Encapsulation Machine

Model: SEC-80

OPERATION INSTRUCTIONS

Sinda Machinery Co., Ltd

Add.: No. 1000, Jinting Road, Minhang District, Shanghai, China.
Tel.: +86-18721220898 Fax: +86-21-31266620
Http://www.sindamachine.com E-mail: info@sindamachine.com

CONTENTS

1. Overview

SEM-80 encapsulation machine is a softgel capsule preparation equipment with stable performance, easy operation and high degree of automation. It is suitable for online packaging production of laboratories, pharmaceutical research institutions and large-scale production enterprises to produce different specifications of liquid and paste Chinese and Western medicines, health products, food, cosmetics and special chemical preparations.

Softgel capsules have the following advantages:
Neat and beautiful, easy to swallow, and can mask the unpleasant stench of medicines.
The filling amount is uniform and accurate, especially suitable for filling drugs with strong potency and severe side effects after overdose.
The softgel capsules are completely sealed and can prevent oxygen from entering, so the stability of volatile drugs or drugs that are easily deteriorated when exposed to air can be improved and the drugs can have a longer storage period.
Suitable for low melting point solid drugs that are difficult to tablet or prone to deformation during storage.
Can improve the bioavailability of drugs.
Can be made into enteric-coated softgel capsules.
Drugs that are unstable and easily oxidized when exposed to light, moisture, heat are also suitable for making softgel capsules.

2. Technical Parameters

2.1 Main Machine:
Overall dimensions: 1150*600*1450 (mm)
Weight: 400kg
Power: 1.5KW

2.2 Glue Tank
Overall dimensions: 450*450*880 (mm)
Weight: 35kg
Power: 1.2KW

2.3 Drying Tumbler
Overall dimensions: 760*420*700 (mm)
Weight: 40kg
Power: 0.75KW

2.4 Water Chiller:
Overall dimensions: 600*450*800 (mm)
Weight: 55kg
Power: 1.5KW

2.5 Requirements for Public Systems
Compressed air: ≥0.4MPa
Power input: 220V/50Hz single three-wire

2.6 Equipment Capacity

Model	Capacity (pellets/hour)
SEM-80 type	6000

This production capacity value is calculated based on olive-shaped softgel capsule pills with a loading capacity of 500mg.

3. Main Machine

The supporting equipment of the main machine includes: sol tank, drying cage, PLC control system, chiller, mold and compressed air supply system.

4. Working Principle

The compressed air supply system is used to send the prepared glue in the sol tank to the gelatin box through the hose to prepare two pieces of glue film. The two pieces of glue film are bonded together through the heating of the spray body. At the same time, the supply material is used the pump injects the filled material into the middle of the mold cavity, and relies on the mold to pressurize and form. After the brush is moved, the capsules are swept off the mold and collected on the conveyor belt, and then enter the tumbler for drying and forming to enter the next process.

5. Installation and Use Instructions

5.1 Preparations
Confirm that the ground wire (PE) of theencapsulation machine is firmly connected, the resistance of the ground wire is <4Ω, and the wire is required to be more than 4m2.

5.2 Environment Requirements

- The machine should be installed on a level ground, with clear surroundings. It is required to leave at least 0.5m of maintenance space on the back and left and right sides of the equipment, and avoid high temperature, moisture, dust, and direct sunlight. Do not be corroded by corrosive gases and oils. The ambient temperature requirement range is 18-22℃, and the humidity requirement range is 45%-55%.
- The room must be equipped with a single three-wire power supply, and the power supply is 220V/50Hz. Install a mains power air circuit breaker at an appropriate location in the room.
- A set of purified water supply outlets are installed in the sol room. In order to avoid microbial contamination of the ground drain outlets, a medical-specific clean floor drain must be installed.

- The room must be equipped with an air source with a compressed air pressure of not less than 0.4MPa, and the air source is required to be dry compressed air with a cleanliness of 0.5 μm. If the workshop does not have air supply facilities, a compressed air machine is optional.
- The room area is set differently according to different equipment models, and should generally not be less than 4*4m. The door opening is greater than 1.2m, and the door height of the room is not less than 2m.

5.3 Main Components

- The main machine is composed of hopper, feeding pump, gelatin box, rubber wheel, mold, pill discharger and conveyor.
- The feed pump is used to supply the liquid medicine and is synchronized with the main machine through the connection of the equipped mold gear.
- The gelatin box is used to keep the glue liquid warm and cooperate with the rotation of the rubber wheel to prepare rubber. Installation of gelatin box The gelatin box should be fixed smoothly on the rubber wheel. Observe the PTFE plate on the back of the plastic box to make it completely attached to the rubber wheel to avoid glue leakage during work. Adjust the glue outlet gate so that the gap on both sides is consistent, usually about 0.7mm, and connect the heating rod.
- The conveyor is used to transfer and transport softgel capsule pellets.
- The connection method of the rubber pipe is to fix the glue inlet of the glue box and the silicone pipe with a hose clamp. The other end of the pipe is connected to the Y-shaped tee, the insulation sheath is connected, and the heating cable is installed in place.

5. 4 PLC Control System

Used for circuit control and main machine operation of the whole machine

5.5 Glue Tank

- Configure different types of sol tanks according to different outputs. The material of the sol tank (hose outlet, inner tank, jacket, stirring paddle) is 304 stainless steel. It mainly includes a stirring motor, a stirring paddle, a temperature controller, a rubber outlet, a water inlet, an inner tank, a jacket (purified water must be added when using it) and a discharge outlet (there are two drainage outlets, one is the jacket heating medium discharge outlet, One is the inner tank material discharge port).
- Glue process
- Add purified water visible through the window into the jacket, usually 2/3 of the window.
- Weigh purified water, gelatin gum, and glycerol in a ratio of 1:1:0.3.
- Put the weighed purified water into the sol tank.
- Connect the power supply and heat the sol barrel. The temperature is

set between 75-80°C.

