ADAE

Dental Vacuum Pressure Casting Machine

DESCRIPTION

Our ADAE Vacuum Pressure Casting Machine is a precision induction casting machine which uses the vacuum pressure method for casting. The vacuum pressure casting machine is better than the centrifugal casting machine in many ways. For example, no vibration is produced during the casting process thanks to the vacuum pressure casting method; lower noise and better cooling result thanks to the water cooling system.

There are three vacuum pressure casting methods to push alloys into the casting ring: 1) apply positive pressure on the alloys. 2) apply negative pressure on the casting ring. 3) apply both positive and negative pressure mentioned on 1) and 2). Our ADAE Pressure Casting Machine uses the third method, which has the best results among the three methods.

This casting machine is ideal for all dental alloys (except titanium). The melting and casting process is done in a vacuum state, argon gas can prevent the oxidation of alloys and precious metals, which reduces the polishing work after casting.

SPECIFICATIONS

Voltage	220V / 110V ±5% 50HZ / 60HZ
Power	2.5 kW
Pressure of argon	0.2mpa-0.4mpa
Vacuum pump Pumping rate Max. Pressure Power	220v 50hz 4c5/m 10pa 250w
Max. Amount of alloy	50g of alloys, stainless steel, or precious metals (except titanium)
Melting method	Induction heating
Dimensions	H490 x W660 x D690 (mm)

INSTALLATION

1. Power: single phase 220V±5% 50Hz, capacity not less than 3KVA
2. Power cord: 2.5mm^2 (copper wire)
3. Grounding, resistance≤4Ω
4. Placed on a stable and flat surface. Distance between the casting machine and the wall should be more than 30cm for better cooling

OPERATIONS

1. **Inspection**

   (1) Check and adjust the output pressure of argon to 0.2MPa, the valve should be 80% open to allow gas flow. Do not set the pressure too high, check the connectors for leaks.

   (2) Check the upper and lower rings for sealing.

   (3) Check if the crucible is clean. There should be no blockage. Replace them when necessary.

   (4) Check if the water temperature and water level in the water tank are normal.

   (5) Open the upper and lower doors.

2. **Operations**

   (1) Connect the power cord to the power supply, the three displays light up, all indicate 0. (the power cord can be always connected to the power supply)

   (2) Turn on the power on the front panel.

   a. the 3 displays show 120(±5); 0; 0.

   b. when the TEST indicator (on the left) lights up, the machine is in TEST mode.

   c. there are 4 status indicators.

   Upper Door Indicator: lights up when the upper door is open;

   Lower Door Indicator: lights up when the lower door is open;

   Water Pressure Indicator: lights up when the water pressure is low;

   Water Temperature Indicator: lights up when the water temperature is high.

   d. when the power is turned on, the water pump and the cooling fan starts working, sounds can be heard.

   (3) Adjust the voltage level according to the material and amount of alloys. Level 3 for Cr-Co alloys, Ni-Co alloys and stainless steel (180V), Level 2 (165V) or level 1 (140V) for Au or Ag. The voltage fluctuation should also be considered while choosing voltage levels. High voltage levels should not be used for melting low melting pointing metals or precious metals. The Voltage Level can be chosen by pressing the Voltage button, relevant indicators will light up accordingly.

   NOTE: Level 0 is only used for testing, while the machine is in Test Mode, do NOT put in crucible, and the testing time should be short to avoid damage to the machine because of high current.

   (4) Push the rod down to the bottom of the crucible until the hole is completely blocked. After that put metals into the crucible, the metals should be as compact as possible. Close the upper door and close the switch, the upper door indicator goes off.

   (5) Put the preheated casting ring into the casting chamber, close the lower door, and the indicator goes off. After putting in the casting ring, the casting process should be in the shortest possible time for better results.

