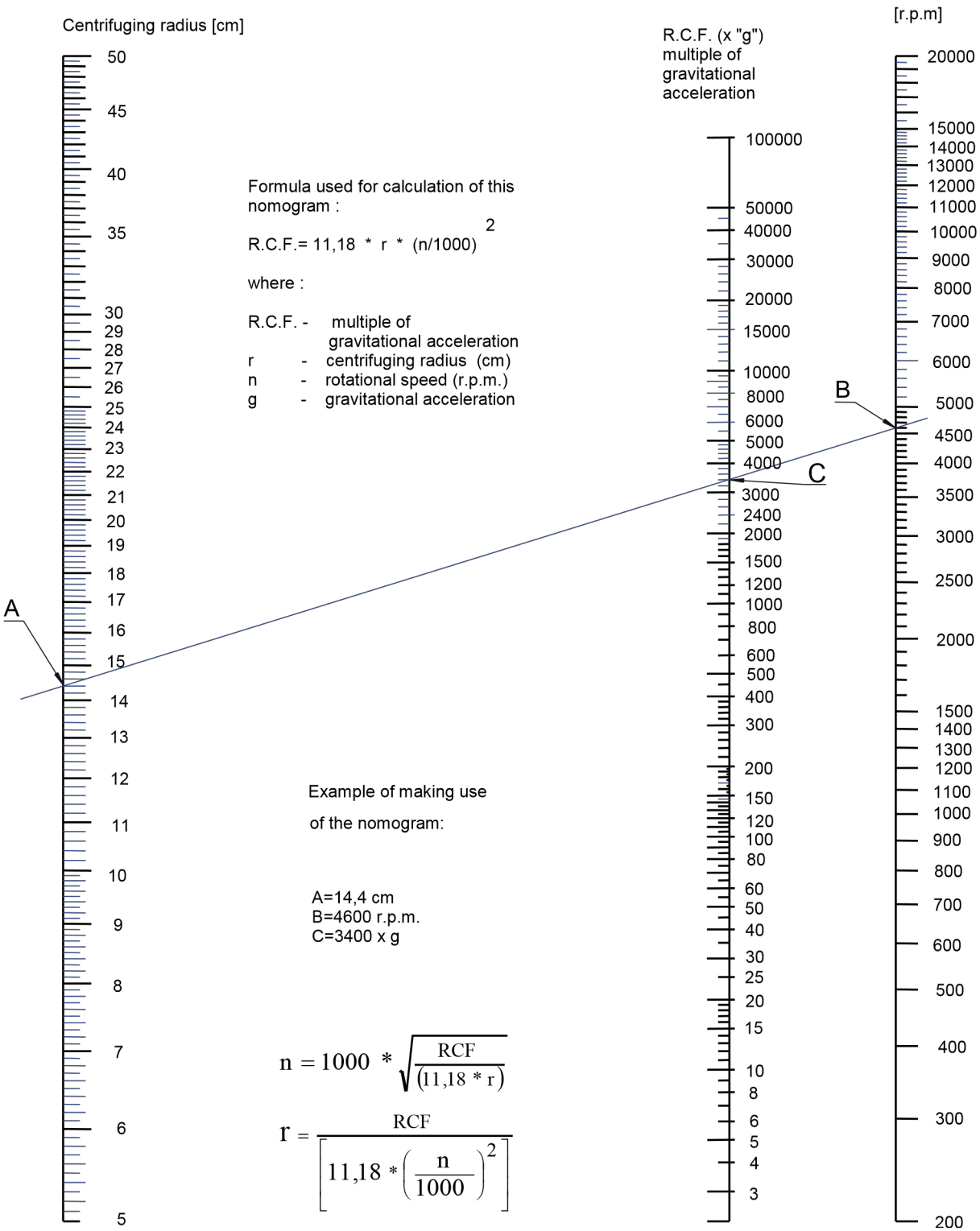
5. **Device**
   – type: ……
   – serial No.: ……

6. **Description of decontamination**
   (see user manual)
   ……
   ……
   ……
   ……

7. **Decontamination carried out by:**
   – name: ……

8. **Date and signature** ……

NOMOGRAM



Formula used for calculation of this nomogram :

$$R.C.F. = 11{,}18 * r * (n/1000)^2$$

where :

R.C.F. - multiple of gravitational acceleration
r - centrifuging radius (cm)
n - rotational speed (r.p.m.)
g - gravitational acceleration

Example of making use of the nomogram:

A=14,4 cm
B=4600 r.p.m.
C=3400 x g

$$n = 1000 * \sqrt{\frac{RCF}{(11{,}18 * r)}}$$

$$r = \frac{RCF}{\left[11{,}18 * \left(\frac{n}{1000}\right)^2\right]}$$

Meet the rest of the family

Brand new generation of centrifuges

HAWK

Compact Centrifuge

Maximum speed	**18000** rpm
Maximum RCF	**24270** xg
Maximum Volume	**4 x 100ml**

HARRIER

General Purpose Centrifuge

Ambient and Refrigerated

Swing Out / Fixed Angle / Microplate

Maximum speed	**18000** rpm
Maximum RCF	**30065** xg
Maximum Volume	**4 x 250ml**

Distributor

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