- When the temperature reaches 75-80℃, put the weighed glycerol into the sol bucket and stir evenly for about 3-5 minutes.
- Then add the weighed gelatin and stir. After timing for 40-50 minutes, turn off stirring and set the temperature to 50-55°C. Let it sit for 6-8 hours before use.

5.6 Drying Tumbler

It is used for drying and shaping of capsules. The freshly pressed capsules enter the rotating cage for drying, which usually takes about 10 hours. The reverse rotation is used to export the dried capsules.

5.7 Water Chiller

- Connect the power supply of the chiller, inject enough purified water into the water storage tank of the chiller, connect the chilled water outlet to the water inlet of the rubber wheel, and connect the water outlet of the rubber wheel to the water return port of the chiller.
- the chiller within 15 minutes before starting up, and prepare chilled water in advance. Frozen water is used to quickly form the rubber on the normally operating rubber wheel and separate from the rubber wheel to ensure the quality of the capsule shell.
- During use, there will be an alarm when there is insufficient water in the water tank. After filling up with water, press the reset button and the compressor will work normally.

5.8 Mold

For the use of molds, molds with different filling volumes and shapes are selected according to the specifications of different drugs. Each set of molds consists of two rolling molds, a spray body, a diverter plate and a matching gear.

5.9 Capsule Transportation

The conveying system is responsible for transporting the prepared pellets to the rotating cage for shaping and drying.

