HARRIER

and

HARRIER R

User Manual

Please read this before use

SIGNS

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

This manual was prepared with special care. MSE CENTRIFUGES LTD may change the manual at any time and without notice because of improvements, typographical errors, inaccuracies of current information or improvements to facilities.

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

Content

1 Application

The Harrier/R/RH centrifuges are benchtop laboratory centrifuge for in vitro diagnostic (IVD). Devices are used for separation samples taken from people's, animals' and plants' components of different densities, under the influence of the centrifugal force, to provide information about their biological state (Harrier – ventilated, Harrier R – with cooling, Harrier RH – with cooling and heating).

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

In the centrifuge, 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	**Harrier**					**Harrier R/RH**				
mains voltage (L1+N+PE)	230V	100V	110V	120V	127V	230V	100V	110V	120V	127V
	±10	±5				±10	±5			
mains frequency,	50/60Hz	50Hz/60Hz				50Hz	60Hz	60Hz		
power consumption (max.)	600W					980W				
current protection [A]	T 6,3A	T 10A				T 10A	T 16A			
cooling medium	-					R507 (CFC/HCFC free)				
	Harrier					**Harrier R**	**Harrier RH**			
capacity (max.)	1000 ml									
speed – RPM	90 ÷ 18000 rpm (step 1 rpm)									
relative centrifugal force – RCF	30065 x g (step 1 x g)									
Torque, or else the unit need to be changed (max.)	19148 Nm									
running time	00:00:01 ÷ 99:59:59 – [hours, min., sec] (step 1s)									
time counting	as start button is pressed / as preselected speed is reached									
short-time operation mode – SHORT	yes									
continuous operation mode – HOLD	yes									
user programmes	100									
adjustable temperature	-					-20 ÷ 40°C* (step 1°C)	-20 ÷ 55°C* (step 1°C)			
initial cooling/heating PROG 99 (90 ÷ 2500 RPM)	no/ no					yes / no	yes / yes			
guaranteed temperature with max. rotor speed	-					≤4°C				
cooling/heating without centrifuging	no					yes/ no	yes / yes			
cooling/heating with centrifuging	no					yes /no	yes / yes			
acceleration (ACEL)	10 linear curves									
deceleration (DECEL)	10 linear curves									
programmable non-linear curves:										
Acceleration	10									
Deceleration	10									
USB communication	yes									
Electromagnetic compatibility	according to PN-EN 61326-1:2006									
ambient conditions	PN-EN 61010-1 (p.1.4.1)									
set-up site	indoors 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	IP21					IP20		IP20		
height (H)	380 mm					380 mm				
width (W)	443 mm					443 mm				
depth (D)	545 mm					695 mm				
height with open cover (H_{oc})	768 mm					768 mm				
noise level	56 dB									
weight 230V	41,8 kg					64,8 kg	65,7 kg			
weight 120V	45 kg					70,9 kg	71,8 kg			

*time 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, GERMAN, SPANISH, ITALIAN, PORTUGUESE, RUSSIAN, SWEDISH, CZECH, POLISH

3 Installation

Open the package. Remove 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 the package*

Name	pcs.	cat no.
centrifuge HARRIER/R/RH	1	see name plate
complete clamp	1	17664
spanner for the rotor	1	17665
spanner for emergency opening of the cover	1	17162
power cord 230V / 120V	1	17866/17867
fuse WTA T 6,3A 250V / WTA T10A 250V /WTA T16A 250V	2	17862/17863/17864
Vaseline 20ml	1	17201
USB A-A cable	1	16655
user manual	1	20352/R/RH/EN

3.2 *Location*

- Ensure safe location.
- The centrifuge shall not be located near source of heat and shall not be subjected to direct sunlight.
- Centrifuge should be located on a stable and flat-levelled table top.
- 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 changing from cold to warm, condensation of water will occur inside the centrifuge. It is therefore important that sufficient time be provided for drying out of the centrifuge prior to further use of the centrifuge (min. 4 hours).
- Do not position the centrifuge so that it is difficult to operate the power switch.
- Supply voltage given on the name plate has to be consistent with local supply voltage. MSE CENTRIFUGES LTD 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 emergency cut-out that shall be located far from

	the centrifuge, near the exit or beyond the room.

	▪ **Before switching on, check whether the centrifuge is connected to 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 intalled.**

3.3 *Current protection*

	The centrifuge is equipped with thermal current protection. Fuse is situated in the plug-in socket unit at the back of the centrifuge.

4 Safety notes

4.1 *Operating personnel*

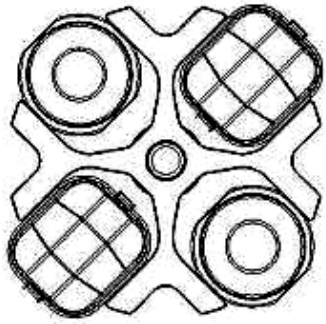
	▪ The laboratory centrifuge can be operated by authorised laboratory personnel after familiarisation with the user manual. ▪ **User manual shall be always held near the centrifuge.** ▪ The centrifuge should not be misused. ▪ If the centrifuge is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

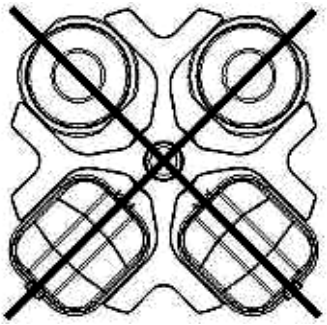
4.2 *Guarantee*

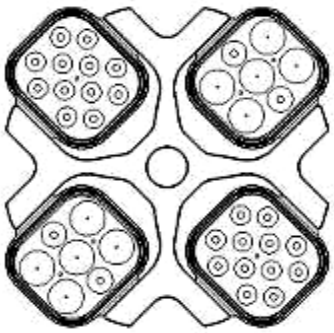
	▪ The warranty period is **24 months** (unless otherwise specified in the purchase documents). ▪ The service life of the centrifuge specified by the manufacturer is **10 years**. ▪ After termination of the warranty period, it is necessary to carry out yearly technical inspections of the centrifuge. ▪ 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.

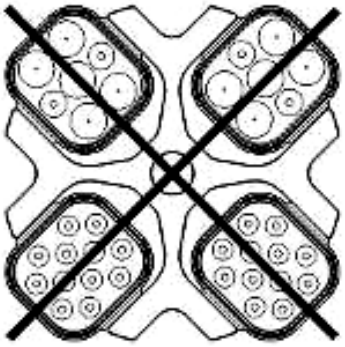
4.3 *Loading the rotor*

- Fix the rotor firmly on the motor axis.
- 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. Swing-out rotors must be equipped with all (two or four – dependent on the type of rotor) buckets.
- Lubricate the swing-out rotor journal pins.

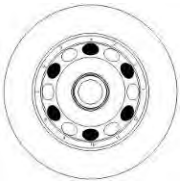


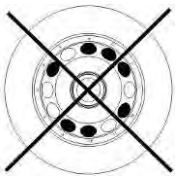






CORRECT **WRONG**





CORRECT **WRONG**

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

	**FILLING TUBES** ▪ Fill test tubes outside the centrifuge. ▪ Please pay special attention to the quality and proper thickness of the glass test tubes walls. Those must be test tubes for centrifuges. ▪ Fill test tubes outside the centrifuge.

4.4 *Safety hints*

	**ROTORS MAINTENANCE** ▪ Lubricate the swing-out rotor trunnion pins. ▪ Use only accessories in good condition. ▪ Protect equipment against corrosion using accurate preventive maintenance.
	**HS ACCESSORIES MAINTENANCE** ▪ Make sure that rubber O-rings are lightly coated with silicone grease. 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 as a result of a high energy supply 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.

	**CENTRIFUGES 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.

INSPECTION PROCEDURES CARRIED OUT BY THE OPERATOR

The operator has to pay special attention to the fact that key centrifuge parts are not damaged for safety reasons. This is specifically important for:

- Centrifuge accessories and especially structural changes, corrosion, preliminary cracks, abrasion of metal parts.
- Screw connections.
- Inspection of seals of the buckets if such are used. Special attention must be paid to all of the rubber (seals) parts. In the 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 lapse of guarantee).
- Only the manufacturer-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 consulted 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) neither leave objects, e.g. glass vessels within this zone.
- It is not permitted to put any objects on the centrifuge

COVER OPENING

- It is not permitted to open the cover manually in emergency procedure when 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.

