

Company Profile

Hunan Xiang Yi Laboratory Instrument Development Co., Ltd is high technology enterprises mainly engaged in manufacturing centrifuge and laboratory instrument with 40 years. The first refrigerated centrifuge(50000r/min) and first high speed refrigerated centrifuge(20000r/min) of China were made in Xiang Yi. The company has already passed ISO9001:2000 and international safety certificate CE. The effective implementation of quality system guarantees ulteriorly the stability of product quality, reliable after-sale service and product safety.

In the 80-90s of last century, our company had cooperated with Japan Tomy Company and America Beckman Company in technology field, which improve the technology level of Xiangyi up to domestic leading level. The super capacity rotors of angle rotor 6×1000ml and swing rotor 6 ×2400ml have already passed rotor service life cycle test by authority of the United States in 2009, and surpassed the US standard of life cycle. This marks some performance of Xiangyi centrifuge has already reached to international advance level. We will take this as a driving force, working hard to achieve further successes, make Xiangyi centrifuge reach to international advance level quickly and became the famous centrifuge manufacturer of the world.

With Xiangyi centrifuge technology and brand familiarity increased in centrifugal industry, Xiangyi makes great effort to expand the market both at home and abroad, our products have already been exported to over 20 countries, such as USA, Germany, Japan, Turkey, India, Mexico, Vietnam and so on. In order to meet the increasing market demand, in 2006 Xiangyi has invested a large sum of money to establish Xiangyi Industry Park, which located at Taiwanese Investment Zone of Hunan Province. There are domestic advanced CNC and 6 centrifuge assembly lines, which have improved the annual centrifuge production capacity from 5000 sets to 20000 sets. We have established jointly a laboratory instrument development center with domestic famous university. And there are many domestic senior R&D talents in laboratory instrument field. Now Xiangyi has become the production base of laboratory instrument in China.

RCF Calculation Method and Attention for Max. Speed Setting

◆ □ RCF Calculation Method

RCF value is relation to the revolutions per minute and the centrifugal radius; you can apply following formula to calculate:

$$\text{RCF} = 1.118 \times 10^{-5} \times n^2 \times r \quad (\times g)$$

n——speed (r/min)

r——max. centrifugal radius (cm)

g——acceleration of gravity (9.8m/s²)

◆ □ Attention for Setting Max. Speed

The standard max. speed on this product is gotten and verified based on the sample with density 1.2g/ml. The sample means the total contents of any compartment, including specimen, tubes, sealing assembly and adapters. If the density of centrifugation samples is greater than the required 1.2g/ml, the maximum allowable speed for the rotor should accordingly be reduced. It can be calculated by the following formula:

$$N_{\text{max allowable speed}} = N_{\text{max. speed}} \times \sqrt{\frac{1.2}{\rho_{\text{actual-density}}}} \quad \rho : \text{actual density (g/ml)}$$



Note: Here explicitly emphasize that even if the sample mass is less than 1.2g/ml, it is forbidden to increase the maximum allowable speed on the rotor.

In Formula:

Max speed means the maximum allowable speed for sample with density equal to 1.2g/ml. Please refer to the available rotor on section 2.3 for the standard maximum speed.

Respected Customers:

Thank you very much for using our centrifuge. We are trying our best to provide products with good quality and performance. For easy operation, please read the manual carefully and conduct on the instruction steps before operation.

Whatever questions do you have during operation, please contact us. We will try our best to solve your problems.

Best regards!

This manual tells how to use H2050R centrifuge correctly. Before using (installation, operation, maintenance and inspection etc.) please read the manual carefully. Operate the product after understanding the safety attentions.

Attentions
In order to describe the detailed parts, the graphic illustrations in this manual were showed without outer housing or protective cover. When you using this product, make sure the outer housing or protective cover is installed correctly and operate according to the instructions. The graphic illustrations in this manual only for explanation, maybe different with the product you purchased. In order to enhance the convenience and accuracy of the instruction manual, the content of the instruction manual would be changed with the product updating or specification changes. If the instruction manual is damaged or lost, please contact with the local agent or us directly.

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Symbol and its Meanings

Symbol	GB No.	Meanings
~	4706.1	Alternating current
	5465.2	Power on(general supply)
○	5465.2	Power off (general supply)
	4728.2	Protective earthing(ground)
	4793	Warning: Safety caution

Safety Information



Safety Information clarifies the requirements of safe operation in the instruction manual.

Please carefully read it before installation, operation, maintenance and repairing. Understanding the warning and correct operation can avoid the personal injury and the damage of centrifuge.



We are dedicated to the centrifuge development and improvement, thus our information and data subject to change without notice. Thank you!



Rotor Service Life: Normally 5 years for aluminum alloy rotor and 7 years for titanium alloy rotor. The rotor over service life must be discarded or returned to the factory for inspection.



It is forbidden to use the rotor with cracks, corrosion or over service life.

Attention for installation and maintenance

- ◆ The rotor accessory and package may be placed in the centrifugal chamber. You should open the door lid to check and take out while installing.
- ◆ In the machine maintenance process, the parts that need remove cover may cause electrical shock or personal injury. Ensure that the power has been cut off and the power line has been removed from the socket, and qualified staff manipulates it.
- ◆ The replaced part must be consistent with the requirements of this centrifuge. If you are not sure, please contact our after service department.

Attention for electric system

- ◆ To reduce the risk of electric shock, the centrifuge adopts the plug with three points which must connect to the socket with ground lead.
- ◆ Make sure if the wall socket is connect with the ground wire. The voltage of power supply must accord with the voltage of centrifuge.
- ◆ Don't use the power adapter from three holes to two holes.
- ◆ It is forbidden to use the expanding socket with two lines or all-purpose power adaptor without ground wire.
- ◆ Don't put container with liquid on the centrifuge or around the centrifuge. If the container is knocked over, the liquid will infiltrate into centrifuge and damage the electrical or mechanical parts.
- ◆ Before moving the centrifuge, make sure to power off the centrifuge, in order to avoiding the possible damages caused by electric shock.
- ◆ If the centrifuge is damaged, please do not repair it by yourself. Please contact the professional technician in your company or distributor and our service engineer to handle it.

Attention for fireproofing

- ◆ Please use the overload fuse with same model and specification.
- ◆ The centrifuge is not designed for the flammable and explosive matters. You cannot make centrifugation for the matters (chloroform, acetaldehyde), and cannot put the matters in the centrifuge or store them around centrifuge within 30cm.

Attention for safe operation

- ◆ Please use the rotor and accessories which are designed for this centrifuge by our company. It is forbidden to use the rotor and accessories with cracks, corrosion or over service life.
- ◆ Make sure if the centrifugal chamber is cleaned before operation. Make sure if the screw (nut) of the rotor in the centrifugal chamber has been screwed down.
- ◆ Not exceed its max speed of rotor during operation. Don't decelerate rotor speed or stop by hand. Don't open the door lid during centrifugation.
- ◆ Don't hold or move centrifuge when rotor is rotating.
- ◆ If the glass test tube is cracked in centrifuge chamber, please carefully check and clean the gasket and centrifugal chamber because the glass fragment may have inserted into their surface.

- ◆ The distance between centrifuge and other objects must be kept 30cm during operation. You should not stand around centrifuge within 30cm unless adjusting it. Anything is not allowed to enter into centrifuge during operation.

Attention for safety in chemistry and biology

- ◆ The routine manipulation may include all kinds of liquid and test sample which may be the disease-causing and poisonous matters. The centrifuge cannot be manipulated with the matters unless you have taken the protection measures.
- ◆ Please pay attention to the liquid explanation in container before operation.
- ◆ Be careful of the infectious liquid. The infectious samples must be manipulated according to the manipulating program and method in lab for avoiding expanding disease.
- ◆ You should follow the environment security and protection requirements when destroying the discarded liquid.
- ◆ Users have the responsibility to clean and sterilize centrifuge and accessory if you need maintenance service from our company.
- ◆ Always be aware of possibility of contamination when using radioactive, toxic, or pathogenic materials. Take all necessary precautions and use appropriate decontamination procedures if exposure occurs.
- ◆ The use of sealed rotors, buckets and/ or sample containers will provide increased protection from contamination during routine operation. However, these items will not guarantee contamination protection from accidents resulting in damage to the rotor or buckets. Do not run hazardous materials in the centrifuge unless placed in a biohazard enclosure and operated using all appropriate safety precautions.
- ◆ Never use any materials capable of producing flammable or explosive vapors, or extreme exothermic reactions.

Chapter 1 Installation and Adjustment

1.1. Inspect the centrifuge



Warning: Do not install the centrifuge around the place with flammable or explosive materials. Before power on, please open the door lid by door emergency release tool and check the chamber. Please do not power on before taking out the matters in the chamber.

1.2. Identify the Installation Environment

- ◆ Environment Temperature and Humidity: The surrounding environment would have extent impact on the centrifuge service and performance. The working environment temperature is 10°C to 35°C, and the relative humidity is no more than ≤85%.
- ◆ It is prohibited to put lab equipment with large heating production and strong vibration around centrifuge.
- ◆ Avoid installing in the areas with humidity and direct sunlight.
- ◆ Avoid installing in the areas with corrosive, flammable or explosive gas.
- ◆ Avoid installing in the areas with greasy dirt, dust and metal dust.

1.3. Installation Site

- ◆ When centrifuge is in operation, the rotor and its accessories is in the high speed spinning state. A flat, level surface is critical for avoiding rotor imbalance during operation. Place centrifuge on a steady platform or table.
- ◆ Adequate space to allow for proper air circulation. Allow at least 30cm clearance around all sides of the centrifuge.

1.4. Installation Steps

- ◆ As soon as you receive the centrifuge, carefully inspect it for shipping damage. Report any damage immediately to the transportation company and file a damage claim, then notify our company.
- ◆ According to the packing list, to check the main machine, accessories, attached tools and files

and file whether any parts are missing.



!warning : When moving the machine, do not hold the front panel.

- ◆ Unpacking package: Removing 8 pcs of M8 wooden screw on top door plank first (refer to Figure 1.4-1) and discharging the top door plank then, other side planks should be integrally unpacked after removing 4 or 6 pcs of M8 wooden screw on side planks. Take off the plastic cover, at last offload the main machine from packing baseboard and place it on the steady platform. Make four rubber cushions stand in balance. (This model usually is heavy, it is best to have three to four persons to moving it) At last, please take care of the package and packing materials to avoiding environment pollution.

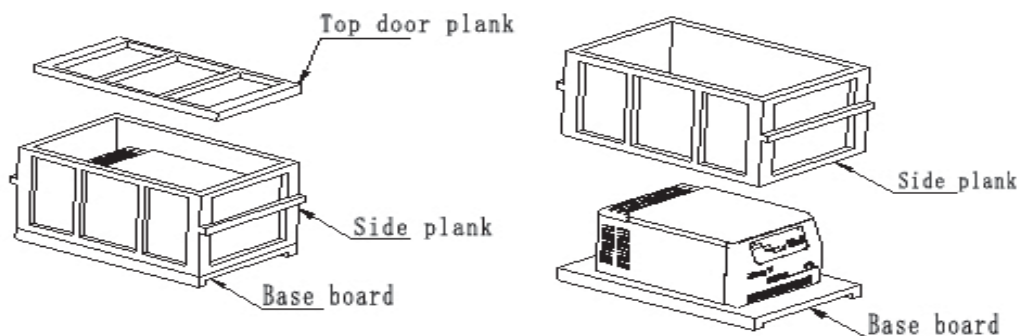


Figure 1.4-1 Unpacking Steps

- ◆ Power requirements: For H2050R, it is AC220V 50Hz 15A.
- ◆ Make sure that the voltage of power supply must accord with the voltage of centrifuge (Please check the power supply label under the power socket on the back of the centrifuge. This centrifuge is adopted AC with single phase and three wires 220V power). Connect the power cord to the electric outlet on centrifuge back first, and then put the plug on the other end into the external mains jack. Press down one side marked “ON” on the switch on the centrifuge right side to power on.
- ◆ Open the door lid: if the centrifuge is powered on, press  key to open the door lid automatically. If the power is off, pull the emergency door release string (Figure 2.4-2). Check

the chamber and take out of other materials except for the rotor. Clean up the chamber.

