THARMAC
Cellspin®

# Instruction manual

# *Cellspin® II / Cellspin® IIR*

# Cytocentrifuge

Man CS2/CS2R 01.2017 EN

CE IVD

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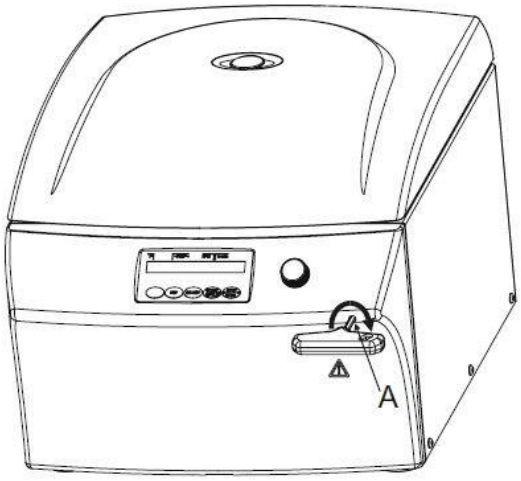



Fig. 1

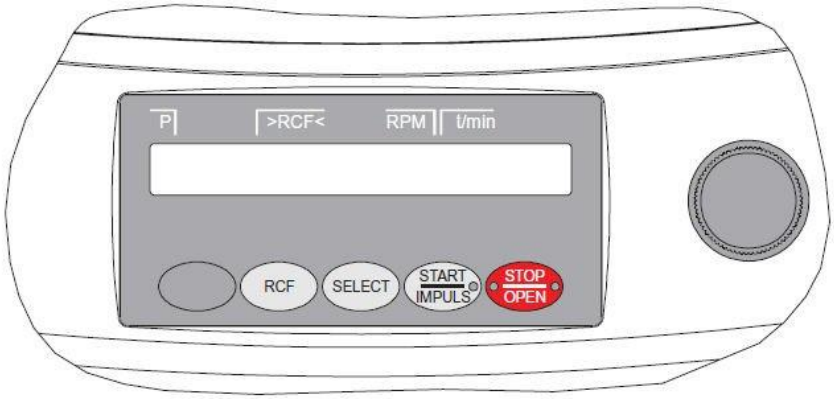



Fig. 2 Cellspin II

# 1 Use according to specification

The machine presented here is a medical product (laboratory centrifuge) according to the IVD guideline 98/79/EG. The centrifuge is used to separate substances or substance mixtures with a density of max. 1.2 kg/dm³. This also includes substances and substance mixtures of human origin. The centrifuge is only intended to be used for this purpose. A different use or application over and above this is deemed not in accordance with the specifications. The company THARMAC Cellspin® GmbH undertakes no liability for damages resulting therefrom.
Belonging to the application according to specification is also the observance of all references contained in the Instruction Manual and compliance with the inspection and maintenance works.

# 2 Remaining risks

The device is built according to the state-of-the-art and the recognized safety regulations. If used and handled improperly, there could be life-threatening danger to the user or third parties, or the device could be impaired or there could be other property damage. The device is only to be used for its intended purpose and only when it is in safe working condition.

Malfunctions which could affect safety must be corrected immediately.

# 3 Technical specifications

| | | | | | |
|---|---|---|---|---|---|
| Manufacturer | THARMAC® GmbH, D-35647 Waldsolms | | | | |
| Model | *Cellspin® II* | | *Cellspin® IIR* | | |
| Type | 1401 | 1401-01 | 1406 | | 1406-01 |
| Mains voltage (+/- 10%) | 200-240 V 1~ | 100-127 V 1~ | 200-240 V 1~ | 240 V 1~ | 115-127 V 1~ |
| Mains frequency | 50-60 Hz | 50-60 Hz | 50 Hz | 60 Hz | 60 Hz |
| Connected load | 400 VA | 400 VA | 800 VA | | 950 VA |
| Current consumption | 2.0 A | 4.0 A | 4.0 A | | 8.0 A |
| Cooling medium | - | | R 404A | | |
| Max. capacity | 4x 200 ml | | | | |
| Allowed density | 1.2 kg/dm³ | | | | |
| Speed (RPM) | 16000 | | | | |
| Force (RCF) | 24900 | | | | |
| Kinetic force | 9500 Nm | | | | |
| Obligatory inspection (DGUV Regel 100-500) | No | | | | |
| Ambient conditions (EN/IEC 61010-1) | | | | | |
| - Set-up site | Indoors only | | | | |
| - Altitude | Up to 2000 m above sea level | | | | |
| - Ambient temperature | 2 °C to 35 °C | | 5 °C to 35 °C | | |
| - Humidity | Maximum relative humidity 80% for temperatures up to 31 °C, linearly decreasing to 50% relative humidity at 40 °C | | | | |
| - Excess-voltage category (IEC 60364-4-443) | II | | | | |
| - Pollution degree | 2 | | | | |
| Device protection class | I | | | | |
| Not suitable for use in explosion-endangered areas | | | | | |
| EMC | | | | | |
| - Emitted interference, Interference immunity | EN / IEC 61326-1, Class B | FCC Class B | EN / IEC 61326-1, Class B | | Class B |
| Noise level (dependent on rotor) | ≤ 68 dB(A) | | ≤ 64 dB(A) | | |
| Dimensions | | | | | |
| - Width | 401 mm | | 407 mm | | |
| - Depth | 529 mm | | 698 mm | | |
| - Height | 346 mm | | 346 mm | | |
| Weight | Approx. 31 kg | | Approx. 52 kg | | |

| | | | | |
|---|---|---|---|---|
| Manufacturer | THARMAC® GmbH, D-35647 Waldsolms | | | |
| Model | *Cellspin® IIR* | | | |
| Type | 1406-50 | 1406-51 | 1406-70 | 1406-71 |
| Mains voltage (+/- 10%) | 200-240 V 1~ | 100-127 V 1~ | 200-240 V 1~ | 115-127 V 1~ |
| Mains frequency | 50-60 Hz | 50-60 Hz | 50 - 60 Hz | 50 - 60 Hz |
| Connected load | 400 VA | 400 VA | 400 VA | 400 VA |
| Current consumption | 2.0 A | 4.0 A | 2.0 A | 4.0 A |
| Cooling medium | R 404A | | | |
| Max. capacity | 4x 200 ml | | | |
| Allowed density | 1.2 kg/dm³ | | | |
| Speed (RPM) | 16000 | | | |
| Force (RCF) | 24900 | | | |
| Kinetic force | 9500 Nm | | | |
| Obligatory inspection (DGUV Regel 100-500) | No | | | |
| Ambient conditions (EN/IEC 61010-1) | | | | |
| - Set-up site | Indoors only | | | |
| - Altitude | Up to 2000 m above sea level | | | |
| - Ambient temperature | 2 °C to 35 °C | | | |
| - Humidity | Maximum relative humidity 80% for temperatures up to 31 °C, linearly decreasing to 50% relative humidity at 40 °C | | | |
| - Excess-voltage category (IEC 60364-4-443) | II | | | |
| - Pollution degree | 2 | | | |
| Device protection class | I | | | |
| Not suitable for use in explosion-endangered areas | | | | |
| EMC | | | | |
| - Emitted interference, Interference immunity | EN / IEC 61326-1, Class B | FCC Class B | EN / IEC 61326-1, Class B | Class B |
| Noise level (dependent on rotor) | ≤ 64 dB(A) | | | |
| Dimensions | | | | |
| - Width | 401 mm | | 407 mm | |
| - Depth | 529 mm | | 698 mm | |
| - Height | 346 mm | | 346 mm | |
| Weight | Approx. 35 kg | | | |

| | | | |
|---|---|---|---|
| Manufacturer | THARMAC® GmbH, D-35647 Waldsolms | | |
| Model | *Cellspin® IIR* | | |
| Type | 1406-20 | | 1406-21 |
| Mains voltage (+/- 10%) | 200-240 V 1~ | 240 V 1~ | 115-127 V 1~ |
| Mains frequency | 50 Hz | 60 Hz | 60 Hz |
| Connected load | 800 VA | | 950 VA |
| Current consumption | 4.0 A | | 8.0 A |
| Cooling medium | R 404A | | |
| Max. capacity | 4x 200 ml | | |
| Allowed density | 1.2 kg/dm³ | | |
| Speed (RPM) | 16000 | | |
| Force (RCF) | 24900 | | |
| Kinetic force | 9500 Nm | | |
| Obligatory inspection (DGUV Regel 100-500) | No | | |
| Ambient conditions (EN/IEC 61010-1) | | | |
| - Set-up site | Indoors only | | |
| - Altitude | Up to 2000 m above sea level | | |
| - Ambient temperature | 2 °C to 35 °C | | |
| - Humidity | Maximum relative humidity 80% for temperatures up to 31 °C, linearly decreasing to 50% relative humidity at 40 °C | | |
| - Excess-voltage category (IEC 60364-4-443) | II | | |
| - Pollution degree | 2 | | |
| Device protection class | I | | |
| Not suitable for use in explosion-endangered areas | | | |
| EMC | | | |
| - Emitted interference, Interference immunity | EN / IEC 61326-1, Class B | | Class B |
| Noise level (dependent on rotor) | ≤ 64 dB(A) | | |
| Dimensions | | | |
| - Width | 407 mm | | |
| - Depth | 725 mm | | |
| - Height | 356 mm | | |
| Weight | Approx. 52 kg | | |

# 4 Notes on safety

**No claim of warranty will be considered by the manufacturer unless ALL instructions in this manual have been followed.**

- **The centrifuge should be installed on a good, stable base.**
- **Before using the centrifuge absolutely check the rotor for firm placement.**
- **When the centrifuge is running, according to EN / IEC 61010-2-020, no persons, dangerous substances or objects may be within the safety margin of 300 mm around the centrifuge.**
- **Rotors, suspensions and accessories that possess traces of corrosion or mechanical damage or if their term of use has expired may not be used any longer.**
- **The centrifuge may no longer be put into operation when the centrifuging chamber has safety-related damages.**
- **With swing-out rotors the trunnions must be regularly lubricated in order to ensure consistent swinging out of the hangers.**
- **For centrifuges without temperature control, when the room temperature is increased and/or if the device is frequently used, the centrifuging chamber could be heated up. Therefore, it can't be ruled out that the sample material might be changed due to the temperature.**

- **Before the initial operation of your centrifuge you should read and pay attention to the operating instructions. Only personnel that has read and understood the operating instructions are allowed to operate the device.**
- Along with the operating instructions and the legal regulations on accident prevention, you should also follow the recognized professional regulations for working in a safe and professional manner. These operating instructions should be read in conjunction with any other instructions concerning accident prevention and environmental protection based on the national regulations of the country where the device is to be used.
- This centrifuge is a state-of-the-art piece of equipment which is extremely safe to operate. However, it can lead to danger for users or others if used by untrained staff, in an inappropriate way or for a purpose other than that it was designed for.
- The centrifuge must not be moved or knocked during operation.
- In case of fault or emergency release, never touch the rotor before it has stopped turning.
- To avoid damage due to condensate, when changing from a cold to a warm room the centrifuge must either heat up for at least 3 hours in the warm room before being connected to the mains, or run hot for 30 minutes in the cold room.
- The centrifuge rotor may only be loaded in accordance with the chapter "Loading the rotor".
- When centrifuging with maxim revolutions per minute the density of the materials or the material mixtures may not exceed 1.2 kg/dm$^3$.
- The centrifuge may only be operated when the balance is within the bounds of acceptability.
- The centrifuge may not be operated in explosion-endangered areas.
- The centrifuge must not be used with:
  - inflammable or explosive materials
  - materials that react with one another producing a lot of energy.

- When centrifuging hazardous substances or mixtures, which are toxic, radioactive or contaminated with pathogenic microorganisms, suitable measures must be taken by the user. Fundamentally, centrifuge containers with special screw closures must be used for hazardous substances. For materials of risk groups 3 and 4, in addition to sealable centrifuge containers, a bio-safety system must be used (see the "Laboratory Bio-safety Manual" from the World Health Organization). In a bio-safety system, a bio-seal (sealing ring) prevents droplets and aerosols from escaping. If the hanger of a bio-safety system is used without the lid, the sealing ring must be removed from the hanger to prevent damage to the sealing ring during the centrifugation run. Damaged bio-safety systems are no longer microbiologically sealed.
  If a bio-safety system is not used, a centrifuge is not microbiologically sealed for the purposes of the standard EN / IEC 61010-2-020.
  When closing a bio-safety system, follow the instructions in the chapter "Handling of bio-safety systems".
  For the available bio-safety systems, see the chapter "Appendix, Rotors and accessories". If in doubt, you can get the information you need from the manufacturer..

- The centrifuge must not be operated with highly corrosive substances which could impair the mechanical integrity of rotors, hangers and accessories.
- Repairs must only be carried out by personnel authorized to do so by the manufacturer.
- Only original spare parts and original accessories licensed by THARMAC® GmbH.

