Kalstein

Model YR0172-3

Vacuum Oven

Instruction Manual

Thank you very much for purchasing our Model YR0172-3 Vacuum Oven.

Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a hand place for future reference.

 Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

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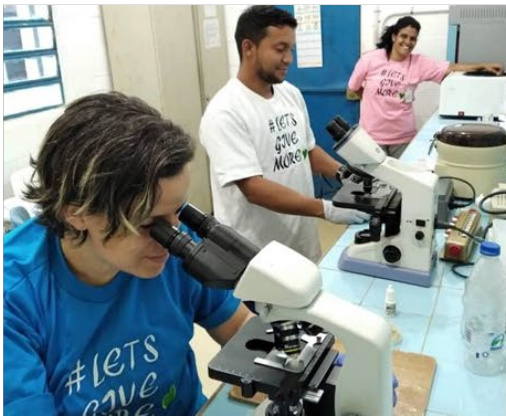

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Name and model

Vacuum Oven YR0172-3

Use

This vacuum drying oven is for various laboratories of factories, enterprises, mines, universities and research institutes to dry and heat objects in vacuum environment. To dry and heat objects in vacuum environment has following advantages:

(1) Decrease dry temperature (low pressure and low temperature)

(2) Avoid oxidation of objects when being heated and prevent objects from damage caused by dirt.

(3) Avoid heated air killing biological cells.

Technical Specification

Type / Index / Name	6050B	6021 6051	6012 6020 6022	6030（A） 6032 6034	6030B	6050 6053	6090	6210	6500
voltage	AC 220 V 50-60Hz								
Input power（W）	650	400 1450	400 400 700	850 850 850	250	1450	1150	2060	2800
Control scope	RT+10~200（250）℃ RT+50~392（482）℉				RT+10~200（250）℃ RT+50~392（482）℉		RT+10~200（250）℃ RT+50~392（482）℉		
Fluctuating degree（℃）	1.0								
Attainable Vacuum degree	133Pa								
Shelf (layer)	2	1 2	2 1 2	1 2 4	2 3			3	4
Bladder Material	stainless steel								
Size of the Bladder (mm)	300× 295× 275	220×210×220 300×300×275 415×370×345		320×320×300		300× 295× 275	450×453 ×603	560×450 ×640	630×810× 845
Out size(mm)	585× 472× 450	500×375×410 605×490×450 730×560×550		630×510×490		585× 472× 450	610×592 ×1350	720×1260 ×1550	790×1030 ×1855

Table 1 YR0172-3 Vacuum Drying Oven Technical Index

Note: 1. This product is produced according to Q/TIWY7-2004.

2. RT refers to environment temperature.

All technological indexes are get under the situation with environment temperature 25℃（77℉）, relative humidity ≦85% and vacuum degree is ≧0.1Mpa. And all data are tested with mercurial thermometer whose precision is ±0.1℃（℉）. The mercurial head of the thermometer should touch the surface of the shelf inside the cabinet well.

Structure and working principles

Vacuum drying ovens (Hereafter referred as drying oven) are all desk-top type except for model YR0172-7 and model YR0172-8 that are standing type. Generally speaking, drying oven is made up of a cabinet, an internal bladder (working room), a vacuumizing system, and a temperature-control system.

The cabinet is made up of high-quality sheet with sprayed plastic surface. So the exterior surface is bright in color. Internal bladder is made up of galvanized armor plate or stainless steel armor plate with the shape of semi-arc. The space between the internal bladder and the out shell is filled with super-thin glass wool for insulating heat. In the middle of cabinet door, there is a view window made up of double-layer bulletproof glass. In the inner part beside the door, a thick safety glass and a long column like door pin are used. The distance between them is very convenient to adjust so that the door presses the rubber airproof enclosure after the cabinet is closed. Thus air leakage when vacuumizing is prevented. (Note: The

rubber airproof enclosure is not oil-proof.)