◆ Rotor Inspection

Take out of the rotor from the package. Carefully inspect whether the rotor is damaged, deformed or with crack and corrosive spot. If it is, please stop using the rotor immediately and contact the supplier.

- ⚠ **Attention** : It is forbidden to use the rotor over service life or not designed by our company.
- ⚠ **Attention**: It is forbidden to use the rotor and accessories with cracks, corrosion spot.
- ⚠ **Attention**: During operation the cone of the rotor must mate with the cone of the motor shaft properly.

◆ Rotor Installation

Hold the rotor bottom by both hands and install the rotor on the motor shaft correctly. Then hold up the rotor steadily (not shacking) by one hand, and put the T-shaped inner hexagon spanner into the rotor center by another hand. In the mean while turn the spanner for 3 to 6 rounds in clockwise direction until the rotor clamps the rotor base. Make sure that the cone of the rotor must mate with the cone of the motor shaft properly. See Figure 1.4-2

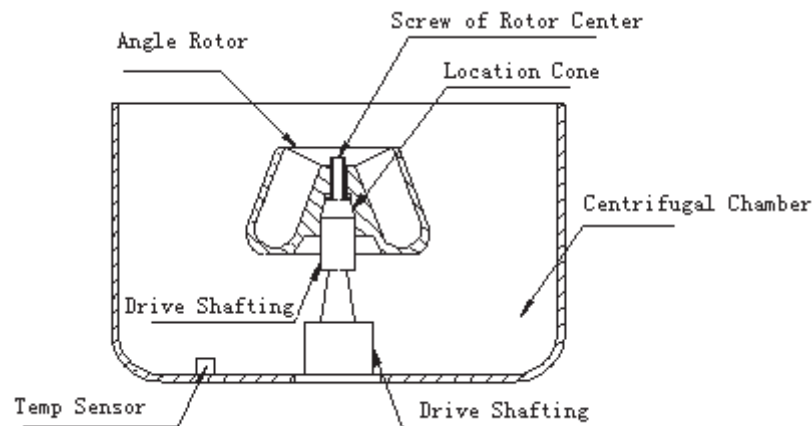


Figure 1.4-2 Rotor installation and disassembly on external cone shaft

◆ Rotor Disassembly

As shown in the above figure: At first, hold up the rotor steadily (not shacking) by one hand, and put the T-shaped inner hexagon spanner into the rotor center by another hand. In the mean while turn the spanner for 3 to 6 rounds in counterclockwise direction until the rotor can be separated from driving shaft. Then hold up the rotor bottom by both hands, and rotor can be taken out from rotor base vertically.

When install the swing rotor, please place the buckets on the right place with same number according to the number on the bucket. Check whether the bucket is hanging on properly and rotate flexibly.

- ◆ If there are any electronic problems during operation, it should be inspected and repaired by the professional technicians

1.5. Centrifuge Trial Operation

1. Before starting the centrifuge, firstly confirm if there's any loose for rotor, the centrifuge is level or not, and if it is stable with the horizontal level. Closed the centrifuge door cover, if no abnormalities are empty load, the maximum speed is set to 1000 r/min, after the speed up to 1000 r/min, and then set the maximum speed to 2000 r/min, when the speed up to 2000 r/min, and then, in turn, additive 1000 r/min until the installed rotor's max.speed, if no abnormal phenomenon, according to the step 2 on load operation debugging.

2. Trial operation for max. load: If it is used with the swing rotor, firstly press the bucket to check if the buckets are blocked or not. If no this phenomenon, then start operation. Set the max speed to 1000rpm/min, and then set the maximum speed up to 2000 r/min, when the speed up to 2000 r/min, and then, in turn, additive 1000 r/min until the installed rotor's max.speed, if no abnormal phenomenon, the trail operation is success.

Chapter 2 Operating Instructions

2.1. Naming Rule

H2050R is tabletop high speed refrigerated centrifuge driven by AC frequency-conversion motor, naming rule as shown in the figure 2.1

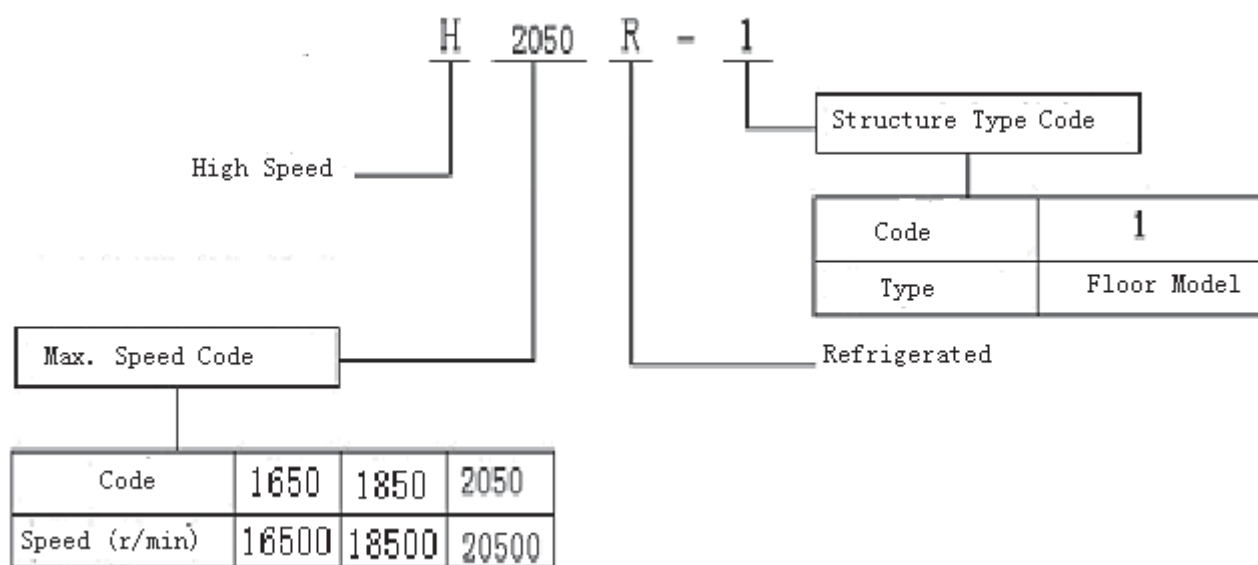


Figure 2.1 Naming Rule

2.2. Main Technical Parameters

Model	H2050R
Max. Speed	20500r/min
Max. RCF	29200×g
Max. Capacity	4×750mL
Control	Microprocessor
Motor	AC Frequency-conversion Motor
Speed Accuracy	±50r/min
Time Setting Range	Short-run: Press 【PULSE】 Timing: 10sec~99 min59sec Continuous: HOLD
Environment Requirement	Temp:10℃~35℃ Relative Humidity≤85%
Temp Setting Range	-20℃~+40℃
Temp Controlling Accuracy	±1.5℃

Model	H2050R
Refrigeration System	Non-CFC imported compressor unit
Power Supply (single phase, three wires)	220×(1±10%)VAC 50Hz 15A
Noise	< 65dB(A)
Centrifuge Dimension(L×D×H)	560×800×440(mm)
Package Dimension(L×D×H)	680×1080×580(mm)
Net Weight/Gross Weight	118kg/170kg

Form 2.2 H2050R 2.2. Main Technical Parameters

2.3. Available Rotors

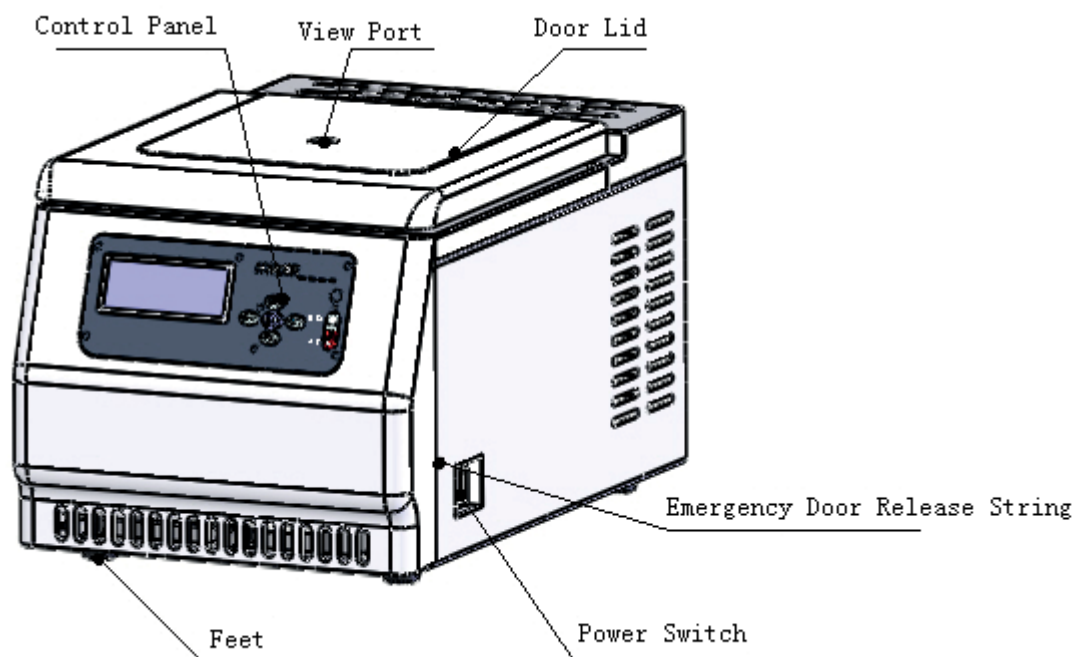
Available rotors for H2050R are shown in Form 2.3. According to this form you can confirm the used rotor's max. speed, max. RCF and the available adaptors, brackets, buckets for this rotor.

Rotor No.	Max. Speed	Max. RCF	Rotor Type		Capacity
NO.1	20500r/min	29200×g	Angle Rotor		12×1.5/2.2ml
NO.2	14500r/min	19270×g	Angle Rotor		8×15ml
					(Adaptor) 8×5ml
NO.3	15000r/min	23120×g	Angle Rotor		12×10ml
					6×30ml
NO.4	13000r/min	17940×g	Angle Rotor		6×50ml
NO.5	4000r/min	3500×g	Swing Rotor (Adaptor available)		4×750ml
NO.6	4000r/min	3040×g	Rectangular Bucket Rotor	Adaptor	4×4×50ml
					4×10×15ml
					4×20×10ml
					4×28×5ml
					4×25×1.5ml
			Round Bucket Rotor		4×500ml
			Swing Rotor		4×37×5ml
					4×24×7ml
			Microplate Bucket		4×2×96 well
NO.7	16500r/min	24890×g	Angle Rotor		24×1.5/2.2ml
NO.8	12000r/min	15805×g	Angle Rotor		6×85ml
NO.9	10000r/min	11960×g	Angle Rotor		6×100ml

Form2.3 Available Rotors for H2050R

2.4. Structure Characteristics

2.4.1. Structure for Main Machine and Display Control Panel



H2050R is tabletop high speed refrigerated centrifuge. This centrifuge is composed of main machine, rotor and other accessories. And main machine is composed of machine frame, chamber, drive system, electric control system, refrigerating system and display control panel. Rotor, tube (bottle) and etc. accessories would supplied by contract.(Note: There is an emergency door release string over the power switch for emergency door opening.