- The following safety regulations apply:
  EN / IEC 61010-1 and EN / IEC 61010-2-020 as well as their national deviations.
- The safe operation and reliability of the centrifuge can only be guaranteed if:

– the centrifuge is operated in accordance with the operating instructions,
– the electrical installation on the site where the centrifuge is installed conforms to the demands of EN / IEC stipulations,
– the tests for device safety required in the respective countries, e.g. in Germany in acc. with BGV A1 and BGR 500, are carried out by an expert.

## 5 Symbol meanings

Symbol on the device:

Attention, general hazard area.
Before using the device, make sure you read the operating instructions and observe the safety information!

Symbol in this document:

Attention, general hazard area.
This symbol refers to safety relevant warnings and indicates possibly dangerous situations.
The non-adherence to these warnings can lead to material damage and injury to personal.

Symbol on the device and in this document:

Beware of biohazard.

Symbol in this document:
This symbol refers to important circumstances.

Symbol on the device and in this document:

Symbol for the separate collection of electric and electronic devices according to the guideline 2002/96/EG (WEEE). The device belongs to Group 8 (medical devices).

Applies in the countries of the European Union, as well as in Norway and Switzerland.

## 6 Delivery checklist

The following items and accessories are delivered with the centrifuge:

| | |
|---|---|
| 1 | Connecting cable |
| 1 | Hex. pin driver |
| 1 | Notes on moving the equipment safely |
| 1 | Operating instructions |
| 1 | Lubricating grease for trunnions |

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

## 7 Unpacking the centrifuge

- Lift the carton upward and remove the padding.
- 

  Do not lift by the handle rail.
  Observe the weight of the centrifuge, refer to chapter "Technical specifications".

  Lift the centrifuge on both sides with an appropriate number of helpers and place it on the laboratory table.

## 8 Initial operation

- Remove the transportation safety device from the bottom of the housing, see sheet ”Transportation safety device"
- **Position the centrifuge in a stable and level manner in a suitable place. During set-up, the required safety margin of 300 mm around the centrifuge is to be kept according to EN / IEC 61010-2-020.**

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

- Ventilation openings may not be blocked.
  A distance of 300 mm must be maintained from the ventilation slots and openings of the centrifuge.
- In the case of the centrifuge, type 1406-20, 1406-21, connect the nitrogen supply according to the enclosed instruction sheet AH1406-20XX.
  In the case of the centrifuge, type 1406-50, 1406-51, connect the refrigerating/heating circulator according to the enclosed instruction sheet AH1406-50XX.
  In the case of the centrifuge, type 1406-70, 1406-71, connect the refrigerating/heating circulator and the nitrogen supply according to the enclosed instruction sheet AH1406-70XX.

> **It is mandatory that the centrifuge be connected according tot he enclosed instruction sheet. Make sure you opserve the enclosed instruction sheet**

- Check whether the mains voltage tallies with the statement on the type plate.
- Connect the centrifuge with the power cord to a standard mains socket. For connection ratings refer to Chapter "Technical specifications".
- Turn on the mains switch. Switch position "*I*".
  The machine type and program version will be displayed and the LEDs light up. After 8 seconds,
  **OPEN OEFFNEN** is displayed and the left LED on the STOP / OPEN key blinks.
- Open the lid.
  The last used centrifuge data will be displayed.

## 9 Opening and closing the lid

### Opening the lid

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

- Press the button STOP / OPEN . The lid unlocks via the motor and the left LED in the push button STOP / OPEN extinguishes.

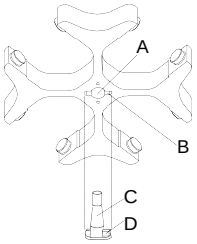
### Closing the lid

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

If the left LED in the STOP / OPEN button flashes, press STOP / OPEN button so that the motor-driven lid lock goes into the basic position (opened).

- Place the lid and lightly press down the front edge of the lid. The locking action is effected by motor. The left LED in the button STOP / OPEN lights up.

## 10 Installation and removal of the rotor




- Clean the motor shaft (C) and the rotor drilling (A), and lightly grease the motor shaft afterwards. Dirt particles between the motor shaft and the rotor hinder a perfect seating of the rotor and cause an irregular operation.
- Place the rotor vertically on the motor shaft. The motor shaft dog (D) has to fit in the rotor slot (B). The alignment of the groove is labelled on the rotor.
- Tighten the rotor tension nut with the supplied wrench by turning in a clockwise direction.
- Check the rotor for firm seating.
- Loosening the rotor: Loosen the tension nut by turning in a counter clockwise direction, and turning until the working point for lifting. After passing the working point for lifting the rotor is loosened from the motor shaft cone. Turn the tension nut until the rotor is able to be lifted from the motor shaft.

## 11 Loading the rotor

Standard centrifuge containers of glass will not stand RCF values exceeding 4000 (DIN 58970, pg. 2).

- Check the rotor for firm seating.
- With swing-out rotors all rotor positions must be lined with **identical** hangers. Certain hangers are marked with the number of the rotor position. These hangers may only be used in the respective rotor position. Hangers that are marked with a set number (e.g. S001/4) may only be used in the set.
- The rotors and hangers may only be loaded symmetrically. The centrifuge containers have to be distributed evenly on all rotor positions.

## 12 Control and display elements

See figure on page 4.

Fig. 2: Display and control panel

### Control knob

For setting the individual parameters.
Turning anticlockwise reduces the value. Turning clockwise increases the value.

### Control panel pushbuttons (keys)

SELECT

Selection control key for selection of specific parameter.
The subsequent parameter is selected by every further keystroke.

START IMPULS

- Start centrifugation run. The LED in the button lights up during the centrifugation run as long as the rotor is turning.
- Short-term centrifugation
  The centrifugation run is effected as long as the button is held down. The LED in the button lights up during the centrifugation run as long as the rotor is turning.
- Store inputs and changes.

STOP OPEN

- End centrifugation run.
  The rotor runs down with a pre-selected brake step. The right-hand LED in the button lights up until the rotor is stationary. Once the rotor is stationary the left-hand LED flashes in the button. Pressing the button twice triggers the EMERGENCY STOP.
- Unlock the lid.
  The left-hand LED in the button goes out.
- Leave the parameter input.

RCF

Switch between RPM and RCF display.
RCF values are displayed in **> <**.

Start pre-cooing

The pre-cooing is settable. It is pre-adjusted to 2800 RPM

### Adjustment possibilities

| | |
|---|---|
| PROG RCL | Program position of the called-up program. |
| t/min | Running time. Settable from 0 - 99 min, in 1 min increments. |
| t/sec | Running time. Settable from 0 - 59 s, in 1 second increments. |
| | Continuous run "/". Set parameter **t/min** and **t/sec** to zero. |
| RPM | Revolutions per minute. A numerical value from 500 RPM up to the maximum speed of the rotor can be set. Maximum speed of the rotor. |
| RAD/mm | Centrifugation radius. Input in mm.<br>The input of the radius is only possible if the RCF display (> RCF <) is selected. |
| RCF | Relative centrifugal force. A numerical value can be set, which gives a speed between 500 RPM and the maximum speed of the rotor. Adjustable up to 100 in intervals of 1, and from 100 in intervals of 10. The RCF value is automatically rounded up or rounded down with regard to the RPM interval. The input of the RCF is only possible if the RCF display (> RCF <) is selected. |
| | Starting steps 1 - 9. Step 9 = shortest starting time, Step 1 = longest starting time. |
| | Brake steps 0 - 9. Step 9 = shortest run-down time, Step 1 = long run-down time,<br>Step 0 = longest run-down time (brakeless run-down). |
| T °C | Temperature Set Point (only in centrifuges with cooling). Adjustable from -20°C to +40°C, in 1°C intervals. The lowest obtainable temperature depends on the rotor (see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories"). |
| PROG STO | Program position on which the program is stored. 9 programs can be stored (program positions 1 - 2 - 3 - … 9). The program position # serves as temporary storage for altered adjustments. |

## 13 Entering centrifugation parameter

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

- Select the RPM or RCF display with the key RCF. RCF values are displayed in **> <**.
- Select the desired parameters using the button SELECT and set using the knob .
  In order to set continuous operation, the parameters **t/min** and **t/sec** must be set to zero with the knob . Continual running is represented in the display by the following symbol, "/".
- After input of all parameters, press the key START / IMPULS in order to store the adjustments on the program position #. As confirmation, ((( **ok** ((( will be displayed for a short period.

The data on the program position # will be overwritten with every input of parameters and pressing of the key START / IMPULS .

## 14 Programming

### Program input/alteration

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

- Select the RPM or RCF display with the key RCF. RCF values are displayed in **>** **<**.
- Select the desired parameters using the button SELECT and set using the knob ⟲.
  In order to set continuous operation, the parameters **t/min** and **t/sec** must be set to zero with the ⟲ knob . Continual running is represented in the display by the following symbol, "∞".
- The parameter **PROG STO** can be selected using the button SELECT and the desired program position set using the knob ⟲.
- Press the button START / IMPULS in order to store the setting on the desired program position. ((( **ok** ((( is displayed briefly as confirmation.
  If the key START / IMPULS is pressed without the parameter **PROG STO** being activated, the settings are always stored in the program place #.

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

### Program recall

- Select the parameter **PROG RCL** using the button SELECT and set the desired program position using the knob ⟲.
- Press the button START / IMPULS The centrifugation data of the selected program position is displayed.
- The parameters can be checked by pressing the button SELECT.
  To leave the parameter display press the button OPEN / STOP
  or press no button for a period of 8 seconds.

## 15 Centrifugation

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

If the permissible weight difference within the rotor loading has been exceeded, the drive shuts down during the start-up, the unbalance display lights up, and **IMBALANCE** is displayed.

A centrifugation run can be stopped at any time by pushing the key OPEN / STOP.

All parameters can be selected and altered during the centrifugation run (see Chapter “Entering centrifugation parameter”).

You can switch-over at any time between the RPM and RCF display with the key RCF. The input of the centrifugation radius is necessary if you are working with the RCF display.

If **OPEN OEFFNEN** is displayed, a further operation of the centrifuge is only possible after opening the lid once.

If **R xx n-max xxxxx** is displayed, then no centrifugation run has taken place as the rotor was changed beforehand, refer to Chapter " Rotor Identification ".

- Turn on the mains switch. Switch position .
- Load the rotor and close the centrifuge lid.

### Centrifugation with pre-set time

- Adjusting time or recall a program with pre-set time (see Chapter "Programming").
- Press the key START / IMPULS The LED in the button START / IMPULS lights up for as long as the rotor turns.
- After expiration of the time or with truncation of the centrifugation run by pushing the key OPEN / STOP the run-down is effected with the selected brake step. The brake step is displayed.

During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the remaining time will be displayed.

### Continuous run

- Adjusting the symbol ′ or recall a continuous run program (see Chapter "Programming").
- Press the key START / IMPULS. The LED in the button START / IMPULS lights up for as long as the rotor turns. The time metering begins at 00:00.
- Press the key OPEN / STOP in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed.

During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed.

### Short-term centrifugation

- Hold down the key START / IMPULS The LED in the button START / IMPULS lights up for as long as the rotor turns. The time metering begins at 00:00.
- Let go of the key START / IMPULS again in order to stop the centrifugation run. The run-down is effected with the selected brake step. The brake step is displayed.

During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature (only in centrifuges with cooling) and the expired time will be displayed.

## 16 Emergency Stop

- Press the key ◦OPEN / STOP

twice. With Emergency Stop the run-down is effected with brake step 9 (shortest run-down time). Brake step 9 is displayed. If brake step 0 was pre-selected, the run-down time is technically longer than with brake step 9.

## 17 Acoustic Signal

The acoustic signal sounds:

- Upon the appearance of a disturbance in 2 second intervals.
- After completion of a centrifugation run and rotor standstill in 30 second intervals.

The acoustic signal is stopped by opening the lid or pressing any key.

The signal after completion of the centrifugation run can be activated or deactivated in the following manner, if the rotor is at standstill:

- Hold down the key SELECT for 8 seconds.
  After 8 seconds, **SOUND / BELL** appears in the display.
- Set using the knob **OFF** or **ON**.
- Press the key START / IMPULS ◦ in order to store the setting.
  As confirmation, ((( **ok** ((( will be displayed for a short period.

### 17 Recall hours of operation

Recall hours of operation is only possible during rotor standstill.

- Hold down the key SELECT for 8 seconds.
  After 8 seconds, **SOUND / BELL** appears in the display.
- Press the key SELECT once again.
  The centrifuge's hours of operation (**CONTROL:** ) are displayed.
- Press the key ◦OPEN / STOP◦

to exit the hours of operation recall

## 18 Cooling (only in centrifuges with cooling)

The temperature set-point can be adjusted from -20°C to +40°C. The lowest obtainable temperature is dependent on the rotor (see Chapter "Anhang/Appendix, Rotoren und Zubehör/Rotors and accessories").

