

# **Table-type High speed centrifuge PE-6926**

## **Data Sheet**

Version 1.0EN dated 16.10.2015

**Part number: 1.75.45.2020.6**





## **1. General**

- 1.1. The present Data Sheet is intended for familiarising the user with the principle of operation, construction and rules of operation of PE-6926 centrifuge.
- 1.2. Due to continuous improvement of the device, modifications not worsening the technical specification of the instrument can be made to its design.
- 1.3. Never proceed to operation of the instrument without getting familiarised with the technical description and rules of operation stated in the Data Sheet!

## **2. Purpose**

- 2.1. PE-6926 Laboratory Centrifuge is intended for use in biology, chemistry, medicine, agriculture and forest science, food safety, blood station and clinical test.
- 2.2. This machine features good rigidity, high strength and corrosion proofing, owing to its high material of steel and its surface with spurt models processing. Meanwhile, this machine possesses the advantages of succinct structure, small volume, low noise, smooth temperature rise, high efficiency, safe and reliable, and it is fit for the experimental analysis with fewer samples and more separation steps.
- 2.3. The features of this machine are as followed:
  - The vibration-absorption effect of this machine works very well by the application of its special damper. This machine also has a self-balance function.
  - The special PWM-controlled speed control system assures its high control accuracy and its fast acceleration and deceleration function, which provides different acceleration and deceleration time to be freely chosen. To meet the requirement of labs, the brushless DC motor also assures the operation of the machine in a quiet working state. The carbon brush doesn't need to be replaced, so there are no carbon pollutions.
  - This machine has a parameter-saving function, and it can calculate the RCF value automatically.

- There are many rotors with different levels. The tube frame can be replaced, and there are many tubes, convenient to choose.
- This machine has a protective function owing to its electronic lock. When its faceplate is uncovered, the centrifuge machine cannot be operated.

### 3. Operating conditions

3.1. Ambient air temperature, °C .....	+5 to +40
3.2. Relative air humidity, % .....	up to 80
3.3. Supply voltage, V .....	220±20
3.4. Power supply frequency, Hz .....	50±2

### 4. Technical Specification

4.1. Maximum rotational speed, rpm .....	16,500
4.2. Maximum relative centrifugal force (RCF), g .....	18,780
4.3. Rotational speed setting discreteness, rpm .....	50
4.4. Rotational speed precision, rpm .....	±50
4.5. Rotor type .....	fixed-angle
4.6. Maximum rotor capacity <sup>1</sup> , ml .....	12x10
4.7. Maximum timer setting .....	0÷99h:59 min
4.8. Timer setting discreteness, min .....	1
4.9. Noise level, dB .....	not more than 70
4.10. Rated supply voltage, V .....	220 (50 Hz)
4.11. Maximum power consumption, W .....	350
4.12. Overall dimensions (W x D x H), mm .....	315x280x260
4.13. Weight, kg .....	17
4.14. Average service life, years .....	5

### 5. Scope of delivery

5.1. PE-6926 centrifuge .....	1 pc
5.2. Power cord .....	1 pc
5.3. Data sheet .....	1 pc

<sup>1</sup> With rotor No. 6. Refer to Appendix 1 for available rotor types.

## 6. Principle of Operation

6.1. The centrifuge machine helps to separate, condense or purify the different density components (or particles) of the solutions by the usage of centrifugal sedimentation principal.

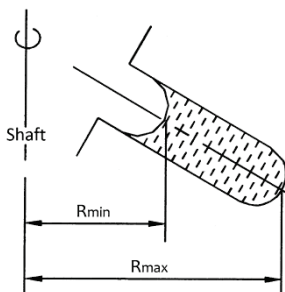


Figure 1 - Position of the test tube in the rotor

After placing the centrifuge tubes with equivalent test solutions in the test tubes around the rotors symmetrically and starting the machine, the RCF produced in the high-speed rotary of the rotors, which are driven by the motor, separates the different density components (or particles) in the test solutions. The value of RCF depends on the rotating radius “r” (the horizontal distance from the position of the test solutions to the axle center) and the rotating speed “n”, and here is the calculation formula.

$$RCF = 1.118 \times 10^{-6} \cdot n^2 \cdot r \cdot g,$$

n - The rotating speed (r/min),

r - The rotating radius (mm).

