



HORECO₂
和丰利干冰

HP80A

Dry Ice Pelletizer

user's manual

**WARNING: READ CAREFULLY BEFORE
OPERATING**

**HORECO2 Dry Ice Blasting Equipment &
Service Co., Ltd.**

**No 18, Xinling Road, Houxi Industrial Park,
Jimei District, Xiamen, China**

Content

<i>SECTION 1. MAINTENANCE SAFETY REQUIREMENTS AND TOOL LIST.....</i>	<i>1</i>
1、Maintain security requirements.....	2
2、Tool list.....	3
<i>Section 2, Control Panel Introduction and Operation Mode.....</i>	<i>6</i>
1、Operating mode.....	7
2、Introducing the Control Panel.....	8
3、Equipment operation.....	10
<i>Section 3. Diagnosing screen failures and solutions.....</i>	<i>11</i>
1、Troubleshooting and Solutions.....	12
(1)、Inverter fault.....	12
(2)、Work timeout failure.....	12
(3)、Dangerous pressure.....	14
(4)、Limit exception.....	15
<i>Section 4. Other Questions.....</i>	<i>16</i>
1、Understanding Control Panel Meters.....	17
2、Learn about hydraulic systems.....	19
<i>Section 5. Gas-liquid system.....</i>	<i>21</i>
1、Learn about gas-liquid pipelines.....	22
2、Adjusting dry ice capacity.....	26
<i>Section 6. Electrical Components.....</i>	<i>27</i>
1、Electronic control system safety rules.....	28
2、Electrical components.....	29
<i>Section 7, Cavity.....</i>	<i>32</i>
1、Understanding Cavities.....	33
2、die template.....	34
3、Die head set screw locking sequence.....	35
4、Piston removal.....	36
Appendix	
1、Hydraulic schematic diagram.....	41
2、Hydraulic schematic diagram.....	42
3、Electrical schematic.....	43

SECTION 1.
MAINTENANCE SAFETY
REQUIREMENTS AND
TOOL LIST

1、 Maintain security requirements

While exposure to carbon dioxide gas is not harmful to humans, caution must always be exercised when using anything that can replace oxygen in the breathing environment.

Never operate the machine without an exhaust duct connected, always operate in a well-ventilated area.

When operating the equipment, do not exceed the recommended carbon dioxide concentration levels specified by regulatory agencies or local company safety policies.

Before performing maintenance on this equipment, all operators and supervisors should be familiar with the literature on the physiological properties of carbon dioxide. This information is available from the Occupational Safety and Health Regulations (OSHA); U.S. Department of Agriculture (U.S. Drug Administration); National Institute for Occupational Safety and Health; Institute of Environmental Medicine; and ACGIH (American Conference of Governmental Industrial Hygienists).

Liquid and gas carbon dioxide

Before performing any maintenance on the piping or valve parts of the equipment, the machine should be depressurized by evacuating liquids and gases, and all pressure gauges should be zeroed before operation.

Power

Except for removing the pellet squeeze piston, the power must be turned off and locked for the rest of the operation

Component removal and installation

Use appropriate lifting equipment or auxiliary equipment to remove or install heavy components on the pelletizer. Use the dedicated piston removal tool to remove the piston of the pelletizer.

Always follow company policy on maintaining safety

2、 Tool list

List of special tools for Pelletizer

Torque wrench

25-200N.m

Corresponding hexagon socket head 10mm 12mm



Valve core disassembly wrench



Piston more disassembly tooling



List of common tools

Open end wrench

8mm, 10mm, 13mm, 14mm, 16mm, 17mm, 19mm
21mm, 22mm, 24mm, 27mm, 30mm, 32mm



Allen key

1.5-10mm

12mm,



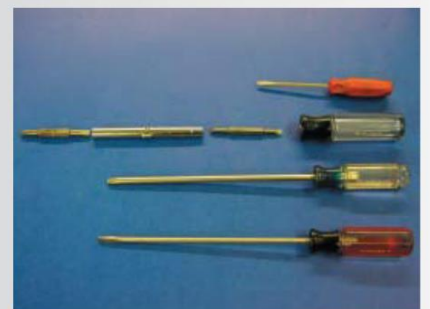
Adjustable wrench

8 inch, 12inch



Phillips screwdriver

3mm, 5mm, 6mm



Flat-blade screwdriver

3mm, 5mm, 6mm



Torque wrench

3/8 series 25 N/M

1/2 series 40-200N/M



Multimeter



Hacksaw



Pipe wrenches



Section

*2---Introduction to
Control Panel and
Operation Mode*

1、 Operating mode

Pre-cooling

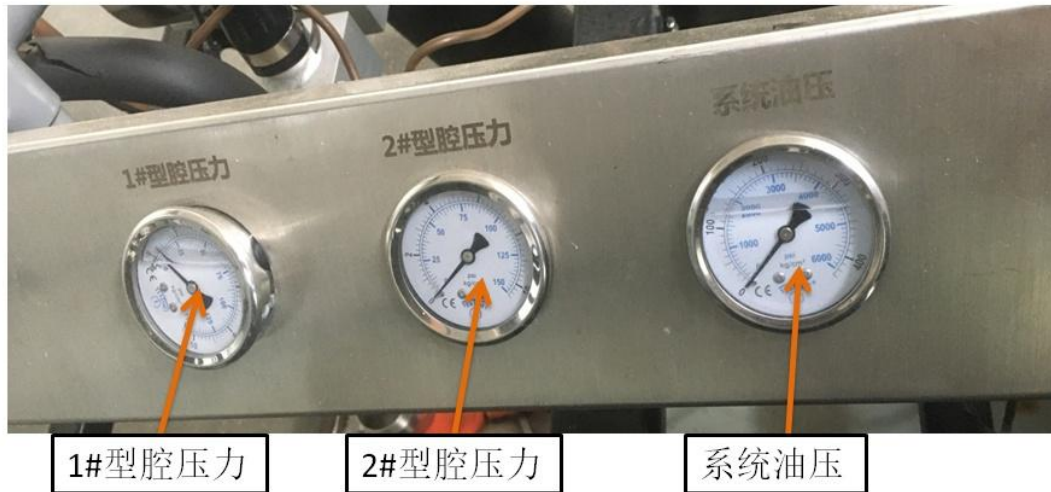
The cooling cycle uses the top solenoid valve to cool the liquid hose and extrusion barrel. The machine will then go into production mode using the ball valve injector.

Ice making

In the production mode, the time relay is used to control the opening and closing of the ice spray valve, and the length of the ice spray valve is controlled by setting the time relay time, so as to meet the needs of different output.

2、Introducing the Control Panel

Control panel

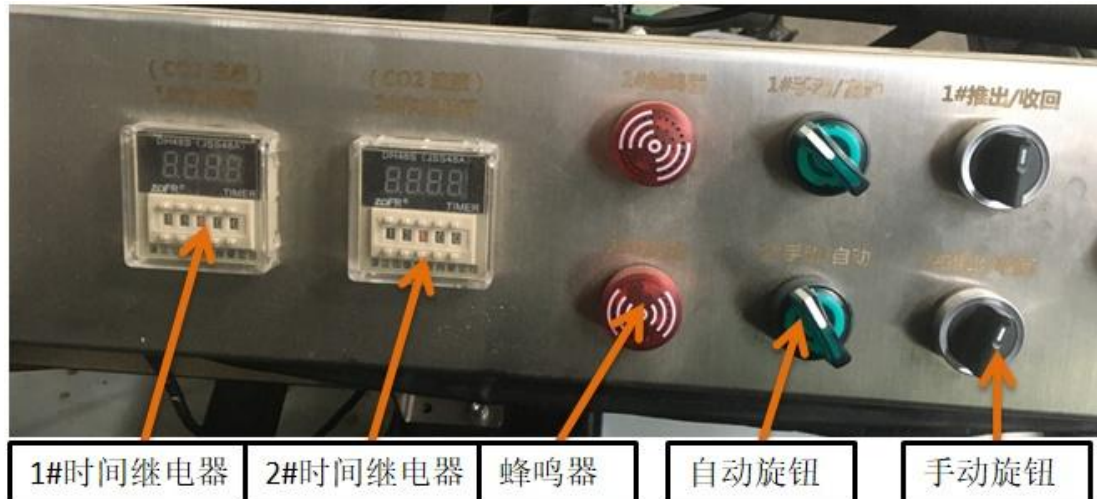


- 1 1# cavity pressure: detect the gas pressure in 1# cavity;
- 2 2# cavity pressure: detect the gas pressure in the 2# cavity;
- 3 System oil pressure: Check the oil system pressure.