4.6 *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 overview*

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 description*

Fig.1. General view

1. Power switch
2. USB
3. Control panel
4. Cover
5. Sight glass
6. Emergency lid opening

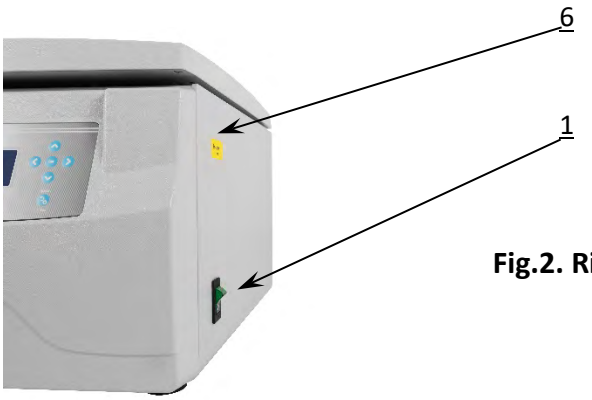


Fig.2. Right side of centrifuge

1. Motor shaft
2. Rotor
3. Rotor lid
4. Clamp bolt/rotor nut

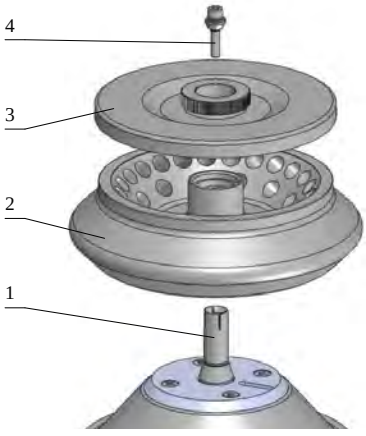
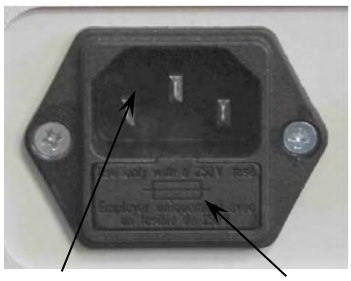


Fig.3. Assembly of angle rotor

Fig.4. Mains socket back of the centrifuge

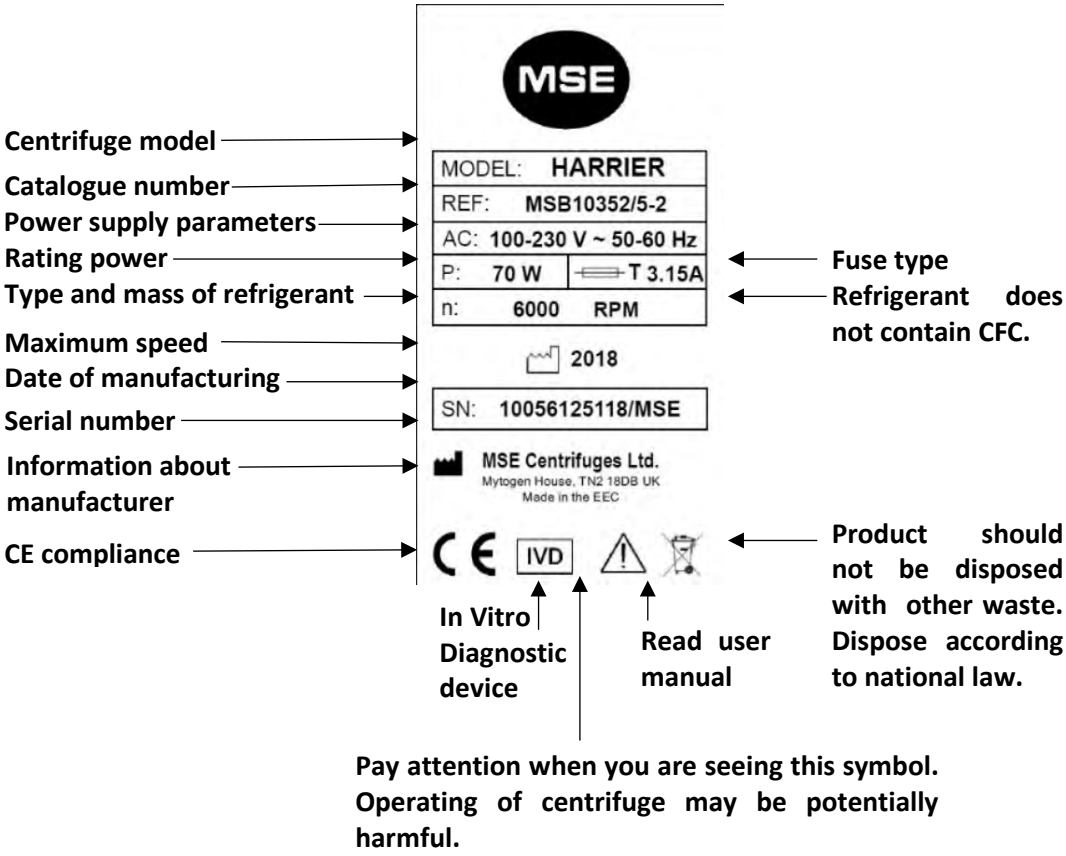


1. Plug-in socket
2. Fuse socket

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*

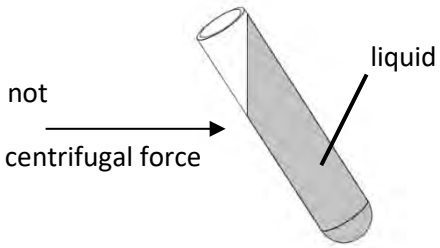


5.5 *Rotor and accessories installation*

- 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.

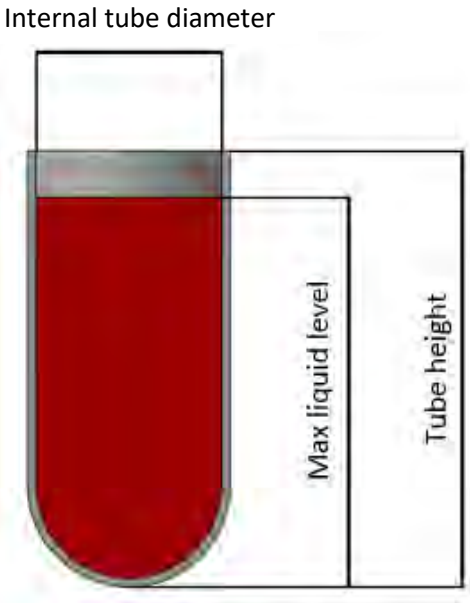
- In case of rotors designed with the cover (angled rotor), they must not be used without the rotor lid. Rotor covers must be closed tightly. Rotor covers ensure smaller drags of the rotors, proper setting of the test-tubes and airtight sealing.
- Please only use buckets intended for the selected types 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.



- Please fill tubes according to below formula:

$$\text{Max liquid level} < \text{Tube height} - \frac{\text{Internal tube diameter}}{2}$$



Additionaly please adhere to the manufacturer's restrictions about the filling of the test tube.

⚠	**It is recommended to equalise 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 the 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.

5.9 *Increase in temperature (Harrier only)*

In uncooled centrifuges, the temperature in the rotor chamber, rotor and sample can increase to above 40°C, based on the run time, g-force (rcf)/speed and ambient temperature.

6 Centrifuging

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
	LID	lid opening
❄	FAST COOL	start fast cooling mode, precool (Harrier R and Harrier RH only)
	BACK/ OPTIONS	exit the current menu / mode type, choose options for simplified display (press and hold for 1 s.)
▲	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. In the user manual, examples of screens from the Harrier R/RH are shown. For Harrier (without refrigeration), the temperature is not shown. The flashing of field on display mean it is ready to set. The flashing of fields is visualised as highlighted in the user manual.