The time (Ts) needed during the separation and deposition of the mixed solutions is calculated by this formula:

$$T_s = \frac{27.4 \times (\ln R_{max} - \ln R_{min}) \times \mu}{n^2 \times r^2 \times (\sigma - \rho)},$$

$R_{max}$  The rotating radius of the test solutions having the farthest distance with the axle center

$R_{min}$  The rotating radius of the test solutions having the nearest distance with the axle center

$\rho$  The density of the mixed solutions (g/cm<sup>3</sup>)

$\mu$	The viscosity of the mixed solutions (p)
n	The rotating speed (rpm)
r	The particle's radius (cm)
$\rho$	The particle's density ( $\text{g/cm}^3$ )

## 7. Working Procedure

- 7.1. Place the centrifuge machine on the platform and ensure its balance. Shake the machine with hands to check out whether the machine has been placed stably or not.
- 7.2. Plug the supply cord into the outlet and press down the power switch (the power switch is on the right bottom of the machine).
- 7.3. After pressing down the button of “STOP & OPEN”, put the rotors on the motor shaft, and connect the rotors with motor shaft tightly together by tightening the screw nuts (the move should be very gentle and substantially shaking and pressing should be avoided, so as to protect the flexible support system of the motor. Then, place the adapter with test tubes on the rotors and rotate the rotors. The rotors should be turned flexibly, the adapter should be rotated freely, and there should be no block or collision.



Figure 2 – Control panel

1 – The operation and time setting area; 2 – The display area of the parameter numbers; 3 – The operation icon; 4 – The setting of rotor modes; 5 – The setting of rotating speed; 6 – The “SET” button; 7 – The “RCF” button; 8 – The “START” button; 9 – The “UP” button; 10 – The “DOWN” button; 11 – The temperature setting and display area<sup>2</sup>; 12 – The display area of rotating speed and centrifugal force; 13 – The shift button of rotating speed and centrifugal force; 14 – The area of acceleration and deceleration; 15 – The “IMPULS” button; 16 – The “Enter” button; 17 – The “STOP & OPEN” button.

- 7.4. Place the centrifuge tubes into the test tubes. The centrifuge tubes should be placed symmetrically, and the test solutions in the tubes should be even, so as to make sure the equilibrium operation of the machine.





Figure 3 – Start-up display


- 7.5. Cover the faceplate and check out whether it is covered tightly, or the centrifuge machine cannot be operated.
- 7.6. Set up the rotor mode, the rotating speed and the needed time.

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<sup>2</sup> This is the cavity temperature, and non-refrigerated centrifuge has no such setting function.

- 7.6.1. Press the “ UP” or “ DOWN” button to choose the proper parameter set at the start-up display (**Figure 3**).

**Note:** There are 20 sets of parameter set ranging from 00 to 19.

- 7.6.2. Press the “ SET” button to enter the first adjustment panel (**Figure 4**), or touch the screen and click the rotating speed area to enter the same panel.

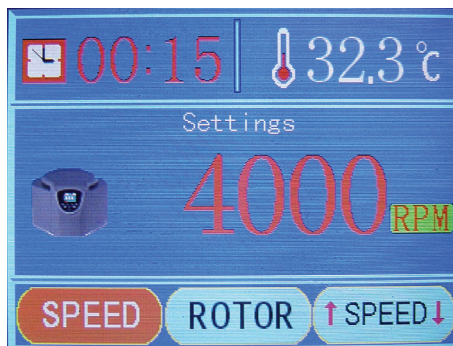


Figure 4 – Entering the first adjustment panel

- 7.6.3. Press the “ UP” or “ DOWN” button to adjust the rotating speed value (**Figure 5**).

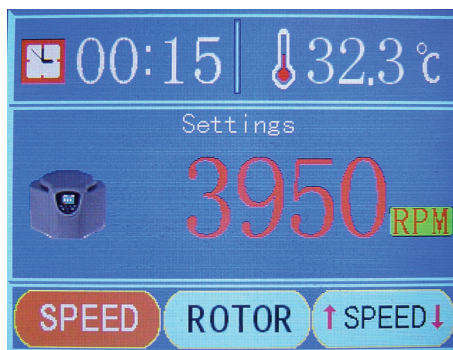








Figure 5 – Rotating speed setup

**Note:** The slowest rotating speed is 100 rpm, and the fastest is the maximum rated speed of the rotor. 50 rpm rotating speed



can be adjusted by each press. Pressing the “UP” or “DOWN” button fixedly can adjust the speed value continuously.