2.4.2. Electric Control System

The control system has adopted 8-digit CPU, and motor drive has adopted advanced VFC technology for stable speed and energy saving, with over-speed and over-temperature protection functions. Control Structure Relationship as shown in Figure 2.4-2:

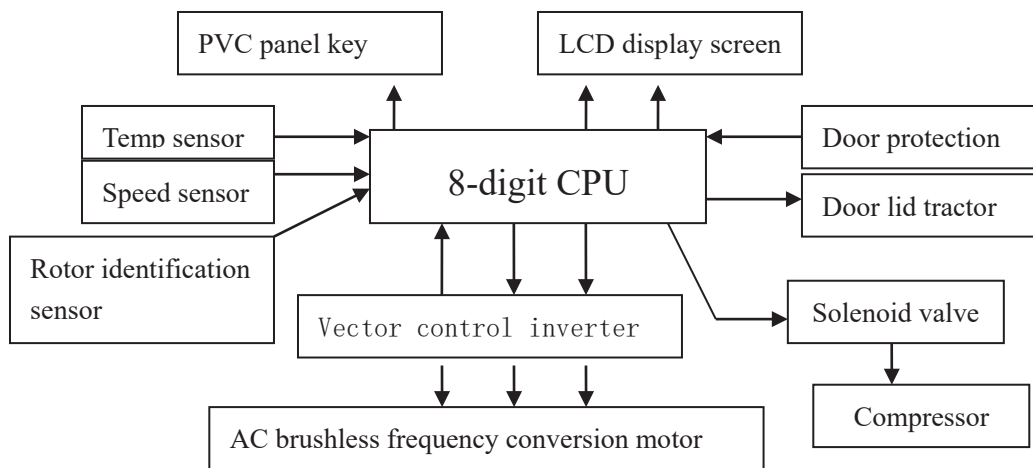


Figure 2.4-2 Electric control system for H2050R

2.4.3. Drive System

Rotor is driven directly by motor. Frequency conversion motor with high torque is equipped with special shocking absorber for reducing vibration and noise. Drive device reference figure 2.4-3

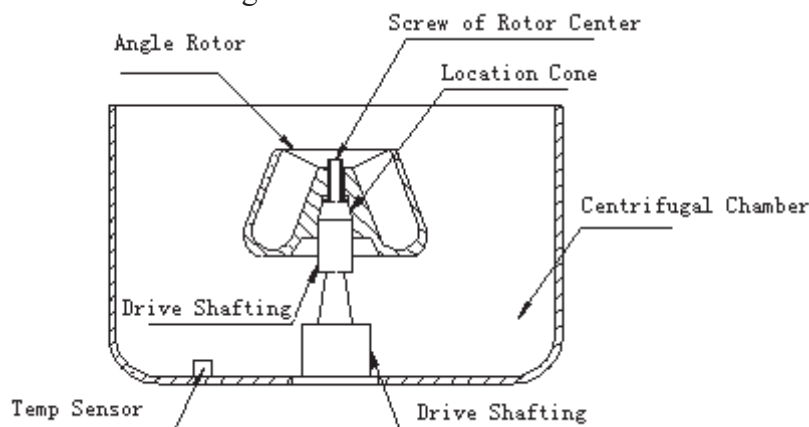


Figure 2.4-3 Drive System

2.4.4. Refrigerating System

Refrigerating compressor is located on the lower back of the centrifuge. The evaporator is revolved around the chamber. The temp sensor under the bottom of the chamber would detect the temperature of the gas in the chamber, and the system will control the compressor start/off state based on the detected temperature. The heat produced during operation is depended on frictional heating. This centrifuge is equipped imported compressor with two circuit control for good efficiency of heating and refrigerating. Refrigerating theory as shown in Figure 2.4-4

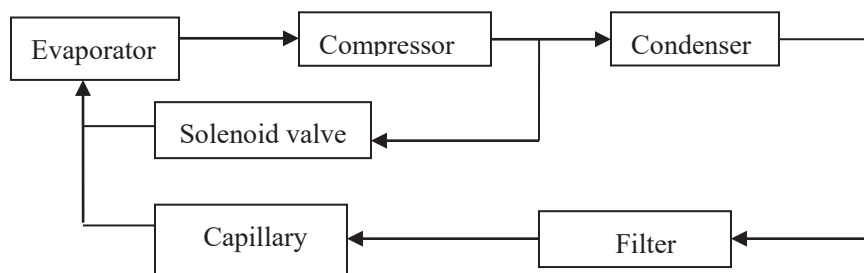


Figure 2.4-4 Refrigerating theory

2.4.5. Chamber

The chamber is made of stainless steel which is durable and incorrodible. It is sealed by EPDM or silicon-gel gasket. Rotor drive shaft and thermosensor/temp sensor are located in the bottom of the chamber. Refer to Figure 2.4-5

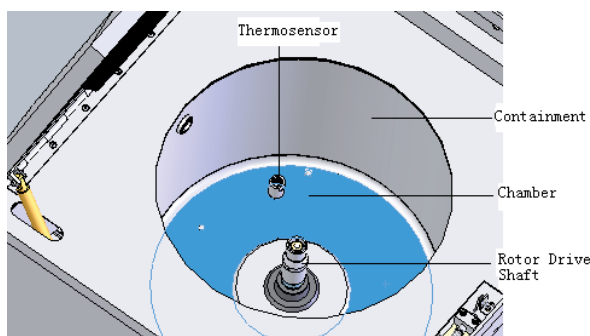


Figure 2.4-5 Chamber

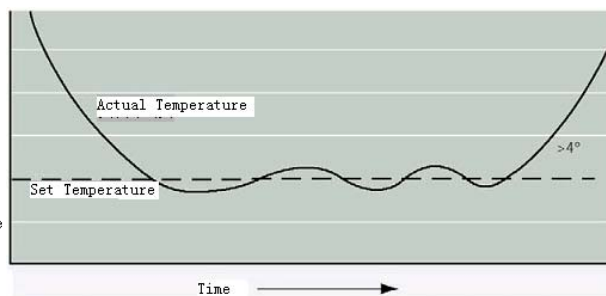


Figure 2.4-6 Temp Control Curve

The thermosensor would consistently monitor the temp in the chamber. Because of the difference of the rotor material, dimension, mass and the chamber diameter, depth, the thermal resistance in the chamber would be different, which would also cause the temperature of the rotor and chamber to be different. Aim to the sample temp the microprocessor would calculate the corresponding chamber temp, and through setting the compensation value of the rotor used to reach the required rotor temp. During operation the displayed rotor temp should be in the set value range of 2°C tolerance (after compensation/correction). The microprocessor would monitor the thermosensor to confirm the temperature change of the chamber, please refer to Figure 2.4-6. If the chamber temp is over 50°C or the temp sensor is damaged, the system would give temp failure message and the rotor would decelerate or shut down.

2.5. Panel Controls Instruction

2.5.1. Control Panel

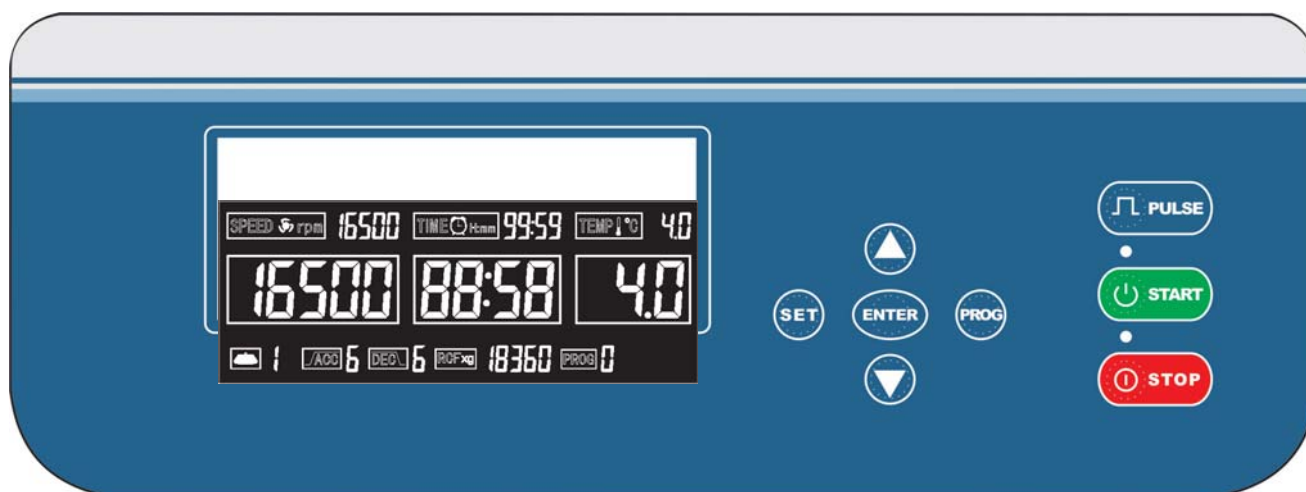


Figure 2.5-1 H2050R Control Panel

2.5.2. Indicators

	Light off: Stop state
	Light on: the start indicator is green and flashing, which means the centrifuge is started and is accelerating. Green indicator always light on means the centrifuge reaches the set speed and is running stably.
	Light off: Running state
	Light on: the stop indicator is red and flashing, which means the centrifuge stop working and is decelerating. Red indicator always light on means the centrifuge is completely stopped.

2.5.3. Keys Operation Instruction

“Set”key

◆ Press the  key, and then it shows "  " on the LCD display window and the number is flashing. Press  or  key to select the rotor number.

◆ Press the  key, then it shows "  " on the LCD display window and the number is flashing. Press  or  key to set the speed.

◆ Press the  key, then it shows "  " on the LCD display window and the number is flashing. Press  or  key to set the centrifuge working time.(When the first two number on "  " flashing, you can set the minute parameter. When the last two number on "  " flashing, you can set the second parameter.) The time setting range is 1:00~99:59. Press  to confirm the current setup, otherwise, the setup would be cancelled automatically in 5 seconds.

◆ Press the  key, then it shows "  " on the LCD display window and the number is flashing. Press  or  key to set the chamber temperature.

◆ Press the  key, then it shows "  " on the LCD display window and the number is flashing. Press  or  key to set the acceleration profile. Acceleration profile is from 1 to 9, the value is higher means the ACC time is shorter, usually choose 5.

◆ Press the  key, then it shows "  " on the LCD display window and the number is flashing. Press  or  key to set the deceleration profile. Deceleration profile is from 1 to 9, the value is higher means the DEC time is shorter, usually choose 5.

	“Start”key
	Press  key and the green start indicator is flashing. When the centrifuge reaches the set speed, the green indicator always light on.

