

# USER MANUAL



## Laboratory centrifuge **MPW-55**

**Read before use!**

Serial number of the centrifuge: .....

For centrifuges with serial no (SN): from 10055087622



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## 1. Symbols used in the manual and on the device

Symbol	Explanation
	<b>WARNING!</b> Warning of potential injury or health risk
	<b>DANGER!</b> Risk of electric shock with potential for severe injury or death as a consequence
	<b>DANGER!</b> Biohazard with potential for risk to health or death as a consequence
	<b>DANGER!</b> Risk of explosion with potential for severe injury or death as a consequence
	Symbol identifying a medical device for in vitro diagnostic use
	CE mark
	Symbol informing about the method of disposal
	Please read the instruction manual before you start working with the device
	Manufacturer's data

## 2. Application

The MPW-55 centrifuge is a laboratory microcentrifuge for *in vitro* diagnostic (IVD), used to separation of samples took from people's, animal's, and plant's components with different densities, to provide information about their biological state under the influence of the centrifugal force. Its construction ensures easy operation, safe work, and wide range of applications at laboratories engaged in routine medical analyses, biochemical research works etc. This centrifuge is not biotight and therefore during centrifugation of preparations requiring biotightness one has to use closed and sealed rotors. In the centrifuge, it is prohibited to centrifuge caustic, inflammable and explosive preparations.

### 3. Technical data

manufacturer	"MPW MED. INSTRUMENTS" SPÓŁDZIELNIA PRACY 46 Boremlowska Street, 04-347 Warsaw – Poland				
type	<b>MPW – 55</b>				
cat. no (REF)	10055/12-56				
mains voltage (L1+N+PE)	230 V	100V	110V	120V	127V
	±10%	±5%			
frequency	50/60 Hz				
maximum power consumption	90W				
overcurrent protection	fuse WTA-T 3,15A 250V				
capacity (max.)	48 ml				
rotational speed range – RPM	100÷ 14500, step 100				
maximum acceleration – RCF [ x g ]	15279				
acceleration	3 linear characteristics				
deceleration	3 linear characteristics				
programs	9				
time range	15 s÷99 min 45 s, with 15 s interval and ∞				
electromagnetic compatibility	according to EN 61326-2-6:2006				
protection zone	300 mm				
dimensions:					
height (H)	180 mm				
width (W)	220 mm				
depth (D)	270 mm				
noise level	≤ 56 dBA				
weight of centrifuge 230V	approx. 5kg				
weight of centrifuge 120V	approx. 5kg				

#### 3.1. Environmental conditions

- The device may only be used indoors.
- The permissible ambient temperature is 2°C to 40°C.
- Maximum allowed relative humidity 80% at temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- The mains voltage fluctuations must not exceed ± 10% of the nominal voltage.
- Maximum altitude 2,000 m above sea level.
- Overvoltage category II.
- Pollution degree 2.

## 4. 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.



### 4.1. The contents of the package

name	pcs	catalogue number
Centrifuge MPW-55	1	10055/12-56
Complete clamp	1	17167
Spanner for the rotor	1	17099T
Spanner for emergency opening of the cover	1	17162
Power cord 230V / 120V	1	17866/17867
Fuses WTA-T 3,15 A 250 V (230V)	2	18676
Technical vaseline 20ml	1	17201
User manual	1	See page 1


### 4.2. Other accessories

Catalog no	Specification
16150	Hematocrit reader – round

### 4.3. Location


	<ul style="list-style-type: none"> <li>▪ The device should be lifted from below near its feet and placed directly on a suitable laboratory table.</li> <li>▪ The centrifuge should be set so that access to the power switch is not difficult.</li> <li>▪ Do not place the centrifuge near heaters and avoid direct sunlight.</li> <li>▪ The table on which the centrifuge is placed should be stable and have a flat, leveled top.</li> <li>▪ A protection zone of at least 30 cm on all sides should be provided around the centrifuge. The ambient temperature for normal operating conditions of the centrifuge is given in section Environmental conditions.</li> <li>▪ When changing the place from cold to warm, water condensation inside the centrifuge will occur. It is important to allow sufficient time for drying before restarting the centrifuge (minimum 4 hours).</li> <li>▪ The supply voltage must match the voltage specified on the rating plate. Laboratory centrifuges by "MPW MED. INSTRUMENTS" are devices with a basic safety class and have a three-wire connection cord with a plug resistant to dynamic loads.</li> <li>▪ The power socket should have a protective pin.</li> <li>▪ It is recommended to install an emergency switch located far from the centrifuge near the exit from the room or outside the room.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ <b><i>Before switching on, check if the centrifuge is properly connected to the power supply.</i></b></li> <li>▪ <b><i>Only the power cord recommended by the manufacturer may be used.</i></b></li> </ul>

### 4.4. Current protection


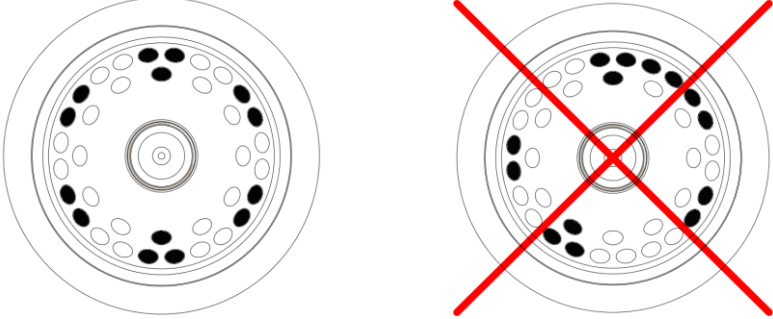
	The centrifuge is equipped with thermal current protection. Fuse is situated in the plug-in socket unit at back wall of the centrifuge.
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## 5. Safety notes