3. **OPERATIONS**

(1) Press the Vacuum button, the indicator lights up, and the casting ring is lifted. When the vacuum gauge reaches 0.7-0.8MPa, the vacuum process is finished. If the vacuum gauge cannot reach 0.7-0.8MPa in 1 min, please stop the machine and check for leaks. The casting machine can also work without the vacuum process. It will only cause the oxidation of metals.

(2) After the vacuum process is finished, press MELT button. The machine remains in a vacuum state. The working voltage and working current are shown on the displays. In the melting process, the melt indicator lights up, the vacuum indicator goes off. Please observe the state of the metals from the observation window, when the metals are completely melted, this process is finished.

(3) After the metals are fully melt, press the CAST button to start the casting process. The melt indicator goes off, the casting indicator lights up. During this process, the graphite rod is lifted, and argon goes into the casting chamber. Argon pushes the metals from the crucible into the sprue, the metals are completely pushed into the casting ring under the positive pressure from the upper chamber and negative pressure from the lower chamber. This process lasts for 3-5 seconds. The process of metals being pushed into the crucible can be seen from the observation window. As the positive pressure increases, the vacuum decreases to 0, and the working voltage and working current become 0.

(4) The cast indicator goes off 10 seconds after the casting process. Sounds of the air release and dropping of the casting ring can be heard. Open the lower door and remove the casting ring with instruments. The casting process is finished and the pressure becomes 0.

PROTECTION AND CONTROL

1 Water pressure

The water pressure indicator lights up when the water pressure is low, it goes off when the water pressure becomes normal. The water pressure is preset during manufacturing, it can be adjusted later. When the water pressure is low, melting process is not allowed, the other four processes are not affected. Low water pressure may be caused by problem of the water pump, low voltage, connection problem, or lack of water, etc.

2 Water Temperature

The water temperature detector is installed on the outlet of the water tank. When the water temperature is high, the water temperature indicator lights up; when the water temperature is low, the indicator goes off. High water temperature will affect the cooling of the working coil. If the water temperature is high, the power cannot be turned on. If the water temperature becomes high when the machine is running, the indicator lights up, but the machine will not be stopped until the processes are finished. The machine can be restarted after the water temperature drops.

3 Overheat Protector T1.
The overheat protector T1 is installed on the medium frequency circuit board, the protector will be activated when the temperature is too high.

4 Control of the Lower Door.
When the lower door is fully closed, the indicator goes off. When the lower door is not closed, the buttons on the control panel do not work.

5 Control of the Upper Door.
When the upper door is fully closed, the indicator goes off. When the upper door is open, the buttons on the control panel do not work.

6 Vacuum Process
Make sure the upper and lower doors are closed, press the vacuum button, the vacuum pump starts working. After the Vacuum button or stop button is pressed, the vacuum pump stops, the vacuum electromagnetic valve closes, and the pressure in the casting chamber remains. If the pressure in the vacuum chamber is more than -0.4MPa, upper and lower doors cannot be opened. If the pressure is less than -0.4MPa, the doors can be opened. Press the Cast button to allow argon enters the casting chamber, then the lower door can be opened.