### Standby-cooling

With rotor standstill and closed lid the centrifugal chamber is cooled to the pre-selected temperature. The temperature set-point is shown in the display.
Standby cooling will be subject to a timed delay after a centrifuge run and the display will show **OPEN/OEFFNEN**. The delay time can be pre-set in 1minute steps from 1 to 5 minutes. It is pre-set to 1 minute.
With the rotor standing still and the cover open the delay time can be set as follows:

- Hold down the key for 8 seconds.
- After 8 seconds, **t/min = X** appears in the display.
- Use the rotary button to set the delay time.
- Press the key START / IMPULS ◦ in order to store the setting.

  As confirmation, ***** ok ***** will be displayed for a short period.

To leave the delay time display press the key ◦OPEN / STOP◦ or do not press any key for a period of 8 seconds.

### Pre-cooling the rotor

- Press the key . The LED in the button START / IMPULS ◦ lights up for as long as the rotor turns.
- Press the button ◦OPEN / STOP◦ to end the pre-cooling. The run-down is effected with the selected brake step. The brake step is displayed.

During the centrifugation run the rotational speed of the rotor or the subsequently resulting RCF value, the sample temperature and the expired time will be displayed.
The pre-cooling speed can be adjusted in decade steps from 500 RPM to the max RPM of the rotor. It is preadjusted to 2800 RPM.
When the rotor is stationary and the lid open the pre-cooling speed can be set in the following manner:

- Hold down the key for 8 seconds.
- After 8 seconds, **t/min = X** appears in the display.
- Press the key once again.
- The set pre-cooling RPM - **RPM = XXXX** will be displayed.
- Set the desired pre-cooling speed using the knob .
- Press the key START / IMPULS ◦ in order to store the setting.

  As confirmation, ***** ok ***** will be displayed for a short period.

To leave the pre-cooling RPM display press the key ◦OPEN / STOP◦ or do not press any key for a period of 8 seconds.

## 19 Relative centrifugal force (RCF)

The relative centrifugal force (RCF) is given as a multiple of the acceleration of gravity (g). It is a unit-free value and serves to compare the separation and sedimentation performance.
These values are calculated using the formula below:

$$RCF = \left(\frac{RPM}{1000}\right)^2 x\ r\ x\ 1{,}18 \qquad ==> \qquad RPM = \sqrt{\frac{RCF}{r\ x\ 1{,}118}}\ x\ 1000$$

RCF = relative centrifugal force
RPM = rotational speed (revolutions per minute)
r = centrifugal radius in mm = distance from the centre of the turning axis to the bottom of the centrifuge.

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

## 20 Centrifugation of materials or mixtures of materials with a density higher than 1.2 kg/dm³

When centrifuging with maxim revolutions per minute the density of the materials or the material mixtures may not exceed 1.2 kg/dm$^3$.
The speed must be reduced for materials or mixtures of materials with a higher density.
The permissible speed can be calculated using the following formula:

$$\text{Reduced speed } (n_{red}) = \sqrt{\frac{1.2}{\text{Greater density [kg/dm}^3\text{]}}}\ \text{x maximum speed [RPM]}$$

e.g.: maximum speed RPM 4000, density 1.6 kg/dm$^3$

$$n_{red} = \sqrt{\frac{1.2\ \text{kg/dm}^3}{1.6\ \text{kg/dm}^3}}\ \text{x } 4000\ \text{RPM} = 3464\ \text{RPM}$$

In the exceptional case that the maximum loading indicated on the hanger is exceeded, the speed must also be reduced.
The permissible speed can be calculated using the following formula:

$$\text{Reduced speed } (n_{red}) = \sqrt{\frac{\text{maximum load [g]}}{\text{actual load [g]}}}\ \text{x maximum speed [RPM]}$$

e.g.: maximum speed RPM 4000, maximum load 300 g, actual load 350 g

$$n_{red} = \sqrt{\frac{300\ \text{g}}{350\ \text{g}}}\ \text{x } 4000\ \text{RPM} = 3703\ \text{RPM}$$

If in doubt you should obtain clarification from the manufacturer.

## 21 Rotor Identification

After every start of a centrifugation run the rotor utilised is identified.
After a change of rotor the drive switches off and the rotor code (R xx) as well as the maximum rotational speed (n-max=xxxxx) of the rotor are displayed.

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

## 22 Emergency release

During a power failure the lid cannot be unlocked by motor. An emergency release has to be executed by hand.

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

See figure on page 4.

- Switch off the mains switch (switch position "0").
- Look through the window in the lid to be sure that the rotor has come to a standstill.
- Insert the hexagonal wrench key into the bore hole (Fig. 1, A) and carefully rotate by half a turn in clockwise direction until the lid can be opened.
- Pull the hexagon socket head wrench out of the drilling again.
- If the left LED in the ⚬OPEN / STOP⚬ button flashes after the centrifuge is switched on again, press the ⚬OPEN / STOP⚬ button so that the motor-driven lid lock goes into the basic position (opened) again.

## 23 Maintenance and servicing

The device can be contaminated.

Pull the mains plug before cleaning.

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

- Centrifuges, rotors and accessories must not be cleaned in rinsing machines.
- They may only be cleaned by hand and disinfected with liquids.
- The water temperature must be between 20 – 25°C.
- Only detergents/disinfectants may be used which:
  - have a pH between 5 - 8
  - do not contain caustic alkalis, peroxides, chlorine compounds, acids and alkaline solutions
- In order to prevent appearances of corrosion through cleaning agents or disinfectants, the application guide from the manufacturer of the cleaning agent or disinfectant are absolutely to be heeded.

### Centrifuge (housing, lid and centrifuging chamber)

#### Surface cleaning and care

- Clean the centrifuge housing and the centrifuging chamber regularly, using soap or a mild detergent and a damp cloth if required. For one thing, this services purposes of hygiene, and it also prevents corrosion through adhering impurities.
- Ingredients of suitable detergents:
  soap, anionic tensides, non-ionic tensides.
- After using detergents, remove the detergent residue by wiping with a damp cloth.
- The surfaces must be dried immediately after cleaning.
- In the event of condensation water formation, dry the centrifugal chamber by wiping out with an absorbent cloth.
- Lightly rub the rubber seal of the centrifuge chamber with talcum powder or a rubber care product after each cleaning.
- The centrifuging chamber is to be checked for damage once a year.

If damage is found which is relevant to safety, the centrifuge may no longer be put into operation. In this case, notify Customer Service.

#### Surface disinfection

- If infectious materials penetrates into the centrifugal chamber this is to be disinfected immediately.
- Ingredients of suitable disinfectants:
  ethanol, n-propanol, isopropyl alcohol, glutardialdehyde, quaternary ammonium compounds.
- After using disinfectants, remove the disinfectant residue by wiping with a damp cloth.
- The surfaces must be dried immediately after disinfecting.

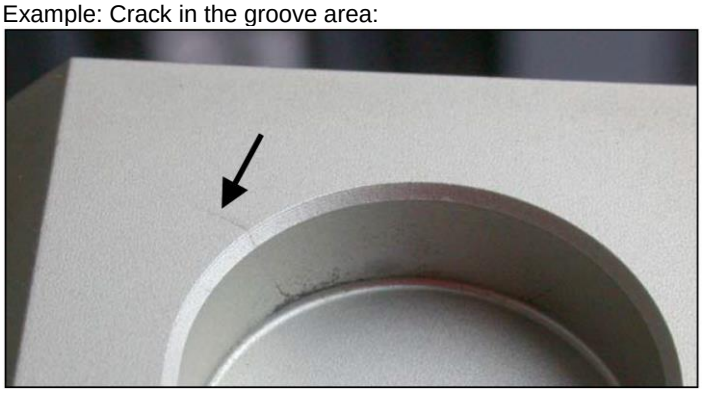
### Removal of radioactive contaminants

- The agent must be specifically labelled as being an agent for removing radioactive contaminants.
- Ingredients of suitable agents for removing radioactive contaminants:
  anionic tensides, non-ionic tensides, polyhydrated ethanol.
- After removing the radioactive contaminants, remove the agent residue by wiping with a damp cloth.
- The surfaces must be dried directly after removing the radioactive contaminants.

## Rotors and Attachments

### Cleaning and care

- In order to avoid corrosion and changes in materials, the rotors and accessories have to be cleaned regularly with soap or with a mild cleaning agent and a moist cloth. Cleaning is recommended at least once a week. Contaminants must be removed immediately.
- Ingredients of suitable detergents:
  soap, anionic tensides, non-ionic tensides.
- After using detergents, remove detergent residue by rinsing with water (only outside of the centrifuge) or wipe off with a damp cloth.
- The rotors and accessories must be dried directly after cleaning.
- Angle rotors, container and hanger made of aluminum are to be lightly greased after drying using acid-free grease, e.g. Vaseline.
- The sealing rings of bio-safety systems must be cleaned weekly.
  The sealing rings are made of silicone. To guarantee the leak-tightness of the bio-safety systems, the sealing rings must not be handled with talcum powder after cleaning or autoclaving.
  Each time before using the bio-safety system, all parts of the bio-safety system must be visually inspected for damage. In addition, the sealing ring(s) of the bio-safety system must be checked to make sure they are in the correct installation position.
  Damaged parts of the bio-safety system must be exchanged immediately.
  If there are signs of crack formation, brittleness or wear, immediately replace the sealing ring in question. In the case of lids with sealing rings which cannot be replaced, the entire lid must be exchanged.
  For the available bio-safety systems, see the chapter "Appendix, Rotors and accessories".
- In order to prevent corrosion as a result of moisture between the rotor and the motor shaft, the rotor should be disassembled and cleaned at least once a month, and the motor shaft should be lightly greased.
- The rotors and accessories have to be checked weekly for wear and corrosion. For swing-out rotors, it is important to check the area of the lifting lugs, for hangers, the grooves and the base should be checked for cracks.
  Example: Crack in the groove area:



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

- Check the firm seating of the rotor on a weekly basis.

## Disinfection

- If infectious material should get on the rotors or accessories, they must be appropriately disinfected.
- Ingredients of suitable disinfectants:
  glutaraldehyde, propanol, ethyl hexanol, anionic tensides, corrosion inhibitors.
- After using disinfectants, remove disinfectant residue by rinsing with water (only outside of the centrifuge) or wipe off with a damp cloth.
- The rotors and accessories must be dried directly after disinfection.

### Removal of radioactive contaminants

- The agent must be specifically labelled as being an agent for the removal of radioactive contaminants.
- Ingredients of suitable agents for removing radioactive contaminants:
  anionic tensides, non-ionic tensides, polyhydrated ethanol.
- After removing the radioactive contaminants, remove agent residue by rinsing with water (only outside of the centrifuge) or wipe off with a damp cloth.
- The rotors and accessories must be dried directly after removing the radioactive contaminants.

### Trunnions

With swing-out rotors the trunnions must be regularly lubricated in order to ensure consistent swinging out of the hangers.

### Rotors and accessories with limited service lives

The use of certain rotors, hangers and accessory parts is limited by time.
These are marked with the maximum permitted number of operating cycles or with an expiration date and the maximum permitted number of operating cycles or just with the expiration date; e.g.:

- "einsetzbar bis Ende: V. Quartal 2011 / usable until end of: V. Quarter 2011" or
  "einsetzbar bis Ende Monat/Jahr: 10/2011 / usable until end of month/year: 10/2011"
- "Max. Lauf Zyklen / max. cycles: 40000".

For safety reasons, rotors, hangers and accessory parts may no longer be used if either the indicated maximum number of operating cycles or the indicated expiration date has been reached.

## Autoclaving

The following accessories may be autoclaved at 121°C / 250°F (20 min):

Swing-out rotors
Angle rotors made of aluminium
Hangers made of metal
Lid with bio-seal
Adapter

[23] Nothing definitive can be said about the degree of sterility.

The lids of the rotors and containers must be removed before autoclaving.
Autoclaving accelerates the ageing process of plastics. In addition, it can cause discolourations in plastics.
The lid of the rotors 1515 and 1515-A may only be autoclaved 10x. Afterwards, it must be exchanged for safety reasons.
After autoclaving, the rotors and the accessories must be visually inspected for damage and any damaged parts must be exchanged immediately.
If there are signs of crack formation, brittleness or wear, immediately replace the sealing ring in question.
In the case of lids with sealing rings which cannot be replaced, the entire lid must be exchanged.
To guarantee the leak-tightness of the bio-safety systems, the sealing rings must not be handled with talcum powder after autoclaving.

## Centrifuge containers

- With leakiness or after the breakage of centrifuging containers broken container parts and leaked centrifugation material are to be completely removed.
- The rubber inserts as well as the plastic sleeves of the rotors are to be replaced after a glass breakage.

Remaining glass splitters cause further glass breakage!

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

## 24 Faults

If the fault cannot be eliminated with the help of the fault table, please inform Customer Service.
Please specify the type of centrifuge and the serial number. Both numbers can be found on the name plate of the centrifuge.

