AIXIN MEDICAL

USER MANUAL

AX-ZL3

Medium Frequency Casting Machine

1. Description:

The AX-ZL3 Medium Frequency Casting Machine is used for casting alloys in prosthetic dentistry and orthodontics. It can be used to melt precious alloys or investment casting in all fields of dentistry. This machine can be used to deal with special structured removable dentures, metal bases of casting crowns, metal-porcelain crowns, and all kinds of clamps. The medium frequency casting machine is the updated version of the high frequency casting machine, so it has all the features of a high frequency casting machine. Furthermore, it has the following advantages:

- This casting machine has an advanced all-transistor circuitry, which makes it a highly efficient, low power consumption and low power rating (2.5kW) machine.
- No preheat is needed, melting and casting process can start immediately after the machine is turned on, the interval between melting and casting is two minutes.
- This machine can work under the voltage of 220V±10%.
- Low working voltage and low high-frequency radiation makes it safer and more reliable.
- It is a compact machine with a small size and low weight.

2. Specifications:

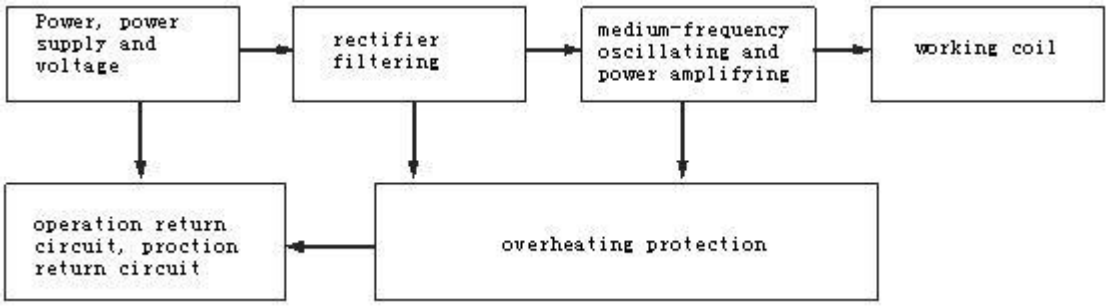
Power supply voltage	AC 220V / 110V ±10% 50Hz / 60HZ
Power	2.5kW
Maximum melting amount	50g (cobalt-chrome alloy)
Melting duration	30g ≤ 65s (standard)
Casting radius	210mm
Centrifugal rotational speed	500rpm
Casting method	Horizontal centrifugal melting
Motor power	0.37kW
Cooling method	Air cooled
Dimensions	52×52×93 (cm)
Weight	100kg

3. Installation:

1. Power supply: Single-phase power supply should be used (Capacity ≥ 3kVA, Voltage AC220V±10%, 50Hz, 12A). If the voltage exceeds the limit, a voltage regulator should be installed, the capacity of the regulator should be more than 5kVA.
2. Diameter of the power supply wire ≥ 2.5mm (copper)
3. Resistance of the grounding device ≤ 4Ω, there should be a reliable connection between the equipment and the ground to ensure the safety of the users.

4. 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.

5. Instructions:

Read the manual carefully before using, especially the parts in this section. Follow the procedures strictly to avoid any accidents.

1. Standard Operations:

1) Turn on the power switch and the air blower should start working, choose the correct voltage by adjusting the voltage selector according to the material and weight of the metal (voltage shown on the AC voltmeter). For 30g of refractory alloy, choose 180V±5V on the voltage selector. Increase 5 volt for every 10g of alloy added. The maximum voltage limit is 195V. (Normally, keep the voltage between 175V-185V).
2) Put the pre-heated casting mold on the V-shaped bracket, place the crucible sliding platform close to the V-shaped bracket casting ring, in order to prevent it from hitting the sliding platform during the centrifugal casting process which will affect the result. This will also prevent the sliding platform from hitting the work coil. Adjust the center position of the mold, lock it after it is balanced with the balance weight, use a compression nut to tighten the centrifugal bracket, aim the red positioning light beam to the positioning point, close the lid, the door indicator light and position indicator light should be on.
3) Press the melting button and notice the reading on the ammeter, the normal electric current should be around 10A, and should not be above 16A.
4) Observe the state of melting from the observation window. When the melting is completely finished, press the casting button and the centrifugal motor rotates for about 3-5s, then press the stop button, open the lid and take out the casting mold after it stops. The machine should stop working for more than two minutes before being used again. Adjust the centrifugal bracket according to the position line and the position point after using, the work coil should

be between the vents to make sure the work coil cools off.