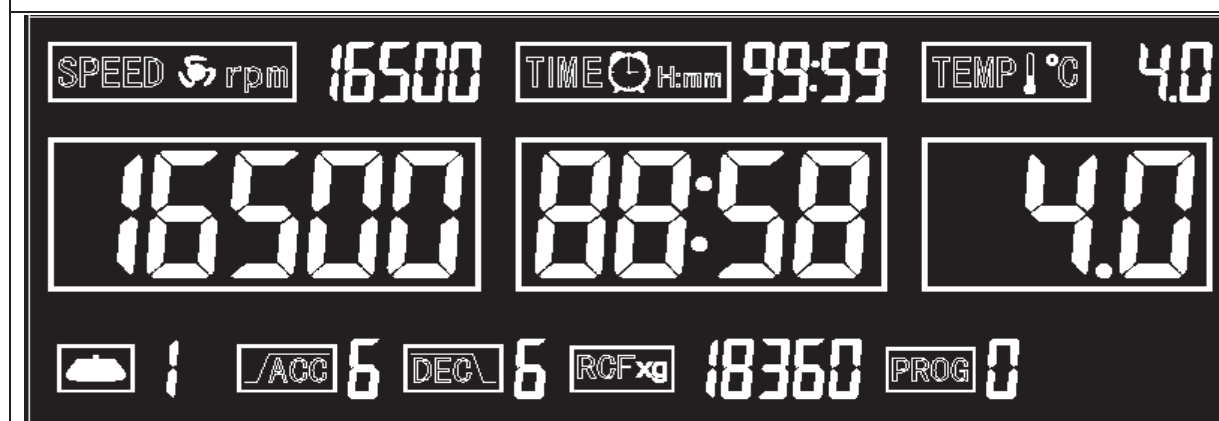
	“Stop” key
	When the centrifuge is working (the time isn’t counted down to “0”), press  key to stop it by manual and the red stop indicator is flashing.
	When the centrifuge is in the state of rest and rotor does not run (but the centrifuge is power on), press  key to open the door lid.
	When it shows an error code on display window, press  key to clear the error code.

	“Program” key
	With  ,  ,  ,  keys together to realize program storing, using and modifying.

 	“Increase/Decrease” key
	Press  to increase the setting parameter value.
	Press  to decrease the setting parameter value.

	“Confirm/Enter” key
	Press  key to confirm the setup parameter value. Usually after pressing  key to set rotor number, speed, time, ACC/DEC profiles, press  key to confirm all parameters. If you do not press  key, and then the setup parameters would be invalid.
	“Pulse/Shortrun” key
	◆ Press the  key and hold on, then the centrifuge will run swiftly; Release the  key, the centrifuge will stop automatically.

LCD display window meaning



	Speed setup display window, to display the setup speed
	Real-time speed display window, to display the running speed.
	Time setup display window, to display the setup time.
	Running time display window, to display the running count-down time.
	Display the setup temperature parameter, unit: °C
	Display the running temperature parameter, unit: °C
	Rotor number display window, to display the setup rotor number
	Acceleration profile display window, to display the setup ACC profile.
	Deceleration profile display window, to display the setup DEC profile.
	Relative centrifugation force display window, to display the corresponding RCF during operation
	Program display window, to display the program number for current running parameters.
	Error/default code display window: only when the system is failure, the window and error code would be displayed.

2.5.4. Programming Operation

Programming operation instruction		
State	Display window	Function Description
Storing		◆ Program storing: In the stopping status, press key once and the “” value flashes (character will not flash), then press or to select the preset program number (preset programs are 1 to 25, total 25 programs). At last must press to confirm the current settings. Otherwise, it will automatically cancel the setup after 5 seconds.
Using		◆ Program using: In the stopping status, press key twice and the “” value and character flash simultaneously, then press or to select the stored program number (preset programs are 1 to 25, total 25 programs). At last must press to confirm the program selection. Otherwise, it will automatically cancel the setup after 5 seconds.
Modifying		◆ Program modifying: Refer to setting parameters instructions, press key to set rotor number, speed, time, temp, ACC and DEC profiles, and then press to confirm and the current program will automatically be stored at “”. If press in the status of parameters not being modified, “” digital value will flash (but the character will not flash) and press or to select the modified program number. At last press to confirm. The current program will automatically be stored to “PROG XX” (XX is 1 to 25, no more than 25 programs).

2.5.5. Centrifugation Modes Selection

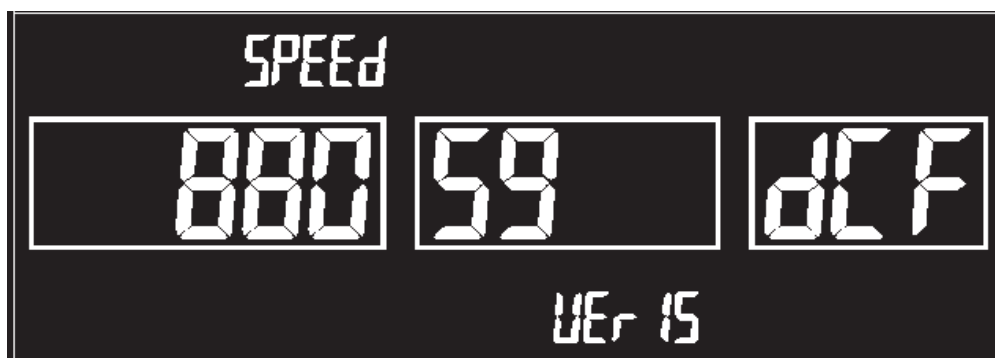
Centrifugation Modes Operation		
State	Display window	Function Description
Timing		◆ Press the  key and set  time as any value between 00:01~99:59(Timing operation mode), and then press  key to start centrifuge and the start indicator light is on. The value on running time window is the countdown centrifugation time (from XX: XX to 00:00, the time unit is minute:second). When time is counted down to “0”, the centrifuge automatically slows down and stops running. When the speed is 0 r/min, the buzzer will tweet and the [STOP] indicator light is on.
Short-run		◆ Press  key, and set  time as any value between 01:00~99:59. Press  to start the centrifuge. The “” shows on time setting window and the [START] indicator light is on. The cumulated centrifugation time (increase from 00:00) is displayed in the running time window (the time unit is minute: second). When release the  key, the centrifuge automatically slows down and stops running. The [STOP] indicator light is on.
Continuous		◆ Press  key, and set the  time as “A0:XX” (continuous centrifugation mode) by press . Press  to start the centrifuge and the [START] indicator light is on. The setting display window shows “”. The cumulated centrifugation time (increase from 00:00) is displayed in the running time window (the time unit is minute: second). When press  key, the centrifuge automatically slows down and stops running. The [STOP] indicator light is on.

2.5.6. Timing Modes Selection

The timing modes is defaulted on countdown timing once START key pressed when instrument leaving factory. If require starting timing until reaching the setup speed, you can realize it by following operation.

How to realize timing until reaching the setup speed: Before the instrument power on press  key and hold on, and then switches on. 5 seconds later release the key. Thus you can realize the mode of timing until reaching the setup speed.

Timing modes check (Timing until reaching the setup speed): When the instrument power on and stand by, as well as the speed is zero, press  and hold on. The LCD display window shows “**SPEED**” on the speed setting window, which means countdown timing until reaching the setup speed. Otherwise, it shows “**START**” which means timing once START key pressed.



How to realize timing once START key pressed: Before the instrument power on press  key and hold on, and then switches on. 5 seconds later release the key. Thus you can realize the mode of timing once START key pressed.



Timing modes check (Timing once START key pressed): When the instrument power on and stand by, as well as the speed is zero, press  and hold on. The LCD display window shows “**START**” which means timing once START key pressed.. Otherwise, it shows “**SPEED**” on the speed setting window, which means countdown timing until reaching the setup speed.

2.5.7. Operation Steps

1. Rotor and tube inspection: Before operation must carefully inspect the rotor and tubes.



It is forbidden to use cracked and damaged rotor, tubes, which may cause instrument damage or personal injury.

2. Rotor installation:
3. Hold the rotor bottom by both hands and install the rotor on the motor shaft correctly. Then hold up the rotor steadily (not shaking) by one hand, and put the T-shaped inner hexagon spanner into the rotor center by another hand. In the mean while turn the spanner for 3 to 6 rounds in clockwise direction until the rotor clamps the rotor base. Make sure that the cone of the rotor must mate with the cone of the motor shaft properly. See

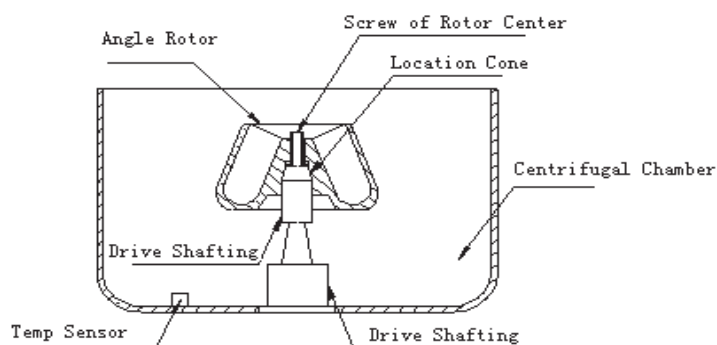


Figure 2.5-7

Figure 2.5-7 Rotor installation

4. Adding liquid and placing the tubes:

Adding liquid into the tubes with the same weight and check their weight by balance. And then place them in the rotor symmetrically. The tubes must be placed central symmetrically. The two tubes central symmetrically placed must be with the same weight. Otherwise, there will be vibration and noise because of imbalance.

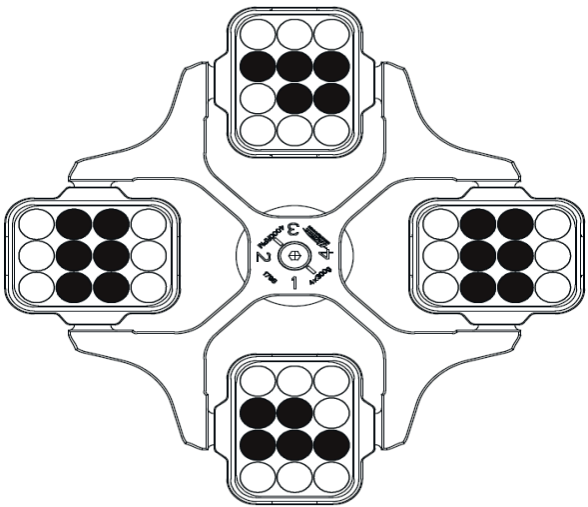
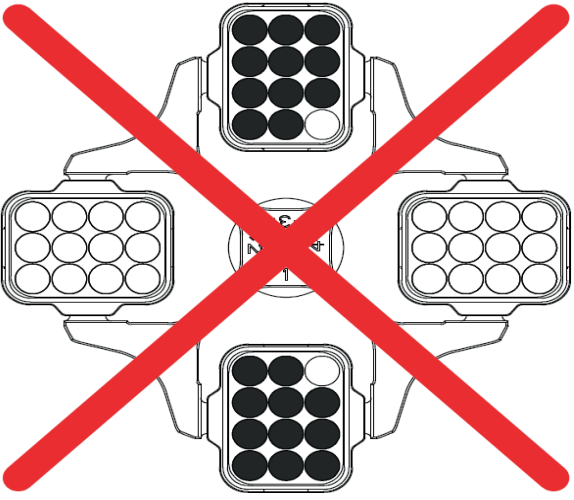
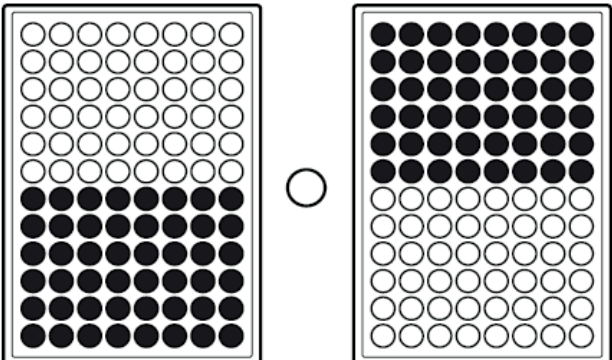
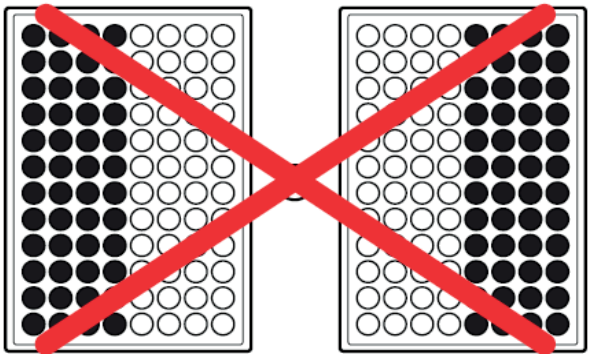
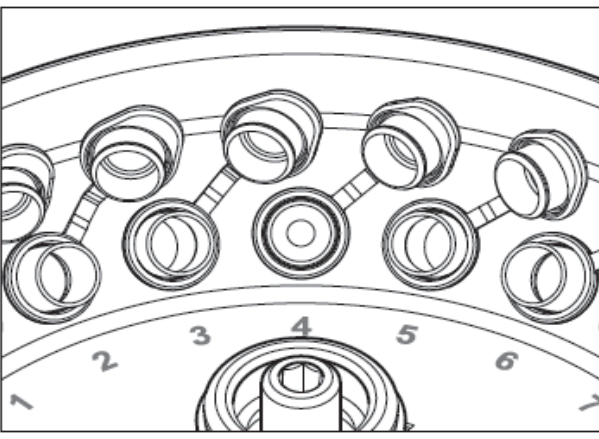
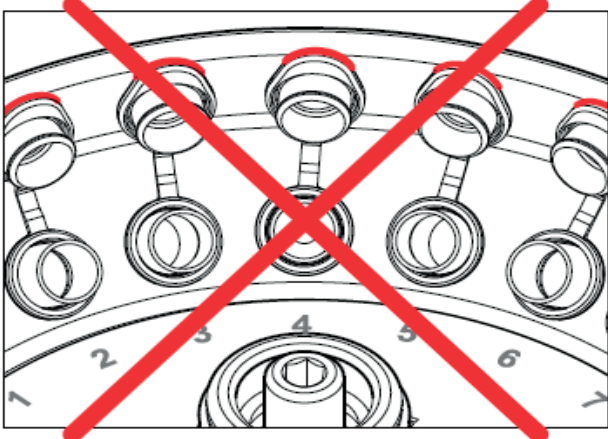
When placed all loads, if the rotor has lid, please rotate and tighten the lid.