Perform a MAINS RESET:
- Switch off the mains switch (switch position "0").
- Wait at least 10 seconds and then switch on the mains switch again (switch position " ").

| Message / fault | | Cause | Remedy |
|---|---|---|---|
| No display | --- | No voltage.<br>Overvoltage protection tripped out. | # Check supply voltage.<br># Mains switch ON. |
| TACHO - ERROR | 1, 2, 96 | Faulty speedometer.<br>Motor, electronics defective. | # Open the cover.<br># Switch off the mains switch (switch position "0").<br># Wait at least 10 seconds.<br># Turn the rotor vigorously by hand.<br># Switch on the mains switch again (switch position " "). The rotor must turn during switch-on. |
| CONTROL - ERROR | 8 | Error in lid locking or lid closure. | |
| IMBALANCE | --- | The rotor is unevenly loaded. | # Open lid.<br># Check the loading of the rotor, see chapter "Loading the rotor".<br># Repeat the centrifugation run. |
| CONTROL - ERROR | 4, 6 | Error in lid locking or lid closure. | # Perform a MAINS RESET. |
| N > MAX | 5 | Rotation too fast | |
| N < MIN | 13 | Rotation too slow | |
| MAINS INTERRUPT | --- | Power failure during the centrifugation run.<br>(The centrifugation run was not finished.) | # Open lid.<br># Push START / IMPULS button.<br># Repeat the centrifugation run if necessary. |
| ROTORCODE | 10.1, 10.2 | Incorrect rotor coding | # Open lid. |
| CONTROL-ERROR | 21, 22, 25, 27, 29 | Error / defect electronics | # Perform a MAINS RESET. |
| CONTROL-ERROR | 23 | Error / defect controls | |
| SER I/O - ERROR | 30, 31, 33, 36 | Error / defect electronics | |
| ° C * - ERROR | 51 - 53, 55 | Error / defect electronics | |
| FU / CCI - ERROR | 60 - 64, 67, 68, 82 - 85 | Error / defect electronics / motor | |
| SYNC-ERROR | 90 | Error / defect electronics | |
| SENSOR-ERROR | 91 - 93 | Error / defect unbalance sensor | |
| KEYBOARD-ERROR | --- | Error / defect controls | |
| NO ROTOR | --- | No rotor installed | # Open lid.<br># Install rotor. |
| N 2 ROTOR MAX | --- | Speed in the selected program greater than the maximum speed of the rotor. | # Check the set speed.<br>Reduce the set speed |

## 25 Acceptance of the centrifuges for repair

Before returning the device, a transport securing device has to be installed

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

We reserve the right to accept contaminated centrifuges.

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

We ask for your understanding in this matter.

## 26 Disposal

Before disposal, the device must be decontaminated and cleaned to protect people, the environment and property.

When you are disposing of the device, the respective statutory rules must be observed.

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

The icon of the crossed-out trash can shows that the device may not be disposed as part of domestic waste.

The waste disposal guidelines of the individual EC countries might vary. If necessary, contact your supplier.

# Working with *Cellspin*® Cytocentrifuge

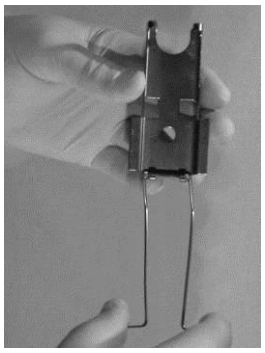
## 27 Introduction

*Cellspin*® Cytocentrifuge was developed to concentrate particles like cells or similar which are in suspension on the Cytoslide.

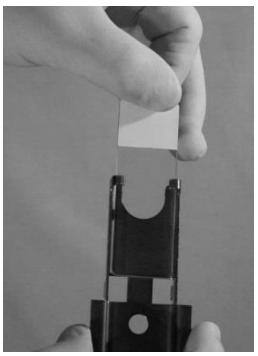
The device contains a **CellClip-rotor** with a maximal speed of 2,000 rpm.

Depending on version, the **CellClip-rotor** is able to carry up to 12 **preparation systems**.

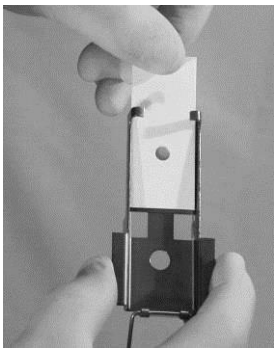
One **preparation system** includes:



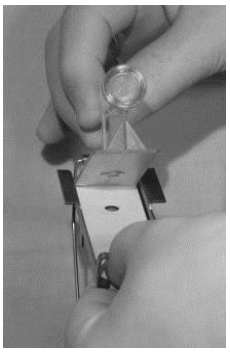
**CellClip**



**Cytoslide**
**or ECO-slide**



**Filter card**
**or ECO-seal**



**Cellfunnel®**
**disposable or reusable**

For an optimal result always use original high-quality **THARMAC® GmbH** consumables:

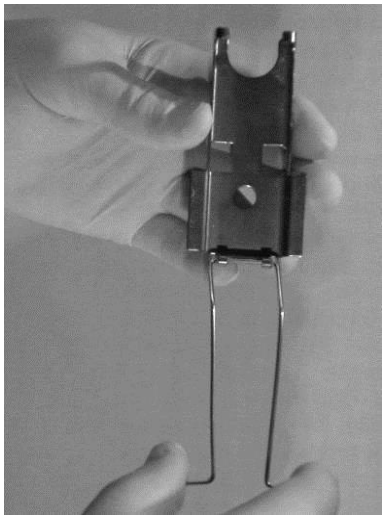
For the Cellfunnel®-preparation system:
- **CellClips**
- **Filter card**
- **Cellfunnel®**

For the ECOfunnel®-preparation system:
- **CellClips**
- **ECO-seal**
- **ECOfunnel®**

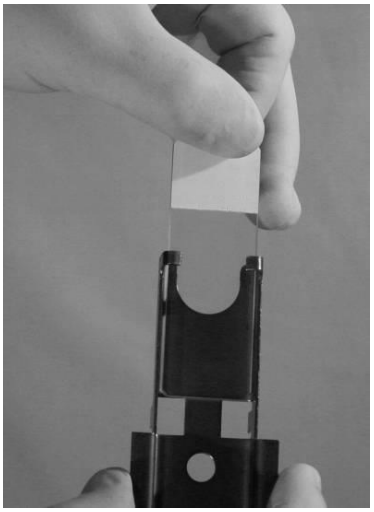
For accelerated diagnostics use our special **Cytoslides** or **ECO-slides** with sedimentation area, which allows a simplified finding of cells.

## 28 Assembling and disassembling of Cellfunnel® preparation system

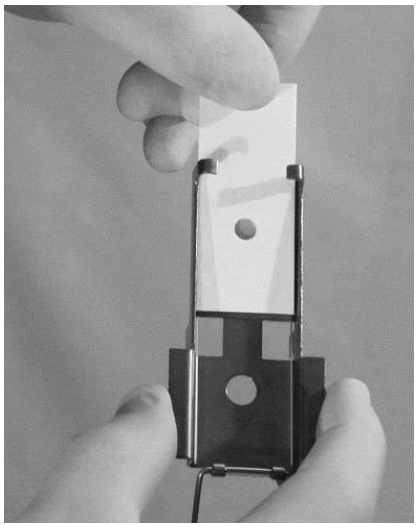
**! For your own safety always wear suitable protective clothing !**



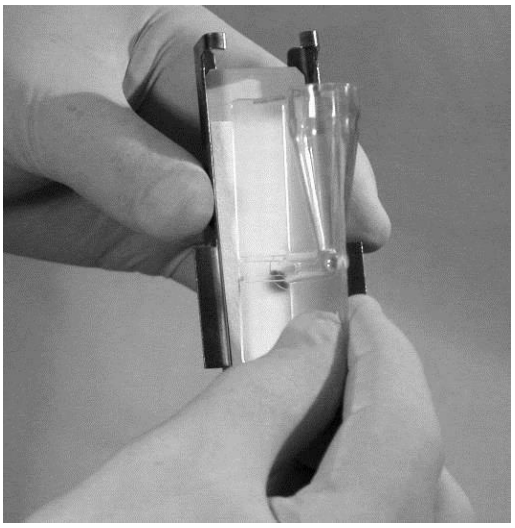
1. Open the clamp of the **CellClip.**



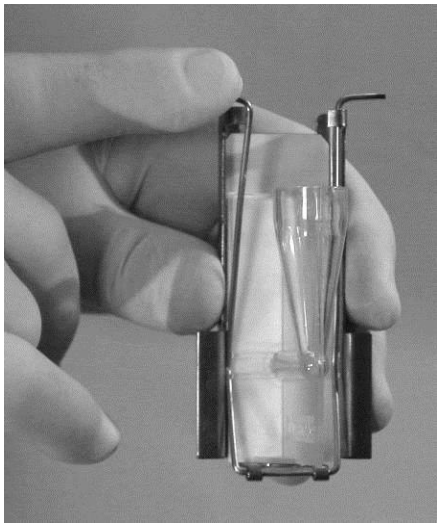
2. Insert the **Cytoslide** with marked side upwards.



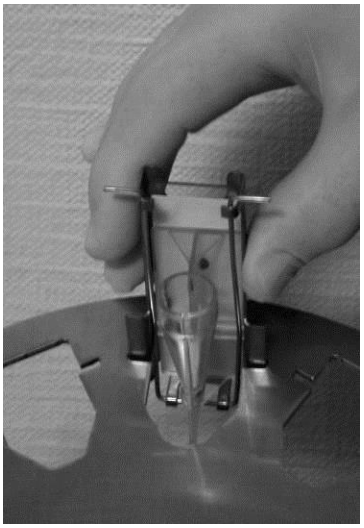
3. Insert **Filter card** (not applicable by using Cellfunnel® disposable).



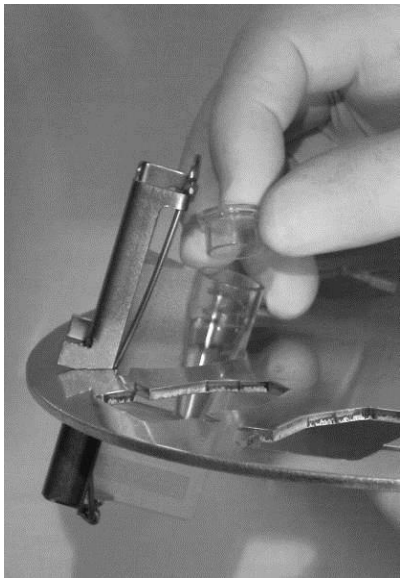
4. Insert **Cellfunnel®** (disposable or reusable).



5. Move clamp about **Cellfunnel®** and clip in both hooks.

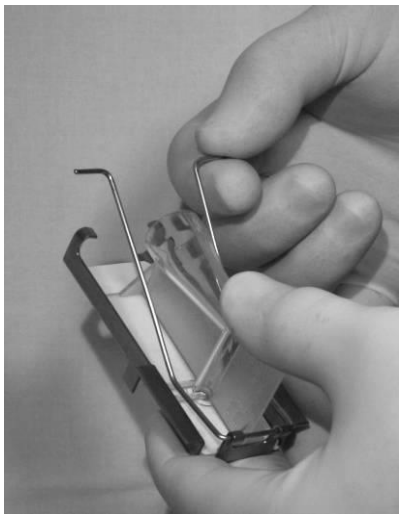


6. Insert the **preparation system** in the **CellClip-rotor** of your *Cellspin®* Cytocentrifuge.

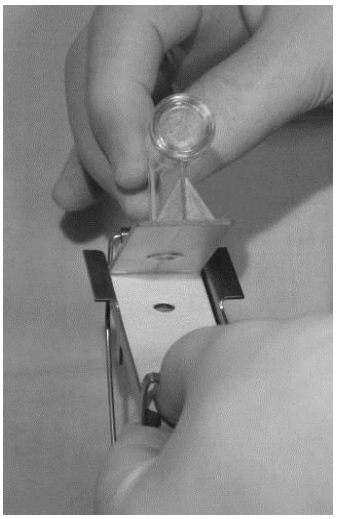


7. Pipette up to 0.5 ml cell suspension into the funnel of the **Cellfunnel®.** Put on the cap, close the cyto-centrifuge cover, set time and rotation speed and press start button.