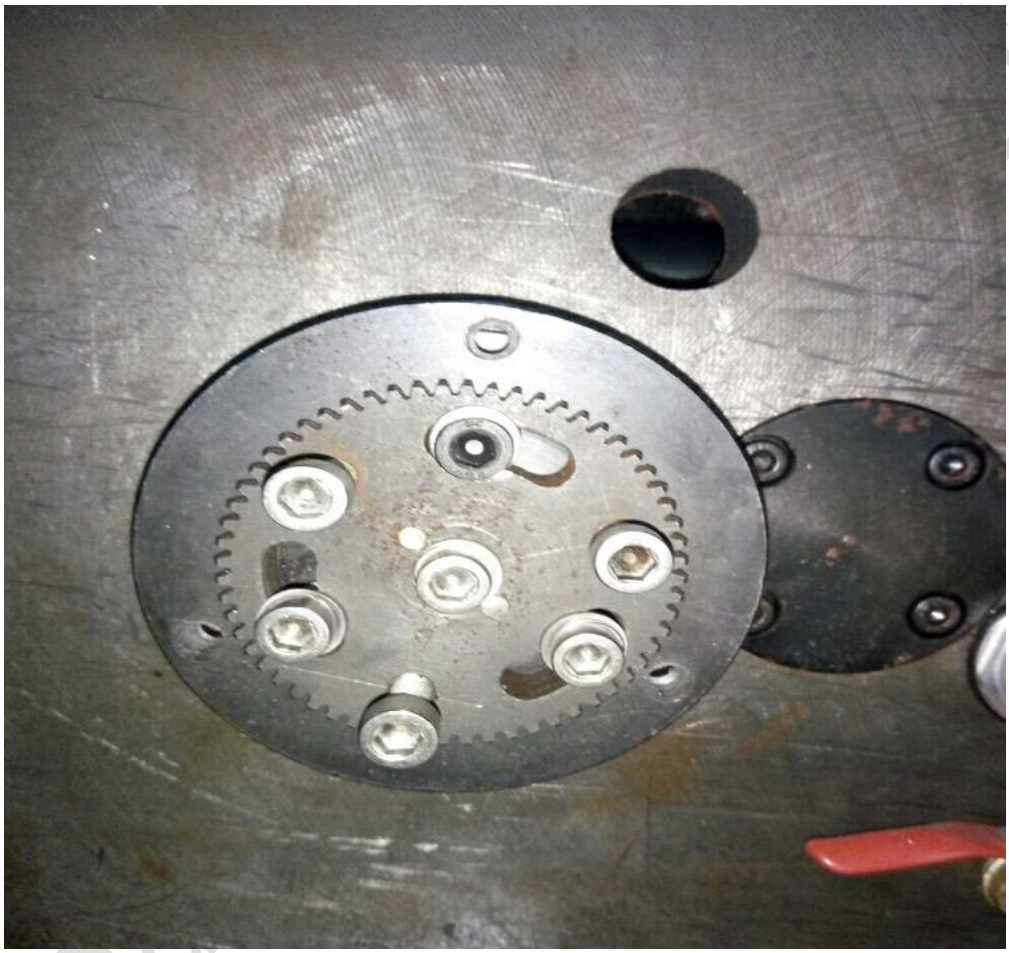
6. Softgel Capsule Production Process

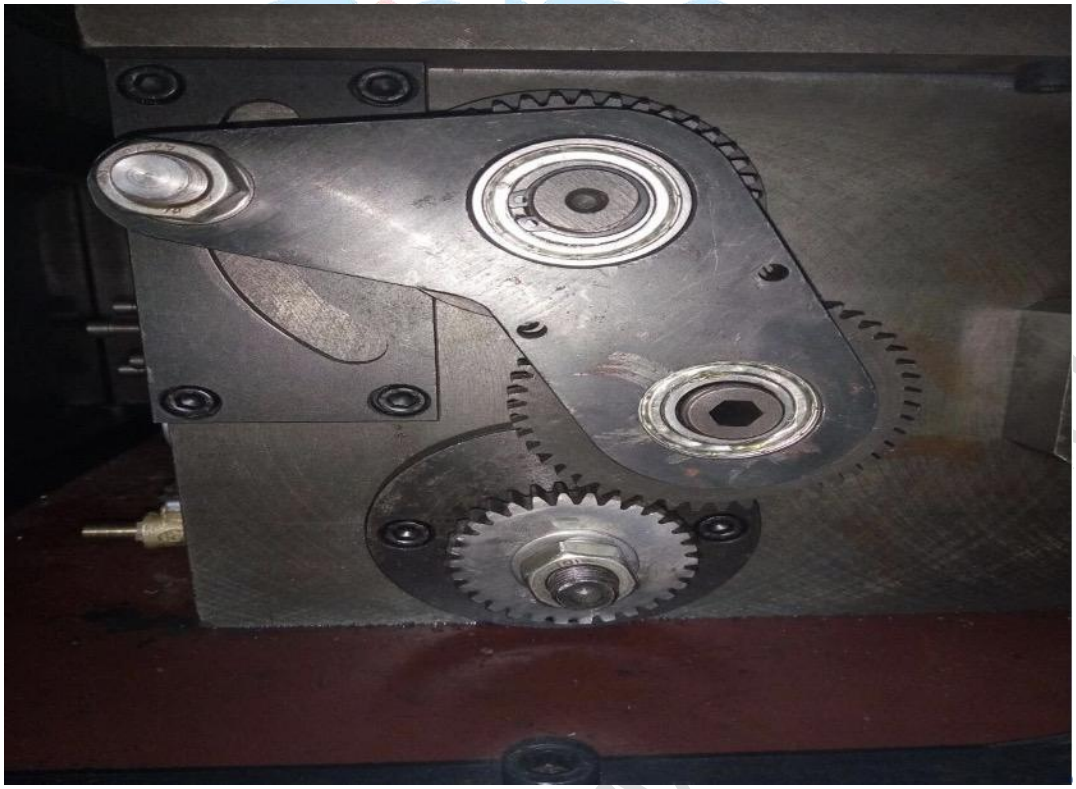
6.1 Mold Installation and Adjustment

- First, select a suitable mold according to the specifications of the drug to be prepared, and confirm that the rolling mold and related parts have been sterilized.
- The two rolling molds are divided into left and right. The end face of the mold is engraved with the model number and left and right marks. Distinguish the left and right molds and install them on the corresponding spindle (with the engraving facing outward). Align the positioning pins of the rolling mold and lock the fixed pressure of the rolling mold. plate.
- Adjust and rotate the right spindle along the steering direction of the main machine so that the right-side rolling mold is completely symmetrically

aligned with the left side. The adjustment method is to loosen the three fixing screws at the oblong hole on the adjusting plate, tighten the other three lifting screws to separate the adjusting plate from the transmission gear, return the three lifting screws, and use a rolling die adjustment wrench (randomly supplied). Turn the right spindle. After aligning the rolling mold, tighten the fastening screws to prevent the rolling mold from loosening and shifting. Turn on the main machine control button,

- Check the symmetry of the mold. It is strictly forbidden to bring the two rolling molds closer together without adjusting the symmetry.





- Install the spray body (with the engraving facing outward) and connect the spray body heating rod and sensor. Use the roller mold to press the hand wheel to adjust the gap between the two roller molds, which is about 1mm (the two roller molds are not allowed to contact each other without the gelatin skin passing through, to prevent the pressure of the roller molds from being damaged). Then gently