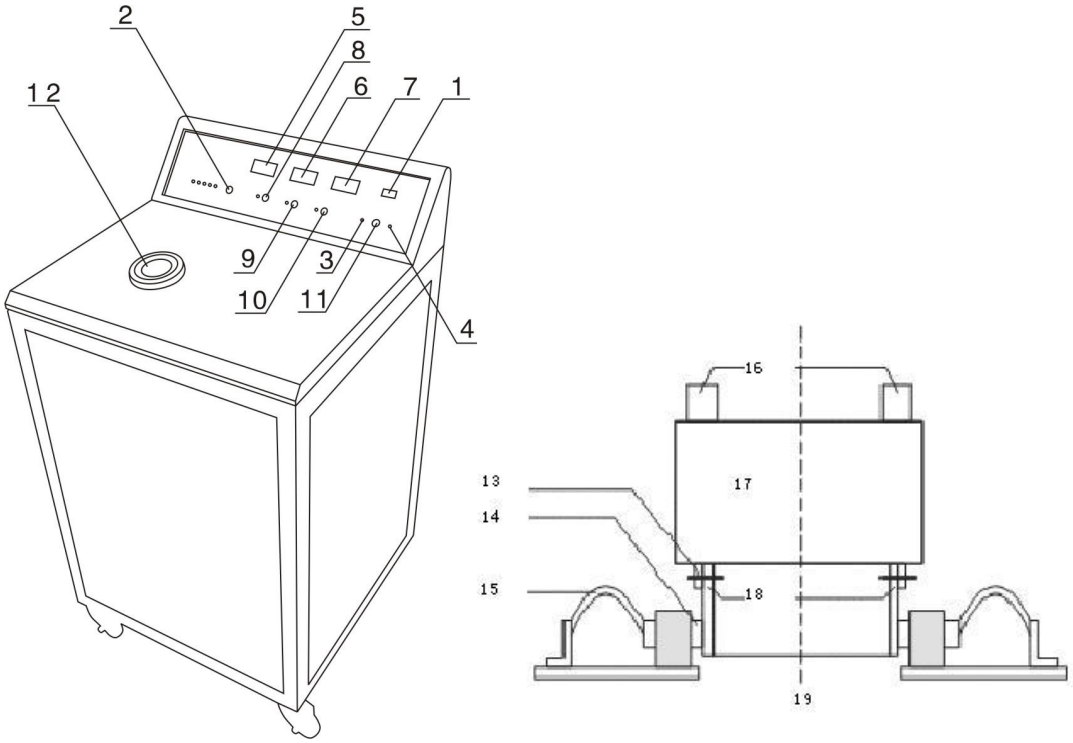
2. Cautions

1) After the machine's first installation, long distance delivery, maintenance, long-time idle, an "Operation test" and "Empty test" is recommended before using to ensure the safety of the users. (For more information about "Operation test" and "Empty test", please refer to appendix.
2) Adjust the balance weight to make it balanced, tighten the balance weight nuts to avoid loosening in the centrifugal casting process.
3) Please do not open the lid in the process of melting or casting.
4) Please do not press the voltage selection button (XK) 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 which could cause splashes from gasification or damage of the crucible.
7) Turn off the DK power switch or disconnect the plug immediately when malfunction occurs.
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. Avoid casting partially melted alloy which could cause incomplete casting. Also, avoid over-melting, which will cause the alloy to become dark in the oxide process, and will affect the quality of the product.
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 center starts to bulges and the surface starts to overflow. If heating continues, the alloy will reach its boiling point, a big bubble will appear on the surface, followed by splashes 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 when 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.

Empty test:

Choose the operation test mode on the voltage selector (the corresponding red light should be on), remove the crucible from the work coil, place the centrifugal bracket in the melting position, turn on the DK power supply switch, the AC voltmeter should indicate 120V, press the melting button, if the DC ammeter indicates 4.0A and the DC voltmeter indicates 140V, the machine is normal.
Notice: the Empty test must be operated under the lowest voltage.