The vacuumizing system is made up of vacuum pump, vacuum meter, vacuum valve (For model YR0172-7 and model YR0172-8, we have vacuum pump. And vacuum valve is replaced by electromagnetic valve) and air-release valv（e Pls ensure that the rubber suction exhaust port rotates 180deg）. According to user’s need, drying (cleaning) filter pot (equipment) or air-inlet valve can be equipped. Vacuum pump for other model is optional. (The velocity of vacuum pump you selected should not be less than 2L/S.) Temperature-control system is made up of sensor (Pt100 platinum resistance), temperature controller, and heater. When receiving output resistance signal (100Ω for 0℃, 0℃) from sensor, temperature controller will display in PV screen real temperature tested from inside of working room. When input signal is less than set value, the power tube (bidirectional silicon-controlled rectifier) is open and the heater gets enough electrical power to create heat. Otherwise, there is no power in the power tube and the heater does not heat. The temperature controller has the special function of adjusting output power with PID, testing and correcting temperature error and timing function. If the power is high than the set value, there will be a warning light and automatic cutting function will be effective.

Operating method of the controller

1. Preparation before use

The product should work under the following conditions of use:

1.1 Ambient temperature: 5℃～40℃;

1.2 The relative humidity is not more than 85%;

1.3 Atmospheric pressure: (86～106) KPa;

1.4 The altitude is not higher than 2000 meters;

1.5 There is no strong vibration source and strong electromagnetic field around;

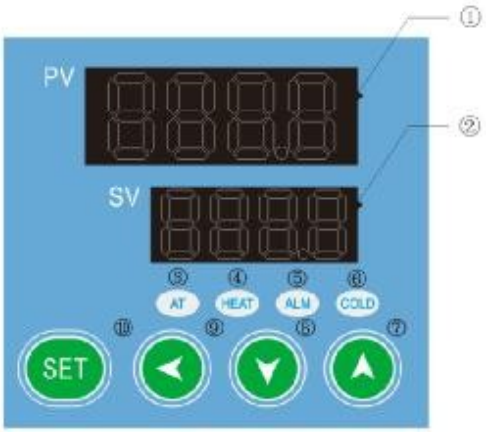
1.6 It should be placed on a stable, level, without serious dust, Indoors without direct sunlight and no corrosive gas;

1.7 Leave enough space around the product, as shown in the upper right figure, and should not be placed under the fire alarm;

1.8 The power supply voltage of the product is shown in the technical indicators (Attached Table 1 to Table 3);

1.9 Place reasonably, adjust the position and quantity of the shelves, and put in the work items. It is necessary to maintain a certain gap (>100mm) around the upper and lower sides, and the weight should be such that the shelves are not deformed by bending.

2. Preparation before use



① (PV) display
* Display measured value
* Various prompts are displayed according to the status of the instrument.

② (SV) display
* Display set value
* Display various parameter values according to the status of the instrument

③AT (running indicator light): It lights up when the controller is working, flashes during auto-tuning, and goes off when it stops;

④ HEAT (heating indicator light): It lights up when there is heating output.
⑤ ALM (alarm indicator light): Lights up when there is an alarm output, and the buzzer sounds.
⑥ COLD (refrigeration indicator light): on when there is refrigeration output; (Note: this product has no COLD refrigeration function)
⑦ Used to adjust various parameter values or enter the auto-tuning state
⑧ Used to adjust the internal parameter value or enter the self-tuning state
⑨ Shift key: used to shift the set value, internal parameter and observe the timing running time;
⑩ Function keys:
* Setting value modification
* Recall of parameter symbols and confirmation of parameter modification.

2.1 The layout of the product temperature controller panel (see Figure 1);

2.2 Close the door of the box, and the handle should be vertically downward;

2.3 Adjust the air door to a suitable position according to the moisture level of the item.

2.4 Turn on the power, the indicator light is on and the fan running sound can be heard;

2.5 The temperature controller enters the working mode after about 4 seconds of self-checking procedure, that is, the PV screen displays the measured temperature, and the SV screen displays the set temperature. When PV＜SV, the HEAT light

should be on, indicating that the temperature controller enters the heating state.

2.6 Check temperature control accuracy

2.6.1 Put a 0.5°C indexed mercury thermometer (or a digital thermometer with a resolution of 0.1°C) into the product working room;

The mercury probe of the thermometer should be in the geometric center of the effective space of the studio

2.6.2 Choose a point within the temperature control range of the product and set the SV temperature control value. When the PV measurement value is equal to the set value, keep it at constant temperature (1～2) hours or so (depending on product specifications, the constant temperature time may vary) , Observe that the difference between the actual measured temperature value of the mercury thermometer and the measured value displayed by the temperature controller PV should be ≤±1.0℃.