place the spray body in its natural position in the middle of the left and right roller molds, and adjust the main machine to a position where the engraved line on the front end of the spray body is 2mm-3mm lower than the engraved line on the roller mold. The adjustment method is to first ensure that the left plunger is at the injection station. (Material is about to be punched), open the left door of the main machine, connect the hanging wheel frame with the pre-installed mold matching gear, tighten the fixing nut, lift the spray body, and separate the left rolling mold.

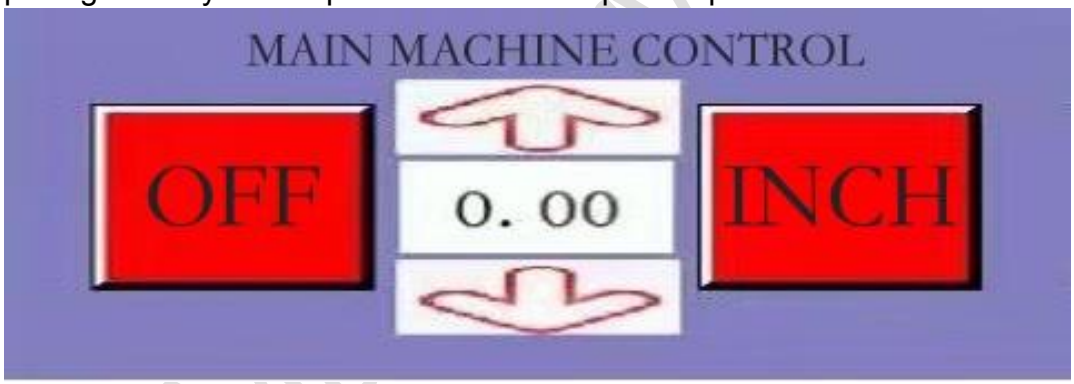
6.2 Preparations before Starting

- Confirm that the rolling mold is installed correctly and there is no foreign matter between the two rolling molds.
- Confirm that the spray body is installed correctly and that the heating rod and sensor are connected intact and securely.
- Confirm that the plastic box is installed correctly and securely, and that the heating rod and sensor are connected intact and securely. The gap between the pre-adjusted rubber outlet and the rubber wheel is generally about 0.8mm.
- Confirm that the filling contents are free of stratification and solidification, and the temperature is suitable for pill making.
- Place the sol tank with the glue stored directly behind the main unit, connect the rubber pipe, tie the heating tape and insulation cover, and connect the power supply of the heating tape.
- Confirm that the compressed air starts and stops normally, and the supply pressure is guaranteed to be 0.1~0.3mpa. Confirm that the compressed air pipeline is correctly connected to the sol tank, and ensure that there is a pressure regulating valve on the pipeline.
- Confirm that the connection between the chiller pipeline and the main machine is intact and there is no water leakage, and ensure the liquid level in the water tank.