6. Diagram:



1) Power indicator
2) Voltage selector
3) Position indicator
4) Door indicator
5) Selected voltage
6) DC voltage
7) DC current
8) Melt button
9) Cast button
10) Stop button
11) Operation panel
12) Observation window
13) Electrode bolt
14) Electrode
15) Spring chip
16) Connecting chip of the capacitor set
17) Capacitor case
18) Conducting board
19) Axis

7. Troubleshooting:

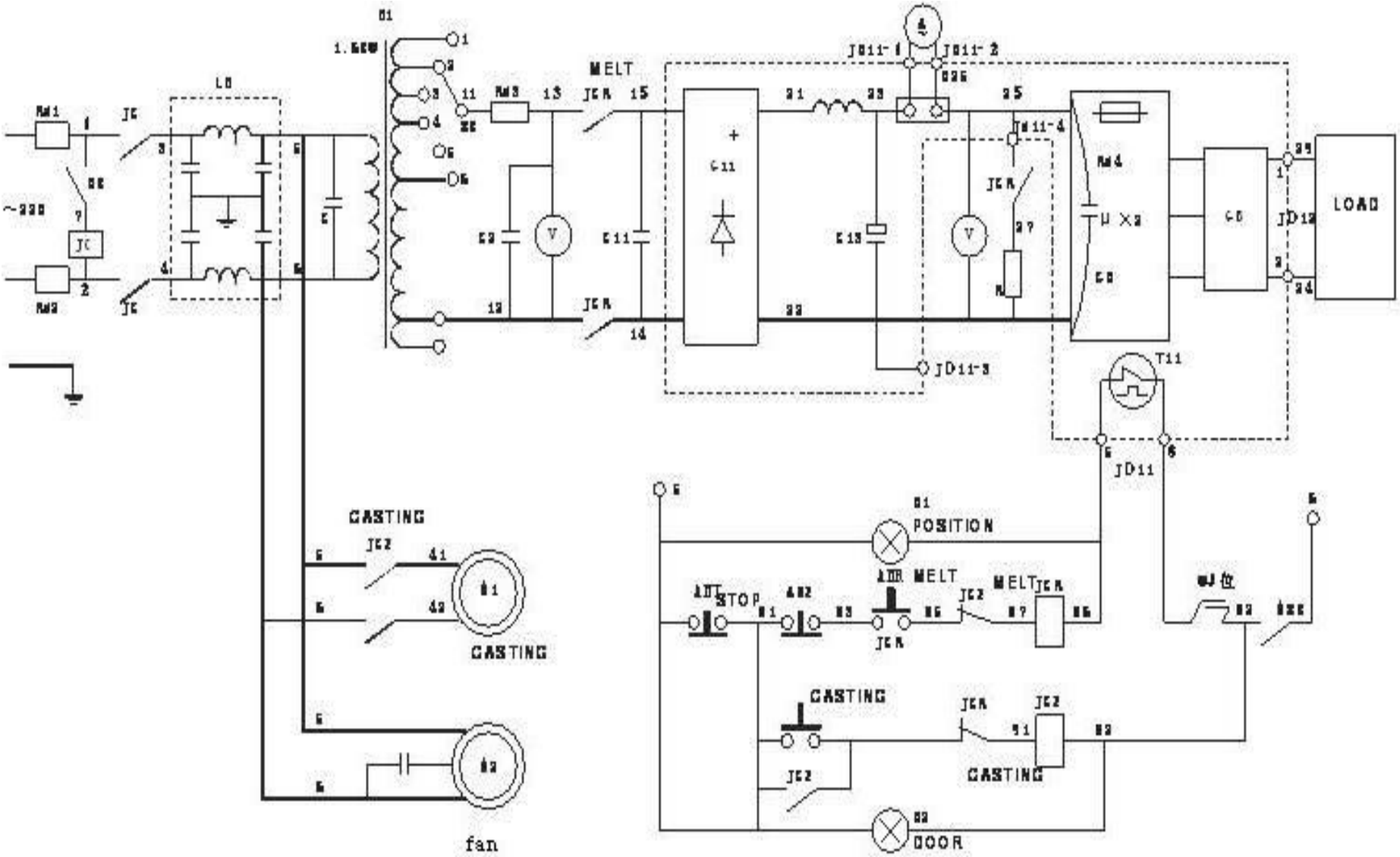
If problem occurs, run the Empty Test to examine, identify and analyze the problem, repair the machine, and use the machine until the Empty Test tests OK.