3. Temperature and timing setting

3.1 In the working mode, press the key SET once, the PV screen will display SP characters, press ▲ or ▼ key, to make the SV screen display the required temperature value; (refer to Appendix 2 for the process of recalling each function)

3.2 Press the key SET again, the PV screen will display St characters，press ▲ or ▼ key, make the SV screen display the required time value; (refer to Appendix 2 for each function call process)

3.2.1 When the setting St is 0, the controller cancels the timing function and the controller runs all the time; when the ST setting is not 0, the controller has the timing function. When the running time of the controller is up, the SV screen

displays "END", The buzzer buzzes, the controller stops

working, press any key to mute the sound, press and key ▲ and SET at the same time for 4 seconds to restart.

3.2.2 When the controller is in the working mode, just press the key ▼, the PV screen will display "TIME", and the SV screen will display the running time of the controller. Press the shift key again, and the controller will return to the working mode.

3.3 In the timing state, press the key SET again to return to the working mode and enter the working state.

4. Upper deviation alarm setting.

The upper deviation setting is reasonable, which can protect the system from over-tolerance or out-of-control temperature control. It must be used when the product is working.

4.1 When the product leaves the factory, AL=10 ～ 15 is generally set, that is, the alarm temperature is: (SV+AL)℃.

4.2 Press the "SET" key for about 4 seconds. When the PV screen displays the characters LE , release it and open the electronic lock LE before you can modify the relevant parameters.

Unlock procedure: Press and hold SET for 4 seconds. When the PV screen displays LE characters, use the key ▲ ▼ to change the value of the SV screen from "0" to "Unlock password=3" (user layer password), and then open the electronic lock (After 1 minute without any operation, the temperature controller will

automatically return to working mode);

4.3 Press the key SET a few times, when the PV screen displays characters AL , use the key ▼ ▲ to set a reasonable upper deviation value (AL);

4.4 After over-temperature, the buzzer will alarm intermittently, and the over-temperature light ALM will be on for a long time, press any key to silence;

4.5 When the temperature exceeds the AL value from the high temperature operating value set to the low temperature, it will also give an alarm, which is a normal situation, just press Mute.

5. Methods to improve the accuracy of temperature control.

5.1 After the product has been used for a period of time, the temperature control accuracy should be checked according to the method 2.6, if it exceeds ±1.0℃, it can be corrected according to the following method:

5.1.1 Enter the temperature controller parameter menu (see item 4.2)

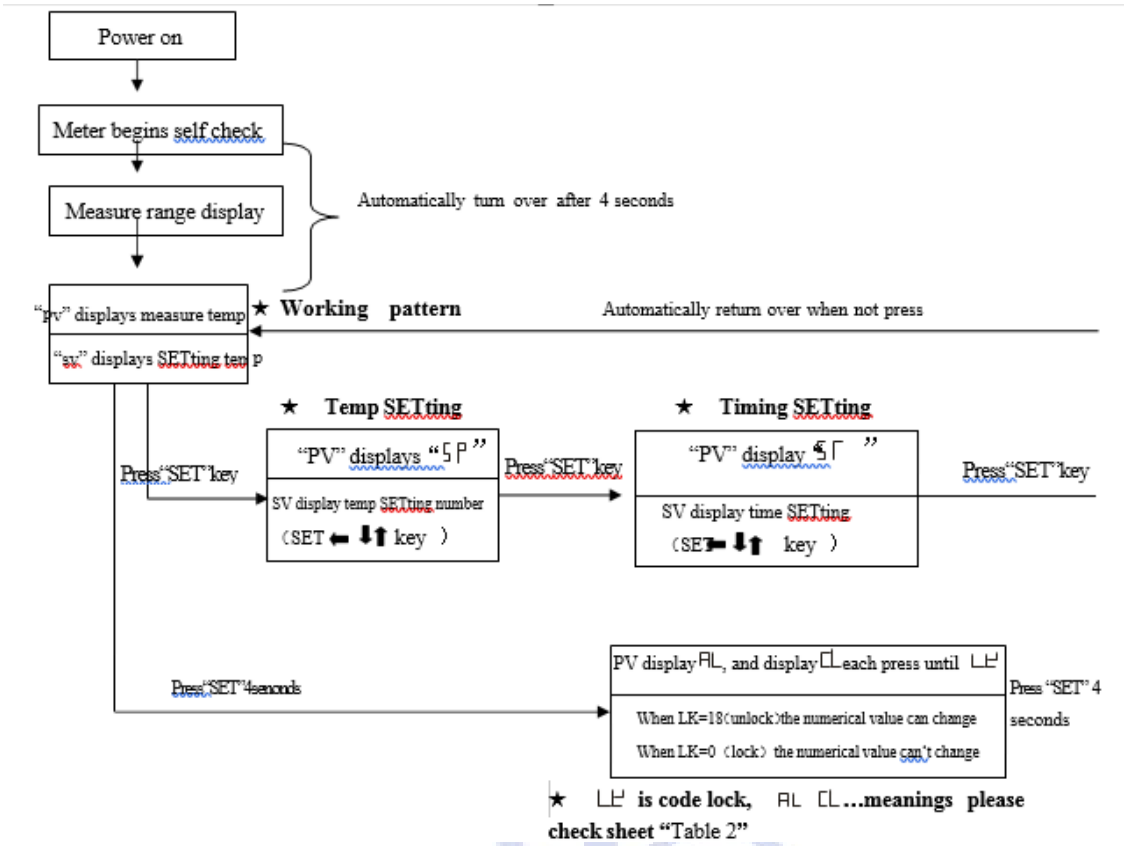
5.1.2 Opening the electronic lock (see item 4.3)

5.1.3 Long press the "SET" key, go to the symbol PV, enter LK=3 for accuracy correction, the correction method is as follows:

$$\text{Press PK} = 4000 \times \frac{\text{(Measured value PV - standardable value)}}{\text{PV Measurements}}$$

After the formula is calculated, use the key ▼ ▲ to modify on the basis of the original PK value at the factory (Note: One correction is inaccurate, and the correction can be repeated until it meets);

6. Sequence to pick up the functions of the instrument



7. Sequence to pick up the functions of the instrument

Symbol	Name	Setting range	Description	Factory set value
tM /tM	Setup of maxi temperature permissible by the instrument	37.0-320.0	Stop heating beyond maxi temperature and give alarm.	
PO /Po	Boot mode	0～1	①when PO =0, after open the power, the controller in a stopped state, need to press the set key + increase key at the same time for more than 4seconds to start running. ②when PO=1, after open the power, the controller will be running;	
AL /AL	Alarming setting	0-Full Range 0.0-Full Range	When temperature is beyond SV+AL, the ALM indicator turns on.The buzzer sounds and the heating	

			power turn off.	
/Pb	Zero point adjust (intersection)	-100-100 -100.0-100.0	When the zero error comparatively smaller and the full point error comparatively larger, to update this value should be needed. Ordinary for pt100, updating this value is rarely needed.	
/PK	Full point adjust(intercept)	-1000-1000 seconds	When the zero error comparatively larger and the full point error also comparatively larger, to update this value should be needed. PK=4000× (setting value-actual value)/actual value. For pt100 adjusting this value is need at first time.	
/LK	Password key	0-255	When LK=18 the parameters listed above then the above parameters can be updated.	

How to use

(1) Environment request

a) Temperature 5～40℃（104℉）

b) Relevant humidity: ≦85%

c) Power: AC 220 V 50-60Hz

d) There is no strong tremble around or corrosive air around.

(2) Vacuumzing debug

a) Close the cabinet door and turn the door pin to tight place. Close air-release valve (Make the hole in rubber stop is in 90°angle to the hole in air-release valve.) Open vacuum valve (turn 90° anticlockwise.) The vacuum valve may be tight in first

use.