- 1 Power indicator: White light on means the power is on;
- 2 Reset button:
Function 1: long press the fault reset button for 2s to stop the motor;
Function 2: When the machine alarms, press the reset button to reset, and the machine will work again.

- 3 Power switch: turn on the power of the whole machine;
- 4 Emergency stop button: instantly turn off all power and actions of the machine to prevent accidents;



- 1 1# time relay: control the opening time of the 1# cavity ice spray solenoid valve;
- 2 2# time relay: control the opening time of the 2# cavity ice spray solenoid valve;
- 3 Buzzer: alarm when the machine is abnormal;
- 4 Automatic knob: turn it clockwise and the machine starts to run automatically;
- 5 Manual knob:
 - Function 1: Rotate the push button to start the device motor;
 - Function 2: Rotate the cylinder counterclockwise to advance, and rotate the cylinder clockwise to retreat.

Mode selection

The operation of this machine is divided into two modes: manual and automatic. The manual mode is used for maintenance of equipment.

Emergency stop

During the working process, if any fault occurs, press this button to stop all actions.

After stopping the machine, rule out emergency situations as a priority.



3、 Equipment operation

Startup steps

Step 1 – Wear gloves and earplugs before operating the machine and place the dry freezer at the dry ice outlet.

Step 2 – Open the liquid phase valve (CO₂ liquid line);

Step 3 – Turn the power switch inside the device's electrical box to the power-on position;

Step 4 – Turn on the power switch on the operation panel to release the emergency stop;

Step 5 – Start the motor (turn the 1# manual push knob or 2# manual push knob to start the motor);

Step 6 – 1# cavity, 2# cavity automatic knob;

The machine will remain on the cooling cycle until the desired number of strokes is reached to start producing dry ice pellets, after which the machine will go into full production.

Close steps

Step 1 - close the liquid phase valve (CO₂ liquid pipeline);

Step 2 - The equipment continues to run for a certain period until no dry ice particles are produced (the length of time is related to the piping arrangement);

Step 3 - Drain the residual liquid in the pipeline until the liquid pressure is 0 bar, and open the drain valve (normally open) of the pipeline;

Step 4 - Turn off the motor (long press the fault reset button for 2s to stop the motor)

Remarks: After shutdown, the liquid emptying valve needs to be opened normally to prevent residual dry ice in the pipeline or the liquid is not emptied. In the closed pipeline, the pressure will continue to rise, which will damage the equipment and cause personal accident safety caused by pipeline blasting.



Drain

Section 3 – Diagnosis and Solutions

1、Troubleshooting and Solutions

(1) 、 *Inverter fault*

(the buzzer keeps ringing)

1. motor stopped



1. View fault codes

(2) 、 *Work time out*

(Buzzer flashes, time interval 1S)

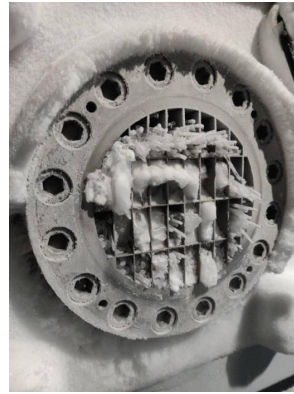
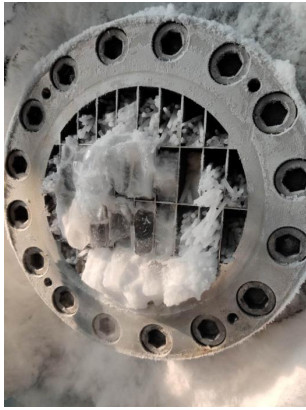
1. The template or die head is blocked by water ice
2. Hydraulic solenoid valve coil failure or failure
3. Pressure switch failure

1. Remove the template die to thaw, and re-install after drying
2. Check whether the hydraulic coil is normal
3. Check whether the pressure switch is normal
4. Contact our service

All piston action and solenoid valve ice spray are stopped

1. Multiple machines in the same plant all have extrusion overtime alarms, which may be caused by excessive liquid or ambient water content. Water ice can accumulate on the touch head and the template, and the accumulation of dry ice particles on the template has limited the flow, which makes the device squeeze the dry ice for a long time, and the alarm is overtime.

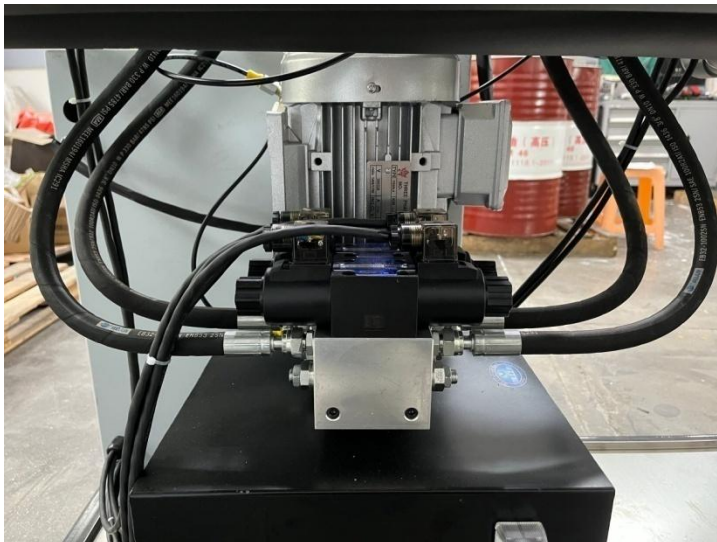
The template is not cleaned thoroughly when the template is turned on. When the template is wet, the production of dry ice particles will cause the template to be blocked, the molding quality will be poor, and it will also cause the extrusion time-out alarm, as shown in the figure below.



If the above situation occurs, remove the die head and template to thaw (water flushing), and then reinstall it for production after thorough drying.

It is recommended to use carbon dioxide liquids with low water content to produce dry ice

2. Check whether the system pressure can reach the set pressure of 225bar.
3. Check whether the oil temperature is normal, lower than 60 °C, if the oil temperature is too high, please refer to the hydraulic fault solution.
4. Excluding the above reasons can not solve the problem, please contact us at 0592-6220885 in time, we will provide quality services in time.
5. Check the hydraulic coil to see if the power is correct. Rotate the manual knob. If the reversing valve coil is normal, the corresponding coil will light up in



red.

(3) 、 *Dangerous pressure*

1. Check the liquid storage tank pressure, the storage tank pressure is greater than 20bar.
2. Production of dry ice is prohibited during tank filling
3. Is the setting of Shannes pressure switch correct?
4. Check the ice spray solenoid valve for leaks



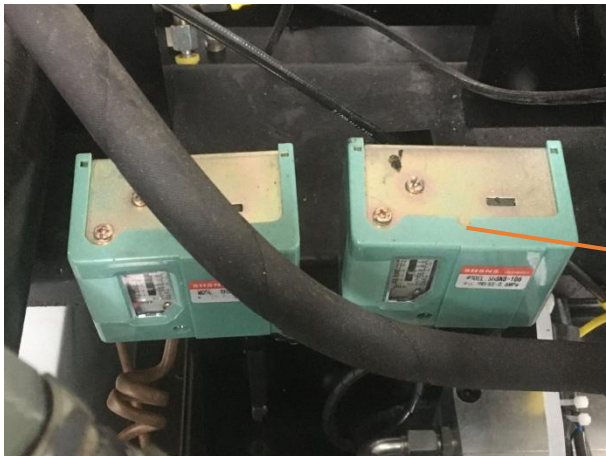
1. The pressure of the normal cavity will be controlled within 4bar. The cavity pressure is controlled by the time set by the time relay to control the pressure in the cavity. When the pressure in the cavity exceeds 6bar, the device will alarm the dangerous pressure to protect Parts of the equipment are not damaged. The spray speed of dry ice is positively related to the cavity pressure, and the pressure is controlled within a certain period of time, that is, the speed of ice spray is controlled to avoid too much dry ice in the cavity.