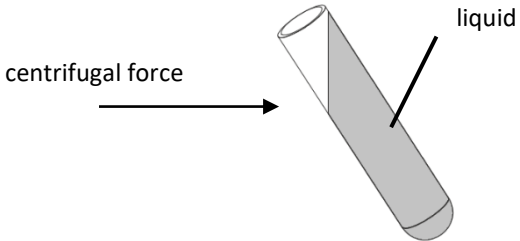
### 5.1. General remarks

	<ul style="list-style-type: none"><li>▪ The laboratory centrifuge may be operated only by qualified laboratory personnel after getting acquainted with the user's manual.</li><li>▪ <b>The operating instructions are part of the product.</b></li><li>▪ <b>The instruction manual should always be kept near the centrifuge.</b></li><li>▪ The centrifuge cannot be operated inconsistently with its purpose.</li><li>▪ <b>If the centrifuge is used in a manner inconsistent with the manufacturer's guidelines, the safety of the device operation may be impaired.</b></li></ul>
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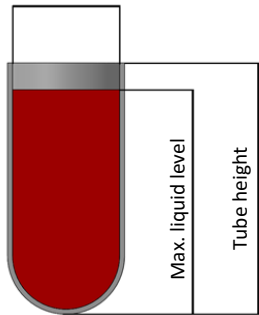
### 5.2. Filling the rotor

	<ul style="list-style-type: none"><li>▪ <b>Check that the rotor is properly seated and bolted to the motor axis.</b></li><li>▪ Do not exceed the maximum rotor load (information is provided on the rotors).</li><li>▪ In order to ensure symmetrical loading, fill opposite openings of the rotor with inserts and test tubes of the same type and weight.</li></ul> <div style="text-align: center;"></div>
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### 5.3. Filling tubes

	<ul style="list-style-type: none"><li>▪ <b>Tubes may only be filled outside the centrifuge.</b></li><li>▪ Tubes may only be filled with the maximum amount of substance specified by the manufacturer.</li><li>▪ The test tubes must be filled in such a way that the centrifuged substance does not run out of the vessel during centrifugation.</li></ul> <div style="text-align: center;"></div> <ul style="list-style-type: none"><li>▪ In case the tube manufacturer has not specified a maximum level, fill the tubes according to the formula: <math display="block">\text{Max liquid level} &lt; \text{Tube height} - \frac{\text{Internal tube diameter}}{2}</math></li></ul>
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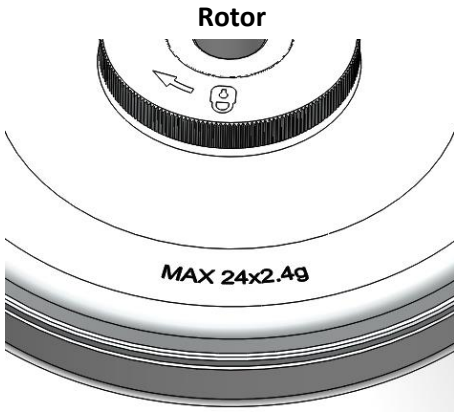


	<p>Internal tube diameter</p> 
	<ul style="list-style-type: none"> <li>▪ For centrifugation in the centrifuge, only containers included in the list of equipment and centrifuge tubes, the diameter, length and strength of which are appropriate, should be used. The use of test tubes from other manufacturers should be agreed with MPW MED. INSTRUMENTS or its authorized representatives.</li> <li>▪ Pay attention to the quality and appropriate thickness of the walls of glass test tubes. <b>Glass tubes should be centrifuge tubes.</b></li> <li>▪ To prevent the centrifuge from being unbalanced, it is recommended to weigh the filled test tubes before inserting them into the rotor. When centrifuging in horizontal rotors, it is recommended to weigh the filled containers / hangers. This will allow to minimize the differences in mass between them, which will positively affect the suspension of the engine and the reduction of noise level during the operation of the centrifuge.</li> </ul>

#### 5.4. Safety hints




	<p><b>ROTORS MAINTENANCE</b></p> <ul style="list-style-type: none"> <li>▪ Use only accessories in good condition.</li> <li>▪ Protect equipment against corrosion using accurate preventive maintenance.</li> </ul>
	<p><b>HAZARDOUS MATERIALS</b></p> <ul style="list-style-type: none"> <li>▪ Infectious materials could be processed in closed buckets only.</li> <li>▪ 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 when dangerous substances contaminated the centrifuge or its accessories.</li> </ul>
	<p><b>EXPLOSIVE AND COMBUSTIBLE MATERIALS</b></p> <ul style="list-style-type: none"> <li>▪ It is not allowed to centrifuge explosive and inflammable materials.</li> <li>▪ It is not allowed to centrifuge substances prone to reacting in result of supplying high energy during centrifugation.</li> <li>▪ The centrifuge can not be operated in explosion-endangered areas</li> <li>▪ It is not allowed to centrifuge materials capable of generating inflammable or explosive mixtures when subjected to air.</li> </ul>

## 5.5. Operating conditions

	<p><b>START-UP</b></p> <ul style="list-style-type: none"> <li>▪ Prior to switching the centrifuge on, one shall carefully read all sections of this user manual in order to ensure smooth operation and avoid damages of this device or its accessories.</li> <li>▪ In order to protect the centrifuge against unbalance, fill in the test tubes up to the same weight.</li> </ul>
	<p><b>TRANSPORTATION</b></p> <ul style="list-style-type: none"> <li>▪ Centrifuge must not be transported with the rotor mounted on the shaft.</li> </ul>
	<p><b>GENERAL HINTS</b></p> <ul style="list-style-type: none"> <li>▪ One must use original rotors, test-tubes, and spare parts only.</li> <li>▪ In the case of faulty operation of the centrifuge one shall ask of assistance of service of MPW MED. INSTRUMENTS or its authorized representatives.</li> <li>▪ It is not allowed to switch the centrifuge on if it is not installed properly or rotor is not fitted correctly.</li> </ul>
	<p><b>CENTRIFUGAL SUBSTANCES</b></p> <ul style="list-style-type: none"> <li>▪ It is not allowed to exceed load limit set by the manufacturer. Rotors are intended for fluids of average homogeneous density equal to <b>1,2 g/cm<sup>3</sup></b> or smaller when centrifugation is carried out at maximum speed. When fluids of higher density shall be used, then it is necessary to change density of centrifuges sample in <b>PARAM/DENSITY</b> field.</li> <li>▪ Observe the limitation on the permissible mass specified on the rotor (e.g., MAX 24x2,4g). If the designation is given on the rotor, it refers to the mass of the sample. If the designation is given on the rotor, it refers to the mass of the entire load.</li> </ul> <p><b>Examples:</b></p> <div style="text-align: center;">  <p><b>2,4g</b> – maximal mass of tube content</p> </div>

## 5.6. Work safety

The centrifuge should be inspected by an authorized service at least once a year (after the warranty period). The reason for more frequent inspection may be, for example, a corrosive environment. Tests should end with issuing a validation protocol, which specifies checking the technical condition of a laboratory centrifuge. It is recommended that you create a document that records all repairs and inspections. Both these documents should be kept in the place where the centrifuge is used.