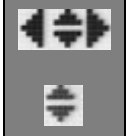
<table>
<tr><td></td><td>After switching on of centrifuge, the welcome screen will appear. On the next screen, it is then possible to set up parameters.</td></tr>
<tr><td> 
</td><td>Simplified display mode is set as default, it is possible to switch to normal (see chapter 9.3) display mode (with two sub modes shown below).</td></tr>
<tr><td colspan="2">Normal display</td></tr>
<tr><td>RPM display mode</td><td>RCF display mode</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

- **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	programme no.	
11199	rotor no.	
PARAM	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**

Exemplary change of **SPEED** setting:

- Press **SET** (to enter edit mode) – appears.
- Use ▲▼◄► keys to select **SPEED** field (flashing).
- Press **SET-** flashing.
- With ▲▼ choose 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:

- Press **SET** (to enter edit mode) – appears.
- Use ▲▼◄► keys to choose **RCF** field (flashing).
- Press **SET-** flashing.
- With ▲▼ choose preferred 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 select: ▪ Use ▲▼ keys to 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 Types of Main Screen**	

Change of **TIME** setting::	
	▪ Press **SET** (to enter edit mode) -  appears. ▪ Use ▲▼◄► keys to select **TIME** field (flashing).
00:02:00 **[hh : mm : ss]** e.g.: centrifuging time – 2 minutes 00 seconds	▪ Press **SET** -  flashing. ▪ With▲▼ choose preferred value. ▪ Use ◄► to choose order of magnitude of changing value (highlited). ▪ 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:	
	▪ Press **SET** (to enter edit mode) – appears. ▪ Use ▲▼◄► keys to select **TEMP** field (flashing). ▪ Press **SET** key. ▪ With ▲▼ choose preferred value. ▪ Confirm settings by pressing **SET**. ▪ Press **BACK**.

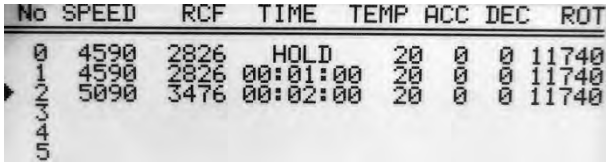
6.4 *Users programmes*

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

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

- **Normal display mode**

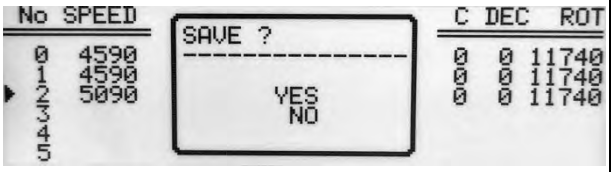
- Press **SET** key – appears.
- Use ▲▼◄► keys to select **PRG– –** field (highlighted)
- Press **SET** key – list of programmes is visible.



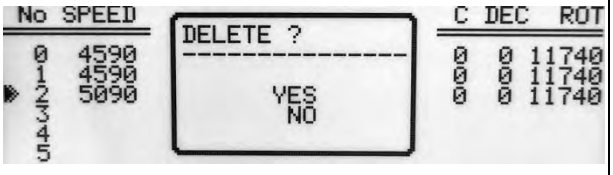
- Use ▲▼ to choose preferred programme.
- Confirm with **SET** key.

LOAD, **SAVE**, **DELETE, NEW PROGRAMME**

Select **NEW PROGRAM** by pressing .



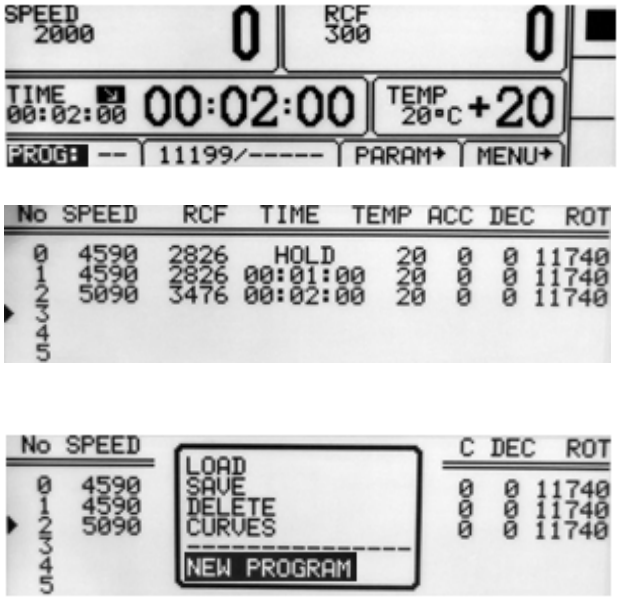
SAVE – save settings as a programme (confirm by selecting **YES** and pressing **SET**)



DELETE – delete programme (confirm by selecting **YES** and pressing **SET**)

NEW PROGRAM – enter to create new programme mode (as below)

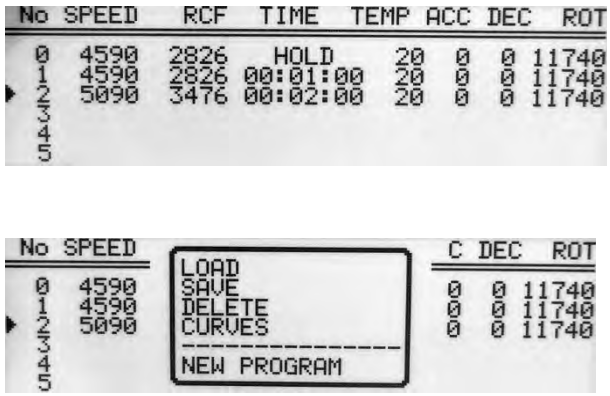
Creating a new programme:

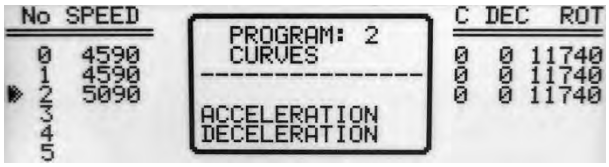


- Press **SET** key.
- Use ▲▼◄► keys to select **PROG** field (flashing).
- Press **SET** key. List of programmes is visible, choose preferred position (number of programmes).
- Press **SET** key- menu of programme settings will appear.
- Choose **NEW PROGRAM** press **SET** and **BACK**, and then set chosen parameters of centrifuging (refer to Chapter **6. Centrifuging**).

- **Changing parameters during centrifuging**

There is a possibility to change parameters: **SPEED, RCF, TIME, TEMP** during centrifuging.
Such modifications inactivate the existing running programme. When programming is set, modification during run is noted
by **PROG – –** symbol (instead of the programme number).

User multi-section **acceleration/deceleration** features	**CURVES** – create acceleration or deceleration features
	▪ Use ▲▼ keys to choose the saved programme for which you intend to create the acceleration or deceleration features (selected with symbol ▶). ▪ Press **SET**. ▪ With ▲▼ keys, choose **CURVES.** ▪ Press **SET** - the selection frame is displayed**.**

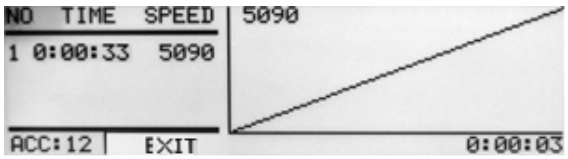


- With ▲▼ keys, choose **ACCELERATION** to create acceleration features or **DECELERATION** to create deceleration features
- Confirm selection by pressing **SET**.

Acceleration features	PROG / CURVES / **ACCELERATION**

After choosing **PROG → CURVES → ACCELERATION** the features wizard window will be displayed:

The current acceleration feature connected with the loaded programme will be displayed on the screen.



NO.	section no. (max. 4)
TIME	total acceleration time
SPEED	final RPM
ACC:12	feature's no. (10-19)

If the **EXIT** field is selected, the message will flash. Pressing the **SET** key will cause a return to the **PROG → CURVES** fold, without making changes in the acceleration features. Press ▲ to start programming "1" section.

