AIXIN MEDICAL USER MANUAL

AX-ZL5

Vacuum Casting Machine (Water Cooling)

Introduction:

The AX-ZL5 Medium Frequency Vacuum Casting Machine (water cooling) is a high-end equipment in dental laboratories. It is upgraded from the older medium and high frequency casting machines. This unique machine is designed and developed with our own patent technologies. It is now the only vacuum casting machine with patent in China. The advantages are: small size, light weight, easy operations, no radiation, less electricity consumption and the machine can be used on electric outlets in general homes.

Γ	
Power supply voltage	AC 220V / 110V ±10% 50HZ / 60HZ
Power	2.5KW
Maximum amount of molten metal	About 50g (cobalt/chrome alloy)
Melting duration	30g (cobalt/chrome)≤60s (standard)
Casting radius	210mm
Centrifugal rotational speed	500rpm
Casting method	Horizontal centrifugal casting and melting
Motor power	0.37KW
Cooling method	Water cooling
Vacuum pump	220V/50HZ
Water pump	220V,50HZ,30W,10L/min
Vacuum duration	≤1min
Dimensions	68×53×90cm ³
Weight	120kg

Specifications:

Circuit Diagram:

The medium-frequency casting machine has an all-transistor circuitry, the circuit diagram is below.



It consists of the following elements in the return circuit: transformer, voltage selector, rectifier filter, amplifying of medium frequency fluctuating power, over-heat protection, operation indications.

The process includes the following procedures:

single phase power supply goes through a transformer and a voltage-selector, choose the suitable voltage according to the material and weight of the alloy. The amplified medium frequency which

is applied to the work coil melts the alloy. There is a temperature measurement device which can prevent over-heating by operating the return circuit. And by operating the return circuit, it can also control the melting and casting process.

Installation:

- Power supply: single phase power supply (the electric capacity should be above 2.5KVA, voltage 220V±5%, 50HZ). If the voltage exceeds the range, a voltage regulator should be added, the capacity of the voltage regulator ≥3KVA.
- The area of the cross section of the copper power supply wire ≥2.5 mm². It should be installed independently, power distribution, 20A above, voltage 400V, one-way miniature circuit breaker (for example, D20 type).
- 3. The electric resistance of the ground protection device should be $\leq 4\Omega$. There should be a safe ground connection to ensure the safety of the users.

4. Note: this equipment can't connect the leakage protector, otherwise it will cause tripped.

Instructions:

Read the instructions carefully before using. Please operate strictly according to the operation procedures, to assure the safety of the users.

Before using, tank must be added enough water! Check the temperature condition in the water regularly.

First time using the machine, you have to dismantle the right panel of the machine and open the two valves which at the inlets and outlets of the vacuum pump(we have closed two valves for transportation safety)

<u>Normal use</u>

- Turn on the power, the fan and water pump should start working. Choose the right voltage on the Voltage Selector (readings showed on the AC voltmeter) according to the material and its weight. Choose Third Grade (about 180V) for melting 30g of alloy, and choose Second Grade if the weight increases by 10g. The voltage cannot exceed 195V (normally keep the voltage between 175V and 185V).
- 2. Rotating the centrifugal frame, with mechanical positioning, turn to the vertical position of the front of the equipment and ensure the crucible is in the center of the working coil after rising it.
- 3. Open the vacuum box. Choose the casting frame according to the size of the casting rings (big casting ring does not need it). Make the extrance of the crucible align horizontally with the sprue of the casting rings. Put the metal in the crucible
- 4. Put the preheating moulds safely in the bracket. Lock the cover of the vacuum box.
- 5. Loosen the pressure nut on the centrifugal frame. Make balance and lock with the counterweight nut. Then rotate pressure nut and tighten the centrifugal frame and postion it. Close the lid of the machine. The door indicator and position indicator are on at present.
- 6. Pressing "vacuum" button, vacuum pump is operating. Vacuum finished while it stays around0.9. If it cannot get vacuum in a long time(more than 1 minute), it says that the machine

has discouraged parts or vacuum pump is faulty. It has to stop working. After repairing, you can just do or continue do it. It has no impact of casting and melting, only effecting on the oxidation degree.