	<p><b>INSPECTION PROCEDURES CARRIED OUT BY THE OPERATOR</b></p> <p>Operator has to pay special attention to the fact that the centrifuge parts of key importance due to safety reasons are not damaged. This remark is specifically important as for:</p> <ul style="list-style-type: none"> <li>▪ Centrifuge accessories and especially structural changes, corrosion, preliminary cracks, abrasion of metal parts.</li> <li>▪ Screw connections.</li> <li>▪ 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.</li> <li>▪ Control of execution of the guarantee yearly technical inspection of the centrifuge (after lapse of guarantee).</li> <li>▪ 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.</li> <li>▪ It is not allowed to lift or shift the centrifuge during operation, and rest on it.</li> <li>▪ It is not allowed to stay in the safety zone within 30 cm distance around the centrifuge neither leave within this zone some things, e.g., glass vessels.</li> <li>▪ It is not allowed to put any objects on the centrifuge.</li> </ul>
	<p><b>COVER OPENING</b></p> <ul style="list-style-type: none"> <li>▪ It is not allowed to open the cover manually in emergency procedure when rotor is still turning.</li> </ul>
	<p><b>ROTORS</b></p> <ul style="list-style-type: none"> <li>▪ It is not allowed to use the rotors and round carriers with signs of corrosion or other mechanical defects.</li> <li>▪ It is not allowed to centrifuge highly corrosive substances which may cause material impairment and lower mechanical properties of rotor and round carriers.</li> <li>▪ It is not allowed to use rotors and accessories not admitted by the manufacturer. Let to use commercial glass and plastic test tubes, which are destined to centrifuging in this laboratory centrifuge. One should absolutely not use poor quality elements. Cracking of glass vessels and test tubes could result in dangerous vibration of the centrifuge.</li> <li>▪ It is not allowed to carry out centrifugation with the rotor caps taken off or not driven tight.</li> </ul>

### 5.7. Unbalance

The centrifuge is equipped with a rotor imbalance sensor. In the event of its activation, the centrifugation process is stopped by quick braking and an error message is displayed. Erasing the error message is possible by pressing any key (STOP, COVER, and ▲ ▼) after stopping the rotor.

Make sure that the rotor has been properly loaded - places in the rotor must be equipped with identically filled containers, inserts and test tubes in order to obtain the best possible weight balance (see chapter Filling the rotor).

Then close the lid and restart the spin cycle.

	<p>Unbalance causes noise, vibrations during operation and has a negative effect on the driveline (engine, shock absorbers). The more precisely the process of balancing the feed to the rotor is carried out, the smoother the centrifuge will run and the longer the useful life of the drive system will be. Moreover, an excellent level of separation of the swirl material is achieved, since the already separated components will not be picked up again by vibrations.</p>
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## 5.8. Residual risk

The centrifuge is built according to the state-of-the-art and the recognized safety regulations. Nevertheless, still remain some level of residual risk due to improper operation and malfunctions. It is possible to decrease residual risk by strictly applying user manual conditions and correcting malfunction which could threaten safety, immediately.

## 6. Operating

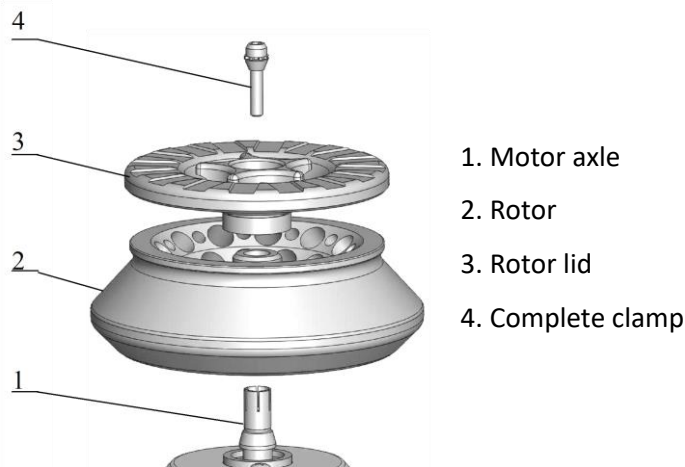
### 6.1. Centrifuge overview

The new generation of laboratory centrifuges "MPW MED. INSTRUMENTS" is equipped with modern microprocessor controllers, very durable and quiet brushless asynchronous motors and equipment that meets modern user requirements.

### 6.2. Centrifuge description



**Fig.1. General view  
MPW-55**



**Fig.3. Assembly of angle rotor**



**Fig.2. Rear of the  
centrifuge MPW-55**

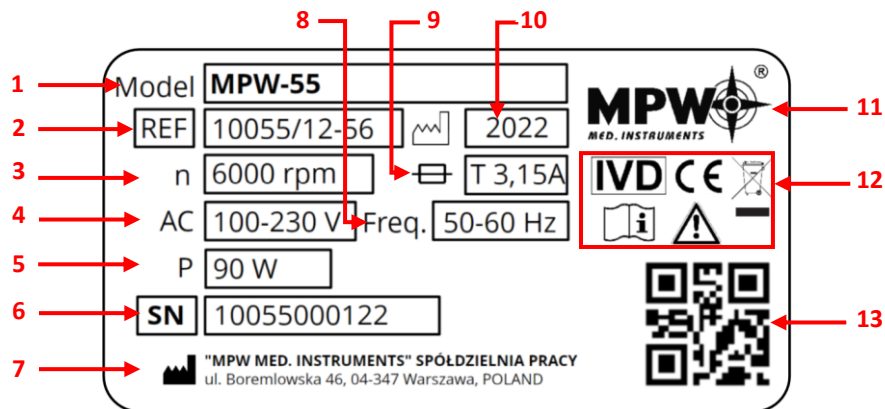
- 1. Plug-in socket
- 2. Fuse socket

### 6.3. Construction

The centrifuge has rigid self-supporting structure. Housing was made of ABS type plastic. Cover is fixed on steel axles of hinges and from the front is locked with electromagnetic lock blocking possible opening during centrifugation. Rotation chamber casing was made of thick steel sheet. The rotation chamber bowl is made of plastic. Rotors are from aluminum and reductive inserts from the polypropylene.