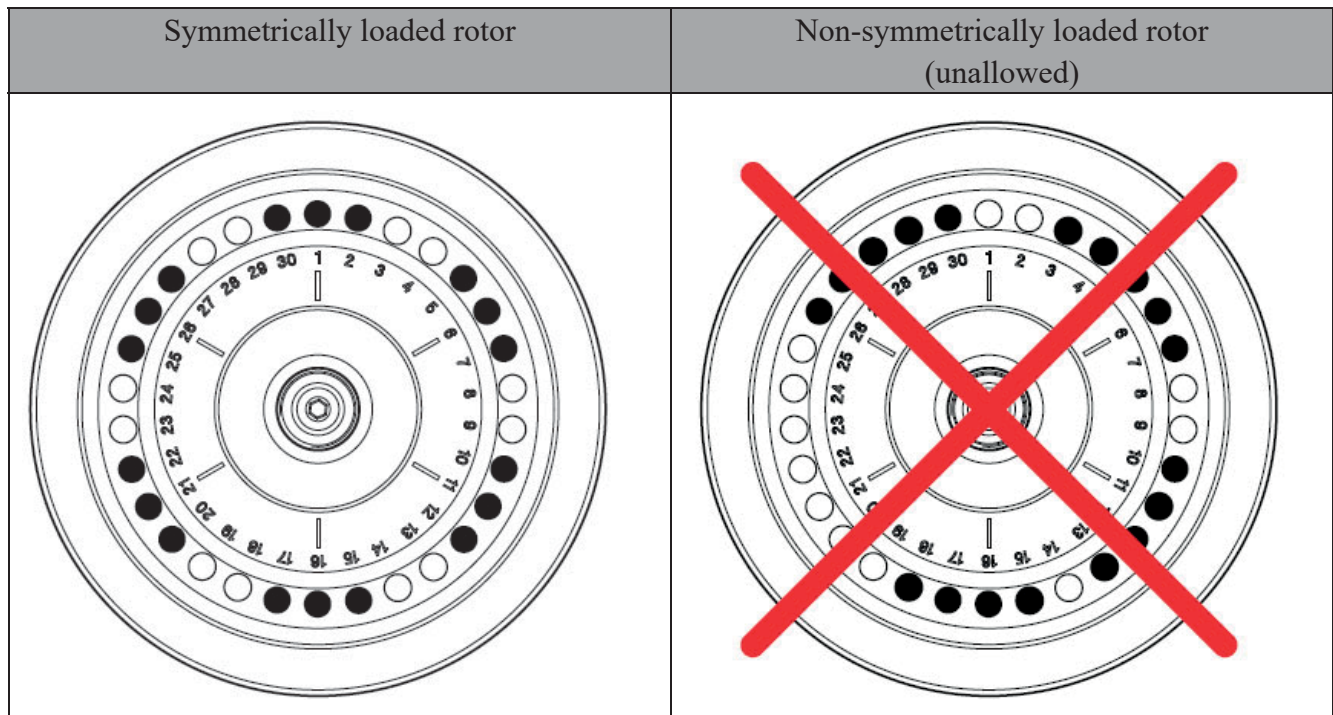
Check whether the rotor is installed properly and tightly.

☐ ☐ All cavities in the swing rotor must be loaded with the same type tubes. The rotor form has marked what kind of tube capacity can be loaded in which rotor. Please load the tubes on the corresponding rotors according to the rotor specification form.

Some swing rotors can equipped with different brackets or buckets. These accessories only be allowed to use in the specified rotor yoke.

☐ ☐ Swing rotor and tubes must be placed symmetrically. Tubes must be placed in the buckets in even. Refer to “Available Rotors” form for allowable combination. For angle rotor, all cavities also must be loaded.

Symmetrically loaded rotor	Non-symmetrically loaded rotor (unallowed)
	
	
	



In some buckets it marked the max. Load Weight or its max. Load Weight with the whole set of buckets. Do not over the limit. For exception, please refer to “Attention for Setting Max. Speed”. Max. Load weight includes adaptors, buckets, tubes and the total weight of load materials. If there are rubber pads under the tubes, each tube must has the same pads with the same quantity.

- ☐ ☐ It is not allowed to add liquid in centrifuge chamber.
- ☐ ☐ While adding liquid in the tube must be careful to avoiding spill the liquid in the chamber.
- ☐ ☐ Do not excess the max. load specified by tube manufacturer.

Make sure that the sample height in tubes is almost equal. Try the best to mini the weight tolerance.

Note: Do not excess the max. imbalance tolerance. For high speed centrifuge the tolerance of each tube weight with liquid must be less than 0.5g.

5. Close the door lid: Press down the door lid until you hear “clicking” sound which means the door lid pin enter into the hook. Then lift the door lid by hand to check whether it is closed properly. If the door lid cannot be opened, it means it is closed properly. If press

the  key and centrifuge cannot run, the buzzer will tweet and the default window displays  error code which means the door lid is not closed properly.

Press  key to clear the error show, and close the door lid properly again.

6. According to the operating instructions to set rotor number, speed, time and ACC/DEC profiles etc.

7. Start and stop operation



Warning: Before inspect the chamber and take out of all materials except for the rotor, do not start the centrifuge. Otherwise, the centrifuge may be damage.



Warning: It is forbidden to run the rotor exceed of its max speed, because overspeed may cause instrument damage and even the personal injury.

- a) Press  key to run centrifuge and the [START] indicator light is on.
- b) Automatic stop: When time is counted down to “0”, the centrifuge automatically slows down and stops running. When the speed is 0r/min, the buzzer will tweet and the [STOP] indicator light is on. At this time, you can unlock the door lid.
- c) Stop by manual: In the running status (the working time isn’t counted down to “0”), press  key to slow down and stop running. The buzzer will not tweet, and the [STOP] indicator light is on. When the speed is 0r/min, you can unlock the door lid.

8. Take out tubes: When the rotor stops spinning, press the  key to open the door lid (it is forbidden to open the door lid which the rotor is still spinning). Then take out tubes.



Note: During operation if the power failure leads to the electric lock not triggering and the door lid not open. Please wait the rotor coasting to 0rpm, and then pull the emergency door release string to open the door lid.

9. Uninstall the rotor: Unscrewing the bolt with T-shape spanner. Lift and take out the rotor.
10. Power off: After finished centrifugation, press down the power switch on the back of the centrifuge, and plug out the power cord after power off.



Don't hold up or move the centrifuge during operation.



Don't open the door lid when rotor is spinning.



Every day take out the rotor after finishing the last operation

Chapter 3 Maintenance

- ◆ If it is leaving unused for long time, please take out the rotor of the chamber. Then wipe up the rotor with neutral cleaning mixture and stock it at dry and ventilated place. The motor shaft should be smeared with some lubricating oil for protection.
- ◆ All action on rotor (Install and take out) should be soft, and rotor should be taken out vertically. Avoid falling the rotor to damage the shaft.
- ◆ In routine maintenance process use neutral cleaning mixture to clean the chamber and wipe up the water.
- ◆ Regularly inspect the rotor whether it is corrosive or cracked etc. and replace it in time.
- ◆ Every day after finishing the last operation, wipe up the condensation water in the chamber and keep it dry.

Chapter 4 Common Troubles and Troubleshooting Method

4.1. Common Troubleshooting Method

During operation, maybe there are following failures, please refer to following methods for easy troubleshooting.

◆ Power on but no display

- 1) Check whether the input power is accordance with centrifuge rated voltage by multimeter. If it is the power problem, check and troubleshooting.
- 2) Check whether the power cord is connected with the mains jack. If it is loosen and not connected properly, check and troubleshooting.

◆ Loud noise or abnormal vibration

- 1) Check whether symmetrically placed tubes are with same weight. If the weight does not meet the tolerance requirement, please balancing weight again and make sure symmetrically placed tubes with the same weight.
- 2) Check whether the tube is broken or no. If it is, clear the rotor and place it with the same weight tube.
- 3) Check whether the tubes are symmetrically placed in the rotor. If not, please place them symmetrically.
- 4) Check whether the centrifuge is placed on a steady platform in level and the stress on four foot is in even or not.
- 5) Whether the rotor is bend or not. Whether the ground is stable and there is strong shock around.
- 6) Check whether damping absorber parts are damaged or not. If it is, replace them. (Please conduct under the instruction of professional service engineer.

◆ **Poor refrigerating effect**

- 1) Whether the environment temperature is too high. If it is, please lower the environment temperature by related device. Whether the chamber temperature is higher than the temperature setting range of the centrifuge.
- 2) Whether the centrifuge is installed too near the wall.
- 3) Whether the heat sink in condenser is blocked by dust or condensing fan is broken and not run.
- 4) Whether the coolant in refrigerating system is leaked and interfused with air or the refrigerating pipeline is blocked and broken.
- 5) After reparation the quantity of refrigerant pumped in is too much or less, or not meet the requirement.

◆ **Centrifuge not work**

- 1) Check whether connecting terminals is connected with circuit board properly and the connection is loose or not. If it is, please fasten the connection wires properly.
- 2) Check whether the input/output voltage is correct with multimeter. If the power supply transformer is broken, please replace it with the same model and specification transformer.
- 3) Check whether the motor is energized with multimeter. If the motor is energized but not rotate, it means the motor is damaged and replace it.
- 4) If the motor can rotate but the rotor does not spin, please check whether the rotor is installed correctly. If no abnormal on the rotor, please contact our service engineer.

