

TDL-6C CENTRIFUGE OPERATION MANUAL

I. BRIEF INSTRUCTION

The instrument's out shell adopts whole metals outer shell, hard enduring, good system ability to avoid earthquake. Controlled by micro-computer, simple operation, rotate speed and time can choose freely. It can change setting data at any time in the running state. It adopts the direct current and no brush dynamo. And it doesn't need a maintenance, has no carbon powder pollution, the noise is low. What's more, it has an electromagnetism door lock, safety credibility.

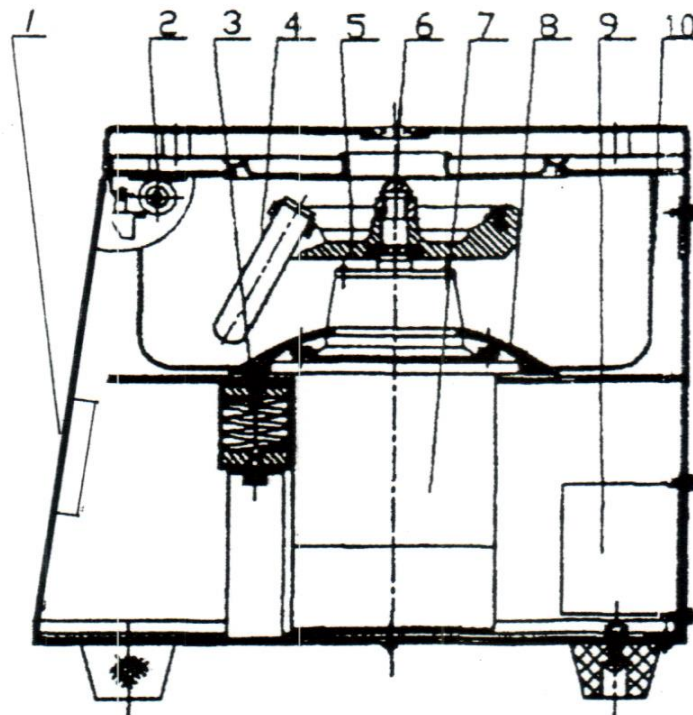
It is widely used in hospitals and biochemistry labs to make qualitative analysis to serum, plasma and so on.

This instrument can used safely if the environment temperature is 5-40°C, relative humidity is not more than 80%, and there is no electric dust, explosive air, and caustic air.

II. STRUCTURE

The instrument is made up of frame, swivel head, transmission, minus shock, electric control and so on.

The structure picture as following:



- | | | |
|--------------------|--------------------------------------|--------------------------|
| 1. Control panel | 2. Electromagnetism door lock | 3. Minus shock setting |
| 4. Centrifuge tube | 5. Rotor | 6. Shaft nut |
| 7. Dynamo | | |
| 8. Seal ring | 9. Electric appliance control system | 10. Centrifuge's chamber |

III. TECHNICAL DATA:

Max. speed	6000rpm	Timer range	0-99min
Max. RCF	4390*g	Fuse specification	10A
Max. Capacity	200ml	Power supply	220V 50Hz
Motor power	1100W	Weight	27KG
Rotor 1	Swing rotor	S0510004	100ml×4
Rotor 2	Swing rotor	S055004	50ml×4
Rotor 3	Swing rotor	S050516	5ml×16
Rotor 4	Swing rotor	S052008	20ml×8
Rotor 5	Swing rotor	S052006	20ml×6
Rotor 6	Swing rotor	S051012	10ml×12
Exterior size:	410×530×340 (L×W×H) mm		

IV. PRINCIPLE OF OPERATION

Put tubes with equaling sample into swing-out rotor symmetrically, the rotor will spin on axis after you start the machine, It will make the composition at different weight density separate from solution.