### 6.4. Name plate

The data concerning the device should be read from the rating plate located on the rear wall of the centrifuge (the picture below is an example).




- |                              |   |
|------------------------------|---|
| 1 Centrifuge model           | 8 Rated frequency   |
| 2 Catalog number             | 9 Current protection                                      |
| 3 Maximum speed              | 10 Year of production                                     |
| 4 Rated voltage              | 11 Manufacturer's logo                                    |
| 5 Maximum rated power        | 12 Approval marks and symbols<br>(explained in chapter 1) |
| 6 Serial number              | 13 QR code for serial number                              |
| 7 Manufacturer's information |   |

### 6.5. Rotor and accessories installation

	<ul style="list-style-type: none"> <li>▪ Connect the centrifuge to the power source (mains socket at the back of the centrifuge).</li> <li>▪ Turn on the centrifuge (switch on the side of the centrifuge).</li> <li>▪ Open the cover of the centrifuge by pressing the COVER key. Before installing the rotor, check that the centrifugation chamber is free from contamination, e.g., dust, glass splinters, liquid residues that must be removed.</li> <li>▪ Put the rotor on the motor axis by sliding it onto the cone as far as it will go (keeping the coaxially between the rotor and the motor axis).</li> <li>▪ Screw the clamp into the motor shaft (clockwise), then tighten it firmly with the rotor wrench.</li> <li>▪ Swinging rotors must be equipped with buckets in all seats.</li> <li>▪ Container suspension pins should be regularly lubricated with technical petroleum jelly.</li> <li>▪ In the case of rotors with a cover, they must not be used without the cover. Rotor caps must be screwed securely onto the rotor. The rotor and cover are marked with the same catalog number (REF) to eliminate the risk of incorrect selection when the user has several types of rotors. Rotor covers ensure lower rotor resistance, correct tube seating and airtight sealing.</li> <li>▪ Only containers suitable for the selected type of rotor should be used.</li> <li>▪ In order to increase the durability of the rotor and seals, it is recommended to lubricate the rotor pins used to suspend the containers, the undercuts for the pins in the containers, gaskets and threaded places with technical petroleum</li> </ul>
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	<p>jelly.</p> <ul style="list-style-type: none"> <li>▪ In order to replace the rotor, remove the tubes and containers, loosen the rotor clamp with the provided wrench, counterclockwise, and then use both hands to grasp the rotor on opposite sides and remove it from the motor axis by pulling it upwards.</li> </ul>
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	<p><b>ATTENTION!</b> The centrifuge will transfer small weight differences resulting from loading the rotors. However, it is recommended that you balance the vessels as carefully as possible to ensure that they work with minimal vibration. If the centrifuge is started with a large unbalance, the unbalance system will turn off the drive and an error signal will be sent. A "U" symbol will appear on the screen.</p>
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## 6.6. Control device

The microprocessor control system used in the centrifuge provides a wide range of setting and implementing operating parameters, i.e.:

- selection of the spin speed from 100 to 14500 RPM, every 100 RPM or RCF x g,
- selection of the centrifugation time from 15 seconds to 99 minutes 45 seconds, every 15 seconds or continuous operation,
- selection of short-term operation "SHORT",
- possibility to program 9 work programs,
- selection of 3 characteristics of rising speed,
- selection of 3 braking characteristics

## 6.7. Setting parameters

Data setting and read-out system forms hermetically closed keyboard with distinctly accessible operation points. Easily readable displays signaling individual performed operations facilitate operator's programming and recording of parameters and condition of the centrifuge.

## 6.8. Safety features

### 6.8.1. Cover lock

The centrifuge can be started only with properly closed cover. The cover can only be opened after the rotor has stopped. In case of emergency opening of the cover during operation, the centrifuge will be immediately switched off and the rotor will be braked to a complete stop. When the cover is open (the **COVER** diode is on), the drive is completely disconnected from the power supply, which makes it impossible to start the centrifuge.

### 6.8.2. Unbalance detecting

When loads of opposite buckets or carriers in rotors are unbalanced, the drive will be switched-off during acceleration or operation of the centrifuge – and the **U** sign will be displayed.

### 6.8.3. Rest state inspection

Opening of the centrifuge's cover is possible only with the rotor in the state of rest. This state is being checked by the microprocessor which recognizes and signals with **S** sign on the display the rest state prior to opening the cover.

## 6.9. Increase a temperature

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.

## 7. Centrifuging





Power switching ON/OFF is carried out with master switch situated on the side wall of the centrifuge. All settings on the centrifuge are done by means of the control panel.







### 7.1. Control panel

The control panel located on the front wall of the casing is used to control the operation of the centrifuge.



Fig. 4. Control panel

	<p>Start centrifuging</p>	<p>Blinking of the LED diode next to the START key indicates the rotation of the rotor.</p> <p>The centrifuge can be started if:</p> <ul style="list-style-type: none"> <li>the cover is closed (a dot will appear on the display,</li> <li>the LED diode on the COVER key is off</li> </ul>
	<p>Stop centrifuging</p>	<p>Interrupt the centrifugation at any time and break the rotor. After pressing the key, the display shows the arrow ↓ indicating the rotor braking and the number of the performed braking characteristics.</p> <p>- end of the rotor braking process - the S (Stop) sign lights up on the display, which also signals this state with a sound</p>
	<p>Cover opening</p>	<p>Opening the cover or its incorrect closing is signaled by the diode lighting, the key is active only when the rotor is not rotating. The cover can be opened only when the rotor stops, the S symbol will be displayed on the display and the centrifuge signals the possibility of opening the cover with five short beeps.</p> <p><b>ATTENTION!</b> The centrifuge cannot be opened when the = sign, signaling the possibility of changing the parameter value, is active, even despite the stopped rotor.</p>
	<p>Short-term centrifugation</p>	<ul style="list-style-type: none"> <li>Short-term operation of the centrifuge when the key is held down until it is released.</li> <li>In the short mode the rotor is accelerated to the speed set in the given program,</li> <li>Acceleration and deceleration of the rotor take place in accordance with the previously programmed characteristics,</li> <li>Pressing the STOP key after releasing the SHORT during deceleration of the rotor will result in faster deceleration of the rotor according to characteristic no. 1,</li> <li>The centrifugation time in the SHORT mode is measured in minutes and seconds from the moment the centrifuging cycle starts (from pressing the SHORT key) to the moment the rotor stops.</li> </ul>