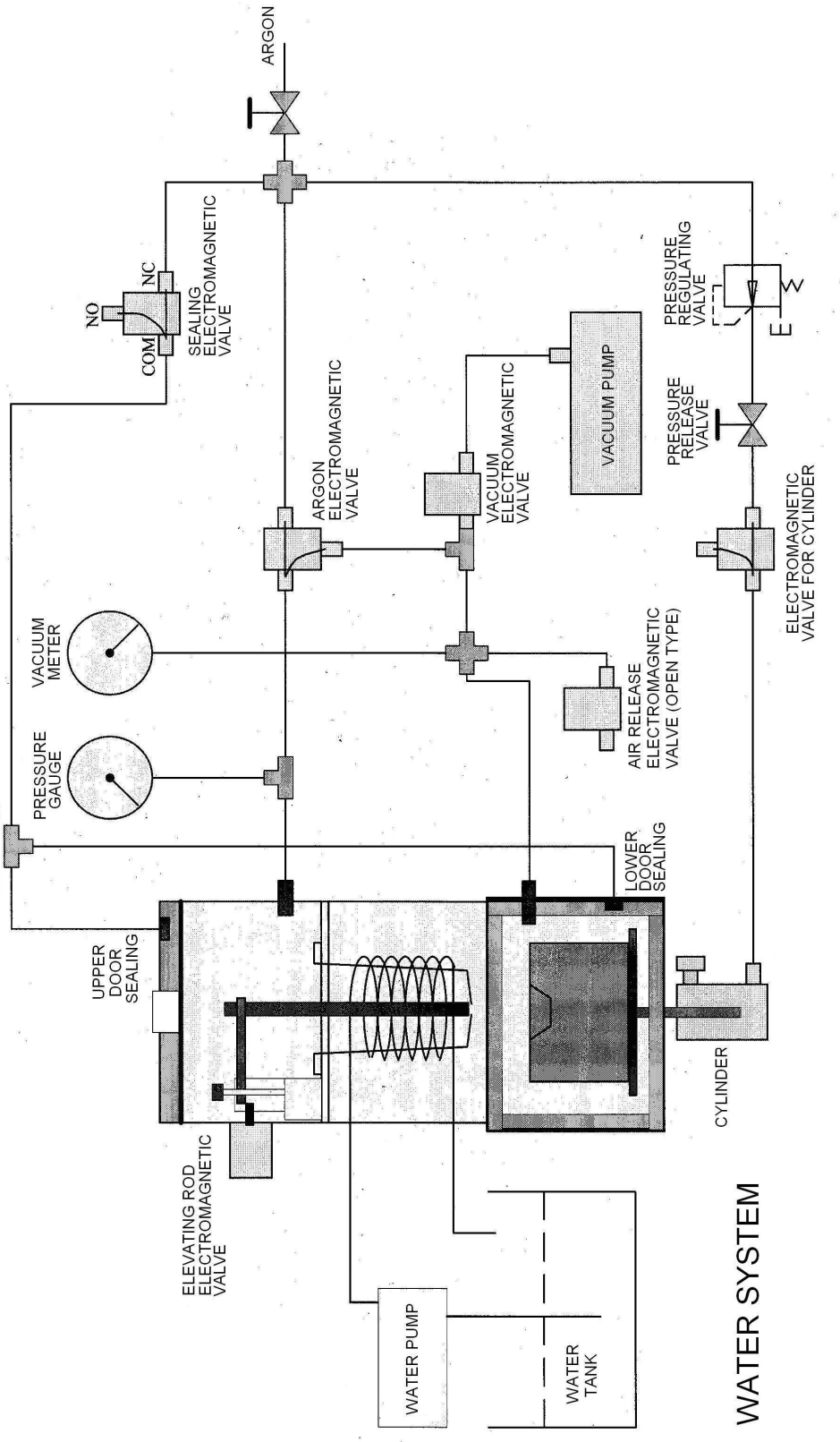
7 Melting
Controlled by upper and lower doors, water pressure, water temperature, Melt, Cast, and Stop buttons. The melting process will only start when all the conditions are OK. The melting process can be stopped by overheat, low water pressure, Cast and Stop buttons.

8 Cast
There are two processes for casting:
1. The graphite rod if lifted;
2. The electromagnetic valve is opened to allow argon (can be replaced by air) goes into the casting chamber.
This process can only be controlled by Cast and Stop button (or the Emergency Stop button).