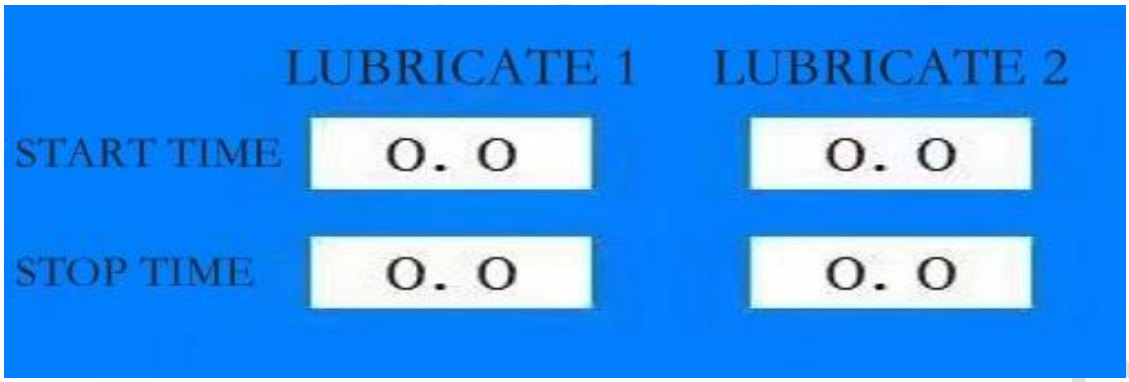
6.3 Power-on Operation

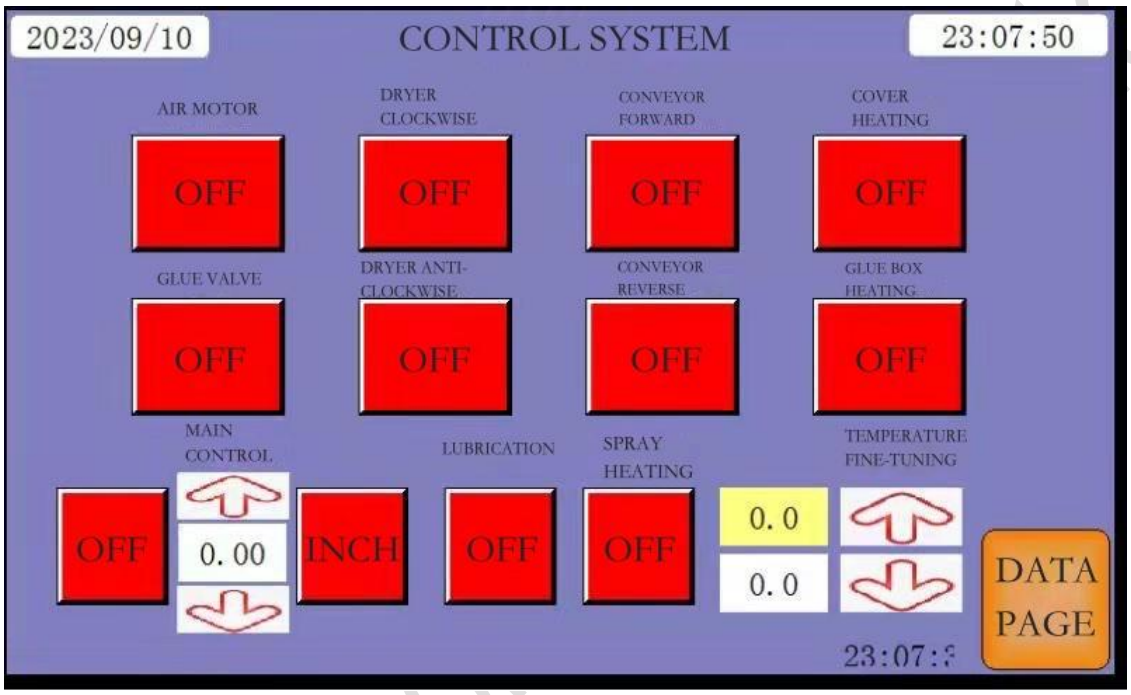
After all confirmations are completed, enter the boot operation.

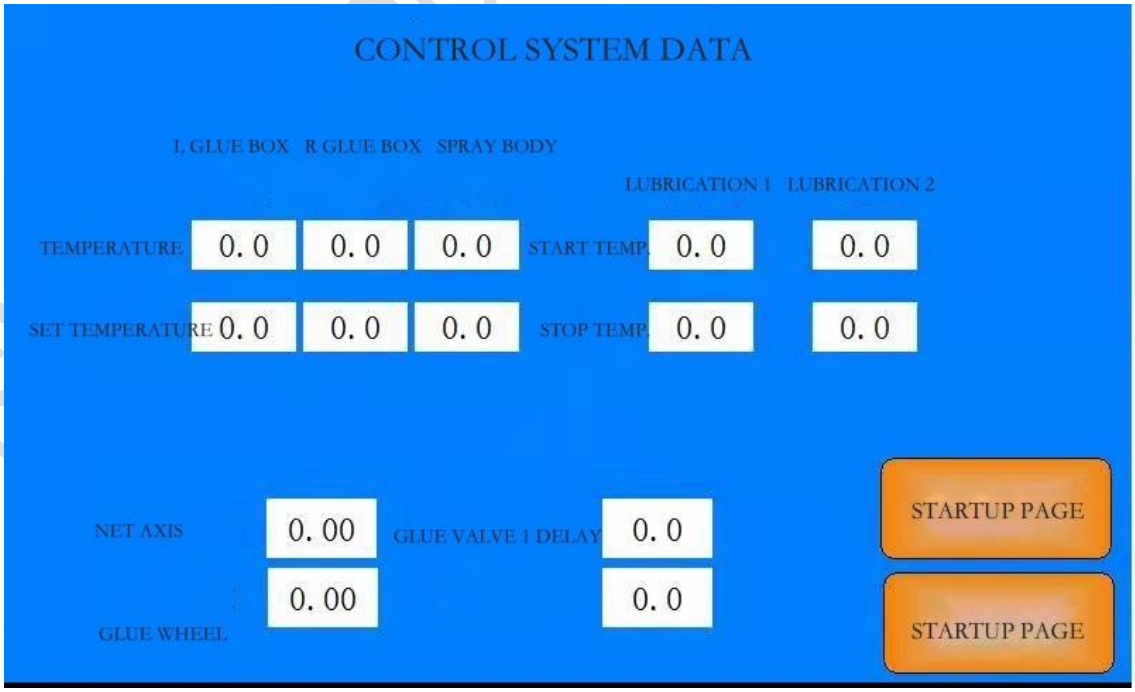
- Turn the circuit breaker in the power box to the closed position. The touch screen will display the power on. Enter the operation screen and set the temperature of the left and right plastic boxes and the spray body. The plastic box temperature setting range is between 50°~60° and the spray body. When the temperature is between 35° and 45°, turn on heating.
- Turn on the water chiller switch button and set the water temperature to about 14°. Open the water inlet and outlet valves.
- The quality of rubber is crucial to the qualification rate of products. After the temperature of the glue box and heating tape is constant, turn on the compressed air switch, adjust the air outlet pressure to 0.03~0.05mpa, open the glue supply valve, and turn on the glue flow control screw. When the glue is stored at half of the glue box, , turn on the main machine control button (the speed is generally set to 30.00), start to prepare the rubber, and measure the thickness of the rubber. The left and right rubber thickness is required to be 0.7mm, and the left and right thicknesses are consistent, paving the way for the production of more perfect products.