 	Increase / decrease values	<ul style="list-style-type: none"> <li>The function key fields are used to change the program as well as to set their individual parameters such as: <b>speed, RCF, time, acceleration and deceleration characteristics</b>.</li> <li>After pressing the key corresponding to the called function, the equal sign "=" appears on the display instead of the colon ":" after the letter corresponding to the given function. It means that the value of a given parameter can be changed by buttons: down arrow or up arrow.</li> <li>The possibility of changing the parameter value is signaled by the "=" sign and is active for three seconds. This is the time when you should start setting the desired value. Three seconds after setting the desired value of a given parameter, this value will be saved in the program or after selecting a given program it will be set as active.</li> </ul>
	Spin speed / RCF	<ul style="list-style-type: none"> <li>change the spin speed</li> <li>pressing the key again will switch the programming mode from setting speed to setting <b>RCF</b> value</li> </ul>
	Spin time	<ul style="list-style-type: none"> <li>Programming the centrifugation time (from 15s to 99min 45s).</li> <li>Setting the - m - s symbol over 99min 45s <b>will cause the continuous operation of the centrifuge</b>.</li> </ul>
	Acceleration / deceleration	<ul style="list-style-type: none"> <li>Programming the acceleration characteristics ACC and deceleration DEC of the rotor.</li> <li>The rotor acceleration characteristic is symbolized by an up arrow ↑. Pressing the key again will switch the programming mode from setting the acceleration to programming the braking characteristics of the rotor.</li> <li>The rotor braking characteristic is indicated by a down arrow ↓.</li> <li>There are three characteristics of acceleration and deceleration to choose from.</li> <li>Characteristics numbered 1 are the fastest.</li> </ul>
	Program	<ul style="list-style-type: none"> <li>The key is used to select a program number which is to be executed or reprogrammed.</li> <li>Nine programs can be programmed.</li> </ul>

## 7.2. Sound signals

The sound signal complements the information provided optically.

- One short beep - confirmation of the executed command (e.g., increasing the parameter etc.)
- Two short beeps - signals that the command cannot be carried out (e.g., Increasing the spin speed above 14500).
- One long beep - signals the start of the following processes:
  - Braking after pressing the STOP key,
  - Starting work in short mode and braking after releasing the SHORT key,
- Five short beeps - the rotor stops, the cover can be opened,
- Five short beeps and one long beep - signaling readiness for operation after switching the power on.

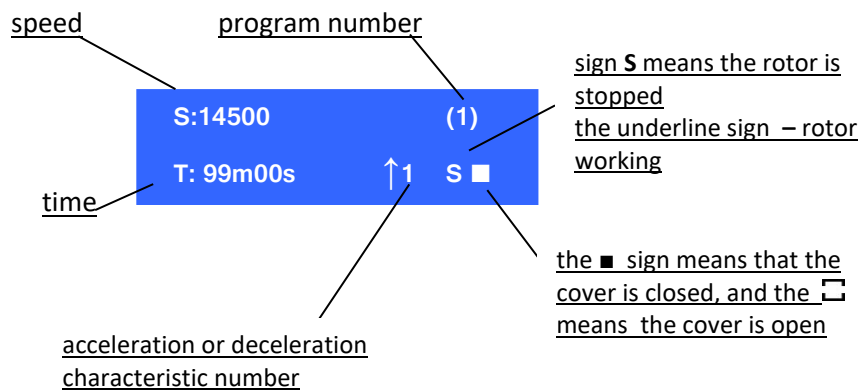
## 7.3. Display


The centrifuge has readable display LCD, on which are showing information being referred to the actual condition of the system.

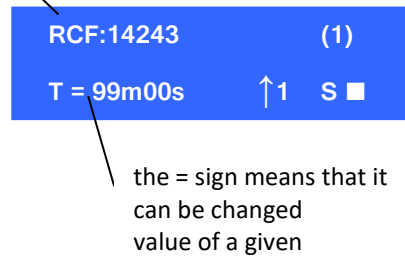
The information about the centrifuge type, program version and internet address are displaying at once after switching supply on for three seconds.



Following the information about program has been lately made, the time, speed and acceleration characteristic settings will be displayed.




after pressing the key  twice, the display will show the acceleration value corresponding to the programmed speed




The program parameters cannot be changed during the centrifuge operation, but its further implementation can be interrupted by pressing the **STOP** key.

#### 7.4. Spin starts

After familiarizing yourself with the operating elements, programming and preparation of the centrifuge for operation, set the program, then close the cover and press the **START** key . The centrifuge starts and runs the programmed program

#### 7.5. Spin stops

The centrifugation is stopped automatically after the execution of the program. If you want to terminate the execution of a given program earlier, you can do it by pressing the **STOP** key . After finishing work, remember to turn off the centrifuge power supply with the main switch located on the side of the centrifuge

### 7.6. Mathematical relations

#### 1.1.1. RCF – relative centripetal force

**RCF** acceleration is the acceleration generated by the rotary motion of the rotor acting upon tested product and it can be calculated according to the formula:

$$RCF = 11,18 \times r \times (n/1000)^2$$

RCF [x g],      r [cm],      n [rpm]

Depending on the distance of particles of the tested product from the axis of rotation, one can establish with use of the above formula the minimum RCF, average RCF or maximum RCF. On the basis of pre-set RCF value and given radius of the bottom of the bucket one can calculate with it the rotational speed to be set in the program of centrifuging. Selection of the time of sedimentation and the RCF value shall be carried out experimentally for any given product.

Once every 100 rpm, an electronic circuit automatically calculates and displays RCF value. In order to program required RCF value one shall use nomogram or change the rotational speed, matching displayed value to required acceleration value.