After centrifugation remove the **preparation system** and disassemble it as follows:

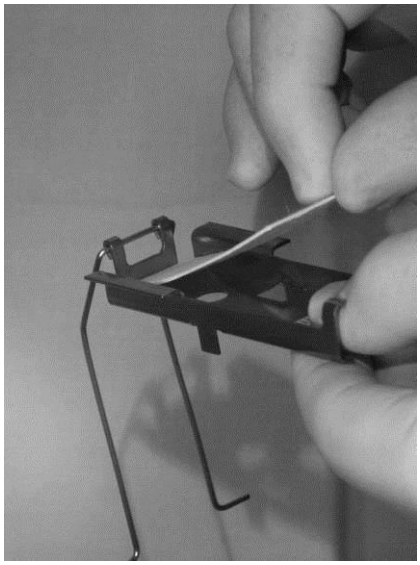


8. Hold the **preparation system** in one hand and press lightly on the **Cellfunnel®** when opening the **CellClip.**

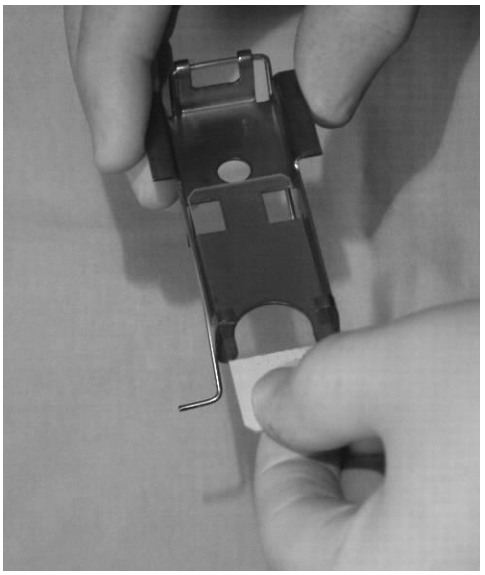


9. Remove the **Cellfunnel®** and put it into disinfectant solution.

While disassembling the **preparation system** do not move or shift the filter card on the Cytoslide!



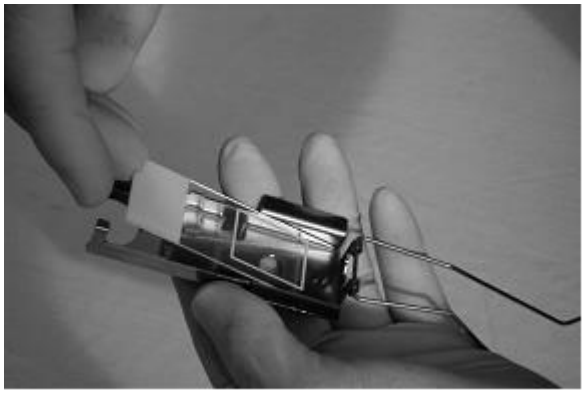
10. Press thumb on the **Cytoslide** and remove the **filter card**.
Dispose the used filter card according to general regulations.



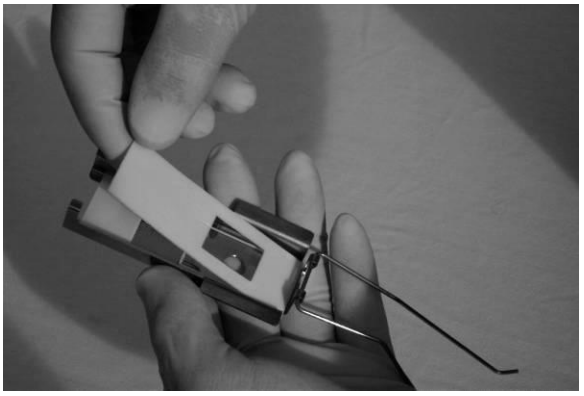
11. Remove the **Cytoslide.**
Put the **Cellclip** and the reusable **Cellfunnel®** into disinfectant solution.
Dispose disposable **Cellfunnel®** according to general regulations.

## 29 Assembling and disassembling of the ECOfunnel® preparation system

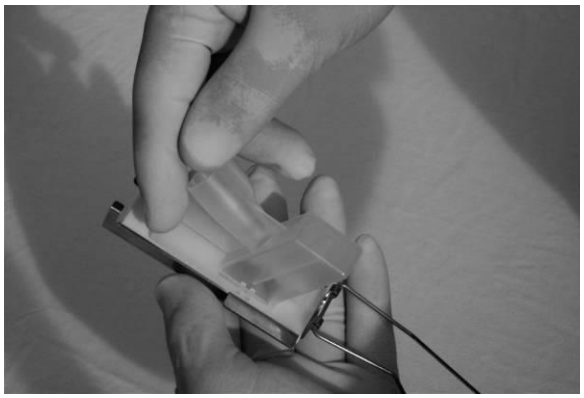
**! For your own safety always wear suitable protective clothing !**



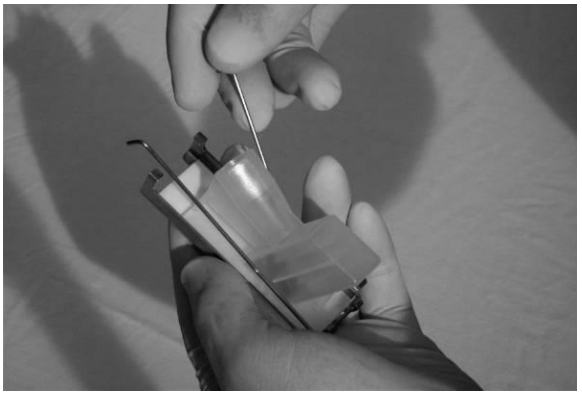
1. Insert the **ECO-slide** with marked side upwards into the **CellClip**.



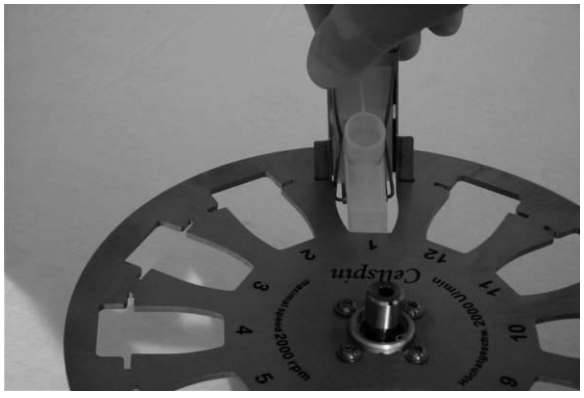
2. Apply the **ECO-seal**.
(Take care of correct positioning).



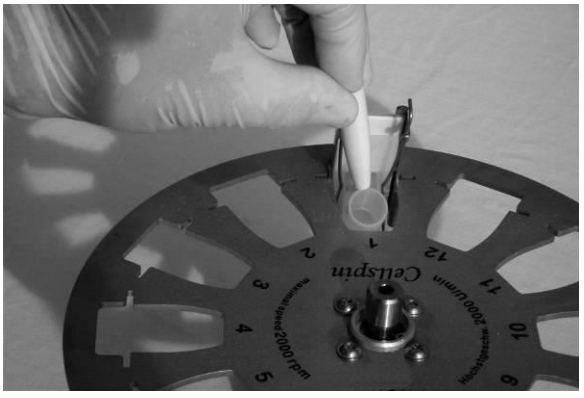
3. Insert the **ECOfunnel®.**



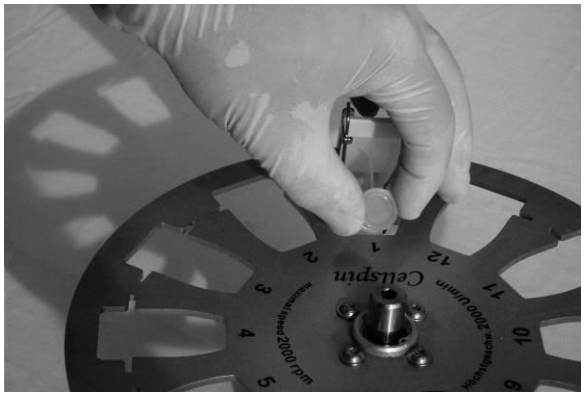
4. Close the **CellClip.**



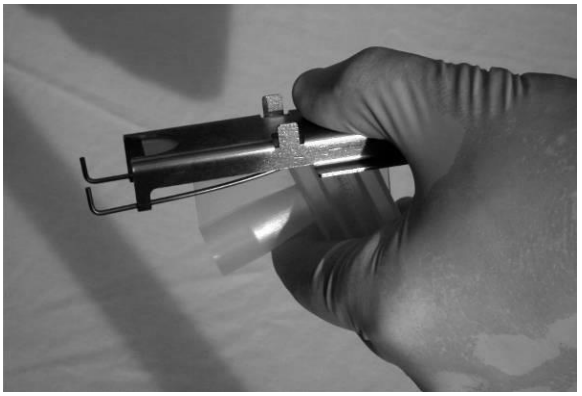
5. Insert the **preparation system** in the **CellClip-rotor** of the *Cellspin®* Cytocentrifuge.



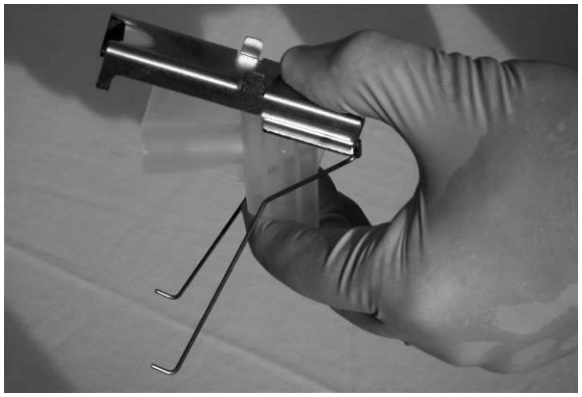
6. Shake vial with cell suspension and determine the turbidity. Depending on turbidity pipette 1-2 ml cell suspension into the **ECOfunnel®**.



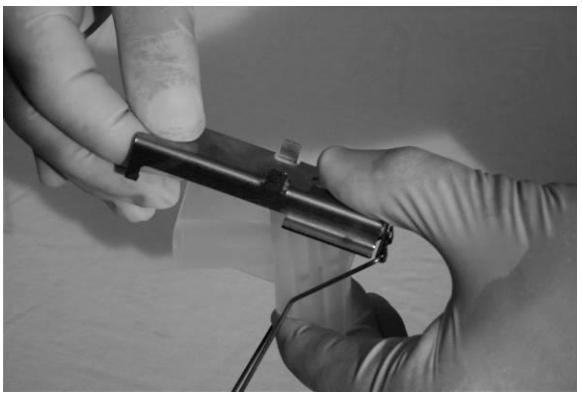

7. Close **ECOfunnel®** with a cap.
Centrifuge the samples.



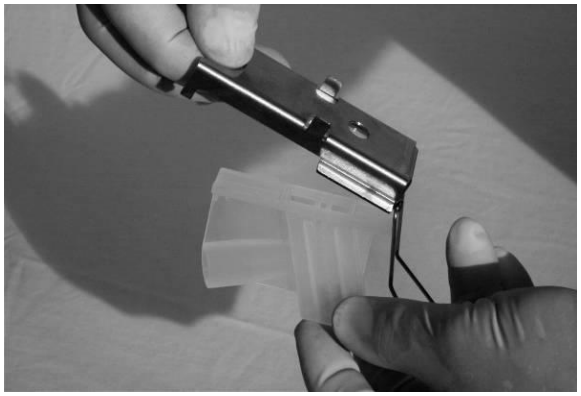
8. After centrifugation remove **preparation system** from the rotor tilted to prevent running back of the cell suspension onto the **ECO-slide**. Decant excess liquid.



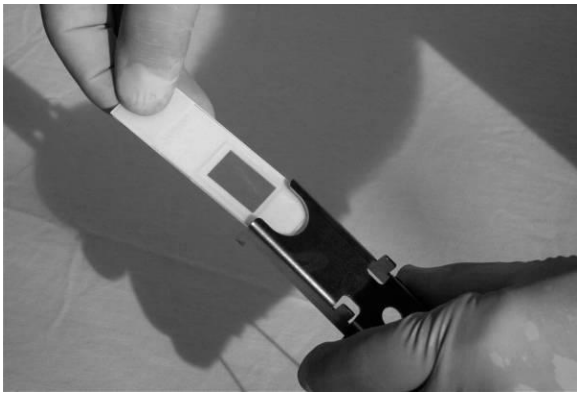
9. Press the **ECOfunnel®** lightly on the **CellClip**, open the clamp slowly.



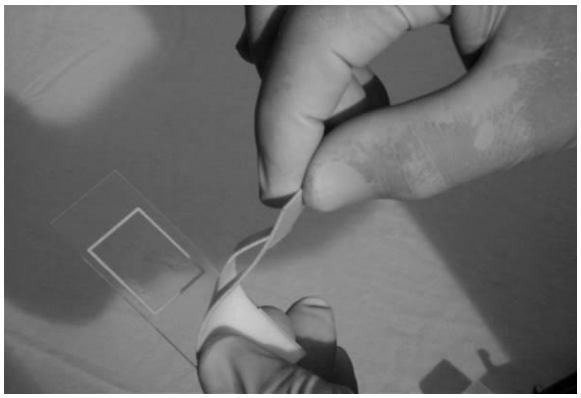
10. Hold **ECO-slide** and **ECO-seal.**



11. Put reusable **ECOfunnel®** into disinfectant solution.
Dispose disposable **ECOfunnel®** according to general regulations.