- Turn on the lubricating oil pump button (generally the on time is set to 1 second and the off time is set to 60 seconds), and the prepared rubber passes through the rubber guide roller, lubricating oil roller, spray body, rolling mold, and screen roller in sequence. Finally enter the mesh glue bucket. Gently let the spray body fall freely on the rubber and the roller mold. Adjust the mold pressing hand wheel on the left side until the capsule shell is pressed out. Adjust the temperature of the spray body so that the two pieces of rubber are completely bonded together. Turn on the injection switch to press the capsule. Weigh the weight of the pellets and adjust the injection amount. After the pellets are qualified, you can turn on the forward rotation button of the conveyor belt, turn on the conveyor fan, and turn on the tumbler for drying and shaping. The dried pellets (about 10 hours) are reversed and exported through the rotating cage.


LUBRICATE 1
LUBRICATE 2
START TIME
O. O
O. O
STOP TIME
O. O
O. O


2023/09/10
CONTROL SYSTEM
23:07:50
AIR MOTOR
DRYER CLOCKWISE
CONVEYOR FORWARD
COVER HEATING
OFF
OFF
OFF
OFF
GLUE VALVE
DRYER ANTI-CLOCKWISE
CONVEYOR REVERSE
GLUE BOX HEATING
OFF
OFF
OFF
OFF
MAIN CONTROL
LUBRICATION
SPRAY HEATING
TEMPERATURE FINE-TUNING
OFF
0. 00
INCH
OFF
OFF
0. 0
0. 0
DATA PAGE
23:07:3


CONTROL SYSTEM DATA
L GLUE BOX
R GLUE BOX
SPRAY BODY
LUBRICATION 1
LUBRICATION 2
TEMPERATURE
0. 0
0. 0
0. 0
START TEMP.
0. 0
0. 0
SET TEMPERATURE
0. 0
0. 0
0. 0
STOP TEMP.
0. 0
0. 0
NET AXIS
0. 00
GLUE VALVE 1 DELAY
0. 0
GLUE WHEEL
0. 00
0. 0
STARTUP PAGE
STARTUP PAGE

6.4 Shut Down and Clean

- After the pellets are pressed, you need to turn off the injection switch first, loosen the roller mold pressure handwheel, lift the spray body, turn off the heating button, stop the main machine, turn off the lubricating oil pump, turn off the compressed air, turn off the power supply and valve of the chiller, turn off the display without using power. Remove the insulation sleeve of the hose and the hose to clean the site.
- After the rubber has cooled and solidified, clean the glue box and rubber pipe. Drain the remaining glue from the glue tank and add warm water to the tank for soaking and cleaning.
- After the rubber is cleaned, the feed pump, spray body, and rolling mold need to be cleaned online. The cleaning fluid should be selected according to the nature of the content. Generally, 95% alcohol is used for cleaning until there is no residue. Add The liquid paraffin oil is circulated and drained from the return pipe.
- Clean all parts of the machine and the ground around the equipment.

7. Fault Causes and Troubleshooting

Fault	reason	Method of exclusion
There are bubbles in the capsule	Insufficient lubricating oil 2. The medicine delivery tube is not tightly sealed 3. Insufficient liquid medicine in the hopper 4. The PTFE sleeve with oil leakage is not flexible in rotation. Out 5. The oil outlet rod hole is clogged	Add lubricating oil and open the oil outlet valve 2. Check whether the quick connection of the drug delivery tube is tight 3. Add liquid medicine 4. Repair PTFE sleeve 5. Clean the oil rod hole to make it transparent
Large deviation in pill weight	1. The plunger rod sealing ring is damaged. 2. The injection pipeline leaks at the quick connection 3. The spray body switch plate is not pushed in place. 4. The tightness of the locking bolts is inconsistent 5. Plunger rod wear	1. Replace the plunger rod sealing ring 2. Replace the quick-connect plug 3. Push the spray body switch plate into place 4. Adjust the tightness of the bolts 5. Replace the plunger rod
The capsule is leaking	1. The temperature of the spray body is slightly lower during pressing 2. The spray body heating rod is heated unevenly 3. There is damage to the mold 4. The position of the spray	1. When suppressing again, make sure that the joint is completely 2. Replace the heating rod with a qualified one 3. Replace the mold 4. Install the heating rod correctly

	heating rod is incorrect.	
Unqualified pill shape	The thickness of the left and right rubber is inconsistent The position of the spray heating rod does not match the Spray body heating temperature is too high The filling volume does not match the mold	Adjust rubber thickness Adjust the position of the heating rod (sometimes it is not appropriate to push it all the way) On the basis of ensuring that the sealing of the rubber pellets is qualified, the temperature of the spray body should be slightly lowered. Replace the mold to match the drug specifications