(3) Connect vacuum drying oven vacuumizing pipes (exterior diameter: Φ=16mm) with vacuum pump (2XZ-2 model, exterior diameter for air entering mouth: Φ=16mm) well (for model YR0172-7 and model YR0172-8, they have been connected well) through a vacuum connecting pipe (interior diameter: Φ=16mm, thickness of the pipe wall=10mm) packaged with the machine. Switch on power of the vacuum pump and it begins to draw air. When the vacuum indicating meter points to -0.1Mp, close vacuum vale first, and then switch off vacuum pump power to avoid oil of vacuum pump flowing back into the working room. (For model YR0172-7 and model YR0172-8, there is no vacuum pump). You can switch off power of the vacuum pump directly). Now the cabinet is in vacuum situation.

(4) Debug of the vacuum cabinet

Carry on the following operation after vacuum debugging:

(a) Switch on the power of the vacuum cabinet and now power indicating light is on (For mode YR0172-7 and model YR0172-8, you have to push on the switch of temperature controller). Now power of temperature controller is switched on and it begins self-inspection. PV displays testing temperature of the working room and SV displays the set value set when delivery. AT and HEAT light in temperature controller should be on. It shows that the apparatus is in heating situation.

(b) Modify set temperature value

First, press function key of temperature controller (SET). PV displays SP. You can modify the set value through press ⇧ or ⇩. (For model YR0172-7 and model

YR0172-8, you have to modify the set value separately for the 2 or 3 temperature controllers. Following is similar.)

Second, after finishing modifying, press SET again. PV displays ST. (**If you do not need the function of timing, let ST=0**). Press SET again to make PV display the temperature of the working room. SV will display the newly set value. Apparatus's AT and HEAT light should be on. Now the apparatus is in heating situation again.

(c) When the temperature inside the working room is close to the set value, HEAT light will blink. It shows that the apparatus is in PID adjusting phrase. Sometimes the testes temperature is higher than the set value and sometimes it is lower than the set value. These are normal situations. When testes temperature is close to or equals to the set value, after 1-2h, the working room is in constant temperature situation. And the object is in drying situation.

Note: When the temperature you need is very low, you can finish the setting of temperature in two times. For instance, if the temperature you want is 140℉, set the temperature as 122℉ in the first time. Then set for the second time as 140℉ so as to reduce or refuse temperature overshoot and enter constant temperature quickly.

(d) After finishing drying of the objects, switch off the power. If you want to decrease the temperature quickly, open air release valve to make the vacuum degree equals to 0. Wait for 5 minutes before open the cabinet door (Because it maybe impossible to open the door if you try to open it immediately.)

(5) The humidity of the object inside the dry cabinet is relatively large. The steam generated when drying may affect the performance of the vacuum pump. It is suggested to add a desiccator/filter between the dry cabinet and the vacuum pump. Our company can equip a desiccator with the out shape of Φ120× 300mm and the

interface mouth diameterΦ16 (have indicated in the contract) according to request.

（6）If in the procedure of drying goods, there is the need of adding nitrogen or other inert gas, it should be listed in the contract and we will add another air entering valve.

Note: (a). If the vacuum pump works normal and is in accordance with technical request, but it cannon draw air to make the room in vacuum situation, open the cabinet door and screw tight the door pin with plank we prepared for you in accessories box. Close the door and try again.
(b) This vacuum dry cabinet should not be used as electric heating and drying cabinet. Since the working room is not in vacuum situation, the tested temperature is much different from real temperature.

Precautions

(1) The shell of the vacuum cabinet should be connected with the ground well to ensure safety.

(2) The vacuum cabinet should be in the environment that its relative humidity is ≤85%, there is no corrective air, no strong shack source and strong electromagnetic field.

(3) There is no anti explosive and anti corrosive equipment in the working room of the cabinet, so combustible, explosive objects or objects that easily create corrosive gas should not be put in the cabinet for drying.

(4) The vacuum pump should not be working for a long time. So when the vacuum degree reaches the point you want, shut off the vacuum pump first and then switch off the power of the vacuum pump. When the vacuum degree cannot meet your need, switch on the vacuum pump again. So the lifespan of the pump is prolonged.

(5) If the object for drying is damp, add a filter between the vacuum pump and the cabinet to avoid steam entering the pump and causing any problems.