- 7. Press "argon" key after vacuum. Vacuum stopped, and argon injected.
- 8. Vacuum gauge is back to zero. Press "melt" and it stop injecting argon and starts melting. Crucible rises first. Then coil is charged with electricity to melt metal. The melting current is about 10A and cannot exceed 15A. Or the machine should be turned off to check.
- 9. Observate the melting from the the window. When all metal melting, press "casting" button immediately. Crucible drops first, then centrifuge. For safety, lock the door with electric plug lock. Centrifuge spins about 5-8 seconds, then press the "stop" button and the centrifuge is power off. The centrifugal frame is continue rotating because of inertia.
- 10. After centrifugal frame fully stopping. Open the lid of the machine after loosing the electric plug lock. Open the vacuum box, and take out the cast rings. The casting and melting process is completed

Note: Before working, the centrifugal frame have to be balanced, then lock it ! Or it will cause damage to the machine

Crucible being up and down

1) Melting metal or doing no-load test, coil must be above. Coil should be around the crucible While centrifuging, coil must be beneath and away from the crucible.

2) There are two ways of coil being up and down:

A) automatic: In the "normal operation", press "melting" button, the coil is up; Press "casting" button, coil is down.

B) manually: Press UP button, coil is up; Press DOWN button, coil is down. Manual lifting button is on the right of the inside machine .

C) note: while making coil rise. You have to the adjust position of the centrifugal frame to ensure woking coils never touch crucible and centrifugal frame.

D) note: When coil is up, if rotating centrifugal frame, you have to ensure that the centrifugal frame and crucible never touch the coil

Diagram:

Controlling system



- 1) Power switch: ON indicates the machine is connected to the electrical outlet, OFF indicates the power is cut down.
- 2) Voltage Selector:

Rotary Voltage Selector: it has 6 grades, from the first grade to the sixth grade, the power decreases. The second and the third grades are used for melting high-melting metals like cobalt/chrome alloy. The forth and fifth grades are used for melting medium-melting alloy. The sixth grade is used for experiments. Choose the right voltage on the Voltage Selector, for example, for melting high-melting metals, the third grade is normally used, but if the voltage is too high or too low it cannot reach the required 180V-185V, when this happens users should choolse the grade according to the voltage.

- 3) Door indicator. When the lid is closed, the indicator is on; while open, the indicator is off.
- 4) Position indicator: Position the centrifugal frame vertically. The position indicator is on while lid closed
- 5) Chosen voltage: indicates the alternating voltage needed for melting.
- 6) DC voltage: indicates the DC voltage needed for melting
- 7) DC current: indicates the DC current of the melting.
- 8) Vacuum gauge: shows the vacuum pressure in the vacuum box.
- 9) Melt button: after pressing this button, the medium-frequency vibrating circuit is activated, and the machine starts to melt the alloy.
- 10) Cast button: after pressing this button, the centrifugal system stops, and the melting alloy is casted in the mould in the centrifugal process.
- 11) Stop button: after pressing this button, the centrifugal system or the melting system stops

12) Vacuum button: after pressing this button, the vacuum system is activated

- 13) Argon button: after pressing this button, the machine starts to fill argon
- 14) Observation Window: observing the state of the casting and melting
- 15) Power indicator

For adjustment and maintenance of coil position, there are two buttons in front of the inside panel.

1. The coil UP button:press this button, the coil is up while it is beneath. It can be inching and continuous.

2. The coil DOWN button: press this button, the coil is down while it is above. It can be inching and continuous.

While using the two buttons, don't allow to press the buttons of melting, casting on the panel. Coil must be adjusted to the bottom while finished

16)

Cautions:

- 1. After the machine's first installation, long distance delivery, maintenance, long-time idle, running the Empty test is recommended before using to ensure the safety of the users.
- 2. Adjust the balance weight to make it balanced, tighten the balance weight nuts to avoid loosening in the centrifugal casting process.
- 3. Please don't open the lid in the process of melting or casting.
- 4. Please don't press the voltage selection button in the process of melting.
- 5. Take note of the amount of current flow after pressing the melting button, when the current flow exceeds 16A, the machine should be switched off immediately. Identify the problem (the condition of the material, inappropriate voltage selected etc.), and use the machine after the problems are solved.
- 6. Observe the state of the melting metal carefully, avoid melting with extreme high temperatures.
- 7. Press Stop button immediately if there anything wrong, then check the machine.
- 8. In the melting process, observe the state of metal carefully as the result from melting different alloy may differ. After the melting process is done, casting should start immediately.
- 9. The process of melting and casting: after the heating starts, the color of the alloy changes from yellow to red and then to white. Molding should start immediately when the surface softens, the surface starts to overflow. If heating continues, the alloy will reach its boiling point, which indicates over-melting. If there is alloy hanging in the middle of the crucible, open the lid, poke the alloy with a metal stick to make it fall down, close the lid, continue the heating process.
- 10. Notice on using the crucible: do not use crucibles with leaks, keep the inside clean, wipe off the sand and dust with a clean cloth before using, keep the outside clean from dirt.
- 11. The Empty test is for examine if the melting device is working properly, users must run this test after repair, examines and long distance transportation. The method of running the Empty Test: turn on the power, do not put crucible into the working coil, select 0 grade on the Voltage Selector (lowest grade), and the AC voltage gauge should indicate w120V. Press the Melt button, and the AC ammeter should indicate 4.0A, the AC voltmeter 140V, which indicates the device is normal. Press Stop button after the test.