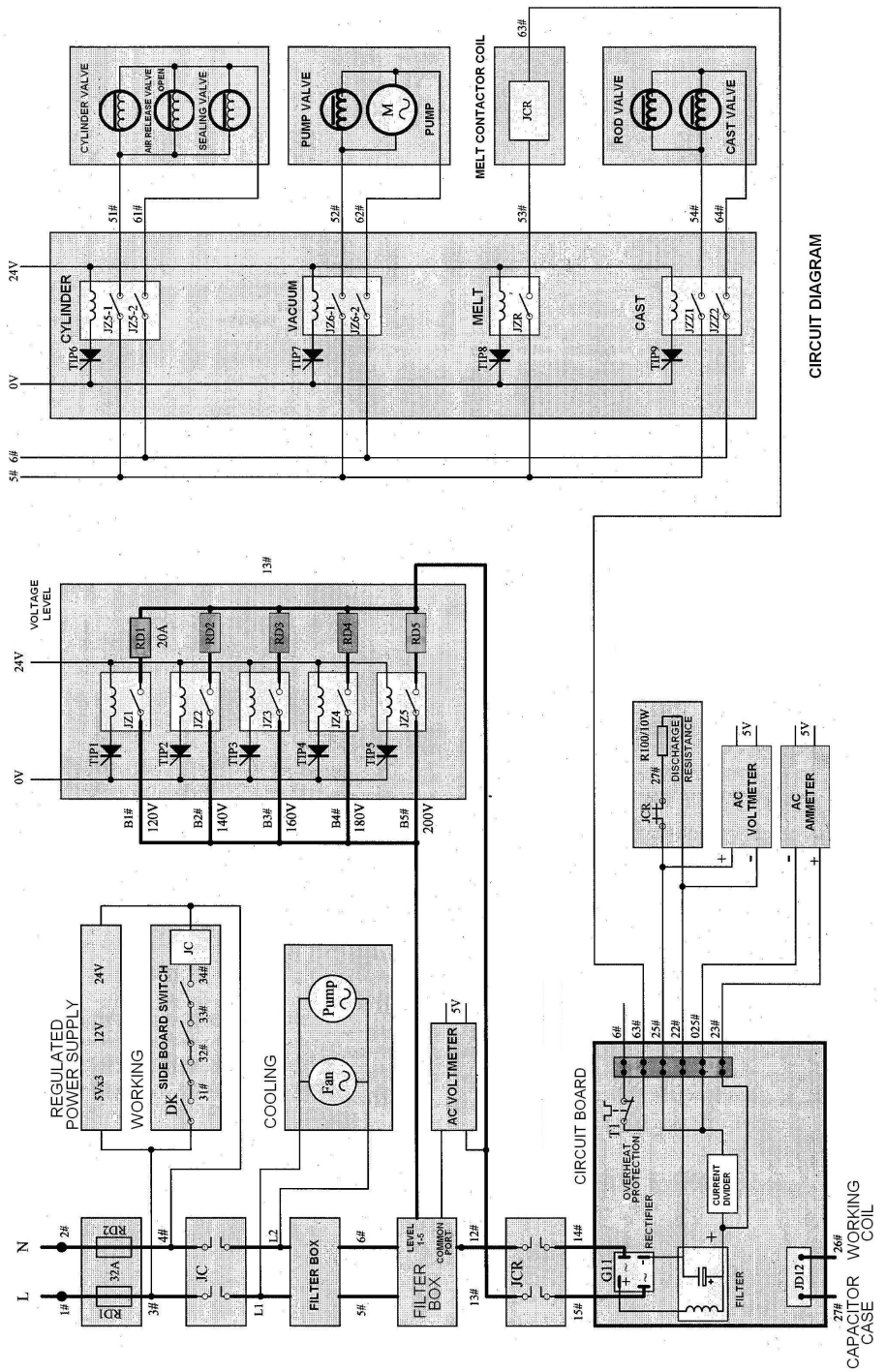
9 Stop
10 seconds after the casting process started, the machine stops automatically. During this process, the casting ring is lowered. In case of emergency, an invisible Emergency Stop button is placed under the Cast button. Press this emergency button whenever necessary, and the machine will stop working immediately.