The formula of calculating RCF is as follows:

$$RCF = 1.096 \times 10^{-7} n^2 r (N)$$

$$1000g = 9.8 N$$

n----- Rotating speed(r/m)

r----- Radius of rotating(cm)

The formula of calculating separation time is as follows:

$$T_s = \frac{27.4(\log_e R_{max} - \log_e R_{min})}{n^2 r^2 (Q - \rho)} \mu \quad (\text{min})$$

$$n^2 r^2 (Q - \rho)$$

ρ ----- Density of mixed liquid (g/cm³)

μ ----- Glutinousness of mixed liquid (p)

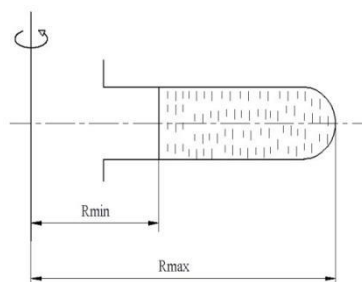
n----- Rotating speed

r----- Radius of particle (cm)

ρ -----Density of particle (g/cm³)

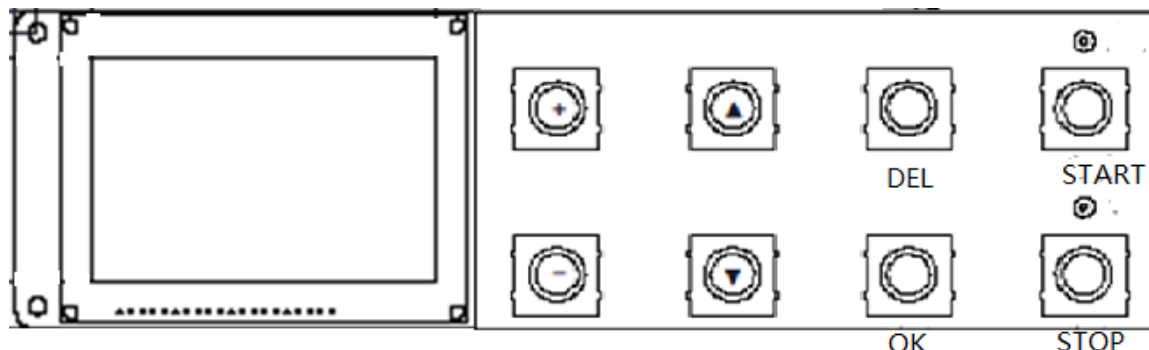
R_{max} ----- The horizontal distance from the bottom of solution to the center of the rotating axis (cm)

R_{min} ----- The horizontal distance from the surface of solution to the center of the rotating axis (cm)



V. OPERATION PROCEDURE

5.1 control board operation:



The meaning of this instrument's control board and every part is follow:

- a) Speed setting: press "del" button, use "▼" "▲" screen cursor to set speed, then press "+" "-" to set the speed number;
- b) Time setting: after setting speed, use the same method of using "▼" "▲" to chose screen cursor to set time, then press "+" "-" to set time.
- c) Speed increased setting: meanwhile, under the setting state, when screen cursor chose AC date, use "+" "-" to adjust speed increased.
- d) Speed decreased setting: meanwhile, under the setting state, when screen cursor chose DC date, use "+" "-" to adjust speed decreased.
- f) After setting parameter, press "com." to make sure parameter setting.
- g) when the condition 'state', press "start" button to begin working, 'state' is the state of current machine's condition, mainly conclude stop/running/door open/E1-9.
- h) "stop/open" button is needed to press when machine is stopping work or the machine cover need to be open.

note: Error code, you need to press the "del" key to clear the current failure prompted the state.

5.2 operation procedure:

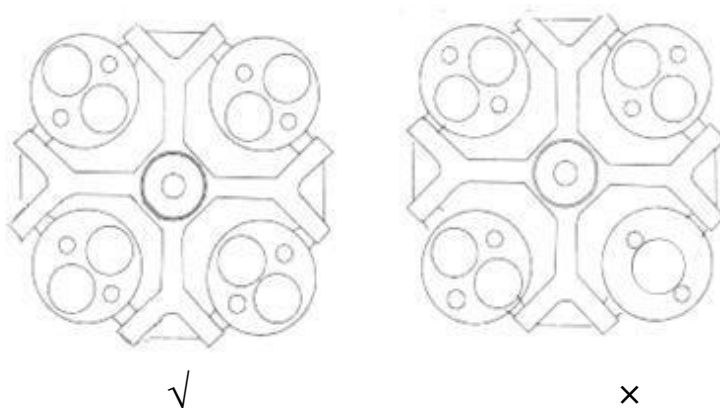
- (1) Placed the centrifuge in the stable ground, the centrifuge should apart wall 10cm to make sure centrifuge level and no shaking.
- (2) After connect the plug with power, open the switch in the right side of centrifuge, the yellow light lighting mean the machine already connect the power, and press stop button to open cover.
- (3) Put the same amount sample in centrifugal tubes and put centrifugal tubes into centrifugal cup tube hole. centrifugal tubes must be put in even number and symmetrical.
- (4) Closed cover and check whether locked well(after closed to open the cover slightly and the cover don't open).
- (5) If the running parameter needed to adjust, it can be adjusted to press increase and decrease button. note, after adjusting setting must press OK button. This can be save the setting value.
- (6) Press start button to start machine, Digital display of setted speed, the centrifugal force