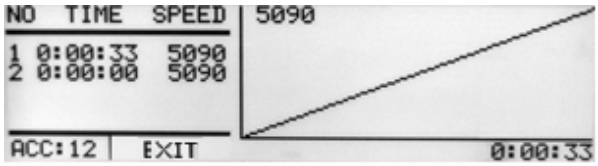
„1" SECTION

- Press **SET**.
- With ▲▼ choose time for section, press **SET**.
- With ▲▼ choose speed for section, press **SET**.

The set speed value is limited by the maximum speed of the rotor connected with the edited programme. After the programming of the speed, graphical display of the section (of all sections) will occur TIME+SPEED of the user's acceleration features.

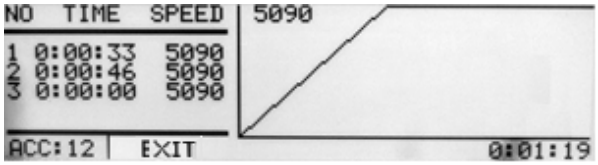
After programming section 1, there is a possibility to programme the next section, number 2:

„2" SECTION

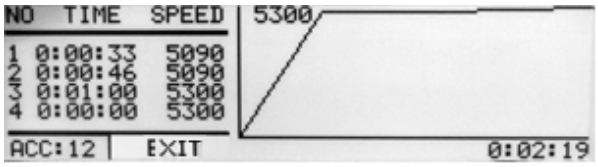
	Programming of new section (the whole line 2 is flashing). Programming as in section 1. It is also possible to abandon the programming: with **UP/DOWN** keys choose the **EXIT** option (it will flash) and then save (press the **SET**). Acceleration features will be as section 1 with **TIME/SPEED** parameters described in line 1.

The minimal speed of acceleration will be equal to the last speed programmed.

„3" SECTION

	Programming of a new section is possible (when the whole line 3 is flashing). Programming as in section 1. It is also possible to abandon the programming: with ▲▼ keys, choose the **EXIT** option (it will flash) and save (press **SET**) Acceleration features will be as section 2 with **TIME/SPEED** parameters described in lines 1 and 2.

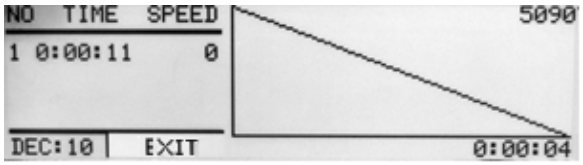
„4" SECTION

	Programming of a new section is possible (when the whole line 4 is flashing). Programming as in the case of section 1. It is also possible also to abandon programming: with ▲▼ keys choose the **EXIT** option (it will flash) and save (press **SET**) Acceleration features will be as section 3 with **TIME/SPEED** parameters described in lines 1, 2 and 3.

Repeated attempts to programme previously programmed sections of the acceleration features will cause beginning of programming of the whole acceleration features once again (with settings of the programme loaded to edition – factory setting).

Deceleration feature:	PROG / CURVES / **DECELERATION**

After choosing **PROG → CURVES → DECELERATION,** the window of the features' wizard will be displayed: **Default deceleration features connected with the loaded programme will be displayed on the screen. Creating of deceleration features takes place differently than acceleration features.**



NO.	section no. (max. 4)
TIME	total acceleration time
SPEED	final RPM
DEC:10	features no. (10-19)

First press **EXIT** field (the message is flashing). Pressing the **SET** key will revert to the **PROG → CURVES**, without making changes in the deceleration features. Press ▲ to start programming "1" section.

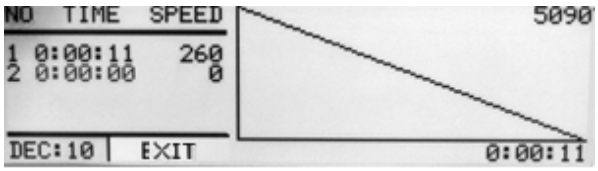
„1" SECTION

- Press **SET**.
- With ▲▼ choose time for section, press **SET**.
- With ▲▼ choose speed for section, press **SET**.

In order to compete the creation of the deceleration curve, it is necessary for the speed of the last of programmed sections of the curve to be equal = 0. Otherwise the curves wizard will not enable the end of programming (it will be impossible to select the EXIT option).

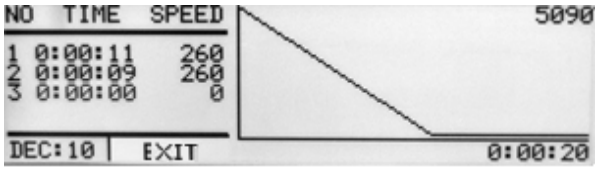
After programming the section 1, there is a possibility to programme the next section, number 2. You can opt out of the following sections by pressing **EXIT.**

„2" SECTION

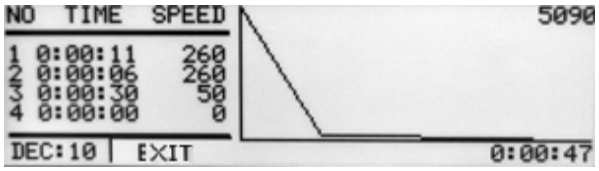
	New section programming possible (the whole line 2 is flashing). Programming as in section 1. To stop creating the deceleration curve at the stage of two sections, it is necessary to set the speed in section 2 to 0 and press the **SET** key and then choose **EXIT** and press **SET**.

The maximum speed of the next section of deceleration feature is equal to the pre-programmed speed of the previous section.

„3" SECTION

	New section programming possible is (when the whole line 3 is flashing). Programming as in section 1. To stop creating the deceleration curve, it is necessary to set the speed in section 3 to 0 and press the **SET** key and then choose **EXIT** and press **SET**.

„4" SECTION

	New section programming is possible (when the whole line 4 is flashing). Programming as in the case of the section 1. If speed of the last section=0, it is possible to save the created features by choosing the **EXIT** option with ▲▼ keys and pressing the **SET** key and then choose **EXIT** and press **SET**.

Repeated attempts to programme, pre-programmed sections of the acceleration features will cause a reset of the whole deceleration features (with settings of the programme loaded to edition, factory settings).

6.5 *Programmes with user features*

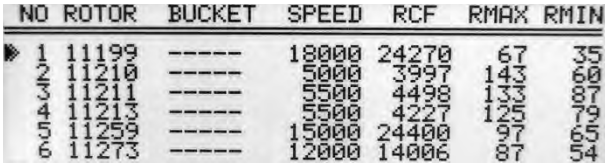
Loading a modified programme in the **CURVES** folder is signalled? by the icon on the main screen:

	Icon  signals that programme with user acceleration/deceleration features is loaded.

It is not possible to change parameters (speed, rotor no. and others) during a run, when a programme with user feature is loaded. However, changing these parameters is possible in **PARAM/ ACCELERATION**, **PARAM/DECELERATION**.

6.6 *Rotor selection*

Simplified display mode	
	▪ Press and hold  for 1 second. ▪ Choose rotor number (exemplary **11199/-----)** with▲▼. ▪ Press **SET**. ▪ Follow instructions below (below **Normal display mode** description)
Normal display mode	
	▪ Press **SET**–  appears. ▪ Use ▲▼◄► to select rotor choosing field.



NO	ROTOR	BUCKET	SPEED	RCF	RMAX	RMIN
1	11199	-----	18000	24270	67	35
2	11210	-----	5000	3997	143	60
3	11211	-----	5500	4498	133	87
4	11213	-----	5500	4227	125	79
5	11259	-----	15000	24400	97	65
6	11273	-----	12000	14006	87	54

- Press **SET** (Rotor list will appear).
- Use ▲▼keys to select chosen rotor number
- Confirm by pressing **SET**.
- Press **BACK**.

It is possible to set **AUTOMATIC ROTOR IDENTIFICATION**.

The procedure is described in subsection **9.8**.

6.7 *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.