CAUTIONS

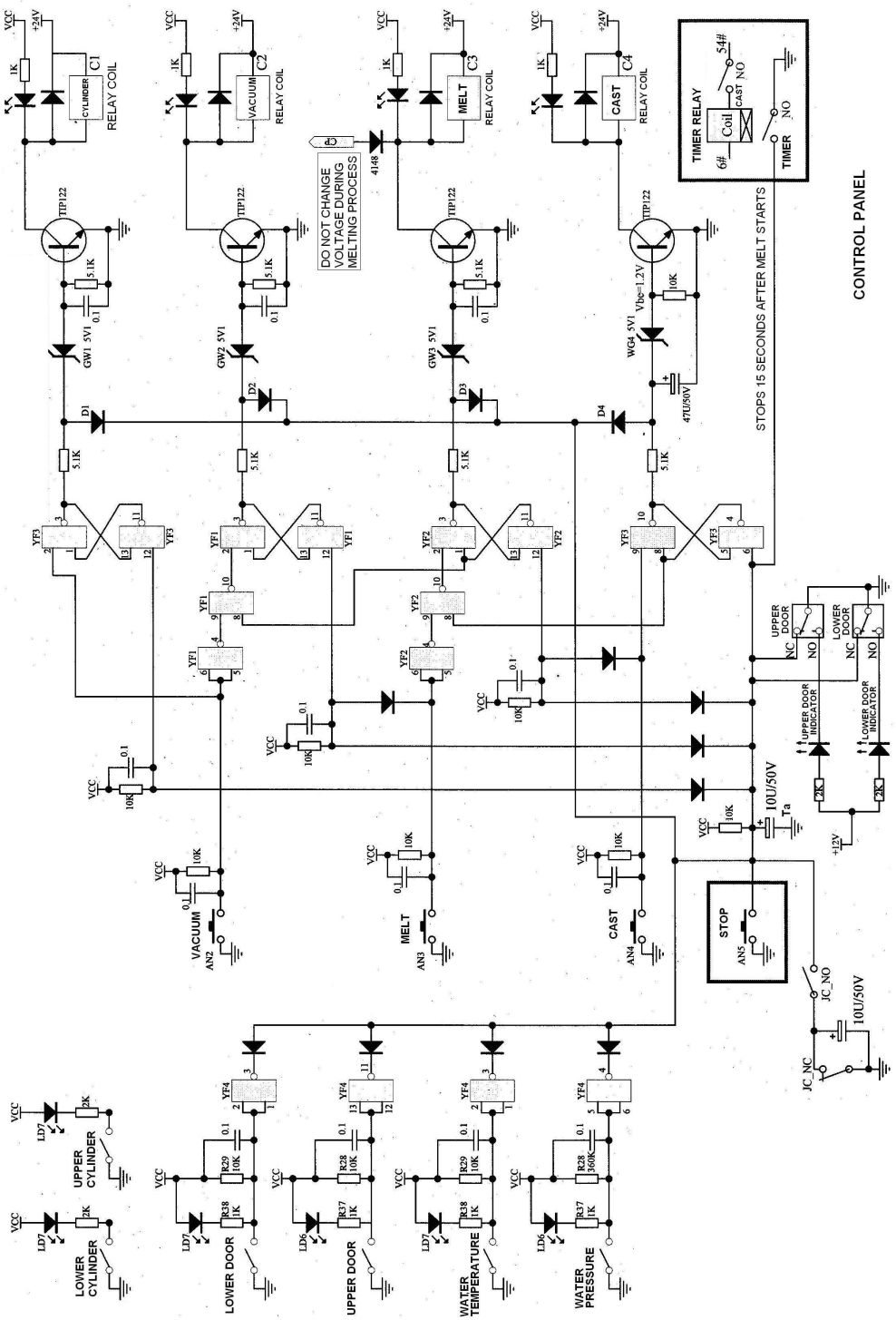
1) The water tank should always be filled with cold water, otherwise the lifespan of the working coil may be shortened.
2) Users should check the oil level of the vacuum pump. The oil level should be neither too high nor too low. High oil level may result in oil leak, and low oil level may result in low vacuum power. If the vacuum pump power is low, please also check the sealing of the vacuum pump.
3) The water pressure and connecting parts of the water pump should be checked regularly.
4) A self-test should be run if the machine is being moved, sent for maintenance, or not being used for days.
5) Do NOT change the voltage during Melting process.
6) If the ampere is over 18A during melting process, the machine stop be stopped immediately and checked for problem.
7) Avoid over heating during melting process, the crucible and other parts may be damaged.
8) Please check the condition of the crucible before putting in metals. The crucible should be full, without crack, with the right hole in the bottom. The lifting and lowering actions should be smooth.
9) After the casting ring is put into the machine, the casting process should be done as soon as possible in order to obtain better casting results.