Warning: the Empty Test should only be run under the lowest voltage.

Troubleshooting:

(1) operating circuit fault:

a) contactor damage, change.

b) if door indicator and position indicator will not be on, you can check according to principle diagram AX- ZL5

(2) melting system failure:

a) if melting system malfunction, it should be checked by "no-load experiment". Fix it until no-load experiment to normal. You can check according to principle diagram AX- ZL5 1. Switch on the power. If the power indicator is not on, check the fuse RD1,2(32A). If blow out, replace it; Check indicator, if damaged , replace it; If it continue to blowout after replacing ,it may have a short circuit. Open the machine to check the short circuit

2. Press power button DK, the ac volatge is 0V. Check fuse RD3(20A) is blowout

Problems		Ca	uses	Sol	utions
1. Connect	Fan does	1.	RD1 and RD2 (32A) melted.	1. 7	The fuse still blows after being replaced, which
the power	not work	2.	There is open circuit in the DK	ind	icates that there is short circuit in the return
switch DK,			and JC operating return circuit,	circ	cuit. Causes and solutions:
AC voltage			or JC is damaged and JC is	1)	There is short circuit in the filtering box caused
is 0V, RD is			open.		by the breakdown of the capacitor. Open the
not melted.					filtering box LB and replace the capacitor.
				2)	Wire 3, 4, 5, 6 are loose, touching each other or
					touching the case of the machine, find out the
					wire and connect them properly.
				3)	The main transformer B1 is damaged or there is
					problem in secondary winding contacts.
				2. 1	Find the open circuit on the DK, JC connecting
				retu	Irn circuit and the damaged parts.
	Fan	1.	The AC voltmeter is damaged	1	Replace the voltmeter, find out the open-circuit
	works		or there is a connection problem.		locations and make repairs.
	normally.	2.	There is open circuit in the	2	Check the connection of the input and output of
			connections of the main		the transformer and find the open circuit point.
			transformer B1.		
2. Connect the	DK power	1.	There is short circuit in the C2	1.	Measure C2, C11 using a multi-meter while the
switch, AC vo	ltage is 0V,		capacitor (connected parallel to		power is off, find out and replace the breakdown
RD is melted.			the AC voltmeter) or the C11		capacitors.
			capacitor (installed on the JCR	2.	Method to examine the rectifier bridge G11:
			contactor).		(G11 and C13 shunts are fixed on the cooling
		2.	The rectifier bridge G11 is		plate) loose the screws on the shunt, separate the
			damaged (50A, 1000V).		wires, measure the rectifier bridge with a
		3.	The electrolytic capacitor C13		multi-meter.

	 (six parallel connected, 470μ) is breakdown. 4. The chosen voltage is too high (>200V) which causes strong current. 5. Too much metal melted or the current is too strong caused by the change of alloy. 	 3. While measuring the rectifier bridge, also measure the C13 with the multi-meter to check if there is short circuit. If there is short circuit, measure the capacitor separately to find out the breakdown capacitor. 4. Lower the voltage to a normal range. 5. Decrease the amount of alloy melted or lower the selected voltage. 分流器 分流器 人方洗器 人方洗器 人方洗器 人方洗器 人方法
 3. After melting is activated, the readings of the DC voltmeter and DC ammeter are 0, RD3 is not melted. (the door indicator and the position indicator and the position indicator are normal) 4. After activating the melting function, there is reading on the DC voltmeter, there is no reading on the DC ammeter. RD4 (20A) is not melted. (installed in the upper part of the printing panel of the vibrator) 	 This problem is caused by the opening of the melting contactor JCR, and the poor contact of the connecting point of the return circuit in the melting operation. Damage of the device in the melt button AN1, contactor, JCR, JC or MB. RD4 is not melted, under normal circumstances the vibrator is normal. If the vibrator is normal, the problem might be caused by the following reasons: Poor contacts caused by the loosening of the screws on the electrodes. Poor contacts between the cloaterday and the caused by the screws on the electrodes. 	 Find out the return circuit connections of the melt operation and tighten them. Find out and replace the damaged parts. Run the Operation Test first, if it tests normal, find and replace JCR or JR. If the test result is not normal, the parts on the MB panel are broken, to solve the problem, replace the MB panel. Run the vibrator test. The procedures are: Disconnect the output wires of the high frequency transformer, one of the output wires in the JD12 terminal (two orange terminals on the upper left corner of the cooling board). Select the lowest voltage, the AC voltage is about 120V, press the Melt button. If the reading on the AC voltmeter is around 170V, the AC current is 1A, the vibrator is normal. The problem parts are between JD12 terminal and the working coil
	 board (the force on the spring is too little or there is a layer of oxide). 3. The copper cooling plates on the working coil touch each other. 4. The capacitor case is breakdown and short circuited. 	 Tighten the loose screws. Remove one side of the spring, tighten it and put it back to increase its power. Polish the electrodes and the oxide layer of the conducting board with a piece of fine sandpaper (insert the sandpaper into the electrode and the conducting board and turn the centrifugal frame). Watch the copper cooling plates of the working coil and see if there is touching among them, separate them if they contact.