2. The dangerous pressure of the equipment alarm may be that the ice spraying speed is too fast. At this time, we need to check the pressure of the liquid storage tank. The pressure should not exceed 20bar. The normal production of dry ice is strictly prohibited under the condition of ultra-high pressure.

3. When the liquid storage tank is filled with liquid, especially at the moment when the liquid is filled, shock pressure will be generated in the storage tank, and the amount of ice spray will change drastically. In order to protect the equipment, it is strictly forbidden to produce dry ice during liquid filling.

4. Whether the setting of the Shannes pressure switch is correct, and the dangerous pressure is set to 6bar. If there is any change, please contact us and make appropriate changes according to your production status.

5. Check whether there is leakage in the ice spray solenoid valve. If there is leakage, please replace the new solenoid valve in time, and disassemble the liquid filter to check whether there is any foreign matter in the filter element. Please replace the filter element on time, usually with 6 months is a replacement cycle.



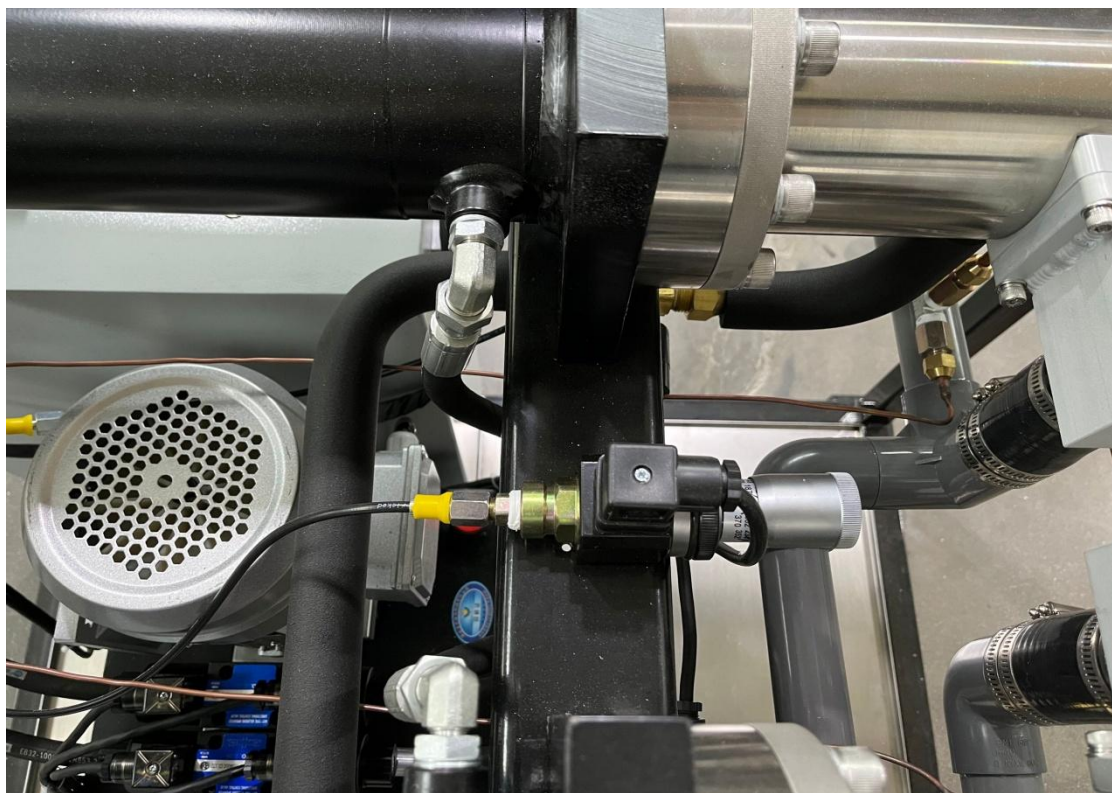
Shannes pressure switch, set to 6bar, measure the cavity pressure, and alarm when the pressure exceeds the set pressure

(4) 、 Cavity ice blocking

1. The cavity is blocked with ice, and the ice is sprayed too much, so that the maximum extrusion pressure exceeds the pressure set by the pressure switch, resulting in the dry ice in the cavity not being completely squeezed out during the dry ice extrusion stage, resulting in a cavity pressure alarm

1. Turn the manual knob to see if the time between the cylinder reaching the front limit is very different from that of the other cylinder. If so, it means that the cavity is blocked with ice, and the touch head needs to be disassembled, and the dry ice inside the cavity should be taken out. .

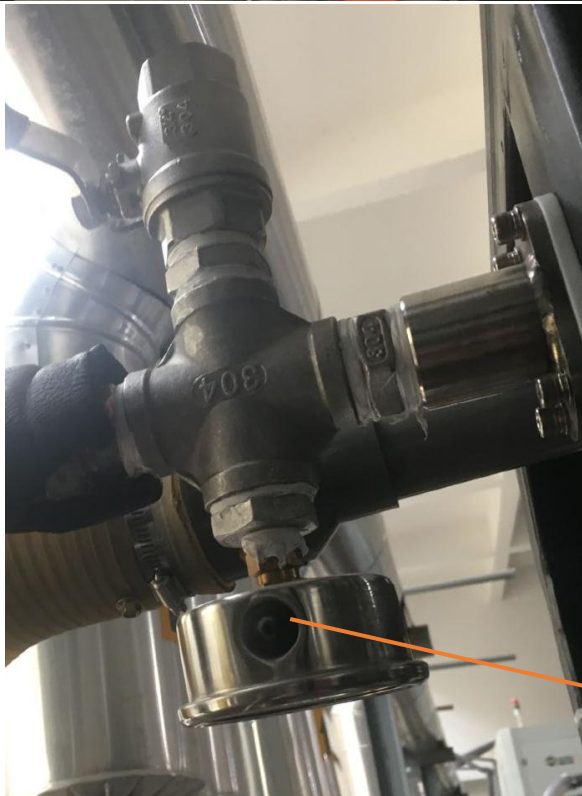
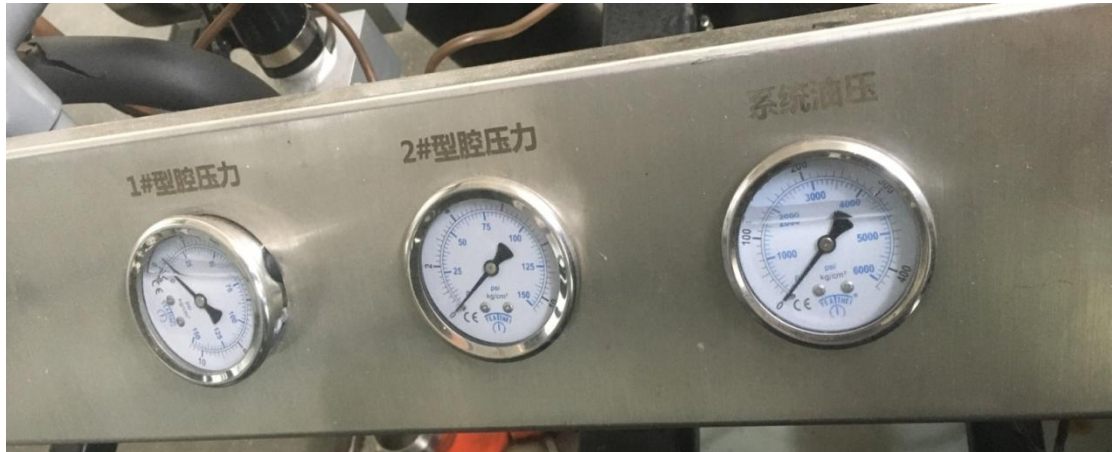
2. Contact our service



All piston action and solenoid valve ice spray are stopped

Section 4 – Other Questions

1、 Understanding Control Panel Meters



liquid pressure

Cavity pressure

During the end of the spray cycle, the pressure in the cavity should indicate a maximum pressure of 2.0 bar, then as the ice spray ends, the piston begins to advance and the pressure drops rapidly to zero. If the pressure in the cavity does not reach 2.0bar, that is, the dry ice output of a single cavity is less than 360g in one cycle, the following problems may exist:

The ball valve switches on the pipeline are not fully opened, and the pressure drop of liquid carbon dioxide is too large when passing through the valve;

The filter in the equipment is blocked due to dry ice powder, and the pressure drop in the pipeline is too large;

The outlet of the tank pipe is blocked by dry ice powder, which may be caused by an incorrect start-up process or shutdown process, or the pressure drop freezing due to a leak in the pipe;

The cavity pressure instantly rises to a high point and disappears instantly, which may be due to the instantaneous impact caused by the vaporization of the liquid in the pipeline, which generally occurs when the equipment is restarted after the production process is suspended or stopped.