For above four failures, please contact the local agent or our company directly, and do troubleshooting under professional engineer's instructions.

4.2. Trouble Code and Troubelshooting Method

◆ Imbalance protection failure

Diagnostics: During operation if the vibration amplitude caused by imbalance exceeds a certain limitation value, the system will automatically enter into protection state by automatic shutdown and show



on the display window. Troublshooting flows refer to figure 4.2-1

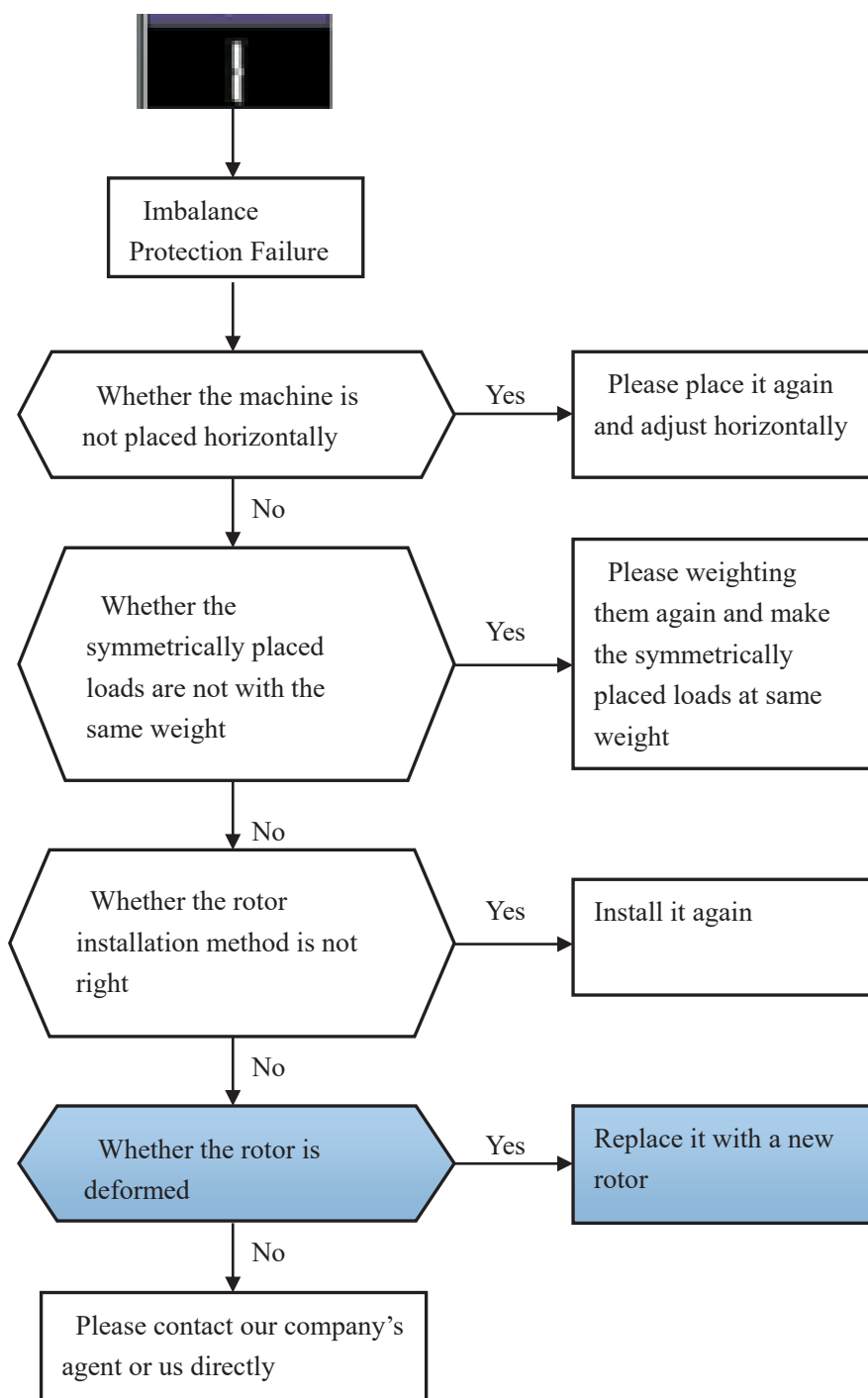


Figure 4.2-1 Imbalance Failure Troubleshooting Flows

◆ Over-temperature protection failure

Diagnostics: When actual temperature exceeds the maximum allowable temperature 50°C or the temp sensor is broken, the system will automatically shut down and while it shows error code

“2” in the display window. Troubleshooting flows refer to figure 4.2-2

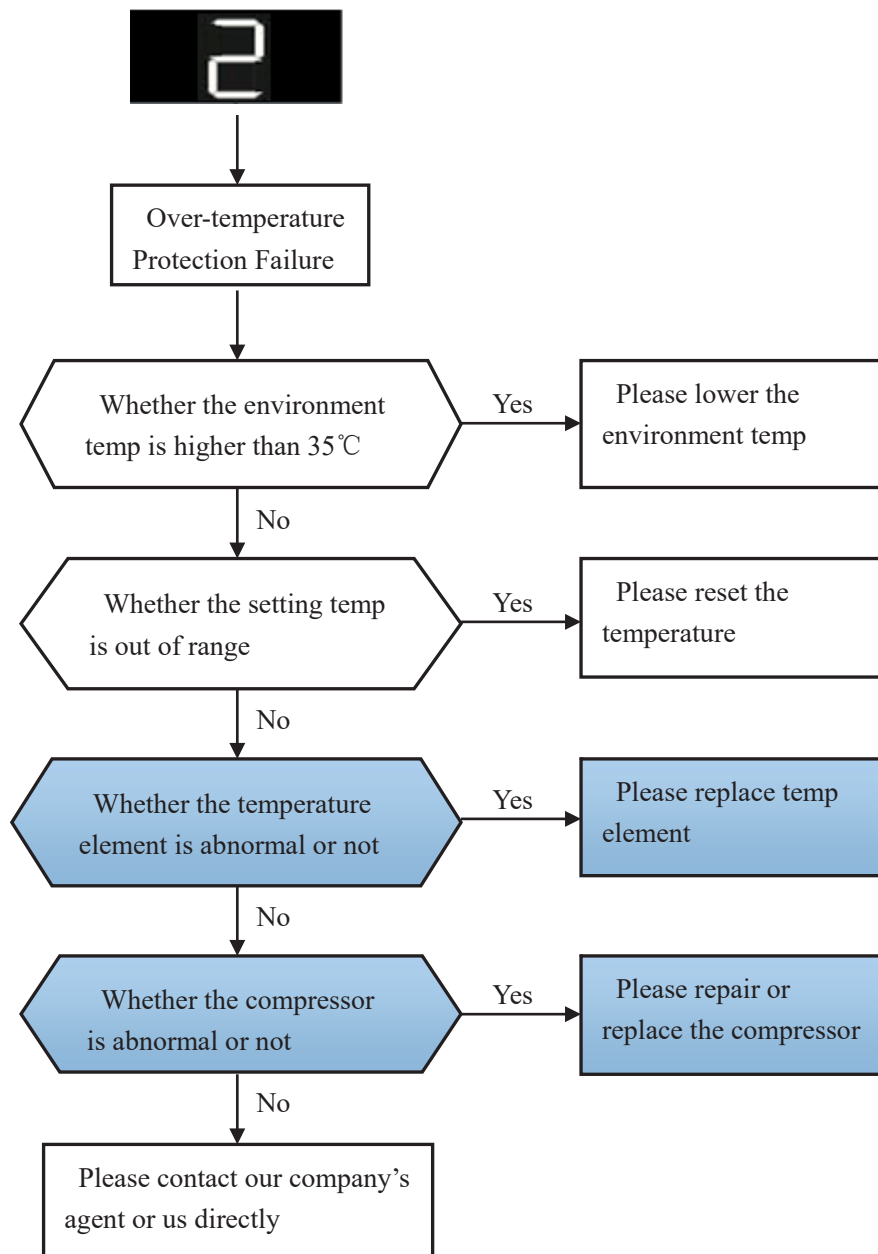


Figure 4.2-2 Over-temperature Failure Troubleshooting Flows

◆ Rotor Protection Failure

Diagnostics: When the centrifuge is started, the system will identify the rotor number automatically while the speed is below 300rpm. If the rotor number is not same with the setting, the system would automatically shut down. In the display window, it shows error code“4”. Troubleshooting flows refer to figure 4.2-3

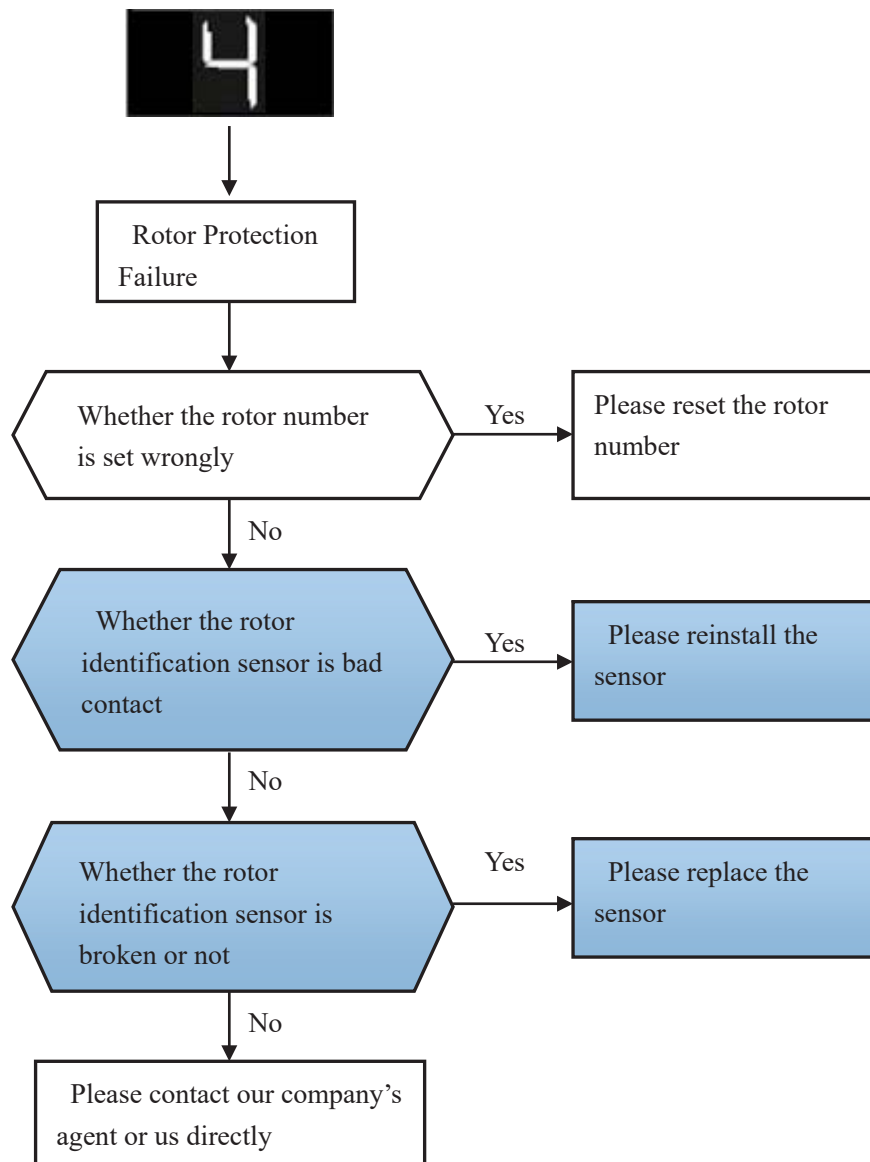


Figure 4.2-3 Rotor Failure Troubleshooting Flows

◆ Door Lid Protection Failure

Diagnostics: As centrifuge belongs to high speed running equipment, if door lid is not closed, system will not be able to start; if we forced to open the door during the process of operation, the system will automatically stop and at the same time in the display window it will show error