12. Remove **ECO-slide** and **ECO-seal** together.



13. Remove **ECO-seal** carefully from **ECO-slide.** Dispose the seal according to general regulations.

Stain **ECO-slide** according to established staining protocol.

## 30 Cleaning reusable Cellfunnel® or ECOfunnel® and CellClips

**Disinfection**

After application, disinfect **reusable Cellfunnel®** or **ECOfunnel®** and **CellClips**.
We recommend in laboratories usually used surface disinfectant.

After disinfection wash **Cellfunnel®** or **ECOfunnel®** and **CellClips** in water and dry them. Do not use bottlebrushes or harsh detergents.

**Cellfunnel®** or **ECOfunnel®** are designed for multiple use. Due to disinfectant over a longer time the inside of the **Cellfunnel®** can be roughen. Thus, we recommend renewing the **Cellfunnel®** after a period of three years.

**Cleaning/disinfection of closed CellClip-rotor and seal**

**Sterilization:** autoclave at 121 °C (250 °F) for 15 min.
**Cleaning:** wipe out with a 2% glutaraldehyde-solution according to manufacturer guidelines.

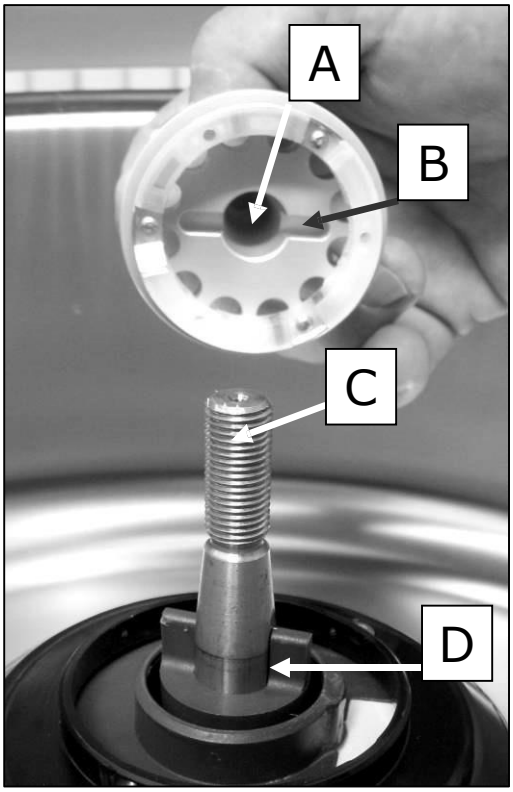
After cleaning, rub the seal of closed rotor with talcum powder or a rubber care product.

**Disposing of filter cards**

The filter cards are generally determined for one-time use.
Due to possibly contamination, filter-cards have to be disposed safely after use.

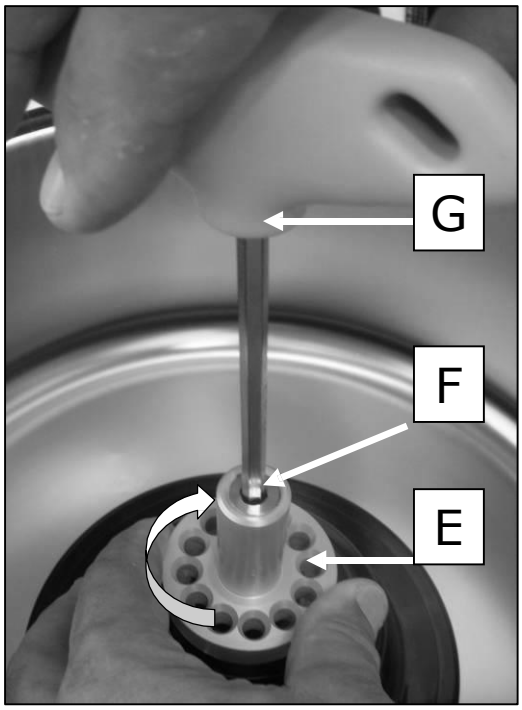
**Advices for cleaning your *Cellspin®* Cytocentrifuge please read the instructions of the centrifuge**

## 31 Installation and removal of rotor hub (E)




1. Clean motor shaft **(C)** and the hole of the hub **(A)**. Then grease slightly the motor shaft. Dirt located between motor shaft and rotor prevent a perfect fit of the hub and causes a turbulent run.

2. Put on the hub vertically. The carrier of the motor shaft **(D)** must be located in the groove of the hub **(B)**.



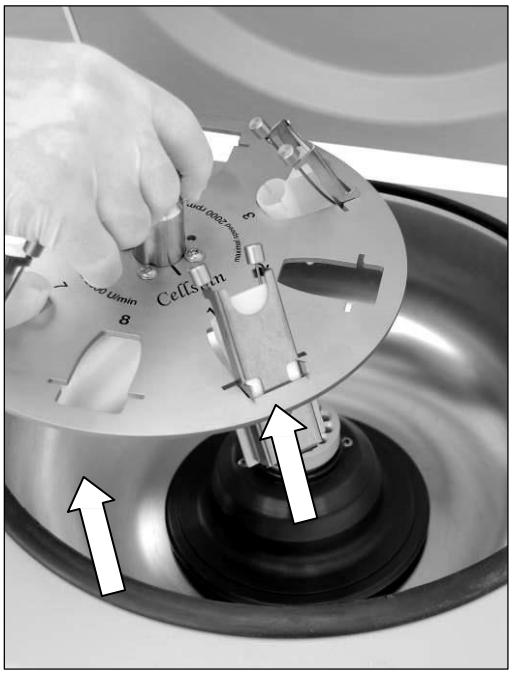

3. Tighten the clamping nut **(F)** of the hub **(E)** with the supplied key **(G)** by turning clockwise.

4. Check if rotor fits firmly.

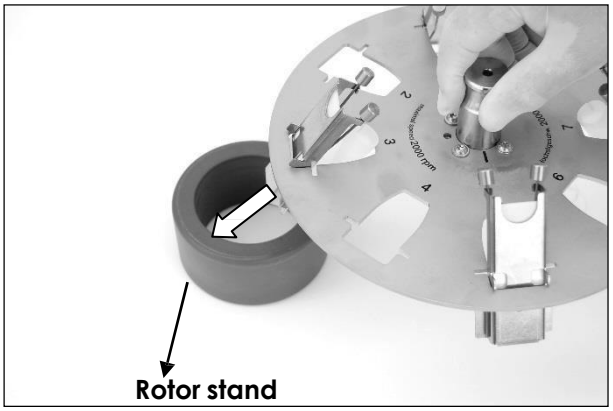
***Removing the hub:*** Remove the clamping nut by turning counterclockwise and turn the hub to the take-off pivot. After overcoming the take-off pivot, the hub removes from cone of the motor shaft. Turn the clamping nut until you can take off the hub from motor shaft.

## Removable rotor 370

**1.** Take the rotor out of the centrifuge *(Fig. 6.1)* and park it on the supplied rotor stand *(Fig. 6.2)* to load or clean the rotor beyond the *Cellspin®*.

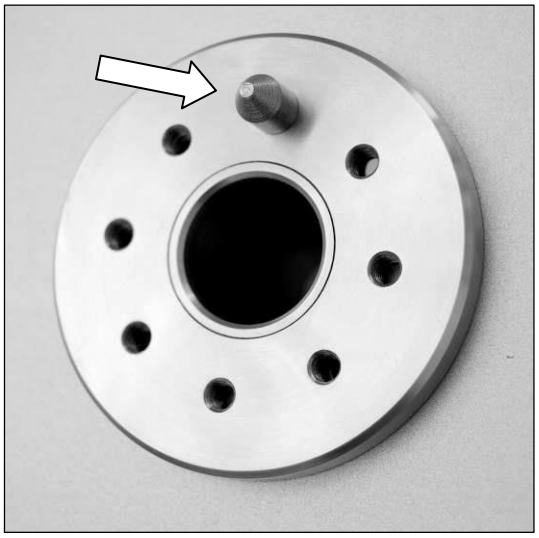


(figure. 6.1)




(figure. 6.2)

**2.** Take care that for the reset of the rotor, the guide pin at the bottom of the rotor *(Fig. 6.3)* has to lock in one of the holes of the hub *(Fig. 6.4)*.



(figure. 6.3)

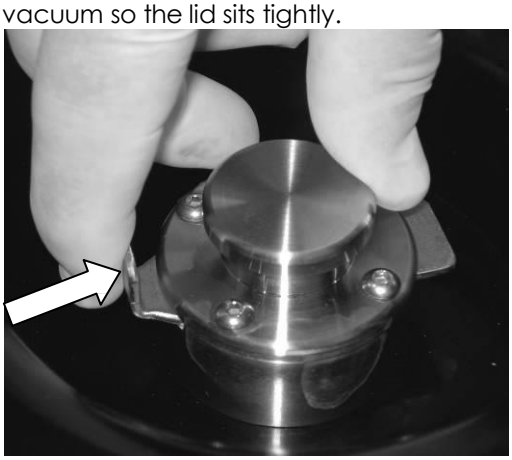
(figure. 6.4)

**Attention: Please grease the axis.**

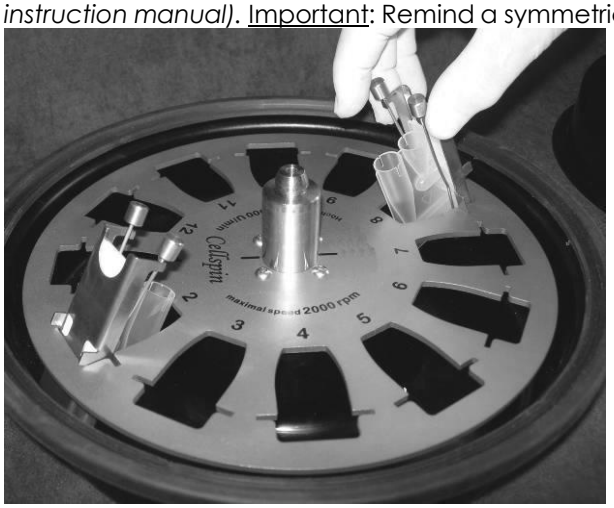
## Closed CellClip-rotor 101

1. Take the CellClip-rotor out of the *Cellspin®*.

2. Press with the index finger on the closure (s.b.) and take off the lid. Due to dense lock, there is a light vacuum so the lid sits tightly.

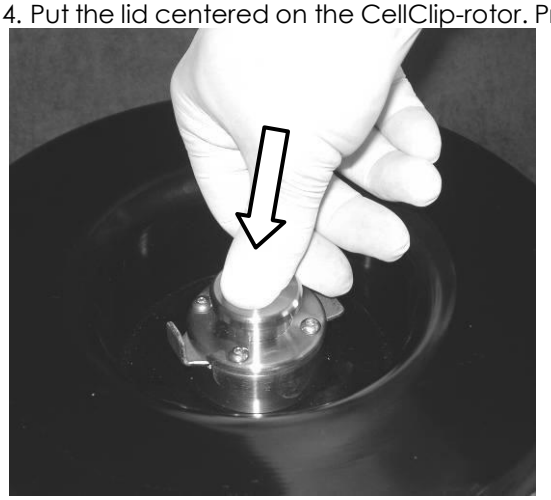


3. Insert the **Cellfunnel®-** or **ECOfunnel®-preparation system** *(for assembling see point 2 and 3 in the instruction manual)*. Important: Remind a symmetrical load of the CellClip-rotor.




**Attention: Please grease the axis lightly.**

4. Put the lid centered on the CellClip-rotor. Press centrically on the closure until it locks. (Click-noise)



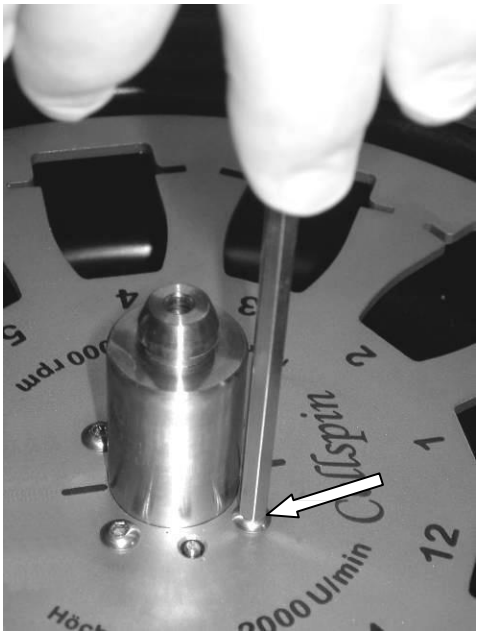
5. Take CellClip-rotor into the *Cellspin®* and place it on the hub.