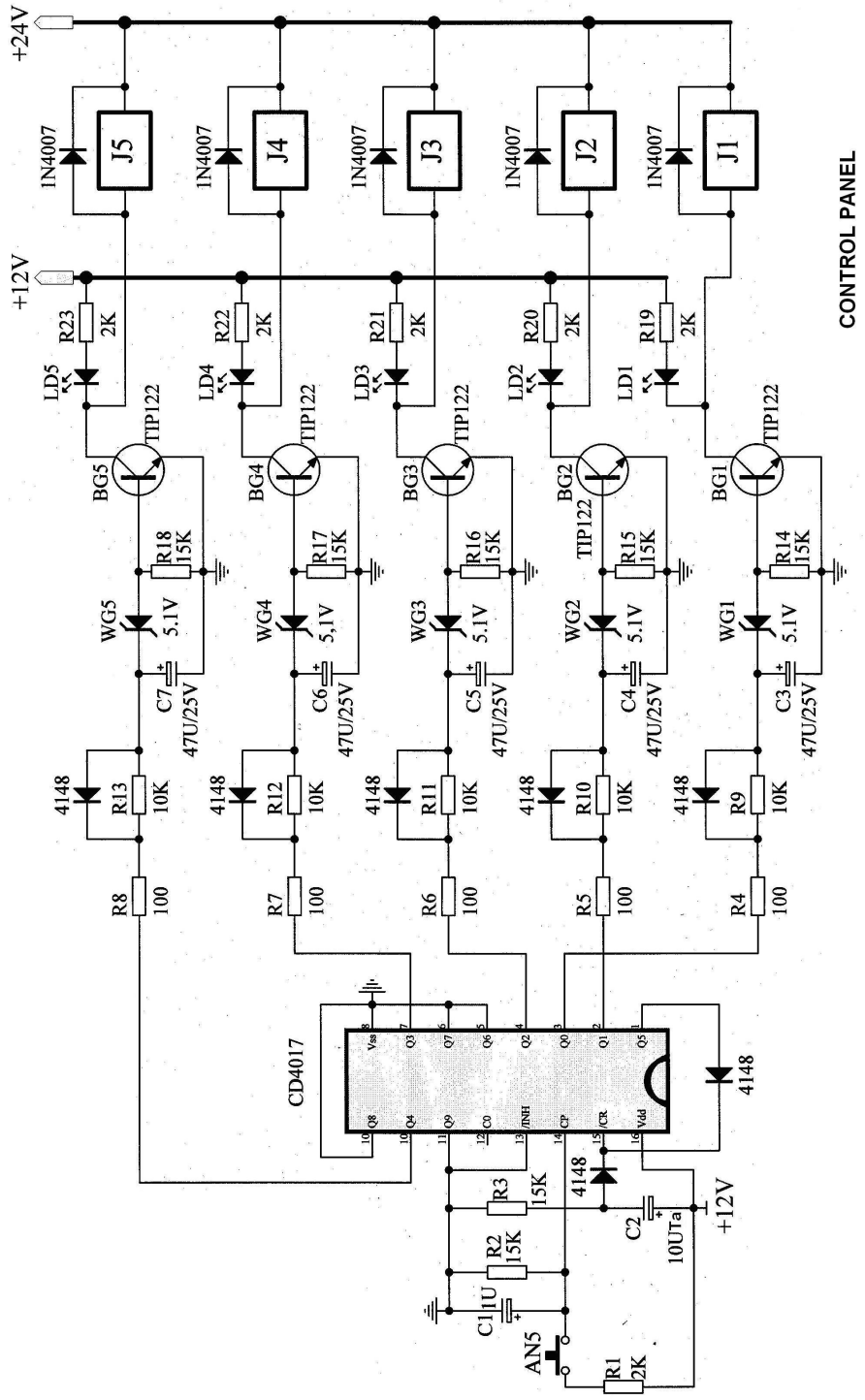
（Diagram 1）Water System



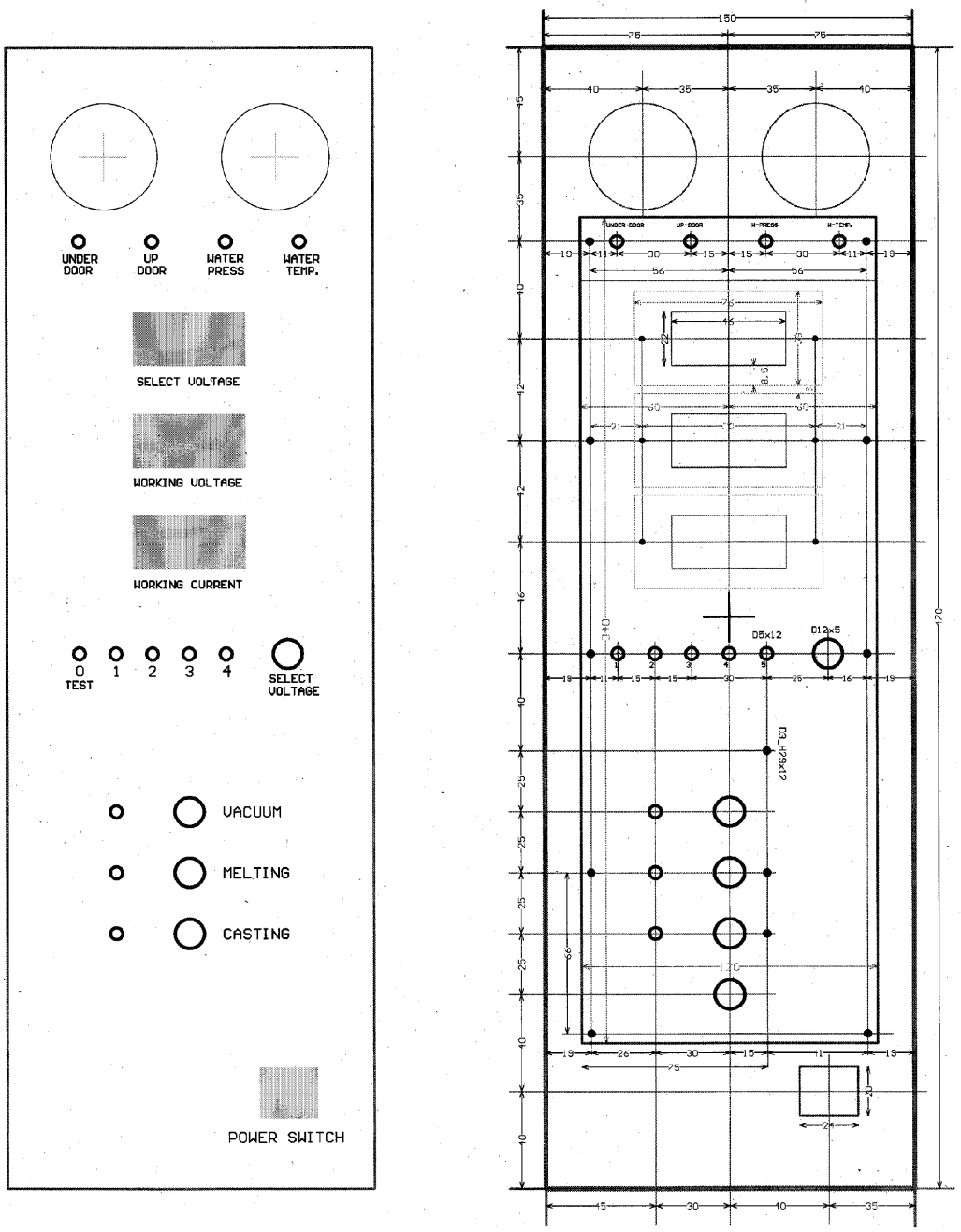