Liquid pressure

When the valve is opened, the pressure gauge indicates the liquid CO₂ pressure in the pipeline. During the injection cycle, the pressure gauge indicates that the normal pressure drop does not exceed 1.4bar. If the pressure drop exceeds 1.7 bar during reblasting of dry ice, the liquid filter may be clogged, or the pipe ball valve may not be fully open, or there may be dry ice powder in the pipe blocking part of the pipe. The liquid CO₂ working pressure range of the HP80A pelletizer is 13-20 bar. If the pressure gauge fluctuates violently, there is a lot of gas in the pipeline.

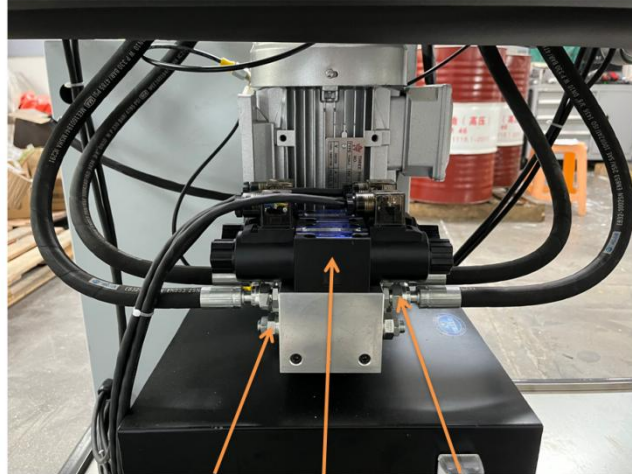
Hydraulic pressure

During the extrusion cycle, the hydraulic pressure should be increased from 0 to 80 bar. This stage is the rapid feed stage. The double pumps work at the same time, and the cylinder performs differential feed to realize the rapid passage of the cylinder through the exhaust area. After passing through the exhaust zone and entering the extrusion zone, the hydraulic pressure is increased from 40 bar to a maximum of 225 bar, depending on the type of die plate used. The period from the rear limit to the front limit is normally 14.5-15.5s, and the longest should not exceed 20s.

2、 Learn about hydraulic systems

HP80A adopts 220V motor, single gear pump

The displacement of the HP80A pump is 4.2mm/r,



溢流阀 换向阀 油口

respectively.

The solenoid valve action of HP80A is energized as shown in the figure below

The reversing valve is a DC24V three-position four-way "G" type solenoid valve

The relief valve is a safety valve RV-01 direct-acting relief valve to prevent the system pressure from exceeding 250bar and causing damage to the equipment.



油箱进油口

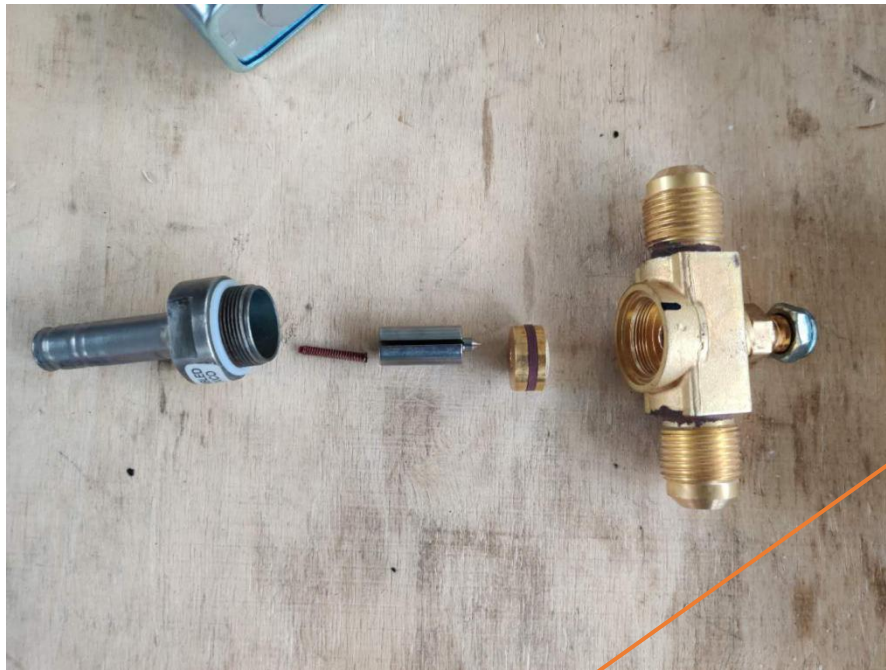
*Section 5 –
Gas-liquid system*

1、 Learn about gas-liquid pipelines

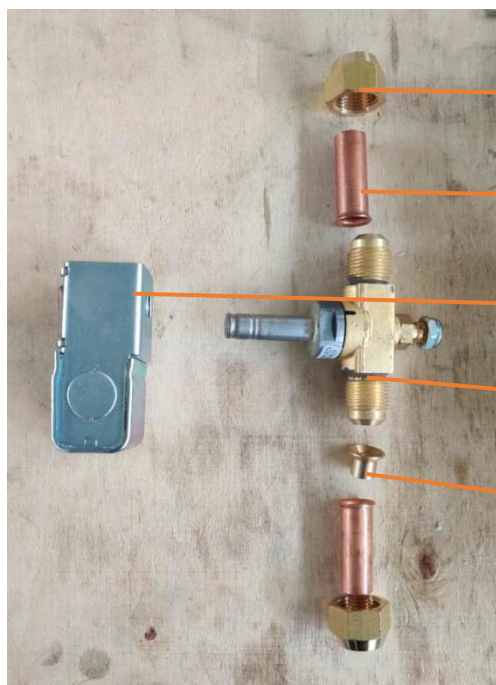
The HP80A pelletizer liquid phase and exhaust gas pipelines are independent pipelines, and do not interfere with each other. This arrangement can control the movements of the equipment more flexibly to realize various functions of the equipment. A filter is installed at the inlet of the liquid phase pipeline to ensure the cleanliness of the liquid entering the equipment and valve and protect the equipment.



The HP80A adopts Emerson solenoid valve to control the spraying and stopping of dry ice. The advantage of this valve is that it is waterproof, completely electronically controlled, has fast response, good sealing performance and extremely low leakage. Opening and closing is responsive and easy to control.



When the solenoid valve fails to open or close, close the switch on the liquid pipeline, open the exhaust valve to confirm that there is no pressure, remove the solenoid valve spool, check whether there is foreign matter, and clean it with diesel oil or a cleaning machine, re-install, press and smooth by hand, dry and re-install to restore. If there is no improvement after cleaning, please replace the solenoid valve in time



copper nut

copper pipe

magnet wire

Solenoid valve body

Throttle valve

Part of the CO₂ liquid expands through the orifice to form gas, and part of it forms dry ice powder, which accumulates in the cavity

HP80A adopts 3M filter, which is installed in the liquid phase pipeline to filter the liquid entering the equipment, protect the equipment and solenoid valve, and prolong the service life.



Liquid filter



filter removal tool

It is strictly forbidden to disassemble and assemble under pressure. Before dismantling, be sure to empty the pressure of the equipment and open the emptying valve on the pipeline. The residual dry ice will continue to volatilize and regenerate the pressure.



Reinstall after replacement or cleaning, make sure the thread is locked, otherwise it will leak or even cause gas explosion

Filter element 5μm filtration accuracy

The filter element is a consumable, please replace it regularly

Before installation, check that the O-ring is intact and correctly installed in the groove. If there is still air leakage after locking, please replace it in time.