code“5”. Troublshooting flows refer to figure 4.2-4

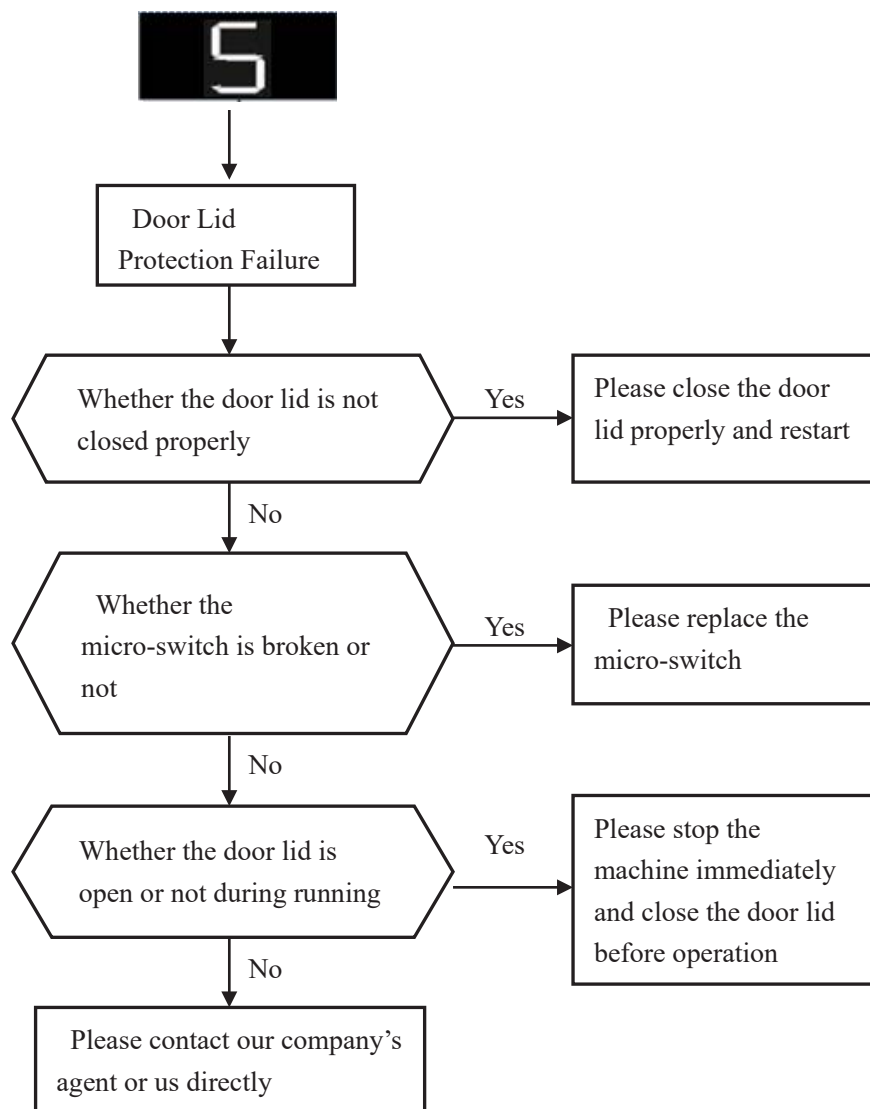


Figure 4.2-4 Door Lid Failure Troubleshooting Flows

◆ Overspeed Protection Failure

Diagnostics: When the setting speed exceeds the allowable speed of related rotor, the system shall not work; When the speed is over the setup speed by 500rpm during centrifuge operation, the system shall stop automatically and show error code “E” on the display window.

Troubleshooting flows refer to figure 4.2-5

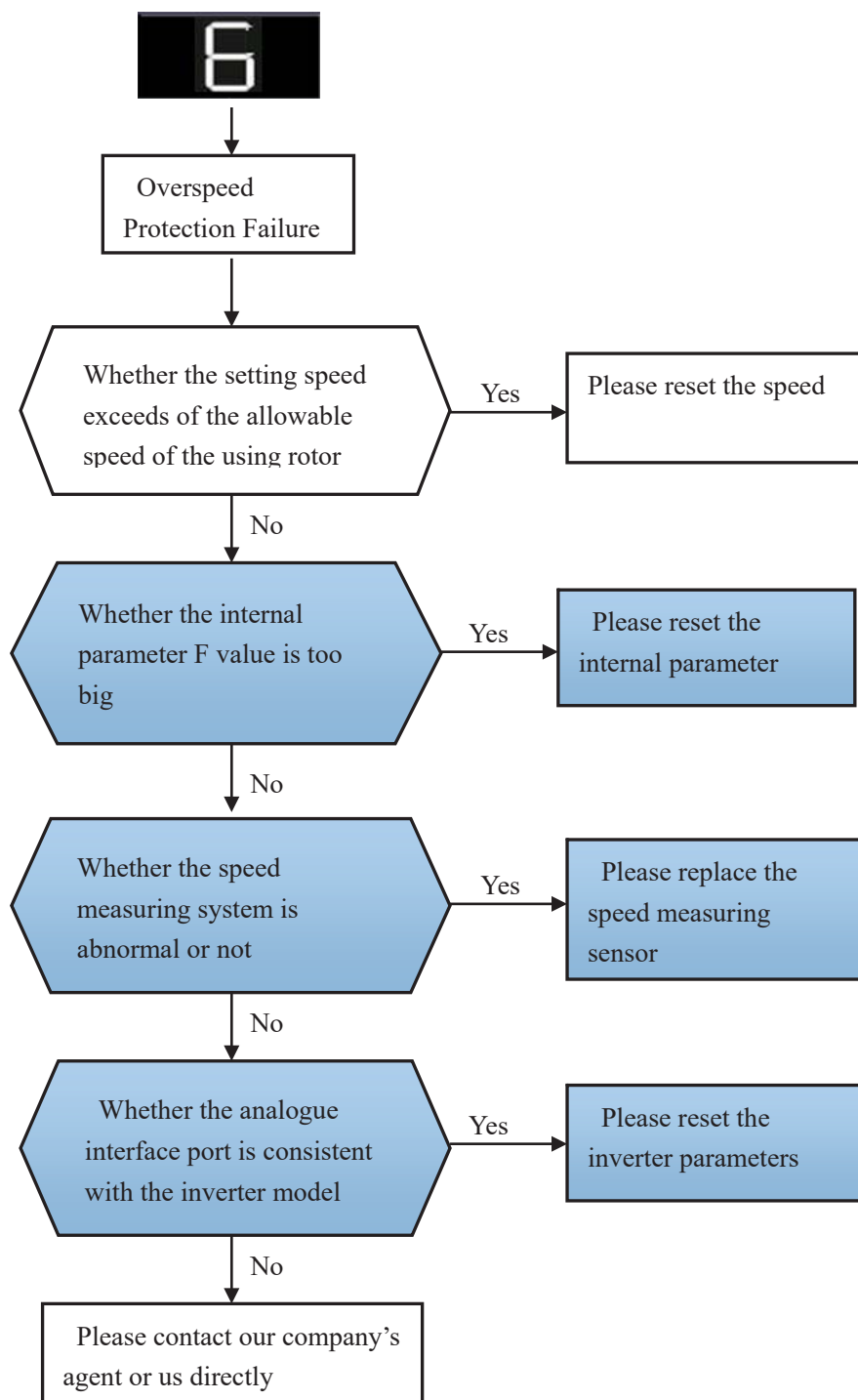


Figure 4.2-5 Overspeed Failure Troubleshooting Flows

◆ Speed Measuring Protection Failure

Diagnostics: When speed measuring is failure, the system shall not stop and only show error

code “” on display window. Troubleshooting flows refer to figure 4.2-6

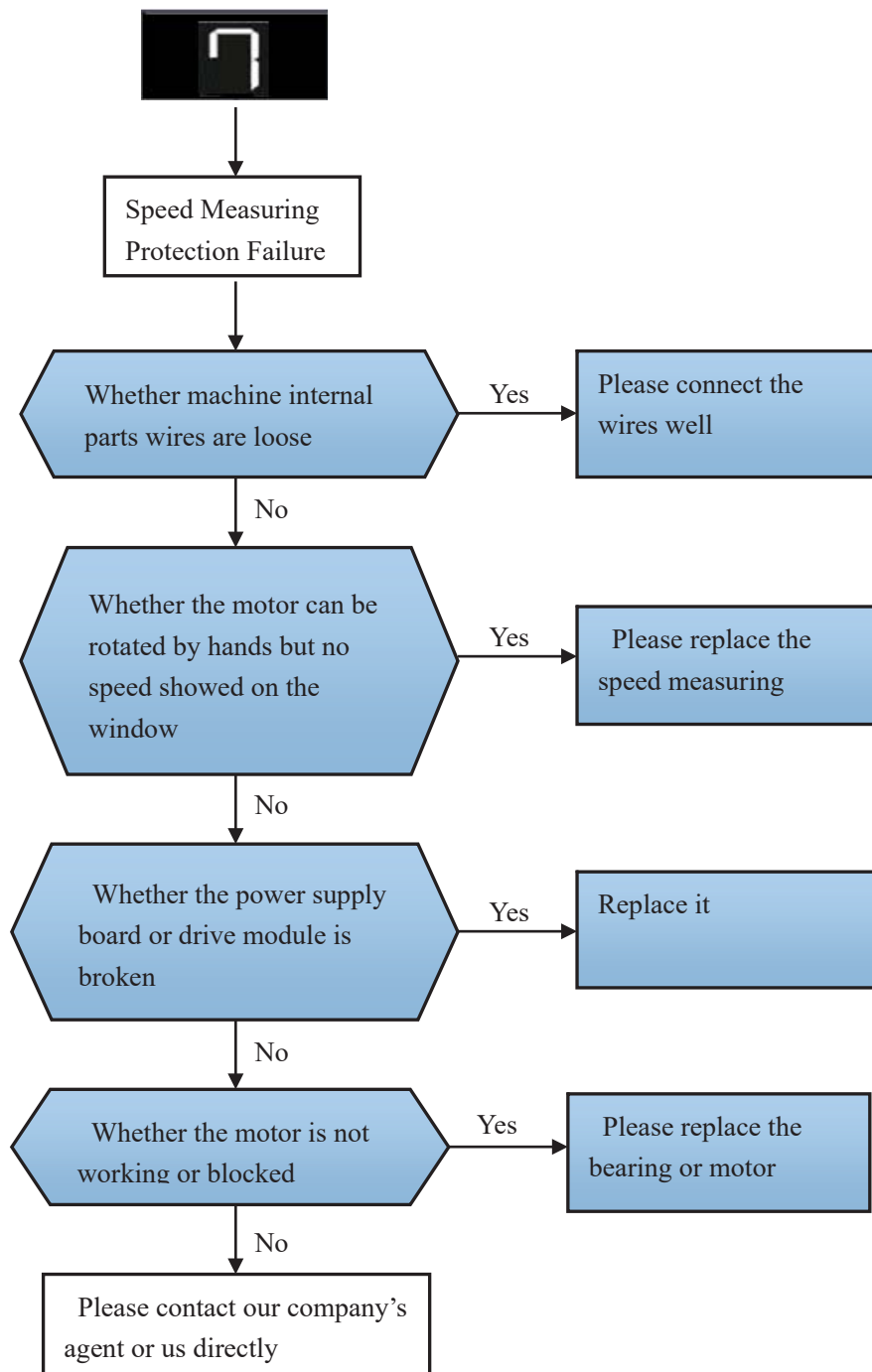


Figure 4.2-6 Speed Measuring Failure Troubleshooting Flows

◆ Mal-operation Protection

Diagnostics: If the mal-operation fault code shows before starting centrifuge, the system shall not work; if the mal-operation fault code shows during centrifuge operation, the system shall consider it as invalid setting; if press START key during stopping situation (Deceleration), the system shall consider it invalid operation and show error code “8”. Troubleshooting flows refer to figure 4.2-7