		Disconnect one of the wires capacitor case and the working centrifugal frame to the position does not occur, measure the resists conducting chips of the capacito with a multi-meter, replace them is circuit.	between the coil, rotate the where melting ance of the two or case (*10K) if there is short
5. After press the Melt button, there is DC voltage but no DC current, RD4 is melted.	 The power transistor or the reverse diode is damaged. The load current is too high. 	 The RD4 is melted, make replacer fuse and run the Empty test only w no short circuit in the oscillating b method: remove the RD4, set the r the *100 mode, connect the multi- electrolytic capacitor (negative ele wire) and the left frame of the RD resistance is less than 100Ω, it ind there is broken parts on the oscilla Contact the company for repairs. The load current is too high, the re the selected voltage is too high (> melted metal is too much, or the n titanium. 	ment of the when there is board. Test multi-meter to -meter to the ectrode, black 04 fuse, if the licates that ating board. eason is that 200V), or the nelted metal is
6. During the melting process, the DC current suddenly turns to 0, there is DC voltage. The Empty Test is normal under the lowest voltage.	The load is too heavy, or the temperature of the power component is too high, which cause the vibrator to stop vibrating.	 Reduce the amount of alloy r Lower one level of voltage. Increase the interval between process. 	melted. 1 two working
7. Press melt button, there is DC voltage but no DC current, press Stop button again, DC voltage drops slowly.	 This indicates that after pressing the Stop button the Capacitor C13 has no fast discharging return circuit, the reasons are: 1. The discharge resistance R1 (100Ω, 10W) is melted. 2. There is open circuit in the C13 discharging return circuit connections. 	 Measure the discharge resistance I 10w), if the resistance is >100Ω, i is broken and should be replaced. installed on the controlling relay b remove one end while measuring. Find out the open circuit point on return circuit of C13 according to (or the connection diagram), and c C13(+)→shunt→JD11→JCR→R1→JD 	R1 (100 Ω , it means that it R1 should be board KJB, the discharge the diagram connect it. D11 \rightarrow C13(-)
8. Over-heating protection: When the temperature of the cooling device is above 65°C, the temperature relay T11 is activated, the melting contactor releases. When	 There is something wrong with the fan, or the air-inlet is jammed which cause insufficient air flow. Working continuously in high-temperature environment. Temperature relay T11 is broken 	 Replace the fan, and clean the air- frequently. Increase the intervals between two processes. Measure the two output wires of T multi-meter, if there is open circui damaged and should be replaced. 	inlet o working f11 with a it (R>0), it is

the temperature of the	(the contact points touching each	
cooling device drops:	other under low temperatures).	
melting contactor JCR		
restarts.		

随机附件:

manual	1	
Crucible Base	1	
Casting rings	3	
Centrifugal frame	2	
O rings 45x2		
O rings45x3	1	
white silicon adhesive tape	0.5m	
pliers	1	
crucibles	5	
brush	1	
fuse (32A)	2	
fuse (20A)	2	
fuse (5A)	1	
Air tube $(\phi 8)$	2.5m	
Φ 8×1/4straight cutting	2	
$\Phi 8 \times 1/4$ bendcutting	1	
5010 Silicon bridge	2	
electric resistance 100Ω	1	
capacity 474	1	
1/4 inside the wire	1	