8. Maintenance

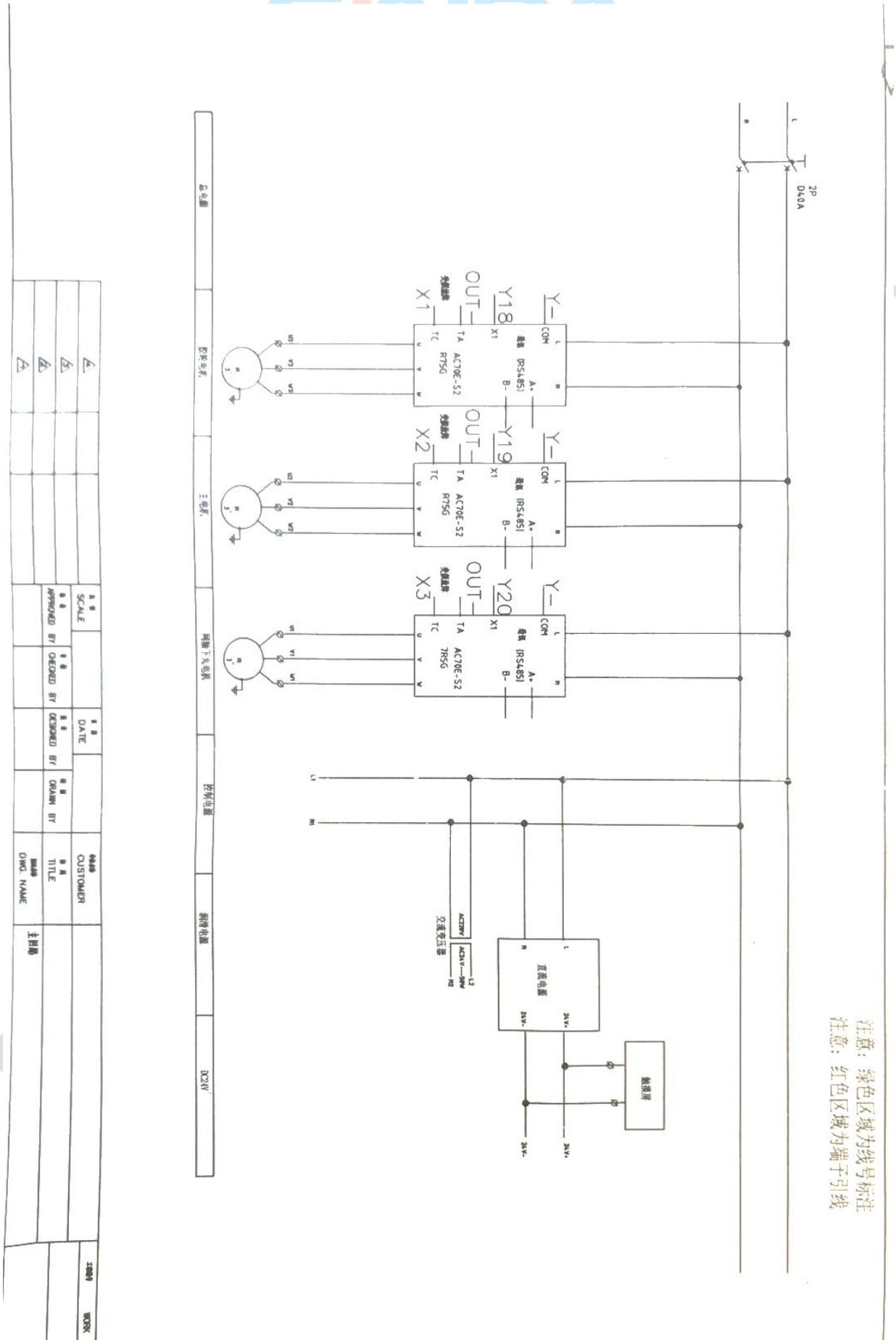
8.1 Care

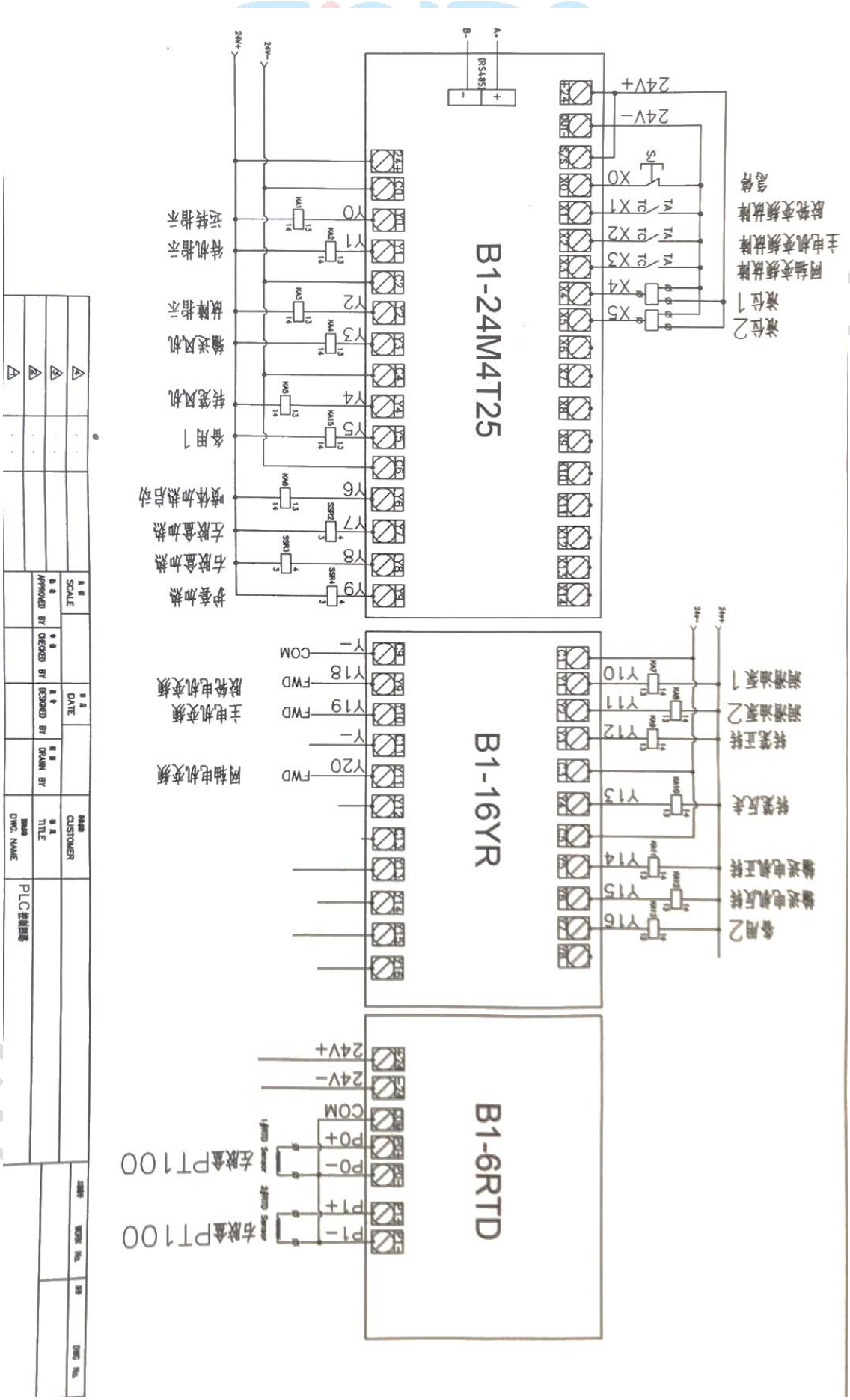
- Before starting the machine, inject lubricating oil according to regulations
- The operating procedures must be strictly followed, and it is strictly forbidden to use hard objects or hands to insert into the mold and mesh shaft.
- After the work is completed, the power, water and air sources should be cut off. After each heating part has cooled down, thoroughly clean the machine and cover it with a dust-proof cover.