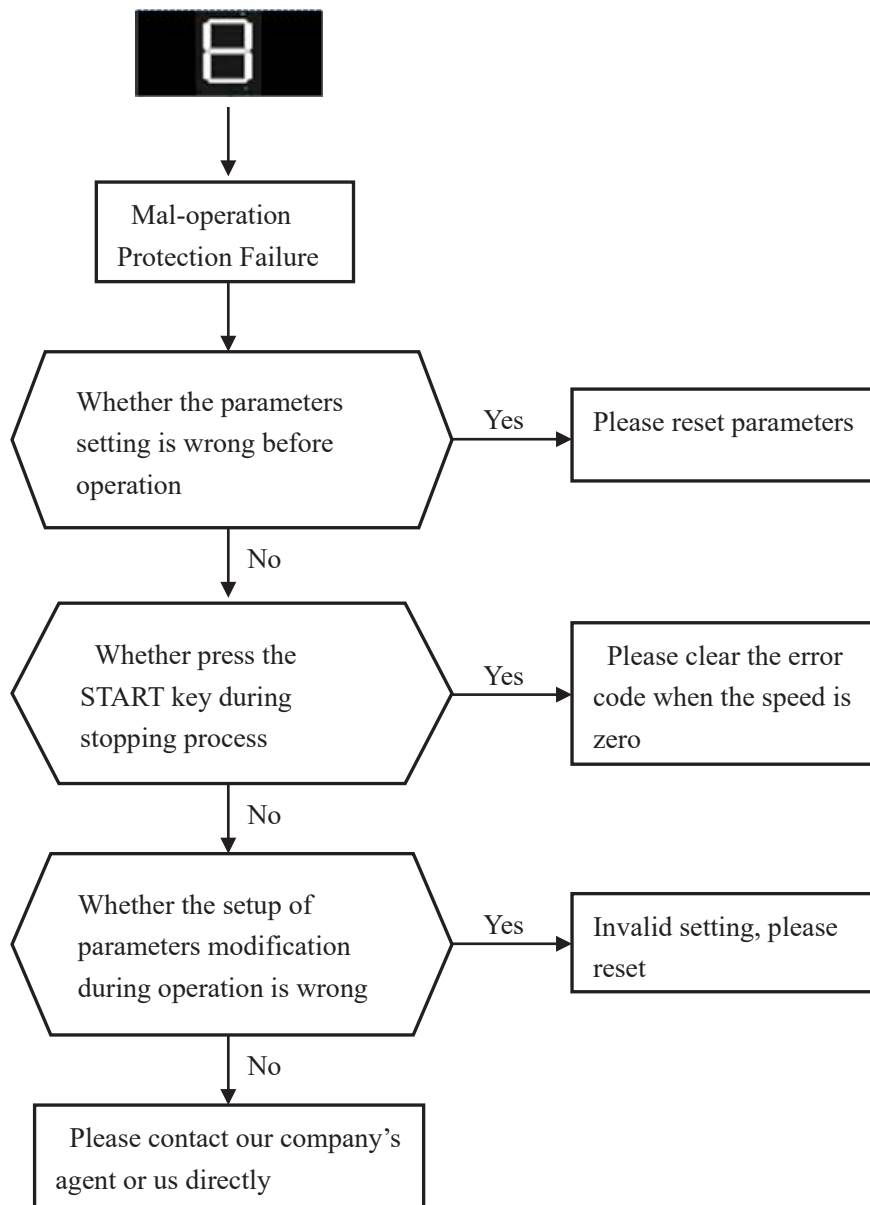


Figure 4.2-7 Mal-operation Failure Troubleshooting Flows

◆ Inverter Protection

Diagnostics: When inverter is failure, the system shall not start and show error code “9” on the display window. Troubleshooting flows refer to figure 4.2-8

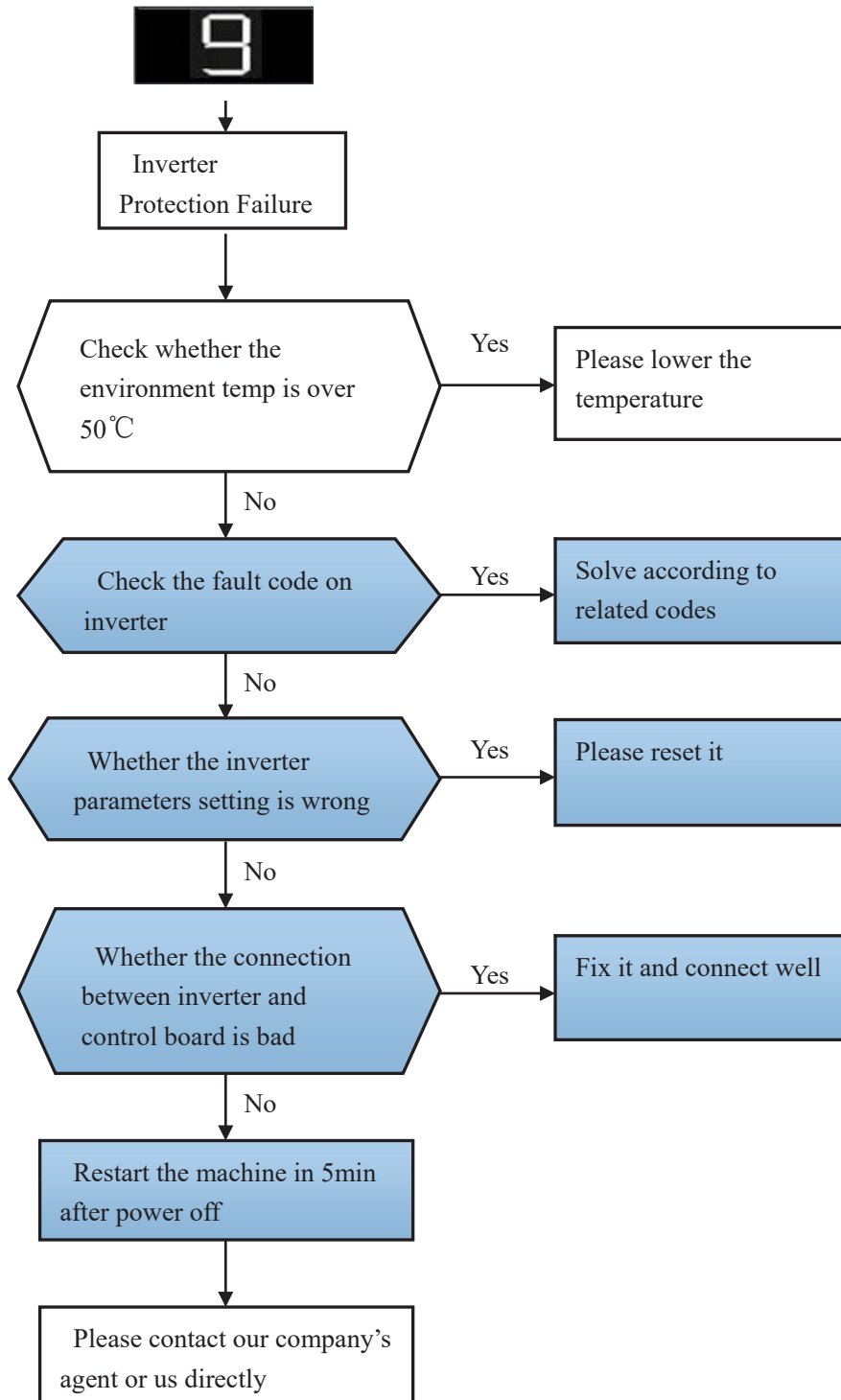


Figure 4.2-8 Inverter Failure Troubleshooting Flows

Note: For the failure with color fill, please ask for service help. You can contact with the local agent where you purchase the centrifuge or contact us directly, and do troubleshooting under professional engineer's instructions.

If there are other failures during operation, which make the centrifuge not working normally, please contact with the service office designated by our company.

Chapter 5 Transportation and Storage

◆ Transportation

- 1) You should use the wooden case and carton during long-distance transportation. Put centrifuge with dust helmet into the case, and fill with foam or plastic shock absorption materials. It is forbidden to be hit, inverted, and rolled, avoiding big vibration, rough handling, inverted and tilted.
- 2) You can directly move the centrifuge in room for short distance, but avoid big vibration, hitting, inversion and tilting.

◆ Storage

- 1) If it is leaving unused for long time, the centrifuge should be stored in ventilated, dry and clean room where no corrosive, flammable and explosive matters is.
- 2) If the centrifuge is unused for a long time, please try the best to pack it with the original packages.
- 3) If the centrifuge is unused over one week, you should take out the rotor, and then clean it with neutral cleaning mixture in time and wipe up with cloth.

Version No.: V5.0.0

After-sales Service and Warranty

Attentions

Respected customers,

Thank you for purchase of our company's products. To protect your legal rights and avoid your worries, we provide warranty service for one year with the main machines. If it is broken under warranty with inartificial reason, we will supply free maintenance service. The customer needs to pay an amount of money if the product has exceeded the warranty period. We will not supply free maintenance if any following matter is happened:

- Exceed of the warranty period or without the warranty card.
- The trouble is caused by wrong installation, operation and maintenance.
- The trouble is caused by the unauthorized uninstalling and repairing by our company.
- The trouble is caused by using the rotor not equipped with this centrifuge.
- The trouble is caused by war, natural disasters or other irresistible factors.

If you have any questions to consult during operation, or there are faults need repairing on the product, please contact us by e-mail or phone. We will reply your feedback in time.

Packing List

No	Name		Quantity	Unit	Remark	Check
1	Main machine (LCD)		1	set		
2	Option of rotor	Swing rotor 4×750ml	1	pc		
3		Adaptor 4×250ml	1	set		
4						
5						
6						
7	Attached tool	6mm T-shaped inner hexagon spanner	1	pc		
8						
9						
10						
11	Attached file	Packing List	1	copy		
12		Instruction Manual	1	copy		
13		Qualified Certificate	1	copy		
14						

Inspector:

Date:

Quality Certificate

Product Name: Tabletop High Speed Refrigerated Centrifuge

Product Model: H2050R

Serial No.: _____

This product is tested and qualified for delivery.

Inspector:

Date:

Warranty Card

(Filling in maintenance record under warranty)

Name and Model			
Serial Number		Manufacturing Date	
Date	Maintenance Content		Service Engineer

Note: Please safekeep this card

Date: Dec., 2013

Users Feedback Card

Product Name			
Model		Serial Number	
Manufacturing Date		Purchasing Date	
User's name (Signature and Stamping here)			
Contact Address:			Contact Person:
Tel.:	Fax:	E-mail:	
Suggestions and feedback on this product:			