No. 1 ice
spray valve
sprays dry

Cavity pressure gauge
port, measure the
pressure in the cavity,
control the amount of ice
spray

2、 Adjusting dry ice capacity

When the HP80A is working normally, a single cavity has a cycle every 18s, and the output in one cycle is 360g (to protect the equipment, the maximum should not exceed 400g) In different production environments, we need to adjust the specific parameters of dry ice accordingly to achieve the equipment's performance. optimal productivity.

When the equipment is first installed, it is necessary to adjust the equipment, first produce according to the default parameters, and receive a single dry ice pellet for weighing.

1. The single dry ice output is less than 360g,
 - a. Adjust the time relay to control the opening time of the ice spray solenoid valve
2. A single dry ice output is more than 400g
 - a. Please appropriately reduce the ice spraying time to suit the production situation. We recommend that the maximum ice spray time should not exceed 14s.

*Section VI –
Electrical
Components*

1、 Electronic control system safety rules

1. Electrical maintenance and troubleshooting should only be performed by persons with formal training and expertise.
2. Do not modify or omit the protective interlock.
3. Before starting up, read and pay attention to the warning signs.
4. When the troubleshooting is confirmed, the power must be cut off and the main switch must be locked.
5. Pay attention to wet areas to prevent electric shock.
6. Personnel must be cleared before power is sent to any equipment.
7. Do not open the electrical box unless it is necessary to inspect the electrical equipment.
8. Do not modify the circuit unless authorized by the manufacturer.
9. When replacing electrical parts, first determine if they meet specifications, including color coding of wires.
10. Do not wear metal glasses, necklaces, etc. when operating electrical equipment. Also do not wear rings, watches, bracelets.

2、Electrical components

Electric
cabinet



If the hydraulic pump is the heart of the ice maker, the programmable logic controller (PLC) is the brain of the system. It goes through the input and controls the function through the output. The data is analyzed from the input, and if everything is ok, the PLC sends the correct signal to the output to operate the pelletizer function.



Amplifying board to prevent the plc input from burning out due to external short circuit



Fuse terminal (effective protection circuit)



Delixi leakage protector switch



Single phase AC contactor



Switching power supply (AC220V to DC24V)

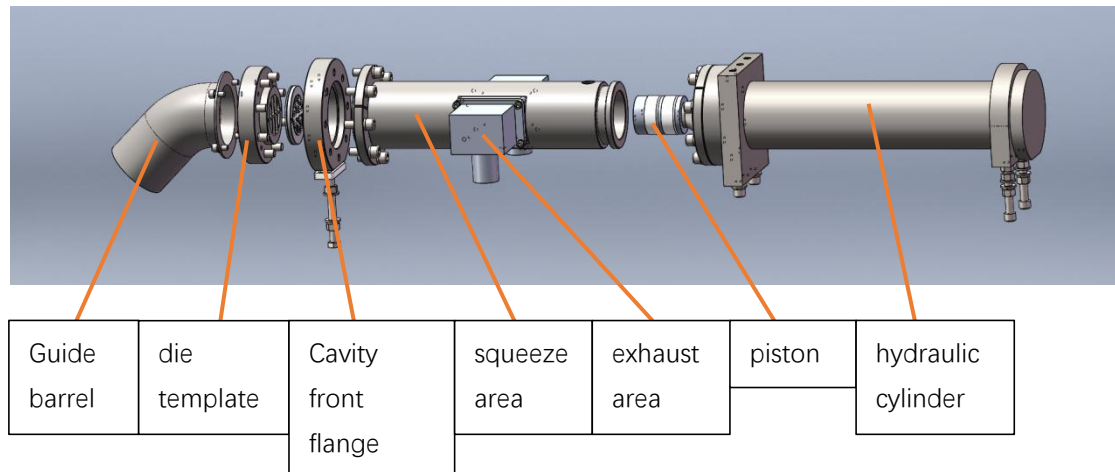


Electrical Cabinet Cooling Fan

Section 7---Cavity

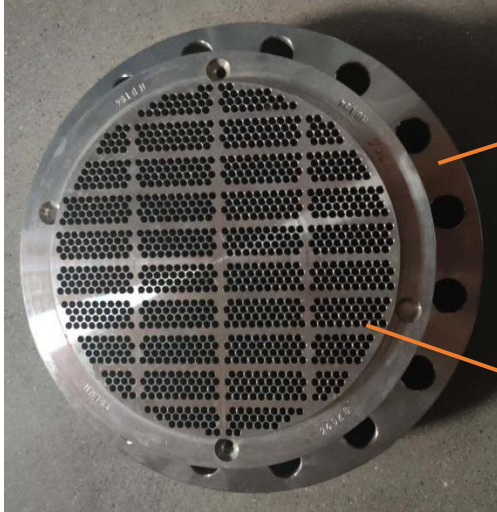
1、 Understanding Cavities

HP80A adopts a new cavity structure and an exhaust structure with independent intellectual property rights, which achieves small volume, large production capacity, and improves the conversion ratio (the conversion ratio reaches 2.45:1, that is, 1kg of dry ice particles can be produced per 2.45kg of liquid raw material). The structure of the cavity is described in detail below.



2、 Die template

HP80A can produce dry ice pellets of various specifications, and can produce high-quality dry ice pellets of 3mm and 16mm.



3mm template
installation using 3mm
die support

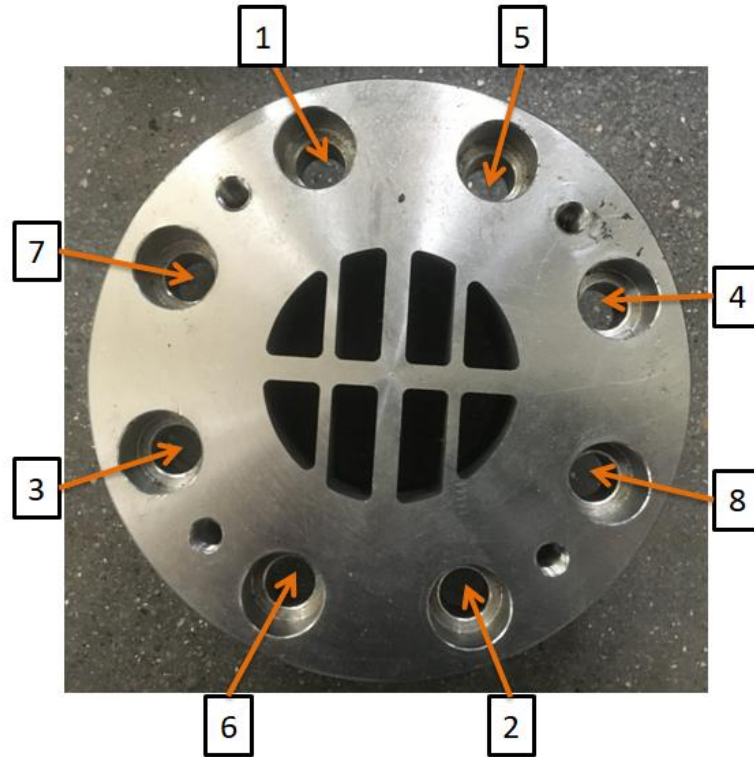
3mm template



16mm integrated,
die template

3、 Die head set screw locking sequence

The die head fixing screw locking principle The diagonal line is evenly locked, and the torque wrench is used for