## Cleaning the closed CellClip-rotor

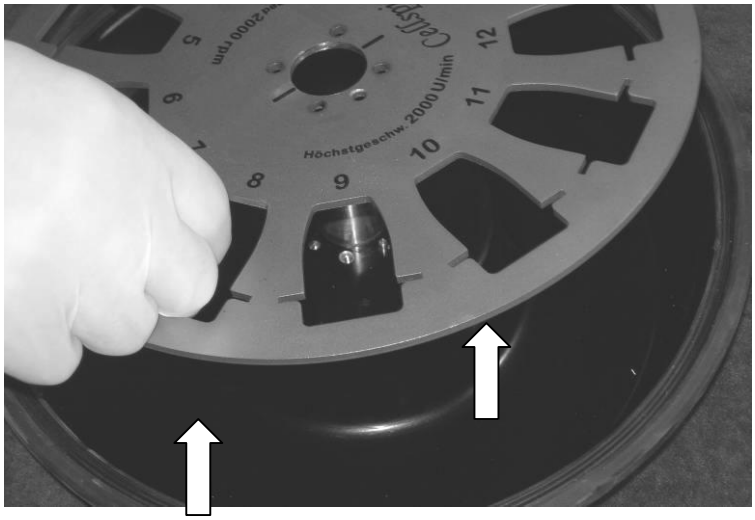
**Information: Do not clean the closed CellClip-rotor in the dishwasher or with harsh detergents !!!**

1. Open the closed CellClip-rotor.

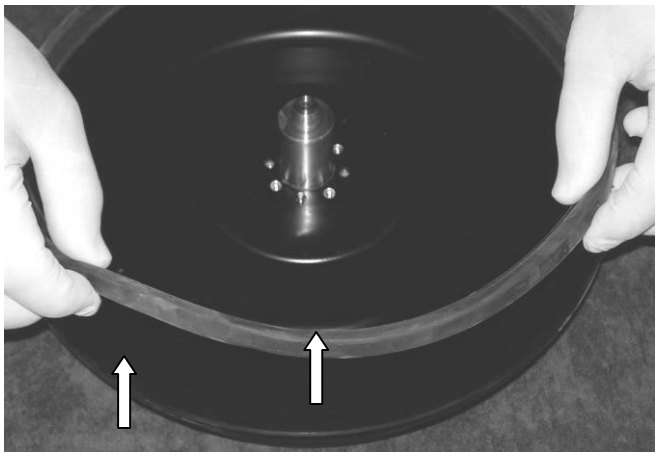
2. Remove the four screws. (see figure)




3. Take application out of the CellClip-rotor.

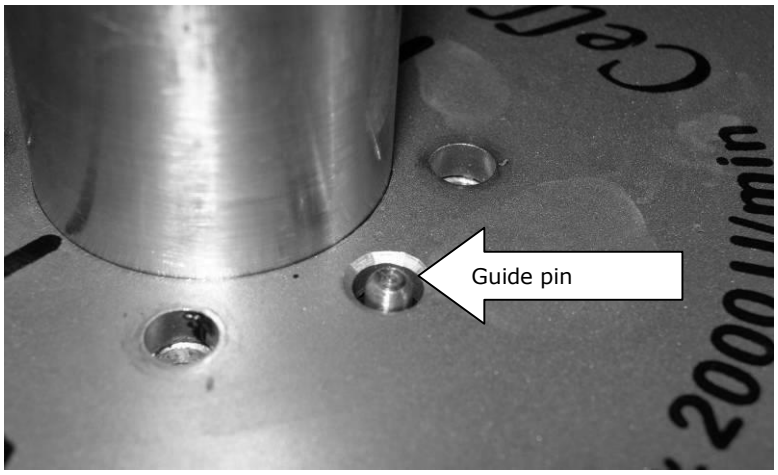


4. Remove seal from outer rotor.



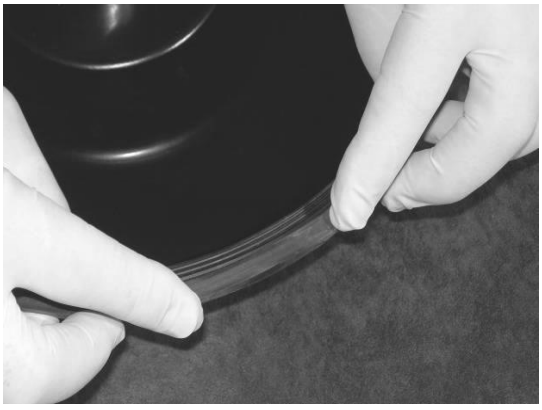
5. Clean or disinfect application, rotor, lid and seal.

6. Insert the application centered into the rotor.
Take care that guide pin is inside the provided port (see figure).




7. Screw the four screws tightly.
**Attention: Please grease the axis lightly.**

8. Put the seal on the outer rotor. Please check if seal mounts evenly.
**Dust the seal lightly with talcum.**



## 32 Application field for *Cellspin®* Cytocentrifuge

**All cell suspensions can be processed within the *Cellspin®* Cytocentrifuge.**

**Body fluids**

e.g. out of chest and belly area, testicles, outpourings in joints, urine, cysts, liquids out of the ureter, bladder or renal pelvis, cerebrospinal fluid.

**Suspensions made of brushed, wiped off or sucked off cells**

e.g. smear of cervix and bronchial flushing

**Suspensions out of cell cultures**

e.g. in the virology
Cell cultures in liquid media

**Gynecological cytology:**

Cysts liquids out of mamma und ovary
Douglas puncture
Ascites
Urine

**Urology:**

Urine and liquids out of flushing
Cysts out of the kidneys
Outpourings out of the testicles possibly ascites

**Cytology of internal medicine:**

Ascites
Pleura-Pericardial effusion
Liquids out of stomach flushing
Bronchial secretion
Cysts

**Neurology:**

Cerebrospinal fluid

**Pathology:**

Processing of all sent in cell suspensions and liquids.

## 33 Instruction for processing of different body fluids with *Cellspin®* Cytocentrifuge

**Please consider:**
**The following protocols are just case examples! You have to develop instructions for sampling, preparation and staining, respectively, adapted to your laboratory. All instructions need to be adapted to the processing question.**

| | |
|---|---|
| **Examination material:** | Oral mucosa |
| **Extraction:** | Brush |
| **Fixation:** | The brush is put into a plastic vial filled with fixation fluid and equipped with a screw cap<br><br>Alternative: Fixation-spray for smear test |
| **Transport:** | By mail |
| **Pretreatment:** | **Centrifugation at 2,100 rpm for 10 Min**.<br><br>**Decantation of supernatant and shaking up of the sediment**<br><br>If the sample is bloody an additional pretreatment is required. |
| **Cyto centrifugation:** | The ECO-slide is inserted into the CellClip with filter card and ECOfunnel®.<br><br>**Pipette 2.5 ml of the sampling into the ECOfunnel® and centrifuge at 1,800 rpm for 5 minutes.** |

***Put CellClip with ECO-slide, filter card and ECOfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **Recommendation:** | The material should be processed completely. |
| **Fixation:** | Fixation-spray |
| **Staining:** | Papanicolaou-staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

| | |
|---|---|
| **Examination material:** | Liquor |
| **Extraction:** | Puncture |
| **Fixation:** | None, if it is processed in the laboratory within 1-2 hours or in fixation with alcohol in relation 1:1 |
| **Transport:** | From operating room to the laboratory - fresh material in plastic vessels with screw cap by courier or by mail – fixed material |
| **Pretreatment:** | None |
| **Cyto centrifugation:** | The Cytoslide is inserted into the CellClip with filter card and Cellfunnel® or Double Cellfunnel®. |

***In case of potentially infectious material, you should use the disposable Cellfunnel®.***

| | |
|---|---|
| **A** | Pipette 0.5 ml sample fluid into the opening<br>(optionally 2 x 0.5 ml when using Double Cellfunnel®) |

***Put CellClip with Cytoslide, filter card and Cellfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **B** | **cytocentrifugation is performed at 1,000 rpm for 10 minutes.** |
| **Recommendation:** | The material should be processed completely. |
| **Fixation:** | depends on staining<br><br>e.g. Pap-staining: Fixation-spray<br>May-Grünwald: air-drying |
| **Staining:** | mainly May-Grünwald staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

| | |
|---|---|
| **Examination material:** | Bronchial lavage |
| **Extraction:** | Bronchial lavage under bronchoscopy |
| **Fixation:** | Saccomano-Fixativ or 96% alcohol 1:1 |
| **Transport:** | directly from operating room, by courier or mail |
| **Pretreatment:** | **Centrifugation at 1,500 rpm for 10 minutes.** |
| | **Decantation of supernatant and shaking up of the sediment** |
| **Cyto centrifugation:** | The Cytoslide is inserted into the CellClip with filter card and Cellfunnel® (optionally Double Cellfunnel® or ECOfunnel®) |

***In case of potentially infectious material, you should use the disposable Cellfunnel®.***

| | |
|---|---|
| **A** | Pipette 0.5 ml sample fluid into the opening (optionally 2 x 0.5 ml by using Double Cellfunnel® or 1 ml when using ECOfunnel®) |

***Put CellClip with Cytoslide/ ECO-slide, filter card/ECO-seal and Cellfunnel®/ ECOfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **B** | **cytocentrifugation at 2,000 rpm for 10 minutes.** |
| **Recommendation:** | The material should be processed completely. |
| **Fixation:** | depends on staining |
| | e.g. Pap-staining: Fixation-spray<br>May-Grünwald: air-drying |
| **Staining:** | Papanicolaou-staining or May-Grünwald-staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

| | |
|---|---|
| **Examination material**: | Cyst aspirates |
| **Extraction**: | Puncture |
| **Fixation:** | Mixture of alcohol |
| **Transport**: | Plastic vial with screw cap possibly prefilled with fixation fluid in relation 1:1 |
| **Pretreatment**: | **Centrifugation at 2,000 rpm for 10 minutes** |
| | **Decantation of supernatant and shaking up of the sediment** |
| **Cyto centrifugation**: | The Cytoslide is inserted into the CellClip with filter card and Cellfunnel® (optionally Double Cellfunnel® or ECOfunnel®) |

***In case of potentially infectious material, you should use the disposable Cellfunnel®.***

| | |
|---|---|
| **A** | Pipette 0.5 ml sample fluid into the opening (optionally 2 x 0.5 ml by using Double Cellfunnel® or 1 ml when using ECOfunnel®) |

***Put CellClip with Cytoslide/ECO-slide, filter card/ECO-seal and Cellfunnel®/ ECOfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **B** | **cytocentrifugation at 1,500 rpm for 10 minutes.** |
| **Recommendation:** | The material should be processed completely. |
| **Fixation**: | depends on staining |
| | e.g. Pap-staining: Fixation-spray<br>May-Grünwald: air-drying |
| **Staining**: | Papanicolaou-staining or May-Grünwald-staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

| | |
|---|---|
| **Examination material:** | Urine |
| **Extraction:** | Midstream urine, catheter urine, vesicoclysis |
| **Fixation:** | Mixture of alcohol (Recommendation: Cellcollect) |
| **Transport:** | Plastic vial with screw cap possibly prefilled with fixation fluid in relation 1:1 |
| **Pretreatment:** | **Centrifugation at 2,000 rpm for 10 minutes** |
| | **Decantation of supernatant and shaking up of the sediment** |
| **Cyto Centrifugation:** | The Cytoslide is inserted into the CellClip with filter card and Cellfunnel®. |

***In case of potentially infectious material, you should use the disposable Cellfunnel®.***

| | |
|---|---|
| **A** | Pipette 0.5 ml sample fluid into the opening |

***Put CellClip with Cytoslide/ ECO-slide, filter card / ECO-seal and Cellfunnel® / ECOfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **B** | **cytocentrifugation at 1,500 rpm for 10 minutes.** |
| **Recommendation:** | The material should be processed completely. |
| **Fixation:** | depends on staining |
| | e.g. Pap-staining: Fixation-spray<br>May-Grünwald: air-drying |
| **Staining:** | Papanicolaou-staining or May-Grünwald-staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

| | |
|---|---|
| **Examination material:** | Pleura/ Ascites |
| **Extraction:** | Puncture |
| **Fixation:** | Unfixed |
| **Transport:** | directly from operating room, by courier or mail in plastic vials with screw cap, material should be processed within 24 h. |
| **Pretreatment:** | **Centrifugation at 2,000 rpm for 10 minutes**<br>**Decantation of supernatant and shaking up of the sediment** |
| **Cyto centrifugation:** | The Cytoslide is inserted into the CellClip with filter card and Cellfunnel® (optionally Double Cellfunnel® or ECOfunnel®). |

***In case of potentially infectious material, you should use the disposable Cellfunnel®.***

| | |
|---|---|
| **A** | Pipette 0.5 ml sample fluid into the opening<br>(optionally 2 x 0.5 ml by using Double Cellfunnel® or 1 ml when using ECOfunnel®) |

***Put CellClip with Cytoslide/ECO-slide, filter card / ECO-seal and Cellfunnel® / ECOfunnel® into CellClip-rotor before pipetting!***

| | |
|---|---|
| **B** | **cytocentrifugation at 2,000 rpm for 10 minutes.** |
| **Recommendation:** | The material should be processed completely. |
| **Fixation:** | depends on staining<br>e.g. Pap-staining: Fixation-spray<br>May-Grünwald: air-drying |
| **Staining:** | Mainly May-Grünwald-staining |

Air-dried preparations can be stored for special analyses, like e.g. immunocytochemistry.