6.8 *Finishing the centrifuging*

	When preselected time is reached, centrifugation will end automatically.
 X1	▪ Before preselected time is completed, it is possible to stop centrifugation. Pressing **STOP** for the first time will stop centrifuging with the features set in loaded programme.  symbol will be shown.
 x2	▪ Pressing **STOP** for a second time will stop centrifuging with the fastest feature.  symbol will be shown.

▪ The message about cancelling of centrifuging can be deleted with the **STOP**, **SET, COVER,** ▲▼◄► or **BACK** key.

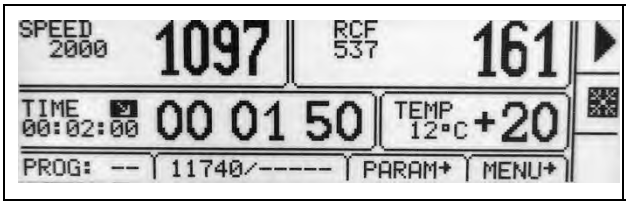
7 Temperature control

⚠	**Harrier R** and **Harrier RH** only

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:

	▪ Press SET (to enter edit mode) – appears. ▪ Use ▲▼◄► keys to select **TEMP** field (flashing). ▪ Press SET key. ▪ With▲▼ choose preferred value (from -20°C to 40°C). ▪ Confirm settings by pressing **SET**. ▪ Press BACK.

	▪ Cooling is indicated by this symbol (flashing).

7.1 *Initial cooling during centrifuging – FAST COOL*

FAST COOL	▪ The parameters available 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), centrifuge chamber, rotor and centrifuge container must be pre-cooling to the predetermined temperature. It may cause minimalization of temperature differences. ▪ Initial cooling may be activated by **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 needed to obtain the requested temperature the quickest.

	**FAST COOL** mode is selected by symbol  flashing in the right upper side of display.
	It is possible to exit **FAST COOL** mode at any time by pressing **STOP** key. Interruption of the function is signaled by a message.

7.2 *Initial cooling or heating without centrifuging – THERMAL CHAMBER*

	PARAM → **THERMAL CHAMBER**
 **0 RPM**	▪ It is possible to run the centrifuge in **THERMAL CHAMBER** mode - cooling for R, cooling and heating for RH (rotor is at standstill). ▪ How to enable **THERMAL CHAMBER** is described in Parameters of centrifugation chapter.

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

	PARAM → **START DELAY – OF TEMPERATURE**
 **2500 RPM**	▪ 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.

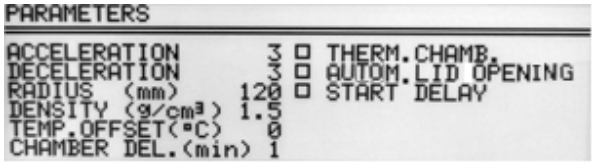
7.4 *Cooling or heating in „SHORT" mode*

	▪ Cooling and heating features are available in SHORT mode. ▪ How to enable run centrifugation in **SHORT mode** is described in Centrifugation/SHORT mode.

7.5 *Cooling and heating notes*

Centrifuges with cooling (HARRIER R and HARRIER RH) are 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.

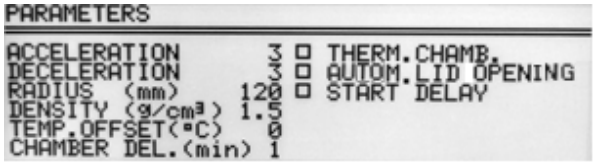
8 Parameters of centrifugation

Simplified display	
	▪ Press and hold  by 1 second. ▪ Choose **PARAM.** with ▲▼ ▪ Press **SET**. ▪ Follow points descripted below (**Normal display mode** description)
Normal display	
	▪ Press **SET**. ▪ With ▲▼◄► keys select **PARAM**. ▪ Press **SET.**
	

ACCELERATION	chosen acc. feature (0-the fastest, 9-the slowest)
DECELERATION	chosen dec. feature (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

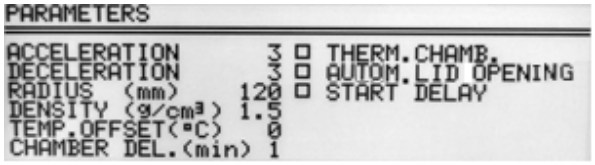
THERMAL CHAMBER	cooling of the chamber without centrifuging
AUTOM. LID OPENING	automatic opening of cover after centrifuging
START DELAY	delay start (after pressing START)

8.1 *Acceleration/deceleration – changing features*



- With ▲▼ keys select **ACCELERATION** or **DECELERATION**.
- Press **SET.**
- With ▲▼ keys select requested number of feature.
- Press **SET**.
- **ACCELERATION** –10 (0 ÷ 9), linear accelerating features assigned to every rotor. 0-the fastest acceleration, 9-the slowest acceleration.
- **DECELERATION** – 10 (0 ÷ 9), linear decelerating features assigned to every rotor. 0-the fastest deceleration, 9-the slowest deceleration.

8.2 *Radius*

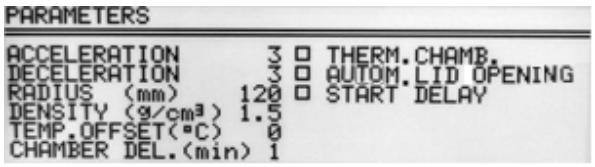


- **RADIUS [mm]** - control of the radius of the rotor within the range from $\mathbf{R_{min}}$ to $\mathbf{R_{max}}$. Available values depends on chosen rotor.
- To change the rotor radius select **RADIUS [mm]** with ▲▼ keys.
- Press **SET**.
- Set requested value by pressing ▲▼.

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

Reducing of the rotor radius (and the resulting change of displayed RCF value) applies until switching off of the power supply of the centrifuge or setting the Rmax maximum radius once again (loading the programme does not change this setting!).

8.3 *Sample density*



- **DENSITY (g/cm³)** – default density is set to **1,2 g/cm³**

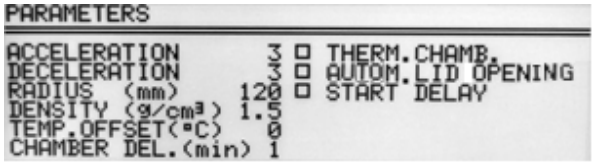
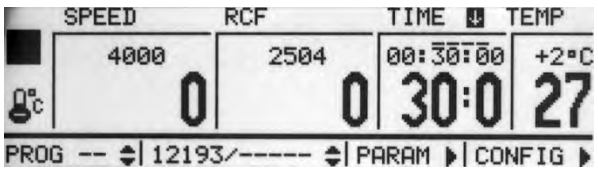
To change the density (value range:

1,2÷9,9 g/cm³):

- Via ▲▼ keys select **DENSITY (g/cm³)**

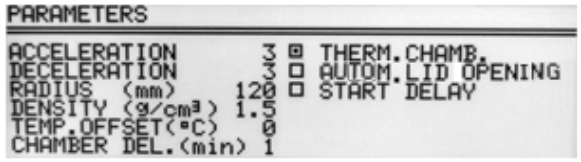
	▪ Press **SET**. ▪ Set requested value by pressing ▲▼. ▪ Press **SET**.
	When density is changed,  symbol is visible on the screen. Changing of **DENSITY** value is compulsory when density of sample placed into rotor is higher than 1.2 g/cm^3. Change of **DENSITY** value leads to a lower maximum speed value.

8.4 *Temperature offset*

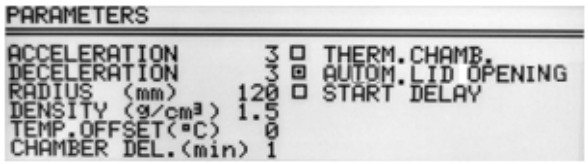
	With▲▼keys select **TEMP. OFFSET**. Press **SET**. Use the ▲ ▼ keys to select the difference between the temperature that the cooling system will aim for, and set temperature. Confirm selection by pressing **SET**. **Warning!** The use of the offset cannot extend the temperature range achieved by the 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 range from -20°C to 20°C.
	Activation of the function is signalled on the main screen with  or  depending on the offset value sign.