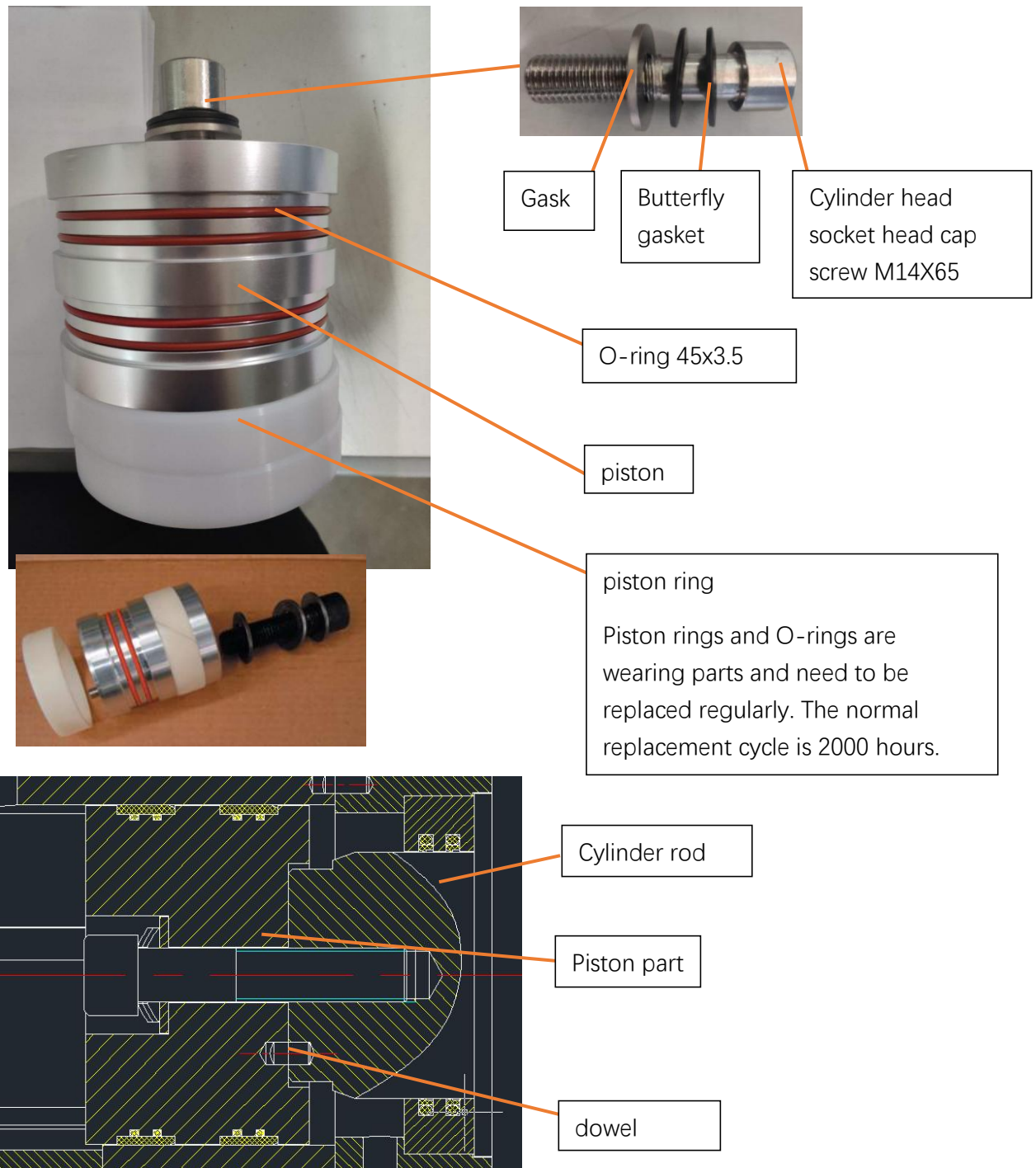
locking.

1. Tighten according to the sequence shown in the figure above, and the initial locking force is 20N.m.
2. After locking for one turn, adjust the locking force to 36N.m and continue to lock in sequence.
3. Repeat step 2 to make sure each screw has the same preload.

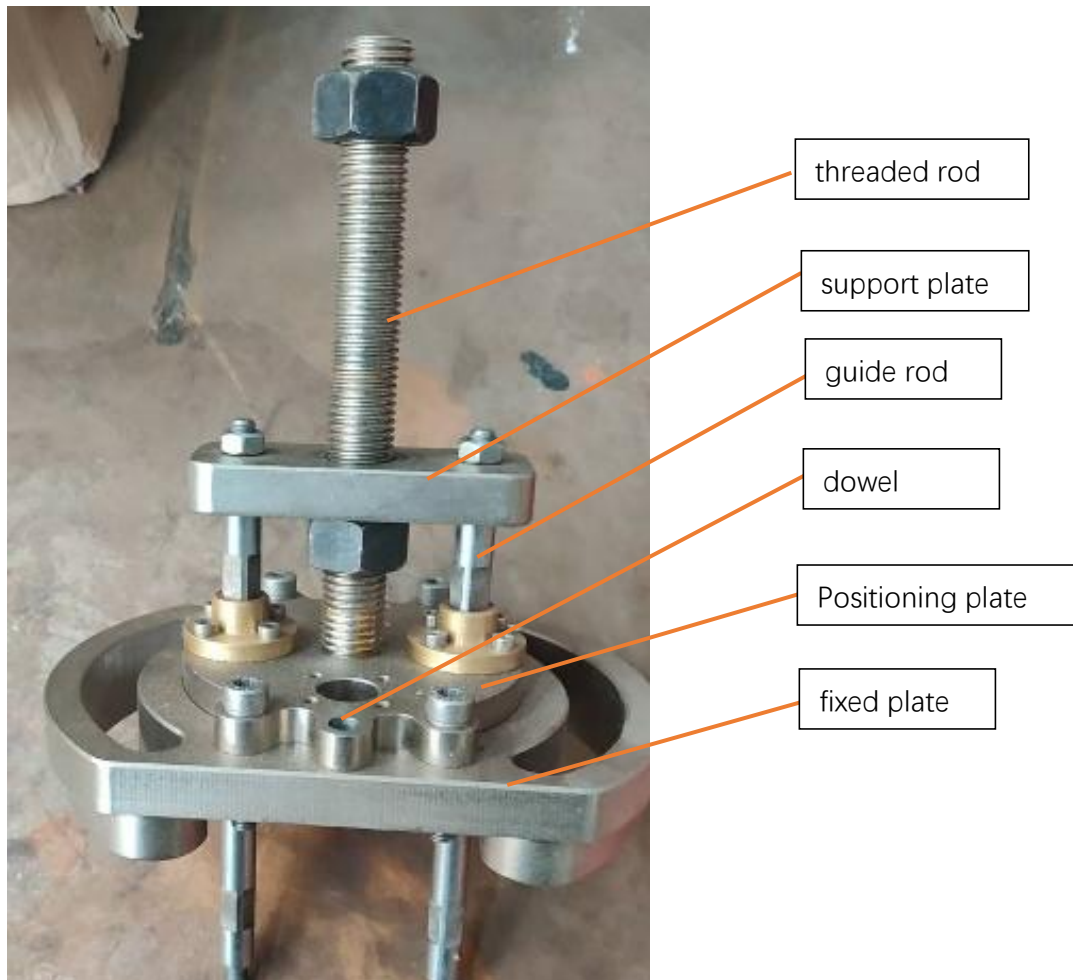
Note that the above data is for the installation of the equipment at room temperature. For example, when the equipment is disassembled and installed at low temperature during the production process, after locking according to the above steps, after this production is completed, the equipment needs to be re-locked when it returns to normal temperature. Due to thermal expansion and cold contraction, the required pre-tightening force will not be achieved after the screw returns to normal temperature. Check the die head screws every three months and re-tighten them. When the equipment alternates between hot and cold, the preload force will gradually decrease.

4、Piston removal

The HP80A piston structure is shown in the figure below



When the piston is installed, it is necessary to align the pin holes. When the piston ring and the O-ring are installed, the piston ring will bounce up under the support of the O-ring, and it will be an interference fit with the cavity. In order to facilitate the disassembly and assembly of the piston, we will provide a special disassembly tool, as shown in the figure below

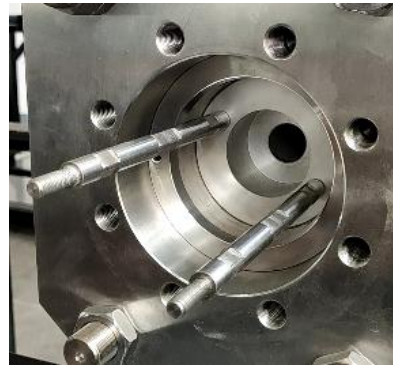


Disassembly steps

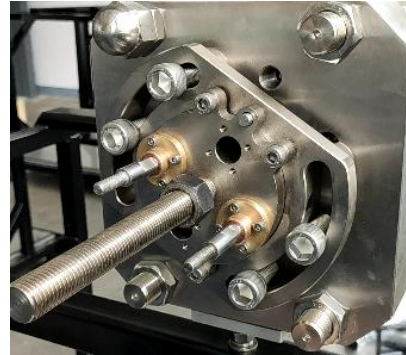
1. Put the piston on top of the front end of the cavity, and remove the screw with a 12mm Allen wrench. If the piston rotates during removal, switch the device to manual mode, remove the travel switch, push out the piston manually, and press the cylinder piston tightly. On the front cover, then remove the screws.