- 7.6.4. Press the “ SET” button to enter the rotating speed adjustment panel. Next, press the “ UP” or “ DOWN” button and press the “ SET” button again to enter the time adjustment area. The needed minutes can be chosen by pressing the “ UP” or “ DOWN” button (**Figure 6**).

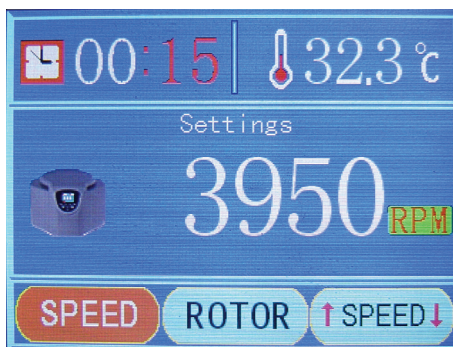





Figure 6 – Minutes setup

- 7.6.5. Press the “ SET” button to enter next step, and the needed hours can be chosen by pressing the “ UP” or “ DOWN” button (**Figure 7**).

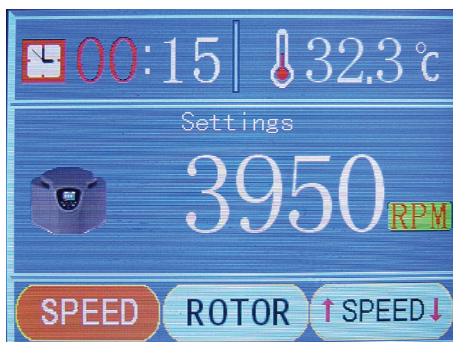


Figure 7 – Hours setup

- 7.6.6. On the bottom of the first adjustment panel, press the “**SET**” button to enter the second adjustment panel (the adjustment panel of rotor modes), or touch the screen and click the rotor number area to enter the same panel.

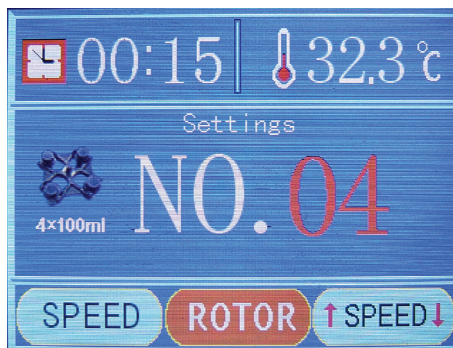




Figure 8 – Rotor setup

Press the “ UP” or “ DOWN” button to choose the rotor number (**Figure 8**).

**Note:** Please take the real objects as the reference, and find the corresponding real rotor pictures and rotor number.

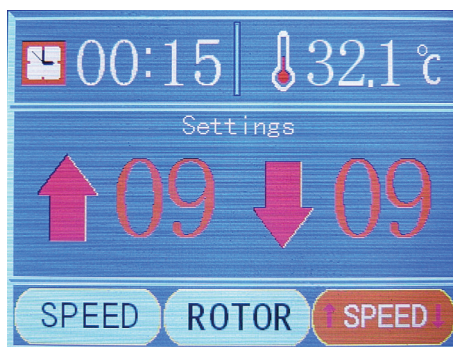



Figure 9 – Acceleration and deceleration setup panel

- 7.6.7. Press the “**SET**” button to enter the third adjustment panel (the adjustment panel of acceleration and deceleration),

or touch the screen and click the acceleration and deceleration area to enter the same panel (**Figure 9**).

- 7.6.8. Press the “ DOWN” button to adjust the deceleration of the rotating speed, or touch the screen and click the icon to do the same operation (**Figure 10**). There are 10 deceleration levels: 0 is the slowest while 9 is the fastest.

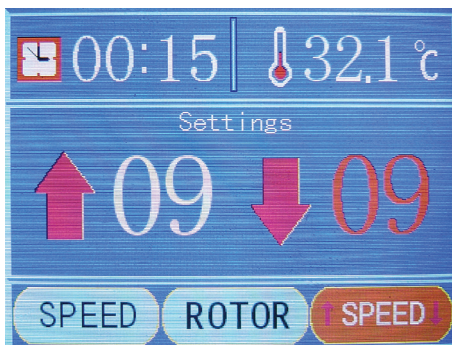



Figure 10 – Deceleration setup

- 7.6.8. Press the “ UP” button to adjust the acceleration of the rotating speed, or touch the screen and click the icon to do the same operation (**Figure 11**). There are 10 acceleration levels: 0 is the slowest while 9 is the fastest.