### 7.6.1. Nomogram of relationship - rotational speed/centrifuging radius/RCF

The dependence nomogram – speed / radius / RCF is included in the appendix to this manual.

### 7.6.2. Maximum load


In order to avoid overloading of the rotor one shall observe maximum load which is recorded on every rotor. Maximum permissible load is reached when all test-tubes are filled with the fluid with 1.2 g/cm<sup>3</sup> density.

If density of the centrifuged liquid is higher than 1.2 g/cm<sup>3</sup>, then test-tubes could be filled only partially or one shall limit operation speed of the centrifuge, which is being calculated from the formula:


$$n_{\text{perm}} = n_{\text{max}} * \sqrt{\frac{1,2}{\gamma}} ; \quad \gamma = \text{specific gravity} \left[ \frac{G}{cm^3} \right]; \quad n_{\text{max}} \text{ [maximum rotational speed - rpm]}$$

## 8. Maintenance


### 8.1. Cleaning of the centrifuge

	<ul style="list-style-type: none"> <li>▪ <b>Pull the mains plug before cleaning.</b></li> <li>▪ <b>Before any cleaning or decontamination process other than that is recommended by the manufacturer, the user has to ask the manufacturer if the planned process does not damage the device</b></li> <li>▪ For cleaning, water with soap or other water-soluble <b>mild detergent</b> shall be used.</li> <li>▪ One should avoid corrosive and aggressive substances.</li> <li>▪ It is prohibited to use alkaline solutions, inflammable solvents or agents containing abrasive particles.</li> <li>▪ Do not lubricate the centrifuge motor shaft.</li> <li>▪ The unused centrifuge should have cover opened.</li> </ul> <p style="text-align: center;"><b>Once a week</b></p> <p>Using wiping cloth, remove condensate or residues of the products from the rotor chamber.</p> <p style="text-align: center;"><b>Once a month</b></p> <ul style="list-style-type: none"> <li>▪ Check the rotor clamping thread. In case of damage, replaced it.</li> <li>▪ Check the centrifuging chamber whether it is damaged. In case of damage, it cannot be longer put into operation. Notify authorized service workshop.</li> </ul>
---	--


### 8.2. Maintenance of centrifuge elements

	<ul style="list-style-type: none"> <li>▪ In order to increase the durability of threaded places, they should be lubricated with technical petroleum jelly.</li> <li>▪ Make sure that the sealing rings (rubber) are covered with a thin layer of technical petroleum jelly in order to maintain tightness (catalog number 17201 - element of basic equipment).</li> </ul>
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## Cleaning of the accessories

	<ul style="list-style-type: none"> <li>▪ In order to ensure safe operation, one shall carry out in <b>regular</b> way periodical maintenance of the accessories.</li> <li>▪ 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.</li> <li>▪ In case of observation of surface damage, crevice, or other change, as well as the corrosion, the given part (rotor, bucket, etc.) shall be immediately replaced.</li> <li>▪ Clamping rotor, containers and reducer inserts must be cleaned regularly to prevent corrosion.</li> <li>▪ Cleaning of the accessories shall be carried out outside of the centrifuge <b>once every week</b> or still better after each use. For cleaning them one should use neutral agent of pH value 6÷8. It is forbidden to use alkaline agent of <b>pH &gt; 8</b>. Then, those parts shall be dried using soft fabric or in the chamber drier at ca. 50°C.</li> <li>▪ Angle rotor should be placed on a fabric with holes facing down, for effective drying.</li> <li>▪ Do not use bleach on plastic parts of the rotor.</li> <li>▪ In this way, the useful service life of the device is substantially increased and susceptibility to corrosion is diminished. Accurate maintenance increases the service life as well and protects against premature rotor failures.</li> <li>▪ Do not use bleach on plastic parts of the rotor.</li> <li>▪ According to laboratory standards, minimize the immersion time in each solution.</li> <li>▪ Especially prone to the corrosion are parts made of aluminium.</li> <li>▪ Corrosion and damages resulting from insufficient maintenance could not be subject of claims lodged against the manufacturer.</li> <li>▪ The unused rotor should have the lid removed.</li> </ul>
---	---

### HS accessories maintenance:

	<ul style="list-style-type: none"> <li>▪ Check the general condition of seals.</li> <li>▪ Make sure that rubber O-rings are lightly coated with silicone grease. Use high vacuum grease, e.g., type „C” by LUBRINA.</li> <li>▪ In order to maintain hermetic sealing, it is recommended to replace the sealing rings after each autoclaving.</li> <li>▪ Store hermetically sealed rotors and buckets with the lids removed.</li> </ul>
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## 8.3. Sterilization

### Plastics - legend to abbreviations

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

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

	radiation $\beta$ radiation $\gamma$ 25 kGy	C <sub>2</sub> H <sub>4</sub> O (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).

### 8.3.1. Autoclaving

- Rotors, buckets, and round carriers can be sterilized in autoclave with temperature 121°C during 20 min (215 kPa), unless otherwise specified in the OPTIONAL ACCESSORY.
- During sterilization (autoclaved) by means of steam one should consider temperature resistance of individual materials.
- Deformation of the accessories (carriers or lids made of plastic) may occur during autoclaving.
- Do not autoclave disposable materials (e.g., tubes, cyto-container).
- The life of the accessory depends on the frequency of autoclaving and use.
- Autoclaving reduces lifespan of plastic components. They should be replaced if any signs of damage are visible, including a change in colour or shape or when leakage etc.
- Pressure in closed containers can cause plastic deformation or explosion.
- Prior to autoclaving the rotors and accessories, thoroughly wash and rinse 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	○ <sup>1)</sup>	FKM	●
POM	●	EPDM	●
PE-LD	○	NR	○
PE-HD	○	SI	●
PP	●		