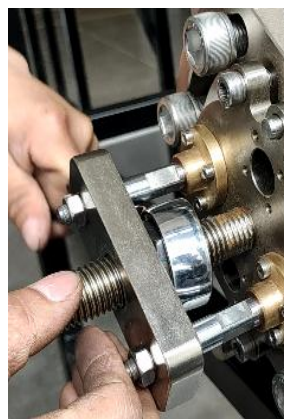
2. Remove the tool guide rod installed in the threaded hole of the piston and lock it.



3. Put the main body of the tooling into the guide rod, and fix the fixing plate on the die head seat with screws to ensure that it is locked.

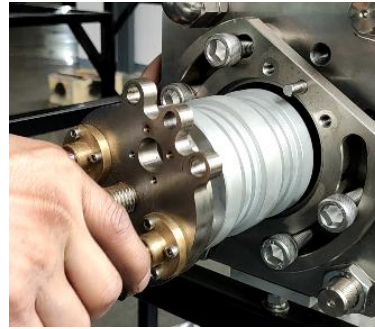
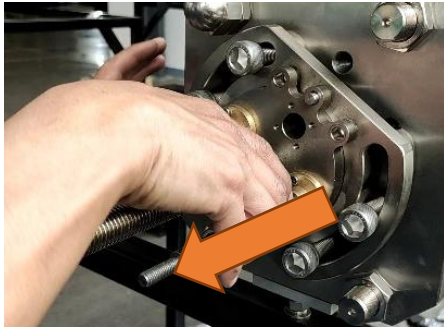


4. Install the support plate, lock the nut on the guide rod, rotate the nut on the threaded rod, and use the thread to pull out the piston.



5. Remove the national screws of the positioning plate, remove the support plate and take out the piston and the positioning plate as a whole

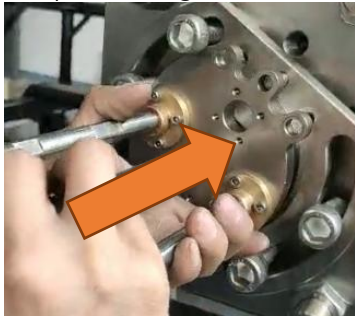




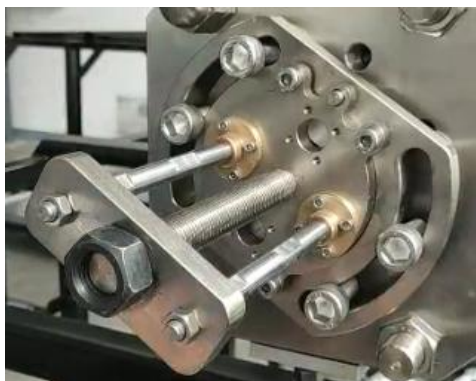
6. Replace the piston ring and O-ring after removal. Note that the fixed plate remains locked after removal and cannot be moved, otherwise the positioning pins will not be aligned during installation.

7. Put the O-ring in the piston O-ring groove, install the piston ring in the piston groove, the chamfer of the piston ring faces the direction of the cylinder, cut the piston ring along the direction of 45°, and install the two piston rings in a staggered direction. . Piston rings should be installed neatly. During the replacement process, the piston and the positioning plate cannot be disengaged. If they are disengaged, the direction of the pin hole must be re-determined.

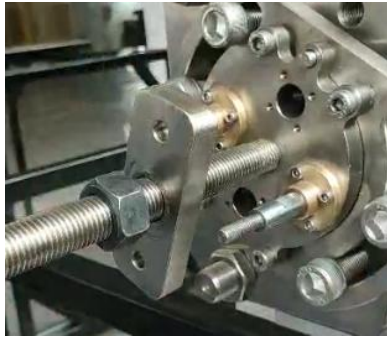
8. Put the installed piston together with the positioning plate into the cavity, install the positioning screw on the external pin, and lock it.



9. Install the nut and push the piston into the cavity by rotating the nut until the piston is close to the end face of the cylinder piston rod.