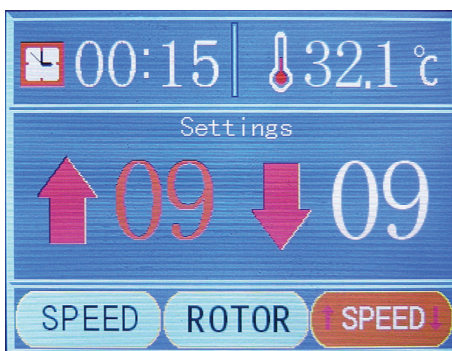












Figure 11 – Acceleration setup

- 7.6.9. When finishing every step mentioned above, press the “ ENTER” button for about 2 seconds to preserve the adjusted value, and then withdraw from the adjusted state.
- 7.7. After checking out the settings mentioned above, press the “ START” button to start the operation of the machine. During the operation, the current centrifugal force can be displayed on the window by pressing the “ RCF” button, or touching the screen and clicking the RCF icon. Repress the button, and the rotating speed value can be displayed again.
- 7.8. When counting down to 0, the centrifuge machine stops working automatically. During the operation, pressing the “ STOP” button can also stop the operation of the machine. When the rotating speed reaches 0, the buzzer would make a buzzing sound, and the cue words would be displayed on the window. The faceplate can be removed.
- 7.9. When press the “ IMPULS” button and hold for a few seconds, the rotors would start rotation slowly; when the rotating speed reaches its fastest speed, the rotors would not accelerate the speed any more. When relax the “ IMPULS” button, the rotors begin the deceleration until they stop rotating. During the deceleration process, the “ IMPULS” button cannot be pressed any longer; when the rotors stop the rotation completely, the centrifugal process would restart by pressing and holding the “ IMPULS” button.
- 7.10. After the rotors stop the rotation completely, press the “ STOP” button to uncover the faceplate (if the faceplate could not be removed because of its high rebound force against the seal ring on top of the centrifugal chamber, please press the faceplate slightly with one hand and repress the “ STOP” button with the other to open the faceplate), and take out

the centrifugal tubes carefully. The whole separation process is done.

7.11. Turn off the power switch, and cut off the power of the centrifugal machine.

**Instruction:** There is an emergency device on the bottom of the machine. If the sample should be taken out during the power outage, the faceplate can be uncovered by pulling the stainless wire on the bottom after the rotors stop the operation. But this device is forbidden to be used during the operation process.

## ***8. Comment Malfunctions and Obviating Methods***

8.1. When the machine breaks down, the buzzer would make a buzzing sound and the cue words would be displayed on the window.

8.1.1. The faceplate uncovers.

If the faceplate becomes open during the operation, the machine would enter the stall mode. The malfunction obviation or operation work should be done after the rotating speed turns back to 0.

8.1.2. Overspeed.

If the setting goes wrong, for example, when the setting rotating speed exceeds the maximum rated speed of the rotors, the machine would automatically run with the maximum rated speed of the rotors.

8.1.3. Overheat.

If the operating temperature is too high and the cavity temperature is over 55 centigrade, the machine cannot be operated. After its cooling, the machine goes back to work normally.

8.2. Besides the malfunctions mentioned above, please contact the technicians of the manufacturer to obviate the malfunctions.

8.3. The obviating methods of the common malfunctions are listed in the table below.

<b>common malfunctions</b>	<b>causes</b>	<b>obviating methods</b>
The monitor doesn't work after connecting with the power supply.	There is no 220V power supply.	Check the power supply.
	The fuse is melted.	Change the fuse.
The machine can work but the speed cannot be accelerated, or the machine sounds or smells strangely.	The control system goes wrong.	Send the machine to the manufacturer for the maintenance.
The actual rotating speed is inconsistent with the setting or displaying rotating speed. The machine runs unstably or even out of control.	The control system goes wrong.	Send the machine to the manufacturer for the maintenance.

## **9. Disposal**

- 9.1. After expiration of its service life, the machine causes no hazard for human life or health or for the environment and requires no special methods of disposal.
- 9.2. The disposal procedure shall be determined by the organisation operating the centrifuge.