● may be used

○ cannot be used

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



## 8.4. Chemical resistance

### Chemical resistance of plastics

	aldehydes	cyclic alcohols	esters	ether	ketones	strong or concentrated acids	weak or diluted acids	oxidizing substances	cyclic hydrocarbons	ahs	haloid hydrocarbons	alkalis
PS	○	●	○	○	○	○/●	○/●	○	○	○	○	●
SAN	○	●	○	○	○	○	○/●	○	○	○	○	●
PMMA	○/●	●	○	○	○	○	○/●	○	○/●	○	○	○
PC	○/●	●	○	○	○	○	○/●	○	○/●	○	○	○
PVC	○	●	○	○	○	●	●	○	●	○	○	●
POM	○/●	●	○	●	●	○	○	○	●	●	●	●
PE-LD		●	●	●	○/●	●	●	○	●	●	●	●
PE-HD	●	●	○/●	○/●	○/●	●	●	○	●	○/●	○/●	●
PP	●	●	○/●	○/●	○/●	●	●	○	●	○/●	○/●	●
PMP	○/●	●	○/●		○/●	●	●	○	○/●	○	○	●
ECTFE ETFE	●	●	●	●	○	●	●	●	●	●	●	●
PTFE FEP PFA	●	●	●	●	●	●	●	●	●	●	●	●
FKM	●	○	○	○	○	○	●	○/●	○/●	○/●	○/●	○/●
EPDM	●	●	○/●	○	○/●	●	●	○/●	○	○	○	●
NR	○/●	●	○/●	○	○	○	○/●	○	○	○	○	●
SI	○/●	●	○/●	○	○	○	○/●	○	○	○	○	○/●
●	very good	Permanent action of the substance does not cause damage through 30 days. The material is able to be resistant through years										
○/●	good to limited	Continuous action of the substance causes insignificant and partly reversible damage through the period of 7-30 days (e.g., puffing up, softening, reduced mechanical durability, discolouring).										
○	limited	The material should not have the continuous contact with the substance. The immediate occurrence of damage is possible (e.g., the loss of mechanical durability, deformation, discolouring, bursting, dissolving).										

Rubber inserts shall be exactly cleaned or possibly replaced. Centrifuges and accessories are made of different materials.

Do not use bleach on plastic parts of the rotor.

	<p><b>DANGER!</b></p> <p>MPW 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.</p>
	<p>User is responsible for proper disinfections of the centrifuge if some dangerous material was spilled inside or outside of the centrifuge. During the above mentioned works one must wear safety gloves.</p>

## 9. Troubleshooting


### 9.1. Correction of errors

Majority of faults could be removed by switching the centrifuge **OFF** and then **ON**. After switching the centrifuge **ON**, there shall be displayed parameters of the recently implemented program and sound signals comprising four successive tones shall be generated. In the case of short-duration power failure the rotor is decelerate.

Please find below the most frequent faults and their repair methods.

<b>1. Lack of the display:</b>	<b>Remedies:</b>
<i>Is mains socket live ?</i>	<i>Check mains socket fuse.</i>
<i>Is supply cable plugged into socket ?</i>	<i>Plug correctly supply cable.</i>
<i>Is input fuse good ?</i>	<i>Replace input fuse (rated data on rating plate).</i>
<i>Is master switch switched ON ?</i>	<i>Switch ON power supply.</i>
<i>Above was checked and still there is not display active.</i>	<i>Call service.</i>
<b>2. Centrifuge does not start:</b>	<b>Remedies:</b>
<i>START key pushing does not generate reaction or single tone only</i>	
<i>P message is displayed</i>	<i>Call service</i>
<i>LED diode of cover is shining</i>	<i>Close cover. The lock has to be locked with typical sound. He has to the sign of the dot appear on the display. If the diode is not switching off one shall call service.</i>
<i>LED diode of "Start" key is shining</i>	<i>Switch power supply OFF/ON. If fault still persists then call service.</i>
<i>The digit of display parameters is blinking</i>	<i>Push the "Stop" key which has been recorded program. If fault still persists then call service.</i>
<b>3. Centrifuge starts but does not accelerate</b>	<b>Remedies:</b>
<i>E symbol displayed after stopping. Drive overload</i>	<i>Wait for 15 minutes and switch again after opening and closing the cover.</i>
<b>4. One cannot open the cover:</b>	<b>Remedies:</b>
<i>With the attempt opening cover is audible buzzing of the lock.</i>	<i>One should lift up till the yellow LED "Cover" is switching on. Failed spring of cover lifting or bended the lock striker. One should bend the striker or call service.</i>
<i>LED diode "Cover" is not shining and the centrifuge not swirling.</i>	<i>Lock is failed. Call service.</i>

### 9.2. Emergency cover release


	<p><b>EMERGENCY COVER RELEASE</b></p> <p><b>Attention!</b> <i>The cover may be opened in emergency only when the rotor is at rest. Before emergency opening the cover, switch off the mains power switch and disconnect the power cord. Wait 10 min and/or looking through the sight glass, make sure that the rotor is not rotating.</i></p> <p>To do this, insert the key for emergency opening of the cover (catalog number 17162) into the hole on the right side of the housing, and then push it until the lock is released and the cover is opened.</p> <p>The emergency opening of the cover can be used e.g., in the event of a power failure, failure of the control panel, etc.</p>
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## 10. Guarantee

Manufacturer grants to the Buyer the guarantee on 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 authorized service workshops, granted with the MPW Certificate.

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

	<ul style="list-style-type: none"> <li>▪ Guarantee period amounts to 24 months (unless otherwise specified in the purchase documents).</li> <li>▪ Guarantee conditions are described in guaranteed card.</li> <li>▪ The service life of the centrifuge specified by the manufacturer amounts to 10 years.</li> <li>▪ After 24 months from the start of the warranty period (date of purchase), a technical inspection of the centrifuge should be carried out (validation) by an authorized service of the manufacturer. Subsequent inspections should be carried out at annual intervals.</li> <li>▪ Maximum period of storage of not used centrifuge amounts to 1 year. After this period, a service authorized by manufacturer should carry out technical inspection of the centrifuge.</li> <li>▪ Manufacturer reserves the right to make technical changes in manufactured products.</li> </ul>
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## 11. Transport and storage

<ul style="list-style-type: none"> <li>▪ Store the device only in a closed and dry room.</li> <li>▪ Remove rotor from centrifuge before transport.</li> <li>▪ Use the original packaging and transport protection for transport.</li> </ul>
---