## 34 Additional information

Some information about the operation of the device to facilitate the entry into the application:

**Quantity of sample liquid**

**Cellfunnel®** are aligned to obtain an optimal result with 0.1 – 0.5 ml of sample liquid.
**Double Cellfunnel®** can be filled with 2 x 0.1 – 0.5 ml.
**ECOfunnel®** can be filled up to 5 ml.

If there is more liquid available, the quantity of sample liquid should be split into two or more sample chamber.

**Which concentration of cells?**

The number of cells should be selected as follows (possibly with cell counter):

| | | |
|---|---|---|
| **Single Cellfunnel®** | = 1x | approx. 100,000 cells |
| **Double Cellfunnel®** | = 2x | approx. 100,000 cells |
| **ECOfunnel®** | = 1x | approx. 1.000,000 cells |

Liquids with a larger number of cells should be diluted to reach the desired quantity of cells.

**Centrifugation speed, times and acceleration**

Surveys with users showed, that generally a speed of 500 rpm up to 1,500 rpm for 10 minutes is sufficient for most of the samples. Liquids with a high protein concentration need more time.

Crucial for the time is the complete absorption of liquid to the filter card and the whereabouts of the cells on the Cytoslides. Too short times induce whereabouts of liquid in the sample chamber and a possible float of the cells. Too long times after completely absorption of liquids induce a drying out of the cells preparations, which results in a degradation of the cells.

## 35 Prevention of inaccurate results

**Question:** **I do not receive any cells**

**Answer:** The exit opening of the filter card is blocked. Ensure that the opening of the filter card is located at the bottom of the CellClip towards the opening in the Cellfunnel®.

**Question:** **There are no abnormal cells in my preparation, although I have abnormal cells in the sample**

**Answer:** Probably the abnormal cells are bigger and heavier than the normal cells. Thus, they set off at the bottom of the concentrate. There they can be easily missed if the cell pellet is not completely resuspended after precentrifugation. Resuspending the cells can be done in a vortexmixer in a centrifugation tube and several ml of electrolyte solution.

**Question:** **I do not receive enough cells**

There can be different reasons for it:

- In the diluted preparation are not enough cells.
- Rarely populated preparations fill cylindrical und conical parts of the Cellfunnel®.
- Too few cells were given into the Cellfunnel®.
- The cells emanate due to hyaluronic acid in jointly fluid.
- The Cytoslide is located between exit opening of the Cellfunnel and filter card.

**Answer:** You can solve the problems as follows:
Suspend again the cells in 1-2 ml electrolyte solution and if possible combine the content of several centrifugation tubes from the same preparation. Examine one drop of the resuspended cell concentrate.
Enrich the preparation as mentioned above .

Release the hyaluronic acid precipitation in some hyaluronidase.

Assemble the preparation system in correct order.

**Question:** **I receive too many cells**

**Answer:** The Cellfunnel® was filled with too much suspension of highly concentrated cell suspensions. Examine one drop of the resuspended cell concentrate; if necessary dilute up to the tenfold.

Refer the dimension of the sample to the quantity of cells.

Information: Do not count on the appearance of the preparations.

**Question:** **The cells flow toward the label or toward the opposite direction**

**Answer:** The thin adherent cells were too wet before fixation so they were pressed up to the label when putting the Cytoslide into alcohol or they were slipped when removing from alcohol. Let suspension medium almost completely evaporate before fixation.

**Question:** **I receive a roundly cell band or „bulls eye formed" allocation**

**Answer:** The cells are adherent thick and the borders are almost dry while the center furthermore is wet. This supports the washing-up of the cells. Add less cell suspension.

Before cytocentrifugation use suspension with unfixed and fresh cells. Even do not use cell suspensions or blood cell suspension that were not collected in alcohol.

Soap blood cell suspensions before cytocentrifugation.

Check the number of cells.

Compensate the difference in cell suspensions and do not use suspensions, which were not processed in the *Cellspin®* Cytocentrifuge. Use always clean slides (none out of frosted or albumin glass).

Use a balanced electrolyte solution.

Keep the cell suspension away from the filter card.

Do not use a normal saline.

## 36 Recommended times and speed

**Please consider:**
**The following protocols are just case examples! You have to develop instructions for sampling, preparation and staining, respectively, adapted to your laboratory. All instructions need to be adapted to the processing question.**

*Cellspin*® **Cytocentrifuge**

| Liquid | Min | Rpm. | Start-up speed (only for *Cellspin® II*) |
|---|---|---|---|
| Kidney punctate | 10 | 1,000 | Low level 7 |
| Lavages | 10 | 1,000 | Low level 7 |
| Liquor | 10 | 1,000 | Low level 7 |
| Mamma-punctates | 10 | 800 | Middle level 8 |
| Pleura | 15 | 800 | Middle level 8 |
| Thyroid punktate | 10 | 1,000 | Low level 7 |
| Iliac crest liquid | 5 | 500 | High level 9 |
| Tumor liquid | 5 | 500 | High level 9 |
| CD 4 Lymphocytes | 5 | 500 | High level 9 |
| CD 8 Lymphocytes | 5 | 500 | High level 9 |
| Urine | 10 | 1,000 | High level 9 |

Only for *Cellspin® II*: Recommended break modus for normal work: level 9

Immediately fix the preparation after removal.

Do not immerse in 95% ethanol if prepared cell monolayer is still wet, because the cells could run away.

## 37 Declaration of conformity

THARMAC
Cellspin®

CE IVD

**Konformitätserklärung**

**Declaration of Conformity**

Wir, die Firma THARMAC® GmbH, DE 65205 Wiesbaden, erklären hiermit in eigener Verantwortung, dass das nachfolgend aufgeführte Gerät und Zubehör zu einem In-vitro-Diagnostikum alle einschlägigen Anforderungen der Europäischen Richtlinie 98/79/EG einhält.

*The THARMAC® GmbH, DE 65205 Wiesbaden hereby confirms at its sole responsibility that the instrument and accessories for an In-vitro diagnostic procedure IVD as listed below, meet all relevant requirements of the European Directive 98/79/EG.*

**CELLSPIN Zytozentrifuge**

Insbesondere wird versichert, dass die grundlegenden Anforderungen gemäß Anhang I der Richtlinie

**In Vitro Diagnostics Direktive - 98/79/EG**

eingehalten werden.
*We guarantee in particular that the basic requirements according to annex I of the Directive 98/79/EG arefulfilled.*

Eingehalten werden die relevanten Abschnitte der folgenden Normen:
*The products comply with the following standards:*

EG-Richtlinien/Normen, EC guidelines/standards:
**73/23/EWG, EN 61010-1, EN 61010-2-020**
**89/336/EWG + 92/31/EWG + 93/68/EWG, EN 61000-6-1, EN 55011, EN 61000-3-2, EN 61000-3-3**
**98/37/EG, EN ISO 12100-1, EN ISO 12100-2**
**98/79/EG**

Diese Erklärung gilt für alle Produkte, die ab dem
*This declaration applies to all products that have been marketed for the first time as of*
01. Januar 2017

erstmalig in Verkehr gebracht werden und für die eine interne Freigabe erteilt wurde.

Die technischen Unterlagen werden bei den Herstellern aufbewahrt.
*The manufacturer maintains the technical documentation.*

Wiesbaden, den 02.01.2017

Joachim Camrath
Sicherheitsbeauftragter MPG, THARMAC® GmbH

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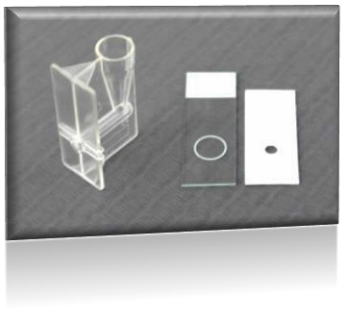
## 38 Conversion table

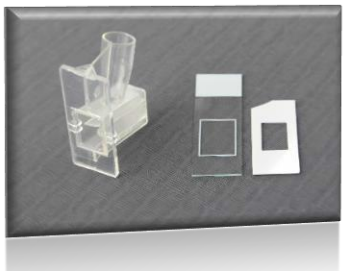
| Speed | Force |
|---|---|
| rpm | (g) |
| | |
| 500 | 28 |
| 600 | 40 |
| 700 | 55 |
| 800 | 72 |
| 900 | 91 |
| 1.000 | 112 |
| 1.100 | 135 |
| 1.200 | 161 |
| 1.300 | 189 |
| 1.400 | 219 |
| 1.500 | 252 |
| 1.600 | 286 |
| 1.700 | 323 |
| 1.800 | 362 |
| 1.900 | 404 |
| 2.000 | 447 |

## 39 Consumables for *Cellspin®* Cytocentrifuge

| Category | Art.No. | Article | PU |
|---|---|---|---|
| Single Cellfunnel® | | – sample volume: up to 0,5 ml<br>– sedimentation field: 1 field, round, 6 mm in diameter | |
|  | 304 | Single Cellfunnel®<br>reusable | 12 |
| | 305 | Filter cards<br>for Single Cellfunnel® 304 only | 200 |
| | 310 | Cytoslides<br>slides with one circle, un coated | 100 |
| | 311 | Cytotslides<br>slides with one circle, co ated | 100 |
| | 320 | Single Cellfunnel®<br>disposable | 100<br>500 |
| | 395 | Single Cellfunnel®<br>with brown filter card for samples up to 0,4 ml | 5<br>0 |
| Double Cellfunnel® | | – sample volume: up to 2 x 0,5 ml<br>– sedimentation field: 2 fields, round, 6 mm in diameter each<br>– ideal for immunochemical examination | |
|  | 306 | Double Cellfunnel®<br>reusable | 12 |
| | 307 | Filter cards<br>for Double Cellfunnel® 306 only | 50 |
| | 309 | Cytoslides<br>slides with two circles, uncoated<br>for Double Cellfunnel® 306 only | 100 |
| | 312 | Cytoslides<br>slides with two circles, coated for<br>Double Cellfunnel® 306 only | 10 |
| | 316 | Cytoslides<br>slides with two offset circles, coated<br>for Double Cellfunnel® 323 only | 100 |
| | 317 | Cytoslides<br>Slides with two offset circles, uncoated<br>for Double Cellfunnel® 323 only | 10 |
| | 323 | Double Cellfunnel®<br>disposable, with two offset holes | 100<br>500 |

## ECOfunnel®

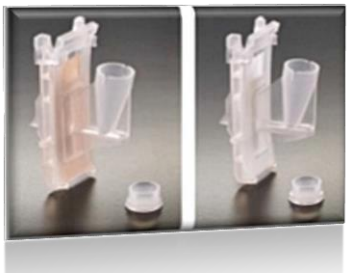
– sample volume: up to 6 ml
– sedimentation field: 1 field, rectangular, 22 x 15 mm



| | | |
|---|---|---|
| 313 | ECOfunnel®<br>reusable | 1 |
| 314 | ECO-slide<br>Slide coated,<br>for ECOfunnel® 313 und 322 only | 10 |
| 315 | ECO-seal<br>Seal for ECOfunnel® | 100 |
| 322 | ECOfunnel®<br>disposable | 100<br>500 |

## EASY Single Cellfunnel®

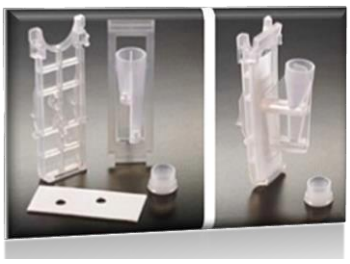
– sample volume: up to 0,5 ml
– sedimentation field: 1 field, round, 6 mm in diameter
– disposable sample chamber with disposable clip



| | | |
|---|---|---|
| 1393 | EASY Single Cellfunnel® with filter card<br>disposable | 40<br>200 |

## EASY Double Cellfunnel®

– sample volume: up to 2x 0,5 ml
– sedimentation field: 2 fields, round, 6 mm in diameter each
– disposable sample chamber with disposable clip
– ideal for immunochemical examination



| | | |
|---|---|---|
| 1395 | EASY Double Cellfunnel® with filter card<br>disposable | 40<br>200 |

## EASY ECOfunnel®

– sample volume: up to 6 ml
– sedimentation field: 1 field, rectangular, 22 x 15 mm
– disposable sample chamber with disposable clip

| | | |
|---|---|---|
| 1391 | EASY ECOfunnel® with seal and ECO-slides<br>disposable | 4<br>0 |

All articles are also compatible with Shandon Cytospin®