## **10. Safety Requirements**

- 10.1. As regards the method of protection of a human against electric shock, the device corresponds to class I of GOST 12.2.007.0 standard. When operating the device, the "Rules for Operation of Customers' Electrical Installations" and "Safety Rules for Operation of Customers' Electrical Installations" approved by the State Power Supply Inspectorate (Gosenergonadzor) shall be

observed and the requirements of GOST 12.2.007.0 standard shall be met.

- 10.2. The persons allowed to operate the device shall have necessary qualification and be trained in the safety regulation as well as shall have studied the present document.
- 10.3. Prior to connecting the device to the power mains, make sure that the power cord is free of mechanical damages.
- 10.4. It is strictly prohibited to work with the unearthed device. The power supply has its own earth wire, so the null line and the earth wire cannot be used together, so as to prevent the damage of electric shock.
- 10.5. The rotors and the centrifugal tubes should be checked regularly. If there are any cracks or aging phenomena, those components should be replaced immediately.
- 10.6. The solutions in the centrifugal tubes should be seen as even as possible. If the solutions in the tubes vary too much, there would be a large scale of vibration. In this kind of situation, the operating machine should be stopped its operation and checked to meet the requirement of the solutions in the tubes. The centrifugal tubes should be placed symmetrically in the even numbers, and the nut caps connecting the rotors with the motor shaft should be tightened.
- 10.7. Should an abnormal sound be heard when the device is working, it shall be immediately disconnected from the power source.
- 10.8. During the operation process, the centrifugal machine cannot be moved, and the faceplate cannot be uncovered.
- 10.9. Never place any objects onto the centrifuge cover.
- 10.10. It should be very careful to take out the rotors. The proper way is to knock upward slightly the rotors on the bottom by using nonmetal tools (like the handle of the screwdriver) until the connection between the rotors and the motor shaft becomes loose. The rotors should not be pulled out directly with hands

after loosening the nut caps, so as not to damage the flexible support system of the machine.

- 10.11. After the whole separation, the centrifuge machine should be cleaned up in time, the power switch should be turn off, and the power supply should be cut off.

### **11. Storage and Transportation Rules**

- 11.1. The centrifuge shall be stored indoors in the packing box at the air temperature of +5 to +40°C and relative air humidity of not more than 80%.
- 11.2. The unpacked device should be stored at ambient air temperature of +5 to +40°C and relative humidity of 80%.
- 11.3. The device may be transported by any transportation mode in roofed vehicles within the temperature range of -40 to +50°C and relative humidity of not more than 95%.

### **12. Warranty**

- 12.1. The guaranteed service life of the instrument is 12 months from the date of its shipment to the consumer as determined in the bill of lading or, in the absence of the latter, from the date of manufacture of the product.
- 12.2. Ecohim Co. Ltd. guarantees the compliance of the product with the requirements stipulated in item 4 hereof provided the consumer adheres to the operation, transportation and storage conditions.
- 12.3. Within the guaranteed service life, the free-of-charge repair or replacement of the device on the claim is provided in case the consumer has observed the storage, transportation and operation rules.
- 12.4. The warranty maintenance shall be only performed by the authorised service centres.

### **13. Claims Information**

- 13.1. In case of revealing any faults within the guaranteed service life or incompleteness when unpacking the product, the consumer shall submit the claim report to the manufacturer's address:



Ecohim Co. Ltd.

22 17<sup>th</sup> Line, building I, Suite 406, Vasilyevsky Island, Saint Petersburg 199178

Phone/fax: (812) 322-96-00, 449-31-22, 449-31-23;

E-mail: info@ecohim.ru, URL: www.ecohim.ru

13.2. No claims for the device may be submitted:

- on expiration of the warranty period;
- if the consumer has broken the operation, storage and transportation rules provided in the operating documentation.

#### **14. Certificate of Acceptance**

PE-6926 Table-type High speed centrifuge, serial number **6K926P** \_\_\_\_\_ has been manufactured and accepted in accordance with the statutory requirements of the state standards and current technical documentation and recognised to be ready for service.

Date of manufacture \_\_\_\_\_

Stamp of the Technical  
Control Department

Inspector \_\_\_\_\_

**Appendix 1 – The rotor parameters**

No	Appearance	Capacity	Maximum RPM	Maximum RCF, g
1		12×1.5/2.0 ml	16,500	18,900
2		18×1.5/2.0 ml	15,000	17,860
3		24×1.5/2.0 ml	14,000	18,187
4		10×5 ml	14,000	13,600
5		8×7 ml	14,000	12,271
6		12×10 ml	12,000	13,400