（Diagram 2）Electric System



（Diagram 3）Electric System



（Diagram 4）Electric System



（Diagram 5）Control Panel

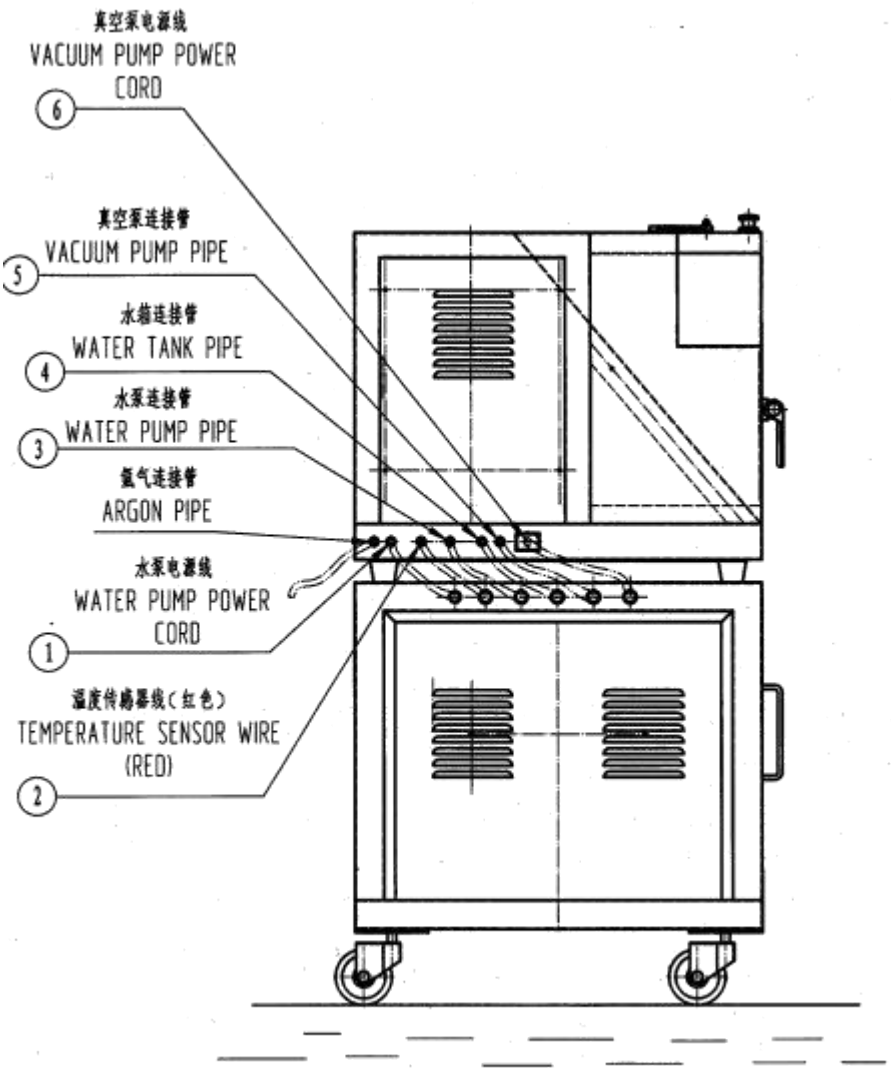


DIAGRAM 6 (CONNECTION)