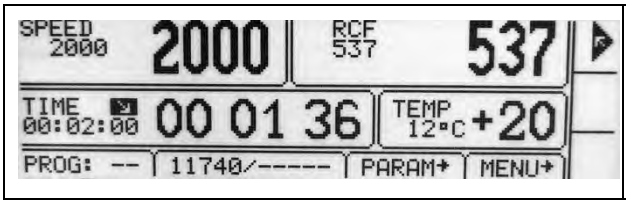
8.5 *Thermal chamber*

	**HARRIER R** and **HARRIER RH** only

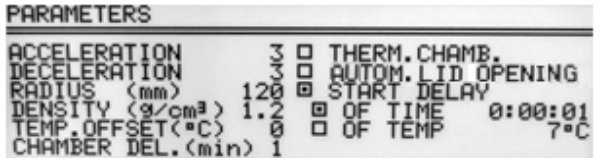
without centrifuging	**THERMAL CHAMBER**
	▪ With ▲▼◄► keys select **THERMAL CHAMBER**. ▪ Press **SET** (to turn on/off). ▪ With ▲▼ keys select temperature value. Set demanded value by pressing ▲▼.
	▪ When THERMAL CHAMBER function is activated, T symbol is visible on the screen. ▪ Changing temperature from the main screen is not possible. ▪ Opening cover terminates THERMAL CHAMBER function (closing cover back turns it on).
▪ If **THERMAL CHAMBER** is turned on (in **PARAM**) and centrifugation completes, THERMAL CHAMBER will activate itself. ▪ **THERMAL CHAMBER** can be only activated when no other programmes are running.	

8.6 *Automatic lid opening*

Automatic lid opening	**AUTOMATIC LID OPENING**
	▪ When centrifuge process is finished, cover will be opened automatically. ▪ When centrifuging is terminated by pressing **STOP**, the opening of teh cover is possible by pressing **COVER**.

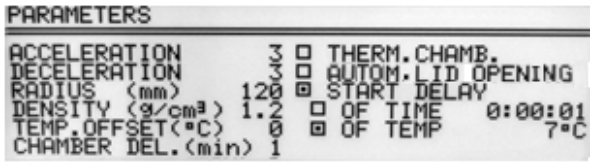
	▪ this symbol means that **OPEN LID AFTER RUN** has been activated.

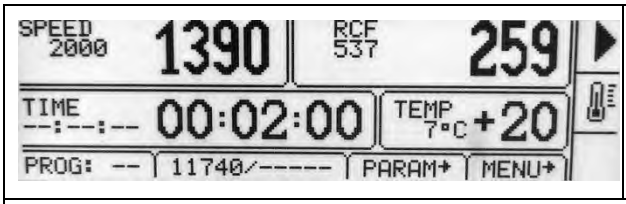
8.7 *Start delay - of time*

	Start centrifuging since preselected delay is reached.	**START DELAY / OF TIME**
		▪ With ▲▼ keys select **START DELAY**. Press **SET**. ▪ Start delay can be set from **0 : 0 0 : 0 1** to **9 : 5 9 : 5 9**. ▪ With ▲▼ keys select **OF TIME**. Press ► and then **SET**. ▪ With ▲▼ keys set requested value. ▪ Confirm by pressing **SET**.
		▪ When START DELAY function is activated, symbol is visible on the screen.
START DELAY / **OF TIME** function cannot be run when **START DELAY** / **OF TEMP** is activated.		

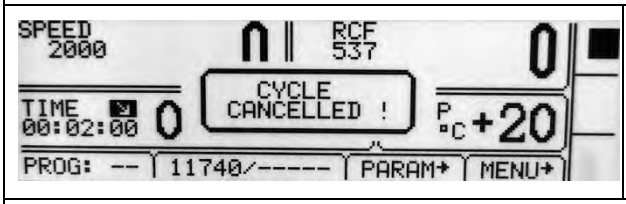
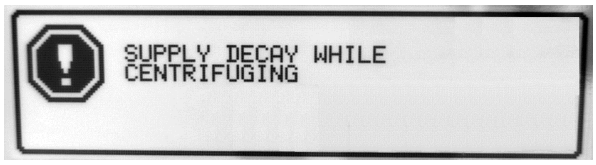
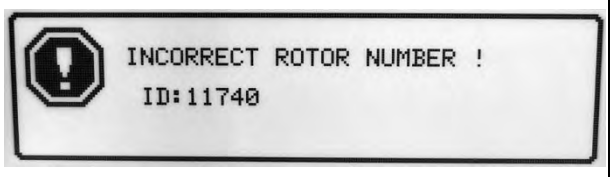
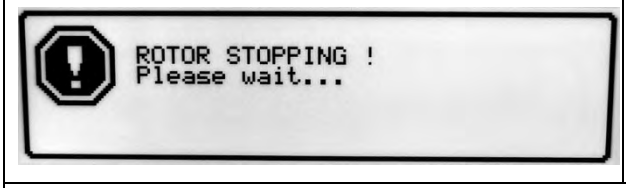
8.8 *Start delay – of temperature*

	HARRIER R and **HARRIER RH** only

	Start centrifuging after preselected temperature is reached.	**START DELAY** / **OF TEMP.**
		▪ With ▲▼ keys select **START DELAY**. Press **SET**. ▪ Start delay can be set from **0 : 0 0 : 0 1** to **9 : 5 9 : 5 9**. ▪ With ▲▼ keys select **OF TEMP**. Press ► and then **SET**. ▪ With ▲▼ keys set requested value. ▪ Confirm by pressing **SET**.

	▪ When **START DELAY – OF TEMPERATURE** is turned on,  symbol is visible on the screen.
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.	
START DELAY / **OF TEMP.** function cannot be run when **START DELAY** / **OF TIME** is activated.	

8.9 *Screen messages*

End of centrifuging – manual mode	
	Centrifuging may be stopped at any moment via the **STOP** key. The information message: **CYCLE CANCELLED** will be displayed.
End of centrifuging – normal mode	
	Stopping centrifuging in accordance with the set time will cause **multi-ton audible signals** (after stopping the rotor) and displaying of the following message: **FINISH OF CENTRIFUGING**
Additional messages	
	In case of power shortage while centrifuging, the following error screen will be displayed: **SUPPLY DECAY WHILE CENTRIFUGING**
	Identified number of the installed rotor is not compatible with the rotor number pre-programme.
	Rotor is braking (only when centrifuge was switched off during rotor running).
After pressing **SET** or **STOP**, the main screen will display.	

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"	IMBALANCE 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 !"	CLOSING THE LID MANUALLY
"ROTOR STOPPING !" "Please wait..."	INITIALIZING AFTER MAINS FAILURE WITH ROTATING ROTOR
" CYCLE'S ABORTED !"	CENTRIFUGING ENDED DUE TO 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	EXPLANATION
"OVERHEATING MOTOR !" "INVERTER ERROR !"	"OVERHEATING MOTOR !" "INVERTER ERROR !"
"INVERTER SERIAL BUS ERROR !"	"INVERTER SERIAL BUS ERROR !"
"TEMPERATURE SENSOR ERROR"	"TEMPERATURE SENSOR ERROR"
"PRESSURE CONTROL FAILURE!"	"PRESSURE CONTROL FAILURE!"
"OPENING COVER in RUN!"	"OPENING COVER in RUN!"
"SPEED METER ERROR"	"SPEED METER ERROR"
"I2C BUS ERROR"	"I2C BUS ERROR"
"OVERHEATING CENTRIFUGE !"	"OVERHEATING CENTRIFUGE !"
"ROTOR OVERSPEED !"	"ROTOR OVERSPEED !"
"COVER LOCK MALFUNCTION !"	"COVER LOCK MALFUNCTION !"

8.10 *Temporarily disabled functions*

The functions below can be temporarily disabled.

active	SPEED	RCF	TIME	TEMP	PROG —	——— / ——	PARAM	MENU
THERMAL CHAMBER	●	●	●	○	●	●	●	●

During run

active	SPEED	RCF	TIME	TEMP	PROG —	——— / ——	PARAM	MENU
PROG 99	○	○	○	○	○	○	○	●
ACC/DEC 10-19	○	○	●	●	○	○	●	●

Standstill

active	SPEED	RCF	TIME	TEMP	PROG —	——— / ——	PARAM	MENU
PROG 99	○	○	○	○	●	○	○	●
ACC/DEC 10-19	○	○	●	●	●	○	●	●

● available
○ disabled

8.11 *Unbalance*

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

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 (see section 4.3).