10. After confirming that the piston is in place, remove the support plate, remove the guide rod, and pull out

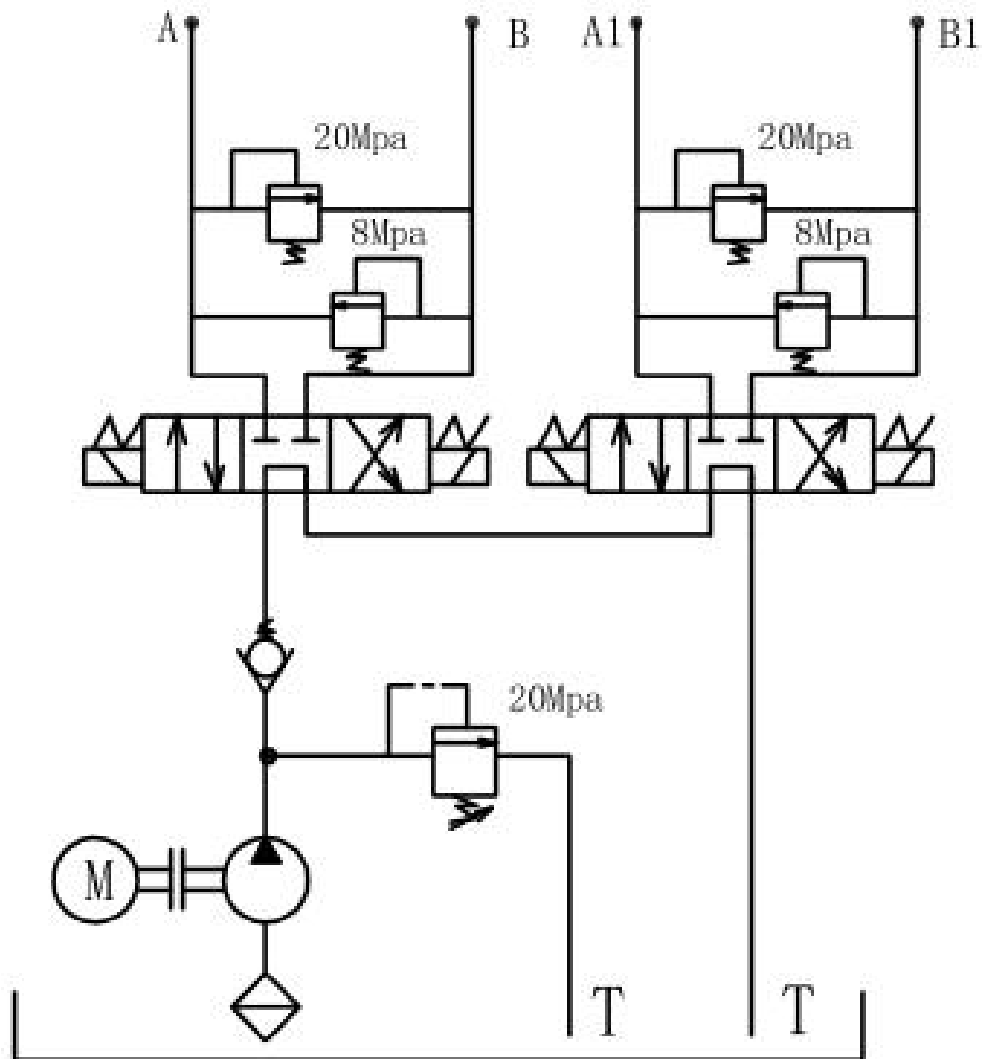


11. Remove the screws of the fixing plate, remove the tooling, and lock the national nut of the piston.



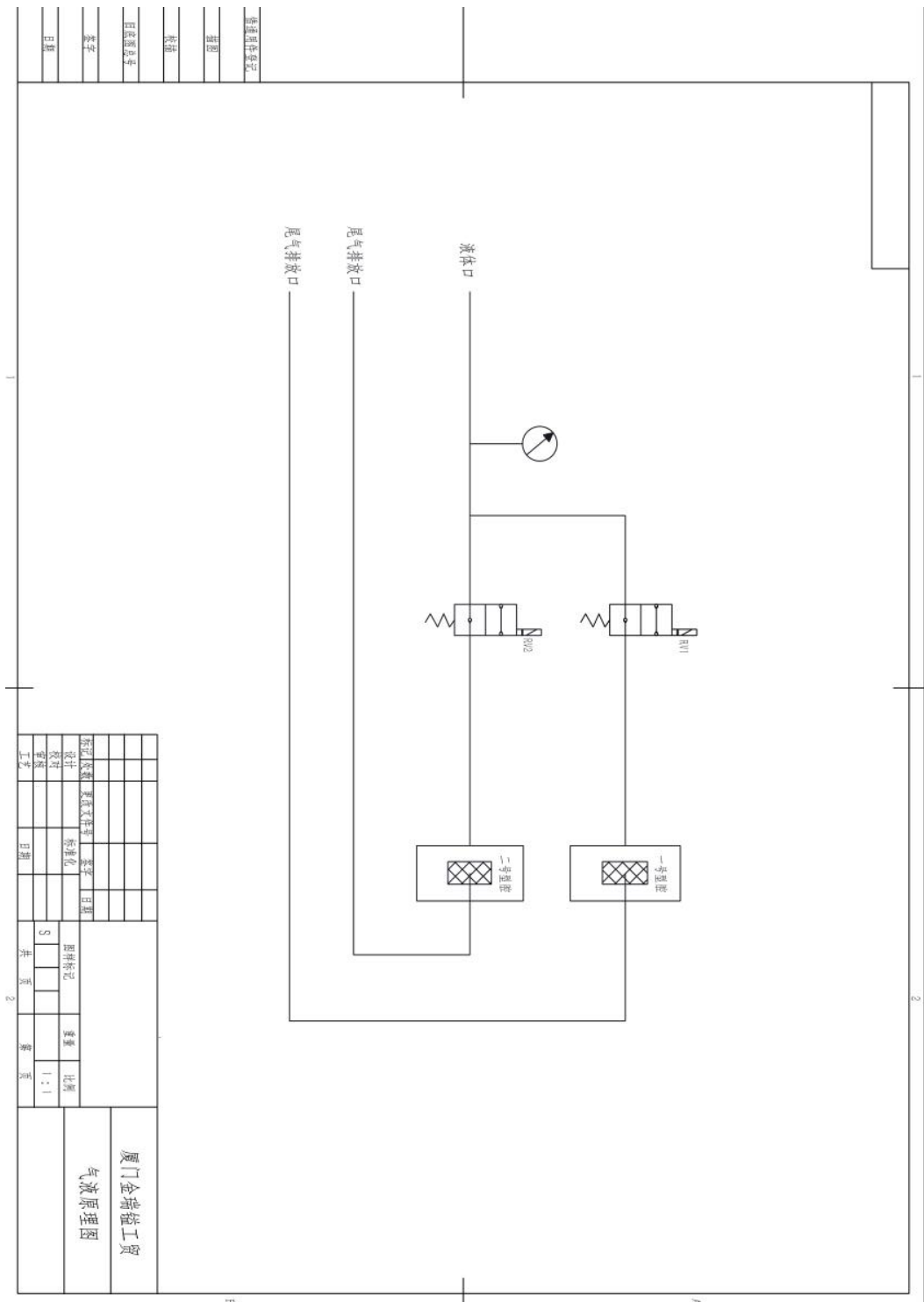
Appendix

1、Hydraulic schematic

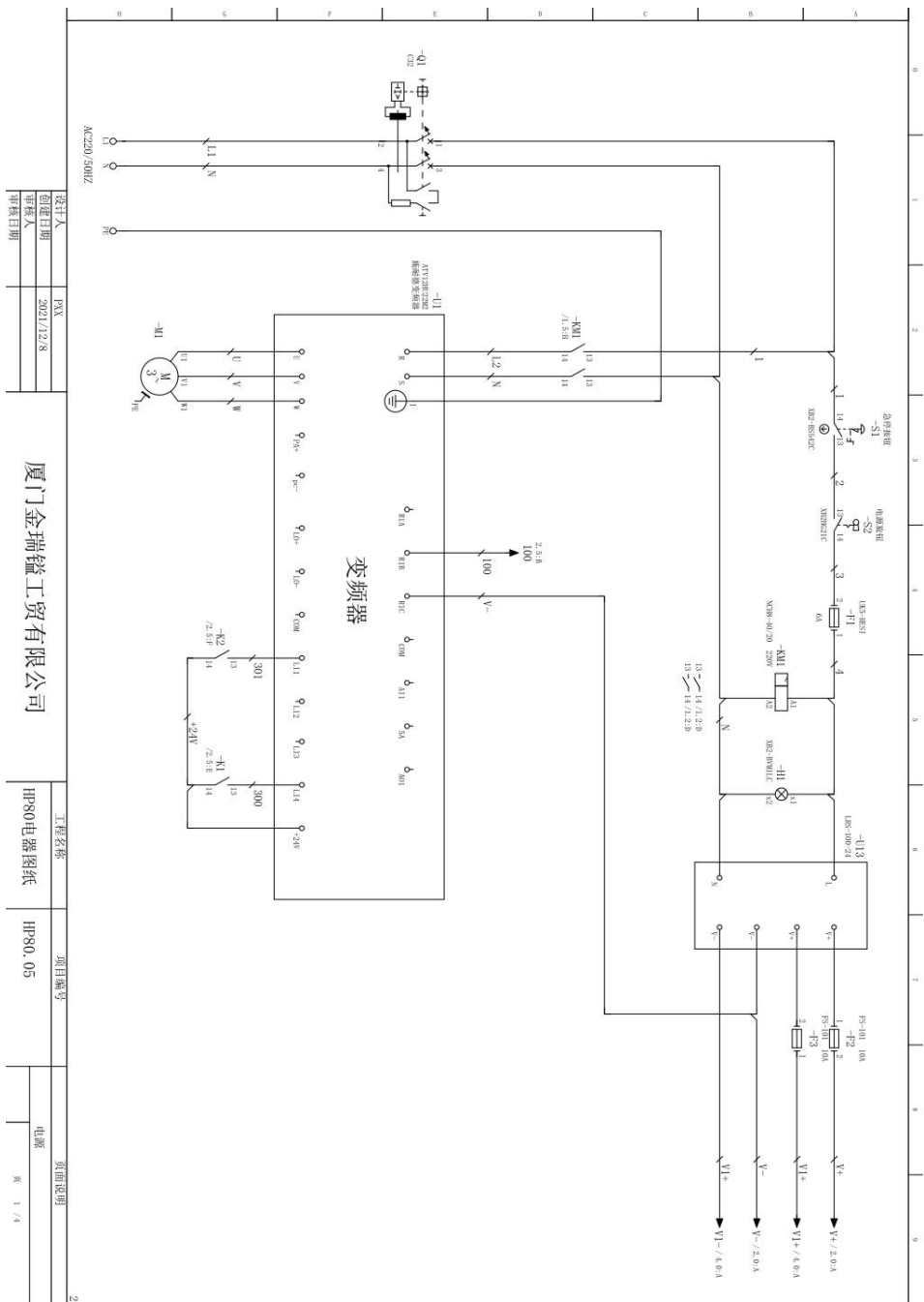


液压原理图

2、 Gas-liquid schematic



3、Electrical schematic



Consumable parts list

piston seal rings 4pcs

O-rings $\Phi 45 \times 3.55$ mm (inner diameter) 8pcs

Glass tube fuse 6*30mm 10A 5pcs

Ceramic fuse 5*25mm 6A 5pcs

provide tools

Set of hexagon wrench

#12 Allen key

Remove Piston Tool