and time parameters during operation, when machine reach the setting time, it will be automatically stop and have the prompt beep. It can be also press the stop button in running halfway. When centrifugal head stop stable ,there have 2 seconds to open the cover, over this time, should press stop button to open.

- (7) If power off when working, first of all the power switch should be closed (in case suddenly have power) when the motor completely stop working, use emergency knot (pull it)to open the cover and take out the separating liquid (emergency knot is located in left hand)。
- (8) When running time countdown "0",the centrifuge will stop working automatically, when speed is zero, it will beep. Press stop button, the cover open automatically.
- (9) After making sure that the rotor stop completely, the cover can be opened, take out separating tubes carefully of finish the whole separation procedure.
- (10) Closed power switch, cut off power.

Especially note: when setting parameter, if the machine need work in the low temperature (under zero centigrade or far lower then zero centigrade), it need adopts cooling method, it means that the needed low temperature should only set temperature parameter, time parameter not setting temporary. then start machine for cooling, precooling to the setted low temperature, then set the other parameter.

2. Operation step (please used together with the above table)



- (1) Connect the power supply to the machine cover, and turn on the power switch in the right of centrifuge. If the yellow light is on, and it means that the power is right connected. And then press the “stop” key to open the door cover.
- (2) Put commensurable samples in the centrifugal tube. Symmetrically put it in the brick. Don’t run the rotor in disequilibrium state.
- (3) Press the start key and then start the equipment. The nixie tube displays the setting parameter of rotate speed, time when it works. It automatically puts on the brakes and shuts down when the equipment reach the setting time. There is bumming pointing out. You can press stop key directly in the midway of the revolving. You can open the face gate after the swivel stops well for 2s. If it is over 2s, open the face gate then you can press the stop key.
- (4) If the power cuts, you can open the face gate and take out the separation liquid by pulling the emergency pull button. (The emergency pull button should be in the left hand)

VI. MATTERS NEED ATTENTION

1. To ensure safety and centrifugal effect, the equipment should be put in the table-board of the fixed plane. Anything can't be put in the face gate. The sample should be put symmetrically. Ensure screw down the nut before boot-strap.
2. Often examine whether the swivel and the centrifugal tube have the problem of crackle and old, if there is the phenomenon, exchange the it in time.
3. After the experiment, clean the equipment lest should rusty.
4. If the sample gravity is over 1.2g/cm^3 , the highest speed 'n' is computed as this:

$$n = n_{\text{max}} \times \sqrt{1.2 / \text{sample weight}}$$

5. The face gate can not be open when the centrifuge has not stopped well.
6. The instrument should have reliable earthing.
7. There is spared fuse in the fuse box.
8. Shut down the power switch and pluck the plug after the experiment. Plug into the plug in the next experiment. Don't forget to take on the power switch.
9. **When the machine is working , you should work 20min and have a rest of 10min.**

VIII. COMMON TROUBLE & RESOLUTION

No.	Common trouble	Reason	Solution
1	Connect the power, but the indicator and nixie light doesn't light	No power	Check the power
		Blown fuse	Replace
		Power switch doesn't turn on	Turn on power switch
2	Set speed with actual speed are different	Voltage is on the high side or low side	Contact with electric department
3	Door locker can not lock during run.	Door locker magnets broken or got stuck	Replace
4	Press on, the speed display O, yellow light is light	There is something wrong with door switch	Replace
5	There is noise after starting on the machine	Tube with liquid not equaling sample or rotor nut loosen	Make the tube with equaling sample, tighten the nut

VIII. MAINTAIN

1. Please read the manual book before operation.
2. Don't place (stack) the machine upside down during customer moving to avoid damage machine and fitting.
3. If there is a long time no use the machine, please packing the machine well according to keep dry requirement. And it is better to store in no corrosive gas and well-ventilated space of $5\sim 40^{\circ}\text{C}$, humidity $\leq 80\%$.

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