Then close the cover and restart the programme.

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. Single-time pressing 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 it up to 1s will make the centrifuging stop with the strictest feature.

9 Menu

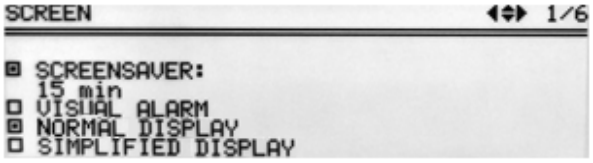
Simplified display	
	▪ Press and hold BACK 1SEC by 1 second. ▪ Choose **MENU** with ▲▼ ▪ Press **SET**. ▪ Follow points described below (**Normal display mode** description)
Normal display	
	▪ Press **SET**. ▪ With ▲▼◄► keys select **MENU**. ▪ Press **SET**.
	▪ To navigate in **MENU** use ▲▼◄► keys. To enter menu press **SET**.

CONFIGURATION	centrifuge configuration
PASSWORD	password protection
LAST 10-CYCLES	10 last centrifugation cycles history
CYCLES	total working time, working cycles counter
ROTOR RUNTIME	counting time for each rotor
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**
	▪ With ▲▼◄► keys, select **SCREENSAVER**. ▪ Press **SET** and then ▼ . ▪ With ▲▼ keys select demanded value from 1 to 60 minutes. ▪ Select selection by pressing **SET.** ▪ Leave the menu by pressing **BACK**.

9.2 *Visual alarm*

Visual alarm	▪ CONFIGURATION/ **SCREEN**
	▪ Via ▲▼ keys choose **VISUAL ALARM** ▪ Select it by pressing **SET**. **VISUAL ALARM** causes the screen to flash after the end of centrifuging or after an error.

9.3 *Types of main screen*

Default setting is **SIMPLIFIED DISPLAY**.
To switch to **NORMAL DISPLAY**, follow the rules in section 9.3.2.

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

9.3.1 Switching the normal display to simplified display

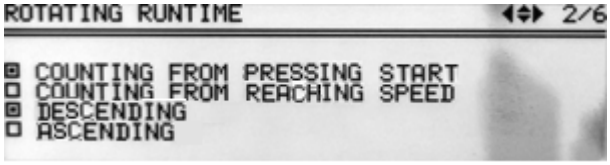
	▪ Press the **BACK** button for 1 sec. then:

	▪ Via ▲▼ keys select **SIMPLIFIED DISPLAY**. ▪ Press **SET**.

9.3.2 Switching the simplified screen to normal display

	Press the **BACK** button for **1 sec.** then:
	▪ Via ▲▼ keys select **DISPLAY MODE** (flashing). ▪ Press **SET**. ▪ Then choose **NORMAL DISPlAY** and press SET.

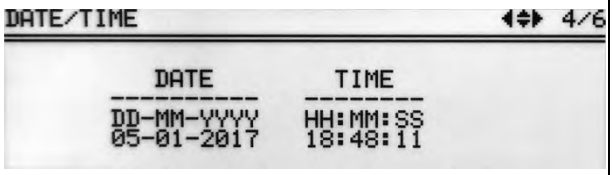
9.4 *Rotating runtime*

Way of time counting	MENU/CONFIGURATION/ **ROTATING RUNTIME**
	▪ Via ▲▼ choose demanded option. ▪ Select it by pressing **SET**.
Counting from:	
Pressing start →	COUNTING SINCE ROTOR IS IDENTIFIED
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 demanded option. ▪ Select selection by pressing **SET**.
Warning signals are always switched on.	

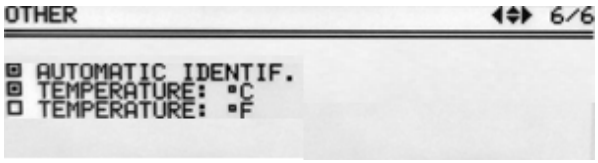
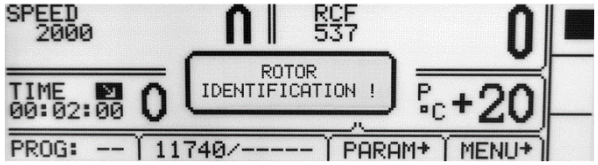
9.6 *Date/time*

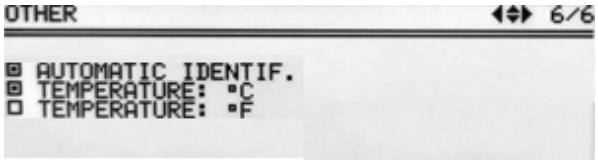
Setting up time and date	MENU/ CONFIGURATION /**DATE/TIME**
	▪ Via keys ◄► select **DATE/TIME** field (flashing). ▪ Press **SET**. ▪ Via◄► **keys** choose requested value. ▪ Via ▲▼ keys change choosen value. ▪ Confirm by pressing **SET**. ▪ Repeat above steps for other values. ▪ Press **BACK.**
Set date and time are still active even after restart of centrifuge.	

9.7 *Language*

Changing menu language	MENU / CONFIGURATION / **LANGUAGE**
	▪ Via▲▼ keys choose menu language ▪ Select it by pressing **SET.**

9.8 *Other*

Rotor automatic identification	MENU / CONFIGURATION / **OTHER**
 	Thanks to the automatic rotor 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 "6.7 Choosing rotors". The **AUTOMATIC IDENTIF.** is turned on by default. To enable the function: ▪ Via ▲▼ keys choose ☐ **AUTOMATIC IDENTiF.** ▪ Press **SET** (☐ change to ☑).

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**.

TEMPERATURE IN °C

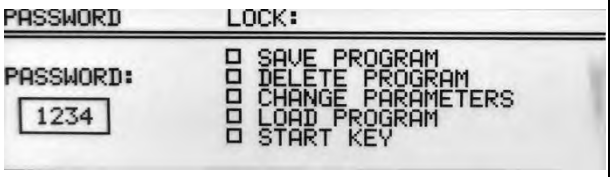
TEMPERATURE IN °F

9.9 *Password*

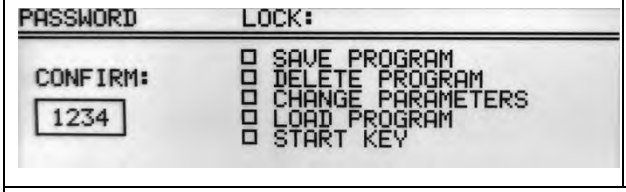
Setting up password	MENU / **PASSWORD**
To prevent from unauthorised use, a **PASSWORD** can be set.	

Note: No PASSWORD is set by default.

The PASSWORD can be set as follows when the rotor is at a standstill.

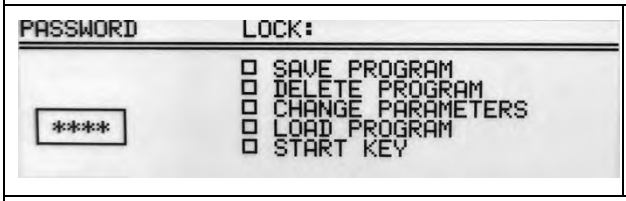


- Press the ▲▼ keys until "**PASSWORD:**" blinks.
- Press **SET**.
- Press ►
- With ◄► keys set the PASSWORD. With ▲▼ keys set correct value.
- Repeat above steps for all places.
- Press **SET**.



- 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).

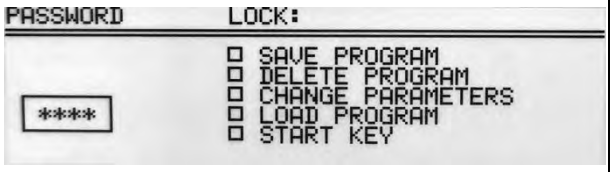


From then on, access to the **MENU** is only possible after entering the password.