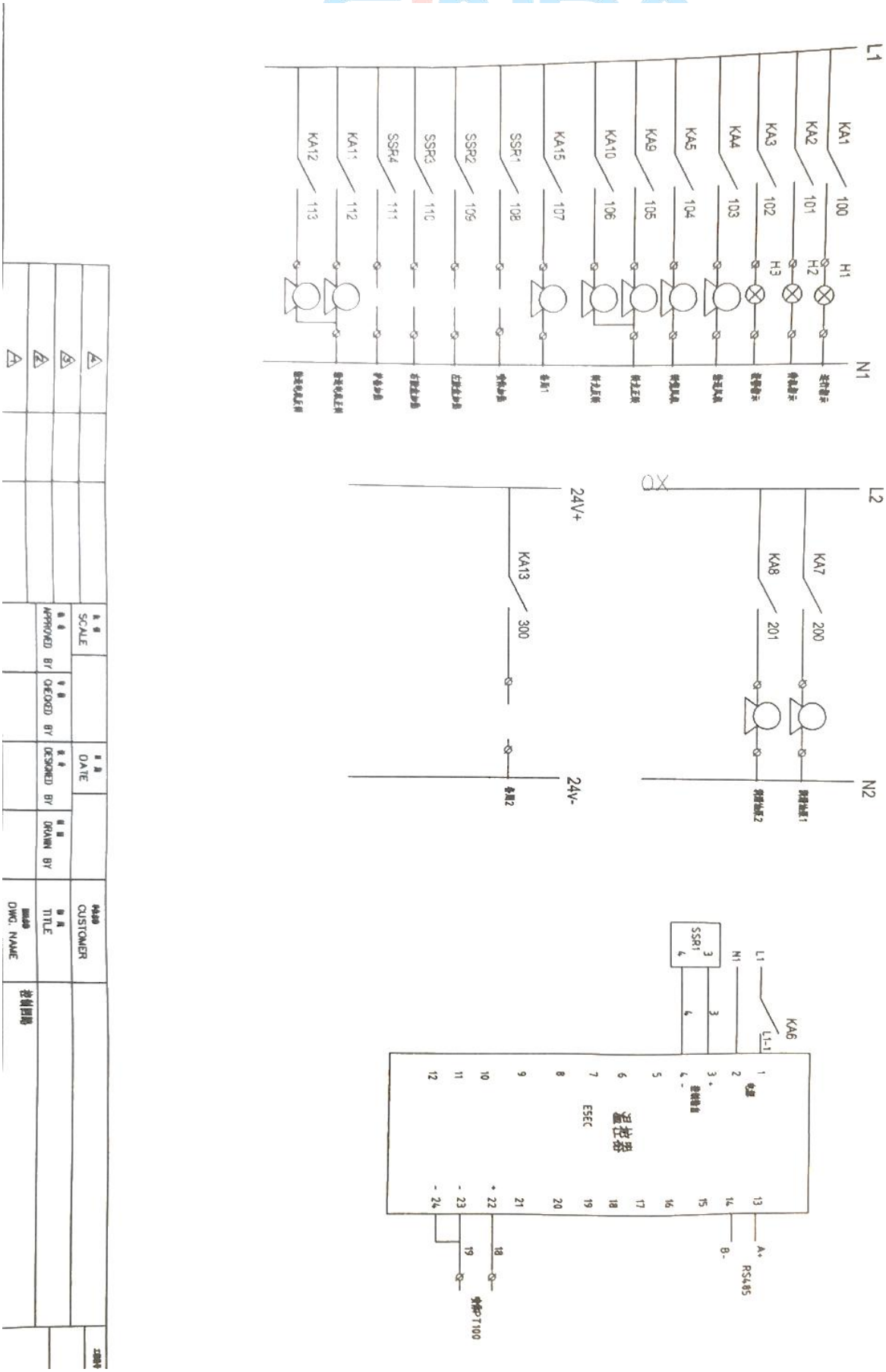
8.2 Maintenance

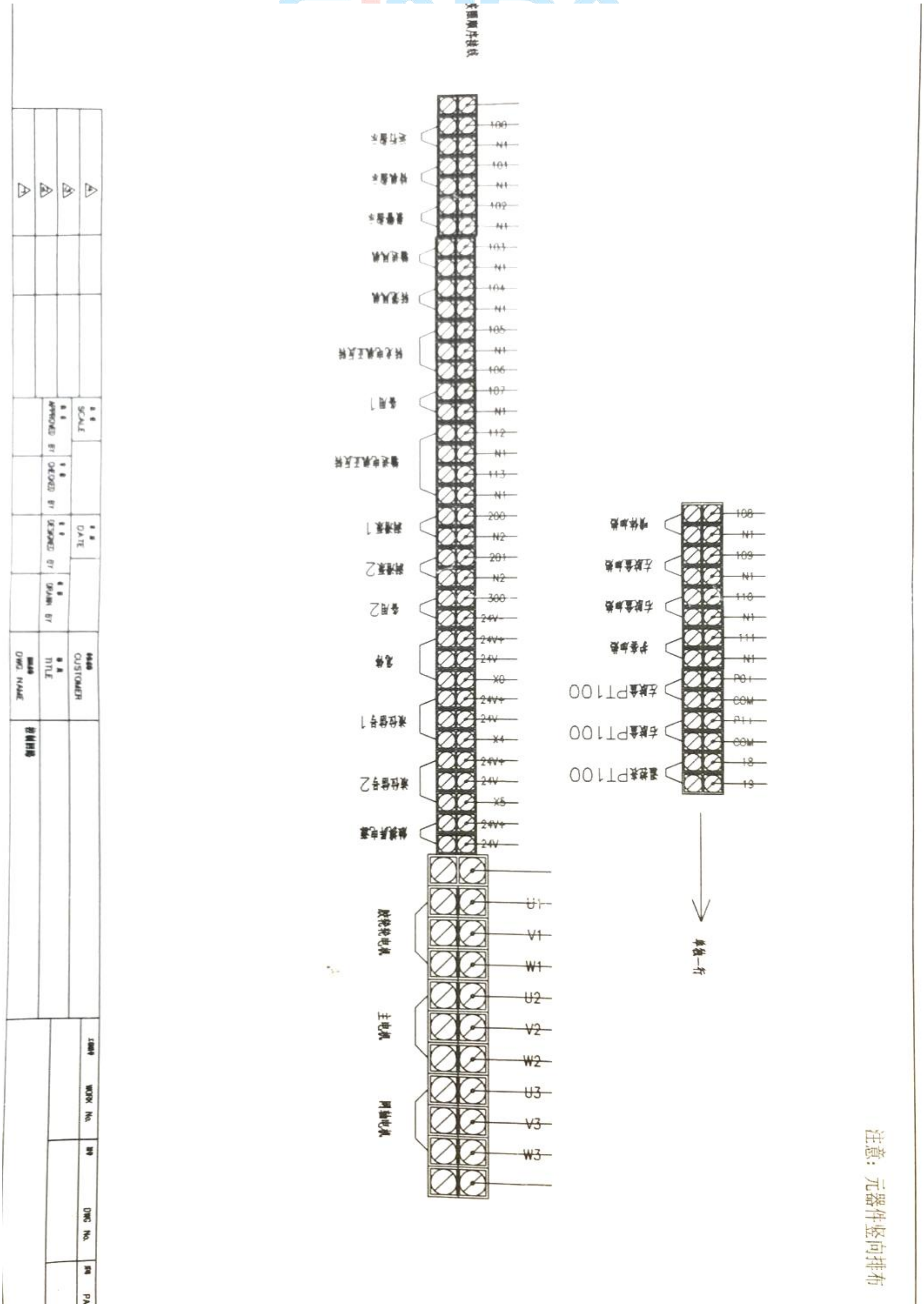
- After the machine has been used for one quarter, perform minor maintenance, scrub and refuel all exposed transmission parts, check whether all fasteners are loose and tighten them.
- After the machine has been used for one year, in-process maintenance will be carried out. In addition to completing the maintenance work, perform oil changes and inspections on each transmission box. If some wearing parts are aging, please replace them with new ones.
- When the machine is in use for two years, perform major maintenance, disassemble and clean all transmission parts, running parts, sliding parts, and seals of the machine, and replace aging parts. Heating elements and electrical appliances must be tested for insulation, and the insulation resistance must be greater than 1MΩ.

9. Circuit Diagram


注意：绿色区域为线号标注
注意：红色区域为端子引线
2P
D40A
Y18
Y19
Y20
X1
X2
X3
OUT
AC70E-S2
R75G
7R5G
COM
(RS485)
A+
B-
TA
TC
触摸屏
直流电源
交流变压器
DC24V
AC220V
AC24V
SCALE
DATE
DRAWN BY
TITLE
DWG. NAME
CUSTOMER
主回路


B1-24M4T25
B1-16YR
B1-6RTD
RS485
A+
B-
24V+
24V-
X0
X1
X2
X3
X4
X5
COM
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Y9
Y10
Y11
Y12
Y13
Y14
Y15
Y16
Y18
Y19
Y20
FWD
PT100
PT100
PLC控制原理


L1
N1
KA1
KA2
KA3
KA4
KA5
KA9
KA10
KA15
SSR1
SSR2
SSR3
SSR4
KA11
KA12
100
101
102
103
104
105
106
107
108
109
110
111
112
113
H1
H2
H3
L2
N2
KA7
KA8
200
201
24V+
24V-
KA13
300
KA6
L1-1
N1
SSR1
ESEC
RS485
A+
B-
PT100


SCALE
DATE
CUSTOMER
TITLE
DWG NAME
APPROVED BY
CHECKED BY
DESIGNED BY
DRAWN BY
WORK No.
DWG No.
U1
V1
W1
U2
V2
W2
U3
V3
W3
PT100
PT100
PT100
注意：元器件竖向排布