See diagram on the last page as reference.

Problems		Causes	Solutions
1. Connect the power switch DK, AC voltage is 0V, RD is not melted.	Fan does not work	1. RD1 and RD2 (32A) melted. 2. There is open circuit in the DK and JC operating return circuit, or JC is damaged and JC is open.	1. The fuse still blows after being replaced, which indicates that there is short circuit in the return circuit. Causes and solutions: 1) There is short circuit in the filtering box caused by the breakdown of the capacitor. Open the 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. Find the open circuit on the DK, JC connecting return circuit and the damaged parts.
	Fan works normally.	1. The AC voltmeter is damaged or there is a connection problem. 2. There is open circuit in the connections of the main transformer B1.	1 Replace the voltmeter, find out the open-circuit locations and make repairs. 2 Check the connection of the input and output of the transformer and find the open circuit point.
2. Connect the DK power switch, AC voltage is 0V, RD is melted.		1. There is short circuit in the C2 capacitor (connected parallel to the AC voltmeter) or the C11 capacitor (installed on the JCR contactor). 2. The rectifier bridge G11 is damaged (50A, 1000V). 3. The electrolytic capacitor C13 (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.	1. Measure C2, C11 using a multi-meter while the power is off, find out and replace the breakdown capacitors. 2. Method to examine the rectifier bridge G11: (G11 and C13 shunts are fixed on the cooling plate) loose the screws on the shunt, separate the wires, measure the rectifier bridge with a multi-meter. 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.
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 are normal)		1. 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.	1. Find out the return circuit connections of the melt operation and tighten them. 2. Find out and replace the damaged parts. 3. 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

	2. Damage of the device in the melt button AN1, contactor, JCR, JC or MB.	broken, to solve the problem, replace the MB panel.
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).	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: 1. Poor contacts caused by the loosening of the screws on the electrodes. 2. Poor contacts between the electrodes and the conducting 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.	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. 1. Tighten the loose screws. 2. 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). 3. Watch the copper cooling plates of the working coil and see if there is touching among them, separate them if they contact. 4. Disconnect one of the wires between the capacitor case and the working coil, rotate the centrifugal frame to the position where melting does not occur, measure the resistance of the two conducting chips of the capacitor case (*10K) with a multi-meter, replace them if there is short circuit.
5. After press the Melt button, there is DC voltage but no DC current, RD4 is melted.	1. The power transistor or the reverse diode is damaged. 2. The load current is too high.	1. The RD4 is melted, make replacement of the fuse and run the Empty test only when there is no short circuit in the oscillating board. Test method: remove the RD4, set the multi-meter to the *100 mode, connect the multi-meter to the electrolytic capacitor (negative electrode, black wire) and the left frame of the RD4 fuse, if the resistance is less than 100Ω, it indicates that there is broken parts on the oscillating board. Contact the company for repairs. 2. The load current is too high, the reason is that the selected voltage is too high (>200V), or the melted metal is too much, or the melted metal is titanium.

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.	1. Reduce the amount of alloy melted. 2. Lower one level of voltage. 3. Increase the interval between two working process.
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.	1. Measure the discharge resistance R1 (100Ω, 10w), if the resistance is >100Ω, it means that it is broken and should be replaced. R1 should be installed on the controlling relay board KJB, remove one end while measuring. 2. Find out the open circuit point on the discharge return circuit of C13 according to the diagram (or the connection diagram), and connect it. wire NO.25 wire NO.22 ↓ ↓ C13(+)→shunt→JD11→JCR→R1→JD11→C13(-)
8. Over-heating protection: When the temperature of the cooling device is above 65℃, the temperature relay T11 is activated, the melting contactor releases. When the temperature of the cooling device drops: melting contactor JCR restarts.	1. There is something wrong with the fan, or the air-inlet is jammed which cause insufficient air flow. 2. Working continuously in high-temperature environment. 3. Temperature relay T11 is broken (the contact points touching each other under low temperatures).	1. Replace the fan, and clean the air-inlet frequently. 2. Increase the intervals between two working processes. 3. Measure the two output wires of T11 with a multi-meter, if there is open circuit (R>0), it is damaged and should be replaced.


MELT
LOAD
CASTING
POSITION
STOP
MELT
CASTING
CASTING
DOOR
fan