In case of incorrect password, it will show message: **ACCESS DENIED!**

To delete the **PASSWORD,** "**0000**" must be set.

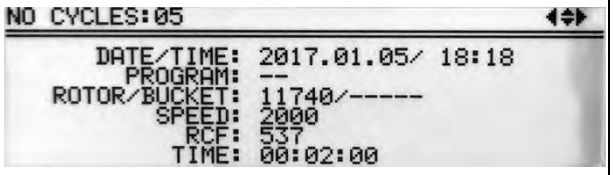
If the **PASSWORD** is forgotten, the emergency code "**7654**" should be used to clear password and remove all locks.

Setting up locks	
	▪ With ▲▼ keys choose a lock. ▪ Select a lock by pressing **SET**. ▪ Repeat above steps for desired locks. ▪ Leave menu with **BACK** key.

	Disabled*	**description**
SAVE PROGRAM	SAVE button	▪ no programmes can be saved
DELETE PROGRAM	DELETE button	▪ no programmes can be deleted ▪ saving a programmes where one was already stored is disabled
CHANGE PARAMETERS	fields: SPEED RCF TIME TEMP PROG— ——— / ——— PARAM PROG	▪ parameters cannot be modified
LOAD PROGRAM	LOAD button	▪ no programmes can be called up
START KEY	START key	▪ centrifugation cannot be started

* Executing disabling procedures is only possible after entering the correct password

9.10 *Last 10 cycles*

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

9.11 *Work time*

Total working time of centrifuge and quantity of working cycles.	MENU / **WORK TIME**
	In the **WORK TIME** menu, the following information is displayed: ▪ total working (centrifugation) time ▪ working cycles counter

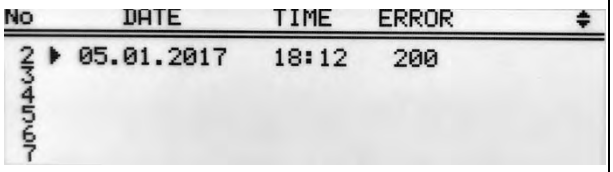
9.12 *Rotor runtime*

Information about the time of centrifuging and of the quantity of the working cycles of each rotor. The table also contains icons confirming successful validation of the centrifuging.	MENU / **ROTOR RUNTIME**
	▪ The list can be scrolled using ▲▼ keys. ▪ To exit press **BACK** key. Symbols: ✓' – more than 100 cycles left !¦! – less than 100 cycles left ! – worn rotor

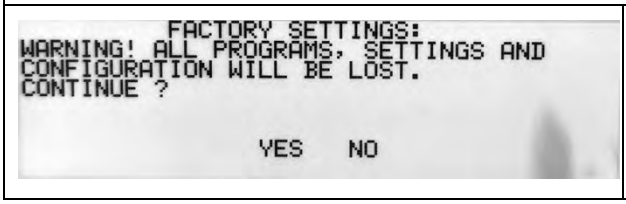
9.13 *Contact us*

Information about the type of the centrifuge, firmware version, and contact details.	MENU / **CONTACT US**
	▪ The list can be scrolled using ▲▼ keys. ▪ To exit press **BACK** key.

9.14 *Diagnostics*

Information about errors during the operation of the centrifuge (for service).	MENU / **DIAGNOSTICS**
	Intended for service purposes!
	▪ The list can be scrolled using ▲▼ keys. ▪ To exit press **BACK** key.

9.15 *Factory settings*

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

10 Maintenance

10.1 *Cleaning of the centrifuge*

- **Pull the mains plug before cleaning.**
- **Before any cleaning or decontamination process other than that is recommended by the manufacturer, the user should ask the manufacturer if the event the planned process should damage the device**
- For cleaning, water with soap or other water soluble **mild detergent** shall be used.
- 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.
- If unused, the centrifuge should have its cover left open.

Once a week

- Using a wiping cloth, remove any 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 any damage. In case of damage, it can not be longer be used. Notify authorised service workshop.

10.2 *Maintenance of centrifuge elements*

- The rotor pins should always be lubricated with petroleum jelly.
- In this way, uniform deflection of the buckets and a quiet centrifuge operation is ensured.

Cleaning of the accessories

- In order to ensure safe operation, carry out **regular** and 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, clean

	or/and autoclave and then lubricate socket with the petroleum jelly. ▪ 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. ▪ If maintained this way, the useful service life of the device is substantially increased and susceptibility to corrosion is diminished. Accurate maintenance increases the service life and protects against premature rotor failures. Do not use bleach on plastic parts of the rotor. According to laboratory standards, minimise the immersion time in each solution. ▪ Parts made of aluminium are especially prone to corrosion. ▪ Corrosion and damages resulting from insufficient maintenance cannot 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 be always 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		

One can use all standard disinfectants. Centrifuges and devices are made of different materials, one should consider their variety.

	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 sterilised in autoclaves with temperature up to 121°C for at least 20 mins (215 kPa), unless otherwise specified in the **OPTIONAL ACCESSORY**.
- During sterilisation (autoclaved) by means of steam, temperature resistance of individual materials should be considered.
- Distortion 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 accessories depends on the frequency of autoclaving and use.
- Autoclaving reduce lifespan of plastic and mechanical components. PC tubes can become useless.
- Pressure in closed containers can cause plastic distortion or explosion.
- Prior to autoclaving the rotors and accessories, wash and rinse thoroughly 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 steam sterilisation at 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 use of the substance over 30 days does not cause damage. The material is able to be resistant for years
○/●	good to limited	Continuous use of the substance causes insignificant and partly reversible damage through the 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. Immediate damage is possible (e.g. the loss of mechanical durability, distortion, discolouring, bursting, dissolving).

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

Do not use bleach on plastic parts of the rotor.

DANGER!

MSE 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.

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

11 Troubleshooting

The majority of faults can be removed by switching the centrifuge OFF and ON. 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?*	*Plug supply cable correctly.*
	Is master switch ON?	*Switch ON power supply.*
Motor error is displayed		Call service.
Centrifuge does not start (indications are proof for cycle in progress and 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.
(motor error)	*After stopping, error rotor message is displayed*	Check if rotor number in 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 loaded programme is correct
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 complete stop of the rotor and displaying of the  symbol.
	The sensor is connected correctly, and the error is still displayed.	Call service.
Mains failure during run	*The message about power failure will display.*	Wait for 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 overheating (50°C) in the chamber	*The overheating message will be displayed.*	Call service.

11.1 *Emergency cover release*

	**EMERGENCY COVER RELEASE** You can manually open the lid (eg. in case of power failure). To do this, insert the key into the emergency opening of the cover (Cat. No. 17162) into the hole on the right side of the chassis and then push it until you release the lock of the lock and open the cover. ***CAUTION!*** *The cover can be opened in emergency only when the rotor is at rest. You should check this by looking inside the centrifuge using the viewfinder provided in the lid.*

12 Guarantee

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

Repairs should be carried out in authorised MSE service workshops.

The centrifuge shall be sent for repair after decontamination.

13 Disposal

- When disposing of the device, statutory rules must be observed.
- Pursuant to guideline 2002/96/EC (WEEE), all devices supplied after August 13, 2005, may not be disposed as part of domestic waste.
- The device belongs to 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 cannot be disposed 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.mseuk.com**	
UNITED KINGDOM	e-mail:	sales@mseuk.com	

DISTRIBUTOR:

15 ANNEXES

Meet the rest of the family

Brand new generation of centrifuges

MICROCENTAUR R

Refrigerated Micro Centrifuge

Maximum speed	**18000** rpm
Maximum RCF	**24270** xg
Maximum Volume	**24 x 2/1.5ml**

HAWK

Compact Centrifuge

Ambient and Refrigerated

Swing Out / Fixed Angle / Microplate

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

Distributor

CE IVD

11 Browning Road, Heathfield, East Sussex. UK. TN21 8DB
Sales: +44 (0) 1435 517 000
Service : +44 (0) 1435 517 005
www.msecentrifuges.com