(6) If the object for drying is light and small in size (grains), a defending net should be added in the mouth for vacuum pump inside the working room to avoid absorbing any grains and damaging the pump (or electromagnetic valve).

(7) After being used for several times, the cabinet may not able to be in vacuum situation. Now you have to replace the door airproof tool or adjust the door pin of the cabinet. When drying temperature of the cabinet is over 200℃, there may be air leakage (Except model YR0172-5(B), YR0172-5(A) and YR0172-5). Now take off the back board of the cabinet body and screw loose heater seat with spanner, replace “0” shaped airproof enclosure or screw tight the heater seat.

(8) If the air release rubber stop is difficult to turn, wipe some fat (such as Vaseline).

(9) Except for repairing, the left cabinet cover should not be opened (except for model YR0172-7 and model YR0172-8) to avoid damaging of electric control system.

(10) The vacuum cabinet should be always clean. It is forbidden to clean the glass on the cabinet door with chemical solution. It should be cleaned with soft cotton cloth.

(11) If the cabinet is not in-use for a long time, clean exposed plated parts and coat them with neutral fat to avoid erosion. Cover it with plastic film to avoid dirt and place it in dry room to avoid damage to electric parts.

Failure treatment

Failure phenomena	Possible reasons	Treatment
No power	The out power socket had no power,	Check whether the lines are connected well and whether the socket is well.
	The power plug is not inserted well in the socket or the line is cut off.	Re-insert the plug or repair the line.
	The fuse is broken or there is no fuse.	Check whether there is any short circuit; replace the fuse (short circuitfor apparatus power transformer, short circuit for heater, short circuit for grounding and others short circuit all can cause breaking of fuse.
PV display "□□□□"	Temperature sensor Pt100 is damaged	Check Pt100, replace it
	Temperature sensor line is not connected well.	Connect lines again.
	Test scope of the apparatus is not correct	Re-set again.
The temperature doesnot increase	The set value is too low	Set temperature SV≥RT+20°F RT is environment temperature
	The output circuit of the apparatus is falling off.	Connect the lines again.
	Temperature controller has no output signal or is damaged or the controllable silicon is damaged.	Replace it.
	The heater is damaged (short circuit, or open circuit)	Replace it.
	Use timing function or the setting is not correct.	ST=0 or ST=(heating time +constanttemperature time
The temperature is out of control or there is offset or overshoot because of the error between tested temperature and real temperature.	The output of temperature controller is out of control.	3041 or BTA is damaged and replace it.
	Not qualified to use	SV≥RT+20°F
	Pt sensor doest connects well.	Get rid off grounding resistance.
	Relevant parameters are not correctly set.	Re-set relevant parameters, such as Ar、P and so on.
There is big difference between tested temperature and realtemperature.	No vacuum situation.	Vacuumizing.
	The mercurial thermometer head is not on the shelf.	Replace it.
	The apparatus or parameter is changing.	Re arrange Pb Pk parameters.
The cabinet cannot be	The vacuum pump is not of the correct model and size.	The vacuumizing speed should not be less than 2 L/S.
	Various connecting pipe is too loose.	Replace it.

vacuumized.	The vacuum meter is damaged.	Replace it.
	The door is not closed well.	Adjust the door pin distance.
	The door airproof rubber is aged and lack of elasticity.	Replace it.
	Air release valve and vacuum vale is not in the correct place.	Adjust them.
	The electromagnetic valve is damaged. (model YR0172-7,model YR0172-8)	Replace electromagnetic valve
Air leakage (the vacuum degree decrease to 0.092 Mpa from 0.1Mpa within 24 hours.	There is air leakage in various connect pipes.	Check and replace it.
	Except for model YR0172-5(B), YR0172-5(A) and YR0172-5, the distortion of heater "O" shaped airproof circle causes air leakage.	Screw tight the heater seat (in the back of the inner bladder.) or replace "0" shaped airproof circle.
	The air release valve is not in the right place.	Place it in the right place.
	There is air leakage in vacuum valve.	Replace it
	The electromagnetic valve cannot be closed well and there is air leakage. (for model YR0172-7 and model YR0172-8)	Replace it.