### 11.1. Transport and storage conditions

	Storage (in the package)	Storage (without the package)	Transport
Temperature	-25 ÷ +55 °C	-5 ÷ +45 °C	-25 ÷ +60 °C (general) -20 ÷ +55 °C (air)
Relative humidity	10 ÷ 75 %	10 ÷ 75 %	10 ÷ 75 %
Pressure	70 ÷ 106 kPa	70 ÷ 106 kPa	30 ÷ 106 kPa

## 12. Disposal

	<ul style="list-style-type: none"> <li>▪ Dispose of the device in accordance with applicable regulations.</li> <li>▪ Pursuant to Directive 2002/96 / EC.</li> <li>▪ The device belongs to group 8 (medical equipment) and is classified under the category "business to business".</li> <li>▪ The disposal regulations of the individual EU countries may differ. If in doubt, please contact the supplier of the device.</li> </ul>
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### 13. Manufacturer's info

"MPW MED. INSTRUMENTS" SPÓŁDZIELNIA PRACY

Boremlowska 46 Street

04-347 Warsaw

tel. (+48) 22 610 56 67 (sales department - POLAND)  
(+48) 22 879 70 46 (sales department - outside POLAND)

(+48) 22 610 81 07 (service)

fax: (+48) 22 610 55 36

e-mail: [mpw@mpw.pl](mailto:mpw@mpw.pl)

website: [www.mpw.pl](http://www.mpw.pl)

000042924 - number of entries in the Waste Database

PL/CA01-01782 - identification number given by Office for Registration of Medicinal Products,  
Medical Devices and Biocidal Products.

### Distributor's info

<b>DISTRIBUTOR:</b> <div style="border: 1px solid black; height: 150px; width: 100%;"></div>
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### 14. Annexes



**A. Wyposażenie dodatkowe/Optional accessories****MPW-55****WIRNIK / ROTOR****PARAMETRY WIRNIKA / ROTOR PARAMETERS****POJEMNIK/BUCKET****WKŁADKA / ADAPTER**[liczba probówek na wirnik/tubes per rotor] **PROBÓWKA / TUBE****11202****RPM 14500, RCF 15279, Rmax 65,  $\phi$  42****bez pojemnika/without bucket****14084**[12] 15127 0,5 ml probówka PCR (7,8 x 31 mm)  
0,5 ml PCR tube (7,8 x 31 mm)**14133**[12] 15125 0,2 ml probówka PCR (6 x 21,6 mm)  
0,2 ml PCR tube (6 x 21,6 mm)**bez wkładki/without adapter**[12] \* 2-1,5 ml probówka (10,8x41,8 mm), Eppendorf®; [15011], 2 ml (10,8x41,8 mm); [15128], 1,5ml (10,8x40,5 mm)  
2-1,5 ml tube (10,8x41,8 mm), Eppendorf®; [15011], 2 ml (10,8x41,8 mm); [15128], 1,5ml (10,8x40,5 mm)**11204****RPM 14500, RCF 15279, Rmax 65,  $\phi$  51, 32****bez pojemnika/without bucket****14084**[24] 15127 0,5 ml probówka PCR (7,8 x 31 mm)  
0,5 ml PCR tube (7,8 x 31 mm)**14133**[24] 15125 0,2 ml probówka PCR (6 x 21,6 mm)  
0,2 ml PCR tube (6 x 21,6 mm)**bez wkładki/without adapter**[24] \* 2-1,5 ml probówka (10,8x41,8 mm), Eppendorf®; [15011], 2 ml (10,8x41,8 mm); [15128], 1,5ml (10,8x40,5 mm)  
2-1,5 ml tube (10,8x41,8 mm), Eppendorf®; [15011], 2 ml (10,8x41,8 mm); [15128], 1,5ml (10,8x40,5 mm)**12205****RPM 14500, RCF 14574, Rmax 62,  $\phi$  90****bez pojemnika/without bucket****bez wkładki/without adapter**[24] 15101 19  $\mu$ l kapilara hematokrytowa (1,3 x 50 mm)  
19  $\mu$ l micro-hematocrit capillary tube (1,3 x 50 mm)**Suma końcowa**

## DECLARATION OF CONFORMITY

Product name: **Laboratory centrifuge  
MPW-55**

Product type: **Laboratory centrifuge**

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product classification on the basis of the Directive 98/79/EC: Non classified to list A or B and not for self-testing.

**Product complies with the requirements:**

• **Directive 98/79/EC (IVD), including the requirements of harmonized standards:**

EN 15223-1:2016

EN ISO 18113-3:2011

EN 13612:2002

EN 61326-2-6:2006

EN 13612:2002/AC:2002

EN 61010-2-101:2002

EN 13975:2003

EN 62304:2006

EN ISO 14971:2012

EN 62304:2006/AC:2008

EN ISO 18113-1:2011

EN 62366:2008

• **selected harmonized standards of Directive 2014/35/UE (LVD):**

EN 61010-1:2010

EN 61010-2-020:2006

EN 61010-1:2010/A1:2019

EN 61010-1:2010/A1:2019/AC:2019-04

• **Directive 2014/30/UE (EMC)**

• **Directive 2011/65/UE (RoHS 2)**

Z-ca PREZESA ZARZĄDU

Wojciech Anisiewicz



PREZES ZARZĄDU

mgr Łukasz Satański

**"MPW MED. INSTRUMENTS"  
SPÓŁDZIELNIA PRACY**

Warsaw, 46 Boremlowska Street

*applies Quality Management System in line with*

*PN-EN ISO 9001:2015, PN-EN ISO 13485:2016*



# DECLARATION OF DECONTAMINATION

(repair)

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

**1. Device:**

– type: .....

– serial No.: .....

**2. Description of decontamination**

(see user manual)

.....

.....

.....

.....

**3. Decontamination carried out by:**

name: .....

**4. Date and signature:**

.....

# DECLARATION OF DECONTAMINATION

(return)

In order to protect our employees please fill out the declaration of decontamination completely before sending centrifuge to the manufacturer (return).

**1. Device:**

– type: .....

– serial No.: .....

**2. Description of decontamination**

(see user manual)

.....

.....

.....

.....

**3. Decontamination carried out by:**

name: .....

**4. Date and signature:**

.....

# NOMOGRAM

Centrifuging radius [cm]

R.C.F. (x "g")  
multiple of  
gravitational  
acceleration

[r.p.m.]