Table 2 Failure treatment

Packing list

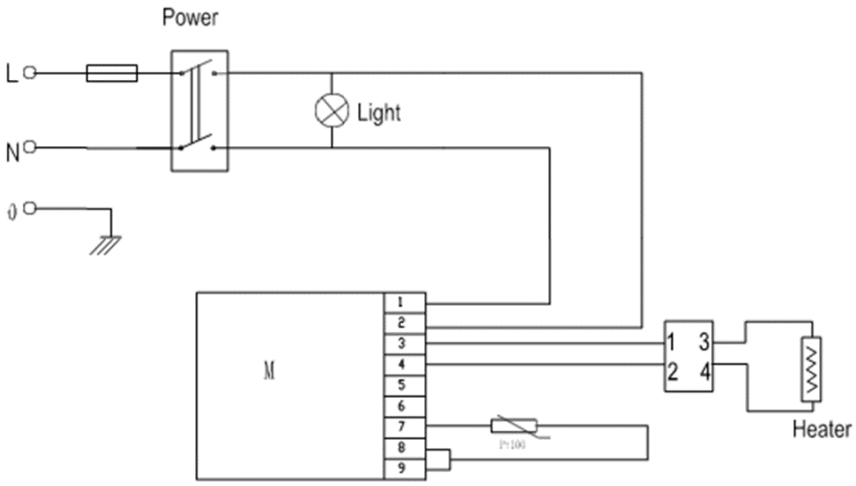
Serial No	Type	Name	Unit	Quantity	Remark
1	File	User manual		1	
2	File	Packing list		1	
3	Fittings	Vacuum tube		1	
4	Fittings	Fuse		2	
5	Fittings	spanner		2	

Table 3 Packing list

The articles listed here is in accordance with the articles packed in the box.

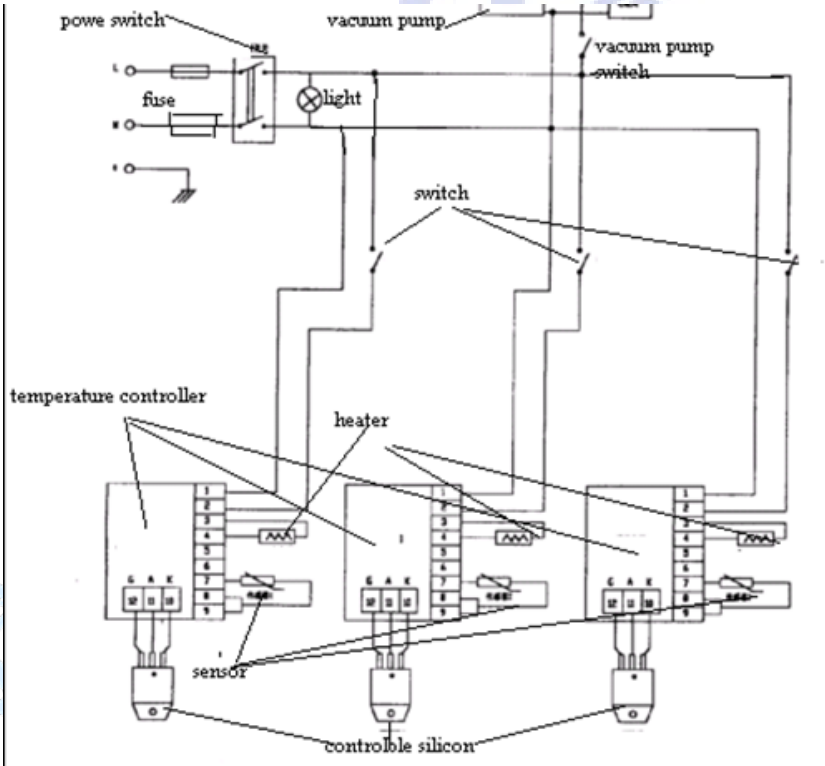
Packer2

Connection principle for electrical parts (A)



Vacuum Oven (Except for mode YR0172-7and model YR0172-8)

Connection principle for electrical parts (B)



Explanation: 1. 6090 has two set of temperature controllers, heaters, and sensors.
2. Thie diagram does not include vacummzing system.
3. Any change will not be informed.

YR0172-3, YR0172-7 Vacuum Dry-Cabinet